

THE "MINI-JUPETTE" SLING AT THE TIME OF INFLATABLE PENILE PROSTHESIS IMPLANTATION: ADEQUATE TREATMENT FOR ERECTILE DYSFUNCTION WITH MILD INCONTINENCE AND/OR CLIMACTURIA AFTER RADICAL PROSTATECTOMY

LA BANDELETTE "MINI-JUPETTE" LORS DE L'INSERTION D'UN IMPLANT PÉNIEN GONFLABLE : UN TRAITEMENT CHIRURGICAL ADÉQUAT D'UNE DYSFONCTION ÉRECTILE AVEC INCONTINENCE URINAIRE LÉGÈRE ET/OU ORGASMURIE APRÈS PROSTATECTOMIE TOTALE

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KEYWORDS : Penile prosthesis; Post-radical prostatectomy erectile dysfunction; Climacturia; Urinary incontinence; Male sling | Implant pénién; Dysfonction érectile post-prostatectomie; Orgasmurie; Incontinence urinaire; Bandelette masculine

ABSTRACT

Aim. - The usual morbidity after radical prostatectomy (RP) implies, the possible need for inflatable penile prosthesis (IPP). This study aims to validate the efficacy and safety of a sling called "Mini-Jupette" concomitantly with the implantation of an IPP that will counteract mild UI (<2 pads/day) associated or not with climacturia for patients resistant to non-invasive therapeutic approach.

Methods. - We provide a detailed description with robust illustration of an original surgical technique. The method the criteria analyzed in the study and the statistical method. Retrospective data from 15 patients from 2006 to 2016 are detailed.

Results. - Data about erectile function, continence before and after operation are documented for this cohort with mild incontinence (15pts - 100% - mean pad/day was 1.5, SD = 0.6) and climacturia (6pts-40%). Mean age was 65.9 years (SD = 6.3). There were no complications but 2 patients had dysuria and one patient present urinary retention requiring temporary bladder drainage. At 6 months, incontinence were objectively cured for 80% of patients and 2 patients (13%) improve their continence by a slight activation of the implant, the climacturia disappeared in 5 patients (82%). A telephone interview shows a good durability of the results. with a mean time of 107 months follow-up.

Conclusion. - Concomitant insertion of the "Mini-Jupette" sling during implantation of an IPP contributes reliably, safely and durably to the treatment of post-radical prostatectomy mild incontinence and/or climacturia.

Introduction

Following radical prostatectomy (RP) for localized prostate cancer, erectile dysfunction (ED) may ensue, often necessitating the need for semi-rigid or inflatable penile prosthesis (IPP) insertion. Other consequences of RP include urinary incontinence (UI) and climacturia.

The incidence of UI is estimated to be as high as 33% of patients who report using protective devices (such as pads, diapers and clamps) [1]. Another often underreported consequence of RP is climacturia or post-RP orgasm-associated incontinence in relation to sexual stimulation and/or during orgasm. In a meta-analysis of 43 studies, climacturia was reported by 20–93% of RP patients at least a few times after surgery [2]. All these patients reported significant bother and 25% reported losing interest in sexual intercourse [3].

Both UI and climacturia greatly affect quality of life domains of prostate cancer (PCa) survivors and have been associated with poor performance outcomes.

Recommending an IPP to a patient with a post-RP ED is an excellent solution, but neglecting mild incontinence and/or climacturia leads to a significant risk of insufficient global satisfaction.

Since 2006, we have developed a technique of passive and active compression of the urethra in combination with the implantation of an IPP. We named this procedure the "Mini-Jupette".

This operation is simple with few postoperative complications. It is effective and can help overcome an often-distressing iatrogenic situation for PCa survivors. We first shared our novel data with an oral scientific presentation in 2016 at the David Ralph "Penile Implant Master class" in London. This was followed by a video, which has since been published online in the Video Journal of Prosthetic Urology [4]. Multi-institutional studies examining the efficacy of the "Mini-Jupette" are also underway, the first of which has been published [5].

