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Posters

Head

P10-916

Head injuries in elite soccer players: "the need for harsher regulations"

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Head injury is reported to account for up to 22% of all injuries in soccer, although this includes all severities of injury and the injury mechanisms are not well described. Many well documented clinical investigations provide valuable information about the frequency, the circumstances and the biomechanical parameters associated with head impact in soccer. There remains however an inconclusive amount of evidence whether head impact during aerial challenge in soccer results in long-lasting visual, cognitive, proprioceptive and psychological problems.

In 8 years experience as an orthopaedic sportstraumatologist, a number of elbow-to-head and head-to-head injuries in soccer drew my specific attention. Not only the devastating energy impact on the head and the slow recovery of the athlete but certainly also the loose rule enforcement of this type of heading duel injury, is difficult to oversee.

FIFA´s guidelines are nevertheless simple: ´a red card is given in any case of an elbow kick whether there was an intention or not.´

The impression of me and many of my colleagues is that the impact of this kind of injury on the athlete goes way beyond the concussion recovery or the consolidation of an orbital or zygomatic cranial fracture.

Literature suggests especially a high incidence of concussion and serious neck injury in this type of impact but no studies report the timing towards a full return to elite sport again.

Our experience is that the cognitive, proprioceptive, visual and psychological deficits remain even months after the elbow-to-head incident.

Initial fracture healing in cranial impact injury during soccer allows the player to regain his physical abilities quite quickly, but the subtle changes in fast tactical decisions, proprioception, heading towards a ball and visionary status last for much longer.

This is why more stringent rules or punitive sanctions must be warranted for this type of impact on the head during game play. Our suggestion - that was discussed at the latest medical committee of FIFA - is to restrain the attacker from the pitch untill the full recovery of the attacked player is reached, even if the television replay would suggest an unintended type of elbow kick impact during aerial challenge.

These suggestions are made, based on the fact that this is one of the major injuries that an elite soccer player can suffer from in his career and based on the possible long-lasting effects of this injury, experienced by the players. We present a review of the literature on this important topic, stuffed with specific videos during game play and videos of biomechanical subject testing. We ask the ESSKA floor to share our thoughts on this topic with our sports-traumatological colleagues and hope to convince the floor that further studies are needed especially on the long-term problems of this elbow-to-head impact injury during soccer. We would like to have the opportunity to present the necessary information that provides justification for more stringent efforts in this matter in order to better protect our athletes.

Spine

P11-304

Evaluation of cervicobrachialgies by miofascial trigger points produced by irritated focal points of the neourovegetative system due to dental and tonsilic problems in triathletes

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Introduction: The Vegetative Nervous System exerts an inevitable influence on the whole organism, and at the same time, it is influenced by irritated focal points from any of its parts, having repercussion in any other point located at a certain distance. The odontogenous irritated focal points from the VNS provoke variations in its bioelectric levels which alters the normal working of the rest of the organism.

Materials and methods: Retrospective study of 26 traithletes with active miofascial cervical trigger points due to dental and tonsilic problems through the constant irritation of the NVS, from the period that goes from January 2005 to January 2006: 9 men (age range between 30-60) and 17 women (age range between 15-55).

Exploratory protocol: Touching of the painful cervical points
Visual exploration of the oral cavity
Evaluation of ortopantomography
Evaluation of antero-posterior and lateral cervical X-Ray

We use diagnostic clinical criteria of miofascial Trigger Points proposed by Travell and Simons.

By means of odontological infiltrations of procaine 0,5% we make differential diagnostic tests and treatment in itself, if dental surgical treatment is not necessary.

Results: All presented diagnostic criteria of miofascial Trigger Points in superior trapezium, except Local Twitch Response, and pathological relation with superior and inferior wisdom teeth, and tonsils, with precise laterality.

The test of infiltration of procaine was positive in all of them, being possible to achieve a suppression of syntomatology in less than two hours.

There was no osseous or flesh parts pathology radiollogically visible.

Conclusion: The hiding of the symptomatology does not mean the elimination of the etiology, and the only way to avoid repetitive episodes, chronification or irreversible lesions is through the odontological neurofocal correct treatment. We must analyze the oral cavity and be able to interpret the ortopantomography.

P11-567

Espondylolysis in soccer players

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Introduction: The lumbar back pain is a common symptom of presentation in young athletes. Sports, like soccer, that involve manoeuvres of repetitive hyperextension and forced rotation of the lumbar spine associate to a major incidence of espondylolysis. The purpose of this study was to review lumbar spondylolysis in young soccer players.. To describe the symptomatology, diagnosis, treatment and time of sports recovery.

Materials and methods: We are analyzed retrospectively patients by lumbar espondyilolysis diagnosed between the year 2000 and 2004 in of Spanish Football players Federation, Catalonian Delegation. Age is recorded to the moment of the diagnosis, sex, lumbar affected vertebra, side, time of evolution of the pain, associate injuries, treatment and period of sports rest.

Results: 34 patients are revised for the period in study by a minimal follow-up of 18 months. Average age: 15,79 years (8-22). In 70,5 % the affected vertebra was L5. 61,7 % was bilateral, whereas in the unilateral ones there was no difference of side (6 rights and 7 left sides). The time of evolution up to the diagnosis was in average 3,4 months (1 week to 24 months). The radiological diagnosis was realized by means of X-ray SPECT-bone scan. All the patients included in the study to whom sports rest was prescribed, with an average of 5,18 (1,5-16) months rest to start running and 7,26 (3-20) months rest up start again competitive practice. 44 % (15) of the patients were treated with a lumbar rigid corset.

Conclusions: This pathology can happen inadvertent displaying 23.5% of false negatives in the radiographic study. Diagnosis is suggested to be strict in the method and the sport rest.

Shoulder

P12-31

Clinical assessment in patients with arthroscopic release in idiopathic frozen shoulder

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Introduction: The purpose of the prospective assessment was to evaluate the results of arthroscopic release in patients with idiopathic frozen shoulder.

Materials and methods: We studied 28 patients (15 female, 13 male; average age 49 years) over 34 months (24-79) after 6 weeks, 3, 6, 12, and after an average follow-up of 36 months. All of them had undergone a minimum of 6 months of conservative treatment including supervised physical therapy,

NSAID's, and a home-stretching program. Patients suffered from symptoms like global loss of active and passive shoulder motion, pain in shoulder motion, and severe impairment in their daily activities. Exclusion criteria of the study were glenohumeral arthritis or a rotator cuff tear, a history of shoulder trauma, previous surgery, and secondary shoulder stiffness. All patients were examined clinical, by X-ray, MRI, laboratory studies, and arthroscopy. The Simple Shoulder Test (SST), the American Elbow and Shoulder Score (ASES), a 10-point visual analogue scale (VAS) to measure pain, and the SF-36 questionnaire were calculated before operation and at follow-up examinations.
Results: The last evaluation shows a significant improvement in the bodily-pain, vitality, and role-function-physical score of the SF-36 questionnaire ($p<0.05$). Other sub-scores showed an improvement but with no statistical significance ($p>0.05$). There were no significant differences compared to the early postoperative evaluations. Mean SST improved from 4 to a mean of 10 ($p<0.05$), mean ASES improved significantly from a mean of 35 to a mean of 91 points ($p<0.05$). According to the VAS, the mean preoperative score was 7 as compared to a mean of 2 in the last examination ($p>0.05$).
Conclusions: Arthroscopic release refractory idiopathic frozen shoulder provides reliable expectations in both clinical and general health status for most patients. We recommend the use of a limb-specific and a general-health-status questionnaire to conclude the benefit of the surgical treatment and contribute the optimization of a therapy concept more effectively.

P12-109

A long-term clinical follow-up Study after arthroscopic Intra-articular Bankart repair using absorbable tacks

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Background: The aim of the study was to perform an independent long-term evaluation after arthroscopic Bankart repair using absorbable tacks.
Hypothesis: Arthroscopic Bankart repair using absorbable tacks will result in stable shoulders.
Study Design: Case Series, Level of evidence, 4.
Methods: Eighty-one consecutive patients (84 shoulders) with symptomatic, recurrent, anterior, post-traumatic shoulder instability were included in the study. All the patients had a Bankart lesion. The age of the patients was 28 (15-62) years. The number of dislocations prior to surgery was five (subluxation). The operation was performed 28 (3-360) months after the index injury by one of three surgeons with a special interest in shoulder surgery using an intra-articular arthroscopic Bankart procedure involving absorbable Suretac® fixators. Seventysix/84 (90%) of the shoulders (50 male, 23 female patients) were re-examined by two independent observers, after a follow-up period of 98 (46-129) months.
Results: In the long-term, the failure rate in terms of stability was 8/76 (11%) dislocations and a further 6/76 (8%) had experienced or had clinical signs of subluxation. The Rowe score was 91 (38-98) points at follow-up and the Constant score was 90 (56-100) points. The Constant score for the contralateral shoulder was 93 (69-100) points ($p<0.001$).
Conclusions: In the long-term, the arthroscopic Bankart procedure using Suretac® fixators resulted in stable, well-functioning shoulders in the majority of patients. Eighteen per cent of the patients had experienced signs of instability during the follow-up period in terms of dislocations or subluxations.

P12-116

The adhesive capsulitis of the shoulder: Results of the conservative treatment with a new integrated therapeutic protocol

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The adhesive capsulitis of the shoulder is characterised by a significant loss of active and passive mobility and growing painful symptoms. It is attributable to the inflammatory process with the consequent formation of adhesion between capsule, anatomical humeral neck and the lower capsule which causes a reduction of the articular volume. Frozen shoulder may be primary or idiopathic when has a spontaneous onset in the absence of precise causes as trauma, fractures, dislocations that may be because of shoulder stiffness. The evolution of the disease through three phases: freezing phase, frozen phase, thawing phase: slow and gradual complete ROM restoration. Idiopathic capsulitis showes a benign evolution but sometimes the symptoms are protracted and determine a major functional limitation of the shoulder affected with severe discomfort of the patient. The study includes 52 patients 40 female and 12 male, aged between 36 and 52 years. The side affection was the right in 18 cases and the left in 34 cases. The dominant arm has been involved in 65.3% of cases. Interval between the onset of symptoms and the start of treatment was between 3 and 12 months. 20 patients have put in correlation beginning of the symptoms with a minor trauma. 32 does not have reported no trauma. 16 had a endocrine disease (hypo-hyperthyroidism, diabetes, hypercholesterolaemia) 4 syndrome of sjogren, 2 subject did therapy with antiepileptics agents, 4 accounted for therapies headache, 4 run therapies with antidepressants medicine. The therapeutic integrated protocol consisted in association of phisiotherapic and anesthesiological integrated care. The authors propose a new protocol including the use of hyaluronic and anesthetic periarticular and intra articular injections followed by a capsular and muscular stretching specific program. It was iniected a mixture of local anaesthetic medium/long duration (naropina) associated with Ialuronic acid both in the intraarticular and in sub acromial space through the anterosuperior, lateral and anteroinferior portals for 2-3 times a week depending on the gravity of the symptoms. Some cases of more serious and painful limitation required suprascapular nerve block and/or very low doses of triamcinolone acetonide, dosing carefully the total volume of mixture administered for favourable effect on articular and periarticular soft tissues. In the same place, at the end of injection therapy followed the physiotherapeutic program consisting in stretching exercises for the recovery of ROM both active and passive. A personalized home-therapy protocol of exercises was given to every patient. All the patients were monitored in the pre-treatment, during and after treatment. Some subjects which demonstrated a particular anxiety were followed by a specialist in psychology. At minimum distance of 2 years All patients been assessed by the disappearance of the symptoms. Full resolution of symptoms and the full recovery of ROM were obtained after 5-7 weeks and an average of 15-20 medical and phisiotherapic treatments. Total of 50 patients on 52 that the 96.15% have healed with clinical excellent result and a subjective complete satisfaction. No one has presented a recurrence of symptoms at a distance of 2 years. In only two cases (3.45%), a female 45 years old and a male 52 years old affected by type I diabetes, the disease was demonstrated refractory to treatment and needed an arthroscopic capsular release.

P12-123

Functional outcome of arthroscopic rotator cuff repairs: A correlation of anatomic and clinical results

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The goal of this prospective study was to determine the pattern of anatomic and functional outcomes among patients undergoing single row arthroscopic rotator cuff repair.
Material and Methods: This study used data prospectively collected on all patients undergoing single row arthroscopic rotator cuff tendon repair at The Cleveland Clinic between May 2000 and March 2003. The average age of the thirty patients included was 56.3±12.3 years (range 30-78). The average time to follow-up was 22.3 months (range 12-36). Patients completed identical evaluation forms at their preoperative and postoperative visit (average 22 months). Data collected included the following: socio-demographic information, PENN shoulder questionnaire, general HRQOL questionnaire SF36, and an actual physical activity question. Preoperative assessment of the rotator cuff was performed by MRI. Postoperatively, an ultrasound examination was performed to evaluate the structural integrity of the rotator cuff repair. "Recurrent tear" is defined as a repair that appeared either as partial tearing (incomplete healing) or as complete re-tearing of the tendon according to the ultrasound examination.
Statistical analysis: Univariate analysis was used to compare mean values observed in the studied population and the reference groups. Comparisons were made to an external reference group (healthy population), a historical control group baseline vs. follow up), and an internal control group (No Tear vs Recurrent Tear).
Results: Sixty prcent of the patients (n=18) had an intact rotator cuff repair with no sign of retearing at follow-up. Forty percent of patients (n=12) had some ultrasound signs of retearing the rotator cuff at follow up. Out of these 12 patients, the "Recurrent Tear" group, six of them demonstrated partial tearing while the other six had complete retearing of the repaired tendon. PENN scores prior to surgery were at the level of 25-48% of theoretically possible maximum for the corresponding domains (pain, satisfaction, function, total). Improvement in all PENN scores was highly significant ($p<0.001$) and the

values at the time of follow-up achieved 88-92% of the theoretically possible maximum. All ten SF36 scores were found to be lower prior to surgery than in non-patient population and five of them (Physical Functioning, Role-Physical, Bodily Pain, Social Functioning, Physical Component Score) were significantly lower. These five scores increased significantly after surgery. Additionally, all SF36 scores at follow up were close to fifty and thus statistically non-distinguishable from the scores observed in the general non-patient population. Even though several studies have revealed excellent clinical results with arthroscopic repair of rotator cuff tendons, poor healing of the repair and retearing of the tendon occur in many cases. Patterns of outcome correlating functional capacity and anatomic integrity of the repaired rotator cuff are not well defined. This study confirmed that single row arthroscopic repair of small and medium-sized supraspinatus tendon tears significantly improves rotator cuff integrity and functional outcomes. A completely healed tendon was observed in 60% of the cases. Age is a predictor of cuff integrity postoperatively. Functional improvement was more prominent and significant in patients with complete healing at follow-up. However, a recurrent tear did not preclude positive functional results.

P12-136

Clinical features of traumatic rotator cuff tears occurred in the population younger than 40 years old

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Purpose: As rotator cuff tears were mostly occurred on the basis of degeneration, they were frequently seen in a relatively elderly population. So, in a younger population severe rotator cuff tears those required to be repaired were quite rare. The purpose of this study was to clarify the clinical features of severe traumatic rotator cuff tears occurred in a relatively younger population.

Materials & Methods: Among patients who underwent arthroscopic rotator cuff repair, 14 patients (3 females and 11 males) younger than 40 years old were investigated. Regarding their injured mechanism, they occurred during a sports activity in 10 (a snowboard injury in 4), by a traffic accident in 3, and by a fall from a stair in one. Among them, 12 shoulders were injured by a direct blow on an involved shoulder or by touching a ground in an abducted position of the shoulder. An involved shoulder was dominant in 6 and non-dominant in 8. The mean duration from the onset to the patient's first visit was 7 months, and the mean duration of the conservative treatment was 4 months. The indication for arthroscopic rotator cuff repair was finally decided with an arthroscopic finding showing deeper tears more than grade 2. When intratendinous tears were suspected on preoperative MRI, those tears were identified by careful probing at arthroscopy. When an extensive tear was suggested by some findings such as a softening or a fraying of rotator cuff, the tear was exposed by a pilot incision. After an adequate debridement of tear site, arthroscopic repair was performed. Several clinical features including arthroscopic findings were retrospectively investigated.

Results: All the tears were recognized in the supraspinatus tendon. As no complete tear was seen, there was an articular-side partial tear in 7, a bursal-side partial tear in 2, and an intratendinous horizontal tear in 5. Their mean age was 30.6, 36, and 26.8 years old, respectively. While shoulder pain was recognized in all shoulders, their daily activity was disturbed in 13, and the pain at rest was recognized in 2. Difficulty in active elevation was complained of by 9 shoulders, and disability of active abduction was recognized in shoulders with 1 articular-side and 2 intratendinous tears. On the other hand, no severe contraction was seen. Regarding their location of tears, while most tears were recognized at the anterior aspect of the supraspinatus tendon, 3 of 5 intratendinous tears were recognized at the central aspect of the supraspinatus tendon. Posterior capsular tightness and the greater tuberosity notch on the humeral head those were frequently seen in throwing shoulders were rare. While the thickening of the subacromial bursa was seen in all shoulders, inflammation or synovitis in the subacromial bursa was seen only in 2 shoulders. As a characteristic finding, after the exposure of the tear site an inflammatory granulation tissue was recognized in shoulders with 2 articular-side and 2 intratendinous tears.

Conclusions: In relatively younger patients showing recalcitrant shoulder pain after trauma, attention should be paid to the presence of a partial rotator cuff tear, including an intratendinous tear. In cases of intratendinous tears, prior to arthroscopic surgery, those tears should be carefully estimated on preoperative MRI and pilot incision after careful probing at arthroscopy. The presence of inflammatory granulation tissue at tear site may influence the symptom of their shoulder.

P12-160

Does one-week follow-up X-Ray evaluation change the therapeutic decision on proximal humeral fractures treatment?

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Introduction: Proximal humeral fractures that are considered to be treated conservatively are routinely followed with a one-week X-Ray control to ensure no further displacement of the fracture that precludes conservative treatment and make surgical decision to be considered. The pourpose of this study was to analyze the value of the second X-Ray exam of the fracture considering the changing of the initial therapeutic decision as the end point.

Material and Methods: 104 proximal humeral fractures were included. Mean age of 71,14 years. 79 female and 25 male. 33 fractures were surgically treated and 71 were conservatively treated. Analysis was done based on initial and one-week after fracture X-Ray exam including AP and Outlet view. Displacement of the fracture, Neer classification, humeral head-shaft angle and anatomical neck-shaft angle were recorded in the initial as well as in the one-week X-Ray exams. Initial therapeutic decision based on initial X-Ray exam was compared with final therapeutic decision based on one-week X-Ray exam to determine the change in the therapeutic decision caused by the follow-up X-Ray exam.

Results: There were 41 non-displaced and 63 displaced fractures. The decision of surgical treatment of the 33 surgically treated proximal humeral fractures was done after the view of the initial X-Ray exam and no further radiological exam was done.

In the 71 proximal humeral fractures conservatively treated no change of the therapeutic decision was done from the initial X-Ray exam decision to the view of the one-week X-Ray.

Mean humeral head-shaft angle of 141,32º in the initial X-Ray and of 133,76º in the one-week follow-up X-Ray. Mean difference of 7,56º. Mean anatomical neck-shaft angle of 54,23º in the initial X-Ray and of 44, 20º in the one-week follow-up X-Ray. Mean difference of 10,03º.

4 times a fracture considered displaced in the initial X-Ray was considered non-displaced in the one-week X-Ray but no therapeutic decision was changed. 1 time a fracture considered non-displaced in the initial X-Ray was considered displaced in the one-week X-Ray but no therapeutic decision was changed.

Conclusions: The decision to surgically treat proximal humeral fractures is based in the initial X-Ray exam. The decision to conservatively treat proximal humeral fractures is not changed after the analysis of the one-week follow-up X-Ray exam. There is no need to perform a one-week X-Ray control of proximal humeral fractures since no change in therapeutic decision has been observed.

P12-169

Recovery of muscle strength in arthroscopic Bankart repaired shoulders

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Purpose: The purpose was to clarify the recovery term of the shoulder muscle strength in patients who underwent arthroscopic Bankart repair with postoperative external rotational position.

Materials and methods: Subjects were nine patients who underwent arthroscopic Bankart repair for recurrent anterior shoulder instability, and who were placed in postoperative rotational position for 3 weeks after surgery. Before surgery, at 6 weeks, 3 and 6 months, the shoulder muscle strength at flexion, abduction, internal rotation and external rotation was measured with a Kin Com TM. Side-to-side differences were evaluated for each measurement, and the strength of the operated shoulder was compared with the preoperative strength.

Results: The strength in all directions of the operated shoulder was significantly reduced at 6 weeks. The strength of flexion and external rotation was recovered to the preoperative level by 3 months after surgery, and the strength of abduction and internal rotation was recovered by 6 months. The percent strength of the operated shoulder to the healthy side was 92% in flexion, 83% in abduction, 85% in internal rotation, and 75% in external rotation at 6 months.

Conclusion: This study showed that the recovery of the muscle strength of the Bankart repaired shoulders needed from 3 to 6 months after surgery. However the strength of abduction, internal rotation, and external rotation in the operated shoulders was less than those of the healthy side at 6 months after surgery.

P12-210

Recovery of muscle strength in arthroscopic Bankart repaired shoulders using knotless suture anchor

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Introduction: The clinical results of arthroscopic Bankart repair have been equal to open surgery. Less limitation of shoulder range of motion after arthroscopic surgery can ensure specific activity in athletes as well as daily activities. The time of return to participating in sports was clinically 3 to 9 months after arthroscopic Bankart repair in previous reports. However, the index of the time of return to sports activity had not been clarified.

Purpose: The purpose was to clarify the recovery term of shoulder muscle strength in patients who underwent arthroscopic Bankart repair.

Materials and methods: Subjects were twenty patients who had undergone arthroscopic Bankart repair using knotless suture anchor for traumatic recurrent anterior shoulder instability. The average age was 20.1 years old, ranged from 14 to 47 years old. In postoperative management, unrestricted daily activities were allowed at 3 months after surgery, and sports activity involving collision and throwing were permitted at 6 months after surgery. None of the patients had recurrent instability during the average 15.5 months follow-up term (range: 12 to 26 months). Before surgery, and at 6 weeks, 3, 6 and 12 months after surgery, the shoulder muscle strength at flexion, abduction, internal rotation and external rotation was measured with a Kin Com® (Rehab World, TN, USA). Side-to-side differences were evaluated for each measurement, and the strength of the operated shoulder was compared with the preoperative strength. Side-to-side difference was significantly evaluated using paired t-test. Prospective changes in each shoulder were evaluated using one factor ANOVA.

Results: The operated shoulder strength in all directions was significantly reduced at 6 weeks, but was recovered to the preoperative level by 3 months after surgery. At 6 months after surgery, the percent strength of the operated shoulder compared to the healthy side was 92% in flexion, 88% in abduction, 87% in internal rotation, and 85% in external rotation. At 12 months after surgery, they were 95% in flexion, 94% in abduction, 101% in internal rotation, and 93% in external rotation. Side-to-side difference significantly persisted in all directions until 6 months after surgery, but had recovered by 12 months after surgery.

Conclusion: This study showed that the recovery term of the muscle strength to preoperative level in the Bankart repaired shoulders was at least 3 months. The recovery of the muscle strength of the operated shoulders to the level of the opposite side was between 6 months to 12 months. However, the percent strength at 6 months after surgery can be adopted as the index for return to sports activity based on our results without recurrent instability after surgery.

P12-233

Echography and CT-scan- arthrography: A prospective comparative study 3 months and one year postoperatively after athroscopic repair procedure

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Purpose: Arthroscopic repair aims at repacing open surgery for rotator cuff tears. During the year 2005, we compared arthro-CT-scan and echography in order to establish whether echography can be a non-invasive way to appreciate integrity of the repair.

Material and Methods: A prospective study of thirty consecutive patients who were managed with an-all-arthroscopic repair of rotator cuff tears was performed. All patients were reviewed at 3 months and 1 year post-operatively with CT-scan arthrography (Toshiba 64) and echography (Sequoia 512). A Constant score was performed at each examination.

Following patients were excluded from study:patients with partial tear of the rotator cuff, patients operated by combined technic (arthroscopic and mini open) or by open surgery, patients previously operated, patients only treated by acromioplasty or by tenotomy of the long head othe biceps without repair of the rotator cuff tear. All patients were operated in beach-chair position under general anesthesia coupled with inter-scalene block. Acromioplasty and tenotomy of the biceps were performed in all cases. The shoulder was postoperatively immobilized in an abduction-pillow for 3 weeks after surgery in order to protect the rotator cuff repair. During this period only passive motion were allowed.under the supervision of a physiotherapist. Unrestricted active assisted forward flexion and rotation were allowed after 6 weeks and strengthening of the rotator cuff was permitted after 3 months. Classification of the French Society of Arthroscopy was used to appreciate the result of the post-operative CT-scan control. Statistical analysis of the preoperative and postoperative paired data were done with XLstat, Mann and Whitney tests and CHIsquare. The level of siginificance was set at p less than 0.05.

Results: Constant score significantly improved one year after the arthroscopic procedure, despite incomplete tendon healing. In case of isolated supraspinatus tears, Constant scores were higher when healing is complete ($p < 0.05$). More than half (53%) of the rotator cuff repairs presented with a defect on arthro-CT-scan one year after treatment(stage III and IV of the French Society Arthroscopy classification). Sagittal and frontal retractions as well as fatty degeneration are of bad prognosis for tendinous healing ($p<0.05$). Double-row repair is more efficient than single-row ($p<0.05$). Sensibility of echography is 86.7% and specificity is 96% to appreciate the healing of the suture. Combined with the result of the Jobe test, specificity is increased to 99.5% and sensibility to 94.8%.

Discussion: Several authors have reported that data of the arthro-CT scan is the golden standard to appreciate the healing of the rotator cuff after open surgery or arthroscopic procedure. However the arthrography remains painful for the patient and rare complications were reported. Echography is a non-invasive imaging system but his results are operator-dependant. Our study demonstrates the efficiency of echography coupled with Jobe test to appreciate the results or the operated rotator cuff tear.

Conclusion: Constant scores are significantly improved by arthroscopic procedure, regardless of the tendon integrity. Echography is an efficient and non invasive imaging system to study the anatomical result of tendon repair.

Key Words: Rotator cuff repair-Arthroscopic repair-Tendon healing-Echography-CT-scan

P12-250

Autologous platelet rich plasma application improve results of arthroscopic rotator cuff repair: a pilot study

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Aim: Arthroscopic repair of rotator cuff tear has advanced to the point where excellent results can be achieved for all tear types and sizes. Research is always progressing in measures that could result in expedited recovery and decrease postoperative recovery. The application of platelet rich plasma during arthroscopic rotator cuff repair will result in improved function, evaluated through Constant and UCLA scores, and pain measures that do not deteriorate over time.

Prospective Cohort, pilot study; Level of evidence 4.

Methods: A cohort of patients undergoing arthroscopic repair of a rotator cuff tear received application of autologous platelet rich plasma (PRP) in combination with an autologous thrombin injected into the the bone and the tendon at the end of the procedure. Following the operation, patients were given a standard rehabilitation protocol and followed prospectivally at 6 (T1), 12 (T2) and 24 (T3). Assessment measures included a pain score (VAS) as well as functional scoring (UCLA and Constant scores). Any adverse effect was prospectically recorded.

Results: From January 2004 to May 2004, 14 patients underwent a rotator cuff repair with local application of autologous platelet rich plasma (activated by autologous thrombin). In all the cases a complete cuff tear was confirmed by arthroscopic examination. The average age of patients at time of operation was 66.6 (±9.04) years; 8 patients were males and 6 were females. 10 cases involved the dominant arm and 4 cases the non-dominant one. Out of the original 14 patients, 13 were seen at the final follow-up (24 months postoperative).

The mean UCLA score increased from 16.54 (±5.46) preoperatively to 32.92 (±1.19) postoperatively at 24 months of follow up ($p<0.001$). 3 patients achieved excellent and 10 good results according to the UCLA scoring system at the T3 (24 months) follow up evaluation.

The mean Constant score improved from a preoperative value of 54.62 (±16.98) to 85.23 (±7.22) at latest postoperative follow-up ($p=0.001$) with excellent final results according to the rating system in all the case.

On the average, the age and gender-adjusted Constant score improved from an average preoperative score of 70.4 % (±22.6) to 111.8% (±10.5) at the final follow-up.

Patients demonstrated a significant decrease in VAS scores at 6 (T1), 12 (T2) and 24 (T3) months follow-ups compared to the preoperative value. The same data were obtained for UCLA and Constant scores.

No adverse events related to this application were noted during the procedure.

Conclusions: The hypotesis was satisfied. This case series describes a novel method to apply platelet rich plasma during arthroscopic repair of rotator cuff repair.The clinical model selected for this case series (Pilot Study) was seen to be appropriate and will be implemented in a prospective randomized investigation into the efficacy of platelet rich plasma application to improve or expedite the surgical outcome following arthroscopic rotator cuff repair.

P12-251

Open and arthroscopic tenodesis of the biceps tendon - a biomechanical study

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Objectives: For pathologies of the long head of the biceps tendon (LHBB), various surgical treatment options have been described, ranging from tenotomy to different open and arthroscopic techniques of tenodesis. We analysed the biomechanical properties of 5 widely used operative techniques for tenodesis of the LHBB: Three arthroscopic or mini-open techniques including the interference screw technique, suture anchor technique, ligament washer technique, and two open techniques including the keyhole technique and the bone tunnel technique.

Methods: 10 porcine humeri for each technique were used to evaluate the ultimate failure load and cyclic displacement. Vertical tensile loading was performed with a strain rate of 100 mm/min. The load was applied parallel to the humeral shaft axis. After preloading with 5 N, each specimen was cyclically loaded between 10 and 100 N for 200 cycles. The displacement was evaluated after every cycle by an optical displacement transducer (Video Extensometer, Messphysik, Fürstenfeld, Austria). This transducer measured the distance between two marks, one attached to the tendon 10mm distal of the fixation site and one on the humerus next to the fixation site. This setup assured that only the displacement at the site of fixation was measured, nearly completely eliminating the elongation of the tendon itself. Loading to failure was performed for those specimens who completed 200 cycles without fixation failure. Displacement and ultimate failure load were measured. The failure mode was analysed by inspection during the test and evaluating the specimens after failure. A one-way analysis of variance (ANOVA) was used to evaluate overall differences between the different groups. When overall group differences were observed, the Student-Newman-Keuls procedure was used as a post-hoc test to identify the specific location of statistically significant differences.

Results: Cyclic Displacement: There was no failure of the fixation during cyclic testing. Video analysis revealed the smallest displacement in the IS and LW group with a mean displacement after 200 cycles of 4.28 ± 1.44 mm and 4.47 ± 1.95 mm, respectively. After 70 cycles of loading, the displacements for the IS and LW groups were significantly smaller in comparison to the KH and BT group ($p<0.05$).

Ultimate failure load: The highest UFL was found in the IS group with a mean of 480.9 ± 116.5 N, which was significantly higher as for every other group ($p<0.005$). The UFL of the BT group with a mean of 210.5 ± 27.7 N was significantly smaller as for every other group ($p<0.005$). There were no statistically significant differences between the SA, the LW and the KH group.

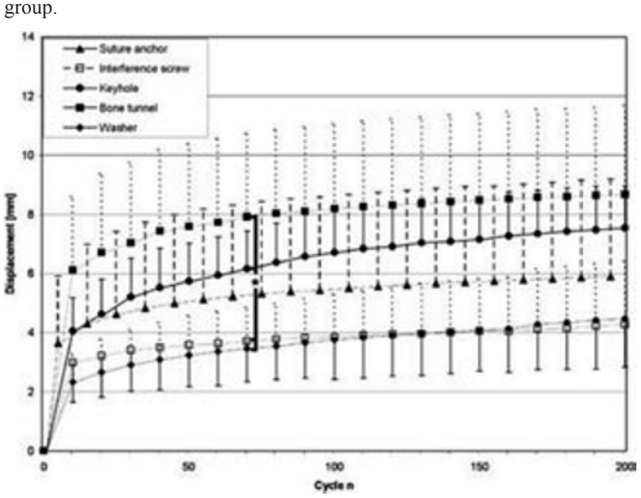

Fig. 1

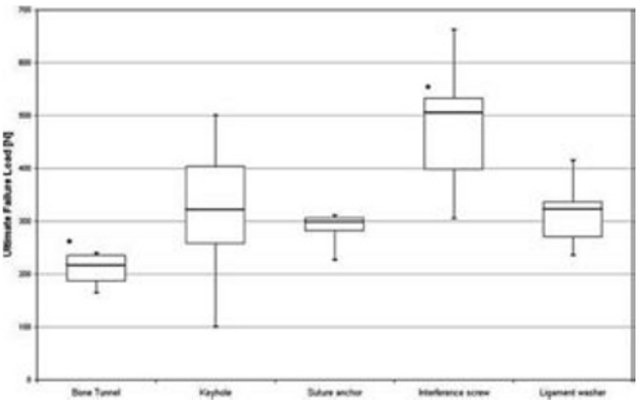

Fig. 2

Conclusions: Recently published procedures using interference screws, suture anchors and ligament washer appear to be superior to the keyhole technique and the bone tunnel technique regarding both, displacement and primary fixation strength.

P12-254

Labrum repair combined with arthroscopic reduction of capsular volume in shoulder instability

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We performed arthroscopic treatment of traumatic anterior and anteroinferior shoulder instability combining three procedures-labrum repair, reduction of capsular volume and suture of the rotator cuff interval - with the aim of analysing the results with regard to stability and function. Between January 1999 and December 2003, 27 patients underwent arthroscopic treatment for labrum repair with metal anchors, reduction of capsular volume through thermal capsulorrhaphy and suture of rotator cuff interval. These patients were evaluated in the pre- and postoperative period using the UCLA and Rowe scales and in the postoperative period using the ASES scale. During a mean follow-up period of 32.4 months (range 22-74 months) all shoulders remained stable. Using the UCLA scale, there was improvement from the preoperative period, with a mean score of 24.7, to the postoperative period, with a mean of 32.81. Improvement was also shown by the Rowe scale, with a mean score of 39.81 in the preoperative period and 90.74 in the postoperative period. On the ASES scale the mean score was 92.22. All shoulders remained stable and there was marked functional improvement in the patients who were treated. These results are comparable to those obtained with open surgery, observing similar patient selection criteria.

P12-267

Triple endobutton technique in reconstruction of the acromioclavicular joint

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Acromioclavicular (AC) dislocation is a common injury often affecting young adults especially amongst cyclists and martial art practitioners. Its sequalae range from an asymptomatic shoulder to one that is painful with significant loss of strength in the affected upper limb. The management of acromioclavicular joint dislocation has revolved around expert neglect for asymptomatic low-grade dislocation to complex surgical reconstruction. The literature however is inconclusive as to the best surgical treatment available.

The author describes a new technique to reduce and maintain reduction of the coraco-clavicular interval with the use a low profile triple metallic button technique. It comprises of 8 strands of no 2 high strength polyethene suture which are tensioned and secured at the coracoid end with one metallic button and another two similar metallic buttons on the clavicle end. The “snow shoe” hold on cortical bone means that the implant can withstand cyclic loading without cutting out from the bone. The position of the two endobuttons on the clavicle mimics the original footprint of the coraco-clavicular ligaments. This technique obviates the need for future removal of implant.

The author has utilized this fixation technique on 5 patients. All patients have quickly returned to activities of daily living and regained full range of motion. Postoperative radiographs have demonstrated excellent reduction of the

coracoclavicular interval and the AC joint. There has been no loss of reduction or iatrogenic coracoid or clavicle fractures in all the cases.

P12-280

New insight into the Hill-Sachs lesion

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Recent orthopedic and anatomic studies have depicted a capsular ligamentous structure - the "Ligamentum semicirculare humeri" (LSCH) in the latero-superior shoulder joint capsule below the tendons of the supra- (SSP) and infraspinatus (ISP) muscles.

The present study was performed on 26 shoulder joint specimens from 21 cadavers. Twelve alcohol-formalin-glycerol fixed and nine fresh shoulder joints were finely dissected.

The LSCH was present in all the twenty six shoulder joint specimens. It was always clearly delineated as an arched structure in the supero-lateral shoulder joint capsule despite its intra-capsular position. It arouse from the Tuberculum majus et minus superior facets, ran backwards forming a semicircular arch, which ended on the posterior facet of the Tuberculum majus, between the insertion tendons of the ISP and M. teres minor (TM) muscles. Hill-Sachs lesions have been described as compression fractures associated with glenohumeral joint (GHJ) dislocations. In one three-dimensional CT investigation about the lesions of the boney structures of the GHJ-s with anterior instability it is clearly demonstrated, that Hill-Sachs lesion is situated in the area between the ISP and TM insertion tendons (Stevens et al., 1999).

Hill-Sachs lesion is ordinary situated on the border of articular surface and the posterior edge of the Tuberculum majus. Close to this region are the insertion areas of the M. infraspinatus and the M. teres minor tendons. Between the tendons is the inserting point of the LSCH. In one case on our specimens, it was possible to identify minor Hill-Sachs lesion exactly at the insertion point of the LSCH.

Taking into consideration the Hill-Sachs lesion location and the recently discovered anatomical details about the superior glenohumeral joint capsule, it is reasonable to put up a hypothesis, that Hill-Sachs lesion is not only a boney lesion, but it may be formed by the rupture of the LSCH at its posterior insertion that may lead to the imbalanced rotator cuff muscle forces and instability.

P12-288

The relevance of manipulation under anaesthesia in the treatment of primary frozen shoulder

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Objectives: There is still a concern about the best treatment of primary frozen shoulder stadium II and III [1] after unsuccessful physical therapy. However, known that a full recurrence by itself in all cases is not to expect. Possibilities of intervention range from acupuncture over steroid injection to arthroscopy. In our clinic patients with forementioned conditions are manipulated under anaesthesia. Aim of this study was to evaluate the outcome of these patients and the complication of this intervention.

Methods: Between 1st January 2002 and 31st of december 2004 76 patients with primary frozen shoulder stadium II and III were manipulated under anaesthesia. Diagnosis was confirmed clinically and further lesions were excluded by MRI. 29 patients could be involved in this follow up. 20 patients with secondary frozen shoulder or later shoulder operation were excluded. Patients had had physical therapy about 26.6 weeks before manipulation. Mean age was 57.6 years (range, 36 to 74) and average follow-up time was 3.5 years (39 month, range 20 to 54). We measured range of motion (ROM), evaluated DASH and normalized Constant Score [2].

Results: No complication appeared. All patients would do the manipulation again. 27 patients (93%) are very satisfied and 2 (7%) slightly. Mean time from first discomfort to manipulation was 12.4 month (range, 3 to 30). Normalized Constant Score was 90.1 (range, 75.6 to 97.6). DASH Score was in average 88.9 (±12.6), symptoms 86.8 (±15.3) and function 89.4 (±12.9). Passive anteversion was 172.2 (range, 160° to 180°) and external rotation in 90° abduction was 81.6° (range, 40° to 100°).

Conclusions: This study shows that manipulation under anaesthesia in patients with primary frozen shoulder stadium II or II is a successful procedure. ROM, especially external rotation and anterior elevation, improves almost to normal. DASH and Constant Score archieved good results even similiar or better than arthroscopically therapy [3], without their complications.

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P12-307

Delayed subclavian venous stenosis following undisplaced clavicle fracture - a case report

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Clavicle fractures are common; the vast majority heal without complication and develop no neurovascular sequelae. We present the first documented case of positional venous insufficiency in the upper limb as an immediate complication of a closed, minimally displaced clavicle fracture.

A 16 year old boy fell onto his right dominant shoulder whilst playing football. He immediately complained of pain and described the right arm as 'swollen, blue and throbbing'. On presentation there was marked venous engorgement of the right upper limb associated with throbbing and discomfort. The symptoms resolved by elevating the limb and recurred when the arm was in a dependant position. Symptoms recurred rapidly whenever the patient extended his elbow beyond 90 degrees of flexion (when he took his arm out of his sling). Arterial examination was normal with a capillary refill of <2 seconds. Additionally no sensory or motor neurological deficit was found. Further examination revealed a dislocated sternoclavicular joint on the same side. Radiographs and CT scan confirmed a minimally displaced fracture of the medial third of the right clavicle associated with an ipsilateral subluxation of the sternoclavicular joint. A manipulation of the sternoclavicular joint was performed under anaesthetic the following day. The symptoms of venous insufficiency were unchanged following the manipulation.

Arterial duplex scan was entirely normal however venography of the arm in the dependant position revealed areas of intermittent narrowing in the subclavian vein at the site of the fracture. These findings are indicative of spasm and seemed likely to be induced by irritation of the vein directly by the fracture rather than by haematoma or compression. A venous duplex confirmed positional reversal of flow in the brachial vein suggestive of proximal venous obstruction. After several days, following deterioration of vascular symptoms the patient was transferred to a regional vascular unit where he was warfarinised.

There have been several reported cases of venous insufficiency associated with clavicular fractures. These are predominantly due to subclavian vein thrombosis or compression from fracture callus. To our knowledge there are no reports of acute venous insufficiency associated with a clavicular fracture in the absence of thrombus. This case reminds us of the close location of neurovascular structures to the clavicle and the potential for neurovascular compromise following clavicular fractures.

P12-361

Arthroscopic treatment of Ideberg type III glenoid fracture

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Introduction: Fractures of the glenoid cavity are rare. However, they are often intra-articular and can result in considerable morbidity as they cause chronic instability and/or post-traumatic arthritis.

Anatomic restoration of the joint surface is the goal in surgical management of displaced intra-articular fractures. Open reduction internal fixation of a glenoid fossa fracture usually allows for an anatomic restoration of the joint but often requires an extensive soft tissue dissection (in contrast to an arthroscopic approach), which has the theoretical risk of stiffness, muscle weakness, and pain.

In this poster, we describe an accurate reduction and fixation technique of Ideberg type III glenoid fractures through an arthroscopic approach.

Operative Technique: We provisionally introduced a K-wire to the coracoid process and used it as a joystick to align the fractured pieces while visualizing the articular surface arthroscopically. We then used the anterosuperior and lateral portals to fix the fracture with a 4.0 mm cannulated cancellous screw.

Discussion: The use of an arthroscope has theoretical advantages such as clear visualization of the intra-articular surface, virtually no stripping of

vascular supply to bony fragments, limited trauma to the periarticular soft tissue, and the possibility of an early rehabilitation. However, this technique requires experience in shoulder arthroscopy and has a learning curve before it can be mastered.
Conclusion: Arthroscopic reduction of glenoid fractures has the theoretical advantages of more accurate fracture reduction, reduced surgical trauma, minimal soft-tissue dissection, and shortened postoperative recovery period. By improving visualization of the shoulder joint, this technique also allows for better diagnosis and treatment of any associated injuries.

P12-386
Epidemiology and complications after rotator cuff repair
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Rotator cuff repair is an effective treatment, improving both function and pain. Previous research has shown that comorbidities, gender, and payer negatively impact shoulder function after rotator cuff repair. The purpose of this study was to identify the epidemiology of rotator cuff repair and likelihood of readmission and reoperation. The SPARCS database, a New York census of surgical admissions, was used to identify cuff repairs performed between 1997-2002. Primary cuff repairs were tracked for readmission within 90 days and cuff re-repair within one year. Risk of these outcomes was modeled using age, sex, insurance, comorbidity, hospital and surgeon volume, and in- or out-patient surgery. 52,485 cuff repairs were identified with a yearly increase from 6,656 (1997) to 10,128 (2002) and a shift toward out-patient surgery (57% to 82%) during this time. Readmission was higher among inpatients (8%; 3%). Other predictors of readmission were age, Medicare/Medicaid, and comorbidity. Predictors of revision cuff repair were age and comorbidity. Conversely, self payers were significantly less likely to be readmitted or have a cuff re-repair. This study found a 52% increase in cuff repair from 1997-2002 and an increase in out-patient cuff repair compared to in-patient. Significant associations between readmission and reoperation were identified with age, sex, inpatient surgery, insurance, and comorbidity. The reasons for the rapid rate of increase should be the focus of future study.

P12-390
Shoulder activity varies by diagnosis
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Introduction: Patient activity level may be an important prognostic variable relating to outcome in patients with shoulder disorders. A scale for measuring the level of shoulder activity has been validated in a healthy population. The purpose of this study was to validate this scale in a population of patients with shoulder disorders and compare the activity level of patients with different disorders.
Methods: Patients presenting to the office of two orthopedic surgeons with shoulder complaints were asked to fill out a previously validated shoulder activity scale, the Simple Shoulder Test, and the ASES shoulder questionnaire. The patient's diagnosis, gender and age were recorded.
Results: A total of 152 patients, including 86 with rotator cuff disease, 40 with osteoarthritis and 26 with instability, enrolled in the study. The activity level was significantly higher in patients with instability (12.5 ± 5.5) than in patients with rotator cuff disease (10.0 ± 5.1) ($p=0.047$) or osteoarthritis (7.5 ± 4.7) ($p<0.001$). Patients with rotator cuff disease were significantly more active than patients with osteoarthritis ($p<0.01$). Patients with instability were more likely to play contact sports (46%) than patients with rotator cuff disease (6%) or osteoarthritis (0%) ($p<0.001$). They were also more likely to participate in sports involving overhead activity such as throwing or swimming (instability 58%, rotator cuff disease 26%, osteoarthritis 3% ($p<0.001$). Although activity level was significantly associated with age, diagnosis influenced activity level independent of age.
Discussion: This is the first study to compare the activity level of patients with different shoulder disorders. Instability patients tend to be the most active patients whereas osteoarthritis patients tend to be the least active. Further investigation is warranted to determine if activity level can serve as a prognostic variable for patient outcome.

P12-395
The external rotation lag sign for the diagnosis of the isolated supraspinatus tears: does it works?
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The clinical diagnosis of isolated tears of the supraspinatus tendon remains challenging.
Purpose of this study is to reassess the sensitivity and the specificity of the External Rotator Lag Sign (ERLS) for diagnosis of supraspinatus tears in a large cohort of patients.
401 consecutive patients (406 shoulders) with painful shoulders conditions were assessed using the ERLS.. Data from 390 patients and 395 shoulders were available for analysis (226 male, 169 female, mean age: 50,4 ± 15,67; range 16-89). Based on physical examination alone the cuff was described as normal or ruptured. In case of rupture the antero-posterior extentsion of the lesion was judged based. The clinical diagnosis was controlled either arthroscopically or by open surgery.
For full thickness supraspinatus tear The ERLS had a sensitivity of 56% and a specificity of 98%. When the lesion involved also the infraspinatus and the teres minor the sensitivity improved substantially. For partial thickness tears and for transmural ruptures of the anterior half of the supraspinatus tendon the sensitivity was 12% and the specificity was near 100%.
There was a strong positive correlation between the extension of the tear and the amount of the lag. The lag increased from an average value of 7,6° for an isolated rupture of the supraspinatus tendon to 28° in case of extension to the teres minor.
The ERLS is highly specific and acceptably sensitive for diagnosis of full thickness tears even in case of an isolated lesion of the supraspinatus tendon

P12-397
Coracoid transfer I Bristow Latarjet procedure: does it modify the biceps muscle?
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Objective: the aim of this study is to evaluate the size of the short head of the Biceps muscle after coracoid transfer in Bristow-Latarjet procedure for recurrent dislocation of the shoulder.
Methods: In this retrospective case-control study, we compare a group of 26 patients (Group A, A1 operated in dominant limb - and A2 - treated in non-dominant limb), who underwent Bristow-Latarjet procedure, and a control group (Group B) of 23 people with no shoulder diseases. We use in all cases a US machine (ATL 5000 HDI, probe 4.2 MHz) to examine and determine Biceps section Area rate (BA) and Biceps Echogenicity rate (BE) between the dominant limb and the non dominant limb. Statistical analysis is performed with SPSS 13.0 and we use Mann-Whitney test to compare group A and B.
Results: No significant values were found as regards to BA and BE differences, in case-control analysis. The probability level for statistical analysis was set at $p<0,05$.
Conclusions: Bristow-Latarjet (BL) procedure for recurrent dislocation of the shoulder seems not to change the size and the ecographic patterns of the Biceps muscle.

P12-436
Use of preoperative three-dimensional computed tomography to quantify glenoid bone loss in shoulder instability
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Purpose: The purpose of this study was to determine if three-dimensional computed tomography (3-D CT) scans of the glenoid can be utilized to accurately quantify, by means of a glenoid index, bone loss in patients with anterior glenohumeral instability; and to compare the results with arthroscopic measurements to determine if the 3-D CT scan can preoperatively predict which patients with anterior glenohumeral instability will require a bone-grafting procedure.
Methods: From 2003 to 2006, 188 patients with anterior glenohumeral instability underwent arthroscopic evaluation and treatment by the senior author. Of the 188 patients, there were 25 patients ranging in age from 15 to 43 (median of 19) years who underwent 3-D CT evaluations of both of their shoulders. Then an arthroscopic evaluation through a standard anterosuperolateral viewing portal was conducted, and the amount of glenoid bone loss

was quantified arthroscopically based on the location of the anatomic bare spot. For an arthroscopically measured bone loss of less than 25% of the inferior glenoid diameter, an arthroscopic Bankart repair was performed; and for a glenoid bone loss of greater than or equal to 25%, an open Latarjet reconstruction was performed. After the surgical procedure, a linear method was used to calculate the glenoid index from the 3-D CT scans. We defined the glenoid index as the ratio of the maximum inferior diameter of the injured glenoid compared to the maximum inferior diameter of the uninjured contralateral glenoid. If the glenoid index was greater than 0.75, the patient was predicted to require an arthroscopic Bankart repair (the need for surgery and the type of surgery having been determined on the basis of arthroscopic measurements). However, if the glenoid index was less than or equal to 0.75, the patient was predicted to require an open Latarjet procedure. The results of each patient's glenoid index were compared with the arthroscopic decision to perform either an arthroscopic Bankart repair or an open Latarjet procedure.
Results: Of the 25 patients included in this study, 13 patients underwent an open Latarjet procedure and 12 patients underwent an arthroscopic Bankart repair. 12 (92%) of the 13 patients who underwent an open Latarjet procedure had a glenoid index less than 0.75, while all 12 of the patients who underwent an arthroscopic Bankart repair had a glenoid index greater than 0.75. Therefore, the 3-D CT scans accurately predicted the arthroscopic decisions to perform an arthroscopic Bankart repair or open Latarjet in 24 (96%) of 25 cases (Fisher's exact test $p<0.001$).
Conclusions: The glenoid index as calculated from the 3-D CT scan accurately predicted the requirement of a bone-grafting procedure for 24 (96%) of 25 patients when the benchmark value of 0.75 was used. The 3-D CT scan can therefore be used by surgeons as an additional diagnostic tool for preoperative planning and patient counseling.

P12-441
Indication and technique of a new arthroscopic knotless biceps tenodesis
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Aims of the study: The pathology of the long head of the biceps tendon is an important factor predicting the results of arthroscopic surgery of the shoulder.There are often patients with persistent pain after arthroscopic surgery of the shoulder resulting fom disability such as instability or partial biceps tears. There are different ways to manage biceps problems. A simple tenotomy is an option for older patients .The problem is the cosmesis with distalisation of the muscle belly. A better way for younger patients is a strong fixation of the biceps with a short operation time. Our aim was to show a simple, quick and knotless arthroscopic biceps tenodesis technique.
Material and method: We made a prospective study with 25 patients with arthroscopic shoulder surgery for impingement and rotator cuff issues and we used our developed knotless fixation technique for biceps tenodesis using a push lock anchor using the lasso loop technique. The operating time was short ca. 10 minutes.
Results: It was possible to fix the biceps in all cases. We found one distalisation of the muscle belly in a patient. All patients were satisfied with the procedure. Because of the short operation time it was possible to treat all complex cuff problems in an appropriate time.
Discussion/Conclusion: We developed a simple quick and knotless technique of arthroscopic biceps tenodesis .The technique can be used for isolated biceps tenodesis with intact rotator cuff or in combination with arthroscopic cuff repairs.
This is very important for complex arthroscopic cuff repairs such as lesions of the rotator interval involving the subscapularis, instability of the biceps and lesions of the supraspinatus and inraspinatus.

P12-468
An histopathological study of supraspinatus tendon in rotator cuff tears
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Rotator cuff pathology is frequent, and causes great healthcare costs in industrialized countries. Systemic histopathological studies examining pathological findings and their distribution in rotator cuff tendons are lacking in literature. We therefore undertook such a study of supraspinatus tendon samples obtained from patients undergoing arthroscopic repair of a rotator cuff tear to examine the distribution of tendinopathic changes associated with this condition.
Tendon samples were harvested from 31 subjects (21 men and 10 women; mean age 51 years, range, 38 to 64) who underwent arthroscopic repair of a rotator cuff tear, and from 5 male patients who died of cardiovascular events (mean age, 69.6 years). Histologic examination was performed using Haematoxylin and Eosin, Masson´s Trichrome, and Van Gieson's connective tissue stain. The specimens were examined under white light and polarized light microscopy. Particular effort was made to asses any evidence of the changes associated with tendinopathy. This included evidence of thinning and disorientation of collagen fibers, chondroid metaplasia, lipoid degeneration, and mucoid degeneration.
Within each specific category of tendon abnormalities, the chi square test showed significant differences between the control and ruptured tendons ($P < 0.05$). Using the kappa statistics, the agreement between the two readings ranged from 0.57 to 0.84.
The aetiology of rotator cuff tendinopathies and ruptures remains poorly understood. Rotator cuff tendinopathy has been attributed to a variety of intrinsic and extrinsic factors, which may have different roles in determining these lesions.
Our study shows that supraspinatus tendon changes in patients affected by rotator cuff tears occur more often on the articular side of the rotator cuff.
The present study provides a detailed structural characterization of human surgical specimens of supraspinatus tendon from patients with rotator cuff tears, and may be useful for further investigations on the pathogenesis of rotator cuff tears.

P12-481
A new suture tensioning technique for double row footprint restoration with a titanium transfixation anchor screw
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Objectives: A new suture tensioning technique for double row footprint restoration with a titanium transfixation anchor screw to achieve optimal contact area, cuff compression on bone and rotational stability
Methods: Optimal footprint coverage, pressure distribution, bone contact pressure and rotational stability over the total healing period are of special concern for secure tendon-bone healing in cuff repair. Double row cuff repair shows biomechanical advantage over single row repair. However migration of suture anchors is a well known problem under postoperative loading conditions and physical therapy with loss of initial fixation properties.
To improve fixation security a special titanium anchor screw (Königsee, Germany) with a pinned tip and threaded corpus, threadless neck and flat head was designed to allow transfixation of the medial suture and suture tensioning in the same screw. The design allows medial anchoring in best bone near the articular margin of the humeral head and in the lateral wall of the tuberosity, perpendicular to the applied suture tension. Using one or two screws and multiple sutures enlarges the surface contact area , enhances cuff compression onto bone and minimizes micromotion in the tendon bone interface. Arthroscopic use is possible with a special guide.
285 patients were operated with this technique, 46 in mini open and 239 in open technique. Direct fixation was achieved in 205 patients, a modified margin convergence technique was performed in 80 patients. Additional suture anchor subscapularis fixation was performed in 114 and bizeps tenodesis in 223 patients. Rupture sizes ranged from Bateman 1 in 4,6%, Bateman 2 in 54,0%, Bateman 3 in 31,1% and Bateman 4 in 10,4%.
A subjective modified Constant score was used to prospectively evaluate the short term results of the first 68 operated patients preoperatively and with a minimum follow up of 12 months. The results were compared to a control group of 156 patient operated with a comparable single row technique.
Results: From 68 double row patients all were asked by a questionaire before operation and after a minimum of 12 months, 3 patients were deceased, 3 patients could not be reached. 5 patients with previous operations were excluded. 57 scores could be evaluated. The mean preoperative total score improved from 51,7/100 to 75,5/100 points postoperatively All postoperative scores improved postoperative significantly : pain from 5,2/15 to 10,8/15, activity from 4,3/8 to 6,8/8, sleep 1,0/2 to 1,6/2, working height 6,1/10 to 7,9/10 , elevation 5,5/10 to 7,8/10, abduction 4,4/10 to 7,2/10, neck grip 6,3/10 to 7,8/10, internal rotation 5,6 /10 to 7,1/10 , force 12,7/25 to 18,8/25 postoperative. Patient satisfaction was rated very good 52.6% and good 31,6%. The total score of the double row group (75,5/100) was better then for the single row group (71,7/100) points.

Conclusion: The clinical short term results and subjective patient rating confirm our concept of double row tension band suture fixation with a transfixation pin screw in open and mini open cuff repair. Arthroscopic application with an aiming device is now available.

P12-519

The subcoracoid space: an anatomical study

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Objective: To evaluate the amplitude of the subcoracoid space under maximum internal and external rotations of the humeral head and measure the distance between the apex of the coracoid process (ACP) and the following anatomical structures: (a) point of entry of the musculocutaneous nerve (MCN) and its branches into the coracobrachial muscles (CBM) and into the short head of the biceps brachii muscle; (b) acromial artery (AA); (c) lesser tubercle of the humerus (LTH). Relevance: Knowledge of the anatomical relationships between these structures and the ACP is important not only for understanding the etiology of coracoid impingement, but also to prevent vasculonervous injuries, particularly during arthroscopic surgical approaches.

Materials and methods: Thirty shoulders from of fresh cadavers (nine male and 6 female), without of any kind of shoulder disease, were dissected and the distances (in mm) were measured between the anatomical structures defined above and the ACP.

Results: The mean distance between the ACP and the MCN was 49.2 mm (in all specimens a proximal branch of the nerve was identified 34.2 mm away from the ACP), which was not significantly different between the sexes or body sides. The mean distance between the ACP and the AA was 12.4 mm, which was not significantly different between the sexes and body sides. The mean distance between the ACP and the LTH, with the humeral head under internal rotation, was 10.6 mm in men and 8.6 mm in women, thus presenting a significant difference between the sexes.

Conclusions: The smaller distance between the ACP and the LTH in internal rotation of the arm suggests that there is a higher chance of impingement between those bone structures among women.

P12-520

Evaluation of shoulder instability treatment among children and adolescents

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Objective: To evaluate results from surgical treatment of patients under 17 years old who had had episodes of shoulder instability. Material and

Method: Ten patients (11 shoulders) underwent surgery between December 1994 and August 2005 and were assessed in July 2006. The follow-up ranged from 11 to 204 months (mean = 68.5). Five were female and five were male. There were eight right shoulders (72.7%) and three left shoulders (27.3%); 90% were in the dominant limb. Most of the patients (80%) were practicing some type of sports activity. The age at which the first episode occurred ranged from six to sixteen years (mean = 13.1); six cases (54.5%) were non-traumatic and five were traumatic (45.5%). In all cases, the direction was anterior. The number of recurrences ranged from one to several episodes. At physical examination, five shoulders (45.5%) presented signs of multidirectional instability. The time between the date of the first episode and the surgical treatment ranged from one to nine years (mean = 3). Six patients underwent surgery while still under 17 years old (range from seven to 22 years old; mean = 16.1). Seven shoulders (63.6%) presented Bankart lesion and four (36.4%) had capsule ligament looseness. The associated lesions consisted of three lesions of SLAP II type (27.3%), one lesion of the capsule ligament beside the humerus (9.1%) and one case of slight erosion of the anterior margin of the glenoid (9.1%). Seven shoulders (63.6%) underwent arthroscopic treatment: three cases of Bankart repair and SLAP (27.3%); two cases of Bankart repair (18.2%); and two cases of capsular plication (18.2%). Four shoulders (36,4%) underwent open treatment: one case of Bankart and Neer repair (9.1%); two Neer cases (18.2%); and one Bristow case (9.1%). The mean duration of immobilization was 3.4 weeks (range: three to four weeks) and the mean duration of rehabilitation was four months (range: two to seven months). Only one shoulder (9.1%) presented recurrence.

Results: Seven patients returned to their sports activities. On the Rowe scale, the results were excellent in seven shoulders (63.6%), good in three (27.3%) and regular in one (9.1%).

Conclusion: The worst results occurred in the patients who underwent surgery late and had multidirectional instability. Surgical treatment of shoulder instability among children and adolescents must be done early.

P12-526

Arthroscopic treatment of glenohumeral instability - retrospective study on 159 cases

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Objective: A retrospective study was conducted on 159 patients with anterior instability of the shoulder who underwent arthroscopic treatment between January 2001 and December 2005.

Materials and methods: The medical files of 190 patients with anterior instability of the shoulder who underwent arthroscopic treatment were reviewed. Of these, 159 cases presenting complete data in the file were included: 147 patients (92.5%) were men and 12 (7.5%) were women; for 113 (71%) their first episode was traumatic and for 46 (29%) it was atraumatic; 19 patients had undergone an operation after their first episode of dislocation. The age range was from 16 to 71 years (mean: 29); the postoperative follow-up ranged from 12 to 72 months (mean: 37). All the patients were operated on in beach chair position.

Results: Bankart's lesion was found in 108 patients (69%) and SLAP lesion was found to be associated in 62 (39%). A mean of 2.7 anchors were used (mostly metallic anchors). Complications were presented by 42 patients (26.5%): 14 (8.8%) had pain during heavy activities; 12 (7.5%) had some degree of reduction of external rotation; and 16 (10%) presented recurrence: 10 (6.2%) with apprehension sign without dislocation and 6 (3.8%) with dislocation The patients who evolved with complications used a mean of 2.5 anchors, while for those in whom there were no complications, the mean was 2.8 ($p<0.05$). Among the cases in which the first episode was traumatic, 12 (10.6%) had recurrence, while in the atraumatic cases 4 (8.6%) had recurrence. Among the patients who were operated after the first episode of luxation, only one (5.2%) had recurrence, while among those who had had several episodes, 15 (10.7%) had recurrence. Among the patients with Bankart's lesion, 14 (13%) had recurrence and, among those without the lesion, 2 (3.9%) had recurrence. Among the 35 patients with fracture of the anterior margin of the glenoid, 8 (22.8%) had recurrence, and among the 124 cases without fracture, 8 (6.4%) had recurrence ($p<0.05$). Among the 113 patients with a traumatic first episode of dislocation, 12 (11.9%) evolved with limitation to the external rotation after the operation, while among the 46 atraumatic cases, none had any limitation ($p<0.05$). Among the 62 cases that presented SLAP lesion, 11 (17.6%) evolved with postoperative pain, while among the 97 cases without this lesion, 3 (3.1%) had pain ($p<0.05$).

Conclusion: In arthroscopic treatment of anterior instability of the shoulder: 1 - there are fewer postoperative complications with greater use of anchors; 2 - there is a greater recurrence rate in the presence of fracture of the anterior margin of the glenoid; 3 - postoperative pain is related to the presence of SLAP lesion; 4 - limitation of the external rotation after the operation is related to the type of instability (traumatic).

P12-528

Centering osteotomy of the humeral head in posterior shoulder dislocation in the obstetric paralysis sequelae

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Objective: To describe an original operating technique for treating posterior dislocation of the humeral head in cases of obstetric paralysis and its results.

Materials and methods: Twenty-one patients aged one year and six months to nine years and ten months who presented sequelae of obstetric paralysis with adduction contracture, internal rotation and posterior shoulder dislocation were evaluated. Patients who had undergone exploratory surgery on the brachial plexus and patients with total or lower-limb flaccid paralysis were excluded. The patients included underwent the surgical procedure of centering of the humeral head in association with soft-tissue procedures (Sever procedure). The minimum follow-up was 12 months and the maximum was nine years, with a mean of three and a half years. The surgical technique consisted of a deltopectoral approach, stretching of the tendons of the pectoralis major muscles, subscapular capsulotomy and identification of the postertior humeral head dislocations. After externally rotating the arm, a reduction in the humeral head was seen (centralization). The humeral head was attached

to the glenoid surface using a Kirschner wire, and transversal osteotomy was performed on the humerus in the region between the insertions of the deltoid and pectoralis major muscles. The distal part of the humerus was rotated internally, thereby eliminating the deformity due to internal rotation of the humerus. Osteosynthesis was performed using plates and screws, and the joint stability was tested. The arm was immobilized with external rotation of 0 degree to 20 degrees for four weeks, using a thoracobrachial plaster cast. After radiographically confirmed consolidation, the patient was released for physiotherapy.
Results: The mean preoperative active internal rotation was 2 degrees and this became 81.3 degrees after the operation. The mean passive external rotation was 0 degree and became 24.6 degrees. The mean active abduction was 75.5 degrees and became 118.6 degrees. The data underwent statistical analysis using the Wilcoxon test ($p < 0.05$), which showed that all the postoperative results were significantly different from the preoperative values. All the patients, and also their families, were satisfied with the cosmetic and functional improvement obtained over the medium and long terms.
Conclusion: The surgical technique was shown to be effective in treating posterior dislocation of the humeral head in the obstetric paralysis sequelae, with functional improvement and reduction of the humeral head.

P12-531
Arthroscopic rotator cuff repair
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Purpose: This study was performed to evaluate the outcome of a consecutive series of 56 rotator cuff repairs performed with an arthroscopic technique.
Type of Study: Case series.
Methods: In a period from 2005 to 2006, 61 patients underwent a cuff repair with suture anchors by 1 surgeon; 4 patients had surgery on both shoulders. We present an outcome data from 56 of 61 operated shoulders by the use of a Constant scale, and the question of overall patient satisfaction. All but 3 shoulders had the supraspinatus/infraspinatus tendon refixed, 22% had a subscapularis reattachment, and 18% an additional SLAP repair.
Results: At follow-up evaluation (12-24 months after surgery), all patients had significantly better pain relief ($p<0.05$). Final evaluation showed statistically significantly improvement of the Constant results from 41±4,23 preoperatively to 86±4,52 postoperatively ($p<0,05$). According to the Constant score, functional and objective assessment showed that 86% had excellent or good results after arthroscopic rotator cuff repair procedures ($p<0.001$). There was no correlation between tear size and outcome in the SST.
Conclusions: Patients with an arthroscopic rotator cuff repair had a significantly improved functional result and decrease in pain. Arthroscopic repair is successful for large and small tears.

P12-533
Biomechanical evaluation of tendon reinsertion between tunnel suture and anchor fixation techniques: Trial in rabbits
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Objective: Rotator cuff repair has aroused great interest in searching for a less aggressive technique that would enable stronger repairs to be made. In the present study, a comparative assessment of tendon reinsertion was made by experimental surgery using the bone tunnel and anchor techniques at different phases of tendon healing.
Materials and methods: Twenty-four New Zealand albino rabbits were used; two as pilots, four as controls and 18 as the experimental group. The experimental group underwent sectioning and reinsertion of the heel tendon bilaterally, using the bone tunnel technique on one side and the anchor technique on the other. All the heels operated on were immobilized for three weeks. The experimental group was divided into three groups of animals, which were sacrificed 3, 6 and 12 weeks after the procedure. The tendon-bone complex was subjected to biomechanical study and the maximum strength, rigidity and elasticity parameters were assessed.
Result: There was no statistical difference regarding elasticity, rigidity and maximum strength between the anchor group and the bone tunnel group at the three times assessed.
Conclusion: The anchor technique was shown to be similar to the bone tunnel technique in relation to the parameters assessed.

P12-541
Arthroscopic treatment of anterior glenoid fractures with suture anchors
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Anterior glenoid fractures are traditionally treated with open reduction and internal fixation. We describe two cases report of arthroscopic treatment of anterior glenoid fractures associated with traumatic anterior shoulder dislocation. The anterior inferior glenohumeral ligament labrum complex was intact. The bone fragment was fixed with suture anchors. One year after the operation, three-dimensional computed tomography (3D-CT) demonstrated good union of the glenoid fragment with no displacement.

P12-543
Arthroscopic repair of anterior shoulder instability - a comparative study between patients with bankart lesion and patients with bankart and slap lesion
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Aim: Arthroscopic shoulder stabilization using suture anchors has now become a useful method for the most patients with traumatic anterior shoulder instability. The aim of this study was to compare the results, of arthroscopic repair for chronic anterior shoulder instability, between patients with Bankart lesion and patients with an extended labral lesion (Bankart and SLAP lesion).
Materials and methods: Between March 2003 and September 2006, 56 patients with recurrent traumatic anterior shoulder instability underwent arthroscopic repair. Patients with bone deficiency were excluded from the study. Patients were evaluated preoperatively and postoperatively with the classical shoulder instability tests, as well as the Rowe and UCLA Scores. Arthroscopic intra-operative findings were recorded in all patients. The anterior capsule and labrum were mobilized and repaired with suture anchors. The minimum follow up time was 1 year.
Results: There were 36 patients with a Bankart lesion (group A) and 20 patients with an extended labral injury, (group B). The mean age of the patients for group A was 28.8 years and 26.7 years for group B. The mean follow up time was 35 and 38 months for group A and B respectively. Preoperatively, patients in group A reported 11.5 dislocations in average and patients in group B, 23 dislocations ($p<0.005$). The mean total number of sutures anchors that were used for the fixation of the lesion was 2.8 in group A and 5.2 in group B. In group A, the Rowe and UCLA scores improved significantly from 38.64 and 24 respectively, preoperatively to 91 and 34 postoperatively. Similarly, in group B, the Rowe and UCLA scores improved significantly from 34.3 and 23 respectively, preoperatively to 89 and 33 postoperatively. There were no differences between the two groups regarding Rowe and UCLA scores postoperatively. A mean loss of 5° and 7°of external rotation at 90° of abduction was noted in patients for group A and B respectively ($p=0.286$) postoperatively. One patient in group A had a dislocation postoperatively, but none in group B ($p=0.432$)
Conclusions: Our study demonstrated, that although preoperatively, patients with extended labral lesion (Bankart and SLAP lesion) suffered a significant higher number of dislocations in comparison to patients with typical Bankart lesion, there are no differences in function and stability of the shoulder between these patients after arthroscopic shoulder stabilization.

P12-587
Can abduction strength become an indicator to express a shoulder function?
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Purpose: Weakness of abduction strength is often seen shoulder patients. The causes are various, such as rotator cuff insufficiency, pain, instability, limited ROM, paralysis and disuse. We hypothesized that abduction strength might reflect a shoulder condition. The purpose of this study was to assess whether abduction strength could become an indicator to express a shoulder function.
Materials and methods: We studied 57 patients (38 male and 19 female) with shoulder disorders. The average age was 36 years. Twenty-five shoulders

had anterior instability, 21 shoulders had rotator cuff tear, 5 shoulders had throwing injury and 6 had other problems. Preoperative isometric abduction strength was measured at 90 degree abduction with a hand-held dynamometer (MicroFET). We calculated the ratio between strength of affected shoulder and non-affected shoulder. As the methods for evaluating shoulder function, we used Japan Orthopaedic association scoring system for shoulder disorders (JOA score), The American Shoulder and Elbow Surgeons Shoulder Evaluation Form (ASES), Constant Score and Simple Shoulder Test (SST). We analyzed correlations between abduction strength and the score of each evaluation method using Pearson´s correlation coefficient.
Results: The average ratio of abduction strength was 0.711(0-1.16). According to the average scores of evaluation methods, JOA score was 72.1, ASES 58.9, Constant Score 70.8 and SST 7.6. The correlation coefficients between abduction strength and the scores were as follows; JOA score 0.716, ASES Score 0.712, Constant Score 0.810 and SST 0.744. There were significant correlations between abduction strength and the scores (P<.0001).
Discussion: The results of this study have shown that there were strong significant correlations between abduction strength and the scores of evaluation methods. It suggested abduction strength could become an indicator to express a shoulder function.

P12-603
Estimating the dimensions of the rotator interval using MR arthrography
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Background: The goal of this study was to define the dimensions of the normal rotator interval (RI) with magnetic resonance (MR) arthrography and compare it to shoulders with known chronic anterior instability to determine if abnormalities of the RI might be better understood and estimated preoperatively.
Methods: We retrospectively reviewed a consecutive series of 202 shoulders that underwent MR arthrography between 2004 and 2005. Of these shoulders, 120 shoulders were included and divided into two groups according to the diagnosis: Group I (no instability, 50 shoulders) and Group II (chronic anterior shoulder instability, 70 shoulders). Using MR arthrography, the base, height, and glenoid diameter were measured. Then, the area of the RI and the RI index were calculated.
Results: The mean RI dimensions and calculated area for shoulders in the neutral position were as follows: height 16.73 mm, base 48.59 mm, area 406.47 mm^2, and RI index 0.64 in Group I and height 21.87 mm, base 49.40 mm, area 540.06 mm^2, and RI index 0.94 in Group II. The shoulders in Group II differed significantly in the height, RI area, and RI index compared with the shoulders in Group I ($p<0.01$).
Conclusions: Estimating the dimensions of the RI using MR arthrography may be valuable for assessing patients preoperatively.

P12-605
Adhesive capsulitis of the shoulder: Dimensions of the rotator interval measured with MR arthrography
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Background: The goal of this study was to define the dimensions of the rotator interval (RI) in adhesive capsulitis using magnetic resonance (MR) arthrography to preoperatively clarify and evaluate abnormal pathologic conditions of the shoulder involving the RI.
Method: We retrospectively reviewed a series of 73 shoulders that underwent MR arthrography. The shoulders were divided into two groups according to their diagnosis: a no adhesive capsulitis group (Group I: 47 shoulders) and an adhesive capsulitis group (Group II: 26 shoulders). Using MR arthrography, we estimated the height, base, RI area, width, RI index, and RI ratio.
Results: The mean RI dimensions in Group I were as follows: height 16.64 mm, base 48.77 mm, RI area 405.99 mm2, width 15.44 mm, RI index 0.65, and RI ratio 0.60. The mean RI dimensions in Group II were as follows: height 13.12 mm, base 46.22 mm, RI area 303.73 mm2, width 12.75, RI index 0.52, and RI ratio 0.50. The shoulders in Group II differed significantly in height, base, RI area, RI index, and RI ratio from the shoulders in Group I.
Conclusion: There are statistically significant differences in RI dimensions between patients with and without adhesive capsulitis of the shoulder. Estimating the dimensions of the RI in adhesive capsulitis using MR arthrography might prove to be valuable for assessing patients.
Key Words: Rotator interval; MR arthrography; Adhesive capsulitis

P12-614
Arthroscopic bankart repair for recurrent traumatic anterior shoulder instability by suture anchors: Minimum two years follow-up
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Background: The arthroscopic method offers a less invasive technique of Bankart repair for recurrent traumatic anterior shoulder instability. The results continue to improve with the advancements made in instrumentation and technique.
Purpose: This study aimed to evaluate the outcome of arthroscopic Bankart repair with the use of suture anchors for cases that were followed at least two years from the date of surgery.
Methods: A consecutive series of forty shoulders in thirty-seven patients underwent arthroscopic Bankart repair with suture anchor. The mean age at time of operation was 26.25 years. The patients were assessed with two different outcome measurement tools (the University of California at Los Anglos (UCLA) shoulder rating scale and simple shoulder test (SST) score). The mean duration of follow up was 30,18 months. The recurrence rate, range of motion, and post-operative function were evaluated.
Results: The two shoulder scores significantly improved after surgery ($p<0.05$). According to UCLA scale, 37 shoulders (92.5%) had excellent or good scores, 1 shoulder (2.5%) has fair score, and 2 (5%) had poor score. Also all 12 components of SST showed improvement, which was statistically significant. Overall, the rate of postoperative recurrence was 7.5 % (3 shoulders). All patients either maintained or demonstrated improvement of range of motion. There was no loss of external rotation range of motion postoperatively.
Conclusion: Arthroscopic Bankart repair with use of suture anchors is a reliable treatment option that can provide good outcomes in terms of recurrence rate, and range of motion.
Key Words: Arthroscopic, Bankart repair, anterior shoulder instability, dislocation, outcome.

P12-615
Arthroscopic shoulder stabilization in recurrences after previous surgical procedures
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Objective: Successful operative stabilization of the shoulder joint is still a challenging problem. Various numbers of surgical procedures are known. However, arthroscopic techniques using suture anchors are well established. Many studies reported different numbers of redislocations (up to 49%). In those difficult cases open revision surgery is known as the golden standard. The purpose of our retrospectively designed study was, whether arthroscopic performed revision surgery with the use of suture anchors is a successful alternative to restabilize the shoulder joint.
Methods: Patients after an arthroscopic revision surgery of the glenohumeral joint from 2001 to 2007 were retrospectively evaluated. A total number of 21 patients were reviewed at a mean follow up of 2.8 years (6 months to 6.2 years). Average age at time of surgery was 27.8 years. Preoperatively in all cases a MRI was available for diagnostic and surgical indication. The DASH score, the ASES score and the modified Constant-Murley score as well were used. At follow up the patients were clinically examined and a MRI was taken. The MRI was assessed by an independent radiologist.
Results: There was a statistically significant difference in stability testing before and after the arthroscopic revision procedure. There was no statistically significant correlation between the number of redislocations, the time period dislocation - surgery and clinical outcome. The MRI showed good reconstruction of the labrum. The Constant-Murley changed from 72 points preoperatively to 92 points postoperatively, the ASES score ascended from 21 to 28 points. The DASH score dropped from 48 to 8 points. There were no further redislocations in this group. In the questionnaire all patients stated that they would choose the same operative procedure again.
Conclusion: The clinical outcome of arthroscopic revision stabilization following redislocation is comparable to the results of open revision surgery in the glenohumeral joint. The new golden standard for revision stabilization of the shoulder could be the arthroscopic suture anchor technique.

P12-618

Arthroscopic anterior shoulder stabilisation in patients with recurrent shoulder dislocation after foregone open procedures

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In the last 15 years the arthroscopic shoulder stabilisation became a leading role in the operative treatment of the shoulder instability. The development of new fixation devices and procedures increased the possibility for the surgeons to restore the normal anatomy and functionality of the shoulder joint either after failed "classic" open procedures (Bankart procedure).

Objective: To share our experience in the treatment of recurrent shoulder luxations after foregone open stabilization and to show some tips and tricks which increase the success of the method.

Methods: 14 patients with this pathology (3 female and 11 male in the age between 26 and 53 years) underwent an arthroscopic anterior stabilisation of the shoulder in our clinic in the time from January 2003 till June 2005. All of them undergone an open surgical treatment 5-10 years before and had a history of more than 3 recurrent shoulder dislocations postoperative. Patients with severe cartilage damage and rotator cuff tears were not included in the study.

At all of the patients we performed a careful release of the labrum and capsule with so good as possible remodelling of the tree anterior ligaments (SGHL, MGHL, IGHL). After that we marked the ligament insertions on the labral limb and performed the bony- and cartilaginous prints basely in 1-2-4 or 2-3-5 o'clock position. After positioning of 2 to 3 anchors and/or screws the sutures were placed trough the ligaments and the labrum. We were using Anchors with 2 pairs of sutures. The tightening of the sutures was done in neutral rotation of the arm and in elevation and abduction of 30°. Fluid arthro-pump was deactivated.

Postoperative the patients undergone a standard rehabilitation protocol.

Results: All of the patients were clinically tested at 6, 12 and 24 months after surgery. The results were submitted with the Rove score. We didn't find reluxations and loss of external rotation. All of the patients would undergo this operation again if necessary.

Conclusions: The arthroscopic shoulder stabilisation on patients with failed foregone open procedures is a minimal invasive operation with very low morbidity. The recovery time is significant briefer then after open procedures. There is no progression of the shoulder reluxaion rate.

We can hardly recommend to do arthroscopical shoulder stabilisation also in difficult cases after foregone open procedures.

P12-649

Arthroscopic repair of small to medium size rotator cuff tears

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The purpose of this study was to use high-resolution ultrasonography (US) to evaluate the outcome of arthroscopic repair of full-thickness rotator cuff tears (RTC), small to medium size.

Included were 47 patients with full-thickness RTC repaired arthroscopically. Preoperative and postoperative standard evaluations included history, physical examination (PE), radiographs and clinical scoring systems. Postoperative B-mode US examination was performed using 8.0 MHz high frequency linear transducer in order to assess rotator cuff repair integrity.

The mean age at time of surgery was 63 years. The average tear size was 2.2 cm (range, 0-2.5 cm), with minimal retraction (average, 1.3 cm). A mean of 1.6 anchors (range, 1-3) was used in the entire group of patients. The rotator cuff had completely healed in forty-five (96%) of the forty-seven shoulders and partially healed in two. US revealed loose anchors in those two patients; one patient elected to have a second procedure, the second patient opted not to have surgery. Postoperative US revealed normal echoic pattern in all patients. Rotator cuff contours were well-defined. No obvious tendon contour defects were observed, all tendons were attached to there insertion. VAS scores improved from 9.3 preoperatively to1.0 postoperatively. PE revealed significant improvements in functional outcomes as well. Forward flexion improved from a mean of 146.09 degrees preoperatively to 153.73 degrees postoperatively. Abduction improved from a mean of 124.4 degrees preoperatively to 131.41 degrees postoperatively. Internal rotation improved from a mean of T11 preoperatively to T8 postoperatively. External rotation improved from a mean of 48.17 degrees preoperatively to 52.77 degrees postoperatively. Good to excellent results were observed in the ASES and Constant scores.

Arthroscopic repair of full-thickness RTCs produces satisfactory outcomes with regard to objective orthopaedic measures as well as overall patient satisfaction in terms of pain relief and function.

P12-654

Evaluation of partial humeral head resurfacing in osteoarthritic patients under 50 years of age

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This is a prospective series of nine patients diagnosed with osteoarthritis who underwent partial humeral head resurfacing arthroplasty. Their mean age was 43 years. Preoperative and postoperative standardized evaluations included history, physical examination (PE), radiographs, and clinical scoring systems- including the Western Ontario Osteoarthritis of the Shoulder index (WOOS), Constant and Visual Analog Pain (VAS) scores. All patients had failed conservative treatment and were experiencing worsening pain and progressive loss of motion prior to surgery. Postoperative assessments were conducted at 4 - 7 days, 6 weeks, 3, 6, 12, 18 and 24 months. Statistical analysis of the data was performed in order to determine significant differences between preoperative and postoperative scores.

No significant complications were experienced. Postoperatively, all patients reported significant pain relief. VAS scores improved from 4.36 preoperatively to 1.00 three months postoperatively. PE revealed significant improvements in functional outcomes as well. Forward flexion improved from a mean of 107.2 degrees preoperatively to 155 degrees postoperatively. Abduction improved from a mean of 38.8 degrees preoperatively to 48.1 degrees postoperatively. Good to excellent results were also observed in the WOOS and Constant scoring systems.

Partial humeral head resurfacing arthroplasty in patients diagnosed with osteoarthritis yields a successful outcome, with patients experiencing excellent pain relief and improved range of motion. Furthermore, satisfactory results may be obtained without the use of excessively large humeral heads; rather, preservation of bone stock is maintained.

P12-656

Clinical outcomes of transtendinous pasta repair

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Purpose: To evaluate clinical outcome of patients with partial articular supaspinatus tendon avulsion (PASTA lesion) treated arthroscopically with a transtendinous repair.

Methods: 71 consecutive patients from 1998 to 2004 affected by PASTA lesion were operated on with an arthroscopic transtendinous repair using 2 non absorbable stitches fixed to a titanium screw put in the greater tuberosity. 16 patients were lost at follow-up and the remaining 55 were enrolled in this study.

There were 30 males and 25 females with a mean age of 55.6 (31-71) years. Diagnosis of PASTA lesion was done preoperatively basing on the arthro-MRI findings and underwent a surgical procedure after a failed conservative treatment for at least six months and all the patients had a MRI enhaced with gadolinium with a finding of PASTA. lesion.

All the surgical procedure were performed by a single experienced surgeon. In 32 cases PASTA lesion was found as isolated lesions, in 12 cases there was an associated LHB disease (5 dislocations, 5 torns, 2 avulsions), in 3 cases there was a supero-lateral subscapularis torn, in 2 cases there was SLAP II and in remaining 6 cases there was subacromial impingement.

All the patients were classified according to Snyder's classification and so we found 13 patients with a A2 lesion, 22 patients with a A3 lesion and 20 patients with a A4 lesion.

After surgery the arm was positioned in a brace for 4 weeks and a standardizied supervised rehabilitation protocol was performed in all the patients.

All the patient were evaluated, before surgery and at a minimum follow up of 2 years (mean fu 54.8 months), with UCLA Shoulder Rating Scale, Constant Score, SST and VAS method for pain.

Results: All the patients had an improvement of the assessments scores and had a significant reduction of pain. In particular, in 14 patients the post op was characterized by an acute pain measured with VAS scale 7/8 for a period variable between 10 days to 6 months (av 2 months). At the moment of clinical evaluation patients aged > 55 years report irregular pain (especially at extreme intrarotation) and younger patients don't feel pain at all. Pre op Constant score ranges from 15 to 67 (mean 45.5; mediane 47), the post op from 40 to 100 (mean 90.8; mediane 95).

Pre op UCLA ranges from 7 to 20 (mean 14.1 mediane 14), the post op from 22 to 35 (mean 32.9; mediane 34).

Pre op SST ranges from 8 to 12 (mean 9.8; mediane 10), the post op from 0 to 5 (mean 0.8; mediane 0).
VAS score passed from 4-10 (mean 5.6; mediane 5) pre op to 0-5 (mean 1.2; mediane 1) at last follow up.
Conclusions: Transtendinous repair seems to be a good surgical alternative to treat PASTA lesion allowing a good restore of anatomical cuff footprint.
We believe that a difference between partial-thickness rotator cuff in young individuals (the "real" PASTA) and the degenerative one in older individuals should been done because of different clinical outcomes.

P12-666
Deformities associated suture-bridge technique in full-thickness rotator cuff tear
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Introduction: To find out about causes and prevention of deformities associated with suture-bridge technique in rotator cuff tear.
Method: Cohort analysis was carried out on 38 cases (composed of 14 medium, 20 large & 4 massive sized tears) of full thickness tear with larger than medium sized tear treated with suture-bridge technique in 2007. Surgical technique was classified according to numbers of inserted suture-anchors in medial and lateral rows (2x2 26 cases, 3x2 9 cases & 3x3 3 cases) and through intra-operative arthroscopic finding investigated for development of dog-ear deformity and Bird-beak deformity in the marginal and central respectively after repair.
Result: Dog-ear deformity developed in 7 cases and 16 cases as bilateral and unilateral respectively and resulted in 67% of 2x2 sutures (8 cases) in large sized tears, the most frequent ($p<0.05$). All Bird-beak deformity developed in 2x2 sutures of large sized tears, 25% (3 cases). Dog-ear deformity developing after repair was correctable by modified suture-bridge technique and in all 7 cases of large sized tear having 3x2 sutures, executed with suture-anchor supplemented on lateral row, showed no Bird-beak deformity.
Conclusion: It is judged that application of individualized technique according to size of lesion and pattern of tear will be good to prevention of deformity after repair in full-thickness Rotator cuff tear reconstruction using Suture-bridge technique

P12-694
The coraco-acromial ligament: What´s new?
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Objective: The coraco-acromial ligament takes part to the coraco-acromial arch and is implicated in impingement syndrome. We want to know more about the anatomy of this area which looks like a real joint.
Materials and methods: Thirty ligaments were obtained from fresh cadavers (average age 70). Dissections were done with the acromial process and with the coracoïd process included .We only preserved the external part of the ligament (ALB) as described by Brodie.
The whole ligament was measured and especially the acromial part. The relationship with the bursa is analysed too. All pieces are preserved in formaldehyde for histological analyse.
Results: This internal part of the CA ligament is constant and looks like a meniscus .It always extends to the under-surface of the acromial process. The histological nature is fibro-cartilaginous (collagen type 2). The ligament is in touch with the bursa and this one contains some nervous receptors. The average length of the ligament is 3,1cm . The average width at the coracoid is 2,0 cm. The average width at the acromial process is 1,9 cm. The length of the inner part is 2 ,5 cm with a width of 0,6 cm .Thickness ligament is around 2mm.
Conclusions: The inner part of the coraco-acromial ligament may explain some failures of decompression surgery. The fact that the ligament is stuck in the bursa may be a cause of pain in impingement syndrome.
A better knowledge of the sub-acromial space anatomy is quite useful for arthroscopic technique as well as for explain some clinic pathology.

P12-698
Does the delto-trapezial fascia exists?
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Aim: About acromio-clavicular pathology and particularly clavicle dislocation some authors insist on the existence of the delto-trapezial fascia. The clinical importance of this structure is evident. According to Neviaser, Gazielli or Nové-Josserand, the musculo-tendinous insertion in tablecloth of the trapeze at the top and behind and the deltoid below and forward constitutes this screed. This structure insures the vertical dynamic stability of acromio-clavicular articulation. Some confusions exist on this subject. For certain this reality is more functional than anatomical. For Julliard, this screed is formed by an aponeurotic part and by a muscular part. The anatomical descriptions of Olivier, Rouvière, or Poirier of the aponeurotic part would be simply the superior acromio-clavicular ligament described by Julliard. For Rouvière, acromio-clavicular ligament would be only a thickening of some fibers of trapezoid muscle. For other authors, the area between trapezoid muscle and deltoid constitutes in fact the superior acromio-clavicular ligament. This one plays a main role in dislocations. It is always broken in case of dislocation according to Palma.
Purpose of the study was to clarify this anatomical notion: Delto-trapezial fascia is - it a myth or a reality? Is - it a ligamentous structure, a muscular aponeurosis common to the deltoid and to the trapeze, the superior acromio-clavicular ligament or it does not exist?
Method: 20 fresh shoulders from 60 to 95 years old in equal number of men and women were dissected. A compared macroscopic study is realized. The acromio-clavicular articulations are then taken from a surface of 6cm2 and analysed histologicaly.
Results: Macroscopically the fascia seems to exist and appears in form of a non-stop thickening on the superior face of the muscular plan. A fibrotic and muscular network of fibres is strengthened in the posterior part of deltoid and in the front part of trapezoid. Furthermore there are some perpendicular fibres visible in the central area of this screed.
But microscopically, there's no contact between the two muscles: deltoid and trapezoid neither with the A-C ligament. This one is a structure perfectly isolated with lateral edges curving in the bone. Some nervous receptors are found in the A-C ligament.
Conclusion: The delto-trapezial fascia is not a real fascia neither a digastric muscle. It is important to know that for acromio-clavicular surgical procedures.

P12-702
Lesions of the long head of the biceps in patients with shoulder pain: Incidence report and review of the literature
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Objectives: Lesions of the long head of the biceps (LHB) are known sources of shoulder pain. There is a controversy what is the contribution of a lesion of the LHB to shoulder pain, especially with respect to concomitant rotator cuff disease? The Purpose of this study is to report the incidence of lesions of the LHB in patients undergoing arthroscopy for shoulder pain. Type of Study: Retrospective chart review and review of the literature
Methods: From 1990 to 2006, 1622 patients (pts) who underwent arthroscopy for shoulder pain were evaluated for the presence of lesions of the LHB. The intraoperative findings were assessed according to Habermayer-Walch classification system and thorough review of the literature was completed.
Results: LHB pathology was present in 264 of the 1622 pts (16% of all pts), and the findings were separated in three groups.
Group 1- pts with isolated LHB pathology without rotator cuff tear (16.6% of all pts had LHB pathology):
1) Isolated LHB tendinitis (type IIA) - 31 pts (20 males, 11 females, age 40 - 77, mean 61.42),
2) Isolated LHB rupture - 13 pts, (11 males, 2 females, age 36 - 44, mean 54.4).
Group 2 - pts with both LHB pathology and rotator cuff tear (83.3% of pts had LHB pathology):
1) LHB tendonitis (type IIIA) - 118 pts (70 males, 48 females, age 34 - 88, mean 62.2),

2) LHB rupture (type IIID) - 90 pts (56 males, 34 females, age 24 - 85, mean 62.9).
Group 3 - pts with subscapularis complete tears and LHB dislocation (type IIIB 2) - 12 pts (6 males, 6 females, age 42 - 75, mean 62.9).
Conclusion: The majority (83.3%) of LHB pathology occurs with rotator cuff tears. The literature is unclear on the best method of treatment of the intraarticular LHB pathology.

P12-711
Long term shoulder function after grade I and II acromioclavicular joint disruption
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Background: Acromioclavicular joint separations are very common lesions, with majority being of grade I and II according to Rockwood classification. It is generally agreed that conservative treatment of these injuries leads to good functional results, although there are some studies which suggest that these injuries are associated with high incidence of persistent symptoms.
Hypothesis: Grade I and II acromioclavicular joint disruption significantly impairs long-term shoulder function.
Study Design: Cross - Sectional Study
Methods: Shoulder function of 23 patients who were treated for Grade I or II acromioclavicular joint disruption was evaluated at a mean of 10.2 years after injury. Objective function of the injured shoulder was assessed using the Constant score, UCLA score and Simple shoulder test and was compared to the uninjured shoulder.
Results: After average follow-up of 10.2 years, 12 out of 23 patients (52%) reported at least occasional acromioclavicular joint symptoms. Average Constant score for the injured shoulder was 70.5 and for the uninjured shoulder 86.8. Average UCLA score for the injured shoulder was 24.1 and for uninjured shoulder 29.2. Average Simple shoulder test value for the injured shoulder was 9.7 and for uninjured shoulder 10.9. Extent of acromioclavicular joint disruption and acromioclavicular joint width didn't have any statistically significant influence on shoulder functional scores.
Conclusions: Grade I and II acromioclavicular joint disruption significantly impairs long term shoulder function.

P12-767
Arthroscopic rotator cuff repair with and whithout acromioplasty: a prospective study
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Purpose: our purpose was to evaluate the role of acromioplasty in the arthroscopic repair off full thickness rotator cuff tears in a prospective clinical study.
Methods: Arthroscopic cuff repair was performed in 55 patients with a full thickness rotator cuff tears. They were repaired with metal suture anchors or side to side repair, or combination of the two technics, in 21 patients was performed acromioplasty and in 34 whitout. Results were evaluated with UCLA score. On the analyzing the results at two years´ follow up the X2 test analysis statistical was performed.
Results: comparison between the groups did not show significant diferences respect to the acromioplasty. The overall results for UCLA score was 32.23 in the groupe 1 and 31.7 in the group 2.
The analysis with X2 showed that the acromioplasty did not infuence the outcome.
Conclusions: at short time follow up, the acromioplasty did not seem to significantly affect the outcome of arthroscopic rotator cuff repair.

P12-776
Arthroscopic treatment of chronic calcific tendonitis with rotator cuff tendon repair
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Background: Relatively large calcific materials on shoulder with persistent symptom after long duration of conservative treatment can be selected for operative treatment. Arthroscopic removal has been popular due to less invasiveness, however complete removal of the calcific material sometimes leaves surgeon with a large hole in the rotator cuff tendon, especially the supraspinatus tendon. Repair of this tendon might be essential since this hole is too large to heal itself.
Purpose: The purpose of this study is to evaluate the clinical results of complete arthroscopic removal of calcific deposits with or without repair of the rotator cuff tendon and to compare any difference in suture anchor repair group with side-to-side repair or debridement group.
Methods: From 2005 to 2006, 28 consecutive patients were operated for resistant calcific tendonitis. Among them 3 were dystrophic type calcification with combined rotator cuff tear, one had combined preoperative infection, and one was lost at final follow up, so total of 23 were included for study. Patients not. responding to conservative treatment for more than 1 years with calcific deposit larger than 5 mm in diameter, sharply delineated type of calcification, calcific material in supraspinatus or infraspinatus tendon were included Preoperative and postoperative radiographs, the Constant score, Pain visual analogue scale (PVAS), and pain-relieving time were assessed. All patients received arthroscopic surgery, in which complete excision was attempted in all cases with or without suture anchor repair of the defect in the rotator cuff tendon.
Results: There were 5 men and 18 women. The mean symptom duration prior to surgery was 49 month. Preoperative radiograph showed 14 type A (61%) and 9 type B (39%) calcification, according to French Arthroscopy Society classification. All patients had calcification greater than 5 mm in any one diameter. The mean postoperative follow-up was 12.6 months (3-20 month) Thirteen patients had calcific material removal and complete tear in rotator cuff tendon (mainly supraspinatus tendon) who needed a suture anchor repair. Ten patients received either side-to-side repair or simple debridement. Complete excision was possible in 20 patients (87%) and 3 (9%) showed some remaining calcific deposits after surgery. The Constant score improved from 63.1 to 87.3 (P=0.0002). Seven patients developed secondary stiff shoulder (suture anchor group 5 and non-suture anchor group 2). There were no statistically significant differences between two groups in terms of stiffness or the final outcomes. Pain relief was seen within 6 months after surgery.
Conclusions: Arthroscopic complete removal of calcific deposit with or without suture anchor repair can result good to excellent outcome at postoperative 1 year. There were no difference between suture-anchor repaired group and non-suture anchor repaired group in terms of postoperative stiffness and clinical outcome score. Pain relief was seen within 6 months postoperative period.
Key Words: Calcific tendonitis, arthroscopic removal, suture anchor repair,

P12-783
Magnetic resonance arthrographic findings of presumed stage-2 adhesive capsulitis patients: Focused on combined rotator cuff pathology
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The purpose of this study was to report the magnetic resonance arthrography (MRA) findings of those patients who were considered as stage-2 idiopathic adhesive capsulitis (IAC) on physical examination and also to see if there are any differences in MRA findings between two age groups (over 60 and under 60). From June 2005 to January 2007, 81 nonconsecutive patients, who were considered as stage-2 IAC on history and physical examination, were included in our prospective study. MRA evaluations were focused on whether there were any combined pathologies except adhesive capsulitis, especially the supraspinatus tendon (SSP). The pathologies of the SSP were divided into
i) normal,
ii) tendinopathy or tendinosis,
iii) partial thickness tear, and
iv) full thickness tear.
Two musculoskeletal radiologists, who had an experience more than 5 years, did MR evaluations. Also, two groups (over and less than 60 years old) were assigned to see if there were any differences in MRA findings. The mean age of patients was 66 years old (range, 36 to 73; SD, 3.1) with mean symptom duration of 8.9 months (range, 2 to 36 months; SD 6.1). There were 38 males and 43 females. The involved shoulders were left in 35 patients and right in 46 patients. Fifty patients (61.7%) showed some form of SSP pathologies. Small (less than 1 cm) full-thickness tears were seen in 6 patients (7.4%) and partial-thickness tears were seen in 25 patients (30.9%). SSP tendinopathy were seen in 19 patients (23.5%). Subscapularis tendon partial tears were reported in 9 patients (17.3%). SLAP II lesions were seen in 24 patients (29.6%). The impressions of adhesive capsulitis were reported in 58 patients (71.6%). Group 2 (>60 years old) showed higher prevalence of full thickness tear and partial thickness tear than group 1 (<60 years old) with statistical significance (p=0.0242, 0.0312). However, the entire prevalence of SSP pathology showed no difference between two groups (p=0.1795). In conclusion, over 60% of the

stage-2 adhesive capsulitis showed some form of supraspinatus tendon pathology in magnetic resonance arthrography. Approximately less than 10% of the patients who were consider idiopathic adhesive capsulitis had full thickness rotator cuff tears suggesting the cause might be secondary. Compare to patients under 60, patients over 60 years old had more partial and small full thickness tear of supraspinatus with statistical significance.
Key Words: Shoulder, Idiopathic adhesive capsulitis, magnetic resonance arthrography, rotator cuff tear, prevalence

P12-805

Subscapularis muscle insufficiency following tendon repair. A MRI controlled study

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In this retrospective study postoperative subscapularis (SSC) function was measured with an electronic force measurement plate (FMP) and clinical scores and correlated with SSC-muscle parameters on defined MRI-sequences. 33 patients at a mean age of 42 (15-63) years were followed up at a mean of 37 (24-72) months after reconstruction of an isolated SSC tear with the SST, a VAS, the Constant score (CS) and clinical SSC-tests (Napoleon test, Lift off test). SSC-strength (force in Newton) was assessed in the belly-press- and the lift off position using a custom made electronic FMP. SSC force values were compared with the healthy contralateral side. SSC-muscle diameters and SSC-muscle cross sectional area were measured on standardised sagittal MRI-planes (vertical diameter (DM); transversal-cranial DM and transversal-caudal DM, cross sectional area in mm^2) and compared with a healthy matched control group (CG) (Mann-Whitney-U-Test).
Postoperatively the SST and the subjective shoulder function rating rised significantly compared with the preop. Status. 86% of the patients rated their result as good or excellent. In 72% (24/33) the dominant side was affected. The unweighted CS improved from 51(42-69) pts to 81(67-95) pts ($p<0.01$) postoperatively (pop). The majority of positive preop Napoleon- and Lift off tests could be reversed after surgery, but there were 30% (10/33) positive and intermediate Napoleon-tests left. Mean postop. SSC-force on the operated side averaged 63,86 N(non operated side: 86,31 N) in the belly-press position and 36,27 N(non operated side: 68,90 N) in the lift off position (each $p<0.05$). Postop. MRI revealed significant reduced mean SSC-diameters for the operated SSC compared with the CG. The vertical SSC-DM averaged 80,15 mm(CG: 94,44mm; $p<0,05$), the cran.-transv. DM 23,37 mm (CG: 32,76mm; $p<0,05$) and the caudal-transv. DM 27,18 mm (CG:35,52mm; $p<0,05$) Also the SSC muscle cross sectional area was significantly reduced compared to the control group (1970 mm^2 vs. 3060 mm^2 - $p<0,01$).
Despite good clinical results after reconstruction of isolated SSC tears there is a significant SSC-strength deficit compared with the opposite side that is not reflected in the CS, but can be detected with the FMP and the clinical tests. Also postoperative SSC muscle-diameters and cross sectional areas on MRI are significantly reduced compared with the CG. In about one third of the patients SSC muscle insufficiency and preop muscle atrophy cannot be fully restored by the operative procedure.

P12-809

Histopathology of the supraspinatus tendon in rotator cuff tears

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Background: Causes of rotator cuff pathology are poorly understood. Hypothesis: Macroscopically intact supraspinatus tendon may show profound light microscopy changes. Study Design: Comparative laboratory study.
Methods: Tendon samples were harvested from 88 individuals (49 men, 39 women; mean age: 58.2 years) who underwent arthroscopic repair of a rotator cuff tear, and from 5 male patients who died of cardiovascular events (mean age: 69.6 years). A full thickness supraspinatus tendon biopsy was harvested en bloc within the arthroscopically intact middle portion of the tendon. Using Haematoxylin and Eosin staining, slides were assessed twice by the same examiner using a semiquantitative grading scale assessing fiber structure and arrangement, rounding of the nuclei, regional variations in cellularity, increased vascularity, decreased collagen stainability and hyalinization. Intra-observer reliability of the subscore readings was calculated.
Results: The mean pathologic sum-score of ruptured tendons was significantly greater than the mean pathologic score of control tendons. Within each specific category of tendon abnormalities, the control and ruptured tendons were significantly different (chisquare test); all variables were significantly different. There was good agreement between the two readings.
Conclusions: Nonruptured supraspinatus tendons, even at an advanced age, and ruptured supraspinatus tendons are clearly part of two distinct populations.

P12-821

Arthroscopic salvage of failed arthroscopic Bankart repair - a prospective study with a minimum follow up of 4 years

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Background: Data on arthroscopic salvage of failed arthroscopic Bankart repair are lacking.
Purpose: To prospectively evaluate the surgical outcome of arthroscopic salvage of failed arthroscopic Bankart repair
Study Design: Case series; Level of evidence 4.
Methods: 10 patients (8 male and 2 female, mean age at revision 25.6 years; range 18 to 41) were recruited. The mean interval from the time of the revision surgery to the final follow-up was 68 months (range 46 to 83). Objective testing included preoperative and postoperative range of motion. Outcome measures included the rating system of University of California at Los Angeles (UCLA). The surgical procedure was performed in a consistent manner: capsular plications, suture anchor repair of the displaced labrum, and, when indicated, rotator interval closure.
Results: The UCLA rating system showed a statistically significant improvement from a preoperative average rating of 11.7 (range 6 to 14) to an average of 31.7 (29-35) postoperatively ($P<0.05$). All patients had a full and equal postoperative range of motion compared with the preoperative range of motion. One patient experienced recurrent dislocations after the salvage procedure. None of the other nine patients experienced a recurrent dislocation, with all of them returning to their previous sports level.
Conclusion: Arthroscopic Bankart revision surgery is a reliable procedure with respect to recurrence rate, range of motion and shoulder function in carefully selected patients.

P12-828

Circulating substance P levels and shoulder joint contracture after arthroscopic repair of the rotator cuff

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Objective: To determine the plasma levels of substance P (SP) in patients with postoperative stiffness after arthroscopic rotator cuff repair.
Design: Plasma samples were obtained at 15 months from surgery from 2 groups of patients who underwent arthroscopic repair of a rotator cuff tear. In Group 1, 30 subjects (14 men and 16 women, mean age: 64.6 years, range 47 to 78) with shoulder stiffness 15 months after arthroscopic rotator cuff repair were recruited. In Group 2, 30 patients (11 men and 19 women, mean age: 57.8 years, range 45 to 77) were evaluated 15 months after successful arthroscopic rotator cuff repair. Immunoassays were performed with commercially available assay kits to detect the plasma levels of SP.
Results: The mean plasma levels of SP in patients with postoperative stiffness were significantly greater than those in the control group (81.06 ± 27.76 versus 23.49 ± 5.64, $P < 0.05$).
Conclusions: The plasma concentrations of substance P in patients with shoulder stiffness after arthroscopic rotator cuff repair are higher compared to plasma levels of SP in patients with a good postoperative outcome. The neuronal up-regulation of SP shown in the plasma of patients with post operative shoulder stiffness may underlay not only the symptoms of adhesive capsulitis, but also its development.

P12-834

The arthroscopic Bankart repair with knotless, absorbable suture anchors for the traumatic anterior instability of the athlete's shoulder

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Objective: The primary arthroscopic stabilization using Suture Anchors is the current Gold Standard procedure for traumatic anterior shoulder instability. The new anchor generation with absorbable materials and knotless fixation technique provides comparable biomechanical strength. In this prospective clinical study we examined the surgical procedure using the new knotless, absorbable suture anchors for traumatic anterior instability of the athlete's shoulder type Gerber B2.

Methods: A total number of 45 patients (average age at first dislocation 24.5 years and at surgery 28.1 years, average number of luxation 5,6) with recurrent anterior shoulder instability and without severe glenoid bone defects underwent an arthroscopic stabilization with knotless, absorbable suture anchors (Pushlock©, ARTHREX Company). They were prospectively evaluated preoperative (FU 0) as well as 3, 6 and 12 months postoperative (FU 1-3) using functional shoulder scores (Constant-Murley, ASES, DASH). The shoulder associated sport activities and sport abilities were examined by specific scores (ASOSS, SSAS). 12 months postoperative the anchor position and degradation, the glenoid and labrum morphology were assessed and classified via MRI by an independent radiologist.

Results: The mean arthroscopic stabilization was performed 32.1 months after first dislocation, we used 1.72 anchors (one anchor with 2 sutures) per shoulder. There were statistically significant advantages ($p<0,01$) in the functional status between FU 0, FU1 and FU 2 (Constant-Murley, ASES, DASH). No significance was detectable between FU 2 and FU 3. The low external rotation was reduced by 9.8°, the high external rotation in the average 2.5°. All patients returned to their former sport activities, 32 patients reached the same level after 1 year, 11 were on a lower level (SSAS-Score) and 43 patients had a good or excellent Athlete´s Shoulder Sport Outcome (ASSOS-Score). There were two redislocation by adequate traumas at sport activities. The MRI documented almost no anchor degradation, no anchor luxation, no osteolytic processes (Hoffmann-Classification). The anterior Labrum-IGHL-complex was adherent with up to moderate degeneration (Randelli-Classification)in 86.8%. 33 Patients were very satisfied. In case of redislocation, all patients would undergo this operation again.

Conclusion: With the arthroscopic Bankart repair via knotless, absorbable Suture Anchors we reached an excellent functional outcome and favorable objective and subjective results. The MRI documented the adherent healing of the anterior Labrum-IGHL-complex without any anchor dislocation. All athletes were totally satisfied with their return to the sport activities. Favoring this knotless Anchor technique, we shortened the time of operation. A long-term follow up examination will show the rate of redislocation. In our opinion the pathology is adequately addressed by this surgical procedure.

P12-870

Prosthetic component relationship of the reversed Delta III total shoulder prosthesis in the transverse plane of the body

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Objectives: The Delta III reversed total shoulder prosthesis has provided a successful functional outcome in cuff tear arthropathy (CTA). However, internal and external rotation remain compromised. Positioning of the prosthetic components in the transverse plane has theoretically been suggested, but not proven, to affect rotation. The goal of this study is to radiologically analyse the position of the prosthetic components in the transverse plane, using a uniform spatial reference system , and to establish a relation between the positioning of the components in the transverse plane and its consequences on internal / external rotation of the shoulder.

Methods: We analysed 27 patients who underwent a Delta III reversed total shoulder prosthesis for CTA (mean follow-up 43 months), clinically, with standard X-rays and with computerised tomography (CT). The CT-scans were carried out in positions which would simulate the neutral and complete internal rotation of the prosthetic glenohumeral joint. A uniform spatial reference system using axes in reference to the sagittal and / or coronal plane of the body instead of version of individual bones, was applied to analyse the position of the prosthetic components, and the possible influence of scapular rotation. We assessed impingement of the humeral component upon the glenoid neck in neutral and internal rotation. We determined the correlation between the glenohumeral relationship (divergence / convergence) and internal rotation (radiological and clinical), and we investigated compensation by scapular rotation.

Results: The mean glenohumeral component relationship was 34, and varied from + 6 to 59 degrees. This implied that we detected an anterior divergence between the glenoid and humeral component in all shoulders. Scapular compensation varied from 4 to 35 degrees (mean:13). Radiological internal rotation varied from 15 to 65 degrees (mean:41). No periarticular ossifications, subcoracoidal impingement or instability e.g. hinged abduction, could be noted in any of the shoulders. We detected inferior impingement in 9 patients, posterior in 11, and anterior impingement with the arm internally rotated in 5 patients. The Karl-Pearson coefficient of correlation was calculated to be 0.932 for correlation between the glenohumeral component relationship and radiological internal rotation ($p<0.001$) There appeared to be no significant compensation of the lack of internal rotation by scapular rotation. This study clearly demonstrated that an increase in the anterior divergence of the glenoid and humeral prosthetic components correlates with an increase in the radiologically measured internal rotation.

Conclusions: The correlation between divergence and radiologically measured internal rotation supports the original hypothesis of Grammont that positioning of the glenohumeral components of the reversed prosthesis in the transverse plane affects radiological excursion of the humeral cup on the glenoid ball.

An increase of divergence of the components correlates with an increase in radiologically measured passive internal rotation with the arm adducted. Implementation of a uniform spatial reference system, which uses axes in reference to the sagittal and / or coronal plane of the body instead of version of individual bones, can help in consistently achieving the optimal positioning of the prosthetic components.

P12-877

Impaction default of the glenosphere from the glenoid baseplate in reverse shoulder arthroplasty: An underestimated implant failure

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Objectives: This study analyses the epidemiology and the aetiology of the dissociation of the glenosphere from the glenoid baseplate in reverse total shoulder arthroplasty.

Methods: We report on 530 patients with a reverse shoulder prosthesis where 16 of them with dissociation of the glenosphere from the baseplate. Those patients were part of a multicenter, retrospective, consecutive study of the French Orthopaedic Society (SOFCOT-2006).

Results: In five patients the dissociation was more than 1mm and in four cases this eventually led to a fracture of the central screw necessitating a revision in three of them. In the remaining eleven patients the dissociation was less than 1 mm and remained asymptomatic. Thusfar no revision was needed for these patients.

Conclusions: Dissociation of the glenosphere from the baseplate is an underestimated implant failure with possible therapeutical consequenses. It is the consequence of an impaction default between the Morse taper of the glenoid prosthesis. We believe that a dissociation of less than 1mm can be considered as a stable situation (grade I dissociation) whereas an immediate postoperative dissociation of more than 1 mm (grade II dissociation) is a progressive situation that will lead to fracture of the central screw and migration of the glenoid implant. Interestingly we noted that the symptomatic dissociation always occurred in a Delta III prosthesis (DePuy), whereas in the Aequalis prostheses the dissociation was always asymptomatic.This can probably be explained by the type of locking screw of the glenosphere onto the baseplate.

P12-883

Anatomy of the glenoid: Consequences for implantation of the reverse prosthesis

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Objectives: The reverse total shoulder prosthesis has yielded a successful functional outcome in cuff tear arthropathy (CTA). However, scapular notching, a direct consequence of a mechanical conflict between the humeral prosthesis and the glenoid, remains a major concern. A thorough knowledge of the anatomy of the scapula can help to minimize this radiological phenomenon, which appears to affect the clinical outcome.

Methods: We analysed two hundred dry bony scapulae in a similar manner as is recommended for surgical prosthetic implantation, in an effort to devise a uniform spatial reference system using well-known surgical reference points and planes.
Results: This study clearly demonstrated that the bony rim of the two inferior quadrants of the glenoid forms half a circle. Its center can be accurately used peroperatively as a bony reference for the surgeon. Furthermore, we calculated that the superior part of the glenoid shows a Gaussian-like distribution. The morphology of the infraglenoid tubercle varies in width and length, but the outer margin of the lateral scapular pillar remains constant.
Conclusions: The findings suggest the glenoid is formed inferiorly by a part of a sphere with a variable extension superiorly, the so-called supraglenoidal tubercle. The infraglenoid tubercle has a variable morphology that can cause the conflict of the reverse prosthesis and is clinically known as scapular notching. To prevent this notching a prosthetic bony overhang is advisable and an osseous resection of the infraglenoid tubercle within the anatomical margins defined by this study can help in minimizing the mechanical conflict between the inferior glenoid and the humeral prosthetic component.

P12-947

Histopathological evaluation of ruptures of the long head of the biceps tendon

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Attempts have been made to explain the pathologic basis of rupture of the long tendon of the biceps, but few studies on the pathogenesis of LHBT pathology are available, and none of these study described the histopathological features of the tendon of the LHB from active individuals who underwent surgery.
We aimed to examine the relative prevalence of histological changes which have been associated with the process of tendinopathy in lesions of the tendon of the long head of the biceps brachii and to evaluate the reliability of histopathologic evaluation of tendon tissue in lesions of the tendon of the long head of the biceps.
Samples of ruptured tendons were obtained from 51 patients who underwent arthroscopic release of the LHBT because of refractory biceps tendinopathy at our centre in the period between January 2004 and September 2006.
During surgery, under arthroscopic control, tenotomy of the LHBT was performed by a resection as close as possible to the superior labrum, and a sample 1 cm long of the tendon was harvested.
Two LHB tendons were obtained from each of 5 male patients who had died of cardiovascular events (mean age 69.6 years). The tendon was harvested in the postmortem room under sterile conditions.
Once fixed with buffered 10% formalin, the pieces were dehydrated, embedded in paraffin and cut at 4 μm sections. Finally, sections were stained with Haematoxylin and Eosin and were examined both under white light as well as under polarized light microscopy.
The slides were interpreted using the modified semi-quantitative grading scale which assesses various aspects of the tissue.
A four-point scoring system was used, where 0 indicates a normal appearance, 1 indicates a slightly abnormal appearance, 2 a moderately abnormal appearance, and 3 a markedly abnormal appearance. Overall, the total score for a given slide could vary between 0 (normal tendon) and 21 (most severely degeneration detectable).
The mean pathologic sum-score of ruptured tendons was greater than the mean pathologic score of control tendons (15.76 ± 3.11 versus 3.4 ± 1.9, P 0.001). Within each specific category of tendon abnormalities, the chisquare test showed association between the control and ruptured tendons; all the variables were significantly different. Using the kappa statistics, the agreement between the two readings ranged from 0.53 to 0.85. The LHB tendons of patients undergoing arthroscopic tenotomy for a refractory biceps tendinopathy (with LHBT tear found at the time of arthroscopic surgery greater than 50% of tendon diameter) show marked histopathologic changes. On the other hand, the same tendons from aged individuals with no known tendon abnormalities have, as a group, little histologic evidence of degenerative changes. Moreover, tendon changes are not only localized at the site of macroscopic rupture, but also in the macroscopic intact tendon portion.
Unruptured tendons of the long head of the biceps, even at an advanced age, and ruptured tendons of the long head of the biceps are clearly part of two distinct populations. In ruptured LHB tendon, collagen distribution is abnormal. Tenocytes from ruptured tendons produce greater quantities of type III collagen than tenocytes from normal tendons. This altered production of collagen may be one reason for the histologic alterations described in this study,and may result in the tendon being less resistant to tensile forces, and thus at increased risk of rupture.

P12-953

Arthroscopic revision surgery of failed arthroscopic Bankart repair

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The surgical management of recurrent anterior shoulder instability after failed surgery is challenging.Patients with failed arthroscopic Bankart repairs can be successfully treated with a further open Bankart repair, which allows a direct repair of the capsulo-labral anterior-inferior defect and capsular tightening. Potential disadvantages of the open Bankart repair include postoperative stiffness and subscapularis deficiency, as the latter must be detached in open procedures. The present study evaluated prospectively the surgical outcomes of arthroscopic revision repair of Bankart lesions in a cohort of patients who has undergone an arthroscopic Bankart repair and, has subsequently developed postoperative recurrent anterior instability.
Between January 2000 and October 2003, we performed a prospective cohort study of a consecutive series of patients who sustained an arthroscopic Bankart repair and developed postoperative recurrent anterior instability. 10 patients were recruited. The mean interval from the time of the revision surgery to the final follow-up was 68 months. Objective testing included preoperative and postoperative range of motion. Outcome measures included the rating system of University of California at Los Angeles (UCLA). The surgical procedure was performed in a consistent manner: capsular plications, suture anchor repair of the displaced labrum, and, when indicated, rotator interval closure.
Descriptive statistics were calculated. The results of surgery were compared using the Wilcoxon Sign Rank test. Significance was set at $P < 0.05$.
The UCLA rating system showed a statistically significant improvement from a preoperative average rating of 11.7 (range 6 to 14) to an average of 31.7 (29-35) postoperatively ($P<0.05$).
We followed up patients for a mean of 68 months (46 to 83 months).
All patients had a full and equal postoperative range of motion compared with the preoperative range of motion. One patient experienced recurrent dislocations after the salvage procedure. None of the other nine patients experienced a recurrent dislocation, with all of them returning to their previous sports level.
Causes of recurrence after primary Bankart repair have been related to various factors. Patients with bone loss are at risk for recurrent instability after arthroscopic Bankart repair.
In presence of bone deficiency, an open bone restoring procedure should be carried out. Other risk factors are shoulder hyperlaxity, nonanatomic repair of the capsulolabral tissue (i.e. medialization of the capsulolabral tissue), insufficient number of sutures, and inadequate postoperative immobilization.
To optimize success with the arthroscopic technique, there are a number of factors that must be considered. The first factor is patient selection. Patients with bone loss or with shoulder hyperlaxity are at risk for recurrent instability after arthroscopic revision Bankart repair. Moreover, at arthroscopy the labrum must be mobilized and the glenoid neck must be properly decorticated to produce a bleeding bed that allows soft tissue to heal to bone. Return to sports should be delayed until full range of motion and normal strength has been regained, which usually takes 5 to 6 months.
In conclusion, arthroscopic Bankart revision surgery using suture anchors is a reliable procedure with respect to recurrence rate, range of motion and shoulder function in carefully selected patients.

P12-957

Shoulder joint contracture and plasma levels of substance P after arthroscopic repair of the rotator cuff

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Postoperative stiffness (POS) of the shoulder may occur after an apparently successful reconstruction of a rotator cuff tear.

The role of the peripheral nervous system in tissue healing has only recently been recognized.

Apart from transmitting nociceptive information to the spinal cord, sensory nerves have efferent effects, including vasodilation and plasma extravasation. These effects are mediated by several neuropeptides that exert trophic effects in different tissues, participating in the regulation of fibroblast and synoviocyte proliferation, and of angiogenesis. They have also been implicated in the synthesis and release of cytokines and growth factors. Substance P(SP) is mainly localized in unmyelinated C-fibers, and is synthesized in the dorsal root ganglion as a result of nerve-ending stimulation by nerve growth factor. SP is secreted by nerves and inflammatory cells such as macrophages, eosinophils, lymphocytes, and dendritic cells, and it is transported both centrally and peripherally, where it is released from terminal cells within the spinal cord and peripheral tissues, although most transport is to the latter. SP acts by binding to the neurokinin-1 receptor. It has proinflammatory effects in immune and epithelial cells, and participates in inflammatory diseases of the respiratory, gastrointestinal, and musculoskeletal systems.

We determined the plasma levels of SP in patients with postoperative stiffness after arthroscopic repair of a rotator cuff tear, and compared them with those in patients with a good outcome after arthroscopic rotator cuff repair. Plasma samples were obtained at 15 months from surgery from 2 groups of patients who underwent arthroscopic repair of a rotator cuff tear. In Group 1, 30 subjects with shoulder stiffness 15 months after arthroscopic rotator cuff repair were recruited. In Group 2, 30 patients were evaluated 15 months after successful arthroscopic rotator cuff repair. Immunoassays were performed with commercially available assay kits to detect the plasma levels of SP.

The concentrations of the neuropeptide SP in sera were measurable in all patients. Patients with postoperative stiffness had statistically significant greater plasma levels of SP than patients in whom arthroscopic repair of rotator cuff tears had resulted in a good outcome ($P < 0.05$) Postoperative stiffness of the shoulder may occur after an apparently successful reconstruction of a rotator cuff tear. An increased amount of SP in the subacromial bursa has been correlated with the pain caused by rotator cuff disease. SP stimulates DNA synthesis in fibroblasts, which are the cellular components of the adhesive capsulitis of the shoulder. Also, SP is a pain transmitter peptide, and pain may cause a secondary muscular and/or capsular contracture. Our results show that the plasma concentrations of substance P in patients with shoulder stiffness after arthroscopic rotator cuff repair are higher compared to plasma levels of SP in patients with a good postoperative outcome. We cannot determine the cause of POS in our patients, but the findings of this study suggest a possible neuronal role in the pathophysiology of POS after arthroscopic repair of rotator cuff tears. The knowledge of the pathophysiological role of sensory nerve peptides in tissue repair in these patients could open new therapeutic options to manage conditions of the musculo-skeletal system with impaired tissue-nervous system interaction.

P12-966

Results of open reconstruction of glenoid rim fractures following shoulder dislocation

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Objectives: Avulsion fractures of the anterior glenoid rim following shoulder dislocation are indications for operative refixation due to a high risk of recurrent dislocation, development of significant glenoid defects and posttraumatic osteoarthritis. The purpose of this retrospective analysis was to evaluate the clinical and radiological outcome of open reconstruction of these injuries.

Methods: Between 2001 and 2007 20 patients (age=49.4 years, min=26.4 max=78.0, m:w=17:2) were treated operatively after acute traumatic shoulder dislocation with anterior glenoid rim fracture. 17 underwent lag srew-, 1 K-wire- and 2 anchor-refixation. 8 patients sustained additional injuries (5 fractures of the greater tubercle, 1 extraarticular, 1 intraarticular fracture of the humeral head and 1 fracture of the acromion), which required 2 internal fixations of the proximal humerus and 1 lag screw refixation of the greater tubercle. 18 patients were available for clinical and radiological follow-up after 2,4 (0.21 - 6,46) years, using the Constant and Murley-score and Rowe-score.

Results: 61.0% were unlimited in their ability to work, 66.7% unlimited in sports and leisure activities. 10 patients complained none or only mild pain. 72.3% had no restrictions in their daily lives. 72.0% presented with a flexion and abduction > 121°. 16.7% were rated group A, 11.1% group B, 50.0% group C and 22.2% group D according to Constant and Murley allover score. Rowe-score was group A for 8, group B for 4, group C for 2 and group D for 4 patients. Complications: re-dislocation 1, subchondral sclerosis 7, implant dislocation 1, restricted ROM 3; neurovascular dysfunction, infection or recurrent dislocation 0. Progress in osteoarthritic changes occurred in 3 patients (16.6%).

Conclusions: Open reconstruction of glenoid rim fractures following shoulder dislocation is a valueable procedure regarding medium-term subjective and objective scores in shoulder function, pain and strength. Recurrent dislocation, glenoid defects and early onset of osteoarthristis can be avoided.

P12-981

Arthroscopic treatment of acromioclavicular dislocation: Preliminary results

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Acromioclavicular dislocation presents an overall incidence of 3 to 4 per 100,000 inhabitants in the general population, and 25 to 50% of the lesions occur during sports activities. In addition to the controversy regarding Rockwood type III acute acromioclavicular dislocation (ACD), there is discussion about the type of attachment to be implemented and, today, what is the role of arthroscopy in treating these lesions.

Objectives: To evaluate the preliminary radiographic and functional results from patients undergoing arthroscopic ACD treatment at our service.

Material and Methods: Between August 2006 and July 2007, 14 patients with a diagnosis of ACD underwent operations arthroscopicaly assisted, using a coracoclavicular attachment technique with two Fastin RC anchors (Johnson & Johnson). Eight patients were reevaluated after a minimum of six months of follow-up, with regard to radiographic reduction results and Karlsson, Constant and UCLA scores.

Results: After six months of follow-up, the patients presented a mean Constant score of 94.38 (82-100) and mean UCLA score of 32.63 (26-35). Three patients presented Karlsson A and five, Karlsson B. Radiographic evaluation showed that there was a radiographic loss in three patients with three months of follow-up (three subluxations; 3/8; 37.5%) and in seven patients with six months of follow-up (seven subluxations; 7/8; 87.5%), although without any displacement of the acromioclavicular joint.

Conclusion: The preliminary results from arthroscopic treatment of the acromioclavicular dislocation led to satisfactory functional results, despite the high incidence of subluxations of the joints.

P12-1008

Arthroscopic management of spinoglenoid cysts associated with SLAP lesions and suprascapular neuropathy

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Suprascapular neuropathy may occur secondary to extrinsic compression, repetitive overhead movements or variations of the normal anatomy. Isolated injury of the infraspinatus muscle is a rare entity and frequently secondary to suprascapular nerve compression at the spinoglenoid notch.

Materials and methods: We report two pacients aged 25 and 32 with a history of 10 and 8 months posterior shoulder pain. Physical examination revealed atrophy of the infraspinatus fossae and weakness in external rotation strength and abduction. In both patients, MRI showed a spinoglenoid cyst without a clear communication with the glenohumeral joint. EMG showed neurapraxia of the suprascapular nerve at the spinoglenoid notch. Both patients underwent shoulder arthroscopy which confirmed a type II SLAP lesion communicating with the cyst. After cyst excision with a motorized shaver, the superior labrum tear was fixed with 2 bioabsorbable suture anchors. Arthroscopic suprascapular nerve release was then performed in both patients. Postoperatively the patients were placed in a sling for 6 weeks. Passive and

active range of motion was allowed at 3 weeks and 6 weeks respectively. The follow up was 12 and 14 months.
Results: Posterior shoulder pain was relieved inmediately after surgery. Patients went back to work after 2 and 3 months. Full strength recovery, assesed by isokinetic testing, was achieved by 3 months MRI at 4 months showed complete healing of the SLAP lesion, with no evidence of cyst recurrence. At latest follow-up both patients were satisfied and returned to their pre-injury activity level.
Conclusion: A glenoid labral cyst should be included in the differential diagnosis of posterior shoulder pain with associated infraspinatus atrophy. Arthroscopic treatment allows diagnosis of the SLAP lesion, cyst excision and suprascapular nerve release.

P12-1024
Comparison between metal and biodegradable suture anchors in the artroscopic treatment of traumatic anterior shoulder instability. A prospective randomized study
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Purpose: To compare the clinical outcome of arthroscopic treatment of traumatic anterior-inferior shoulder instability with metal and biodegradable suture anchors in a prospective randomized study.
Methods: Seventy-eight patients with recurrent anterior-inferior shoulder instability underwent an arthroscopic repair with suture anchors. They were randomly divided in two groups of 39 patients each, according to the type of suture anchors used: metal in group 1, and biodegradable in group 2. Exclusion criteria were: multidirectional instability, capsular avulsion from the humeral head (HAGL and RHAGL lesions), associated rotator cuff tears, and severe humeral and/or glenoid bone loss. Results were evaluated using the DASH self-administrated questionnaire, Rowe score, and Constant score normalized for age and gender. On analyzing the results at a two-year follow-up, we considered the following independent variables: age, gender, dominance, type of work (manual or sedentary), type of sport (contact, non contact, overhead), sport activity level (recreational, agonistic, professional), timing from first episode of dislocation to surgery, age at the first dislocation, number of dislocations, pathology of glenoid labrum, and anterior-inferior glenohumeral ligament (AIGHL), associated SLAP lesions, and type of suture anchors (metal or biodegradable). Univariate and multivariate statistical analysis were performed in order to find out variables that were independently associated to the outcome. Significance was set at $p < .05$. The null hypothesis was that differences in clinical outcomes between the two groups were not significant.
Results: Eight patients (10.3%) were lost at follow-up: 3 in group 1 and 5 in group 2. Among them, 1 case from group 1, and 2 from group 2 reported recurrence of dislocation. None of the patients visited at follow-up referred recurrence of dislocation. Comparison between groups did not show significant differences for each variable considered. Overall results for DASH score were 6.8 points in group 1 and 7.0 points in group 2; for Rowe score were 88.7 in group 1 and 92.9 in group 2; for Constant score were 95.8 points in group 1 and 97.6 points in group 2. Univariate and multivariate analysis showed that differences between groups 1 and 2 were not significant for each scoring system considered. Therefore, the null hypothesis was not rejected.
Conclusion: At a short-term follow-up, no significant differences were observed in the clinical outcome of arthroscopic treatment of traumatic shoulder instability when performed with metal or biodegradable suture anchors. Recurrence rate was 2.6% in group 1 and 5.2% in group 2 (overall rate: 3.8%).

P12-1027
Evaluation of scapular position in overhead athletes
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Purpose: To evaluate scapular malposition in overhead-athletes.
Methods: For the present study, 42 overhead-throwers were enrolled. They were 22 professional and 20 non professional; 23 males and 19 females. At the time of observation 22 were symptomatic (45,2%) while 20 were asymptomatic (42,8%). Each athlete was evaluated using Quick-DASH self-administered questionnaire, DASH-Sport, SICK Scapula Rating scale (Morgan 2003) and finally a complete ROM evaluation (GIRD, ERG, GIRD/ERG). Moreover scapular positioning was evaluated; this analysis was performed using Digital Moiré System (Ortsan, Sassari), a computerized method primarily introduced for scoliosis screening and postural analysis. For outcome analysis we used ANOVA while Bonferroni test was used for multiple comparisons. Significance was set at $p<0.05$.
Results: On analyzing the results, the following independent variables were considered: gender, level of activity (professional, non-professional) and the presence of symptoms at the moment of observation. Females showed a significantly worse score for Q-DASH self-administered questionnaire respect to males (8,7 vs. 4,5). Moreover females showed a significantly higher score for SICK scapula rating scale. Non-professional athletes showed significantly higher results, when compared to professional athletes, for GIRD (3,3° vs. 1,8°), Q-DASH (11,7 vs. 2,9) and DASH-sport (22,1 vs. 4,3). Symptomatic overhead-throwers showed significantly worse results both for Q-DASH and DASH-sport and SICK scapula rating scale. The analysis of scapular position, performed by using Digital Moiré System, showed a significant higher frequency of scapular malpositioning in non-professional overhead-throwers when compared to professional athletes.
Conclusions: The present study showed that scapular diskynesis affect frequently overhead-throwers. It have been demonstrated to be responsible for capsulo-labral and rotator cuff tears; as a consequence, in order to avoid surgical treatment, it should be recognized and treated in early phases. Therefore scapular dyskinesis should be prevented performing an adequate training programme eventually associated to a scapular rehabilitation program focused to correct the functional deficit.

