

Impact on athletic performance of an early return to play following an ACL rupture



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Introduction and purpose: The rupture of the Anterior Cruciate Ligament (ACL) is the most frequent knee injury incurred during participation in sports and especially in football. Typically, the injured athlete must undergo a surgical reconstruction of the ligaments followed by a lengthy rehabilitation period. However, the timeline for return to competition after this operation remains a challenge. More than one third of the athletes are unable to go back to sport performing at the same level prior to the injury. Approximately 65% of patients who experience this injury are able to return to sport at the same level. The fear of undergoing a new accident remains a major hurdle with this sporting recovery and the persistence of functional deficits is the first cause of repetitive ligament injuries.

A re-athletization program guided by strength and conditioning coaches results in a greatly reduces the risk of recurring injury by approximately 66%. The Objective of our study is to observe if early re-athletisation can improve the performances of the patient following a rupture of the LCA.

Methods: Our study involved a randomized control test. Our sample included ten subjects (football players between 18-22 years old), five in the experimental group and five in the control group. Beginning one month post-surgery (plasty with the hamstrings with an isolated rupture from the LCA) the first group participated in weekly re-athletization session beginning one week post-operation, associated with rehabilitation in classical physiotherapy, over a period of six months.

The second participated solely in standard physiotherapy. Both groups were subjected to an initial isokinetic test as a base measurement to track improvement (test mean at five month post-surgery).

After six months, the subjects of the two groups were evaluated using the following tools: an isokinetic test, a questionnaire of KOOS and finally a Hop tests. The isokinetic test is carried out on a Cybex dynamometer. This device possesses the ability to adapt instantaneously to the force delivered by the patient in order to maintain a specific angular velocity. This machine enables the user to develop strength at a maximum power level throughout an entire range of motion for that movement.

Results: The analysis of the isokinetic test and the questionnaire of KOOS ($p=0.30$) enabled us to note differences between the two groups using quantified values (Table 1). However, the results were significant. On the other hand, the analysis of the results obtained through the functional tests showed significant differences between the two groups, highlighting the increased performance and benefit for the group participating in weekly re-athletization (Table 2). The experimental group displayed results in the three jump tests which indicates a greater strength and recovery. For the single hop test $p=0.011$ and the triple hop, the result is $p=0.009$, and for the cross over test, the result is $p=0.04$ (Table 3).

Typical return to sport at a comparable level takes six months post-operation for the two groups.

| KOOS | | Symptoms and stiffness | Pain | Function, daily living | Function, sports and recreational activities | Quality of life | Overall score |
|--------------------|------|------------------------|----------|------------------------|--|-----------------|---------------|
| Experimental group | Mean | 17 | 15 | 17 | 38 | 19 | 21.2 |
| | SD | ± 2.1 | ± 2.7 | ± 2.4 | ± 2.9 | ± 1.7 | ± 2.8 |
| Control group | Mean | 19 | 17 | 22 | 40 | 22 | 24 |
| | SD | ± 1.9 | ± 3.1 | ± 2.6 | ± 2.8 | ± 1.9 | ± 2 |
| | | $p=0.34$ | $p=0.35$ | $p=0.83$ | $p=0.60$ | $p=1.0$ | $p=0.07$ |

Table 1: KOOS results

| HOP TESTS | | Injured knee | | | Healthy knee | | |
|--------------------|------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Single Hop Test | Triple Hop Test | Cross Over Test | Single Hop Test | Triple Hop Test | Cross Over Test |
| Experimental group | Mean | 193.6 | 571.6 | 519.8 | 202.0 | 614.0 | 547.8 |
| | SD | ± 20.6 | ± 52.3 | ± 56.1 | ± 7.5 | ± 25.6 | ± 42.6 |
| Control group | Mean | 165.4 | 475.0 | 432.4 | 184.8 | 541.6 | 470.6 |
| | SD | ± 4.5 | ± 31.3 | ± 40.4 | ± 6.0 | ± 34.6 | ± 53.4 |
| | | $p=0.011$ | $p=0.04$ | $p=0.009$ | $p=0.04$ | $p=0.04$ | $p=0.02$ |

Table 2: hop tests results

| Isokinetics | | Injured knee | | Healthy knee | |
|--------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Pre-tests | Post-tests | Pre-tests | Post-tests |
| Experimental group | Q 60°/sec | 169.2 ± 28.8 | 192.4 ± 14.5 | 192.6 ± 27.3 | 116.6 ± 7.3 |
| | Q 240°/sec | 106.2 ± 11.4 | 205.2 ± 14.4 | 121.2 ± 15.3 | 122.8 ± 8.8 |
| | IJ 60°/sec | 86.8 ± 21.3 | 93.6 ± 12.5 | 101.4 ± 20.9 | 107.8 ± 10.6 |
| | IJ 240°/sec | 61.4 ± 7.1 | 67.2 ± 8.8 | 70.6 ± 9.6 | 81.8 ± 7.3 |
| | IJ 30°/sec exc. | 83.8 ± 30.5 | 101.4 ± 11.4 | 109.2 ± 43.4 | 120.2 ± 7.9 |
| Experimental group | Q 60°/sec | 159.0 ± 16.4 | 154.2 ± 16.7 | 176.8 ± 22.5 | 176.2 ± 21.2 |
| | Q 240°/sec | 108.0 ± 4.7 | 114.6 ± 11.5 | 120.8 ± 9.4 | 121.6 ± 16.6 |
| | IJ 60°/sec | 80.2 ± 11.4 | 77.6 ± 13.3 | 93.8 ± 12.6 | 94.6 ± 9.6 |
| | IJ 240°/sec | 57.6 ± 6.8 | 53.2 ± 7.9 | 65.4 ± 14.2 | 61.6 ± 10.6 |
| | IJ 30°/sec exc. | 85.6 ± 18.0 | 86.2 ± 20.3 | 106.6 ± 22.8 | 103.2 ± 23.4 |

Table 3: Isokinetic results

Conclusion: In our preliminary study, the quantified values for both groups indicated a greater improvement in the performances of the experimental group re-athletization. Although during the statistical analysis and especially in the isokinetic test, few elements significantly evolved to see any for the questionnaire KOOS. The preliminary analysis warrants an experiment involving a larger subject pool be completed.

A re-athletization program beginning one month after operation has been found to limit the nuisances and long period of inactivity (weight increase, losses of muscular force, decrease of aerobic performances) typically experienced by those who rupture the ACL. This program has been found to be especially effective when coupled with regular physiotherapy meetings.