Surgical technique

The patient is placed supine under spinal anesthesia with slight Trendelenburg position and a cavernous body approach is performed transversely at the level of the penoscrotal junction. A 4 cm transverse cutaneous incision is made about 2–3 cm below the penoscrotal junction. This penoscrotal incision affords proximal crural corpora cavernosa (CC) and bulbo-urethral exposure. This approach was inspired by Steven Wilson's approach for penoscrotal AUS implantation in 2003 [6] and further described for penile implant placement in great detail in 2017 [7]

The best exposure is obtained using a disposable selfretaining retractor, which is available from Boston Scientific (the "SKW" deep scrotal retractor) or from Coloplast ("Wilson" scrotal retractor).

The patient is catheterized (18Fr) to empty the bladder and to delineate the exact position of the urethra by palpation during surgery. The penis is elevated over a beaded strap with a hook. This

allows tissues overlying the corpora to be easily swept away by blunt finger dissection and helps avoid any urethral injury or corporal crossover.

After opening Buck's fascia, the ventral side of the cavernous body is released at the bulbo-urethral portion of the urethra. This surgical exposure must be extended towards the urethral bulb, reaching the part of the urethra where the corpus spongiosum is thicker. The tunica albuginea should be clearly visible with well-defined lateral borders of the corporeal bodies at the level of the insertion over the ischio-pubic bone.

In order to achieve ample exposure of the proximal CC, we separate the scrotal septum from the urethral attachment as with an AUS implantation [6]. This manoeuvre allows access to the proximal CC for placement of the "Mini-Jupette" and the pump. One or more rake hooks can further retract the scrotum inferiorly with a rolled sponge if necessary (Fig. 1). The lateral cavernotomies are then suspended on each side by a single stay stitch.

For a "Mini-Jupette" procedure, the corporotomies are not performed a few millimeters lateral from the urethra but, rather, 1 to 1.5 cm laterally from the urethra and close to the insertion of the cavernous bodies on the ischio-pubic bone (Fig. 2).

Figure 1. After dissection, the proximal corpora cavernosa and bulbar urethra should be clean. The scrotal septum is separated from the urethral attachment.

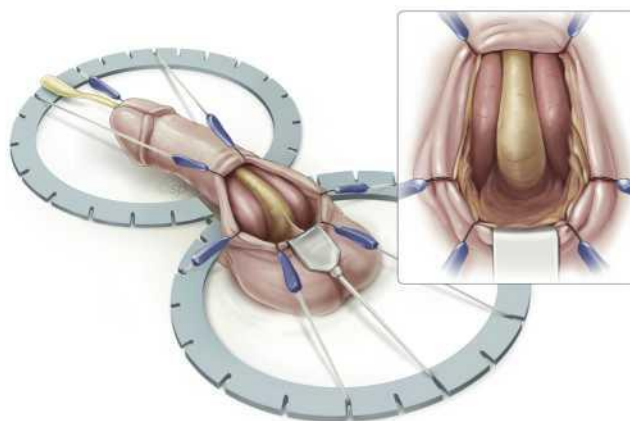
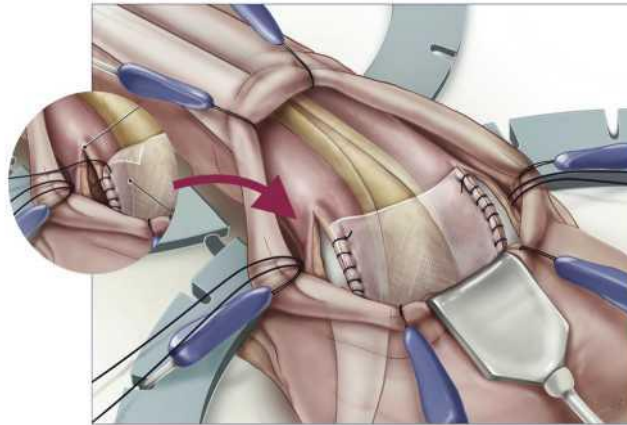