Elbow/hand/fingers

P13-184
New arthroscopic all-inside repair technique of peripheral triangular fibrocartilage complex tears
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Objectives: The peripheral TFCC tears are repaired with out-in or in-out technique. The drawback of these techniques is that an additional incision is required to tie the sutures. We report our experience with all-inside repair technique of peripheral TFCC tears and its advantages.
Methods: From May 2006, we've treated, using our technique, 6 patients with type 1B lesions of the TFCC (4 right hands and 2 left, 5 men and 1 womon). 3 patients had clinical signs of TFCC lesion confirmed by preoperative MRI or arthrogram. The other 3 patients had intra-articular distal radius fracture and type 1B lesions were detected accidentally during the arthroscopically assisted reduction and percutaneous pinning of the fracture. All patients were evaluated at a mean of 9 months (range, 5 to 12 months) with physical examination and the Mayo modified wrist score.
Results: Final wrist extension/flexion averaged 135°, which was 88% of the unaffected side. Final pronation/supination averaged 144°, which was 85% of the unaffected side. Final Mayo modified wrist score averaged 88. Our 6 cases had no ulnar joint line tenderness and negative ulnar grind test at last follow-up. We have not encountered any complications regarding the the sensitive branch of ulnar nerve.
Conclusion: This all-inside technique is as simple as previously described arthroscopic techniques and also has advantages of vertical mattress suture and no additional incision. We recommend this technique as a useful alternative to the others for repairing Palmer type 1B TFCC tear.

P13-299
Wrist ulnaris pain in long distance triathletes due active miofascial trigger points
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Introduction: The Miofascial Trigger Points (MTP) are hyperirritable areas in a skeletal muscle associated to a hypersensitive touchable nodule within a tense strip. The area is painful to compression, causing characteristic referred pain and hypersensitivity, motor dysfunction and even autonomic phenomena. The pattern followed by pain and hypersensitivity become the clue to identity it. They can activate abruptly, because of an evident cause of muscular tension, or progressively, because of less visible chronic muscular overuse
Materials and methods: Retrospective study of 29 long distance triathletes, 17 men and 12 women, who presented wrist ulnaris pain due active MTP in the period which goes from January 2005 to January 2007.

We used diagnostic clinic criteria proposed by Travell and Simons because no laboratory or image tests are capable of diagnosing MTP.
We investigated the etiological characteristics (circumstances for their appearance, lesion mechanism, segment and surface).
Results: All presented the pattern of characteristic referred pain of active MTP. During exploration, we could corroborate the essential diagnostic criteria and reproduced the referred painful pattern and the LTR, except in serratus posterior superior muscle, when pressing the MTP.
- Muscles affected & Segment & Surface: serratus anterior+pectoralis major (5tri,3 men-2 women; running: asphalt 1 man-1 women, land 2 men-1 woman), serratus posterior superior+scalene+ rhomboideus minor and major (10tri,7 men-3 women; cycling: road), latissimus dorsi+pectoralis major (2tri, 2 men; swimming: sea), subscapularis+extensor carpi ulnaris (5tri, 1 man-4 women; swimming: sea 1 man, swimmimgpool 4 women), medial head of triceps brachii (4tri, 3 men-1 woman; swimming: swimming pool), flexor carpi ulnaris+pectoralis minor (3tri, 1 men-2 women; cycling: road),
- Circumstances of appearance: 18 triathletes referred on general training (62.06%), 8 on resistance training (27.58%) and 3 on technical training (10.34%).
- Lesion mechanism: all referred to muscular overuse
Conclusion: Differential Diagnosis must incluye Active MTP, whose diagnosis realices by means of recommended clinical criteria, being the association of local pain when pressing the nodule in the tense strip and the identification of habitual pain, the acceptable minimum criteria.

P13-370
Our experience with arthroscopic treatment of the lateral elbow pain
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Background: In our preliminary study we described different causes of lateral elbow pain and our experience with arthroscopic treatment.
Methods: We reported our preliminary results in our group of patients with lateral elbow pain treated by elbow arthroscopy. We focused also on morphologic elbow changes, hospital stay and duration of rehabilitation. For evaluation of our results we use Mayo elbow performance score and Liverpool score.
Results: We were treated 40 patients with elbow pain and contracture between 1 January 2003 and 31 December 2006 and 30 of them had lateral elbow pain. The average age of the patients was 38 years (12 - 55 years). In 10 patients the cause for elbow pain was chronic synovitis due to rheumatoid arthritis, in 11 resistant lateral epicondylitis, in 6 osteochondral lesion of the olecranon, in 6 degenerative changes on the postero- lateral side of the elbow, in 4 loose bodies, in one osteid osteoma, ostochondritis of the capitellum humeri and arthrofibrosis of the elbow after fracture of the radial head. In most of them (26) range of movement of the elbow was normal and they have no pain 2 years after arthroscopic treatment. 3 of them with osteohondral lesion had 5 degrees and patient after arthroscopic arthrolysis after radial head fracture had 15 degrees elbow contracture.
Conclusion: Arthroscopic treatment of the lateral elbow pain has been proved to be very effective especially in younger population and in patients with early elbow osteoarthritis. The length of hospital stay is reduced. However, the length of rehabilitation depends on the stage of elbow osteoarthritis and extensiveness of the arthroscopic intervention.

P13-403
One case of autologous osteochondral transplantation and arthroplasty for end stage osteochondritis dissecans of the capitellum. Ten years follow up
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Objectives: The treatment of an end stage osteochondritis dissecanse of the capitellum (elbow OCD) still remains challenge. Recently, some reports showed satisfactory pain relief and return to previous sports after osteochondral autologous transplantation (OAT). However, long term results have not been reported. In this presentation, we report long term result of one case of OAT with arthroplasty for end stage elbow OCD.
Methods: A 13-year-old boy who had played baseball for 5 years was evaluated at our hospital. He was right-handed catcher. He had had 4 year history of right elbow pain and occasional catching in his right elbow without obvious traumatic cause. The range of motion was remarkably restricted to 25 degrees in extension and 95 degrees in flexion. Radiographs showed an osteolytic lesion with peripheral bone sclerosis in the right capitellum and large osteophytes in the coronoid fossa and coracoid process. We diagnosed end stage elbow OCD with severe osteoarthritic changes in the right elbow joint. Under general anesthesia, the first operation was performed. There was an articular cartilage defect on the right capitellum measuring about 4 cm^2 and the depth of ht defect was about 5 mm. We then preformed a laterally based wedge osteotomy with an intervening angle of 10 degree at 2 cm proximal to the lateral epicondyle with the apex just medial to the capitellum. We made three cylindrical holes, each 5mm in diameter and 10mm deep, in the OCD lesion. Three osteochondral plugs, each 6 mm in diameter and 15 mm deep, were harvested from a donor site in the right knee joint and grafted into the recipient site. The right elbow was fixed with a plaster splint for 3 weeks after the surgery and then rehabilitation program was started. Ten months after the first operation, we performed second procedure. First, cortical screw was removed. The osteochondral plugs grafted into the recipient site had united with bone around them, and the cartilage of the articular surface was smooth. Second, we resected the osteophytes on the coronoid fossa and process. We obtained 5 degrees in extension and 120 degrees in flexion under general anesthesia. Four months after the second operation, the patient started to play baseball and participate in judo without pain. He continued to play baseball for about 2 years after the second surgery.
Results: At 124 months after the first procedure, he had no right elbow pain and no restriction in his daily activities and recreation sports activities. He had no pain and disability in his donor site. The range of motion of his right elbow at final follow up was 20 degrees in extension and 125 degrees in flexion. Plain radiograph shows neither recurrence of elbow OCD nor donor site abnormalities. The invasion to the intact donor site is one of the most troublesome problems for the OAT for elbow OCD. We have observed his donor site for ten years and he had no troubles in his donor site throughout ten years.
Conclusions: We reported ten years follow up of OAT with osteotomy with satisfactory result. Although satisfactory result was obtained so far, the patient is still young and we have to observe his elbow and knee in the long term.

P13-480
Ligament reconstruction with a single strand trizeps tendon graft in posterolateral rotational instability of the elbow
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Objectives: Surgical technique and short term results of ligament reconstruction with trizeps tendon graft in posterolateral rotational instability of the elbow.
Methods: From 2003 to 2006 posterolateral ligament reconstruction with a single strand trizeps tendon graft was performed in 38 patients with posterolateral instability of the elbow, mainly associated with refractory lateral epicondylitis. The reconstructions were performed with the original O Driscoll technique (6), interference screw fixation (30) and transfixation screw (2) . There were no neurological complications, one superficial wound infection resolved by revision and 3 arthroscopic revisions for intraarticular scaring.
The first 21 operated patients with a minimum follow up of twelve months were reviewed with a subjective 100 point rating score.
Results: From 21 patients 4 could not be reached by letter or telephone, 2 patients were excluded for preoperative stiffness and previous operations other than extensor release. 15 patients could be evaluated. Average follow up was 15,1, min 12, max 24 months. Patients satisfaction with the operation was rated very good by 6 patients (40%), good by 5 (33,3%) unchanged by 4 (26,7%), none worsened. Mean postoperative score was 83/100 points. Mean score for pain was 22,2/30, for ADL 7,3/8, sleep 1,9/2, range of arm motion 9,2/10, extension 9,2/10, flexion 4,6/5, supination 4,7/5, pronation 4,2/5 and strength 20,1/25 points.
Conclusions: Single strand posterolateral ligament reconstruction with a trizeps tendon graft in posterolateral instability of the elbow shows reliable short term results. Most secure fixation is achieved with bone tunnel fixation and tenodesis or transfixation

P13-730
Osteocapsular arthroscopic arthroplasty in degenerative stiff elbow
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Purpose: To evidence the advanteges of arthroscopic technique in treating degenerative stiff elbows.by osteocapsular arthroplasty.
Method: From January 2002 to February 2007,176 degenerative stiff elbows were treated arthroscopically by the same surgeon using arthroscopic ap-

proach. The arthroscopic osteocapsular arthroplasty consists in a reshaping of the elbow bones trimming osteophites and remodelling the articular congruency,removal of loose bodies and posterior and anterior capsulectomy. This method recreate more anatomical compartments in order to decrease pain and to increase R.O.M. 112 Male and 64 female (27yrs-64yrs) were treated consecutively under brachial plexus anaesthesia, with tourniquet inflated, in a prone position. Three posterior and two anterior portals were used. A doulbe drain was positioned at the end of the procedure. Every arthroscopic procedure was carried out after an open ulnar nerve release with a 2.5 cm ulnar incision. The post -operative treatment was based on c.p.m. (5 times per day for 20 minutes) and active exercises under fisioterapic control (4 times per day).
Results: 165 patients were reviewed at 7, 30, 60 and 180 days post-op. Then were recalled for a follow up study at an average time of three years. At 3 years follow up an increased average R.O.M .of 60°.(pre-op 60° post-op 120°) was depicted and a mild residue well tolered pain in 25% cases was evidenced.
Conclusion: Osteocapsular arthroscopic arthroplasty allows to obtain a real advantege in treating degenerative stiff elbow permitting a subjective and objectuive increased R.O.M. of 60° that reconduces these patients inside the functional arch.

P13-912
Is there any relationship between pain and maximum grip strength or pain-free grip strength in lateral epicondylitis?
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Objective: The most common complaints of the patients suffered from lateral epicondylitis are pain and decreased grip strength. Maximum grip strength has demonstrated the greatest responsiveness to change following an intervention, but it had poor validity. Recently some studies has claimed that pain free grip strength could be superior to that of maximum grip strength. It is stil unclear whether could have superiority to use pain-free or maximum grip strength measurement in patients with lateral epicondylitis. The aim of this study was to determine whether maximum grip strength or pain-free grip strength could be most effective indicator in lateral epicondylitis.
Methods: 25 female and 5 male, a total of 30 patients with chronic lateral epicondylitis patients included in the study. Their mean age was 42.97±22.2 with unilateral involvement. In the control group, there were 28 female and 2 male healthy individuals with a mean age of 35.67±1.94. The patients who had been treated by the surgical intervention or injection were excluded. All the individuals both in the study and the control group have been evaluated for pain intensity level and hand grip. Pain intensity level to palpate has been measured using Visual Analogue Scale (VAS). Hand grip measurements taken by Baseline Hydraulic Hand Dynometer have been used for maximum grip strength and pain-free grip strength with 90° of elbow flexion. Algometer was used for measuring the pressure pain threshold during the tests for hand grip. All the records taken from the assessments have been compared both with the groups and within the groups.
Results: The mean age of the patients in the study group was 42.97±2.22 years included 25 (83.3 %) female and 5 (16.7 %) male. Pain intensity to palpate according to VAS 7.63±1.52 cm in lateral epicondyle, 3.33±3.19 cm in medial epicondyle and 7.90±1.56 cm in Frohse arch. There were significant differences in pressure pain threshold in lateral epicondyle and in Frohse arch between the study group and the control group (t1: -7.204, $p<0.05$; t2: 3.516, $p<0.05$). However there was no difference in pressure pain taken in medial epicondyle between the groups (t: -1.845, $p>0.05$). Pain-free grip strength was moderately correlated with pain level to palpate both in lateral epicondyle and in Frohse arch (r1: -0.54, $p<0.00$; r2: -0.50, $p<0.00$), whereas maximum grip strength was weakly correlated with the pain (r1: -0.43, $p<0.00$; r2: -0.38, $p<0.00$). Pain intensity to palpate in medial epicondyle was weakly correlated with the maximum and pain-free grip strength (r1: -0.37, $p<0.00$; r2: -0.30, $p<0.01$). Pain-free grip strength was moderate correlated (positive and middle grade) with the pressure pain threshold in lateral epicondyle (r:0.40 $p<0.01$), in medial epicondyle (r:0.39 $p<0.01$) and in Frohse arch (r:0.35 $p<0.05$). Maximum grip strength was also correlated with the pressure pain threshold taken from lateral, medial epicondyle and Frohse arch (r1:0.32, $p<0.01$; r2:0.38, $p<0.05$; r3:0.32, $p<0.05$).
Conclusion: It has been shown that there were significant correlations between the pain and all grip strength measurements. However the most significant correlations have been found between the pain-free grip strength and pain. Therefore measurements of pain free grip strength could be considered superior to maximum grip strength for assessment in patients with lateral epicondylitis.

P13-1001
Osteochondritis dissecans of the capitellum. A diagnosis not to miss.
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Introduction & Objectives: The osteocondritis dissecans of the capitellum normally occurs in adolescents and is associated with the apparition of loose body in the joint space. The main indication of an arthroscopy of the elbow is the extraction of free intra-articular body The causes are related with trauma/excessive use, almost always the dominant elbow. Vascular anatomy, may make capitellum more vulnerable to trauma and genetic factors with high incidence of bilateral disease; common occurrence among relatives of affected patients. The authors purpose to report a clinical case were the arthroscopy can be an important tool of diagnosis and treatment.
Case report: The patient is a 16-year-old male, which after a traumatic episode of the left elbow by a mechanism of extension, complains of a swelling elbow, pain, and decreased range of motion (ROM). He claims that the pain has been getting progressively worse and alleviates with the rest. On physical examination, the patient had a minimal joint effusion and was tender over his radiocapitellar joint line. He also lacks 15 degrees of terminal elbow extension. The plaine radiography revealed a bony fragment in the lateral capitellium, in magnetic resonance imaging (MRI) scan of the left elbow showed a loose body fragment in the radiocapitellar joint of 8 mm of diameter.
Results: The patient underwent arthroscopy to assess for unstable necrotic fragments. Arthroscopy revealed an osteochondral lesion with similar size and characteristics found in radiographic exams, the withdrawal of the bony fragment was carrying out. One year after, the patient is still asymptomatic and has recovered the ROM.
Conclusions: Osteochondritis dissecans is the most common cause of a loose body in the joint space in adolescent patients. Because clinical findings are often subtle, diagnosis requires a high index of suspicion. While the majority of patients respond to conservative treatment, those with unstable lesions require arthroscopic management, with a fast recovery of ROM.

Pelvis/groin

P14-78
Follow-up of 300 consecutive hip arthroscopies - a Brazilian experience
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A series of 300 hip arthroscopies was done by the same team during 5 years. We present the diagnostics, treatments, complications and results after a minimum of 6 months of follow-up (mean of 1.5 years).
There were 89 labral tears (isolated or not), Femoroacetaluar impingement (FAI) in 80 cases, 25 cases after acute dislocations or fracture-dislocations, 20 evaluations of painful hip arthroplasties, 12 ligamentum teres tears, 9 osteonecrosis evaluations, 10 external coxa saltans releases. 10 sequelae of childhood diseases (including CHD) treatments, 8 osteoarthritis handlings, 6 hips without alterations, 5 psoas tenotomies, 5 osteocondromatosis free bodies removals, 5 pigmented villonodular synovitis, 4 bullet removals, 4 osteoid osteomas and 8 miscellanea cases. The overall complication rate was 7,6%, none of them permanent. There were no complications at the traumatic group. The better results were on the FAI group (mean WOMAC score evolution from 74,5 to 92,4) and the worst were after osteoarthritis (mean WOMACscore evolution from 54,6 to 34). Hip arthroscopy is a new and valuable tool and the best indications are FAI and extraarticular patologies such as external coxa saltans.

P14-81
Results of arthroscopic treatment of femoroacetabular impingement in elite athletes
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Introduction: Femoroacetabular impingement (FAI) is often a problem in young patients with a high level of sports activity and even in professional athletes. In general these patients do not have signs of osteoarthritis of the hip and the aim of treatment is a return to sport at the same level. Hip arthroscopy is the treatment of choice, because of quicker rehabilitation compared with

open surgery. In this study we followed prospectively 17 high level athletes who underwent hip arthroscopy for FAI. We present the clinical results.
Material & Methods: Between June 2003 and August 2006 17 elite athletes (18 hips) underwent hip arthroscopy for FAI. None of them had radiological signs of coxarthrosis. Acetabular rim trimming and resection or suture of the labrum combined with offset correction at head-neck junction were performed in most cases.
The patients were seen for a follow-up postoperatively at 6, 12 and 24 months, one patient also at 4 years. A WOMAC Score was taken preoperatively and at each follow-up to (best score100). The patients were also asked for sports activities before and time to return to sport after operation.
Results: We treated 17 high level athletes. The predominant sports activity was soccer (soccer: 8, ice hockey: 2, gymnastics:1, dance:1, running:1, alpine skiing:1, motocross: 2, fencing: 1).
The mean age of the patients at time of surgery was 24 (18-25) years. One patient had bilateral surgery.
The following surgeries were performed: offset correction + rim trimming: 16 (8 labral sutures, 8 labral resections), offset correction alone: 1, rim trimming alone: 1 (labral resection because of calcification).
There were no perioperative complications like painful hematomas or neurological lesions.
In these series the mean preoperative WOMAC score was 65 (±19). The mean postoperative WOMAC was 89 (±9, 17 hips) at 6 months, 82 (±22, 14 hips) at 12 months and 96 (±2, 7 hips) at 2 years. One patient had a WOMAC score of 98 at 4 year follow-up.
Patients returned to sport between 3-12 months after surgery, 10 at the same level, 4 at a lower level. One patient with bilateral surgery had to stop soccer completely, another one did not return to soccer because of pain at the non-operated hip. A third soccer player changed the kind of sport.
Conclusion: The results in this study show that the return to sport at the same level is possible for the most (82%) of these young patients. Nevertheless the rehabilitation time is sometimes long and some of the patients cannot return to the same level, probably due to progression of degenerative changes and to severe biomechanical demand on their hips. Hip arthroscopy is an efficient method of treating FAI in young patients.

P14-150
Initial experiences and results of arthroscopy of the hip joint
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Introduction: Arthroscopy of the hip is now an established means for diagnosing and treating a variety of intra-articular pathology. It offers the benefits of being a minimal invasive procedure with short rehabilitation and allows for opportunities for future surgical interventions. Better understanding of the arthroscopic anatomy, operative techniques, complications combined with proper patient selection have widened the scope for hip arthroscopy. Our study was undertaken to look at indications, findings, complications and management outcomes from hip arthroscopy performed at our centre over a two year period.
Methods: A retrospective case series study was conducted at our centre involving all patients who underwent hip arthroscopy under the senior author (M.G). All the procedures were performed from April 2004 to Nov 2006 and were followed up for a minimum period of six weeks. The arthroscopy was done as a day case surgery under general anesthesia in all cases. Patients were positioned supine and a standard fracture table was used with the hip in mild abduction and neutral rotation. Average duration of the procedure lasted 30-45 minutes. Post operative rehabilitation allowed for full weight bearing with crutches as tolerated with advice about gentle range of movement exercises.
Results: A total of 35 hip scopes were performed during this period with a slight female predominance. The average age of the patients was 32years. Indications included idiopathic painful hips, labral lesions, sub chondral lesions, loose bodies, osteoarthritis and also as a preoperative diagnostic investigation. Predominant intra operative findings were degenerate hips (28 %), normal looking hips (28 %), loose bodies (17 %) and chondral lesions (14 %). Our study showed two nerve related complications with patients complaining of paraesthesia in the sciatic nerve distribution. Both of these were transient and made complete recovery.
Discussion: The role of hip arthroscopy in the management of hip disorders continues to expand with continued experience and improved instrumentation. It is now becoming increasing used for surgery to the structures surrounding the hip, not just to those within the hip cavity. Whatever the method, the most critical determinants for a successful outcome are patient selection and surgical expertise. Patients with mechanical symptoms and pathology confined to the hip joint and a reasonable expectation of the outcome are the ideal candidates for hip arthroscopy. Awareness of the potential complications, attention to patient positioning and proper orientation of portal sites is the surgeon factor that dictates good outcome. Our study in the small, heterogenous group of patients with hip pain has shown hip arthroscopy to be a safe and effective means for assisting the management of hip disorders.

P14-152
Hip arhroscopy after trauma - a series of 41 cases
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Hip arthroscopy was done in 41 consecutive cases related to hip trauma. Arthroscopy was done in supine position under regional anestesia. There were 25 cases done after hip dislocations or fracture-dislocations, 5 after isolated ligamentum teres injury, 4 after a gunshot wound, 4 after lateral trauma, 2 after femoral head fracture and 1 after malunion of a femoral neck fracture. There were no complications related to the procedure. The findings at the hip dislocation and frature dislocation group included ligamentum teres total rupture (100%), osteocondral fragments (80%), rim fractures (25%), anterior labral avulsions (20%). The femoral head cartilage was evaluated in all cases. One case after dislocation had osteonecrosis. At last follow-up (4 years-6months, mean 1,5 years) the mean WOMAC score of the remaining patients was 90. The best results were at arthroscopies done after isolated ligamentum teres ruptures. Hip arthroscopy can be safely done in trauma cases, even after acute dislocations.

P14-333
Correlation of the impingement test with arthroscopic findings at the acetabular rim in non-dysplastic hips
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Aim: The aim of this study was to determine if a correlation exists between the impingement test and the arthroscopic findings at the acetabular rim in non-dysplastic hips.
Patients and Methods: Sixty-two consecutive patients who were due to have an arthroscopy of the hip in our unit were prospectively recruited into the study. All the dysplastic hips were excluded from the study. One observer was involved in examining all the patients and another one in performing all the arthroscopies. The impingement test was considered positive if at 90 degrees of flexion, adduction and internal rotation, the patient complained of discomfort or pain. The test was performed on the morning of the arthroscopy and all the intra-articular findings recorded at arthroscopy. A tear of the acetabular labrum and chondral damage in the antero-superior margin of the acetabulum were considered as positive pathology at the acetabular rim.
Results: There were 40 males and 22 females in the study group. The impingement test was positive in 57 patients. The arthroscopy revealed positive pathology in terms of an acetabular labrum tear and/ or chondral damage at the acetabular rim in 55 patients. A negative test was recorded in 5 patients but there was positive rim pathology in two of these 5 patients.
Conclusion: The impingement test correlates positively with the pathology at the acetabular rim; the sensitivity of the test for diagnosing acetabular rim pathology is 96.4 % and the specificity is only 60 % in non-dysplastic hips.

P14-335
Hip arthroscopy in the elite athlete
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Aim: The aim of this study was to assess the role of hip arthroscopy in the management of hip pain secondary to a sporting injury, in elite athletes.
Patients and Methods: It is a retrospective study of prospectively collected data. Thirty-one hip arthroscopies were performed on 27 elite athletes for hip pain secondary to injury. Of these 27 patients, one patient had arthroscopy on both his hips and three patients had an arthroscopy twice. All the patients were assessed pre-operatively with a thorough clinical examination, radiographs and MRI scans where appropriate. The modified Harris Hip Score was also recorded for all the patients pre and post-operatively. All operations were performed by the senior author and the patients were assessed at 6 weeks, 3 months, 6 months and a year following the operation.
Results: There were 25 males and 2 females with an average age of 38 years (Range: 18-58) in the study group. Sixty-five percent of the patients were

professional football players followed by cricket and tennis. The patients were referred at an average of 506 days. Two of the 27 patients demonstrated minimal acetabular dysplasia on their pre-operative radiographs. Of the 31 arthroscopies, a primary diagnosis of a labral tear was made in 20, a chondral flap and delamination in 5, early osteoarthritis in 4 and a ligamentum teres tear in 2. Along with the primary diagnosis of a labral tear, twelve of the 20 patients had a secondary diagnosis of chondral injury and or Femeroacetabular Impingement as well. There were no complications reported.
Conclusions: Hip Injuries in athletes are reported late and Chondral Flaps and Ligamentum teres tears are under-diagnosed. Most athletes have a good chance to return back to the original level of sport within 4 months following hip arthroscopy. However, about 40% do continue to have some form of pain. Hip arthroscopy is a safe and effective method for diagnosis and treatment of intra-articular disorders in elite athletes.

P14-389
Allograft reconstruction for symptomatic chronic complete proximal hamstring tendon avulsion
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Background: Complete proximal hamstring tendon avulsion is an uncommon injury that can cause significant disability in young, athletic individuals. Surgical reattachment is recommended and can be performed on a delayed basis if the tissue is sufficiently mobile. However, when the injury is chronic and the tissue is retracted, repair has generally not been indicated. We report a new technique and two year follow up for cases where allograft was used for reconstruction because the tendon was too retracted for primary repair.
Methods: Two 30-year old patients with complete proximal hamstring avulsion at least two years earlier reported severe hamstring weakness and restrictions with respect to sport and recreational activities. Proximal hamstring tendon reconstruction with Achilles tendon allograft was performed for both patients. They were immobilized for eight weeks with the hip in extension and the knee in flexion using a custom orthosis, followed by physical therapy and weight bearing as tolerated. The patients were followed for over two years after the surgery and were evaluated with physical examination, iso-kinetic strength testing and detailed questions about their function.
Results: Following the procedure, both patients returned to a more active lifestyle that was greatly improved with respect to participation in sport and function.
Conclusions: This procedure should be considered as a salvage operation as the patients did not return to completely normal function and demonstrated hamstring weakness on the operated side. Nevertheless, young, active patients with chronic injuries may be considered for this procedure if they understand that the goal of the operation is improvement and not complete recovery.

P14-394
Regeneration potential of the human labrum?
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Introduction: Regeneration of the acetabular labrum was demonstrated in a previous animal model for hip joint arthritis; after resection of its anterosuperior part, neither rapid degeneration nor altered stability of the sheep hip were observed1. Here, the possibility for regeneration of the labrum in humans was considered.
Methods: Six patients who had had an acetabular labrum resection, from the superior part and of at least 60°, by open surgical technique, were reviewed. All of them had been operated at our institution and by the same surgeon. At follow-up (f/u), a native MRI (one patient had an arthro-MRI) with a 360° reconstruction of the labrum and a physical exam were made. F/u- and preoperative MRI were compared for the presence of labral regeneration and continuity at the site of resection and for cartilage defect and extents, compared with intraoperative findings.
Results: Mean age at surgery was 29.5yo±7.9SD. The mean f/u was 3.18y±0.9SD. A labral lesion, anterosuperior, was seen on every preoperative MRI, in 3 patients with a cartilage lesion underneath. At surgery, cartilage lesions were always present: an horizontal chip attached caudally, and was resected. On f/u MRI, the void from resection was filled-up in all patients, by a triangular-shaped structure with the same signal intensity as the original labrum. Only in one patient there was a gap at the posterior end of resection of about 2mm. A cartilage lesion was seen in 3 patients, same extent as at surgery. In only one patient it was visible on both pre- and postop MRI.
Conclusion: According to MRI, regeneration of the acetabular labrum in humans seems to be possible. In parallel to the sheep model, no signs of rapid degenerative joint disease were seen on f/u. However, differentiating between the hip joint capsule and this new structure was sometimes difficult, on native as well as on the arthro-MRI. Thus, the presence of a neo-labrum and its ultrastructure must be furthermore investigated.
Reference: 1) Miozzari HH et al., OsteoArthritis and Cartilage (2004) 12, 419-430

P14-638
Synthetic bone substitute: a long-term follow-up in the context of survival and functional outcome
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Introduction: Bone grafting is a preferred method of improving a depleted bone stock in primary and revision hip arthroplasty, but it is of limited supply. It also carries a risk of transmission of viruses, bacteria and prions which leads to failure of the implant and risk of disease. Synthetic bone substitutes are a favoured alternative as they do not transmit infections and can be produced to meet the demands. We tested the hypothesis that a 50/50 mix of bone and substitute and allograft does not affect long-term survival and functional outcome of hip arthroplasty.
Methods: We analyzed sixty-five patients who had revision hip arthroplasty using impaction grafting over thirteen years ago. Pure allograft and a 50/50 mix of allograft and solid particulate hydroxyapatite substitute (Allogran-N, Biocomposites, UK) were used. Oswestry hip scores were collected pre-operatively and annually thereafter. Function was analysed using multilevel modelling and Kaplan-Meier method used for survival analysis.
Results: There were 37 females and 28 males with mean age of 65.2 years. Twenty-three patients received a 50/50 mixture (Group 0; 12 female, 11 male, mean age 69) and forty-two pure allograft (Group 1, 25 female, 17 male, mean age 64). In group 1 score improved from 48 to 66, in group 0 from 47 to 69. Post-op scores showed a small annual decline (average 1.2/year, $p < 0.01$). This decline was higher for females (average 3.4, $p = 0.025$) and significantly related to pre-op scores ($p < 0.001$). After adjusting for these, group 0 had marginally higher scores (difference 1.6, $p = 0.3$). There were three revisions in group 0 and six in group 1, mainly for aseptic loosening. Survival at 13 years was 84 percent in group 0 and 82 percent in group 1 but the difference was not significant ($p = 0.96$, log rank test).
Conclusions: Fresh autogenous bone is the gold standard graft material for any orthopaedic procedure, but its limited availability and concerns for safety has led research into substitutes. The survival for both the groups does not show significant difference and Allogran appeared to be a satisfactory bone substitute in impaction grafting. We conclude that long-term prosthesis survival and function following revision arthroplasty with synthetic bone is comparable to allograft.

P14-642
A minimally disruptive surgical technique for the treatment of osteitis pubis in athletes
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Background: Multiple surgical procedures exist for the treatment of osteitis pubis; including, curetting the symphysis joint, wedge resection, complete resection of the joint, placement of extraperitoneal retropubic synthetic mesh and arthrodesis of the joint. However, there is a paucity of literature reporting successful outcomes with the aforementioned approaches. Previous accounts of patients treated operatively have reported recalcitrant pain, resulting from iatrogenic instability. Our objective is to present the results of our operative procedure which employs a more conservative technique by avoiding radical disruption of adjacent ligamentous anatomy as a novel surgical option.
Hypothesis: Preserving the adjacent ligamentous structures, will allow competitive athletes to return to competition and activities of daily living void of iatrogenic pelvic instability and free of pain.
Study Design: Case Series
Methods: Four competitive athletes (2 professional and 2 collegiate football players) diagnosed with osteitis pubis were treated conservatively for a minimum of 6 months. Patients underwent surgical intervention upon failure to respond to nonoperative management. The degenerative tissue was resected, allowing only cancellous bone to remain, whilst preserving the adjacent ligamentous structures.

Results: All four patients had their symptoms resolved and returned to competitive athletics. This novel ligamentous sparing technique provided a solid, stable repair and pain relief.
Conclusion: This novel surgical technique, preserving the adjacent ligamentous structures, allows competitive athletes to return to competition and activities of daily living free of pain and void of pelvic instability which has previously been reported following operative management.
Key Words: Osteitis pubis, pelvic pain in athletes, symphysis pubis pain, groin pain, pelvic instability

P14-688
Stress fractures of the sacrum
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During the years 1996 - 2006 23 cases of stress fractures of the sacrum were seen and treated. There were 16 active endurance runners, four middle-aged joggers and three older individuals in the series. Only one of the old persons was not involved with physical activity at the time of the stress fracture. All the patients suffered from lower back and posterior pelvic pain, which was dull, deep and diffuse in the beginning. It was felt during the exercise and after it and started suddenly in 11 of the patients. Later pain was felt in normal daily life (40 %) and it prevented running. There were 16 male and 7 female fractures in the series. The mean age of the patients was 35.4 years (17-79). In active athletes (runners) the mean age was 25.2 years (17-33).Two of the patients suffered from another stress fractures on the other side of sacrum one year later. The fracture was located at the left side of sacrum 6 times, on the right side 5 times and was bilateral in 12 patients.The athletes represented endurance running, only one was middle distance runner and one walker. The diagnosis was done in athletes approximately 1.5 months after the onset of the symptoms. In the other patients the diaganostic delay was 3.5 months. All the six radiogrpahs at early phase were negative. Once a positive CT and Tc scan examination was done. MRI was used in all other patients. In was used as a follow-up examination in four of the patients four months after the diaganosis. The radiological fracture healing had then occurred. The treatment consisted of cessation of running. Swimming and water training (running) was allowed after two weeks´s rest period. Cycling and gym training were added to the compensative training one month later and rowing, cross country skiing one months later. The athletes were able to start running 2.5 months after the diagnosis and full training was possible one months later. Older patients needed two months more before coming back to full activity.

P14-740
Rupture of the ischial origin of the hamstring muscles among athletes: a report of 9 cases of surgical repair
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Objectives: Muscular pathology of the hamstring is frequent among athletes. On the other hand, complete rupture with avulsion at the proximal bone-tendon junction is a rare injury. Functional treatment of this injury gives no successful results. This study aims at providing information on the results of operations on 9 athletes.
Methods: Between 2002 and 2006, 9 male patients with an average age of 36.4 years (from 20 to 59) were operated on for a complete rupture of the hamstring at the proximal bone tendon junction due to sporting accidents - 4 rugby accidents, two soccer, one fencing and one aikido accident- and one domestic accident.
Emergency magnetic resonance imaging was systematically employed. All nine were operated on using the same technique: by reinserting the tendons into the bone with several Mitek GII anchors (3.6 on average). A specific rehabilitation programme was set up. An isokinetic Biodex test was done after 6 months.
Results: All 9 patients were reviewed after a mean period of 33 months (from 9 to 64). At the last review, all patients were satisfied with their functional results. 8 patients out of 9 had gone back to their sporting activities at the same level, a mean 5 months after the operation (from 4 to 7 months). The isokinetic tests related to the unimpaired member show a muscular deficit of less than 8% after the 6th month.
Conclusion: Complete rupture of the hamstring at the proximal bone tendon junction is a rare but serious injury. With an early diagnosis and rapid surgical treatment, normal functions can be recuperated with a rapid return to high level sporting activity.

P14-851
Short-stem, metaphyseal suport, total hip arthroplasty in young patients. Preliminary report
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In the last decades we have assisted to an increase in application of non-cemented total hip arthroplasty (THA) in young patients. More recently there has been an effort to improve implants design to achieve more proximal forces transmission to femur in order to prevent "stress shielding" thus preserving more bone stock for predictable revision surgery. After publication of laboratory and biomechanical tests, long-term prospective clinical trials are needed to evaluate possible advantages of such systems. This work reflects the authors short-term experience with application of a short stem, with metaphyseal support in a population of young patients with severe hip pathology. This is a prospective cohort of 11 patients submitted to THA during 2006 with 7 males and 4 females. Mean age at surgery was 41.9 years (min 22 to max 50). Femoral head osteonecrosis was implicated in n=6, post-trauma osteoarthritis n=2, rheumatoid arthritis n=1, Perthes disease n=1 and primary osteoarthritis n=1. All patients received a noncemented short stem ("Proxima Hip" DePuy®) by posterior approach. Time of surgery was quantified by anaesthesiology team. Patients were evaluated according to Harris hip score (HHS) in the pre-op, 3 months, 6 months and one year post-op. Visual analog scale for satisfaction. Radiological protocol included AP, lateral and weightbearing long axis. Mean pre-op HHS was 38.43 (min. 32.4 to max. 45.3). A period of protected weightbearing during first six weeks was advised to all patients.
Mean follow-up of 15,3 months (10 to 18). Mean time of surgery was 129 minutes (91 to 183). Patients were institutionalized for a mean of 7.7 days (5 to 10). A metal on metal interface was used in 8 cases, metal-polyethylene in 3 (women of fertile age). About head size, 4 cases with great diameter, 4 with diameter 36; from the three poly-on-metal cases, two (n=2) received diameter 32 and one (n=1) diameter 28. Mean HHS at one year was 97.7 (95.4 to 99.9, n=6). All patients assumed as clinically satisfied and would return to surgery. A correct position of implant was achieved in ten cases, with absence of migration to present. In one case we verified varus position on immediate pos-operative control, also without migration. Less-invasive, more preserving surgery is a today's quest for any orthopaedist. Specially if concerning young people with severe hip pathology demanding arthroplasty but with great probability of revision during life-time. Ideally we should combine bone preservation at surgery with more physiological force transmission to proximal femur, thus preventing stress-shielding. This system requires good bone quality in order to achieve secondary integration. Biomechanical and previous clinical reports in elderly people are encouraging but further studies, with higher evidence-level are needed. There is no published data, to our knowledge, of its application in younger people. The preference for metal-on-metal derives from the need for lower wear interfaces combined with greater mobility and stability, more fit to the needs of this population who haven't yet experienced the typical limitations of the elderly. As absolute security in pregnancy is not completely established it was not used in fertile women. This is our preliminary experience and further follow-up is needed. We consider this as a technically demanding solution, needs a cautious learning-curve and its main advantages may only be seen in the long-term.

P14-1005
Arthroscopic findings following traumatic hip dislocation in 14 professional athletes
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Introduction: The purpose of this study was to report on intra-articular hip joint pathologies in patients who sustained dislocation and were treated with hip arthroscopy
Methods: Between 8/23/2000 and 9/15/2006, 14 professional athletes (12 males, 2 females) sustained a traumatic hip dislocation during active competition and were treated by a single surgeon. A retrospective chart review of this cohort was done to report the intra-articular hip pathologies identified at the time of arthroscopy.
Results: The average time from dislocation to surgery was 125 days (range: 0 -556 days). The average time to reduction was 3.56 hours. The average

age at the time of surgery was 30.5 years (range:16-57 years). All patients had labral tears. All patients had chondral defects. Two had isolated femoral head chondral defects, 6 had isolated acetabular chondral defects, and 6 had chondral defects on both surfaces. Eleven patients had loose osteochondral fragments. Eleven patients had partial or complete tears of the ligamentum teres. Nine patients had evidence of femoroacetabular impingement; 4 had isolated cam lesions of the femoral head, 1 had an isolated pincer lesion on the acetabular rim, and 4 patients had mixed pathology. Two patients had capsulolabral adhesions. Two patients had a capsular tear. Additionally, 3 patients underwent intra-operative evaluation of the lateral epiphyseal vessels with Doppler to confirm good blood flow to the femoral head with consistent pulse.

Conclusion: Traumatic dislocation is accompanied by a variety of intra-articular hip joint pathologies, the most common being labral, chondral, intra-articular loose fragments, and disruption of the ligamentum teres.

P14-1014

What hip score should be used to document outcome following hip arthroscopy in the active patient?

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Objective: The purpose of this study was to determine if there was a difference in hip outcome scores for patients with different activity levels.

Methods: The Hip Outcome ADL score(HOS-ADL), Hip Outcome Sport score(HOS-Sports), the Non-arthritic Hip Score(NAH), and the modified-Harris-hip-score(MHH) were completed by patients. 558 patients had complete preoperative scores and 460 had complete postoperative scores. Patients were divided into 3 groups: recreational(n=255), amateur(n=191), and professional-athletes(n=112). The follow-up ranged from 3 months to 2 years. Effect size was used to determine the scores ability to measure change. Small effects were considered >0.20, moderate effects >0.50, and large effects >0.80.

Results: Preoperatively the average HOS-ADL=71(±17), the HOS-Sport=45(±25), the NAH=67(±17) and the MHH=62(±16). For the HOS-Sport, the professionals were higher than the amateur and recreational(p=0.001). For the NAH the recreational athletes had lower scores than the professional (p=0.043).

Postoperatively, the average HOS-ADL=83(±16), the HOS-Sport=57(±29), the NAH=81(±17) and the MHH=78(±18). For the HOS-Sport, the professionals were higher than the recreational (p=0.018).

For recreational athletes, the effect size was large for the NAH and the MHH. The HOS-ADL was moderate and the HOS-Sport was small. For amateur athletes, the NAH and MHH had large effect size and the HOS-ADL and Sport had moderate effect size. For professional athletes, the MHH had large effect size, the NAH and the HOS-ADL had moderate, and the HOS-Sport had small.

Conclusions: Current scores being used to document outcomes in athletic patients perform differently based on activity level. Scores did not differentiate between the level of athletes and most did not show a large effect size.

P14-1017

Correlation of a functional exam to patient function and activity following hip arthroscopy

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Introduction: The purpose of this study was to determine if a 4 part functional exam correlated to patient reported function and activity.

Methods: Following hip arthroscopy, 57 patients underwent a standardized functional exam administered by a physical therapist. The test is scored based on how well the patient performs 4 separate tasks in designated times. These tasks include single knee dips, lateral agility tests, and forward and backward running. Data was also collected from the Hip Outcome Score (HOS), Modified Harris Hip (MHH), and the SF-36 to document patient reported function and activity.

Results: Average time between surgery and sport test was 5 months (range 1.3 to 14 months). Average patient age was 32 years(range 16 to 66). There was no correlation between the functional exam score and patient age. The functional exam score was correlated with MHH(r=.323 p=.013) and HOS sport(r=.346, p=.011). On the SF-36, the functional exam correlated with physical functioning(r=.367, p=.006) and vitality(r=.330 p=.016). The functional exam did not correlate with SF-36 components of mental health, social interaction, role physical, role emotional, and bodily pain.

Conclusions: This study demonstrated that the functional exam did correlate with patient reported functions and symptoms. It did not correlate with factors unrelated to function. This functional exam is an important adjunct to the clinical exam because it helps describe the patient's ability to perform activities.

P14-1046

Outcomes following arthroscopic labral reconstruction in the hip using iliotibial band autograft

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Introduction: The purpose of this study was to report intra-articular pathology and early outcomes following arthroscopic labral reconstruction in the hip using iliotibial band autograft.

Methods: Between 8/2005 and 12/2006, the senior author performed 16 arthroscopic labral reconstructions using an iliotibial band autograft in patients with advanced labral degeneration or deficiency. Of these 16, 9 were available for follow-up.

Results: There were 7 males and 2 females with an average age at time of reconstruction of 25.7 years (range:17-35). Seven of 9 patients had previous arthroscopic intervention. Previous procedures included labral debridement(7), treatment for femoroacetabular impingement(FAI)(2), and acetabular microfracture(1). Average time from initial injury to labral reconstruction was 17.5 months (range:3.7-43 months). The labral autograft was harvested from the iliotibial band through a separate incision. The graft was sutured to the intact labral remnant in the region of labral deficiency in an attempt at re-establishing the suction seal of the hip joint. Eight hips had FAI, 5 had had mixed pathology of cam and pincer and and 3 had isolated pincer lesions. Three patients had grade IV chondral defects, 2 isolated acetabular chondral defects and 1 on both surfaces. Six patients had capsulolabral adhesions and 5 had partially torn ligamentum teres. Average time to follow-up was 8 months (range:5.10-14 months). Average post-operative MHHS was 91(range: 64-100). Average patient satisfaction was 9 out of 10(range: 6-10).

Conclusion: This study showed that patients who are labral deficient or have advanced labral degeneration and undergo arthroscopic iliotibial band labral reconstruction can have good outcomes and result in high patient satisfaction.

P14-1047

2 year outcomes of hip arthroscopy

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The purpose of this study was to report 2 year outcomes of hip arthroscopy. Patients who presented with hip pain to the senior author completed subjective surveys consisting of the modified Harris hip score (MHHS), non-arthritic hip score (NAHS), and Hip outcome score activities of daily living (HOS-ADL) and Sports score (HOS-Sport).

Seventy-three patients underwent hip arthroscopy between 3/2005 and 5/2005. Three patients refused to participate. The average pre-operative MHHS was 57 (range:21-84), average pre-operative NAHS was 60(range:14-84), average pre-operative HOS-Sport was 39(range:0-79), and average pre-eoperative HOS-ADL was 64(range:13-95). The average time from injury to surgery was 610 days (range:14-2212 days). The average age at the time of arthroscopy was 34 years (range:16-55 years). All patients underwent hip arthroscopy for femoroacetabular impingement, chondral damage, and labral pathology. Average time to follow-up was 2.1 years (range:2-2.24 years). Three patients required revision surgery, and 6 went on to total hip arthroplasty, leaving 61 patients. Forty patients (66%) were available for 2 year follow-up. There was statistical improvement in all 4 outcome measures from preoperative to 2 years postoperative (p=0.000). The MHHS improved 23 points 80 (range:41-100), the NAHS improved 21 points to 81 (range:25-100), the HOS-Sport improved 34 points to 73 (range:0-100), and the HOS-ADL improved 24 points to 88 (range:37-100). The average patient satisfaction was 9 (range:3-10).

Hip arthroscopy is evolving and becoming a better tool for the treatment of intra-articular hip pain. At 2 years follow-up, patients experience significant improvement in all 4 outcomes scores resulting in high patient satisfaction

P14-1049

Adult hip dysplasia and femoroacetabular impingement: Usefulness of MR arthrography with leg traction

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Abnormal contact between bone femoral or acetabular secondary to hip dysplasia has been shown as an important cause of hip pain and early developing osteoarthritis.

Objectives: To evaluate the accuracy of direct MR arthrography in the evaluation of articular lesion in patients with hip dysplasia.

To evaluate the technical feasibility and patient tolerance of skin traction

To demonstrate the effects of traction in the diagnosis quality, especially the ability to define labral and cartilage lesions

To correlate MR-arthrographic findings with arthoscopic findings.

Methods: Fifthty-five patients with clinically and radiologically suspected acetabular rim syndrome or femoroacetabular impingement were prospectively analyzed. Images were reviewed independently by two readers, the following parameters were evaluated: acetabular or femoral bone abnormalities (shape, size and coberture), labral tears (type and extension), and cartilage lesions, classified as subchondral, osteochondral or chondral (fraying of chondral surface, partial thickness defect (<50% of the chondral thickness) or full thickness defect (>50%).

Associated injuries such as subchondral cystic changes, bone marrow edema, acetabulum superior bone rim fragmentation, loose bodies, paralabral cysts, capsular and iliofemoral ligament thickening were also recorded. 34 patients underwent arthroscopic hip surgery within next 6 months to MR arthrography.

Sensitivity, specificity, accuracy, and positive and negative predictive values were calculated. K values were calculated to quantify the level of interobserver agreement.

Results: Ten patients had acetabular rim syndrome (4 type I and 6 type II) and 45 femoroacetabular impingement (34 cam type impingement and 11 pincer type impingement).

MR arthrography had an excellent correlation with arthroscopic findings in the diagnosis of labral tears and bone deformities. MR-arthrography with leg traction improves significantly preoperative detection of cartilage lesions because femoral and acetabular cartilage surfaces were seen as separated structures. The amount of separation is increase 1.6mm as an average.

Conclusions: Early and accurate diagnosis of hip dysplasia and femoroacetabular impingement is essential to prevent or delay early articular damage and therefore early OA. Clinical and plain films are still the primary diagnosis however MR-arthrography permits subtle diagnosis of abnormal femoro-acetabular contact and labral associated injuries aiding to surgical planning. Hip MR-arthrography with leg traction improves visualization of central compartment of the hip and therefore increases the accuracy of cartilage lesion.

MR-arthrography with leg traction is the most valuable tool in the preoperative evaluation of intra-articular and periarticular joint structures and provides essential information in planning surgical procedures.

P14-1052

Determinants of patient satisfaction and outcome following arthroscopic treatment of femoroacetabular impingement

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Purpose: The purpose of this study is to report determinants of patient function and satisfaction at 1-year follow-up.

Materials and methods: Our study was approved by the institutional review board. Between March 2005 and March 2006, a cohort of 326 patients underwent arthroscopic treatment of femoroacetabular impingement by the senior author were enrolled in the study. We excluded patients less than eighteen years of age (to account for open growth plates) and those with previous hip surgery, fractures or avascular necrosis. Eighty-two patients were lost to followup. Preoperative and postoperative clinical scores and radiographic documentation (AP pelvic and cross-table lateral hip radiographs) were obtained on 234 patients. We obtained a minimum of one-year followup on 206 patients. Average time to followup was 16 months (range 12 to 27 months). Average age at time of surgery was 39 years(range:16-77). Outcomes data were collected from modified Harris Hip score(MHHS), Hip outcome score ADL(HOS ADL), Hip outcome score Sports scale(HOS Sport), non-arthritic hip score(NAHS) and patient satisfaction(1=unsatisfied,10=very satisfied). Dependent variables were patient satisfaction and modified Harris hip score. Independent variables included demographic, surgical, objective and subjective follow-up parameters. Univariate and multivariate analyses were performed to identify determinants of satisfaction and outcome.

Results: Average patient satisfaction was 8(range:1-10). Average MHHS improved 18 points to 81(range:18-100,p=0.001). Average HOS ADL improved 14 points to 85(range:28-100,p=0.001). Average HOS Sport improved 22 points to 63(range:0-100,p=0.001). Average NAHS improved 16 points to 81(range:0-100,p=0.001). Univariate analysis of demographics found a significant difference($p<0.05$) for female gender and age with respect to patient satisfaction. Analysis of surgical factors showed a decrease in satisfaction ($p<0.05$) and outcome for patients undergoing femoral head or acetabulum microfracture. There was no difference ($p>0.05$) for patients undergoing labral debridement versus labral repair, although revision rate of debridement was higher(9vs4%). Univariate analysis of objective variables showed no difference ($p>0.05$) in preoperative alpha angles, but less satisfaction when the weightbearing surface was less than 2.0 mm ($p<0.05$). Fifteen (5%) patients underwent total hip arthroplasty at an average of 12.4 months (range:3.2-24.3 months) post-arthroscopy. Patients who had a joint space less than 2.0mm, were 6.8 times more likely to undergo THA following hip arthroscopy (CI:2.3-20). Multivariate analysis demonstrated increased satisfaction with increased post-op modified Harris hip score and decreased age ($r2=0.57$,$p=0.0001$). Independent predictors of improvement in MHH were age, preoperative MHH and microfracture ($r2=0.36$,$p=0.001$).

Conclusion: Predictors of increased patient satisfaction include high MHH and absence of microfracture treatment. Patients experienced significant improvement in function at least 1-year postoperatively. This study illustrates the potential of functional improvement and offers patients with FAI a less invasive procedure through arthroscopic methods.

ACL

P15-12

Accuracy of navigated tunnel placement with reference to anterior cruciate ligament reconstruction - a cadaveric model study

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Aim: To assess the accuracy of tunnel placement for the anterior cruciate ligament (ACL) reconstruction comparing the Smith &Nephew, the Arthrex guides and the Brain Lab computer navigation systems.

Methods: 15 Fresh Frozen cadavers were used for the study. 5 knees had ACL reconstructed using the Smith Nephew guide, 5 had with the Arthrex guide and 5 knees had tunnels placed using Computer Assisted Surgery (CAS). The tunnel placement accuracy was assessed by MRI scans post ACL reconstruction.

Results: The findings suggest that the tunnels placed in the CAS group were the most accurate. The tunnels positions were within 3 mm of accuracy in this group.

Conclusions: ACL reconstruction should be carried out with accurate tunnel placement. Care should be taken in placing the tunnel as errors will lead to failure of the reconstructed ligament. CAS assistance is recommended in performing ACL reconstructions.

P15-20

Management of the simultaneous lesion of the central pivot and the sciatic nerve in a subacute phase.

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Introduction: The ligamentous injuries of the knee that are associated to a sciatic nerve lesion, syndrome already described by Platt in 1919, are a serious problem, not only for the therapeutical approach, but also for the aftereffects it can produce.

Material and Methods: From 1993 to 2006 we have treated 13 patients affected from knee instability and associated lesion of the sciatic nerve. All the patients came from other centres, and were seen for the first time, at least, two weeks after the initial lesion, when the acute reparation of the ligamentous lesion would have been possible. The nerve injuries were 11 cases of the

external sciaticus popliteus nerve and 2 cases of lesions of the external and internal sciaticus popliteus nerve.
The ligamentous injuries were 11 cases of ACL (without and objective injury of the posterolateral corner), 1 case of injury of the ACL associated with a injury of the posterolateral corner and 1 case of injury of the PCL with lesion of the PLC.
The surgery includes a joint phase, a microsurgical phase and a palliative phase. The joint phase consists in the reparation of the central pivot (12 cases of patellar tendon bone graft for the reconstruction of the ACL and 1 double bundle reconstruction of PCL with aquiles allograft), one tibial valgus osteotomy in the posterolateral instability and 2 posterolateral plasties. The microsurgical phase consists in the exploration and reparation of the . The mean extension of the nervous lesion was 10'5 cm (range: 8-15 cm) in the external sciaticus popliteus nerve, and it was treated with homolateral sural nerve graft (13 cases). Two cases of internal sciaticus popliteus nerve injury had an spontaneous recovery. The palliative phase: 9 tendinous transfers (posterior tibial tendon to front of the feet) in the cases were the length of the external sciaticus popliteus nerve injury was larger than 10 mm and/or had more than 6 months of evolution.
Discussion: These are injuries that generate a big number of surgical procedures and a long time of inability. The forced valgus mechanism and/or hyperextension of the knee, produces the ligamentous and nerveous injury. Even though from the lesional mechanism you would expect a lesion in the posterolateral complex, in our series we could only demonstrate the injury in two cases. Different authors say that the quick revision of the nervous lesion does not solve the problem, because the macroscopic visualization of the nerve don't allow you to establish the severity of the nervous lesion, or the length of it, unless there is a total rupture of the nervous trunk.
To delay the surgery is a therapeutical option, reducing the joint stiffness, and waiting for the evolution of the nervous lesion until we can decide if the reparation/revision of the external sciaticus popliteus nerve (<6 months) is needed. In a delayed phase we could do the ligamentous reparation and nervous reparation at the same time.
Conclusions: The posterolateral corner lesion does not need reparation in many cases when the patient has a subacute o chronic lesion of the central pivot associated to a peripherical nervous lesion. The nervous reparation only has good results when the length of the lesion of the CPE is less than 8 mm long and has less than 6 months of evolution. Outside of these criteria, we should associate in the same surgery the reconstruction of the central pivot and the nervous graft with a palliative tendinous transfer.

P15-44
Double-bundle anterior cruciate ligament reconstruction using hamstring autografts and bioabsorbable interference screw fixation. Prospective, randomized clinical study with two-year results
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Aims: Conventional anterior cruciate ligament reconstruction techniques have focused on restoration of the anteromedial bundle only, which, however, may be insufficient in restoring the rotational stability of the knee. The aim of this study was to evaluate the clinical results of a new anatomical double-bundle ACL reconstruction using doubled semitendinosus- and doubled gracilis-autografts with bioabsorbable interference screw fixation and two tunnels in both femoral and tibial side. The 2-year clinical results are reported and compared in a prospective and randomized manner to single-bundle 4-stranded hamstring autograft technique using either bioabsorbable or metallic interference screw fixation.
Methods: 77 patients were randomized into three different groups of anterior cruciate ligament reconstruction with hamstring tendons: double-bundle with bioabsorbable screw fixation (n = 25), single-bundle with bioabsorbable screw fixation (n=27), and single-bundle with metallic screw fixation (n=25). The evaluation methods were clinical examination, KT-1000 arthrometric measurement, and the International Knee Documentation Committee and Lysholm knee scores.
Results: There were no differences between the study groups preoperatively. 73 patients (95%) were available at a minimum two-year follow-up (range, 24 to 35 months). The rotational stability of the knee, as evaluated by the pivot shift -test, was the best with the patients in the double-bundle group. Also, the anterior stability of the knee tended to be better in the double-bundle group than the single-bundle groups, although the group differences were not statistically significant. In addition, the patients in the single-bundle groups had more graft failures than those in the double-bundle group. Concerning the knee scores (IKDC, Lysholm), no significant differences were found between the groups.
Conclusions: Rotational stability of the knee is better when using the double-bundle technique instead of the single-bundle technique in ACL reconstruction. Also, the study suggested that the double-bundle technique was able to protect the knee from new injuries resulting in graft failure. The following years will reveal whether the double-bundle reconstruction can also protect the joint from degenerative changes.

P15-70
Short term follow-up of double bundle ACL reconstruction using hamstring tendon fixed with Ligament Plate®
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Aims: We report on minimum 1 year follow-up of double bundle ACL reconstruction using hamstring tendon with Ligament Plate® (Solco, Seoul, Korea)
Methods: We evaluated 35 patients who underwent double bundle ACL reconstruction surgery using hamstring tendon fixed with Ligament Plate® and could be followed-up more than 1 year. Semitendinosus tendon were used for reconstruction of anteromedial bundle of ACL, Gracilis tendon were used for reconstruction of posterolateral bundle of ACL. For femoral fixation, anteromedial bundle was suspended in Ligament Plate® and posterolateral bundle was first linked with Mersilene tape® (5-mm width; Ethicon Inc, Somerville, NJ) and suspended in Ligament Plate®. For tibial fixation, we used double post-tie by 5-0 Ethibond strengthened with cortical screw. Average follow-up was 14.8 months (12-20 months). Prior to surgery and at the follow-up examination, we evaluated the clinical results with Lysholm score, IKDC score, Lachmann test, pivot shift test, and the difference of midthigh circumference, and joint laxity was measured using a KT-2000 arthrometer. For radiographic evaluation, we analyzed knee radiographs including anterior drawer radiographs and evaluated the degree of tunnel enlargement.
Results: Lysholm score improved from 65.6 points to 92.8 points after operation. In the IKDC objective score, group C was 29 patients, group B was 6 patients prior to surgery, Group A was 19 patients, group B was 16 patients at the final evaluation. Lachman test showed negative findings in 25 patients, grade 1 laxity in 10 patients after operation. Pivot shift test showed negative result in 29 patients and grade 1 laxity in 6 patients. The results of KT 2000 arthrometer improved from 4.3 mm difference compared with normal limb to 1.3 mm respectively. Midthigh circumference showed 2.0 cm difference compared with normal limb. Radiographic analysis of anterior drawer view revealed 4.8 mm difference compared with normal limb preoperatively and 0.6 mm difference at the last follow-up.
Femoral tunnel enlarged to 2.0 mm in anteromedial, 1.8 mm in posterolateral, tibial tunnel enlarged to 1.2 mm in anteromedial, 1.2 mm in posterolateral respectively.
Conclusions: Anterior cruciate ligament reconstruction using hamstring tendon grafts fixed with Ligament Plate® could provide more anatomic restoration of anterior cruciate ligament as well as good clinical results. However, a long term follow up will be required.

P15-79
ACL reconstruction using bone-patellar tendon-bone press-fit femoral fixation: Results at 15 years follow-up
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Introduction: Multiple techniques for ACL reconstruction for past years have been introduced. BPTB autograft still remains of the most widely used graft. One of the important factors in ACL reconstruction is a secure and stable graft fixation. The purpose of our study was to evaluate long-term clinical results of using bone-patellar tendon-bone femoral press-fit fixation technique for ACL reconstruction.
Materials and methods: Between January 1989 and December 1991, 199 patients, with the mean age of 30.3 years, underwent ACL reconstruction using BPTB graft with femoral press-fit and tibial interference screw fixation. 89% of patients declared practicing sports activity at different levels. The mean follow-up period was 15.1 years (range, 13.4-16.6 years). Patients were eval-

uated with the use of IKDC criteria, Lysholm Score and Tegner activity scale. Radiographs were assessed using Kellgren-Lawrence (K-L) Scale.
Results: 101 of 199 patients were evaluated at follow-up. According to the IKDC score 83% of patients had normal (A) or nearly normal (B) knee joints, 13% were abnormal (C) and 4% severely abnormal. The mean Lysholm score was 65.3 preoperatively and 91.8 at follow-up. The preopative Tegner activity level was 6.6 and 5.9 at follow-up. 80% of patients practicing sport could return to the preinjury activity and level. 18 patients needed revision ACL surgery. Comparing to preoperative status, in 27% of 101 patients osteoarthritic changes were observed at follow-up: 15% of K-L1, 8% of K-L2 and 4% of K-L3.
Conclusions: The femoral press-fit fixation is simple and cost-effective. It provides direct bone-to-bone healing of the graft and good stability. The use of this technique decreases donor site morbidity, avoids hardware problems and facilities revision surgery. Long-term results support BPTB femoral press-fit fixation technique as a reliable method for ACL reconstruction.

P15-86
Selective single bundle ACL reconstruction
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Biomechanical studies have established the dual role of the anterior cruciate ligament (ACL) in maintaining anteroposterior and rotational stability of the knee. Recently, different patterns of ACL tears with resultant characteristic instabilities have also been described. Conserving intact bundles of the ACL in partial ACL tears could prevent the recreation of new instabilities which have anecdotally arisen with previous techniques of complete ACL debridement prior to reconstruction.
We describe a technique of selective bundle reconstruction to deal with isolated anteromedial (AM) or posterolateral (PL) tears of the ACL and our early results compared to classic ACL reconstruction.

P15-112
Review of the outcome of the round cannulated interference screw (RCI) used for tibial fixation, in primary anterior cruciate ligament reconstruction using a hamstring graft
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The problem of femoral graft fixation in anterior cruciate ligament (ACL) reconstruction is largely solved with the endobutton. Tibial fixation is controversial with the desire to have fixation close to the joint line. Round cannulated interference (RCI) screws are attractive as they are entirely intraosseus and give fixation close to the joint line.
Purpose: To review this form of fixation, the problems associated with the RCI and failure of the graft.
Method: 217 patients who received a quadruple strand semitendinosus-gracilis tendon graft for athroscopically assisted ACL reconstruction were reviewed. The patients were operated on between 11th August 2004 and the 31st January 2007. The mean age of the patients was 26.5 years (16-51 years). The tibial fixation used was an RCI screw, with standard endobutton femoral fixation used in every case.
Results: The RCI screw backed out in 3 patients (1.3%) and had to be removed. There were 9 (4.1%) complete ruptures, 2 (0.9%) 50% tears and one patient with a positive pivot shift and functional instability but the ACL appeared intact. All tears of the grafts occurred between five and thirteen months post-op. Seven of these were traumatic re-injuries. Nine of these went on to have a revision ACL reconstruction.
Conclusion: Despite the sharp appearance of the screw it does not appear to be implicated in the rupture of the grafts.

P15-115
An immunohistological study of changes in the collagen composition of tendon grafts in the bone tunnel
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Introduction: When a tendon is transplanted in a bone tunnel, such as in ACL reconstruction using the flexor tendon of a knee, changes in the tendon substance in the bone tunnel occur later than the maturation of the bone-tendon boundary surface. Therefore, it is necessary to accelerate and/or augment the remodeling of the transplanted tendon. However, previous studies examining this portion are mostly related to the histological changes of the bone-tendon boundary surface, attempts to accelerate and/or modify the changes, or changes in a transplanted tendon that is located in a joint cavity, and thus the biological changes of the substance of a transplanted tendon in a bone tunnel have not yet been clarified in detail. In this study, the process of the post-transplant re-formation of a transplanted tendon in a bone tunnel was observed in detail using an immunohistological method.
Methods: The tendons of the extensor digitorum longus muscle were transplanted into bone tunnels created at the proximal tibia of rabbits to create transplant models of tendons in bone tunnels. The rabbits were killed on Day 3 and at Weeks 2, 8, 6, and 12. The transplanted tendon and proximal tibial complexes were harvested, thinly sliced pieces which were observed using an optical microscope and a polarization microscope after H&E staining and immunostaining. Collagen type-I (COL1), type-III (COL3), CD31, and VEGF were used as targets of immunostaining.
Results: The transplanted tendons were evenly stained with COL1 in the early stages but were not stained with COL3. At Week 4, increases in cellularity, VEGF expression increase, and vascular (CD31-positive) invasion were observed inside the tendons. At Week 8, attenuation of COL1 inside the tendons and consistent augmentations of COL3 were observed, and at Week 12, the COL1 slightly increased again inside the tendons. Under a polarization microscope, Sharpey-like fibers were confirmed at Week 4 and no bone-tendon continuity was observed at Week 4, but more bone-tendon continuity was observed at Week 12. These fibers were composed of COL3, but at Week 12, similar fibers stained with COL1 were also observed.
Discussion: The tendon graft in the bone tunnel showed gradual remodeling from a structure in which COL1 was predominant to one including a large proportion of COL3. This change began as an increase in cellularity, VEGF expression increase, and vascular invasion into the tendon at 4 weeks. The expression of COL1 then decreased concomitantly with an increase in the homogeneous expression of COL3 in the tendon at 8 weeks. The structure formed by this combination of fibers would be expected to be mechanically weak. Subsequently, COL1 increased again inside the tendons, and fibers composed of COL1, which create bone-tendon continuity, were observed. Although it is unknown whether the composition of the Sharpey-like fibers changed from COL3 to COL1 or whether new anchoring fibers composed of COL1 were added, it is thought that this change may lead to an increase of tendon-bone adhesion.

P15-120
The effect of pregnancy on the knee joint laxity and proprioception
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Objectives: Women suffer 4-8 times the anterior cruciate ligament (ACL) rupture rate for the same sport as males. Before our study with the study group in Perugia (Let People Move Laboratory) we analyzed the hormonal factor of the possible reasons. Between the phases of the menstrual cycle there was no significal difference in ACL stiffness and proprioception. In the second part of our measurements in the University of Szeged (Hungary) we analyzed pregnant women because they have significantly higher sexual hormone levels.
Methods: Volunteers: 22 pregnant and 18 non pregnant women, the two groups were comparable. (normal distribution according to body mass index and age)
Measuring ACL laxity:
- KT2000 arthrometer (15,20,30 pounds force and maximal femoral-tibial displacement during 30° flexion of the knee). Detecting elongation of the ACL in millimeters. Measuring proprioception:
- Stabilometry: active and passive balance control with opened and closed eyes, detecting sway path, splitting to anterior-posterior and lateral axes.
- Joint position sense: Joint positions in 30, 60, 90 grad, measuring the differences between the sensed and real knee position 3 times)
Exclusion criteria:
Operated knee, knee instability
Results: The KT-2000 arthrometer measured significal differences between the elongations of ACL in the pregnant and control groups.
The non pregnant group sensed significantly better the joint positions.
With opened eyes the pregnants had significantly less total sway, with closed eyes there was no significant difference. Splitted to AP and lateral axes in pregnancy with closed eyes there was significantly bigger instability in the anterior-posterior axe.

Conclusions: According to the results and the well known fact the knees of pregnant women have increased laxity. We measured weaker joint position sense on the dominant leg. With open eyes the pregnants had significantly less total sway, with close eyes there was no significant difference. The increased weakness of the knee and the weaker proprioceptive perception to the anterior-posterior direction can be a reason for higher injury risk of the anterior crutiate ligament. It seems to be advantageous to give more specific advice for body training and sport during pregnancy. Some kinds of movement can be more risky when it contains more anterior-posterior kinetic components (stears). During the second half of pregnancy the hormonal influence is increasing, the injury risks are higher, more attention is needed. We continue the measurements to clarify the hormonal influence as injury risk factor during female´s sport activity.

P15-125

Patellar tendon versus doubled hamstrings ACL reconstruction. Results of a prospective, randomized trial at a minimum 4 years f-up

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ACL reconstruction requires the use of autologous tendons, allograft and synthetic substitutes with different methods of fixation intra and extra-articular, at the femoural and tibial sites. In the literature we found several studies that compare the reconstruction with patellar tendon and hamstrings. None of the studies show a statistically significant difference between the two methods, but there is a trend towards a better stability in the groups treated with patellar tendon. The objective of our study is to evaluate the subjective and objective results of these two different types of reconstruction techniques: The first group (A) includes patients treated by reconstruction with PTB fixed at femoural side with the byoabsorbable trans condilar system (rigid fix) and at the tibial side with osteoinductive interference screw. The second group (B) includes patients treated by reconstruction with DSTG fixed at femoural side whith endobutton CL and a double tibial fixation whith osteoinductive interference screw and cambra low profile. The study includes 100 patients operated between 2001 and 2003. The criteria for inclusion were: no previous knee surgery; controlateral normal knee; absence of significant degenerative changes; age less than 50 years; no other important ligament injuries associated. The patients were included in two groups: group A: PTB (50). Group B: hamstrings (50). As regards the pathologies associated were found 29 medial meniscus tears, 18 lateral meniscus tears, 6 chondral lesions of the medial condyle, 10 chondral lesions of the lateral condyle, 2 chondral lesions of the patello-femoral joint. Minimum follow-up was 4years. The Protocol on the evaluation includes preoperative and post operative examination whith IKDC score, physical examination, KT 1000, x-ray. There were no significant differences in terms of R. O. M between the two groups although four patients in the group A to have a deficit of extension between 3° and 5° while in group B a patient has a deficit of 5° extension and two patients have a deficit between 6°-8° of flexion. The evaluation of the stability showes at kt 1000 (maximum manual side to side) significantly better in the group a (2.1mm average) and in group b (average 2, 9 mm). There were no significant differences in subjective assessment of the symptoms between the two groups, although there is an increased patello femoral crepitation in the group A. The radiological evaluation according to the criteria of IKDC is considering the majority of patients in each group as normal although six patients in group A, and three patients in group B have slight degenerative changes. The final evaluation notes a higher incidence of normal results in group A. The results were good or excellent both using the patellar tendon and the doubled hamstrings. The better results in the group A are essentially due to a better stability objective assessed to kt1000. However in both groups more than 80% of patients evaluate the operated knee like normal and have a return to the same previous level of activity. The Group A presents a greater symptoms related to the harvest site (crepitation, lack of extension).

P15-165

Measurement of the anteroposterior and rotational knee laxity by a navigation system

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Objectives: Antero-posterior and rotational laxity are responsible for the knee functional instability after ACL rupture. The measurement of antero-posterior laxity by instrumental or X-ray techniques are accepted. However, the measurement of rotational instability is not commonly performed. Navigation systems might help in this measurement.

Methods: We routinely use a non image based navigation system (ORTHOPILOT TM, AESCULAP, RFA) during ACL replacement. 20 cases of ACL replacement have been analyzed. The anterior laxity was measured pre-operatively by dynamic X-rays at 25° of knee flexion. Intra-operative navigation was performed as usual. The anterior and rotational laxity at 25° of knee flexion was measured under maximal manual force before and after ACL replacement. The anterior laxity was measured post-operatively by dynamic X-rays at 25° of knee flexion.

The X-ray and navigated measurements on the same patient were compared a paired Student t-test at a 5% level of significance.

Results: There was a significant difference between navigated and radiographic measurements. However, this difference was less than 2 mm in most of the cases, and then considered as clinically irrelevant. There was a significant correlation between the two measurements.

Conclusion: The navigation system used allowed us measuring anterior and rotational laxity during ACL replacement. This measurement of the anterior laxity was correlated to the pre- and post-operative stress X-rays, and can therefore be considered as reliable. The intra-operative information might be relevant to control the quality of the procedure, and improve its reproducibility. Information about rotational laxity me be helpful, but their exact significance must be more precisely defined. The navigation system used allows an accurate measurement of the anterior laxity during ACL replacement, and also allows assessing the rotational knee laxity.

P15-179

Arthroscopic ACL reconstruction with semitendinosus/gracilis in outpatients and inpatients using Transfix®

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The rupture of the ACL is one of the most common sport injuries; witch often leads to a severe limitation of sport activity. The aim of a reconstruction of an ACL should be a stable knee without limitation through the harvesting of the allograft and the re-establishing of the physiological movement of the knee. The Semitendinosus and Gracilis tendon was favored by many surgeons for ACL reconstruction. Since 1999 we carry out the ACL-reconstruction exclusively with the hamstring allograft with the TransFix® technique. Between 1998 and middle 2005 we treated 140 patients (113 male, 27 female), the average of age was 28 years (16 - 57 years) which we observed retrospectively. The follow up could be performed in 104 patients. These patients were asked by questionnaire and re-evaluated, using Lysholm, IKDC and AQS1. 62 Patients had out patient surgery, the rest of 78 were inpatients and stayed for 3-5 days in hospital. 3 patients had a postoperative infection; one of these had an incompatibility of the absorbable screws we used. Two of these patients were outpatients. We had furthermore one Cyclops that had to be treated surgically. The IKDC score over all showed postoperative 82.94 points, the Lysholm score was 86.84 points in average. The subjective appreciation for the procedure in German school grades (1 best to 6 worst) was 1, 49 in average.

There was no significant difference of outpatients and inpatients. The TransFix® technique allows a stable fixation as well tibial as femoral near to the joint. Thereby one can avoid a windshield wiper and bungee effect and an early functional rehabilitation can be allowed. By using bio absorbable screws (Bio-TransFix®) a removal of metal is not necessary. The satisfaction of the patients is very high; this system can be used perfectly for outpatient ACL reconstruction.

P15-195

No intercondylar notch roof or PCL impingement after anatomical anterior cruciate ligament reconstruction in porcine model

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Purpose: The purpose of this study was to reveal the amount of impingement pressure on the roof and PCL. And to check the biomechanical strength in ACL reconstruction compared to the uninjured knee.

Materials and methods: Fifteen fresh-frozen non-paired adult pig knees were used in this study. The knees were first tested with the intact ACL. The ACL was transected, then, single bundle reconstruction was performed with an open technique using patella tendon autograft, and tested after reconstruction. Two femoral tunnels in the antero-medial (AM) position and High antero-medial (High-AM) position were drilled in each knee. The

Femoral High-AM tunnel was made at 11 o'clock in the right knee and 1 o'clock in the left knee. Two tibial tunnels were drilled in each knee in the antero-medial and postero-lateral (PL) positions. Using those tunnels, three separate ACL reconstructions were performed in each knee, tibial AM tunnel to femoral AM tunnel (AM to AM), tibial PL tunnel to femoral High-AM tunnel (PL to High-AM) and tibial AM tunnel to femoral High-AM tunnel (AM to High-AM). Pressure measuring films (Super-low and Ultra-super-low Range Prescale, Fuji Film, Japan) were then inserted between the ACL and intercondylar notch, or ACL and PCL. Knees were then moved from their maximum flexion to their maximum extension. The pressure measuring films were scanned after the experiment and the images evaluated by specific software. Anterior tibial translation (ATT) was tested in ACL intact, AM to AM and PL to High-AM ACL reconstructions using a robotic/universal force-moment sensor testing system. AM to High AM ACL reconstruction group was not tested in ATT. Anterior tibial load was performed at 70N. The test was performed at 30, 60 and 90 degrees of knee flexion.
Results: There were no significant differences between the values of roof or PCL impingement pressure in ACL intact and AM to AM ACL reconstructed knees. PL to High-AM ACL reconstruction knees also had no significant differences in roof or PCL impingement pressure compared with ACL intact or AM to AM ACL reconstruction knees. Only AM to High AM ACL reconstructed knees showed significantly high impingement pressure compared with other groups. In the anterior tibial translation examination, there was a statistical difference between AM to AM and PL to High-AM ACL reconstruction in 30, 60 and 90 degrees of knee flexion ($p < 0.05$).
Discussion: This study, AM to AM ACL reconstruction did not cause roof or PCL impingement when compared with ACL intact knees. In the AM to AM ACL reconstruction, each tunnel was made in the correct anatomic insertion site, and therefore, should be considered an anatomical ACL reconstruction. Historically, to avoid roof impingement, posterior tibial tunnel placement has been recommended. When the femoral tunnel was made using transtibial technique from posteriorly placed tibial tunnel, the ACL reconstruction would be similar to PL to High-AM ACL reconstruction. This technique has been widely used as an isometric (non-anatomical) ACL reconstruction. This study revealed that, even when the tibial tunnel was placed anteriorly, an anatomically placed femoral tunnel could prevent the incidence of roof impingement. However, neither anatomical (AM to AM) nor non-anatomical (PL to High-AM) ACL reconstructed knees caused roof and PCL impingement, anatomical ACL reconstruction restored better anterior tibial translation than non-anatomical ACL reconstruction.

P15-217

A new technique in anterior cruciate ligament reconstruction to balance the tension of the graft tendon and the contralateral anterior cruciate ligament

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Background: The purpose of the study was to evaluate whether anteroposterior translation (APT) after ACL reconstruction with intraoperative balancing of the transplant tension to that of the contralateral ACL could be obtained at follow up. Additionally, differences of APT's following ACL reconstruction using either autologous patella bone-tendon-bone (BTB) or autologous quadriceps-tendon-bone (QTB) were assessed.
Methods: In a consecutive series of 44 patients (44 knees), ACL deficiency was treated in 30 patients (median age: 33, 16-58, 20 male, 22 right knee) with BTB- and in 14 patients (median age: 31, 17-50, 8 male, 10 right knee) with QTB-reconstruction. APT was evaluated in 20° knee flexion in the affected and healthy contralateral knee using the Rolimeter®. Measurements were performed in both knees preoperative, during, and immediately after ACL-reconstrucion, as well as 3, 6 and 12 months postoperatively in triplates. For statistical analysis the non-parametrical Kruskal-Wallis Test (post test: Dunn´s Test) was used.
Results: Statistically significant decreases of APT were observed between pre- and intraoperative measurements in the BTB- and the QTB-group due to ACL reconstruction (11.1±2.0 to 6.3±0.7mm; $p<0.001$ in the BTB and 11.1±2.3 to 6.8±1.2mm; $p<0.001$ in QTB group). At the intraoperative measurements, there were no differences in APT between the contralateral healthy knee and the reconstructed knee in both groups. During the follow up, significant loss of APT in the balanced reconstructed knees were only observed in the BTB group after 12 months (6.3±0.7 to 7.5±1.2mm; $p<0.05$).
Conclusion: After reconstruction of the ACL, BTB- and QTB-ACL-reconstruction groups, yielded the same anteroposterior translation (APT) as contralateral healthy knees. This new intraoperative technique provides ACL reconstruction with balancing of the anteroposterior knee translation of the healthy contralateral knee. An increase in APT could be observed 12 months after ACL reconstruction only in the BTB group. Further research is necessary to assess whether QTB-ACL-reconstruction should be preferred regarding preservation of the initial ligament tension at follow up.

P15-220

Comparison between single and double bundle ACL reconstruction using a two-incision technique. Two-year results of a randomized clinical trial

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Introduction: The aim of this study was to compare the clinical outcome results of single and double bundle ACL reconstruction using a two-incision technique.
Methods: Seventy patients with a chronic unilateral ACL rupture who underwent arthroscopic assisted ACL reconstruction using a hamstring graft were randomized to receive a single (SB) or double (DB) reconstruction. Both groups were comparable with regard to demographic data, preoperative activity level, injury mechanism, injury to surgery interval, and the amount of knee laxity preoperatively. A double incision outside-in surgical technique was adopted. The incidence of meniscal lesions was comparable between the two groups. On the tibial side the AM guide wire was drilled using a 65° Howell Tibial Guide. In the DB group the PL guide wire was inserted using a prototype rod guide which refers to the AM tunnel and places the PL wire with a fixed direction and distance (9 mm). On the femoral side, in the case of DB, with the knee at 90° of flexion we chose the insertion points starting from the AM which was placed near the posterior cartilage below the OTT. A Shino guide was used for this purpose. The PL insertion point was automatically defined by the prototype rod guide based on the AM tunnel. The distance to the first pin was fixed (9mm). With the knee at 90° of flexion the exits of the two tunnel were almost parallel to the tibial plateau. In the case of the SB, the femoral insertion was selected anatomically in between the AM and PL insertion points. In both groups the pretensed graft was fixed, after looping the hamstrings around a bony (DB) or a metallic (SB) bridge on the tibial side and with RCI screws reinforced with one staple on the femur. In the DB group the PL bundle was fixed first with the knee in extension with manual tension. The AM bundle was fixed second at about 30° of flexion with the same tension. In the SB group the graft was manually tensioned and

fixed in extension. The same slow rehabilitation protocol was adopted. Outcome assessment was performed by an independent observer, blinded with regard to the involved leg and the type of reconstruction employed, using the VAS, the new International Knee Documentation Committee form, the Knee injury and Osteoarthritis Outcome Score, and an arthrometric KT-1000 evaluation.
Results: All the patients reached a minimum follow-up of two years. No differences between the two groups were observed in terms of overall KOOS, IKDC subjective score (79 DB and 77 SB). A statistically significant difference in favour to DB group was found in the VAS (7.9 DB vs 6.9 SB; $p<0.05$). A significant increased number of patients in DB group was able to return to level 1 or 2 sports activities (42% DB vs 22% SB; $p<0.04$). The objective IKDC final scores showed no differences between the two groups (Normal: 77% DB and 63% SB). There were one failure in DB and two in SB group. The KT data showed a statistically significant decrease in the average side to side anterior translation (ATT) in the DB group(1.1 mm DB vs 2,1 mm SB; $p<0.03$). A normal side to side anterior tibial translation (0-2 mm) was found in 86% in SB and in 74% in DB knees. The incidence of a residual pivot shift "glide" was 14% in DB and 20% in SB group.
Conclusions: At two-year follow-up the DB ACL reconstructions shows better VAS, sports activity recovery, and average ATT than the SB.

P15-226
Reconstruction of the anterior cruciate ligament with bioresorbabile fixation: Comparison of patellar bone-tendon-bone and hamstring tendon graft methods - a five years clinical study
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Purpose of the study: The high number of patients with femoropatellar complaints following ACL reconstruction with bone-tendon-bone (B-T-B) autograft led us to use and subsequently evaluate hamstring tendon grafts fixed with the Rigidfix system. In this study we present the evaluation of short-term results.
Material: We evaluated 265 patients (151 male and 114 female) at an average follow-up of 18 months. The average age of the group was 29.7 years (range, 16 to 59 years). In 146 patients we treated the right knee and in 119 patients the left knee. Fifty-five patients in this group also had an associated injury to the soft knee tissues. For reconstruction, a semitendinosus-gracilis quadruple tendon graft was use in 165 patient and BTB in 100.
Methods: The operation was carried out with tourniquet application to the extremity in a flexed position. The tendons of the semitendinousus and gracilis was harvested through an oblique incision and, in some cases, when its width and length was not sufficient for graft construction, the gracilis muscle tendon was harvested too. The graft, at least 75 mm by 8 mm in size, was prepared on a graft board. After having drilled the both tunnels, the femoral Rigidfix reamer was inserted in a routine manner and protective sleeves for Rigidfix cross pins were introduced. With the extremity in semiflexion, the inserted graft was fixed to the cortical bone by absorbable cross pins on the femur and absorbable interference screws on the tibia. The postoperative treatment involved procedures as in the B-T-B technique.
Results: The group was evaluated by the Lysholm score system, with an average of 84.3 scores achieved. The men showed better outcomes than women, i. e., 85.7 and 81.4, respectively. The scores in the patients with a combined tendon (semitendinosus, 83.2 vs. semitendinosus-gracilis, 84.2), nor did they greatly differ between the patients with injury to ACL alone and those with ACL and associated soft tissue injuries (ACL, 83.9 vs. ACL+ associated injury, 85.5). Most of the patients (94 %) were satisfied with the outcome of treatment. The complications involved thrombosis of the operated lower extremity in three patients and repeat surgery for hematoma in two patients. Knee instability was found in five patients. One graft failed to restructure and incorporate, in two knee tunnels were incorrectly centered and two grafts ruptured due to trauma. Three of these patients underwent repeat surgery.
Discussion: Our results, as evaluated by the Lysholm score system, were in agreement with those of other authors. We did not find any difference in knee stability between the patients treated by the hamstring tendon technique and those undergoing reconstruction with a patellar B-T-B autograft. However, the patients with hamstring tendon reconstruction reported a considerably lower number of femoropatellar problems.
Conclusions: ACL reconstruction with a hamstring tendon autograft fixed with the Rigidfix system is a suitable alternative technique to ACL reconstruction carried out with a patellar B-T-B graft. It provides equal knee stability but has significantly lower donor site morbidity. It is suitable for patients who have contraindications for the B-T-B technique and in persons practicing little or no sports.

P15-237
Pullout reattachment of tibial avulsion fractures of the anterior cruciate ligament: a firm, effective suture-tying method using a tensioner
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Purpose: To evaluate the clinical usefulness of suture-tying method using a tensioner for reattaching tibial avulsion fractures of the anterior cruciate ligament (ACL).
Methods: Between January 2004 and October 2005, five isolated tibial avulsion fractures of the ACL were treated operatively using the arthroscopic pullout reattachment technique with four No. 0 Ethibond sutures and with the assistance of an ACL tie tensioner (DePuy-Mitek, Norwood, MA, USA). Four patients were male, and one was female. The mean patient age was 15 (13-19) years.
Results: In all cases, anatomic reduction was achieved without fixation loosening during suture tying. Clear bone union of the avulsed tibial fracture of the ACL in the postoperative follow-up simple radiographs was identified at the eighth postoperative week in four patients with acute avulsion fractures, and at 13 weeks in one patient with non-union of the avulsed fracture. There were no intraoperative or postoperative complications including recurrent displacement of the reduced fracture fragment, or motion limitation. At last follow-up, the anterior drawer, Lachman, and pivot shift tests were negative, and the KT-2000 knee stability test showed no anterior instability exceeding 3 mm. All of the patients subsequently returned to their preoperative activity levels.
Conclusion: Our simple method achieves strong, firm reattachment of the tibial avulsion fractures of the anterior cruciate ligament fracture. In addition, it prevents fixation loosening during suture tying effectively.
Keywords: Anterior cruciate ligament, Tibial avulsion fracture, Pullout reattachment, Tensioner

P15-239
Patellar inferior pole: New landmark of the anteromedial working portal for the arthroscopic surgery of the medial meniscus posterior horn
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Purpose: We evaluated the clinical usefulness of the patellar inferior pole (PIP) as a new anteromedial (AM) portal landmark.
Methods: Group 1 (50 normal right knees in young adults) and Group 2 (50 knees undergoing elective arthroscopic surgery for relatively simple intraarticular pathologies, or diagnostic arthroscopy in various aged adults) were included. Knees with patella alta or baja, ligament injury, joint stiffness, or intraarticular fractures were excluded. In both Groups, 30° flexion true lateral plain radiographs of the knee were obtained, radiological measurements among the CNU (Chungnam National University) AM portal line, line A, point B, length C, D, E, and C-D percentage were performed, and measured results were compared. Also, in Group 2, we made an AM portal on the PIP level by a direct blind skin incision while the knee was in 30° flexion, and analyzed how freely the instruments inserted through the AM portal reached the meniscocapsular junction on the undersurface of the medial meniscus posterior horn (MMPH) and the body of lateral meniscus (LM) using a scoring system of our own design.
Results: Measured data on the plain lateral radiographs had no significant differences between two groups ($P = 0.53$ and 0.09). On evaluating the usefulness of our AM portal using our scoring system in Group 2, 49 knees were classified as good (2 points) for the MMPH. For the body of LM, 48 knees were classified as good. The range of length E was broad in both Groups.
Conclusions: PIP can be used as a new landmark for AM portal.
Clinical Relevance: PIP is useful as a landmark for the AM portal because it can be identified easily and precisely on the skin, and AM portal made on PIP level was effective for instruments inserted reach the MMPH and body of LM.
Key Words: Knee, Arthroscopy, Anteromedial portal, Patellar inferior pole

P15-246

Elongation of simulated whipstitch post anterior cruciate ligament reconstruction tibial fixation after cyclic loading

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Introduction: Whipstitch-post (WSP) tibial fixation for four-strand hamstring (4HS) or other soft tissue Anterior Cruciate Ligament reconstruction (ACLR) has the attributes of rigid cortical anchorage, secure grip on the tendons, and the ability to fixate smaller lengths of graft in the tunnel, i.e. a shorter graft, than is possible with interference screw based or other friction fixation devices; without the known slippage risks of friction fixation methods. However, some consider the method prone to laxity and have doubted whether the suture-tendon weave can withstand cyclic loading without excessive elongation. Our purpose was to test the hypothesis that WSP would have low elongation rates after experimental cyclic loading.
Materials: Eight cadaveric human Semitendinosus and Gracilis (ST/Gr) tendons had whipstitches woven into their overlapped ends. The grafts were looped around a metal bar, tied to a post and cyclically loaded.
Results: The adjusted mean experimental graft elongation for the WSP was 1.13mm with a maximum elongation of 1.64mm and a standard deviation of 0.32. These values are equivalent to the lowest published cyclic loading tibial fixation elongation data.
Conclusions: Whipstitch-Post Tibial ACLR Fixation is biomechanically sound with among the lowest rates of elongation rates after laboratory cyclic loading.

P15-256

Anterior cruciate ligament reconstruction with quadriceps tendon without bone component

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Introduction: We performed anterior knee cruciate reconstruction with autogenous quadriceps tendon graft, without patellar bone component.
Objective: To evaluate both stability and progress of articular function in the medium term.
Patients and Methods: Between November 1997 and June 2003, 21 patients with symptomatic injury of the anterior cruciate ligament were submitted to reconstruction with a graft of the central third of the quadricps tendon fixed to the femur and tibia with absorbable screws. The results were evaluated according to the IKDC form in the postoperative period and to Lysholm scores during the pre- and postoperative period.
Results: Twenty-one patients were evaluated with a mean follow-up of 65.8 months (31-68). Ten patients presented isolated ACL injury. In 7 patients the ligament injury was associated with an injury of the medial meniscus and in 4, with the lateral meniscus. In the preoperative period the found mean of the Lysholm score was 51.48 points (22-86) and in the postoperative, 88.92 points (66-100). There was a statistically significant improvement ($p<0.05$). Postoperative analysis by IKDC showed 3 patients with normal, 17 with almost normal and 1 with abnormal result.
Conclusion: Using this procedure, most knees remained stable on examination. There was improvement in function of the operated knees. No disorders were observed in the quadriceps donor area. There was improvement regarding pain and instability sensation. These results are comparable to those found with other types of autogenous grafts.

P15-316

Effects of donor site morbidity on strength recovery after anterior cruciate ligament reconstruction

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Introduction: The bone-patella-bone(BPB) and hamstring(HS) autografts remain the commonest sources of autografts for anterior cruciate ligament (ACL) reconstruction. Early complications after ACL reconstruction are largely related to graft site morbidity and functional strength deficits.
Aim: To study the effect of autograft harvesting on quadriceps and hamstring deficits and return to functional activities.
Method: Patients with autograft reconstruction of the ACL from January 2005 to December 2006 underwent strength testing of bilateral quadriceps and hamstrings on the Biodex machine at 3 months after surgery. Return to functional activities was allowed if both sets of muscle exhibited strength recovery of 75% or more in comparison to the contralateral lower limb.
Results: One hundred and thirty-two males and 24 females underwent BPB and HS reconstruction of the ACL. Amongst males, BPB harvesting led to significant quadriceps deficit (35.2%(BPB) versus 25.0%(HS)), ($p=0.003$) while hamstring deficit was not significant (9.6%(BPB) versus 15.0%(HS)). Conversely, females exhibited significant hamstring deficits (4.1%(BPB) versus 25.7%(HS))($P=0.001$) with hamstring autografts.
Return to functional activities was significantly slower in males with BPB grafts (mean 128.0 days, S.D.46.0) compared to HS (mean 105.9 days, S.D. 38.9), ($p=0.042$). Autograft type had no significant effect on return to activities amongst females.
Discussion and Conclusion: Donor site morbidity still affect deficits in strength recovery by 3 months after ACL reconstruction, with a possible difference in muscle group response among the sexes.
Quadricep strength deficits remain significant among male patients 3 months after surgery, and affect return to functional activities.

P15-319

ACL partial recostruction: it is a useful techinique?

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The routinely use of the double bundle Anterior Cruciate Ligament (ACL) reconstructive surgery, in the last few years, improved knowledge about the different anatomical and biomechanical properties of the ACL. Consequently more attention has been made regarding the different type of anatomical findings on the native ACL, before the reconstruction, in order to accurately differentiate the different bundles involved on the lesion.
Aim of the present study was to comparatively evaluate the results between full or partial ACL rupture reconstruction according to the anatomic AM and PL bundle differentiation, at a mean follow up of 1 year after surgery.
Between January 2004 and December 2006 we performed 115 ACL reconstruction using hamstring fixed with Endobutton (Smith & Nephew®) on the femoral side and BIORCI interference screw (Smith & Nephew®) on the tibial side.
Of the entire group of study, 17 patients underwent partial reconstruction (6 woman and 11 man). On 5 case PL bundle was involved on the lesion and the reconstruction was obtained with gracilis tendon while on 12 cases AM bundle was torned and the reconstruction was performed with semitendinosus using the same fixation technique as previous description in both cases.
All patients were followed up by clinical and instrumental assessment criteria at 1, 3, 6, months after surgery. Clinical assessment (functional and for pain) was performed with IKDC, Tegner and VAS score. Instrumental evaluation was performed with KT-1000 to test the laxity. Radiographic assessment immediately after surgery and one month later was performed using standard view.
All patients utilized the same rehabilitation protocol that patients begun the day after surgery using CPM and walking with crutches full weight bearing.
At the end the group of study was divided in two groups: Group A (98 patients), 4 strand hamstring total ACL reconstruction , and group B (17 patients), two strand hamstring (semitendinosus or gracilis) for partial ACL reconstruction.
All patients within group B had a better VAS score on the week after surgery and easily return to full range of motion. Tegner with return to previous sport activity level also was faster on the partial reconstruction group. IKDC at 6 month doesn't show any appearing difference with good or excellent results on 97% of cases. No recurrences on ligamentous laxity were observed as well as difference between AM or PL bundle reconstruction.
We conclude that on respect of anatomy, partial reconstruction of ACL, when possible, give an easier functional recovery.

P15-338

Femoral cross pin (RIGIDfix) or absorbable screw (BioScrew) fixation vs. tibial expansion bolt (Intrafix) or absorbable screw (BioScrew) fixation in ACL reconstruction with hamstring tendons. Randomized prospective study of four groups with 2-years follow-up

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Objectives: To find out if there is a different clinical outcome after either cross-pin or absorbable interference screw fixation in the femur and after either expansion bolt or absorbable interference screw fixation in the tibia in

anterior cruciate ligament (ACL) reconstruction with hamstring tendons.
Methods: 120 patients were randomized into 4 groups in ACL reconstruction with hamstring tendons:
1. femoral RIGIDfix cross-pin ("RIGIDfix") and tibial expansion bolt (Intrafix, n=30),
2. RIGIDfix femoral and interference screw tibial fixation ("BioScrew", n=30),
3. BioScrew femoral and Intrafix tibial fixation (n=30) and
4. BioScrew fixation into both tunnels (n=30). The evaluation methods were clinical examination, KT 2000 laxity and Lido isokinetic muscle torque measurements as well as IKDC 2000 classification and knee score, Tegner activity level, Lysholm knee and Kujala patellofemoral scores.
Results: There was a higher preoperative Tegner activity level in the RIGIDfix / Intrafix group (P=0,0240) and the preoperative isokinetic flexion torque at 180 dec./sec was better in the groups with BioScrew / Intrafix and BioScrew / BioScrew fixation (P=0,0316), but otherwise no differences between the study groups were observed.
For the 2-years follow-up 107 patients were present (89%). The evaluation methods disclosed no statistically significant differences between the groups at the 1- or 2-years follow-up examinations. Two years postoperatively the median Tegner activity level ranged from 6 to 7, Lysholm knee score from 94 to 95 and IKDC score from 90 to 91 among the randomization groups. The mean KT 2000 manual maximum side-to-side laxity difference ranged from 1,4 mm to 2,7 mm. At the two years follow-up all but two patients in the RIGIDfix / Intrafix and RIGIDfix / BioScrew groups, respectively, were classified into IKDC A or B categories. A revision reconstruction was performed before the 2-years follow-up in two cases after a high energy injury had caused a re-rupture (one in RIGIDfix/Intrafix and one in BioScrew/BioScrew group). In addition, there were 4 non-traumatic failures; two in RIGIDfix / Intrafix group, one in RIGIDfix / BioScrew and one in BioScrew / BioScrew groups.
Conclusions: There were no statistically or clinically relevant differences in the results 1- or 2-years postoperatively and all four fixation techniques improved patients' performance.

P15-345
Must varus alignment be corrected with an ACL reconstruction?
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Introduction: Varus thrust of the knee is a dynamic worsening of a preexisting varus angle. It is suspected to be a killer factor in ACL reconstructions. It is however not known if there is a direct relation between varus thrust and increased ACL tensions. It is also not clear whether a varus alignment should be treated before an ACL reconstruction is performed. The goal is to give recommendations for the treatment of unstable varus aligned knees with an ACL deficiency.
Hypothesis: The hypothesis was that forces in the ACL would increase with increasing varus alignment, especially when a varus thrust was present and that an ACL deficiency leads to a more pronounced varus thrust.
Methods: Six human cadaver legs were axially loaded with three different weightbearing lines (WBL), creating a varus moment. The lateral tibiofemoral compartment opening and ACL tension was measured.
Results: In the neutral aligned legs, there was no apparent lateral compartment opening and no ACL tension change was noted. The varus moment increased in the 50% and especially the 100% weightbearing situations. The thrust was more pronounced in 10° knee flexion compared to knee extension. In the 100% WBL the ACL tension was significantly higher when a thrust was present. In the absence of an ACL there also was significantly more varus thrust.
Conclusions: There is a significant correlation between varus thrust and ACL tension. In the absence of an ACL the thrust tends to increase.
Clinical Relevance: In the unstable ACL deficient knee with a varus alignment, it is recommended to correct the varus angle with a high tibial osteotomy in order to minimize the chances of an ACL reconstruction failure.

P15-354
Tibial translation and muscle activation during rehabilitation exercises 5 weeks after anterior cruciate ligament reconstruction
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Introduction: It is unclear which rehabilitation exercises are appropriate, regarding adequate muscle activation without excessive anterior tibial translation, 5 weeks after ACL reconstruction.
Objective: to compare different rehabilitation exercises regarding dynamic anterior tibial translation and muscle activation 5 weeks after ACL reconstruction.
Methods: Sagittal tibial translation and muscle activation were registered during the Lachman test (static translation) and 7 rehabilitation exercises (dynamic translation) on 19 patients (11 men and 8 women). The ACL reconstructed knee was assessed 5 weeks after an ACL reconstruction with a quadruple hamstring tendon graft. Tibial translation was registered with the CA-4000 electrogoniometer and muscle activation was registered with surface electromyography on vastus medialis and lateralis, hamstrings, gastrocnemius and soleus.
Results: Exercises performed with a straight leg, i.e. heel raise, standing on one leg and straight leg raise, produced less anterior translation than the maximal anterior translation at Lachman test 90N ($P < 0.041$). Exercises with greater ROM in the knee joint, i.e. seated knee extension (ROM (0)-3-94°), gait (ROM (0)-6-38°), squat on one leg (ROM (0)-4-61°), and squat on two legs (ROM (0)-1-77°), did not differ in maximal anterior translation from the amount of anterior translation produced at the Lachman test. Seated knee extension produced more anterior tibial translation compared to the straight leg raise and standing on one leg ($P \leq 0.046$). Moreover, the EMG activation in vastus medialis and lateralis was greater during the seated knee extension and squat on one leg compared to heelraise and standing on one leg ($P \leq 0.038$).
Conclusions: Different exercises produced different amount of anterior tibial translation and muscle activation. In order to protect the graft from excessive strain, the straight leg raise may be preferable for quadriceps training in the early phase after ACL reconstruction.

P15-355
Iso anatomical ACL reconstruction using a two incision technique
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Objectives: Despite the high long term success of anterior cruciate ligament reconstructions, 10 percent of patients undergoing this primary procedure have recurrent disability and graft failure. Non-anatomic tunnel positioning (primary of the femoral tunnel) acounts for most of all technical failures. We hypothesized that reconstructions that closely recreate the oblique femoral attachment of the ACL would result in more normal knee rotational stability than more vertical reconstruction. The purpose of this study was to determine whether obliquity of the femoral tunnel in the coronal plane has an effect on rotational constraint after ACL reconstruction,as measured by anterior tibial translation and rotation.
Methods: 51 patients with ACL deficiency were included in a retrospective trial with a follow up period of 24 months. Evaluation at 2 years was done using the IKDC, Tegner activity scale and a Lysholm score. Clinical test including a KT 1000, manual lachman test,anterior drawer and range of motion. Donor site morbidity and pain at the second incision were measured.
Results: There were good scores of the IKDC, The Lysholm scores. Tegner activity score was decreased by one point. The KT 1000 arthrometer laxity measured a significant difference between the ipsilateral and contralateral leg, but within 3 mm.in all cases. We could not find a better rotation stability compared to literature. We did found donor site morbidity in 50 percent! pain at the lateral incision was found in 5 percent.
Conclusions: 2 years after ACL reconstruction using the 2 incision technique the subjective and objective outcomes were similar compared to literature. We did found a high percentage of donor site morbidity. We could not measure a better rotation stability with this technique.

P15-365

DVD-supported home training versus group training for cruciate ligament patients observed from a health economic and outcome measurement perspective

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Purpose: The purpose for this study is to develop and test the DVD as a media in connection with the rehabilitation of patients, who have had an operation for reconstructing the cruciate ligament, and the study shall form the underlying basis for the decision-makers and the leaders in order of priority of what kind of rehabilitation there should be offered cruciate ligament patients the first three month after the operation.

This is observed from two economic perspectives, the societal perspective and from health sector perspective, and it observed in the light of cost-effectiveness, given that the municipalities 1.st of January 2007 will take over the responsibility for the rehabilitation.

Study Design: The study is a cost-effective description, and the outcomes are found in a randomised clinical trial (RCT). Baseline data (two weeks after surgery) in the RCT-study are compared with data from the first follow-up (13 weeks after surgery).

The methods, which are used during the economic analysis, are the cost-effectiveness and the cost-utility analysis, seen from the societal perspective plus a cash-economic analysis using the perspective of the health sector (the county). Here the use of resources is collected from four different standard procedures in rehabilitation of cruciate ligament patients.

Material and Methods: The costs estimates in the study are based on facts in a pilot-study implemented as a RCT between DVD-supported home training and physiotherapy supervised group training. Outcome measures are made for KOOS and EQ-5D. In addition physical outcome measurements are made for joint movement, stability and function of the knee. Alongside the RCT the economic calculations is conducted for the two procedures in the pilot study, where the cost-utility ratio is expressed in DK kroner pr. QALY, and a cash-economic analysis of four standard rehabilitation procedures in rehabilitation of cruciate ligament patients is observed.

Results: DVD-supported home training after cruciate ligament surgery gives at least the same outcome or better outcome than physiotherapy supported group training. The difference in the outcome measures are expressed in the EQ-5D and in the KOOS, where the DVD-group obtains a better outcome than the Physio-group. In relation to the physical measurements the outcomes are the same for the two groups.

When we se the outcomes compared against the economic consequences from the rehabilitation offer, we can conclude from the cost-effectiveness and the cost-utility analysis, that the DVD-offer both are cheaper and have the same and better outcome than physiotherapy supported group training. The DVD-rehabilitation offer therefore is the most cost-effective. Under certain circumstances there are even savings to be observed.

The cash-economic analysis of the four standard procedures shows, that Private Practice can be the cheapest offer or at least be very competitive in relation to the DVD-rehabilitation offer or a procedure similar to the one at Århus Sygehus, dependent on attendance to training one or two times a week.

Keywords: Cruciate ligament patients, Cruciate ligament, Rehabilitation, DVD-training, EQ-5D, KOOS, Cost-effectiveness, QALY, Cash-economic analysis.

P15-368

A review of the means of diagnoses of anterior cruciate ligament ruptures

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The vast majority of anterior cruciate ligament (ACL) ruptures are diagnosed by a good subjective history followed by an objective assessment. The value of the Lachman and pivot-shift tests in the diagnosis of ACL injury has been established. In cases of clinical uncertainty where there are multiple ligament injuries, where the knee is too painful or where the patient demands it, a magnetic resonance image (MRI) is performed. If the clinical assessment does not suggest an ACL injury, a tear may be discovered at arthroscopy.

Purpose: To identify each method of making an ACL tear diagnosis in a group of patients attending a single surgeon in an Irish Hospital and within the group critically identify the key factor upon which the diagnosis was made.

Method: 285 patients who underwent an ACL reconstruction, with a single surgeon, between the 1st of September 2004 and 30th of June 2007 were retrospectively reviewed. The mean age of the patients was 26 years (14-50 years).

Results: 206 (72.3%) were diagnosed at clinical assessment. 64 (22.5%) were diagnosed by MRI, as the clinical tests were inconclusive and 15 (5.2%) at arthroscopy. 4(1.4%) of the MRI's were false negative i.e. the ACL appeared to be in tact but following an arthroscopy it was found to be ruptured.

Conclusion: Although there are very few published evaluations of the accuracy of the clinical assessment the results of this review would be in keeping with the expected incidence of ACL's tears diagnosed during clinical assessment.

P15-373

X-base: Report from the Swedish national ACL register 2005-2006

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Objectives: A national quality register for ACL reconstructions was initiated in 2004 by a group of Swedish orthopaedic surgeons. It is under supervision of the Swedish Orthopaedic Society and run by members of the board. The aim of the register is to compare results of the various operative methods and techniques, to improve the outcome after an ACL reconstruction and to give an updated epidemiologic survey of ACL reconstructions and revisions in Sweden today.

Methods: All hospitals and private clinics in Sweden performing ACL reconstructions have been invited to participate in the register and each surgeon has been given a personal login. The surgeon enters patient demographics and peroperative data in the web-based dataset and the patient fills out KOOS (Knee Injury and Osteoarthritis Outcome Score) and Euroqual 5 preoperatively. Follow up questionnaires will be sent out after 1, 2, 5 and 10 years.

Results: In 2005 33 clinics and in 2006 39 clinics were participating in the register. The majority of these clinics perform less than 10 ACL reconstructions per year and only a very small number of surgeons perform more than 50.

In 2005 780(42%) women and 1095 (58%) men were registered and in 2006 this had increased to 894 (41%) women and 1287 (59%) men. The women were significantly younger at the time of the operation with a median age under 20 years. Soccer was by far the most frequent etiology of an ACL rupture with 790 (34% women and 66% men) patients in 2005 and 917 (34 % women, 66% men) in 2006. Alpine skiing, team handball and floor ball also had a high ACL-injury incidence. The total time between injury and operation was around 600 days, counting both acute ACL tears and chronic instability leading to operation. There were large regional variations that decreased from 2005 to 2006. 25-85 % of the operations were performed on a day-care basis, varying largely between different regions.

The choice of transplant and method of fixation is supposedly of great importance to the functional outcome. There are numerous alternatives, the most common graft to use was hamstring tendons in various combinations (83% 2005 and 88% 2006).

Larger variation is seen in fixation methods. In femur the rigifix was most frequently used but in 2006 there was a tendency to use more endobutton, screws and transfix than the year before. Fixation on the tibial side was clearly dominated both years by a screw or intrafix.

Associated injuries are common and several of these are risk factors for secondary osteoarthritis development. 20% had a lateral and 20 % a medial meniscus injury, cartilage lesions were seen in 10% of the patients and a medial collateral ligament injury in 5%.

Both knee function and life quality scores were decreased preoperatively but one year after the operation functional scores were generally high.

Conclusions: The register is a valuable tool to the knowledge of surgical treatment of ACL injuries and factors associated with the outcome. Annual feedback to involved clinics should be of imprtance to improve patient safety. There is still work to be done in all the Nordic countries to co-ordinate the world's potentially largest database for ACL injuries.

P15-376

Anterior cruciate ligament reconstruction with one-bundle hamstrings tendons autograph using navigation: anterior and rotational laxity, anisometry assessment

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Most of anterior cruciate ligament reconstruction with one-bundle failure would become from insufficiency of the graft in rotational loads. The purpose of this study is to evaluate the in vivo anisometry, anterior and rotational laxity.

Methods: 81 anterior cruciate ligament replacements were computer-assisted with ACL Logics Universal Julliard* software. All knees were operated with one-bundle hamstrings tendons autograph.For this study, the operated knee and non isolated LCA worn out were excluded. Manual and computer-assisted tunnel positions were noted. Anisometry, anterior and rotational laxity were controled within computer-assisted before and after reconstruction during surgery.

Results: The lachman anterior and rotative laxity before reconstruction was respectively 12±4 mm and 28°±9 with 10° minimum and 42° maximum. After transplantation, the lachman anterior laxity was 2± 2 mm and rotative laxity 22°±9 with 6° minimum and 42°maximum. Sagital and rotative laxity gains were significant ($p<0.001$ on correlation T-Test apparied series).The transplant anisometry mean was 3.4mm (1.5-10).

Discussion: In this study, the computer-assisted surgery was help to deplace more anteriorly the tibial graft insertion without gap notching. Furthermore, the femoral tunnel position with favourable anisometry confirm us that we replaced the anteromedial bundle. We found in one hand, as in litterature, a significant improvement in anterior lachman laxity but also a significant improvement in rotational laxity and however a great interindividual varibility. We could not noted instabilities in mesured rotational loads as described in other in vitro series wich concluded as a one bundle failure and double bundle success. The validation of these outcomes will need rotational laxity compared study in one bundle versus two-bundle hamstrings tendons autografts for ACL replacement.

P15-378

ACL reconstruction using navigation: a comparative study on 60 patients

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Purpose: The use of surgical navigation does it perform the results of reconstruct of ACL?

Type of Study: Randomized controlled trial

Methods: 60 ACLplasties with quadruple- loop semitendinosus and gracilis tendon were included in this study. The tibial and femoral tunnels were performed either with the classical instrumentation (groupI) or with informatic guides (group II) .The results were evaluated on clinical outcome based on IKDC form (laxity) and on radiologic assessment: radiological lachman (telos at 150 and 200N) and analysis of the position of the tunnels.

Results: No complication has been observed in both groups despite the fact that navigation resulted in extra operativ time. The rate of IKDC laxity was level A in 22 knees of group I with an average of 1,5 mm (0-6) at the telos at 200N. For 26 knees of group II the level of IKDC was A with an average of laxity of 1,3mm (0-5). The laxity was less than 2 mm in 96,7% of the navigated group (83% in non navigated group).On the tibia there exists a statistically difference ($p<0,037$) between both groups on the value ATB that characterizes the sagittal position of the tibial tunnel. If the value ATB is negative, there is impingement of the graft in extension. For the Conventional Group I, ATB = -1,2 (-5 ;4) while it is 0,4 (0 ; 3) in Group II. There is zero negative value of ATB in the Navigated Group II.

Conclusion: This study confirm the objectiv of ACL Logics Julliard protocol: optimization of favorable anisometry and use of a “third eye” to position the tibial tunnel in the projection of the notch arch.

P15-402

Investigation of preoperative and intraoperative bacterial contamination in ACL reconstruction

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Introduction: Although the infection rate after arthroscopic ACL reconstruction is low, this complication may give a substantial insult to the patient. Therefore, every attempt should be made to identify the source of contamination and take prophylactic measures. The purpose of this study was to investigate contamination of the swabs taken from various sites pre- and intraoperatively in patients undergoing ACL reconstruction.

Materials and methods: Thirty consecutive patients who underwent arthroscopic ACL reconstruction with hamstring tendon autograft were included. At the preoperative check-up, swabs were taken from the skin around the knee and the nose, while intraoperative samples were collected from the skin and the surface of the graft during ACL reconstruction.

Results: In pre-operative screening, the skin swabs showed contamination in 29 of the 30 samples (97%). The organisms isolated were Staphylococcus epidermidis in 23, methicillin-sensitive Staphylococcus aureus (MSSA) in 5, and methicillin-resistant Staphylococcus aureus (MRSA) in one patient. Additionally, 16 of 30 preoperative nasal swabs (57%) grew staphylococci. On the other hand, intraoperative culture testing of skin swabs revealed Staphylococcus epidermidis in 3, and MSSA in one patient. Specimen obtained from the graft during operation showed Staphylococcus epidermidis in 2 and MSSA in one patient.

Conclusion: Contamination was identified in majority of the preoperative and some of intraoperative swab samples. Organisms grown were Staphylococcuss epidermidis and aureus. Since these two organisms are the most common causative species in deep infection after ACL reconstruction, prophylaxis should be aimed at eradication of these potential sources of infection.

P15-406

The first results from the Danish Registry for ACL reconstructions

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Background: Anterior cruciate ligament (ACL) reconstruction is presently evolving raipdly. In order to monitor the development in surgical methods and clinical outcome, a national clinical database for knee ligament surgery (Danish ACL Registry) was established in 2005. This study presents the first data with 1 year follow-up from the Danish ACL registry

Methods: All clinics performing ACL reconstructions in Denmark reports to the database. The database is divided into surgeon data and patient data. The surgeon reports anamnestic, objective knee laxity and operative data including graft and implant choices. At one year control, complications, reoperations and objective knee laxity are recorded. The patient registers the KOOS knee score and Tegner function score preoperatively and at 1, 5 and 10 years follow-up. A specific set of indicators that define good diagnostic procedures and clinical outcome have been specified.

Results: During the first 18 months, 3378 knee-ligament reconstructions were registered. 2841 were primary ACL reconstructions, 257 were ACL revisions and 280 were multiligament reconstructions. 90 % of all departments reported to the database. 71 % of primary ACL reconstruction used hamstring tendon grafts and 21 % used patella tendon graft. Meniscus injuries were treated in 35 % of all patients. 17 % had significant cartilage lesions. Follow-up KOOS scores demonstrated specific differences between primary ACL, revision ACL and multiligament reconstructions.

Conclusion: This study presents the first follow-up data from a national ACL registry. These data will become new international reference materials for outcome measures before and after ACL surgery. The database will enable future monitoring of ACL reconstruction techniques and outcome.

P15-414

ACL reconstruction in adolescents using hamstring tendons: new technique and results

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Surgical treatment of anterior cruciate ligament injuries in adolescents continues to be controversial even though the advocates of surgical treatment are growing relative to those who prefer the conservative waiting treatment. The surgical techniques must be respectful of the epiphysary cartilages and try to reproduce the same results that are achieved in adults.

Technique: The authors report on a technique similar to that applied to adults, utilizing doubled hamstring tendons which are fixed with two transverse femoral and tibial bioabsorbable cross pins without interfering with the growth cartilage.
After the harvesting of the ST and GR tendons with a tibial compass adjusted to 45° a 7mm tibial tunnel is prepared. Then according to the one incision technique a femoral tunnel is prepared, also reamed to 7mm and a depth of 30 mm. Having positioned the femoral guide with its shaft measurement proportionate to the tunnels created, we prepare the two superior and inferior transverse femoral holes 3.3mm in diameter.
Then we position the tibial guide, proportionate to the tibial tunnel and with a graduated shaft, and we insert this into the femoral half-tunnel up to the maximum, set at 30mm; then we measure the intraarticular portion (usually 20 to 26mm), so that we can set the external mobile guide-pan to the point corresponding to the sum of the two measurements, femoral and intraarticular.
Then, using interblocking trocars, we prepare the two antero-medial tibial holes, 3.3mm in diameter, which are positioned between the tibial plate and the epiphysary cartilage, under fluoroscopic control.
Successively the femoral cross pins are inserted and with the knee at 20° of flexion and with the graft in distal tension the two tibial pins are positioned.
The postop program is an accelerated rehabilitation.
Material and Methods: We treated with this new method 25 patients (pts) with open epiphysary cartilages from 12 to 16 yrs. old.: 2 pts (1 male and 1 female) aged 12 yrs., 2 pts 13 yrs. (1 m, 1 f) 5 pts (2 m, 3 f) 14 yrs., 10 (7 m, 3 f) 15 yrs, 6 (4 m, 2 f) 16 yrs.
Of the 25 ACL reconstruction we were able to review 20 pts at a follow up of 2 to 5 yrs. using the IKDC score including KT1000 evaluation and Lysholm score. 5 pts were lost for change of address.
1 patient had a rupture of the graft due to a new trauma.
Results: The IKDC was A in 6 pts, B in 12 pts, C in 2 pt. The KT1000 was < 3 mm in 10 pts, 3-5 mm in 9 pts, 6 mm pt. The Lachman test was negative in 8 pts, 1+ with firm stop in 11 pts and 1+ with soft stop in 1 pt. Clinically 2 pts had a mild varus deformity, 2 a mild valgus deformity and 3 a mild recurvatum deformity. The Lysholm score was excellent in 12 pts, 5 good, 3 fair.
Conclusions: This new procedure seems to give us a good opportunity to treat the ACL lesion in adolescent. The results at a medium term follow-up are encouraged but with less good and excellent results compare with the adults. A longer term follow-up is in progress and will be shown.

P15-416
Anatomic reconstruction of the anterior cruciate ligament. Double bundle procedure using the transtibial technique. A cadaver study.
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Our main aim is to present our experience regarding the possibility of developing a new arthroscopic surgical technique for the purposes of an anatomical double bundle ACL reconstruction with two tibial and femoral tunnels via the transtibial technique and by using the Semitendinousus and Gracilis.
For this reason we perform a cadaver study before using in vivo.
Our first aim in this study is to verify the possibility of performing a femoral half tunnel for the posterolateral bundle (PL) through the tibial PL tunnel.
Our second objective is that of verifying recent biomechanical datas whereby a single cross pin by Rigid-Fix system (Mitek) of 3.3 diameter can provide enough fixation strength in a single tunnel (5,6 and 7mm). For this purpose we have developed an original tibial guide which allows to prepare the two tibial tunnels contemporaneously: the posterolateral and the anteromedial, keeping as an intrarticular reference the area of the spinal tibia, and as an extrarticular reference, the medial collateral ligament and the anterior tibial apophysis.
We performed an oblique medial incision to harvest the ST and gracilis, then we use a new tibial guide to create the tibial tunnels.
This guide is calibrated twith vertical swing arm and first bullet for the PL (Postero-lateral) tunnel. A second bullet is positioned on the calibrated guide rail for the AM tunnel. The exit point for the PL tunnel is at the guide tip and for the AM tunnel 3 mm inferiorly. The Guide is based on the preparation of the PL tunnel, with the vertical swing arm positioned at 45°/50° and at 45° from the central tibial longitudinal axis. This point should coincide with the anterior side of the medial collateral ligament. After positioning the guide into the PL tunnel, position the second bullet at 20°/25° on the calibrated guide rail in order to drill the AM Tunnel. After you can drill the AM and PL femoral tunnels from the transtibial portal in accordance with the diameter of the doubled grafts. Then we can pas the grafts and fix with a single bioabsorbable cross pin for each tunnel.The pin utilised singularly for the fixation of each bundle is that utilised for the soft tissue, measuring 42mm in length and 3.3mm in width, allowing therefore a good fixation in diameters with small dimensions, i.e. 5,6,7 mm, as shown in biomechanical tests performed.
Furthermore we have integrated the Rigid fix guide system for the femoral fixation normally utilised, by creating two new rods of 5 and 6mm each in order to allow the construction of tunnels of a smaller diameter.

P15-419
Anatomic single bundle ACL reconstruction in prepubescent athletes with clearly open physes
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Introduction: ACL reconstruction in athletes with clearly open physes is technically difficult but necessary to regain joint stability and to avoid further associated lesions. Few reports exist about the outcome of ACL reconstruction in the prepubescent population. Aim of our study was to prospectively evaluate the clinical and radiological outcome of an anatomic single bundle ACL reconstruction in prepubescent athletes regarding possible growth alteration and return to former sports activity level.
Methods: 48 children and adolescents below 16 years of age had undergone ACL reconstruction at our institution in a 6 year period. Only 14 patients fitted the inclusion criteria adopted: 1. chronic ACL insufficiency, 2. clearly open physes (Tanner stage I or II), 3. athletes with high activity sports level and 4. no associated ligament injuries. We were able to evaluate 10 patients at an average FU of 4.6 years (range 2-8 years). All patients had undergone anatomic single-bundle single-incision ACL reconstruction using a hamstring autograft. The tibial and femoral tunnels were drilled transphyseally. On the femoral side we aimed at a 10 or 2 o'clock position using either a transtibial or, if not possible, an anteromedial approach. Cortical fixation of the graft was achieved with an Endobutton™ on the femur and with a cortical screw and washer on the tibia. Postoperative FU included subjective and clinical IKDC, KT-1000, Tegner and Lysholm score as well as bilateral long leg weight-bearing AP and standard lateral radiographs.
Results: Clinical IKDC showed normal or nearly normal results in all cases. Subjective IKDC was 93.2 ± 5.9, Tegner score was 7.6 (range 6-9) with return to former sports activity level in all cases. One patient suffered from traumatic medial meniscus tear one year postoperatively. Anatomical leg length differed less than 1.5 cm from the uninjured side. Leg alignment showed less than 3° difference in all but one cases. One patient presented with 5.9° difference compared to the other leg, but without clinical symptoms.
Discussion: Anatomic single bundle ACL reconstruction using hamstring tendons is a successful and safe technique to regain joint stability and former activity level after ACL insufficiency in the pediatric patients who are athletically active (Tanner stage I or II). Although some differences of leg length and leg alignment were seen when compared to the uninjured side, we did not find any clinically relevant postoperative growth alterations.

P15-428
Significance of tibial intra-tunnel fixation at arthroscopic ACL reconstruction with hamstring tendon (second-look arthroscopic evalution)
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Purpose: The purpose of this study is to evaluate the effects of intratunnel fixation in the tibial side on the arthroscopic ACL reconstruction with quadruple hamstring tendon at the second look arthroscopy.
Materials and Method: From Dec. 1999 to May 2005, we arthroscopically reexamined 32 cases who had been done arthroscopic ACL reconstruction with quadruple hamstring tendons. Hamstring tendons of all cases were fixed at femoral side with Rigidfix™. At the tibial side hamstring tendons were fixed only Post-tie (Group I) or Post-tie combined with Intrafix™ (Group II). At the time of second look arthroscopy mean age of cases was 30 years and mean duration for second look arthroscopy was 21.3 months. We analyzed the results with IKDC score, KT-1000 arthrometer under anesthesia, Telos stress radiography, tibial tunnel widening on the radiography and second look arthroscopic findings.
Results: Group II had more superior than group I at side to side differences with KT-1000 and Telos stress radiograph, IKDC score, but the differences

were insignificant. At arthroscopic evaluation, Group II also had more superior than group I at graft tension and graft appearance, graft synovialization, but the differences were insignificant. Tibial tunnel widening in the knee AP radiograph was 2.3 mm in Group I and 1.7 mm in Group II and the difference was significant. (P=0.042).
Conclusions: Additional procedure of tibial intratunnel fixation in arthroscopic ACL reconstruction with autogenous hamstring tendon significantly prohibited from tibial tunnel widening but clinical results, radiologic joint stability, findings in second look arthroscopy were insignificantly different. We concluded that Post-tie itself induced satisfactory clinical results, joint stability and graft maturation and that tibial tunnel widening did not affect the results.

P15-431
CT evaluation of graft to bone union and bone tunnel enlargement after anterior cruciate ligament reconstruction with bone-patellar tendon-bone autograft
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Purpose: There have been studies of bone tunnel change after anterior cruciate ligament (ACL) reconstruction, however, there are few on computer tomography (CT) evaluation of bone tunnel change after ACL. ACL reconstruction with bone-patellar tendon-bone (BPTB) autograft is considered to be superior to that with hamstrings in graft to bone union. The aim of this study was to evaluate the change between the graft bone and the tibial and femoral bone tunnel using CT after ACL reconstruction with BPTB autograft.
Methods: We examined twenty patients who underwent ACL reconstruction with follow-up of 1 year between 2003 and 2006.There were 11 men and 9 women, with a mean age of 32 years old (range 14-50) at surgery. All ACL reconstructions were performed with BPTB autograft, which were fixed to the femoral side with an endobutton and to the tibial side with a postscrew. CT was taken on the day after operation and at a mean follow-up of 1 year in all case. We measured the bone tunnel area at two different levels (included BPTB and another not included) for both femoral and tibial tunnels. All the measurements of areas were performed on PC using ImageJ software. The clinical outcome was evaluated using the KT-2000 arthrometer at postoperative 1 year.
Statistical analysis was performed using paired t-test for comparison of continuous variables; simple regression analysis was used for comparisons of proportions between groups.
Results: Meniscectomy was done in 9 patients. The clinical outcome showed no postoperative complications. Graft to bone union in the bone tunnel was seen at the side with most contact in 18 patients with a femoral bone tunnel and 19 patients with a tibial bone tunnel, and completely closed bone tunnel with 1 patient with a femoral bone tunnel. The mean femoral tunnel area (not included bone) increased significantly from 52.7 mm^2 postoperatively to 66.5 mm^2 at 1 year. There was no significant difference in the mean femoral tunnel area (including bone) (49.7 mm^2 vs 45.4 mm^2), in the mean tibial tunnel area (not including bone) (93.3 mm^2 vs 95.7 mm^2), in the mean tibial tunnel area (including bone) (47.7 mm^2 vs 49.3 mm^2). The average side-to-side difference measured by KT-2000 arthrometer at manual maximum force was 1.78±0.45 mm. The difference was less than 3 mm in 14 patients (70%) and 3-5 mm in 6 patients (30%). There was no statistically significant difference in graft to bone union or in the areas of bone tunnel between the two groups. There was no relationship between graft to bone union and KT-2000 measurements. There was no significant correlation between the amount and rate of change for femoral and tibial bone tunnel area and KT-2000 measurements.
We evaluated graft to bone union and bone tunnel enlargement using CT after ACL reconstruction with BPTB autograft. Previous study found little enlargement in the bone tunnel diameter by X-ray after ACL reconstruction with BPTB autograft. There were few studies of CT evaluation after ACL reconstruction with BPTB autograft. Although we had expected the bone tunnel to close around BPTB, complete tunnel closure was found in only 1 case. However, in most cases BPTB unioned at the side with most contact to the tunnel.
Conclusions: Graft to bone union was mostly seen at the point of most contact in the bone tunnel. Bone tunnel enlargement evaluated by CT as shown in this study observed only the femoral tunnel area which did not include the grafted bone.

P15-452
Comparative anatomy of the ACL
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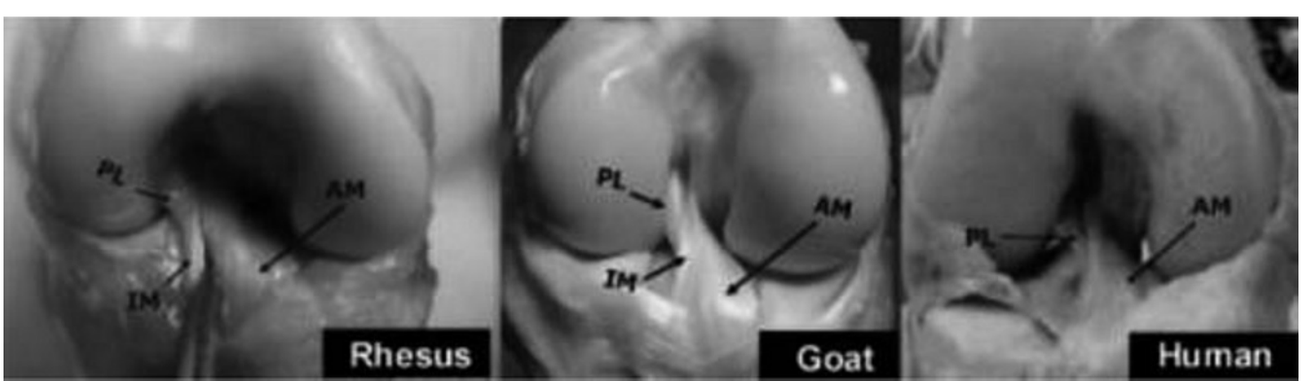
The function of knee is determined by its complex anatomy. Anterior cruciate ligament (ACL) is an important structure of knee and controls the stability of knee, whereas the sizes and shapes of condyles determine the anterior-posterior and rotational motion of the knee. A comparison of the basic anatomy of modern human knee to ancestral human knees, and to those of other animals (mostly primates) can provide novel insights into the natural history of human knee structure and function.
Hypothesis: The form of ACL and femoral condyles are related to the functional demands in animals.
Methods: Animal anatomy was studied on freshly frozen specimens. The ACL anatomy was studied by MRI imaging, followed by dissection. Bones from different species were studied by using 3D CT scans and measurements were made on specific software.
Results: We have found a large variety of ACL anatomy in the Animal Kingdom. The Nubian goat (*Capra hircus*), the springbok (*Antidorcas marsupialis*), the pig (*Sus scrofa domestica*) and the Rhesus monkey (*Macaca mulatta*) have three ACL bundles (AM, IM, PL). Human (*Homo sapiens*) has 2 bundles. The ostrich (*Struthio camelus*) and the chicken (*Gallus gallus*) have only one bundle.
Discussion /Conclusion: By studying the complexities of functional morphologic features of the knee in different animal species we can help surgeons better understand knee kinematics and the role of each ACL bundle in human being and this knowledge will help surgeons reconstruct anatomy more accurately and therefore perform a more precise knee surgery.



ACL anatomy in Rhesus monkey, goat and human

P15-472

Is arthroscopic assisted fixation gold standard in treatment of eminentia fractures of tibia?

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Objectives: Tibial eminence fractures are more common in younger ages and considered to be childhood equivalents of ACL tear. The fractures are originally classified by Meyers and McKeever according to degree of displacement into three types and later comminuted fractures were added as type IV. Their recommendation for treatment was conservative treatment for nondisplaced fractures and open reduction and internal fixation for displaced fractures. There are various methods of internal fixation including Kirschner wires, metal screws or suture materials. Open reduction cause some morbidity, which was decreased by recent arthroscopic methods. Realizing the potential effect of age and fixation method on clinical results we have conducted a retrospective review of patient outcomes.

Methods: Patients who sustained type II or type III fractures of the tibial eminence and were treated with arthroscopic fixation from 1992 through 2006 were included in the study. All surgeries were performed by single surgeon. Data obtained included patient demographics, mechanism of injury, radiological findings, surgical findings surgical technique and complications. At the latest follow up physical examination findings, stability tests and Lysholm knee scores were reviewed. Two additional (anteromedial superior and anterolateral inferior) portals were used for temporary and definitive stabilization of the fracture. Preliminary fixation with K-wires was followed by definitive fixation with either sutures or screws. Suture fixation was performed as described by Berg and Matthews. In screw fixation K-wires used for temporary fixation were used as guides for cannulated screws.

Results: A total of 47 patients met the inclusion criteria. There were 19 type II and 28 type III fractures. The mean age was 22.8 years. Suture was the preferred fixation method in 20 and screw was in 27 cases. Radiological bone incorporation was observed in all patients with an average of 6.7 weeks. The average follow up period was 55.6 months. The overall complication rate was 31% including 6 knee effusions, tenderness over the fixation post for 5 cases, residual instability and vascular insufficiency in one patient. The average loss of motion was 8.7 degrees in flexion and 5 degrees in extension. The median Lysholm knee score was 95. However none of the patients had symptoms of instability, five cases had positive Lachmann and seven had positive KT-1000 test.