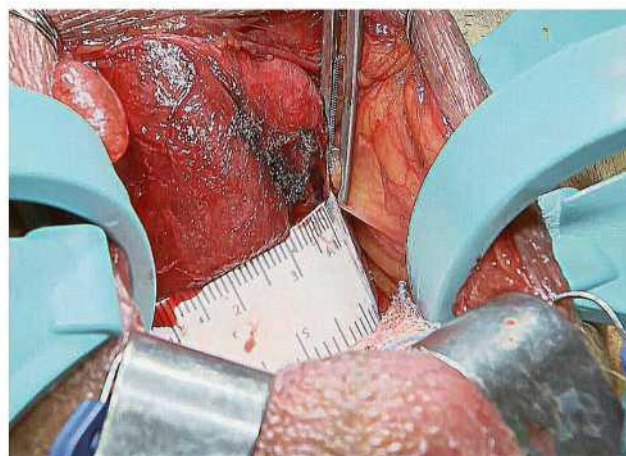
Figure 2. *The external border of the cavernotomies are suspended. The corporotomies, of a length of 3 cm minimum, are close to the insertion of the cavernous bodies on the ischio-pubic bone. The "Mini-Jupette" is fixed by two running sutures positioning on the inner borders of the two cavernotomies.*



The corporotomies are made with a 15-blade or electrocautery bilaterally. The distal limit of the corporotomies must be 1 cm lower than the beaded strap of the Wilson retractor. Initially, the corporotomies are short (1.5cm) to allow equal dilation of the two CC, distally and proximally. Proximal extension of the cavernotomies is then performed to ensure that the corporotomies have a length of at least 3 cm for insertion of the "Mini-Jupette".

Before the dilatation of the CC, the measurement of the width of the polypropylene graft of the "Mini-Jupette" is made between the inner borders of the cavernotomies (Fig. 3)

Figure 3. *Measurement of the width of the polypropylene graft of the "Mini-Jupette", between the inner borders of the cavernotomies.*

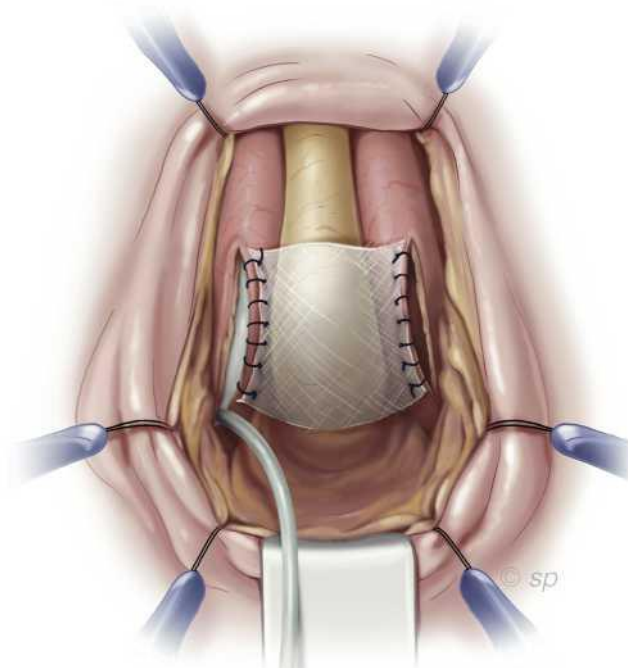


The "Mini-Jupette" is fashioned according to the measurement of the medial inter-corporeal distance using a polypropylene monofilament mesh. This mesh should have high porosity (pores wider than 75 microns), be biocompatible (allowing the passage of macrophages, fibroblasts, neovessels and collagen fibers), and non resorbable. This mesh has the advantage of being easy to cut according to dimensions, having shape memory, very high resistance to sutures, and great flexibility which allows for optimum integration and colonization after six months of implantation (Biomesh COUSIN BIOTECH-France).

Distal and proximal dilatations of the CC are performed in a standard manner according to the type of implant chosen (12 Fr for Coloplast device, 13 Fr for Boston Scientific/AMS device). The "Mini-Jupette" is fixed by two running sutures with monofilament polyester non-resorbable 4-0 (Ti-cron®) on the inner borders of the two cavernotomies (Fig. 2)

Cylinder sizing is selected in such a way that the cylinder tubing will emerge exactly from the posterior angle of the cavernotomies where the "Mini-Jupette" is inserted most proximally (Fig. 4).