Conclusion: In order to avoid morbidity of open reduction and advantages of treating accompanying injuries simutaneusly arthroscopic modes of reduction and fixation was used for all patients in our series. The fixation method had no significant effect on stability and clinical outcome at the time of latest follow-up in our series. After the development of sufficient arthroscopic techniques for stable fixation, postoperative rehabilitation changed from cast immobilization to allowing early aggressive rehabilitation. It could be said that displaced tibial eminence fractures can be treated successfully either with screws or sutures with similar results by using arthroscopic methods independent of age. Suture fixation may be preferred because of lack of hardware removal which causes increased rates of reoperation in internal fixation group. Finally we agreed that the arthroscopic management of eminentia fractures should be standard method of treatment, considering its advantages to open reduction.

P15-477

Comparison of three groups of patients in respect to anterior knee pain after anterior cruciate ligament reconstruction

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Aim: The aim of this prospective study was to compare the results after arthroscopic ACL reconstruction in three groups of patients with a special emphasis on anterior knee pain, patient's ability to walk on his knees and loss of motion.

Methods: A consecutive series of 15 patients with unilateral ACL rupture and without a history of previous incisions in the anterior knee region was included in the study.The patients were randomly allocated into three groups depending on the origin of graft and graft harvesting technique that was used. Patellar tendon autografts were harvested either by the traditional one incision technique (group A), or the subcutaneous two incision technique (group B) in the first two groups.In the last group (group C) one incision 1 cm medial to tibial tubercle were made and patellar tendon allografts were used. One surgeon performed all operations by all-inside arthroscopic technique and interference screw fixation.Pre- and postoperative clinical assessments were performed by the same operating surgeon. The Lysholm Knee Scoring Scale,Tegner activity level, Activities of Daily Living Scale branch of Knee Outcome Survey,IKDC evaluation system,single legged hop test and manual Lachman test were used as standart clinical assessment tools. At 12 months after the index operation, in addition to these parameters KT-1000 laxitymeter,measurement of the range of motion with goniometer,palpation of the donor site for tenderness,palpation of the skin for loss of anterior knee sensitivity and four-grade knee walking test for donor site discomfort were also used in the assessment.In using Knee Outcome Survey instead of using all 17 questions, 14th, 15th and 16th questions of the survey were used as these three lay stress on the function of the knee during kneeling, squatting and sitting.

Results: There was no difference between three groups in regard to age and time passed between injury and reconstruction.The results at the end of first year are presented.Using the IKDC score 3 patients were classified as normal and 2 as nearly normal in group A; 4 patients were classified as normal and 1 as nearly normal in group B, and 2 patients were classified as normal and 3 as nearly normal in group C.The KT-1000 revealed side to side difference of 2.2 mm in group A, 1.7 mm in group B and 3.4 mm in group C.Apart from 2 patients in group A and 1 patient in group C who had loss of extension less than 10 degrees there were no loss in ROM.The answers of the 3 questions of the Knee Outcome Survey had showed that patients had some degree of problem in their knees even before operation.In the final evaluation patients in group C had showed most significant improvement in respect to these 3 questions.In regard to tenderness on the donor site, knee walking test group A has the poorest results.

Conclusion: The very limited number of the patients was the major drawback of this study and this necessitate to be very carefull while interpreting the results. In regard to similarity of the results of tenderness, knee walking and sensitivity in group B and C it can be said that not the greft itself, the localizaton and length of the incision can be an important factor on anterior knee pain. Our results showed that patients can have complaints about anterior knee region even before operation. So while designing new studies it can be appropriate to determine the degree of tenderness, knee walking and sensitivity not only after operation but also before operation too.

P15-491

Two-incision technique bone-tendon-bone versus hamstring in anterior cruciate ligament replacement

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Objective: The purpose of this study was to find out whether the bone-tendon-bone (BTB) autograft has advantages over the hamstring tendons (HT) when performed with the same surgical approach and fixation technique.

Materials and methods: From 1999 to 2001, 202 BTB and 92 HT autografts for anterior cruciate ligament (ACL) reconstruction were performed consecutively by the same surgeon using the two-incision technique with interference screw fermoral and tibial fixation. In the BTB and HT groups, respectively, mean age was 22.8 and 21.6 years, 52.9% and 58.5 were women, 54.4 and 54.3 the left knee was affected, 89% and 97% practice cutting sports more than 199h/year. Follow-up was until 24 months and included evaluation of IKDC score and Telos arthrometer measurements. Anova, Chi-square and Student t test were used for statistical analysis.

Results: No differences were found between groups in IKDC score, but subjectively a 75.3% of BTB and 95.7 of HT refers to have a normal knee. A 20.4% cases of the BTB group referred numbness of the anterior aspect of the knee. A statistical significant increase in anterior tibial displacement measured by Telos arthrometer was found in HT group versus BTB group, when compared the hole group and women of both groups but not when men of both groups where compared.

Discussion: ACL ligament graft choice and technique continues to be controversial. Trials comparing patellar tendon and hamstring autografts usually use different surgical approach and fixation techniques. The increase in anterior tibial translation in the HT group, especially in women, may not only be due to the inferior fixation strengths of interference screws using HT but also to hormonal differences. Nevertheless, this increase in anterior tibial translation didn't have clinical significance because no difference in IKDC score were observed between groups and even subjectively HT group felt their knee normal in a higher percentage of cases compared to BTB.

P15-494

Graft selection by patients undergoing anterior cruciate ligament reconstruction

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Introduction: Multiple studies have found that allograft is an acceptable alternative to autograft for anterior cruciate ligament (ACL) reconstruction. Both grafts have merits and demerits. A substantial percentage of internet users search for medical information on the World Wide Web. We let the patients be involved in the graft decision. We analyze the trends of patient's selection and investigate the impact of internet on decision by way of a questionnaire.

Materials and methods: Seventy consecutive patients undergoing ACL reconstruction were included in the study. Grafts type information leaflets (auto-hamstring tendon versus allo-Achilles tendon) were provided before admission. Patients were allowed to decide the type of graft. On admission, they were asked to answer a 10-item questionnaire about their decision and underwent ACL reconstruction using the selected graft.

Results: Forty one patients selected autograft and 29 patients wanted allograft. Factors affecting their decision were surgeon's explanation and internet search in the order. Fifty six patients (80%) explored the internet for information before graft decision. There was no significant difference in the rate of internet use between autograft and allograft groups. But the rate of patients who answered they had understanding of grafts type after internet search and who answered internet search had influence on their decision was significantly higher in the allograft group.

Conclusion: More patients selected autograft for ACL reconstruction. But Patients had understanding of graft type through internet search preferred allograft.

P15-495

Arthroscopic fixation of tibial eminence fractures using bioabsorbable suture anchors

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Introduction: Various fixation devices have been introduced for arthroscopic reduction and internal fixation (ARIF) of tibial eminence fractures. However, till now there has been no universal technique which can be applied regardless of skeletal maturity, fracture comminution, or fragment size. Suture anchor technique has been proven to be a safe and strong fixation method of capsule, ligament, or tendon. We report clinical results of arthroscopic fixation of tibial eminence fractures using bioabsorbable suture anchors with surgical technique.

Materials and methods: Between 2005 and 2006, five patients (mean age 35 years, range 8-48 years) with fracture of the tibial eminence underwent an arthroscopic reduction and internal fixation with bioabsorbable suture anchors. Anteromedial, anterolateral, medial mid-patellar, and lateral mid-patellar portals were used. Three or 4 bioabsorbable suture anchors were used for fixation. Clinical symptoms and physical findings for all patients were evaluated 1 year postoperatively.

Results: After 1 year, all patients showed full range of motion without flexion contracture. No patient showed anterior instability exceeding 3mm with KT-2000 arthrometer testing. Radiographically, all patients showed bony union.

Conclusion: Arthroscopic suture anchor technique for fracture of the tibial eminence can provide secure fixation of fracture fragment regardless of fragment size and be applied in both skeletally immature and mature patients.

P15-499

Anterior cruciate ligament reconstructions with hamstring tendons using bioabsorbable double cross-pin femoral fixation

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Objectives: The purpose of this retrospective study to report clinical outcomes after anterior cruciate ligament (ACL) reconstruction with hamstring tendon autograft fixed with bioabsorbable double cross-pins.

Methods: 46 patients who were available for at least 24 months follow-up were enrolled in this study. The hamstring graft was fixed with Rigidfix (Mitek, Norwood, MA) at femoral side and Intrafix (Mitek) at tibial side. Preoperative and postoperative laxity evaluations were performed using Lachman test, pivot-shift test, Instrumented laxity testing using KT-1000 arthrometer and International Knee Documentation Committee (IKDC) knee examination form. Functional evaluations were performed using the Tegner activity level and the Lysholm knee scoring scale.

Results: The average follow-up was 36.2 months. Preoperatively, the Lachman tests were graded 1+ in 23 patients and 2+ in 23. The pivot-shift tests were 1+ in 27 patients and 2+ in 19. At last follow-up, the Lachman tests were graded 0 in 24 patients and 1+ in 22. The pivot-shift tests were 0 in 32 patients and 1+ in 14 ($p<0.001$). Preoperatively, the mean Tegner activity level was 3.2 and the mean Lysholm score was 62.6. At last follow-up, the mean Tegner activity level was 5.7 and the mean Lysholm score was 97.3 ($p<0.001$). Preoperative mean laxity on KT-1000 arthrometer examination was 5.4 mm and postoperative mean laxity was 1.5 mm ($p<0.001$). Preoperatively, 14 patients were graded as nearly normal, 26 were abnormal, and 6 were severely abnormal according to IKDC knee examination form. Postoperatively, 27 patients were graded as normal, 16 were nearly normal, and 3 were abnormal ($p<0.001$). There were two complications associated with surgery. One patient required manipulation under anesthesia because of postoperative stiffness. Two patients had superficial infections.

Conclusions: ACL reconstruction with hamstring tendon autograft fixed with bioabsorbable double cross-pins showed satisfactory results at mean 36 months postoperatively.

P15-500

Tibial tunnel widening after anterior cruciate ligament reconstructions with hamstring tendons using intrafix tibial fixation

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Objectives: to evaluate tibial tunnel widening over time after anterior cruciate ligament (ACL) reconstruction with hamstring tendon graft using Rigidfix (DePuy Mitek, Raynham, MA) femoral fixation and Intrafix (DePuy Mitek) tibial fixation.

Methods: 56 consecutive patients who underwent ACL reconstructions with a minimum of 2 years' evaluation were retrospectively reviewed in this study. On the anterior-posterior (AP) and lateral radiographs, the diameter of the tibial tunnel was measured at proximal, middle, and distal locations and the changes in the shape of the tibial tunnel were classified. Tunnel widening was defined as widening of greater than 2 mm; group I had no tunnel widening and group II had tunnel widening. Postoperative laxity evaluations were performed using Lachman test, pivot-shift test, and Instrumented laxity testing using KT-1000 arthrometer.

Results: On the AP radiographs, average diameter of the tibial tunnel increased 8.8% at 6 months and 8.5% at 12 months postoperatively compared to immediate postoperative day. On the lateral radiographs, average diameter of the tibial tunnel increased 7.2% at 6 months and 8.1% at 12 months year postoperatively compared to immediate postoperative day. Tunnel shape evaluation revealed predominantly line type in 53 patients (95%). Group I was 42 patients (75%) and group II was 14 (25%). The average KT-1000 measurement was 1.0 ± 1.8 mm in group I and 2.1 ± 2.8 mm in group II. The Lachman tests were graded 0 in 28 patients and 1+ in 13. The pivot-shift tests were 0 in 33 patients and 1+ in 7 in group I. The Lachman tests were graded 0 in 6 patients and 1+ in 8. The pivot-shift tests were 0 in 9 patients and 1+ in 5 in group II. There was no significant difference between two groups ($P > 0.05$).

Conclusions: Tunnel widening was observed in 25% patients after hamstring ACL reconstruction using Rigidfix femoral fixation and Intrafix tibial fixation. Tunnel widening had no significant effect on postoperative anterior instability of the knee.

P15-503

Bioabsorbable interference screws in ACL reconstruction: A prospective clinical and MRI study of two different devices

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The overall clinical results of bioabsorbable fixation devices made of poly-L-lactic acid (PLLA) used for cruciate ligaments reconstruction have been

favorable. However, clinical studies demonstrated no sign of normal bony architecture restored after surgery, although implant channels had been filled with fibrous tissue. The purpose of this prospective study was to examine the extent of structural changes in two different types of bioabsorbable devices using magnetic resonance imaging (MRI) and CT scan over one year period.
Methods: The study group consisted of 20 patients with isolated anterior cruciate ligament ruptures reconstructed with bone-patellar tendon-bone autografts fixed with two differents type of bioabsorbable screw: a poly-l-lactic acid/hydroxyapatite blend (PLLA + HA) interference screw (BioR-CI®, Smith & Nephew Endoscopy, Andover, MA) or screw A and a blend of poly (DL lactide-co-glycolide) (PDLG) and calcium carbonate screw (Calaxo®, Smith & Nephew Endoscopy) or screw B. For each surgery the screw position was alternated in order to obtain the same number of screws equally placed either in the femur or in the tibia. All patients were operated by the same surgeon using a a single incision technique with an autologous ipsilateral bone patellar tendon bone graft. Femoral screw was inserted via anteromedial portal. All patients followed the same similar aggressive rehabilitation protocol with a 6 months return to pivoting sports. Post-op x-ray were obtained immediately after the surgery, while a complete MRI study was performed at 2, 4 and 12 months post-op. The later evaluation included a CT scan as well. The screw degradation, the bone block formation and new bone formation were evaluated using the classification scheme of Tecklenburg and Drogset. Clinical examination was achieved according to the IKDC form at the longest follow-up.
Results: Both composite screws showed signs of degradation at MRI with the screw B almost disappeared within four months post-operatively and the Biorci still clearly visible up to 12 months post-op. The CT scan performed at the longest follow-up, confirmed the calcium carbonate screw disappearance but failed to show any bony replacement within the reabsorbed area. Clinical examination showed all out of one A results according to the IKDC, the only B results was related to a patient who presented a large chondral damage on the lateral femoral condyle, underwenting at the time of surgery an associated microfracture procedure.
Conclusion: According to the data presented, the Calaxo® screw was shown to be reabsorpted within few weeks from surgery however we failed to see instrumental presence of bone replacing within the area initially occupied by the screw, in an otherwise clinical unremarkable conditions of all patients.

P15-537
Double or "triple" hamstrings harvesting for ACL reconstruction? - is killing the hamstrings a good idea?
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Objectives: Many surgeons report the use of double Semitendinous and Gracillis tendon grafts for ACL repairs. However, no mention is done to the fate of the Sartorious that in its tibial (distal) attachment overlies the other two. The objective of this paper is to emphasize this fact, draw attention for possible consequences and give some advice on how to minimize damage to that tendon.
Methods: Various harvesting procedures performed by multiple surgeons in different countries were recorded and visually analysed. Our own procedure of harvesting was put under scrutiny.
Results: The Sartorious tendon tibial attachment is routinely damaged during hamstring tendon harvesting. It is significantly damaged and even disrupted specially during double ST and G harvesting, but that may also be the case even when the intention of the surgeon is harvesting the ST alone.
Conclusions: This paper is focussed on technical aspects of hamstring harvesting. Thomas Rosenberg, from Salt Lake City, Utah, USA advocates the use of a quadrupled ST only tendon graft. Steven Howell, from California, USA recommends using both ST and G, also arranged in a quadrupled fashion. By consulting the literature, it is obvious that the preference of most ACL surgeons is to use both tendons for their ACL surgery. The reasons for this choice are not usually stated, so we can only speculate that among possible reasons are the availability of more material for grafting and the idea that more complete feeling of the tunnels will increase the chances for bone-graft integration. A most objective reason for this choice is that with certain graft fixation devices one needs more graft material than can be provided by only one tendon. The same applies if you fancy one of the more recently advocated double bundle/double tunnel techniques. The process of harvesting the hamstrings is not straight forward. It has its technical difficulties and a non negligible learning curve.
We observed that frequently the Sartorious distal tibial attachment is also significantly severed or disrupted during the process of harvesting the ST with/without the G, therefore disabling the entire pes anserinous tendon complex.
There are several publications in the literature attesting the absence of significant deleterious effects related to the harvesting of the hamstrings. Normal (or almost) knee kinematics are documented. More recently, even pos-op. ("ad integra") regeneration of these muscles has been reported. In spite of the present evidence, is remains, to say the least, surprising that 3 constant, normally present significant muscles of the lower limb perform no other duties than being there just for harvesting. On the other hand, two points seem to be of general consensus:
1) no present surgical technique reproduces entirely the ACL function and
2) the hamstrings muscles are synergistic with the ACL. Therefore, it seems odd that in the process of repairing a ligament one would disable others structures that help in the function we are trying to re-establish. We conclude that this matter deserves further attention, consideration and controlled experiment. As long as this matter remains an open issue we feel it is just a matter of common sense to try to injure the involved structures as minimally as technically possible.

P15-538
2-Y clinical results using a new fixation method for ACL grafts: The expansion bolt
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In ACL surgery, a variety of different fixation methods for ligament transplants is in use. In most cases, their application is limited to one certain method of surgery.
A fixation system using a bioabsorbable expansion bolt (D,L-Polylactide; RESOFIX®) that is suitable for fixation of different transplants, has been tested in the laboratory. Thereafter, clinical application and evaluation have been performed, comparing the new method with the known fixation utilizing interference screws.
Biomechanic investigations had shown comparable loads to failure and stiffnesses when using titanium screws, bioabsorbable screws and the expansion bolt system. Damage to the grafts was lower with the bolt system.
In a prospective, randomised clinical study a bone-patellar tendon-bone transplant (BPTB) was fixed either using a titanium screw femorally and tibially (S-group, n=63), or femorally with a titanium screw and tibially with a 10-mm expansion bolt (D-group, n=63).
A 2-year follow-up investigation using an IKDC score showed for group S: 49A, 11B, 3C, 0D and for group D: 46A, 12B, 4C, 1D, with no significant differences in relevant parameters.
The new, bioabsorbable expansion bolt system has proven as simple in use and clinically reliable. Using a new, smaller bolt system (including 8mm and 5mm), currently double bundle techniques are evaluated as well. The system may be useful for other ligament fixations (e.g. PCL) as well.

P15-544
Solving femoral interference screw divergence in ACL reconstruction: from mathematics to cadaveric study
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Objectives: One of the common accepted methods for ACL reconstruction is transtibial tunnel technique for drilling the femoral tunnel and endoscopical femoral interference screws fixation. A problem has to be faced by the surgeon: inserting the femoral interference screw without significant divergence with the graft. Aim of the study is to describe a method to minimize femoral interference screw divergence through mathematical rules for knee flexion and screwdriver position during the surgical procedure. Correct alignment between femoral tunnel and screwdriver inserted through the AM portal is obtained without any specialized instrumentation or technical modifications.
Methods: First, we theorized a mathematical model of femoral tunnel drilling and screwdriver insertion and we defined a mathematical rule identifying a precise knee flexion angle and screwdriver position, to attain coaxiality between femoral tunnel and screwdriver. Then, we tested the model realizing a static prototype for tunnel drilling and screwdriver insertion following the mathematical rule. We simulated tibial and femoral tunnel drilling and

screwdriver positioning using the prototype on 8 right cadaver knees (group A), verifying the coaxiality between the tunnel and the axis of the screwdriver as in a "best case scenario". We performed subsequently the same procedure on 8 left cadaver knees (group B) without the prototype but using a standard ACL tibial guide and following the mathematical rules, as a "standard case scenario". Separately, unaware of the mathematical model, a senior surgeon performed the procedure on 8 cadaver knees (group C) using the same ACL guide and a standard transtibial tunnel technique, as a "blind" control group..
Results: Group A was supposed to test the formula in a constrained system; we therefore evaluated Group A with a "all-null" test ("all" being coaxiality). In 8 specimen out of 8 we observed coaxiality.
A direct measure of divergence angle was attained in group B ("standard case scenario") and C ("control"), both comparable for tunnel preparation method Mean divergence of group B was 7,5° ± 2,7 while in group C 13,1° ± 3,2.
Conclusions: our study shows that adequate alignment between femoral tunnel and screwdriver axes can be achieved simply following a mathematical rule for correct knee flexion and screwdriver positioning during ACL reconstruction. Namely, when inserting the screwdriver, an additional flexion angle corresponding to the ACL tibial guide value has to be added to the knee flexion while drilling the femoral tunnel, while the screwdriver has to be set parallel to tibial plateau, engaging the femoral tunnel at a rotation of 15° medial to tibial sagittal plane. In our knowledge, this is the first study in which rototraslation matrices are applied to solve interference screw divergence in ACL surgery. Their versatility suggests a further use of rototraslation matrices in investigating other controversial aspect of knee reconstructive surgery.

P15-548
Diagnosis of anterior cruciate ligament injuries in the accident & emergency: Is history more important than clinical examination?
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Background & Methods: We present a retrospective study of 26 patients with ACL injury out of a total 360 patients seen in a specialist knee clinic over one year. All patients had arthroscopic evidence of ACL injury and were seen in the A&E on index presentation. An analysis of the adequacy of the history and the clinical tests performed in the A&E was done.
The case notes were reviewed and the elicited history for each patient was noted against five questions (Mechanism, Onset of swelling, Feeling a pop, giving way and inability to weight bear) on presentation to A&E. An enquiry of 3 questions (of the five) in the history was considered Adequate. The Lachman's and Anterior Drawer tests where documented were analysed.
Results: ACL injuries accounted for 7.2% of the total patients (n=360) and were suspected clinically after an average of 15.3 (1 to 56) days from the initial day of presentation. There were 22 males and 4 females and the average age 25.6 (15-38) years. A clinical diagnosis of ACL injury in the A&E Department was done in 8 patients (30%) of these the history was Adequate in 7. Only 15.4% of patients of the total 26 had a positive instability test and in 38.5% of patients none of the tests could be performed due to either swelling or pain. Lachman's test (85%) and Anterior Drawer (15%) were the common tests performed in A&E with sensitivities of 33.3% & 25% respectively in this series. An Adequate history (3 of 5 questions) in the acute scenario had a sensitivity of 87.5%, specificity of 44.4%, Positive predictive value of 41% and a Negative predictive value of 89%.
Conclusion: An adequate history was a better predictor of an ACL rupture on acute presentation in the A&E Department and instability tests were not as reliable or mostly could not be performed because of swelling and pain.

P15-549
Augmentation technique for the treatment of ACL partial tears - early clinical analysis
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Anterior crutiate ligament (ACL) partial tears account for 10% to 30% of all ACL lesions. The repair of chronic partial ACL tears usually sacrifices the intact bundle of the ligament. Their natural history as well as their optimal treatment still is debatable. Even if conservative treatment can be successful in non active patients, ACL reconstruction is required for active patients or athletes because of the persistent instability.
During the period 2006-2007 we treated 9 patients with partial tears of the ACL. They were 6 men and 3 women with a mean age of 33.2 years (23-40). There was a history of trauma on their knee with hemarthrosis. The anterior drawer sign and the Lachman test were positive to all of them, while the pivot shift test was negative in 4 patients, trace negative in 2 and positive in 3 patients. All of them had an MRI examination, where the suspicion of an ACL tear was set.
The partial tear of the ACL was confirmed arthroscopically. In 7 patients there were lesion of the antero-medial bundle, and the rest 2 had a postero-lateral bundle tear. The patients underwent an ACL reconstruction using hamstring tendons autograft (semitendinosus and gracilis) and with simultaneous preservation of the not affected bundle. The graft was stabilized with an endo-button in the femur and with an absorbable interference screw and post-fixation with staple in the tibia.
The mean follow-up was 10.6 months. At the last follow-up, none of the patients experienced any pain or instability. The Lyscholm score improved from an average of 74 preoperatively to 93 postoperatively. According to the Tegner Activity Level the mean pre-injury level was 6.6 and became 6.1 at the time of last follow-up. All patients returned to their employment and to recreational sports. Preserving the residual bundle of the ACL has been reported to improve the results of its reconstruction, due to increased mechanical strength and blood flow to the graft but also by maintaining some propioceptive innervation. Our experience with this technique, confirmed, in the short term, its promising results.

P15-554
Postoperative analgesia with continuous administration of local anesthetic after ACL reconstruction
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There is a trend to decreasing perioperative and postoperative pain, in order to reduce the hospitalization of the patients. Infusion pumps for pain control are used in many orthopaedic procedures. In this study, our purpose was to evaluate the effectiveness in reduction of postoperative pain and narcotic and NSAIDs consumption following ACL reconstruction with ipsilateral quadrupled hamstrings tendon autograft, using continuous infusion of bupivacaine via a catheter placed into the knee surgical trauma.
During the period 2006-2007 we studied 62 patients (38 men, 24 women aged from 20 to 45 years) with ASA score I and II. All of them had an epidural anaesthesia through a subarachnoid approach with administration of a 15 mg levovupivacaine and 0,2 mg morphine solution. Before the end of the procedure, a catheter was placed subcutaneously in the donor site trauma, which was connected to a system of continuous infusion of local anesthetic (L.A.) bupivacaine (Naropaine 200mg).
Immediately postoperatively and 24 hours from surgery we recorded the oral visual analog scale (VAS) score (0-10) and any complications (nausea, vomit, decreased lower limb mobility). Depending on the recorded data we intervened to the L.A. infusion flow and we assessed the patients' needs for additional analgesia.
Postoperatively, a VAS score of 2-4 was retained for 53 patients (85%), 5 patients needed the infusion flow to be increased to 6-8ml/h. Additional NSAIDS were administered to only 4 patients (6%) without adjusting the infusion flow.
The use of a catheter for continuous L.A. infusion of donor site trauma, after ACL reconstruction in combination with epidural anaesthesia via subarachnoid administration of L.A. and morphine provides a satisfactory postoperative analgesia to a significant percentage of patients.

P15-578
Anterior Cruciate Ligament delayed autograft reconstruction in skeletally immature patients. About 22 patients with 5 years follow-up
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Background: Management of an Anterior Cruciate Ligament (ACL) rupture in young patients with open physes is controversial and requires special consideration. In adults, nonoperative treatment of ACL tears leads to an increased risk of meniscus injuries, recurrent instability and degenerative arthritis. What about the delayed surgery when physes are fused in adolescent which had injuries when physes were open, regarding the risk of associated

pathology. The purpose of this study was to present the results of delayed reconstruction treatment for ACL rupture after fusion of the physes.
Materials and methods: This retrospective series included 22 patients (6 girls, 16 boys). They were initially treated conservatively and later had an intra-articular graft reconstruction, after maturity of the physes (an average of 30,6 months after injury). The ACL reconstruction was done during the period 1992 to 2003. The average age at initial injury was 13 years (4 to 16 years, with physes open for all the patients). The patients'ages at time of ACL reconstruction ranged from 14 to 18 years. In all cases, the surgical ACL reconstruction was performed under arthroscopy, similar to our adult experience. We have using patellar tendon graft 20 times and four-strand hamstring techniques for 2 patients. The mean follow-up was 5 years.
Results: At the times of initial injury, 2 medial meniscus injuries were treated with arthroscopic partial resection. At the times of reconstruction, 11 meniscus tears were found: 6 medial and 5 lateral (50% of the knees). We repair one medial meniscus tear. Four partial meniscectomy were done and 6 tears were kept in place. At the last follow up, 5 patients have other surgery for medial meniscus tears ; only one tear can be repair. At the final time, 90% lateral meniscus and 68% medial meniscus were in place. The overall IKDC scores at the final review were grade A in 14 knees, grade B in 5., grade C in 3. There were 3 cases of new traumatic rerupture at one year, 4 years and 5 years after surgery. At the time of surgery, we saw 3 degenerative lesion. At the last time, any arthrosis was observed.
Conclusion: Nonoperative management in young patients resulted in a high prevalence of meniscal tears at the time of surgery (50%). It would appear that early stabilisation seems to decrease meniscal injuries, but in this young population, it's a specific surgery because of risk of physeal damage. Only surgical team with great experience and good learning curve of this surgery are recommended for this specific surgical treatment.

P15-583

Femur fracture risk following double-bundle ACL reconstruction: A comparison of experimental and computational results

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Objectives: Studies have shown that the ACL is made up of two functional bundles, AM and PL. To more closely restore normal, intact knee anatomy and kinematics, DB ACL reconstructions are now being performed. Previously, computational studies were conducted for both a sawbone and CT scan femur geometry. Using finite element analysis, the risk of femur fracture was assessed after addition of the PL tunnel, and according to tunnel location. These studies determined that the DB technique did not increase the risk of femur fracture when compared to SB reconstruction, and that slight variations in tunnel placements do not significantly increase this risk. In this study, cadaver femurs were used to validate the results of the computational studies.
Methods: Eleven cadaver femurs were used in this study. Both AM and PL tunnels were drilled in the bone. A strain gage rosette, used to determine principle strain, was attached to the bone just outside the AM tunnel, which has been shown by the computational studies to be an area of high stress. The proximal end of the femur (mid-shaft) was potted using a fast drying cement and inserted into an axial testing machine. Loads were applied by pressing a flat metal plate against the femoral condyles. These loads were applied in 100 N increments from 0 to 1300 N and strain readings were recorded at each load. The principle strains were computed and the maximum principle strain was used in comparison to the resulting strains of the sawbone and CT scan finite element models.
Results: The results of the experimental testing were plotted as micro-strain versus load applied (N). A least squared analysis was used to determine the linearity of the experimental lines. Table 1 shows the resulting r-squared value used to measure linearity (1 being linear), and the slope of each line.

	CT Model	Sawbone Model	Cadaver Average	Cadaver Std. Dev.
r^2	1	1	0.991436	0.010449
slope	0.318	0.299	0.239245	0.088764

Using the student's t-test for small sample sizes, there was shown to be no significant difference between the slope values of the cadaver tests and the models. The relationship between strain and load was shown to be close to linear (r^2=1), for cadavers 1-11. The strain was analyzed at each load for both models and cadavers. Figure 1 shows the resulting strains at 1200 N in compression. There was shown to be no significant difference among the values of strain at each load.

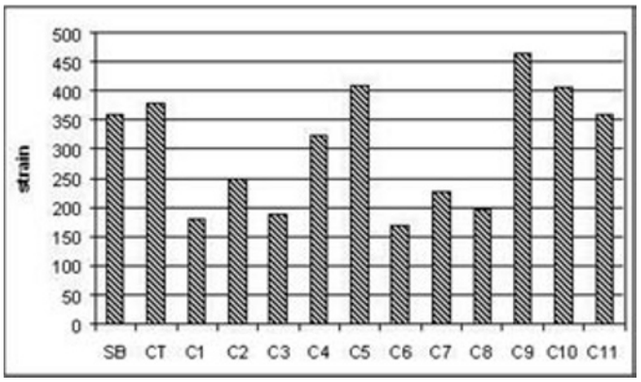

Figure 1

Conclusions: The results of this study support the validity of the computational results obtained from the sawbone and CT scan models. Slight differences can be attributed to the heterogeneous material properties of bone, which differ with specimens, and the homogenous material properties of the sawbone model. The steeper slope of the computational models suggests a stiffer material than that of the cadavers, due to loading techniques used in the experimental (distributed load) and computational (point load) testing.

P15-590

Measurement of the mid-substance circumference of the antero-medial and postro-lateral bundle in the normal anterior cruciate ligament

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Introduction: Recently, good results have been reported the anatomical double bundle(DB) anterior cruciate ligament reconstruction(ACL-R). However, it is still unclear whether the conventional method of reconstruction gives a superior outcome, and few problems were reported.Compared with the antero-medial bundle (AMB), postero-lateral bundle(PLB) is placed in a severe mechanically environment. Therefore, in order to protect the PLB, it make the initial tension of the PLB as low as possible, or it use a thicker graft for the PLB more than AMB.So far, a considerable volume of data has been reported for the footprint of the AMB and PLB. However, data on the size of the mid-substance(MS) of the AMB and PLB are still lacking. Thus, we measured the cross-section(CS) of the MS of the AMB and PLB of the normal ACL. Our aim is to verify proper CS area ratio between the AMB and PLB for the anatomical DBACL-R.
Material: The study materials were 25 cadavers used for the anatomical course for medical students at Kurume University School of Medicine. Each right knee joint was resected and exposure a whole view of the ACL. The AMB and PLB were separated and the circumference of each bundle of fibers in the mid-portion of the AMB/PLB was measured under fixed tension using a tension meter. The CS area and diameter were calculated from the circumference, assuming the CS to be circular.
Moreover, after excising the ACL, the femoral and tibial footprints of the AMB and PLB were identified, each attachment was photographed, and the area was measured by image analysis.
Results: The femoral footprint, MS and tibial footprint each value at the site of are shown in Tab.1.

	ACL	AMB	PLB
femoral footprint	71±20	34±12	30±10
mid substance	28±7	17±4	10±4
tibial footprint	113±41	57±24	44±17

Discussion: In anatomical DBACL-R, it is most common to fix the AMB/PLB graft under equal tension. However, a thin graft of poor quality always produces considerable internal stress compared with another one, or results in poor stress distribution.On the other hand, tension is distributed according

to the CS of the graft obtained, and attempts to make the stress constant have also been reported. However, it is doubtful whether the kinematics of the knee joint, will be fully reproduced, since the tension applied to the AMB/PLB will be influenced by the volume of the graft.To obtain data that might help resolve this problem, we investigated the ratio of the volume of the AMB/PLB in the normal ACL. Tab. 2 shows the distribution of the diameter of the AMB graft and PLB graft in response to anatomical reconstruction, as calculated from these data. Considering that many surface fibers are present at the site of attachment to the tibia and femur, the ratio in the MS would seem to be important for reconstruction of the original pattern. This is reflected in the combination of the diameter of the PLB graft and the actual ratio of the ligament material in Tab.2. However, it should be relatively simple to create a graft on the basis of such a ratio in clinical practice, and further review of this issue is warranted.

	The diameter of AMB graft		
The diameter of PLB graft	By ratio of the femoral footprint	By ratio of the mid-substance	By ratio of femoral footprint
4.5	4.7	5.9	5.1
5	5.2	6.6	5.7
5.5	5.8	7.2	6.3
6	6.3	7.8	6.8

P15-616

Lateral radiographic study of the tibial insertions of the anteromedial and posterolateral bundles of human anterior cruciate ligament

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Background: Recently, anatomical anterior cruciate ligament (ACL) reconstruction with double bundle reconstruction has been proposed. We previously reported on the precise anatomical measurements of the femoral and tibial insertions for anteromedial and posterolateral bundles of ACL using cadavers. Their femoral attachments have been discussed in several studies, however few previous publications have mentioned radiographic measurements of the tibial insertions of two bundles.

Purpose: To determine the radiographic measurements of the tibial insertions for anteromedial and posterolateral bundles of ACL.

Methods: A hundred knees from 50 cadavers were dissected in order to select the bilateral knee joints in best condition for inclusion in this study. Furthermore, knees that displayed macroscopically degenerative changes or evidence of trauma, such as osteoarthritis, meniscal tears or ligament injury, were excluded. Finally, thirty-one cadaveric proximal tibias were obtained. ACL was divided into anteromedial and posterolateral bundles to the insertion attachment. After identification of the anteromedial and posterolateral bundles insertion sites on the tibia, the insertion center was marked with a lead pin. The anterior and posterior edge of ACL and the anterior edge of posterior crcuciate ligament were also marked. Straight lateral radiographs were taken, and locations of the tibial insertions were examined.

Results: The sagittal distance between the center of the tibial insertions of the anteromedial and posterolateral bundles and the anterior margin of the tibial condyles averaged 18.0 and 20.0 mm, respectively. The distance from the anterior margin of the condyles of the tibia to the center of the tibial insertions of the anteromedial and posterolateral bundles averaged 36.6% and 40.5% of the total anteroposterior width of the tibial condyle, respectively. The distance between the posterior margin of the tibial insertions of ACL to the anterior margin of the posterior cruciate ligament's attachment averaged 14.2 mm.

Discussion: We previously reported that the sagittal distance between the center of the tibial insertions of the anteromedial and posterolateral bundles from the anterior margin of the tibial articular cartilage averaged 13.0 and 14.7 mm, respectively. This study discusses different lengths from our previous study because the measurement method was different. In the previous study, measurents were taken from the anterior edge of the articular cartilage of the tibia, whereas in the present study, it was measured from the anterior margin of the tuberosity of the tibia because the anterior margin of the tuberosity of the tibia is a good mark in radiographs but the anterior edge of the articular cartilage cannot be observed. The present study gives important information on the precise anatomy of the anterior cruciate ligament bundles when performing reconstruction using fluoroscopy and for evaluating anterior cruciate ligament reconstruction surgery on a radiological basis.

Conclusions: This study defines the radiographical location of the tibial insertions of the anteromedial and posterolateral bundles of ACL. This contributes to more accurate anatomical double bundle ACL reconstruction surgery, and radiographic evaluation of such surgery postoperatively.

P15-622

The arthroscopic technique for revision ACL surgery through low medial parapatellar portal

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Objective: The objective of this study is to present the arthroscopic technique we use for ACL revision surgery using the low medial parapatellar portal and our results.

Methods: 21 ACL revision surgeries were performed by the same surgeon from January 2005 to August 2007. Previous grafts were 7 synthetic ligaments, 9 BPTB and 5 hamstrings. In all cases new femoral tunnels were drilled through a low medial parapatellar portal at the 9:00 o'clock position in the right knees and 3:00 o'clock position of the left knees with a clear deviation angle from the previous femoral tunnels. These tunnels were too much centrally (12:00-12:30 o'clock) or frontally placed. No hardware removal from the femur was necessary. In all cases new femoral fixation was accomplished with Endobutton (No 20mm or 15mm) or Endobutton BPTB. As new grafts we used hamstrings from the ipsilateral leg in 9 cases and from the contralateral leg in 5 cases and 7 BPTB. In the tibia we used the old drilled tunnels in 9 cases and we created new tunnels in 12 cases (9 of them were too much anteriorly placed and 3 too much posteriorly). For tibial fixation we used BIORCI-HA screw of large diameter and new staples.

Results: All patients returned to their previous level of activity. 4 of them in professional sport level 9 months after their operation. Evaluation was made by KT-2000, functional tests, questionnaire based on the IKDC formula and new x-rays. One superficial infection was handled by oral administration of two antibiotics. No femoral wall collapse between the two femoral tunnels occurred.

Conclusions: The arthroscopic revision technique for failed ACL previous surgery through medial parapatellar portal is demanding but offers in most cases the possibility for drilling new, more anatomically placed femoral tunnels without the necessity of hardware removal.

P15-624

Coronal angle of the double bundles of human normal ACL using oblique coronal MR imaging

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Introduction: Several studies have demonstrated that in ACL reconstruction the less perpendicular the angle of the graft in the coronal plane to the joint line resulted in reduced loss of flexion and anterior laxity. Therefore, the importance of graft positioning in the coronal plane is emphasized. We previously measured the angle of human ACL in the coronal plane in cadaveric knees, and reported the results at the Fifth Biennial Congress of ISAKOS. Recently, anatomical double bundle ACL reconstruction has been performed. However, the angle of each bundle of normal human ACL in the coronal plane is unknown. The aim of the present study is to define the angle of two bundles of human ACL in the coronal plane with MR imaging.

Methods: Thirty-five healthy volunteers participated in this study. They had no history of knee injuries and no knee problems. MRI was obtained on the right knee and oblique coronal imaging along the ACL was taken. The examinations were performed at 0.4 T with T2-wighted oblique coronal images. Of 35 knees, 15 knees of 15 subjects had separate images of the two bundles, anteromedial and posterolateral bundle. Those 15 subjects were aged 15 - 50 years old (mean 31.5 years old). Oblique coronal images were transformed into coronal image by the original program on PC. By the program, coronal images are generated by taking oblique images from the directions determined by the crossing angles to the horizontal and sagital sections, fixing them at the original positions, and orthographically projecting them to the coronal (frontal) view. Then, the angles of two bundles were measured on projected coronal images by ImageJ software. The angle of the anteromedial and posterolateral bundle of ACL in the projected coronal plane was measured as the angle subtended by the anteromedial and posterolateral bundle of ACL and a line drawn parallel to the articular surface of the proximal tibiae.

Results: The angle of anteromedial bundle ranged from 60 - 76.5 degrees, averaging 68.6 degrees and that of posterolateral bundle ranged from 46.6 - 67.7 degrees, averaging 56.8 degrees. The difference between the angle of anteromedial and posterolateral bundle ranged from 4.5 - 16.9 degrees, averaging 10 degrees. The mean angle of the anteromedial bundle significantly differed from that of the posterolateral bundle by paired t-test ($p < 0.0001$).
Discussion: In our previous study of the angle of human total ACL in the coronal plane in cadaveric knees, the angle of the medial edge of ACL averaged 60 degrees and the lateral edge of ACL averaged 68 degrees. The mean angle of two bundles in the present study was 68.6 degrees for the anteromedial bundle and 56.8 degrees for the posterolateral bundle and approximates the range of the angle of total ACL in the previous cadaveric study. As double bundle ACL reconstruction has gained more attention and is being performed, the anatomical positioning of two bundles is emphasized. Therefore, the coronal angle of the both bundles of human normal ACL is important for performing anatomical two bundles ACL reconstruction.
Conclusion: We have detailed the coronal angle of both bundles of human normal ACL using oblique coronal MR image to separate two bundles. The angles of the two bundles significantly differed.

P15-627
ACL lesions and subtalar dysfunction: A close relationship
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Even if ACL lesions are common in contact sports, a contact is not involved in the majority of ACL lesions, in soccer for instance. Varus and internal rotation in the knee is the most frequent mechanism related to ACL lesion. The knee is located in the lower limb between two ball in the socket joints: The hip and the subtalar joint. these joints played a major role in rotation balance and specially the subtalar joint because its close situation to the contact point on the ground. A subtalar joint dysfunction is almost in all cases related to a tenodesis effect on the Flexor Hallucis Longus (FHL) tendon in the retrotalar space. This condition induces a functional hallux rigidus that can be diagnosed clinically with a specific clinical test, gives a pathognomonic footprint on footscan platforms and induces a specific pattern in gait. In gait the pronation is prolonged at push-off and provoques a time-lag that is reported at heel strike by an increased supination and a contact on the lateral aspect of the calcaneus. A medial collapse of the knee in stance phase and an increased varus moment at heel strike are observed in gait analysis. This dynamic dysfunction is aging as a predisposing factor in ACL lesions. Systematically tested in patients with ACL lesion, a subtalar dysfunction is diagnosed in more than 90% of cases. Management of the subtalar dysfunction is included in the rehab protocol after ACL reconstruction with specific manoeuvres and exercices. A surgical endoscopic tenodesis of the FHL tendon is sometimes proposed.

P15-631
The computer assisted single-stage combined ACL reconstruction with osteotomy for chronic ACL rupture coupled with early medial tibio-femoral arthritis
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Background: To describe our experience with computer assisted combined anterior cruciate ligament (ACL) reconstruction and osteotomy. It may provide long-term symptom relief and improved function in patients with medial knee arthrosis and ACL-deficiency, while delaying or possibly eliminating the need for further surgical intervention such as arthroplasty.
Methods: Two patients who had medial unicompartmental arthrosis and chronic ACL-deficient knees underwent ACL reconstruction along with femoral osteotomy in one case and upper tibial osteotomy in the other. We used Orthopilot software to perform computer assisted combined anterior cruciate ligament (ACL) reconstruction and osteotomy.
Result: Subjective evaluation at postoperatively indicated significant improvement compared to preoperative evaluation and better scores for patients who obtained normal knee range of motion. Objective evaluation by International Knee Documentation Committee showed improved score postoperatively. Both had minor complications occurred in the immediate postoperative period. The average correction angle of the osteotomy was 7 degrees (7-10).
Conclusion: Computer assisted ACL reconstruction and osteotomy may provide long-term symptomatic pain relief, increased activity and improved function. Only Anterior cruciate ligament reconstruction may not effectively provide pain relief to the ACL-deficient knee with degenerative medial arthrosis. The results of this study suggest that combined high tibial or femoral osteotomy and ACL reconstructions are effective in the surgical treatment of varus, ACL-deficient knees with symptomatic medial compartment arthritis. Computer aided surgery allows precise correction of the axial deformity and tunnel orientation intraoperatively.

P15-637
Treatment of outcome of ACL reconstruction with artificial ligament
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Synthetic ligament for anterior cruciate ligament (ACL) reconstruction have been widely used in the 1980s and early 1990s in orthopaedic surgery. The initial enthusiasm surrounding the introduction of synthetic graft materials stemmed from their lack of donor morbidity, their abundant supply and the significant strength of these devices. The disadvantages at long-term follow up are cross-infection from allogenic material, an immunological response because the artificial ACL is a inert graft, tunnels osteolysis, femur and tibial fractures near the tunnels, finally there is a synovial reaction, knee osteoarthritis and tumors. Following initial enthusiasm, the use of artificial ligament substitutes for ACL reconstruction has then declined.
A group of 126 patients was treated with artificial ligaments in our Institute between 1985 and 1990. In the last years we reviewed 53 of these patients. All the patients have clinical signs of increased laxity compared with their opposite knee and radiographic signs of degenerative change.
Based on Ahlbäck criteria (focusing on joint space narrowing) we proposed to 9 patients with a grade 2 of knee osteoarthritis a 2 step surgical treatment: first the ligament removal, then the arthroscopic ACL reconstruction with autograft after 6-8 months.
After few years from ACL reconstruction with autograft or artificial ligament removal alone, the objective scoring tests showed that all treated and untreated patients experienced the same degree of symptoms, functional impairment and radiographic signs of articular degeneration. Problems associated with the use of synthetic grafts as ACL substitutes include the generation of particulate debris (wear particles) and subsequent sterile effusions that generate a degenerative articular reaction that do not stop after ligament removal.
We conclude that the ACL reconstruction with autograft in these patients do not influence the natural history of knee ostheoarthritis started from artificial ligament debris.

P15-644
How frequent is meniscus damage after damage to the anterior cruciate ligament?
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Objective: Meniscus damage has been attributed to mechanical knee joint instability. In particular, ruptures of the anterior cruciate ligament (ACL) have been reported as cause of meniscus pathology. Our goal is the evaluation of the frequency and description of meniscus damage after an artificial rupture of the anterior cruciate ligament. We are consistently studying the anterior cruciate transection model of the rabbit which has a definite starting point of the laceration of the ACL and may be used for observational studies with a shorter time period than in the human patient.
Methods: After acceptance of the animal study protocols by the Institutional Animal Welfare Committee, the Ethics Board and the responsible Regional Government Board, we could use 32 New Zealand White rabbits in our study. All rabbits were male and skeletally mature as checked by standard x-ray.
All surgeries were performed under sterile operating room conditions. Rabbits received i.m. narcotics for anaesthesia. An open medial parapatellar approach to the ACL was performed. This allows a transaction in the middle third of the ligament under complete visualisation. During the surgery, any additional joint pathology can well be excluded. After surgery, the rabbits were allowed weight bearing as tolerated and full activity in their cages. Sacrifice of all animals was performed at 2, 4, 8 and 12 weeks after surgery. Per timepoint, 8 rabbits were sacrificed. The frequency and patterns of medial and lateral meniscus damage were recorded at the time of complete joint

dissections. Also, the state of the ACL remainders were recorded at dissection. In addition, we evaluated the damage to the cartilage macroscopically and microscopically using well established cartilage pathology classification systems (ICRS, Outerbridge, Mankin).
Results: All rabbits tolerated the procedure quite well. Clinically observed, full weight bearing was reached quickly after the surgery. Already at 2 weeks after surgery, signs of meniscal damage like meniscus oedema, fibrillations and small tears of the posterior meniscus horns were found in the knees after transaction of the ACL. 5 of 8 rabbits had such changes in their knees at 2 weeks. With time, fibrillations became more obvious. Also, the tears became bigger and menisci were even damaged to the extent of meniscus dislocation towards the joint capsule. The actual frequency of macroscopically visible meniscus damage was 6 of 8 knees at 4 weeks, 7 of 8 knees at 8 weeks and 6 of 8 knees at 12 weeks. Especially at the later time points, damage was observed in medial and lateral menisci.
Conclusions: As after ACL rupture in human patients, this rabbit model shows meniscus damage after damage to the anterior cruciate ligament. Under full weight bearing, damage to the menisci happens very early. Also, the consequences remain not restricted to just one knee compartment. As many menisci were already damaged so early during the study period, the frequency does not increase so much more with time. But the obvious pathology of the menisci still becomes more severe with time. This indicates that reconstruction of the ACL as possible preventive treatment must be timed well. From this animal model study, we may carefully conclude that a later reconstruction may still decrease the severity of menicus damage. It may definitely be concluded that osteoarthritis -like pathology seems to start more or less inevitably after laceration of the ACL.

P15-645
Clinical results of anterior cruciate ligament reconstruction comparing lateralized single-bundle reconstruction with a patellar tendon graft and double-bundle reconstruction with a hamstring tendon graft
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Objective: Double-bundle ACL reconstruction has been recommended for superior postoperative rotatory stability. Since two graft substitutes are required for double-bundle reconstruction, a patellar tendon graft is not sufficient. For single-bundle reconstruction with a patellar tendon graft, the femoral tunnel should be placed laterally to restrain rotatory loads. The purpose of this study was to compare the short-term clinical results of lateralized single-bundle reconstruction using a patellar tendon graft (PT group) with double-bundle reconstruction using a hamstring tendon graft (HT group).
Methods: One hundred thirty-seven patients who underwent unilateral ACL reconstruction were prospectively investigated. Clinical examinations were performed preoperatively and at 1, 3, 6, 12, 18 and 24 months postoperatively and followed-up at every 6 or 12 months thereafter. Extension lag was evaluated by measuring heel height difference. Knee stability was evaluated with KT-1000 measurement, pivot shift test and anterior drawer test. Kneeling pain in knee walking test was graded and isokinetic peak torque in knee extension and flexion was measured. Overall knee functions were classified according to the IKDC evaluation form.
Results: Forty-nine (84%) patients consisting of 18 females and 31 males in the PT group and 64 (83%) patients consisting of 42 females and 22 males in the HT group were followed-up more than 24 months and included in the data analysis. The PT group showed earlier recovery of knee extension with smaller heel height difference compared to the HT group, however, significant difference was no longer seen between the 2 groups after 6 months (Figure 1). No significant difference in the side-to-side difference of KT-1000 measurement (Figure 2), pivot shift test or anterior drawer test was detected between the 2 groups. The PT group and the HT group showed better recovery of hamstrings and quadriceps strength at 3 months postoperatively, respectively, and the significant difference disappeared after 6 months. There was no significant difference in results of knee walking test or IKDC evaluation between the 2 groups.

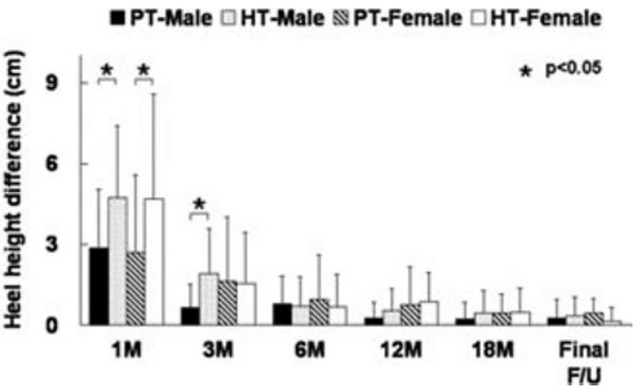

Figure 1

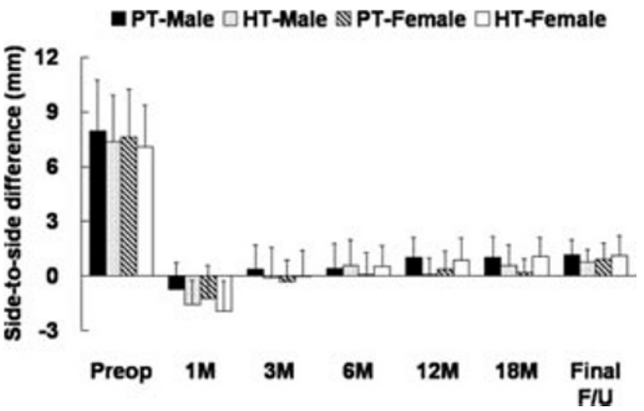

Figure 2

Conclusion: The current study with a minimum 2-year follow-up showed equal overall results in the PT and HT groups. It was suggested that lateral placement of a patellar tendon graft could improve the clinical outcomes of single-bundle reconstruction comparable to those of double-bundle reconstruction with a hamstring tendon graft.

P15-652
Recellularization and maturation of allografts used to replace the ACL. Variables that have an influence on these processes
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Objectives: First, to evaluate the processes of recellularization, remodeling and maturation of tendinous allografts used to replace the ACL, and second, to analyze the variables that could have an influence on these processes, such as preservation, or not, of the infrapatellar fat pad and graft tension.
Materials and methods: We performed ACL reconstruction with a cryopreserved tendinous allograft on 53 rabbits. In ten of them the infrapatellar fat pad was resected, and in the other 43 it wasn't. The allografts were evaluated at 1, 2, 3, 4, 5, 6, 12, 24 and 52 weeks. The specimens were evaluated by conventional histology, image analysis and ultrastructural analysis.
Results: Tendinous allografts seem to be a good graft from the biological point of view. At three months, the allograft histologically resembles a normal ACL ("phenomenon of ligamentization"). Moreover, the tendon allograft provides a functional replacement for the removed ACL; that is, neither articular degeneration nor graft biodegradation were observed. Cellular repopulation begins at the periphery and progresses centrally. During peripheral remodelling, the central zone of the graft remains acellular and compact. Once the periphery of the graft has been successfully repopulated, the process progresses until the entire graft is completely restored. That is, during the remodeling process, the entire graft structure is not affected simultaneously, diminishing in this way the risk of rupture ("creeping substitution" phenomenon). During the remodeling process two phenomena occur: for one thing, lysis of the old collagen of the graft by macrophages; and for another thing, production of new collagen by active young fibroblasts. Both phenomena

are simultaneous and synchronic. The maturation process progresses towards the center of the graft. The cells modulate into fibrochondrocytes ("polarized differentiation"). We have observed that in those cases in which infrapatellar fat pad was preserved, the recellularization process is faster and the remodelling earlier, than in those in which it was resected. Adequate graft tension is crucial for complete graft maturation; hence, the importance of the isometric ligament placement.
Conclusion: The results of this study derive from animal experimentation; nonetheless, it is likely that the recellularization, remodeling and maturation processes in humans, will take place in the same manner.

P15-657
ACL deficient knees with advanced medial compartment arthrosis treated with combined ACL reconstruction and mobile bearing unicompartmental arthroplasty
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Unicompartmental knee arthroplasty for the management of advanced medial compartment arthrosis in the active middle-aged individual has gained widespread acceptance. It is not uncommon for medial compartment arthrosis to co-exist with ACL deficiency in this population; thus, creating a relative contraindication for unicompartmental knee arthroplasty, particularly when using the mobile bearing model.
Objective: To present our management of active middle-aged patients with ACL deficient knees and advanced medial compartmental arthrosis treated simultaneously with ACL reconstruction and mobile bearing unicompartmental arthroplasty. The surgical technique and results will be presented.
Methods: We prospectively evaluated six patients undergoing endoscopic ACL reconstruction combined with mobile bearing unicompartmental knee arthroplasty for the treatment of instability and medial compartment arthrosis. All procedures were performed on an out-patient basis. The study population consisted of 4 males and 2 females with an average age of 56 years (range 41-62). The average duration of symptoms was 10.7 years with an average of 1.4 surgical interventions on the affected knee. In addition to clinical and radiographic assessment, patients were evaluated pre-operatively and post-operatively using Oxford, Knee Society and Tegner Scores. Hospital stay and length of disability were also recorded. Patients had an average follow-up of 2.3 years.
Results: All patients demonstrated significant improvement compared to their pre-operative status. The average Tegner scores improved from 2.1 to 3.4. The average Oxford Knee Score improved from 22 to 44 and the Knee Society Score 47 to 81 points. Average length of time on crutches was 11 days.
Conclusion: Active middle-aged patients with ACL deficient knees and medial compartment arthrosis can be successfully treated simultaneously with a combined ACL reconstruction and mobile bearing unicompartmental arthroplasty. The procedure is done as an out-patient and with minimal disruption in ADLs.

P15-661
Re-rupture of the football-player's reconstructed ACL after return to competitive sport: What failed?
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Objective: To analyze the factors contributing to the failure of primary ACL reconstruction in international/national elite football-players.
Materials and methods: We retrospectively evaluated 6 cases of re-ruptures of the reconstructed ACL after return to competitive sport. All the patients underwent isolated single-bundle ACL reconstruction in both the first and second operation. Two of them had suffered an ACL rupture of the contralateral knee previously. All the patients returned to previous sport activity at the same level previous to the first operation after re-operation. We have analytically evaluated each case, after the first operation and after the second operation, by means of x-rays, MRI, MRI plus three-dimensional reconstruction software, and functional tests made previously to return to sport participation. Moreover, we have analyzed the video of the lesion mechanism of the re-rupture and the video of arthroscopy. We have analyzed graft selection, surgical technique, femoral/tibial tunnel position, obliquity of the graft in the coronal and sagittal plane, impingement between ACL and PCL in flexion and extension, and early return to vigorous sport participation.
Conclusions: The surgeon, the patient or the physical therapist have some responsibilities in re-rupture of the reconstructed ACL.

P15-663
Relationship between the obliquity of the graft in the coronal plane and rotatory stability after ACL reconstruction
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Objective: Several studies emphasize the importance of an adequate femoral tunnel location for the success of an ACL reconstruction. But little importance has been given to the coronal plane in comparison with the sagittal plane. The aim of this study is to evaluate the relationship between the obliquity of the graft in the coronal plane and clinical results after ACL reconstruction.
Materials and methods: We retrospectively evaluated 30 patients who underwent isolated single-bundle ACL reconstruction with quadrupled hamstrings grafts or B-PT-B with one-incision transtibial technique (inside out technique) using the following as method for femoral fixation, bioscrew, endobutton or transverse femoral fixation, with a minimum of 1 year follow-up. We have evaluated the patients by means of Lachman test, pivot-shift test, IKDC score, Tegner activity score and Lysholm score. Moreover, we performed the instrumental Lachman test with the KT-1000 arthrometer. We have performed in all the cases plain radiographs and an MRI to analyse femoral tunnel position in both the sagittal and coronal plane. In all cases MRI demonstrated an intact and well-integrated graft which was confirmed by means of arthroscopy in 6 cases (intact graft with good tissue quality and tunnel fixation). Moreover, in all the patients the lateral para-sagittal MRI images demonstrated optimal position of the femoral bone tunnel, defined as zone IV. We have measured in the coronal plane the angle between the joint line and the graft. We have also evaluated the axis of the femoral tunnel on an imaginary clock face. Finally, we have measured the angle between the joint line and the graft on the sagittal MRI view. Patients were divided in two groups: group I: negative pivot-shift; group II: positive pivot-shift.
Results: There were 24 patients in group I (80%) and 6 patients in group II (20%). The angle between the joint line and the graft in group I was smaller than in group II ($p<0.05$). We found a relationship between the obliquity of the graft and the clinical results. We found that a vertical graft orientation does not control internal tibial rotation. This malpositioned graft could predispose to its failure particularly with rotational stress (sports activities). There was less pivot-shift in the cases were the femoral tunnel was more oblique. We have seen that pivot-shift test correlates more accurately with the patients' symptoms and therefore with patient satisfaction than anterior translation measured by the KT-1000. Moreover we have observed that femoral tunnels of the transfix group tend to be closer to the 12 o'clock position when compared to the femoral tunnels of the bioscrew and endobutton groups. Therefore, graft placement and orientation may vary in function of the femoral fixation technique.
Conclusions: Our data supports the original hypothesis that modifying the coronal plane obliquity of the femoral tunnel would influence rotational constraint of the knee, without higher anterior tibial translation.

P15-672
Computer assisted surgery assessment of anterior and rotational laxities during manual Pivot-shift testing after resection of the anterior cruciate ligament (ACL): A cadaver study
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Introduction: The goal of the study was to validate a computer assisted method to assess anterior and rotational laxities during manual Pivot-shift testing with and without anterior cruciate ligament rupture and during complete range of motion in flexion and extension. Furthermore the kinematic variability between different knees should be evaluated.
Method: 9 knees from 6 cadavers were tested by 4 different surgeons before and after arthroscopic ACL resection. A Computer Assisted Surgery system (Kneetrac, Stryker, Pusignan, France) was used to assess the motion of the tibia in relation to the femur during the tests. Rotational laxity and anterior laxities in both tibiofemoral compartments were evaluated under the following conditions: gravity, with a constant anterior load of 100 N, with internal and external torque of 5 Nm and with manual Pivot-shift test. The data were analyzed with a factorial analysis of variance with repeated measures.

Results: A significant variability of knee kinematics could be found between the different specimens. The variation of knee kinematics during flexion/extension movement differed significantly before and after ACL resection ($p<0.001$ Eta2 = 0.407). A significant increase of anterior laxity could be confirmed during the manual Pivot-shift test after ACL resection. The effect on rotational laxity occurred especially between 10° and 40° ($p<0.001$ Eta2 = 0.195). The manual perception of the "shift" was expressed by a fast decrease of anterior laxity and internal rotation at 33° ± 9° of knee flexion. Compared to the evaluation with an isolated anterior load (anterior drawer) or isolated rotational stress, the pivot shift test represents the most reproducible assessment of the absence of an ACL between different knees, even if the anterior laxity is also very high with anterior stress ($p<0.001$ Eta2 = 0.840).
Conclusions: 1. Computer assisted surgery systems allow for a precise and reproducible evaluation of knee kinematics in ACL intact knees and after ACL resection.
2. The results showed a high variability of knee kinematics of the different specimen.
3. Analysis of the Pivot-shift showed a high interexaminer variability with respect to the amount of tibiofemoral displacement.
4. Despite this variability, the shift occurred in all knees and with all examiners at a knee flexion angle of 33°±9°. The pivot shift is the most sensible clinical test for detection of ACL tears.

P15-675

Anterior cruciate ligament reconstruction associated with an open wedge distal femoral varus osteotomy: A case report

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Introduction: In young athletes, chronic anterior knee instability caused by anterior cruciate ligament (ACL) insufficiency is often the cause for meniscal and osteochondral lesions or osteoarthritis. The physiological proportion of sliding and rolling is lost in ACL-deficient knees, which causes, as the result of excessive anterior translation of the tibia, stress to cartilage, menisci and ligaments. In patients with congenital valgus malalignment (primary valgus) degenerative changes can be promoted as the result of mechanical unicompartimental overload.
Case report: Male, 17 years old, history of a sports accident that result an injury of his right knee in December 2005. Since that day, the patient complained of chronic pain reported to the lateral compartment and instability of his right knee.
At clinical examination: valgus deformity of the right knee with a positive Lachman test, Anterior Drawer test and Pivot Shift test.
Magnetic resonance imaging confirms rupture of the lateral meniscus, lateral unicompartimental chondral lesions and a midsubstance tear of the ACL.
In March 2006 the patient was submitted to a partial meniscectomy of the lateral meniscus, and an ACL repair using homolateral autologous quadriceps tendon graft associated with an open wedge distal femoral varus osteotomy, during the same procedure.
After 12 months of follow-up the patient has a favourable evolution with functional recovery and no evidence of knee instability.
Discussion: Osteotomies around the knee for the purpose of deformity correction and unloading of unicompartimental arthritis remain a viable treatment despite some controversy. Valgus deformity of the knee, whether due to developmental or traumatic aetiology, is less common. It has been our practice to correct valgus deformity using a distal open wedge femoral varus osteotomy (DFVO).
There is only little evidence regarding the outcome of ACL repair associated with distal open wedge femoral varus osteotomy. Considering our own results and the literature, combined DFVO/ACL procedures are a good choice for patients with valgus deformity, lateral unicompartimental chondral lesions and chronic anterior knee instability.

P15-693

Osteoligamentary ACL replacement using a hardware-free press fit fixation technique and supplementary hardware fixation - cyclic stress tests in vitro with bovine knees

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Introduction: The aim of the study was to investigate whether the ligamentum patella ACL replacement using a hardware-free press fit technique - a well established clinical practice - will withstand postoperative weight bearing stress and functional training. Do supplementary femoral and tibial fixation methods show advantages in stability that justify the use of hardware?
Methods: Sixty bovine knees were prepared and operated as in the osteoligamentary press fit technique on the human knee, the strength of the fixation was estimated and documented intraoperatively.
Into thirty proximal tibia ten specimens with press fit, ten specimens with press fit and metal screw, and ten specimens with press fit and spongiosa reinforcement were implanted
Into thirty lateral femoral condyles ten specimens with press fit, ten specimens with press fit and supplementary biodegradable interference screw, and ten specimens with press fit and supplementary titanium interference screw were implanted.
In a test cylinder the specimens were exposed to 500 cyclic loads between 50 and 250 N; after that a linearly increasing load was applied until rupture occurred.
Movements of the bone blocks were monitored with sensors; force, distance and time were also monitored continuously. The measured values resulted in force-distance diagrams from which peak load and stiffness can be determined. Material fatigue, loosening effects and failure modus were also documented.
Results: In the six different test groups there was no failure in the cyclic load tests, all fixation methods withstood 500 cycles with loads between 50 N and 250 N.
The Peak load tests showed the following average forces: with tibial press fit 512 N, with tibial press fit and metal screw 1192 N, with tibial press fit and spongiosa reinforcement 827 N; with femoral press fit 967 N, with femoral press fit and biodegradable interference screw 1292 N and with femoral press fit and additional titanium interference screw 1890 N.
Discussion: The above results demonstrate that an adequate primary stability of an osteoligamentary ACL reconstruction can be achieved exclusively with press fit technique. This allows early functional rehabilitation and weight bearing. Concerning the femoral fixation a supplementary securing with hardware is not necessary; the tibial fixation can be supplementarily secured by an autologous spongiosacylinder out of the tibial drilling canal and thus the peak load can be increased; the tibial fixation with a titanium screw results in a significant increase of the peak load.

P15-718

Anatomic ACL reconstruction: Restoration of the AM bundle in primary ACL surgery

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Introduction: The ACL consists of two functional bundles, the anteromedial (AM) and posterolateral (PL). In rare instances during ACL injury, disruption of the AM bundle may be accompanied by sparing of the PL bundle, resulting in knee instability. MRI can demonstrate the injury pattern. Lachman and KT-1000 testing reveals increased anteroposterior translation, while Pivot Shift testing reveals only slight rotatory instability. Using the anatomical concept, the PL bundle can be preserved in situ and the AM bundle can be reconstructed to restore knee stability.
Methods: Seven patients with isolated AM bundle tear were diagnosed by history, examination, MRI and arthroscopy. All subsequently underwent PL bundle preservation in situ and AM bundle reconstruction using soft tissue allograft or autograft (mean diameter 8.2mm). Patients were prospectively followed with Lachman, KT-1000, Pivot Shift, range-of-motion, and IKDC score.
Results: Mean age at surgery was 32.1 years (range 15-56). Mean follow-up was 24 months (range 19-28). Mean Lachman grade decreased from 1.7 to 0; mean KT-1000 decreased from 8.6 to 1.0 mm; mean Pivot Shift test decreased from 1.0 to 0; mean total arc of motion increased from 129 to 140 degrees; and mean IKDC score increased from 43.7 to 92.5 ($p<0.05$ for all comparisons).
Conclusion and Discussion: Improved understanding of the functional anatomy of the ACL has led to recognition of the uncommon single-bundle ACL tear. When the AM bundle is torn alone, our results suggest efficacy of isolated AM bundle reconstruction with preservation of an intact PL bundle in situ.

P15-726

ACL double bundle anatomical reconstruction using out-in technique

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Purpose: In order to present an out - in approach to perform anatomical double bundle ACL reconstruction.

Method: Avoiding all the problems connected with possible too short tunnels and not anatomical fixation due too in -out technique we performed an out-in ACL reconstruction fixing the graft with 4 absorbable screws in order to obtain more anatomical A-M and P-L bundle.

An out in arthroscopic guide was designed for tibial and femural drilling. to guarantee a precise position of P-L and A-M bundles. 145 patients were operated from January 2004 to January 2007. All the procedures were perfomed by the same surgeon, 95 were males, 50 were females The patients were evalued at 30.,90 and 180 days post-op.Then were re-called at an average of 2.5 years follow up. IKDC score was evalued by an external surgeon.(supervisor).

Results: A cases 82%, B cases 13%, C cases 3 rebreak.: In 3 cases the P-L femural screw was not completely screwed in the tunnel allowing pain during flexion-extension. In 12 cases the femural guide didn't allows us to obtain a perfect position for the k-wires and the procedure was completed using just a normal out -in guide.

Conclusions: Double bundle ACL reconstruction using out-in technique allows to obtain good results in a high pecentage of cases. The residual glide it is represented in a very low rate. Measuring the lenght of the tunnels and the lenght of the insertional areas it is a good method to avoid conflict between screw and soft tissue and to avoid not precise tunnels in double bundle ACL reconstruction.

P15-736

ACL reconstruction with hamstrings: prospective randomized multicentric study, comparison between double bundle and single bundle technique

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Introduction: This study was promoted by S.E.R.O.D. (Spanish Society of Knee Surgery). Several biomechanical and clinical studies suggest that the double bundle tenchnique provides better results in terms of anterior tibial traslation control and in the rotatory stability after acl reconstruction. The purpose of this study is to compare both techniques focusing in the clinical results.

Methods: From October 2006 to March 2007, 58 patients underwent primary hamstring ACL reconstruction were included in a multicentric prospective randomized study. The single bundle technique (SB) was performed in 26 patients and the 32 were operated using double bundle technique (DB). Femoral fixation was performed by means of EndoButton CL devices (Smith & Nephew Endoscopy, Andover, MA), and tibial fixation was done with bioabsorbable interference screws plus metallic staple. The demographic characteristics were similar in both groups. The follow-up was 11.6 month of average. All this cases were evaluated using the IKDC scale.

Results: The subjective evaluation of IKDC showed a clinical improvement in both groups in comparation with the preoperatory situation, but without significant differences between groups. There were statistically significative differences in relation with previous medial meniscetomy, 25% in the DB group versus 3.8% in the SB group. The objective ligament evaluation was better in the DB group, 84.3% were included in results A and B, versus 73.1% in the SB group ($p>0.05$). We did not find significant differences between groups in the evaluation of the pivot-shift. With the functional test de DB group showed 9.4% in C and D results, however the SB group got 15.4% of poor results.

Conclusions: The subjective results of both groups are comparable after 1 year of follow-up. We achieved, in the DB group, a better anterior tibial traslation control, but without statistic significance. Regarding the pivot-shift the results are similar. The functional test was significally better in the DB group.

P15-739

How much bending the knee when drilling the posterolateral femoral tunnel during double-bundle ACL reconstruction through a medial portal

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Purpose: The purpose of this study is to determine the influence of knee flexion angle for drilling the posterolateral (PL) femoral tunnel during double-bundle anterior cruciate ligament (ACL) reconstruction via the anteromedial (AM) portal on resulting tunnel orientation and length.

Methods: In nine fresh cadaveric knees, the ACL was excised and 2.4 mm guide wires were drilled through the PL bundle footprint via an AM portal. We compared knee flexion angles of 90, 110, 130 degrees. AP-, lateral- and tunnel view radiographs were measured to determine tunnel orientation, o'clock position, and direct measurement were used to determine intra-osseous tunnel length

Results: On AP view, increased flexion resulted in more horizontal tunnels. The angles were 31.9 ± 7.1°, 26.4 ± 8.9° and 23.0 ± 8.1° for 90°, 110° and 130°. The pin orientation was significantly different when comparing 90° and 130°.

On lateral view, increased flexion resulted in more horizontal tunnels. The angles were 68.9 ± 19.9º, 50.4 ± 11.6º, 31.3 ± 12.3º for 90°, 110° and 130°. All values were significantly different.

On tunnel view, pin orientation was 22 ± 8.2°, 28.3 ± 6.7° and 35.9 ± 6.2° for 90°, 110° and 130°. All values were significant. Mean o'clock position was 09:00 ± 0:12. Intra-osseous length of the pins did not significantly change with knee flexion.

The exit of the pins on the lateral femur with regard to femoral attachment of the LCL was proximal. The distance was 0.1 ± 6.6 mm, 6.4 ± 6.4 mm and 9.2 ± 2.4 mm for 90°, 110° and 130°. This was significant when comparing 90° and 130°. The shortest distance between the exit and the posterior femoral cortex was 4.0 ± 1.8 mm, 9.7 ± 3.5 mm, and 13.2 ± 2.8 mm for 90°, 110° and 130°. All values were significant.

Conclusion and Discussion: The PL femoral tunnel orientation change with knee flexion angle, mostly on the lateral view. When bending the knee at 110°, the exit of the PL pin through the lateral femoral cortex is too close from the attachment of the LCL. Also, the 90° flexion angle is not acceptable leading to two risks: damaging the LCL and blowing out the posterior cortex. Thus we recommend drilling the PL tunnel through the accessory AM portal at 130° of knee flexion. At 110°, exit of the PL pin is close to the attachment of the LCL. 90° flexion risks damage to the LCL and backwall blow-out.

P15-752

Ten-year follow-up study comparing conservative versus operative treatment of anterior cruciate ligament ruptures. A matched-pair analysis of high level athletes

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Aims: The objective of this article is to view the long term results of operatively versus conservatively treated anterior cruciate ligament ruptures in high level athletes. The two groups were compared regarding the extend of degenerative changes in the knee, instability, activity level, subjective and functional outcome parameters.

Methods: Patients with an anterior cruciate ligament tear on either MRI or arthroscopic evaluation more than ten years previously, who were treated conservatively were pair-matched with the patients who had had a Bone-Patella-Tendon-Bone reconstruction, with respect to; follow-up, age, gender and Tegner activity score before injury. In total 50 patients were pair-matched for the present study.

Results: In this study we found no statistical difference between the patients treated conservative or operative in objective and subjective functional outcome, degenerative changes in the knee and other lesions involving the knee. The patients who were treated operatively had a better stability of the knee and a one point higher Tegner score.

Conclusion: In this pair-matched study the instability repair using a BPTB ACL reconstruction is an excellent knee stabilising operation. It however does not change the ten year results in subjective and functional outcome measurements between operative and non-operative treatment. Further prospective studies with these latest reconstruction techniques need to be undertaken.

P15-754

Effect of varying patella tendon bone block lengths on pull out strength for anterior cruciate ligament reconstruction. How small a bone block can we afford to use?

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Aims: The aim of the present study was to investigate the possibility of using small bone blocks. Our hypothesis was that 10 millimeter (mm) long bone blocks have comparable loading capacity to 20 mm long bone blocks.

Methods: Ten human cadaver knees had ACL reconstruction, randomly assigned to the 10 and 20 mm group (group 1 and 2). After reconstruction, pullout tests were performed using a tensile testing machine (Instron). Stiffness, failure load and failure mode were recorded.

Results: Mean stiffness was 63.4±22.3 N/mm for 10mm blocks and 76.4±19.2 N/mm for 20mm blocks. Mean failure loads were 373.2±136.6 N for 10 mm bone block and 446.6±140.8 N for 20mm bone block without a significant difference (p=0.345) in graft failure load. All bone-patellar tendon-bone grafts failed at the graft-femoral complex.

Conclusions: We concluded that a 10 mm long bone block is not significantly weaker than a 20 mm long bone block. Fixation strength of a 10 mm bone block exceeds loading values at passive and active extension of the knee. Tensile testing performed on elderly human cadavers will result in underestimation of the failure loads to be expected in the young patient. Clinical relevance: 10 mm long bone blocks could offer good fixation strength in anterior cruciate ligament reconstruction.

P15-771

Immunohistochemical study of the apoptosis of the ruptured anterior cruciate ligament

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The purpose of study is to identify and measure the apoptosis of the ruptured human anterior cruciate ligament.

Between January 2004 and May 2006, the 15 acutely ruptured anterior cruciate ligaments were harvested from patients who underwent a anterior cruciate ligament reconstruction surgery with autogenous hamstring tendon. The apoptoses of the ruptured anterior cruciate ligament tissue specimens were measured by TUNEL and Caspase staining. The harvested semitendinosus tendon during the reconstruction surgery was also stained as a control group. We measured the ratio of the stained cells to total cells using microscopic cell count.

The average staining positive cell ratio of the ruptured anterior cruciate ligament was 73% in synovium and 23% in stroma. The staning positive cell ration of the semitendinosus tendon as a control was from 1 to 15% only. The most apoptotic staning of the ruptured anterior cruciate ligament was found in synovium, especially vascular endothelial cell.

The most apoptosis of the ruptured anterior cruciate ligament were occurred in synovial vascular endothelial cells. This finding may be related with impaired blood clot formation of the ruptured anterior cruciate ligaments, which result in poor healing potential.

Key Words: Knee, Anterior cruciate ligament rupture, Apoptosis, TUNEL, Caspase

P15-779

Are intercondylar notch and tibial slope risk factors for anterior cruciate ligament tear?

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The anatomical and biomechanical study of the knee reveals two factors which could be dangerous for the anterior cruciate ligament (ACL): the tibial slope and the intercondylar notch of the knee. The aim of this study was to compare the width of the intercondylar notch on MRI scans and the values of tibial slopes on standard radiographs of the whole tibia. 50 patients with normal ACL and 50 patients with ACL tear were included in this study. The authors measured the tibial slope with four different techniques and calculated an index to compare the width of the intercondylar notch as described by Souryal (Notch Width Index) for each patient. The results show that the tibial slopes of patients with ACL tear are significally higher than those of patients with intact ACL (p<0,01). Moreover, the width of intercondylar notches of patients with ACL tear is statistically lower than those of patients with normal ACL (p<0,01). This study concludes that the value of tibial slope and the width of intercondylar notch seem to be two anatomical risk factors for ACL tear which could be considered in the ACL reconstruction and in the postoperative care.

P15-781

ACL primary repair combined with bone marrow stimulation in acute partial tear: Results in a group of athletes

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Objective: The purpose of this study was to evaluate the outcome of ACL primary repair combined with bone marrow stimulation in the treatment of an acute partial tear in athletic population.

We hypothesized that ACL primary repair combined with bone marrow stimulation would effectively restore stability and function in young athletes with acute partial tear of the ACL.

Methods: Included in this investigation were patients less than 40 years of age who presented to the senior author after a sports related knee injury and were subsequently diagnosed with an acute partial tear of the ACL. Diagnosis was based upon a history of pain and buckling, an examination demonstrating anterior instability, an MRI suggestive of partial tear of the ACL with at least some fibers of the ACL in continuity. Ultimately, arthroscopy confirmed the partial ACL tear based on visual assessment and stability on probing. We excluded patients with grade IV chondral injury, partial or complete injury to the lateral collateral ligament or posterior cruciate ligament, complete tear of the medial collateral ligament (patients with grade I or II MCL injury were included), contralateral knee injury or surgery, severe malalignment, or unwillingness to participate in our strict rehabilitation protocol at a specified center. Patients were informed that study participation was voluntary and offered the option not to participate in the study in which case they could choose the study procedure (primary repair combined with bone marrow stimulation) or could choose standard ACL reconstruction or non-surgical treatment. In all patients surgery was performed within 1 month post injury. Study patients were also informed that if, at the time of surgery, a complete instead of partial ACL tear was diagnosed, they would be excluded from the study and standard ACL reconstruction would be performed. Postoperatively, all patients followed the same rehabilitation protocol, similar to the Steadman Protocol. Outcomes were assessed using Marx, Noyes, Tegner, SANE, Lysholm, Rolimeter and IKDC Knee Scores.

Results: 26 patients were followed for a mean of 25 months. Mean age was 26.6 yrs Final Tegner, Marx, and Noyes scores were not statistically different compared to pre-injury values. However, final SANE rating was significantly lower than pre-injury SANE rating. Final SANE rating and Tegner scores were significantly higher than their respective pre-operative values. Mean Rolimeter side to side difference of anterior knee translation was significantly reduced from 5 mm (SD = 2 mm) pre-operatively to 1.1 mm (SD = 0.9) post-operatively.

Conclusion: ACL primary repair and bone marrow stimulation can be a viable treatment in acute partially torn ACL injury. Careful patient selection and proper protective rehabilitation are essential to achieve good results. However, further studies are necessary to determine the role of this technique in the treatment of ACL injuries.

Level of evidence: Level IV evidence (case series).

Key Words: Anterior cruciate ligament; partial tear; primary repair; microfracture; healing response; arthroscopy.

P15-801

Bony Landmarks and Topography of the femoral insertion of the anterior cruciate ligament: An anatomical study

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Objective: Few articles have described the femoral insertion site of the anterior cruciate ligament regarding to bony landmarks and topography. The purpose of this study was to determine qualitatively and quantitatively the femoral insertion of the anterior cruciate ligament regarding bony landmarks and topography.

Methods: The femoral insertion of the anterior cruciate ligaments was studied histologically in seven human fetuses, arthroscopically in sixty patients who underwent an anterior cruciate ligament surgery, and grossly in sixteen cadaveric knees. Three-dimensional laser pictures of the cadaveric speci-

mens were taken to quantify length, area, and angulations of the femoral attachment of the anterior cruciate ligament.
Results: Our findings demonstrated the presence of two bony landmarks in the femoral ACL attachment. A bony ridge that runs from proximal to distal was consistently found in all the arthroscopic patients and cadaveric knees. It was named "lateral intercondylar ridge". A bony landmark between the femoral insertion of the AM and PL bundles running from anterior to posterior was also found in the majority of the specimens. This bony landmark was named "lateral bifurcate ridge". In addition, by observing the topography of the femoral insertion site a change of the slope between the femoral attachment of the PL and AM bundles was eminent in all of the specimens.
Fetal specimens: The histological analysis in fetuses demonstrated the existence of the lateral bifurcate ridge in 6 out of 7 fetuses. From the 6 specimens with lateral bifurcate ridge, 4 had a prominent ridge that separates the AM and PL bundles at the femoral insertion, whereas the other 2 had a smaller, but clear, ridge. The lateral bifurcate ridge was visible only in the anterior part of the ACL footprint.
Arthroscopic evaluation in ACL patients: In all the patients, the lateral intercondylar ridge was present. No fibers of the ACL were attached anterior to this ridge. The presence of the lateral bifurcate ridge was observed in 49 out of 60 patients.The lateral bifurcate ridge was also better seen in the more anterior part of the ACL attachment.
Human cadavers: Our gross observations of the ACL femoral attachment demonstrated that its shape is a segment of circle with its anterior border straight and its posterior border convex. The anterior straight border is demarcated by a bony landmark, the lateral intercondylar ridge. This anterior bony landmark is observed from proximal to distal and it was found in all the specimens. Thirteen knees out of 16 demonstrated the presence of the lateral lateral bifurcate ridge, 9 had a prominent ridge and 5 had a smaller, but evident ridge. The lateral bifurcate ridge often separates only the anterior part of the AM and PL attachment, instead of running through the entire footprint of the ACL. The change in the topography between the AM and PL insertion site was evident in all 16 knees.The 3D assessment confirmed the findings of the gross observation. The measurements obtained by the 3D camera are available in the tables.

	Mean	Range
Femoral ACL attachment lenght (mm)	17.2 ± 1.2	19-14.7
Femoral ACL attacment width (mm)	9.9 ± 0.8	11.5-8.4
AM major Axis (mm)	9.8 ± 1	11.7-8.1
PL major axis (mm)	7.3 ± 0.5	8.3-6.6

	Mean	Range
Lateral Intercondylar ridge lenght (mm)	14.9 ± 2	17.5 - 12
Lateral Bifurcate Ridge (mm)	3.5 ± 0.8	4.5 - 2
ACL attachment area (mm2)	196.8 ± 23.1	230.4 - 158.1
AM attachment area (mm2)	120 ± 19.8	155.3 - 103.5
PL attachment area (mm2)	76.8 ± 15.6	118.7 - 54.5
Change of slope (degrees)	27.7 ± 8.9	40.9 - 11.8
AM curvature radio	25.8 ± 12	48.7 - 8.4

Conclusion: The anterior cruciate ligament femoral attachment has a unique topography with a constant presence of the lateral intercondylar ridge and an often bony ridge between AM and PL femoral attachment,the lateral bifurcate ridge.These anatomical findings may assist surgeons to perform anterior cruciate ligament reconstruction on an anatomical basis.

P15-804
Quantitative determination of ACL femoral footprint: Superimposition technique of microscopic measurement on three-dimensional volume rendering (3-D VR) CT image
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Determination of the femoral footprint of ACL is important to perform reconstruction surgery. The purpose of this study was to quantitatively determine ACL femoral footprint on three-dimensional volume rendering (3DVR) CT image using superimposition technique of microscopic measurement.
Materials and methods: Eleven intact cadaveric knees were subjected to computer tomography to obtain 3-D VR images of femur. Lateral femoral condyles including ACL fibers were then sectioned for histological analysis in the plane parallel to Blumensaat's line and perpendicular to saggital plane. ACL insertion site was identified in histological sections, superimposed onto the corresponding CT sectional images and reconstituted to quantitatively determine and visualize ACL footprint on 3-D VR CT images.
Results: ACL footprint was microscopically identified as a direct type of ligament insertion adjacent to articular cartilage of the posterior aspect of the lateral femoral condyle. The most posterior bundle of ACL has continuity to articular cartilage and ACL footprint occupied 32 ± 2 % (mean ± S.D.), 41 ± 2 %, 65 ± 4 % posterior part of the lateral condyle at one-fourth, half, and three-fourths of height from roof of the notch to the distal end, respectively (Fig.1). ACL footprint on 3-D VR CT images coincided with the crescent-shaped hollow just behind the Resident's Ridge (Fig2).

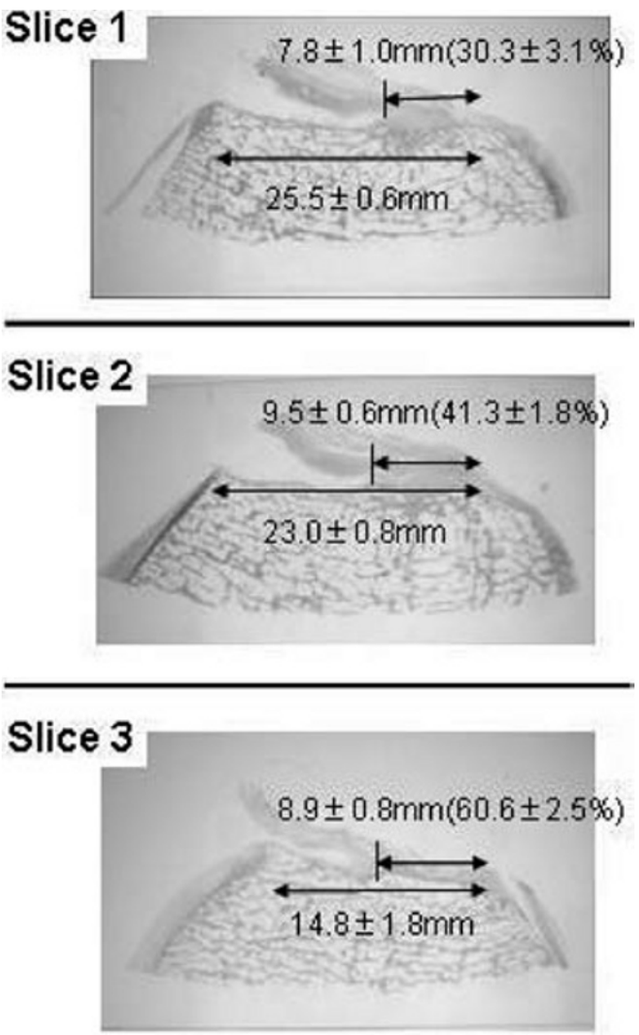

Fig 1

Conclusions: Superimposition technique of microscopic analysis quantitatively determined and visualized ACL femoral footprint on 3DVR-CT image. These results are useful for ACL surgery or CT-based computer-assisted ACL surgery.

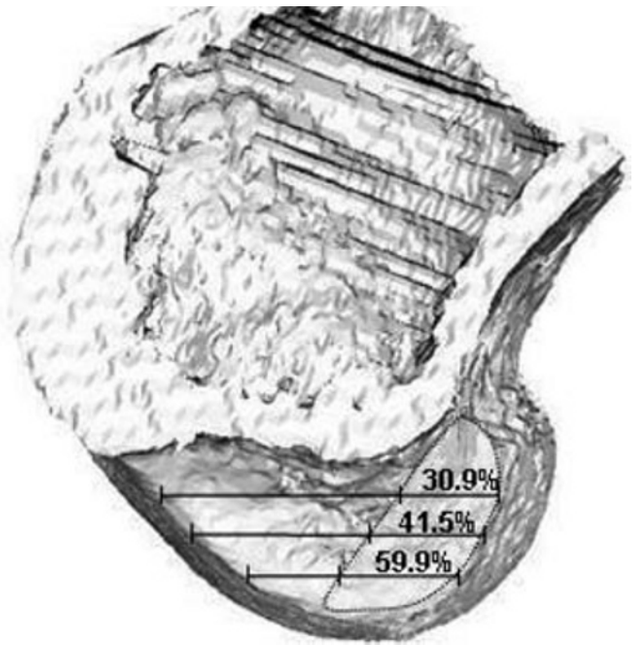

Fig 2

P15-810

A comparison of mid-term results of anterior cruciate ligament reconstruction with patellar tendon and quadruple semitendinosus tendon

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The purpose of this study is to compare the mid-term results of anterior cruciate ligament (ACL) reconstruction using either central third of the patellar tendon (PT) or quadruple semitendinosus tendon (ST-T).

Materials and methods: Total 81 patients (83 knees) comprised two study groups. PT and ST-T groups consisted of 45 patients (45 knees, 40 male, 5 female) and 38 patients (41 knees, 30 male and 8 female) respectively. Central 10 mm of PT autograft was fixed with 2 interference screw in PT group. Two Endobutton for 2 femoral socket and tibial post-screw provided quadruple ST-T fixation for ST-T patients. Average age at the time of final control and follow-up period were 35 ± 8.3 and 83.38 months (range 50 to 144) in PT group and 35.2 ± 8.6 and 88.34 (range 50 to 115) in ST-T group respectively. Both group were comparable in terms of demographic data, activity level, functional scores, time from injury and associated pathologies at the time of surgery (P>0.05). While none of the patients was operated on acute period, 11 cases (24.4%) in PT group and 9 cases (23.7) in ST-T group had surgery during subacute period. All patients were evaluated at final control using, Lysholm functional score, Tegner activity level, IKDC rating scale, WOMAC osteoarthritis index, instrumented laxity testing (KT-1000), isokinetic performance of thigh muscles (Cybex II) and clinical and radiological findings. Statistical analysis included Chi-square test, one-way ANOVA, Kruskal-Wallis variance analysis, student -t test and Mann-Whitney-U test.

Results: While functional scores were improving in both groups significantly (P< 0.000) activity level was decreased (P<0.00) with regard to pre-injury status (7±1.1 vs 5.2±1.8 for PT group and 7.1±1.3 vs 5.4±1.8 for ST-T group) but there is no difference between them (P>0.5). According to IKDC subjective evaluation, there were 42 (97.7%) cases in PT group and 33 cases (95.9% with exception of bilateral cases) in ST-T group who were rated normal and nearly normal. IKDC final score demonstrated that there were 42 patients (93.3%) normal or nearly normal in PT group and 37 patients (97.4%) in ST-T group. No statistically significant difference was found between the groups. KT-1000 did not exhibit significant difference between the groups but increased laxity was together decreased functional scores (P<0.002). Meniscectomy was associated with high rate of degenerative changes (P<0.04). Frequency of mild degenerative changes is very close in both groups (PT group 82.2 % vs ST-T group 84.2%). Donor site morbidity and patellofemoral problems were significantly higher in PT group (33%) than in ST-T group (13.2%, P<0.02). Flexion loss (more than 6º) was strongly associated with anterior knee pain (P<0.000) and patella baja was mostly together with flexion loss (P<0.04). While significant weakness was demonstrated in extensors in PT group (P<0.05), same happened for flexors in ST-T group (P<0.006).

Conclusion: Although both procedures yield to comparable clinical outcome, patellar tendon reconstructions are with significantly higher rate of patellofemoral problems and donor site morbidity. Gain of complete flexion as much as extension should be underlined to prevent anterior knee pain. Graft harvestmen should be partly responsible for muscle weakness.

P15-820

A long-term (10 to 12-year) retrospective study of anterior cruciate ligament repair using allograft reconstruction

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We retrospectively reviewed the long-term clinical outcome of unilateral arthroscopic anterior cruciate ligament (ACL) repair using allograft reconstruction.

From October 1995 to December 1997 50 arthroscopic ACL reconstructions were performed. Six reconstructions were performed in the acute phase, meaning within 2 weeks following trauma, eleven reconstructions were performed subacute, ie. from 2 to 8 weeks postinjury, and a majority of 33 reconstructions was performed in the chronic phase, more than 8 weeks postinjury. Multiligamentous injured knees and ACL injuries in polytrauma patients were excluded. A screw and washer (DePuy Mitek, Raynham USA) was used for tibial fixation of the allograft, the Mitek® (DePuy Mitek, Raynham USA) fixation device was used for femoral fixation.

At the time of evaluation the mean duration of follow-up was 10 years 6 months. We reviewed 36 male and 14 female patients. All patients were examined by one and the same physician, not related to the surgery. They were evaluated using the International Knee Documentation Committee (IKDC) score, the Lysholm score, the Tegner scale, single hop test, KT-1000® arthrometer (MEDmetric Corporation, San Diego, USA) and Biodex® isokinetic dynamometer (Biodex Medical Systems, New York, USA).

Three patients had suffered a rerupture caused by major trauma ; there was one failure due to deep infection. Seven patients had an extension lag of at least 3 degrees and all patients had knee flexion of at least 120 degrees. On the Tegner scale the sports level at time of follow up had decreased by an average of 0.93 points (from 7.25 to 6.32).

On the Lysholm scoring scale 36 patients scored excellent, 11 patients good and 3 patients fair. No patients scored poor.

The single hop test showed 44 patients scoring 91 to 100% of the distance hopped by the unaffected leg and 5 patients scoring 76 to 90%. One patient did not perform the hop test because of recent surgery to the Achilles tendon.

On the IKDC form 11 patients scored grade A, 22 patients grade B, 8 patients grade C and only 3 patients grade D. The mean IKDC score was 93.15.

In conclusion, the long-term follow-up results of allograft ACL reconstruction leaving the medial hamstring tendons untouched are at least as good as when autografts are used, which is consistent with literature findings.

P15-859

A detailed analysis of the footprints of separated small bundles of the anterior cruciate ligament

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Introduction: Detailed knowledge of the footprint of the anterior cruciate ligament (ACL) is essential for anatomical and functional reconstruction. The purpose of this study was to meticulously examine the morphology and attachments of ACL on the femur and tibia by separating the ACL into about twenty small bundles.

Materials and methods: Twenty knees of 10 cadavers were used in this study. The overlying synovium was carefully removed to expose the ligament fibers. The ACL was divided into about twenty small bundles and each footprint of the femur and tibia was marked to investigate the relationship of the footprint of the femur and tibia.

Results: In all specimens, the small bundle containing the ACL did not run in parallel but were complicated. The bundles originated from the anterior portion of tibial attachment and inserted into the medial and proximal portion of the femora attachment, while those from the posterior portion of the tibial

attachment were inserted into the lateral and distal portion of the femoral footprint. The femoral attachment was relatively similar in all specimens, however the tibial attachment showed two patterns of location of the footprints of small bundles: an oblique pattern and transverse pattern.
Conclusion: This study confirmed the complicated fibrous structure of the ACL and the footprint of tibia and femur ACL, implying that multi-bundle ACL reconstruction, such as two-bundle reconstruction, is superior to single-bundle reconstruction.

P15-866
Functional testing to discontinue brace use for sport after ACL reconstruction
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Background and Purpose: Brace prescription after ACL reconstruction is controversial (McDevitt 2004, Sterett 2006), yet most US ACL surgeons recommend brace use for return to cutting and pivoting sports (Decoster 2003, Delay 2004). All active patients in our practice are braced and must pass a sports battery of tests before they return to play (RTP). Criteria include 90% score on 4 one-legged hop tests (Noyes 1991), burst superimposition strength test (Snyder-Mackler 1995), Knee Outcome Survey ADL Scale (KOS-ADLS) and a global rating of knee function (Irrgang 1998).
Case description: Twenty-one patients who were one year post ACLR were tested again one year after surgery using the same test battery with and without their braces. There were 9 women and 12 men with a mean age of 27 years.
Outcomes: Mean KOS-ADLS score was 98%, global rating was 97% and KOS-SAS (Sports Activity Scale) score was 95%. One patient failed hop testing with and without the brace. Two additional patients failed the test while braced but passed unbraced. Subjects performed better unbraced than braced in all hop tests: single leg hop braced = 100%; unbraced =106% (p=0.001); cross-over hop braced=98%; unbraced=102% (p=0.010); triple hop braced = 98% ; unbraced =101% (p=0.019); timed hop braced = 98%; unbraced = 103% (p=0.003).
Discussion: Twenty of 21 patients continued to score above RTP criteria one year after ACLR. All patients in the cohort performed better unbraced than braced. Criterion based functional testing resulted in successful RTP in 20/21 individuals and the recommendation to discontinue brace use one year after ACLR.

P15-874
NCS for assessment of quadriceps muscle after ACL reconstruction using quadriceps tendon
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We performed prospective study to assess quadriceps muscle strength after ACL reconstruction using autologous quadriceps tendon and usefulness of motor nerve conduction study (NCS) in the evaluation of quadriceps muscle after ACL reconstruction.
This study included a total of 20 patients who underwent ACL reconstruction using autologous quadriceps tendon. Motor NCS and Cybex isokinetic study were completed preoperatively and at 3, 6, 12 months after surgery. In Cybex isokinetic study, we assessed extensor peak torque and relative peak torque (operated leg / nonoperated leg) at 60° and 180°/sec. In NCS, we stimulated femoral nerve distal to inguinal ligament and assessed motor latency, compound motor action potential (CMAP) and relative CMAP for vastus medialis, rectus femoris and vastus lateralis. We performed correlation analysis between extensor peak torque and CMAP.
In Cybex isokinetic study, relative peak torque decreased at 6 month and increased from 6 to 12 month at 60° and 180°/sec (p=0.004; p=0.028). In NCS, motor latency showed no difference before and after surgery. Relative CMAP decreased at 3 month in vastus medialis, rectus femoris and vastus lateralis (p=0.072; p=0.007; p=0.056). It significantly increased from 3 to 12 month in vatus medialis (p=0.011) and from 3 to 6 month in rectus femoris (p=0.028). Extensor peak torque and CMAP recovered up to 80% of nonoperated leg within 12 month. In correlation analysis, there was strong correlation between extensor peak torque and CMAP in vastus medialis.
Cybex isokinetic study showed good recovery of quadriceps muscle strength. NCS correlated with Cybex isokinetic study, suggesting useful assessing tool in the evaluation of muscle strength after ACL reconstruction

P15-875
Computer assisted anterior cruciate ligament reconstruction with biologic fixation as graft fixation method
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Background: Computer navigation with the OrthoPilot software was developed for ACL reconstruction to allow the surgeon to have the general view of the topographic structures during operation. This system is capable of determining the exact optimum position of tunnel replacement by computer navigation. This determination is made by a high precision infrared camera and rigid bodies fixed onto the patient. We aim to describe our clinical experience with our technique with this software
Method: 53 patients were treated through navigated ACL reconstruction with bone patellar tendon autograft. 2 patients were excluded who had a combined procedure of ACL reconstruction with osteotomy. The graft was not detached from the proximal tibia and patellar bone plug was used as interference fixation in the femoral tunnel.
Results: All patients who returned for the follow-up examinations were evaluated; the clinical outcome was excellent or very good. Postoperative radiological examination showed correct positioning of the osseous channels location
Conclusions: The orthopilot navigation system is capable of determining the exact optimum position of tunnel replacement. The tunnel position can be improved by the use of computer-assisted navigation and that the clinical result in terms of laxity is not found with early accelerated rehabilitation. We could commend that exact placement of the osseous channels intraoperatively leads to a good outcome of the anterior crutiate ligament reconstruction.

P15-887
Morphometry of the patellar tendon: consequences for the harvesting of bone patellar tendon-bone grafts.
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Introduction: Although its appropriateness for use as an ACL graft has been well demonstrated, Bone-patellar tendon-bone graft dimensions which is an important surgical variable in ACL reconstrution has rarely been reported. The goal of this study is to report the average dimension of the patellar tendon, the average cross sectional area of the BPTB graft, and to assess the interindividual variability of these values.
Materials and methods: The patellar tendon and the bone-patellar tendon-bone graft were prospectively assessed in 203 human knees (122 men, 81 women, mean age: 31 years) which were consecutively operated for an anterior cruciate ligament reconstruction. All the measurements were carried out manually with a slide calliper. The length of the patellar tendon was measured after a 10mm wide BPTB graft was harvested from the central third of the tendon, with a double blade. The cross sectional area of the graft was indirectly assessed. The graft was folded on itself and passed through the calibrator. The value was divided by 2 to obtain the cross sectional area. Correlations were searched between the dimension of the patellar tendon and the patient morphotype.
Results: The average length of the patellar tendon was 45.8 mm (±5.7). The average width of the tendon was 29.3mm (±2.9). The cross sectional area of the graft was 39.2mm^2. Although there is a high inter individual variability, the tendon length increase with the patient height whereas the width of the tendon and its diameter increase with the weight ($p<0.05$).
Discussion: We used a very simple technique in order to assess the graft cross sectional area. The values of the cross sectional area of the BPTB graft, although very similar to those of the native ACL, is half the cross sectional area of the tunnels. The mere dimension of the graft used may be of importance because this is what ultimately determines the final neoligament surface area for healing, and therefore, strength. Moreover, the dimensions of the graft have to be taken into account when performing the ACL reconstruction, in order to avoid a length mismatch or an impingement with the notch. The correlations that have been found indicate the dimensions of the graft tend to match with the morphology of the patient.

P15-909

Double bundle or single bundle plus extraarticular tenodesis in ACL reconstruction? A case study

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Introduction: Anatomic reconstructions of ACL with double bundle gracilis and semitendonosus tendons graft, reproducing AM and PL bundles, have been introduced to offer a better biomechanical outcome, especially during rotatory loads. On the other hand many methods of tenodesing the lateral aspect of the tibia to the femur to reduce internal rotation of the tibia and minimize anterior translation of the tibia relative to the femur as a backup for intra-articular reconstruction, have been also suggested. The goal of this study is to evaluate the effect, on the internal rotation of the tibia, of a lateral reconstruction in addition to a standard single bundle ACL reconstruction as compared with an anatomic double bundle ACL reconstruction.
Computer assisted ACL reconstruction has been used because it could be very effective in evaluating the global kinematic performance of the reconstructed knee.
Methods: We selected twenty consecutive ACL reconstruction procedures to be performed in males in our Hospital. Patients were alternately assigned to one of two groups:
Group A: standard single bundle ACL reconstruction with doubled gracilis and semitendinosus tendons graft with an arthroscopically assisted two incisions technique and a lateral extraarticular reconstruction.
Group B: double bundle ACL reconstruction with doubled gracilis and semitendinosus tendons graft with an arthroscopically assisted two incisions technique. In all ACL reconstruction procedures navigation process was performed.
Results: Both surgical techniques reduced significantly AP displacement, IR and ER of the tibia respect to preoperative ACL deficient condition ($p < 0.05$). Comparing the group A after the single bundle reconstruction and the group B after the AM bundle fixation, non differences were found in AP displacement, IR and ER of the tibia (p=0.75, p=0.07 and p=0.07 respectively; power: 0.94).
Comparing the group A after the addition of the lateral tenodesis and group B after the PL bundle fixation (AM+PL) no differences in AP tibial displacement and in ER of tibia were found (p=0.9 and 0.15 respectively; power: 0.99); while a significant reduction in IR of the tibia was found in group A after the addition of the lateral tenodesis respect to the group B after the addition of the PL bundle (p=0.0001; power: 0.26).
Conclusion: On the basis of our study, the addition of a lateral extraarticular reconstruction to a standard single bundle ACL reconstruction with hamstrings tendons graft in an "in vivo" reconstruction, is more effective in reducing the internal rotation of the tibia at 30° degrees of knee flexion, as compared with a standard single bundle ACL reconstruction and with an anatomic double bundle reconstruction is confirmed

P15-925

Extracortical fixation of grafts in ACL reconstruction. A biomechanical comparison of two implants

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Purpose: Extracortical fixation of hamstring grafts in ACL reconstruction is frequently associated with bone tunnel enlargement. Material properties and implant design are highly important in order to limit graft- tunnel motion. The purpose of the study was to evaluate the biomechanical difference between a new fixation device (Retrobutton, Arthrex Inc., Naples, FL) and a commonly used device (Endobutton, Smith&Nephew Endoscopy, Andover, MA).
Methods: Biomechanical testing was performed using 32 porcine hind-limb distal femurs. To isolate implant behaviour and to eliminate graft-loop-interaction, the implant was fixed to the material testing machine (MTS 858 Minibionics II) with a custom made metal hook. Cyclic loading was carried out for 1000 load cycles between 50-250N at 1 Hz, followed by a load to failure test. The tested devices were:
(A) Endobutton 20mm,
(B) Endobutton 40mm,
(C) Retrobutton 12/20mm,
(D) Retrobutton 12/40mm.
Statistical significance was defined with a p-value<0.05.
Results: The Endobutton 40mm showed significantly higher per cycle motion (0.43mm/cy) compared to the other devices. The Endobutton 20mm and the Retrobutton 12/20mm showed comparable values (0.16mm/cy). Subsidence after 1000 cycles resulted in values lower than 1mm for all tested implants. Measured stiffness in the load to failure test of the Retrobutton 20mm (892.5 N/mm) was significantly higher than those of the Retrobutton 12/40mm (486.1 N/mm), whereas stiffness of the Endobutton 40mm (306.8 N/mm) showed significantly lower values than those of the 20mm devices, respectively (A: 660.7; C: 892.5 N/mm). The ultimate failure load of the Endobutton did not differ (A: mean=1026.9N, SD=70.4; B: mean=1112.4N, SD=98.1), whereas the Retrobutton devices yielded earlier (C: mean=798.3N, SD=96.0; D: mean=947.3N, SD=201.2). Ultimate failure load of the Retrobutton 12/20mm was significantly lower compared to both Endobutton devices.
Conclusion: The smaller per cycle motion and thus, the higher stiffness of the Retrobutton could limit graft-tunnel motion and promote a faster ingrowth of the graft. With improved implant design extracortical graft fixation may still be an attractive fixation technique in primary and revision ACL reconstruction.

P15-928

Could we perform double bundle ACL reconstruction in revision?: A CT-scan analysis of tunnel positionning for failure of primary ACL surgery

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Introduction: ACL revision is not a uncommon procedure and an analysis of causes of failure is the key of the surgical strategy. In most of cases the failure is due to a positioning error of the bone tunnels. The aim of this study was to analyse by CT-scan the tunnels positionning in 19 consecutive ACL revision.
Materials and methods: Between 2005 and 2007, we selected 19 patients with complete data (X-Rays and CT-Scan) before ACL revision. The CT-scan was performed by the same radiologist senior with the same protocol. We analysed the positionning of the tibial and femoral tunnels in axial and frontal plane. On the tibia we measured the antero-posterior and medio-lateral positionning relating to the larger diameter. On the femur we analysed the tunnel positionning on the sagittal plane.
Results: In 47% the tunnel tibial was too anterior with a positionning in the first anterior third of the tibial surface. At the femur we found 21% of abnormal positionning. In 2/3 of cases, patients had one positionning error either on the tibia either on the femur.
Discussion: Standard X-Rays do not allow to analyse properly tunnel positionning in different planes. We recommend to perform CT-Scan in case of ACL revision in order to analyse the exact positionning of the tunnel wich is the main cause of ACL reconstruction failure. Futhermore CT-scan is useful to plane the surgical procedure. A tunnel graft and /or graft fixation should be decided before the procedure. Thus we can choose for single or double bundle reconstruction.

P15-932

CT-scan study of the position of the tunnels in anatomic double-bundle reconstruction of the anterior cruciate ligament

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Purpose: The aim of this study was to analyse the position of the femoral and tibial tunnels after double-bundle reconstruction of anterior cruciate ligament (ACL).
Materials and methods: Patients included had no anterior surgery and none other lesions associated. Anatomical reconstruction with anteromedial (AM) and posterolateral (PL) bundles were done with one surgeon, with same operative method using harmstring tendons. Grafts were routed through two tibial and femoral independent tunnels as previously described. 30 operated knees were included. We analysed position of the tunnels using CT-scan. The femoral and the tibial attachment of the AM and PL bundles were studied. They were first compared with prior anatomic studies and secondly with the positions of the attachments of the AM and PL bundles of the controlateral ACL.
Results and Conclusions: Reference points of the positions of the tunnels with double bundle reconstruction of the ACL are given and identifiable with CT-scan. This study describes area of each two bundle. Followings studies of

correlation of anatomic position of the graft and good clinical outcome will have to complete these data.

P15-933

ACL reconstruction with hamstring tendon autograft - clinical results after a minimum follow-up of 7 years

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Aims: Numerous clinical studies have examined the clinical results after isolated ACL reconstruction. However, significant controversies still exist with regard to graft sources and fixation methods. Only limited studies in the literature have examined the mid-, and long term results of ACL reconstruction using autogenous hamstring grafts. The aim of this study was to evaluate the clinical results of primary ACL reconstruction with a single-incision technique, quadrupled hamstring tendon graft and titanium interference screw fixation after a minimum follow-up of 7 years.

Methods: Case series. The study group comprised 93 consecutive patients (53 men and 40 women) who underwent primary ACL reconstruction with four strand hamstring tendon autograft and titanium RCI interference screw fixation. A single-incision endoscopic technique with femoral tunnel placement trough the anteromedial portal in 120° of flexion was used in all patients. The mean age of the patients at the time of the ACL reconstruction was 28 years (range, 17-54 years). Medial meniscal lesions were found in 32 patients, lateral meniscal lesions in 22 patients and 11 patients had lesions of both menisci at the time of the reconstructive procedure. The assessment consisted of the IKDC Ligament Evaluation Form which incorporates multiple subjective and objective criteria and the Lysholm score. Ligament stability was measured by the Lachman and pivot-shift tests. Instrumented knee testing was performed using the KT-1000 arthrometer using the manual maximum test. Standard weight bearing posterior-anterior and lateral radiographs were performed to assess tunnel placement and degenerative changes.

Results: Of the 93 patients in the study group, 87 (93%) were reviewed after a minimum follow-up of 7 years after primary ACL reconstruction. 4 patients (4%) had subsequently undergone revision ACL reconstruction because of traumatic re-rupture of the primary graft. Of the 83 patients with functional grafts 59 patients (68%) had normal, 22 patients (25%) nearly normal , and 2 patients (3%) abnormal knee function according to IKDC criteria. The mean subjective IKDC score was 93.0± 8.9 points (range, 80-100). Mean KT-1000 side-to side difference was 7.3± 2.2mm preoperatively and 1.7±1.2mm postoperatively. The difference was significant ($p<0.001$). None of the patients exhibited significant tunnel enlargement.

Conclusion: Primary anterior cruciate ligament reconstruction with hamstring tendon graft and titanium interference screw fixation exhibits excellent objective and subjective results at a minimum follow-up of 7 years. The titanium interference screw fixation affords secure incorporation of the graft over the long term. In our experience hamstring tendon autograft is associated with little graft morbidity and we recommend its use as the primary graft source for ACL reconstruction.

P15-936

Radiofrequency thermal shrinkage for treatment of anterior cruciate ligament laxity

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Objective: The aim of this study was to retrospectively analyze the results of 24 patients who underwent radiofrequency thermal shrinkage (RFTS) for treatment of anterior cruciate ligament laxity

Methods: From January 2004 to June 2006, 24 patients with partial tears of the anterior cruciate ligament (n = 18) or lax anterior cruciate ligament (n = 6) were treated with radiofrequency thermal shrinkage (RFTS) during arthroscopy. The 24 patients included 23 men and 1 woman with an average age of 28 years ranging from 23 to 45 years old. All the patients were followed up for an average period of 10 months (range: 8-13 months). Follow-up included subjective questionnaires (International Knee Documentation Committee [IKDC], Lysholm) and objective clinical tests (IKDC, pivot-shift, Lachman).

Results: During the follow-up, 8 shrinkages (6 partial tears and 2 lax anterior cruciate ligament) were failed. The rest of patients remained stable with a negative Lachman test result. For these 16 patients, postoperative mean Lysholm score of the knee was 89, which was signicantly higher then that of preoperative score of 55.

Conclusion: The results of this study suggest that RFTS is a technique that may be applied to appropriately selected patients with athletically low-demand who have either lax or partially torn ligaments.

P15-938

Articular cartilage injury of the posterior lateral tibial plateau associated with acute anterior cruciate ligament injury

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Objectives: To report on articular cartilage injury of the posterior lateral tibial plateau associated with acute anterior cruciate ligament (ACL) injury and to investigate the correlation between bone bruises depicted on MRI and cartilage injury of the posterior lateral tibial plateau detected at arthroscopic ACL reconstruction.

Type of Study: Retrospective case series study.

Methods: Thirty-nine knees in 39 patients with recent ACL rupture (age range: 14 to 55 years; with a mean age of 22.8 years) were selected for this study from our cases of ACL reconstruction from July 2005 to June 2006. Using preoperative MRI, we evaluated whether there were bone bruises or not in the lateral compartment of the knee and divided them accordingly into two groups: the bone bruise positive group and the negative group. The differences in the proportions of the lateral meniscus (LM) tears and the cartilage injuries in the 2 groups were evaluated by Fisher's exact probability test.

Results: Thirty-five cases out of 39 arthroscopic ACL reconstructions (89.7%) were regarded as bone bruise positive in the lateral compartment and 4 cases (10.3%) were regarded as negative. At arthroscopic ACL reconstruction, 33 cases (84.6%) had tears in the LM posterior horn, 34 cases (87.2%) had articular cartilage injuries in the lateral femoral condyle and 29 cases (74.3%) had articular cartilage injuries in the posterior lateral tibial plateau. From 35 bone bruise positive cases, 32 cases (91.4%) had tears in the LM posterior horn, 33 cases (94.3%) had articular cartilage injuries in the lateral femoral condyle and 28 cases (80%) had articular cartilage injuries in the posterior lateral tibial plateau. Of 4 bone bruise negative cases, one case (25%) had a tear in the LM posterior horn, articular cartilage injury of the lateral femoral condyle and of the posterior lateral tibial plateau. There was a statistically significant correlation between the proportion of bone bruise and cartilage injury of the lateral femoral condyle ($P=0.004$), that of the posterior lateral tibial plateau ($P=0.04$) and that of tears in the LM posterior horn ($P=0.008$).

Conclusions: This current study has shown us that we need to pay attention to the cartilage damage of the posterior lateral tibial plateau as well as to tears in the posterior horn of the LM, when acute ACL injury is evident.

P15-942

ACL reconstruction with hamstring tendon autograft in children and adolescents with open physes - clinical results after a minimum follow-up of 2 years

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Aims: Controversy exists with regard to the management of anterior cruciate ligament injuries in patients with open physes. While nonoperative treatment has demonstrated poor results, surgical reconstruction with an intra-articular graft with drill holes made through the tibial and femoral physes carries the potential for growth arrest. The aim of this study was to evaluate the clinical results of ACL reconstruction with a single-incision technique, quadrupled hamstring tendon graft and a physeal respecting graft fixation after a minimum follow-up of 2 years.

Methods: Case series. The study group comprised 42 consecutive children and adolescents (34 boys and 8 girls) who underwent intraarticular ACL reconstructions with a four strand hamstring tendon graft and a physeal respecting graft fixation. The mean age at the time of the operative procedure was 14 years (range, 8-16 years). The mean height was 164 cm (range, 140-181cm). Mean time between injury and reconstructive procedure was 5 months (range, 0.5-9.2 months). On the femoral side the graft was fixed with a closed - looped EndoButton. On the tibial side the graft was fixed with a post in 33 patients in 4 patients with a bioabsorbable interference screw and in 5 patients a hybrid fixation was used. The follow-up assessment consisted of the IKDC Ligament Evaluation Form and radiographic evaluation. Ligament stability was measured by the Lachman and pivot-shift tests. Instrumented knee testing was performed using the KT-1000 arthrometer using the manual maximum test.

Results: Of the 42 patients in the study group, 40 (95%) were reviewed at a mean of 28 months postoperatively. 4 patients (10%) had subsequently undergone revision ACL reconstruction because of graft failure or re-rupture. Lateral meniscal lesions were present in 22 patients (52%). Of these 14 lesions were amenable to refixation. Medial meniscal lesions were present in 7 patients (17%) and were fixed in 5 patients. Of the 36 patients with functional grafts 28 patients (70%) had normal and 8 patients (20%) nearly normal knee function according to objective IKDC criteria. No patient had any radiographic or clinical signs of growth disturbance. Mean KT-1000 side-to side difference was 6.5± 2.1mm preoperatively and 1.8±1.6mm postoperatively. The difference was significant ($p<0.001$).
Conclusion: In our opinion the transphyseal anterior cruciate ligament reconstruction with hamstring tendon graft in children and adolescents with a physeal respecting graft fixation is a highly reliable operative technique to restore knee stability to the knee. It allows for return to sport and decreases the risk of subsequent meniscal injury and degenerative arthritis associated with the ACL-deficient knee, all with a relatively minimal risk to the physis.

P15-944
Revision ACL reconstruction with hamstring tendon autograft - clinical results after a minimum follow-up of 2 years
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Aims: There are only limited studies in the literature examining the results of revision ACL reconstruction using autogenous hamstring grafts. The aim of this study was to evaluate the clinical results of revision ACL reconstruction with a single-incision technique, quadrupled hamstring tendon graft and bioabsorbable interference screw fixation after a minimum follow-up of 2 years.
Case series: The study group comprised 73 consecutive patients (19 women and 54 men) who underwent revision ACL reconstructions between January 2003 and December 2004 with four strand hamstring tendon autograft and bioabsorbable interference screw fixation. The cause of primary ACL failure was determined at the time of revision surgery, based on clinical history and radiographic and intraoperative findings. A single-incision endoscopic technique with femoral tunnel placement trough the anteromedial portal in 120° of flexion was used in all patients. The mean time between the primary and the revision reconstruction was 82 months (range, 8 - 216 months). The mean age of the patients at the time of revision ACL reconstruction was 31 years (range, 18-52 years). The primary ACL graft was a patellar tendon graft in 60 patients and a hamstring tendon graft in 13 patients. The assessment consisted of the IKDC Ligament Evaluation Form which incorporates multiple subjective and objective criteria. Ligament stability was measured by the Lachman and pivot-shift tests. Instrumented knee testing was performed using the KT-1000 arthrometer using the manual maximum test.
Results: Of the 73 patients in the study group, 67 (92%) were reviewed at a mean of 31 months (range, 24-46 months) after revision ACL reconstruction. 5 patients (8%) had objective failure of the revision ACL reconstruction. Of the 62 patients with functional grafts 36 patients (53%) had normal and 26 patients (39%) nearly normal knee function according to IKDC criteria. The mean subjective IKDC score was 81.9±17.1 points (28-100). Mean KT-1000 side-to side difference was 7.6±2.6mm preoperatively and 2.4±1.9mm postoperatively. The difference was significant ($p<0.001$).
Conclusion: Revision anterior cruciate ligament reconstruction with hamstring tendon graft and bioabsorbable interference screw fixation exhibits good objective results at a minimum follow-up of 2 years. Subjectively the results appear to be inferior to those of primary anterior cruciate ligament reconstruction. In our experience hamstring tendon autograft can be successfully used for revision ACL reconstruction. However, in patients with enlarged tunnels graft incorporation may be difficult leading to subsequent graft failure.

P15-964
Fracture of the femoral tunnel after single bundle anterior cruciate ligament reconstruction - a case report and review of literature
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Fractures after anterior cruciate ligament reconstruction using a single-bundle technique are very rare. There are several reports about tibial plateau fractures after ACL reconstruction with hamstrings. Two femur fractures after BioTransfix femoral fixation in professional athletes are published recently[1]. There is no report about a femur stress fracture after Hamstring tendon ACL reconstruction with extrakortikal femoral fixation so far.
We report the case of a 22 year old man, injured in a soccer game, who sustained a complete ACL tear.
The torn ACL was repaired with a quadruple Hamstring graft in a transtibial single bundle technique using an EndoLoop CL® as the femoral fixation and a RCI-HA screw as the tibial fixation. Two and a half months after the operation and a mild-moderate rehabilitation program (wearing a brace at all times) the patient missed a step walking downstairs and felt a sharp pain in his operated leg. Immediate X-Ray showed no pathologies. At our clinic a MRI was done and revealed a lateral supracondylar femur fracture. Osteosynthesis with screws was performed the same day, the arthroscopy afterwards showed the intact reconstructed ACL.
6 weeks after the osteosynthesis the patient was totally pain free and returned to his original rehabilitation program.
To our knowledge, this is the first case report of a femoral tunnel fracture after extracortical fixation after an ACL reconstruction with hamstring autograft. The patient´s fracture resulted from minimal trauma and required surgical fixation. The reconstructed ACL was not harmed.
Complications after the repair of the anterior cruciate ligament have been reported throughout the literature, but are still very rare. Arriza et al. described a femoral stress fracture caused by a transfemroal fixation device caused by minimal trauma[1]. Wilson et al. reported a stress fracture caused by minimal trauma in BTB-ACL-reconstrcution[2]. We show a single case in which single bundle ACL reconstruction with extracortical fixation also lead to a stress fracture. Careful rehabilitation and a supporting brace throughout the first three months of remodelling reduces the risk of complications.
Reference: 1) Stress fractures of the femur after ACL reconstruction with transfemoral fixation Arriaza R; Senaris J; Couceiro G; Aizpurua J Knee Surg Sports Traumatol Arthrosc 2006 Nov;14(11):1148-50
2) Fracture of the femoral tunnel after an anterior cruciate ligament reconstruction Arthroscopy 2004 May;20(5):e45-7 Wilson TC; Rosenblum WJ; Johnson DL

P15-968
ACL reconstruction with an anatomic double bundle-single semitendnosus tendon technique
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Introduction: The conventional technique of anterior cruciate ligament reconstruction was primarily designed to replace the anteromedial (AM) bundle. Although good results have been obtained with this technique recent studies have questioned its ability in restoring the knee's rotational stability.
Objective: The purpose of this study is to compare the clinical outcomes of patients who underwent anatomic double bundle ACLR with the use of a single semitendinosus tendon and conventional single tunnel ACLR using semitendinosus and gracilis (STG).
Methods: From 2001 to 2004, 24 consecutive patients with ACL deficient knees were randomly assigned to undergo either anatomic double bundle ACLR with the use of a single semitendinosus tendon or conventional single tunnel ACLR using semitendinosus and gracilis (STG). In the double bundle group, two tibial and two femoral tunnels were prepared for the anteromedial (AM) and posterolateral (PL) bundles. Femoral fixation was achieved with two endobuton CL while a screw-post construct was used for tibial fixation. For the other group, a single endobutton for femoral fixation and staple with bone plug for tibial fixation were used. Follow-up was then conducted at designated intervals to evaluate the clinical outcome using standard knee scales (IKDC, Lysholm, Tegner, Noyes, SANE), computerized knee arthrometer, radiograms and in selected cases second-look arthroscopy. The AP and rotational stability were also documented. Statistical analysis were then performed with the student's T-test to determine any significant differences between the two groups.
Results: At a mean follow-up of two years, IKDC scores demonstrated no significant difference ($p>0.05$) as 91% of those operated with double bundle and 88% of those with single bundle ACLR were rated as normal (A) or near normal (B). Lysholm, Noyes, Tegner and SANE scores demonstrated a similar trend.
Anterior tibial translation as measured by computerized knee arthrometer was not significantly different ($p>0.05$) with a mean of 1.9 mm for double bundle and 1.7 mm for single bundle. Preliminary evaluation of rotational stability seem to favor the double bundle technique. In the double bundle group, one patient was documented to have motion deficits (10°-120°) while another had impingement. Second-look arthroscopy demonstrated notch impingement which was subsequently debrided and partially excised.

Conclusions: The short-term follow-up demonstrated no significant differences between single bundle and anatomic double bundle ACL reconstructions. The apparent advantage of the double-bundle technique in terms of rotational stability needs to be consistently demonstrated as no validated examination technique has yet been established. The use of two separate femoral and tibial tunnels may be more anatomic but remains to be technically demanding.

P15-969

Allograft in anterior cruciate ligament rerupture. Experience of 12 cases at one year minimum of follow-up

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Purpose: Evaluation of the use of allograft in iterative anterior cruciate ligament (ACL). 10% to 20% of anterior cruciate reconstructions are re-operated on for an anatomical failure by another graft. In order to avoid the sacrifice of autologous tissue, to minimize surgical trauma and post operative morbidity (pain, tenderness), allogenic tissue has emerged. The disadvantages are the infectious risk, the cost and the low current availability in France.

Material: Between November 2004 and June 2006, we operated on 12 reruptures of ACL reconstruction by tibialis tendon (anterior or posterior) allograft (7 cases) or patellar tendon (5 cases). All the grafts were deep fresh-freezed without secondary sterilisation. Ten men and two women were operated on; all had a low level of sports activity. The first surgery was autograft with : hamstring tendon (5 cases), patellar tendon (5 cases), one extra articular plasty and one artificial ligament. The plasty was associated in 11 cases with an extra articular augmentation and a high tibial osteotomy in 2 cases of medial narrowing space. The graft was secured in the femoral tunnel by a Rigidfix® or a bio absorbable screw, and in the tibial tunnel by an absorbable screw.

Results: All the patients were re-examined at a mean follow-up of 22 months (12 to 39 months). One patient suffered a hyperthermic post op period without later consequence. The average subjective IKDC improved from 38 to 76 points and the functional appreciation of the knee from 2.7 to 8.5 points. Average differential laxity (manual maximum translation) was reduced from 6.7 mm (4 to 9 mm) to 1 mm (0 to 4 mm). Only 2 patients, recently operated on, did not resume their sports activity. The two biopsies, at 2 years post-op, showed collagen bundles exhibiting a good crimp pattern and high cellularity.

Discussion: Our results, both subjective and objective, were very satisfactory: all the patients were very significantly improved, there was no side to side residual laxity higher than 4 mm. In the literature, most clinical studies comparing autograft to allograft show little difference in long-term outcome. However, some studies have reported an increased postoperative traumatic rupture rate in allograft groups. The risk of disease transmission with allografts delivered by Tissue Banks in France seems very low.

Conclusion: Tendinous allograft is an alternative graft source in patients well informed about the risks and the advantages, and allows patients to resume their sports activities within an acceptable and reasonable timeframe.

P15-971

Traumatic knee dislocation with ACL disruption and intact all other knee ligaments

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Traumatic knee dislocations are serious injuries and presenting with multiple ligament disruption. We present a case report of traumatic knee dislocation with only ACL disruptAn 18 years old patient presented in our E.R. department after a motorcycle accident with anterior knee dislocation. After the radiological verification the dislocation was reduced and the leg splinted. The patient had no neurovascular injuries. Ten days after the accident the patient was operated for reconstruction under general anesthesia. Manual instability tests performed with the patient under anesthesia produced a positive result for the Lachman test, a negative one for the posterior drawer test, and negative results for the valgus and varus instability tests. Intraoperatively a n ACL disruption was found which was reconstructed with a bone-patellar tendon - bone autograft. He had no postoperative complications and followed an ACL reconstruction rehabilitation program. In one year follow up he had normal range of motion without clinical signs of knee instability and returned to all his activities.

Traumatic knee dislocations present with two or three ligament ruptures. A thorough clinical and laboratory evaluation is mandatory for a correct surgical plan.

P15-974

Tibial eminence fractures in children and adolescents

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Aim: Improving the results of tibial eminence fracture management in children and adolescents.

Materials and methods: Tibial eminence fractures occur as a result of pivoting forces on the knee and usually occurs in children of 8-14 years.

In view of treatment we classify these fractures into two types: Type1 fracture in which there is a minimal displacement of the fragment, we recommend conservative treatment-closed reduction which can be obtained by full extension of the knee and immobilising the knee in a back slab for a period of 4 weeks and rehabilitation. Type2 fractures in which tibial eminence fragment is evulsed and displaced. Conservative treatment of type2 fractures leads to malunion of the fragment there by decrease in ACL tone. This causes limitation in knee extension and anterior instability.Hinderance to closed reduction of the avulsed fragment may be due to interposition of the medial meniscus or the counter pull exerted by anterior horn of lateral menisc which inserts into tibial eminence. Therefore Type2 fractures of the tibial intercondylar eminence have an undoubtful indication for arthroscopic osteosynthesis . In the department of paediatric traumatology at Central Institute of Traumatology and Orthopaedics, Moscow, we perform reposition of avulsed tibial intercondylar eminence fragment using arthroscopic technique. We perform transepiphyseal fixation of the fragment using K-wires and steel wires. Postoperatively immobilse the knee in full/hyperextension in a back slab for 4 weeks and thereafter rehabilitation. For the last 10 years we performed 54 arthroscopic osteosynthesis of the tibial eminence fractures of type2 with in age group of 5 to 18 years.

Using arthroscopic method of treatment in tibial intercondylar fractures in children minimises traumatism to the knee,promptly accelerates the rehabilitation and restores the function of the knee.

Conclusion: Arthroscopic osteosynthesis of the displaced tibial eminence fractures with transepiphyseal fixation using K-wires and steel wires is an effective method of treatment and shows a good outcome.

P15-1003

MRI and CT measurements of ACL knee laxity with a new device - dynamic 3D evaluation in vivo

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Introduction: There is still a missing link in between radiology (MRI/ CT Scans) and dynamic evaluation of in vivo joint laxity and rotational instability. Therefore a knee holding device a knee force application was developed for measurement of anterior translation and rotation. To the anterior-posterior applicated force an axial load on the lower limb was added to imitate the gait of a down-stair step and sports rotation.

This new device is build in a material that can be used inside MRI and CT Scan.

Materials and methods: In this device a two directional force applicator was used for simultaneous axial loading, anterior translation and rotation of the femoro-tibial joint. We tested 20 consecutive patients in pre and post-op ACL replacement, in both knees.

Measurements in CT scan and MRI were completed by clinical evaluation (Lachman, lateral pivot shift and kt1000 evaluation with control of the contra lateral knee). Evaluation of rotation and antero-posterior laxity was performed comparing both knees of the patient: measurements on lateral and medial condylus and the distal femur in relation to tibial plateau with and without load-stressed were performed. We measured also the knee joint internal rotational of the tibia on ct scan and mri and compared it side to side, before and after loading.

Results: Difference of laxity of pre and post-op could be shown; rotational instability could be measure and correlated with the anatomical ACL lesion and position of the ACL graft.

Conclusion: The two directional force application on lower limb stressing knee joint is tested in several study-groups all over the world, with the goal of defining 3 dimensional femoro-tibial translation.

The presented system is patient and testing friendly, easy to perform in daily mri/ct use and may give a new information flow to surgeons to evaluate the anterior-posterior and rotational instability in a knee with an ACL rupture.

P15-1006

Anterior cruciate ligament reconstruction complicated with septic knee arthritis

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Objective: The aim of this study was to examine clinical presentation, laboratory findings and outcome of patients with septic arthritis of the knee after anterior cruciate ligament (ACL) reconstruction.

Methods: Eight postoperative infections after arthroscopic ACL reconstruction, were included in our study. All patients had patellar tendon autograft, except two who had synthetic graft. Clinical and laboratory findings, management and clinical outcome are reported.