Figure 4. *The cylinder tubing exits the corpora cavernosa distally towards the scrotum at the posterior angle of the cavernotomy at the deep insertion of the "Mini-jupette".*



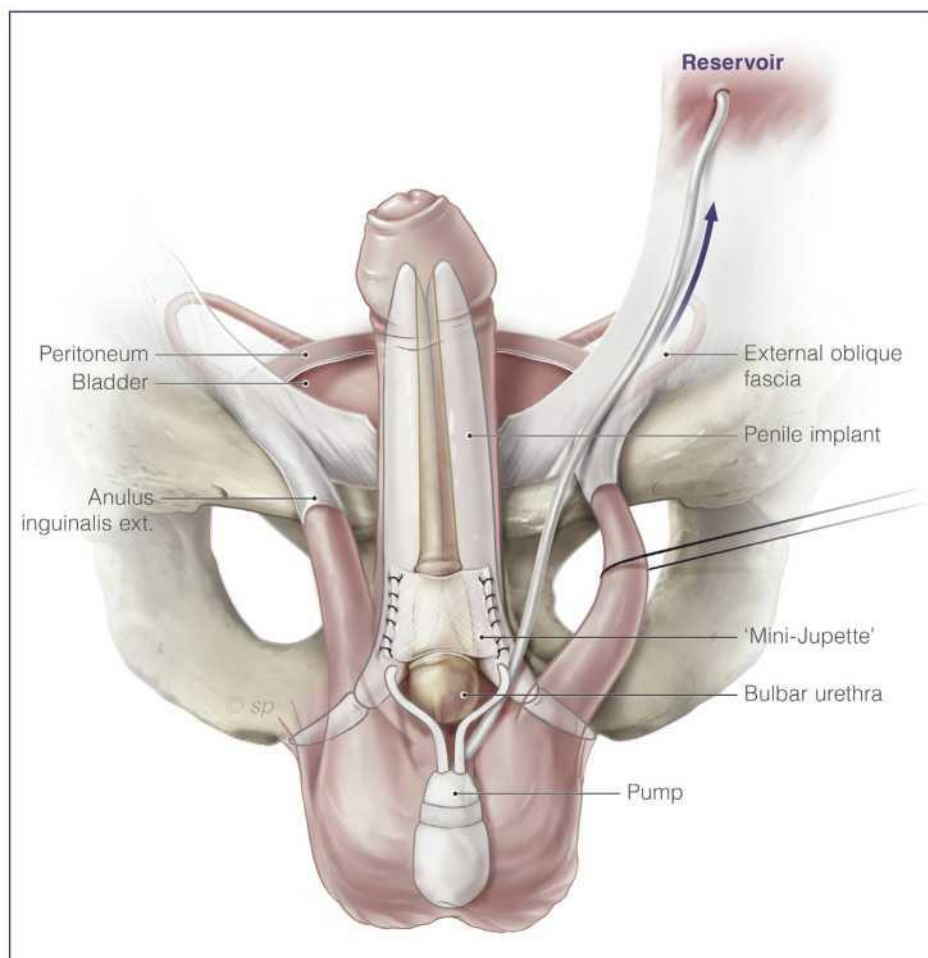
The cylinders are then conventionally introduced into the two cavernous bodies by positioning the inflatable posterior portion of the cylinders at the level of the "Mini-Jupette". We close the cavernotomies with a running absorbable synthetic polyester copolymer suture (Vicryl® or Polysorb®) set on 2/0 needle 5/8 to have a watertight closure (Fig. 5).

The tension of the "Mini-Jupette" is set to obtain a light compression of the bulbar urethra with the 18 F bladder catheter in place. Passage of fine scissors between the "Mini-Jupette" and the urethra should be tensionless. If significant tension is noted, the "Mini-Jupette" is removed and a wider graft is used.

In our experience, the choice of the IPP does not appear to impact outcomes: Boston Scientific/AMS 700 (CX or LGX) or Coloplast (Titan OTR). Implant selection depends on the size of the penis and/or surgeon's preference. The cylinders are then full inflated to assess functional outcomes and to confirm adequate compression of the urethra.

The scrotal pump is placed in a Dartos pouch. Since these patients have previously undergone a RP, it is our preference to perform a second small counter-incision at the level of the left antero-superior iliac spine to introduce the reservoir into the retroperitoneal space (Fig. 5).

Figure 5. *The penile implant is in place, the control pump is in the scrotum. Because the patient had a radical prostatectomy, the reservoir is positioned in the abdomen via another incision.*



Closed suction drainage of the scrotal site is provided for 12 to 24 h. The bladder catheter is removed 24 h postoperatively and the prosthesis is partially deflated (1/4 according to Erectile Hardness Score [EHS]). All patients are discharged home within 48 h of the procedure and post-operative pain is managed with oral medications. Antibacterial prophylaxis with a quinolone and clindamycin is provided for 5 days. According to our protocol, the penile implant is activated twice a day one month post-operatively and for at least 3 months (15 min in the morning and in the evening with mobilization of the penis for a better fitting of the penis to the penile implant).

Material and methods

The ideal indication for an IPP with concomitant "MiniJupette" procedure is a patient with post-RP ED resistant to medical treatment, and with mild incontinence (<2 pads/day) and/or climacturia, both resistant to physiotherapy.

Beyond appropriate patient selection for a penile implant (realistic expectation, appropriate patient counseling, classical discussion and informed consent), the only true contraindication for the "Mini-Jupette" procedure is similar to that of an AUS or male sling and is significant post-void residual urine volume secondary to bladder outlet obstruction, neurogenic bladder or post-RP bladder neck or urethral stricture.

Data were collected for cases of concomitant placement a "Mini-Jupette" sling and IPP, that were performed from July 2006 through June 2015. Collected variables included age, time from RP, erectile function as per the International Index of Erectile Function score 5 (IIEF 5), severity of UI as per pad test, amount of climacturia, data of the operative procedure, and treatment outcomes and complications. Follow-up was performed at 8 and 30 days and 3 and 6 months postoperatively and a longer follow-up, by phone calls, at the end of 2018 for a limited cohort was performed. Uroflowmetry was done at 1 month.

Results

Between 2006 and 2015, the "Mini-Jupette" procedure was offered to a select cohort of 15 patients with complaints of ED after RP, as well as a mild incontinence (1–2 pads/day) with or without climacturia. All patients were operated on by the same surgeon and received an IPP and a concomitant "Mini-Jupette".

Mean post-RP time was 32 months (10–38; SD =9.8). The average age of the operated cohort was 65.9 years (SD = 6.3). The average total duration of the two interventions combined was 72 min (SD = 19.8). Among these fifteen patients, 15 had post-RP ED and mild incontinence (mean 1.5 pads/day) and 6 patients had post-RP climacturia with significant psychological bother. IPP devices used were the AMS 700 LGX in 4 patients (26.7%), AMS CX in 9 (60%) and Coloplast Titan in 2 patients (13,3%). Other clinical data are listed in Table 1.

We did not experience any immediate or late postoperative complications related to the IPP or the "Mini-Jupette" procedure except for one case of urinary retention and 2 cases of post-operative dysuria (20%). For these patients, a 16 Fr urinary catheter was reinserted for a few days alongside anti-inflammatory treatment and total deflation of the implant was performed. No significant dysuria or de novo urgency was noted in patients at months 1, 3 or 6.

Patients were followed at month 3 and month 6, and as needed for patients with device failure or dissatisfaction. At 6 months, a satisfactory improvement of ED with the IPP was noted in the entire cohort. IIEF-5 scores, as expected, also improved, from a mean of 8.9 (SD = 1.2) before surgery to 22.5 (SD = 0.4) after PI insertion, representing a change of 13.6 points. On statistical analysis of the series, we noted a low correlation between age and IIEF-5 scores before the surgery ($p = 0.28$), which almost doubled afterwards ($p = 0.48$). There was no correlation between the IIEF-5 score and the number of pads/day.

At 6 months follow-up, 12 patients (80%) were completely dry without IPP activation and 2 patients (13%) with partial device inflation (EHS 2/4) during significant physical activity for complete control of urinary leakage. No patients reported climacturia de novo in the group of patients with mild isolated incontinence. Of the 6 patients with climacturia, 5 patients (83%) reported complete resolution. Due to their significant ED, lack of orgasm and intercourse, 2 patients could not indicate whether they had pre-operative climacturia and did not have any postoperatively.

As per our practice routine, only patients who are highly motivated for a clinical reassessment following RP (ED, UI and climacturia), those who are dissatisfied or those with complications complete long-term followup. In 2015, a patient who had this combined surgical approach 8 years earlier developed cylinder rupture and recurrence of UI. The IPP was replaced without manipulating the "Mini-Jupette" and continence was immediately restored.