Results: Fever over 39o, pain and knee stiffness were the most common symptoms started at 15.7 days (mean average time) after initial surgery. The patients get operated 4.2 days after the entry of symptoms. Elevated erythrocyte sedimentation rate (average, 82.1mm), C-reactive protein (average, 12.76 mg/l), and blood cell count (average, 9843 iu/l) were the main laboratory findings. All patients underwent arthroscopic incision and drainage (average, 1.7 procedures). Cultures from knee joint aspirates were negative in two cases. In all the other cases revealed staphylococcus aureus, except one which revealed staphylococcus epidermidis. Intravenous antibiotics were administrated for 30 days and ciprofloxacin - rifampicin were further received per.os. for two months. Graft was retained in all patients, except one who had synthetic graft. At an average follow-up of two years, the Lysholm score was 91.8 out of 100 points.

Conclusion: Septic arthritis following ACL reconstruction is a serious complication. Arthroscopic joint lavage, debridement, and antibiotics, are the goals for succesful treatment in order to protect the articular cartilage, maintain knee function and retain ACL graft.

P15-1009

Arthroscopic anatomy of anterior cruciate ligament

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Anatomy of the ACL: Functionally, the ACL consists of two parts, the anteromedial AM and posterolateral PL bundle. These two functional bundles are named according to their insertion on the tibial side. The fascicles of the AM bundle originate at the most anterior and proximal aspect of the femoral attachment and insert at the anteromedial aspect of the tibial attachment. Conversely, the fascicles of the PL bundle originate at the posterodistal aspect of the femoral attachment and insert at the posterolateral aspect of the tibial attachment.

Methods: Over a period of 16 months 347 patients undergoing knee arthroscopic surgery at our department.

147 patients undergoing knee arthroscopic surgery for pathology unrelated to the ACL. We visualize the ACL through the anterolateral and the anteromedial portal. The AM bundle tightens in flexion and the PL bundle relaxes, whereas in extension the PL bundle tightens and the AM bundle relaxes.

200 patients had ACL rupture. For the classification of ACL injury we used Pittsburgh Classification ACL Injury Pattern and documented other intraarticular findings.

Only patients who have an injury-surgery interval less 120 days are included in our first ongoing study in which we document the arthroscopic rupture pattern of the AM and PL bundle and try to relate it to the injury mechanism.

Results: The most frequent injury pattern is the proximal rupture of both bundles (59.4%).

The AM bundle was torn from the femoral side in 85.7 % of cases. From the tibial side in 2.38 % of cases. AM mid substance tear in 2.38 % of cases. We have no cases of AM bundle elongation.

The PL bundle was torn from the femoral side in 64.2 % of cases. From the tibial side in 84.76 % of cases. PL was insufficient due to elongation in 7.14%.

Mostly injuries occurred during sports activities with rotation component.

Conclusion: We have reported on the arthroscopic appearance of the intact AM and PL bundle in 147 patients. And reported on the first 42 of acute ACL injury evaluated using a new classification system. Ongoing study will compare the injury mechanism to the arthroscopic rupture pattern and may allow for a more accurate pre-operative assessment of ACL injury.

P15-1011

Backward walking affects stride-to-stride variability

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Objectives: Stride-to-stride variability is defined as the temporal variations in movement patterns from one stride to the next. Through nonlinear methodology it has been proven that stride-to-stride variability under healthy conditions exhibits a chaotic structure which renders the neuromuscular system adaptable to environmental changes, whereas aging and several neurologic and orthopaedic conditions may have an effect on stride-to-stride variability and thus make the system less adaptable to perturbations. In recent years there has been a growing interest in the use of backward walking (BW) and running for training and rehabilitation purposes. Although have been studied from a biomechanical, cardiovascular, and metabolic perspective, nothing is known about variability that BW displays.

The purpose of the present study was to investigate whether the reversal of the walking direction from forwards to backwards has an effect on the stride-to-stride variability. We hypothesized that backward walking would display increased variability when compared to forward walking.

Methods: 9 healthy male subjects walked on a motorized treadmill initially forwards and then backwards at their self-selected pace while hip, knee, and ankle kinematic data were collected (50Hz) with an eight-camera optoelectronic system. A nonlinear measure, the largest Lyapunov exponent (LyE) was calculated from the resulted hip, knee, and ankle sagittal angular displacement (flexion/extension) time series for both walking modes. Larger LyE values signify increased variability and increased sensitivity to initial conditions. Dependent t-tests were used for the comparison of LyE means of forward and backward walking for each of the three main joints of lower limb (i.e. hip, knee, and ankle). Differences were regarded as significant at $p<0,05$.

Results: BW displayed increased variability for the three joints. LyE values for hip were 0,122 and 0,198 for FW and BW correspondingly. LyE values for knee were 0,12 and 0,184 and for ankle 0,161 and 0,25 for FW and BW correspondingly. Results were statistical significant.

Conclusions: BW has been used as component of rehabilitation programs after ACL reconstruction. Research indicates that BW increases the strength and power of the quadriceps muscle and that it is associated with less biomechanical strain on the knee joint than is FW. Our results revealed that during BW the joints of lower extremity exhibit a greater amount of variability when compared with FW. Thus, hip, knee, and ankle display decreased adaptability to environmental changes and this may render these joints susceptible to injuries. Perhaps this could be more severe for ACL reconstructed patients when performing BW during their rehabilitation period. Moreover, such an injury may happen in highly competitive team sports such as soccer and basketball where the athletes often perform BW activities. Although BW may seen a reasonable component of rehabilitation programs after ACL reconstruction, before we use it for this purpose we need to know all aspects of this walking mode, including stride-to-stride variability.

P15-1023

Anterior cruciate ligament revision with Achilles freeze-dried allografts

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Introduction: The use of allografts in anterior cruciate ligament (ACL) reconstruction and ACL revision avoids donor site morbidity, decreases operative time and improves knee cosmesis. Freeze-dried allografts are more available and easier to store than fresh-frozen allografts. The purpose of this study was to analyze our long-term results of ACL revision with freeze-dried allografts.

Materials and methods: Between January 1999 and December 2005 we used freze dried-allografts in 55 patients who had previously failed an ACL reconstruction. The average age was 29 years (range 19-51) and the follow-up was 24 months (range 12-64 months). Thirty-five patients had an associated meniscal injury, 30 underwent partial meniscectomy and 5 collagen meniscal implant. In 16 patients the femoral tunnel was drilled outside-in from the lateral cortex and the graft was fixed with Richard staples both proximally and distally. In 39 patients the femoral tunnel was drilled from the tibial tunnel and the graft was fixed proximally with rigidfix and distally with an interference screw.

We performed preoperative, 6, 12 and 18 months postoperative radiographs and MRIs. Clinical results were assessed with the Lyshom score.

Results: Only 23 patients (41%) returned to their preinjury activity level. Twenty patients (36%) referred knee instability and 10 patients required ACL

revision with fresh-frozen allografts. The histology of the failed freeze-dried allograft showed degenerative changes with poorly organized collagen fibers.
Forty-one per cent of the patients had persistent postoperative knee effusion and two patients developed septic arthritis.
The MRI showed graft resorption and tunnel widenning in 30% of the cases.
Conclusion: Our results do not support the use of freeze fried allografts in ACL revision. The high incidence of postoperative effusion secondary to synovitis, altered mechanical properties of the graft, tunnel widening and graft resorption could be responsible for our poor results.

P15-1026
New device for patellar tendon harvesting - clinical study on 25 knees -
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Introduction: In a previous study, a device for bone-patellar tendon-bone graft procurement, employing one small vertical incision to reduce donor-site morbidity, was evaluated on a continuous series of 27 fresh cadaver knees. Some incidents were noted that lead to modifications of the instrument. The aim of this study was to validate this new device in current surgery.
Materials and methods: The instrument and the surgical technique were evaluated on a prospective consecutive series of 25 patellar tendon ACL reconstructions. A vertical incision is centred on patellar apex. A 15 millimetres length patellar bone plug is made after drilling central hole for the traction sutures. It is passed into the device after calibration. Peritenon is cleaved from the tendon and the device is pushed down in the direction of tibial tuberosity, stripping the central third of the patellar tendon. When the instrument arrives in thrust, it is drive 25 millimetres into the tibial tuberosity. Tibial bone plug is then detached by rotations. During the procedure, a continuous tension on the suture traction has to be maintained. The graft was extracted from the device.
The patellar tendon and each bone blocks were measured and calibrated. Harvesting procedure duration, incision length, difficulties or incidents were notified.
Results: Mean incision length was 29 millimetres. Mean procedure duration was 14 minutes. Device permitted to harvest a good quality graft that was used for ACL reconstruction in all cases. Length of the tibial bone block was the most difficult to predict and learning curve was needed. Some difficulties, such as traction sutures rupture, are reported.
Discussion: Patellar tendon autograft is a commonly used graft for anterior cruciate ligament reconstruction. However, persistent donor-site complications such as unsightly scar, tenderness, disturbance in anterior knee sensitivity are still a problem.
The principal finding in this study was that it was possible to harvest a consistent bone-patellar tendon-bone graft through 30 millimetres vertical incision using this new device. This technique gives cosmetic and functional benefit, living the infrapatellar nerve or its branches intact and the paratenon closed. A mid-term follow-up is started.

P15-1029
Isokinetic evaluation of the influence of the concentrated growth factor on the ACL grafts
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Objectives: Secondary damages of the intraarticular structures after ACL reconstruction often requires arthroscopical assessment and treatment. We take advantage of another arthroscopy performed not only to treat the secondary damaged structures but also to perform ACL graft enhancement, what was the aim of the study.
Materials and methods: A group of 8 football players who have undergone unilateral ACL hamstring reconstruction had secondary meniscal damages confirmed by MRI scan. Six of them have undergone the procedure of fixation of the damaged meniscus by combination of stitching and using of bioabsorbable materials. Direct evaluation of the graft has confirmed its continuity with loosing some tightness and single fibres stratification. Six to eight 0.7mm diameter needle injections have been performed in orther to inject 1-2 cm3 platelet rich plasma along the ACL graft. The remained volume of 6-7 cm^3 of PGF has been inserted into capsulo-meniscal area of both menisci (4-6 in each meniscus).
Results: Seven of eight sportsmen have achieved significant improvement of the knee function in the isokinetic evaluation (peak torque, time rate of torque development, work fatigue, hamstring to quadriceps ratio) 6 months after arthroscopy comparatively to the same isokinetic procedure performed 6 months after ACL reconstruction. One patient's achievement was not statistically significant. In the static evaluation X^2 independence test and Fisher's test with $p \leq 0.05$ were used.
Conclusions: Another knee arthroscopy extorted because of the following damages after earlier ACL reconstruction performed is sugested to be used not only to assess and repair the damages but also to reinforce the most endangered and exploited structures (ACL graft, menisci).

P15-1031
Adult tibial eminence fracture fixation: Arthroscopic procedure using K-wire folded fixation
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The authors describe a new and simple technique for arthroscopic fixation of tibial intercondylar eminence avulsion fractures using folded surgical pin. This technique allows reduction and fixation of the bone fragment without using special equipment. After standard arthroscopic procedure to explore the knee and to remove fracture debris and blood clot, the bone block is reduced and advanced with the spike of the anterior cruciate ligament tibial drill guide. A 1.8-mm K-wire is drilled through the guide from the proximal tibia into the reduced fragment. It is bent on its end into the joint with a strong needle case. The K-wire is then pulled back until a good fragment compression to the tibia appears with the wire starting unbending. Next, the other side is bent on the anterior tibial cortex and cut. This arthroscopic fixation allows elastic compression fragment stabilization that authorizes early weight bearing and rehabilitation programs. The material is extracted by traction after 6 months.

P15-1032
Augmentation of isolated tears of the anteromedial- and posterolateral bundles of the ACL: Clinical short-term results.
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Clinical interest recently focused on symptomatic partial ACL injuries in order to perform an individual partial ACL reconstruction. This study presents the concept of partial ACL tears, will describe the assessment of anteromedial (AM) and posterolateral (PL) tears as well as their arthroscopic reconstruction including clinical results.
Methods: In a prospective case series 20 patients with symptomatic partial ACL tear underwent an arthroscopic partial ACL reconstruction with augmentation of the AM- or PL bundles. Intact parts of the ACL were preserved and fixation of the semitendinosus graft was by means of a femoral Endobutton CL and a tibial bioabsorbable interference screw. Patients average age was 36 years [range 23-64]. Follow-up was between 12 - 16 months with an average of 14 months. Examination of patients included a history, clinical evaluation with KT-1000, knee scores and radiographs.
Results: At follow-up all objective and subjective scores as well as stability parameters had increased significantly. The subjective IKDC was 80 points for group AM and group PL (both p=0.04) and the Cincinnati Knee Score 83 pts (AM) and 88 pts (PL) (both p=0.02). The objective IKDC at f/u was 100% "B" for PL patients (p=0.008) and 86% "B" and 14% "A" for AM patients (p=0.02). The average side-to-side KT-1000 at f/u was 0.8mm for PL (p=0.01) and 0.6mm for AM (p=0.02), the Pivot shift was characterized as "clunk" in 20% of PL and 29% of AM patients. There was no restricted ROM in any patient nor a serious intra-or postoperative complication. Radiographs documented the correct AM- or PL bone tunnel positions.
Conclusions: Short-term results of AM- and PL augmentation in symptomatic patients demonstrate significant increased subjective and objective scores as well as stability parameters. Potential advantages of restoring intact ACL remnants in AM-or PL augmentation are increased proprioception and vascularisation and a high anatomical accuracy of the procedure.

P15-1035

A computerized analysis of femoral condyle radii in 37 ACL reconstructed and 37 contralateral intact knees using 3D CT reconstructions

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To analyze the relationship between the shape of the medial and lateral femoral condyles in the sagittal, coronal and axial planes.

Methods: 3-dimensional CT reconstructions of 37 ACL reconstructed and 37 contralateral intact knees were performed and the data were imported in Rhinoceros 4.0®. The radii of the medial and lateral femoral condyles were determined in the sagittal, coronal and axial planes by digitally reconstructed circular arcs along the bony condylar profiles. The intra- and interobserver testing revealed was performed and revealed good results. Statistics were performed using the Wilcoxon test, significance level: $p<0.05$.

Results: The average sagittal radius of the medial femoral condyle (FC) in 37 intact knees was 21.6 mm (SD 1.7mm) and of the lateral FC 21.3 mm (SD 1.8mm) ($p=0.2$). The average radius of the medial FC in the coronal plane in knee extension was 22.4 mm (SD 3.2mm) compared to 27.8 mm (SD 4.4mm) for the lateral FC ($p=0.000$) and the average radius of the medial FC in the axial plane in 90° knee flexion was 21.3mm (SD 3.3mm) compared to 18.3mm (SD 2.6mm) for the radius of the lateral FC ($p=0.000$). The average radius of the medial FC was smaller in extension compared to 90° of flexion (21.2mm to 22.4mm, $p=0.05$) and the average radius of the lateral FC was significantly bigger in extension compared to 90° of flexion (27.8mm to 18.3mm, $p=0.000$). The 37 ACL reconstructed knees demonstrated similar radii in all three planes to the intact knees without a significant difference.

Conclusions: The results indicate that the radii of the medial and lateral femoral condyles are similar in the sagittal planes but demonstrate significant asymmetry in the axial and coronal planes. The average radius of the lateral FC is significantly bigger in extension whereas the radius of the medial FC is significantly bigger in flexion. There was no significant difference between ACL reconstructed knees and contralateral intact knees. The results provide reliable geometric parameters necessary for the three-dimensional reconstruction of the articular surfaces of the femoral condyles.

P15-1043

Effect of platelet rich plasma on tendon healing in a bone tunel

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Purpose: The aim of this study was to ascertain the effect of platelet rich plasma on the biological process of healing of a tendon in a bone tunnel.

Materials and methods: Ten rabbits underwent surgery of both back legs and the medial gastronemicus tendon was sectioned and introduced in a bone tunnel performed in the tibia. In the experimental leg the tendon was infiltrated with the platelet rich plasma obtained by plasmapheresis without a membrane or barrier, and the other leg, the control, was not. Five animals were killed at 2 weeks and the other five at 4 weeks. A radiography of the tibia was performed and tissue samples were taken for histological and immunohistochemical evaluations.

Results: Macroscopically and ragraphycally we observed a higher bone callus formation in the experimental tibias at 4 weeks. Microscopically higher condroid, osteoid and trabecullar bone tissue formation was appreciated in the platelet rich plasma group at 2 and 4 weeks, as well as direct tendinous fibers anchorage to bone at 4 weeks. Immunohistochemically no difference in type II collagen distribution was observed, although the platelet rich plasma group presented a grater area with type II collagen.

Conclusions: The local application of platelet rich plasma accelerates and increases the healing processes of a tendon in a bone tunnel although it don't modify the sequence of events that occur during the healing process. Platelet rich plasma can help in the healing of a tendon in a bone tunnel.

P15-1066

Enlargement of bone tunnels in the anterior cruciate ligament reconstruction with semitendinosus and gracilis: compare tridimensional computadorized tomography and radiography

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Most of studies measure the enlargement of bone tunnels in the anterior cruciate ligament reconstruction with radiography.

The purpose of this paper is to compare the measure in tomography and radiography with 1 and 7 months of post operative.

We decide to do it because we think that radiography is not a precise method to measure in milimeters and literature show high values of enlargement with no laxity. We measure 22 tibial and femoral bone tunnels of 22 knees with anterior cruciate ligament reconstruction with semitendinosus and gracilis using cross-pin and interference screw.

They were 22 pacients with age from 16 up to 46 years old with mean age of 30.

In the radiography we could measured 2 knees on the first month and 10 knees on the seventh month in the femoral bone tunnel. In the tibial bone tunnel we could measured 10 knees on the first month and all on the seventh month. In the tomography we could measured all the knees in both months.

We can´t compare the measure in the femoral bone tunnel using radiography.

In the tibial bone tunnel the enlargement was between 30 and 55% and similar of the literature.

In the tomography the bone enlargement was between 7 and 38% on the femur and 7 and 25% on the tibial tunnel. The radiography is not a good method to measure the enlargement of bone tunnels.

The tomography is a precise method to measure the bone tunnel because we can look the wall of the tunnel. There was enlargement in 77,2% of femoral bone tunnel and 81,8% of the tibial tunnel.The sizes of this enlargements were smaller than the literature.

PCL

P16-23

Chondral injury using cross-pin femoral fixation in PCL reconstruction: A cadaveric study

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In posterior cruciate ligament (PCL) reconstruction many techniques have been described. Crucial item in pre-operative planning is graft choice and graft fixation. Compared to other grafts, hamstring is getting more popular because it is longer, has higher mechanical properties and doesn´t harm extensor apparatus of the knee. Moreover the absence of the bone block makes easier hamstring insertion in the femoral tunnel. Hamstring greater disadvantage is fixation. Many fixation devices, used in anterior cruciate ligament (ACL) reconstruction, have been described for PCL procedure. One of these, recently proposed, is a cross-pin femoral fixation technique, for hamstring PCL reconstruction. The authors drilled the femoral tunnel in an inside-out manner (width 8 mm and depth 35 mm) and fixed the hamstring with the Rigidfix (Mitek, Norwood, MA), passing the device via the anterolateral (AL) portal. We present the results of an anatomical cadaver study, in which the aim was to evaluate the entrance points of cross-pins and the possible iatrogenic damages, during transverse fixation via anterolateral portal. The fixation device we used is the Rigidfix (Mitek, Norwood, MA), designed to use two biodegradable pins for ACL femoral fixation. Femoral drilling and cross pins insertion were performed on 20 (10 × 2) fresh frozen cadaver knees. With the knee full flexed (125°-130°), femoral tunnel was drilled via anterolateral portal (8 mm drill, 30 mm of depth), in a position at 2 o'clock and in an inside-out manner. The anterolateral portal was placed 1 cm above the lateral tibial plateau and being tangential to the patellar tendon. The Rigidfix cross-pin guide, was inserted into the femoral tunnel through the anterolateral portal as described by In et al. The aiming device for the pins insertion was then assembled. We gave three positions to the cross-pin guide: 0°, 45° and 90° slope, referring to the horizontal plane (the floor).Per each position of the guide (0°, 45° and 90°), we inserted two color-coded metallic pins (length 40 mm, diameter 2.7 mm), that didn't reach the femoral tunnel. We recorded and

subdivided the cross pinholes, according to femoral guide position, in three different groups (respectively A, B and C). Group A (femoral guide position 0°, black pins): two knees (10%) had two pins inside the cartilage of the medial femoral condyle; thirteen knees (65%) had 1 pin inside the cartilage of the medial femoral condyle; five knees (25%) had both pins out of the cartilage. Group B (femoral guide position 45°, red pins): six knees (30%) had two pins inside the cartilage; 11 knees (55%) had one pin inside the cartilage; three knees (15%) had both pins out of the cartilage. Group C (femoral guide position 90°, green pins): 11 knees (85%) had two pins inside the cartilage; three knees (15%) had one pin inside the cartilage.In conclusion, we do not recommend routine use of this new technique, because the instrumentation is particularly designed for ACL reconstruction transtibial technique. At the moment the surgeon hasn't any anatomical landmark to securely place the pins out of the articular surface. Nevertheless if this new method has been preferred, we suggest a 0° femoral guide slope, still having a high iatrogenic chondral damage risk.

P16-437

Retrospective clinical long-term outcome of patients treated operatively after traumatic knee dislocation

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A traumatic dislocation of the knee joint is a very severe ligament injury with often dramatic consequences for the patient. The aim of our study was to analyze the long-term outcome after surgical treatment. Retrospective clinical case series study of all patients (n=89; n=90 knees) treated operatively in our institution for traumatic knee dislocation from 1980-2006. Inclusion criteria were a bicruciate injury with at least one collateral ligament lesion. A medial collateral ligament (MCL) lesion was present in 59, a medial posterior collateral ligament (MPCL) lesion in 51, a lateral collateral ligament (LCL) lesion in 26, a popliteal muscle injury in 26, a medial meniscal lesion in 19, a lateral meniscal lesion in 24, a biceps tendon lesion in 8, a peroneal nerve lesion in 4, rupture of the patellar ligament in 4 and a femoral fracture in 5 patients. A reconstruction/refixation of the anterior cruciate ligament (ACL) and the posterior cruciate ligament (PCL) and if applicable of all peripheral structures was performed. From 7/89 patients were excluded being unable to participate personally in the follow-up regimen (now living e.g. in Egyt). 1 died to a non knee-related reason, 3 denied study participation and 2 patients were lost to follow-up. 76/82 patients (m:w=68:12; mean age at injury 31 yrs, range 14-66 yrs) were clinically evaluated personally by the first author (MTH). 66 patients were treated operatively within 30 days and 10 after 30 days from trauma. For ACL an suture/refixation was performed in 19, a reconstruction with patellar tendon/quadriceps tendon in 55 and with allograft in 2 patients; for PCL a suture/refixation was done in 55, a reconstruction with patellar tendon/quadriceps tendon in 25 patients. Examination included assessment of cruciate ligament laxity by KT-1000 in 25° flexion with 67N, 89N and 134N, the ap translation with the rollimeter in 25°/70° flexion, the posterior drawer test in 70° flexion, collateral ligament laxity with varus/valgus stress in extension and 30° flexion. The Total Knee Score, Tegner Activity Index, active and passive ROM and VAS pain and satisfaction was assessed. Data were analyzed using SPSS 13.0. The mean follow up time was 12 years (1-27 yrs). 69/76 patients (91%) were able to return to work without or only slight impairment. 7/76 patients receive full workers compensation. 46/80 patients (58%) were absolutely painfree. 28 patients (35%) reported an identical sport activity level compared to preinjury. The mean Total Knee Score was 182 (139-200), the Tegner Activity Index preinjury 7 (3-10), at follow-up 5 (0-10). ACL laxity with KT-1000 134N compared to the uninjured side was 1.4 mm (injured 3.9mm). ACL laxity with rollimeter compared to the uninjured side was 1-2mm in 48, 3-5mm in 23, 6-10mm in 4 and >10mm in 1 patients. PCL laxity was 0-2mm in 45, 3-5mm in 24, 6-10mm in 3 and >10mm in 3 patients. Mean active and passive flexion was 124°/123° ipsi- and 132°/131° contralateral. Mean VAS (0-10) pain and satisfaction was noted 1.3 and 8.8. 4/80 of patients (5%) had undergone a TKR, 2/80 a medial open and 2/80 a lateral closing wedge HTO. Knee dislocations remain a major therapeutic challenge. However with precise early complete bicruciate reconstruction and restoration of the peripheral anatomy good patient satisfaction with overall mantained sport and working activity can be achieved. Financial support by the Swiss National Insurance Trust (SUVA) is greatly appreciated.

P16-469

Surgical results of implant-free double-bundle posterior cruciate ligament reconstruction using press-fit technique with periosteum-enveloping hamstrings tendon autograft

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Surgical reconstruction of the posterior cruciate ligament (PCL) is indicated in PCL-deficient knees with severe symptomatic instability and associated ligament injuries. Traditional transtibial tunnel methods using various fixation techniques for different grafts were commonly used; however, long-term results remained unpredictable. This work presented an implant-free double-bundle PCL reconstruction technique using femoral press-fit technique and periosteum-enveloping hamstring tendon in the tibial tunnel.

Methods: From December of 2002 through July of 2005, this arthroscopy-assisted technique was used in 14 patients with PCL injuries. Semitendinosus and gracilis tendons were prepared as two loops with knots. The periosteum was enveloped to each loop. After creating two bottle-neck femoral tunnels and one tibial tunnel, the grafts were passed one after another. The press-fit method (grafts' knots into bottle neck of femoral tunnel) was used for femoral site fixation. The intra-articular opening of tibial tunnel was filled with periosteum-enveloping tendon. A tie with Mersilene tape over a bone bridge for each tendon loop was used for tibial site fixation.

Results: After 24-44 months of follow-up, the clinical outcomes have been encouraging. Data from 13 patients were analyzed completely. Eleven patients could return to the same of pre-injury daily activity and sports activity. According the IKDC rating System, 11 of the 13 patients had normal or nearly normal ratings. Only two patients were found to exhibit grade 2 laxity. Tibial tunnel widening was found in one patient.

Discussion: We proposed this double-bundle PCL reconstruction technique using a knots' femoral press-fit technique and periosteum-enveloping hamstring tendon in the tibial tunnel. This technique has advantages, which include fixation close to joint, not usage of implant, protection of graft at tibial turn, potentially good tendon-bone healing, and dual waterproof in femoral plus tibial tunnels. Although the short length of hamstring tendon was noted in the technique, we believe that the graft length does not affect outcomes if good tendon-bone healing by periosteum are achieving. Further biomechanical and histological investigation should be conducted to elucidate this issue.

Conclusion: Without an implant, this alternative technique was applied for PCL reconstruction and achieved satisfactory preliminary clinical results. Nevertheless, a large series of patients with long-term follow-up is required to fully assess the effectiveness of this procedure.

P16-511

The effect of femoral tunnel angle on graft forces in inlay PCL reconstruction, a comparison of two techniques for femoral tunnel placement

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Introduction: In a posterior cruciate ligament (PCL) reconstruction, a high graft force has been implicated in eary graft failure. When considering graft force, controvery still exists between these outside-in and inside-out methods which were commonly used for creation of femoral tunnel. The purpose of this study was to measure the graft forces of different femoral tunnel during a PCL reconstruction using tibial inlay technique.

Methods: A tibial inlay PCL reconstruction (anterolateral bundle) was performed in twenty porcine knees, in which ten using an inside-out technique and ten using an outside-in technique for femoral tunnel. One end of each graft was fixed to a tensioning jig with a load cell used to measure force in the graft when posterior loads (140N) were applied to the tibia.The knees were tested at full extension, 30 degrees, 60 degrees, and 90 degrees of flexion. Results were analyzed using a Student t test with paired data.

Results: The force on the graft was significantly higher with the outside-in technique during posterior loading at 60 degree and 90 degree of flexion than it was in the inside-out technique. ($p<.05$) There were not significantly different between two techniques at 0 degree and 30 degree of flexion.

Discussion: During early healing period after PCL reconstruction, a high graft force can lead to unpredictable stretch-out of the graft. Like acute angle over tibial tunnel in PCL reconstruction, the femoral tunnel angle may also contribute to shear stress and early graft failure. We used tibial inlay technique to diminish some bias which might be created by tibial tunnel technique. Although previous study indicates that significantly lower graft/femoral tunnel angles in the outside-in technique. This study revealed that significantly higher graft forces can be obtained when using this outside-in technique for femoral tunnel placement.
Conclusion: In this biomechanical study, a smaller graft force was achieved in the inside-out technique for femoral tunnel placement.

P16-525
The posterolateral corner of the knee. Anatomy and Morphometry of the lateral collateral ligament, popliteus tendon, popliteofibular ligament, fabellofibular ligament, arcuate ligament complex and posterior cruciate ligament.
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Objectives: The posterolateral corner (PLC) has been identified as an important ligament complex for maintaining stability of the knee joint by several authors. The purpose of this study was to establish a precise qualitative and quantitative anatomy of the PLC under microsurgical dissection.
Methods: 25 human cadaveric knee specimens were used. Anatomic preparation of the structures of the PLC using a magnifying loupe, microsurgical instruments and an operative microscope was performed. Anatomic variations, ligament shape and topography of the ligament attachments were recorded. Moreover the insertion area and distances between the ligament insertion points were measured.
Results: Mean values in mm: L(ateral)C(ollateral)L(igament: footprint femoral anterior-posterior 9,62 footprint femoral superior-inferior 11,23 footprint fibular superior-inferior 8,49 footprint fibular anterior-posterior 5,59 length 63,0 diameter 5,13 d(istance) LCL-P(opliteus)T(endon)anterior 5,70 d LCL-PT distal 5,88 d LCL-Epicondylus posterior 4,04 d LCL-Epicondylus distal 4,31. Popliteus Tendon: length 35,98 diameter 9,17 footprint femoral 11,15x5,62 d PT-Epicondylus posterior 6,6 d PT-Epicondylus distal 9,75. Popliteofibular ligament:footprint fibular 4,88x4,95 length anterior 15,04 length posterior 12,36 width 6,94. Fabellofibular ligament: footprint femoral 6,61 footprint fibular 4,93 length 35,24 diameter 4,71. Arcuate ligament complex: footprint capsule 10,01 footprint fibular 5,65x6,41 length 32,51 diameter 8,33 maximum width 22,34
The presence of the popliteofemoral ligament was 100%, its anatomic variations are described. The presence of the fabellofibular ligament was 63%. The lateral collateral ligament, the popliteofibular ligament, the popliteal tendon, the arcuate ligament complex, the meniscofemoral ligaments and the PCL were measured regarding lenghth, width, diameter, morphology and area of insertion and distances to adjacent structures.
Conclusions: The study gives detailed information about all known structures of the PLC and therefore provides useful information for the development of reconstruction techniques.

P16-527
Radiographic referencing of the anterolateral and posteromedial bundle of the PCL: an anatomic analysis
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Objectives: The purpose of this study was to precisely define the femoral and tibial attachments of the two fiber bundles of the PCL and correlate them to radiographic images in order to establish a radiographic anatomy and evaluate plain radiographs as accurate to postoperatively assess femoral and tibial tunnel placement in double-bundle PCL reconstruction.
Methods: 15 human cadaveric knee specimen were used. After anatomic preparation, the insertion of the 2 fiber bundles were marked. The lateral femoral condyle was removed and high definition digital images were obtained. The insertion areas were marked with lead and anteroposterior and lateral radiographs were taken. A measurement grid system (modified from the description for ACL referencing via radiographs by Bernard et al.) was used to correlate anatomy and radiography.
Results: We present a qualitative and quantitative anatomy of the femoral and tibial insertion sites of the anterolateral and posteromedial bundle of the PCL, their subsumption into a measurement grid system and a their correlation on radiographic images.
Conclusions: Accurate definition of the insertion sites of the PCL is essential for double-bundle reconstruction. The results of our study may be used as a reference for intra- and postoperative control of femoral and tibial tunnel placement

P16-607
PCL arthroscopic femoral inlay reconstruction. Surgical technique and early results
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Many operative techniques have been described for reconstructing the posterior cruciate ligament (PCL) but so far none has been able to consistently correct abnormal posterior laxity or provide consistent functional results. So far the most used technique is the trans-tibial popularized by Clancy in the early 80's and implemented later with the use of arthroscopy. While most of the attentions have been pointed at the tibial side, recently some studies have showed that the weak point of the graft is located on the femoral articular emergence rather than the tibial one. The aim of this paper is to present a new arthroscopic technique combining the advantages of the arthroscopic approach with those of the inlay fixation on the femur footprint in order to produce better biomechanical and anatomical reconstruction.
Surgical technique: Patient's set-up is similar to a standard trans-tibial arthroscopic reconstruction. Ipsilateral quadriceps tendon-bone grafts is harvested, creating patellar bone plug approximately of 15 mm long by 12 mm wide by 8 mm deep, and incorporating all 3 layers of the quadriceps tendon, as suggested by Noyes. The bone block is first fashioned to obtain a circular plug measuring 1 cm of diameter and 8 mm in depth, then drilled and prepared to accept a cannulated 3 mm screw. Tibial tunnel is first created, after placing two posterior portals and working using a transeptal view. Then the femoral attachment is debride trying to preserve as much as possible of the native posterior cruciate ligament Using a PCL femoral guide (Acufex, Smith and Nephew, Andover, Massachusetts) a 2.3 mm pin is inserted using an outside-in procedure. Then a femoral socket of the some 10 mm depth is created so that the bone plug can fit in and then fixed with a cannulated screw (OsteoMed, Addison, TX). Alternatively an in-out system has been used with a retro-drill (Okoshi drill system) to create the femoral socket and in this case we prefer to fix the bone block using an Endobutton system secured at the medial condyle cortex.
Results: After some cadaver studies performed at the Department of Anatomy of the University of Barcelona, four patients have been treated with this technique from June 2006 to February 2007. Two out of four were complaining with a PCL rupture with a a posterolateral grade I lesion, the others two presented an isolated PCL lesion. The average posterior translation at the time of surgery was 11,4 ± 1,7 mm, while they showed an average translation of 3,2 ± 0.8 mm at an average of 10 months post-op.
Conclusion: The femoral inlay arthroscopic reconstruction has been proposed to reduce the biomechanical effects of the femoral sharp angle on the graft fibers and to provide a more anatomical reconstruction. Early results are satisfactory and encourage in further biomechanical and clinical studies.
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P16-647
Multiligament injuries in children and adoslescents
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Introduction: Knee dislocations are reported to occur from 0.001% to 0.13% of all patients presenting with orthopaedic injuries. Severe ligament injuries without fracture dislocations after kneedislocations are even more rare in children and adolescents. Very few reports have been published concerning young patients and ligament disruptions after knee dislocations.
Materials and Methods: We have retrospectively collected data from 24 young patients under the age of 17 with severe kneeinjuries and/or knee dis-

locations seen at our institution in the period from 1999 to 2006. There were 12 girls and 12 boys. Age between 6 and 17 (Mean 15 years). Follow-up between 24 and 77 months (Mean 37 months).
Seven patients had chronic injuries and the rest were treated within weeks after the injury. Injury mechanisms were traffic accidents in 12 cases, sports in eleven cases and ADL injury in one patient. Six had a knee dislocation at the injury.
Thirteen of the patients had combined lesions of the anterior cruciate ligament (ACL) and the posterior cruciate ligament (PCL) and of these six also had a posterolateral corner injury (LCL/PLC). One of these six patients had a lesion of the medial patellofemoral ligament (MPFL) and which was reinserted.
One of the ACL/PCL patients also had a medial collateral ligament (MCL) rupture and an MCL ruture that was reconstructed. Five patients had lesions of the PCL and the LCL/PLC. Three patients had an ACL injury as well as injury of the PLC/LCL. Two of the patients had a peroneal nerve palsy that improwed over time.
Arhthroscopically assisted anatomical reconstructions with trans-epiphyseal technique were done with autograft quadricepstendons for PCL with single or two bundle technique in the femur and hamstringtendons for the ACL reconstruction in 5 patients and in some cases with contralateral hamstrings as well. Allografts in combination with autograft hamstrings were used in seven patients. One patient had a major complication with deep infection over the medial reconstruction and was treated with arthroscopic debridement and open revision of the infection. The reconstructions were intact. And there were three smaller complications (blister from tourniquet, brisement force and removal of suturewasher).
On evaluation of the results, the ROM in two patients showed a slight extension deficit of 3-5 degrees and 4 patients had a flexion deficit of more than 25 degrees. IKDC scores in group A and B. KT-1000 with 0-5 mm at 70 degrees. Lachmann with grade 0 and 1. No or slight Pivotshifts.
There were five reoperations. One patient had a rerupture of the PCL and the posterolateral complex and he had a revision with Quadriceps tendon from the ipsilateral knee and hamstrings from the contralateral knee. One had a rerupture of the LCL/PLC and had a revision with hamstrings from the contralateral knee. One had a deep infection over the medial reconstruction and was treated with arthroscopic debridement and open revision of the infection. The reconstructions were intact. One had removal of Bilok-screwhead. The last had a removal of a suturewasher.
Conclusion: Combined kneeligament lesions in the young patients are rare, but can be treated with good results with anatomical reconstruction of the ruptured ligaments using autografts and/or allografts. The complicationrates are low. We recommend that these patients are treated in a specialized center with experience in handling these complex cases.

P16-706
Multiple ligament reconstruction in the knee
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Introduction: Lesion of the popliteus fibular ligament and the popliteus tendon with or without rupture of the lateral collateral ligament is referred to as lesion of the postero-lateral corner of the knee. Lesion of postero-lateral corner is often induced by knee dislocation and concomitant with lesion of the cruciates and medial collateral ligament.
Materials: In the period from August 1997 to May 2005 154 patients with postero-lateral instability combined with lesion or other ligaments of the knee were treated with primary repair with augmentation or reconstruction. Median age were 30 years, 102 were males. 27 % had previous surgery. Causes of injury were RTA in 33% and sport in 54%.
Method: All had reconstruction of the lateral structures using hamstring grafts. All concomitant ligament instability were treated with reconstruction using either autografts or allografts.
98, available for follow-up more than 24 mths post-op, were evaluated according to the IKDC form, objective stability measure and subjective KOOS score. Patients were examined by an independent observer.
Results: In our series 36% of PLC-ACL reconstructions were revision cases, indicating that Non-diagnosed PLC instability concommitant to ACL instability may leed to failure of ACL reconstruction.
Median 60 mths after multiple ligament reconstruction 63% were normal or nearly normal (IKDC A and B).
Subjective KOOS scores were lower than scores 1 year after primary ACL reconstruction especially on pain, ADL, Sport and QOL. Subjective KOOS scores were comparable scores in postmenisected OA in pain, ADL and sports activity.

P16-915
Quantification of posterolateral knee radiographic landmarks
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Aims: During intra-operative procedures, it can be difficult to locate the attachment sites of the fibular collateral ligament (FCL), popliteus tendon (PLT), and popliteofibular ligament (PFL) in the absence of specific radiographic guidelines. Our purpose was to establish radiographic landmarks for the femoral and fibular attachment sites of the FCL, PLT, PFL, and lateral gastrocnemius tendon (LGT).
Methods: 11 nonpaired specimens were dissected. 2 mm metal spheres were imbedded within the centers of the bony attachments. Radiographic measurements in the AP and lateral views were made in a picture archiving and communication system program. On the AP view, all femoral attachment locations were measured perpendicular to a line crossing the distal-most edges of the femoral condyles. Perpendicular distances to a line intersecting the most proximal aspects of the lateral and medial tibial plateaus were measured for the tibial-based structures. The locations of fibular markers were also measured perpendicular to this tibial plateau line. On the lateral view, a reference line was drawn along the posterior femoral cortex, and perpendicular distances between this reference line and the marked attachment sites were quantified. A second reference line was drawn perpendicular to the posterior cortex and intersecting the posterior point of Blumensaat's line. The inclination of the tibia was used as a second reference line. To examine interobserver reliability, three examiners were assigned to independently measure blinded radiographs. Single-measure intraclass correlation coefficients (ICCs) were used to determine variability.
Results: The ICC was 0.972, indicating a high level of reliability among the three examiners.
AP View: On the femur, the PLT attached closest to the femoral joint line at a distance of 14.6 mm, followed by the proximal FCL (27.1 mm) and the LGT (34.6 mm). Distal to both tibial structures were the PFL, attaching on the fibula at an average distance of 21 mm from the tibial plateau line, and the distal FCL at 35 mm.
Lateral View: *Femur.* The average FCL attachment on the femur was 4.3 mm from the lateral epicondyle in the anteroproximal direction, 14 mm from the PLT attachment, and 9.6 mm from the LGT attachment. It was found to be located 0.3 mm posterior to the extension of the posterior cortex and 12.1 mm distal to the line crossing Blumensaat's point. The average distance from the origin of the PLT to the lateral epicondyle was 12.1 mm. The average PLT origin site was 0.9 mm posterior to the posterior cortex extension and 25.8 mm distal to the line drawn through Blumensaat's point. *Tibia.* The average posterior tibial slope was found to be 13º. *Fibula.* The distal FCL attached 13.9 mm distal to the PFL attachment. The average FCL attachment was 5.7 mm posterior to the fibular diaphyseal axis and 6.0 mm distal to the line intersecting the most anterior point of the fibular head, compared to 9.5 mm posterior and 6.6 mm proximal for the location of the PFL attachment.
Conclusion: This study provides a reliable and transferable protocol for identifying posterolateral attachment sites on radiographic images. We believe that the integration of these two approaches will allow not only for a higher degree of precision in quantifying the attachment sites radiographically but also for more consistent intraoperative and post-operative assessments of anatomical reconstructions.

P16-945
Isolated PCL reconstruction with hamstring tendon autograft - clinical results after a minimum follow-up of 2 years
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Aims: The treatment of PCL injuries continues to be a matter of debate and there are only limited studies in the literature examining the results of PCL reconstruction using autogenous hamstring grafts. The aim of this study was to evaluate the clinical results of isolated PCL reconstruction with a single-incision transtibial technique, quadrupled hamstring tendon graft and bioabsorbable interference screw fixation after a minimum follow-up of 2 years.
Methods: Case series. The study group comprised 28 consecutive patients (19 men and 9 women) who underwent isolated PCL reconstruction with

four strand hamstring tendon autograft and bioabsorbable interference screw fixation. A single-incision endoscopic transtibial technique for the reconstruction of the anterolateral bundle of the PCL was used in all patients. The mean age of the patients at the time of the reconstructive procedure was 28 years (range, 16-52 years). The follow-up assessment consisted of the IKDC Ligament Evaluation Form which incorporates multiple subjective and objective criteria. Ligament stability was measured by the posterior drawer and reversed pivot-shift test. Instrumented stress-radiography in 90 degrees of flexion using the Telos device was used for objective quantification and grading of posterior laxity pre-, and postoperatively.
Results: At the time of the operative procedure significant articular cartilage lesions in the medial and patellofemoral compartment were found in 14 (50%) patients. Of the 28 patients in the study group, 24 (86%) were clinically and radiographically reviewed after a minimum follow up of 24 months after isolated PCL reconstruction. Mean posterior tibial translation was 10.1mm preoperatively and 5.5mm postopoeratively. The mean subjective IKDC score increased from 59 points preoperatively to 81 points postoperatively. The differences were significant ($p<0.001$). According to the objective IKDC criteria 6 patients (25%) had a normal, 14 patients (58%) a nearly normal, and 4 patients (17%) an abnormal knee function. There was no correlation between subjective knee function and posterior tibial translation. The status of the articular cartilage contributed significant to the subjective outcome
Conclusion: Isolated posterior cruciate ligament reconstruction with hamstring tendon graft and bioabsorbable interference screw fixation affords acceptable improvement of objective ligament stability and subjective knee function in patients with PCL insufficiency. In our experience PCL reconstruction should be recommended to young, active or symptomatic patients with isolated PCL insufficiency as the natural history of these injury is not so benign as previously thought.

P16-965
Surgical treatment of different chronic posterior laxity: Study of arthroscopic double bundle reconstruction for posterior cruciate ligament with or without posterolateral corner reconstruction
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Purpose: Prospective study of 32 patients with chronic posterior laxity. The objective was to demonstrate the efficacy of a surgical reconstruction with two-bundle according to the pre op status of laxity.
Materials and Methods: Between 1995 and 2003, we performed 32 PCL reconstructions using a two-bundle quadriceps tendon autograft. Clinical outcome was evaluated with the IKDC scoring system. Posterior laxity measurements were performed with stress radiography (Hamstring contraction and Telos). There were 21 males. 12 direct posterior laxity (DPL) and 20 postero-postero-lateral instability (PPLI)which needed posterolateral corner reconstruction.
Surgical technique: Both antero-medial (AM) and postero-lateral (PL) bundles are arthroscopically reconstructed using quadriceps tendon, with two femoral sockets and two tibial tunnels.The femoral fixation is achieved with Endobutton® CL, and the tibial fixation is performed with BioRCI screws and stapple. The AM bundle is fixed at 20°-30° of flexion while the PL is fixed close to full extension. All patients underwent the same postoperative rehabilitation protocol: passive range of motion exercises are immediately begun on CPM,50% partial weightbearing with a knee brace for 6 weeks. Secondary retrains were reconstructed as needed. In case of high tibial valgus osteotomy, osteotomy was done first, before any ligament reconstruction. Post-operative bracing was always used. The rehabilitation protocol depends on the combined procedures.
Results and Discussion: The mean follow-up was 22 months (12-53 months).
For the 12 DPL, the subjective score was 53 and at the last FU, 68.5. For the 23 PPLI, the subjective score was 53.5 and at the last follow up, 64.5.
The average pre-op laxity as measured by stress radiography at 90° of flexion, was 3.7 mm to 1.9 mm at the last follow up (Gain 48.6%), for Telos and 6.9 mm to 4.4 mm for the Hamstring contraction (Gain 36.2%).
Concerning the PPLI, The average pre-op laxity as measured by stress radiography at 90° of flexion, was 5.1 mm to 1.7 mm at the last follow up (Gain 61.7%) for Telos and 9.6 mm to 4.7 mm for the Hamstring contraction (Gain 51%). Compared to the pre-op status, there was a statistically significant improvement for activity level, symptoms, subjective evaluation, final score and posterior drawer. The gain of laxity is significantly better for the PPLI compared to the DPL. However, clinical results are significantly better in case of DPL compared to the combined instability.
The analysis of the results showed that the highest laxity gain was obtained for combined instability. PCL arthroscopically assisted reconstruction with two bundle quadriceps tendon is technically feasible.

P16-976
Reconstruction of the posterior cruciate ligament in a skeletally immature patient with ligament agenesis: Description of technique
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Objective: To describe a technique for reconstructing the posterior cruciate ligament in a child aged 11 years and 8 months presenting ligament agenesis, and to evaluate the result from this reconstruction and from impeding posterior displacement of the tibia during lenghtening.
Materials and Methods: This was a male patient aged 11 years and 8 months who had been diagnosed with grade III fibular hemimelia (absence of fibula) at the age of three years. At birth, he also presented a foot deformity (valgus of the rearfoot and abduction of the forefoot) and a discrepancy of 5.5 cm in the left leg. After surgery to correct the foot deformity and a first attempt to correct the leg length discrepancy, it was decided to develop an intra-articular technique for reconstructing the posterior cruciate ligament (PCL) using an allograft from the quadriceps tendon. This was done in August 2006. The femoral tunnel was constructed arthroscopicaly assisted, in horizontal dorsal decubitus, and the fixation method used was a post fixation using a femoral metaphyseal cortical screw. The tibial tunnel was made via posterior arthrotomy, in horizontal ventral decubitus, with attachment using a cannulated screw.
Results: Three months after the operation, radiographic consolidation had been achieved and the patient presented a range of motion of 130 degrees and negative posterior drawer and Lachmann tests, while maintaining residual anterior instability (+/4+). He underwent an MRI at six months after the operation, which showed full integration of the graft. A further correction of the leg discrepancy was then indicated, which was performed on July 14, 2007. Today (two-month follow-up assessment) he is undergoing lenghtening with full range of knee motion and no symptoms in the knee. On radiographic evaluation, anterior femorotibial displacement was noted, but without posterior femorotibial displacement.
Discussion: Ligament agenesis is associated with congenital deformities of the legs and was described by several authors in the 1980s (Vernon & Tolo, 1981; Johansson & Aparisi, 1983; Kaelin, Huline & Carlioz, 1985). Little is known about the prognosis for these problems: the reports are on single cases and the observations are only short-term, with many doubts regarding case management. The same applies to posterior displacement of the tibia during bone lenghtening, which was first described by Jones & Mosley in 1985, and has also given rise to doubts about the treatment. The alternatives described have been aggressive surgery on soft tissues to release the knee flexor tendons, addition of a brace (halting the lenghtening) or inclusion of a femoral ring (Jones & Moseley in 1985; Grille Dungl in 1991; Sanpera et al in 1995).
Conclusion: The technique developed for reconstructing the posterior cruciate ligament in cases of skeletal immaturity was:
1) Effective for avoiding posterior displacement of the tibia in relation to the femur during the early postoperative period (6 months);
2) Effective for avoiding epiphyseal lesions during the early postoperative period (6 months);
3) Inconclusive in relation to the efficacy of avoiding posterior displacement of the tibia during its stretching, because of the short follow-up.

P16-990
Treatment of chronic injuries of the posterior cruciate ligament and posterolateral corner: Preliminary results with a minimum of one year of follow-up
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Objectives: To present a case series with preliminary results from a technique for reconstructing the posterior cruciate ligament (PCL) and the "anatomy" of the posterolateral corner, in relation to objective physical examination parameters, objective scores and functional scores.
Materials and Methods: Between January 2004 and July 2007, 26 patients underwent surgery using the techniques for anatomical posterolateral corner reconstruction and PCL reconstruction. Thirteen patients received allografts

and thirteen received autolgrafts. This study was conducted at IOT-HC-FMUSP-SP and the Vita Institute (Vita Care). All the surgeries were performed by the same surgeon. However, only 12 patients with a minimum of one year of follow-up were analyzed in this study. The patients presented chronic injuries and the mean time elapsed from receiving the injury to surgical treatment was 5.6 years (minimum of 0.5 and maximum of 20 years). The length of follow-up ranged from 12 to 43 months, with a mean of 22.25 months. The patients were evaluated in June and July 2007, when they were examined in relation to I) physical examination, II) objective score (objective IKDC) and III) subjective score (subjective IKDC).
Results: Measurement of the posterior displacement of the tibia in relation to the femur, by means of descriptive measurements from 1 to 5 in the physical examination demonstrated that eight of the twelve patients presented a posterior drawer of 1+ (7) or 2+ (1) and the remainder were zero (4/8); seven patients had posterior Lachmann of 1+ and the remainder were zero (5/8); only three patients (3/12) had varus stress at zero degrees and the remainder had zero (9/12); only three patients had an active quadriceps test of 1+(3/12) and the remainder had zero; only two patients had a positive dial test at 90 degrees (2/12).
Discussion: Injuries involving the posterolateral structures of the knee present a therapeutic problem for knee surgeons, because of their challenging diagnoses, anatomy and complex biomechanics. Several anatomical studies have been produced to demonstrate the biomechanical importance of the structures of the posterolateral corner, starting in the 1990s. The structures with greatest biomechanical importance are the popliteal tendon, lateral collateral ligament and the popliteofibular ligament. There is still no consensus in the literature regarding which technique is the best, since reports on long-term results and randomized comparisons between techniques are still rare. Most reports are descriptions and experiences from individual surgeons and/or services, which increases the relevance of this study. With regard to rotation of the tibia, this was shown to be more effective and more uniform in the tests than was posterior displacement of the tibia. We believe that reconstruction of the popliteal component by means of a tibial tunnel and attachment in the anterior femoral tunnel is fundamental for avoiding rotation and also posterior displacement of the tibia in relation to the femur. Finally, the varus stress was well controlled with this technique, in our opinion. There were only two cases in which control was not achieved, precisely in revision cases.
Conclusions: With the technique used for anatomical reconstruction of the posterolateral corner and PCL reconstruction:
1) All the patients improved in regarding physical examination;
2) Posterior tibial displacement had inferior results compared to the rotation and varus instability

P16-1019
Reconstruction of the medial collateral ligament of the knee
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Lesion of the medial collateral ligament can be treatment non-operatively, and good to excellent results can be expected with return to full preinjury activity level. In combined lesions the medial collateral ligament rupture can be treated non-operatively combined with reconstruction of the central pivot.
In cases of multiple ligament injury or Grade III non-operative treatment of the medial collateral ligament lesion may lead to varus instability or rotatory instability.
Material: In the period from January 2004 to December 2006 80 patients with grade 3 medial instability were treated with primary or secondary medial collateral ligament reconstruction. Median age was 35 years (range 14 to 64 ys), 50 were males. 8 were revision cases.
Method: All had reconstruction of the medial collateral complex using hamstring grafts. Through a oblique approach the pes anserinus was exposed and the Semitendinosus tendon harvested utilising an open tendon stripper. The distal incersion was kept intact.
The posteromedial corner of the tibia was identified through the same approach. Through a small incision at the medial femoral epichondyle the proximal incersion point of the MCL was identified distal to the fibres of the m.quadricipitis obliquus and posterior to the medial patellofemoral ligament. Drill-holes through proximal tibia and femur were done and a reconstruction of the medial collateral ligament superficial layer and the postero oblique fibres were performed.
All were available for follow-up more than 12 mths post-op and were examined by an indipendent observer using the IKDC form and subjective KOOS score

	Primary reconstruction	Revision cases
Isolated MCL reconstruction	16	1
Combined w/ ACL recsonstruction	39	5
Combined w/ ACL n PCL reconstruction	7	
Conbined w/ ACL n Posterolateralcorner rec.	3	
Combined w/ ACL, PCL n posterolateral corner rec.	2	
Combined w/ PCL reconstruction	1	2
Combined w/ PCL n posterolateral corner rec.	2	
Combined w/ posterolateral corner reconstruction	2	
SUM	72	8

P16-1067
The topography of femoral attachment of the posterior cruciate ligament
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Background: The objective of this study was to determine quantitatively and qualitatively the topography and bony landmarks of the femoral footprints of the anterolateral and posteromedial bundles of posterior cruciate ligament.
Materials and Methods: Twenty unpaired knees from twenty human cadavers were evaluated in this study. The surface features of the femoral footprints of the anterolateral and posteromedial bundles of posterior cruciate ligament were studied by macroscopic observation and by three-dimensional laser photography.
Results: Our findings demonstrated that there was a bony prominence that is located proximally to the femoral footprint of posterior cruciate ligament in the majority of the specimens evaluated. This bony landmark was denominated "medial intercondylar ridge" by the senior author and the ridge determined the proximal border of the posterior cruciate ligament footprint. The medial intercondylar ridge was visually observed in 18 out of the 20 human knees and was confirmed by 3-dimensional assessment. In 8 out of 20 knees, we observed a small bony prominence between anterolateral and posteromedial bundles of posterior cruciate ligament. A clear change of the slope in the posterior cruciate ligament femoral footprint was observed between anterolateral and posteromedial bundles. The area of the posterior cruciate ligament footprint was 209.± 33.82 mm^2, the AL bundle was 118 ± 23.9 mm^2 and the PM bundle was 90 ±16.13 mm^2.
Conclusion: The posterior cruciate ligament femoral footprint has a unique surface anatomy with a frequent presence of the medial intercondylar ridge and a less frequent presence of a medial bifurcate ridge. Clinical Relevance: These anatomical findings may assist surgeons in performing posterior cruciate ligament reconstruction in a more anatomical fashion.

Meniscus

P17-5
The nonoperative treatment of degenerative meniscal tears
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Objectives: To evaluate the effectiveness of a physical therapy protocol on the treatment of degenerative meniscal tears in the presence of minimal radiographic evidence of arthritis and no mechanical symptoms.
Methods: Twenty-eight patients with minimal osteoarthritis and presentation, examination, and radiographic findings consistent with a degenerative meniscal tear, were enrolled in a six-week course of physical therapy. After six weeks, all patients were offered surgical intervention. Those who elected surgical intervention underwent arthroscopy at an average of 1.7 months after completion of physical therapy. Upon initial presentation, and at the six-week and two-year follow-up, all patients were provided an International Knee Documentation Committee (IKDC) scoring questionnaire.
Results: At six weeks, 16 patients (57.1%) elected to continue non-operative treatment while the remaining 12 patients underwent arthroscopy and partial

meniscectomy. The IKDC scores after six weeks of physical therapy were significantly higher for the patients who declined surgery than for those who elected to have surgery ($p<0.05$). At a mean follow-up of 31.7 months, IKDC scores were available for 22 patients (78.6%). This included 11 patients treated conservatively and 11 arthroscopy patients. There was no significant difference in IKDC scores between the two groups at 31.7 months.
Conclusions: This study provides support for the initiation of non-operative treatment of select degenerative meniscal tears. Over half of patients in this study were able to avoid surgery with only six weeks of therapy. Moreover, the majority of these patients remained improved over the 31 month follow-up time period.

P17-106
Evaluation of a meniscal repair scaffold in an ovine model
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Objectives: To avoid joint degeneration associated with meniscectomy[1], scaffolds intended to elicit rapid infiltration of cells and tissue growth are under development[2]. The objective of this study was to assess the long-term performance of a porous polyurethane scaffold[3] in a partial meniscectomy ovine model. Here we describe the histological appearance of the scaffold-meniscus region at 2 weeks and 3 months post-implantation.

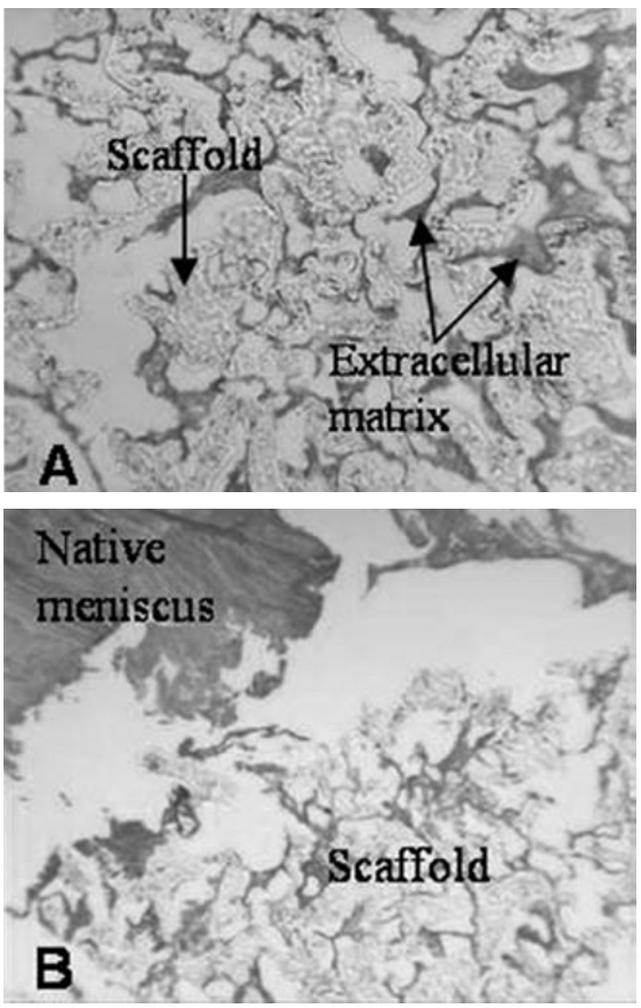

Fig 1A: Scaffold, 1B: Scaffold-meniscus area, 2wks

Methods: 20 skeletally mature ewes were subjected to unilateral partial surgical excision of the lateral meniscus. An arthrotomy was performed and a wedge of meniscus was removed. The wedge extended from the mid posterior horn to the mid anterior horn and to within 1mm of the outer rim. In 10 animals, the defect was left unfilled. In 10 animals a biodegradable aliphatic polyurethane scaffold with pore sizes of <400 microns and porosity of 80% was implanted (Orteq Ltd., UK). Ethibond sutures were placed through the implant in horizontal mattress fashion and used to secure it to the remaining meniscus and capsule. At 3 months, the animals were euthanized. The percent of the defect that was filled with new tissue was visually estimated for both groups. The meniscus was removed from the joint, fixed, embedded in paraffin, sectioned, and stained with haemotoxylin and eosin.
Results: All animals resumed normal gait within one week of surgery. One animal died at 2 weeks from causes unrelated to the presence of the implant. Histological analysis revealed cellular infiltration and matrix deposition within the scaffold (Fig 1A) but little integration with the native tissue (Fig 1B).
At 3 months, %fill was 50-95% in the scaffold implanted group and 30-50% in the empty defect group. Cells had populated the scaffold and begun depositing matrix that was integrated with the native tissue (Fig 2).

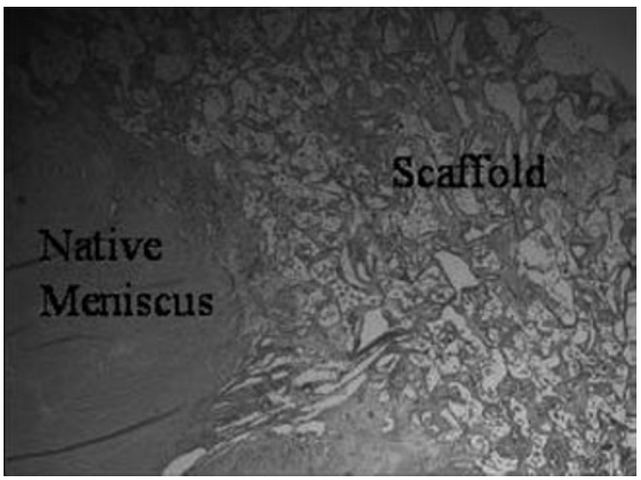

Fig 2: Meniscus-scaffold junction, 3 months post-op

Discussion: We have described the histological appearance of a porous urethane scaffold after implantation into a meniscal defect ovine model. Cells had infiltrated the scaffold as early as 2 weeks post-implantation and by 3 months the scaffold was populated with cells surrounded by extracellular matrix that was somewhat integrated with the native meniscus. Our results suggest that the scaffold provides an acceptable structure for cellular infiltration. Its chondroprotective characteristics are currently being examined in a longer-term model.
References: 1.Chatain,2001;9:15-18. 2.Stone,1997;79:1770-7. 3.Heijkants,2004;15:423-7.
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P17-211
The reproducibility of radiographic measurement of lateral and medial meniscus horn position
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Objectives: The objective of this investigation was to evaluate the possibility of locating and reproducing the tibial insertion areas of the anterior and posterior horns of the lateral and the medial meniscus on preoperative radiographs.
Methods: In 20 tibia heads, we prepared anterior and posterior horn insertions of both the lateral and the medial meniscus and marked their circumference with radiopaque steel balls of 1.6 mm in diameter. Standardized anteroposterior and lateral radiographs were made. On these radiographs, different landmarks were defined, their distances measured (tibial width and depth, distance from lateral tibia border to meniscus insertion midpoint, distance from anterior tibia border to meniscus insertion midpoint, distance from anterior and lateral tibia border to the lateral and the medial intercondylar spine) and ratios determined.
Results: For the lateral meniscus, anterior horn midpoint is located at 45.1 ± 1.3 % of tibial width and 41.9 ± 3.2 % of tibial depth, posterior horn midpoint

at 49.8 % ± 1.9 % of tibial width and 72.1 ± 2.3 % of tibial depth. For the medial meniscus, anterior horn midpoint is located at 57.3 ± 2.7 % of tibial width and 12.0 ± 1.0 % of tibial depth, posterior horn midpoint at 56.5 % ± 1.6 % of tibial width and 81.6 ± 3.4 % of tibial depth. The statistical analysis of these measures showed a precise and constant positioning of the lateral and medial meniscus insertions on the tibia plateau. We found constant topographic relations between the lateral meniscus insertions and the lateral intercondylar spine as well as between the medial meniscus insertions and the medial intercondylar spine.
Conclusions: The anterior and posterior horn insertions of the lateral and the medial meniscus can be determined on radiographs with a high precision and reproducibility. The results of this study will be useful in the development of a technique for precise radiographic meniscal horn determination in lateral and medial meniscus transplantation.

P17-244
Comparison of arthroscopic meniscal repair results using three different meniscal repair devices in an anterior cruciate ligament reconstruction population.
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Aim: The goal of this study was the evaluation of arthroscopic meniscal repair results using three different repair devices (RapidLoc of Depuy Mitec, T- Fix of Acufex Microsurgical, and FasT-Fix of Smith& Nephew).
Methods: From 2001 to 2006, 265 patients with 280 meniscal tears underwent to meniscal repair using three different all-inside meniscal repair implants (88 patients using RapidLoc, 85 patients using T- Fix, and 92 patients using FasT-Fix). There were 181 medial and 99 lateral tears; 174 tears were located in Cooper radial zone 1 and 106 tears in zone 2. All patients had concurrent anterior cruciate ligament reconstruction. All cases were performed by a single surgeon. Follow-up assessment included clinical examination, arthrometry (KT-1000), the International Knee Documentation Committee (IKDC) criteria, and Lysholm functional questionnaires. Success clinical criteria included absence of joint-line tenderness, swelling, blocking, and negative McMurray and Appley test.
Results: Mean follow-up was 26 months (range, 9-36 months). Tear length averaged 2.7 cm (range, 1.2-4.3 cm). An average of 2.4 suture devices was used (1.9 of RapidLoc, 3.1 of T- Fix, and 2.2 of FasT-Fix). Twenty eight menisci repairs were consider as failures according to our criteria (success rate 92.4 % for FasT-Fix, 87% for T- Fix, and 86,5% for RapidLoc). There were 16 re-look arthroscopies for device removal and partial meniscectomy, with 8 patients having failure of meniscal repair in zone 2. Both the subjective Lysholm and IKDC scores were significantly improved, with higher improvement in FasT-Fix patients' group. Chronicity, location or length of the tear, and patients' age did not affect the clinical outcome.
Conclusions: The compared meniscal repair systems showed comparable clinical results. Meniscal repair systems appeared to be a safe and effective technique providing a high rate meniscus healing in both complex tears and tears located in Cooper radial zone 2.

P17-253
Influence of the integrity or not of the anterior cruciate ligament in patients submitted to medial meniscectomy
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Introduction: Reconstruction of the anterior cruciate ligament (ACL) associated with traumatic injury to the medial meniscus (MM) is a matter of speculation. The aim was to comparatively evaluate the progress of patients with traumatic injury to the medial meniscus with non-reconstructed ACL, without injury and with reconstructed ACL.
Methods: All patients with medial meniscus injury submitted to medial meniscectomy between 1995 and 2002 with a minimal follow-up of five years, were divided into group 1 (meniscectomy + non-reconstructed ACL), group 2 (meniscectomy + whole ACL) and group 3 (meniscectomy + reconstructed ACL). Clinical evaluation by pre- and postoperative Lysholm in each group (Wilcoxon) and by IKDC after surgery between the groups (Kruskal-Wallis).
Results: Group 1 (30 individuals), age 39.5±8.96 years, follow-up 9.3±1.8 years, preoperative Lysholm 63.50±13.80 and postoperative 83.50±11.80 (p=0.000). Group 2 (26 individuals), age 46.19±8.42 years, follow-up 8.35±2.9 years, preoperative Lysholm 60.80±15.00 and postoperative 84.00±15.75 (p=0.000). Group 3 (28 individuals), age 34.07±7.21 years, follow-up 8.04±2.59 years preoperative Lysholm 65.32±8.32 and postoperative 84.43±8.30 (p=0.000). Without statistical difference of preoperative Lysholm (p=0.54) and postoperative IKDC (p=0.32) between the groups.
Conclusion: There was improvement in postoperative Lysholm, indicating efficacy of the meniscectomy. However the postoperative values between the different groups were not statistically significant, indicating that there was no difference regarding injured, repaired or whole ACL.

P17-265
Radial displacement of lateral meniscus combined with anterior cruciate ligament injury
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Introduction: It has been reported that radial displacement (RD) of a meniscus suggests meniscus dysfunction. Some authors have reported that RD of a medial meniscus is related to progression of osteoarthrosis. There have been a number of reports on RD of the medial meniscus, but reports on the lateral meniscus (LM) are rare. LM injury is very frequently combined with anterior cruciate ligament (ACL) injury. RD of the LM is frequently visualized on coronal view of MRI. The purpose of this study was to investigate RD of the LM in patients with ACL injury.
Methods: This study included 57 patients (59 knees) who had undergone isolated single-bundle ACL reconstruction with hamstrings tendon or bone-patellar tendon-bone graft. The patients comprised 24 males and 33 females, with a mean age of 30 years (range, 16-55 years) at the time of surgery. Mean follow-up was 17 months (range, 12-39 months). All knees were assessed by MRI both preoperatively and at evaluation. The mean period from injury to preoperative MRI was 21 months (range, 1 day to 26 years), the mean period from surgery to MRI evaluation was 9.3 months (range, 6~28 months). RD was evaluated by a coronal view on MRI. The length which was extruded from the lateral tibial plateau was measured and corrected for scale.
Results: An LM tear was found by arthroscopy in 32 knees at surgery. The size of the LM tear was less than 1 cm in 18 knees, and more than 1cm in 14 knees. With regard to the type of tear, a longitudinal tear was seen in 23 knees, a flap tear in 2 knees, a horizontal+flap tear in 3 knees, a transverse+longitudinal tear in 3 knees and a flap + longitudinal tear in 1 knee. The treatment for the torn LM was partial meniscectomy in 8 knees, repair in 1 knee, abrasion in 1 knee, both meniscectomy and repair in 1 knee, and no treatment in 21 knees. RD of the LM was evident in 40 knees preoperatively, and in 42 knees at evaluation. LM tear was combined in 23 of these knees. Mean preoperative RD was 1.8mm, and that at evaluation was 2.4mm. There was no correlation between preoperative RD and the time from injury to preoperative MRI, or between RD at evaluation and the time from surgery to MRI at evaluation. With regard to the presence or absence of a LM tear, mean preoperative RD was 2.1mm in the LM tear(+) group and 1.5mm in the LM tear(-) group ($p=0.12$), and corresponding figures at evaluation were 2.8mm and 1.8mm ($p<0.05$), respectively. In terms of the size of LM tear, mean preoperative RD was 1.6mm in the group with a < 1cm tear, and 2.8mm in the group with ≥ 1cm tear ($p<0.05$), and corresponding figures at evaluation were 2.1mm and 3.2mm($p<0.05$), respectively. In terms of the type of LM tear, mean preoperative RD was 1.9mm in a longitudinal tear group, 2.4mm in the group with other type of tear, including flap tear and combined tear ($p<0.05$), and the corresponding figures at evaluation were 2.2mm and 4.1mm ($p<0.05$), respectively.
Conclusion: These results show that RD is present more frequently in cases of combined LM tear, especially flap tear or combined tear, and also, in cases of longer tears. For all parameters assessed in this study, RD was larger at evaluation than before surgery. It is speculated that failure of the hoop structure and surrounding tissue supporting the LM might lead to RD.

P17-329
Lateral meniscus repair against popliteal tendon. An experimental study with a knee simulator
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Purpose: Evaluate the effect of fixing the popliteal tendon when suturing a lateral meniscus.
Type of study: Experimental study using human cadaveric specimen.
Methods: Six fresh human knee specimens were used. A lateral condyle os-

teotomy was used to access to the lateral compartment. After cheking meniscal and ligaments integrity a complete bucket handle tear of the lateral meniscus was performed. Meniscal suture was performed using 2/0 braided non absorbable suture. The specimens were divided in three groups. All of them had 2 vertical mattres stitches posterior to popliteal hiatus and 3 anterior to it. Group A had no other aditional suture. Group B had an aditional stitch including the popliteal tendon and, in Group C this stitch included the popliteal tendon as well as the capsula. Afterwards, the femoral condyle was anatomically reatached using 3 cancellous screws. The knee were mounted in a kinematic knee simulator that can reproduce the forces and motions of an anatomical joint. After 1000 gait cycles the meniscal repair was assessed.
Results: No alteration of gait motion could be recorded in any group. No failures of the meniscal construct were observed in any of the three groups.
Conclusion: The results suggest that at least in the experimental field, the popliteal tendon can be fixed as a part of a lateral meniscus repair, without any alteration of knee motion nor impact on meniscal suture.

P17-334

Deformation and movement of meniscus: 3D MRI analysis during knee flexion -normal vs. horizontally torn meniscus

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Objective: To clarify the movement and deformation of the normal meniscus and torn meniscus, we examined healthy knees and horizontally torn medial menisci using MR in different knee flexion angle.
Methods: The subjects comprised five healthy volunteers (two male, three female; mean age: 26.2 years) and two patients with horizontal tear in the medial meniscus (30-y-o female and 39-y-o male).A horizontal-type open magnetic resonance was used to acquire images of the knee joint from extension to 150 degree flexion at 25 degree increments for five healthy volunteers. A three-dimensional fast spin echo imaging sequence was selected for the imaging conditions. For two patients with medical meniscus tear, true-FISP imaging sequences were used to acquire images o from extension to 60 flexion at 20 increments. Six points A, B, C, D, E, and F in the anterior and the posterior segment in medial and lateral meniscus were chosen to evaluate movement against tibia and deformation of the meniscus body. The medial and lateral menisci were evaluated separately (Fig.1). In the cases of the horizontal tear of medial meniscus, additional points G, H, I, and J were also chosen to evaluate movement and deformation of the meniscus and torn fragment (Fig.1). In order to standardize differences in body size among the subjects, the most anterior point of the tibial cartilage was set as zero and the most posterior point was set as 100.
Results: The medial and lateral menisci located most anteriorly at extension and moved significantry posteriorly from 25 degree to 100 degree by 12.6 to 16.7% of tibial cartilage length. The height of the anterior segment of medial meniscus was highest at the extension and statistically significantly decreased at 125 and 150 degree knee flexion, whereas the height of the posterior segment of medial meniscus was lowest at the extension and increased significantly with knee deep flexion of 125 and 150. There was no significant difference in the height of either anterior or posterior segment of the lateral meniscus during knee flexion. In cases with medial meniscus tear,the height of the femoral apex of the posterior segment (F) was 18.4 and 23.4 and increased significantly in both cases than normal, showing abnormal deformation of the posterior segment in the torn meniscus. The tip of torn fragment of the posterior segment (H) moved more poseteriorly than the point G, demonstrating that abnormal movement of the torn fragment increased the gap of the horizontal tear.
Conclusion: Medial meniscus showed significant deformation in the anterior and posterior segment and torn meniscus showed abnormal movement and deformation in the posterior segment. The lateral meniscus also indicated the deformation in the posterior segment in deep knee flexion.

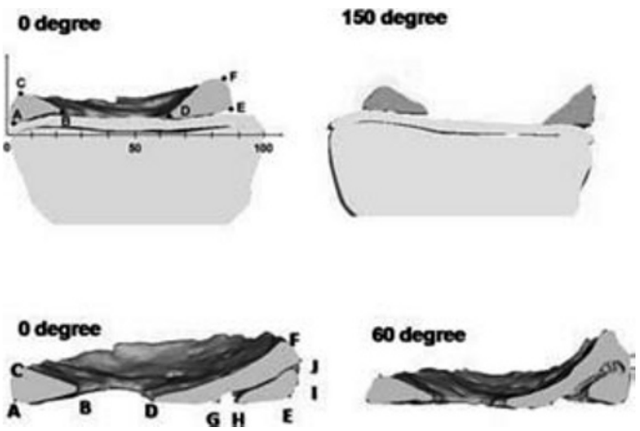

Fig. 1

P17-340

Lateral based knee instability and chondrolysis after lateral partial meniscectomy in athlete

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Rapid chondrolysis after partial arthroscopic lateral meniscectomy has been seldom reported in literature. Considering the relatively high number of partial lateral meniscectomy performed, we cannot understand why this complication is so rare. The purpose of this paper is to report a series of athletes developing a chondrolysis associated with posterolateral corner laxity after a partial lateral meniscectomy and attempt to hypothesize the pathogenesis of this devastating complication. Five male professional soccer players of Italian championship with a mean age of 26,8 years underwent a partial lateral meniscectomy because a traumatic lateral meniscus tear. Patients showed a slight varus knee and there were clinical signs compatible with a meniscal tear. No other pathological sign were found. An MRI scan confirm these findings. After surgery patients were unable to resume sport activities because of swelling and knee pain during training sessions. At a mean time of 8 months (range 6-12 months) from surgery patients were re-examined and a new MRI scan was performed. Clinical examination revealed a slight swelling of the knee and signs of posterolateral corner laxity. MRI scan revealed intra-articular fluid and pathological findings of knee posterolateral corner associated with a thinning of the articular cartilage. Arthroscopy showed free cartilagineous debris floating into the knee and a high grade of cartilage damage on the lateral compartment. The evaluation of lateral compartment, ruled-out a new tear of the meniscal remnant and showed a positive drive-trough sign with knee in the figure 4 positioning. All patients had an open re-tensioning of the posterior meniscofemoral capsule, and in one case, an augmentation of the popliteal tendon using a free semitendinous graft was also done. This surgery give a complete resolution of symptoms and patients resumed sports activities without any restriction after a period between 4 and 5 months. Basing on this experience we hypothesize that partial lateral meniscectomy may have a role in causing a subtle rotatory instability that combined with high stress of sports activity can dramatically increase the susceptibility of joint to chondrolysis, Varus knee seems to be a possible predisposing factor. Open surgery addressing the insufficiency of lateral or posterolateral corner has been found to be effective in improving knee function and resolve patients symptoms at a short-term follow-up.

P17-352

Possible reflex pathway between medial meniscus and semimembranosus muscle; An experimental study in rabbits.

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Purpose: Meniscus is a well innervated tissue with four types of receptors. These receptors are mainly concentrated at the anterior and posterior horns. Although they are intended to be a part in reflex arc, this function has not been thoroughly evaluated. The purpose of this study was to demonstrate direct evidence of reflex arc between the medial meniscus and semimembranosus muscle.

Methods: Five adult domestic male rabbits were used in this study. Under general anesthesia, knee arthrotomy and thigh dissection were made in order to expose medial meniscus and semimembranosus muscle. Menisci were stimulated by Teflon coated bipolar needle electrodes. Needles were placed in the posterior horn of the medial menisci. Two Teflon coated monopolar needle electrodes were placed in semimembranosus muscle A four channel electromyograph was used for recording.

Results: In response to stimulation, 2 different potentials were recorded from the target muscle. The first response had a very short distal latency and its amplitude was changing in accordance with the strength of the stimulus suggesting that this response was being elicited by direct muscle stimulation. However, a second delayed response with less amplitude also appeared in some traces. The latency and the amplitude of this second response were fairly stable stating that this delayed response was being generated by a reflex pathway and seen in all subjects.

Conclusions: Mechanical stimulation of the posterior horn receptors during flexion or rotation of the knee joint may result in an activity similar to electrical stimulation, which causes semimembranosus muscle contraction that pulls the medial menisci backward. This activity may prevent menisci from squeezing during movement of the knee joint.

Key words: Medial meniscus, semimembranosus, muscle, reflex arc.

P17-398

Evaluation of patient satisfaction following arthroscopic meniscus surgery with local anesthesia

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Objectives: The efficacy of exclusive intra operative local anaesthesia in arthroscopic meniscus surgery has long been questioned. The aim of this study was to assess patient´s satisfaction following intra-articularly injected lidocaine and bupivacaine for pain relief during arthroscopic knee surgery.

Methods: The authors conducted a satisfaction inquiry in 50 consecutive patients submitted to arthroscopic meniscus surgery with local anaesthesia.

The procedure was made without tourniquet. 2 portals were used. The skin was infiltrated with 10cc of 2% lidocaine with adrenaline. An intra-articular injection of 10cc of 2% lidocaine with adrenaline and 25mg of bupivacaine was administered 10 minutes prior to the surgery. Postoperative pain treatment was made with diclofenac 50 mg IV and/or clonixine lysinate 100 mg IV on demand (maximum 3id). Patients were discharged the day after surgery.

The inquiry consisted on a self-administered questionnaire, sent by mail 3 months after surgery. Patients were questioned regarding the pain during and after surgery and whether they would recommend this anaesthetic procedure to another patient or repeat it on a second surgery. A total of 7 closed questions were asked, with free comments.

Results: 48 patients answered the questionnaire. No patients required conversion to general anaesthesia. 9 patients (18,8%) had local anaesthesia at their own request. The remaining had the procedure according to the surgeon´s proposal. 38 patients (79,2%) had no or mild pain during the anaesthetic procedure, and 36 (75,0%) had no or mild pain during the operative procedure. 4 patients (8,3%) referred intense pain at some point during surgery. 9 patients (18,8%) reported mild pain due to the positioning and non-related to the operated knee. Significant postoperative pain was reported by 29 patients (60,4%) and only 9 patients had no pain in the postoperative period. 37 patients (79,8%) would recommend this procedure to other patients, and the same number would accept this procedure if a second arthroscopy was to be performed.

Discussion: The use of local anaesthesia is effective for the intra operative control of pain in patients subject to meniscal repair arthroscopic surgery. However, its exclusive use is insufficient in postoperative pain control. The study revealed an overall acceptance of this procedure.

P17-410

Arthroscopic view: can we see more?

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Introduction: Even if the arthroscope, the light source and the camera are properly functioning during an arthroscopic operation, the view is frequently disturbed by air bubbles, debris or blood. Can irrigation improve the view? To address this, the goal was to define arthroscopic image quality objectively and quantitatively, and show an application by comparison of two pump systems.

Methods: Arthroscopic image quality was defined based on the presence or absence of disturbances. Disturbances were categorized as Bleeding, Turbidity (synovial fluid), Air Bubbles, Loose Fibrous Tissue, and Attached Fibrous Tissue, described as covering a certain percentage of the image area and duration. The unique interpretability of the definitions and the percentage level were evaluated. Ten minutes of digital film were selected arbitrarily from ten arthroscopic knee procedures. They were analyzed for the presence or absence of a disturbance by five observers using a time-action analysis and the specified definitions. Tester agreement was assessed by kappa statistic. Additionally, each disturbance at different stages of impeding the image area was randomly displayed as a movie clip of two seconds to 26 orthopedic surgeons and 13 residents. The subjects had to indicate if the view was acceptable or not with the level of acceptance placed at 75% or more agreement. They were asked to indicate what the most troublesome disturbance in their opinion, type of pump they use and the number of portals.

Lastly, the performance of an automated pump was assessed in comparison to the gravity pump with the proposed arthroscopic image quality. Ten arthroscopic operations performed with a gravity pump and ten with an automated pump (FMS Duo system) were matched on duration of the surgery and shaver usage, type of operation, and surgical experience. The percentage of disturbances was determined for each operation and analyzed with a Mann Whitney U test.

Results: The adjusted kappa statistic (kappa is corrected for high prevalence) shows good tester agreement for all disturbances (range 0.71-0.96), except for Turbidity (0.44). This is due to the difficulty to assess the exact start and end time of Turbidity.

For Bleeding and Air Bubbles, a clear transition from acceptable to unacceptable view was found for disturbances covering approximately 25% of the image area. For Turbidity and Loose Fibrous Tissue this transition was more gradual. Surgeons who used an automated pump tolerated a lower level of Turbidity ($p<0.05$). Bleeding was definitely the less tolerated disturbance. Around 64% used a gravity pump and 59% used two portals.

Finally, Bleeding, Air Bubbles and Loose Fibrous Tissue each occurred less than 3% of the operation time for both pumps, and showed no statistically significant differences. A significant difference was found in favor of the automated pump for the presence of Turbidity ($p=0.015$), which occurred 18% vs. 8% on average.

Conclusion: Five disturbances were uniquely described resulting in the definition of arthroscopic image quality as good or acceptable if no more than a quarter of the image area is disturbed. Because of tourniquet application, bleeding plays a minor roll in routine knee arthroscopy. Turbidity is reduced by an automated pump, but it was not indicated as a limiting factor. Additionally, more expensive equipment is required. Concluding, arthroscopic view can be improved, in which the proposed image quality can be a valuable tool.

P17-473

Eleven years of experience in treating undamaged or apparently undamaged discoid menisci

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Objectives: The authors report their experience in treating discoid menisci that are responsible for painful symptoms in the absence of a clear lesion.

Methods: From January 1995 to December 2006 the Authors found 89 discoid menisci, 42 of which were undamaged or apparently undamaged. In all cases a sauceritation was performed.

Results: The patients were evaluated according to the Ikeuchi Knee Rating System. After three years, 79% of results were excellent and 21% good. At an average follow-up of 7.9 years (min 7 - max 11) the excellent results fell

to 70%, the good results were the same 21% and 9% were poor. This was probably caused by arthritic post-meniscectomy phenomena.
Conclusions: In the Authors' opinion, all discoid menisci, whether damaged or undamaged must be sauceritated in order to restore the physiological biomechanics of the knee and to avoid interstitial meniscal lesions that can became complete lesions

P17-476
Posterolateral corner of the knee, popliteal hiatus: Anatomy and clinical consideration
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Aim: The popliteal hiatus is the opening defined by the fascicles of the lateral meniscus, which permits the popliteal tendon to pursue its course from the tibia to its femoral attachment. Although there is no attachment of the lateral meniscus to the lateral collateral ligament, there is a loose peripheral attachment to the joint capsule. Because of these capsular attachments, the lateral meniscus is quite mobile. Subluxation or dislocation of an intact lateral meniscus is a controversial, and knee pain or locking is rarely reported. Meniscus subluxation could be influenced by enlarged popliteal hiatus. Nevertheless, there is nearly no data about normal size of the popliteal hiatus. The aim of this study was to establish normal variance of the popliteal hiatus length and to obtain prevalence of hiatus injury during arthroscopic knee operations.
Materials and Methods: Clinical part: records on popliteal hiatus injury from 1000 arthroscopic knee operations, performed at Vilnius University hospital were analyzed. Experimental part: in total 136 knees (68 rights and 68 left) of 40 male and 28 female human cadavers, with no evidence of previous surgery to the knees, were investigated at Vilnius morgue of Forensic medicine and Department of Anatomy, Histology and Anthropology of Vilnius University during the period 1999-2001. The age of males ranged from 19 till 92 y. (average - 52, 6 y.), whereas age of females - from 30 till 86 y. (average - 57, 2 y.).
Results: Experimental part: length of the body, length of popliteal hiatus, other morphological indices of the knee, tibial plateau and menisci were measured in cadaver knees. In males median length of hiatus was: M=1,53 cm (SD=0,17; Min-Max 1,1-2,0; variance = 0,03); in females: M=1,37cm (SD=0,16; Min-Max 1,0-1,6; variance = 0,02). There was no statistically significant difference between the right and the left knee. The highest correlation coefficients (r) were obtained between the hiatus length and tibial width (0, 51), lateral meniscus area (0, 36), length of the body (0, 32). Clinical part: 16 patients (1.6%) had clinically enlarged popliteal hiatus and pathological meniscus dislocations. We found 10 cases of hiatus tear in stabile knee and 6 cases in unstable knee.
Conclusions: The popliteal hiatus has relatively constant length, but if it exceeds 2 cm, the pathological enlargement should be considered.

P17-556
Arthroscopic repair of radial lateral menicus tear by double horizontal sutures with inside-outside technique
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Objectives: The purpose of this prospective study is to report arthroscopic repair of radial lateral menicus tears at the anterior horn and corpus junction by double horizontal sutures with inside-outside technique.
Methods: Five patients with an average age of 28, 6 years were treated. The repair was performed with double horizontal sutures by inside-out technique using the zone-specific curved cannulas without an enhancement procedure. A mean of 2.4 superior and 2.8 inferior stitches were performed. Reduction was obtained in all cases. Evaluation of patients was performed by Lysholm functional knee scores. All patients were followed clinically and radiological by means of MRI to assess meniscus integrity at the repair site with an average follow-up of 31,2 months.
Results: All patients were able to return to their initial level of activities. MRI showed a fully healed meniscus at the repair sites in all cases with no further disruption of the debrided area that was previously addressed. Mean of Lyshom scores improved from 61,8 preoperatively to 94,2 postoperatively. The difference between preoperative and postoperative values was found to be as statistically significant. No cases of postoperative extra-articular or intra-articular complications were encountered.
Conclusion: The technique that we described is easily reproducible and allows repair of the radial meniscus tear of the lateral meniscus without using a special enhancement procedure. Repairing of radial lateral menicus tears that extend into capsuler zone instead of resection improves activity level and will delay post-meniscectomy degenerative changes.

P17-568
Arthroscopic meniscectomy outcome on stable knee: long term results. About 30 cases with 21 years of follow-up.
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Introduction: The purpose of this retrospective study was to assess the results of 30 arthroscopic meniscectomy on stable knees with 21 years of follow-up.
Materials and Methods: 30 arthroscopic meniscectomy (29 patients) with 24 medial and 6 lateral meniscectomy were included in this study. The mean age at time of surgery was 31 years and there were 94 % traumatic lesions. The minimum follow-up period was 20 years. 87 % of all the lesions were vertical but all for the medial meniscus. They always interested the posterior portion of the medial meniscus and the mid portion and the posterior portion of the lateral meniscus. The meniscus rim was conserved during the surgery and meniscectomy were considered as subtotal in all the cases. They were reviewed clinically and radiographically according the IKDC form with an instrumental KT1000 measurement by an independent examinator. X ray with schuss view was obtained for all the cases. The level of significance was set at $p = 0.05$.
Results: The mean IKDC subjective score was 80 + 11 points with most often satisfied patients. Return to sports occurred in 70 % cases, 21 years later. There was one iterative surgery after a failed treatment of a lateral flap meniscal tear. Objectively, there were 63% rated A, 30 % rated B and respectively 3.5% rated C and D according to the IKDC. There was no iterative surgery for further symptomatic osteoarthritis. The prevalence of osteoarthritis is 25% after medial meniscectomy compared to 33 % after lateral meniscectomy.
Conclusion: Satisfactory clinical subjective and objective results were obtained after arthroscopic meniscectomy with long-term follow-up. Joint space narrowing prevalence was found in 25 % for the medial meniscus. Actually, arthroscopic meniscectomy for the treatment of vertical tear of the medial meniscus on stable knee is a reliable treatment in patients less than 35 years old. However the degenerative changes after long time follow-up should lead us to more conservative alternative when it is reasonable.

P17-572
Tibiofemoral contact mechanics with a non-functional meniscus and femoral resurfacing prosthesis
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Background: This in vitro study aims to determine the peak contact pressure in the tibiofemoral joint with a contoured articular partial femoral resurfacing device (HemiCAP®) and a complete radial tear of the medial meniscus. Increased contact stress with a non-functional meniscus is of concern for potential deleterious effects on tibiofemoral contact mechanics.
Methods: Peak contact pressures were determined in seven fresh frozen cadaveric specimens using a Tekscan sensor placed in the medial compartment above the menisci. Specimens were selected after inspection of the medial compartment according to the following criteria: Intact femorotibial cartilage, intact meniscus, and intact collateral and cruciate ligaments. A knee simulator was used to test each knee in static stance positions (5°/15°/30°/45°) and through a dynamic knee-bends cycle (10 times) with single body weight ground reaction force (GRF). The ground reaction force was adjusted to the living body weight of the cadaver donor. All specimens were tested in three different conditions: (1) untreated; (2) flush device implantation; (3) complete radial tear at the posterior horn of the medial meniscus. A paired sampled t-test to compare means (significance, $p \leq 0.05$) was used for statistical analysis.
Results: The average age of the seven male specimen was 69 years (range: 61-78) with an average weight of 72kg (range: 61-85kg). Continuous data was obtained at every trial. On average, no statistically significant differences were found in any testing condition comparing the normal knee with

flush device implantation as well as at 5° stance position after creating the complete radial meniscus tear. The meniscus tear resulted in a significant average increase of peak contact pressures by 63%, 57%, and 57% (all $p \leq 0.05$) at 15°, 30° and 45° static stance positions compared to flush device implantation. An average increase of 78% ($p \leq 0.05$) was observed through the dynamic knee-bends cycle.
Conclusion: Resurfacing with the prosthetic device appears not to increase peak contact pressures. However, the data suggests that a non-functional meniscus appears to be biomechanically disadvantageous in an in-vitro application. Possible effects of reduced meniscal tissue and biomechanical integrity of the meniscus must be considered in an in-vivo application.

P17-573
Left in place meniscal tear is an alternative treatment for meniscus preservation in patients with ACL rupture
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The objective of this retrospective study was to evaluate the natural course of meniscal tears left in place during arthroscopic reconstruction for ACL chronic deficiency.
Materials and Methods: 91 patients with an ACL reconstruction were included in this study. At the time of surgery, 20 patients had had previous meniscectomy (12 lateral, 8 medial). The average time between injury and surgery was 2 years. The capital menisci were intact in 83 medial menisci and 79 lateral menisci before reconstruction. After the surgery, 62 medial meniscal tear and 34 lateral meniscal tear were found to be stable under the femoral condyle using the probe and they were left in place. None of the tears were sutured during ACL reconstruction. The mean length tear for the medial meniscus was 10 mm (5 to 20) and 10 (5 to 20) for the lateral meniscus. All the patients had arthroscopic ACL reconstruction. They were reviewed clinically and radiographically according the IKDC form with an instrumental KT1000 measurement. Iterative meniscectomy was considered as a failure for the survivorship analysis. The mean follow up was 8 years.
Results: At final follow up, for the lateral meniscus, no further meniscectomy was performed.12 medial meniscectomies were performed after ACL reconstruction during the first 4 years (17% of 62 cases available) and 7 between 4 and 8 years of follow-up (33% of 52 cases available). From the 17 iterative meniscectomy, 10 were performed for extension of the initial tear compared to 7, which remained unchanged regarding the length tear. The survivorship analysis was 96%, 72% and 67% at respectively 2, 8 and 10 years. Failures for left in place medial meniscal tear were statistically correlated to the length of the meniscal tear (> 10 mm, $p = 0.0031$). There was no correlation found between the residual laxity after the surgery and iterative medial meniscectomy.
In conclusion, left in place meniscal tear during arthroscopic reconstruction is an alternative technique for meniscus preservation. This attitude is especially efficient for the lateral meniscus regardless the length of the tear. For the medial meniscus, this attitude should be discussed only for lesion smaller than 10 mm and stable under the femoral condyle with the probe. In all the other cases, other technique of meniscus preservation is recommended.

P17-600
MRI and clinical features of radial tear in posterior horn of medial meniscus
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Objectives: The purpose of this study was to examine the MRI findings and clinical features of radial tear in posterior horn of medial meniscus.
Methods: Among 647 patients who received arthroscopic medial menisectomy (partial or total) between September, 2002 and August, 2007, 62 patients (9.6%) with radial tear in posterior horn of medial meniscus were included in this study. Preoperative MRI scans and medical records of these patients were reviewed.
Results: Fifty six patients (90%) were female and six were male (10%) and the mean age was 56 years old. On physical examination, 50 cases (81%) had posteromedial joint line tenderness, 48 cases (77%) had positive McMurray test, and 50 cases (81%) had positive Apley grind test. Arthroscopic finding showed longitudinal, partial to full thickness cartilage defect of medial femoral condyle in 52 cases (84%). These cartilage defects on femoral condyles were in contact with posterior horn of medial meniscus during knee motion. In the preoperative MRI scans read by radiologists, only 15 cases (24%) had posterior horn tear, while 42 cases (68%) had degenerative change without tear, and 5 cases (8%) had no specific abnormality in posterior horn of medial meniscus. In review of the MRI scans that showed degenerative change without tear, only the most medial one or two sagittal cuts had grade I or II signal change, while other sagittal cuts were normal.
Conclusions: The incidence of radial tear in posterior horn of medial meniscus) is relatively high. Although only one or two cuts show degenerative change in the MRI scan without definite findings of tear, radial tear of posterior horn of medial meniscus should be suspected if there is accompanied posteromedial joint line tenderness. In the presence of radial tear in posterior horn of medial meniscus, partial menisectomy should be performed for symptom relief and prevention of cartilage damage on femoral condyle.

P17-609
The comparison of Pollard method and MRI dimensions for meniscal sizing in the Korean
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Objectives: The purpose of this study was to investigate the accuracy of Pollard method for meniscal sizing of the meniscal allograft by comparison with MRI dimensions.
Methods: The width and length of the 50 medial and lateral menisci were measured and compared using Pollard method and MRI scans. Meniscal height was also measured in MRI scans to evaluate the range of individual variation.
Results: The measurements of the width of the medial meniscus and the length of the lateral meniscus using Pollard method and MRI were similar (P=0.459, P=0.108, respectively). However, the length of medial meniscus was shorter by 5.16 ± 2.06 mm (P=0.000), and the width of lateral meniscus was wider by 2.15 ± 3.75 mm (P=0.001) in measurements of Pollard method compared to measurements by MRI.

	Pollard method dimension	MRI dimension
Medial meniscal width	29.35 ± 1.85	28.99 ± 3.64
Medial meniscal length	29.35 ± 1.85	44.84 ± 3.52
Lateral meniscal width	32.80 ± 3.54	30.66 ± 3.63
Lateral meniscal length	34.78 ± 3.84	35.73 ± 3.27
Medial meniscal height		6.26 ± 0.86
Lateral meniscal height		6.47 ± 0.84

	Actual difference (mm)	Proportional difference (%)
Medial meniscal width	0.36 ± 2.64	2.19 ± 9.08
Medial meniscal length	- 5.16 ± 2.06	- 11.41 ± 4.15
Lateral meniscal width	2.15 ± 3.75	7.85 ± 13.09
Lateral meniscal length	- 0.94 ± 3.11	- 2.43 ± 8.86

To modify the length of medial meniscus, we thought that there was a mistake in Pollard method that medial meniscal length is 80% of tibia plateau length. So linear regression analysis was used to calculate expected medial meniscal dimensions from each specimen's tibia plateau length and MRI dimension. We got this equation [Medial meniscal length = 0.734 x tibia plateau sagittal length + 8.14]. Using this equation, we could get meniscal dimenions that actual difference was 0.02 ± 2.04 mm, and similar to MRI dimensions (P=0.959). Also we thought that there was a mistake that lateral meniscal width is measured from the peak of the lateral tibial eminence to the periphery of the lateral tibial metatphysis, because there were many cases which had convex-shaped lateral margin of proximal tibial metaphysis, and were oversized. So we changed the lateral margin from metaphysis to epiphysis with ignoring osteophyte. Using this modification, we could get lateral the width of lateral meniscus that actual difference was -0.10 ± 3.37 mm, and similar to MRI dimensions(P=0.0867). Medial and lateral meniscal heights were 6.26 ± 0.86 mm and 6.47 ± 0.86 mm, and there was no significant individual variation.
Conclusions: Pollard method is a simple method for meniscal sizing, but the length of medial meniscus and the width of lateral meniscus measured by Pollard method showed significant difference with MRI dimensions. Therefore, a modification of Pollard method is required in order to accurately measure the meniscal size which is necessary in meniscal transplantation.

P17-680

Accuracy of MRI to detect meniscal and ACL tears: Interobserver reliability among radiologists

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This paper is a MRI study of patients who were clinically suspected meniscal or ACL tears.There were 100 patients with the mean age was 35.7 (17-55). Before arthroscopies were performed,every patient had MRI reported by an radiologist whose experience was unknown in muscoloskeletal system and after arthroscopies two other experienced examiner who have been worked in our hospital rereported MRI sequences. Interobserver reliability of three those radiologist was examined by kappa test. The sensitivity, specificity, and accurracy of MRI reports before arthroscopic intervention were % 84, % 58, % 73 for medial meniscus,% 56, % 86, % 82 for lateral meniscus and % 93, % 92, % 93 for ACL injuries respectively. Of the two specialized radiologists,sensitivity, specificity and accuracy rates of the first one were % 91, % 79, % 85 for medial meniscus, % 75, % 82, % 81 for lateral meniscus and % 93, % 75, % 80 for ACL injuries respectively and the second one´s were % 94, % 46, % 64 for medial meniscus, % 56, % 86, % 82 for lateral meniscus and % 90, % 85, % 87 for ACL injuries respectively. Only the second radiologist´s reports were istatiscally lower for medial meniscus which was suprising because he was the most experienced one. Although success rates of MRI never reaches a hundred percent, MRI is routinely asked for because it is relatively cheaper (50 euros)in our country. The experience of radiologist was not reflected to the results of MRI in this study. The accuracy of MRI reports might be affected by the use of different MRI devices and centers which may differ quality of images and sequences.

P17-703

Arthroscopic treatment of recurrent lateral cysts: 2 years follow up

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To analyse the reasons of the recurrences of the symptomatic lateral meniscal cysts and to evaluate the results of clinical outcome.

Seven patients with symptomatic recurrent lateral meniscal cyst were operated. Previous surgery was performed, using lateral meniscus resection with arthroscopic cyst debridement in 4 cases; partial lateral meniscus resection with cyst aspiration in 2 cases and lateral meniscus resection and open cyst resection in 1 case. The mean age of patients was 28 (16- 37) years and mean time of the recurrences the cysts was 10 months (3 - 22 months). All cysts were operated arthroscopically, using outside- in cyst decompression technique. Lateral meniscus lesions were treated with standart arthroscopic technique in two cases and using additional transcystic portal - in 5 cases. The postoperative treatment course was same for the all patients. The mean follow up time was 2 years.

All patients did not have any major injury after first operation. All patients had repetitive lateral meniscus tear: horizontal with flap in 2 cases, horizontal in 5 cases. Degenerative changes inside menisci (after resection of the damaged part) were found in 3 cases. All meniscal damages were located in the medial and anteromedial part of menisci. One patient had associate medial meniscal tear and three chondromalacia patella grade II. The clinical results were classified as excellent in 5 and good in 2 cases.

In our study the reason of the recurrent lateral meniscal cyst was repetitive lateral meniscus damage in all cases, what probably was caused by inadequate previous lateral meniscal resection. Outside-in cyst decompression technique with preserved meniscus resection, using also transcystic portal have demonstrated in our study good clinical results.

P17-709

Collagen meniscus implant. Clinical, radiological and magnetic resonance imaging results at 5 years follow up

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Surgical removal of meniscal tissue can result in pain, loss of joint stability, dysfunction of mechanical forces and can lead to osteoarthritis and irreversible joint damage. Therefore, meniscus tissue should be preserved whenever possible. In case of massive loss of meniscus tissue there are two applicable methods for substitution: allograft transplantation or implant of a collagen meniscus scaffold. In 1992 Stone, Steadman and Rodkey have developed a bioreadsorbable collagen matrix (CMI) (Regen biologics, Inc.,Franklin Lakes NJ, USA) which acts as a scaffold to replace the original medial meniscus. This scaffold supports ingrowth of new tissue by means of migration of fibrochondrocytes and the production of extracellular matrix and should supports regeneration of meniscal like tissue. Between January 2001 to December 2003, 34 patients underwent arthroscopic placement of a collagen meniscus implant by a single surgeon to treat an irreparably damaged medial meniscus. In 6 cases the patients had one prior meniscectomies. The others presented an irreparable meniscali lesion at time of surgery. Follow-up evaluation included Lysholm II Score and Tegner Activity Score, X-rays and MR-arthrography of the knee at 2 and 5 years after surgery. 6 patients were lost at follow-up: five didn't accept intrarticular injection of contrast fluid and one patient had a new trauma of the knee that caused CMI failure. Lysholm scores improved significantly from 58 preoperatively to 94 at two years of follow-up. Average Tegner activity scores improved significantly from 2 preoperatively to 5 at 2 years. These results has been confirmed with clinical examination at 5 years with comparable scores. On standard X-rays there weren't further degenerative changes of medial compartment compared to preoerative studies. On Mr-arthrography at 2 and 5 years CMI-meniscus complex was always visible even if in 17 and 20 cases respectively smaller in size compared to a normal medial meniscus. MR signal had continued to mature between 2 years and 5 years after implant, progressively decreasing intensity but in any case comparable to the low signal of a normal meniscus. The chondral surfaces of the medial compartment had not degenerated further since the placement of the implant. In six cases arthroscopic second look evaluation has been performed, revealing in all cases the presence of the implant, although with a reduced size respect to the original one. This population of patients showed very good clinical results after 5 years from a CMI arthroscopic implant. In most of cases CMI had a slightly reduction in size but, beside the CMI-meniscus complex presented abnormalities in aspect if compared with a normal medial meniscus, has helped reduce the deterioration by protecting the chondral surfaces in all patients at five years of follow-up.

P17-710

FasT Fix® all inside meniscal repair

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Introduction: The aim of this study was to evaluate our results of all inside meniscal repair using the FasT Fix® device with and without simultaneous anterior cruciate ligament (ACL) reconstruction, in medial versus lateral menisci, of patients with different age and gender.

Methods: The results of all-inside meniscal repair using FasT Fix® devices were retrospectively evaluated in 29 patients with 29 repaired meniscal ruptures mean 11 (3-16) months after surgery. There were 15 men and 14 women with mean age 29 (14-48) years. Twenty-three ruptures affected the medial menisci and 6 the lateral menisci. Eight patients had at the time of the operation ACL rupture, 3 had simultaneously ACL reconstruction and 3 were ACL reconstructed at a later stage.

The primary end point for evaluating the results of meniscal repair was re-operation due to failed healing or re-ruptures. Knee function outcome at follow up was measured by Knee Injury and Osteoarthritis Outcome Score (KOOS). The results were statistically analysed using t-test and chi-square test.

Results: Five (17%) of the 29 repaired menisci were re-operated mean 11 (3-16) months after primary surgery. None of the lateral menisci were re-operated. None of the 3 patients with simultaneously ACL reconstruction were re-operated. Among the 5 patients who had ACL rupture at the primary operation, but not were reconstructed, 2 were re-operated.

KOOS: At follow up there was no difference between the re-operated and not re-operated patients in any KOOS category.

Conclusions: Eleven (3-16) months after primary operation with all inside meniscus repair with FasT Fix®, 5 of 29 patients were re-operated due to failure or re-rupture. At follow up there was no significant difference in knee function outcome according to KOOS between patients with successful meniscal repair and patients with meniscal repair failure.

P17-712

Certain factors may influence repeat meniscus surgery in patients after suture meniscus repair

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Purpose: Meniscus repairs have become more common in an attempt to preserve meniscus function and protect the chondral surfaces of the knee. Numerous studies report a high incidence of meniscus repair failures. Our purpose was to determine what factors might influence or lead to repeat surgery after suture meniscus repair.
Methods: A single surgeon performed 283 meniscus inside-out suture repairs (age range, 18 to 71 years), including 177 males and 106 females. Ninety-three patients had concurrent ACL reconstruction; 44 additional patients had 2-stage ACL reconstruction. One hundred eighty-one medial and 102 lateral menisci were repaired. Eighty percent (80%) of medial meniscus repairs were in the posterior third, 11% in the middle third, 1% in the anterior third, and 8% extended to all areas of the meniscus. Forty-nine percent (49%) of lateral meniscus repairs were in the posterior third, 26% in the middle third, 22% in the anterior third, and 3% extended to all areas.
Results: Thirty-seven (37) patients (13%) required repeat surgery on their repaired menisci. Eighteen percent (18%) of medial and 10% of lateral repairs required repeat surgery. There were no differences based on age, gender or lesion anatomic (anterior, middle, posterior) location. Average time to repeat meniscus surgery was 2.5 years (range, 75 days to 13 years). Thirty-eight percent (38%) of repeat surgeries were within one year, 32% were between one and two years, 16% were between 3 and 5 years, and 14% were greater than 5 years after the initial meniscus repair. Medial repairs required repeat surgery significantly earlier (1.8 years) than lateral repairs (4.5 yrs) (p=0.01). Staged ACL reconstructions had fewer second meniscus surgeries (2%) compared to concurrent ACL reconstructions (16%) (p=0.03). Patients with concurrent ACL reconstructions were 7.6 times more likely to undergo repeat meniscus surgery compared to staged reconstructions [CI: 1.3 to 44.9].
Conclusions: Medial (versus lateral) meniscus suture repairs and repairs with concurrent ACL reconstructions (not staged) were factors that resulted in earlier and higher rates of repeat meniscus surgery. This latter finding supports performing meniscus repair and ACL reconstruction as separate operations. There were no differences based on age, gender or lesion anatomic (anterior, middle, posterior) location.

P17-713

Post operative chryo therapy after meniscal resections

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Introduction: Celcus (53 b.C. - 7 a.C.) described five cardinal signs of inflammation; calor, rubor, tumor, dolor and function laesa. Empiri has taught us that decreasing the inflammatory processes increases healing and limits symptoms after trauma. Acute trauma are today treated by the RICE principle; R/rest, I/ice, C/compression, and E/elevation. After surgery, rest, compression, elevation and to some degree chryo therapy are recommended. The aim of this study was to evaluate the effect of chryo therapy after artroscopic meniscal resections.
Materials: In this prospective study, 38 patients, 29 men and 9 women, aged 46 years (18-71), operated with arthroscopic meniscal resections, were randomized to postoperative treatment with KoldBlue® chryo therapy bandage or conventional elastic bandage. Twenty patients had chryo bandage (Chryo bandage-group), and the remaining 18 had elastic bandage (Elastic bandage group). The groups were comparable in respect of the patients' age, sex, kind of meniscal lesions, surgical duration, and additional pathology.
KoldBlue® is an elastic bandage made of polyutrethane. It is chilled in the refrigerator and contains cooling effect for 40-60 minutes after application. The patients in this study used the KoldBlue® chryo bandage 4 times a day the first 4 postoperative days. In this periode of time we recorded their need for analgetics and their subjective level of pain, measured by visual analoge scale (VAS). The forth postoperative day we measured the patients' joint swelling compared to preoperative measurement. KOOS was recorded preoperatively and 3 weeks and 3 months postoperatively, and Tegner was measured preoperatively and 3 months postoperatively. We also recorded duration of need for chruches and sick leave from work.
Results: The patients in the chryo bandage group had significant lower mean pain score measured in VAS the first 4 postoperative days (p<0,01). The patients in the chryo bandage group had a tendency to lower need for analgetic drugs (paracetamole, codeine) the first 4 postoperative days (not significant). The degree of joint swelling the forth postoperative day was equal for the two groups. Preoperatively there was no difference in function outcome measured by KOOS between the two groups of patients. Three weeks postoperatively there was a tendency toward higher score in the KOOS category "Symptoms" for the chryo bandage group (p=0,08). Comparing scores preoperatively and 3 weeks postoperatively, chryo bandage group had, compared to the elastic bandage group, higher scores after 3 weeks in all KOOS categories, and this was significant for the categories "Pain" (p<0,01), "ADL" (p=0,02) and "Sport/Rec." (p=0,045). There were no differences in function level outcome measured by Tegner score between the two groups after three months. There was no difference between the groups in duration of use of chruches or sick leave.
Conclusions: Patients who got postoperative chryo bandage treatment, had significant lower pain score the first 4 postoperative days, and they had significant quicker increase in function outcome score the first 3 weeks, than patients treated with conventional elastic bandage.

P17-727

Results of all-inside meniscal repair with FasT-Fix™ meniscal repair system in 83 cases - a prospective study

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Purpose: The goal of this prospective study was to evaluate the results of arthroscopic meniscal repair with the FasT-Fix repair system. Type of study: Prospective case series.
Methods: 83 meniscal repairs with the FasT-Fix meniscal repair system in 80 patients with a mean age of 29 years were performed between 2001 and 2004. Concurrent anterior cruciate ligament (ACL) reconstruction was performed in 70% of the cases. All tears were longitudinal and located in the red/red or red/white zone. Criteria for clinical success included absence of joint line tenderness, locking, swelling, and a negative McMurray test. Clinical evaluation included also the Lyscholm knee score, and KT-1000 arthrometry.
Results: The average follow-up was 38 months (range, 24-61 months). Six of 83 repaired menisci (7.23%) were considered failures according to our criteria. Therefore, the success rate was 92.77%. Time required for meniscal repair averaged 15 minutes. Postoperatively, the majority of the patients had no restrictions in sports activities. 92% had an excellent or good result according to the Lysholm knee score. Four patients had a restriction of knee joint motion postoperatively, and an arthroscopic arthrolysis was performed in one of them. Analysis showed that, age, length of tear, simultaneous ACL reconstruction, chronicity of injury, and location of tear did not affect the clinical outcome.
Conclusions: Our results, shows that arthroscopic meniscal repair with the FasT-Fix repair system provides a high rate of meniscus healing and offers reduction of both the risk of serious neurovascular complications and operative time.

P17-751

Meniscal repair: Is there any place for myths? Prospective study of 58 "all-inside" meniscal repair with the FasT-Fix meniscal repair system

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Objectives: Althought meniscal function, meniscal healing capacity and consequences of meniscectomy are well established meniscal repair is still sometimes associated to a high failure rate and delayed recovery. The goal of this prospective study was to evaluate the results of arthroscopic meniscal repair using the FasT-Fix repair system.
Methods: 58 meniscal repairs with the FasT-Fix meniscal repair system were performed in 49 consecutive patients between September 2004 and September 2006 by the two authors. Concurrent ACL arthroscopic reconstruction with harmstrings authograph was perfomed in 45 patients. All patients were evaluated preoperatively with magnetic resonance imaging. Inclusion criteria were vertical full-thickness tears greater than 10mm in length or displaced more than 3mm in the R-R or R-W zones (< 6mm from meniscocapsular junction). Exclusion criteria were tears in the avascular zone, complex tears and degenerative changes in the peripheral meniscal tissue. We also excluded repairs performed in conjunction with other meniscal repair devices or techniques. Criteria for clinical success included absence of joint line tenderness,

locking, swelling and a negative McMurray test (Barrett Criteria). Clinical evaluation also included the IKDC and Lysholm score and was performed by an independent observeur blinded to the surgical protocol.
Results: The mean follow-up period was 23 months (range, 12 to 36 months). The average age at the time of meniscal repair was 26,6 years (range, 15 to 45 years). The lesions were sport related in 40 patients and due to work accident in 9. The period from injury to meniscal repair ranged from 2 to 240 days (median, 120 days). The medial meniscus was affected in 31 cases and the lateral meniscus in 27 cases (9 patiens had both meniscus repaired).
At follow-up 2 patients had a positive McMurray test and tenderness on joint-line palpation and 1 patient had tenderness on joint-line palpation and effusion. They were considered as failures. The 3 cases were medial meniscus repairs and 2 required revision arthroscopy and a partial meniscectomy, 12 and 14 months postoperatively. No further complications were reported in this group of patients. Both evaluation scores had a high percentage of good and excelent results.
Conclusion: Our results show that arthroscopic meniscal repair with the FasT-Fix meniscal repair system provided a high rate os meniscus healing (94.8%) according to Barrett´s Criteria in this group of patients. Special attention should be paid when dealing with medial meniscus tears in more aged patients or chronic ACL deficiencies.

P17-775
Postarthroscopic osteonecrosis following arthroscopic meniscectomy: fact or fiction?
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Osteonecrosis in the postoperative knee has been described as a complication of arthroscopic meniscectomy and has been referred to as “postarthroscopic osteonecrosis” (PAON). To differentiate between PAON and spontaneous osteonecrosis of the knee (SONK), a stage-dependent diagnostic work-up is mandatory due to the following circumstances:
(a) A normal preoperative MRI performed not earlier than 6 weeks after the onset of symptoms (diagnostic window) is mandatory to exclude SONK and rule in PAON as a differential diagnosis in cases with osteonecrosis in the postoperative knee.
(b) MRI signal changes of PAON can mimic those of SONK or might even represent transient bone marrow edema. (c) Contradictory reports exist about histologic findings of resected PAON lesions (osteonecrosis versus subchondral fracture without osteonecrosis versus a combination of both).
We performed a review of PAON cases in the literature to evaluate if previous studies have applied a correct diagnostic algorithm. Only clinical studies with PAON cases following conventional meniscectomy were included. A correct diagnostic work-up was assumed if the study ruled out preexisting SONK by means of MRI or bone scan respecting the diagnostic window of each diagnostic tool. The review of literature revealed that up to 48% of patients diagnosed with PAON following conventional arthroscopic meniscectomy might have had a preexisting early-stage SONK.
A diagnosis of early-stage SONK might avoid unnecessary arthroscopy. A preoperative MRI should be performed not earlier than 6 weeks after the onset of symptoms to show the presence or absence of early-stage spontaneous osteonecrosis of the knee (SONK). Therefore, a stage-dependent diagnostic imaging is advisable prior to initial surgery to avoid the diagnostic postoperative dilemma not to be able to differentiate between preexisting SONK and PAON. If initial arthroscopy does not relieve symptoms, it is advisable to observe the natural course of a potential early-stage SONK for a few months, rather than quickly perform another surgical intervention.
We suggest that the unspecific term “osteonecrosis in the postoperative knee” rather than the misleading term “postarthroscopic osteonecrosis” should be used if preexisting SONK has not been ruled out prior to initial surgery.

P17-803
Imaging findings after meniscal repair with degradable polyurethane scaffold: Preliminary results
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To date, there are no satisfactory solutions to the meniscal originated knee pain post meniscal tear repair. In this study a newly developed polyurethane material that has the intended properties of reducing pain and inducing tissue growth in a damaged meniscus is tested. Thus far 11 patients have received meniscal implants. Eight medial and three lateral menisci were operated. All implants covered the posterior horn with 3 reaching halfway into the meniscal body and one extending into the anterior horn. The average length of the scaffold meniscus measured on MR imaging was 45mm.
All patients will be imaged using conventional and dynamic MR imaging techniques at 1 week and 3, 12 and 24 months after surgery. The longest follow-up to date is 5 months. The influx of gadolinium contrast in a tissue during the first three minutes after injection gives a measure of the vascularisation, capillary permeability, perfusion and composition of the interstitial fluid. It can be measured using dynamic MRI and is represented as a Time Intensity Curve (TIC). This curve permits an evaluation of the healing process after surgery.
In the first week after surgery, the capsule and suture area display fast and intense enhancement typical for post-operative inflammation and the formation of early scar-tissue. There is no enhancement in the base or the tip of the scaffold meniscus. After three months the speed and intensity of enhancement in the capsule and suture area between the remnants of the native meniscus and the scaffold have decreased indicating maturation of scar-tissue. However, the base of the scaffold meniscus now shows enhancement. This can only be explained by proliferation of blood vessels from the capsule and the residual meniscus wall into the scaffold meniscus. The tip of the matrix shows limited enhancement in some patients after three months.
On anatomical MR images, the signal intensity (SI) of the implanted scaffold is close to that of water on both T1- and T2-weighted spin echo and turbo spin echo sequences in the first week. After three months the SI decreases but is still clearly higher than that of the native meniscus. The implants in the posterior horn all had a normal position and no loosening of the sutures or tears of the scaffold were found. After three months, one of the patients had slight expulsion of body of the scaffold meniscus but this is a common finding in transplanted menisci.

P17-882
The posterior fold of medial meniscus - pathology or variation from normal meniscal anatomy?
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Purpose: While the anatomic variations of external meniscus are well documented, very few papers concern the medial meniscus. In arthroscopy textbooks there is a mention about the posterior fold (“ondulation “ in French literature), presumed to be a normal aspect of medial meniscus. Papers based on MRI documentation and correlation with arthroscopy stated that meniscus fold or flounce (the MRI name for this particular aspect) exists, but without correlation between it, menisci tear and cartilage lesions frequency. For a while, it was considered a positional variation of the meniscus during arthroscopy. We intend to document more about it and how it may influence knee joint function.
Method: In the last four years we have encountered 56 documented clinical cases (4,9%) from a total of 1136 knee performed arthroscopies. The patients were admitted with persistent mechanical symptoms, suggesting a medial meniscus tear; the onset of symptoms was - in most of the cases - insidious, no trauma related and the history was longer than three months (min. 3 months - max. 5 years).
Results: The arthroscopy documented the posterior fold - placed in the posterior third of meniscus, along the free edge - and different grades of articular cartilage lesions on the medial femoral condyle, in the area corresponding to the menisci fold; in flexion/extension movement, the fold impinge on the femoral articular. From the 56 cases, 50 presented different grades of localized articular cartilage lesions (Outerbridge grade from I to III). More, there was a significant correlation between patient age and grade of deterioration, which may suggest that longer time the knee works in these conditions, more advanced will be the cartilage lesion. During arthroscopy, no other pathology was discovered to cause the patient symptoms; there were only 5 cases with associated external meniscus tears, but with no cartilage deterioration in external compartment. At follow-up time all patients were symptom free.
Conclusion: The posterior fold may be related to an anatomical variant with some excessive substance placed in a specific meniscus area. In our opinion, based on cases treated in the last three years, the fold may generate inadequate kinematics during flexion-extension movements with high stress on articular cartilage. A minimal partial circumferential meniscectomy can solve these problems and free the patient of these symptoms.

P17-955

Meniscus transplantation in biologically young patients with chondromalacy

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Objectives: Authors present their experiences with deep frozen meniscus transplantation in young patients with weight bearing pain and chondromalacy in injured compartment after menisectomy.

Methods: Chondromalacy and pain begins usually in some years after subtotal menisectomy in injured compartment. Meniscus transplantation could improve forces transmission and lubrication in the joint and could help to cartilage healing if it is changed.

Material: From May 2004 to January 2007 operated authors 31 meniscus transplantation, with arthrotomy in 23 patients, arthroscopically in 8 patients, 14 women and 17 men, 22 medial and 9 lateral. Contemporary ACL reconstruction was in 10 patients (8x ST autologous graft and 2x BTB allograft). All menisci were fixed transosseous to the tibia in anterior and posterior horn and with PDS suture to the capsule. In 6 biologically young patients (32-38 years) with cartilage defects 2nd-3rd sec. Outerbridge and good X-ray axis made contemporary microfracture of cartilage defects.

Results: All patients were healed without complications. Three months after operation had 26 patients knee movement S-0-0-130. All patients had no walking pain in 4 months after operation and no pain in jogging 6 months after operation. Control arthroscopy was made in 9 patients from which 4 were after microfracture of cartilage defects. All menisci were healed and defects were covered with good fibro-cartilage tissue. Control MRI was in 12 patient and all menisci showed normal density, without degenerative changes.

Conclusion: Meniscus transplantation is a new method by which is possible to improve conditions in weight bearing compartment after menisectomy. Deep frozen meniscus grafts healed without problems to the capsule and tibia, decrease weight bearing transmission and improve lubrication of the synovial fluid and by the way nutrition of cartilage too. Results are short time but look very promising.

P17-972

Arthroscopic therapy of meniscus injuries using the Fast-T-Fix System - clinical and radiological outcome

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Query: The menisci are biomechanically important for unimpaired function of the knee joint and should be preserved as far as possible in the treatment of knee-joint injuries. Longitudinal tears near the capsule with retained collagen structure of the meniscus are the classical indication for refixation. The objective of this prospective study was to evaluate the clinical and MRT results following meniscus suture using the Fast-T-Fix System.

Method: 168 patients with meniscus injuries were treated arthroscopically with the Fast-T-Fix System between April 2003 und April 2005. 89 patients also had injury to the cruciate ligament. The mean age of the 112 men and 56 women was 31.3 (16 - 59 years) and the trauma had occurred on average 9.6 days prior to treatment. In 123 cases, the meniscus tear was medial, in 45 cases lateral. The mean tear length was 1.7 cm. MRT examinations could be performed in some of the patients 6 and 12 months postoperative. The extent of pain, mobility, the activity level and patients' quality of life were evaluated pre- and postoperatively using the Tegner Activity Index, the Lysholm Score and the Visual Analogue Scale (VAS).

Results: The Tegner Acitivity Score at the time of the accident was 6.8 points, at reexamination 6 months postoperative 5.9 points and one year after the operation 6.4 points. The Lysholm Score showed a value of 88.4, respectively 93.5 points in the follow-up. On the Visual Analogue Scale for pain, the patients achieved a value of 1.9 points after 6 months and 1.5 points after 1 year. The rerupture rate was 4.7 %. MRT examination after 6 months showed healed meniscus tissue with no relevant cleft formation.

Conclusion: Menicus suture using the Fast-T System appears to be an efficient treatment technique for traumatic injuries to this tissue. The rerupture rate is acceptable, the clinical results of this treatment method were good to very good in the majority of the treated cases. Preservation and refixation of injured menisci is of decisive clinical importance.

P17-975

Arthroscopic partial resection of the symptomatic lateral discoid meniscus in childhood

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Query: A lateral discoid meniscus in childhood can lead to persistent symptoms due to pain on stress, snapping (?) or by development of blocking and thus become clinically manifest. In such cases, discussion centers first around the criteria (extent of pain, MRT findings or duration of complaint) which justify an arthroscopic operation and second which intraoperative procedure makes sense in dependence on the meniscus tissue present.

Method: Between 1/2003 and 6/2006, 48 patients with a mean age of 8.1 years (3.3-13.6 years) underwent arthroscopic therapy of a symptomatic lateral discoid meniscus. Depending on the extent and accessibility, mechanical resectioning instruments and the Holmium-YAG-Laser were used. 44 Patients could be anamnestically and clinically reexamined on average 24 months (6-48 months) postoperative. The evaluation was made using the Ikeuchi Score, which rates the criteria snapping, pain and mobility, categorized in excellent, good, fair and poor.

Results: Intraoperative there were 31 cases of complete and 17 cases of incomplete discoid meniskus according to Watanabe. 41 menisci showed lesions, while 7 menisci appeared macroscopically intact. At the time of reexamination, 38 patients reported total freedom from complaints. 4 patients expressed occasional pain. There was, however, no limitation of sports or activities of everyday living. 2 patients complained of stress-related pain. According to the Ikeuchi Score, the results in 38 patients could be rated excellent, in 4 patients good, in 1 patient fair and in 1 patient poor.

Discussion: Therapy-resistant, symptomatic lateral discoid meniscus raises the question of therapy of choice. On the one hand, resection leads to premature arthrosis, on the other hand, a damaged, functionally-impaired meniscus also damages the surface of the cartilage. Moreover, persistent pain symptoms and limitation of movement cannot be accepted. The middle-term results of our study are convincing with respect to function and pain reduction by means of the arthroscopic therapy applied.

P17-1013

A review of the current practice of meniscal allograft transplantation

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Introduction: Meniscal surgery accounts for approximately 50% of the 1.5 million arthroscopic procedures performed on the knee annually. Over the last century, a progressively more conservative approach to meniscal surgery has emerged with every attempt made to preserve as much meniscus as possible, rather than simply excising torn fragments. This reflects our increased understanding of the function of the meniscii. Resection of only 20% of a meniscus results in a 350% increase in joint contact forces with the resultant joint degeneration.

Aim: To perform an evidence based review of the practice of meniscal allograft transplantation surgery and its success to date.

Method: A literature review examining published data over the last ten years was performed via PubMed and Medline using the key words 'meniscal transplant surgery'. Papers were grouped accordingly their levels of evidence and tabulated using Microsoft Excel (Microsoft, USA).

Results: No Level 1 or 2 studies were identified and only 20% of studies looked at isolated meniscal transplantation. Four major categories of information were gathered

Graft Types: Four types of graft are used - fresh allograft, fresh frozen allograft, cryopreserved graft and freeze dried (lyophilized) graft. Cryopreserved and fresh frozen allograft are most frequently used and it has been noticed that the process of freeze drying leads to graft shrinkage, and hence use of this graft is discouraged.

Fixation: Best results occur when anterior and posteriors horns are fixed using bony fixation vs soft tissue sutures.

Outcome Measures: Cook (2005) reported a 75% improvement in pain and function over a 4-6 year period and Wirth et al (2002) found satisfactory results after 1 years., however, its effect on future joint degeneration is still unknown. The ideal patient group includes patients under 40 years of age with knee pain, proven meniscal injury and a normally aligned, stable joint and Outerbridge Grade III degenerative changes or less. Roth et al (2000) reported that 36% of grafts tore after implantation.

Conclusion: This is still a relatively new procedure and there are no current long term results of its benefits. There has been a chronological progression

from open to arthroscopic surgical technique. Though many studies can be found scattered throughout the literature, their value is questionable as wide variations in methodology, outcome measures and post-op rehabilitation programmes have been found. Study populations are mostly too small to be statistically and studies looking at isolated meniscal transplantations are uncommon. This is compounded by high reported failure rates and a risk of disease transmission.

P17-1036

Comparison between different types of suture configuration in meniscal repair. A biomechanical study

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Purpose: To compare biomechanical properties of different types of meniscal suturing techniques in a porcine model.

Methods: One hundred-sixty porcine medial menisci underwent a full-thickness vertical lesion in their peripheral third, 3 millimiters away form the peripheral edge. Each lesion was repaired in a single site and then each meniscus was mounted on a biomechanical testing machine. We performed four different types of suture configuration: horizontal mattress (group 1), vertical loop (group 2), double vertical loop (group 3) and crossed (group 4). For each group, we performed meniscal repair using two different types of suture: Ethibond #0 (subgroup A), and Fiberwire #2-0 (subgroup B). For each subgroup, we used 10 samples to perform a load-to-failure test, and other 10 samples to perform a cycling loading test. Mean failure load, and elongation at 100 cycles were considered. Statistical analysis was performed to compare the groups with the Kruskal Wallis test, and Tukey's test for multiple paired comparisons. Significance was set at $p<0.05$

Results: At the load-to-failure test series, double vertical and crossed sutures showed significantly higher failure load than horizontal mattress and single vertical suture, without a significant difference between them. Horizontal mattress sutures were significantly weaker than all the other groups. Fiberwire #2-0 showed significantly greater mean failure load for each type of suture configuration when compared with Ethibond #0. At cyclic loading test series, double vertical and crossed suture configuration showed significantly lower mean elongation than horizontal mattress and single vertical suture. Horizontal mattress suture group showed the greatest mean elongation. Fiberwire #2-0 showed significantly lower elongation than Ethibond #0, for each suture configuration.

Conclusion: Double suture configurations (crossed and double vertical) showed better mechanical behaviour than single sutures. Horizontal mattress showed worst results, regardless of the type of suture material used. Fiberwire #2-0 showed greater mean failure load and lower mean elongation than Ethibond #0, regardless of suture configuration used.

P17-1037

Role of autologous plasma concentrate in the meniscal horizontal tear treatment

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Objectives: The idea of leaving the continuity of the damaged meniscus by stitching but not cutting it out is technically very difficult to perform in the cases of horizontal tears.

Materials and Methods: Meniscal horizontal tear fissure (up to 10mm diameter) in the region of the posterior horns of the medial menisci confirmed by the MRI scan in 6 patients has been fulfilled with autologous plasma concentrate. 14 days of bearing relieve after the procedure has been used as well as kinetic therapy while bearing relieve since the first day post-op. Full bearing was allowed after 4 weeks. Control MRI scan was performed after 12 weeks after the surgery.

Results: All the patients achieved healing of the partially damaged menisci and disappearing of the former characteristic clunk in the medial compartment of the joint in the subjective evaluation.

Conclusions: In case of technical difficulties with stitching of meniscus horizontal tear we suggest considering to glue the damaged area.

P17-1050

Cellular repopulation of meniscal allografts: current insights

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Introduction: We have investigated the DNA fingerprint profile of 42 viable meniscus allograft biopsies. Additionally a limited number of transplanted deep frozen and viable allograft specimen were examined histologically to visualize cellular repopulation.

Materials and Methods: 42 biopsies of a viable meniscal allograft were analyzed using DNA fingerprint technology. The DNA fingerprint profiles of the biopsies were divided into 5 categories (ranging from complete donor DNA (1) to complete acceptor DNA (5)).

Basic histology was performed on a limited number of specimen to determine the morphology and the cellularity of the superficial and deep zone of the allograft.

Results: 28 biopsies had complete acceptor DNA (5); 8 biopsies more acceptor than donor DNA (4), 3 biopsies had as much donor as acceptor DNA (3), 1 biopsy had more donor than acceptor DNA (2) and 2 biopsies had only donor DNA (1). Specimen obtained after viable meniscal allograft transplantation showed a normal cellularity in the deeper areas of the graft while deep frozen specimen were hypocellular.

Discussion: Our data show that donor cells are able to survive in a human viable transplanted meniscus for a long period. The authors hypothesize that the cellular repopulation process by acceptor cells is more incomplete and slower in the human model in contrast to the animal model where repopulation is forthwith. These data invite for a re-appraisal of the discussion on the use of viable vs. deepfrozen allografts and support further research into repopulation biology of allografts and scaffolds.

P17-1051

The CD34+ superficial cell in the normal and pathological human meniscus

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Introduction: We recently characterized different cell types in the normal human meniscus based on the synthesis of extracellular matrix compounds and the expression of specific cell membrane markers (Osteoarthritis Cartilage. 2005 Jul;13(7):548-60). To further explore the biology of the meniscus, an immunohistochemical analysis was performed on both normal and pathological specimen.

Materials and Methods: Human knee menisci were harvested from pathological joints at the time of total joint arthroplasty or partial meniscectomy. Specimen were obtained from joints diagnosed with rheumatoid arthritis (N=2), osteoarthritis (N=5), traumatic tear of the meniscus (N=5). The normal meniscus (N=4) specimen were obtained from the University Tissue Bank through the general organ donor program. A semi-quantitative immunohistochemical scoring (0=absent, 1= weak staining, 2= intermediate staining, 3= strong staining) was performed on paraffin embedded section: H&E, PAS, Saffranine-O, CD34, CD31 and smooth muscle actin (SMA).

Results: The normal meniscus was characterized by a CD34+ superficial cell layer. This cell type was not observed in pathological menisci. In the case of a meniscus tear, the superficial cell layer was characterized by cell proliferation, expression of SMA and myofibroblast-like morphology, while the osteoarthritic meniscus is characterized by a general decrease of cell number and more chondrocyte-like morphology. In both cases, CD34+ cells could not be observed. The RA specimen were covered by synovial pannus tissue characterized by the presence of vascular elements and CD34+ fibroblasts.

Conclusion: To our knowledge, this is the first study to illustrated the in vivo biological response of the human meniscus in different pathological conditions. Trauma induced a proliferative repair response of the superficial cell layer in contrast to degenerative disease which was characterized by a general hypocellularity. CD34+ superficial cells were not observed in these conditions. We hypothesize that the recently described CD34+ superficial meniscus cell plays a role in the homeostasis of the human meniscus. This knowledge could be important for future tissue engineering applications.

P17-1060

Comparison of nonoperative and endoscopic treatment of popliteal cyst - preliminary results

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Introduction: Appearance of popliteal cyst is related to intraarticular pathology and/or unidirectional passage of fluid from the joint into the cyst. In some cases origin of the pathology is inflamed popliteal bursa. Questionnaire performed by ESSKA showed that 37% of surgeons neglect it, 25% treat their patients with arthroscopy and 6% make open surgery. 80% of surgeons have not changed their treatment over last 10 years. The purpose of this study is preliminary evaluation of nonoperative treatment in comparison to endoscopic one that includes elimination of all known reasons of popliteal cyst existence.

Materials and Methods: From February 2003 group of 33 patients with symptomatic popliteal cyst underwent 8 months nonoperative treatment consisted of physiotherapy, extensive load elimination, compressive braces wearing, NSAIDs application and 3 times aspiration with injection of steroid. From January 2004 to June 2006, 29 symptomatic cases in which conservative treatment failed were qualified and treated endoscopically. I these patients we performed "all in one" procedure that included intraarticular pathologies treatment combined with valvular mechanism removal and endoscopic cystectomy in majority of cases. All patients were evaluated at the final follow-up. Patients included 15 men and 14 women (age 6 to 57). Average observation time after surgery was 15 months. Intraarticular pathologies, valvular mechanism type and frequency of its occurence, time to pain elimination after surgery and time to full range of motion were evaluated. Rauschning and Lindgren criteria, Lysholm score and VAS were used for evaluation. Patients underwent ultrasonography before surgery, 3, 8 months after and at the follow up. In questionable cases and in children we did MRI. Endoscopic cystectomy was the only procedure in children.

Results: All 25 adult patients had coexisting intraarticular pathologies: medial meniscal lesions in 13 cases, chondral lesions in 11 cases, synovitis and synovial hypertrophy in 10 cases, ACL lesions with instability in 6 cases, plica syndrome in 6 cases, rheumatoid diseases in 3 cases and lateral meniscus tear in 2 cases. Chondromatosis, partial tear of PCL and OCD in 1 case adequately. Valvular mechanism was observed in 20 patients: in 13 of them it was transverse capsular fold, in 3 overgrowth synovium in 2 medial meniscal tear and coat-like synovial hypertrophy in 1 case. Preoperatively Rauschning and Lindgren score was 2,28, after 8 months of nonoperative treatment 1,88; 8 month after surgery 0,72 and 0,58 at follow up. Average VAS was preoperatively 4,91, after nonoperative treatment 4,94, 8 months after surgery 8,51 and 8,58 at follow up. Average Lysholm knee score was 58 preoperatively, after nonoperative treatment 60,62, 8 month after surgery 83,6 and 84,31 at follow up. Full range of motion was gained in 2,5 days on average, mean time of pain elimination was 31 h. Ultrasound exam after nonoperative treatment showed persistent cyst in 33 of 35 cases (94%), in 6 of 29 (21%) cases 8 moths after surgery and in 4 (14%) at follow up. There were no persistent complications in our material.

Conclusions: Nonoperative treatment of popliteal cyst seems to be insufficient in majority cases. We consider "all in one" endoscopic treatment of popliteal cyst as a save and reproducible procedure that allowed fast recovery of patients. This procedure should be taken into consideration as a valuable option in our practice.

Cartilage

P18-9

Spontaneous osteonecrosis of the knee following arthroscopic chondroplasty

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Objectives: The goal of this study was to evaluate the association between the use of radiofrequency (RF)-based devices and the occurrence of spontaneous osteonecrosis of the knee (SONK).

Methods: Cases with persistent postoperative symptoms following arthroscopic surgery with a chondroplasty procedure performed using a mechanical shaver, RF-based device or a combination of both devices, were identified from a cohort of consecutive patients treated between January 2000 and November 2003. Five hundred twenty-one charts and radiographs were retrospectively reviewed to identify patients who had returned to the clinic with postoperative symptoms warranting magnetic resonance imaging (MRI). The post-chondroplasty MR images were blindly evaluated by a musculoskeletal radiologist for evidence of osteonecrosis.

Results: Of the 521 chondroplasty cases identified, five charts were unavailable, leaving 516 cases available for review. Of these 516 patients, 205 (39.7%) patients underwent chondroplasty with mechanical methods alone, 259 (50.2%) underwent chondroplasty with a combination of mechanical and RF-chondroplasty, and 52 (10.1%) were treated with RF-chondroplasty alone. 26 of the 516 (5.0%) patients returned to the clinic and had a postoperative MRI. Of the MRI patients, 5 (0.97%) patients had postoperative MRI evidence of new onset osteonecrosis (SONK). Of these patients, two (0.98%) had received mechanical shaver chondroplasty alone and three (1.16%) had received chondroplasty using the mechanical shaver along with an RF-based device.

Conclusions: In this cohort, MRI evidence of symptomatic SONK was detected in 0.97% (5/516) of patients following arthroscopic chondroplasty using the mechanical shaver with or without an RF-based device. This study suggests that SONK can be a complication associated with arthroscopic chondroplasty regardless of the technique used. Further study of the etiology of SONK and methods for predicting and preventing its occurrence is needed.

P18-17

Pre-treatment range of knee flexion affects outcome of Hyaluronan injection for knee osteoarthritis

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Objectives: Intra-articular (IA) injections of Hyaluronic Acid (HA) are currently indicated to improve symptoms and function in patients with knee osteoarthritis (OA). This study investigated symptomatic and functional outcome of HA injections in patients with knee OA. The main objective was to identify clinical characteristics that may help discriminate between people who respond well to this treatment vs. those who do not.

Methods: 29 subjects (54.4±9.0yrs, BMI 30.5±3.6 kg/m^2) with symptomatic knee OA were included in the study and signed an informed consent to partake in data collections pre- and post-treatment. Each was scheduled for 5, weekly, IA injections of HA and was tested prior to treatment and no later than 3 weeks following the last injection. Knee function was assessed with questionnaires (Knee Outcome Survey (KOS), a Global rating of knee function, and the Knee Osteoarthritis Outcome Score (KOOS)), as well as with range of motion (ROM) measures, a six minute walk (6MW), a timed stair climbing task (SCT) and quadriceps strength testing. T-tests, Pearson product moment correlation coefficients and linear regression were used to analyze the data. Alpha was set at 0.05.

Results: Overall means improved significantly for self reported scores (KOS: $p=0.001$; Global: $p=0.007$; KOOS subscales all ≤ 0.004). The distance walked during the SMW increased by an average of 120 ft. ($p<0.001$) and SCT times improved by approximately 1 sec. ($p<0.001$) after treatment. Linear regression analysis showed that pre-treatment knee flexion ROM influenced changes in self-reported scores after HA treatment; greater knee flexion predicting greater improvement ($p=.032$; $r2=.159$), prompting further analysis of the influence of ROM on outcome. Eighteen individuals with knee flexion range above the group mean showed significantly greater post-treatment KOS improvement ($p=0.026$) compared with the eleven individuals below the mean. The high knee flexion ROM group also improved the scores of the KOOS pain subscale significantly more than the others ($p=0.021$).

Both groups improved testing scores equally, as measured with the SMW and the SCT. Pre-treatment KOS scores were similar, although the high knee flexion ROM group rated themselves higher on the global rating (74 vs. 59; $p=0.029$). They also demonstrated better function during some tests at base-

	KOS *	Global	KOOS - pain *	KOOS - symp	KOOS - adl	KOOS - sport	KOOS - qol	6MW	SCT
More Flexion	12±13.6	11±15.4	13±10.6	13±9.8	12±10.4	17±16	14±15	114±116	1.13±1.1
Less Flexion	3±8.3	5±17.7	2±13.1	6±16.5	6±13	13±25.3	7±25	129±84	1.16±1.2

Graph: P18-17

line; there was less interlimb difference in ROM (7˚ vs. 16˚; p=0.016), they had faster times for the SCT (by 2 sec; p=0.047), a greater activation ratio of the quadriceps (92% vs. 84%; p=0.028). A difference in BMI was further observed in that the high knee flexion ROM group's was lower than the others (p=0.03), yet BMI did not predict success.
Conclusions: Symptoms and/or functional performance improved in the majority of patients following IA injections of HA. Joint mobility and muscle function may influence self-perceived outcome following treatment, but significant overall functional improvement was measured regardless of whether these were registered by questionnaires evaluating knee function. Some patients may not perceive actual functional improvement, possibly if pain remains a dominant symptom. Furthermore, questionnaires may not be sensitive to changes in limited aspects of function which are nonetheless registered in functional tests.

P18-51
Traumatic deep cartilage lesions of the knee: Outcome of subjective treatment evaluation
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Objective: The aim of this study was to determine what effect, if any, the different aspects would have on subjective evaluation scores after treatment of deep traumatic cartilage lesion. Following aspects were taken into account: lesion (grade, location, size, associated articular lesions), time after surgery, patients' age, performed surgical cartilage procedure.
Materials and Methods: From the 1st of January 1998 to the 10th of December 2000, 2,643 consecutive knee arthroscopies were performed. The diagnosis of the deep traumatic cartilage lesion based on arthroscopy was a criterion for the inclusion to the study group.
During each arthroscopy the questionnaire providing information about cartilage lesion (grade, location, area, status of surrounding cartilage), associated articular lesions and performed procedure was completed. The lesion grade was determined with the use of the Outerbridge classification and the lesions were subdivided into isolated and non-isolated lesions (with associated articular lesions). The data were collected with the use of questionnaire based on the International Knee Documentation Committee (IKDC) Questionnaire. The analysis of the patients´ subjective evaluation of the treatment was performed according to the IKDC criteria.
The statistical analysis was performed with the use of the Pearson correlation coefficient and t-test. Significance was set at $p<0.05$. In statistical analysis a Microsoft Access database and Statistica 6 (StatSoft Inc.) was used.
Results: Deep cartilage defects were diagnosed in 204 cases (7.7%). Subjective follow-up was carried out more than one year after arthroscopy (mean period, 4.9 years). The average age of patients was 32 years and the largest group - patients aged 21-30 years (44.6%).
Significantly better postoperative subjective scores were obtained in the group with non-isolated traumatic lesions. There was no significant correlation between the postoperative subjective scores and the time after arthroscopy, but there was significant negative correlation between the patients age and postoperative subjective scores. Concerning the defect grade and location, significant negative correlation between the defect grade and postoperative subjective scores was observed and the best mean postoperative subjective scores were obtained when the defect was located on the medial femoral condyle. In patients with the defect size of 2cm2 and more there was significant negative correlation between the defect size and postoperative subjective scores.
In the analysis of the used surgical treatment following procedures were compared: mosaicplasty, microfractures and the group with untreated lesion. Significantly worse subjective results comparing to mosaicplasty and untreated lesions, were obtained in cases of microfractures both in isolated and non-isolated lesions.
Conclusion: Our study confirms that the natural history of cartilage lesions remains unpredictable and not well understood. Another serious problem is qualification for treatment - which lesion needs treatment, which does not. Keeping in mind the Poehling's warning - "Cartilage, primum non nocere", appropriate selection of patients for certain cartilage procedure, concerning different circumstances, should be performed to avoid bad and not-satisfactory results.

P18-57
Autologous chondrocyte implantation using fibrin matrix for the treatment of articular cartilage defect of the knee
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Objective: Autologous chondrocyte implantation(ACI) is widely used to treat symptomatic articular cartilage defects of the knee. On the other hand, fibrin matrix ACI is a new tissue-engineering technique for the treatment of deep cartilage defects, in which autologous chondrocytes are seeded on a three-dimensional scaffold provided by a gel type fibrin matrix.
Methods: Fibrin matrix ACI was used to treat deep cartilage defects of the femoral condyle in 8 patients. There were six men and two women with a mean age of 38.1 years (range; 16 to 60), and mean defect size was 4.1cm2 (range; 2.0 to 9.0). Clinical and functional evaluations were performed using various score systems, and second look arthroscopy was performed at 6 months postoperatively in 6 patients.
Results: All patients showed improve clinical and functional statuses after surgery, and no significant graft-associated complications were encountered. Arthroscopic assessments performed at six months postoperatively produced a nearly normal (grade II) International Cartilage Repair Society scores for 62.5% of the fibrin matrix ACIs performed.
Conclusions: Fibrin matrix ACI offers the advantages of technical simplicity, minimal invasiveness, a short operating time, and easier access to difficult sites than classical ACI. Based on the findings of this clinical pilot study, fibrin matrix ACI offers a reliable means for the treatment of articular cartilage defects of the knee.

P18-85
Mechanical debridement and controlled bipolar chondroplasty. Two-year results from a randomized controlled study of knee chondroplasty
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Introduction: The debridement of deep cartilage defects is one of the most frequently measures in arthroscopic surgery. This randomized study was undertaken to compare the effectiveness of simple mechanical debridement and the 52°C-controlled bipolar chondroplasty.
Material and Methods: A total of 60 patients (28 male, 32 female, and age 43.3 range 20 to 50 years) who were suffering from a grade III cartilage defect of the medial femoral condyle were included. Exclusion criteria were revision arthroscopy, injury or osteoarthritis grade II or more.
After randomization 30 patients had undergone a simple debridement of the cartilage defects by a mechanical shaver (MS). The rest had undergone thermal chondroplasty by using a temperature-controlled bipolar device with a constant thermo-application of 51°C (TC).
The patients were evaluated by the Knee-injury and Osteoarthritis Outcome Score (KOSS) preoperatively and at time of follow-up. The activity level was measured by the Tegner score (activity level before onset of the symptoms and at time of follow-up).
The follow-up was undertaken 2 years after the arthroscopy.
Results: Preoperatively no significant differences in the preoperative findings between the patients in both groups were evaluated.
One patient from the MS group had died in the meantime. A total of 9 patients had undergone revision operations because their persistent knee problems: in the MS group 4 replacements and 3 osteotomies; in the TC group 1 osteotomy and 1 revision arthroscopy with subtotal medial meniscectomy. The quote of revisions was significantly higher in the MS group (p=0.040). These patients were excluded from evaluation.
The remaining patients from both groups profited from the operation. The preoperative KOS was 19.6 points in the MS group and 25.1 points in the TC group (p=0.329). Patients from the MS group had a KOOS of 75.8 points at time of follow-up. In the TC group the KOOS () was significantly better, $p<0.000$.
The patients from both groups had to accept a decrease of their level in physical activity. But patients from the TC group had a significant ($p<0.000$) Tegner activity Score (4.5 points) the patients from the MS group (2.9 points).
Conclusion: TC is a potential method in treatment of deep cartilage defects. The short term outcome is better than after MS. Long-term results are required.

P18-128

Mosaicplasty-type fixation with autogenous osteochondral grafts for the treatment of ocd (stages 3 and 4)

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Introduction: This paper presents a clinical and functional assessment of the cases of OCD treated with small osteochondral grafts (mosaicplasty-like).

Material and Methods: Between 1999 and 2004, we operated on 12 knees with OCD Stages 3 and 4. They were assessed using the ICRS scale, VAS scale, X-ray and. MRI.

Structure of the study: Clinical series, retrospective, level of evidence 4

Results: Before surgery, all were in Classes III and IV on the ICRS scale (4 in III; 8 in IV). At the time of surgery, age was 27.5 ± 7.9 years, with male predominance (75%). 11 of the cases were assessed as Classes I and II on the ICRS scale (7 in I and 4 in II), with 1 patient in Class IV. X-ray assessment was less favourable, revealing alterations in the articular space in 75% of cases.

Discussion: This technique enables biological fixation of fragments, and functionally, the clinical results obtained were very good. Avoids the implantation of foreign material and makes use of bone fragments of the same rigidity as the OCD fragment.

Conclusion: The technique described is an excellent alternative to the techniques normally used for the fixation of Stages III and IV OCD.

P18-129

Mosaicplasty with periosteal graft for resurfacing local full-thickness chondral defects of the knee. A minimum two year follow-up

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Introduction: Clinical and functional assessment comparing cases full-thickness chondral defects (OC) treated with mosaicplasty or mosaicplasty covered with periosteum (mosaicambium).

Material and Methods: 20 knees with OC defect, (10 mosaicplasty/10 mosaicambium) operated between 1999 and 2005. At 2007 all were assessed using the ICRS scale, VAS scale, X-ray and. MRI.

Structure of the study: Clinical series, retrospective, level of evidence 4

Results: Before surgery, all were in Classes III /IV (ICRS scale). At 2007 18 cases were assessed as Classes I and II on the ICRS scale (12 in I). Between groups there were no statistical differences. X-ray revealed no alterations in 55% of cases.

Discussion: With no differences, why mosaicambium option? Grafts donor zones give morbidity and disability namely at patello-femoral. Mosaicambium uses less OC grafts, reducing the possibility of morbidity at graft donor zones.

Conclusion: Mosaicambium technique is an excellent alternative for OC defects greater than two cm^2.

P18-131

The surgical outcome of the osteochondral grafts in osteonecrosis of the medial femoral condyle - comparison between with osteotomy and without it -

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Objectives: We previously reported the good result of autogenous osteochondral graft and high tibial osteotomy in the osteonecrosis of medial femoral condyle. The purpose of this study is to compare the osteochondral grafts only with the osteochondral grafts and high tibial osteotomy for the osteonecrosis of medial femoral condyle.

Methods: From 1998 to July 2006, we performed two operative procedures for the osteonecrosis of medial femoral condyle in our hospital. The patient whose femorotibial angle (FTA) was more than 180 degrees received the osteochondral grafts with high tibial osteotomy (Group A), and the patient whose FTA was less than 180 degrees received the osteochondral grafting procedure only (Group B). There were 21 patients 22 knee joints, and they were observed more than 1 year after their operation. Our follow-up rate was 84%. There were 11 patients 12 knees, 3 men 8 women, and 5 right and 7 left ones in group A. There were 10 patients 10 knees, 0 men 10 women, and 4 right and 6 left ones in group B. The mean operative age was 62.0 year-old in group A and 59.7 year-old in group B. The mean follow-up periods was 49.8 months in group A and 27.9 months in group B. We assessed the area of the recipient site, the number of the grafted plugs, the classification of Koshino, preoperative and follow-up FTA, the osteotomy angle, preoperative and follow-up Japanese Orthopaedic Association knee osteoarthritis score (JOA score) and the ability of the straight sitting like Japanese style. The comparison between group A and B, or between preoperative score and follow-up score was performed. We diagnosed significant difference as P value less than 0.05.

Results: The mean area of the recipient site was 413.5 mm2 (range 64 to 800mm2) and the mean number of the grafted plugs was 3.5 (range 1 to 6). These items had no significant difference in group A and B. Koshino´s classification was ranged from stage II to IV, and the mean value was 3.6 in group A and 2.9 in group B. The mean preoperative and follow-up FTA was 181.0 degrees and 169.5 degrees in group A, and the mean preoperative FTA was 175.6 degrees in group B. The mean osteotomy angle in group A was 11.5 degrees. The mean preoperative and follow-up JOA score in group A were 69.4 points (from 55 to 80) and 96.1 points (from 85 to 100), and the mean preoperative and follow-up JOA score in group B were 62.1 points (from 50 to 80) and 92.9 points (from 70 to 100). Follow-up scores in two groups were significantly larger than preoperative ones. The items which had significant difference between group A and B were only follow-up periods, Koshino´s classification and preoperative FTA. About 60% of all could sit straight like Japanese style at follow-up.

Discussion: The osteochondral graft with high tibial osteotomy, not the osteochondral grafts only, may be performed for the patients whose FTA were more than 180 degrees.

Conclusion: The two operative procedures, in respect of considering their alignment, have obtained good clinical outcome, and we recommend the two procedures for the osteonecrosis of medial femoral condyle.

P18-140

Predictors of medium term outcome of microfracture - significant effect of smoking.

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Objectives: Patients with meniscal pathologies, axial malalignment and ligament instabilities have traditionally been excluded from microfacture studies. Results of microfracture after high tibial osteotomy done for varus mal-alignment have been successful. Having surgery for meniscal problems and ligament deficiencies should theoretically not affect the outcome of microfracture. There are no studies evaluating the effect of smoking on microfracture. We have done this study to evaluate the effects of smoking, concomitant knee surgeries and other factors including location of defects on the outcome following microfracture of the knee.

Methods: The details of 386 consecutive patients who had microfracture of the knee were taken from the Sports Injury Service database at the Robert Jones & Agnes Hunt Orthopaedic Hospital, Oswestry. Patients with a minimum follow up of 6 months were selected. After exclusions, 320 patients were included. Two rounds of postal questionnaires were used to assess patient satisfaction, Lysholm score, Tegner activity scale, VAS for pain and a modified IKDC score. The factors studied were smoking, concomitant knee surgery, age over 50 years, different surgeons and compartment location. The four compartments were medial, lateral, patellofemoral and combined. Any patient with microfracture in one compartment and even chondroplasty in the other were grouped in the combined category.

Results: After two rounds of postal questionnaires, 196 patients responded (61.25%).The mean age was 40.64 years and the mean follow up 37.02 months (range 6-78 months). There were 35 smokers and 161 non-smokers. 64 patients had surgery in the medial compartment, 35 in lateral, 50 in patella-femoral and 47 belonged to the combined category. 93 patients had other surgeries along with microfracture(47.45%). Of these, 20 had ACL reconstruction and 4 had ACL radiofrequency tightening. 72.1% of overall patients were satisfied with their outcome, 18.95% were not satisfied and 8.95% couldn't decide.

51.43% of smokers were satisfied with their outcome and 76.88% of non smokers. This was statistically significant with p value of 0.021. In patients with age more than 50 years, a statistically significant difference was found with p value of 0.023.

The results between different knee compartments were not statistically significant with relation to patients' satisfaction rating using the Chi Square test. ANOVA test was significant at 0.001 level only for Tegner Score difference. There was no statistically significant difference in patients who had other

knee surgeries compared to those with only microfracture. No statistically significant difference was found between the two main surgeons outcome on patients' satisfaction or score differences.
Discussion: Most patients continue to experience the benefit of microfracture after mean 3 years follow up in our series. Smoking and age over 50 years have a statistically significant effect on outcome of microfracture of the knee. Having concomitant knee surgeries(partial meniscectomy, ligament reconstruction, loose body excision, meniscal repair and lateral release) at the time of microfracture at the same time doesn't make a difference to the outcome. The results suggest that the medial compartment doesn't do as well as previously thought and patellofemoral group does surprisingly well.

P18-177

Autologous chondrocyte implantation using fibrin matrix for the treatment of articular cartilage defect of the knee -preliminary report -

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Background: Autologous chondrocyte implantation(ACI) is widely used to treat symptomatic articular cartilage defects of the knee. On the other hand, fibrin matrix ACI is a new tissue-engineering technique for the treatment of deep cartilage defects, in which autologous chondrocytes are seeded on a three-dimensional scaffold provided by a gel type fibrin matrix.
Hypothesis: Fibrin matrix ACI offers a reliable means for the treatment of articular cartilage defects of the knee.
Study Design: Case Series
Methods: Fibrin matrix ACI was used to treat deep cartilage defects of the femoral condyle in 8 patients. There were six men and two women with a mean age of 38.1 years (range; 16 to 60), and mean defect size was 4.1cm^2 (range; 2.0 to 9.0). Clinical and functional evaluations were performed using various score systems, and second look arthroscopy was performed at 6 months postoperatively in 6 patients.
Results: All patients showed improve clinical and functional statuses after surgery, and no significant graft-associated complications were encountered. Arthroscopic assessments performed at six months postoperatively produced a nearly normal (grade II) International Cartilage Repair Society scores for 62.5% of the fibrin matrix ACIs performed.
Conclusions: Fibrin matrix ACI offers the advantages of technical simplicity, minimal invasiveness, a short operating time, and easier access to difficult sites than classical ACI. Based on the findings of this clinical pilot study, fibrin matrix ACI offers a reliable means for the treatment of articular cartilage defects of the knee.
Key words: Cartilage defect; Fibrin matrix autologous chondrocyte implantation; knee.

P18-224

Mosaicplasty arthroscopic technique in the treatment of chondral defects of the knee joint - a seven years clinical study

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We describe the clinical results of the mosaicplasty technique in the chondral defects of the knee joints.
Material and Methods: From March 2000 to December 2007,121 patients underwent mosaicplasty for knee osteocondral defects. Mean age was 34 years.74 patients were males and 47 females. 86 of the patients had OCD, 35 had lesions of traumatic origin related to sports activity. All head lesions Outerbridge 3 or 4 with mean size 4,5 cm 2.75% of lesions were located to MFC, 21% of the LFC and 4% to the patella.18 patients underwent rearthroscopy before 6 months follow-up due to pain and swelling.
Results: The first two months all patients had swelling of the knee, after 4 months one of five cases was notice and at twelwe months none have swelling or pain. The ROM was normal for all the patients, after twelwe months,and in 85 % were pain free. In 10 cases present swolling and pain wich are remision after NSAID local and general treatment and repause. All the patients receive treatment with Synovial or Synocrom for five weeks, in dose of 1 injection/week. Clinical foolow-up showed 81 % excellence and 19% good results and improve of the Lysholm scale. The second look performed after 6 months show a good bone integration and no other lesions.
Conclusions: The mosaicplasty hade good results in chondral defects smaller than 10 cm2.The disadvantage of donor site morbidity seems to be well compensated both phisically and mentally in the treated patients.The application of this method is generally accepted as a joint salvage operation both by the surgeon and the patient before make other surgical procedures.

P18-303

Osteochondritis dissecans of knee in long distance triathletes

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Introduction: The articular hiliano cartilage of the knee with its morphological characteristics has lubricating functions and of distribution of weight of the articular surface. Unfortunately, it has a very low capacity of regeneration after any lesion.
The osteochondritis dissecans is both a lesion from the bone and from the cartilage due to multiple etiologies.
Materials and Methods: Retrospective study of 25 long distance tri-athletes afflicted by osteochondritis dissecans of knee, from the period that goes from January 2000 to January 2004: 20 men and 5 women.
It was made a detailed study with clinical history and complementary tests. We evaluated the existence of associated lesions, surgical and post- surgical complications, level of stability and functional activity.
Results: Process followed around 2,7 years. More frequent in the right side. Running on foot was the process with more lesions. Main motive of the examination: pain and main exploratory sign: articular blockage. The most frequently found lesion on Nuclear Magnetic Resonance (NMR) was the crater. Injured area of 1,8 cm. and the surgical technique employed was mosaicoplasty. The post- surgical functional activity was the same that existed before the lesion in 72%. Lysholm´s test gave as a result a positive difference in favour of the post-surgery.
Conclusion: The surgical techniques employed in the recovery of osteochondral lesions must take into account the size and localization, treating only big craters no matter where they are while the small ones, if they are on the periphery or on the weight area should not be treated.

P18-328

Micobacterium Kansasii knee septic arthritis: a case report with 6 years evolution in a nonimmunocompromised patient

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Although Mycobacterium kansasii is one of the major pulmonary mycobacterial pathogens, it is rarely identified as a cause of extrapulmonary infections. Only 50 septic arthritis have been published in 1999. AIDS, chronic skin psoriasis, renal transplant and more rarely related to a previous trauma and the use of intra-articular corticosteroids were well defined risk factors.
Case report: A 49-year-old man with no systemic disease, presented a swollen and chronically painful knee without fever nor alterations in blood laboratory analysis. The clinical findings appeared 6 years ago after a car accident. He was previously diagnosed in another Hospital first as a medial meniscus rupture and later as a Baker's cyst. Some arthroscopies and intra-articular corticosteroid injections were previously performed without success. After a radiological and MRI study, an arthroscopical synovectomy was performed. The culture of synovial biopsy was positive for Mycobacterium kansasii and we started a 14-month-antimycobacterial treatment (isoniazid-rifampicin-ethambutol) with good clinical results.
Discussion: Septic arthritis due to Mycobacterium kansasii in nonimmunocompromised patients is extremely rare. The knee is the most frequent affected joint. A previous trauma and corticosteroid injections were present in this case as risk factors. The main diagnostic procedure was culture of a synovial biopsy specimen. In all previously described cases, the treatment was started 5 months after diagnosis on average and debridement was associated with antimycobacterial treatment. Because the response to appropriate antibiotic combinations is good, prolonged pain and stiffness should be avoided if the diagnosis were made earlier and treatment initiated rapidly.
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P18-362

Prospective evaluation of biologic resorbable scaffolds in the knee: indications, technique and 12 months results

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Aims: During knee arthroscopies osteochondral defects are unexpectedly frequently encountered and oblige surgeons to their treatment. In our experience in middle aged active patients synthetic solutions may have immediate functional and pain relief effect. In this prospective study we have started to evaluate porous resorbable bone graft substitute plugs (TrufitTM).

Methods: The utilized implant is a cylinder composed of poly(D,L-lactide-co-glycolide) to which calcium sulphate and surfactant are added to enhance bone in-growth and make implant's surface more hydrophilic. The three-dimensional porous cylindrical implant with interconnected pores is press fit into the site for close apposition and encourage migration of repair tissue as blood and marrow into the scaffold. The plugs are available in different sizes (5,7,9.11 mm) and can be contoured at the time of surgery in order to match the individual joint surfaces. 60 patients were included in the study. Age ranged from 35 to 65 years. Every patient has underwent arthroscopic knee assessment to evaluate size, location and degree of defects and has underwent implantation of TrufitTM cylindrical resorbable scaffold. Majority of synthetic bone substitutes implanted were 11 mm in diameter.

Results: Patients have been controlled clinically and by serial knee MRI's and showed statistically significant improvement of IKDC and WOMAC scores associated to healing of defect and integration of bone plugs in absence of adverse reactions.

Conclusions: At our institution, among other treatments, we recently have decided to use TrufitTM synthetic implants, retaining interesting to use a scaffold that enables bone and hyaline like cartilage in-growth before of it's resorption. Preliminary results seem to show that porous, resorbable scaffolds can be used in treatment of cartilage since they offer good support to secondary bone in-growth. We expect long term result to convalidate these preliminary data.

P18-369

Methicillin resistant staphylococcus aureus: A review of admission and pre-admission screening in an Irish hospital

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Purpose: To report on, the admission screening and incidence of Methicillin Resistant Staphylococcus Aureus (MRSA) in a population presenting for day case knee arthroscopies in an Irish hospital.

Method: The incidences of positive MRSA results over the time period of 1st September 2005 to 31st of August 2006 were reviewed. 767 knee arthroscopies carried out as day procedures by a single surgeon, in this time period.

Routine MRSA screening on admission was commenced in September 2005. Of the 465 patients routinely screened on admission for MRSA, 4 (0.86%) of these were found to be positive. Of these four, two were identified as being at risk of previous exposure to MRSA. Prior to commencement of routine testing patients were only screened if deemed to be at a high risk of exposure of MRSA e.g. previous hospital stay, repeated doses of anti-biotics as set out in The Control and Prevention of MRSA in Hospitals and in the Community, Sari Infection Control Subcommittee.

Conclusion: The incidence of MRSA in outpatient day case arthroscopy procedures carried out by a single surgeon, over a 12 month period was less than 1% (0.86%). We are unaware of any clinically obvious infections in the post-op period. On the basis of these results it would suggest that change in the peri-operative management of this group of patients is not warranted.

P18-383

Treatment of articular cartilage lesion in the knee by perforations, stem cells and "autologus matrix induced chondrogenesis": preliminary results

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Objectives: The Authors report their experience in treating articular cartilage lesions in the knee by perforations, stem cells and "autologus matrix induced chondrogenesis".

Methods: From July 2005 to March 2006, 14 patients were treated by perforations and a membrane and from April 2006 to January 2007, 7 patients were treated by perforations, a membrane and were supplemented with femoral bone marrow blood drawn from the condyle. The surgical technique allows a one-session surgical operation, including a first arthroscopic stage during which the lesion is examined and is prepared for the second stage, which is done by a mini-open procedure

Results: The results of the patients with undamaged menisci treated by perforations, a membrane and bone marrow blood supplementation, were compared with two homogeneous control groups (one of patients treated by microfractures and the membrane, and another of patients treated by perforations and the membrane).In one patient it was possible to make a second look in the course of which some samples for hystologic examination were taken. The samples taken from the innermost area of the lesion revealed the presence of hyaline like cartilage.

Conclusion: Short term results are positive and encouraging, although they represent only a preliminary study. The technique we have described is simple, reproducible and can be carried out in one step. Penetrating deeper into the bone than the microfracture devices do, allows us to reach the zone of the larger bone lacunae and this causes a greater release of blood and all its components Covering the lesion protects it from the sinovial liquid and traps the bone marrow bleeding. In this way, we prevent the bone marrow blood and all its components from being lost into the joint, and the first and most important clot is kept in place. Supplementing the focus lesion with bone marrow blood and its stem cells, growth factors and all the other components improve the so called "Superclot" and accelerates the healing process. Taking stem cells "in loco" and during surgery, is certainly a less invasive and traumatic technique for the patient, who does not have to undergo pre-operative procedures. A prolonged follow-up and a larger number of case studies are necessary to verify the positive results of this preliminary phase of our research

P18-415

ACL reconstruction and medial femoral condyle cartilage lesions: Microfracture treatment vs no treatment. A double blind prospective study.

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In this double blind prospective study we evaluated the clinical differences at 1-2 year follow up between the treatment with microfractures and the abstenction in the medial femoral condyle chondral lesion observed during ACL reconstruction arthroscopically assisted.

Materials and Methods: The series consist of 27 patients treated consecutively with an ACL reconstruction associated with a III°-IV° chondral lesion of the medial femoral condyle according to ICRS classification. The patients were operated by the same orthopeadic surgeon with the same operative technique (12 BPTB and 15 double ST and GR) in the same clinic and observed the same rehabilitation protocol.

The patient were divided into 2 groups: A group (12 patients) ACL reconstruction without any kind of treatment for the chondral lesion; B group (15 patients) ACL reconstruction treated with arthroscopic microfractures. They were evaluated after 12-24 months from surgery by another orthopeadic surgeon not involved in the surgical equipe and all the datas were collected by the only surgeon informed about the treatment. At the follow-up we lost 4 patients for changing of address.

The results were classified according to the IKDC score with clinical evaluation and KT-1000 arthrometer.

Results: The KT1000 was excellent (<3mm) and good (3.5 mm) in 95.7% of the patients.

There were no statistically significant differences between BPTB and STG ACL reconstruction.

Into the two groups IKDC score was: 8 A, 1 B in the group A; 10 A and 4 B in the group B.

At the clinical examination1 patient in A and 4 in B group had pain at medial femoral condyle.

18 (7 in A group and 11 in B group) resumed the sport at the same level as before the ACL injury and 5 (2 in A group and 3 in B group) at a lower level than before.

Conclusions: It's seems to be undoubtful that the treatment of the chondral lesion do not involve the ACL reconstruction results.

In our clinical follow up both the abstention and the treatment of the medial femoral condyle chondral lesion with arthroscopic microfractures had the same objective and subjective clinical results. The patients of microfracture group had more medial pain compared with the abstention group at this follow-up. A longer term follow-up is in progress and will be shown.

P18-455

Knee arthrosurface system

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The Hemicap system represent a new choice in the treatment of small to medium cartilage lesions affecting almost all major joints (hip, shoulder and knee). It is a really minimally invasive option as the surgical technique requires small incisions and restricted blount dissection of soft tissues. Moreover a small bone stock removal is needed, and further revision to more invasive systems is relatively easy. Unfortunately this procedure has really strict indications depending on the involved joint. Our inclusion criteria in knee pathology are: age of at least 40 years, chondral lesion (IV stage according to the ICRS) inferior to 20mm with unmasked subchondral bone, absence of kissing lesion or involvement of the other compartment, extension lag inferior to 10°, good bone quality and stable joint. Conversely this procedure must be avoided in case of: limb malalignment greater than 7°, previous joint infections or Cr-Co allergies.

From February 2005 to November 2006 10 Hemicap prosthesis were implanted in patients affected by stage 4 chondral lesions of the medial condyle (9 patients) and avascular necrosis lateral condyle (1 patient). Preoperative evaluation consisted in X-ray study in A-P, L-L and 45° of flexion A-P films, while MRI was performed in doubtful cases as well as arthroscopic evaluation if necessary. All patients were then evaluated with both an objective and subjective scoring scale (Womac and IKS score). Mean age at the time of surgery was 54.2 years and right side was involved in 4 cases. All patients met with previous inclusion criteria even if preoperative arthroscopic evaluation was necessary in 3 patients. Average hospitalization was 4.5 days. Our postoperative protocol consisted in immediate CPM in order to recover a complete flexion as soon as possible, partial weight bearing for the first 21 days and quadriceps and glutei strengthening. All patients were rewieved at an average FU of 22 months. All patients but one experienced a complete pain relief during daily life activities as well as a postoperative ROM comparable to the unaffected side. Womac and IKS score improved from 15.3 and 118 to 88 and 178.2 respectively. Our preliminary results confirm that Hemicap prosthesis may represent a good option in the treatment of chondral lesions in patients that are too old to receive a biologic treatment or too young to undergo a prosthetic replacement. In case of correct indications and proper surgical techniques (mapping of the lesion and inclination of the cup) we observed a complete pain relief and postoperative ROM comparable to the unaffected knee.

P18-456

Prevention of blood induced joint damage by using intra-articular iron Chelators; an experimental study in rabbits

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Purpose: Animal model was designed to evaluate the effect of intra-articular iron chelator treatment in prevention of blood induced joint disease.

Methods: Thirty domestic male rabbits were divided into 3 equal groups. One milliliter of homologous blood was injected into the left knee of each rabbit in group 1 and 2. In group 2, 0.1 ml desferroxamine mesilate (DM) was given beside blood. In group 3, the animals received injections of 0.1 DM which was mixed with equivalent volume of sterile saline solution. The joints were injected 3 times each week for 12 weeks. At the end of 12 weeks, the knee joints of each rabbit were sacrified.

Results: The synovium in group 1 was thicker than in group 2 and found as statistically significant. Obvious erosion and ulceration of the cartilage was seen in all joints in group 1 but absent in group 2. In group 2, there were inflammatory infiltrate without any cartilage defect. In group 3, synovium was normal in all sections.

Conclusion: Iron chelator treatment reduced the formation of blood induced joint damage in rabbit knees by inhibiting the iron-catalyzed formation of destructive oxygen metabolites which has a direct effect on joint cartilage and synovium.

Key words: Blood, cartilage damage, oxidative stress, iron chelator.

P18-470

Management of chondral defects in the varus knee

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Chondral defects of the articular surface of the knee remain a management challenge. Various cartilage repair techniques have been described, including marrow stimulation (i.e. subchondral drilling, abrasion arthroplasty, microfracture), autologous cultured chondrocyte implantation osteochondral autograft transplantation (i.e. mosaicplasty) and autogenous periosteal grafts.

Arthroscopic autologous chondrocyte implantation is a management option for chondral defects, but it is contraindicated in the presence of tibio-femoral malalignment, which would impose mechanical overload to the repair tissue.

For this reason we aimed to investigate the outcome of patients with chondral defects of the medial tibial plateau and varus malalignment of the knee who underwent arthroscopic implantation of autologous chondrocytes and a medial opening wedge high tibial osteotomy.

8 patients (4 men and 4 women; mean age, 49.6 years, range: 42 to 58) with chondral defects of the medial tibial plateau in a varus knee underwent arthroscopic implantations of autologous chondrocytes in conjunction with a medial opening wedge osteotomy. Pre and post-operative IKDC score, Lysholm score, Tegner score and VAS score were used to evaluate the patients.

The Lysholm score, Tegner score and the VAS score showed significant improvements from pre-operative to post-operative values. Lysholm score from 65.7 (49-88) to 94.6 (89-100), Tegner score from 3.7 (3-5) to 7 (5-8), VAS from 7.2 to 2.0.

All patients showed also improved the IKDC scores. Preoperatively, 4 patients had abnormal and 4 severely abnormal pre-operative values. At final post-operative follow up 28.1 months following the index procedure, 4 patients had normal, 3 nearly normal, and 1 abnormal values. Cartilage repair procedures aim to obtain a mechanically durable graft that can resist high impact loading and wear and tear. Consequently, untreated mechanical malalignment is a contraindication to articular cartilage restoration. HTO transfers mechanical loads to the unaffected compartment of the knee.

HTO alone and conventional treatments that abrade or penetrate the subchondral bone (drilling or microfracture) produce fibrocartilaginous repair that is mechanically inferior of hyaline cartilage.

Autologous chondrocyte implantation and osteochondral grafting are contraindicated alone in the presence of tibio-femoral malalignment, which produces overload on the affected compartment of the knee, and subjects the repair tissue to mechanical overload.

The association of chondral resurfacing with HTO produce a better outcome compared with HTO alone. Hence, we performed arthroscopic implantation of autologous chondrocytes combined with an opening wedge osteotomy on the medial side of the proximal tibia for the management of varus malalignment and chondral surface lesions of the medial tibial plateau.

In our hands the association of arthroscopic implantation of autologous chondrocytes with an opening wedge osteotomy on the medial side of the proximal tibia is a viable option for the management of chondral defects in varus knees.

P18-502

Functional and goal-oriented rehabilitation program to return to sport after arthroscopic autologous chondrocyte transplantation of the knee

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Cartilage knee injuries are rather common in athletes practicing sports activities with repetitive high-level impact and torsional loading. The management of these injuries is difficult depending to the limited potential to repair of articular cartilage tissue, and because it requires a long recovery period that precludes athletic competitions for months or even years.

Recently the treatment of full-thickness cartilage injuries have been improved with arthroscopic second generation autologous chondrocyte transplantation, that presents many advantages over other cartilage reconstructive techniques, reducing the joint surgery trauma and accelerating the recovery.

The rehabilitation program following autologous chondrocyte implantation is a critical component of treatment that is designed to facilitate the graft's healing and influence the successful outcome of the procedure. It is well known the effect of intermittent pressure to induce chondrocyte proliferation and maturation activity, but excessive loads can be deleterious for the graft integration. Therefore the rehabilitation program, especially for patients that practice high impact sports, should be progressive, goal-oriented, individualized and ideally designed taking into account the patient's age, sport activity, and the lesion's size and location.

We identified four rehabilitative stages that represent a progressive continuum of therapeutic management. To ensure a successful outcome, rehabilitation should occur in a controlled setting, with skilled therapists and with access to rehabilitation swimming pool, gym, and field, under the supervision of the orthopaedic surgeons.

The goals of the four stages are: protection of the transplant, and the recovery of normal gait (stage 1); recovery of a correct run (stage 2); recovery of sports specific skills, and the restitution to team and competitions (stage 3); maintenance of the physical fitness attained during rehabilitation, and to prevent the risk of re-injury (stage 4). The progression from one stage to the next one is allowed according to surgeons advice and when the clinical criteria for progression to the next phase are fulfilled without pain, swelling and intra-articular effusion.

The safety of the rehabilitation program is assured by the goal-oriented protocols that is based on recovery of full range of motion, strength, and sport specific skills without pain, swelling or effusion. These clinical signs are indicative of the delicate balance required to promote cartilage healing and together with functional criteria must be always considered for load progression. Not all the patients are able to progress at the same speed and those with more severe impairments may require more time to progress through the rehabilitation program. Progression that is criterion-based, rather than time-based, consider these interpersonal differences. A strict cooperation between surgeon and rehabilitation teams is necessary for avoiding any dangerous practice.

P18-579

Osteochondral autogenous transfer for an early stage of knee osteoarthritis

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Introduction: There remain some debates on osteochondral autogenous transfer (OAT; mosaicplasty) for an early stage of osteoarthritis in knee joints (OA). It is still unclear whether OAT can actually stop disease progression when applied to the early OA, and whether transferred cartilage maintains its properties inside affected joint.

Objectives: To investigate effectiveness and validation of OAT for the early OA.

Materials and Methods: Consecutive series of seventeen cases (seventeen knees) were retrospectively reviewed. Six males, and 11 females, and average age at the surgery was 58.9±11.8 years old (37~70). Inclusion criteria was those patients who had isolated chondral lesion, ICRS grade-3 and -4, at medial femoral condyle (MFC), whose standing lateral femor-tibial angle (FTA) was less than 180 degrees, and whose radiographic OA grading was Kellgren-Lawrence (K/L) grading less than 3. Several numbers of osteochondral plugs were transferred from lateral and medial edges of femoral groove. IKDC subjective score, FTA, and K/L grading were assessed pre-operatively and at the final follow-up (19.2±9.7 months in average). The degree of medial meniscus (MM) extrusion at MRI coronal images was grade as grade-0 normal to grade-4 degenerated. Factors influencing post-operative outcomes were evaluated.

Results: Post-operative IKDC score improved comparing to pre-operative one. FTA significantly increased from 178±2.2 degrees pre-operatively to 179.5±3.0 degrees post-operatively (P=0.0030). And there was positive strong correlation between pre-operative FTA and post-operative FTA (R2=0.6699). Eight cases did not change in their K/L grading, while 9 cases deteriorated their grade more than one in K/L radiographic grading. There was no obvious correlation between pre-operative MM extrusion and increase in FTA.

Discussion: The present study demonstrated favorable short-term clinical outcomes after OAT for the early stage of knee OA where FTA was less than 180 degrees. However, the study also showed FTA increased after the surgery. In some cases where the pre-operative FTA was close to 180 degrees, the post-operative FTA increased being over 180 degrees. These results indicated that OAT significantly improved clinical outcomes while it cannot improve or maintain lower limb alignment suggesting that this mal-alignment could affect long-term clinical results.

Conclusion: In conclusion, this study showed OAT is an effective option for the early knee OA. Further long-term clinical study is mandatory to evaluate the influence of increased FTA on the clinical outcomes.

P18-598

Arthroscopic techniques for the fixation of a three dimensional scaffold for autologous chondrocyte transplantation: Arthroscopic techniques vs. open technique (conventional suture fixation)

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Objective: Current studies investigate the clinical outcome of matrix associated autologous chondrocyte implantations and compare them to arthroscopic microfracturing. Limitation of these studies is a comparison between a minimal invasive approach (m-ACI) and an arthrocopic technique (microfracture). Aim of the present study was to evaluate the structural properties of M-ACI with multiple fixation techniques implanted in fresh porcine knees after they had undergone load to failure. Our hypothesis was that the yield load, maximal load, and stiffness of both arthroscopic fixation techniques at time point zero are superior to these of conventional suture techniques.

Methods: We evaluated the ultimate failure load, yield load and stiffness of three different techniques for the fixation of a 2 mm thick polymer fleece: 1. Fixation with biodegradable PLLA Pins (group 1), 2. a transosseous anchoring technique (group 2), and 3. conventional suture fixation (group 3). Technique 1 (pin) and 2 (transosseous anchoring) can be used arthroscopically. The Kolmogorov-Smirnov test was used to test the normal distribution within the groups. A one-way analysis of variance (ANOVA) test was used to evaluate overall differences between the different test groups for load at failure and stiffness ($p < 0.001$).

Results: Stiffness was 6.62 ± 0.60 N/mm in group 1 (pin fixation); 3.83 ± 0.76 N/mm in group 2 (transosseous suture technique); and 1.62 ± 0.23 N/mm in group 3 (conventional suture technique). The difference between group 1 and group 3 and group 2 and group 3 was statistically high significant ($p < 0.001$). In group 1 the mean yield load was 77.37 ± 11.86 N; in group 2 the mean yield load was 61.89 ± 10.71 N, and in group 3 the mean yield load was 16.62 ± 5.35 N. Mean yield load in group 1 and group 2 was significantly higher than in group 3 ($p < 0.001$). Ultimate load was 88.56 ± 14.39 N in group 1; 72.30 ± 10.96 N in group 2; and 17.08 ± 5.32 N in group 3. The difference between group 1 and 2 and group 3 was statistically high significant ($p < 0.001$). In group 1 all specimen failed by tearing the scaffold. In group 2 the suture anchors of the scaffold were pulled out of the drill holes. In group 3 the sutures cut through the uninjured cartilage.

Conclusion: Our biomechanical data show that both fixation techniques, the pin fixation technique and the transosseous fixation technique have a higher ultimate load, yield load and stiffness than the conventional suture technique at time point zero However, these data can be interpreted only with the Bioceed C® matrix. The biomechanical data about the fixation strength of arthroscopic techniques for the fixation of three dimensional scaffolds for autologous chondrocyte transplantation justify the preferential treatment of arthroscopic fixation techniques with this particular biomaterial and should lead to further research these techniques.

P18-623

Bone marrow mesenchymal stem cells in a hyaluronan scaffold for treatment of an osteochondral defect in a rabbit model

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Objectives: Mesenchymal stem cells (MSC) may result in better quality of cartilage repair, reduction of donor site morbidity from cartilage harvesting and less hypertrophy of the repair tissue compared to autologous chondrocyte implantation. The purpose of this study was to evaluate whether MSC in a hyaluronan scaffold (HYAFF 11®) would induce repair of an osteochondral defect in a rabbit knee, and to compare the degree of repair with that obtained with same scaffold without cells.

Methods: Bone marrow was harvested from the posterior iliac crest in 11 New Zealand White rabbits. MSC were isolated and cultured in autologous serum

for 28 days. The cells were transferred to a hyaluronan scaffold 48 hours prior to implantation. A 4 mm diameter wide and 1.5 mm deep defect was created in the medial femoral condyle of both knees and a scaffold seeded with approximately 2 x 106 MSCs was implanted in one knee while an empty scaffold was implanted in the contra-lateral knee. After 24 weeks the rabbits were euthanized and histological sections were subjected to semiquantitative and quantitative evaluation by observers blinded regarding treatment modality.
Results: High degree of filling of the defects was obtained, with no statistically significant difference between the two treatment modalities. There were more chondrocyte cluster formation (p=0.03) in the MSC treated defects, but no difference in the parameters hyaline like cartilage, integration to surrounding cartilage, amount of necrosis and surface integrity. No hypertrophy of the repair tissue was seen.
Conclusions: In this study it appears that the additive effect of MSC in the repair of an osteochondral defect is limited. The study seems to support previous findings with relatively small differences when comparing hyaluronan scaffold with and without MSC in osteochondral defects. In an osteochondral lesion cells from the bone marrow adjacent to the lesion may contribute to the repair and partly outweigh the effect of the added cells. The effect of adding MSC or chondrocytes may be more important when the access to cells from the bone marrow is limited. However, MSC in a hyaluronan scaffold is a promising treatment approach, but further studies are needed.

P18-626
Chronic cartilage disorders in children knee
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Diagnostics and treatment of the knee cartilage pathology in children is an actual problem of paediatric surgery and traumatology, considering low reparative activity of the cartilage tissue.
We performed arthroscopy in 98 children (from 6 till 15 years old), hospitalized with the complaints of the knee pain, swelling and locking. All patients had had knee blunt trauma. Pathology of the articular cartilage of different grades (Outerbridge classification) was revealed in all cases.
Patients with chronic chondral and osteochondral fractures of the patella and femur`s condyles made the most numerous group of the children - 62% (61 cases), including 15 cases with free osteochondral fragment. Full rupture of the anterior cruciate ligament (ACL) was the cause of the degenerative changes of the femur`s condyles (grade 2-3) as we revealed this cartilage disordes in all children with such kind of the ACL injury (15 cases - 15%). Ostechondritis dissecans was revealed in 5 children (5,5%) - 3 - patella, 2- medial femoral condyle. We observed chondral lesions (2-3 grade) of the femur`s condyle in 5 children (7 knees) with discoid lateral meniscus. Plica mediopatellaris caused severe cartilage damages (till grade 4) in 12 patients (12%). We performed microfractures (48), chondroplasty (52), removal of the free osteochondral fragment (15), partial resection of the discoid lateral meniscus (7) and resection of the pliica mediopatellaris (12). Besides surgical treatment of the cartilage injuries all children received rehabilitation treatment, chodroprotectors, intraarticular viscosupplementation with hyaluronic acid. The remote results of the treatment were different and depended on the type of the pathology. All patients were examined in 1 year after arthroscopy. We observed no pain, swelling and locking in all patients with chronic osteochondral and transchondral fractures, cartilage injuries caused by discoid lateral meniscus and plica mediopatellaris. Only 40% of the patients with osteochondriris dissecans had no complaints. Children with cartilage degenerative changes caused by full ACL ruptures had complaints in all cases.
Using arthroscopy in acute period of the knee blunt trauma in children allows to determine the injury and performed efficient treatment in early posttraumatic period (before the progressing of degenerative changes). Unsatisfactory results of nonoperative treatment of the ACL injury testify to necessity of its surgical restoration to prevent cartilage disorders.

P18-692
Osteonecrosis of the knee following artrhoscopic operations
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Objectives: The last years with the increased number of arthroscopic procedures in elderly patients a new terminology the so-called "postmeniscectomy osteonecrosis" has been reported. We retrospectively review 14 such cases.
Methods: We review the charts, the radiographs and MRI's of fourteen cases who developed osteonecrosis of the knee after routine arthroscopic meniscectomy. Nine men and five women with a mean age of 63.1 (55-76) years met our inclusion criteria. In six patients there was a previous history of a mild twisting type injury. All the patients had no signs of osteonecrosis at the preoperative MRI and plain X-rays. MRI was done between 2 and 5 months after the onset of symptoms.
Results: In all the patients a partial meniscectomy of the medial meniscus was performed. Postoperatively all patients experience persistent knee pain in a period between 2 to 14 weeks after the operation. A new MRI revealed osteonecrosis of the femoral condyle. Five patients operated on with a unicondylar knee arthroplasty while in the other nine cases conservative treatment was followed.
Conclusions: The so called "postmenicsectomy osteonecrosis" is a rare clinical entity affecting mainly elderly patients. Although the incidence cannot be defined and the etiology remains unclear we must be aware of this clinical entity. The degenerative tear of a meniscus is a common MRI finding at this age and there is need firstly of conservative treatment before performing an arthroscopic partial meniscectomy. In cases of persistency of symptoms after an arthroscopic meniscectomy the diagnosis of the osteonecrosis must be clarify with a new MRI.

P18-696
Evaluating knee function in patients treated with characterized chondrocyte implantation and microfracture, following an identical, standardized rehab protocol.
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Objectives: It may be expected that a two-step open surgery with characterized chondrocyte implantation (CCI) would be disadvantageous to the pace of knee function recovery compared to a one-step arthroscopic microfracture procedure. The objective was to assess the target knee function in patients following an identical, standardized rehab protocol, as part of a prospective randomized clinical trial comparing CCI to microfracture in treating symptomatic cartilage defects of the knee.
Methods: CCI (N=51) and microfracture (N=61) patients were assessed preoperatively and at 6, 9, and 12 months post operatively. Mobility (AROM, with standard goniometer), Anterior Laxity (with KT1000, N134), Isokinetic Strength (concentric peak torque in %BW at 60°/sec) and lower limb Functionality (with a single hop, the crossover triple hop and timed hop test) were evaluated. Of 112 patients, 100 completed the mobility tests, 85 the functional tests, 75 the strength tests and 65 of the patients completed the anterior laxity tests. Completion rate was equally divided amongst groups.
Results: There were no significant differences in knee function between both treatment groups preoperatively. Also at 6, 9 and 12 months no significant differences were observed between treatment groups for all four tests, except at 9 months the difference for quadriceps strength for the microfracture group (Med =186) compared to the CCI group (Med= 144) was significantly higher (p = 0,046). In general the knee function recovered at 12 months.
Conclusion: Strikingly the results demonstrate that there is no significant influence of the different surgical procedures on the function of the target knee at 12 months post-surgery. Future research on symmetry index could be an interesting approach to elucidate the knee function more sensitively.

P18-737
Mosaicplasty in athletes: two to seven years follow up
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Objective: Evaluate retrospectively mosaicplasty technique for the treatment of chondral lesions of the knee in athletes and determine predictive factors for good or poor outcomes.
Methods: 30 patients (27 male, 03 females, medium age of 37 years) were subjected to mosaicplasty for the treatment of chondral lesions of the knee. 07 patients were simultaneously subjected to meniscectomy and 08 to meniscectomy and anterior cruciate ligament reconstruction. They were preoperatively evaluated by subjective IKDC and modified Cincinnati protocol. 19 patients were reevaluated post-operatively with 02 to 07 years of follow up. The subjective IKDC and modified Cincinnati protocol and return to previous sports activity were applied in order to evaluate the clinical outcomes.
Results: Subjective IKDC was 64.6 ± 6.8 pre-operatively and 81.8 ± 20.1 post-operatively (p<0,01). Modified Cincinnati was 5.3 ± 0.8 pre-operative-

ly and 7.5 ± 1.7 post-operatively (P<0,01). 53% of the patients returned to pre-operatively level of sports activity, 29% returned in a lower level and 17% did not return to sports (P<0.01). Although not statistically significant, a trend to better results was observed in patients younger than 35 years, with less than one year of symptoms, and patients without concomitant ACL tear. Throclear lesions seem to have inferior results than condylar lesions.
Discussion: Mosaicplasty demonstrated to be a good technique to the treatment of knee chondral lesions in younger patients without associated lesions and with shorter period of symptoms. It corroborates literature results.
Conclusion: Mosaicplasty promoted a subjective improvement of the knee in athletes. Return to sports activity occurred in a specific group of patients.

P18-780
Efficacy of bone substitute in the arthroscopically assisted treatment of tibial plateau fractures
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Objectives: Tibial plateau fractures affect the stability and the function of the femorotibial joint.
The fractures of the tibial plateau require precise restoration of the articulare surface, stable internal fixation for early mobilization.
The correction of depression was normally maintained with autologus bone graft, but now there are many different substitutes available.
The purpose of this study is to asses the functional outcomes of the minimally invasive techniques in the treatment of the tibial plateau fractures using β tricalcic phosphate as bone substitute.
Methods: We treated 11 patients with tibial plateau fractures taking in account the Schatzker classification (type II, III). The operation consists in arthroscopic inspection of the joint, management of the meniscal injuries and reconstruction under arthroscopic control of the joint surface.
Osteosinthesis was performed with screws and plates (minimally invasive aproch).
The bony defect was filled with β tricalcic phosphate (ChronOs).
After surgery, full weight bearing was permitted within 8-10 weeks.
Follow up at 12 months included clinical, functional (KSKS, Lysholm score) and radiographic control.
Results: In all cases knee range in flexion was more than 100°, normal extension, without any limitation in walking activity. Functional evaluation with Lysholm score gave an average 95.3. Radiograms showed in all 11 cases consolidation of fracture and restoration of articular morphology.
Conclusions: Arthroscopy offer many advantages in the treatment of the tibial plateau fractures: optical control of the reduction, management of meniscal injuries, less morbidity.
The bone substitutes (ChronOs) demonstrated to be effective and comparable with autologous bone. Advantage consists in avoiding a supplementar surgical time for bone grafting with low morbidity and quick recovery.

P18-811
Safety of characterized chondrocyte implantation (CCI) in treatment of patients suffering from symptomatic knee cartilage defects - compassionate use program (CUP)
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Objectives: The compassionate use program (CUP) evaluates findings of patients with complex knee cartilage defects for whom standard treatment has failed. Participants received treatment under the condition that the surgeon weighed out the risks and benefits of CCI.
Methods: Neither pre-defined eligibility criteria nor prospective outcome measures were established. Participants reported all clinically relevant knee-related AEs after CCI. Collected data was listed according to MedDRA (version 8.1) in terms of event severity; variables were summarized by descriptive statistics.
Results: At the time of database lock, 207 patients received CCI; safety data was available from 163 subjects. Most common AEs (reported in 43% of the patients) were arthralgia, joint swelling/effusion, muscle atrophy and joint crepitation/lock. Ninety percent of these AEs were considered unlikely/unrelated to CCI. Single cases of hypertrophic scar (skin) and knee instability were considered to be graft-related; they have been regarded as new/unexpected/non-serious ADRs. Five percent of the patients reported serious AEs, only one case of arthrofibrosis was considered possibly related to CCI.
Conclusions: Reported AEs give no indication of a significant risk for CCI. Overall, CCI is well tolerated in a CUP population; reported AEs were within expectation range in patients undergoing knee surgery.

P18-825
A prospective study of alginate seeded with mature allogenic human chondrocytes in the treatment of articular cartilage defects
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Aim of the study: To produce tissue-engineered cartilage by human articular chondrocytes cultured in a biocompatible, biodegradable matrix for the treatment of (osteo)chondral lesions.
Materials and Methods: Earlier studies have shown that chondrocytes proliferate in alginate, and synthesize a cartilage-like matrix for up to 8 weeks. Allogenic human chondrocytes were cultured in 1.0% alginate beads for 2 weeks before implantation into cartilage defects of the knee joint. Prior to the surgical intervention a small part of the alginate beads was dissolved and the chondrocytes were tested for their phenotypical stability. The (osteo)chondral lesion of the femoral condyle in 22 patients (3 lateral - 19 medial) was debrided by an open technique, and covered by an autologous periosteal flap. Subsequently the defect was filled with the alginate beads. The cartilage lesion was finally injected with 0.5% fibrin gel. Parameters that were followed pre- and postoperatively, were the Lequesne index, the WOMAC, the KOOS and VAS-score, and Gd-DTPA MRI. A follow-up arthroscopy to assess the macroscopic aspect and the integration of repair tissue into surrounding native cartilage was performed at 12 months postoperatively.
Results: Clinically, major adverse reactions to the scaffold seeded with the cartilage cells, were not observed. The results (mean follow-up: 19months) of clinical examination of the involved joint as well as the functional scores improved with time. Follow-up arthroscopy at 12 months showed an intact articular surface, with good integration into the surrounding cartilage, and a practically normal indentation was felt on palpation.
Conclusion: This surgical procedure is performed in one step. Biodegradable, biocompatible scaffolds could be used in the treatment of cartilage defects, with the advantage that the artificial matrix provides an initial support to the chondrocytes, making the implant theoretically initially biomechanically superior to the model in which cells are injected as a suspension under a periosteal flap.

P18-833
Safety of characterized chondrocyte implantation (CCI) in the treatment of patients with complex symptomatic knee cartilage defects - Expanded Access Program (EAP)
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Objectives: Results from a pivotal Phase III clinical trial show that treatment with CCI compared to microfracture results in improved structural repair of symptomatic cartilage defects without a marked increase in adverse events (AEs). The Expanded Access Program focuses on the safety of CCI exposure in a population presenting symptomatic complex knee cartilage lesions, but were ineligible for the above-mentioned trial.
Methods: Participating patients were followed up to 24 months on a named-patient basis. CCI safety was assessed by monitoring AEs.
Results: All 22 patients reported at least one treatment-emergent AE of mild to moderate intensity. Most common AEs included arthralgia, joint swelling/effusion, and muscle atrophy (which were reversible). Cartilage hypertrophy was reported in two patients, two other reported graft complications requiring re-intervention. There was a total of 17 SAEs in ten patients, none of which was considered to be product-related.
Conclusions: Based on these findings, we conclude that there is no evidence for any major safety issues following CCI treatment in patients with com-

plex knee cartilage lesions. Most reported AEs may be associated with the severity of joint damage in this particular population, and/or the associated surgical procedure.

P18-836

Arthroscopic treatment of popliteal cysts

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There are various modalities in the treatment of popliteal cysts. The aim of this study is to investigate the efficacy of endoscopic excision of popliteal cysts together with the arthroscopic evaluation of the co-existing intraarticular pathologies.

Between the years 1994-2005, 24 patients (9 men, 15 women) who came to our clinics with the complaint of soft tissue swelling and mass in the popliteal fossa, are included in this retrospective study. All had preoperative MRI, confirming the diagnosis of popliteal cysts. One patient who was previously treated by open popliteal cyst excision in another hospital applied to our clinics with recurrence. The mean age of the patients was 48 ± 16 SD. The pathology was on the left knee in 13 and on the right knee in 11 patients. Diagnostic and therapeutic arthroscopy was performed to all 24 patients and their popliteal cysts were removed with the cyst wall. The patients were mobilized full weight bearing on postoperative first day and physiotherapy was started.

During arthroscopic evaluation, popliteal cysts were seen together with degenerative arthritis except 3 patients. In 21 patients, there were degenerative medial meniscus tears and Outerbridge Grade II-III chondromalasia in the medial femoral condyle. Partial menisectomy and chondroplasty were performed to these patients. In all patients, no connection between the cyst and knee joint was found. During their follow-up, only one patient had recurrence (0.4 %). After the re-excision of the popliteal cyst in this patient's second arthroscopic evaluation, recurrence did not occur during the follow-up.

Only open surgical excision of the popliteal cysts results in high recurrence rates and unsatisfactory results. The underlying intraarticular knee pathologies should also be treated by arthroscopy. As a result of this study, arthroscopic evaluation and treatment of the popliteal cysts and underlying intraarticular knee pathologies is found to be safe, minimal invasive, efficacious, with very low recurrence rates. Multicentric, prospective and randomized clinical studies are needed further.

P18-838

Simultaneous arthroscopic autologous chondrocytes implantation and high tibial osteotomy for chondral defects in the varus knees

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Purpose: To report the outcome of 8 patients (4 men and 4 women; mean age, 49.6 years, range: 42 to 58) with chondral defects of the medial tibial plateau and varus malalignment who underwent arthroscopic autologous chondrocyte implantation and medial opening wedge high tibial osteotomy

Methods: Pre- and post-operative IKDC score, Lysholm score, Tegner score and VAS score were used to evaluate the patients.

Results: The Lysholm score, Tegner score and the VAS score showed significant improvements from pre-operative to post-operative values. Lysholm score from 65.7 (49-88) to 94.6 (89-100), Tegner score from 3.7 (3-5) to 7 (5-8), VAS from 7.2 to 2.0.

All patients showed also improved the IKDC scores. Preoperatively, 4 patients had abnormal and 4 severely abnormal pre-operative values. At final post-operative follow up 28.1 months following the index procedure, 4 patients had normal, 3 nearly normal, and 1 abnormal values.

Conclusions: The association of arthroscopic implantation of autologous chondrocytes with a medial opening wedge osteotomy of the proximal tibia is a viable option for the management of chondral defects in varus knees. Level of evidence: IV, Case series

Key words: High tibial osteotomy; Arthroscopic autologous chondrocyte implantation; Varus knee; Chondral defects; Arthroscopy.

P18-839

Arthroscopy excision of benign bone tumour - case report

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Introduction: Excision with or without bone grafting is the best treatment for many benign bone tumours. The conventional open approach is often satisfactory, but is associated with significant morbidity and complications. The cortical window prepared to approach such lesions further compromises the already weakened osseous framework and sometimes results in intra-operative and post-operative fractures. Under this circumstances an arthroscopy approach would be desirable.

Case report: A 52- years- old lady, presented pain around the left knee sometimes with a mild swelling that appeared over de past 6 months. There was no history of trauma to the knee, any fever, any systemic symptoms.

Examination revealed normal range of motion with some pain at extreme flexion, McMurray`s test was negative and no evidence of ligamentous laxity. X-ray of the knee was normal. MRI of knee joint showed a image well delimited in distal femur over the intercondilar notch, with caractheristique aspect of an enchondroma.

The patient underwent arthroscopic excision using the same approach for the femoral tunnel of the anterior cruciate ligament plasty.

Conclusion: Arthroscopic excision is the treatment of choise for certain benign bone tumours around the knee. The advantages of this approach over the conventional open approach include a decrease risk of intraoperative and postoperative fractures, decrease morbidity of approach and cosmesis.

P18-853

Increased type I collagen in undamaged cartilage of anteromedial osteoarthritis of the knee

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Introduction: Anteromedial osteoarthritis (AMOA) is a distinct phenotype of knee osteoarthritis. The arthritic lesion on the tibia is localised to the anteromedial quadrant with preservation of cartilage posteriorly in a crescenteric form. The aim of this study was to investigate the molecular features of the different severities of cartilage damage from adjacent areas, from anterior to posterior, within the AMOA knee.

Methods: Ten medial tibial plateau specimens were collected from patients undergoing unicompartmental knee replacements. The specimens were prepared for histological and immunohistochemical analysis. Sections of the same cartilage were snap frozen for quantitative immunoassay and Real Time Polymerase Chain Reactions (RT PCR). The sections underwent histological staining, with Safranin-O and H&E, and were OARSI graded. Further sections were used for immunohistochemical staining for Type I and II Collagen. The cartilage within the area of macroscopic damage was divided into equal thirds: T1(most damaged), to T3 (least damaged). The area of macroscopically undamaged cartilage was taken as a 4th sample N. Immunoassays were undertaken for Collagen I, Collagen II and GAG content. RT PCR compared gene expression between areas T and N.

Results: As expected, there was a decrease in OARSI grade across the four areas, with progressively less fibrillation, and more safranin-O staining between areas T1, T2 and T3. Area N had an OARSI grade of 0 (normal).

The Immunoassay for GAG showed decreased levels with the increasing severity of cartilage damage (ANOVA $P<0.0001$). There was no significant difference in the Collagen II staining, content or gene expression between areas. Unexpected results were obtained for Collagen I. The immunohistochemistry showed an increase Collagen I staining, occurring within chondrocyte pericellular areas in the undamaged region (N).

This was confirmed by immunoassays which showed that the Collagen I content of this posterior, macroscopically and histologically normal cartilage, was significantly higher than the damaged areas (ANOVA $P<0.0001$). Furthermore, RT PCR showed that there was a significant difference in Collagen I expression between the damaged and macroscopically normal areas. ($p=0.04$).

Conclusion: In the AMOA phenotype there are distinct areas, demonstrating progressive cartilage loss. We conclude that in this phenotype Collagen I content is increased in areas of macroscopically undamaged and histologically normal cartilage. These changes seen in Collagen I may represent very early changes of the cartilage matrix within the osteoarthritic disease pro-

cess, and may be able to be used as an assay of early disease. The changes found with Collagen I expression may also be a therapeutic target for disease modification or treatment.

P18-885

Inter-rater reliability of a clinical scale to assess knee joint effusion

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Background and Purpose: Knee joint effusion may indicate joint inflammation or irritation, therefore, objective monitoring of this variable may be important in clinical decision-making. The author's clinic utilizes a modified stroke test to assess for knee joint effusion. (Figure 1)

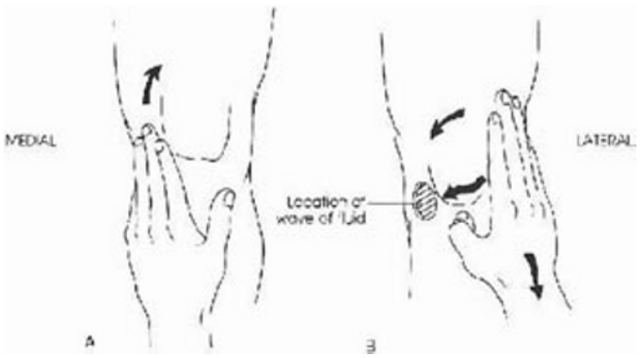

Figure 1

An operationally defined grading scale to assess knee joint effusion is presented. The purpose of this study was to determine the inter-rater reliability of this knee joint effusion grading scale in an outpatient orthopedic physical therapy clinic.
Subject: Seventy-five patients (44 male, 31 female) who were receiving outpatient physical therapy for a unilateral knee problem for whom effusion testing was indicated were utilized. The subject's age ranged from 16 to 65 years old.
Methods: Pairs of therapists graded the knee joint effusion using the clinical grading scale. A contingency table was constructed and was analyzed using Cohen's kappa values to establish inter-rater reliability. Statistical analyses were conducted to establish level of agreement.
Results: The kappa value was 0.61 and the percent agreement was 0.73. Fifty-four of 75 pairs of tests had perfect agreement. Only 5 had disagreement of two grades and there were no disagreements of more than two grades.
Conclusion and Discussion: These findings provide evidence to support the clinical effusion grading scale presented is a reliable method to assess knee joint effusion between therapists in an outpatient orthopedic physical therapy clinic in patients with unilateral knee dysfunction. Only 5 of 75 tests resulted in disagreement that could result in different clinical decisions being made by the therapists.

P18-897

Safety of characterized chondrocyte implantation (CCI) in the repair of symptomatic cartilaginous knee defects

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Objectives: The study focuses on the safety of CCI using autologous chondrocytes for up to 24 months post-surgery in Belgian Army staff with single or multiple cartilage lesions.
Methods: Patients were treated with CCI (n = 20). Safety parameters such as AEs, physical examination and concomitant medication were determined. At the 24 month-time point, safety data was available for nine patients.
Results: Treatment-emergent AEs (TEAEs) were reported in 95% of patients. Most commonly occurring AEs were musculoskeletal/connective tissue disorders (80% of the patients), including arthralgia, joint effusion/crepitation/swelling and tendonitis. Many AEs were considered to be surgery-related, and of mild to moderate intensity. Severe AEs were reported in 15% of the patients, including wound infection, arthralgia and neck pain. Nine patients experienced 16 serious AEs; of these, seven cases were considered related to the surgical procedure and one to the transplant itself. There were no cases of cartilage hypertrophy or re-intervention.
Conclusions: There is no evidence for any safety issue or unexpected risk indicating that CCI is inappropriate for the studied population. AEs for which a relationship to the treatment could not be excluded might exhibit the inherent risks of surgery procedures and/or any underlying joint damage.

P18-898

Autologous chondrocyte transplantation in treatment of the chondral defect of the knee (second look and MRI study)

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Introduction: Clinical, radiographic, and arthroscopic results of twenty-two knees that had undergone autologous chondrocyte transplantation (ACT) were evaluated.
Materials and Methods: Seventeen males and four females with average age of 26 years at the time of surgery from 1999 to 2000 were included and followed for 44 months. Diagnoses at the time of surgery were osteochondritis dissecans (n=14), chondral or osteochondral defect (n=7), and osteonecrosis (n=1). 13 lesions were on medial femoral condyle, 7 on lateral femoral condyle, 4 on femoral trochlea. The average defect area was 5.3cm2 (1.5-12.5). Treatments were performed in two separate operations, initial arthroscopic evaluation and obtaining slivers of cartilage for culture, and later implantation 4 to 6 weeks after the harvest. Passive motion exercise was administered within 48 hours after the surgery and rehabilitation on crutches with non-weight bearing was kept for 6 weeks.
Results: Postoperative range of motion was not different from preoperative range. Lysholm score improved from 70 to 90. Brittberg score was 9.9 (8-12) on second look arthroscopy (n=11). 26 postop MR images were obtained from 17 patients. Signal identical with surrounding cartilage and repair tissue-bone interface irregularity was maintained postoperatively, and frequent hypertrophic changes were observed. Two graft failures and one hematoma were observed. Manipulation was performed due to limited range of motion in two knees and debridement of hypertrophic tissue was done in two knees.
Conclusion: Autologous chondrocyte transplantation offers an important treatment option for large, full thickness defect located on the weightbearing surface of the femur, however, every effort has to be made for the successful results and the surgeons should be aware of the adverse events frequently encountered.

P18-901

Redifferentiation and hyaline-specific extracellular matrix protein synthesis in human chondrocytes cultured in a PCL scaffold

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The redifferentiation, proliferation and hyaline-specific extracellular matrix (ECM) protein synthesis of chondrocytes cultured in a polycaprolactone (PCL) scaffold were analysed. Gene expression of the type II collagen and aggrecan was assessed by real-time PCR in cells from PCL, monolayer and pellet cultures. Ki-67 immunodetection was used to assess the proliferative activity of cells cultured in PCL scaffolds and pellets. Chondrocytic differentiation was evaluated using S-100 immunodetection, and the synthesis, and deposition into scaffold pores, of type II collagen and of glycosaminoglycan (GAG) were analysed by immunohistochemistry and Alcian blue staining, respectively. All parameters were assessed at 7, 14 and 28 days of cultures maintained in either FBS-containing medium (FCM) or ITS-containing medium (ICM). Expression of the type II collagen gene was lower in FCM cultures than in ICM cultures for all culture systems ($p<0.05$) at all times of measure. Moreover, PCL scaffolds cultured in ICM were able to induce collagen gene expression more efficiently than pellet and monolayer cultures. Aggrecan gene expression did not vary significantly among FCM cultures, but in ICM cultures, the monolayer cultures had significantly higher levels of aggrecan gene expression than did either the PCL or pellet cultures. Chondrocytes cultured in PCL scaffolds or pellets with FCM did not proliferate to a great extent but did maintain their differentiated phenotype for 28 days. Levels of hyaline-specific ECM protein synthesis, and protein deposition

into the scaffold pores, were similar among PCL and pellet cultures grown in FCM and in ICM. In conclusion, chondrocytes seeded in PCL scaffolds and cultured in medium supplemented with ITS, efficiently maintained their differentiated phenotype and were able to synthesise cartilage-specific ECM proteins.

P18-902

Efficacy of characterized chondrocyte implantation (CCI) in the repair of symptomatic cartilaginous knee defects

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Objectives: CCI optimizes in vivo structural cartilage repair by using a patented cell marker-based selection. Present study tested the efficacy of CCI by measuring knee function and pain before and up to 24 months after intervention.

Methods: The study was performed on Belgian Army staff with single or multiple knee cartilage lesions. Recruited patients (n=20) received CCI. Efficacy was based on the KOOS, VAS and ARS for knee function, pain and knee activity respectively. Based on these clinical outcomes, efficacy data was obtained before and 24 months after CCI.

Results: Mean lesion size (n=20) was 2.33 cm^2 (SD: 1.16); mean administered dosage was 2.18 *106 cells /cm^2. Eighty percent of the cartilage lesions were ICRS grade III-IV. Regarding efficacy, clinical status improved significantly compared to baseline values (mean change in overall KOOS and subdomains = 28.2 at 24 months follow-up). Similar trends were observed for VAS and ARS. At 24 months post-surgery, the percentage of patients with asymptomatic knees increased from none (baseline) to 56%.

Conclusions: Significant improvement of clinical outcome over baseline demonstrates that CCI provides clinical benefit in a military population with symptomatic ICRS grade III-IV knee cartilage lesions.

P18-906

Extracorporeal shockwave treatment of early spontaneous osteonecrosis of the knee

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Purpose of the study: This work reported of eleven cases of early spontaneous osteonecrosis of the knee successfully treated with a novel extracorporeal shockwave treatment (ESWT).

Traumatic and vascular theories have been proposed as a causative factor of the spontaneous osteonecrosis of the knee, but the precise etiology still remains speculative. The lack of blood in some critical areas, such as the subchondral bone of femoral condyles or the tibial plateaus, has been considered the underlying condition of this pathology.

The ESWT, thanks to its neo-angiogenetic effect, can be suggested as an effective conservative treatment for spontaneous osteonecrosis of the knee.

Materials and Methods: Ten patients (6 men and 4 women; mean age = 65 years) with a medial femoral condyle osteonecrosis of the knee (one bilateral) were evaluated in this work. Their history was negative for steroid therapy, systemic lupus erythematosus, alcoholism, Caisson decompression sickness, Gaucher´s disease and hemoglobinopathies. Exclusion criteria was the evidence of a structural collapse of the subchondral bone. Two patients have received a femoro-popliteal by-pass within the last year, while others five presented a deficit of the vascular axis of the homolateral lower limb documented by an eco-colordoppler. A clinical evaluation was taken at the diagnosis using KSS, McGill Pain Questionnaire (PPI, NRS, VAS). Plain radiographs, radioisotope bone scan and MRI confirmed the diagnosis of osteonecrosis.

The patients were treated with a cycle of three ESWT performed with 2000 pulses of 0,28 mJ/mm^2 with Wolf Piezoson 300 Dornier Meditech with 6,5 MHz ultrasounds for three times in a month.

A clinical evaluation was performed at first and at third month after the treatment and a MRI evaluation was performed at fourth month after the treatment.

Results: The clinical evaluation showed a significant improvement of the symptoms ($p<0,001$) and of the articular functionality ($p<0,001$). MRI of all cases revealed the continuity of the cartilage with a reduction in bone marrow edema and no collapse of the lesion; in one case the total recover up to a normal signal in the subcondral bone was documented.

Discussion: The most effective treatment for osteonecrosis lesions without evidence of structural collapse is conservative, with rest and protected weightbearing. In our study, a single cycle of ESWT produced an improvement of the clinical and MRI aspects in eleven cases of spontaneous medial femoral condyle osteonecrosis of the knee. The neo-angiogenetic effect of the ESWT appears to accelerate the time for the symptom remission.

The ESWT might have the potential to curtail the progression of the disease and to avoid the need for surgical treatment.

P18-907

Physical function in patients with hip osteoarthritis versus normal control subjects - a case-control study

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Osteoarthritis (OA) is by far the most prevalent joint disorder. The knee and the hip are the principal large joints to be targeted and such conditions are important causes of pain and disability in the elderly. Several studies have examined patients with knee OA, but few studies have examined physical function in patients with hip OA.

Purpose: The purpose of this study was to evaluate if there were any differences in physical function (muscular strength, hip range of motion, walking distance, sub-maximal cardiovascular fitness test) and health related quality of life between individuals with hip OA and a matched control group.

Materials and Methods: Twenty-seven control subjects (13 men and 14 women) and 27 individuals with hip OA with a mean minimum joint space (MJS) of 2.1mm (0-3.9mm) were matched with respect to age, sex, and frequency of strength training according to Physical Activity Score for Elderly (PASE). Outcome measures: Isokinetic muscle strength tests for ankle-, knee- and hip extension and flexion, isometric muscle strength test for hip abduction, hip range of motion (ROM), the standardized 6 minute walking test (6MWT), Aastrands sub-maximal ergometer bicycle test, and the health related quality of life, SF-36 were used.

Results: The mean age for individuals with hip OA and the control groups was 60.3years and 59.5 years, respectively, with a range from 40-83 years. Mean body mass index was 24, with a range from 19-35. Individuals with hip OA had significantly reduced knee extension muscle strength on involved side compared to uninvolved, but there were no differences between left and right side for the matched control group ($p<0.05$). Individuals with hip OA had significantly reduced: hip extension ROM ($p<0.01$), hip internal and external ROM ($p<0.0001$), and abduction and adduction ROM ($p<0.0001$) compared to the matched control group. Individuals with hip OA showed significantly reduced walking distance for the 6MWT ($p<0.05$), and significantly reduced health related quality of life compared to the matched control group ($p<0.01$).

Conclusion: Individuals with a symptomatic hip OA with a MJS of less than 3.9 had significantly reduced physical function. The individuals with hip OA showed significantly reduced quadriceps muscle strength, reduced hip extension-, rotation and abduction ROM, reduced walking distance, and reduced health related quality of life compared to the matched control group. Physical therapy should target muscle strength- and hip ROM exercises for patients with hip OA. Future studies will be needed to disclose, whether improving these impairments will affect walking distance and health related quality of life.

P18-911

A prospective outcomes study of refrigerated fresh osteoarticular allografts to treat articular cartilage defects of the femoral condyles

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Objective: Fresh osteoarticular allograft transplants are often utilized to treat symptomatic chondral and osteochondral defects in the young, active population. Chondrocyte viability has been shown to significantly decrease when allografts are stored for longer than 28 days. The purpose of this study was to examine the clinical and functional outcomes of patients receiving refrigerated fresh osteoarticular allografts between 14 and 28 days after procurement. Our hypothesis was that outcomes after transplantation with fresh refrigerated osteoarticular allografts would not be clinically or functionally different from historically reported outcomes after fresh (<7 day) implanted osteoarticular allografts.

Methods: Twenty three consecutive patients (23 knees) who underwent treatment for focal articular cartilage defects of the femoral condyles with refrigerated fresh osteoarticular grafts were prospectively followed for a minimum of 24 months. The average age of the implanted refrigerated allografts was 20 days. Patients were assessed preoperatively and postoperatively for a minimum of two years with outcome surveys. Comparison among data collected preoperatively and at final clinical follow up was made using paired t-tests.
Results: Twenty three patients were prospectively enrolled during this time period. At the time of surgery, their mean age was 30.9 years (range, 16-47) and their body mass index (BMI) was 27.1 kg/m^2. The mean lesion size was 4.8 cm^2. The mean time between donor procurement and implantation of the allograft was 20.4 days (range, 15-25). Preoperatively, 14 patients has a diagnosis of a localized osteochondral lesion due to a dislodged osteochondritis dessicans lesion of the femoral condyle, while nine others had localized full thickness chondral defects. Cincinnati Knee survey results increased significantly from 49.2 pre-surgery to 67.6 at two years post-implantation (p=.003). IKDC Subjective scores increased significantly from 52.0 to 66.9 ($p < .001$) over the same intervals. No correlation was found between patient outcome scores and patient age, BMI, duration of symptoms, lesion size, graft age, or donor age at death. Radiographic evaluation at final follow-up revealed 22 of 23 (96%) of the grafts were in stable position with good osseous incorporation into host bone. No graft failures were encountered in any patient.
Conclusions: Transplantation of refrigerated fresh osteoarticular allografts stored less than 28 days provides significant functional and clinical improvement after a minimum of two years in patients treated for full-thickness osteochondral defects of the femoral condyles and was similar to historically reported outcomes.

P18-913

A randomized trial comparing arthroscopic surgery to non-surgical care for knee osteoarthritis

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Introduction: Although the efficacy of arthroscopic surgery for knee osteoarthritis is highly controversial, only one Level-1 study has been performed. We conducted an evaluator-blinded, two-group, parallel-design randomized controlled trial in patients with knee osteoarthritis comparing arthroscopic surgery plus non-surgical care (S+NS) to non-surgical care alone (NS).
Methods: Patients with knee osteoarthritis (Kellgren and Lawrence (KL) grade ≥2) presenting to a tertiary care clinic were eligible. Patients with unicompartmental disease with malalignment >5 degrees, and those >60 years of age with grade 4 disease in ≥2 compartments, were excluded. Stratification was by grade and surgeon. Arthroscopic treatment was at the surgeons' discretion and included lavage plus any combination debridement of articular cartilage, degenerative tears of menisci, osteophytes, and synovectomy. Non-surgical care consisted of medication management, physical therapy with continued home exercise (compliance monitored), and osteoarthritis-specific health education workshops. The primary endpoint was change in the WOMAC score at 2 years.
Results: 1019 patients were screened for eligibility from January, 1999 to August, 2005; 188 were randomized; 92 to the S+NS group (age=58.6±10.2, BMI=31.6±6.7, KL grades 2/3/4=42/45/5); 6 crossed-over, 86 received surgery [articular cartilage debridement (84), meniscal debridement (59), partial meniscectomy (38), loose bodies removal (12), osteophyte excision (8), synovectomy(11)]. 86 patients were in the NS group (age=60.6±9.9, BMI=30.2±6.3, KL grades 2/3/4=36/46/4). 4 patients from the S+NS group and 5 from the NS group withdrew from the study.
Conclusions: The results of this trial will provide the most scientifically rigorous evidence pertaining to the efficacy of this commonly used procedure.

P18-920

Implantation of minced autologous cartilage on a synthetic scaffold. Development of a one-stage cartilage repair technique

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Objective: The Cartilage Autograft Implantation System (CAIS) is being developed as a potential alternative surgical treatment of articular cartilage lesion(s) of the knee. CAIS involves preparation and delivery of minced, autologous cartilage loaded on a 3-dimensional scaffold, then fixated with staples. This described approach allows cartilage repair to be performed within a single surgical procedure. The mechanical fragmentation of cartilage tissue creates increased tissue surface area and therefore, facilitates the outgrowth of embedded chondrocytes onto a carrier matrix. The use of cartilage tissue fragments with an appropriate polymeric scaffold provides a novel intraoperative approach for cell-based cartilage repair. The clinical study is designed to assess safety and initial performance of the CAIS system.
Methods: A proprietary disposable, arthroscopic device for harvesting and mincing cartilage tissue has been developed. A scaffold made of polyglycolide/ polycaprolactone (PGA/PCL, Ethicon, Somerville, NJ) foam reinforced with polydiaxanone (PDS, Ethicon) mesh was designed for deliverance of the harvested cartilage fragments. For the fixation of the scaffold, PDS/PGA staples (DePuy Mitek, Raynham, MA) were constructed and optimized.
A multinational clinical study of CAIS is ongoing in the EU and involves 6 countries (Austria, Sweden Belgium, Germany, Italy, UK) and up to 35 patients. With the exception of Germany, the subjects are randomized in a 2:1 schema with microfracture as a control (CAIS:microfracture). Subjects return for follow-up visits at 1 and 3 weeks, 2, 3, 6,12, 24, and 36 months post-operatively. Subjects are clinically evaluated and interviewed regarding the occurrence of adverse events and asked to complete questionnaires regarding disability, function, pain and quality of life. MRI's are completed at baseline, 3 weeks, 6, 12, 24, and 36 months.
In addition, a US pilot clinical study has completed enrollment with 29 patients. This multicenter study involves 6 sites, with study parameters similar to the EU trial.
Results: In vitro studies show efficient harvest of viable tissue with potential outgrowth performance equivalent to previously published methods.
Safety and performance of both clinical study arms from the US pilot study will be reported through 6-months. In addition, some preliminary EU data will be discussed.
Conclusions: The instrumentation enabled the successful preparation and fixation of a minced autologous cartilage tissue loaded implant in a single intraoperative setting. The CAIS device has demonstrated short-term safety in subjects treated to date. Additional data must be analyzed regarding long-term safety and device performance.

P18-941

Second generation ACI in patellofemoral full-thickness chondral defects: A clinical, arthroscopic, and histologic review at 5 years follow up

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Tissue engineering has emerged as a potential therapeutic option for cartilage regeneration.
Our hypothesis was to verify if a second generation ACI procedure with a Hyaluronan-based scaffolds seeded with autologous chondrocytes could be a viable treatment for damaged articular surface of the patellofemoral joint at medium term follow up.
Methods: Thirty-two chondral lesions with mean size of 4.7 cm^2 were treated with Hyalograft-C. Twenty-two lesions were located in the patella and 10 in the trochlea. Sixteen patients had previous trauma, 3 had osteochondritis dissecans, and 13 had degenerative changes. Transplantations were carried out arthroscopically or through a mini arthrotomy incision. Eight patients had concomitant procedures, including patellar realignment, lateral release,

and meniscectomy. Results were evaluated using the International Cartilage Repair Society- IKDC, EuroQol EQ-5D form, and MRI scans at 5 yrs. Six patients had second-look arthroscopy and biopsies. Statistical analysis was performed using the paired t test and Wilcoxon signed rank test.
Results: The International Cartilage Repair Society- IKDC and EuroQol EQ-5D scores demonstrated a statistically significant improvement (P<.0001). Objective preoperative data improved from 6/32 (18.8%) with the IKDC A or B to 29/32 (90.7%) at 5 yrs. after transplantation. Mean subjective scores improved improved from 43.2 points preoperatively to 73 at final follow up. Magnetic Resonance Imaging studies revealed 70% to have an almost normal cartilage with positive correlation to clinical outcomes. Second-look arthroscopies revealed the repaired surface to be nearly normal with biopsy samples characterized as hyaline-like in appearance.
Conclusion: Biodegradable scaffolds seeded with autologous chondrocytes can be a viable treatment for chondral lesions at medium term. The type of tissue repair achieved demonstrated histologic characteristics similar to normal articular cartilage. A Longer follow up will determine the durability of the repair produced with this technique.
Keywords: autologous chondrocyte implantation (ACI); chondral lesions; patellofemoral; chondrocytes; scaffold

P18-946
Engineering in vitro an osteochondral plug
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Articular cartilage has a poor intrinsic regenerative potential. As a matter of fact, when a lesion occurs, the repair tissue is often fibrous, having insufficient biomechanical properties, which could frequently lead to the development of early osteoarthritis when physiologic mechanical forces act on this repair tissue. Moreover, the treatment of osteochondral lesions is often challenging. In the last decade, tissue engineering approaches addressed this topic with many cell-seeded biomaterials and some of them are currently used in clinical practice. In previous studies, we focused on engineering in vitro a biphasic composite made of cellular fibrin glue and a calcium phosphate scaffold evaluating the morphology, the histological appearance and the integration between the two components of the construct. Those studies demonstrated a gross and microscopic integration of the two components and a cartilage-like quality of the newly formed matrix. Moreover, we noticed an improvement of this integration and GAGs production during the in vitro culture. The present study is focused on the evaluation of the immunohistochemical, biochemical and biomechanical properties of our construct. We noticed an increase in the collagen type 2 synthesis over the experimental times at the immunohistochemical assay. Regarding the biochemical properties, we noticed an increase in the GAGs and DNA quantity over the experimental times. Regarding the biomechanical properties we registered an improvement in the compression and shear modulus. These data suggest that culturing the samples before implantation can give the surgeon a more developed and resilient construct. However, this model needs to be validated in an in vivo orthotopic environment in order to evaluate its behaviour under physiologic load bearing stimuli and the integration of the construct in the host tissues in order to define the optimal timing of in vitro culture before implantation. We believe that this model based on coupling a cell-seeded hydrogel and an hard scaffold could be a valuable model for osteochondral repair.

P18-961
Durability of ACI up to 10 year follow-up: A multicenter observational study
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Objectives: The purpose of this study was to determine if improvement with autologous chondrocyte implantation (Carticel, ACI) at 1-5 year follow-up is sustained at 6-10 year follow-up.
Methods: 72 patients met eligibility criteria: full-thickness distal femur lesion(s); signed HIPAA consent; baseline and 1-5 year modified overall condition Cincinnati scores. 10 year follow-up assessments were collected prospectively. Score change from baseline, treatment failure, and subsequent operations were assessed over the study period.
Results: Baseline patient and defect characteristics: mean age=37 years; 61% male; mean BMI=27.2 kg/m^2; mean total defect area=4.3 cm^2; worker's compensation (40%); having at least one prior cartilage repair procedure (68%). 93% (50/54) of patients who improved at 1-5 year (mean=4.6 yrs) follow-up sustained improvement at 6-10 year (mean=9.2 yrs) follow-up (p=0.206). At 1-5 year follow-up, 75% (54/72) improved, 12.5% (9/72) did not improve, and 12.5% (9/72) had a failed ACI. At 6-10 year follow-up, 1 additional patient did not improve, and 3 additional patients failed ACI. Of those who improved from baseline, overall condition, pain, and swelling scores improved 3.7, 4.7, and 5.2 points at 6-10 year follow-up, respectively (p<0.001, all parameters). 30 patients, including 12 treatment failures, had 48 operations or complications. Most (92% 44/48) operations or complications occurred at 1-5 year follow-up, were predominantly arthroscopic, and more likely to occur in treatment failures than non-treatment failures.
Conclusions: Although patients were a challenging patient population at baseline, these results support the conclusion that early success with ACI is sustained long term, in this study up to 10 years post surgery.

P18-977
Minimally-invasive arthroscopically-supported unicondylar surface replacement in discrete cartilage defects of the knee joint - initial results with the Arthrosurface® system -
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Query: The treatment of discrete but advanced cartilage damage to the knee joint, such as in osteonecrosis in patients older than 45 years, has not been satisfactorily resolved to date. The objective of this prospective study was to investigate the utility of a minimally-invasive unicondylar surface replacement system and to record the first clinically-obtained results.
Method: We are reporting on the results of the first 19 operations of discrete knee joint defects performed in our clinic since October 2004 using the Arthrosurface System. The Arthrosurface System consists of specially-preformed convex implantate dowels and an adapted integrative fraise system for handling the femurcondylus. The knee joint function, the activity level and the patient's quality of life were evaluated pre- and postoperative using the Knee Society Score, the Tegner Activity Index and the Lysholm Score.
Results: In the operating room, the system was impressive in its utility. No implantate-related complications have occurred in the short follow-up time thus far. In the early postoperative phase, the patients achieved rapid increase in their activity level which paralleled the reduction in pain relief attained.
Conclusion: The Arthrosurface® System shows beneficial properties for treating localized but advanced cartilage damage to the knee joint of patients older than 45 years of age. In particular, it enables arthroscopically-supported minimally-invasive implantation. Intact structures are thus not damaged and the patient rehabilitation is rapid.

P18-982

The autologous chondrocytes implantation - compressive impact testing of the tissues

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Introduction: This study was focused on evaluating biomechanical properties of human hyaline cartilage and cultured autologous chondrocytes used in ACI, with an emphasis on dynamic compressive testing.

Material: Fresh hyaline cartilage samples from 18 operated knee joints - from non-weight-bearing and defect zones, and chondrografts Type 1 and Type 2 were tested.

Methods: Blunt impact testing was realized by a pendulum-like instrumented impact device. A Laser Doppler Vibrometer (LDV) was applied as a basic sensor of the dynamic movements of impactor mass during impact. Dynamic strain rates varied from 10 s-1 to 100 s-1.

Results: The mean values of compressive strengths were determined to be 11.32 ± 2.32 MPa for the non-weight-bearing zone, 10.37 ± 4.11 MPa for the defect zone and 7.44 ± 3.98 MPa and 8.73 ± 4.46 MPa for both cultured tissue engineered materials. The corresponding strains were identified as $\varepsilon = 0.35 \pm 0.09$ (non-bearing zone), $\varepsilon = 0.33 \pm 0.10$ (defect zone) and $\varepsilon = 0.76 \pm 0.09$ and $\varepsilon = 0.69 \pm 0.14$ for the artificial materials. Cartilages were tested as circumferentially unconstrained where sidewall bulging was possible under load.

Discussion: The comparing of original hyaline cartilage and their hyaline-like tissue replacements plays an important role from the biomechanical point of view. Various procedures have been used for ACI surgery, but the appropriate tissue is still being looked for.

Conclusions: Non-weight-bearing zone cartilage showed distinct poroelastic properties; the defect zone cartilage had larger compressive deformations. Chondrografts showed satisfactory compressive strength, but large compression deformations. The force-deformation curve identified the deterioration point. Both chondrografts seem to be reasonable alternative methods for ACI surgery.

P18-991

Microfracture versus abrasion in the older patient - analysing the durability with a total knee arthroplasty as the final point

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Objectives: Microfracturing and abrasion are arthroscopic techniques for the treatment of cartilage defects in the knee. In our study we compared the durability of both techniques with a total knee arthroplasty as the final point.

Methods: Between the years 2002-2003 we performed 47 microfracturings and 450 abrasions. The microfracturings were compared to abrasions in matched pairs concerning age, gender and grade of chondropathy. Both groups had 29 women and 18 men. The mean age in the microfracturing group was 58 years, in the abrasion group 61 years. Both groups only had grade 3-4 chondropathies of the medial femur. In over 90 % of the cases menisectomies were performed as a second surgery. After abrasions the patients were mobilised with full weight bearing and after microfracturing with partial weight bearing for 3-4 weeks. We performed a clinical examination, x-rays and a magnetic resonance tomography. Quality of life short form 36, Womac osteoarthritis score and Tegner/Lysholm score were obtained. 6 months after the first examination the patients were interviewed on the telephone to assess the progression of the revision rate.

Results: After a 2 year follow up 5 total knee arthroplasties and 1 unicondylar knee had to be implanted after microfracturing, 10 total knee arthroplasties after abrasion. After the telephone interview, 6 month later, 1 more total knee arthroplasty was implanted after microfracturing, 2 more arthroplasties after abrasion. Both groups showed similar clinical results.

Conclusion: After 2,5 years abrasion showed a higher number of failures (26%) than microfracturing (15%) with a total knee arthroplasty as the final point.

Due to the high number of failures after abrasion we can not recommend this technique for the older patient. Microfracturing can only be recommended as a limited goal surgery.

P18-1004

Autologous chondrocyte implantation in the treatment of the knee chondral defect

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Purpose: From the year 2003 to the year 2005 we implemented clinical trial in the treatment of deep chondral defects of the knee joint with matrix assisted chondrocyte implantation using a hyaluronan scaffold (Hyalograft C). In the prospective study we evaluated functional, macroscopic, histological and MRI outcomes.

Methods: 11 patients were treated from November 2003 to January 2005. We evaluated results in 9 patients, eight men and one woman, with an average age 31 years. Defects of an average size 3,9 cm^2(2-6) were localized on femoral condyles. We evaluated functional outcomes according to IKDC, Lysholm score and performed MRI examination prior to and after ACI (6,9-12,30-36 months). The newly formed tissue was controled visually (ICRS visual score) at the second look arthroscopy 9 to 12 months after ACI. Specimens for histologic analysis were harvested from the site of implanted chondrocytes.

Results: The average IKDC subjective score improved from 46 points before surgery to 74 points 12 months and 77 points 36 months after surgery respectively. The preoperative Lysholm score was 61 points and 86 points 36 months postoperatively. At second-look arthroscopy newly formed cartilage was evaluated as nearly normal in 7 and as abnormal in 2 cases. The average ICRS visual score was 9,4 points. The newly formed tissue had histological characteristics of hyaline-like cartilage in 1 patient. and a mixed (hyaline/fibro) cartilage in 8 patients. 30-36 months after ACI had been done control assesment with standardized cartilage sensitive 2T MRI was performed in order to evaluate the integrity, morphologic features and signal of articular surfacs and changes in the subchondral bone. The surface of the newly formed cartilage was smooth in 6 patients in the remaining patients it was slightly iregular. In 5 patients the new cartilage slightly protruded above the level of the surrounding cartilage. In the majority of patients irregularity of subchondral bone plate was found.

Conclusion: Functional improvement of the knee could be seen in all patients. Hyalograft C leads to a good fill of defects with newly formed tissue. A well-fixed tissue mainly of mixed (fibrohyaline) type formed in less than a year. The scaffold resorbed without problems. Smoothening of the chondral graft in shallow defects appears after 6-12 months, in deep subchondral defects the smoothening takes longer. The graft often slightly protrudes above the level of surrounding cartilage. The results of clinical assesments and MRI 30-36 months after ACI are promising.

P18-1021

Juvenile Osteochondritis Dissecans (jOCD) of the lateral femoral condyle. Clinical and radiographic outcomes of surgical treatment

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Background: Juvenile Osteochondrititis dissecans (jOCD) most commonly affects the knee joint with approximately 10-15% of lesions occurring in the lateral femoral condyle.

Depending on the stage are different surgical techniques (refixation or removal of the fragment, micro-fracturing, autologous chondrocyte transplantation etc.) used for arthroscopic treatment.

The purpose of this study was to evaluate retrospectively the functional (incl. sports activity) and radiographic outcomes of operative management.

Materials and Methods: 47 patients with jOCD were surgically treated between January 1995 and January 2007 at our department, in 7 cases (14.8 %) the defect was located at the lateral femoral condyle.

The localisation at the lateral femoral condyle was in five cases in the dorsal area, which is an unusual localisation for jOCD.

The mean age at surgery was 15 years, the growth plate were closed in 3 cases and open in 3 cases (one case could not be valued). Refixation of the loosed body (four times), removal of the fragment and micro- fracturing (two times) and an autologous chondrocyte transplantation was performed.

Functional and radiographic outcome was evaluated with the Lysholm-Gillquist Score and IKDC-Score as well as with magnetic resonance imaging (MRI). The average size of the cartilage-bone defect was 3.7 cm^2. The mean clinical follow- up was 38.5 months, the mean radiological one 8 months.

Results: 80 % of the cases participated in football or basketball praeoperative, but only in two cases was a previous trauma reported.
Except for one patient, who reported casual knee pain, clinical, functional and radiographic evaluation showed good results at 3 years after surgery. The mean IKDC-Score was 79.7 and the mean Lysholm-Gillquist-Score 88.6. All patients participated in sports again, but the level of sports activity decreased.
MRI scans showed good healing of the cartilage-bone defect. Patients with open growth plate at the surgery showed better postoperative results according to Outerbridge - Classification.
Conclusions: Juvenile Osteochondrititis dissecans seems to have an unusual dorsal localisation at the lateral femoral condyle. The often given indication for surgery for these rare cases of jOCD was supported by the good clinical, functional and radiological results. Patients with still open growth plate seem to have a better outcome.
Our results showed that arthroscopy is a safe technique for different therapeutic interventions without any major complications.

P18-1034
Knee cartilage lesion: Intra-articular administration of Plasma-Rich in Growth Factors. Patients subjective evaluation
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Objectives: Since 1990, medical science has recognized several components in blood which are part of the natural healing process and if added to wounded tissues or surgical sites as a concentrate have the potential to accelerate healing. These specific components in blood include platelet derived growth factor (PDGF) and transforming growth factor beta (TGFß), both of which are contained within the alpha granules of platelets, and fibronectin and vitronetin, which are cell adhesion molecules found in plasma, and fibrin itself.
Plasma-rich growth factors (PRGFs)is an autologous concentration of human platelets in a small volume of plasma. Because it is a concentration of platelets, it is also a concentration of the 7 fundamental protein growth factors proved to be actively secreted by platelets to initiate all wound healing. Because these concentrated platelets are suspended in a small volume of plasma it also contains the 3 proteins in blood known to act as cell adhesion molecules for osteoconduction and as a matrix for bone, connective tissue, and epithelial migration. The aim of this study was to access patients subjective evaluation after intra-articular administration of PRGF.
Methods: Indications for treatment were symptomatic (pain, effusion) arthritis and focal chondral lesions grade III and IV. This could be done as a isolated treatment or associated to a surgical treatment (chondral shaving, microfractures, high tibial osteotomy and ACL reconstruction).
The patients were asked by phone interview the following questions: how was pain evolution after treatment; did you noticed diference in joint effusion; how did you felt about knee mobility/function (answer options were worse, the same, sligtly better, better or much better. We also asked if he would recommend the treatment to a friend (answer options were never, maybe, yes or certainly)
Results: Between September 2005 and September 2006 we performed 468 PRGF intra-articular applications in 132 patients (108x3 and 24x6). 65 patients were also submitted to surgical treatment. The phone interview was performed to 89 aleatory patients (67%). The mean follow-up was 16 months (range, 24 to 12 months). We divided the patients in Group A (surgical treatment - 52 patients) and group B (no surgical treatment - 37 patients). The answer obtained are listed in the tables.

	Worst	Same	Slightly better	Better	Much Better
Pain	1	6	15	28	2
Effusion	0	14	15	22	1
Function	0	10	19	22	1

	Worst	Same	Slightly better	Better	Much better
Pain	0	5	11	20	1
Effusion	0	7	9	21	0
Function	0	6	10	21	0

	Never	Maybe	Yes	Certainly
Group A	0	7	39	6
Group B	0	4	26	7

Conclusion: Authors believe that PRGF application althought´s not a curative treatment as a significant positive effect in patients quality of life. Further studies will be needed to validate this clinical experience.

P18-1048
Arthroscopic surgery in OA knees. a quality of life investigation study at medium term
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Purpose: The purpose of this study was to investigate the medium-term postoperative impact on quality of life of arthroscopic surgery for osteoarthritis (OA) of the knee in elderly population.
Materials and Methods: In a series of 35 patients who underwent arthroscopic surgery for OA, 30 patients were available at follow up. Mean age was 68 y (range 60-78). The follow-up period ranged from 24 to 48 months, with a mean of 38 months. All the patients underwent a similar procedure comprehensive of carefull radiofrequency arthroplasty for treatment of cartilage lesions, osteophytes removal, debridement of articular cartilage surface. Exclusion criteria for this study were RA, severe OA with narrrowing of the joint line (according to Ahlback classification). Results were assessed by use of the SF-36 quality of life based questionnaire, compairing pre and post op values. T-test and Spearman correlation were used for statistics (P<0,01).
Results: In 3 cases (10%) because of poor postoperative results further surgery was required (knee replacement). In the remaining 27 patients (90%), all the subscores of SF-36 questionnaire improved in a statistical significative manner. These favorable results were maintained at the last follow-up. Mean preoperative scores: PF 30.00; RF: 21.25; BF 16.75; GH 22.50; VT 20.00; SF 35.62; RE 36.66; MH 41.25. Mean postoperative scores: PF 60.00; RF: 40.00; BF 44.00; GH 45.50; VT 40.00; SF 77.5; RE 70.00; MH 64.25.
Conclusion: Arthroscopic surgery provide a consistent benefit in quality of life in high percentage of cases at medium term follow-up. This procedure can be consider as an option to improve quality of life in OA knee prior knee replacement.

P18-1061
Results following cartilage repair in the knee using a synthetic osteochondral scaffold.
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Purpose: Porous, resorbable scaffolds offer a new solution for symptomatic osteochondral and chondral articular defects in the knee and other joints. This paper reports on early results of this off-the-shelf product.
Methods and Results: 11 active sporting patients underwent cartilage repair using TruFit CB plugs (Smith and Nephew) for symptomatic defects on the medial or lateral femoral condyle. 8 had failed previous treatment (debridement in 6 and microfracture in 2) while in 3 this was the first repair procedure. Postoperatively patients were touch weight bearing for 2 weeks and partial until 4 weeks. Data was collected prospectively. The overall mean age was 34.3 (range 21 - 50) and 7 were male. Seven lateral femoral condyle defects were treated, all associated with lateral meniscal tears. Four medial defects were associated with ACL injury (1), PCL injury (1) or isolated chondral injury (2). Single plugs were required in most but 2 patients received 3 plugs.
9 of the 11 patients were improved at mean follow up of 11 months with 4 currently back to full pre-injury level of sport. Subjective IKDC scores improved from 44.6 preop to 79 post op (p<0.05). 2nd look arthroscopy was undertaken in 6 showing well healed and well integrated surface. In one patient the grafted area is very soft and has not integrated. MRI scans including 3T T2 Mapping sequences have shown early formation of the subchondral lamina in most while the patient with the soft graft has shown no solid infill on MRI assessment.
Conclusion: These preliminary results indicate that TruFit CB plugs offer a potential solution for small focal chondral defects, offering an alternative to microfracture or osteochondral grafting with advantages of low morbidity and rapid recovery without the need for prolonged non-weight bearing. However it is likely that the plugs may not be indicated for large lesions.

Patellofemoral

P19-11

Painless arthroscopic lateral retinacular release without a tourniquet using a new portal - "the lateral release portal"

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Method: To perform a lateral release the use of a superomedial operating portal is described. This portal can injure the sensitive vastus medialis obliqus muscle causing postoperative pain, haematoma at the portal site and decreased quadriceps function postoperatively. Lateral release using a new novel "Lateral Release Portal" helps the arthroscopic surgeon to place the portal under vision with accuracy, visualise the lateral retinaculum and perform a complete lateral release from superolateral aspect of the patella to lower limit of the lateral retinaculum without having to swap portals.

Operative Technique: The "Lateral Release Portal" is situated 5 cm inferior to the inferior pole of the patella and 3.5 cm lateral to the tibial tubercle, roughly lying just below the Gerdy`s tubercle. This port is used to introduce the electrocautery to perform the lateral retinacular release.

Discussion: The "Lateral Release Portal" has been successfully used for quite some time and all patients are discharged home the same day. No postoperative haemarthrosis was noted. Majority of the patients have no pain and are back to the activities of daily living within a week and back to work by 3 weeks.

Conclusions: The success of lateral release depends on the initial pain relief and aggressive rehabilitation. Postoperative haemathrosis affects the outcome due to pain with an effect on the outcome. Lateral release without tourniquet using the novel "Lateral Release Portal" without the use of tourniquet is recommended.

P19-19

Reconstruction of chronic disruptions of patellar tendon using a central band of complete extensor mechanism graft

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Introduction: The chronic disruption of patellar tendon means a serious injury of the knee. Multiple techniques for repairing or reconstructing a deficient extensor mechanism have been described, however, few have been able to reliably restore a functional extensor mechanism. A therapeutic option is the reconstruction with the central band of complete extensor mechanism graft.

Material and Methods: We present the cases of six patients with patellar tendon chronic rupture from different etiologies treated by means of this technique. One patient presented this lesion as a complication after acl reconstruction using autogenous bone-patellar-bone graft. Other patient was a polytraumatic patient with sequelae of inaproppiate open tibial fracture osteosynthesis. The third patient had a conminute patellar fracture that was treated with patellectomy and Insall technique. Secondarily, this patient presented an important extension lack by extensor mechanism rupture, and three cases were spontaneous patellar tendon ruptures after total knee arthroplasty. We used in all of these cases the central band of complete extensor mechanism graft technique (auto or allograft).

Results and Discussion: The clinical outcomes that we obtained were satisfactory, an average range of movement of 0/10/100º, and there wasn´t any case of infection disease and graft versus host disease. Multiple techniques for repairing the chronic patellar tendon disrruptions exist. The first challenge to solve is to obtain the suitable patellar height. The second point will be to get a functional extensor mechanism. Central band of complete extensor mechanism graft allows to restore the full range of movement of the knee join. This technique was decribed by H. Dejúr. The central band of complete extensor mechanism graft could do it using auto or allograft. The succes of this technique depends on a correct preoperative planning, return the physiological patellar height and tightly tensioned in full extension the extensor mechanism.

Conclusions: The reconstruction of chronic disruptions of the patellar tendon using the central band of complete extensor mechanism graft technique provides satisfactory results in terms of range of movement with a low rate of complications.

P19-55

Early management and outcome of a very large trochlear osteochondral lesion sustained without apparent significant injury in an adolescent

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Introduction: Osteochondral fractures of the knee are not uncommon and tend to occur in adolescence. These injuries usually involve the weight bearing area of the femoral condyles but may involve the trochlea[1]. Although the mechanism of injury and clinical findings usually suggest significant trauma, plain x-ray examinations are often normal[2]. The PFJ should be examined with a 'skyline' view ideally obtained at 30 degrees of knee flexion[3]. We report a case of trochlear osteochondral fracture without significant injury in an adolescent which was missed initially and subsequently diagnosed and treated successfully.

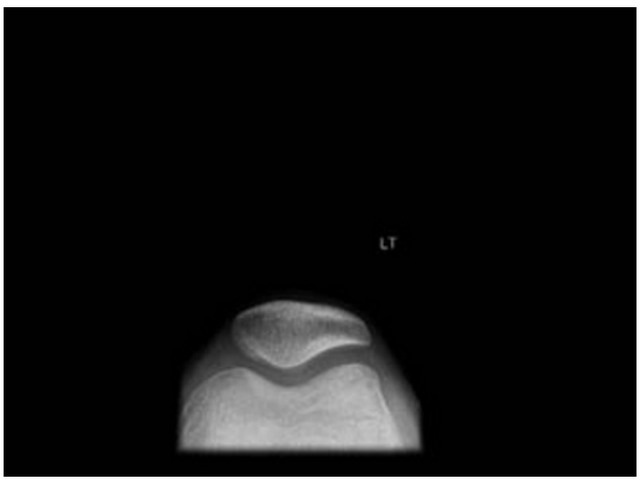
Case report: A 14 year old healthy male patient was hurdling on a running track when he felt and heard a 'click' in his left (trailing) knee while going over the hurdle. He felt pain but cleared the next hurdle and then pulled up. There were no falls or direct trauma of any kind. He continued to walk but noticed swelling in his knee within the first hour.

No Xray was acquired at first presentation due to the absence of any direct injury and his continuing full weight bearing status. The patient was allowed home. One week later, he still reported pain, swelling and something "moving around" inside his knee and re-presented to the A&E department. He had a tense effusion, quadriceps mechanism was intact and he had tenderness over both femoral condyles. Range of movement was 0-60 degrees. There was no clinical evidence of cruciate or collateral ligament injuries. X-rays taken at this stage showed an abnormality over the trochlear region of the femoral condyles on the lateral view only (Fig 1). The standard AP and 'Skyline' view which was obtained in mid-flexion did not show any abnormalities (Fig 2). At arthroscopy there was a very large defect in the lateral aspect of trochlea. A full thickness cartilage fragment measuring 3 x 2.5 cm was retrieved from the lateral gutter through a lateral arthrotomy incision (Fig 3). The base of defect was debrided down to bleeding bone. The fragment fitted perfectly into the defect (Fig 4), and was fixed using 5 bio absorbable pins (Orthosorb, DePuy). The knee was splinted in full extension using a hinged brace. Immediate full weight bearing was allowed. 30 and 60 degrees of flexion were allowed at 2 and 4 weeks respectively. At 6 weeks, MRI showed apparent healing of the defect (Fig 5). The patient was asymptomatic and is having physiotherapy rehabilitation before returning to sports activities.

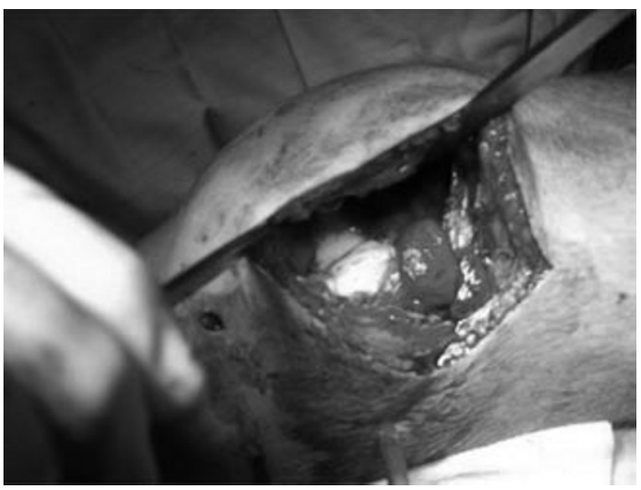
Conclusion: Osteochondral defects are not uncommon but usually occur after direct trauma or falls. In this case there was no such injury and the patient remained full weight bearing throughout. For this reason, X-rays were not taken at the initial presentation. The presence of a tense effusion within an hour of injury mandates Xray examination. Skyline views are indicated to examine PFJ and should be taken in the appropriate angle of flexion which is around 30 degrees. In our case the knee was flexed beyond this angle and so the skyline view missed the abnormality.

Lateral Xray suggesting a trochlear lesion

Arthrotomy showing the trochlear defect



Skyline view in midflexion missed trochlear defect



Osteochondral segment fitted perfectly in defect

MRI showed healing of lesion. Pins in situ

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P19-139

Medium term results of patellofemoral joint arthroplasty: A multi surgeon, multi implant study

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Introduction: Isolated patellofemoral joint (PFJ) osteoarthritis has long been a common observation as an important source of knee pain. Once non-operative treatment modalities have been exhausted, the surgical options available are transposition/elevation of tibial tubercle, drilling, realignment procedures, patellectomy, patellar resurfacing, patellofemoral arthroplasty (PFA) and total knee arthroplasty (TKA). Among these, PFA is an established treatment of isolated PFJ osteoarthritis. We present our multi-surgeon, multi-implant series of patellofemoral joint arthroplasty performed over a 10 year period.
Material & Methods: This study was a retrospective review of all PFA performed in the Knee Arthroplasty Unit at our hospital over a ten year period from 1997 to 2006. The unit comprises seven specialist surgeons, each with considerable experience in knee arthroplasty and numerous trainee surgeons. One hundred and one PFA performed in 91 patients were identified from the theatre records. Three different implant models were used: the Lubinus implant (Waldemar Link), the FPV system (Wright Medical) and the Avon system (Stryker Howmedica Osteonics).
Results: 101 arthroplasties in 91 patients were followed up for average period of 48.8 months (6-96 months). Of these, none were lost to follow up. The average age was 57 years with female patients thrice as common as male patients. Concomitant procedures in the form of 23 lateral retinacular release or 6 osteochondral autograft transfer system (OATS) were performed. There were 6 complications with 2 infections and 4 stiff knees. 31 arthroplasties had subsequent procedures including arthroscopic debridement (18), arthroscopic lateral retinacular release (8), tibial tuberosity transfer (3) and manipulation for stiffness (2). A total of 4 arthroplasties underwent revision to total knee arthroplasty, 2 for infection and 2 for progression of tibiofemoral osteoarthritis.
Conclusions: The necessity of revision surgeries in one third of the cases suggests that close follow-up of the patients is needed to address any concerns that can be easily resolved. A majority of the patients in our study had very good outcomes and did not need subsequent procedures in the medium term. Our study reiterates the importance of proper patient selection, surgeon experience and correct surgical technique in successful outcomes from PFA.

P19-148

Unique combination of patellofemoral joint arthroplasty with Osteochondral Autograft Transfer System (OATS)

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Introduction: Isolated symptomatic patellofemoral osteoarthritis is reported in about 10% of the general population above the age of 55 years and may cause severe pain and functional limitations. We have come across a subset of patients with advanced patellofemoral osteoarthritis who also had well defined full thickness cartilage loss lesions on the weight bearing femoral surface. In these patients the findings or the symptoms are not severe enough to warrant a total knee replacement. In this select group of patients, a combination of patellofemoral arthroplasty (PFA) and Osteochondral Autograft Transfer System (OATS) can be performed to address this unique problem.
Material and Methods: At our institute out of 38 PFA procedures performed by the senior author, a concomitant OATS was performed in 6 knees in 5 patients. A retrospective analysis of patients who underwent this combination procedure between the year 2000 and the year 2005 was carried out through review of case notes.
Results: The average age of the patients in our case study was 48.2 years (36 to 59 years) at the time of surgery. The average follow up was 3.8 years (18 months to 84 months). Four of the six knees are doing well in the medium term. One patient had progression of tibiofemoral arthritis and needed a total knee replacement. The only poor result was a young male, who two years following the PFA, developed a deep infection of the knee. Except for this patient awaiting a second stage revision for an infected knee, all others returned back to their occupation and achieved their desired level of activity.
Discussion: This combination procedure has not previously been reported in literature. The advantage of this combination is that, the donor tubes for the OATS can be harvested from the trochlea or just adjacent to it, which happens to be the bed for the trochlear implant. This area provides good quality thick donor articular cartilage. As the surgical exposure has already been done for the patellofemoral arthroplasty, our operative time is extended by approximately ten minutes for the OATS procedure. This combination procedure offers an alternative to more invasive options such as total knee replacement in younger patients in whom it is preferable to delay such major surgery. The disadvantage of this combination is that it has limited application - in a series of 38 knees, only 6 were deemed suitable candidates, with the result that only a few individuals in specialized centers will be able to gain the necessary expertise to perform it.
Conclusion: This unique combination of PFA and OATS has not been reported to date and we feel that this procedure has a useful place in the armamentarium of the knee surgeon to tackle this unique problem in a select group of younger patients.

P19-175

Efficacy of the vastus medialis oblique muscle strengthening exercises on the correction of mechanical lateral patellofemoral malalignment

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Background: The lateral malalignment of the patella is commonly responsible for patellofemoral disorders and affected by the forces produced by the vastus medialis oblique (VMO) muscle and the vastus lateralis (VL) muscle. The VMO muscle is reported to be the primary stabilizer of the patella during knee extension. Some treatment protocols emphasize strengthening of the VMO muscle as the nonsurgical treatment of choice for patients with patellofemoral dysfunction to increase the stabilizing effect of the VMO muscle.
Purpose: The purpose of this report is to review and analyze the current literature pertaining to the effect of the VMO muscle strengthening exercises in enhancing the correction of lateral patellar malalignment.
Methods: A computerized literature review was conducted using searching machines including MEDLINE, CINHAL, CENTRAL, COCHRANE and PEDro databases. The following key words were used: patellofemoral, patellar maltracking, vastus medialis oblique muscle strengthening exercises, and VMO and patellar tracking. Papers were selected for review according to the following criteria:
(1) studies were related to VMO strengthening exercises and their effect on patellar tracking;
(2) meta-analysis and randomized controlled trials; and,
(3) published in a peer reviewed source.
Results: Thirteen studies were selected according to the mentioned criteria. Three studies investigated the relationship between VMO and patellar trakking. Four studies examined different types of exercises that emphasized the VMO contraction and contribution. Six studies highlighted the effects of VMO strengthening on patellar tracking and how exercise plays an important role in the treatment of PFPS resulting from maltracking.
Conclusion: Based on this review, it can be concluded that the VMO strengthening exercises are beneficial in the treatment of patellar maltracking and could be a viable nonsurgical alternative treatment to restore the normal patellar tracking.

P19-191

Long term follow up of Medial Patello Femoral Ligament reconstruction in patella dislocation

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Introduction: We have a theory, that in the adult, the individual patella fits its trochlea. We think that although realignment of the patella might stabilize the patella, it may not necessarily prevent patello femoral degeneration. With this in mind, we have developed a procedure, for reconstruction of the medial patello femoral ligament (MPFL), in recurrent patella dislocations, where the patella is stabilized without realignment. We are reporting on a follow-up study of 29 knees in 26 patients. Average follow-up was 7.2 years (4.4 years - 9.3 years).
Indications: Reconstruction of the MPFL was done in 29 consecutive knees for recurrent patella dislocation. The only criteria for surgery were recurrent patellar dislocation. The only pathology surgically addressed, was the MPFL. The Q-angle, trochlear dysplasia, patella morphology, patella height or a tight lateral retinaculum were ignored and not taken into consideration when considering the surgical procedure. The aim was to restore the patella stability and movement to the pre dislocation situation.
Technique: At the time of surgery a routine arthroscopy was performed and a patellar or trochlear chondroplasty was done if there was loose articular fragments. The MPFL was reconstructed with a double strand gracilis autograft. Special attention was paid to the tension in the reconstructed MPFL, the aim being to restore patella mobility to the pre-dislocation situation. The contralateral patella was used as a parameter. Immediate post-operative mobilization was allowed and intensive rehabilitation started 6 weeks post-operatively. Full physical activity and sport were allowed after proper quadriceps rehabilitation. This took at least 3 months or longer.
Results: Measuring instruments used in follow up were the subjective IKDC, Lysholm and Tegner. All these scores continued to improve beyond 5 years follow-up. The improvement in these scores after 5 years, was however, not statistical significantly better when compared with scores before 5 years. The average score at 7 years were: Subjective IKDC 84.3 (63.3 - 98.9). Lysholm: 93 (73 - 100) Tegner: 7 (4 - 10) Seven patients, included in this study, had various surgical procedures performed on their contra lateral knee, this had a negative, although not statistically significant, effect on all three scores. Damage to the articular cartilage of the patella or trochlea, showed a negative effect on the Lysholm but not on the IKDC and the Tegner scores. There were no further dislocations in any of the knees.
Conclusions: Reconstruction of the MPFL is an effective, surgical procedure for preventing recurrent dislocation of the patella irrespective of any underlying predisposing factors. The functional results were consistent over a 7-year period, supporting the principle of restoring patella stability, to the pre-dislocation situation, without realignment.

P19-192

Relation between patella height and successful MPFL reconstruction

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Introduction: In analyzing our 7-year results of MPFL reconstructions, there were no redislocations but there were a few patients with quads weakness, specifically in terminal knee extension. Further analysis of this group, with quadriceps weakness, showed that there might be a relation between quadriceps weakness and patellar height. This problem is probably related to the fact that the MPFL is a non-isometric ligament that is tight in extension and lax in flexion.
In cadaveric studies we found the there is a relation between patella height and non isometry of the MPFL. The higher the patella the greater the non isometry
Method: Patella height measurements were done according to Bernageau's technique, the Caton Deschamps index and the patella tendon length. An

exact lateral standing X-ray with the knee in full extension and with maximum quads contraction was used for the measurements. The patella height was compared with the Kujala score as well as with a possible extensor lag at three months and final follow up. These measurements were done on 29 isolated MPFL reconstructed knees with an average 7 years follow-up. We looked at the relation between the patella height, extensor lag, p-f degeneration and its effect on terminal knee extension and on the Kujala score

Result: No correlation between the Caton Deschamps index and knee extension. Low correlation between patella tendon length, Bernageau index and knee extension No correlation between Caton Deshamps index and the Kujala score. Positive but low correlation between patella tendon length, Bernageau index and Kujala score. No correlation between trochlea dysplasia and the Kujala score. Positive correlation between P-F degeneration and the Kujala score

Conclusion: In a previous study which we presented we showed that the MPFL is a non-isometric ligament, tightening in extension and becoming lax in flexion. In our cadaveric studies we found that the higher the patella, the more pronounced this non isometry.

In this study there was a tendency towards a lower score for both knee extension and the Kujala score the higher the patella

We believe that in severe patella alta, the lengths change in the reconstructed MPFL, becomes too large to allow for a successful isolated MPFL reconstruction without resulting in weakness of terminal knee extension. The lack of terminal knee extension is caused by the tension being more in the reconstructed MPFL than in the patella tendon. In these cases MPFL reconstruction should be combined with a distal transfer of the tibial tubercle.

P19-208

The influence of the lower patellar pole in the pathogenesis of chronic patellar tendinopathy

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Purpose: Evaluation of a possible association of the lower patellar pole length with chronic patellar tendinopathy.

Methods: Between 2000 and 2005 25 patients with chronic patellar tendinopathy underwent conservative and surgical treatment in our clinic. All of them had preoperative MRI were three independent examiners measured the Caton Index, the length and the ratio of the articular and non-articular patellar surface, tendon length and thickness and the thickness and length of the hypodens lesions in the patellar tendon. The measurements were compared with 50 MRI of a control group with no clinical patellofemoral disorders or patellar tendinopathy.

Results: Significant changes in tendon thickness (9,42 ± 2,87 vs. 4,88 ± 1,13; $p<0.0001$), a prominent non-articular surface of the patella (10.62 ± 2,86 vs. 7,098 ± 2,53; $p<0.0001$) and significant higher ratio between the articular and the non-articular patellar surface (0,32 vs. 0,24; $p<0.0001$) were found in the jumper´s knee group. No significant changes were seen in the length of the articular surface or the Caton Index.

Conclusions: The development of chronic patellar tendinopathy in athletes might be associated with a longer lower patellar pole as patients with jumper´s knee showed a longer non-articular patellar surface compared with the control group.

P19-261

Algoritm of diagnostic and surgical treatment of patellar chondropathy

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Introduction: Patellar chondropathy (PCH) is very often diseases in every age, which have many distinct and obscure causes.

Aim: Elaboration algorithm to help the physician to investigate and to choose the adequate methods for surgery patellofemoral joint (PFJ) with PCH.

Material and Methods: Between 1990 and 2005 520 patients (354 male - 68,2% and 166 female - 31,8%), of average age 35 (17 - 80) have been investigated and operated using elaborated surgical algoritm. The time elapsed from the PCH beginning was approximately 36 months (1-360). The clinical, radiological, biomechanical, MRI and arthroscopical methods were used. The patients were evaluated in 24 month using 2000 ICDS score.