Nevertheless, between August and October 2018, phone interviews allowed to assess late outcomes in 9 patients who had achieved complete resolution of ED and UI/climacturia at 6 months post-operatively. Data was not available for 2 patients and 1 patient died from other causes. The mean duration of this follow-up was 107 months (60–149; SD =28.01). In this small cohort of patients, despite being older with a mean age of 74 years (63–82; SD = 6.19), patient satisfaction with IPP was high (IIEF-5 score: 22.9), there was good control of continence (mean pads 0.22, SD =0.42), and there was no recurrence of climacturia.

Table 1 Clinical, surgical and outcomes of 15 patients who underwent concomitant inflatable penile prosthesis and « Mini-Jupette » insertion.

Data	Pt1	Pt2	Pt3	Pt4	Pt5	Pt6	Pt7	Pt8	Pt9	Pt10	Pt11	Pt12	Pt13	Pt14	Pt15	Mean	Std	
Age (y), mean (SD)	63	59	52	65	68	73	68	67	58	74	73	69	71	67	61	65.9	6.3	
Time from RP (months)	28	18	33	10	35	26	33	32	28	29	36	48	38	44	43	32.1	9.8	
Operating time (min), mean (SD)	70	55	63	80	112	80	66	45	42	90	82	78	70	50	100	72.2	19.8	
IIEF-5 score, mean (SD)	9	7	8	9	9	10	10	7	NA	8	8	11	10	9	10	8.9	1.2	
Urinary incontinence																		
Pads per day	2	1	2	1	2	3	1	1	1		2	2	1	2	1	1	1.5	0.6
Climacturia																		
Rare						Yes												
Frequent	Yes										Yes	Yes		Yes				
Always			Yes															
Unknow*		Yes						Yes										
IPP type	CX	LGX	CX	CX	LGX	CX	Titan	CX	CX	LGX	CX	CX	CX	OTR	CX	LGX		
Intraoperative Complications	None	None	None	None	None	Dysuria	None	None	Retention	None	None	None	Dysuria	None	None	None		
Outcomes																		
IIEF-5 score	24	21	20	22	24	23	23	22	NA	23	22	23	23	23	23	22.5	0.4	
Urinary incontinence																		
0 ppd	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes		
Improved	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
Unchanged														Yes				
Dry with slightly activation IPP			Yes								Yes							
Climacturia																		
Resolved	Yes					Yes					Yes	Yes		Yes				
No Climacturia de novo		Yes						Yes										
Unchanged			Yes															

IIEF-5: international index of erectile function 5 items; NA: not available; RP: radical prostatectomy; IPP : Inflatable Penile Prosthesis

Discussion of outcomes and operating hypothesis of the "Mini-Jupette"

The "Mini-Jupette" procedure which combines an IPP and a mini sling has excellent efficiency in treating ED with 6 months post-operative IIEF-5 scores improving to 22.5 (SD = 0,4), representing a change of 13,6 points, similar to solitary IPP implantation data in the literature [8]. Of note, younger patients experienced a better improvement in this score.

Clinical follow-up of UI and climacturia can be difficult because, often, patients' priorities are related to improvements in sexual function. Nevertheless, concomitant "Mini-Jupette" placement significantly improved patients' post-RP UI and climacturia.

At 6 months of follow-up, 12 of 15 patients (80%) were completely dry without IPP activation, due to the passive effect of the "Mini-Jupette". The remaining 2 patients (13%) required slight device inflation (EHS 2/4) during significant physical activity for complete neutralization of urinary leakage, a representation of the active effect of the sling. These results compare favorably with outcomes reported with the AUS (65.7%), and other male slings (48.2–64.0%), depending on the type of sling [9].