Results: Algorithm for investigate PCH include: 1st STEP -assessment of history, 2nd STEP - assessment of etiology, 3rd - STEP - assessment of anatomical status, 4th STEP - assessment of biomechanical situation, 5th - STEP - assessment of inflamation, 5th - STEP - assessment of functional status. 6th STEP - DIAGNOSIS. Algorithm for surgery PFJ with patellar chondropathy is following. 1st STEP. Shaving , drillng (mikrofracture), massive irrigation. 2nd STEP. PFJ congruence recovery with lateral hyperpressure (Proximal realignment - lateral release, vastus medialis obliqus advancement, medial tightene, patellar tenodesis. Distal realignment - soft tissue surgery: medial transfer the lateral half of the patellar tendon (skeletally immature); bone tissue surgery: tibial tuberosity medialization). PFJ congruence recovery without lateral hyperpressure (tibial tuberosity proximalization; tibial tuberosity distalization). 3rd STEP. Sagital decompression of FPJ (tibial tuberosity ventralization). Using this algoritm the follow-up were scored: 71,9 % - A, 23,4% - B, and 4,7% - C.

Conclusion: This algorithm is useful for adequate surgery PCH.

P19-275

Acute patellofemoral instability at young sportsmen

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Concerns to rather rare damages having a place at young sportsmen. Usually direct influence on area tuberosity of tibia. As a result of that occurs avulsion of the own patellar ligament together with the part tuberosity of tibia and comes acute patellofemoral instability.

Purpose: To determine the correct diagnosis of damage in due time and to apply adequate treatment.

Materials and Methods: For last five years under our supervision were on treatment 19 young sportsmen with the acute patellofemoral instability. Patients had received damages in contact kinds of sports. To determine the correct diagnosis radiological research was helped. At 7 patients 2 types of damages was revealed; at 12 - 3 type of damage tuberosity of tibia on Salter-Harris. The age of patients was 12-14 years (boys-18, girls-1). At avulsions, tuberosity of tibia adequate treatment must be open reduction and internal fixation. Operative treatment carried out in first 3 days after trauma. Arc incision on the forward - top surface of a shin. Careful audit. Removal of haematoma. Exact comparison of the avulsion fragment tuberosity with parent bed, fixing it's by two Kirshner wires, in addition imposed lavsan seams. Plaster splint. Seams removed in 12 days. Imposed a circular bandage from Scotch cast for two months. Then took wires and carried out in full regenerative therapy. Patients started sports trainings in 6 months. The remote results have been investigated at all 19 patients after three years after trauma. At radiological research: true tuberosity union, synostosis processes are completed. Anatomy-functional research: contours tuberosity of tibia in comparative aspect is not changed; the function patellar tendon in full volume. Two from observed patients had stopped sport career; 17 - successfully continue; in physical development are not late.

Conclusion: At acute patellofemoral instability at young sportsmen the adequate treatment is earlier surgical operation - open osteosynthesis tuberosity of tibia. Social and sport prognosis at that is favorable.

P19-337

Evaluation of the modified elmslie trillat procedure for patello-femoral dysfunction

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Aim: The aim of this study was to evaluate the Elmslie-Trillat procedure carried out for recurrent patellar dislocation, patellofemoral pain, or a combination of both.

Patients and Methods: Between 1997 and 2003, twenty-nine patients underwent an Elmslie-Trillat procedure which consisted of a lateral retinacular release and medialisation of the tibial tubercle for recurrent patellar dislocation, patellofemoral pain or both. All the patients were evaluated subjectively, objectively using the Fulkerson functional knee score and radiologically.

Results: The average age of the patients was 36 years. The mean follow-up was 45 months (24 to 74). Subjectively, 19 patients (66%) had excellent or good results and 7 knees (24%) had a fair result. All the patients with a dislocation of the patella had an excellent or good subjective result, whilst only 3 knees (34%) in patients with the primary symptom of patellofemoral pain and 4 knees (44%) with both symptoms had a good or excellent result. The mean Fulkerson's functional knee score was excellent for patients with dislocation only, and fair for those with only pain or both pain and dislocation. The congruence angle was corrected in all the patients by this method. There were no further dislocations in our series. Two patients required removal of metal work.

Conclusion: We conclude that the Elmslie-Trillat procedure is a good surgical option for treatment of recurrent patella instability, following failed conservative therapy. However, the results are not as favourable for patients with anterior knee pain.

P19-453

MPFL reconstruction for recurrent patellar dislocation

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Patello-femoral instability is a complex issue. Exact physiopathology is still unclear. Conservative treatment may lead to instability recurrence up to 50% of cases and persistent symptoms resulting in a invalidating problem. Thus surgical treatment may be proposed even in case of first dislocation. Several surgical options have been proposed in the last decades varying from proximal and distal realignments, lateral release, and throcleoplasties in the attempt to correct one or more of the predisposing factors (patella alta, vastus medialis obliquus dysplasia, excessive tibial tuberosity-trochlear groove distance, and throclear dysplasia). Recent studies have stressed the role of medial patello-femoral ligament as the primary medial restraint to lateral patellar dislocation. Its passive and active (through its connections to the VMO) role is now clear, such as the evidence of the high rupture rate in case of patella dislocation. Based on this evidence several authors have proposed their technique for MPFL reconstruction showing good or excellent subjective results and low recurrence rates. From March 2005 to December 2006 MPFL reconstruction was performed in 23 patients. Painful unstable patella and patella dislocation were present in 13 and 14 patients respectively. Mean age at the time of surgery was 28 years and mean FU was 22 months. 18 were available for the last FU and were evaluated with Kujala, Fulkerson, Tegner and Larsen score as well as with complete imaging study. Postoperative treatment consisted in knee bracing (0°-60°), immediate CPM (0°-90°) and complete weight bearing.

These scores improved from 62, 13.2, 61.2 and 64.5 preoperatively to 90.3, 17, 94.3 and 96.3 postoperatively. Patellar tilt in static and dynamic conditions improved from 14° to 6.5° and from 19.2° to 7.6 respectively. Merchant and Laurin angles improved from 6.3 ° to 8.2° and from -7° to 7° respectively. No recurrence of dislocation was noted at the last FU. Only 1 patient was unhappy with the clinical result even in presence of a good correction of the imaging parameters.

We believe that isolated MPFL reconstruction is a good option in case of patellar dislocation in patients with almost normal predisposing factors. In case of severe trochlear dysplasia or excessive TTTG distance additional procedures may be added to the ligament reconstruction.

P19-454

Medial reefing in patello-feomoral instability

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Patella dislocation is a relatively frequent event in young patients. Both conservative and surgical treatments are accepted options. Conservative treatment consists in stretching exercises and vastus medialis obliquus (VMO) strengthening but a recurrence of dislocation is present in 44% of cases. Moreover persistent chronic retropatellar pain and instability are experienced in 40%-70% of patients. These evidences have lead to a different attitude: surgical treatment is now proposed even in case of first dislocation.

Moreover several predisposing factors have been identified in the pathogenesis of patellar instability: excessive patellar height, excessive tibial tuberosity-throclear groove distance (TTTG), vastus medialis obliquus (VMO) dysplasia, and trochlear dysplasia. More recently the role of the medial retinaculum has been stressed. It is composed by several anatomic structures which play an important role in stabilizing the patella and this role is even more important case of patella alta or patello-femoral dysplasia. Medial reefing is an accepted option in patients with patello-femoral problems. Most authors suggests this procedure in case of patellar instability (patellar subluxations or dislocations) that have failed a period of 3-6 months of conservative period. We believe that in case of dislocation this is not a good option as it not address to the MPFL lesion and a high recurrence rate may be expected. Thus we propose this procedure in case of unstable patella with almost normal predisposing factors; patients with previous dislocations were excluded from this study. Several techniques have been proposed varying from open to all arthroscopic, and from isolated reefing to combined procedures.

From May 2000 to December 2004 we performed 32 medial reefing procedures. Patients were evaluated with subjective Kujala questionnaire and with complete imaging study. Mean age at the time of surgery was 19 years and average follow up was 55 months. Preoperatively, 14 patients were rated poor, 11 fair and 0 good. Postoperatively 2 patients were rated poor, 6 fair and 17 good.

We have performed medial reefing in association with lateral release until 2000, then we have abandoned the lateral release following the evidence that it may increase patellar instability. We perform an arthroscopic technique with 3 knots tied through three medial mini incisions. The knots are tied at 60°-70° of flexion and under arthroscopic control. Postoperative treatment consists in, elastic compressive casting, immediate passive motion from 0°-60°, and complete weight bearing for two weeks. Our clinical results are encouraging with high satisfaction rates and no recurrence of dislocations. Even if longer follow up studies are necessary to confirm this mid term results, we believe that the key point relies in the strict indication: unstable patella with almost normal predisposing factors.

P19-461

Clinical and radiological results of the isolated recosntruction of medial patellofemoral ligament of the traumatic recurrent patella dislocation using tibialis P osteir allolograf

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The Purpose of this study was to assess the clinical and radiological results after a follow-up of 2 years after medial patellofemoral ligament(MFPL)rec onstruction using a tibialis tendon allograf. thirteen knees in 13 patients with the recurrent patella dislocation underwent surgery. The graft was secured using 2 or 3 anchors for the patella side and interference fit screw for femoral side. Average duration of follow-up was 25 months and a mean age was 25 years old. Two knees developed dilocations after previous arthroscopic lateral release and medial plications. Clinical assessment was performed using the Kujala score and Crosby-Insall criteria. The radiographic evaluation was performed. According to Crosby-Insall criteria, 6 knees were rated as excellent, 6 good, and 1 poor. The Kujala score was improved from 75.4 points preoperativly to 90.2 points two years after surgery($P<0.05$). The congruence angle was significantly improved from average 14.8 degrees to - 8 degrees. The patella tilting angle decreased from average 13.5 degrees to 9.2 degrees ($P<0.05$). In one knees manipulation was needed at 8 weeks after surgery. MPFL recosntruction for the recurrent patella dislocation improved the clinical symptoms and the patellofemoral tracking in min. 2 years follow-up evaluation.

P19-506

Post-traumatic ossification of the patellar tendon treated by arthroscopy: case report

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Objectives: The Authors report a case of a young woman affected by post-traumatic ossification of the patellar tendon that was treated by arthroscopy.

Methods: A young women, aged 34, was seen with pain in the region of the patellar tendon and a limited ROM of the knee. An xray showed an extensive ossification of the patellar tendon after injury to the knee five months before. A review of the literature showed only one report of patellar tendon ossification that had been treated by excision of bony mass and augmentation using a Leeds-Keio ligament. We prefer not to use an artificial ligament so we decidedt to remouve the ossification and to augment the remaing tendon with the semitendinous tendon, but the patient, that had alredy experienced two surgerys for her lesion, did not accept this proposal compelling the Authors to find another solution. So two arthroscopic approaches, four months apart, were performed in order to create a solution of continuity between the patellar apex and the tendon.

Results: The patient recovered a complete ROM of the injured knee four months after the second arthroscopic surgery and returned to her daily activity, including fitness and jogging.

Conclusion: The Authors thing that the solution described in this report is a good compromise, resulting in less invasive surgery and greater patient satisfation.

P19-620

The effect of the iliotibial band on the stability of the patellofemoral joint

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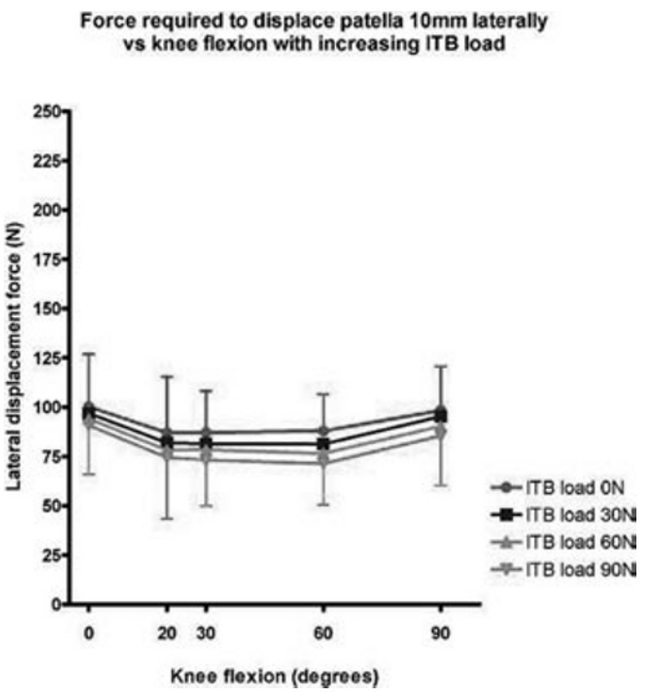
Objectives: The effect of the iliotibial band (ITB) on tibiofemoral and patellofemoral(PF) kinematics has been previously investigated.The ITB may affect the behaviour of the lateral retinaculum since anatomic studies have shown interconnections between them.This study aims to investigate and quantify the effect of loading the ITB on the stability of the PF joint.

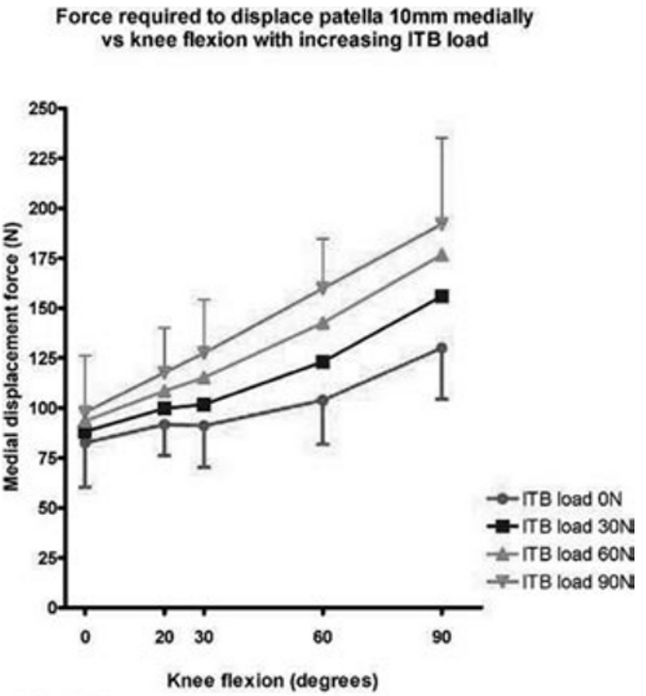
Methods: Sixteen cadaveric fresh frozen knees were used.The quadriceps was separated into 5 functional components and a total load of 175 N was applied. The stability of the PF joint was measured in a five-degree of freedom rig with the knee mounted sideways. An Instron testing machine measured the force required to displace the patella 10mm medially then laterally at 0,20,30,60 and 90 degrees of knee flexion. This was performed at the following loads applied to the ITB (0N,30N,60N,90N). Differences in the restraining force after loading the ITB was analysed with 2-way matched ANOVA (Bonferroni post hoc).

Results: Lateral stability was decreased on average by 6N (SD=4) between 20 and 60 degrees of flexion when the ITB was loaded to 30N.At 0 and 90 degrees flexion there was no significant change.At 60 and 90N of ITB load, there was a statistically significant reduction in lateral stability ($p<0.01$) at all joint angles but the change was not significantly different between one angle and another. Thus,the average reduction in lateral stability when the ITB was loaded at 60N and 90N is 9N(SD=5) and 13N(SD=7) respectively.

Medial stability progressively increases with increasing knee flexion ($p<0.001$) and increasing ITB loads ($p<0.001$). At 30N ITB load there was no significant change at 0 degrees flexion and the increase in medial stability went from 8N (SD=3) at 20 degrees flexion to 26N (SD=10) at 90 degrees flexion. At 60N ITB load the change in medial stability increased progressively with knee flexion angle, from an increase of 11N (SD=6) at 0 degrees flexion to 47N(SD=18) at 90 degrees flexion. At 90N ITB load, this ranged from 15N (SD=9) at 0 degrees flexion to 62N(SD=22) at 90 degrees flexion.



Lateral Stability



Medial Stability

Conclusions: The ITB has a significant effect on patellofemoral stability. This is demonstrated by the change in the force required to displace the patella medially and laterally by 10mm. The lateral stability decreases as the ITB is loaded. The medial stability increases with increasing ITB loads and this is especially so at higher knee flexion angles.

P19-628

Acute traumatic patellar dislocation in pre-mature patients - arthoscopic treatment

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MPFL has been recognized as the most important ligamentous stabilizer, preventing latelar patellar dislocation. Ten patients with a mean age of 16(14-18)yo suffered from acute traumatic patellar dislocation, underwent knee arthroscopy and closed transcutaneous MPFL reconstruction. The mid-term results were assessed radiologically, clinically and functionally, using the Lysholm knee score. At the latest follow-up all patelae were stable and knees functional with a mean Lysholm knee score of 98 (95-100) points. We recommend this simple operative procedure for the management of acute PF joint dislocation in younger patients

P19-650

The effect of patellofemoral overstuff on the extensor retinaculum following total knee replacement

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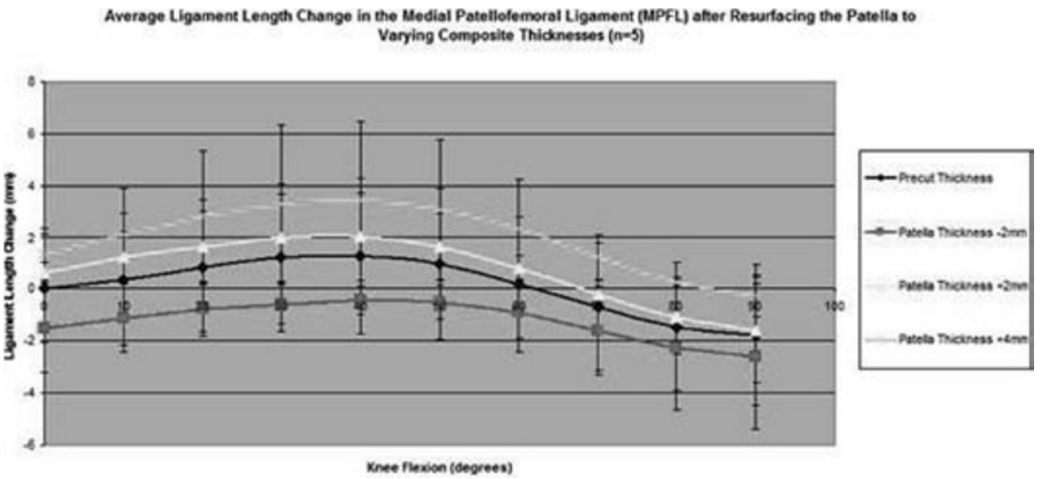
Objectives: The extensor retinaculum acts as a checkrein for the patella as it tracks over the surface of the femur. Overstuffing the patellofemoral joint can overwhelm these soft tissue constraints and negatively impact on the patellar bone and patellar button composite. To date there is no data quantifying the effect overstuffing the patellofemoral joint has on the principal soft tissue constraints of the extensor retinaculum after total knee replacement (TKR). The aim of this study is to test the hypothesis that overstuffing the patellofemoral joint may lead to patellofemoral complications as a consequence of excessive stretching of the retinaculae.

Methods: 8 fresh frozen cadaver knees with no history of injury were placed on a customised testing rig. The femur was fixed to the rig in neutral rotation and permitted unconstrained motion of the knee by allowing the tibia to move freely through an arc of flexion. The quadriceps were divided into six components and loaded to 175N in their physiologic line of action using a



MPFL length change after patella overstuff

cable, pulley and weight system. The iliotobial tract was also preserved and loaded with 30N. Tibiofemoral flexion and extension was measured using an optical tracking device. Monofilament sutures were passed along the fibres of the medial patellofemoral ligament and the deep transverse band of the lateral reinaculum and the anterior ends attached to the patella. The posterior suture ends were attached to Linear Variable Displacement Transducers (LVDTs). Thus, small changes in ligament length were recorded by the trancducers. Ligament length changes were recorded every 10 degrees from 90 to 0 degrees during an extension cycle. A longitudinal transpatellar approach was used when performing a TKR to preserve the medial and lateral retinaculum. Testing was conducted on an intact knee following insertion of a cructiate retaining TKA (Genesis II, Smith & Nephew). The patella was resurfaced with an ´onlay´ button centred over the medial ridge. A range of patellar button composite thicknesses were achieved by placing 2mm thick nylon washers behind the button. Variables measured were 2mm understuff, precut thickness, 2mm overstuff and 4mm overstuff. Statistical analysis was performed using a two way ANOVA test.
Results: Preliminary data are currently available on 5 knees. 2mm understuff resulted in significant slackening of the MPFL by a mean of 1.6mm at 50-0 degrees extension ($p<0.05$). 2mm overstuff resulted in no significant length changes in the MPFL throughout extension. 4mm overstuff resulted in a significant lengthening of the MPFL by a mean of 2.1mm at 90-10 degrees extension ($p<0.001$). No significant length changes were seen in the lateral retinaculum throughout the extension cycle, for all patella composite thicknesses.
Conclusion: Overstuffing the patella places the medial retinaculum under greater tension than the lateral retinaculum. Medial placement of the patellar button to improve tracking may contribute to this.

P19-655

Patellofemoral malalignment is not a sufficient condition for the onset of anterior knee pain or patellar instability

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Purpose: To identify if there is a relationship between the presence of patellofemoral malalignment (PFM) and the presence of anterior knee pain and/or patellar instability in the active young.
Type of study: Retrospective clinical study.
Materials and Methods: 40 Insall's proximal realignments performed on 29 patients with "isolated symptomatic PFM" were evaluated. The average follow-up after surgery was 8 years (range: 5-13 years). Clinical results were rated according to the Cincinnati symptom scale, Lysholm score, Tegner activity level and Cincinnati patient perception scale of the overall condition of the knee. Moreover, we performed axial view X-rays and CT of the patellofemoral joint at 0º of knee flexion in all the cases.
Results: Postoperative CT, at long-term follow-up, demonstrated PFM in 21 cases (56.75%). In 16 cases (43.24%) there was a satisfactory centralization of the patella in the femoral trochlea. There is no relation between the result (satisfactory vs unsatisfactory) and the presence or absence of PFM ($p = 0.875$).
Conclusion: Our findings indicate that not all patellofemoral malaligned knees show symptoms; that is, PFM is not a sufficient condition, at least in postoperative patients, for the onset of symptoms.

P19-659

Gait pattern normalization after lateral retinaculum reconstruction for iatrogenic medial patellar instability

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A case of medial patellar instability following Insall's proximal realignment studied pre- and postoperatively by gait analysis is presented. Preoperative gait analysis showed an increased stance time period as well as an increased horizontal braking, heel contact and toe-off vertical peak forces on the affected limb. In our case, gait parameters tended to shift towards a normal value pattern after reconstruction of the lateral retinaculum. We speculate about the importance of the passive restraining structures in patellar stability, in contrast to the role of the muscle function advocated by some authors.

P19-705

Issues of pathological mediopatellar plicae of the knee joint in children and adolescents

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According to various authors, injuiry to knee joint in children who require surgical management, make from 5% to 7 % from all injuries of the skeletal muscular apparatus. The problems of pathological mediopatellar plicae is actual and is not studied enough both in adults, and in children and adolescents. The special attention is made to complexity of its diagnostics, minimal-invasive methods, and also ways of treatment and surgical tactics. The purpose of our research: to develop diagnostic algorithm for verification of pathological mediopatellar plica syndrome and definitions of tactics of surgical treatment.
As object of research results arthroscopic management, out of 516 children operated in the clinic of paediatric traumatology at the Central institute of traumatology and orthopedics from 1995 till 2007, 75 patients had fibrosed mediopatellar fold.
Its well known that embryologically synovial folds divide a knee joint into three parts, with development and growth these plicae partially or completely aplasiate. The rests of plicae thickens, insignificant, but chronic traumatisation to mediopatellar fold leads to its consolidation and further its mechanical friction about medial femoral condyl causing to condylar chondromalacia. and. pain in these patients is caused due to stretching of uneffected joint capsule, adjoining the pathological fold. According to this theory, the etiology of the given problem does not raise any doubt. But preoperative diagnostics of the present pathology, despite of highly developed noninvasive instrumental ways, remains to be extremely difficult.
All 75 patients who had admitted in our department and were diagnosed

arthroscopically as pathological mediopatellar plica syndrome, were not diagnosed preoperatively either clinically or instrumentally .Majority of patients were admitted with suspicion of injury to medial meniscus both clinically and radiologically. All were investigated by both ultrasound and MRI. But only after conducting arthroscopy, we revealed the impingement of plica between patella and femoral condyle and most often, with the movement of the leg the consoled plica get tensed and rolled on femoral condyle. All patients were treated with resection and a partial resection of the plica with mechanical cutter, and also by means of high-frequency radio ablator.
Thus, inspite of development of modern noninvasive methods of investigations diagnosing the pathological mediopatellar plica is difficult enough. In disputable and unclear cases a unique authentic method of diagnostics is arthroscopy of the knee joint which allows to verify with 100 % confidence those or other pathologies in a knee joint including the pathological plicae, and also to carry out adequate surgical management.

P19-716

Investigation of proper fixation site for medial patello-femoral ligament reconstruction

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Introduction: The medial patellofemoral ligament (MPFL) is a primary restraint for lateral instability of the patella and its reconstruction is widely accepted for the treatment of lateral patellar dislocation. However, the optimal fixation site has not yet been clarified. There have been few discussions about the intra-operative isometry measurements for reconstruction. In some cadaver study, patellar attachment of MPFL is not important for MPFL isomerty. The first purpose of this study was the proper femoral attachment of MPFL in consideration of intra-operative isometry. On the other side, several reports emphasize the MPFL as the dynamic stabilizer by the attachment of the quadriceps muscles, especially vastus medialis, however, the attachment site has not been enough investigated. The second purpose of this study was to examinee the morphology and anatomical relationships of the MPFL to the quadriceps muscles.
Materials and Methods: We evaluated the isometry using isotac® on the femoral side during operation and examined the relationship between the pattern of distance variation between two points within the range of motion of the knee and the location of isotac® on X-rays in 27 cases of MPFL reconstruction, regarding the location of isotac®, which we anchored so that the distance variation between two points may be within 5 mm. And 16 knees of 8 cadavers were used for this study. The skin and subcutaneous tissues were removed. The MPFL was identified after the removal of the medial longitudinal retinaculm. The muscle fibers of the quadriceps were removed to clarify the anatomical relationships between the MPFL and the tendinous portion of the quadriceps muscles.
Results: There were 14 cases in which the distance between two points became longer during knee flexion (Group A) and 13 cases in which it became shorter during knee flexion (Group B). We assume that the maximum anteroposterior diameter on lateral view X-ray to be 100%, the distance from the distal articular surface was 50.4% in all cases, 54.8% on average in Group A and 45.6% on average in Group B, showing a significant difference ($p<0.001$). The distance from the posterior border was 35.4% in all cases, 37.2% on average in Group A and 33.5% on average in Group B, showing no correlation with the variation ($p=0.14$). In 16 cadaver study, the femoral attachment of MPFL was nearly the same position with isometric position. MPFL was originated from the location between the medial epicondyle and the adductor tubercle and fanned out toward the patella. The MPFL went into under the vastus medialis and widely attached to the tendinous portion of the vastus intermedius at the proximal portion, and fused with the undersurface of the medial longitudinal retinaculm at distal portion.
Discussion: The mean site of femoral attachment in all 27cases in consideration of isometry may be useful in determining the ligament fixation site. And we can obtain the site with lateral view X-ray. From cadaver study, it is essential to reconstruct the dynamic restraint of the patella by means of the reconstruction which cooperates with the vastus intermedius.

P19-729

Repair of the medial patellofemoral ligament in primary dislocation of the patella. A prospective randomised study

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Objectives: Lateral dislocation of the patella will, conservatively treated, lead to disability due to anterior knee pain and instability/redislocations in between 30 and 50% of the patients. Patella dislocation results in lesion of the medial patellofemoral ligament (MPFL) (appr. 90%) typicallt with disruption at medial femoral condyle insertion. Osteochondral lesions to the patella or the lateral femoral is also seen frequently. Early reinsertion of the MPFL could lead to improved clinical outcome after primary patella dislocation.
The purpose of this randomized prospective study is to evaluate clinical results after operative treatment with refixation of the MPFL compared to non-operative treatment in patients with acute primary dislocation.
Methods: The present study design was a randomised prospective study including 84 patients.
Patients between 13 and 30 years with primary patella dislocations and no prior history of patelladisorders were included. All patients were examined by x-ray and initially arthroscopic examined before randomization to operative or non-operative treatment. The operative treatment consisted of refixation of the medial patellofemoral ligament to the medial epicondyle with suture anchors. Main endpoints were Kujula knee function score and redislocation rate at 1 year follow-up.
Results: 2 patients were lost to follow-up. Redislocation rate was 15 % and 17 % in the operated group and non-operated group respectively (NS). Kujula score (0-100) was 84 in the conservative treatment group and 78 in the reinsertion group (NS). Redislocations were not correlated to sex, body mass index or Q-angel.
Conclusion: Data indicate that early reinsertion of the medial patello-femoral ligament do not reduce risk for redislocation or improve knee function in patients with primary patella dislocation.

P19-760

Effect of medial patellofemoral ligament (MPFL) reconstruction for recurrent patellar dislocation on three-dimensional (3-D) tracking of the patella - an in-vivo evaluation using 3-D computer model

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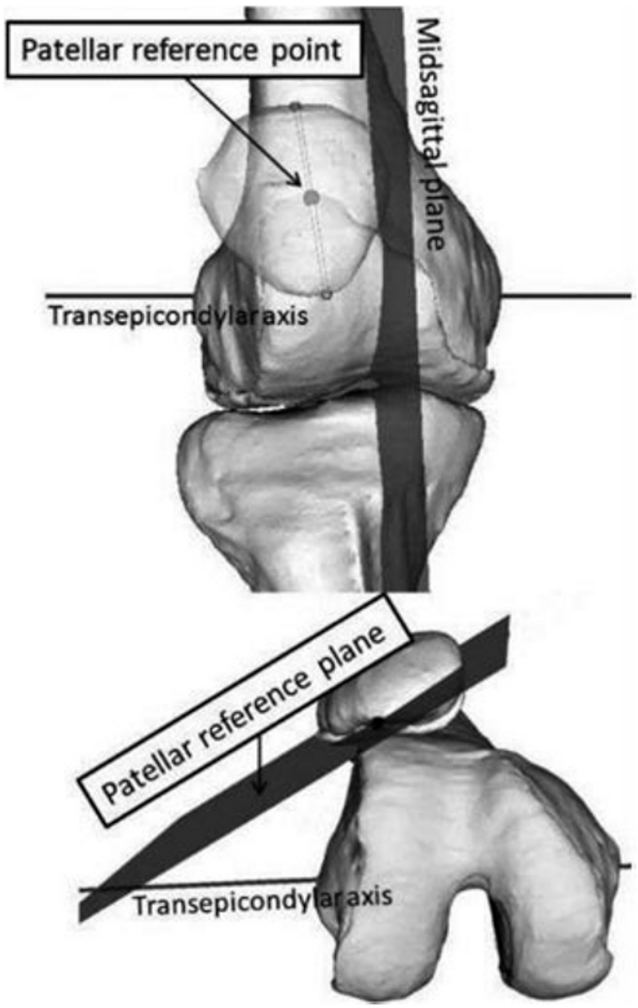
Purpose: The MPFL reconstruction has been performed for patients with recurrent patellar dislocation (RPD). However, its effective on the patellar tracking has not precisely been analyzed yet. The purpose of this study was to evaluate 3-D patellar tracking in patients with RPD after the MPFL reconstruction.
Patients and Methods: There were 5 patients with RPD and 10 normal subjects. 3-D MR images were taken from 0° to 50° of knee flexion. The same imaging was repeated on the patients who were evaluated clinically-successful after MPFL reconstruction. Using these images, 3-D computer models were created. In this study the patellar shift and the patellar inclination were used as parameters of 3-D tracking of the patella. The midpoint between the distal and proximal points of the patella was defined as the reference point. The plane included these three points and parallel to the line passing through the mediolateral osseous border of the patella was defined as the reference plane. The midsagittal plane was defined as the plane perpendicular to the transepicondylar axis (TEA) and passing through the mid-point between the medial and lateral femoral epicondyle (Fig). Each location of the reference point was expressed by the distance from the midsagittal plane defining as the patellar shift. The patellar inclination was defined as the angle between the TEA and the reference plane.



The patellar reference point & the patellar plane

Results: Results were summarized in Table 1-3. The postoperative patellar shift decreased at all flexion angles except in one. The postoperative patellar inclination angle decreased from 0° to 30°, while that increased in the two patients at 40° and 50°. In summary, the postoperative patellar shift and patellar inclination angle remained greater than those of the normal controls.

Patients	0°	10°	20°	30°	40°	50°
1. pre-MPFLR	25.6	22.4	19.9	18.0	14.3	12.2
1. post MPFLR	19.4	19.0	19.0	18.3	16.9	15.7
2. pre-MPFLR	14.7	13.9	9.8	9.6	4.9	4.9
2. post MPFLR	6.2	6.8	6.4	5.0	4.4	4.5
3. pre-MPFLR	11.7	11.3	8.6	7.7	5.9	7.1
3. post MPFLR	5.6	4.8	3.9	3.0	2.4	2.6
4. pre-MPFLR	21.1	22.0	21.1	30.3	30.6	31.7
4. post MPFLR	18.1	17.9	19.8	20.7	21.1	22.0
5. pre-MPFLR	20.1	20.3	22.0	23.1	25.4	25.9
5. post MPFLR	14.9	15.2	15.5	14.7	13.4	13.3
Normal control±SD	7.9±4.2	6.8±4.1	4.8±4.2	4.1±4.5	4.1±4.2	4.5±4.0

Patients	0°	10°	20°	30°	40°	50°
1. pre MPFLR	20.1	13.0	7.3	5.5	0.6	0.8
1. post MPFLR	5.9	5.8	2.4	2.2	2.4	2.8
2. pre MPFLR	26.6	25.7	18.8	16.9	13.7	15.4
2. post MPFLR	15.4	16.6	15.4	14.0	14.7	15.6
3. pre MPFLR	20.8	21.2	16.7	15.5	13.3	17.4
3. post MPFLR	9.4	9.6	8.4	7.5	7.6	8.7
4. pre MPFLR	47.9	51.4	46.9	63.0	65.1	64.1
4. post MPFLR	40.4	39.0	41.1	42.0	42.0	42.2
5. pre MPFLR	30.1	28.7	29.3	29.8	32.3	34.5
5. post MPFLR	21.9	21.9	20.8	18.5	14.9	14.2
Normal control±SD	6.8±6.6	5.9±6.8	4.1±6.2	3.7±6.6	4.2±6.2	4.7±5.9

Patients	0°	10°	20°	30°	40°	50°
1. pre MPFLR	185	219	277	269	302	289
1. post MPFLR	136	277	245	350	359	326
2. pre MPFLR	172	206	192	135	134	166
2. post MPFLR	199	196	204	178	175	202
3. pre MPFLR	119	174	220	214	272	271
3. post MPFLR	213	292	233	246	206	235
4. pre MPFLR	125	151	155	140	168	108
4. post MPFLR	162	164	164	197	160	162
5. pre MPFLR	179	227	237	263	243	240
5. post MPFLR	248	309	343	343	360	428
Normal control±SD	177±47	218±60	270±51	321±70	386±66	409±65

Conclusion: The MPFL reconstruction stabilizes the patellae by widening articular cartilage contact area, but it does not normalize the patellar tracking.

P19-792

The axis of the patello-femoral joint

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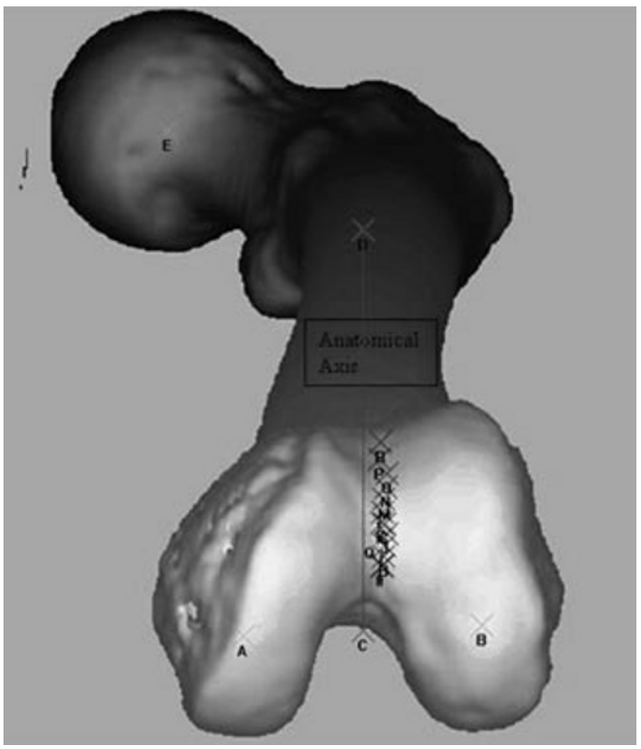
Aim: Patellofemoral complications are one of the major causes for revision surgery. The aim of this study was to define the 3-dimensional geometry of the femoral trochlear groove and its relationship to the tibiofemoral joint in terms of angles and distances.

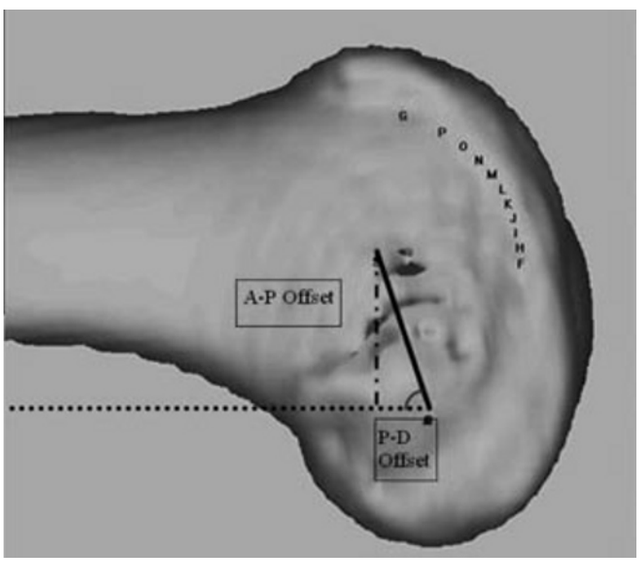
Method: CT scans of 45 normal femurs were analysed using custom designed imaging software.The flexion axis of the tibiofemoral joint was found to be a line connecting the centres of the spheres fitted to posterior femoral condyles. The trochlear geometry was defined by fitting circles to cross sectional images and spheres to 3D surfaces. A trochlear axis was constructed through these centres. The deepest points on the trochlear groove were identified using quad images and Hounsfield units. After aligning the femur using different axes, the location of the groove and the trochlear axis was examined in relation to the conventional axes of the femur.

Results: The deepest points on the trochlear groove could be fitted to a circle with a radius of 23mm (S.D. 4mm) and an root mean square(RMS) error of 0.3mm. In the sagittal view, the centre of the circle was offset by 21mm (S.D.3mm) at an angle of 67° (S.D. 7°) from a line connecting the midpoint between the centres of the femoral condyles and the femoral head centre. On either end of this line, the articular surface of the trochlea could be fitted to spheres of radius 30mm (S.D. 6mm) laterally and 27mm (S.D. 5mm) medially, with a low R.M.S error of 0.4mm.

The trochlear groove is positioned laterally (especially in its mid portion) in relation to the mechanical, anatomical, and transepicondylar axes of the femur. It is also clearly not co-planar, with any of the three axes although it most closely approximates to the anatomical axis. The line joining the centres of these two spheres passes through the centre of the trochlear groove circle and can be used to align the trochlea groove. The patello-femoral axis is angulated in relation to the 3 femoral axes. By aligning the femur to this new axis, the trochlear groove becomes linear with less than 1mm deviation along its length.



Position and orientaion of the trochlear groove



sagittal view

Discussion: This investigation has allowed us to characterise the trochlear groove.This can be used to document abnormalities of alignment and shape in pathological conditions, and can be of use in planning and performing joint reconstruction. It may also have implications for the design of patello-femoral replacements and the rules governing their position

P19-802

Isolated patello femoral replacement (PFR) - symmetrical or asymmetrical

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Introduction: PFR has grown in popularity in recent years driven by the success of the Avon prosthesis (Stryker) which resects minimal bone and provides a broad shallow trochlear component which can be externally rotated to accommodate lateral tracking. However control of rotation is poor and malrotation has been shown in some of the failures. In addition the component is symmetrical which is at variance with most modern knee replacement systems.

Method: The short-term outcome of the last 50 symmetrical Avon PFRs has been compared with the first 50 of a new asymmetrical PFR, the Journey (Smith & Nephew), which also has modern instrumentation improving rotational control.

All patients were prospectively assessed by a research nurse using the subjective Oxford Knee Score (OKS) and WOMAC, and either the objective Bristol or American Knee Score.

Data was recorded prospectively on the Knee Replacement Database.

Results: The two groups were similar with a majority of females and an average age of around 60 in both groups. Pre-operative scores were also similar with all three scoring systems.

At 8 month review the asymmetrical Journey prosthesis gave better average results with all scoring systems. OKS (0-48) 36.6:29.6; WOMAC (60-12) 21.7:26.1 and AKS/BKS (0-100) 92:82.

Conclusion: The more anatomical shape of the asymmetric prosthesis appears to offer some advantage in terms of comfort and function. Long-term outcome is awaited.

A new asymmetrical patello femoral replacement with modern superior instrumentation has been shown to give superior short-term results to an older symmetrical implant

P19-847

Long term results on trochleoplasty in dysplastic knee trochlea

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Introduction: Trochlear dysplasia is an important risk factor for patellar instability. Because of a decreased trochlear depth in combination with a low lateral femoral condyle, the patella cannot engage properly in the trochlea. We performed a Henri Dejour trochleoplasty in patients complaining of recurrent patellar dislocations or persistent retropatellar pain due to trochleodysplasia. In this technique, the femoral trochlea is deepened by removing the subchondral trochlear bone followed by incision, impaction and fixation of the cartilage along the trochlear groove.

Materials and Methods: Between 1996 and 2002, we performed 34 trochleoplasties in 29 patients. All the patients were primary suffering of trochleodysplasia with severe symptoms of pain or instability. This retrospective study analyses the clinical outcome of patients with more than five years of follow-up. Four patients were lost to follow-up. Five patients were excluded because they received another major procedure concerning their affected knee (1 TKA, 1 arthrodesis, 1 patellectomy, 1 patellofemoral prosthesis and 1 patient received a pain pump). Finally, 25 knees in 20 patients (6 men, 14 women) with a mean age at follow-up of 32, 7 years (SD: 9,2) were available. All these patients were questioned by a medical doctor, which was not the operating doctor. We registered early complications, later interventions, the current use of painkillers, a visual analogue scale, the Larsen-Lauridsen score, the current range of motion and KOOS score.

Results: At a mean follow-up time of 7,5 years (SD: 1,8) , two patients were using analgesics on a daily basis. The mean VAS score was 3,8 (SD: 2,8). All patients had a range of motion of more than 90° with a mean of 133° (SD: 17,2). The Larsen Lauridsen score was 11,5 (SD: 4,1). The general KOOS score was 248,3 (SD 113). Nine knees underwent a re-operation (5 mobilizations under general anesthesia, 1 wound dehiscention, 1 removal of screws, 1 arthroscopic synovectomy and 1 arthroscopic treatment for meniscal problems).

Conclusion: At a mean follow-up of 7,5 years, all patients had a good mobility of the knee and more than 90% were pain free. Although the majority of these patients were unable to perform sports or a heavy job, most of them were able to perform daily activities. Although the result was not perfect, the majority of this population, with frank trochlear dysplasia associated with persistent retropatellar pain or recurrent patellar dislocations were satisfied and would choose to undergo this operation again (60%). In the future further research is necessary and randomized clinical trials comparing trochleoplasty with other possible surgical techniques (such as medial patellofemoral ligament (MPFL) reconstruction) need to be performed.

Keywords: Trochleodysplasia - Trochleoplasty - Retropatellar pain - Patella dislocations.

P19-855

Patellar instability: Long term results of surgical treatment correcting "one by one" the anatomical abnormalities

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Introduction: Patello-femoral joint disorders are common in young patients, due a abnormal knee anatomy. Numerous operations have been described to(for) treatment of patello-femoral instability.

Methods: A retrospective study reviewing the results of a single surgeon. Were treated between 1993 and 2004, forty nine knees in forty four patients, five were bilateral. The mean age was 22 years (range 14 to 44), 24 patients were female and 18 male. Average follow up of 88 months (34 -144 months), average time between symptoms and surgery was 47 months (3 - 150 months).

Pre-operative symptoms, x-rays, CT and predisposing factors were analysed. Surgical thecnique correcting step by step the anatomical abnormalities: lateral retinacular release, medialisation, distalisation and VMO plasty. Pos-operative outcome was determined based on the incidence of complications, subjective score, functional scores (Lysholm and Arpege), X-ray evaluation and statistical was performed with SPSS.

Results: 79% of patient were satisfied and very satisfied. Functional global results was 84% good to excellent (Arpege).

Lysholm score: Excellent (20%), Very good (31%), Good (13%). 2,6% of degenerative osteoarthritis (Crosby-Insall) Pos-operative complication: 3 patients (7,7%) presented pos-operative patello femoral dislocation, 2 cases of haemarthrosis, 1 case of hidrarthrosis, 2 fractures of tibial tubrosity and 4 scars.

Conclusion: Surgical treatment correcting step by step abnormalities founded in patellar instability, gives good subjective and functional results. The best results in patients with short average time between symptoms and surgery.

P19-858

Patellar fracture surgical treatment. What is today´s role of total patellectomy? 5-years experience

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Patella fractures constitute about 1 % of all fractures in adult. Usually are intarticular lesions with important repercussions in sports practice and socio-professionally. Has many different presentation forms with strict correlation with treatment. The objective of the study is to evaluate present impact of this injury and clinical results with different surgical procedures.

This is a retrospective study of all cases operated in our institution in the period of 01/11/01 and 01/11/06 (n=42), convoqued by phone. Five were excluded (4 obits and 1 change of residence to foreign country). From the remainder, 28 presented to clinical evaluation. Clinical results were evaluated acording to Knee Society Score modified by Insall (KSS), visual analog scale for satisfaction. Radiological protocol included AP, lateral and Merchant´s view. 16 males and 12 females with mean age of 58 years (18 to 86). Lesional mechanism was direct trauma in all cases (24 after fall, 3 car accidents and 1 sports trauma). 2 knees had previously been operated (one total knee arthroplasty -TKA, one previous patella fracture). Fractures were classified as 16 transverse, 4 transverse comminuted, 3 inferior pole fractures and 1 post-TKA (Goldberg III A). Primary surgery was tension band with Kirschner wires (according to OA group) in 21 cases, 4 partial patelectomies with reinsertion of patellar tendon, 1 total patellectomy and 1 cerclage with wire. Mean KSS-function was 76.60 (min.45 to max.100) and mean KSS-knee 86.39 (min. 63 to max. 100).

Three complications were registered: infection and loosening (n=1); loosening (n=2). Two were submited to total patelectomy and one to open reduction and internal fixation with screws.

Globally results can be considered as satisfactory. Even the reoperated patients considered as satisfied with their actual condition. One of the worse clinical results corresponded to fracture after TKA. Although we consider total patellectomy as last surgical resource, in this series we registered three out of 28 cases (10.7 %) with fair clinical results and degree of satisfaction. Further evaluation is needed to define the critical point at wich reconstrution or preservation should be abbandoned in favor of total excision, thus sparing the patient to aditional surgery after prolonged and difficult rehabilitation. Possible advantage of allograft over total patellectomy is also issue of interest.

P19-864

Extensor mechanism allograft in multioperated Knee: 5-10 years f ollow-up of three cases

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Basic functions as walking or standing demand active knee extension capacity. Although surgical reconstruction of extensor mechanism allows reliable results in the general population, some cases add important suplementary difficulties such as patients with total knee arthroplasty (TKA), post-infection or multioperated knees with diminished tissue restoring capacity. Allograft has been reported as a viable option in such cases with good clinical results. Immunological issues, risk for disease transmission and long-term clinical results are questions of concern with the use of any allograft tissue. The autors present three cases in which allograft was used to restore extensor mechanism in multioperated knees. 53 year-old male that had a tibial plateau fracture (Schatzker VI), initially treated with open reduction and internal fixation, evolved with infection and faillure of implant, subsequent material extraction and external fixation, with persistent infection. At 2 years post-injury presented varus deformity, medial tibial plateau necrosis and pseudartrosis, patellar-tendon destruction and stiffness (20º range of motion). A closing wedge high tibial osteothomy (HTO) was performed to resolve the malalignement and pseudartrosis. After HTO consolidation, the extensor mechanism is repared with an allograft (consisting of partial patella, patellar tendon, distal bone block). After clinical and serological normalization regarding infection, a stemmed, semi-restrictive TKA is performed. 58 year-old female submitted to surgery for simptomatic patella bipartita complicated with septic arthritis submited to surgical treatment at the age of 25. Progressive stiffness of the knee joint developed with severe functional limitations. A primary TKA was performed at the age of 47. One year later she suffered a patella fracture treated surgically (K wires and tension band AO group) with patella necrosis, extension-lag and persistent pain which lead to total extensor mechanism allograft (quadriceps tendon, patella, patellar tendon, distal bone block). Five-years ago suffered periprosthetic tibial fracture treated nonoperatively. 40 year-old male who suffered anterior cruciate ligament rupture at the age of 26 treated with bone-tendon-bone plasty. Submitted to arthrotomy for stiffness and infection 9 months after plasty and new arthrotomy one year later with section of neo-ACL and elevation of tibial tuberosity, which was complicated by intra-operative fracture. At the age of 28, extensor mechanism repair with allograft. Clinical and radiological results are presented regarding range of motion, quadriceps strength (isokinetic testing), Knee Society Score, visual analog scale for symptoms and radiological signs of graft integration. Clinical follow-up was 60, 114 and 142 months respectively. Radiological integration of graft is present in the three cases. All deambulate without external aid and with active extension during all range of passive articular movement with acceptable quadriceps strength. Although these cases present multiple variables afecting the knee joint, the extensor mechanism remains effective after allograft in the long term in all patients. All patients refere as "very-satisfied" with knee function. Isokinetic tests are an important tool to evaluate functional outcome and we encourage its further aplication. The local tissue conditions of the host were severe, and the allograft considered as the last therapeutic resource.

P19-867

Mid-term follow-up of distal patello-femoral realignment and MACI on patella

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Aims: Patellofemoral malalignment is often associated to chondromalacia patellae. Many auhors reported the outcomes of distal realignment procedures in the treatment of patellofemoral malalignment, but few reported outcomes of this procedure combined with treatment of the cartilagineous defects.

The aim of this prospectic study, was to evaluate clinical, CT and histological outcomes at 3 years after surgery, of patellofemoral distal realignment and autologous chondrocyte implantation on membrane (MACI).

Methods: Twelve patients (6 female-6 male, mean age 31, range 20-40) affected with lateralised and tilted patella associated to type III-IV chondral patellar lesions were enroled. Two patients were bilaterally treated. A pre-operative CT evaluation was performed in all patients in order to assess pa-

tellofemoral congruence angle and tilting, and TT-TS. Only patellar lesions larger than 3 cm^2 were included in this study and the mean defect size was 4.5 cm^2. None of the patients was affected by patello-femoral osteoarthritis, rheumatic, infective or neoplastic pathologies. Follow up was 36 months.
After a diagnostic arthroscopy to definitely ascertain the abnormal patellar tracking and to define the degree of cartilage lesion, patients underwent a cartilage biopsy. After a mean waiting time of 30 days (min. 25 - max 40) patients underwent the second operation of tibial tuberosity transposition by Fulkerson (partially modified), associated with the MACI technique on the patella. Clinical assessment was performed with the Kujala Knee Score, Lysolm Score, Tenger Score, and Cincinnati Modified Score at 0 / 3 / 6 / 12 / 24 / 36 months after surgery, and CT at 0 / 24 months. In 2 cases, at 18 months after surgery, was possible to perform a second look arthroscopy with biopsy whilst removing tibial screws. Histological assessment was performed according to the ICRS Score.
Results: No major adverse events were seen nor in the postoperative time neither at distance. Clinically we found a substantial improvement in knee function, either subjective or objective. The mean Kujala score improved from 56.5 to 88.5 at 36 months. Mean LysoIm, Tenger and Cincinnati scores improved respectively from 56.8, 1.3 and 2.8 pre-op. to 90.2, 4.4 and 7.7 at 36 months. CT scan performed at 24 months showed in all cases a normal patello-femoral alignmnent. Histological analysis of the 2 biopsies showed hyaline-like reparative tissue in both samples.
Conclusions: The clinical improvement, the CT aspect of patello-femoral alignment, and the histological outcomes, showed that MACI technique, when associated with patello-femoral distal realignment by Fulkerson, is effective in reliefing pain and in restoring joint function and hyaline-like reparative tissue.

P19-908
Rotation can lead to false positive and false negative identification of trochlea dysplasia on a conventional radiograph
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Radiologic criteria are commonly used to diagnose femoral trochlear dysplasia causing objective and potential patellar instability. A dysplastic trochlea can be identified on conventional radiographs when the line of the trochlear groove crosses the anterior border of one or both condyles. The aim of this study was to establish the influence of rotation on the precision of these radiographic criteria as classified on a true lateral conventional radiograph. In a radiological in vitro study using two different distal femurs we found that rotation deviations of the distal femur can simulate femoral trochlear dysplasia in a normal knee. In case of trochlear dysplasia, rotational deviations can simulate a normal trochlear shape with crossing of the trochlear groove with the anterior border of the femoral condyle. Even a rotation deviation of five degrees can cause a false positive or false negative diagnosis. We recommend the use of fluoroscopy to obtain a true lateral view (with both condyles overlapping on the posterior side) in order to correctly classify trochlea dysplasia and would strongly urge that no surgery should be performed on the basis of rotated conventional radiographs.

P19-924
Trochleoplasty for recurrent patello femoral instability - due to femoral groove dysplasia: Surgical correction of the pathology - our experience
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Background: An abnormal trochlea is reported to be associated with recurrent patellar instability in a significant part of the cases. In these cases it is logical to consider fashioning a groove as part of a realignment procedure. We report our experience with this technique.
Methods: 11 consecutive patients with symptoms of recurrent patellar instability due to trochlear dysplasia were identified using a true lateral radiograph of the knee. In the CT scan, patients with trochlear dysplasia demonstrated a poor depth, or even a flat or convex trochlea and lateral trochlear slope angle, a lateralised patella to the trochlear groove with poor congruency, and a greater lateral patellar inclination angle. They underwent a reshaping of anterior distal femur by lifting off the cartilage shield with a layer of subchondral bone, reaming out a groove of normal depth from the cancellous bone and reattaching the cartilage shield down into the bottom of the new trochlea. Outcomes were documented at 1/2 years minimum follow-up using the patellofemoral score, WOMAC score and standard conventional radiographs.
Results: In all the cases, patients reported good improvement in stability (no dislocations) and most patients had a marked improvement in pain and functional scores at follow-up (mean follow-up 24 months). No serious complications occurred. One patient required a total knee replacement after 8 months due to breakdown of independent osteochondral focus after direct trauma on the lateral condyle.
Conclusion: It appears to be a satisfactory and safe method for treating patients with patellofemoral joint instability caused by trochlea dysplasia. We found no evidence of cartilage damage in our small cohort of patients.
Surgically creating more normal anatomy can correct the pathological features of trochlear dysplasia by Trochleoplasty. The goal of this surgical procedure is to deepen the trochlear groove for a better engagement of the patella. We report that the trochleoplasty may be adopted as a primary intervention for patellar instability.

P19-952
Clinical and radiological results after lateral release in patients with patellofemoral arthritis
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Objectives: Lateral retinacular release has been described to relieve pain, improve function and realign the patella in patients with patellofemoral arthritis. The aim of this retrospective study was to assess the clinical outcome and the radiological result of the lateral release procedure.
Methods: 38 consecutive patients (17 women, 21 men) with isolated patellofemoral arthritis that were treated with lateral retinacular release were followed for 3 (6 to 2) years. Their mean age at time of surgery was 46 (34 to 72) years. The operated knee joint was assessed pre- and postoperatively by using the IKDC-Score (subjective evaluation form, IKDC-activity level), the VAS and radiological measurement of the completed axial x-rays (patella centering and lateral patellofemoral angle). Statistical evaluation was performed with the t-test and Wilcoxon-test.
Results: Subjective IKDC improved from 41,75 (±17,1) points to 73,1 (±17,4) points ($p<0,01$). VAS improved from 7±2,3 to 3±2,4 points ($p<0,01$). IKDC activity level improved from 4±2,2 to 8±1,7 points ($p<0,01$). X-ray measurements revealed a significant better patella centering from 7±2,2 to 5±1,7mm ($p<0,01$; method of Hepp et al. 1987) and a significant decrease of the lateral patellofemoral angle (Laurin et al.1979) from preoperatively 6±3,2 to 12±1,5 degree ($p<0,01$).
Conclusions: Lateral retinacular release relieved symptoms, allowed for an increased activity level and improved radiological patellofemoral alignment as long as 3 years postoperatively. These results confirm the good results described in other studies.

P19-985
Reconstruction of the medial femoropatellar ligament using a medial strip from the medial femoropatellar ligament: Preliminary results after a minimum of one year of follow-up
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Objectives: To present a case series with preliminary results from using a technique for reconstructing the medial femoropatellar ligament (MFPL) with a medial strip from the patellar ligament, regarding recurrences and functional scores.
Materials and Methods: Between March 2004 and June 2007, 29 patients underwent surgery using the MPFL reconstruction technique with a medial strip of patellar ligament, in accordance with the technique described by Camanho et al (2007) (SURGICAL TECHNIQUE). Only 17 of the patients presented a minimum of one year of follow-up and therefore these were the patients analyzed in this case series. Out of these 17, four patients underwent operations in the acute phase, less than four weeks after their injuries. The remainder were chronic cases (more than four weeks after their injuries).
Results: Our patients presented a mean Kujala score of 79.23 (minimum of 50 and maximum of 100). On the subjective IKDC scale, the patients presented a mean score of 73.98 (minimum of 36.79 and maximum of 100). Only one patient presented episodes of subluxation and none of the patients presented recurrences of femoropatellar instability.
Discussion: MPFL injuries due to acute dislocation of the patella are well documented, the MPFL is considered the principal restraint to lateral displacement of the patella. There is still some controversy in the literature regarding the treatment for acute dislocation. The management methods of immediate reconstruction and/or repair versus conservative treatment are

topics for debate. In cases of chronic femoropatellar instability, the insufficiency of the medial containment structures for lateral luxation has also been well demonstrated. Various techniques have been described for treating this dilocation when conservative treatment fails. Among them are distal, proximal and combined realignment techniques and lateral release. Among the patients with chronic femoropatellar instability with more than two episodes of dislocation and tomographic measurements of the AT-TG (anterior tuberosity-troclear groove) that were less than 20 mm (1), we used MPFL reconstruction with a medial strip of patellar ligament. This technique could also be performed in acute luxation cases.
Conclusion: Our case series using the MPFL reconstruction technique with a medial strip of patellar ligament presented excellent functional results from the Kujala and subjective IKDC scores. The technique was also effective in improving syntoms from femoropatellar instability.

Osteotomy

P20-72
Changes of alignment in HTO: Effect of weight bearing
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Aims: To evaluate the change of knee alignment in patients with high tibial osteotomy (HTO) after weightbearing.
Methods: From June 2004 to September 2006, we performed thirty six HTO for unicompartment arthritis patients with varus deformity. Thirteen patients without instability and with accurate radiologic evaluation were included. We evaluated the changes of mechanical axis and tibiofemoral angle (T-F angle) through the immediate postoperative (supine position) and postoperative four months (Weight-bearing) full-limb radiogram.
Results: The mean change of mechanical axis and T-F angle was 22.1% and valgus 8.9 degrees in immediate postoperative full-limb radiogram, and 33.8% and valgus 8.9 degrees in postoperative 4 months weight-bearing radiogram. The mechanical axis and T-F angle increased 11.7 % and 1.8 degrees ($p<0.05$).
Conclusions: In patients with HTO, the surgeon should consider the increase of mechanical axis and T-F angle after weight-bearing.

P20-87
The "inside-out" minimally invasive high tibial osteotomy technique
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Purpose: External-fixeter opening-wedge bone-transport high tibial osteotomy has several advantages compared to other methods. Most importantly, correction is obtained gradually as an outpatient where it can be precisely measured on mechanical axis radiographs. This allows exact correction to one degree of mechanical axis valgus: avoiding the under- or over- correction that can occur when alignment is estimated from intra-operative radiographs in methods utilizing plates to achieve complete correction at the time of surgery. In addition, because the osteotomy is below the tibial tubercle there is no alteration of patello-femoral mechanics nor is there any deleterious effect on the results of any subsequent prosthetic knee arthroplasty. There is also no hardware left in the knee after the fixeter pins are removed. However with this method, as well as with all other opening wedge methods, the tibia is cut from medial to lateral, hopefully stopping when an ideal thickness lateral bony "hinge" has been defined. However it is difficult to produce this ideal thickness lateral bony hinge consistently because it is difficult to cut close to the lateral cortex without cutting through it. We hypothesized that a gigli saw could be inserted parallel and just medial to the lateral cortex through a single small drill hole, thus producing a lateral hinge of exactly the right thickness at the outset, followed by completion of the osteotomy in a lateral to medial direction.
Methods and Materials: Ten patients aged 27 to 56 years, underwent HTO using a gigli saw inserted through a lateral drill hole. Simultaneous procedures included microfracture in eight, autologous chondrocyte implantation in two, anterior cruciate ligament reconstruction in one, medial meniscectomy in five, lateral meniscectomy in two, and chondroplasty in five. Pre-op varus ranged from five to 19 degrees.
Results: No complications occurred at surgery. All patients had union of their osteotomies by 13 weeks postoperatively after outpatient correction of the deformity using an external fixator. The gigli cut produced less space between the bone ends, i.e. a finer cut, than occurs with osteotomes. A reliable bony lateral hinge was produced in each case. No significant propagation of the osteotomy occurred. Incisions were generally about one inch in size.
Conclusions: The inside-out technique produces a reliable lateral tibial bony hinge, is neurovascularly safe, produces a smaller bone gap than occurs with osteotomies and avoids osteotomy propagation into the tibia. Cosmesis is excellent.

P20-97
High tibial osteotomy or unicompartmental knee replacement for unicompartmental osteoarthritis of the knee?
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We have compared historical results of Maquet´s high tibial osteotomy for unicompartmental osteoarthritis of the knee in 48 patients with the results of Unicompartmental Knee replacement in age and sex matched patients. Knee Society scoring system has been used to assess the knee function post operatively. 95.8% of cases showed a femoro-tibial angle of 6.5° valgus and 72% showed a 0° mechanical axis at final review. Knee Society scores improved from 42.4 to 72.4 in cases with High Tibial osteotomy compared to an improvement of Knee Society score from 42.3 to 85.3 ($p = 0.0002$) after unicompartmental knee replacement). Improvement of Knee society scores was better after UKR compared to after HTO. Six of the HTO cases needed revision surgery to Total Knee replacement (survivorship of 87.5%). There were two failures of UKR's due to tibial plateau fracture (survivorship of 95.8%), which needed revision to total knee replacement.

P20-172
External tibial torsion as a cause of lateral compartment osteoarthritis of the knee
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This study analyses the relationship between external tibial torsion and lateral compartment arthritis. Unrecognized, external rotation deformity often results in failure of knee arthroplasty. There are currently few studies documenting this pathology.
A retrospective assessment of 45 cases of lateral compartment arthritis secondary to external tibial torsion was carried out. Correction of the apparent valgus was obtained by reducing the external tibial torsion via internal rotation of the tibia on the tibial component. It is possible to rotate the tibia 20 - 25 degrees on the tibial component. This is sufficient to correct up to 45 degrees of external tibial torsion. For those patients with external tibial torsion greater than 45 degrees, the results of total knee replacement are poor. The residual external tibial torsion results in an abnormally high ´Q´ angle with patella mal-tracking and instability.
Of the 45 cases, ten had external tibial torsion greater than 45 degrees and underwent combined rotational high tibial osteotomy and total knee replacement. The results of the cases corrected by total knee replacement alone were all good to excellent. Three of the ten cases with combined high tibial osteotomy/total knee replacement were classified as poor, with stiffness and pain. The treatment of osteoarthritis of the knee with external tibial torsion is complex. Treatment of cases with external tibial torsion less than 45 degrees is reliable, but in cases greater than 45 degrees is much less satisfactory.

P20-173
Rotational osteotomy of the proximal tibia for mal-tracking/dislocation of the patella
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Mal-tracking or dislocation of the patella is often the result of abnormal anatomy. Understanding the anstomy will clarify the treatment options available. The common anatomical causes of dislocation range from the valgus knee to patella alta and external tibial torsion. External tibial torsion results in symptoms ranging from patello-femoral pain to subluxation or dislocation. Many patients become symptomatic after an injury and recognition of the anatomical pathology helps in the treatment decision. A retrospective study was carried out on 232 rotational high tibial osteotomies in 221 patients operated on between 1990-2004. The pre-operative degree of external tibial torsion and ´Q´ angle was noted. The extent of any patello-femoral pathology

was documented, as well as the degree of correction. Assessment was carried out using the HSS score and the Lysholm score. Notation was made of prior surgery, including arthroscopy, patella tendon transfer and patellectomy.
Of the 232 cases, 80% showed good to excellent results with resolution of patello-femoral pain and instability. Ten percent had residual pain but no instability and 20 cases proceeded to total knee replacement. The best results were seen in cases of pain and instability with minimal patello-femoral arthritis. Some cases with end-stage patello-femoral arthritis were improved with the improvement in quadriceps function via reduction in the ´Q´ angle. Rotational osteotomy of the proximal tibia for symptomatic patella instability secondary to significant external tibial torsion results in good to excellent results in 80% of cases.

P20-174

Puddu open wedge high tibial osteotomy for osteoarthritis of the kene

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This study documents the short term follow-up of a group of patients with unicompartmental osteoarthritis of the knee, with associated collateral ligamnt laxity. There are currently few studies documenting the indications and results of open wedge high tibial osteotomy. A retrospective assessment of 76 cases of open wedge high tibial osteotomy was carried out for cases performed between 1999 and 2005. The average follow-up was 5.5 years and a mean age of 38 years. We selected cases with varus alignment and laxity of the medial collateral ligament. Cases were included of valgus alignment with laxity of the lateral collateral ligament and two of these were due to mal-union of lateral tibial plateau fractures. Clinical evaluation was carried out using the HSS score. Clinical laxity pre and post-op was noted, as well as range of motion, quads function and swelling. Pre and post-op 3 Ft standing x-rays were carried out to assess alignment. The Puddu open wedge osteotomy was used in all cases with autogenous bone from the iliac crest.
Open wedge high tibial osteotomy for unicompartmental osteoarthritis with ligament laxity treats both problems. The alignment change deals with the arthritis symptoms and the opening wedge tension the collateral ligament. Of the 76 cases, 64 are good to excellent with 3 non-unions and 5 cases converted to total knee replacement.
Open wedge high tibial osteotomy can deal effectively with selected cases of unicompartmental osteoarthritis with associated collateral ligament laxity.

P20-274

A comparative study of the use of platelet-rich plasma and autologus iliac crest as graft sources in opening wedge high tibial osteotomy

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Introduction: Usually, opening wedge high tibial osteotomy is performed with the addition of autologus iliac crest graft. Obtention of autologus iliac crest graft is associated with high morbidity. The literature has several experimental studies showing the osteoinductive capability of the platelet rich plasma, as well its potential in improving bone healing and callus formation.
Aims: The purpose of the present study was observe the time required to bone union on the osteotomy site, pain level and bleeding in regard to opening wedge high tibial osteotomies. We compared two types of graft sources, the iliac crest and a biologic graft constituted by platelet rich plasma with connective-tissue stem-cells derived from bone marrow.
Methods: We studied seventeen patients randomized in two groups. There were nine patients in the control group, these patients were submitted to the osteotomy using iliac crest as graft source. There were eight patients in the study group, these patients were submitted to the osteotomy using the platelet rich plasma with connective-tissue stem-cells derived from bone marrow as graft source. The platelet-rich plasma was isolated by plateletpheresis using the Haemonetics MCS+.
The bone marrow was obtained from the iliac crest, using an aspiration needle. Them we added the bone marrow to the platelet rich plasma, thus forming our biologic graft. The patients were evaluated every two weeks, in order to detect signs of bone union on the osteotomy site using X-rays as radiologic method of choice. The patients were also evaluated to pain level in first post operative day, using a visual pain scale. The drop in the hemoglobin level was also registered.
Results: The time required to bone union on the osteotomy site was longer in the study group than the control group, although it was not significant (p=0,057). Regarding the pain level and the drop in hemoglobin level there were no differences between the two groups (p> 0,05).
Conclusion: The use of our biologic graft could not offer advantages when compared to the iliac crest graft in terms of pain and hemoglobin level drop. Moreover, the time required to bone union on the osteotomy site was longer in the study group than the control group.

P20-317

Correction of varus knees by opening wedge osteotomy

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Objectives: The operational technique for opening wedge osteotomies has been simplified by the use of the Puddu-plate. This study presents results after use of Puddu-plates on proximal tibial osteotomies.
Methods: 50 proximal tibial osteotomies have been preformed with opening wedge technique due to knee osteoarthritis with varus malalignment in the period 2000-2006. The knee osteoarthritis was mainly due to a previous medial meniscal extirpation or facture of the medial tibial condyle. 16 patients had an additional rupture of the anterior cruciate ligament. The mean age of the patients was 47 years (31-66 years), and 20 females and 30 males were operated. The patients had a mean tibiofemoral varus angle of 1° (7° varus-3°valgus). The osteotomy was fixed with a Puddu-plate securing the planned angular correction, and the osteotomy cleft was filled by autogenous pelvic bone. The mean follow-up time was 34 months (12-73 months).
Results: The width of the osteotomy cleft was determined by the tooth of the implant. The mean width of the tooth was 8.5 mm (5-12.5 mm), and the mean angular correction measured on pre- and postoperative radiographs was 8.0° (5-15°). The osteotomy cleft healed after a mean of 12 weeks (7-18 weeks). One patient suffered venous thrombosis of the leg, two a postoperative wound infection and one an osteosynthetic failure. The knee injury and osteoarthritis outcome score (KOOS) increased significantly during the observation period. A score of 100 means no complains. For pain the mean preoperative score was 51 and the score at follow-up was 83. The corresponding scores for symptoms were 54 and 81, for activity of daily life (ADL) 62 and 90, for sport and recreation 26 and 61 and for quality of life 30 and 65 (P<0.001).
Conclusion: The results after opening wedge osteotomy using the Puddu-plate show improvement during the first 2 years. The operational technique is simpler compared to previous methods, and the degree of angular correction is accurate depending on the width of the tooth of the implant which in mm corresponds relatively well with the degrees of angular correction.

P20-490

Survivorship of high tibial valgus osteotomy and effect of preoperative ahlbach and postoperative femoro tibial and tibial slope angle on pain alleviation

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Purpose: High tibial osteotomy (HTO) for the treatment of unicompartimental varus knee osteoarthritis is an effective treatment for young and active patients. The aim of this study was to ascertain the survivorship of high tibial valgus osteotomy and the effect of preoperative Ahlbäch and postoperative femoro tibial angle and tibial slope on pain alleviation.
Materials and Methods: Eighty closing-wedge high tibial valgus osteotomies, performed in 73 patients, 21 men and 52 women, age 61 years (range 42-82 years) were evaluated retrospectively after 87.48±27.88 month follow-up (range 16-137 months) to determine survivorship using Kaplan-Meier survivorship analysis and pain, inclusion in the waiting list or total knee arthroplasty as end points. The Kolmogorv-Smirnov test was used to assess the normality of distributions. Analysis of variance (Anova) analysis was done to ascertain the relationship between the apparition of pain and preoperative Ahlbäch, postoperative femoro-tibial angle and tibial slope. A P-value <0.05 was considered significant.
Results: Eighty nine percent of patients at 5 years and 61% at 10 years had not required conversion of the high tibial osteotomy to a total knee arthroplasty, but only 64% and 46% were free of pain. Patients with a higher preoperative Ahlbäch degree had a tendency to less pain. Preoperative fermorotibial angle was corrected from 179.83º±4.31º to 170.09º±3.60º. Preoperative tibial slope angle was 84.34º±4.39º, immediate postoperative tibial slope angle was 87.58º±4.76º and in the last radiographic exam was 89.29º±6.05º.

No relationship was observed between pain and postoperative femoro-tibial angle. Patients with a greater tibial slope angle or anteversion of the tibial slope were statistical significantly associated with higher probability of having pain.
Discussion: The high tibial valgus osteotomy is a useful technique to postpone in time the need of total knee arthroplasty surgery in a high percentage of cases. Complains concerning intensity of pain effects on patient's physical activity and results after operative treatment with HTO. In contrast to other series results were not jeopardized by the presence of more advance osteoarthritis radiographic signs and postoperative femoro tibial angle was not related with presence or absence of pain. Nevertheless, HTO requires a meticulous technique to avoid postoperative anteversion of the tibial slope that will jeopardize the result. Closed wedge HTO decrease the posterior tibial slope. Loss of slope angle can be correlated with technical difficulties in posterior tibial cortical osteotomy due to proximity of popliteal vessels or to progressive collapse of the anterior cortical bone of the distal tibia in the spongiosus bone of the anterior tibial metaphysis.

P20-539
Results of additive tibial osteotomy in osteoarthritic knees with varus malalignement
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Objectives: Additive high tibial osteotomy is recommended for patients with symptoms of unicompartimental overloading due to medial osteoarthritis of the knee with varus malalignement. The purpose of this retrospective study was to evaluate the results and complications of this procedure.
Methods: In the years 2001 - 2005 75 patients were operated for isolated medial overloading of the knee. 55 (m:w=35:20, age 54,8 years) were available for a clinical and radiological follow-up after 3,5 (1,6-5,5) years. Developments of MAD, MPTA, Slope, pre-existing osteoarthritic changes and complications were aquired. Clinical outcomes were meassured with IKDC, Tegner and Lysholm scores. Tibial osteotomy was performed in usual medial open-wedge technique using a PUDDU-plate for stabilisation. Rehabilitation protocoll was early functional without weight bearing for 5 weeks.
Results: PreOP MAD 2,18° varus; preOP MPTA 86,0°; preOP slope 80,37°, preOP Osteoarthritis (Jäger&Wirth-score): 0:12,5% 1:53,13% 2:18,75% 3:15,63%. Complication rate implant-related: 10,9%; others:9,1%.postOP MPTA 89,64°; postOP slope 80,42°. follow-up MAD 1,18° varus; follow-up MPTA 89,0°; follow-up slope 79,81°. Changes preOP:follow-up ΔMAD 1,08° ΔMPTA 3,16° Δslope 0,87°. Changes postOP:follow-up Δ MPTA 0,58° Δslope 0,81°. Tegner-score 3,6(of 10), Lysholm-score 81,6(of 100), IKDC ROM: A38 B14 C1 D2, Stability A40 B15 C0 D0, Swelling A48 B6 C1 D0, Compartment A16 B37 C2 D0, Osteoarthritis A2 B32 C21 D0, Function A29 B13 C6 D7, Overall A3 B26 C18 D8.
Conclusions: Our results indicate that the additive tibial osteotomy is a preferable option in patients with varus malalignement and symptoms of medial overloading. It successfully restores function of the knee joint. The presented procedure corrects the leg´s axis and effectively maintains correction angles.

P20-648
Complex osteotomy assisted with navigation and arthroscopy around the knee
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Introduction: One of the main reasons of failure of osteotomies is the variability in the results of the correction achieved, which depends on the experiencie of the surgeon. Although we can use computer softwares, the preoperative planification with conventional radiographies is still difficult, imprecise and it doesn't allow to consider the rotational component of the deformity neither to obtein dinamic information.
The aim of this study is to analize the posibility of using navigation to optimize the deformity correction and obtain real and dinamic parameters of the correction achived. Our team has an experience of 250 total knee arthroplasties assisted by navigation in the last 3 years.
Materials and Methods: We have realized 6 osteotomies assisted by navigation in complex deformities of the low extremities. In three cases these deformities were secondary to fractures, one case was due to a congenital fibular pseudoarthrosis that had undergone multiple operations, and two cases were secondary to an adquired genus valgus.
With the aim of avoiding arthrotomy of the knee, we use the arthroscope to take the intraarticular references, which are essential for navigation.
Results: In all the cases navigation has allowed us to perform a precise correction of the deformity, even for the varus and valgus component as for the rotational one. In one case of a femoral osteotomy, both navigation sensors were placed femoraly, allowing us to control the sagital deformity. We have had a real time intraoperative control of the correction achived and a precise quantification of the result achieved. Arthroscopy not only allowed us to obtain the intraarticular references for navigation, but aslo to review the joint.
Conclusions: Navigation is a useful instrument to analize precisely the deformity and to control intraoperatively the real result of the correction obtained. It doesn't need any special software for osteotomies.

P20-777
Effekt of a biplanar osteotomy on primary stability following high tibial osteotomy - a biomechanical RSA cadaver study
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Open-wedge high tibial osteotomy (HTO) is becoming increasingly popular for the treatment of varus gonarthrosis in the active patient. Various implants can be used that differ with regard to fixation stability, design and osteotomy technique. The use of a rigid plate fixator in conjunction with a biplanar osteotomy is reported to offer excellent clinical results. Clinically, it is hypothesized that the biplanar osteotomy increases primary stability in the sagittal plane thus promoting bone healing. So far, there are no biomechanical studies that quantify the stabilizing effect of a biplanar versus uniplanar osteotomy.
24 fresh frozen human tibiae were mounted in a metal cylinder and open wedge osteotomy was performed in a standardized fashion. Proximal and distal tibial segments were marked with tantalum markers of 0,8 mm diameter. Two different plates with locking screws were used for fixation: a short spacer plate (group 1, n=12) and a plate fixator (group 2, n=12). In 6 specimen of each group a biplanar V-shaped osteotomy with a 160° angulated anterior cut behind the tuberosity was performed. In the remaining 6 specimen of each group, a simple uniplanar osteotomy was performed in an oblique fashion. Axial compression of the tibiae was performed using a materials testing machine under standardized alignment of the loading axis. Load-controlled cyclical staircase loading tests were performed. Specimen were x-rayed simultaneously in 2 planes together with a biplanar calibration cage in front of a film plane with and without load after each sub cycle. Radio Stereometric Analysis (RSA) allowed for serial quantification of plastic and elastic micromotion at the osteotomy site reflecting the stability provided by the combination of implant and osteotomy technique. No significant additional stabilizing effect of a biplanar osteotomy in craniocaudal and mediolateral plane was found in any specimen. However, additional stability was present in anteroposterior and all rotational planes in those specimen fixated with a plate fixator.
In implants with a high degree of primary stability, the additional stabilizing effect of a biplanar osteotomy does not come into effect. In short spacer plates the fixation stability was significantly increased in AP and rotational planes. Clinically, the V-shaped osteotomy is benefical for all HTO patients since it promotes bone healing. Biomechanically, biplanar osteotomy is mandatoy for shorter plate designs to increase stability prior to bone healing.

P20-832
Osteotomy of the fibula in lateral closing wedge osteotomy of the tibia
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Introduction: As it has previously been described by Jackson, the osteotomy of the fibula is regarded as a major risk factor for a lesion of the peroneal nerve in closing wedge osteotomy of the tibia. Therefore it was presumed, that the osteotomy of the fibula should be done as distally as possible. However, distal osteotomy of the fibula is associated with an increased risk of non-union. We present data from our clinics, which was prospectively collected and analyzed regarding this controversy.
Materials and Methods: Data from all patients over the age of 40 years, which received a lateral closing wedge osteotomy for medial gonarthrosis were collected prospectively. All osteotomies were stabilized with tension-plate fixation according to Weber. Early mobilization with limited weight bearing was allowed in all patients. In total, 49 patients were operated on, wherefrom 7 were lost to follow-up. Therefore, 44 patients (86%) could be re-examined and analyzed after 6 months.

Results: The median level of the osteotomy of the fibula was 9.4 cm (± 2.2 cm) beneath the tip of the fibula. In 28 cases (67%), the osteotomy was between 7 and 12 cm beneath the tip of the fibula, in 7 cases (17%) it was above 7 cm and in another 7 cases (17%) below 12 cm. In 11 cases, a lesion of the peroneal nerve was found. 10 of these patients have received an osteotomy 7 to 12 cm beneath the tip of the fibula.
The distance between the two planes of the osteotomy was found to decrease from 0.7 cm (±0.6 cm) postoperatively to 0.4 (± 0.5 cm) after 6 months. In 9 patients there was radiological evidence of callous bone healing, in 21 patients there was mineralized callus, whereas in 10 patients no evident reaction was found. In subgroup analysis we found in patients with mineralized callus a distance between the planes of the osteotomy of 0.4 (± 0.3) cm, decreasing to 0.1 (± 0.2cm) after 6 months. In patients with evidence of callous bone healing, this distance was found to be 1.0 cm (± 0.6cm) postoperatively and 0.7 (± 0.5 cm) after 6 months, respectively. In patients with no evidence of bone healing, this distance was found to be 1.0 (±0.5) cm and 0.7 (±0.4) cm, respectively.
The distance of the plane of osteotomy corresponds to the risk of delayed- or non-union ($p<0.001$) whereas the level of the osteotomy of the fibula does not ($p=0.410$).
Conclusion: To avoid lesions of the peroneal nerve, the osteotomy of the fibula should be done at least 12 cm beneath the tip of the distal fibula. According to our data there is no increased risk of non-union. However, the risk of non-union is markedly increased, if the distance of the two planes of the osteotomy is over 1 cm.

P20-841

Position of the patella after lateral closing wedge osteotomy of the tibia

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Introduction: Various results have been discussed in the literature concerning the vertical position of the patella after proximal wedge osteotomy of the tibia. We present data from our clinics, which was prospectively collected and analyzed regarding this controversy.
Materials and Methods: Data from all patients over the age of 40 years, which received a lateral closing wedge osteotomy for medial gonarthritis were collected prospectively. All osteotomies were stabilized with tension-plate fixation according to Weber. Early active mobilization with limited weight bearing was allowed in all patients. In total, 49 patients were operated on, wherefrom 5 were lost to follow-up. Therefore, 44 patients (86%) could be re-examined and analyzed after 6 months.
Results: The mean Insall-Salvati-Index was 0.77 (±0.17) preoperatively and 0.82 (±0.15) postoperatively ($p=0.659$). In 19 patients, this index increased after surgery, in 14 patients it decreased respectively. In 20 patients this index was below 0.82 before surgery, in 18 patients it was below 0.82 after surgery. The mean Blackburne-Peel-Index was 0.98(±0.13) preoperatively and 0.98 (±0.18) postoperatively ($p=0.109$). In 17 patients this index increased after surgery, in 15 patients it decreased, respectively. We did not observe any patient with an index below 0.54. However, 10 patients had an index above 1.06 preoperatively and 11 patients postoperatively. According to the Insall-Salvati-Index, we would have to diagnose a patella baja preoperatively and a normal height of the patella postoperatively. In our series, 20 patients would qualify for a patella baja before surgery and 18 patients after surgery. According to the Blackburne-Peel-Index, the mean scores are within the normal range. Therefore, no malpositioning of the patella was present. 10 patients were diagnosed with patella alta before surgery, 11 patients after surgery, respectively.
Conclusion: There is no direct influence on the vertical position of the patella by lateral closing wedge osteotomy of the tibia. According to the literature, the main risk factor is postoperative immobilization. However, the appropriateness of the scoring-systems has to be critically scrutinized, because reference points of these assessments are altered by the osteotomy.

P20-842

Autologous osteochondral transfer (OATS) of the lateral femoral condyle and high tibial osteotomy (HTO). A joint preserving concept for the treatment of medial gonarthrosis and circumscribed cartilage defects of the lateral femoral condyle

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Introduction: For the biological and joint preserving therapy of medial (varus-) gonarthrosis, the high tibial osteotomy (HTO) is a common treatment. Especially younger and mid-aged patients benefit truly from this procedure. The optimal indication is a medial osteoarthrosis due to a varus deformity and an intact lateral condyle. Full-thickness cartilage lesions of the lateral femoral condyle (LFC) are supposed to be a contraindication for this procedure.
In order to avoid a total knee replacement (TKR), we combined autologous osteochondral transfer (OATS) in circumscribed articular cartilage defects of the lateral femoral condyle as a "preconditioning" for HTO, which was performed after consolidation of the LFC in a second procedure.
Patients and Methods: From 05/05 to 03/07 we treated the first 10 patients (4f/6m) with the described two-step procedure. The average age was 54,3 years (47 - 64). All patients were pre- and postoperatively examined and rated according to the following scores: IKDC, subjective and objective, Lysholm-Gilquist and Cincinnati. The average follow-up period was 9,5 months (6 - 13).
Results: After an average time period of 7 weeks (4 - 36) following OATS at the LFC, an HTO was performed, when a previous arthroscopy revealed a consolidated cartilage surface of the LFC. In the median 2 cylinders (1 - 3) of 10mm diameter have been transplanted.
The knee angle was intraoperative determined by means of navigation (Orthopilot™, Aesculap, Germany, Module "HTO 1.4") and was 5° varus (2 - 11) preoperatively and 4° valgus (2 - 6) postoperatively.
In our patients no complication occurred so far. From our 10 patients 9 improved significantly from the two-step procedure. The average IKDC score increased from 45,7 to 63,3, Lysholm-Gilquist and Cincinnati score increased from 47,9 to 71,4 resp. from 43,4 to 63,8.
Discussion: Our pilot study indicates that in some selected cases the combination of OATS at the LFC and HTO can be performed in order to avoid an early TKR in patients suffering from medial osteoarthrosis of the knee and n additional circumscribed cartilage defect of the LFC. From our first 10 patients 9 showed significant clinical improvement. One patient had no benefit; the patient predominantly suffered from a symptomatic arthrosis of the femuropatellar joint.
We suppose that a proper physical examination and differentiated information of a compliant patient is necessary for the success of this two-step procedure. Long-term follow-up will show how long patients will improve from this biological, joint-preserving treatment and TKR can be avoided.

P20-846

Proximal lateral closing wedge osteotomy of the tibia in middle-aged patients - a 10 year experience

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Introduction: Middle-aged patients with moderate medial tibiofemoral gonarthritis are considered being the ideal candidates for a proximal lateral closing wedge osteotomy of the proxima tibia. We present data from our patients, which have been followed prospectively for 10 years.
Methods: All patients over 40 years, which were operated on for medial tibiofemoral gonarthritis using proximal lateral closing wedge osteotomy of the tibia from 04/1994 until 03/1995 were assessed and followed prospectively. The osteotomy in all patients was stabilized using 1/3-tubular plate according to the technique described by Weber. 49 patients were operated on during this period of time, out of which 22 (45 %) could be re-assessed after 10 years. 27 patients were lost to follow-up (15 deaths unrelated to the procedure).
Results: 22 patients were eligible for 10 years follow-up. 9 patients were asymptomatic, 6 patients had mild symptoms of gonarthritis and did not require medical treatment. 7 patients received knee replacement surgery. In multivariate analysis we found no significant influence of factors such as age, gender, profession, body-mass-index and degree of gonarthritis. Furthermore, the tibiofemoral angle, neither pre- nor postoperatively was no significant predictive factor for the outcome after 10 years. In tendency, we observed less favourable results in younger patients, whereas patients with moderate to mild gonarthritis showed better outcome. The group of patients which received secondary arthroplasty showed a higher degree of varus deformity preoperatively. HSS-Score was 51.4 points preoperatively, 76.4 points 6 months postoperatively and 70.1 points after 10 years, respectively. KSS-Scores were 24.0 / 42.1 preoperatively, 71.8 / 71.8 after 6 months and 79.5 / 33.3 after 10 years, respectively.
Conclusions: These results 10 years after closing wedge osteotomy of the lateral tibia for medial gonarthritis are similar to current literature. Patients who did not require secondary arthroplasty show good results. Patients with a higher degree of gonarthritis and a higher degree of varus deformity, as well

as younger patients seem to be less satisfied in long term. Body-mass-index was not identified as an independent risk factor for unfavourable outcome. We conclude that good results can be obtained in patients with less severe arthritis und a moderate level of preoperative varus deformity.

P20-888

Closed wedge high tibial osteotomy with Rigid Stepped Plate (RSP)

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Purpose: The purpose of the study was to introduce and report the early clinical and radiographic results of closed wedge proximal tibial osteotomy using Rigid Stepped Plate (RSP) which was newly devised for superior fixation strengths.

Methods: Twenty one patients (13 males and 8 females) were included in the study. Average age was 47.4 years (30-60) and BMI was 25.4(19.9-29.4). Initial diagnoses were primary osteoarthritis (n=12), anterior cruciate ligament deficiency with or without secondary osteoarthritis (n=7) and osteochondritis dissecans (n=2). Lateral closing wedge proximal tibial osteotomies using RSP were performed and followed up for 12 to 29 months. Concomitant surgery was microfracture in 4 knees, second stage ACL reconstruction in 5 knees, and partial meniscectomy in 8 knees.

Results: Tibiofemoral angle changed from varus 0.8° to valgus 5.1°, and the posterior slope decreased from 10.9° to 8.8°.

Full range of motion was restored and weight bearing could be initiated at 6.8 weeks (range, 5-10) postoperatively. Radiographic union was observed at average 7.9 weeks (range,6-12). Second stage ACL reconstruction was performed in 5 knees and the mean interval to reconstruction was 7.4 months.

Conclusion: The RSP offered firm initial fixation to the osteotomy site with less demanding technique and could safely enable early range of motion exercise and weight bearing, thus leading to accelerated union at the osteotomy site. It was also expected to prevent the possible adverse events resulting from excessive soft tissue dissection and long term immobilization.

P20-927

Changes in patellar height and posterior tibial slope following high tibial opening wedge osteotomy in treatment for medial compartment knee osteoarthritis - do they affect early treatment outcomes?

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Introduction: High Tibial Opening Wedge Osteotomy (HTOWO) is currently the preferred method of operative treatment for medial compartment knee osteoarthritis with varus malalignment, especially in young active patients who have good range of knee movements (>90º) and require less than 20º of correction for varus deformity. The main goals of the procedure are to correct knee malalignment and to relieve load from the damaged cartilage surfaces. At the present there are many fixation systems, used for stabilization of the osteotomy site, which greatly improve treatment outcomes and allow for early patient rehabilitation. However, there are some possible adverse effects of the HTOWO procedures, such as decreased patellar height and increased posterior tibial slope angle. They may result in patellofemoral pain or worsening of any preexisting anteroposterior instability. The aim of this study was to establish if there is a correlation between decreased patellar height or increased posterior tibial slope and the early treatment outcomes.

Methods: Between 2003 and 2006, we performed 38 HTOWO procedures at our Department. Of those, 23 operations were carried out on women and 15 on men. The mean patient age was 62 years. In all of the cases fixation was achieved with modular plate Osteo+™. Outcomes of treatment were assessed clinically according do the VAS (Visual Analog Scale) pain scale and the HSS (Hospital for Special Surgery) score. Radiographical evaluation included assessment of joint axis (on anteroposterior view), posterior tibial slope according to Moore - Harvey method, patella height according to the Caton - Deschamp index (CD), Blackburn-Peel (BP) and Insall-Salvati modified index on the lateral view.

Results: The follow-up period ranged from 9 to 36 months. Bone union at the osteotomy site was achieved in all of the cases. Postoperative assessment of knee alignment revealed the mean valgus angle of 9,1°. A statistically significant increase in the posterior tibial slope angle (average increase of 3,1º) and a distal shift in the position of patella in relation to femur were found (ΔCD -0,13 ; Δ BP -0,15). We noted a marked reduction of pain, as well as improvement in knee function (the mean HSS score changed from 65 points before the surgery to 87 points postoperatively).

Conclusion: Slight changes in patellar height and posterior tibial slope following the osteotomy do not have a negative effect on good early outcomes of treatment for unilateral medial compartment knee osteoarthritis with HTOWO procedures.

Total joint replacement

P21-26

Pre-operative Infection in Knee Arthroplasty (PIKA I) - A pilot study to monitor the incidence of infection in patients for arthroplasty of the knee after steroid injections during the time of conservative management

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Objectives: Pilotstudy to evaluate the pre-operative infection rate in patients with osteoarthritis of the knee getting knee arthroplasty following steroid injection in the conservative treatment.

Design: Prospective, single-centre based cohort study

Setting: Level II Trauma Center

Patients: Patients sheduled between january 2005 and may 2007 for arthroplasty of the knee in primary osteoarthritis following steroid injections in the conservative treatment were included.

Intervention: Surgery with the Genesis II knee prosthesis (Smith & Nephew), cemented or hybrid technique, by a medial approach. After the incision of the fascia a fluid sample for microbiological evaluation was taken, then the surgery was continued.

Outcome Measures: Age, sex, site, microbiological results.

Results: 273 patients (184 female, 89 male) with a mean age of 70.24 ± 8.61 years were operated during the study period. In 123 patients (45.05%) the left knee was operated. 175 patients were included in the study because of getting one or more intraarticular steroid injections during the conservative treatment of the osteoarthritis. This was done by private praxis orthopaedic surgeons. In 17 patients (9.71%) we found bacterials in the microbiological sample. Twice a MRSA was found, here operative revision was performed. All other patients got an oral antibiotic treament with a 3rd generation cephalosporin for 6 weeks.

Conclusion: The results of our study patients show that there is a significant incidence of occult preoperative infection in osteoarthritic knees after steroid injections during the time of conservative treatment. For more detailed evaluation, also with long time follow-up and measuring the functional outcome, an international multi center study is planned.

P21-35

The safe zone using the “inside-out” lateral release technique in valgus total knee arthroplasty

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Several methods have been described to correct a valgus deformity during total knee arthroplasty (TKA). The “inside-out technique” is a soft-tissue release, to correct a valgus deformity in total knee arthroplasty: after the proximal tibial and distal femoral bone cuts are made, the knee is extended and distracted with a lamina spreader, bringing the posterolateral capsule complex under tension. The release is performed transversely, from the lateral edge of the resected posterior cruciate ligament (PCL) to the posterior margin of the iliotibial band.

When the extension gap remains unbalanced after the intra-articular release, the iliotibial band (ITB) is lengthened in a controlled manner as necessary from inside with use of the so-called “pie-crusting” technique, which consists of multiple oblique stab incisions one centimetre above the joint line. This process continues until a balanced extension gap has been achieved.

However, the use of this technique may place the common peroneal nerve at risk for direct injury. The purpose of our cadaveric study is (1) to define a “safe zone” to avoid common peroneal nerve injury during the posterior-lateral corner inside-out release technique and (2) to identify anatomic landmarks to help in localizing the nerve prior to performing the lateral soft tissue release.

Twenty cadaveric dissections (10 cadavers: 8 female, 2 male) were used to identify an anatomic landmark on the cut tibial surface to help in localizing

the nerve. Knee replacement surgery was performed using the PFC Sigma posterior-stabilized, fixed-bearing total knee system. A separate lateral approach, along the posterior border of the biceps tendon, was performed and the common peroneal nerve was identified at the level of the posterior aspect of the lateral femoral condyle. The nerve was identified distally as it came around the neck of the fibula and care was taken to avoid distorting any of the local anatomy. A calliper micrometer was used for all measurements. In each case, the distance from the nerve to the tibia was measured from the closest identifiable margin of the nerve to the closest edge of the tibial cortex (PLCN). Moreover, during the "pie crust" technique using a laminar spreader distracting the femoro-tibial joint space, we measured the distance between the most posterior stab incisions and the nerve.
The average distance from the posterolateral corner of the tibia to the closest margin of the nerve was 13.54 mm (range 11.20-18.60 mm). The mean distance between the most posterior stab incisions of the iliotibial band and the nerve at the correspondent level was 3.58 cm (range: 3.10 - 4.53 cm).
This study shows that the nerve is at risk of direct injury using the inside-out release of the posterolateral capsule (danger zone), but not during pie-crusting of the iliotibial band (safe zone).

P21-69
The utility of preoperative distractive stress radiograph to extent of medial release in total knee arthroplasty
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Purpose: The purpose of this study is to evaluate utility of preoperative distractive stress radiograph for decision of extent of medial release in total knee arthroplasty of osteoarthritis knee joints with varus deformity.
Materials and Methods: We reviewed 120 osteoarthritis knee joints (75 patients) with varus deformity who underwent primary total knee arhtroplasty from August, 2004 to December, 2005. In all cases, one observer measured tibio-femoral angle on whole lower-extremity radiograph and distractive stress radiograph preoperatively. We grouped extent of medial release by stage and analyzed the association of corrected angle on distractive stress radiograph with extent of medial release. We classified into 5 groups with release of deep medial collateral ligament (group 1), release of posterior oblique ligament or semimembranous tendon (group 2), release of posterior capsule (group 3), release of superficial medial collateral ligament (group 5). We excluded cases with severe osteophyte because it has lower extent of medial release despite severe varus angle on distractive stress radiograph.
Results: The mean tibio-femoral angle on preoperative distractive stress radiograph was valgus 2.4° in group 1, valgus 0.8° in group 2, varus 2.1° in group 3, varus 2.7° in group 4. The extent of medial release was increased significantly with increased degrees of varus deformity in preoperative distractive stress radiograph.
Conclusion: On primary total knee arthroplasty, preoperative distractive stress radiograph can be useful to predict the extent of medial release.

P21-75
The Vanguard™ total knee replacement early results are promising comparable to the established maxim knee prosthesis
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Objectives: Total knee replacement has evolved to one of the most successful and cost-effective major orthopaedic operations to reduce pain, improve function and enhance quality of life in patients with arthritis of the knee joint. The Vanguard™ Total Knee Replacement represents the clinical heritage of other Biomet® knee systems and combines it with state-of-the-art design features to produce the most comprehensive total knee system available today. The purpose is to review early clinical results of the Vanguard™ compared to the Maxim® total knee replacement.
Method: Between July and September 2005 40 Maxim® total knee replacements were performed and between July and September 2006 54 Vanguard™ total knee replacements were performed. Patients were reviewed preoperatively and at 3 month's and one year. No patients were lost to follow-up. All patients had clinical, radiological assessments and were scored by the Knee Society Score. WOMAC score and SF-36 questionnaire.
Results: The mean age was for the Maxim group was 71 (Stdev 9,5), the mean height was 167 cm (Stdev 6,8) while the mean weight was 78 kg (Stdev 14,4). The mean age was for the Vanguard group was 70 (Stdev 8,5), the mean height was 167 cm (Stdev 8,8) while the mean weight was 82 kg (Stdev 11,8). For both groups the most common diagnosis was osteoarthritis. To date there were no radiological, septic or aseptic loosening and no revisions.
The is an evident improvement in de WOMAC and KSS function- and pain score with both groups with no significant difference. Both groups showed an improvement in de mean KSS with no significant difference (Maxim preoperative 49,6 postoperative 82,2 / Vanguard preoperative 46,5 postoperative 83,8)
Conclusion: We believe that the Vanguard™ Total Knee Replacement early results are promising comparable to the established Maxim knee prosthesis. Long term surveillance of implant is ongoing. Long term surveillance of implant is ongoing.

P21-76
Early results of the Zimmer Unicompartmental Knee Replacement
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In 2005 the Zimmer Unicompartmental Knee Replacement was introduced. The design was based on the Miller-Galante unicompartmental knee replacement, and allowed more flexion. The aim of this study was to closely follow up a consecutive cohort of patients with this new prosthesis.
Forty-nine patients with a Zimmer Unicompartmental Knee Replacement were reviewed at a minimum of 6 months and maximum of 2 years. Prospective data collection included demographic data, BMI, side of operation, Kellgren radiological score, knee flexion, implant sizes, tourniquet time, length of hospital stay, American Knee Society scores, the status of the patello-femoral joint, complications and revisions.
The average age of all patients was 66.6 years. The average tourniquet time was 73 minutes and the average length of hospital stay was 3.7 days. Flexion improved from 111o preoperatively to 120o postoperatively. The average American Knee Society scores improved from 53.1 to 94.1 (knee score) and from 48.8 to 93.4 (function score). There was no obvious learning curve, and there were no significant complications. To date no revisions have been carried out.
The early results are encouraging and not worse compared to other unicompartmental knee replacements at this stage. The results are reproducible and consistent. This cohort of patients will be followed long-term.

P21-80
Medial gastrocnemius rotational flap for treatment of chronic knee infection after knee arthroplasty
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Introduction: Postoperative infections after knee replacement anterior to the ligamentum patellae are difficult to treat, show a prolonged healing period and a high recurrence rate. An option for the treatment is the transfer of a medial gastrocnemius rotational flap in combination with a meshgraft to cover the defect. The purpose of the study is to present the results, the time of rehabilitation and the surgical technique.
Material and Method: In the time between 1999 bis 2006 in total 17 patients with chronic anterior knee infection after joint arthroplasty underwent a treatment with a medial gastrocnemius rotational flap in combination with a meshgraft. All patients were studied at a mean followup of 32 months (range, 6-56 months).
Results: In all cases a rapid revascularisation of the wound was observed. The mean time of postoperative hospitalisation was 23 days (range, 12 - 36 days). Superficial wound infections were seen in 2 patients and could be solved without major problems. In 2 patients the total knee arthroplasty had to be removed due to the recurrence of a deep infection.
Discussion: Medial gastrocnemius flap transfer can provide successful salvage of chronic anterior knee infection with poor soft tissue coverage. The surgical technique is demanding but the learning curve for an experienced orthopaedic surgeon is low. Precondition for this procedure is the control of the deep infection.

P21-83
Stiffness after total knee arthroplasty: Mid to long-term follow-up
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The purpose of the study is to evaluate the results of revision TKA due to stiffness.

Materials and Methods: Between 1992 and 2005, 23 cases of stiff knees after TKA were revised, most by the senior author. Seventeen cases were followed more than 2 years. Mean age at revision was 62.2 Y (range: 40-82 Y). Seventeen patients were females. The underlying diagnosis was osteoarthritis in 22 patients and post-traumatic in one patient. Postoperatively, patients were asked about their subjective satisfaction. Objective results were graded according to HSS score. The differences between preoperative and postoperative HSS score, arc of motion, average flexion and extension, were checked by t-test variance.
Results: Time interval between primary and revision procedures was 24.5 months (range: 2-96 M). Overstuffing of tibial spacer was found as the underlying etiology in 2 patients, patella baja in one, malposition of femoral component in one, arthrofibrosis in one, infection in 10 and idiopathic in 8 patients
Preoperative arc of motion was 30.2 degrees (between -18.6 extension to 48.8 flexion). Preoperative HSS score was 43. Intraoperative, V-Y plasty was needed in 10 patients (43%). The patella was revised in 15 patients (65%). One patient had popliteal artery injured and repaired. Arc of motion at the end of revision averaged 98.7 degrees (between: -1 to 99.7); range: full extension to 120 flexion. In the non-infected cases, one case of loosening of tibial and femoral components was found and one with tibial component loosening alone. No loose components were found in 11 cases. In the Infected cases, tibial loosening alone was found in 3 cases, tibia and femur in 5 cases and patellar in 2 cases. Implants used at revision were: 17 cases with CCK, 4 with TCPIII, one with PS and one Mobile-Bearing prosthesis.
Seventeen patients were available for last FU, four followed less than two years and two patients were lost for FU. Mean follow-up time was 5.8 years (range: 2-13Y). Subjective satisfaction was reported by 88% of patients. Postoperatively, HSS score increased to 73.6 with 23% excellent result, 36% good, 23% fair and 18% poor results. Postoperative arc of motion increased to 73.8 degrees (between: -5.6 and 79.4). Low arc of motion (<30) was recorded in 2 patients. Postoperatively, significant increase in average flexion ($p=0.0052$) and arc of motion ($p=0.0003$) were recorded in relation to preoperative status. No significant change was found in HSS score ($p=0.078$) and in extension ($p=0.65$).
Discussion and Conclusion: At 5.8 years FU in average, better results of flexion and arc of motion were recorded postoperatively, but still with a low arc of motion. In our hands, revision of stiff TKA resulted in good subjective results and less than optimal objective results.

P21-89
Robot-assisted TKA improved the precision of γ and δ angle
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Objective: Recently robotic-assisted total knee replacement has become a new emerging method of artificial joint implantation. The purpose of this study was to compare robotic-assisted implantation of a total knee replacement with conventional manual implantation retrospectively.
Methods: We reviewed 72 patients who were scheduled for total knee arthroplasty, divided to have either conventional manual implantation of a Zimmer LPS prosthesis (30 patients: Group I) or robotic-assisted implantation of such a prosthesis (32 patients: Group II). The ROBODOC was used for the robotic-assisted procedures. Preoperatively as well as at final follow up the Knee Society score were determined. Radiographs were made at this interval and analyzed for evidence of loosening, prosthetic alignment, and other complications.
Results: In clinical assessment, the final follow up knee society score of group I was 90.9±4.88 points and that of group II was 91.6±2.94 points. There was no difference statistically. The final follow up knee functional score of group I was 88.5±3.70 points and that of group II was 87.9±4.99 points. There was no difference statistically. The postoperative range of motion of group I was 122±16.9 degrees and that of group II was 118±9.02 degrees. There was no difference statistically. In radiological assessment, the postoperative tibiofemoral angles of group I was 5.3±2.6 degrees and that of group II was 6.0±1.8 degrees. There was no difference statistically. The α and β angle of group I was 95.6±2.65, 88.6±2.58 degrees and that of group II was 97.7±0.97, 88.8±1.59 degrees. There was no difference statistically. The γ and δ angle of group I was 4.19±3.28, 85.5±0.92 degrees and that of group II was 0.17±0.65, 89.7±1.7 degrees. There was a significant statistical difference ($P<0.05$).
Conclusions: The robotic-assisted technology had definite advantages in terms of preoperative planning, the accuracy of the intraoperative procedure and postoperative follow up in lateral knee radiograph, especially in γ and δ angle. But disadvantages were the high complication rate, which we believe was required for the more careful and experienced operative technique. Increased γ angle or δ angle may produce anterior post-cam impingement and promote polyethylene wear in lateral plane [18]. But actually in real, the sum of femoral flexion angle (γ angle) and tibial flexion angle (δ angle) is more important because each knee implant has its own tibial inclination angle. Authors recommends that the sum of femoral flexion angle (γ angle) and tibial flexion angle (δ angle) should to be less than 15 degrees in lateral X-ray postoperatively to prevent anterior post-cam impingement or to reduce polyethylene wear in lateral plane in long term follow up.

P21-90
In-vivo kinematic study after PS TKA
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Objective: It has been generally assumed that patients in Asia or the Middle East can flex deeper due to their daily activities, such as sitting cross-legged and kneeling. Therefore, the objective of this study was to investigate the range of flexion and articular contact kinematics of a South Korean patient cohort using a novel dual fluoroscopic imaging technique.
Methods: Ten South Korean female patients after posterior-substituting (PS) TKA (LPS-Flex, Zimmer Inc, Warsaw, IN) were recruited. All patients had their surgeries performed by the same surgeon and were evaluated as clinically successful using the Knee Society scoring system. The surgeon manually flexed the patient's knee at the time of the study visit to determine the maximum passive range of motion (ROM). The patients were then imaged using two fluoroscopes (BV Pulsera, Philips, Bothell, WA) placed orthogonally to each other while they performed a single leg lunge from full extension to maximal flexion under weight-bearing load. The acquired images and 3D CAD models were then used to create a virtual fluoroscopic system. The in-vivo pose of the components were determined by manipulating the TKA models until the projection of the components matched the component outlines on the fluoroscopic images.
Results: Contact on the anterior aspect of the polyethylene tibial post was observed in three patients. One of the three patients also exhibited condylar lift-off in the lateral tibial compartment. The average maximum weight-bearing flexion was 115.3 ± 5.7°. Four of the ten patients showed cam/post disengagement at their maximal flexion, and six patients maintained posterior cam/post engagement. Two instances of contact were observed between the femoral box and the medial aspect of the tibial post. Lateral condylar lift-off was also observed in flexion for one patient.
Conclusions: The Korean cohort of this study demonstrated that the passive maximum flexion was approximately 30° more than the active maximum weight-bearing flexion. This data indicated that passive and active functions of the knee after TKA should be clearly distinguished. Our data indicated that the patients flexed close to 150° during passive flexion. However, these patients only flexed, on average, to 115° during a weight-bearing single leg lunge.

P21-91
Mini-incision quadriceps split study and MIS new QS indication clinical test
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Objective: Patient demand for a less invasive surgical approach reducing the trauma induced to the joint has resulted in the development of Minimally Invasive Surgery (MIS). Incisions into the quadriceps tendon or into the vastus medialis muscle make the approach less difficult but this violation will slow the recovery and affect the ROM of the knee. In Asian knees, author found the variation of VMO is so much, so new clinical test for MIS QS should be needed to show location relationship between the upper pole of the patella and the insertion of VMO itself. The purpose of this comparison study was to verify whether MIS QS TKA can be a more functional and better method in treatment of advanced degenerative arthritis comparing with mini MIS TKA.
Methods: Group I: MIS QS group were 12 knees (69.3±9.7 years) and follow up period of that were 26.8± 0.4 months. Group II: mini quad split MIS TKA were 50 knees knees (67.4±5.6 years) and follow up period of that were 32.2± 0.6 months. We did clinical and radiological assessment.
Results: The length of incision of group I was 9.32±0.96 cm and that of group II was 10.9±0.5 cm. In clinical assessment, the postoperative pain

score of group I was 47.5±2.74 points and that of group II was 47.4±3.27 points. The postoperative knee score of group I was 94.5±5.16 points and that of group II was 93.9±5.94 points. The postoperative knee functional score of group I was 90±8.94 points and that of group II was 93.4±6.73 points. The postoperative range of motion of group I was 122±16.9 degrees and that of group II was 116±23.5 degrees. In radiological assessment, the postoperative tibiofemoral angles of group I was 5±2.6 degrees and that of group II was 5.4±2.7 degrees. The α and β angle of group I was 95±3.5, 88±3.4 degrees and that of group II was 96±2.5, 89±2.4 degrees. The γ and δ angle of group I was 5.17±4.12, 85±1.4 degrees and that of group II was 3.96±3.1, 86±1.8 degrees.
Conclusions: There were no significant differences in functions between two groups. Both MIS QS and mini Quad split TKA are an effective and safe method in treatment of advanced degenerative arthritis.

P21-159
Dynamic in-vivo behaviour of a novel tibial insert design for TKA
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Introduction: The Polyethylene design of the PCL retaining balanSys® knee was modified allowing especially in deep flexion a more physiological external femur respectively an internal tibia rotation. Only the lateral side of the newly designed PE differs from the conventional high-conformity design by a modified convex part from the centre of the articulating bearing surface towards posterior. The hypothesis for the new design is an increase of flexion while decreasing the forces on the lateral side. Furthermore the AP stability due to reduction of the conformity was investigated.
Methods: During implantation of a TKA in 8 patients (3 male 5 femaile; mean age 73 years) stability with the Rolimeter®, force on lateral & medial side with FlexiForce® sensors for different flexion & rotation angles and range of motion was measured. The measuring procedure was repeated three times: Type I with conventional concave surfaces on medial and lateral side and two modified types II and III with a different convex shape posterolaterally (more extended convexity in type III than in type II).
Results: The increase of AP stability of the bearing type II and III in relation to type I was not relevant: Rolimeter results in 90° flexion was 5.8±1.8mm, 6.1±1.7mm and 6.3±1.8mm and in 25° flexion 5.3±1.3mm, 5.8±1.5mm and 5.8±1.1mm for type I, II and III respectively. The in-vivo measured force in relation to the conventional bearing type I defined as 100% was significantly lower on the lateral side in maximal knee flexion for type II = 40±27% and III = 25±12%. Simultaneous the medial force increased to 130±23% for type II and 140±51% for type III. Performing internal tibial rotation in the maximal flexed knee the lateral force also decreased to 29±21% and 29±22% while the medial increased to 140±67% and 133±42% for type II and III respectively. The maximal flexion angel measured using a goniometer was 121.8° ± 12.5° for type II 125.8° ± 9.3° for type II and 126.2° ± 13.8° for type III.
Conclusion: The modified design of the PE can reduce the force on the lateral side significantly without loss of stability and furthermore allowing more flexion in PCL retaining total knee prostheses. This might be a step to improve clinical results in TKA.

P21-162
Precision of the positioning of an unicompartmental knee prosthesis by a mini-invasive navigated technique
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Objectives: Unicompartmental knee replacement (UKR) is accepted as a valuable treatment for isolated medial knee osteoarthritis. Minimal invasive implantation might be associated with an earlier hospital discharge and a faster rehabilitation. However these techniques might decrease the accuracy of implantation, and it seems logical to combine minimal invasive techniques with navigation systems to address this issue.
Methods: The authors are using a non image based navigation system (ORTHOPILOT TM, AESCULAP, FRG) on a routine basis for UKR. We prospectively studied 60 patients who underwent navigated minimally invasive UKR for primary medial osteoarthritis at our hospital between October 2005 and October 2006. We established a navigated control group of 60 patients who underwent conventional implantation of a UKA at our hospital between April 2004 and September 2005. There were 42 male and 78 female patients with a mean age of 65 years (range, 44-87 years). There were no differences in all preoperative parameters between the two groups.
The accuracy of implant positioning was determined using predischarge standard anteroposterior and lateral radiographs. The following angles were measured: femorotibial angle, coronal and sagittal orientation of the femoral component, coronal and sagittal orientation of the tibial component. When the measured angle was in the expected range, one point was given. The accuracy was defined as the sum of the points given for each angle, with a maximum of five points (all items fulfilled) and a minimum of 0 point (no item fulfilled). Our primary criterion was the radiographic accuracy index on the postoperative radiograph evaluation. All other items were studied as secondary criteria.
Results: The mean accuracy index was similar in the two groups: 4.1 ± 0.8 in the study group and 4.2 ± 1.2 in the control group. 36 patients (60%) in the control group and 37 patients (62%) in the study group had the maximum accuracy index of five points. All measured angles were similar in the two groups. There were no differences between the percentages of patients in the two groups achieving the desired implant positions. Mean operating time was similar in the two groups. There were no intraoperative complications in either group. The groups had similar major postoperative complication rates during hospital stay (3% for both).
Conclusion: The used navigation system is based on an anatomic and kinematic analysis of the knee joint during the implantation. The modification of the existing software for minimal invasive approach has been successful. It enhances the quality of implantation of the prosthetic components and avoids the inconvenient of a smaller incision with potential less optimal visualization of the intra-articular reference points. However, all centers observed a significant learning curve of the procedure, with a significant additional operative time during the first implantations. The postoperative rehabilitation was actually easier and faster, despite the additional percutaneous fixation of the navigation device. This system has the potential to allow the combination of the high accuracy of a navigation system and the low invasiveness of a small skin incision and joint opening.

P21-163
What is a « normal » knee laxity?
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Objectives: To get an optimal ligamentous balance is recommended during total knee replacement. But the goal to be achieved remains unclear, especially because the normal knee laxity in vivo is not well documented. The ligamentous balancing during total knee replacement remains mainly on surgical skill. However, navigation system are very powerful tools to measure intra-operative knee laxity and might help achieving an optimal balance. We designed this study to define the normal laxity of the knee in vivo with the same navigated measurement technique than that used in clinical practice for total knee replacement.
Methods: 20 patients operated on for isolated anterior cruciate ligament instability have been documented. The medio-lateral knee laxity has been measured by a non-image based navigation system before the ligament replacement, assuming that there was no significant lesion of the collateral ligaments. The authors used the OrthoPilot® navigation system (Aesculap, Tuttlingen, FRG). Infrared trackers were fixed by percutaneous bicortical screws on the distal femur and the proximal tibia, and strapped on the foot. A kinematic and anatomic registration was performed by moving hip, knee and ankle joints and palpating several relevant anatomical landmarks with a navigated stylus. Then the mechanical coronal femoro-tibial angle was measured in full extension and at 90° of knee flexion without stress and with a manual maximal stress in varus and valgus. The angle variation between the stressless and the varus or valgus measurements was considered as the lateral or medial laxity measurement.
Results: The mean medial laxity in extension was 3° ± 2° (range, 1° to 6°). The mean lateral laxity in extension was 3° ± 2° (range, 2° to 8°). The mean medial laxity at 90° of flexion was 2° ± 2° (range, 0° to 4°). The mean lateral laxity at 90° of flexion was 4° ± 2° (range, 2° to 8°).
Conclusion: The software used allows measuring accurately the ligamentous laxity of the knee, specially in the coronal plane. No controlled force was used, by the previous experience of the authors showed that there was little change in the maximal laxity by using calibrated spreaders in comparison to manually applied forces. The results of the present study are well fitted to the current literature of in vitro studies. But to transfer in vitro results to the in vivo situation may lead to some errors, if the measurement technique is different in the two situation. This is the first study defining the normal laxity

of the knee in vivo with the same navigated measurement technique than that used in clinical practice for total knee replacement. To define the physiological knee laxity is a prerequisite when defining the goals to be achieved when balancing a knee during total knee replacement.

P21-164

Navigated revision total knee replacement

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Objectives: Revision TKR is a challenging procedure, especially because most of the standard bony and ligamentous landmarks are lost due to the primary implantation. However, as for primary TKR, restoration of the joint line, adequate limb axis correction and ligamentous stability are considered critical for the short- and long- term outcome of revision TKR. There is no available data about the range of tolerable leg alignment after revision TKR. However, it is logical to assume that the same range than after primary TKR might be accepted, that is ± 3° off the neutral alignment. One might also assume that the conventional instruments, which rely on visual or anatomical alignments or intra- or extra-medullary rods, are associated with significant higher variation of the leg axis correction.

Methods: We used an image-free system (ORTHOPILOT TM, AESCULAP, FRG) for routine implantation of primary TKA. The standard software was used for revision TKA. Registration of anatomic and kinematic data was performed with the index implant left in place. The components were then removed. New bone cuts as necessary were performed under the control of the navigation system. The size of the implants and their thickness was chosen after simulation of the residual laxities, and ligament balance was adapted to the simulation results. The system did not allow navigation for centromedullary stem extension and any bone filling which may have been required. This technique was used for 54 patients. The accuracy of implantation was assessed intra-operatively by measuring the residual laxity with the new implant in place and by measuring the limb alignment and orientation of the implants on the post-operative radiographs.

Results: An optimal ligament balance was achieved in 82% of the cases. Limb alignment was restored in 88%. The coronal orientation of the femoral component was acceptable in 92% of the cases. The coronal orientation of the tibial component was acceptable in 89% of the cases. The sagittal orientation of the tibial component was acceptable in 87% of the cases. Overall, 78% of the implants were oriented satisfactorily for the five criteria.

Conclusion: The navigation system enables reaching the implantation objectives for implant position and ligament balance in the large majority of cases, with a rate similar to that obtained for primary TKA. The navigation system is a useful aid for these often difficult operations, where the visual information is often misleading. The navigation system used enables facilitated revision TKA.

P21-166

Medio-lateral laxity before and after total knee replacement

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Objectives: To get a balanced knee is desirable after total knee replacement. Navigation system might help measuring the knee laxity during the implantation.

Methods: 30 patients operated on for primary TKR have been analyzed. Preoperative examination involved varus and valgus stress X-rays at 0 and 90° of knee flexion. The intra-operative medial and lateral laxity was measured with the navigation system before and after prosthetic implantation. Varus and valgus stress X-rays were repeated after 6 weeks. X-ray and navigated measurements before and after TKR were compared with a paired Student t-test at a 0.05 level of significance.

Results: There was a significant difference between navigated and radiographic measurements. However, this difference was less than 2 mm in most of the cases, and then considered as clinically irrelevant. There was a significant correlation between the two measurements.

Conclusion: The navigation system used allowed measuring the medial and lateral laxity before and after TKR. This measurement was strongly correlated to the radiographic measurement by stress X-rays, and can therefore considered as accurate. The navigated measurement is a valuable information for balancing the knee during TKR. The reproducibility of this balancing might be improved due to a more objective assessment. The navigation system used allows measuring accurately and objectively the knee laxity during TKR.

P21-180

Tibiofemoral contact point after posterior cruciate retaining and substituting total knee arthroplasty: A dynamic in-vitro measurement

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Introduction: The introduction of posterior substituting knee prosthesis was intended to achieve a posterior femoral roll-back of the tibiofemoral contact point during knee flexion similar to physiologic knee kinematics. Therefore the purpose of this in-vitro study was to investigate dynamically the tibiofemoral contact point kinematics of a new prosthesis-system, which provides fixed and mobile posterior cruciate retaining (CR) and posterior cruciated substituting component (PS). We hypothesized a significant alteration of tibiofemoral contact pattern after TKA using the CR components relative to physiologic kinematics, whereas the PS components were suggested to restore physiologic kinematics.

Methods: Seven fresh frozen left knee specimens (mean age 62, range 52-75 years) were mounted in a specially designed knee simulator. Extension cycles were simulated from 120° flexion to full knee extension with an extension moment of 31 Nm. After implantation of the knee prosthesis-system (Triathlon®, Stryker, Limerick, Ireland) a pressure sensitive film (Tekscan®, Boston, USA) was fixed on the femoral inlay surface and the tibiofemoral contact was dynamically measured with 10 Hz. The prosthesis system provides fixed inlays (FCR/FPS) and mobile bearing inlays (MCR/MPS), which are intended to rotate on the tibial baseplate. Both inlays are available with a posterior cruciate retaining (FCR/MCR) and a posterior cruciate substituting design (FPS/MPS). Movements of the tibia relative to the femur were measured using an ultrasound based 3D motion analysis system (Zebris CMS-100®, Isny, Germany). After investigation of the posterior cruciate retaining components the posterior cruciate ligament was resected for implantation and measurement of the posterior cruciate substituting components.

Results: After implantation of the fixed and mobile cruciate retaining inlays (FCR/MCR) the center of tibiofemoral contact pressure moved posteriorly during knee extension up to 11 mm (SD 4 mm) on the medial tibiofemoral compartment, whereas the center of pressure on the lateral compartment moved lower than 3 mm (SD 2 mm), showing lateral pivoting. In contrast, after implantation of the fixed and mobile posterior substituting components (FPS/MPS) the center of tibiofemoral pressure moved anteriorly in both compartments during knee extension up to 9 mm (SD 6 mm, p=0.04). All component designs showed an external rotation of the tibia relative to the femur during knee extension, with a maximum of 13° (SD 8°)external rotation after implantation of the mobile posterior substituting inlay.

Discussion: This in-vitro study enabled the dynamic measurement of tibiofemoral contact pattern after various total knee arthroplasties. After implantation of the posterior cruciate retaining components abnormal tibiofemoral contact patterns were observed, with a "paradoxical" posterior movement of the medial tibiofemoral contact point and lateral pivoting, which could cause a limitation knee range of motion due to posterior femoral impingement at high knee flexion degrees. In contrast, after implantation of the posterior substituting components, the tibiofemoral contact point showed a more physiologic movement, which is suggested to provide the possibility for a higher range of knee motion.

P21-181

Load and contact stress on inlay cam after posterior cruciate substituting total knee arthroplasty: A dynamic measurement

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Introduction: The introduction of posterior substituting knee prosthesis was intended to achieve a posterior femoral roll-back of the tibiofemoral contact point during knee flexion similar to physiologic knee kinematics. This femoral roll-back was suggested to be a major contribution for achieving maximum range of knee motion, especially at high knee flexion angles. Nevertheless, the post/cam mechanism offers the risk of failure due to mechanical overload. Therefore the purpose of this in-vitro study was to investigate dynamically the load and contact stress on the post/cam mechanism of the polyethylene inlay of posterior substituting knee prosthesis.

Methods: Seven fresh frozen left knee specimens (mean age 62, range 52-75 years) were mounted in a specially designed knee simulator in which isokinetic flexion-extension motions under physiologic loading were simulated.

Extension cycles were simulated from 120˚ flexion to full knee extension with an extension moment of 31 Nm. After implantation of the knee prosthesis-system (Triathlon®, Stryker, Limerick, Ireland) a pressure sensitive film (Tekscan®, Boston, USA) was fixed on the cam of the inlay surface to measure maximum load and contact stress with a frequency of 10 Hz. The prosthesis system provides a fixed and a mobile, rotating posterior cruciate substituting inlay.
Results: With both types of inlays maximum load did not show significant difference with up to 480 N on the posterior surface of the cam at 120° knee flexion, whereas in full extension the anterior surface of the post was loaded up to 170 N. Contact stress on the posterior surface of the cam was measured to be up to 19.7 MPa at 120˚ flexion. In contrast, contact stress on the cam of the mobile inlay was measured to be significantly lower (6.8 MPa, p=0.04).
Discussion: Maximum posterior load on the inlay post was measured in flexion, whereas the inlay post was loaded anteriorly in extension. A mobile, rotating PS-inlay offers the possibility to minimize contact stress and maximize the contact area of the post/cam mechanism to avoid mechanical overload of the polyethylene inlay.

P21-182
Influence of femoral rotation on radiographic alignment after total knee arthroplasty
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Introduction: The ability to evaluate this alignment using postoperative radiographs might be confounded by limb rotation. The aim of the presented study was therefore to measure the effect of limb rotation on postoperative radiographic assessment and to introduce a mathematical correction to calculate the true axial alignment in cases of a confounded radiograph.
Methods: A synthetic lower left extremity (Sawbones®, Inc,Vashon Island, WA) were used to create a modelresurfacing total knee arthroplasty of the Interax I.S.A.® knee prosthesis system (Stryker, Limerick, Ireland). Laser guided measurement of the tibia after preparation showed a straight lower limb with a femoral valgus angle of 6.5°. The model was fixed in an upright stand which positioned the limb in varying degrees of rotation. Five series of 10 anteroposterior (AP) radiographs were taken with the knee in full extension, with femoral limb rotation ranging from 20° external rotation to 20° internal rotation in respect to the x-ray beam and cassette, in 5° increments. After digitizing each radiograph, an independent observer measured the femoral valgus angle for each series of the long leg radiographs using a digital measurement software (MEDICAD®,Hectec, Altfraunhofen, Germany). Each observer was instructed to determine the femoral valgus angle following the software's guidelines. In addition each observer measured the distances a and c of the femoral component figured on the radiographic film. Using a student t-test, the effect of femoral limb rotation on the measured femoral valgus angle and a correlation between femoral rotation and femoral valgus angle was established. Then for each limb rotation c/a ratio was determined to calculate the limb rotation and to calculate a theoretical correction for each rotated limb radiograph to determine the real femoral valgus angle.
Results: Without an application of femoral rotation the femoral valgus angle was measured radiographically to be 6.5° (SD 0.4°). With external femoral rotation the measured femoral valgus angle linearly decreased to a minimum of 4.5° (SD 0.2°) at 20° femoral rotation. In contrast, with increased internal femoral rotation the measured femoral valgus angle linearly increased up to 7.7° (SD 0.2°). The linear regression (R2=0.94) calculated a 0.09° change of radiographically measured femoral valgus angle per femoral rotation angle. With the femoral rotation the radiographically measured c/a ratio decreased linearly (R2=0.98) with further internal rotation. The calculation of the real femoral valgus angle using the calculation of the c/a ratio showed a maximum difference of up to 0.7° (p=0.22) between the calculated and the real femoral valgus angle, which is supposed to be 6.5° at each femoral rotation angle.
Discussion: The results of the presented study suggest a significant influence of femoral rotation during radiographic evaluation of limb alignment after total knee arthroplasty. With further external femoral rotation the radiographically apparent femoral valgus angle decreases, with further internal rotation the femoral valgus angle increases. As the apparent femoral valgus angle changes linearly in the range of 20° internal and external leg rotation, a calculation of the distances of the femoral component could be used to determine the real femoral valgus angle in cases of femoral limb rotation.

P21-189
The effect of total knee replacement on the extensor retinaculum
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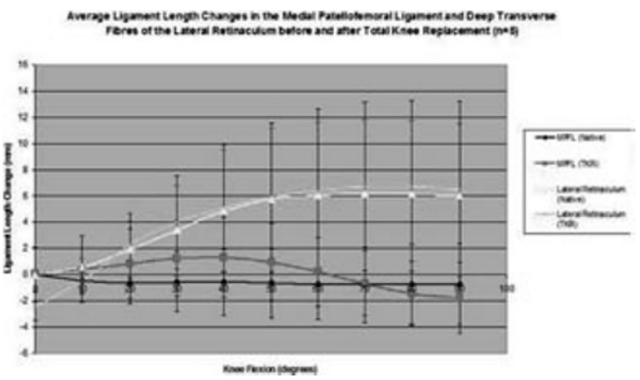
Objectives: Interest in studying the patellofemoral joint in total knee replacement (TKR) has increased in recent years, as problems here have been implicated as a common cause for revision surgery. Retinacular tensions play an important role in patellofemoral stability especially in early knee flexion. Abnormal soft tissue tensions post arthroplasty may contribute to altered patellofemoral kinematics leading to problems such as pain and excessive wear. The aim of this study is to test the hypothesis that insertion of a TKR may effect range of motion as a consequence of excessive stretching of the retinaculae.
Methods: 8 fresh frozen cadaver knees with no history of injury were placed on a customised testing rig. The femur was fixed to the rig in neutral rotation and permitted unconstrained motion of the knee by allowing the tibia to move freely through an arc of flexion. The quadriceps were divided into six components and loaded to 175N in their physiologic line of action using a cable, pulley and weight system. The iliotobial tract was also preserved and loaded with 30N. Tibiofemoral flexion and extension was measured using an optical tracking device. Monofilament sutures were passed along the fibres of the medial patellofemoral ligament (MPFL) and the deep transverse band in the lateral reinaculum with the anterior ends attached to the patella. The posterior suture ends were attached to Linear Variable Displacement Transducers (LVDTs). Thus, small changes in ligament length were recorded by the transducers. Ligament length changes were recorded every 10 degrees from 90 to 0 degrees during an extension cycle. A longitudinal transpatellar approach was used when performing TKR to preserve the medial and lateral retinaculae. Testing was conducted on an intact knee and following insertion of a cruciate retaining TKR (Genesis II, Smith & Nephew). Statistical analysis was performed using a two way ANOVA test.
Results: Preliminary results are currently available on 5 knees. The MPFL had a mean behaviour close to isometric, while the lateral retinaculum slakkened by a mean of 6mm as the knee extended from 60 degrees. There was no statistically significant difference seen in ligament length change patterns in both the MPFL and in the deep transverse band of the lateral retinaculum after knee replacement



Length Changes in the Retincaculum after TKR (n=5)

Conclusion: The data does not support the hypothesis that insertion of a TKR will cause abnormal stretching of the retinaculae. This result relates specifically to the TKR design tested; other types may cause different patterns of retinaculur strain, depending on the antero-distal geometry of the femoral component.

P21-197
The effect of staged ligament releases on extension and flexion gaps in-vivo
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Objectives: Staged ligament releases in total knee arthroplasty have different effects on the stability of the joint in extension and in flexion as shown by Krackow et al 8 years ago. This has consequences for a tibia-first user, who utilizes the ligament-guiding technique to establish the rotation of the femoral component. If higher degree ligament releases had to be done to balance

the knee in extension, the femur starts to rotate externally in an uncontrolled fashion when lifted up from the tibia. Even though the in this manner created flexion gap would still be symmetrical, the femoral component is internally malpositioned with consecutive patella problems. A new sequence of bone cuts with a standardized ligament release has been created ("Extension gap-first"-technique). In this technique one of the main assumptions is, that a mild to moderate ligament release allows the femur to rotate ligament-guided into the correct position parallel to the epicondylar axis, when lifted up from the tibia in a typical tibia-first technique. Extended ligament releases including the release of the superficial medial collateral ligament on the other hand destabilize the femur in flexion and cause an uncontrolled external rotation. The aim of the study was to approve this assumption and to quantify the effect of a staged ligament-release in extension on the stability in flexion.
Methods: In 20 patients with different degrees of contract varus osteoarthritis a total knee arthroplasty was performed using the "Extension gap-first"-Technique. During the operation the effects of the staged ligament releases were monitored and quantified with a navigation system (PI Galileo, Plus Orthopedics). After each step of ligament release in extension, the effect of this specific release on the ligament-guided rotational position of the femur was controlled. The release stages were continued until a balanced extension gap was created.
Results: When the superficial MCL had been released, the femur showed 4°-5° more external rotation than before this release. The effects of moderate ligament releases on the femoral rotation were substantially less and allowed the creation of a rectangular flexion gap without the risk of internal malpositioning of the femoral component.
Conclusions: This is one of a few studies examining the effects of ligament releases in extension and flexion in osteoarthritic knees with contracted medial ligaments. The results confirm the clinical observation that tibia-first users have problems with positioning the femoral component after having performed extensive ligament releases.

P21-201
Surgical site infection after total knee arthroplasty: a monocenter analysis of 923 first-intention implantations
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Objectives: We report the results of a retrospective analysis of 923 cases of first-intention total knee arthroplasties. The objective was to determine retrospectively the rate of surgical site infections (SSI), including all infections diagnosed during the first year, and to search for risk factors. We also wanted to present our surveillance system planned for a 10-year period.
Methods: From January 1994 to January 2004, first-intention total knee arthroplasty (TKA) was performed on 999 knees. HLS(Tornier) prosthesis were implanted. At minimum 12 months, follow-up data was complete for 923 implants which constituted the study group. Female gender predominated (72%). Mean patient was 71 years (range 26-93). Anterior surgery was performed for 25% of the knees. Etiologies were osteoarthritis (87.5%) and rheumatoid polyarthritis (6.9%). Cefazolin was used for systematic preoperative (one injection) and postoperative (48hr) antibiotic prophylaxis. Vancomycin was used for patients with a contraindication for cefazolin. Information was collected from two sources: computerized consultation charts for all follow-up visits completed prospectively since 1995 and data collected by the Hygiene and Epidemiology Unit during the year following implantation. Data on surgical site infections was collected from the hospitalization files, outpatient files and control visits. Each case of infection was validated at an annual interdisciplinary meeting. We retained for analysis deep infections requiring revision surgery with identification of the causal agent on the intraoperative samples. We identified a subgroup of infections occurring during the first postoperative year, the delay generally retained for SSI.
Results: Twenty SSI after TKA were identified during the 10-year surveillance period (2.1%). Mean follow-up was 43 months (range 12-123, median 37 months). The rate of SSI occurring during the first postoperative year was 1,4%. Eighty-percent of the infections (n=16) occurred within the first two postoperative years. Two infections were diagnosed two to five years after surgery and two others after five years due to hematogenous contamination. All of the observed infections involved a single causal germ. Agents identified were: Gram+ (90%) and Gram- (10%), with a clear predominance for S.aureus (n=9). Infections developed 2.8 fold more often in patients with inflammatory disease and 2.1 fold more often in patients with anterior knee surgery. Age and body mass index did not differ between patients with and without SSI.
Conclusions: The analysis of our series demonstrated the difficulties in conduction long-term surveillance.

P21-223
Does a patient prefer a URK to a TKR?
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Introduction: It has been suggested that, because of superior proprioception and kinematics, a UKR is functionally superior to a TKR. We were interested to know whether, from a patient's perspective, this is true.
Method: We had 21 patients who had simultaneous bilateral knee replacements by the same surgeon. At the time of surgery a TKR was done on the one knee and a UKR on the opposite knee. There were 18 medial UKR's (12 mobile and 6 fixed bearings) and 3 lateral (all fixed bearings). These patients were prospectively assessed by SANE (single assessment numeric evaluation - William CORR 373) and the re-assessed at an average of 26 months (12 - 58 months).
Results: The pre-operative average SANE was 35 (20 - 65). The post-operative average, for both knees, were 72 (50 - 100). This was a statistically significant improvement.
The average post-op score for the UKR knees were 77 (70 - 90). The average post-op score for the TKR knees were 85 (50-100). The difference is not statistically significant.
11 Patients could not detect any difference between the TKR knee and the UKR knee. 7 Patients preferred the TKR while 3 patients preferred the UKR. This is not statistically significant.
Conclusion: Although statistically insignificant, there was a tendency for patients to prefer the TKR to the UKR. UKR's are kinematically superior and have better proprioseption that TKR's; this however does not seem to have a positive result on what the patient experiences. In view of this and the inferior survival rate of UKR's, when compared to TKR's, their place in the treatment of gonarthrosis, should be re assessed.

P21-232
A comparison between mini and conventional total knee arthroplasty in the early stage after surgery
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Background: Total knee arthroplasty (TKA) has been relied upon as an effective treatment for knee arthritis for over 30 years. A minimally invasive surgery (MIS) has been developed for TKA, though no consensus has yet been reached on the definition of the procedure. Our group performed a "Conventional TKA" (C group) for decades, then performed a "Mini TKA" (M group) via a mini midvastus approach for several years thereafter in our hospital. In this study, we sought to clarify the difference between the M and C groups by assessing the early results of the two groups. We hypothesized that the knee function would recover earlier in the M group than in the C group, and without major problems.
Materials and Methods: We retrospectively reviewed 25 knees in the M group and 21 knees in the C group. All patients underwent primary TKA using the same model of posterior stabilized type in our hospital. Both the radiographic and clinical outcomes were evaluated. The implant position was assessed based on the Knee Society evaluation. Straight leg raising, range of motion (ROM), and gait ability were compared in the early period after surgery. Complications in the two groups were also examined. There were no significant differences between the two groups in the preoperative femorotibial angle, ROM, or the knee and function scores of the Knee Society.
Results: The length of the skin incision was 10.9 cm (range, 9-12 cm) in the M group and 17.1 cm (range, 13.5-21 cm) in the C group. The difference between the two was significant ($p<0.001$). The duration of the surgery and the total amount of blood loss did not differ significantly between the groups. The components were correctly implanted in both groups. The implant angles were $\alpha=97\pm2$, $\beta=90\pm2$, $\gamma=1\pm2$, and $\delta=84\pm2$ degrees in the M group and $\alpha=97\pm2$, $\beta=89\pm2$, $\gamma=1\pm2$, and $\delta=83\pm1$ degrees in the C group. There were no significant differences between the two groups in any of the angles. The femorotibial angle was significantly improved in both groups. Straight leg raising could be achieved significantly earlier in the M group (in 2.9±1.5 days after the surgery) than in the C group (in 4±1.9 days) ($p=0.03$). Patients in the M group could bend their involved knees 90 degrees in 6.7±5 days after surgery, while those in the C group tended to take somewhat longer to accomplish the same (in 9.5±6.9 days). Neither group had complications

such as intra-operative fracture, notch formation in the anterior part of the femur, major nerve or vessel injury, skin necrosis, infection, or clinically obvious thrombosis.
Conclusions: The Mini TKA was performed through a skin incision of less than two-thirds of the length of the incision used for the Conventional TKA. Unlike the ultimate MIS, the Mini TKA can be performed on cases with severe deformity. Recovery during the early postoperative period was better in the M group than in the C group. No disadvantages such as false implant positions or complications were found in either of the groups. We are now pursuing an earlier postoperative recovery and improved postoperative management in the M group.

P21-252
Soft tissue tenser technique to self assessment of femoral rotation in total knee arthroplasty. Early experience results with FBI instrument
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Objectives: Total knee arthroplasty in last years has changing the field of applications: from old patients with low demand activities is shifting toward younger patients with higher level of activities demand. Details are promising to more reliable outcomes. Surgeons in conjunction with orthopaedic industries are studying a new instrumentation to better fit the anatomy in M.I.S. surgery and more precise design able to reproduce the correct tensioning of ligaments.
In the years, two philosophies were developing to the assess femoral rotation in total knee arthroplasty: bone references and ligament references.
The first one use the bone landmarks to assess the right femoral rotation while the second one use the ligament tensioning to assess the femoral rotation.
Both technique and instruments are able to attend good outcomes, further anatomic and biomechanical studies seem to show that the difference between the two surgical approach can be avoided. Instead of developing a new class of instruments, we put together the two philosophies giving to the surgeon more challenge to assess the femoral rotation in total knee arthroplasty.
Methods: this study shows the early results with FBI instrumentation (Zimmer ins, Warsaw). We operated 12 patients using FBI instrumentation. The case load included 8 men and 4 women. The age distribution was from 65 to 74 years with a median age of 68. The operation time has been the same one of the traditional instrumentation.
Results: So far the patients have been shown good and improved early recovery. There was not any complication during the early post-operative time.
Conclusions: This is use a mini soft tissue tenser good to fit in MIS surgery and a IM rod for the free femoral rotation, at same time surgeon can check the femoral landmarks (whiteside line and epi-line) to put the two ways in conjunction and fitting better outcomes.

P21-262
Less invasive total knee arthroplasty: Extramedullary femoral reference without computer navigation
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Introduction: Femoral intramedullary canal referencing is utilized by most of the total knee arthroplasty (TKA) systems. Violation of the canal is performed in order to engage rod instruments in the femoral diaphysis and to refer of the anatomical axis of the femur. Fat embolism, activation of the coagulation cascade, and bleeding may occur from the reamed femoral canal. The purpose of our study was to validate a new set of "minimally-invasive friendly" instruments which allow to prepare the femur without violating the intramedullary canal.
Material and Methods: Fifty consecutive patients undergoing primary TKA through a limited-parapatellar approach were enrolled in the study after informed consent had been obtained. Results of this cohort (group 1) were compared to another contemporary group (group 2) of 50 TKAs operated by the two authors using intramedullary instruments. The two groups were matched for gender, deformity, degree of arthritis, and surgical approach. Reliability of the new extramedullary set of instruments was first tested in ten cadaveric limbs. Preoperative long weight-bearing AP and lateral view of the knee were obtained taking care of neutral limb positioning. Template of the mechanical and anatomical axis were performed. Distal femoral resection was planned according to the template, and considering a bone cut perpendicular to the mechanical axis of the femur. Measurement from the template were reproduced on the distal femoral cutting jig. Flexion-extension control of the distal femoral resection was obtained using the anterior meta-diaphyseal cortex reference. Depth of resection, and varus-valgus angulation were selected according to the previous measurements and referring over the most prominent distal femoral condyle. A double check was performed using an extramedullary rod referring two and a half finger-breaths medially to the antero-superior iliac spine. Postoperative blood loss, pain, swelling, functional recovery, and complications were recorded. Radiographic alignment was measured with full-limb x-rays.
Results: Femoral component coronal alignment was within 0±2° (α angle) of the mechanical axis in 84% of group 1 and 87% of group 2 ($p>0.05$). Sagittal alignment of the femoral component was 0±2° (γ angle) in 88% of group 1 and 72% of group 2 ($p=0.01$). There were no difference between the two groups regarding the operative time. In group 1, postoperative blood loss (740 vs 820 mL) was reduced but this difference did not reach the statistical significance ($p=0.07$). No difference was found in terms of postoperative pain, knee swelling, and functional recovery.
Discussion: Extramedullary reference with careful preoperative templating can be safely utilized during total knee arthroplasty. Avoiding the violation of the femoral canal may enhance the benefits of a less invasive approach.
Kandel L, Vasili C, Kirsh G. Extramedullary femoral alignment instrumentation reduces blood loss after uncemented total knee arthroplasty. J Knee Surg. 2006 Oct;19(4):256-8.

P21-264
Quantitative analysis of polyethylene wear particles in synovial fluid by scanning electronic microscopy. Technique development.
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Introduction: The biologic effects of wear debris are an important factor limiting the longevity at mid and long term of total knee replacements. Wear debris may lead to macrophages activation, secretion of proinflammatory factors which cause periprosthetic osteolysis and aseptic loosening.
Different materials have been designed for prosthetic implants in order to decrease wear debris of polyetylene and reduce particles to minimizise biological effects.
In vitro studies have provided important information. Several studies with simulators have been performed in order to reproduce as much as they can polyethylene wear conditions to identify, quantify and characterizise particles by Scanning Electronic Microscopy.
Objectives: The aim of this study is a technical description to identify polyethylene particles in vivo by Scanning Electronic Microscopy and Spectometry in patients who underwent total knee arthroplasty and to show difficulties find out in its development
Materials and Methods: During two years, synovial joint fluid samples were collected from volunteer group of patients who have underwent a Total knee Arthroplasty. Thus, difficulties for development of our technique, to isolate, make a quantitative analysis and characterization of polyetlylene particles, were detect.
Between 3 and 12 ml of synovial fluid were drawn and stored under refrigeration. All samples were filtered after several dilutions of Chlorhydric acid and methanol through a 0.05 μm-sized polycarbonate filter. This filter were recovered by a golden layer in order to be able to identify and characterizise polyethylene particles by Scanning electronic microscopy Jeol JSM-840 and Raman spectometry
Results: We could get enough synovial fluid from each patient for analysis, as a minimum 1 mililiter. Wear debris in vivo in synovial fluid is much less than the one obtained by simulators. Besides, it's mandatory a previous enzimatic digestion process and preparation in order to remove blood red cells and other organic components, such as bone or cartilage tissue diluted in fluid
Conclusions: It is mandatory to process synovial fluid samples to detect polyethylene particles in vivo by Scanning electronic microscopy, image analysis and Spectometry. We describe the technique used for this purpose.

P21-269

The survivorship and results of total knee replacement following revision of an unicompartmental knee replacement

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Background: Unicompartmental knee replacements (UKR) converted to total knee replacements(TKR) have often been viewed with scepticism because of the perceived difficulty of the revision and because revision procedures generally do less well than primaries.

Methods: This is a prospective review of TKRs converted from a UKR between 1990 and 2004. We present the survivorship of a 77 patient cohort and the clinical results of 35 patients.. All information was recorded at the time of surgery onto the Bristol Knee database and patients have been regularly reviewed by the research nurse since.

Results: The 77 patients in the survivorship study had an average follow-up of 6.9 years and an average Bristol Knee Score of 78.5. Using Kaplan-Meier survivorship analysis a 91% survivorship at 10 years was demonstrated. Only 35 patients are currently alive and available for examination. The average age at which the UKR was performed was 59.8yrs, with a time to failure averaging 8.2yrs. The average age at revision to TKR was 66.1yrs. There was an average follow-up period of 10.5yrs and an average Bristol Knee Score of 78.2 with 16 excellent, 11 good, 5 fair and 3 failed results.

Conclusion: Previous studies have shown that revision of UKR to TKR is not technically difficult. This study shows that the survivorship following revision of a UKR is comparable to that of a primary TKR but the clinical results are less good.

P21-273

The value of a subjective score for the patello-femoral assessment in total knee-arthroplasty

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Introduction: Scores which are commonly used to assess total knee arthroplasty are sometimes not sufficient to assess the function of the patellofemoral joint. During a comparative study between 2 series of total knee arthroplasty with and without a resurfaced patella, an objective score referred to as “patellar score” has been designed and assessed on 135 patients clinically reviewed and on 20 patients surveyed on the phone.

Score Component: The “patellar score” is based on the assessment of knee pain thanks to Visual Analog Scale (VAS) for items related to patellofemoral joint function: going up or down the stairs, keeping a prolonged seated position, leaving an armchair, getting out of a car. A Numerical Scale is used for the patients surveyed over the phone. The pain felt during palpation of the internal and external patellar sides, as well as that of the trochlea, is assessed equally, similarly with a VAS. The total amount is divided by the number of items as to obtain a “patellar score” out of 10. The lower the score the better the result.

Score Analysis: The results are compared to the International Knee Society clinical score, to the subjective “clinical anterior knee pain Score” established by Waters and to the patients global satisfaction. Each “patellar score” item is analysed to eliminate non relevant items. A link has been observed between the IKS score, the “patellar score”, and the patients’ satisfaction. The “patellar score” has allowed a finer analysis of the pains undergone by the patellofemoral joint, in detecting a difference in favor of the patellar resurfacing, whereas the more global IKS score was not modified. Besides, the “patellar score” has allowed a more accurate approach of the patient’s pain. Palpation Clinical items have not significantly modified the results of the score. By cancelling them a self evaluation file is obtained.

Conclusion: The “patellar score” is based on the Visual Analog or Numerical Scale, commonly accepted for its value in assessing pain. Such a score allows a fairly good evaluation of the PTG since it is connected to the IKS clinical score, and to the patients’ satisfaction. It can be adapted to obtain a subjective self evaluation file.

P21-286

Total knee arthroplasty after failed medial unicompartimental prostheses: 33 cases

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The aim of this study was to evaluate the clinical and radiological results of 33 total knee arthroplasties (TKA) performed between January 1993 and March 2005 after failed medial unicompartimental prostheses.

Material and Methods: We operated on 23 female and 10 male patients. The mean age at revision was 78±8.42 years. The mean preoperative IKS function score was 43±14.66 points (0-70) and mean knee score 57±13.62 points (0-70). The mean global score was 99±23.76 points (0-130). The causes of failure were: 15 tibial plateau and 5 femoral implant loosening, 2 femoral and tibial loosening, 5 polyethylene wear, 2 lateral gonarthrosis, 2 femoro patellar gonarthrosis, 1 dislocation of the polyethylene (mobile bearing plateau), and 1 infection.

In 12 cases we used a metallic wedge to fill in the bone loss (4 mm: 2 cases, 6 mm: 3 cases, and 8 mm: 7 cases). In 7 cases we used an allograft (a piece of frozen femoral head) and in 1 case a metallic wedge plus an allograft. Otherwise we used 19 long tibial stems and 2 femoral stems.

Results: The results were based on 27 cases (5 deceased and 1 lost to follow up) and the mean follow up was 73±41.7 months (8-153). We had no early complications but one case of stiffness that required manipulation under general anesthesia. We had to perform 4 revisions: 2 for tibial loosening and 2 for patellar button loosening. The mean IKS function score was 80.4 ±16 points (40-100), the mean knee score was 86.3±10.6 points (63-100), and the global score 166.72±21.3 points (128-200). We found 8 radiolucent lines at the tibial plateau level (4 less than 1 mm thick and 4, 2 mm thick) and 1 less than 1 mm thick at the femoral level. All the allografts fitted perfectly in the bone without osteolysis. 2 patients will have an other revision: 1 for tibial plateau loosening (8 years follow up) and 1 for femoral loosening (9 years follow-up).

Conclusion: Our results are comparable to other publications. The results of unicompartimental knee revisions are not as good as those of primary TKA, the same as osteotomy revisions, and better than TKA revisions. We think the operative procedure is less demanding than osteotomy or TKA revision. The distinctive feature of medial unicompartimental prosthesis revision is the tibial bone loss, which was present in 60.5% of our cases.

P21-290

Computer-assisted TKA for severe genu varum deformities - results for 31 prostheses

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The aim of this paper was to assess the implantation accuracy, the release incidence, and the clinical results for 31 computer-assisted TKA for severe genu varum (= or > to 10°).

Material and Methods: We implanted 90 E-Motion FPTM prostheses (B-Braun-Aesculap, Tuttlingen, Germany), between December 2001 and December 2003, using the OrthopilotTM (B-Braun-Aesculap, Tuttlingen, Germany). Among these, 34 were implanted for osteoarthritis with genu varum deformity equal or superior to 10°. 31 were kept in 17 female and 14 male patients, but 3 had to be removed because of peroperative computer failure. The right side was involved in 16 cases and the left one in 15. The mean age at surgery was 74±5.34 years (61-82). The mean preoperative HKA angle was 167.48°±2.08° (163°-170°). According to modified Ahlbäck criteria, we operated on 1 stage II, 1 stage III, 14 stage IV, and 15 stage V gonarthrosis. 27 patients had previously undergone a TKA on the contralateral side (87%). As far as the IKS score was concerned, the mean knee score was 21.13±9.23 points (0-20), the mean function score was 35.32±18.53 points (5-85), and the mean global score 56.23±23.86 points (20-108). The mean preoperative flexion was 116.94°±12.5° (90-140). Using Charnley’s categories, 18 were classified in group A, 10 in group B, and 3 in group C.

The main goal of the operation was to obtain a radiological HKA angle comprised between 177° and 183°. The standing long leg X-Rays were made at 3 months postoperatively. A tibial medial collateral ligament (TMCL) « release » was performed every time the reducibility tests showed a medial to lateral side difference equal or superior to 4 degrees. At revision, we used the IKS scoring system to evaluate clinical results.

Results: We had no postoperative complications and the mean follow up was 30.81±7.23 months (24-46). The mean peroperative HKA angle given by OrthopilotTM was of 167.87°±2.90° (163°-176°), that is to say quite close to the radiological preoperative HKA angle (except for one case, 170° versus 176°). This angle was 180.29°±2.90° (179°-182°) after implantation of the prosthesis. We had to perform TMCL release in 10 cases (32.25%). In 5 cases we released only the deep MCL and in the last 5 cases we released the deep and superficial MCL (16.1%).

The postoperative radiological HKA angle was of 179.89°+/-1.83° (175°-184°), which means we reached our goal in all cases but 2 (93.55%).

Concerning the revision IKS score, the mean knee score was 93.89±6.21 points (74-100), the mean function score was 92.22±11.21 (65-100), and the mean global score 185.74±15.56 points (144-200). Moreover, the mean flexion score was 114.07°±10.56° (90°-140°), quite close to the preoperative flexion.

Conclusion: The OrthopilotTM allows the same quality of prosthesis implantation (1,2,3,4,5) in case of severe genu varum. The objective evaluation of deformity reducibility shows that computer navigation considerably decreases the need to perform a release. Clinical results are correlated to the quality of prosthetic implantation.

P21-291

Mechanical femoral axis values in case of genu varum or genu valgum deformity: 108 cases

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According to Kapandji and also to Hungerford and Krackow's assertion (CORR, 1985; 192: 23-33) many surgeons consider the normal mechanical femoral axis (MFA) presents a valgus of 2 to 3°. In order to check if this notion was applicable to genu varum or genu valgum deformity, we led a prospective study on 106 cases of gonarthrosis operated on for total knee replacement (TKR) between October 2001 and December 2003.

Material and Methods: The series was composed of 89 genu varum and 17 genu valgum, 65 female and 41 male patients. The mean age was 75±6.72 years (59-93). The MFA axis was measured on preoperative long leg X-rays without considering the mechanical tibial one which is always difficult to measure because of predominant bone wear on this side. The mean femorotibial angle (HKA) was 173.43°±7.30 (160-200°) for the global series, 186.94°±4.89° (181°-200°) for genu valgum deformity, and 171.07°±4.27° (160°-179°) for genu varum.

Results: The mean genu valgum MFA was 93.88°±3.52 (85-100). We recorded 1 case at 85°, 1 at 90°, 1 at 91°, 3 at 92°, 1 at 93°, 1 at 94°, 5 at 95°, 1 at 96°, 1 at 97°, 1 at 99°, and 1 at 100°. The median was at 95°.

The mean genu varum MFA was 90.86°±2.2° (85-97). We recorded 1 case at 85°, 1 at 86°, 3 at 87°, 4 at 88°, 3 at 89°, 30 at 90°, 18 at 91°, 14 at 92°, 7 at 93°, 3 at 94°, 4 at 95°, and 1 at 97°. The median was at 91°. If we consider the cartilage is 2 to 3 mm thick and if we add it to our measures the median for genu varum was 93-94° and 92-93° for genu valgum.

Conclusion: As far as genu varum is concerned, our measures correlate to Kapandji's and Hungerford´s criteria in only 50% of the cases. If we consider 90° and 91° were "normal" (53.9%), some femurs were in varus (< to 90°: 11.2%) and others were in valgus (> to 92°: 30.7%).

The genu valgum MFA was in valgus in most of the cases (more than 88%) but it was also in varus!

P21-292

The role of navigation to predict soft tissue release during computer-assisted total knee arthroplasty. Results of a prospective study of 90 cases

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Soft tissue release is a worrying problem when one have to perform a total knee replacement for genu varum or genu valgum deformity. For a long time, some surgeons have been performing systematically a release in case of severe deformity. This standpoint is questionable because in some cases the deformity is reducible and there is no need to do a release and in other cases, this soft tissue release could lead to a great imbalance between medial and collateral ligaments. Computer assisted TKR can measure the reducibility of the deformity and appears to be very useful to predict soft tissue release and to avoid improper release.

The aim of this paper was to assess operatively the role of OrthopilotTM navigation (B-Braun-Aesculap, Tuttlingen, Germany) to predict soft tissue release during TKA.

Material and Methods: From December 2001 to december 2003 we used OrthopilotTM to navigate 90 e-motion TKA. We operated on 90 gonarthrosis, 75 genu varum (160° to 179°), 13 genu valgum (181° to 200°) and 2 knees without any deformity (femoro-patellar arthrosis). During the operation we performed 14 releases: 13 for genu varum (9 deep medial collateral ligament -12%-, and 4 deep and superficial MCL -5.3%) and 1 for genu valgum deformity (7.7%). The reducibility was evaluated by looking at the load line after giving a manual stress in valgus or in varus at 10° of flexion. We collected prospectivelly the reducibility of the deformity and we compared the data to the need to do a release. These data were recorded just after getting the load line, before removing the osteophytes. We considered the knee was well balanced when we had a side to side difference lower than 4°. We classified the results into 3 groups : over correction, normo correction and under correction. Inside this last group we individualized 4 subgroups : A, 3° and less under correction (177 to 179°), B, 5° and less (175 and 176°), C, 8° and less (172 to 174°) and D, more than 8° (171° and less).

Results: 41 cases had an over correction (45,5%) among which 11 genu valgum. 20 had a normo correction (22,2%) among which 1 genu valgum. In these 2 groups we never performed a soft tissue release. 29 had an under correction : 15 for A group (16.6%), 7 for B group (7.8%), 6 for C group (6.6%) and 1 for D group. Regarding the A group, we performed a deep MCL release in 3 cases out of 15 that is in 20% of cases. For the B group we performed 4 deep MCL releases out of 7 that is in 57% of cases. For the C group we performed a release in 6 cases out of 6 that is 100%. In 3 cases we performed a deep and superficial MCL release (50%), in 2 cases Only a deep MCL release and in 1 case a postero-lateral corner release (genu valgum deformity). In the last group (D - one case) we performed a deep and superficial MCL release.

Conclusion: Navigation can predict the need to do a release during computer-assisted TKA. We think it is important to check the reducibility of the deformity before doing any release. The less the reducibility is important the more the risk to do a release is great. Navigation reduces the incidence of large soft tissue release (only 5 cases in our series that is 5.5%).

P21-321

Results at 2-5 years follow-up of 152 unicompartimental knees HLS UNI Tornier

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After a fall of employment between the years 80-90, the unicompartimental knee (UNI) has found a boost in recent 5-10 years, due to the improvement of design, of the materialsand to the improvement of surgical technique, both with good long-term results reported in literature by some recent studies. The indications to the UNI are represented by: Pain Located at the damaged compartment, controlateral compartment integrity, cruciate ligaments integrity, asymptomatic patello-femoral joint , range of motion > 90°, age > 65 years, varous deformity < 10 degrees, valgus deformity < 10 degrees for the lateral UNI, recurvatum < 5 degrees ; absolute contraindication is represented by rheumatic arthritis, while age and obesity seem to be two variable parameters. There are so-called borderline indications that are represented by: varus deformity >10° not reducible, flexion deformity > 10°, valgus deformity > 10°, age > 75 years, post-traumatic arthritis , HTO revision , revision of UNI , patellofemoral arthritis. It is important to assess carefully the patello-femoral joint in the indication the UNI. The association between patello-femoral pain and one of the following parameters that the presence of a radiological finding of patello femoral incongruity or the intraoperative finding of a chondral damage of 3-4 degree represents the real contraindication to the UNI . We also believe that the rare symptomatic situation of medial overload is usually well tolerated and however decreases with the correction of the varus deformity. In this study are reported the results with a minimum follow-up of 2 years and a maximum of 5 years, referring to a group of 152 unicompartimental protheses , 10 lateral UNI - 142 medial UNI , using the HLS Evolution Tornier UNI prosthesis. The anatomical femoral component is 3 mm thick with a central 8mm peg and an anti-rotation keel. The rounded posterior profile has been studied to obtain an increased flexion .The tibial component used was always all-poly. The thickness of the tibial component vary from 9 to 13 millimetres. The absence of keel or pegs improves the conservation of bone stock at the tibial side that represents a crucial factor in the case of revision. Surgery was performed without use of tourniquet. There were no major intra and post operative complications and the period of hospital stay was on average of four days. The age of the patiens was between 58 and 77 years (average age: 65 years). It is interesting that the 26.3% (40 UNI) have been implanted with borderline indications: 33 cases of varus deformity >10 degrees, 3 cases of valgus deformity > 10 degrees, 2 cases of HTO revisions , 2 revisions of failed UNI. As regards the 10 cases of lateral UNI we treated 2 cases of post meniscectomy arthritis, and 8 cases of valgus deformity. The results were evaluated with the HSS knee score and were the following: 99 excellent = 65.13% of which 10 lateral and 91 medial UNI , 44 good all medial UNI = 28.94%, 0 fair = 0%, 9 bad = 5.92% all medial UNI. Considering the high rate of excellent and good results obtained in 94.1% of cases, even if with a short term follow-up, and whereas the learning curve, we can observe that, with the correct indicatons and with a careful surgical technique, the

unicompartimental knee rapresents a reliable option in the treatment of the arthritis of the knee.

P21-331

Results at 2-5 years follow-up of 152 consecutive unicondylar knee arthroplasty

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The unicondylar knee arhroplasty (UKA) has found an increased use in the last 5-10 years, due to the improvement of the design, materials and surgical technique, both with good long-term results reported in literature by some recent studies. The indications to the UKA are represented by: isolated unicompartmental disease, controlateral compartment integrity, intact ACL, asymptomatic patello-femoral joint, range of motion > 90 degrees, age > 65 years, varus deformity < 10 degrees, valgus deformity < 10 degrees, recurvatum < 5 degrees for the lateral UKA; absolute contraindication is represented by rheumatic arthritis, while age and obesity seems to be two variable parameters. There borderline indications that are represented by: fixed varus deformity >10°, flexion deformity > 10°, valgus deformity > 10°, age > 75 years, post-traumatic arthritis, HTO revision, revision of UKA, patellofemoral arthritis. It is important to assess carefully the patello-femoral joint in the indication of the UKA. The association between patello-femoral pain and one of the following parameters that the presence of a radiological finding of patello femoral incongruity or the intraoperative finding of a chondral damage of 3-4 degree represents a real contraindication to the UKA. We also believe that the rare symptomatic situation of medial overload is usually well tolerated and however decreases with the correction of the varus deformity. This study reports the results at a minimum follow-up of 2 years and a maximum of 5 years, related to a group of 152 UKA, 10 lateral - 142 medial, using the HLS Evolution Tornier UNI arthroplasty. The anatomical femoral component is 3 mm thick with a central peg and an anti-rotation keel. The rounded posterior profile has been studied to obtain an increased flexion. The tibial component used was always all-poliethilene. The thickness of the tibial component vary from 9 to 13 millimeters. The absence of keel or pegs improves the conservation of the tibial bone stock that represents a crucial factor in the case of revision. There were no major intra or post operative complications and the period of hospital stay was on average of four days. The age of the patients was between 58 and 77 years (average: 65 years). It is interesting that the 26.3% (40 UKA) have been implanted with borderline indications: 33 cases of varus deformity >10 degrees, 3 cases of valgus deformity > 10 degrees, 2 cases of HTO revision, 2 revisions of failed UKA. As regards the 10 cases of lateral UKA, we treated 2 cases of arthritis following a lateral meniscectomy, and 8 cases of valgus deformity. The results were evaluated with the HSS knee score and were the following: 99 excellent = 65.13% of which 10 lateral and 91 medial UKA, 44 good all medial = 28.94%, 0 fair = 0%, 9 bad = 5.92% all medial. The high rate of excellent and good results obtained in 94.1% of cases confirms that the uni-compartmental knee replacement rapresents a reliable option in the treatment of the arthritis of the knee.

P21-347

Posterior stabilized inlays in TKA reduce retropatellar contact pressure in vitro compared with a Deep-Dish design

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Objectives: The aim of this study was to examine the influence of different prosthesis designs (Deep-Dish (DD) vs. posterior stabilized (PS)) on the patello-femoral pressure in Total Knee Arthroplasty (TKA). The femoro-patellar pressure depends among other things on the AP stability of the knee joint. The DD congruent tibial inlay component is characterized as being highly conforming in the sagittal plane. It is described to add anteroposterior (AP) stability when combined with adequate ligament balancing. It is more bone sparing when compared to a PS design and preserves a possibly intact posterior cruciate ligament (PCL) with a comparable clinical outcome. Moreover, the use of DD has been described to be equally applicable with a resected or deficient PCL.

Methods: Fresh frozen human knee specimens (n = 8, 7 male, 1 female) underwent testing in a kinematic device simulating an isokinetic knee extension cycle from 120° of flexion to full extension. Knee motion was driven by a hydraulic cylinder applying sufficient force to the quadriceps tendon to produce an extension moment of 31 Nm. The amount of patellofemoral contact pressure and its distribution was measured by means of a pressure sensitive film (Tekscan®, Inc., Boston, USA). Patellar contact pressure was examined first after implantation of a cruciate retaining TKA (Genesis II, Smith&Nephew, Memphis, USA). An 11 mm polyethylene (PE) DD insert was tested before and after resection of the PCL. Finally, the femoral component of the cruciate retaining TKA was removed and replaced by a PS model repeating measurements with an 11 mm PE inlay. The patella was not resurfaced throughout the whole procedure. A paired sampled t-test was applied for comparison of means and considered significant at $p < 0.05$.

Results: There was no statistical significant difference of patello-femoral peak and mean contact pressures of the DD inlay before and after resection of the PCL. After implantation of the PS TKA peak pressure was significantly lower (Mean: 6.12 ± 2.37 MPa, Range: 10.68 - 3.30 MPa) in comparison with the DD type (7.12 ± 2.53 MPa, 11.94 - 3.55 MPa; $p < 0.01$) with a preserved PCL. Also the mean contact pressure turned out to be lower with the PS design ($p < 0.006$; PS: 3.58 ± 1.25 MPa, 5.91 - 2.08 MPa, DD: 4.27 ± 1.34 MPa, 6.66 - 2.18 MPa). The contact area was also significantly smaller with the PS design ($p < 0.03$, PS: 140.84 ± 40.04 mm^2, 188.47 - 65.10 sq mm, DD: 175.97 ± 24.46 sq mm, 222.56 - 142.56 sq mm).

After resection of the PCL differences in contact pressures and contact area between DD and PS failed to reach statistical significance although there was an obvious tendency towards lower pressures with the PS-design.

Conclusions: The results of this study suggest that a posterior stabilized TKA design reduces the retropatellar peak and mean pressure as well as the contact area in comparison with a deep-dish design when the PCL is preserved. The better reproducible rollback with a PS model could serve as a possible explanation. However, this difference is less pronounced when a DD inlay is applied after resection of the PCL. Nevertheless, a PS rather than a DD design is recommended in the PCL deficient knee.

P21-348

Posterior stabilized inlays in TKA reduce patello-femoral contact pressure compared with a cruciate retaining design: An in vitro study

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Objective: Anterior knee pain after Total Knee Arthroplasty (TKA) is one of the most common patient complaints leading to numerous revision procedures. Changing the kinematic behaviour of patello-femoral joint and increased retropatellar contact pressure could add to its sequelae. The aim of this in vitro study was to compare the influence of different prosthesis designs on patello-femoral contact mechanics.

Methods: Fresh frozen human cadaveric knee specimens (n = 8, 7 male, 1 female) underwent testing in a kinematic device simulating an isokinetic knee extension cycle from 120° of flexion to full extension. Knee motion was driven by a hydraulic cylinder applying sufficient force to the quadriceps tendon to produce an extension moment of 31 Nm. Area and peak femoropatellar contact pressure and the centre of force (COF) were measured by means of a pressure sensitive film (Tekscan®, Inc., Boston, USA). Femoropatellar contact pressure was recorded in a first approach after implantation of a cruciate retaining (CR) TKA (Genesis II, Smith&Nephew, Memphis, USA) with an 11 mm polyethylene (PE) insert. The CR TKA was than removed to be replaced by a posterior stabilized (PS) design and measurements were repeated with an 11 mm PE inlay. The patella remained unresurfaced. A paired sampled t-test to compare means (significance, $p < 0.05$) was used for statistical analysis.

Results: After implantation of the PS design, average patello-femoral area contact pressure was significantly lower ($p < 0.006$) compared with the CR design (PS: 3.58 ± 1.25 MPa; CR: 4.31 ± 1.40 MPa). The mean patello-femoral peak contact pressure decreased significantly with the PS TKA (Mean: 6.12 ± 2.37 MPa) in comparison with the CR type (7.17 ± 2.41 MPa, $p < 0.02$).

Conclusions: The results of this in vitro study suggest that a posterior stabilized TKA design reduces the patello-femoral area and peak contact pressure in comparison with a cruciate retaining design and may result in less frequent anterior knee pain in an in vivo application. It is hypothesized that this could be due to a better reproducible rollback of a PS design.

P21-382

Patellar reconstruction using posterior femoral condyle: 4 year follow up

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Objectives: Patellectomy can result in long term weakness and relative instability in prosthetic knee joints. Patellar resurfacing is an optional addition to primary knee arthroplasty in cases of tri- compartment gonarthritis. This option is not available in those patients with previous patellectomy. The aim of this case is to demonstrate the viability and long term survival of patellar reconstruction using the posterior femoral condyle at primary TKR in patients with previous patellectomy.
Methods: The posterior lateral femoral condyle cut during total knee replacement was used as a non- vascularised bone graft to reconstruct the patella. A medial para- patellar incision was used to create the Patellar pouch. The patient was examined clinically at operation, 6 weeks, 12 months, 2 years and 4 years from operation. Clinical examination and radiographic evidence of patellar position and survival were used.
Results: The patient has a stable, well positioned patella, with no pain from the graft and no clinical evidence of mal- tracking. Radiographs show excellent survival of the graft and good position at 4 years.
Conclusion: Patellar reconstruction using non- vascularised bone graft is a viable alternative surgical option to aid stability in those patients undergoing primary TKR with previous patellectomy.

P21-421

Performing TKR surgery without using autologous or allogenic blood transfusions - use of one low capacity subcutaneous suction drain or no drains associated with moistured dressings, continuous cryotherapy and effective elevation

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Objectives: This was a prospective, non-randomized, non-comparative case-control study involving 100 patients with a minimum pre-op. values of 12.5g/l Hg and 38.7% Hct who had had a TKR for uncomplicated primary osteoarthritis without any intra or post-operative autologous or allogenic blood transfusions. In most cases only a single, small capacity, subcutaneous suction drain was used.
Hypothesis: Not using deep suctions drains, associated with the use of moistured (in opposition to dry) dressings, continuous cryotherapy and effective elevation will maintain blood losses to the point that blood transfusions, and even routine blood reserves, are unnecessary. Other parameters recorded were: occurrence of leg swelling, amount of drainage, significant haematomas, wound discharge, wound healing/speed of recovery, post-op. infections, ROM, and economic savings. Level of evidence: IV, case series
Methods: Hg. and Hct. values were taken pre-op. and at 24/48h, 7 days and 3 weeks post-op. At surgery, a tourniquet was employed in all cases. All layers were closed with interrupted sutures. When a drain was used, a thin suction drain was left extra-articularly, in the plane between the fascia and the subcutaneous tissue. A bulky cotton dressing humidified with sterile saline was applied. The leg was elevated. Only at this point the tourniquet was released. The drain system was kept closed for another 30 minutes. Criotherapy and elevation were used uninterruptedly for at least 24h. Passive motion was not utilized. Dressings were changed for dry ones after 24h. Passive mobilization to 90º was started and achieved from day 1.
Results: all Hg and Hct levels were above minimum registered values of 8.8g/L and 27%, respectively, at 48h post-op. Therefore, no blood transfusions were performed in any of these patients. However, decrease in blood levels was significant. There were no registered complications directly attributable to the method employed concerning the parameters mentioned except for few cases of significant soft tissue ecchymoses. Early mobilization was facilitated. Early discharge was achieved.
Conclusions: We concluded that without the use of deep closed drain systems it is possible to avoid both blood transfusions and routine pre-op. blood reserves. However, we agree with previous reports that occult total blood losses can be significant and underestimated; therefore, we routinely control the parameters for acute post-op anaemia. Patients can be mobilized easier and earlier without the cumbersome bottles attached to their legs, allowing faster mobilization, recovery and discharge. In opposition to some reports but in accordance with others we observed an increase of significant ecchymosis in our earlier cases, and that was mainly the underlying rational for the use of a low calibre subcutaneous drain in more recent patients.
There are significant weaknesses in this study. It was not randomized and there was no control group. The influence in the favourable outcome of the various technicalities employed, including those mentioned in the title, is difficult to appreciate and analyse separately, deserving further study. The fact that this study was prospective and we were able to avoid a blood transfusion in all the patients involved was the main incentive for its publication.

P21-423

MIS subvastus versus conventional parapatellar approach for total knee arthroplasty. Minimum 2 year follow up

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Objectives: The purpose of this study was to determine if one can obtain equal or better short term results with equal or less incidence of complications in total knee arthroplasty, using the MIS subvastus approach, compared to the conventional parapatellar approach.
Methods: We compared the results of an age, sex and body mass index (BMI) cohort of patients who underwent total knee replacement by either MIS subvastus (37) or conventional parapatellar approach (36) between October 2003 and March 2005.
Follow up was done at a minimum of 2 years; clinical outcome scores and component alignment were analyzed and reported.
Surgery was done by the senior surgeon for both groups, the same implant was used for all patents (Scorpio Stryker), follow up visits were assigned for the recollection of data.
Results: There were no statistical differences between the two groups regarding time of surgery, outcome scores (WOMAC, Knee Score) Visual analog pain score, complications, and component misalignment.
Conclusions: Minimally invasive total knee arthroplasty through a subvastus approach rendered equal short term results to conventional parapatellar approach in our hands. Although we did find a clear tendency in the MIS group towards better visual analog pain scores and achievement of 90 degrees of flexion during hospital stay, we cannot be sure that this will translate in shorter hospital stays and better outcomes on the long term. MIS surgery has been said to cause higher incidence of misalignment of the components, in our study we did not have this complication.
Long term follow up studies are needed to determine weather MIS surgery can obtain equal or better results than the conventional approach.

P21-427

Role of infrapatella fat pad on primary total knee arthroplasty

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Purpose: To investigate the role of infrapatella fat pad on primary total knee arthroplasty (TKA).
Patients and Methods: From August 2002 to July 2003, 100 primary osteoarthritic knees were undergone TKA of which design had open box posterior substituting femoral component (Scorpio PS Knee™). Group 1 (50 knees) is preserved infrapatella fat pad and repaired fad at wound closure. Group 2 (50 knees) is excised infrapatella fat pad as possible and only repaired joint capsule. Patients were followed up for a mean 40 months.
Results: KSS score was 91.9 in Group 1 and 92.9 in Group 2. KSS function score was 81.6 in Group 1 and 83.7 in Group 2. Patella score was 29.9 in Group 1 and 27.9 in Group 2. Patella height as Insall-Salvati ratio was 1.19 in Group 1 and 1.23 in Group 2. The differences between the Group 1 and Group 2 according to the above indexes were insignificant. 2 cases of recurrent hemarthrosis as complications were occurred in Group 1 and 2 cases of intractable anterior knee pain which were needed arthroscopic evaluation as complications in Group 1 were developed.
Conclusion: The differences of clinical outcomes whether infrapatella fad pad was excised or not were insignificant. But preservation of infrapatella fad pad on open boxed PS TKA showed unique complications as recurrent hemarthrosis which might be caused by fat pad adhesion to intercondylar notch. We do not recommend for preservation of infrapatella fad pad on primary PS TKA with open box design.

P21-434

Can an algorithm (flow chart) facilitate clinical decision making in possible failed knee arthroplasty?

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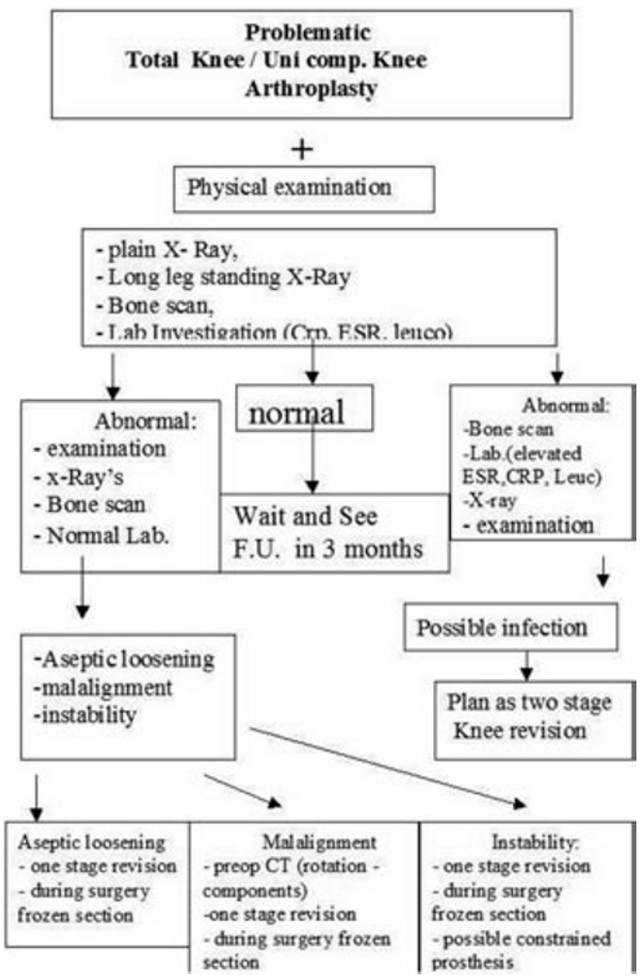

flowchart revision knee 2

The purpose of this retrospective study was to determine failure mechanisms in knee arthroplasty and how to facilitate clinical decisionmaking. We noticed a pattern by which failure occurs and have developed a decision flow chart, this chart helps us in diagnosing failed knee arthroplasty.
Retrospectively all knee arthroplasty revisions for any reason during a 7yr period (09 - 2000 / 09- 2007), a total of 68 patients where studied.
Subdivision showed two main groups:
Failed Total Knee Arthroplasty (TKA) (nr 46) reasons for failure in the TKA group:When we analyse the data for both subgroups, three main reasons for revision can be determined.
1 instability (27)
2 malalignment/malpositioning (15)
3 aseptic loosening/wear (13)
4 infection (3)
5 fracture (1)
6 flexion-extension deficiency (1)
7 arthrofibrosis (1)
8 pain of unknown origin (1)
Unicompartimental knee arthroplasty (nr 22) reasons for failure in the UKA group:
1 aseptic loosening (10)
2 progressive lateral arthrosis (4)
3 malalignment/malpositioning (3)
4 infection (3)
5 instability (1)
6 fracture (1)
7 pain of unknown origin (1)
A flowchart using these data was made and facilitates us in clincal decision making. So when ever a patient visits a non knee-specialist, workup can be started according to this flowchart.
By using this flowchart unnecessary consultations and delay in treatment can be reduced, which benefits both patient and orthopedic surgeon

P21-445

PIPB (patella in place balancer)

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Presentation of the first 100 results with a newly designed knee balancer and new operative technique, the "PIPB" for use in Total Knee Arthroplasty.
This proposed balancer is used in conjunction with a 'tibial cut first' technique and allows the patella to remain in place while setting the appropriate balance and consequently easily preparing the bony cuts of the femur in the balanced position.
The benefit of this instrument is:
- avoiding the lateral pressure in the collateral ligaments
- determining and controlling the correct height of flexion gap - and consequently extension gap and polyethylene insert thickness.
- Improved implant congruency through corresponding flexion and extension gaps
- The femoral resection guide (and thus the femoral component) can be placed in 0° to 3° in reference to the femoral axis depending on the anatomy of the femur.
This revolutionary new knee balancer instrumentation and technique allows to keep the knee balance in correct tension. Promising clinical results (24h hospitalisation) will prove the benefits of this technique, both in knee function and longevity of the implant.

P21-447

Restoration of joint line height in revision total knee arthroplasty with offset stems

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Introduction: Restoration of joint line height remains a challenge in revision total knee arthroplasty. Often flexion gap instability leads to the use of a bigger polyethylene and proximalisation of the femur and joint line. Long stems create an anterior position of the femoral component and a bigger flexion gap.
Materials and Methods: Prospective cohort study (Level II) on 120 revision total knee arthroplasties. Sixty revisions with offset stems and sixty without offset system.
During surgery, femoral (AP & ML) size, tibial size, flexion and extension gap measured with a balancer, anterior offset position in mm without offset, thickness of posterior wedges, distal femoral component position compared to the medial and lateral epicondyle, poly thickness and patella-poly distance were noted. Use of anterior or posterior offset and amount in mm was analyzed. On a lateral view joint line height, patellar height and posterior condylar offset was measured.
Results: Osteolysis leads to AP undersizing of the femur. Low tibial cuts result in small tibia size asking for a downsized femur.
Long stem trends to 3.4 mm anterior position of femur. Posterior offset stems result in poly 4 to 6 mm thinner. Better joint line and posterior offset reconstruction with offset stems.
Conclusion: Posterior offset stems in revision allow for a more anatomical reconstruction with the right size of femur, more posterior condylar offset, a smaller flexion gap, a thinner poly and a more anatomical joint line position. Posterior offset stems allow for the use of longer uncemented stems and a neutral position of the femoral component.
Use of stems creates offset problems in revision cases. With anterior offset the flexion gap becomes bigger. If a bigger poly is used in flexion this will lead to proximalisation on the femoral side and changes to the joint line.

P21-460

One stage bilateral unicompartmental knee arthroplasty - results for a prospective study of 14 cases

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The purpose of this study was to analyse the early results of bilateral unicompartmental knee arthroplasty (UKA) performed in the same operative setting, in terms of morbidity, post-operative blood loss, functional recovery, hospital stay and patient satisfaction.

Materials and Methods: Between January 2001 and December 2006, the senior author performed 190 UKA of which 44 were bilateral (that is 22 patients). 28 out of the 44 were done on 14 patients as a single stage bilateral UKA (14.7% of the 190). There were 10 women and 4 men with a mean age of 73.92±7.76 years (61-82). We operated on 13 bilateral medial osteoarthritis and 1 bilateral lateral osteoarthritis. The surgical approach was a limited medial para patellar approach for medial UKA and a standard lateral para patellar approach for the lateral one. The ASA score was graded as 1 in 3 cases, as 2 in 9 and as 3 for the remaining 2 cases. 6 patients had general anaesthesia, while the other 8 had spinal anaesthesia. The average duration of the whole procedure was 2h30 mn ± 15 mn.

Results: The average amount of blood loss measured from surgical drains was similar from one side to the other: 186.43 ± 96 ml for the right side, versus 199.64 ± 128 ml for the left. Haemoglobin level at D+1 post-operatively averaged 114.64 ± 15.1 g/l (99-150), while being 139.50 ± 13.99 g/l (114-159) at D-1. It measured 113.43 ± 13.13 g/l (97-142) at D+5, and 110.92 ± 14.27 g/l (94-137) at D+10. None of the patients required blood transfusions, while 2 of them were given intravenous iron supplements. All the patients got up on average, at D+1.1 ± 0.26 (1-2), and left the hospital full weight bearing, with 2 crutches, at D+12.1 ± 3.28 (9-21) knowing that, the in hospital recovery period following a single UKA procedure is 8 days at our institution.

Regarding post operative complication, we had only one Pulmonary emboli in a patient with a previous history of thromboembolic disease. 3 month after the operation All the patients were satisfied of the procedure and would recommend it without hesitation.

Conclusion: Bilateral unicompartmental knee arthroplasty can be performed as a single stage procedure without any increase in morbidity. None of the patients in our series had enough blood loss to require blood transfusion. The benefits for health care are obvious regarding hospital stay (12 days instead of 16), lesser period of disability, etc.

P21-493

Significance of tibial component tilting angle in PS TKA

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Introduction: The purpose of this study was to evaluate the influence tibial component posterior tilt in PS TKA.

Methods: Thirty-one knees underwent PS TKA designed tibial posterior tilt cut (Group A) and 30 knees underwent PS TKA designed flat tibial cut (Group B). We assessed component angle using lateral radiographs on the basis of the "Knee-Society Total Knee Arthroplasty Roentgenographic Evaluation and Scoring System" by Frederic C. Ewald., and tibio-femoral contact point using lateral radiographs with the knee at full extension. The contact-point ratio was calculated as the distance from the anterior edge of the tibial component to the tibiofemoral contact point divided by the total width of the tibial component. We also evaluated the postoperative knee extension and flex angle.

Results: The mean femoral delta angle was 84.6 degrees and 87.1 degrees for the Group A and the Group B($p<0.05$). The mean tibial gamma angle was 83.2 degrees and 85.3 degrees for the Group A and the Group B($p<0.05$). The mean contact-point ratio at full extension was 47.5% and 57% for the Group A and the Group B($p<0.05$). The contact point was significantly anterior in the Group A. The mean postoperative knee extension angle was -0.5 degrees and -0.5 degrees for the Group A and the Group B. The mean postoperative knee flexion angle was 124 degrees and 120 degrees for the Group A and the Group B. There was no statistically significant difference in the postoperative knee extension and flexion angel between the two groups.

Conclusions: As a result of this study we concluded that the tibial posterior tilt has no effect on postoperative knee extension and flexion angle. The mean femoral delta and gamma angle in the Group A were significantly smaller than that in the Group B. It means that the Group A requires hyper extension of bone axis to get full knee extension.

P21-516

More than two years follow-up results of the high flexion posterior stabilized fixed bearing total knee athroplasty

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The purpose of this study was to evaluate the clinical and radiological results of a high flexion fixed bearing posterior stabilized total knee arthroplasty using Scolpio Superflex implant. From March 2002 and December 2005, 128 knees of 98 patients had been followed up for more than 2 yeras. The mean age at the time of opperation was 65 years old. The preoperative diagnosis included osteoarthritis in 96 knees and rheumatoid arthritis 2 knees. The clinical results was evaluated by Knee rating system of the Hospital for Special Surgery (HSS) and Knee Society (KS) scoring system. The mean flexion improved from 120.4 degrees to 129.1 degrees at the last follow-up. 78 knees (82%) knee showed more than 120 degrees flexion in the last follow-up. The HSS score improved from 64 points to 85 points ($p<0.05$) The mean KS clinical score improved from 35.0 points to 90.5 points ($p<0.05$) and KS functions socre, from 40.8 points to 80.4 points ($p<0.05$). 62 patients could take a cross leg sitting posture and 48 patients was able to do squatting psoture. Total knee arthropaslty with Scolpio-Superflex showed the good range of motion and satisfactory early clinical results. However, the long term results were needed.

P21-522

All-polyethylene tibial component unicompartment arthroplasty

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Objectives: Recently, there has been a rapid growth of unicompartmental arthroplasty. There is a dearth of literature on this subject, especially on the effects of all-polyethylene tibial components on loosening rates. The purpose of this study was to evaluate the efficacy of unicompartmental arthroplasty with all-polyethylene tibial components via a clinical and radiographic outcomes assessment.

Methods: Sixty-one patients (75 knees) underwent medial unicompartmental arthoplasty performed by a single surgeon in one institution with cemented all-polyethylene tibial components. The mean age at the time of surgery was 62.8 ± 9.2 years and the mean BMI was 31.1 ± 5.6. The mean length of follow-up was 4.3 ± 1.0 years (range 2.1-6.1). All patients had a minimum of 2 years follow-up for functional outcomes (ADLS, WOMAC) and radiographic assessments.

Results: The mean post-operative ADLS score was 82.5 ± 13.6. WOMAC pain and physical function scores were 86.6 ± 14.4 and 84.4 ± 13.4, respectively. There were no cases of any significant tibial component loosening. Varus alignment improved from 7.4 ± 2.6º to 3.9 ± 3.2º ($p<0.001$). The Kaplan-Meier survival score was 91.0 ± 3.4%. Seven knees required conversion to total knee arthroplasty (TKA). All failures were related to either progression of arthritis in other compartments (6/7 cases) or recalcitrant pain (1 case). In all conversions, a TKA was performed with standard primary components and instrumentation.

Conclusion: With proper patient selection, all-polyethylene tibial component unicompartment arthoplasty is a straight forward and reproducible procedure with minimal tibial component wear and low revision rates. This procedure affords minimal tibial resection and potentially easy conversion to TKA using standard primary arthroplasty instrumentation.

P21-529

Computer assisted navigation in total knee arthroplasty (TKA): Comparison with the conventional method

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Objectives: The aim of this retrospective study was to compare the clinical and radiographic results after TKA (LCS, DePuy), performed either by computer assisted navigation (Brainlab, Johnson&Johnson) or by conventional means.

Methods: Between May and December 2006 we reviewed 32 conventional TKA performed between 2000 and 2004 (group A) and 36 navigated TKA performed between 2004 and 2005 (group B) by the same experienced sur-

geon. The mean age in group A was 74 (range 60-87) years and 73 (range 38-86) in group B with a similar age distribution. Patients with a previous tibial osteotomy or revision arthroplasty were excluded from the study. The preoperative mechanical axes were -25° (varus) to +15° (valgus) in group A and -24° to +13° in group B. Examination was done by an experienced orthopedic resident independent of the surgeon. All patients had pre- and postoperative long standing radiographs. The IKSS and the WOMAC were utilized to determine the clinical outcome. Patient's degree of satisfaction was assessed on a visual analogous scale (VAS).
Results: The postoperative mechanical axis in group A ranged between -12° to +3° (mean -2.33°, SD 4.34), in contrast the mechanical axis in group B was on average closer to the neutral axis (-6° to +4°, mean -1.65°, SD 2.21). This difference in variation of the mechanical axis between both groupes was pronounced in patients with large initial deformities, however it didn't reach statistical significance. Both groups showed a significant postoperative improvement of their mean IKSS-values (group A: 103 preoperative to 182 postoperative, group B 106 to 181) without a significant difference between the two groups. Neither the WOMAC nor the patient's degree of satisfaction -as assessed by VAS- showed significant differences. Operation time was significantly higher in group B (mean 124.65 min.) than in group A (mean 94.70min., $p<0.001$).
Conclusion: Computer assisted navigation in TKA seems to yield reproducible results superior to conventional TKA concerning the postoperative alignment especially in patients with large preoperative deformities. The relevance for clinical outcome and lifetime of TKA remains to be prooved in long term studies to justifie the longer operation time.
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P21-552
Does minimally invasive total knee arthroplasty make a difference in medical complications?
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Introduction: Analysis of possible benefits of minimally invasive total knee arthroplasty on medical complications, in hospital and one month mortality.
Materials and Methods: Prospective randomized study (Level I) on medical complications in 387 minimally invasive total knee arthroplasties. Compared to a published series of conventional total knee arthroplasty (JBJS Am 2007;89:27-32).
Data was collected on in hospital mortality, cardiopulmonary complications, DVT and pulmonary embolism, renal failure and urinary complications, stroke, ileus, transfusion rate, neurovascular complications and one month mortality. CRP levels, HB and white blood cell counts were followed during the postoperative period.
Results: For all studied parameters complications were substantially lower in MIS TKA except for neurovascular complications. Especially DVT and transfusion rate were significantly lower. Early mobilization, less soft tissue damage and diffuse bleeding, reduced morphine use and lower volume shifts were considered causes of this reduced morbidity. Neurovascular complications (0.7%) were related to longer tourniquet times.
Conclusions: Being metal and plastic boys medical complications were not yet analyzed for MIS TKA.
A substantial reduction in morbidity was observed with this technique. Neuropraxia by longer tourniquet times seems a problem in the diabetic patient. MIS TKA makes knee arthroplasty acceptable in the ASA III & IV patient with reduced morbidity and one month mortality.

P21-555
Bone defects in revision knee arthroplasty: Filled with freeze-dried bone mixed with platelet growth factors. A randomized controlled trial
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Objectives: To evaluate the usefulness of freeze dried bone allograft with platelet growth factors, versus frozen bone allograft, in the filling of the contained bone defects that are seen in revision knee arthroplasty.
Methods: Twenty patients with loosened knee arthroplasty, exhibiting a bone defect contained around the knee prosthesis, were randomly assigned in two groups, in the control group (ten patients) was done a revision knee arthroplasty filling the bone defect with frozen bone allograft, and the second group (ten patients), the defect was filled with freeze-dried bone allograft mixed with platelet growth factors. Both groups were evaluated with x-rays, nuclear scan and bone densitometry preoperatively at 1, 6 and 12 months postoperatively.
Results: There was no differences between the groups in the x-ray either nuclear scan at 1, 6 and 12 months after surgery in the capacity to fill the defect. Both groups had an increase of bone mineral density (BMD) at 1, 6, and 12 months after surgery, without significant difference.
Conclusions: The bone mineral density of the frozen-dried bone combined with platelet growth factors had the same results than the frozen bone. The platelet growth factors combined with frozen-dried bone is as useful as the frozen bone, it is easier to obtain, to store, and it has a lower cost.

P21-558
Lateral unicompartimental knee arthroplasty: Medium term results with a full poly implant
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Introduction: Lateral unicompartmental knee arthroplasty (UKA) is a valid alternative treatment in the event of arthritis confined to the lateral compartment. The present reports describes the 2 to 13 years results associated with a lateral unicompartmental knee arthroplasty using a full poly plateau.
Methods: Seventy consecutive UKA that were performed with cemented HLS Uni (Tornier, France) implants in 66 patients were studied both clinically and radiographically. The mean follow up was 64 months (24 to 155). Height UKA were discared on account of to short a follow-up period. The IKS score was used to compare the pre- and post-operative results.
Results: The mean IKS knee score improved from 67 points preoperatively to 93 points at the time of the final follow-up and the IKS function score improve from 69 points to 83 points. Fifty eight knees had an excellent or good result (96 %), and 2 patients had a fair result (4 %). Mean flexion at follow-up was 132° (85 to 150°). One patient underwent revision to total knee arthroplasty because of aseptic loosening of the tibial component and one patient underwent a second UKA on the opposite compartment because of progression of arthritis. No septic complication was observed. No revision was performed because of wear. Kaplan Meier analysis revealed a survival rate of 98,3% at ten years.
Conclusion: Lateral UKA with full poly implant can provide excellent mid-term results. Correct patient selection however, is essential.

P21-591
"Case efficient arthroplasty": Trial components are not required in total knee arthroplasty
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Introduction: This prospective randomized study compared early results of two groups of total knee arthroplasties (TKA), performed using a standard technique (STD) or with a technique which emphasizes the preoperative planning in order to cut down surgical steps (Case Efficient Arthroplasty: CEA).
Methods: One hundred consecutive patients who underwent total knee arthroplasty were enrolled in the study. Exclusion criteria were severe varus or valgus deformity (>20°). Preoperative parameters did not differ between the two groups. In both series a limited parapatellar approach was used and the patella was not everted. All knees were implanted with the same Legacy PS hi-flex prosthesis by the same surgeon using the same dedicated set of instruments. Both groups received a multimodal postoperative pain and thromboprophylaxis management. In the CEA group a careful preoperative radiographic planning was performed in order to predetermine correction angles, amount of bone resections, and implant sizing. CEA technique was focused to reduce intraoperative double-checks, to utilize essential instruments of the armamentarium, to limit the number of holding pins to instruments on bone, and to use spacer blocks in the place of trial components.
Results: Average tourniquet time was 18 minutes longer in the STD group. Of the various objective parameters a significant difference was found in early quadriceps strength recovery in favor of the CEA group. A trend toward reduced blood loss was observed in the CEA group. Postoperative radiographic analysis showed no major outliers in both groups. Components sizing was appropriate in all cases. The STD group had a higher DVT rate. No patellofemoral or tibiofemoral instability was observed at 6 months follow up in both groups.

	STD(#50)	CEA(#50)	significance
Tourniquet time (min.)	55	37	p=0.002
Total blood loss (ml)	830	710	p=0.005
Pain day one (VAS)	4.1	4.0	n.s.
Active SLR (days)	1.9	1.4	p=0.003
90° flexion goal (days)	3.5	3.3	n.s.
Flexion at 30 days	114°	117°	n.s.
Distal DVT	# 6	# 2	n.s.
Postop Mech axis 0+2°(%)	89	92	n.s.
Vr-Vl stability <5° (%)	96	96	n.s.

Conclusions: Reducing intropeative double-checks and trial components use during total knee arthroplasty does not compromise the clinical and radiographic result. An expeditious procedure may result in lower postoperative morbidity and advantages in costs-related issues. "Case efficient arthroplasty" in TKA should be explored in high volume practices.

P21-594

MIS + CAS in knee replacement: Bi-unicompartmental (BI-UKR) vs total knee (TKR) - a matched paired study

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Introduction: Since 2002 we have been performing computer assisted BI-UKR on high-selected patients with bicompartmental tibio-femoral knee arthritis. All patients referredd an asymptomatic patello-femoral joint. Aim of this study is to compare, in a matched-paired study, the results of this procedure to MICAS-TKR (mini invasive computer assisted surgery).

Materials and Methods: From January 2002 to October 2004, 21 patients with bicompartimental tibio-femoral knee arthritis who underwent to computer assisted BI-UKRs were included in the study (group A). No patient had any clinical evidence of ACL laxity or flexion deformity and all had a preoperative range of motion of a least 110°.

At a minimum follow-up of 2 years, each patient in group A was matched with a patient who had undergone a computer assisted TKR for bicompartmental tibio-femoral knee arthritis between July 2000 and November 2004 (group B). Patients were matched in terms of pre-operative arthritis severity, age, gender and pre-operative range of motion. Preoperatively all the knees were evaluated according to both the Knee Society and the GIUM score.

Results: At the latest follow-up no statistically significant difference was seen for the Knee Society score between the 2 groups. The mean Functional score was 83.5 (range: 73-100) for group A and 78.79 (range: 59-90) for group B. A statistically significant difference was seen for the Functional score with superior results for group A (p=0.01).

A statistically significant difference was seen for the GIUM (Italian UKR Group Study Score, more demanding for uni replacement) score with better results for group A (p=0.02). No poor or abnormal results were seen in either group with no statistically significant difference in terms of percentage of results (p=0,38).

Discussion: Current patient expectations following knee replacement surgery include a knee that resembles normal and allows an unrestricted active life. At a minimum follow-up of 2 years all patients with Bi-UKR had improved. The functional and GIUM scores showed statistically significant improvement in Bi-UKR group.

The results of this preliminary study suggest that Bi-UKR is a viable option for bicompartmental tibio-femoral arthritis in selected cases as well as TKR.

P21-625

Blood loss after total knee arthroplasty: Effects of computer-assisted surgery

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Introduction: Total knee arthroplasty entails significant blood losses. Computer-assisted surgery could minimize this, as there is no need to use intramedullar guides. This study aimed to compare blood losses and transfusion requirements on patients undergoing a computer-assisted TKA with those patients on whom a conventional technique is employed.

Materials and Methods: We have prospectivelly studied 87 patients undergoing a TKA performed in our institution. The patients were randomly assigned to two different groups: conventional technique (44 patients) and navigator-assisted technique (43 patients). The study included anthropometric variables, the total blood loss due to drainage and its own reinfusion, the preoperative haemogram and those performed on days 1, 4 and 7 following the surgery, and the transfusion requirements. Total blood losses were calculated through Brecher´s formula. Data were analysed with the SPSS statystic program.

Results: Both groups were comparable in all variables except in the case of the ischemia duration, which was significantly superior in the computer-assisted group (89.5 vs. 75.8 minutes; p=0.007). Blood loss due to drainage was higher in the conventional technique group (612.5 ml vs 446.8 ml; p= 0.007), as was the number of patients to whom blood from the blood recovery system was reinfused (53 % vs 23 %; p=0.023). There were no statistically differences found between the total blood losses of both groups (average 2199 ml vs. 2085 ml; p=0.5), nor in the number of patients on whom an allogenic transfusion had been performed (23% vs 9%; p= 0.1); though there were differences when calculating the received red cell mass (average 510 ml vs. 340 ml; p<0.001).

Discussion: Conventional technique in knee arhtroplasty uses intramedullar guides, and this is a potential source of bleeding in surgery. Using computer-assisted technique the intramedullar guides are avoided and surgical bleeding seems to be lower.

Conclusion: Those patients undergoing a computer-assisted surgery tended to experience a lower bleeding and needed less blood (autogenic more allogenic) than patients operated with conventional surgery.

P21-629

Does recognising concerns of patients prior to knee joint replacement surgery lead to early hospital discharge

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Background: Traditionally patients with osteoarthrosis requiring joint replacement received out patient consultation from the respective clinicians. We introduced a nurse led clinic called the hip and knee club as a preoperative education program to address patients' concerns prior to surgery. We studied the effect of a preoperative education program on discharge patterns.

Patients and Methods: 550 patients from our hospitals were studied, receiving preoperative and postoperative education programs, as well as home visits from a community based outpatient team. We analysed randomly 40 of this group who attended the clinic and received education from a specialist nurse using demonstrations, verbal feedback and a written booklet. Data on patient compliance and patient satisfaction were collected at the end of the clinic and at preadmission clinic before surgery using a questionnaire designed specifically for this study.

Results: Information was gathered and psychosocial factors that may affect or delay discharge addressed in this informal patient's education program. We noted that the mean hospital stay was shorter for the hip and knee club group than for the historical control group 9.2[3-22] and days, 14.5 days [2-38] respectively.

Conclusion: A Preoperative education program in a nurse led clinic followed by post-operative home-based rehabilitation, appears more effective in recognising concerns of patients prior to joint replacement surgery. This will promote discharge planning that is more acceptable to patients and carers. This may reduce the length of stay of patients in the UK institution as we noted in our study. Participants felt safe after attending this informal discussion group. The Hip and knee club was designed to address some of these factors that influence feelings of safety and readiness for discharge.

P21-634

Tibial tubercle osteotomy in primary total knee arthroplasty: a safe procedure or not?

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In a prospective and continuous series of 1,474 primary total knee arthroplasties, we analyzed 126 cases where the tibial tubercle osteotomy approach was performed and 1,348 cases were without tibial tubercle osteotomy. With a mininum follow-up of 2 years, statistical analysis showed that tibial tubercle fracture and skin necrosis as postoperative complication related to the osteotomy group. Although, tibial tubercle osteotomy is a necessary procedure under certain conditions, it cannot be considered as an entirely safe procedure. Within this context, the surgeon must always choose a rigorous technique with precise requirements such as bone fragment dimensions, fixation system and particularly, the preoperative identification of factors of-

ten associated with postoperative complications. Respecting these conditions can produce better results and reduce the number of local complications associated with this surgical procedure.

P21-651

TKA - a preliminary study of 378 total knee replacements

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Objectives: The authors present a preliminary study of 378 total knee replacements performed over a five year period (2002 - 2006).
Methods: All of these TKAs respected the same surgical technique (medial parapatellar approach), the same implants (NexGen - Zimmer), and were performed by the same surgical team. Special concern was taken with collateral ligaments balance and patellar tracking. In 89 knees a PCL retaining implant was used while in the other 289 knees the PCL was sacrificed. All of the knees had patellar resurfacing.
Results: The patients were evaluated according to the Knee Society Score and, in spite of a very short follow-up, the results are very encouraging.
Conclusions: Total knee arthroplasty is a very successful procedure in knee arthritis treatment.

P21-658

Per- and post-operative varus and valgus laxity in flexion and extension in navigated total knee replacement using a tensor with 150 N in extension and 100 N in flexion

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Objectives: Several studies have reported instability as a major cause for revision surgery. Therefore, proper balancing of the ligaments during total knee replacement (TKR) is an important determinant of the clinical outcome. The ligament-guided implantation technique of a total knee prosthesis with a tensor will theoretically result in balanced knees. Limited data are available about the amount of applied distraction force and the resulting stability of the replaced knee joint during surgery. Furthermore, it is unknown how this stability is maintained after a 6 months healing period after surgery. The goal of this study is to determine per-operative and 6 months post-operative medial and lateral knee laxity in extension and flexion after implantation of a ligament-guided total knee replacement.
Methods: In 50 patients a primary TKR (balanSys, Mathys Ltd, Bettlach, Switzerland) was implanted using a ligament-guided implantation technique with distraction of the joint in extension with 150 N and in flexion with 100 N. Per-operative laxity of the knee was assessed with a CT-free navigation system (Surgetics®, Praxim, La Tronche, France) directly after opening of the joint and, finally, after implantation of the prosthesis. Knees were stressed medially and laterally using a spring with 50 N at 0.3 m distal to the knee joint in full extension and 70 degrees of flexion. Post-operative stress X-rays were performed at 6 months after surgery with the Telos stress-device in extension and with a custom-made stress device in 70 degrees flexion. The same amount of stress (same moment (Nm)) was applied compared to the per-operative situation.
Results: Per-operative varus and valgus laxity in extension as well as in flexion decreased significantly after implantation of a ligament-guided implant ($p<.0001$). (Table 1) Post-operative varus and valgus laxity in extension at 6 months after surgery did not change compared to per-operative knee laxity after implantation of the prosthesis. On the contrary, both varus and valgus flexion laxity at 6 months post-operative increased significantly ($p<.0001$).

		Per-operative _pre	Per-operative _post	Post-operative
Extension	Varus laxity	4.5° (1.7)	2.6° (1.6)	3.0° (1.3)
	Valgus laxity	5.2° (2.0)	2.5° (1.1)	2.6° (1.1)
Flexion	Varus laxity	4.1° (2.2)	2.4° (1.5)	4.2° (2.6)
	Valgus laxity	3.4° (1.7)	2.1° (1.6)	3.5° (1.4)

Conclusions: This study shows the knee stability in the frontal plane of a ligament-guided knee prosthesis. The knees remain quite stable in extension after 6 months. However, a statistically significant increase of laxity in flexion was seen for which we do not have a good explanation. Possibly, the forces used with the tensor are not the most optimal in flexion. They may be either too high or too low. Apparently, the ligaments had to adapt (stretch) to the new situation, but the mechanism behind this phenomenon remains unclear. The *in vivo* laxity found in this study seemed to be quite similar to the in vitro laxity of the natural knee (according to data of Markolff et al, 1976, and Heesterbeek et al, accepted for publication, 2007). Further studies are needed to define the ideal varus-valgus stability of a knee prosthesis.

P21-665

Flexion and extension laxity after medial unicondylar knee arthroplasty. A comparison between a ligament referenced system and a bone referenced system

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Objectives: Mobile bearing unicondylar kneeprostheses can be inserted with the aid of a spacer or with a tensioner with attached cutting guide. The stability of the knee in flexion and extension after implantation is of major importance for function and prevents dislocation of the polyethylene insert. Goal of this study is to measure the difference in flexion and extension laxity between a unicondylar kneeprosthesis inserted with a ligament tensioner and a unicondylar prosthesis inserted with a spacer.
Methods: A unicondylar kneeprosthesis with a mobile insert inserted with a tensoner (balanSysTM, Bettlach, Switzerland) was compared with a retrospective group with a knee system using spacers (Oxford, Biomet Ltd, Bridgend, UK). In the unicondylar knee with the tensioner 75 newton was used in extension and 50 newton in flexion. In the spacer technique, that spacer thickness was used in which the spacer could just be moved with the force of two fingers in 90° flexion as well as extension position. Both groups were measured after a minimal of 6 months after surgery with fluoroscopy guided laxity measurements in 70 degrees of flexion. In extension laxity was measured with the Telos. Knee Society Score (KSS) clinical and functional subscores were also assessed.
Results: Flexion laxity was 3.9 degrees for the ligament reference technique and 2.4 degrees for the bone reference technique. Extension laxity was 1.8 degrees versus 2.6 degrees. The difference in laxity had no effect on clinical and functional scores, these were comparable for both groups. There were no disloations in both groups.
Conclusion: The spacer technique results in a significantly tighter knee in flexion. The desired medial laxity with medial unicondylar knee arthroplasty is not yet clear. Although in this group no subluxations were observed, a higher tension (75-100 N) of the tensioner in flexion is recommended.

P21-671

Extramedullary versus intramedullary tibial alignment guides for total knee arthroplasty

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Introduction: Correct prosthesis alignment and joint line reproduction in total knee replacement (TKR) is vital for a successful clinical outcome. It is acknowledged that the ideal coronal alignment of the knee following TKR should be between 4-10 degrees of valgus. A neutral or varus knee is associated with a higher failure rate. Previous studies have shown that ideal alignment is achieved in only around two-thirds of cases. This prospective study evaluates whether extramedullary or intramedullary tibial alignment guides are more accurate in producing correct tibial component positioning in the Triathelon total knee arthroplasty system.
Materials and Methods: Two consecutive series, each of 50 patients who had undergone TKR using either the intra (Group A) or extra (Group B) medullary instrumentation were included in the study. Antero-posterior and lateral preoperative and postoperative knee radiographs were assessed using the American knee society radiographic analysis for prosthesis positioning independent observers.
The Tibial Component Angles in the coronal plane (cTCA) and in the sagittal plane (sTCA and) were measured.
Results:

Angle	Group A Group A N=50	Group B N=50	P
cTCA	88.6	88.5	ns
sTCA	88.9	87	<0.05

Conclusion: Our results suggest that use of the intramedullary instrumentation is more effective in positioning the tibial component in the sagittal plane.

However there was no significant difference between the two systems in the coronal plane

P21-677

A comparative study of kneeling ability in normal individuals and knee arthroplasty patients

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Background: Although kneeling is a crucial function of the knee, there is a lack of information on kneeling ability in the elderly.

Methods: The kneeling ability in a group of individuals aged over 60 years (n=96) without any evidence of arthritis was investigated. The range of motion of the knee joint and the ability to kneel in a chair at 90° and on the floor at 90° and 120° were assessed. Comparisons were made to values obtained from groups of patients who had undergone unicompartmental knee replacement (UKR; n=45), total knee replacement (TKR; n=36) or patellofemoral replacement (PFR; n=28).

Results: Normal individuals had an average range of motion of 135° which was significantly greater than UKR and PFR groups which were both 120°. The TKR had the lowest range of motion with an average of 102°, significantly lower than all other groups. Although 9% and 17% of normal individuals were unable to kneel at 90° in a chair and on the floor respectively, the proportion able to do so in both cases was significantly greater than the PFR group. Around half or less of patients in the surgical groups were able to kneel on the floor at 120° which was significantly less than the 83% of normal individuals able to do so.

Conclusion: The data demonstrate a wide disparity between the kneeling ability of normal individuals and knee arthroplasty patients that will need to be addressed as patients increasingly demand greater knee function.

P21-681

Force plate analysis of kneeling ability after knee arthroplasty

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Introduction: Force plate analysis of contact areas and pressure has been used in the fields of podiatry and foot surgery. We used this tool in assessing normal subjects and knee replacement patients kneeling.

Aim: We analysed contact areas and pressures over the front of the knee during different kneeling positions.

Methods: 23 normal subjects and 33 knee replacement patients were included in this study. The patients were selected according to age and kneeling ability and the absence of involvement of other joints. They had unilateral or bilateral Total (TKR) or UnIcompartmental knee replacements (UKR).

Target points were identified on the plate and patients were asked to place their tibila tuberosity on the target sites.

Patients and normal subjects data of load, contact area and pressure were recorded with knee at 90 degrees. A second reading was taken with subjects kneeling in their maximum flexion comfortable position. Foot position during kneeling was recorded in each case.

Results: Average age was 48.3 years for the normal group an 65.5.2 for the replaced knee group. Average range of motion was 141 degrees for the normal group and 115 degrees for the replaced knees group.

In the normal group, there was a significant positive correlation between body mass and kneeling load at both 90 degrees and maximum flexion. Kneeling pressure were never identical in both knees in all groups. There was no significant difference of peak pressures and contact areas between the normal and UKR group.

The angle of flexion affected the contact pressures as going from 90 degrees to higher flexion with the body weight still actively supported increases contact pressure, which then dropped to lowest level in maximum flexion when the body weight was supported by the calf. Peak loads were usually in the region of the tibial tuberosity.

Conclusion: Kneeling may be a sided activity with each individual having a dominant knee. The UKR group showed more of normal kinematics in comparison with the TKR group. Maximum contact pressures decreased in knees able to achieve maximum flexion. As kneeling flexion angle increases, the contact area decreases and while the thigh is off the calf and the peak pressure increases. Contact pressure dropped to below 90 degrees level whenever maximum flexion was achieved.

P21-685

Alteration of skin sensation after knee arthroplasty

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Introduction: Dermal dysaesthesia is a well-recognized consequence of knee replacement, but it has received little attention in the literature this far.

Altered skin sensation is unpleasant for many patients at least initially, and may affect function, especially kneeling.

The aim of this study was to compare postoperative skin dysaesthesia after midline, medial and short medial incisions.

Methods: Eighty patients with 87 knees were examined for skin sensory alterations over the front of the knee at a minimum follow up of 18 months after knee arthroplasty.

Seventeen knees had a long anteromedial incision, 21 had a midline incision, 40 had a short medial incision and 9 cases had a minimally invasive incision (MIS) for UKR.

A purpose-designed grid was used to record sensory alterations in different areas.

Results: The average length for the anteromedial incision was 18.5 cm with an average area of sensory alteration of 88.2 cm^2. The midline incision average length was 17.7 cm with an average area of 56.5 cm^2. The short medial incision used for UKR averaged 11.9 cm in length with an average area of numbness of 49.3 cm^2.

Conclusion: The length of the incision correlated to the area of altered sensations, when comparing long and short medial incisions. Kneeling ability was related to the size and type of sensory alteration. Hypaesthesia improved with time while hyperaesthesia did not.

P21-687

Angle measures correlation between digitalized radiology and knee navigation system in TKA

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Introduction: Correct alignment of prosthesic components has been described as a determinant factor to predict the life of an arthoplasty. Normal range of angular values has been described. Our objective is to determine the correlation between angular meditions obtained by two observers over digital radiology and a navigator system.

Materials and Methods: We selected 53 knees (51 patients) operated by the same surgeon of TKA assited with a computer system (Stryker Knee Navigation system 2.0). Mean age was 73,5 years and average of mass body index was 29. Two observers from our institution used an informatic program (PACS) to measure the angular values: Femorotibial axis pre and post-operative, tibial and femoral post-operative axis, and post-operative tibial slope. Statystical intraclass correlation study was performed comparing these results with those obtained by Navigator. Moreover, categoric variables have been assessed using Kappa Índex and a dispersion analysis using Bland-Altman method.

Results: Correlation of the pre-operative femoro-tibial axis was considered excellent:0.83(0.68-0.91 IC 95%). Correlation in post-operative femoro-tibial axis was moderate 0.36(0.2-0.7 IC 95%). We have found a poor correlation in tibial slope, femoral and tibial axis (less than 0.2). However, we found low absolut diferences, less than 1º, in most of measurements.

Discussion: Computer assisted TKA has been considered to achieve better alignment in coronal plane than conventional surgery, but the effects in sagital and axial planes has not fully proved. Radiology is the used method to assess the alignment of components and the limb in TKA, but potential errors must be considered, and only regards two planes in the space. Navigation systems could avaluate tridimensional components position.

Conclusions: We have found an excellent correlation in the coronal plane, and fair to moderate in the sagital plane among radiography and navigation system, but with low absolut diferences.

P21-689

Reproducibility intra and inter-observer of radiological measurement using digital images in TKA

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Introduction: Radiographic evaluation is essential for measuring limb axis and planning total knee arthroplasty and to assess the results after surgery. The main objective in this study was to evaluate the reliability of intra and

inter-observer radiological measurement using digitalized images in prosthetic knee surgery.
Materials and Methods: 53 Knee in 51 patients (mean age was 73.5 years) underwent total knee surgery were evaluated by two observers from our institution using pre- and post-operative A-P long-standing and lateral films with 30º of flexion, by means of a software to measure digitalized radiological images (PACS). It has been measured: pre- and post-operative femorotibial angle, post-operative distal femoral cut, proximal tibial cut and pre and post-operative posterior tibial slope. Each measure has been achieved twice (second one delayed for 2 weeks from the first). Statistical intra-class correlation study was performed for the values obtained.
Results: Inter-observer correlation for pre-operative femorotibial angle was 0.734 (0.5-085), post-operative femorotibial angle 0.807 (0.63-0.90), preopeative posterior tibial slope correlation value was 0.121 (0.084-0.375) and post-operative 0.215 (0.062-0.473), in distal femoral cut measeurement was 0.734 (0.50-0.85) and in proximal tibial cut was 0.216 (0.14-0.52). Intra-observer values were excellent for femoro-tibial pre- and post-operative angle, good to excellent for tibial slope and good for distal femoral and proximal tibial cuts.
Discussion: Reliability of intra and inter-observer measures for total knee arthroplasty is better than previously described with conventional radiology.
Conclusions: Measurement of TKA angles using digitalized radiological images system is a reproducible method. Correlation intra-observer is excellent and inter-observer is good except in posterior tibial slope measure. Posterior tibial slope is the less consistent measure.

P21-701
Stiff knee after total knee arthroplasty. Role of pre-operative ROM: our experience
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Objectives: Normal function demands higher range of flexion than usual averages after TKR. Stiff knee after TKA depends on four principal points: pre-operative factors, surgical factors, post-operative factors and patients factors. The first one is the most important of them because is the pre-operative range of movement (ROM)that will determine mostly the outcome of the procedure.
Methods: In the last five months, we have operated fifty patients of TKA. This group was composed by thirty-three women and seventeen men. The age distribution was from fifty-three to eighty (average of age sixty-eight). The average of pre-operative ROM under weight bearing was 110° degrees. The patients did not underwent to previous knee surgery and they did not have relevant co-morbidity. We evaluated the post-operative ROM after three months from the procedure.
Results: We found that 96% of the patients had improved their ROM . In fact, 48 patients reached 120° degrees of ROM. Only 2 patients had post-operative reduction of the ROM. In one of these cases we performed mobilization with anaesthesia and the other patient had to accept the new range of movement because he refused to do anything else.
Conclusions: We believe that pre-operative ROM is the most important prognostic factor for post-operative ROM. Stiff knee after total knee arthroplasty needs to be treat in the first six months in order to achieve a good range of movement.

P21-704
Revision TKR with the PFC/TC3 system - does the joint line matter?
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Aim: To assess the functional results of revision TKR with the PFC/TC3 system, and to correlate this with the reasons for revision and restoration of joint height.
Method: 153 patients underwent revision TKR using the PFC/TC3 system. Data was prospectively collected (using the Bristol Knee Score) pre-operatively and at a mean of 4.2 years post-revision. 43 revisions were for infection and 81 revisions were for aseptic loosening. Measurements of the joint height were made pre and post-operatively using Figgie´s method and were divided into 3 groups: lower by more than 5mm, restored and elevated more than 5mm. Use of distal augments and polyethylene thickness were recorded.
Results: The mean pre-op function score was 12 and post-operatively was 19 for the infection group and 20 for the aseptic loosening group. Revision after initial UKR gave a mean score of 21, while revision after TKR gave a mean score of 18 (max 27). Knees in which the joint line was elevated by more than 5 mm had a mean score of 17 while those where the joint line was restored had a mean score of 19. Recent increasing use of distal augments improved the joint line and results.
Conclusion: Revision using the PFC/TC3 system produced acceptable medium term functional results and good survival. Better restoration of joint line and functional results were achieved by distal femoral rather than proximal tibial augmentation.

P21-707
Revision TKR for septic and aseptic loosening - is the outcome different?
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Aim: To assess the results of aseptic and aseptic cases using the PFC/TC3 system, and to correlate this with the restoration of joint line height.
Method: 148 patients underwent revision TKR using the PFC/TC3 system. No re-revision cases were included in this series. Data was prospectively collected (using the Bristol Knee Score) pre-operatively and at a mean of 4.2 years post-revision. 31 revisions were for infection and 53 revisions were for aseptic loosening. Revision for infection was done as a two-stage procedure and aseptic as a single operation. Measurements of the joint line height were made pre and post-operatively using Figgie's method. The cases were divided into 3 groups on the basis of joint line restoration:
Lowered by more than 5 mm
Restored
Elevated more than 5 mm
Results: The mean pre-op total score for the infection group was 35/100 and 40/100 for the aseptic loosening group. The total score post-operatively was 67 for the infection group and 73 for the aseptic loosening group. The joint line was restored in 50% of infected cases and in 60% of aseptic loosening cases.
Conclusion: although the overall results were slightly less satisfactory for the infected revision group, there was no significant difference between the two groups either in total BKS scores or in reproduction of the joint line. The average outcome was much less good than for primary TKR.

P21-724
Complications in 223 cases of the oxford phase 3 unicondylar arthroplasty (UCA) in a county hospital
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Objectives: Aim of this study was to analyse the complications during the first eight years of experience with the Oxford Phase 3 prosthesis for treatment of osteoarthritis by a minimally invasive technique.
Materials and Methods: Between January 1999 and May 2007, 223 arthroplasties were implanted by a single surgeon in a non-teaching hospital. 191 cases had a minimal FU of one year (mean FU 35 months). Mean age was 69 years (range 49-91yrs).
Results: Complications, cause and management:
I Dislocation of the meniscal insert in three patients (1.6%): two due to technical error (revised to TKA and Vanguard UCA respectively) and one traumatic (open reduction).
II Three (1.6%) patients with persisting pain complaints due to failure of proper patient selection were revised to TKA.
III Five (2.6%) patients with moderate pain complaints of which three had correct and two doubtful indications followed a wait and see policy.
IV One intra-operative fracture of the proximal tibia due to surgical error was treated by CPM and casting.
V Ten (5.2%) additional arthroscopic procedures were performed with good results.
Conclusion: The rate of revision surgery was 2.6%. Persisting pain complaints after one year of FU occurred in 4.2 %. Failure of using strict indication criteria e.g. three revisions to TKA due to pain and two patients with persisting moderate pain complaints, emphasizes once more the importance of strict patient selection. When strict indication criteria are considered the unicompartmental Oxford Phase 3 prosthesis is in our opinion the first choice of treatment of anteromedial osteoarthritis.

P21-725

Prosthetic joint infection due to extended-spectrum beta-lactamase (ESBL) producing Escherichia coli

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Objectives: ESBL-producing E. coli is an important nosocomial pathogen and is emerging worldwide. The reports of infections due to this type of microorganism in orthopaedics are still scarce. Here, we reviewed our experience in 5 prosthetic joint infections due to ESBL- producing E. coli.

Methods: Five patients with a periprosthetic joint infection due to ESBL-producing E. coli were detected and prospectively followed-up in our center from January 2004 to December 2005. Clinical characteristics, surgical and antibiotic treatment and outcome are described.

Results: The mean age of the patients was 71.2 years old, 2 were male and in all cases the implant was a knee prosthesis. The mean time from arthroplasty to diagnosis of the infection was 23 days and the clinical manifestations were acute in all cases. In 4 out of 5 cases the ESBL E. coli was the first microorganism isolated and in 1 was identified in the second debridement for acute infection. All patients were urinary catheterized during 24-48 hours after primary surgery and one had received a previous antimicrobial therapy before the identification of ESBL E. coli, no other risk factors were found. Four out of 5 cases were considered deep periprosthetic joint infections and one superficial. The first surgical option in all the cases was an open debridement and a prolonged antimicrobial treatment with a carbapenem (imipenem or ertapenem). The successful outcome was achieved only in the case of superficial infection. The 4 deep infections relapsed after finishing antibiotics and it was necessary to remove the implant. In 2 cases a 2-stage exchange revision was performed with good outcome and in 2 cases was necessary to amputate the extremity to control the infection.

Conclusions: This is the first description of a short series of PJI due to ESBL-producing E. coli. Previous experience in the treatment of PJI due to Gram-negative bacilli (GNB) was associated with poor outcome compared with those infections due to Gram-positive cocci. Our results suggest that periprosthetic joint infection due to ESBL-producing E. coli have an even worse outcome than those due to other more susceptible GNB. It is of note that only one patient had risk factors for developing this type of infections, therefore; it is difficult to design preventive measures. In the future it will be necessary to close monitor the emergence of this pathogen.

P21-731

Pain in the assessment of oxford phase 3 unicompartmental knee arthroplasty (UKA).

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Objectives: The results of knee arthroplasty are commonly assessed by survival analysis using revision as the endpoint. We have used the assessment of pain by a patient based questionnaire as an alternative after the Oxford Phase 3 UKA implanted by a minimally invasive technique.

Materials and Methods: Between January 1999 and May 2007, 223 consecutive Oxford arthroplasties were implanted by a single surgeon in a county hospital. Mean follow-up period was 35 months. Patients were assessed prospectively pre-operatively and after UKA in each year subsequently by a questionnaire. Survival analysis was undertaken.

Results: Preoperatively 85.8% had moderate or severe pain. Postoperatively, of five patients (2.6%) with persisting pain due to failure of using proper patient selection three were revised to TKA and two are still being followed. Three patients (1.6%) with moderate pain after using proper indication criteria accepted their complaints. Ten other patients (5.2%) experiencing moderate pain some time during the eight year period were successfully treated by arthroscopy. If after surgery patients experienced pain which had spontaneous improved by the second year, the initial pain was ignored. Totally 9.6% of patients experienced moderate or severe pain at some stage, and the failure rate was 4.2% in this period of 8 years´ experience.

Conclusion: When strict indications are followed the failure rate of the procedure can be minimised till 1.6% when moderate pain is considered the endpoint. As relief of pain is the primary reason for joint replacement, this is likely to be the most important factor in determining the long-term outcome for the patient.

P21-733

Independent study of the oxford phase 3 unicompartmental arthroplasty (UCA) for treatment of anteromedial osteoarthritis of the knee: 8 years results

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Objectives: Aim of this study was to analyse the clinical results of the first eight years of experience with the Oxford Phase 3 unicompartmental prosthesis for anteromedial osteoarthritis of the knee joint.

Materials and Methods: Between January 1999 and May 2007, 223 consecutive Oxford arthroplasties were implanted by a single surgeon. A total of 191 cases met the required follow-up period of one year. Pain, function of the knee and health-related-quality of life were evaluated by the WOMAC-Questionnaire, the Knee Society Score(KSS), Oxford score and VAS for pain and satisfaction.

Results: Mean age at operation was 69 years and mean follow-up time was 35 months. The mean pre-and postoperative knee society knee scores were 46 and 91 respectively. The pre-and postoperative knee society function scores were 47 and 87. The WOMAC-scores, the Oxford-score and the VAS for pain and satisfaction all improved significantly. Major complications that occured in our series were: dislocation of the meniscal insert in three patients of which two were revised to TKA and Vanguard-UCA respectively, and one reduced by an open procedure succesfully. Three patients with persisting pain complaints due to failure of proper patient selection were revised to TKA. Five others with a correct indication in three and a doubtful indication in two, had a wait and see pollicy.

Conclusion: Evaluation of our patients after a mean follow up of 35 months revealed a significant improvement of the clinical and function scores. Patients' satisfaction is high and major complication rate is low when strict indication criteria are followed.

P21-734

Spinout in mobile bearing TKR - incidence and consequences

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Objectives: Mobile bearing total knee prostheses have a potential for bearing dislocation ("spinout"), the incidence previously reported to be 0.5-3.2%. The reports are however few, and the consequences of spinout are not well documented. The aim of this study was to evaluate the short term consequences and the long term functional outcome after spinout in patients undergoing LCS-RP total knee replacement.

Methods: Retrospective study. Population: All patients undergoing LCS total knee replacement (TKR) from January 1996 until July 2007. Patients with spinout were identified using

1. Operating protocols,
2. Patient administrative system (codes for specific diagnoses and treatment) and
3. Reports from the national arthroplasty registry.

Detailed information regarding the patients, their treatment and the follow up history was collected from journals. Preoperativ X-rays were available for evaluation. The patients having suffered spinouts were examined Nov.2006, and long term functional outcome was evaluated by Range of Motion (ROM), Knee Osteoarthritis Outcome Score (KOOS) and UCLA activity score. The data are compared to historical data from a cohort of patients operated with LCS-RP in 2003; 2-years follow up (n = 41).

Results: In 1450 total knee replacements (LCS-RP), there were 16 spinouts in 16 patients (1.1 %), 11 women and 5 men, age at primary replacement mean 73.1 years [60-83] compared to 68.8 in the control group (p=0.15). Spinout occurred in 9 excessive valgus, 1 excessive varus and 6 neutral knees median 16 days [1-125] following primary knee replacement. Twelve of the spinouts were acute, 4 were chronic. Eleven of the 16 spinouts were initially treated by closed reduction and immobilized in a cast or a brace. Eight of these knees required secondary surgery, 3 had no further spinouts. Five spinouts were initially reduced openly, 2 of these required more than one reoperation.

Twelve of the 16 patients were available for follow up examination median 36 months following spinout [6-72]. The spinout patients had mean ROM 109° compared to 117° in the control group (p=0.04). Mean KOOS-ADL was 74.6 in the spinout group compared to 90.5 in the control group (p=0.001). Mean KOOS-QoL was 44.6 in the spinout group compared to 70.3 in the control group (p=0.001). UCLA activity score was mean 3.5 [2-6] in the spinout group.

Conclusion: In this retrospective study the incidence of spinout in 1450 LCS-RP total knee replacements was 1.1 %. Spinouts mainly occurred shortly after primary replacement. The short term consequences of spinout were severe leading to a minimum of one reoperation in 13 of 16 cases. Although the numbers in this study were small and the control group not matched, our data suggest that spinouts have long term consequences on functional outcome as well.
We suggest that special effort is made in an attempt to prevent spinouts in mobile bearing total knee replacements.

P21-742
Knee artrhodesis and a free vascularized osteomyocutaneous graft to treat a recurrent periprosthetic infection with a large skin defect - a case report
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Objectives: To analize the case of a patient treated with knee Artrhodesis and a free vascularized osteomyocutaneous graft for recurrent periprosthetic infection with a large skin defect.
Methods: We review the case of a sixty one year old man, with a medical history of fractures in the right femur and tibia was leaving multiple scars around the knee 25 years ago. He underwent a total knee arthroplasty with a rotational knee prosthesis (Endomodel; Link, Germany) On September 16th, 2006; This prosthesis was selected because of deformities secondary to the fractures. The days following to the surgery he developed a cutaneous necrosis and a periprosthetic infection for Staphylococcus Aureus and Staphylococcus Epidermidis. Twenty days after the first surgery he was treated with a debridement, exchange of the polyethylene insert and a flap of medial grastrocnemius performed by the plastic surgery service. The specific antimicrobial therapy was beginning. On the postoperative, the flap developed necrosis and multiple fistulae. On December 15th, 2006 was underwent a removal of the implant and an artrhodesis with external fixator. Five days later, a large skin defect was treated in a second time, with a free vascularized myocutaneous graft of latissimus dorsi and a piece of scapula to fill a central osseous defect. The operative cultures were positive to Pseudomona Aeruginosa. The antibiotic therapy with meropenem was given for four weeks. The patient had a satisfactory evolution of the graft, with a normalization of the erythrocyte sedimentation rate and the C-reactive protein level. At the six months of the surgery the CT scan showed an osseous consolidation of the artrhodesis, the external fixator was removed. On the clinical exam he presents a shortening of 3 cm, compensated with a special shoe.
Conclusions: The previous surgeries are a factor that could change the evolution of an arthroplasty. The scars in the anterior aspect of the knee produce poor blood supply to skin, it could give necrosis zones and be the entrance to microorganism. The utilization of a skin graft could be a solution in a initial phase, but in some cases with large skin defects, maybe is necessary perform grafts with microsurgery.

P21-757
Total knee arthroplasty by transverse incision
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Objective: The longitudinal wounds associated with TKA are generally conspicuous for several months, and a few patients have been unsatisfied with hypertrophic scars during the several-year period following surgery. In general the wound horizontal to the skin crease heals better than the wound vertical to it. In the present study, it was hypothesized that if the transverse incision can be safely utilized for TKA, wounds will heal better and feature less scar formation than with longitudinal incision.
Patients and Methods: A consecutive series of 36 patients (41 knees) who underwent primary TKA with the Scorpio NRG Posterior Stabilizer system were examined. The first 21 knees were performed by the longitudinal-incision procedure and the last 20 knees were by the transverse-incision procedure. Skin incisions were performed at the level of the inferior pole of the patella in the transverse-incision group, and performed at the anterior straight midline in the longitudinal-incision group. The incision was extended, if necessary, to perform the operation safely in both incision group. Other than the incisions, the procedures used were the same in both groups. The operative time, blood loss, and any complications were noted in order to evaluate the safety of the new incision. KSS scores and X-rays in all knees were evaluated at 12 months after operation. Scar assessment included the following objective and subjective categories: length, width, color, and undulation. Each patient was asked whether they had problems with the healing of their wound.
Results: There were no significant differences in operative time or blood loss between the groups. There were no significant differences in KSS score and radiologically between the groups. Wound problems were noted once in each group: a subcutaneous hematoma in the transverse-incision group and delayed healing was noted in the longitudinal-incision group. There was no wound infection, necrosis required scar revision, hypesthesia, or limited ROM in either group. The mean length of transverse-incision scars was almost the same (about 15 cm) as that of longitudinal-incision scars in flexion position. The maximum width of transverse-incision scars was significantly smaller than that of longitudinal-incision scars. The color of most wounds in the transverse-incision group was already matched with surrounding skin at 12 months after operation. On the other hand two wounds in the longitudinal-incision group were raised over 1 mm compared to the surrounding skin. A higher proportion of patients who had a transverse incision than patients who had a longitudinal incision thought that their scar was excellent, rather than average, in appearance. Two patients felt their operation scar was unacceptable in appearance.
Discussion: It is as easy in transverse incision as in longitudinal incision in the eversion of patella and subluxation of the knee joint. Postoperative clinical and radiological results were the same in both incisions. As there was no major skin trouble postoperatively, transverse incision is thought to be safely utilized for TKA. Considering the advantages of better wound healing and less scar formation, this new approach may be an alternative option in TKA.

P21-764
Mortality following salvage surgery for infected primary joint replacement
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Introduction: Infection is a serious complication of primary total hip and knee arthroplasty. The Bone Infection Unit at the Nuffield Orthopaedic Centre in Oxford is a dedicated unit for the treatment of this clinical problem. The aim of this study was to establish patient mortality following salvage treatment (debridement, retention of prosthesis and antibiotic therapy) for infection of primary joint replacement, performed at the unit.
Method: A series of 89 patients underwent salvage treatment for infected primary total joint replacement (47 hips and 42 knees) between 1998 and 2003. The average age of the patients was 70.3 years (range 31.8 to 89.1). A survival analysis was performed using death as the sole endpoint and there were no patients lost to follow-up.
Results: There were a total of 26 deaths with a mean time to death of 3.3 years (range 0.8 to 7.2). The 7-year cumulative patient survival of was 66% (CI 5, number at risk 21).
Conclusions: The morbidity associated with infected total arthroplasty has been well documented. This study highlights that patients undergoing salvage treatment for this condition have significant mortality, with up to a third of patients potentially dying by 7 years.

P21-765
The long-term survival results of TKA in patients under the age of 60
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Aim: Increasing numbers of patients under the age of 60, with end-stage OA, are being treated with total knee replacement (TKA). However there are relatively few reports of the long-term survival of TKA in this age group, that have used severe pain or poor knee scores as an endpoint. The aim of this study is to establish the long-term survival results of TKA in patients under the age of 60.
Method: Increasing numbers of patients under the age of 60, with end-stage OA, are being treated with total knee replacement (TKA). However there are relatively few reports of the long-term survival of TKA in this age group, that have used severe pain or poor knee scores as an endpoint. The aim of this study is to establish the long-term survival results of TKA in patients under the age of 60.

Results: There had been 11 revision procedures and of those remaining 15 had Oxford Knee Scores equal to or below 25, giving a total of 26 failures. The cumulative 15-year survival in analysis A was 85% (CI 4) and in analysis B was 63% (CI 5).
Conclusion: The survival of TKA in patients under the age of 60 decreases in the second decade following implantation with significant numbers of prostheses failing due to poor knee function.

P21-772
Patients undergoing lateral unicondylar knee arthroplasty: Outcomes and return to sport
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Purpose: Unicompartmental arthroplasty in athletic individuals with osteoarthritis in the past have had limited success returning patients to sports. Patients who are arthritic and symptomatic in one compartment of the knee may provide better physiological function and quicker recovery compared with knee arthroplasty. The purpose of this study was to prospectively evaluate outcomes following lateral unicompartmental knee arthroplasty.
Methods: Patients that underwent unicompartmental arthroplasty by one surgeon from 2000-2005 were prospectively studied. Nineteen patients underwent lateral unicompartmental knee replacements. The average age for the lateral unicompartmental group was 68 (range, 50-80). Assessment included preoperative and postoperative range of motion, subjective testing, KT-1000, radiographic evaluation consisting of a full plain radiograph knee series including 3-foot alignment films. An MRI was completed in all patients but one who had a pacemaker. All patients had the same implant utilized.
Results: All patients reported severe knee pain preoperatively involving the lateral compartment. No patients were lost to follow-up. One patient was converted to a total knee arthroplasty. Average follow-up was 33 months (range: 24-56 months). The average post-surgical Lysholm score was 91 (range, 67-100) points with a pre-operative Lysholm score of 64 (P=0.001). The pre-operative Tegner was 4 (range, 1-7) with a postoperative Tegner of 5 (range, 1-8) (p=0.001). The preoperative HSS score was 67 (range, 45-87) with a postoperative score of 92 (range, 82-100) (p=0.001). Physical examination and subjective questioning along with MRI correlation helped predict successful outcomes. The average medial compartment Outerbridge grade was 2.2 for the medial femoral condyle and 2.3 for the medial tibial plateau. The average trochlear groove Outerbridge grade was 2.3 and for the patella was 2.2. Overall, patients reported a return to skiing in 5 months, tennis in 4 months, and 1-2 months for walking and jogging.
Conclusions: Determining specific patient selection criteria improves patient outcomes and helps with patient education. This study will give the guidelines necessary to offer an alternative to repeat arthroscopic intervention or total knee arthroplasty and allow patients the ability to return to their activities of daily living and sport. Long term results need to be carefully followed. We are not aware of any previous study attempting to report success with lateral unicondylar knee arthroplasty in a population having returned to sport.

P21-778
Polyethylene wear characteristics in 42 retrieved single-design unicompartmental tibial inserts
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Wear of the polyethylene (PE) tibial component has been reported one of the leading causes of failure in unicompartmental knee replacement. Patient age, hip-knee-ankle angle, and shelf age of the PE have been described most influential with regards to increased PE loss; However, body mass index, alignment of the tibial component, and PE thickness not.
We analyzed PE wear in 42 retrieved Allegretto unicompartmental tibial implants, retrieved over a period of ten years. All implants were analyzed with regards to amount and characteristics of PE wear. These findings were correlated to patient age, body mass index (BMI), radiographic alignment of the implant and extremity as well as implant size and PE thickness. Sever polyethylene wear and pitting was observed in 10/42, moderate wear in 26/42, and minimal PE wear 6/42 retrieved implants. The average in vivo time of these implants was 77 months, respectively 25 and 12 months. The average patient age at the time of implantation was 58 years, respectively 65 and 66 years, with a mean age of 74 years for the patients where the prosthesis had to be revised within a year or less. Polyethylene shelf age, radiographic alignment and BMI were correlated to the amount, character and location of polyethylene wear. The mean shelf age at time of implantation was 16 months, respectively 23 and 10 months. The mean BMI was 28.2 and respectively 29.2 and 30. Our preliminary radiographic results reveal that tibial slope, tibial implant alignment, and Mikulicz line measurements were similar for all three groups. Hip-knee-ankle angles were ≤182 degrees for all knees with severe PE wear. Of the 5 lateral replacements 3/5 were associated with severe PE wear; however at a mean in vivo duration of 76 month.
We conclude from our preliminary observations that PE wear in the examined tibial inserts was most noticeably associated with duration of in vivo performance; however in vivo duration of the implant was relate to patient age and postoperative hip-knee-ankle angles.

P21-787
Time-dependent improvement of functional outcome following TKR - a prospective longitudinal study with repetitive measures prior to surgery, and 6 weeks, 3 months, 6 months, 1 year, 2 years and 4 years after surgery
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Objectives: Long time follow up studies after Total Knee Replacement (TKR) using LCS rotating platform have shown up to 96% survival rate of the implants. Few studies have evaluated short time functional outcome and the progression of that with time. The objective of this study was to determine the time course of functional outcome evaluated by Knee injury and Osteoarthritis Outcome Score (KOOS) the first four years following TKR using LCS rotating platform.
Methods: Fifty-one non-selected patients with 3-compartmental osteoarthritis in one knee underwent TKR with LCS rotating platform. The patients were evaluated by an independent person (physiotherapist) prior to surgery and then at follow up 6 weeks, 3 months, 6 months, 1 year, 2 years and 4 years after surgery. KOOS, a self assessment function score validated for this purpose, was registered, and range of motion (ROM) was determined at all follow ups.
Results: Forty-one patients showed up at all follow ups: 28 women, 13 men, age 40-85 years, (mean 68,7). Dropouts were mainly due to long traveling distance. Mean KOOS 'Pain' increased from 44 prior to surgery, to 65 at 6 weeks, to 88 at 24 months and was 84 at 4 years. Mean KOOS 'Activities of daily living' (ADL) increased from 49 prior to surgery, to 73 at 6 weeks, then gradually increasing to 91 at 24 months and then decreasing to 82 at 4 years. Mean Passive ROM was 115° prior to surgery, 78° at departure from hospital, gradually increasing to 117° at 24 months, and was 114° at 4 years.
Conclusions: Patients undergoing TKR with LCS rotating platform have obtained 49% of their expected total pain relief, and 57% of their expected total ADL function improvement at 6 weeks following surgery. Pain and function most likely continue to improve until 2 years following TKR. ROM will gradually improve up to 2 years after TKR, and is then at the same level as prior to surgery.

P21-796
Knee arthrodesis: Results of intramedullary nailing
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In this study a group of 19 patients who all underwent a knee arthrodesis between 1996 and 2005 was investigated. In the majority of patients the knee arthrodesis was performed as a salvage procedure following an infected total knee arthroplasty. The arthrodesis was obtained by the use of an intramedullary device. The outcome of the procedure was evaluated with radiographs, the SF-36 score and Oxford 12 Knee Score. We found the functional result of a successful arthrodesis to be comparable with a revised TKA. The procedure allows weight bearing within one week, is very well tolerated and accompanied by a high rate of pain relief. Recurrence of infection is the most challenging problem.

P21-814
Effectiveness and utility of tibial endomedullary guide in the orientation of the tibial component in total knee replacements in patients with severe obesity (BMI>35kg/m²)
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Introduction: Obesity favours knee osteoarthritis and can lead to the need for total knee replacement (TKR). This may be more complex in obese patients

since the morphology of the knee may determine the operating technique and, therefore, the correct orientation of the implants, to be more difficult.
We selected patients with a BMI >35kg/m^2 undergoing TKR. We determined the difficulties during surgery and the utility of an endomedullary tibial cutting guide in facilitating the correct orientation of the implants.
Materials and Methods: 500 patients underwent TKR in our unit between January and September 2006. 70 of them (12%) had a BMI > 35 and were included in this prospective, randomized study. The mean age was 67.74 years, 60 were female and 10 male. The mean BMI was 39.95 kg/m^2 (95% CI: 39.06-40.84). Patients were divided into two groups: In group 1(n=31) the tibial component was implanted using the aid of a tibial intramedullary guide. In group 2 (n=39) the tibial component was implanted using the aid of an extramedullary tibial cutting guide.
Preoperative radiographic measurement of the tibial, femoral (anteroposterior and lateral projections) and of the mechanical axis in the telemetry in load was made in all patients. Postoperatively, the orientation of the tibial component in the coronal (anteroposterior) and saggital (lateral) view was measured in the same projections as in the preoperative study.
Ischemia time (tourniquet time) was measured as the time from inflation of the pneumatic sleeve to the moment when the components were cemented.
The statistical significance of the results was calculated using the Student´s t test for two independent samples.
Results: The two groups were comparable with respect to age, BMI and degree of preoperative deformity. The mean age was 69.35 in group 1and 70.06 in group 2. Group 1 had a mean BMI of 39.84 and group 2 of 40.05.
We found no significant differences in the orientation of the components. between the two groups. Postoperative orientation of the femoral and tibial components was within the normal range (90º ± 5º in the anatomical axis of the femur and tibia and between 84º-90º posterior inclination of the tibia in the saggital plane). The mechanical axis was within the normal parameters of varus/valgus (- 5º and +5º).
Statistically significant differences between the two groups were observed in the ischemia time, which was longer in group 2 than in group 1 (p=0.038).
Conclusion: We compared the utility of two types of guide in correctly orientating the tibial component in patients with a BMI > 35kg/m^2. The lesser ischemia time in the group in which the endomedullary guide was used seems to indicate its utility, since the positioning and orientation of the tibial cut is carried out more rapidly and anatomical references are not need for correct orientation as it is guided by the anatomical axis of the tibia. The use of the endomedullary guide reduces surgical time in this type of patients.

P21-827
The radiographic assessment and clinical outcomes of total knee arthoplasty using computer assisted navigation
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Objectives: Authors present comprehensive radiographic and clinical assessment of total knee arhoplasty (TKA) performed traditionally and with the use of Computer Assisted Navigation (CAN).
The aim of study:
1. Radiological assessment and comparison of implant alignment precision considering two operating techniques.
2. Clinical evaluation of 5 years outcomes in both groups (treated using traditional technique and with CAN).
Methods: The material consists of 100 radiograms of patients operated on traditional way and 100 knee point radiograms of patients operated using CAN. Assessment of postoperative radiograms was carried out in order to analyzed coronal mechanical axis and sagital orientation of both femoral and tibial components. Measurements were taken precisely up to 1° and therefore results were classified as good (0-2° deviation to mechanical axis) satisfactory (2°-4°) and poor (over 4°). Assessment of the clinical outcomes in these groups has been performed using the Knee Society Clinical Rating System. In radiographic assessment the most important difference was shown in coronal plane.
Results: Good radiological results with the use of CAN was 58 in comparison to 32 treated with traditional technique. In sagital plane with femoral component no significant differences from statistical point of view have been revealed.(students + and chi^2 Tests) In tibial components (sagital plane) the minimal advantage in CAN treated group has been revealed, but without statistical meaning. End-point outcomes after 5 years in two groups (traditional and CAN treated) haven't shown any statistical differences(Wilcoxon-rank test).
Conclusions: Radiological and clinical outcomes allow to present following conclusions:
1) CAN allows minimize the risk of incorrect implant components alignment.
2) The lack of significant differences can be explained by relatively short follow up period. (only 5 years).
3) More differences should be expected to appear in long term clinical outcomes.

P21-830
Arthroscopic capsulectomy and anterior release for the treatment of stiffness following total knee replacement
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Introduction: The usual surgical procedure for stiffness after a total knee replacement (TKR) is an open arthrolysis, though an arthroscopic procedure can be considered within six months of the index surgery. We have evolved a new procedure of capsulectomy and anterior release which can be used at any time after TKR in patients with a reduced range of movement (ROM).
Objectives: To establish the efficacy of a new arthroscopic technique, for the treatment of stiffness after TKR.
Methods: 22 patients (10 women and 12 men) underwent arthroscopic capsulectomy and anterior release for the treatment of loss of movement after TKR. The mean age was 62 (range 47-71yrs). Mean time between TKR and arthrolysis was 27 months (range 3-54). Indication for the arthroscopic procedure was decreased ROM following TKR. Some patients had already undergone a failed open arthrolysis. Arthroscopy was performed using anteromedial and anterolateral portals. The dense scar tissue was divided and completely excised arthroscopically. ROM was assessed pre-operatively, immediately post-operatively and at 2, 6, 12 weeks, 6 months and 1 year. The Oxford Knee Score (OKS) and American Knee Society Score (AKSS) were used pre-operatively and at 6 months and 1 year post-operatively.
Results: Pre-operatively mean flexion was 50 degrees (Range 20-90°). Post-operatively it was 94.5° (Range 55-125°). At 1 year this was maintained. The mean OKS pre-operatively was 18.4 (range 8-39). At 1 year it was 29.8 (range 9-39). The AKSS (knee and functional components) showed a similar improvement. The mean knee score increased from 47.3 pre-operatively to 71.6 at 1 year. The functional score rose from a mean of 51.3 pre-operatively to 76.9 at 1 year.
Conclusions: This new technique of arthroscopic capsulectomy and anterior release for the treatment of stiffness following TKR is both successful and safe. At 1 year post-operatively the patients have a well maintained increased ROM and significantly improved Oxford and American Knee Society Scores.

P21-852
Time-dependent improvement of functional outcome following Oxford medial UCA - a prospective longitudinal multicenter study with repetitive measures prior to surgery, and 6 weeks, 3 months, 6 months, 1 year, and 2 years after surgery
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Objectives: Long time follow up studies after unicompartmental knee arthroplasty (UCA) using the Oxford medial UCA have shown up to 93% survival rate of the implants at 15 years. Few studies have evaluated short time functional outcome and the progression with time. The objective of this study is to determine the time course of functional outcome evaluated by Knee injury and Osteoarthritis Outcome Score (KOOS) the first two years following Oxford Medial UCA.
Methods: Multicenter study at Martina Hansens Hospital, Asker and Bærum Hospital, and Akershus University Hospital. Between november 2003 and november 2006, 99 patients with uni-compartmental osteoarthritis in the knee were included in the study. Surgical treatment with Oxford medial phase III UCA, minimal invasive technique. The patients are evaluated by an independent person (physiotherapist) prior to surgery and at follow up 6 weeks and 3 months, 6 months, 1 year and 2 years after surgery. KOOS, a self assessment function score validated for this purpose, is registered, and range of motion (ROM) determined at all follow ups. Statistically analyses for repetitive measures are performed using SPSS.

Results: Preliminary results for forty-two patients who have been evaluated at 2 years postoperatively, are presented. 27 women, 15 men, aged 51-78 years, (mean 65 years).
Mean KOOS 'pain' improved from 49 prior to surgery, to 70 at 6 weeks, to 83 at 6 months . Mean KOOS 'activities of daily living'(ADL) improved from 56 prior to surgery, to 75 at 6 weeks, to mean 86 at 6 months. There were no statistically significant differences in either KOOS 'pain' or KOOS ADL between 6 months and 2 years. Mean Passive ROM was 120° prior to surgery, 94° at departure from hospital, and gradually increasing to 129° at 2 years.
Conclusions: Preliminary conlusions:After Oxford medial UCA, patients have obtained 59% of their expected total pain relief 6 weeks following surgery, and 94% of their expected total pain relief at 6 months (compared with 1 year results). The improvement of ADL function at 6 weeks is 65% of their expected total ADL function improvement (100% at 6 months). Pain and function is expected to improve until 6 months following UCA. ROM is excpected to improve until 2 years following UCA, and ROM at 2 years will probably be better than it was preoperatively.

P21-871
Position of prosthesis in TKR with computer navigation
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We conducted this prospective randomized study to investigate whether navigated total knee arthroplasty (TKA) leads to better results than conventional technique and evaluate the association between intra-operative navigation alignment and post-operative radiographic measurement.
For each 80 conventional and navigated TKAs, we used LPS-flex and E.motion using Orthopilot imageless navigation, respectively. We compared mean values, mean deviation and outliers with regard to mechanical axis, femoral and tibial alignment. We conducted correlation analysis between navigation alignment and post-operative radiographic measurement.
In mean values, femoral alignment showed difference between conventional and navigated group (1.0°±2.4° varus vs. 0.1°±2.0° varus; p=0.009). In mean deviation, femoral alignment was significantly less deviated in navigated group (2.0°±1.7° vs. 1.3°±1.2°; p=0.010) but, mechanical axis (2.4°±1.9° vs. 2.3°±1.7°; p=0.845) and tibial alignment (1.4°±1.0° vs. 1.2°±0.9°; p=0.094) showed no difference. In comparison of outliers greater than 3°, conventional group showed more outliers in femoral alignment (28.8% vs 7.5%; p=0.001) but, there was no difference in mechanical axis (25% vs. 25%; p=1.000) and tibial alignment (8.8% vs. 3.8%; p=0.328). Comparing navigation alignment to post-operative x-ray measurement, navigation values were all within 3° but, x-ray measurement of mechanical axis, femoral and tibial alignment showed 23.8%, 6% and 2.5% outliers, respectively. In correlation analysis, there was weak correlation in mechanical axis and tibial alignment (correlation coefficients=0.347, 0.267) and no correlation in femoral alignment (p=0.177).
The results favored navigation with regard to femoral alignment. There was weak or no correlation between navigation alignment and post-operative radiographic measurement.

P21-879
Does femoral rigid body fixation in computer assisted total knee arthroplasty lead to postoperative quadriceps dysfunction
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Background: This prospective study is designed to assess intraopeartive trauma to quadriceps due to rigid boby fixation on the femur and its influence on rehabilitation outcome obtained using a kinematic navigation system for TKR. We also evaluated the impact of the extra time needed to adopt this system on surgical outcome.
Methods: One hundred and sixteen operations were performed with the aid of the kinematic navigation system. Results, including operation time, radiographic alignment of the prosthesis and complications, were compared with non- navigated group. Outcome measures included preoperative knee function, intra-operative factors, blood loss and postoperative rehabilitation.
Results: The operation time (from skin to skin) in the navigation group was average 32 minutes longer compared historical controls. No major complications such as delayed wound healing, infection or pulmonary embolism occurred during this study. Mean blood loss in both the group showed no difference.
A higher incidence and duration of early postoperative quadriceps dysfunction was not associated with computer-assisted TKA through the lateral parapatellar approach. No patient who received surgery had a lag of more than 20 degrees, at 48 hours postoperatively, regardless of the duration of intraoperative time used.
Conclusion: Although the total surgical time was longer, it does not translated into increased postoperative morbidity. Use of a kinematic navigation system has a short learning curve, and requires an additional operation time of less than 32 minutes. We found no impact of patients´ perioperative times on short-term outcomes obtained during our learning curve and next two years. The mechanical axis of the leg was within 3 degrees of neutral alignment along with accurate component alignment. The Computer-assisted TKA through a lateral parapatellar approach was not associated with delayed recovery of the patients during early postoperative rehabilitation.

P21-880
Comparison of the lateral and medial AMC Uniglide unicompartmental knee replacement at 1 year
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Introduction: Many knee surgeons routinely perform medial UKRs yet still think lateral UKR is an unsatisfactory procedure. This study prospectively compares the outcome of lateral UKR's with medial UKR's using the Uniglide knee implant.
Methods: Between 2002 and 2005 29 lateral fixed bearing Uniglide UKR's were performed at our unit. American Knee Society (AKS), Oxford and WOMAC scores were recorded pre-operatively and one year post-op. The results were compared with the 51 medial fixed bearing Uniglide UKR's performed over the same time period. The mean ages of the patients was 63 years in the lateral and 72 in the medial group, both had a predominance of females patients. There was no difference between the pre-operative scores for the two groups.
Results: At one-year review, the two groups had similar mean scores:

	Lateral	Medial
AKS (Max 100)	95	95
Oxford (Max 48)	39	36
WOMAC (Max 12)	19	20

Both groups achieved median flexion of 125°, the mean pain and function scores were both marginally better in the lateral group.
Conclusions: This study suggests that at one year the quality of outcome of Lateral UKR is at least equivalent to medial UKR. The procedure should therefore form part of the knee surgeons' armamentarium, but the differences in the operative techniques for lateral and medial UKR must be appreciated.

P21-890
MIS computer assisted orthopeadic surgery with ligament balancing technique in unicompartmental knee arthroplasty
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Introduction: Unicompartmental knee Arthroplasty (UKA) has head varying degrese of acceptance since its introduction approximately 30 years ago. UKA is now logical and conservative alternative to total knee replacement when only one compartement of the knee is affected. It is estimated that only 5-6% of arthritis knee are suitable for UKA.
The indication for UKA include osteoarthritis limited to one compartement, a functional anterior cruciate ligament,no inflamatory disease.
Computer assisted orthopeadic surgery with ligament balancing technique is optimal choice for UKA. Kinematic navigation reduces the possibility of surgeons mistake, alignement of the femoral and the tibial component,resection level,soft tissue balancing.Increases the accuracy of the component position,especially on the side of the tibia.
Methods: This study represents series of 126 computer assisted surgery UKAs- Preservation with ligament balancing.We using kinematic navigation Ci system.This is cemented system with mobile or fixed bearing.
Imaging studies: AP,lateral and stress X-rays. Our groups included 72 female and 54 male. Average age 71.2 years. Right side 71 time and left side 55 time.The indications in every cases was osteoarthritis. Arthroscopic medial menisectomy was performed in 25 cases.
Approach: Medial parapatellar arthrotomy.
Results: Range of motion before surgery: S 0-0-120 gr., 6 days after surgery S 0-0-100 gr. and 3 months after surgery S 0-0-125.

Hospital stay: Minimally invasive surgery UKA patients remained in the hospital about half as long as patients who inderwent traditional surgery,an average of 6 days.
Conclusion: UKA together with modern design,reproductible instrumentation and kinematic navigation can eliminate the previous cause of early failures,contralateral tibiofemoral degeneration and tibial loosening.
The patients selection must be strict regarding. The kinematic navigation definite precise position of the components of UKA.
Minimally invasive surgery UKA reduced hospital stay,less pain,shorter total rehabilitation.
A continued long term folow up is necessary to evaluate polyethylene wear.

P21-891
Pigmented villonodular synovitis - an unusual complication of Oxford Uni-compartmental knee replacement leading to failure and revision
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Background: Pigmented Villonodular Synovitis (PVNS) is a rare disease of the synovial membrane. Its relationship to unicompartmental arthroplasty is unknown and it has never been reported as a complication of this procedure
Methods: Retrospective review of the notes of two patients who presented with this rare condition after Oxford unicompartmental arthroplasty (Biomet, UK). We present their cases and discuss the difficulties we faced in their management.
Discussion: These cases are remarkably similar in their presentation. The diagnosis was confirmed histologically in both cases. We mainly focus on the diagnostic difficulties and our treatment strategies in both cases. We also review the current literature on this unusual disease.

P21-892
Prognostic factors affecting outcome of infected TKA
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The infection is the most challenging complication in TKA. Even with successful treatment, several months are required in regaining previous function and some patients never return to the same level of function. The purpose of this study was to identify prognostic factors in the treatment of infected TKA.
From January 1995, 45 knees were treated for infected TKA and all were followed up for 1-10 years. The patients were evaluated based on mode of presentation, micro-organism, treatment methods, primary diagnosis, medical co-morbidity, range of motion(ROM), Hostpital for Special Surgery(HSS) functional score, and numbers of major surgical treatments. The failure was defined as the recurrence of infection. In 2-stage reimplantation group, the frequency of use of extensive approach technique was evaluated.
The overall success rate was 91.1% at final follow-up. The constrained type primary prosthesis showed poor success rate, and there were no differences for other factors. The mean postoperative HSS score was 74.4. Late chronic infection, arthrodesis, and constrained type primary prosthesis showed poor functional scores. In the articulating spacer group and the fixed spacer group, the success rate showed no difference. However, the latter needed more extensive approach techniques and showed worse functional score and ROM.
In the treatment of infected TKA, constrained type primary prosthesis is poor prognostic factor for success, and late chronic infection, arthrodesis, and constrained type primary prosthesis are poor prognostic factors for function. The use of articulating cement spacer in 2-stage reimplatation enabled less invasive approach and provided better function than fixed spacer.

P21-899
Reducing MRSA cross-contamination in an acute surgical unit: Is there a place for alcohol-based gel?
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Background: Cross-contamination is an important source of MRSA infections in surgical patients and is preventable by effective hand decontamination. Although use of alcohol-based gels improve compliance with hand hygiene in intensive care units, there is no evidence that they are effective in acute surgical wards.
Methods: This was a prospective study in a 57-bed acute surgical unit (general and orthopaedic). Alcohol-based gel dispensers (Spirigel®) were attached to each bed for a 12 month period. The installation and annual maintenance costs were estimated. The incidence of MRSA colonization, bacteraemia and significant infection rates were compared in the 12 month periods before and after introduction of Sprigel® as well as compliance amongst HCWs.
Results: Initial installation of Spirigel® and dispensers at each bedside cost £5.07 and annual running costs were estimated at £25.92. MRSA colonization rates were similar before and after introduction of Spirigel®. Rates of MRSA bacteraemia and significant infections decreased from 15 to 6.5 per 1000 patients. 48/70 (69%) of HCWs responded to the questionnaire. 46% reported that Spirigel® caused an uncomfortable feeling and 23% felt that it was more irritating than handwashing. 73% felt that Spirigel® improved compliance with hand hygiene. Overall satisfaction with the product was 75%.
Conclusion: Introduction of Spirigel® at each patient's bedside in an acute surgical unit improves compliance with hand hygiene amongst health care workers. Preliminary data suggests that this translates into a reduction in MRSA bacteraemia and significant infection rates although longer follow-up is required to confirm this finding.

P21-900
Two to five years follow-up of high-flex total knee arthroplasty
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Introduction: Clinical experience has shown the needs for high flexion in patients whose social, religious, occupational activities involve kneeling and squatting. The aim of this study was to evaluate the clinical and radiological results of a fixed bearing, high flexion posterior stabilized total knee arthroplasty (LPS-Flex).
Methods: Between July 2001 and October 2004, 234 total knee arthroplasties in 162 patients were performed with LPS-flex prosthesis and 216 knees of 148 patients had been followed up for 2 to 5 years (mean; 3 years 8 months). Among the 148 patients, 141 patients (208 knees) were female and 7 patients (8 knees) were male. The mean age at the time of surgery was 69 years and mean weight and height were 62.8 kg and 150 cm. The preoperative diagnosis included osteoarthritis in 207 knees and rheumatoid arthritis in 9 knees. We evaluated the clinical outcome by range of motion (ROM), Knee rating system of the Hospital for Special Surgery(HSS) and Knee Society (KS) scoring system, and radiological results by measuring various angles.
Results: The mean flexion improved from 126.8 degrees to 129.8 degrees at the latest follow-up;. 191 knees (88 %) showed more than 120 degrees of flexion, 63 knees (29 %), more than 140 degrees of flexion. The mean HSS score improved from 60 points to 86 points ($p<0.001$). The mean KS clinical score improved from 37.5 points to 93.7 points ($p<0.001$) and KS function score, from 42.8 to 81.2 points ($p<0.001$). In 26 knees, radiolucent line of 1~ 2 mm in width was observed under the anterior part of femoral component without symptoms. Aseptic loosening occurred in 3 knees (2 femoral and 1 tibial components) and revisions had been done. In 2 knees showing mid-flexion instability, thicker polyethylene had been inserted. One knee with limited flexion (80 degrees of flexion) and crepitation at postop. 8 week was successfully managed with arthroscopic debridement and manipulation.
Conclusions: Total knee arthroplasty with LPS-flex showed good range of motion and satisfactory early clinical results. Complication rate was similar to those been reported in other series. However, the long term results remain to be evaluated.

P21-958
Health status of obese patients undergoing total knee replacement
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Intention: Obesity and its effect on the health status is an increasingly important health issue. The objectives of this study were:
1) to evaluate the health status of obese patients with knee osteoarthritis (OA) 12 months after undergoing total knee replacement (TKR) and
2) to identify the influence of sociodemographic and clinical variables on the health status.
Methods: Prospective study with 1 year of follow-up. Health status was measured using the disease-specific WOMAC questionnaire. Sociodemo-

graphic and clinical variables, the number of intraoperative difficulties and complications were collected. The relationships between study variables and health status were analyzed using linear regression models.
Results: Sixty-one patients (54 women, mean age 69.84 years SD 6.86) with a mean body mass index of 39.92 SD 3.66 were assessed in the 12-month postoperative evaluation and included in the analysis. Health status improved at 12 months. There were significant differences in the pre- and postoperative WOMAC pain, stiffness and function dimension scores ($p<0.0001$) and an effect size of 2.06, 1.13 and 2.18, respectively. The number of intraoperative difficulties was associated with worse (higher) scores in all WOMAC dimensions (pain: $p=0.032$, stiffness: $p=0.004$ and function: $p=0.012$). Comorbidity was associated with more pain ($p=0.044$) and worse function ($p=0.001$).
Conclusions: The health status improved significantly at 12 months after total knee replacement. The number of intraoperative difficulties and comorbidities negatively influenced the results of the TKR.

P21-960

Problems encountered with less invasive knee arhroplasty by high volume (> 350 cases) and teaching surgeons (Vienna antomical specimen training center)

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Since June 2005 over 350 patients have been operated on using the Less Invasive Knee Arthroplasty technique as is popularized by the faculty of the Vienna anatomical specimen training center. Favourable results using some form of minimal invasive knee surgery have been widely reported.
When we look at our results the same favourable results can bee seen, but there have certainly been some problems and complications.
We would like to report the on problems that we faced and reflect on them. In Gateshead (UK) and Breda (NL) all patients where operated.
= Gateshead (207 cases)
1- deep infection: 2
2- superficial infection: 0
3- manipulation for persistent stiffness: 0
4- lateral release: 0
5- wound necrosis: 0
6- revision for any reason: 0
7- malalignment: 0
= Breda (170 cases)
1- deep infection: 0
2- superficial infection: 2
3- manipulation for persistent stiffness: 10
4- lateral release: 0
5- wound necrosis: 3
6- revision for Patella: 2
7- rupture of plc and revision of femur: 2
8- malalignment: 1
When we look at the combined group of patients we see that the overal complication rate is low and less than 6 %. When comparing these data to a similar group of conventionaly operated TKA the rate of manipulation for persitent stiffness and infection rates are twice as high.
Literature shows revision for patella problems occurs in about 5% and compared to 0.5% with Less Invasive Knee Arthroplasty.
Wound necrosis occurred in the early cases when too much skin traction was applied all 3 cases subsided without any further problems.
The differences between the two institutes in the need for manipulation for persitent stiffness of the knee can be explained by a different approach of the physiotherapists in the aftercare of Total knee patients.
Overall we may conclude that Less Invasive Knee Arthroplasty is a safe procedure comparable to conventional TKA with a lower complication rate and similar results at one year

P21-962

Comparative study of CPK level fluctuation between patients with acute myocardial infarction and operated patients for total knee arthroplasty

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Objectives: Our study includes 30 patients with acute myocardial infarction (AMI) and 27 patients operated for total knee arthroplasty (TKA) without event of myocardial infarction postoperatively, in order to compare the fluctuation of CPK, CK-MB, CK-MB/CPK and troponin levels, between the two groups and to find out the usefulness of these laboratory tests in the diagnosis of acute myocardial infarction in postoperative period of patients operated for total knee arthroplasty.
Methods: In the TKA operated patients the CPK, CK-MB and troponin levels were measured 24, 48, 72, 120 hours postoperatively. In patients with AMI, CPK and CK-MB levels were measured in the first 5 days of their hospitalisation. The data were analysed with the SPSS statistical analysis program.
Results: In the postoperative period after TKA an increase of CPK and CK-MB levels above normal values was observed with duration of 4 days, without however an AMI event. There was a false elevation of CK-MB/CPK index (increased more than 6%) only the first 12 hours after the operation. No abnormal troponin level increase was observed in operated patients. There was a statistical significant difference between the values of CPK, CK-MB levels and CK-MB/CPK index, of patients experienced AMI and patients operated for TKA ($p<0.005$).
Conclusion: Although an increase of CPK and CK-MB levels was observed, the CK-MB/CPK index constitute useful indices for the diagnosis of AMI, 12 hours after TKA. Besides troponin levels are useful in AMI diagnosis, in early postoperative period after TKA.

P21-983

Alignment of components after unicompartmental knee arthroplasty: do they affect outcome?

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Objectives: Unicompartmental arthroplasty (UKA) has received renewed interest as a treatment option for unicompartmental osteoarthritis and favourable long term clinical results are now commonplace. However, the operation is technically demanding and there is debate over how tolerant the device is to malalignment, especially in the mid to longer term. The commonest malalignment following UKA is varus or valgus of both femoral or tibial components, or variations in the tibial slope. The operative manual for one mobile bearing device (Oxford UKA) states that the acceptable limits are ± 10º for varus/valgus and 7º to -5º degrees for the tibial slope. This prospective study seeks to test the hypothesis that the stated tolerances are correct by comparing the clinical and radiological outcome in patients with differing levels of mal-alignment in both coronal and sagittal planes.
Methods: 212 patients were implanted with the Oxford UKA using a minimally invasive approach. Oxford Knee Scores were recorded before and after surgery at 5 years post-operatively. Radiographic measurements were performed to determine the alignment of components. Preliminary analysis intended to compare outcome (Oxford Knee Score) in patients who were a) within the stated tolerance threshold and b) outside the threshold for varus/valgus and tibial slope for both femoral and tibial components. A secondary subgroup analysis (using 2.5º intervals) investigated the effect of alignment variation on outcome in patients whose devices has been inserted correctly (i.e. within the 10 tolerance threshold).
Results: Very few components (less than 5%) had been implanted with alignment outside the recommended range. The mean alignment of tibial and femoral components was for varus/valgus and flexion/extension (tibial=2.1º valgus, femoral= 1.4º varus, tibial slope=1.8º superior tilt). Comparison between the two groups (inside and outside the threshold) was therefore meaningless. There was no significant difference in OKS between the sub groups of patients with different femoral component angulation ($p=0.49$), tibial component angulation ($p=0.17$) and tibial slope angle ($p=0.81$).
Conclusions: The majority of components in this series were implanted within the stated acceptable limits of angulation. The study therefore cannot address whether these suggested acceptable limits of angulation are correct. However, if components are implanted within this range then the device is tolerant to variation in angulation. Alignment difference (within the threshold) has little or no effect upon longer term outcome.

P21-992

The study of correlation between joint kinematics and polyethilene wear using finite elements method for total knee replacement

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Survival time of total knee replacement represent today a great concern of orthopaedic surgeon and prosthesis desingners too. Loosening of the component especialy the tibial one is the most important cause of total knee replace-

ment failure. During the gait cicle forces developed in the knee have a ciclic patern and a value between 10 and 40 Mpa so the components of artificial joints are subject of intensive stress. Our study try to find using the finite element method the correlation between total knee replacement kinematics and stress concentrationat the level of poliethilene during the gait cicle related of the position of tibial component.
Three dimensional joint reconstructionhas been achieved by serial slices obtained from computer tomografyof the patients and also by radiographs of the joint after knee replacement. The model was constructed usin Pro Engineer soft which is remarcable for its precise geometry. The kinematics of geometric model is based on data resulted from video analysis of images obtained from patients for normal walking before and after total knee replacement. The finite elements of total knee prosthesis surfaces has been developed using a comercial software on previos descriebed three dimensional model. The poliethilene erosion phenomenon may be quantified introducing the results obtained for a movment cycle in mathematic formulas which calculate the quantity of material removed by friction depending on contact pressure. Correlation between TKR kinematics and tibial polyethilene loading have been determined for two different moments of 15 and 20 degrees of flexion corresponding to mid stance of gait cycle. We have analysed the stress distribution and poliethylene wear in medial and lateral compartment in mid stance of gait according to position of tibial plateau.

P21-996
Unicompartmental knee arthroplasty - retrospective study of 25 patients
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Introduction: The appropriate treatment for unicompartmental knee arthrosis remains challenging for orthopaedic surgeons. Valgization and varization osteotomies are a temporary treatment method, and total knee arthroplasty will substitute uninvolved compartments. Unicompartmental knee arthroplasty is a controversial alternative. The advantages are: minimum bone loss, preservation of cruciate ligaments and femuro-patelar joint and early return to mobility. It´s a simple and quick procedure and the infection rate is lower. The authors present the results of 26 unicompatmental knee arthroplasties, all in medial compartment.
Materials and Methods: A revision of surgery records between 2004 and 2006 was made, identifying all cases with unicompartmental knee arthroplasty (25 patients; average age of 27 years; 75% female). The clinical records were reviewed. All patients were submited to a physical examination and a questionnaire to evaluate the functional result (International Knee Society (IKS) score) and the quality of life (EuroQol EQ-5D). Also a radiographic control examination was carried through to evaluate the occurrence of osteolysis, loosening, arthrosis of the other compartments, and femuro-tibial alignment. Results were analyzed with SPSS program.
Results: The functional result was generally good, with a low complication rate and a good quality of life index. Two patients have early aseptic loosening and were submitted to components extraction and total knee arthroplasty.
Conclusions: The unicompartmental knee arthroplasty is an efficient method of treatment with low complications rate and a good functional outcome.

P21-1068
Isokinetic evaluation in patients submitted to total knee arthroplasty by the minimally invasive and transquadricipital approaches
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Introduction: It has been stated that for total knee arthroplasty (TKA), the minimally invasive approach permits earlier rehabilitation because it is not prejudicial for the femoral quadriceps muscle.
Objectives: To verify the influence of preserving the extensor apparatus during surgery, strength of the knee extension and flexion muscles was evaluated in patients submitted to TKA with different approaches.
Methods: The values of maximum torque and total work obtained by isokinetic dynamometry six months after surgery were compared for the MIS group of 12 individuals submitted to TKA by the minimally invasive surgical approach and the Control group of eight others submitted to TKA by the transquadricipital approach, between January 2005 and July 2006.
Results: Statistical analysis of the absolute values of maximum torque and total work corrected by body weights did not show a difference between the two groups.
Conclusion: There was no difference in the extension and flexion strength of the knee muscles six months after surgery.
Key words: Isokinetic torque. Orthopedics. Rehabilitation. Geriatrics. Minimally Invasive Surgery. Degenerative Joint.

P21-1069
Minimally invasive total knee arthroplasty: a comparative study
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Objectives: To compare the evolution of randomly selected patients undergoing TKA using two different access routes and the same analgesia and rehabilitation protocol. To evaluate intra- and postoperative parameters of TKA using a minimally invasive technique and preserving the quadriceps, and compare the outcomes with those of the control group using the transquadricipital access route.
Methods: We used the transquadricipital access route to perform TKA in 18 patients and the minimally invasive technique in 20 patients selected according to specific criteria, such as moderate osteoarthritis, pain without improvement after non-invasive therapy, varus or valgus deformities less than 10°, flexion contracture less than 15°, arc of motion over 90° and ability to understand and follow the recommendations.
The route used in the minimally invasive technique was a medial arthrotomy preserving the quadriceps muscle.
Results: The minimally invasive technique was used to operate 20 patients; mean age 64 years; average weight 78 kg; average height 166 cm; average body mass index 29. The length of incision ranged from 8 to 11 cm (average 10 cm) with 30 degrees knee flexion; the tourniquet time ranged from 109 to 157 minutes (average 137 minutes); the surgery time ranged from 99 to 210 minutes (average 142 minutes). The tourniquet was released intraoperatively in 4 cases. In 6 patients it was necessary to make an incision of up to 2 cm in their vasti medialis. At the end of the 2-month period of physiotherapy, the arc of motion ranged from 0-92 to 0-126 degrees (average 108 degrees). The preoperative HSS score ranged from 41 to 75 (average 58) and after 12 weeks this score ranged from 85 to 98 points (average 93 points), the score difference (evolution) ranging from 23 to 55 points (average 34.6 points). During the early postoperative period, patients used bath chairs on Days 2, 3 and 4 (average number of baths on Day 3), transferred themselves independently on Days 2 to 5 (average number of transfers on Day 4) and elevated the operated limb with their extended knees, between Day 3 and Day 28 (average number of elevations on Day 15). Patients walked independently without a walker as support between postoperative Days 14 and 39 (average of walks on Day 22). The conventional technique was used to operate 18 patients mean age 68 years; average weight 76 kg; average height 159 cm); average body mass index 30 The tourniquet average time was 68 minutes); the average surgery time was 105 minutes. The tourniquet was released intraoperatively in 10 cases . At the end of the 2-month period of physiotherapy schedule, the arc of motion ranged from 0-92 to 0-126 degrees (average 108 degrees). The preoperative HSS (Hospital for Special Surgery) score ranged from 32 to 71 (average 51) and after 12 weeks this score ranged from 75 to to 91 points (average 81 points), the score difference (evolution) ranging from 16 to 44 points (average 31 points).
Conclusions: It is possible to perform total knee arthroplasty through 8-10 cm skin incisions. It is possible to perform total knee arthroplasty via the access route with arthrotomy up to the origin of the vastus medialis and preserve this muscle.

Leg/ankle

P22-228
Outcome of the less invasive stabilization system in the treatment of complex peri-articular knee-fractures in the elderly
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Objectives: To evaluate retrospectively outcome of treatment of distal femur fractures and proximal tibial fractures with the Less Invasive Stabilization System (LISS) in the elderly.
Methods: Out of 422 post-traumatic knee-injuries requiring surgery, 33 patients (35 fractures), older then 68 years, treated with LISS for metaphyseal fractures of the knee were analysed. Thirteen patients suffered of a proximal

tibia fracture and 22 of a distal femur fracture. Median age was 81 years (68-96 years). Reposition and stability were scored using post-operative radiographs. Function was determined by Oxford Knee Score (OKS).
Results: Mean follow-up was 11 months (1-39 months). Four patients died of reasons which are independent of the osteosynthesis. One patient developed a deep infection requiring hardware removal. One patient developed a superficial wound infection. Hardware was removed in 3 patients because of persisting soft tissue irritation. Nineteen patients could be reached for filling out the OKS at a mean postoperative period of 17 months (2-31 months). The mean score of the OKS was 34 (16-54). In 4 patients malreduction was seen without clinical consequences. LISS provided stability in all patients, except for 2.
Conclusion: In the elderly, LISS provides an acceptable complication rate in stabilizing peri-articular fractures of the knee. LISS provides good stability. Postoperative pain and function are acceptable as well.

P22-318
The influence on peroneal reaction time after five days of ankle taping
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Objectives: To study the influence of ankle taping on proprioception and active mechanism of joint protection by indirectly measuring of the proprioception.
Methods: The sample was constituted by 32 healthy subjects randomly assigned to either an experimental group (n=17) or a control group (n=15). Subjects had a mean age of 19 years (min=17-max=24), a mean height of 1,67 m (min=1,48-mix=1,80) and a mean weight of 62,5 kg (min=47,5-max=80,5). The experimental group subjects wore an ankle tape for 5 days. No intervention was done on the control group. Several measurements of the peroneal reaction time (PRT) were done before tape immobilization and after removing it. Measurements were done with a trapdoor and surface EMG. The PRT was calculated with a specific computer algorithm.
Results: The wearing of ankle tape during five days did not influence the peroneal reaction time ($p>0,05$).
Conclusions: It seems the ankle tape does not influence the active mechanism of joint protection of healthy subjects, however the decision to administer it should be thoughtful.

P22-349
Hydroxyapatite as a bone graft substitute in AO type B3 lateral tibial plateau fractures
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Following elevation of all articular fractures, filling of the resultant metaphyseal defect is necessary for maintenance of reduction in tibial plateau fractures. Cancellous bone graft has generally been used to fill these metaphyseal defects, but other bone substitutes have been introduced. The purpose of this study was to examine the relative efficacy of hydroxyapatite(HA) and cancellous bone graft(CB) as graft material for bone defects in lateral tibial plateau fractures.
Between 1990 and 2005 fifty tibial plateau fractures were treated surgically. Among these fifty cases, there were 29 split compression fractures (AO Type B3) in lateral tibial plateau. Twenty cases (12 male, 8 female, average age: 53.4) were filled with HA and 9 cases (2 male, 7 female, average age:57.3) were with CB for bone defect. Roentgenographic and functional assessments were evaluated at follow-up periods averaging 14 months in HA group and 23 months in CB group.
Roentgenography at final follow-up showed 1-2mm depression in 7 patients of HA group and 2mm depression in one patient of CB group. Functional assessments (Hohl's Rating System) showed 13 excellent and 7 good in HA group. However, 5 cases were excellent and 4 cases were good in CB group. The result of HA group was slightly better than CB group.
Our findings suggest that hydroxyapatite is an effective alternative to cancellous bone for the filling of bone defects associated with tibial plateau fractures.

P22-482
Anterior chronic pain of the ankle joint: Role of arthroscopic debridment and osteophytectomy
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Introduction: Anterior ankle impingement syndrome is one of the main causes of chronic ankle pain. It consists of pain in the anterior aspect of the ankle related to dorsiflexion. The main causes of impingement lesions are posttraumatic injuries, mainly ankle sprains, leading to chronic pain. When conservative modalities fail, surgical intervention is indicated. According to the literature, Arthroscopic debridment and excision of osteophytes is the treatment of choice
Material and Methods: A retrospective review was made of 14 patients (7men/7 women) with painful limited dorsiflexion of the ankle not responding to non-operative treatment. The mean age of the sample was 48.3 y/o. An arthroscopic debridment with osteophytes resection was performed. Postoperative, patients followed an intensive rehabilitation program.
The aetiology of the impingement (fibrous vs. bony), improvement in the range of motion, pain relief, complications and posttraumatic arthritis evolution were measured.
Results: In 64% of patients impingement was due to an acute traumatic event. In 36% of the patients impingement was due to minimum repetitive injury.
The preoperative ROM was 12º DF, 23º PF. Postoperative, patients showed a mean of 17º DF and 30º PF. 8/14 patients had a bony impingement syndrome whereas 6/14 had a fibrous impingement syndrome. The preoperative pain according to a visual scale was 5.8/10. Postoperative, pain improved to 3.2/10.
Persistent disabling pain was observed in 2 patients, one of them requiring ankle arthrodesis. 1 patient experienced an infection of arthroscopic portals. 12/14 patients showed an evolutive radiologic osteoarthritis. Only 4 of them showed clinical evolution of osteoarthritis.
Conclusions: Arthroscopic debridment and osteophyte excission is a less aggressive surgical treatment for those patients having an anterior ankle impingement syndrome. Improvement in the range of motion is slight. Nevertheless, a worthwhile pain perception reduction is achieved and is mantained a year after surgery

P22-483
Stress fracture of medial malleolus
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Introduction: Stress fracture of medial maleolus is rare and occurs most often in athletes, runners and basket ball players. It appears in high-risk sports where running and jumping is frequent. The pathogenesis is multifactorial. Repetitive submaximal stress-laoding of medial malleolus is always involved, but the onset of the symptoms is also affected by intrinsic factors, such as hormonal imbalances, and biomechanical factors such as talus with broader neck or abnormal pronation.
Diagnosis: The diagnosis is difficult. The main clinical symptom is localized pain on the medial side of the malleolus, Plain films do not always visualize the fracture and the use of MRI is often needed for early detection of fractures. Missed diagnosis can lead to dislocated fracture.
The present study: We wanted to study retrospective the patients treated from 1994 to 2007 at Hospital Mehiläinen, Turku. There were alltogether 11 patients, all competitive high level track and field athletes or runners. There were 4 females and 7 males, the mean age was 20 years. The diagnosis was verified with MRI. Of the patients, 7 were treated operatively and 4 conservatively.
Conservative treatment included avoiding painful stresses on ankle for three months; patients had to quit jumping and running but were allowed pain free activities and training. If the symptoms did not withdraw in three months or if there were cortical fissure in MRI, an operation was performed with two parallel AO cancellous compression screws. The screws were were removed after 12 months. After the operation partial weight bearing and immediate mobilization of the ankle was allowed according to pain. After 4 - 6 weeks patients were allowed water running, bicycling and gym training. Running was allowed after 8 to 12 weeks and competitive activities 4 to 5 months after the operation.
Results: The result for all patients was good in 10 patients, they returned to previous sporting level after 4 to 5 months postoperatively. One patient was operated 18 moths after the onset of the symptoms when an acute-on-chronic doslocated fracture occurred. The fracture healed well in 3 months. Arthrofi-

brosis complicated the healing, and arthroscopy of the ankle was performed twice.
Conclusions: MRI is necessary for the early diagnosis for patient with chronic pain in medial malleolus. Initial conservative treatment is recomended for three months, but operation should be considered for non-responders after three months and for patients with a cortical fissure line in plain films or in MRI. The result for osteosynthesis is good.

P22-621
Posterior arthroscopic management of subchondral lesion of the talus
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The management of osteochondral defects of the talus remains a clinical challenge as a result of the poor intrinsic healing potential of cartilage. The discussion appears when we try to repair those lesions with an intact hyaline cartilage surface.
Materials and Methods: We evaluated the procedure and the results of seven cases with subchondral lesion of the posterior mild half of the talar dome. The surgical procedures were performed using the posteromedial and posterolateral approaches with the patients in prone position. The softened subchondral surfaces were removed and the grafting procedure was also performed arthroscopically. Autograft obtained from the posterior tibia were introduced and impacted into the defect with the same trocar from the posteromedial portal. The patients were evaluated according Ankle Hind-Foot Score (AHFS), Scoring Scale for Evaluation of Ankle Injurires (SSEAI) and a postoperative radiologic protocol.
Results: At the final follow up, mean 2 years after surgery, according AHFS the mean preoperative result was 65 points and the final follow up was 83.7. Acccording SSEAI the mean postoperative result was 78 points (over a total of 90 points). Radiologically and by CT Scan images, the bone graft was integrated completely. No complications postoperatively were observed.
Conclusion: For subchondral lesions of the posterior mild half of the talar dome with an intact hyaline cartilage surface, the arthroscopic debridement and grafting (obtained from posterior tibia) appear to be safe and better option compared with open surgery.

P22-640
Multilevel analysis: A novel approach for statistical analysis of longitudinal studies in orthopaedics
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Objective: Analysis of functional data from longitudinal studies is usually complicated by missing data. The use of repeated measures ANOVA for statistical analysis tends to decrease the sample size and thus affect power and significance of the results. The present study aims to address this problem with use of hierarchical regression or multilevel modeling.
Methods: We analysed functional results of 4777 patients following hip resurfacing arthroplasty. These patients were followed annually using Harris Hip score and Merle d'Aubigné score. Individual domains of Pain, mobility and range of movement were recorded. The scores comprised a follow up period of nine years with some missing values. The data was analysed using multilevel techniques in statistical package SYSTAT 11.0. Model was fitted at two levels, with level one being the scores and level two the patients.
Results: In all the domains of function, pain and movement, pre operative score and gender were significantly associated with post operative hip function ($p \leq 0.05$). A better pre op score predicted a better post op score and male gender was associated with better overall function. There was a consistent inverse relationship of overall functional improvement with individual domains of pain and movement. This implied that a good pre-operative pain score will have less improvement over time as compared to a poor pre-operative pain score. There was no significant effect of age on the overall functional results ($p = 0.492$).
Conclusions: Functional outcome following hip resurfacing arthroplasty is related to individual changes over time. Multilevel analysis is a useful approach to study repeated measures data with missing values.

P22-717
New endoscopic procedure for peroneal tendon dislocation
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Introduction: In 1803, Monteggia was the first describing peroneal instability in a ballet dancer(1). Peroneal tendon instablity and or dislocation are often associated with sports injuries. Dislocation of these tendons can roughly be classified into superior peroneal retinaculum SPR disorders or a congenital inadequate fibular groove. SPR disorders typically follow an inversion injury to a dorsiflexed ankle. Treatment options include non operative treatment, open surgical procedures or minimally invasive surgery. In 1998, van Dijk introduced the possibility to access the peroneal tendons by tendoscopy(2,3). We introduce a totally new endoscopic technique for peroneal tendon dislocation, based on portals for hindfoot endoscopy, as were introduced by van Dijk et al. in 2000(4).
Methods: The new endoscopic approach was first evaluated in 5 cadaveric specimens for its potential and safety. Subsequently 7 patients (8 ankles, 4 left and 4 right) with persistent peroneal tendon dislocation were treated by using the new technique.
The patient is placed in the supine position and standard postero-medial and -lateral portals are made. An additional portal is made 4 cm proximal to the posterolateral portal. The tendons are dislocated by a probe through the posterolateral portals with a 4 mm arthroscope in the posteromedial portal. A full radius shaver is introduced through the additional portal, directing inferiorly to deepen the fibular groove up to the level where the tendons flip over the lateral malleolus anteriorly. Postoperatively the patient is treated with a cast for 4 weeks and is allowed weightbearing as tolerated.
Results: The endoscopic procedure was tested on the specimens followed by a carefull dissection revealing no damage to the posterior talofibular, syndesmotic or calcaneofibular ligament(s). The fibular groove can be deepened sufficiently resulting in a ridge preventing reluxation of the tendons. In the patient group (average age 39 years), none of the treated tendons reluxated and no complications have been reported at an average of 7 months follow up (Median 6). The patients returned to their former normal daily activity at an average of 2 months (Median 2). The average AOFAS ankle score increased from 60 to 90. The VAS score for pain and dysfunction (analogue scale from 0-10, 10 representing most severe pain or dysfunction), decreased from 7 to 2 and from 6 to 3, respectively.
Discussion: Peroneal tendon dislocation with persisting pain over the lateral aspect of the ankle most often demands surgical intervention. The endoscopic hindfoot approach is nowadays a common technique and is regarded as being a good alternative to open surgery in numerous posterior ankle pathologies. By introducing an additional portal we introduced a new and safe endoscopic technique with sufficient prelimenary outcomes for treating peroneal tendon dislocation. More patients and longer follow-up are required to definitely conclude on the effectiveness of this endoscopic technique.
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P22-829
Treatment of talus osteochondral lesions with microfracture and postoperative intraarticular hyaluronan injection; early functional results
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Osteochondral lesions of talus are rarely seen. The aim of our study is to report the early functional results of the treatment of the talus osteochondral lesions with arthroscopic microfracture technique and of the intraarticular hyaluronan injection postoperatively.
17 patients (10 men, 7 women) are included in this is a prospective, randomized clinical study between the years January 2003 and February 2006. The mean age is 37±10 SD. The patients had chronic ankle pain. 8 patient

had right, 9 patient had left ankle pain. Their MRI revealed osteochondral lesion on the medial (16) and lateral (1) part of the talus. All the patients are treated with arthroscopic "débridement" and microfracture. The patients are mobilized non-weight bearing on postoperative first day and full-weight bearing on postoperative third week. As a second part of the study, 8 patients randomized by envelope are selected to apply intraarticular Hyaluronan (Adant) injection. The injection is performed half dose by starting from postoperative third week, weekly, for 3 weeks. The foot and ankle function index is used for the functional evaluation and the pain category of the Freiburg index is used for the pain evaluation of the patients. The surveys are filled by all the patients preoperatively and ninth week postoperatively. The follow-up period is 1.2 years mean. Findings 12 patients have previous history of ankle trauma. For the biostatistics evaluation of the data, paired t-test is used. The increase in the Freiburg pain index is observed in the evaluation preoperative and postoperative data ($p<0.05$). The effect of intraarticular Hyaluronan injection is found insignificant statistically ($p>0.05$). The Foot and Ankle Index scores revealed a significant clinical improvement only in the categories; walking 4 blocks and walking fast ($p<0.05$). In the injection group, the only significant improvement is observed in the category of walking 4 blocks ($p<0.05$).

There are different developing modalities in the treatment of talus osteochondral lesions. As a result of our study, arthroscopic "débridement" and microfracture is found to decrease the pain and to increase the functional performance. The effect of intraarticular Hyaluronan injection is found to be insignificant compared with the non-injection group. Our patient number is small and follow-up period is short. Multi-centered, prospective and randomized studies are needed for further evaluations.

P22-844

Arthroscopic treatment of a synovial chondromatosis case at the ankle joint

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Introduction: Synovial chondromatosis is rarely seen in the ankle joint. The aim of this case report is to demonstrate the successful clinical result of arthroscopic synovectomy and removal of loose bodies in a patient with synovial chondromatosis in the ankle joint.

Materials and Methods: A 22 years old male patient who had had left ankle pain for four years, came to our clinics with his complaint increased for a year. The pain was increasing especially after playing football. He had no history of trauma. He had swelling and a crackle sensation in the ankle. Before coming to our clinics, he was done two intra-articular steroid injections to the ankle in another hospital. He had no pain relief at all. After history taking, physical examination, ankle x-rays and MRI, we performed an ankle arthroscopy to this patient, by using standard anterolateral portal.

Findings: In the physical examination of the patient, there were pain, swelling and palpable mobile lumps on the anterolateral side of the ankle. The ROM was full except slightly decreased dorsiflexion (10 degrees dorsiflexion). There was no crepitation. Laboratory findings including inflammatory parameters were normal. At x-ray, there were multiple, small calcified nodules on the anterolateral side of the ankle and a bony spur on the anterior surface of the distal tibia. On MRI, there were multiple, isodens nodules in the anterior compartment of the ankle within the hypertrophic synovium.

During arthroscopy, the bony spur on the anterior surface of the tibia was excised together with hypertrophic synovium is found anterior to the lateral malleolus. 20 loose bodies -diameter between 4-9 mm- found within the anterolateral compartment were removed by arthroscopy and sent to the pathology.

The pathology confirmed the diagnosis of synovial chondromatosis; nodular lesions surrounded by synovial cells.

No postoperative immobilization was applied. Postoperatively, the patient was full weight mobilized and accelerated physiotherapy was performed. The patient was free of pain on the postoperative fifth day and he returned back to the school soon after. He was followed up for 3 years. At the end of this period, the patient was symptom free and had normal ankle function.

Results and Discussion: The aim of the treatment of synovial shondromatosis is to decrease pain and prevent progression to the early osteoarthritis. Classical treatment consists of arthrotomy and "débridement". Afterwards, generally immobilization with a cast is required. In this case report, it is observed that healing after arthroscopic treatment requires shorter time compared with arthrotomy. Postoperative immobilization is not required after arthroscopy indeed. But in order to see long-term effectiveness, prospective and randomized studies with more patients and longer follow-up are required.

Foot

P23-296

Active myofascial trigger points on internal gastrocnemius muscle, soleus and/or plantaris as a differential diagnosis of plantar fasciitis in long distance triathletes

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Introduction: Myofascial Trigger Points (MTP) are hyperirritable spots in skeletal muscle that are associated with a hypersensitive palpable nodule in a taut band. The area is painful to compression, causing characteristic refereed pain and hypersensitivity, motor dysfunction and even autonomic phenomena. The pattern of refereed pain and hypersensitivity constitute the key for their identification.

Materials and Methods: Retrospective study of 22 long distance triathletes who presented pain on the plantar surface of heel with a pattern of referred pain and hypersensitivity characteristic of active MTP due to training or competition. This study was made from January 2003 to January 2005: 22 men and 20 women.

We used the diagnostic clinical criteria proposed by Travell and Simons, and we did bipedestation lateral X-rays of both feet to dismiss osseous or soft parts pathologies.

Results: All presented clinic of talalgia with irradiation towards sole forefoot which provoked limp, functional limitation to flexo-extension of ankle in its last 10° with respect to its contralateral, to passive stretching in its last grades and to the highest contraction. We objectified, in all cases, the essential diagnostic criteria proposed but not so LTR. 10 cases presented MTP on the three muscles, 17 cases only in quadrates plantar and 15 cases in internal gastrocnemius and soleus, all of them produced during the segment of race, specifically in the resistance training, on earth in 32 cases and in 10 on asphalt, and as hurtful mechanism they presented the muscular overload. In all cases foot bipedestation lateral X-rays were negative.

Conclusion: MTP of quadratus plantae, internal gastrocnemius and soleus must be considered as differential diagnostic of plantar fasciitis when they achieve the essential diagnostic criteria not to delay the right diagnosis, the appropriate treatment or the beginning of training.

P23-442

Functional Hallux Limitus or Rigidus: A common denominator to Hallux Rigidus, Hallux Valgus and painful compensatory mechanisms during gait - review

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The hallux and its Flexor Hallucis Longus tendon have evolved from a prehensile function to a propulsive one as a dynamic prolongation of a mechanical lever that is responsible for the stability of the foot during propulsion. For them to function adequately as such, providing the foot with stability during the mid stance and push off phase, the first ray and its MTP1 joint must have adequate and painless mobility in the sagittal plane. Functional Hallux Limitus, (FHL) is a loss of MTP joint extension during terminal stance when the weight bearing foot is in maximal dorsal flexion, constituting a sagittal plane blockade. As a consequence the mechanical support and stability mechanisms of the foot are disrupted with important consequences. It is a frequent, though relatively unknown condition that clinicians may overlook when examining patients with foot problems and pain locally as well as distant such as knee, hip and lower back pain.

FHL (Functional Hallux Limitus) may cause local symptoms such as callous formation under the IP, pain over the sesamoids, and retromaleolar pain. It may also reduce the mobility of the subtalar joint leading to poor equilibrium and a higher risk of ankle sprains.

Functional Hallux Limitus whatever the origin, causes increased pressures on the dorsal aspect of the MTP articulation that could induce the degenerative changes on the MTP joint if left untreated. Limited dorsal flexion during the push off phase combined with increased and prolonged pronation of the foot, turns the forces of dorsal flexion on the Hallux into valgus forces acting on the first ray and could well play a role in the development of Hallux Valgus.

A Functional Hallucis Limitus is often locally asymptomatic, however, the sagittal plane blockade it causes, induces compensatory motions during gait that cause symptoms else where such as: femoro patellar pain, tendonitis of the goose web and the iliotibial band, shortening and tendonitis of the external rotators of the hip and lower back pain.
In our opinion, one of the most frequent causes yet rarely identified by clinicians is the insufficient excursion of the Flexor Hallucis Longus tendon at the fibro osseous tunnel.
The purpose of this article is to present a critical review of the literature on the Functional Hallucis Limitus. Expose its possible role in the development of Hallux Rigidus and Hallux valgus. Explain the compensatory mechanisms it induces during gait as well as their clinical manifestations and propose a diagnostic and therapeutic approach.

P23-486
Subtalar osteochondritis in soccerplayers
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Osteochondritis of the posterosuperior area of the talocalcaneal surface is a relatively uncommon injury and only two cases has been described in the literature. We present two cases, soccerplayers, who complained of pain in the tarsal canal area during walking and when standing up without prevoius fractures in this area.
The persistance of pain and lack of improvement with conservative treatment made arthroscopic debridement of this injuries necessary. Debridement of the osteonecrotic areas were performed in both cases. After 18 months of follow up both cases present pain-free, and they returned to soccer play at 5 months after surgery.

P23-699
Incidence of chondral lesions of talar dome in ankle fracture types
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Background: Although the surgical treatment of ankle fractures are well known, a paucity of the literature exists that directly correlates chondral lesions with ankle fracture types.
Methods: This study consisted of a retrospective review of the reports of the patients with absence or presence of chondral lesions that underwent arthroscopy assisted open reduction and internal fixation between June 2002 and April 2005. There were 38 female and 48 male patients. The mean age of patients was 41.4 years. They were followed for a mean of 33,9 months. At the end of the follow-up time, all patients were examined by the Ankle-Hind Foot Scale score. Relationship between fracture types and presence of lesions was evaluated.
Results: Four of 27 fractures with chondral lesions consisted of the bimalleolar type. Six of 15 fractures with chondral lesions consisted of the trimalleolar type. Fourteen of 20 distal fibula fractures had chondral lesions. There were significant increase of chondral lesion in distal fibula fractures. The mean AOFAS score was 95.6 among all fractures.
Discussion: There is clear evidence that despite anatomic reduction, postoperative results of ankle fracture repair are not free of complications. According to our results, we believe that inspection of talar dome should be routinely considered in the surgical repair ankle fractures.

P23-822
Arthroscopic resection of calcaneonavicular tarsal coalition. Anatomical cadavera study and report case
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Introduction: Calcaneonavicular coalition (CNC) is an abnormal fibrous, cartilaginous, or bony connection between calcaneus and navicular and is a relatively uncommon cause of pain and disability in chidren. The clinical picture includes pain and a history of repeated ankle sprains.
The conservative non operative treatment resolves symptoms in about 30 % of patients. In the rest, surgical resection of coalition is indicated and good results are expected. Soft tissues interposition techniques have decreased the recurrence rate.
Objectives: Our goal in this study is twofold:
1) develop an experimental model in cadaver of arthroscopic resection of CNC and
2) report the first in vivo case using this new surgical technique.
Methods: We have used four fresh frozen feet to check the ability of arthroscopic technique to visualize and excise the calcaneo navicular ligament and the anterior process of calcaneum. We have essayed different portals in each foot. Anatomical dissection was performed to check amount of bone resected and distance from portals to neurovascular structures. After this experimental study, we have made an arthroscopic resection of CNC in a girl 12 years old suffering a painful calcaneonavicular syndesmosis with an AOFAS Ankle-Hindfoot Scale of 55 points. To our knowledge, it is the first time this surgery has been done.
Results: Experimental model.
It is possible and safe to perform the surgery. In terms of safety and usefulness best visualization portal is anterior to calcaneocuboid joint and parallel to dorsal surface of cuboid, and best working portal is in line with visualization portal at either the lateral border of extensor tendons or between first and second extensor tendons and aimed perpendicular to visualization portal. In vivo surgery.
At tenth week from surgery the patient was doing dance, sports and running without any limitation. The AOFAS Ankle-Hindfoot Scale was 98.
CT shows complete and adecuate resection of calcaneonavicular coalition.
At 6 months from surgery the AOFAS was 100 and the patient did successfully a 3 days peregrination walking on sandy surface.
Conclusions: It is posible and safe to excise arthroscopically the CNC with faster recovery and satisfactory results.

P23-840
Plantar pressure of clipless and toe-clipped pedals in cyclists - a pilot study
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Objective: To determine the effect of clipless and toe-clipped pedals on plantar foot pressure while cycling.
Design and Participants: Seven bikers and 11 healthy volunteers were tested on a Giant ATX Team mountain bike, Tekscan Clinical 5.24 F-scan® system with an inner sole pressure sensor, a Tacx Cycle force One Turbo Trainer and a Cateye Mity 8 computerized speedometer were used. Plantar pressures were recorded over 12 consecutive crank cycles at a constant speed for each of the power outputs.
Setting: University Medical School.
Main Outcome Measurement: Plantar foot pressure under the metatarsals, and difference in plantar pressures between clipped and clipless pedal.
Results: There was a significant difference in the pressure at many positions of the foot, but the sites were different for each individual. Pedal type exerted a statistically significant effect on plantar pressure on the 1st ($p=0.042$), 3rd ($p<0.001$), 5th metatarsals (<0.001), on the 2nd ($p=0.018$) and 5th toes ($p<0.001$), lateral midfoot ($p<0.001$), and central heel ($p<0.001$) areas.
Conclusion: Clipless pedals produce higher pressures which are more spread across the foot than toe-clipped pedals.

Muscle

P24-121
Myofascial active trigger points in femoral vastus lateralis as differential diagnosis of external meniscopathy in long distance triathletes
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Introduction: Myofascial Trigger Points (MTP) are hyperirritable spots in skeletal muscle that are associated with a hypersensitive palpable nodule in a taut band. The area is painful to compression, causing characteristic refereed pain and hypersensitivity, motor dysfunction and even autonomic phenomena. The pattern of refereed pain and hypersensitivity constitute the key for their identification.

Material and Methods: Retrospective study of 22 long distance triathletes who presented intra-articular pain in external side of the knee, with no possibility to walk and articular locking in flexion provoked by training and competition with a pattern of refereed pain and hypersensitivity characteristic of MTP. This study was made in the period which goes from January 2003 to January 2005: 14 men and 8 women We used the diagnostic clinical criteria proposed by Travell and Simons, we made the exploratory tests of knee designed for meniscopathy and IRM of affected knee as complementary test.
Results: All presented pain in interarticular line with limitation to flexo-extension and to stretching in its last grades. A partial loss of the normal patellar movement. Limp got better when telling the patient to walk on tiptoes from the affected side, since it avoided the total extension of affected knee.
We discovered a restriction to the amplitude of flexion of knee, and we also recognized a muscular weakness without atrophy when compared with the other side, without alteration of the patellar reflex. We objectified all the proposed essential diagnostic criteria of MTP, but in no case it was possible to reproduce manually LTR. Meniscus exploratory tests were positive for external meniscopathy, while knee IRM provided negative result in all cases.
Conclusion: MTP of vastus lateralis are a differential diagnosis when treating external meniscopathy positively clinic and radiologically probed because none of them possess one hundred per cent of specificity and sensitivity.

P24-122

Active myofascial TP on internal gastrocnemius muscle, soleus and/or plantaris as a differential diagnosis of plantar fasciitis in long distance triathletes

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Introduction: Myofascial Trigger Points (MTP) are hyperirritable spots in skeletal muscle that are associated with a hypersensitive palpable nodule in a taut band. The area is painful to compression, causing characteristic refereed pain and hypersensitivity, motor dysfunction and even autonomic phenomena. The pattern of refereed pain and hypersensitivity constitute the key for their identification.
Material and Methods: Retrospective study of 22 long distance triathletes who presented pain on the plantar surface of heel with a pattern of referred pain and hypersensitivity characteristic of active MTP due to training or competition. This study was made from January 2003 to January 2005: 22 men and 20 women
We used the diagnostic clinical criteria proposed by Travell and Simons, and we did bipedestation lateral X-rays of both feet to dismiss osseous or soft parts pathologies.
Results: All presented clinic of talalgia with irradiation towards sole forefoot which provoked limp, functional limitation to flexo-extension of ankle in its last 10° with respect to its contralateral, to passive stretching in its last grades and to the highest contraction. We objectified, in all cases, the essential diagnostic criteria proposed but not so LTR. 10 cases presented MTP on the three muscles, 17 cases only in quadrates plantar and 15 cases in internal gastrocnemius and soleus, all of them produced during the segment of race, specifically in the resistance training, on earth in 32 cases and in 10 on asphalt, and as hurtful mechanism they presented the muscular overload. In all cases foot bipedestation lateral X-rays were negative.
Conclusion: MTP of quadratus plantae, internal gastrocnemius and soleus must be considered as differential diagnostic of plantar fasciitis when they achieve the essential diagnostic criteria not to delay the right diagnosis, the appropriate treatment or the beginning of training.

P24-295

Myofascial Trigger Points in rectus femoris and /or vastus medialis as differential diagnosis of quadriceps tendinitis

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Introduction: The Myofascial Trigger Points (MTP) are hyperirritable spots in skeletal muscle that are associated with a hypersensitive palpable nodule in a taut band. The area is painful to compression, causing characteristic refereed pain and hypersensitivity, motor dysfunction and even autonomic phenomena. The pattern of refereed pain and hypersensitivity constitute the key for their identification. They can activate suddenly, because of an evident muscular overload, or progressively, due to not so evident chronic muscular overloads.
Materials and Methods: Non experimental study, of approaching to reality and of descriptive type, of 33 federated non-professional long distance triathletes who presented pain at the level of patella and just above it with a pattern of referred pain and hypersensitivity characteristic of active MTP proposed by Travell and Simons and we applied exploratory tests of amplitude of mobility to stretching of rectus femoris and vastus medialis.
Results: 18 men 16-42 years old and 15 women 19-33 years old Among men, 10 suffered pain in right side (30.30%), affecting to both muscles in three cases, only to rectus femoris in 5 cases (15.15%) and to vastus medialis in 2 cases (6.06%); and 8 in left side (24.24%) affecting to rectus femoris in 4 cases (12.12% and to vastus medialis in 4 cases (12.12%). 3 cases in swimming (9.09%), 6 on cycling (18.18%) and 9 on running on foot (27.27%). All cases occurred while training, of technique in case of swimming and of resistance in the other segments.
Among women, 8 in right side (24.24%), affecting to rectus femoris in 5 cases (15.15%) and to vastus medialis in 3 cases (9.09%); and 7 in left side (21.21%), affecting to both muscles in 2 cases (6.06%), to rectus femoris in 4 cases (12.12%) and to vastus medialis in 1 case (3.03%). 2 cases on swimming (6.06%), 8 on cycling (24.24%) and 5 while running on foot (15.15%). All cases occurred in resistance training.
In all cases (100%), the essential diagnosis criteria were present and we reproduce both the pattern of refereed pain when pressing a nodule as the LTR manually in both muscles. In the test of exploring the rectus femoris, on extending the hip at the same than producing the flexion of knee, they presented lumbar hyperlordosis and limited the extension of hip (restriction to 0º). In the test of exploration of the vastus medialis, test heel-buttock (with hip flexed 90º and flexing knee till it touches buttock with heel), they did not achieve the maximum flexion (restriction of 10º).
Conclusion: Sudden failing of hip by MTP of rectus femoris and unexpected failing of knee by MTP in vastus medialis use to accompany to pattelar and intrarticular pain in many occasions bad diagnoses as quadriceps tendinitis.

P24-297

Active myofascial trigger points in posterior tibial as differential diagnosis of achilles tendinitis in triathletes

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Introduction: Myofascial Trigger Points (MTP) are hyperirritable spots in skeletal muscle that are associated with a hypersensitive palpable nodule in a taut band. Area is painful to compression, causing characteristic refereed pain and hypersensitivity, motor dysfunction and even autonomic phenomena. The pattern of refereed pain and hypersensitivity constitute the key for their identification.
Materials and Methods: Non experimental study of approaching to reality and of descriptive type of 13 non-federated long distance triathletes (5 men and 8 women) who presented pain in Achilles tendon with a pattern of referred pain and hypersensitivity characteristic of active MTP. We used diagnostic clinical criteria proposed by Travell and Simons, we made exploratory test of Achilles tendon, manual test to evaluate muscular strength and ankle AP/LAT X-rays.
Results: 13 triathletes: 5 men (38.46%) between 21-35 years old (average age 28) and 8 women (61.54%) between 19-23 years old (average age 21). Between men, 3 suffered pain in right side (23.08%) and 2 in left side (15.38%). Between women, 4 suffered pain in right side (30.77%) and 4 in left side (30.77%). All cases presented the essential diagnostic criteria and pain or sensitive alteration when pressing MTP, but we could not reproduce LTR manually in the posterior tibial m., soleus and internal gastrocnemius. They walked with foot in eversion and abduction, with weakness when walking on tiptoes, restriction to dorsiflexion of ankle when they are standing up in eversion and abduction. All cases were provoked by running on foot. No case was positive in exploratory test for rupture of Achilles tendon or presented pathology in X-rays.
Conclusions: MTP of posterior tibial render unfit for marching, use to be confused with entesitis or Achilles tendinitis and this retards treatment.

P24-298

Lumbosciatalgia provoked by active myofascial trigger points in gluteus minimus in triathletes

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Introduction: The Myofascial Trigger Points (MTP) are hyperirritable spots in skeletal muscle that are associated with a hypersensitive palpable nod-

ule in a taut band. The area is painful to compression, causing characteristic refereed pain and hypersensitivity, motor dysfunction and even autonomic phenomena. The pattern of refereed pain and hypersensitivity constitute the key for their identification.
Materials and Methods: Non experimental study, of approaching to reality and descriptive type, of 20 federated non professional long distance triathletes with symptom picture of lumbar pain with inferomedial irradiation in buttock, posterior part of thigh and third posterosuperior of calf with a pattern of referred pain and hypersensitivity characteristic of active MTP in season 2006.
Results: The rank of age between the 11 men (55%) was between 22-36 years old (average age 29), between the 9 women (45%) was 28-32 years old (average age 30).
Between men, 7 cases in left gluteus minimus m. (35%), 3 in right (15%) and 1 bilateral (5%); between women, 4 in left (20%) and 5 in right (25%).
In all cases (100%), the essential criteria were found as present, and we reproduce the refereed painful pattern when pressing nodule, but we could not reproduce the Local Twitch Response by touching.
The diagnosis test of radiculopathy: Lasegue (+) (100% cases), Bragard (+) (100%), inverted Lasegue (-) (100%), walking on tiptoes (-) (100%), walking on heels (+) (100%), Duchenne (-) (100%).
Lumbar spine - pelvis - sacrum AP/LAT X-Rays: dysmetria hemipelvis with concavity L4-L5 towards anterior hemipelvis, hyperlordosis L4-L5 and L5-S1 with narrowing of intervertebral space and sacra horizontalization (100% cases).
Lumbar IRM: dehydratation disks L4-L5 and L5-S1 with narrowing of intervertebral space but without protusion, hernia or medular stenosis (100% cases).
There was no alteration of tendon reflexes in any case.
Conclusion: The affectation by MTP of the gluteus minimus m. has clinic characteristics quite similar to radiculopathy S1.

P24-301
Evaluation of exploratory characteristics of long distance triathletes with active miofascial trigger points in pelvic waist
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Introduction: The Trigger Points (TP) are hyperirritable areas, with sudden or progressive activation of the skeletal muscle in hypersensitive touchable nodule within a tense strip. It causes characteristic referred pain and hypersensitivity, motor dysfunction and even autonomic phenomena. The pattern followed by pain and hypersensitivity become the clue to identity it.
Material and Methods: Retrospective study made with 20 long distance triathletes who presented miofascial active TP in pelvic waist from the period that goes from January 2005 to January 2006: 12 men between 18-32 years and 8 women between 19-34 years.
Exploratory characteristics of active miofascial TG and their objective consequences were studied.
Results: With respect to essential criteria: dense nodule within dense strip, with examination referred pain and painful limitation to passive stretching.
With respect to confirmatory observations: pattern of characteristic referred pain. Difficult reproduction of Local Spasmodic Answer.
With respect to affected muscle: The gluteal muscles were the most affected and the gluteus maximus muscle was the most frequently damaged.
With respect to key observations: evident limp, difficult step of sedestation or decubitus in bipedestation and movements of relieving of affected buttock I sedestation. With respect to the restrictions of mobility: specific for every muscle.
With respect to the muscular weakness: muscular weakness without atrophy.
With respect to the alteration of sinewy reflexes: 3 with weakness of the reflex of the kneecap.
With respect to cutaneous signs: 16 with dermographism and/or hypersensitivity over TP.
With respect to comprehension test: positive in all points.
Conclusion: The only way to diagnose miofascial TP is by means of clinical criteria, helped by certain observations in the patient's attitude and by means of muscular exploration.

P24-848
Changes in skeletal muscle architecture following a cycloergometer test to exhaustion in athletes
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We determined whether a short term exhaustive dynamic exercise (cycling) for about 18 minutes induces changes in the intramuscular architecture of the quadriceps in trained athletes. 35 male athletes (age 28.8 ± 9.8 years; height: 175.4. ± 5.5 cm; weight: 74 ± 11.5 kg; average years spent training: 11.1 ± 8.4 years; mean weekly duration of training: 10.4 ± 3.20 hours) underwent an incremental cycloergometer test to exhaustion. Muscle thickness of the right quadriceps femoris (rectus femoris + vastus intermedius), and the angle of pennation of the right vastus lateralis on the quadriceps tendon were determined by high resolution real time ultrasonography.
Quadriceps thickness increased from 32.1 ± 3.3 mm at rest to 34.9 ± 3.0 mm after the test ($p = 0.001$). The pennation angles were significantly greater after exercise (12.8° ± 2.1° at rest; 14.4° ± 2.5° after the test ($p = 0.001$)). There are marked changes in intramuscular architecture of the quadriceps following a bout of cycloergometer exercise to exhaustion, with significant increase of quadriceps thickness and pennation angle.
Ultrasonography allows to evaluate the changes of muscle architecture following exercise.

P24-940
Operative treatment of ectopic calcifications in athletes
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During years 1987 - 2005 46 cases of ectopic calcification - myositis ossificans - in athletes were seen and treated surgically. There were 42 men and 4 women in the series. The mean age of the patients was 26.5 years (15 -60 years). Ectopic calcifications had grown after a direct or indirect trauma in 37 cases and no sudden injury, but recurrent small injuries and / or overuse caused 9 calcifications. The injuries were related to the sports 30 times and other accidents occurred in 7 of the patients.There were 21 calcification in the thigh, 9 anteriorly, 6 laterally and 6 posteriorly. Posterior ossifications were located near ischial tuberosity. 10 calcification were seen at the groin, hip and buttock area, 5 at knee, 1 in leg, 2 in ankle, foot, achilles tendon and shoulder respectively. The patients has suffered from the injury or growing ossification for approximately 10 months before the surgery (4 to 28 months). The calcification was removed in operation totally or subtotally in 39 cases. It was not possible to remove totally in 6 cases. Later some new calcification developed at the site of surgery in 5 cases. The symptoms before surgery prevented full training and competitions / matches in all of the patients. After surgery 6 of them were not able to return to full activity. The athletes represented following sports: soccer 17, ice hockey 6, endurance running 5, volley ball 4, jogging 3, decathlon , orienteering, sprinting 2 each and weight lifting, judo, hurdles, high jump and tennis 1 each. Ectopic calcification may hamper sports training and stop the sports career. With surgery most of these calcifications can be removed with good end result.

Tendon

P25-62
Proximal hamstring tendinopathy - a poorly known clinical entity in athletes?
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Objectives: Tendon injuries and other tendon disorders are among the most common problems in sports. They are known to be difficult to treat and often result in impaired athletic performance. Chronic tendon problems concerning patellar and Achilles tendons are under continuous research but only limited information exists on proximal hamstring tendon disorders. Proximal hamstring tendinopathy expresses itself by lower gluteal pain. Based on surgical explorations sciatic nerve irritation is occasionally related to this probably

underdiagnosed clinical entity. The main objective of this study was to evaluate the follow-up results of surgery for proximal hamstring tendinopathy in athletes. Typical clinical symptoms, surgical technique and histopathological findings are also shortly presented.
Methods: Ninety athletes with proximal hamstring tendinopathy treated surgically were included. The most common sports among professional and competitive level athletes were long- and middle-distance running and soccer. Recreational athletes were involved in various endurance sports. All patients reported of pain in the lower gluteal region during sports activities. The pain had appeared and increased gradually and in most cases without any acute event. The diagnosis was preoperatively confirmed using an MRI. The operation was performed after failed conservative treatment on average 21 months after the onset of symptoms. In surgery the sciatic nerve was freed and a transverse tenotomy was done to the semimembranosus tendon 3-4 cm distal to the origin. The tenotomized semimembranosus tendon was sutured to the biceps femoris tendon to prevent excessive retraction. Biopsy samples from 15 of the operated tendons were randomly taken and analyzed by a pathologist. A four category rating system was used to evaluate the overall result. At follow-up the patients were asked about possible symptoms and their ability to return to sports.
Results: The average follow-up was 49 months. Of the 90 patients, 82 had excellent or good results and they were able to return to the same level of sporting activity as before the onset of the symptoms. This took a mean of five months (range, 2-12). The typical morphological findings of tendinosis i.e. rounding of tenocyte nuclei, increased ground substance, collagen disintegration and increased vascular proliferation were seen in all biopsies without signs of inflammatory cells.
Conclusions: Given the good functional outcome and low complication rate, the authors advocate surgical treatment in proximal hamstring tendinopathy if conservative treatment fails. It seems that the morphological changes in hamstring tendinosis are largely identical to those previously described in patellar and Achilles tendinosis.

P25-66
Reconstruction of chronic patellar tendon rupture with contralateral BTB autograft: A case report
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Chronic patellar tendon rupture is rare disabling injuries are technically difficult to repair because of scar formation, poor quality of the remaining tendon, quadriceps muscle atrophy and consequent knee contracture. The main goal of treatment is to reconstruct the extensor mechanism in a way which allows active knee extension. Many different surgical methods have been reported for the reconstruction of chronic patellar tendon ruptures. In various combinations, they include preoperative or intraoperative traction, repair with autograft and allograft tissue, and the use of synthetic material. The repair is frequently protected with wire, external fixator and some form of postoperative immobilization is usually recommended. We are reporting our experience with the use of contralateral BTB (bone-tendon-bone) autograft, conjoined with double-loop wire reinforcement and no postoperative immobilization.
The operation was performed in regional anesthesia, with the use of tourniquet. Firstly, a 25-mm long and 10-mm wide BTB autograft, similar to the one used for ACL reconstruction, was taken from the contralateral knee. Secondly, a 15-cm long skin incision was made on the front side of the injured knee. After debridement of the scar tissue in the patellar tendon area, a 25-mm long and 10-mm wide bone trough was created in the tibial tubercle. Using an ACL guide, a guide pin was placed in the patella from the inferior to the superior pole. An X-ray was made to confirm its central position within the patella. A 10-mm tunnel in the central portion of the patella was then created. The tibial bone plug of the autograft was press-fitted into the tibial trough and secured with two screws. Patellar bone plug was pulled through the patella and secured with a screw. Two wire loops, connecting the upper patellar edge with a screw secured to the tibial tubercle, were put as reinforcement. After tightening the wire loops, the knee range of motion was checked. One drain was inserted in the knee and the wound was closed in layers. Postoperatively, a CPM machine was used, were included in his postoperative physical therapy program. Partial weight bearing allowed for the first 6 weeks after the procedure. After that time, he started full weight bearing, had 100 degrees flexion and full extension in his operated knee. Three months after the operation, the left knee flexion increased to 130 degrees, there was full extension and no extensor lag with straight leg raising. Wires and screws were removed 6 months after the operation.
Finally, one year after the operation, our patient had full extension and 130 degrees of flexion in the operated knee. Insall Salvati index on the operated side was identical to the contralateral side. The patient had good quadriceps strength and isokinetic muscle testing showed no deficit comparing to his right, uninjured leg. The patient has continued playing nonprofessional basketball, with no limitation.
In our case, reconstruction of a one-year-old chronic patellar tendon rupture with contralateral BTB autograft and double wire loop reinforcement gave an excellent functional result. Patellar alignment and active range of motion of the left knee were restored and maintained.

P25-216
Ultrasound guided percutaneous electrolysis in patients with chronic insertional patellar tendinopathy: a pilot study
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Purpose: Patellar tendinopathy or "jumper's knee" is considered more a degenerative process than an "inflamed tendinitis" proper. Histopatological studies do not show the presence of the inflamationary cells, rather disruption of the collagen fibres, degeneration (deterioration) of the mixoide anoxic signs of tenocitos. The Percutaneous Electrolysis (PE) ultrasond-guided ,consists in the application of high intensity current through cathodic needles provoking an electro-chemical reaction in the region of the degenerated tendon. The disassociation of the water and salt molecules into their constitutional elements will cause, through ionic instability. The reaction organic produced under the active electrode or cathode needle will provoke very localised inflammation, only and exclusively, in the region we are treating, destruction of nerves that they accompany on the neovessels to the painful patellar tendon.
Materials and Methods: A survival analysis is done, using the Kaplan-Meier method according to the Victorian Institute of Sport Assessment (VISA) classification, on 34 sportsmen with patellar tendinopathy who have been treated with (PE).
The number of knees treated was 39 with an age range of 16 to 53 years (average 25.4 years). Of the 34 patients, 33 were diagnosed with entesopathy of the inferior pole of the patella and only one case presented entesopathy quadricipital associated with entesopathy patellar.The range of clinical evolution was between 4 and 288 weeks (an average of 19,7 months) and the time of absence from sporting activity as a consequence of the tendinopathy covered a range of between 0 and 240 weeks (an average of 12.6 months).
Results: of the 17 patients in GROUP 1, or the worse prognosis, 7 abandoned the treatment. By the 6th. week of treatment 50.2% of the remaining patients had been cured and by eight weeks the cure rate was 77%. 27% of the patients hadn't been cured by the 10th. week of treatment. The average time spent in treatment of those who were cured in group 1 was 6.8 weeks and the average number of sessions required was 17.4. Of the 17 patients in GROUP 2, 15 were cured and 1 abandoned the treatment. The percentage of patients cured was 88% and uncured 11.7%. The average timespan of the treatment was 2.45 weeks and the average number of sessions was 8.7.In the survival function with respect to the time in weeks from the first observation to the last for the group with the worse prognosis (VISA<50) and the group with the better prognosis (VISA<50) there are differences which are statistically significant (p=0,001). Likewise in the survival function with regard to the number of sessions of treatment undergone for group1 and group 2 there are statistically significant differences (p = 0,0006).
Conclusion: It can be seen that the PE technique is highly effective in the treatment of patellar tendinopathy, independently of the duration of its clinical evolution and Blazina classification, 28 patients were in stage III (82.3%) and 6 were in stage II (17.6%).The patients with the better prognosis are the ones that in the first observation had a result of VISA >50, 100% of them being cured after 15 sessions of treatment and in an average of 2.45 weeks. The patients with the worse prognosis are those who have a result of the primary observation <50.Even then, 50% were cured in 17 sessions of treatment and in a period of 6 weeks. The VISA scale is an effective instrument for the prognosis of patients with patellar tendinopathy to whom EPI is applied independently of the duration to clinical evolution.

P25-230
Full symptomatic recovery does not ensure full recovery of muscle-tendon function in patients with Achilles tendinopathy
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Objective: The primary purpose of this study was to assess the relationship between muscle-tendon function and symptoms in patients with Achilles

tendinopathy using a validated test battery.
Method: Thirty-seven patients with clinical diagnosis of Achilles tendinopathy in the midportion of the tendon, with symptoms for more than 2 months, were evaluated at the initiation of the study and after one year. The patients were treated with a rehabilitation program, under the supervision by a physical therapist, for 6 months. The patients were evaluated with the Swedish version of the Victorian Institute of Sports Assessment - Achilles questionnaire (VISA-A-S) for symptoms and a test battery for the evaluation of lower leg muscle-tendon function.
Results: There were significant improvements in the VISA-A-S score ($p<0.00$, n=37) and the test battery ($p<0.02$, n=19) at the one-year follow-up. The VISA-A-S questionnaire had an effect size of 2.1 and the test battery had an effect size of 0.73. A low correlation ($r=0.178$, $p>0.05$) was found between the VISA-A-S score and the test battery. A high correlation ($r=0.611$, $p<0.05$) was found between the Drop CMJ and the VISA-A-S score. All other tests in the test battery had low correlations ($r=-0.305$-0.155, $p>0.05$) with the VISA-A-S score. Only 25 % (4 out of 16) of the patients who had full symptomatic recovery had achieved full functional recovery as measured with the test battery.
Conclusion: Full symptomatic recovery in patients with Achilles tendinopathy does not ensure full functional recovery. The VISA-A-S questionnaire and the test battery are sensitive to clinically relevant changes with treatment and can be recommended to be used in both the clinic and in research.

P25-238

Superior effects of combined cryotherapy and compression vs. sole cryotherapy for Achilles tendon microcirculation - a randomized trial

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Background: Cryotherapy and compression are shown to decrease pain and improve function. In Achilles tendinopathy changes of tendon microcirculation have been described with increased capillary blood flow at the point of pain. However, whether sole cryotherapy exerts differential effects than combined cryotherapy and compression is unknown. We therefore hypothetized that standardized CryoCuff™ ankle changes mid-portion Achilles tendon microcirculation different than sole cryotherapy using a frozen gel (KoldBlue®) during intermittent application in a randomized trial.
Methods: Sixty volunteers (33±12yrs, 33males, BMI 25±5) were randomized for either CryoCuff™ (Aircast, n=30, 32±11yrs, BMI 25±4) or KoldBlue® (TLP Industries, UK, n=30, 33±12yrs, BMI 26±5) intermittent 3x10min application. Mid-portion Achilles tendon microcirculation was determined using continuous real-time assessment with a laser-Doppler-spectrophotometry-system (O2C, Germany) regarding capillary blood flow, tendon oxygen saturation and postcapillary venous filling pressures in 2 and 8mm tendon depth simultaneously in real-time throughout the entire 60 minutes study period.
Results: Both, CryoCuff™ and KoldBlue® significantly reduced superficial and deep capillary tendon blood flow within the 1st minute of application (43±46arbitrary units [AU] vs. 10±19AU and 42±46AU vs. 12±10AU, $p=0.0001$) without a significant difference throughout all three applications. However, during recovery superficial and deep capillary blood flow was re-established significantly faster using CryoCuff™ ($p=0.023$). Tendon oxygen saturation was reduced in both groups significantly (3min CC: 36±20% vs. 16±15%, KoldBlue: 42±19% vs. 28±20%, $p<0.05$) with significantly stronger effects using CryoCuff™ ($p=0.014$). Throughout all recoveries, CryoCuff™ led to significantly higher tendon oxygenation (CC: 62±28% vs. baseline 36±20%, $p=0.0001$) in superficial and deep tissue (CC: 73±14% vs. baseline 65±17%, $p=0.0001$). Postcapillary venous filling pressures were significantly reduced in both groups during application, however CryoCuff™ led to significantly lower pressures (CC: 41±7AU vs. baseline 51±13AU, $p=0.0001$ and KoldBlue® 46±7AU vs. baseline 56±11AU, $p=0.026$ for CC vs. KoldBlue®).
Conclusion: Intermittent Cryo/Cuff™ administration of 3x10min combining cryotherapy and compression is superior to cryotherapy alone regarding Achilles tendon microcirculation. Increased tendon oxygen saturation during recovery and superior reduction of postcapillary tendon venous filling pressures facilitating Achilles tendon clearance of metabolic products are evident with the simultaneous use of cryotherapy and compression.

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Superior Achilles tendon microcirculation in tendinopathy among symptomatic females vs. males

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Background: Higher estrogen levels in females vs. males seem to play a role regarding an increased ligament injury rate among women such as in anterior cruciate ligament injuries. However, gender differences in tendon injury have not been established. In Achilles tendinopathy changes of tendon microcirculation have been encountered with increased capillary blood flow at the point of pain which is closely correlated to neovascularisation found in Power Doppler sonography.
Hypothesis: Female patients suffering Achilles tendinopathy have worse tendon and paratendon microcirculation than symptomatic males.
Methods: A total number of 139 Achilles tendinopathy patients (58 females, 81 males) were analysed according to their gender for tendon and paratendon microcirculatory mapping. Tendon and paratendon capillary blood flow, oxygen saturation and postcapillary venous filling pressures were measured at 2 and 8mm tissue depths. A combined laser Doppler and spectrophotometry system (Oxygen-to-see, LEA Medizintechnik, Giessen, Germany) was used for microciruclatory monitoring. Every subject was measured at both legs at 24 positions for tendon and paratendon microcirculatory mapping, which were placed on the Achilles tendon and the corresponding paratendon positions.
Results: Symptomatic females have similar elevated tendon capillary blood flow as males at four Achilles tendon positions. However, distal medial (83±40 vs. 105±74, $p<0.05$) and lateral (98±49 vs. 121±74) paratendon capillary blood flow were significantly lower among men. Symptomatic females have superior tendon and paratendon oxygen saturation at 11/12 positions ($p<0.05$) as well as reduced postcapillary venous filling pressures at the proximal mid-portion tendon (55±17 vs. 63±20, $p<0.05$) and paratendon (69±19 vs. 77±26) location. Pain level were not different among females (5.3±2.2) and males (5.4±2, $p=0.864$). Females had significantly higher FAOS sports scores (71±22 vs. 64±23 in males, $p=0.041$), while 4 out of 5 other FAOS items were not different.
Conclusions: The hypothesis that female patients suffering Achilles tendinopathy have impaired tendon and paratendon microcirculation compared to symptomatic males and asymptomatic females is rejected based on our data. Symptomatic females have similar elevated tendon capillary blood flows compared with symptomatic males suffering Achilles tendinopathy, but superior tendon and paratendon oxygen saturations and reduced postcapillary venous filling pressures indicating a better tendon and paratendon Achilles tendon microcirculation in females. Gender does play a role in Achilles tendinopathy.

P25-245

Percutaneous repair of the ruptured achilles tendon - a clinical study

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Aim: The optimal treatment of the acute, closed primary Achilles tendon rupture remains controversial. The purpose of this study was to evaluate the results of percutaneous Achilles tendon repair.
Methods: From 2002 to 2005, 39 patients with acute, closed primary Achilles tendon rupture were treated with a modified Webb and Bannister percutaneous repair technique. The mean age was 36.5 (21-57) years and the male-female ratio was 31/8. There were 32 athletes in the study group. The mean follow up period was 26 months (range, 19-32 months)
Results: All patients recovered and returned to work at 6 weeks and to sports at 5 months (4 to 6.5 months). Functional assessment using the American Orthopaedic Foot and Ankle Society scale was statistically significantly improved. Thirty three patients (87%) achieved a score of excellent to good, using the 100- point Hannover Achilles Tendon Score. Subjective results were excellent to good in 89% of the patients. There were two patients (5%) with partial re-rupture treated conservatively, 2 patients (5%) with persistent paresthesia in the sural nerve territory, and 1 patient (2.5%) with infection. Thickening of the tendon (delayed healing) occurred in 3 patients. The mean plantar flexion strength compared with the uninjured side was 92%. The time before returning to sports activities ranged 4 to 6.5 months.
Conclusion: On the basis of the results, the (modified) percutaneous Achilles tendon repair proved to be a safe and reliable Achilles tendon repair method with low rate of complications and excellent functional results comparable to open repair

P25-248

A new surgical method to treat neglected ruptures and reruptures of the Achilles tendon

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Background: In patients with a neglected rupture or rerupture of the Achilles tendon, the recommended treatment is surgical. Various surgical techniques have been reported in the literature; however, the outcome is rarely evaluated with a sufficiently long follow-up, using appropriate end-points.

Purpose: The purpose of this study was to evaluate the subjective and objective outcome following a new surgical treatment for neglected rupture or rerupture of the Achilles tendon using augmentation with a free gastrocnemius aponeurosis flap.

Methods: A total of 28 consecutive patients (21 male and 7 female) with a mean (SD) age of 46 (10.4) years were evaluated at a median (range) of 29 (12-117) months after surgery. The surgical technique involved making a single incision and then using a free gastrocnemius aponeurosis flap to cover the tendon gap after an end-to-end suture. The patients were evaluated using the Achilles tendon rupture score (ATRS) and a detailed questionnaire relating to symptoms, physical activity and satisfaction with treatment. The functional evaluation consisted of a validated test battery measuring different aspects of muscle/tendon function of the gastrocnemius/soleus and Achilles tendon complex.

Results: The mean (range) ATRS was 92 (13-100). There were no reruptures. In terms of surgical complications, there was one deep infection, three wound closure complications and deep venous thrombosis in two patients. All but one patient returned to work within six months of surgery. Sixteen (57%) patients were completely satisfied with the treatment. There was a significant decrease in the level of physical activity after the injury compared with before the injury (p=0.004). Of the 25 patients who participated in recreational sports prior to injury, 13 (52%) returned to the same activity level after treatment. In terms of jump performance, no significant differences were found between the healthy and injured sides. There was, however, a significant decrease in strength, in terms of both concentric and eccentric-concentric toe raises and the toe-raise test for endurance compared with the healthy side.

Conclusion: The use of a free gastrocnemius aponeurosis flap to treat neglected ruptures and reruptures of the Achilles tendon rendered a good overall subjective and objective outcome in the majority of patients. The use of a single incision in combination with a free flap augmentation produced favourable results.

Key words: Achilles tendon, Rerupture, Neglected rupture, Free flap, Augmentation

P25-283

A new surgical technique for lengthening quadriceps and patellar tendon and reducting of the late congenital dislocation of the knee

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We applied a novel surgical technique for the quadriceps and patellar tendon lengthening and an osteotomy for correction of the distal femur in Congenital Dislocation of the Knee (CDK) surgery, which is herewith described. The family has seven children. Three of the children have CDK on their left knees.

Case 1: M.K., 7 years old boy. At physical examination, left knee is found in a fixed 40 degrees of extension. Radiographies confirmed the presence of dislocation and both femoral condyles were found dysplastic and weight bearing surfaces of the condyles were facing 40 degrees anteriorly. An anterior longitudinal incision extending from anterior surface of 1/3 upper thigh to the tuberositas tibia was made. Following the skin incision, tendons of quadriceps and patella were longitudinally splitted midway manner from the proximally to the patellar poles. The tendinous part of the quadriceps and patellar tendons which covers the patella were dissected from the bone. Patellar tendon was sectioned laterally at the distal end, as qudriceps tendon was sectioned medially at its proximal end. Anterior cruciate ligament was longer than normal and somewhat lax. İn order to achieve the stability, an antecurvation osteotomy was performed by removing a 40 degree wedge posteriorly at the supracondylar area and fixed with an angular plate. Divided parts of the tendons were sutured while the knee in 90 degree flexion. And an above the knee cast was applied in that position for a period of 6 weeks postoperatively. A stabile union in osteotomy site was seen at third month. At 6th month follow-up, 100 degrees of knee flexion obtained. He can extend his knee to the last 20 degrees of extension. Walking pattern of patient was improved nearly normal.

Case 2: E.K., 1 years-old boy. His left knee flexion was found limited by 30 degrees. He also had teratologic hip dislocations bilaterally. He was operated with the same technique as described above with the exception of femoral osteotomy. The ACL looked normal and femoral condyles were found not so dysplastic as of his brother's. Postoperatively follow up was the same. At 6th month follow-up, 120 degrees of knee flexion obtained.

Case 3: 16 years old girl. She has left CDK similar to that of her brothers'. She also had learning disability, was bed-bound and has never ambulated. So, in that case we do not plan any surgical intervention.

The goal of the treatment in CDK is to obtain adequate ROM for daily life activities. The most important obstacles in reduction of the dislocated knee are tightness anterolateral capsule and shortness of the quadriceps mechanism. Conservative treatment was suggested below the age of 6 months. As surgical treatment many methods have been described. Such as cutting the patella in the midway longitudinally along with quadriceps and patellar tendons. Some other authors accomplish the lengthening quadriceps tendon by V or Y plasties. In our technique, lengthening of the quadriceps mechanism is achieved by dissecting and detaching the tendinous part of the quadriceps and patellar tendons as described.

Genetic nature of the syndrome was supported by the existence of three affected members of the same family. Lengthening of the quadriceps mechanism in CDK can be achieved without dividing the patella or using allografts. Due to dysplastic changes of the condyles, reduction of joint becomes almost impossible. A supracondylar femoral flexion osteotomy may solve the problem.

P25-308

Total Achilles tendon rupture: Comparison of various pathologies. A clinical, radiological and biomechanical study

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Objectives: Percutaneous suture is the gold standard of treating acute total achilles tendon rupture today. Nevertheless, wound healing deficits, reruptures and chronic ruptures may require complex reconstruction.

The aim of this study is the comparison of functional and radiological changes after achilles tendon rupture and surgical reconstruction techniques.

Methods: All patients were diveded into three different groups: Group 1 included 12 patients with acute Achilles tendon rupture who were treated with percutanous suture, Group 2 included 6 patients with chronic rupture who were treated with complex reconstruction. Group 3 included 5 patients with wound healing deficits who as well underwent complex Achilles tendon reconstruction. All surgeries were performed between 1998 to 2005 by the senior author. Subjective evaluation contained the Achilles Tendon Total Rupture Score (ATRS; results range 0-100, 0=max, 100=min), and the VISA-A score (designed by the Victorian Institute of Sport Assessment; results range 0-100, 0=min, 100=max)and the the Visual Analog Scale (VAS; 0=min, 10=max) for pain and function.

The level of calf muscle strength was evaluated by bilateral isokinetic measurement.

Radiologic diagnostic devices such as bilateral sonography and MRI of the formerly ruptured tendon were done to get objective information about the condition of the tendon. For statistic evaluation we used the student's t-test to compare the groups. Significance level was $p < 0,05$.

Results: The most frequent cause of Achilles tendon rupture was a sports injury (tennis 26,1%, soccer 13,0%). Rupture of left Achilles tendon occurred more frequently significantly (left: 19 patients= 82,6%, right: 4 patients= 17,4%).

The VAS of pain showed a result of 0,8 in group 1; 1,3 in group 2 and 0,5 in group 3 (0=no pain, 10=maximum pain). The VAS of function showed a result of 7,29 in group 1; 7,3 in group 2 and 7,5 in group 3.

The VAS of satisfaction results: 7,8 in group 1, 7,8 in group 2 and 7,3 in group 3.

The average ATRS was 26,25 in group 1; 20,0 in group 2 and 31,0 in group 3.

Results of the VISA-A score: 75,4 in group 1; 78,1 in group 2 and 84,2 in group 3.

Isokinetic measurement results of formerly ruptured side compared to contralateral uninjured side: group 1: 79,7%, group 2: 77,7%; group 3: 71,3%.

Sonography (S) and Magnetic Resonance Imaging (MRI) showed similiar results concerning maximum mediolateral diameter of the achilles tendon. Group 1: 15,8mm (S) and 16,6 mm (MRI); group 2: 20,4 mm (S) compared to 21,1 mm (MRI); group 3 22,0 mm (S) and 24,3 mm MRI.

1 patient (8,3%) of group 1, 5 patients (83,3%) of group 2 and 3 patients

(60,0%) of group 3 showed inhomogeneity of the achilles tendon in MRI.
Conclusion: Objective diagnostics have shown that there is a significantly better isokinetic function and significantly less tendon thickening after percutanous suture.
As we found no significant differences in subjective scoring in the long-term results of Achilles Tendon function, pain and satisfaction but significant diffenrences in objective diagnostics this study emphasizes the importance of both radiologic and isokinetic diagnostic devices to evaluate the condition of Achilles tendon after rupture and reconstruction.

P25-438
Graft-bone tunnel interfacial stress analysis
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Introduction: A common technique in anterior cruciate ligament (ACL) reconstruction is to use endo button fixation. This technique initially constrains the graft at the femoral tunnel exit but allows relative graft-bone tunnel motion. This relative motion may effect the healing at this interface. Several studies have focused on different factors that may affect this healing1, 2.
In this study, the effect of different amounts of graft-bone healing on graft stress and motion are examined.
Methods: A finite element model was constructed of a bone with a tendon graft. The bone was as a taken cylinder having a diameter of 60 mm and a height of 10 mm. The cylinder consisted of cancellous bone and a layer of 1.0 mm layer cortical bone. The diameter of the cylindrical graft was taken to be 2.4 mm and the length of the graft was 15 mm. This model is shown in Figure 1.

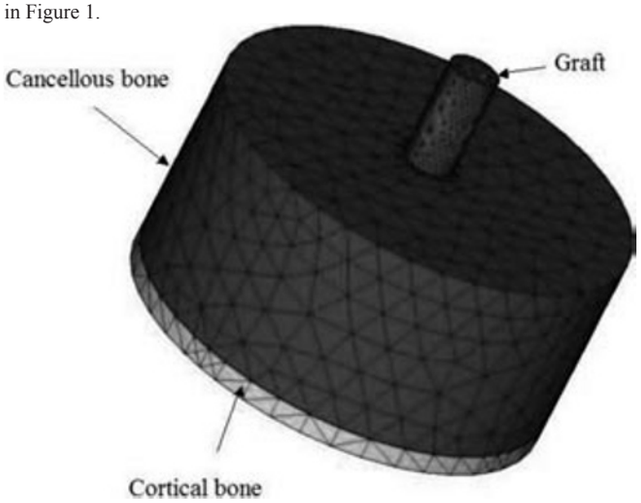

Figure 1 Finite element model of bone and graft

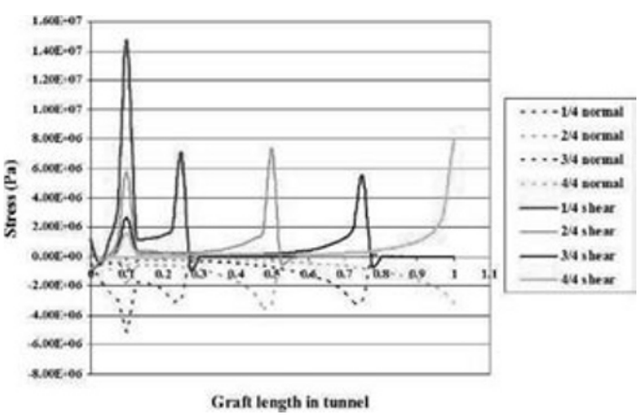

Figure 2 radial and axial graft stress

The bone was assumed to be a linearly elastic material with the modulus of elasticity for cancellous and cortical bone taken to be 280 MPa and 17.6 GPa, respectively, and the Poisson's ratio was 0.33. The modulus of elasticity of the tendon was taken to be 788 MPa and the Poisson ration was 0.494. Displacements on the perimeter of the bone cylinder were constrained. To simulate different amounts of graft-bone healing, the different lengths of the perimeter of the graft were modeled as bonded to the bone. The different bonded lengths were ¼, ½, ¾, and 4/4 of the total tunnel length. The bonding between the graft and tunnel is the model of healing. This distance is as measured from the tunnel exit. A uniform axial tensile loading of 50N was applied to the opposite (free end) of the graft.
Results: Figure 2 shows the normal stress and shear stress on the graft surface along the graft length for the different bonded lengths. Figure 3 shows the plot of the axial and radial graft displacement along the graft length as a function of the bonded length.
Discussion: From Figure 2, it can be seen that four cases have similar maximum surface normal stress and shear stress, which occurs at the beginning of the bonded length. Outside of the bonded region, both shear and axial surface graft stresses are zero. At the interface of cortical bone and cancellous bone, maximum shear stress drops significantly with the increase in the bonded area.
As for displacement (Figure 3), the axial displacement of the graft is much larger than the radial decrease in diameter. The main axial displacement of the graft occurs outside of the bonded area. In contrast to this the maximum radial displacement is the same regardless of the bonded length, however, increasing the bonded length does decrease the length of the graft that experiences the maximum radial displacement.

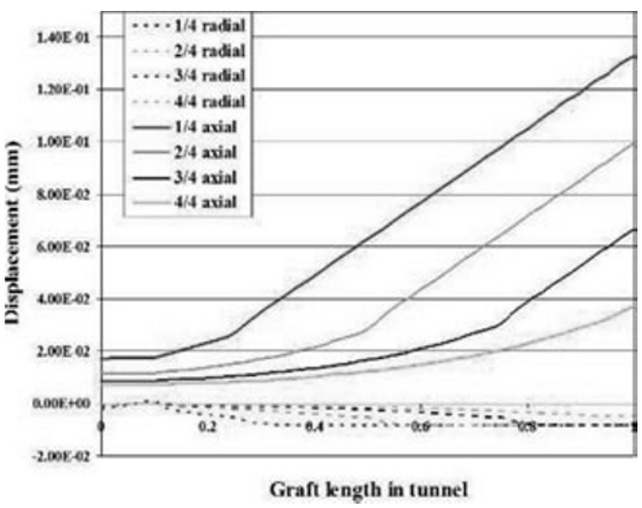

Figure 3 radial and axial graft displacement

This study involves a linearly elastic analysis and as such the stresses and displacement in all cases scales with the applied load. This study assumes that healing at the bone-graft interface proceeds from the tunnel exit (location of endo button fixation) to the entrance. A further limitation of the study is that the interface tissue at the bone-graft interface has material properties of the graft. Alternative possibilities are that tissue healing (bonding) occurs over the entire tunnel length with time.

P25-444
Prospective randomised study on the effect of autologous platelets injection in lateral epicondylitis compared with corticosteroid injection
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Lateral epicondylitis is the most common condition of the elbow. Duration of symptoms can last weeks to years, with an average duration of 9 months. Histological specimens from chronic cases show that it is not an inflammatory condition, but rather an angiofibroblastic degeneration caused by failure of normal tendon repair mechanisms, including vascular responses.
Corticosteroid injection is known as the golden standard in the treatment of lateral epicondylitis and is shown relieve symptoms. However, the positive effect lasts for a limited period of time; approximately 6 weeks. On top of that, corticosteroids do not stimulate tendon healing.
We studied the experimental treatment with injection of autologous platelets, since platelets contain growth factors, which are necessary for tissue regeneration. We obtained platelet rich plasma (PRP) by centrifugation of

autologous blood. The PRP is reported to have a 5-8 times higher concentration than does whole blood.
Patients included in this trial had symptoms for more than 6 months, a VAS-score over 5 and had no effect on bracing or physical therapy. Patients excluded from this trial had an active bilateral epicondylitis, preceding surgical treatment, corticosteroid injection in the last 6 months, or if pain may be caused by other conditions. The study was designed as a prospective double-blind RCT, level 1. 60 patients were included. Follow-up occurred after 4-8-12-24 and 52 weeks after the injection using VAS- and DASH-scores.
We saw a significant decrease in the scores after 4, 8, 12 weeks in both groups compared to the initial scores. However after 24 and 52 weeks the corticosteroid group did not have a significant improval anymore, but the PRP group remained at low VAS and DASH scores.
We conclude that injection of PRP has a positive effect on the course of lateral epicondylitis, the effect actually exceeds the effect of corticosteroids, known as the golden standard. It is therefore a worthy alternative to surgical treatment. However, further research is needed to gain insight in the effect of PRP and the various GF's.

P25-575

Tendoscopy and peroneal vincula: A cadaveric and histological study

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Objectives: Peroneal tendons possess a vascular supply through a mesotendineal structure named vinculum; vincula are identifiable with tendoscopy and are supposed to play a role in tendon healing response, due to prominent vascularity; aim of the study is to verify the feasibility of tendoscopy in evaluating peroneal tendons, to clarify the histological structure of peroneal vincula and to investigate the presence of nervous tissue, so formulating a hypothesis regarding the functional role of vincula
Methods: Cadaver study was performed on 8 fresh-frozen ankles; dissection were conducted to verify accessibility of endoscope, proximity with superficial peroneal nerve and presence of vincula; samples of vincula were obtained; light microscopy and immunohistochemistry (anti-humanS100antibody) were performed, describing structure of vincula and identifying peripheral nerve fibers.; 5 peroneal vincula biopsies were analyzed from patients affected by ankle instability and undergoing tendoscopy for peroneal tenosynovitis.
Results: Peroneal tendons are accessible along the whole common tendon sheath and a discrete distance between the endoscope and the superficial peroneal nerve is present in all specimens; a membranous mesotendineal structure was found in all specimens between both tendons and tendon sheath; macroscopic inspection revealed the presence of a vessel network, arising from the sheath toward the tendon; light microscopy of cadaver samples confirmed the presence of multiple vessel branches crossing the entire structure of the vinculum and identified nervous structures close to the vessels, resembling a neurovascular bundle; immunohistochemical analysis revealed nerve fibers in each specimen; tendoscopy in patients affected by ankle instability showed lesions of the vincula and histology from intraoperative biopsies showed presence of nerve fibers.
Conclusions: Tendoscopy is a useful tool to visualize peroneal tendons and to diagnose and treat different disorders; although literature provides no data about innervations of peroneal vincula, the study shows nervous fibers consistently present inside the intimate structure of vinculum; besides its function in repair and healing processes, this suggests a proprioceptive role of the vinculum in peroneal tendon physiology and lesion of vinculum could be an important element acting synergistically with joint capsule and surrounding tissues lesions and ultimately leading to clinical pictures of ankle instability.

P25-635

Comparative analysis between cyclic and static loading of the knee flexor tendons: a study of young adult cadavers

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During knee ligament reconstruction, a cyclic or static load is applied to the tendon graft to produce graft tensioning before fixation. Although this procedure is part of the surgery, there is no consensus in international literature regarding the best tensioning method to be used in this procedure. This study was conducted on 18 tendons of the human gracilis muscle and eighteen tendons of semitendinosus muscle removed from nine male cadavers, whose mean age was 22.44 years. The tendons were divided into two groups. The first group of tendons was subjected to ten in vitro cyclic loads at 2.5% level of deformation and the value of the deforming load used for each cycle was recorded. The second group was subjected to a static load at 2.5% level and the value of the deforming load used for each minute was recorded. The ANOVA demonstrated that during cyclic loading, the reduction in force values tend to stabilize after the sixth cyclic load, while in the case of static loading, this stabilization occurs by the second minute. When both types of loading were compared, static loading presented a mechanical response that was similar for both tendons studied, while in the case of cyclic loading, the tendons responded differently to the same mechanical stimulus. This fact should be kept in mind since these tendons are conjunctively used during surgical reconstruction of the knee ligament.

P25-815

Light microscopic histology of supraspinatus tendon ruptures

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We analyzed the morphological features of the human surgical specimens of supraspinatus tendon from patients with rotator cuff tears. Tendon samples were harvested from 31 subjects (21 men and 10 women; mean age 51 years, range, 38 to 64) who underwent arthroscopic repair of a rotator cuff tear, and from 5 male patients who died of cardiovascular events (mean age, 69.6 years). Histologic examination was performed using Haematoxylin and Eosin, Masson's Trichrome, and Van Gieson's connective tissue stain. The specimens were examined twice by the same examiner under white light and polarized light microscopy. Particular effort was made to asses any evidence of the changes associated with tendinopathy. Within each specific category of tendon abnormalities, the chi square test showed significant differences between the control and ruptured tendons ($P < 0.05$). Using the kappa statistics, the agreement between the two readings ranged from 0.57 to 0.84. We found thinning and disorientation of collagen fibers and chondroid metaplasia to be more pronounced on the articular side of the specimens from patients with rotator cuff tear ($P < 0.05$). The present study provides a description of the histological architecture of human surgical specimens of normal supraspinatus tendon from patients with rotator cuff tears, and demonstrates more frequent tendon changes on the articular side of the rotator cuff.

P25-823

Tenotomy versus tenodesis in the management of pathology of the tendon of the long head of the biceps brachii

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Background: Primary and secondary pathology of the tendon of the long head of the biceps brachii is common, with no clear consensus about its optimal management.
Hypothesis: No difference in outcomes of tenotomy and tenodesis for pathology of the tendon of the long head of the biceps brachii.
Study Design: We performed a comprehensive quantitative review of the published English language literature comparing the outcomes of tenotony and tenodesis pathology of the tendon of the long head of the biceps brachii.
Methods: All relevant articles in peer-reviewed journals were retrieved, and each article was scored using the Coleman Methodology Score, a highly repeatable methodology score, by two independent reviewers.
Results: Scores were predominantly low for quality of the studies, with patient number and validated outcome measures being the weakest areas.
Conclusion: There is a lack of quality evidence to advocate one technique over the other. We emphasize the need for appropriately powered well conducted randomised control trials comparing the outcomes of these two procedures.
Clinical Relevance: Biceps pathology is a common condition. There is no evidence base for its most appropriate management.

P25-826

Characteristics at haematoxylin and eosin staining of ruptures of the long head of the biceps tendon

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Objective: To examine the relative prevalence of histological changes which have been associated with the process of tendinopathy in lesions of the tendon of the long head of the biceps brachii. To evaluate the reliability of histopathologic evaluation of tendon tissue in lesions of the tendon of the long head of the biceps.

Design: Tendon samples were harvested from 51 patients (31 men, 20 women; mean age, 63.2 years) who underwent arthroscopic release of the LHBT because of refractory biceps tendinopathy, and from 5 male patients who died of cardiovascular events (mean age, 69.6 years). Histologic examination was performed using Haematoxylin and Eosin stained slides that were interpreted using a semiquantitative grading scale assessing fiber structure and arrangement, rounding of the nuclei, regional variations in cellularity, increased vascularity, decreased collagen stainability and hyalinization.

Results: The mean pathologic sum-score of ruptured tendons was greater than the mean pathologic score of control tendons (15.76 ± 3.11 versus 3.4 ± 1.9, P 0.001). Within each specific category of tendon abnormalities, the chi square test showed significant differences between the control and ruptured tendons; all the variables were significantly different (Mann-Whitney U-test 0.05, P 0.001). Using the kappa statistics, the agreement between the two readings ranged from 0.53 to 0.85

Conclusions: Unruptured tendons of the long head of the biceps, even at an advanced age, and ruptured tendons of the long head of the biceps are clearly part of two distinct populations.

Key words: long head; biceps tendon; tenotomy; Histology; Shoulder; Arthroscopy.

P25-831

Gene expression and protein analysis in ruptured human Achilles tendons

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We studied the extracellular matrix of 19 ruptured human Achilles tendons, comparing the composition of specimens harvested from area close to the rupture with specimens harvested from an apparently healthy area in the same tendon. We compared he gene expression and protein localization of collagen type I, decorin and versican including enzymes involved in their metabolism as matrix metalloproteases (MMP-2 and -9) and tissue inhibitory of metalloproteinase (TIMP-1 and -2) using a Real Time PCR, zymography and FACE analysis. There was greater gene expression of proteoglycans core protein, collagen type I, MMPs and TIMPs in the area close to the tendon rupture. The expression of MMPs was confirmed by zymography analysis. The chemical composition of tendon changes showing that carbohydrate content is higher in the macroscopically healthy area than in the ruptured area. In the ruptured area, there was increased core protein synthesis but without the normal glycosaminoglycan production. The tissue in the area of rupture undergoes marked rearrangement at molecular levels, and support the role of MMPs in the tendon pathology.

Type of Study and Level of Evidence: Investigating the effect of a patient characteristic on the outcome of disease using a molecular approach. Level I

Key words: Achilles tendon, Collagen, Versican, Decorin, Tendinopathy

P25-862

High volume image guided injections in chronic Achilles tendinopathy

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Purpose: To determine the effectiveness of high volume image guided injections (HVIGI) for chronic Achilles tendinopathy.

Methods: We included in the study 30 consecutive patients (mean age 37.2 years, range 24 - 58 years) with Achilles tendinopathy for a mean of 35.8 months (range 2 - 276 months) who had failed to improve after a three month programme of eccentric loading of the gastro-soleus complex. Patients were injected with 10 ml of 0.5% Bupivacaine Hydrochloride, 25 mg Hydrocortisone acetate, and up to 40 ml of injectable normal saline. A study-specific questionnaire and the Victorian Institute of Sport Assessment - Achilles tendon (VISA-A) were retrospectively administered to assess short- and long-term pain and functional improvement.

Results: 21 patients (70%) responded. Patients reported significant short-term improvement at 4 weeks of both pain (mean change 50 mm, (SD 28, $p<0.0001$), from a mean of 76 mm (SD 18.2), to a mean of 25 mm (SD 23.3)), and function scores (mean change 51 mm, (SD 31.2, $p<0.0001$), from a mean of 78 mm (SD 20.8), to a mean of 27 mm (SD 28.4)). Patients also reported significant long-term improvement in symptoms using the VISA-A questionnaire (mean change 31.2 points, (SD = 28, $P<0.0001$), from a mean of 44.8 points (SD 17.7), to a mean of 76.2 points (SD 24.6)) at a mean of 30.3 weeks from the injection.

Conclusions: HVIGI significantly reduces pain and improves function in patients with resistant Achilles tendinopathy in the short- and long-term.

P25-868

High volume ultrasound guided injections at the interface between the patellar tendon and Hoffa's body are effective in chronic patellar tendinopathy: A pilot study

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Purpose: To evaluate a novel conservative management modality for patellar tendinopathy.

Methods: We recruited 9 patients with patellar tendinopathy who had failed conservative management and showed evidence of neovascularisation on power Doppler scanning. A high volume ultrasound guided injection at the interface between the patellar tendon and Hoffa's body. The injection contained 10 ml 0.5% Bupivacaine, 25 mg Hydrocortisone, and between 12 to 40 ml normosaline. 100 mm visual analogue scales (VAS) for pain and for function, and Victorian Institute of Sport Assessment - Patellar tendon (VISA-P) questionnaires at an average of 9 months from the injection.

Results: All but one patient (whose pain was unchanged) improved ($p=0.028$). The mean improvement in function 2 weeks after injection was 58 mm on VAS (interquartile range 27 to 88, $p=0.018$). The mean improvement in pain 2 weeks after injection was 56 mm on a VAS scale (interquartile range 32 to 80, $p=0.018$). At a mean follow up of 9 months, an improvement of 22 points from a baseline score of 46 on the VISA-P questionnaire (100 being normal) was established.

Conclusion: High volume injections to mechanically disrupt the neovascularisation in patellar tendinopathy are helpful in the management of this condition. Controlled trials would be warranted to investigate in a more conclusive fashion this management modality.

P25-959

Type-I collagen membrane as a scaffold for tendon repair: An in vitro and in vivo study

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Aims: Bioscaffolds have been proposed as alternatives to auto-, allo-, xeno- and synthetic grafts in tendon and ligament repair and substitution. A new type-I collagen membrane developed for use as a tendon graft was tested in vitro and in vivo.

Methods: The membrane (Opocrin - Modena, Italy) is obtained from type-I collagen harvested from equine Achilles tendon and is composed of collagen I fibres oriented in a single direction. Its is isotropic, due to its microlaminated and multilayered parallel structure. The raw material is carefully processed and come to be a biocompatible, non-reactive, non-antigenic and non-immunogenic acellular membrane that is resorbable and hygroscopic and can be produced in a range of thicknesses and collagen concentrations. In addition, it does not contain elastin, which may elicit inflammatory reactions.

In vitro study. Primary human fibroblast cultures were established and characterized using anti-collagen I and anti-fibronectin monoclonal antibodies. They were seeded at a concentration of 50,000 cells/cm2 on collagen I membranes with aligned fibres (material # 40133) with and randomly arranged fibres (# 40153). Cell proliferation was evaluated at 4, 8 and 12 days by spectrophotometry using an MTT colorimetric reaction. Membrane sections were studied by immunohistochemistry (anti-collagen I and anti-fibronectin monoclonal antibodies) and observed with a confocal microscope on day 12 of culture.
In vivo study. The middle third of the patellar tendon was lesioned bilaterally in 10 adult male New Zealand White rabbits and repaired on the right side by a graft (# 40133). The contralateral tendon was left untreated and served as control. Animals were euthanized 1 or 6 months after surgery and the tendon grafts subjected to histological examination.
Results: The in vitro study demonstrated cell viability and proliferation already on day 4 from membrane seeding, and maintenance of the fibroblastic phenotype until the 12th day. Confocal microscopic observation showed that cells were homogeneously distributed in all membrane specimens, with a more marked orientation along the main membrane axis in batch 40133 than in # 40153.
The in vivo study one month from implantation showed well-differentiated cell growth into the membrane. At 6 months cell orientation and differentiation in the scaffold with aligned fibres was satisfactory, with decreased cellularity, good integration with the surrounding tissue and crimp formation. Inflammatory reaction, plasma-cell infiltrate or excessive implant neovascularization were never observed.
Conclusions: The new type-I collagen membrane exhibited a behaviour similar to other tendon or ligament scaffolds both in vitro and in vivo. In particular, fibre orientation in the membrane with aligned fibres allowed to obtain a quick and well-oriented cell growth as well as good integration with host soft tissues. The membrane appears to be suitable for application in tendon and ligament repair and substitution.

P25-1000
Review of the use of injection therapy for tendinopathy of the shoulder and elbow
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Introduction: The rotator cuff tendons as well as those of the common flexor and extensor origins at the elbow are prone to overuse with resultant microtrauma and inflammation - a cycle that clinically presents as tendinosis. The rotator cuff tendons of the shoulder are affected in 20-30% of cases, while the elbow is involved in 0.4-0.7% of cases, of which lateral epicondylitis (tennis elbow) is 7-10 times more comon than its medial counterpart. Injection therapy has been used since the 1930s to treat these conditions. It is a modality which has evolved both technically and pharmacologically.
Aim: To provide current and evidence based review of the use of injection therapy for tendinopathies of the shoulder and elbow.
Method: We performed PubMed and Medline searches using the phrases 'injection', 'tendon', 'shoulder', 'tennis elbow' and 'golfer's elbow'. The evidence was grouped based on their levels, tabulated using Microsoft Excel and a critical appraisal was carried out.
Results: Injection therapy in the shoulder
All studies reviewed looked at rotator cuff tendons. The long head of the biceps brachii was excluded. Systematic reviews by Buchbinder et al (2003) and Van der Heijden (1996) revealed variability of methodology and overall poor concordance among studies. They concluded that there was no firm evidence for the beneficial use of injectable steroids in treating these conditions. One randomized controlled trial has shown steroids to be superior to intra articular lignocaine. Case series abound about various types of other treatment strategies, such as suprascapular nerve blocks, needle fragmentation with or without lavage,
Elbow
Lateral Epicondylitis
Verhar showed steroid injection to be superior to physiotherapy at six weeks but not one year. Crowther found similar success after injecting 20 mg of triamcinolone over extra corporeal shock wave therapy at 3 months. Altay et al (2002) in his randomized control trial attributed his success using injection therapy to his 'peppering' technique of injecting the steroid rather than to the injected compound itself. Two small studies have so far reported success with autologous blood injection.
Medial Epicondylitis
Results are similar for those for tennis elbow but in one group of patients Suresh (2006) found continued benefit after ten months of dry needling and autologous blood injection.
Conclusion: There have been advancements in injection therapy for tendinopathies at the shoulder and elbow, however, Level 1 evidence suggests that their benefit is not very clear cut. Wide variability in methodology was noted, very few authors have looked at the long term outcome and often more than one technique was used, and hence results would have been biased. An abundance of Level 3 studies exist looking at multiple techniques of injection and novel injectable compounds, but as yet there is no strong evidence to support their use.

Sport specific injuries

P27-38
Bilateral patellar tendon rupture: A rare trampoline injury
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Objectives: To highlight the diagnosis and management of an uncommon injury which has been described in the literature previously but is the first documented case associated with the use of a trampoline.
Case Report: A 44 year old man presented with bilateral knee pain of a few hours duration. The pain started while exercising on the trampoline and his knees gave way while in the air, off the trampoline. A diagnosis of bilateral patellar tendon rupture was made. He underwent emergency repair of his patellar tendons using the modified Kessler technique. The repair was protected with cerclage figure of eight wire. He had an excellent recovery and after three months he was able to ambulate using a normal gate.
Discussion: Bilateral patellar tendon rupture is a rare diagnosis and can be easily missed because of the symmetrical findings. The case that we reported is both interesting and unusual in the sense that it occurred in a healthy adult without any direct impact to the knees, during jumping on the trampoline.

P27-94
Medial and lateral collateral ligaments kinematic in vivo study during knee flexion
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Objective: The collateral ligaments play an important role in maintaining knee stability. The objective of this paper was to investigate the in vivo elongation of the MCL, the deep fibers of the MCL, and the LCL as a function of flexion during a single leg lunge.
Methods: Five knees (two left and three right) from five young and healthy volunteers (25.5 years old) were imaged. These MR images were used to construct a 3D model of each knee using solid modeling software (Rhinoceros, McNeel and Associates, Seattle,WA). These models included the bony geometry of the femur and tibia as well as the insertion areas of the collateral ligaments. The insertion areas of the MCL, deep fibers of the MCL (DMCL), and LCL were further verified by comparing them to a classic anatomic study. Next, each subject performed a quasi-static single-leg lunge to 0-, 30-, 60- and 90- of flexion as a 3D fluoroscope (SIREMOBIL Iso-C3D, Siemens, Germany) was used to acquire two images of the knee from orthogonal directions.
Results: The length of the anterior bundle of the MCL did not change significantly with flexion. The length of the posterior bundle of the MCL consistently decreased with flexion ($p < 0.05$). The change in length of the DMCL with flexion was similar to the trend observed for the MCL. The length of the anterior bundle of the LCL increased with flexion and the length of the posterior bundle decreased with flexion. These data indicate that the collateral ligaments do not elongate uniformly as the knee is flexed, with different bundles becoming taut and slack.
Conclusions: These data on the in vivo elongations of the MCL and LCL indicate that the collateral ligaments may be loaded non-uniformly throughout the flexion path of the knee, with the length of some regions increasing with flexion, while other regions decrease. The large variation in the length of the bundles of the DMCL indicated that the DMCL might also play an important role during in vivo knee flexion.

P27-462

Relationship between the clinical findings and radiographic grade in Osgood-Schlatter disease

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Purpose: Osgood-Schlatter disease (OSD) is one of the most common causes of knee pain related to sports in active adolescents. The aim of this study is to investigate the relationship between clinical findings and radiographic bone morphology and the severity of OSD in adolescents.

Methods: Ninety children (112 knees) were included in the study. They were 65 boys (84 knees) and 25 girls (28 knees). The patients were diagnosed as OSD with complaints of pain, swelling, tenderness of the tibial tuberosity and radiographic abnormality of the tibial tuberosity. History of OSD was investigated, including age at onset of knee pain and term from onset to first medical examination. Clinical findings investigated were: swelling, tenderness, osseous upheaval of the tibial tuberosity, body weight, height, and bone mass index. Radiographic bone growth stages of tibial tuberosity were defined by Ehrenborg's classification: stage A is cartilaginous, stage B is apophyseal, stage C is epiphyseal, stage D is bony. Radiographic severity of OSD was determined by Saito's classification: grade I is upheaval or slight elevation of tibial tuberosity, grade II is radiolucency of tuberosity, grade III is fragmentation of tuberosity.

Results: The age at onset of knee pain averaged 12 years and 6 months old in total, 12 years and 9 months in boys, and 12 years 1 month in girls. The age of boys at the onset was significantly older than girls. For the radiographic bone stage at the initial visit, there was no stage A, 36 in stage B, 51 in stage C, 7 in stage D, and 18 undeterminable knees. For radiographic severity, there were 46 at stage I, 22 at stage II, 26 at stage III, and 18 undeterminable knees. There was no significant relationship between radiographic bone stage, radiographic severity, and the clinical findings. The duration from the onset of pain and to first clinic visit related to the radiographic severity; the patients with longer period had greater severity. There was no significant difference in the mean height between patients at severity I, II, and III. The body weight and body mass index were significantly less in patients at severity I than those in severity III.

Discussion: For the age of the onset of OSD, the mean age of boys was significantly older than that of girls. OSD is known to occur at the apophyseal stage. Because the apophyseal stage corresponds to the stage of growth spurt, the different age at onset of OSD between boys and girls is the result of growth spurts at different ages between them. The duration from the onset of pain to the first clinic visit related to the radiographic severity. The patients with a longer period from the onset of pain to first clinic visit had greater severity, and all patients at the bony stage had severity grade III. Therefore, delaying visiting the clinic from the first onset results in a later bone stage and more radiographic severity grade of OSD. Although there have been several reports on the relationship between avulsion fracture of tibial tuberosity and obesity, to our knowledge, there has been no report on the relationship between OSD and body morphology. In the present study, patients with less body mass index had less severity.

Conclusions: The patients at a later bony stage had a higher severity grade. The patients with lower weight or lower body mass index had a lower severity of OSD.

P27-474

To what extend the rate of injuries effects the level of national football?

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Objectives: Football is one of the most popular sports activities in Turkey and active number of players and spectators is increasing everyday so does the injuries. The data and statistics about injuries provides important epidemiological information and gives an idea about the level of football of that country. Based on these data a systematic injury prevention strategy can be established. In FIFA World Cup 2002 and in the past UEFA cups, Turkish National Team and first division teams had successful results but from that time there is a significant decrease in our team's performance in last three years. Our primary aim in this study was to take a picture of the injuries in Turkish professional football league and to establish a baseline database to be compared and be used in future and asses the medical part of the setback of our teams performance in last three years to define latest preventative measures.

Methods: A comprehensive injury report form was developed based on UEFA's principles and model. The seasons between 2004 and 2006 in Premiere and second Turkish League was evaluated. The physicians of the participating teams were asked to fill the injury forms and report them. The anthropometrical data, previous medical history, attendance and individual exposure of the player, details of injury is recorded on injury form. The definitions of injury types are taken from a study by Hagglund et al. The incidence of injury was given as injuries per match and training and injuries per 1000 hours.

Results: A total of 779 injuries from 1264 players were reported which is equal to 19.8 injuries per 1000 hours including matches and training. When we categorize the injuries by match and training per 1000 hours it was 17.3 and 21.2 respectively. Non-contact injuries was 69% of all injuries. The re-injury rate was 13.3% and thigh, ankle and knee was common sites involved. We found that nearly 60% of injuries were mild ones resulting absence from football less than one week.

Conclusions: Optimum training programs, upgrading player's heath condition and education about injury prevention and rearranging preventative policies is apart of today's football. The injury report from Turkish elite football is very demanding. This is the first time in literature that the incidence of injury in training is higher than in matches, which clearly indicated a need for correctly designed training programmes and a review of entire training cultures. Different from the literature non-contact injury rate is significantly higher in our study. The high ratio of non-contact injuries suggested a need to upgrade preventive measures. From lessons learned based on the first injury analysis an effective control is initiated and specific endurance and stretching programs, warm up and down exercises and new treatment strategies are discussed intensively and will be applied as soon as possible. Based on these conclusions the set back of our teams' performance could be particularly related with these high rates of injuries and it could be said that level of football of a country is related with injuries rates. We hope this study could play a part in developing our own injury prevention strategy for tomorrow's football. Another analysis will be performed two years later and the results of it and the teams' performance will define whether we are successful or not.

P27-496

Epidemiology of injuries in high-level youth sport in Luxembourg

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Increased high-level pediatric sport participation has given rise to frequent sport-related injuries, that could have significant repercussions on the quality of life in adulthood (Hogan et al., 2003, Caine et al., 2006). Therefore, it is important to evaluate the risk of injury and to develop possible strategies for injury prevention. With currently no such data available in the Grand-Duchy of Luxembourg, the aim of our study was to assess the incidence of sport injuries among young elite athletes of various sport disciplines. The target population was composed of 503 young athletes, most of whom were enrolled in Luxembourgish sport academies. In total 12 sport types were analysed retrospectively over a 12-month period: athletics, badminton, basketball, cycling, soccer, handball, swimming, tennis, triathlon, table tennis, gymnastics and karate. An injury was defined as an incident occurring during training or competition that prevented the athlete to participate in at least one training session or game (Brooks and Fuller, 2006). Data were collected via a standardized self-report questionnaire assessing sport participation and injury occurrence during the previous 12 months. Injury incidence rate was determined per 1000 hours of sport exposure, separately for competition and training participation. A total of 276 completed questionnaires could be used for analysis, i.e. 55% of the target population. Our sample consisted of 175 boys (63%) and 101 girls (37%) aged 15.6 ± 0.2 and 15.4 ± 0.3 years, respectively. Fifty-one percent of the athletes indicated having had at least one injury in the last 12 months. In total 198 sports injuries were recorded, corresponding to an injury rate of 0.72 injuries per athlete per year. Total time of sport practice (training and competition) was evaluated at 11.7 ± 0.4 hours per week. The global incidence reached 1.18 injuries per 1000 hours of sport practice (training and competition). Team sports had a higher injury incidence (1.75/1000h) compared to individual sports (0.92/1000h) (relative risk 1.89; CI95% 1.39-2.57; $p<0.001$) and racquet sports (1.14/1000h) (relative risk 1.53; CI95% 1.02-2.30; $p=0.04$). Overall, the relative risk of injury in competition (1.92/1000h) was 2.17 (CI95% 1.58-2.97) times greater ($p<0.001$) than the injury risk in training (0.89/1000h). Most injuries implicated the lower extremity (57%), with a high level of sprains (22%). Ankle and knee injuries were most common in team (58%) and individual sports (64%). The upper extremity was more often injured in racquet sports (39%).

One injury out of five was severe, preventing the athlete from sport practice for more than 4 weeks. This data will be the starting point for further research initiatives into sport injury prevention in the Grand-Duchy of Luxembourg.

P27-542

Isolated acute dislocation of the proximal tibiofibular joint in a soccer player

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Isolated dislocation of the proximal tibiofibular joint is an unusual injury and may, therefore, be easily over-looked in the emergency room. This type of injury is commonly seen in athletes whose sports require violent twisting motions of the flexed knee, such as wrestling, parachute jumping, judo, gymnastics, skiing, rugby, football, soccer, track, baseball, basketball, racquetball, and roller skating. Treatment usually consists of closed reduction with casting. However, many times open reduction and stabilization may be required.

We present the case of an anterolateral dislocation of the proximal tibiofibular joint in a soccer player, after a twisting motion of his left knee.

A 35-year old male, professional soccer player injured his right knee during a soccer game. He reported that while he attempted to kick the ball with his left foot, his body rotated to the right. During the maneuver he lost his balance, his right leg was in contact with the field, the hip joint was adducted and externally rotated, the knee was fully flexed and the ankle was inverted. He was unable to walk without help although he could partially bear weight and he was carried by stretcher to the emergency room. The comparative anteroposterior and lateral x-rays revealed an anterolateral dislocation of the proximal tibiofibular joint, and the CT scanning confirmed the diagnosis. An unsuccessful closed reduction under anesthesia was attempted with the foot dorsiflexed and everted and the knee flexed 90°. Open reduction was followed. During the operation the fibular head was found to be displaced to a position anterior to the lateral prominence of the lateral tibial condyle and the fibular collateral ligament was tight. The fibular head was finally reduced with the help of a hook shaped clasp used as an elevator. The reduced joint was transfixed with a smooth Kirschner wire which was removed six weeks later. The knee was immobilized in 15˚ flexion with a long leg cast for three weeks. For another three weeks the patient walked with crutches and partially bore weight on the right leg. He fully returned to his previous sport activity level, after the 3rd postoperative month. Today, three years later the patient does not have any deficit from the injury.

Acute proximal tibiofibular dislocation is an uncommon injury; however, it probably occurs more often than has been reported. The diagnosis requires an awareness of this injury, a good history of the mechanism and symptoms, and an adequate clinical and radiographic evaluation of the knee, which should involves plain x-rays, and many times comparative x-ray of the contralateral knee or even a CT-scanning. The early diagnosis offer better treatment results and easier return to the preinjury activity status especially for professional athletes.

P27-547

Simultaneous rupture of the patellar tendon, anterior cruciate ligament and meniscus - a case report

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The combined rupture of the patellar tendon and the ACL is a rare injury that can easily escape the diagnosis. There is no consensus concerning its optimal treatment.

We preset a case of a 40 year old male patient who had an injury of his right knee during sports activities. He presented with severe knee pain, hemarthrosis and was unable to walk. On clinical examination, the knee's range of motion was severely restricted. Straight-leg raising was impossible and there was a palpable gap over the patellar tendon. Plain radiographs demonstrated a discontinuity of the patellar tendon and superior displacement of the patella.

The patient was led immediately to the surgery room for repair of the ruptured tendon. Intraoperatively, an ACL tear was established. The remnants of the ACL were excised. There was also a partial tear of the lateral meniscus which was treated with partial meniscectomy. We decided to perform the ACL reconstruction at a second stage operation. Three months later, using a hamstrings tendon graft, the torn ACL was reconstructed. At the last follow-up, the patient had a full range of motion and had returned to his employment.

A simultaneous PT and ACL rupture is an uncommon lesion resulting from the application of a significant force, usually over preexisting asymptomatic pathology. There are very few reports of such injuries in the current literature. A high index of suspicion is essential in achieving a successful diagnosis. The correct timing of the ACL reconstruction in relation to the patellar tendon is debatable due to increased risk of arthrofibrosis when a simultaneous repair is decided. Delayed reconstruction of the ACL, after the immediate PT repair, is believed to provide a safer pathway for a more satisfying functional outcome.

Our approach, to this uncommon injury, provided a satisfactory functional result.

P27-719

Injuries in skiers and snowboarders among children and youth. Case control study on CHIRPP database

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Objectives: Alpine skiing and snowboarding are popular sport with significant risk of injuries. Each year in the United States, an estimated 13 million people participate in recreational skiing or snowboarding activities, accounting for about 57 million visits to ski areas. Many studies of ski or snowboard injuries have not considered risk factors for injuries to specific body regions. We studied the information and data pertinent to injured children (4-14 years) and youth (14-18 years) that was available on CHIRPP (Canadian Hospital Injury Reporting and Prevention Program) database.

Methods: We analyzed 20,615 subjects from 1990 to 2005. Our study group was composed by 11,050 skiers and by 9,565 snowboarders.

Results: We found all injuries among skiers were distributed in the following manner: 1992 knee (18%); 1625 lower leg (15%); 711 forearm (6%). Snowboarding injuries were found prevalently in the forearm (32%) and in the wrist (21%) and only 5% of knee injuries.

Conclusions: We found the highest rates of injury among the youngest group. Snowboarders had more injuries of the upper extremities whereas skiers were more likely to injure their lower extremities. Males were more at risk for head and neck injuries, whereas females had a greater rate of injuries to the lower extremities.

Significant protective attributes were found for helmet use especially with regards to spinal injuries within our study group. This data could be very important in helping to develop new strategies in research and new policies in the management of injury prevention.

P27-758

Latest epidemiological updates in Greek ski resorts

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Purpose: To examine the incidence and patterns of snow sports injuries in Greek ski resorts.

Methods: In a prospective control study, all the injuries occurring in two ski resorts during the 2004-2006 winter seasons were recorded. A total of 978 injured skiers and snowboarders were recorded. As a control group, 775 uninjured people randomly were questioned directly on the slopes. Statistical analysis was performed using t-test, x^2-test and Fisher's exact test.

Results: The injury rate for the study was 6.05 injuries per 1000 skier days. 72.7% of the injuries occurred in alpine skiing and 27.3% in snowboarding. Lower limb injuries were the commonest among the skiers (43%) and females had a significant higher percentage (59%) than males (39%). Snowboarders sustained more upper limb injuries (49.2%). Contusions and ligament sprains (22%) were commonest among the skiers whereas contusions and fractures (20.5%) were commonest among the snowboarders. Knee (33.1% v 13.3%) and wrist (6.8% v 20%) injuries had statistically significant differences between skiers and snowboarders. Most of the injuries occurred during "free riding" (65%), but collision was more often the second injury cause for skiers (15.6%) and jumps for snowboarders (23.5%). 32% of all injuries correlated with the use of the lifts. 23.4% were injured when skiing/snowboarding with an instructor. Most of the injuries happened at the end of the skiing day.

Conclusions: Despite the high incidence of snow sports injuries in Greece the patterns and specific rates of injuries are similar to those reported previously in comparable studies. The incomplete education, the overcrowding and the old equipment are some of the reasons of this high incidence. There is much room to update skiing safety in Greece providing safer slopes and adequate instruction.

P27-759

Upper limb injuries in skiing and snowboarding

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Purpose: To examine the incidence and patterns of upper limb injuries in skiing and snowboarding.

Methods: In a prospective control study, all the injuries occurring in two major Greek ski resorts during the 2004-2005 winter season were recorded. A total of 587 injured skiers and snowboarders were recorded in a multivariate protocol. As a control group, 465 uninjured people randomly were questioned directly on the slopes and statistical analysis was followed.

Results: The overall injury rate was 2.02 upper limbs Injuries per Thousand Skier Days (IPTSD). The possibility to have an upper limb trauma during snowboarding is much greater than skiing (IPTSD for snowboard is 3.01 but only 1.65 for skiing). Just 27.3% of injured skiers, but 49.3% of injured snowboarders experienced an upper limb trauma. Shoulder trauma experienced 8.6% of injured skiers and 13.3% of injured snowboarders and the most frequent type of shoulder injury was dislocation (30.3% for skiers, 52.6% for snowboarders). Wrist and forearm injuries had statistically significant differences between skiers and snowboarders (6.8% vs. 20%). The incidence of wrist fracture was 22.2 % for skiers but 37.5% for snowboarders. The so called "skier's thumb" was detected at 50% of thumb injuries in skiers and 18.8% in snowboarders. Shoulder and elbow injuries had statistically significant differences between males and females skiers. The level of upper limb injured skiers and snowboarders were mainly intermediate (54.5% and 55.5% respectively).

Conclusions: Snowboarding is much more dangerous for an upper limb injury than skiing. The injury incidence and patterns are different among skiers and snowboarders and effective measures and protective means should be applied to eliminate these injuries.

P27-799

Growth and maturation of female adolescent gymnasts, swimmers and tennis players

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Intensive training at a young age may adversely affect the growth and sexual maturation of female athletes, resulting in compromised adult stature.

Purpose: To compare the somatic growth, sexual maturation and final adult height of elite adolescent female athletes.

Methods: Serial measures of height, sitting height, and breast and pubic hair development, were taken on 81 gymnasts, 60 swimmers and 81 tennis players, between 8 and 19 years of age. Menarcheal age, parental heights, maternal menarcheal age and number of training hours were also recorded. Final adult heights were obtained from a sub sample of the athletes (n=100).

Results: Gymnasts were significantly shorter than tennis players and swimmers at all chronological ages during adolescence, and attained menarche at an older age ($p<0.05$). No significant differences were found in adult heights. During adolescence no difference were found in standing height to sitting height ratio's, leg length to standing height ratio's or sitting height to leg length ratio's between sports ($p>0.05$).

Conclusion: The results from this study suggest that regular training did not affect final adult stature and that when aligned by biological age the tempo of sexual maturation was similar in these young athletes.

Key words: Training, menarche, peak height velocity, adult stature

P27-970

Arthroscopic-supported osteosynthetic treatment of tibia head fractures - clinical and radiological outcome -

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Query: Certain intraarticular fractures of the knee joint can be set and fixed arthroscopically. The arthroscopic procedure enables a better view of the entire joint, minimal exposure and extensive lavage. The objective of this study was to evaluate the clinical and radiological results after arthroscopic-supported fracture treatment of the tibial plateau.

Method: 51 patients with intraarticular tibia head fractures underwent arthroscopic-supported osteosynthetic treatment between June 2003 and June 2005. We treated 39 patients with tibia head fractures mostly Type B in the (AO)-classification, 12 patients with strain fractures of the Eminentia intercondylaris Type A 1.3. In 19 patients there was also injury to the cruciate ligament or an osteochondral injury to the femur condyle. The mean age of the 28 men and 23 women was 47.3 (23 - 69 years) and the trauma in the anamesis had occurred on average 2.6 days prior to surgery. The extent of pain, mobility, the activity level and patients' quality of life were evaluated using the Rasmussen Score, the Tegner Activity-Index and the Lysholm Score.

Results: The Tegner Acitivity Score was 6.4 points at the time of the accident, 4.8 points at reexamination 6 months postoperative and 5.4 points one year after the operation. The Lysholm Score showed a value of 76.4, respectively 86.5 points in the follow-up. On the visual analog scale for pain, the patients achieved a value of 2.5 points after 6 months, and 2.0 points after 1 year. The radiological examinations by the Rasmussen method showed excellent or good results in 85.5 % of the patients.

Conclusion: The arthrosopic-supported osteosynthetic treatment of intraarticular tibia head fractures appears to be an efficient treatment technique. In appropriate indication, the results of the arthroscopic procedure could be better than in the classical procedure by arthrotomy. Postoperative morbidity is reduced, hospitalization time and rehabilitation time are shorter. The clinical and radiological results of this treatment method are good to very good in the majority of the cases treated. Preservation of the joint niveau is of decisive clinical importance.

P27-994

Effects of exercise intensity and fatigue on muscle recruitment patterns in healthy and ACLR soccer players: a pilot study

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Objectives: Recent studies have shown that the neuromuscular response to fatiguing exercise, following ACL reconstruction, is altered. The aim of the present study was to evaluate the neuromuscular response at discrete fatigue levels. We hypothesized that the neuromuscular response of the reconstructed leg will differ from that of the intact leg as well as from both legs of the control group at exercise of heavy (with fatigue) but not of moderate (without fatigue) intensity.

Methods: We evaluated 8 healthy and 6 ACLR soccer players 1-3 years post-operatively. ACLR players had anterior tibial translation difference between reconstructed and intact leg less than 2mm, Tegner activity score 8 and Lysholm score 99. Subjects performed a GXT treadmill running test to determine blood lactate response and maximal oxygen uptake. Two 10-min run were performed, one at moderate intensity and one at heavy intensity that were selected from the GXT test. During the bouts gas exchange data and heart rate were collected continuously and blood lactate was measured pre- and post-exercise. EMG data were recorded for 15 seconds at the 3rd and 10th minute from 3 muscles (vastus lateralis, biceps femoris and medial gastrocnemius) bilaterally with a telemetric EMG system. The dependent variable examined was the average peak EMG amplitude. T-tests where used to compare the values at minute 3 and 10 for each muscle for both intact and reconstructed leg separately and for both legs of the control group.

Results: For the moderate bout, baseline and end-exercise lactate values were 2.2(0.4) and 2.6(0.7) vs 2.0(0.3) and 2.4(0.4) mM respectively. End-exercise VO2 values did not differ from VO2 at min 3 [35.8(3.1) vs 34.1(3.1) ml/min/kg, $p>0.05$ for the control group and 32.2(1.7) vs 30.5(3.0) ml/min/kg, $p>0.05$ for the ACLR group]. For the heavy bout, baseline and end-exercise lactate values were 2.1(0.3) and 7.9(0.8) vs 2.2(0.3) and 7.3(1.7) mM respectively. End-exercise VO2 values were significantly higher compared to min 3 [53.6(4.2) vs 47.7(3.9) ml/min/kg, $p<0.05$ for the control group and 49.1(3.6) vs 44.8(3.1) ml/min/kg, $p<0.05$ for the ACLR group]. For the heavy bout there was a significant relative increase in the peak EMG amplitude for both VL for the control group (6.8% for RVL, $p<0.05$ and 6.6% for LVL, $p<0.05$) and a similar relative increase for the intact leg of the ACLR group although it did not reach statistical significance (6.5%, $p=0.07$) with no difference for the ACLR leg. There was also a significant relative reduction for the LBF of the control group (3.1%, $p<0.05$). The moderate bout had no effect on the EMG amplitude for both groups.

Conclusions: The major finding was that during heavy exercise, fatigue as evidenced by a significant rise in VO2 and blood lactate, was compensated for by an increase in the EMG amplitude of the VL for the control group. The ACLR group displayed a similar physiological response but different neuromuscular behavior. Although the intact leg tended to increase EMG amplitude, no alterations were noted for the reconstructed leg. Our results may indicate an inability of the ACL reconstructed leg to progressively recruit muscle fibers

since increases in EMG amplitude have been associated with recruitment of more fibers to compensate for fatigue. Previous studies indicate that ACLR subjects demonstrate normal EMG patterns during non-fatiguing activities such as walking. It appears that fatigue may modify these patterns.

Injury prevention

P28-61

Shoulder profile in elite junior tennis players: horizontal adduction and abduction isokinetic evaluation

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Objective: To establish a normative data of muscle performance, during isokinetic horizontal abduction and adduction of the shoulder, in elite junior tennis players.

Methods: A total of 36 athletes were evaluated (23 males and 13 females), with a mean age of 14 years old (range - 12 to 18). For the exam we used an isokinetic dynamometer (Cybex 6000® - Ronkonkoma, NY), testing the shoulder horizontal abductors and adductors in 60 and 180 degrees per second. We reported the absolute and relative peak torque (PT and PT/BW), total work (TW), endurance ratio (ER) and the ratio of the peak torque between horizontal abductors and adductors (PT Ratio). The data were compared between dominant and non-dominant shoulder, abductor and adductor muscles and among the groups of tennis players divided by age.

Results: The dominant shoulder was stronger than the non-dominant in all parameters ($p<0,05$), except form ER and PT Ratio. The abductors were weak in all players, when compared with the adductors ($p<0,05$). Also, the type of backhand (one-handed or two-handed drive) did not influence the strength of the shoulder horizontal abductors at the dominant arm. The number of years of tennis practice influenced the muscle strength in all absolute data (PT and TW), but not in the relative measurements (PT/BW and TW/BW).

Conclusion: Adaptations of the shoulder muscles in tennis players sometimes lead to imbalance and injuries. Isokinetic data is very important to control those variations, and guide physicians to prevent injuries in junior tennis players around the shoulder region. Our paper is the first one to report the isokinetic data of normal shoulder horizontal abduction and adduction movements in elite junior tennis players.

P28-279

Timings of peak lower limb kinetics and kinematics during football match-play sidestep cutting and straight ahead running

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Aims: Knee and hip kinetic and kinematic alterations during sidestep cutting have been implicated in anterior cruciate ligament injury. An improved understanding of lower limb joint loading in football match-play conditions and influence of sidestep cutting on injury risk is required. Timings of peak ankle, knee and hip kinetics and kinematics during the stance phase of sidestep cutting and straight ahead running are unclear, as is the influence of maneuver type on timings.

Hypothesis: During the stance phase of sidestep cutting compared to straight ahead running the timings of peak internal/external tibia moments (M_z), abduction/adduction moments (M_y), flexion/extension moments (M_x), internal/external rotation angles (A_z), abduction/adduction angles (A_y) and flexion/extension angles (A_x) of the ankle, knee and hip of the planting limb are significantly altered.

Methods: Fifteen injury-free professional male outfield soccer players wearing the same type of studded football boot undertook randomly cued straight ahead and sidestep cutting maneuvers at 30 and 60 degrees using the dominant lower limb on a Fédération Internationale de Football Association (FIFA) approved soccer surface. Running velocity was constrained to 5.5-6.0 $m \bullet s^{-1}$ using timing gates. Using three dimensional inverse dynamics, an eight camera gait analysis system synchronised with a force platform and retro-reflective markers positioned over the whole body, mean ankle, knee and hip joint kinetic and kinematic data was collected.

Results: For each joint peak M_z, M_y, M_x, A_y and A_x were internal, abduction, flexion and abduction, respectively. Peak ankle and knee A_z were predominantly internal but external for the hip. For each maneuver no significant differences were identified in timings of peak M_z, M_y, A_z and A_y for each joint. For each maneuver, timings of peak knee Mx significantly preceded those of the ankle and hip, and timings of peak hip x significantly preceded those of the ankle and knee.

Sidestep cutting compared to straight line running did not significantly affect the timings of peak knee M_x or peak hip A_x. There was no significant difference between timings of peak ankle and hip M_x or between peak ankle and knee A_x. The hip was the only joint for which timings of peak values significantly differed with the type of maneuver. Hip external A_z were significantly earlier for 60 degree sidestep cutting than for straight ahead running. No significant difference was identified between 30 degree sidestep cutting and either 60 degree sidestep cutting or straight ahead running. The timing of peak hip A_z also occurred significantly earlier than the ankle or knee during only the 60 degree sidestep cutting maneuver.

Conclusions: The timings of peak ankle, knee and hip peak internal tibia moments, abduction moments, internal rotation angles and abduction angles were similar, regardless of maneuver. For each manuever, timings of peak knee flexion moments and hip flexion angles preceded those of the other joints investigated. Increasing the sidestep cutting angle to 60 degrees was associated with earlier peak hip internal rotation angles compared to straight ahead running. Early stance phase of these more pronounced sidestep cutting angles involved hip flexion and rotation in combination with knee flexor moments. Targeting their control in early stance may benefit injury prevention training programmes.

P28-683

Comparison of ankle brace and tape on time to stabilization

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Since the high correlation between landing and injuries bracing and taping are usually accepted as external support for the ankle. Their effectiveness has been studied previously and has proven to successfully reduce injury incidence. Mechanisms involved includes improvement of the mechanical stability by restriction of the range of motion, a propioceptive effect mediating cutaneous stimuli that facilitates or improve muscular activity.

Landing forces are important, ground reaction force reaching over three times body mass. Joint displacement and muscular work are essential to control and absorb associated impact forces.

Time to stabilization measure neuromuscular control on the transition from open to close kinetic chain and, therefore has the hability to estimate the relation between landing and injury.

The objective of the present study is to compare the effects of taping and bracing on joint stability and ground reaction force during landing.

Subjects were chosen accidentally and after written consent 38 healthy volunteers between 18-25 years who practice volleyball or basketball on a regular basis were analyzed. Subjects were asked to perform three countermovements jump on a force plate and land on a single leg under each one of the following conditions: bare foot, brace and taped. The registers were used to compare maximum ground reaction force and time to stabilization of three motion axis: antero-posterior, medial-lateral and vertical.

Ground reaction force was obtained with a plat force with an A/D sample frequency of 100Hz with a high pass filter of 3KHz, capture was made by an acquisition module on Igor Pro 5.0.

Time to stabilization was calculated by a polynomial modulation of the force-time signal from the initial contact all data processing and polynomial calculation was made on Igor Pro signal processing module.

Results were tested to compare each condition by Kruskal Wallis with a significance level of $p=0.05$ using SPSS 10.0. Although some of the result may propose some variables to consider on understanding the underlying mechanisms involved in the reduction of injuries with bracing or taping there is no significant difference between any of the conditions tested in this work. Conclusions.

External supports do not affect kinetic values during landing.

Time to stabilization after a vertical jump does not vary when bracing or taping compared with bare foot condition.