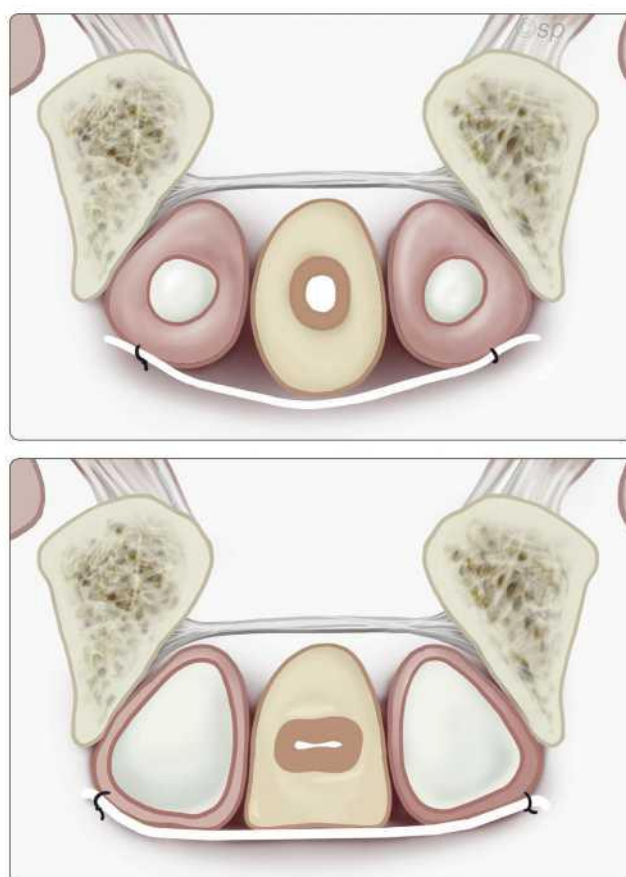
Five of 6 patients (83%) reported complete resolution of climacturia after "Mini-Jupette" graft placement. We did not observe any de novo climacturia or other orgasmic function after this combined procedure. These excellent results are superior to other reported interventions for climacturia (elastic loop or pelvic physiotherapy) [10,11].

Combination surgery for the treatment of refractory post- RP ED and UI with either a male sling (for moderate or light UI) or AUS (for severe UI) is becoming a more and more attractive approach for

urologists. It is technically feasible with either a single or dual incision approach and is associated with good satisfaction rates and durability. Our synchronous single incision approach of addressing two post- RP comorbidities (ED and UI) performed by simply inserting a synthetic mesh of less than 12 cm² represents a great option for some selected patients.

But, how does the "Mini-Jupette" work? According to the procedure described above, when the cylinders of the implant are not inflated, we believe that the "MiniJupette" acts passively by a slight compressive effect on the urethra with bulbo-urethral coaptation comparable to a "male sling" with light tension; this is possible because the "Mini-Jupette" is attached very close to the pelvic bone. During sexual intercourse and cylinder inflation, the "Mini-Jupette" is stretched and acts actively. When the cylinders are full inflated, the distance between the 2 cavernotomies increases, this allows for a temporary stricter compression of the urethra with effective reduction of climacturia and urinary leakage (Fig. 6). Urodynamic and radiological evaluations should help to better understand its mechanism of action and probably understand the cause of the failures observed.

Figure 6. How the "Mini-Jupette" works?



Conclusion

ED, UI and climacturia contribute significantly to the decrease the PCa survivors quality of life scores leading to general dissatisfaction, so revalidation of post-RP ED should not neglect mild UI and/or climacturia.

The "Mini-Jupette" procedure is an easy, inexpensive, fast, safe, useful and reliable technique that can be considered for subsets of patients with post-RP climacturia and/or mild UI at the time of penile prosthesis implantation. As such, it is important to query our patients regarding climacturia as there are many men who can benefit from this combined procedure.

In this small retrospective study with 6 months follow-up of 15 patients and late phone interviews of 9 patients, no patient was dissatisfied with the combined procedure and no other adjuvant treatment for UI was required. Larger patient cohorts and longer objective follow-up are needed to confirm the long-term safety and benefits of this intervention. The best mesh needs to be identified but the braided monofilament polypropylene mesh seems to be very effective and safe, as it has already been used for male sling surgery. In cases of failure to resolve UI and climacturia with the "Mini-Jupette", it will be necessary to demonstrate that other solutions are possible without diminishing efficiency (AUS or sling).

Acknowledgements

Andriane's technique for "Mini-Jupette" insertion described herein is a descendant of the teachings and methods of Dr. Steven K. Wilson's artificial urinary sphincter and penile implantation. We thank Drs Faysal Yafi (Newport Beach, CA), Steven Wilson (La Quinta, CA) and Koen van Renterghem (Hasselt, Leuven BE) for their collegial, friendly and scientific support for an already published international preliminary study.

Anatomical drawings were made by S. Philippaerts (www.spMedical-illustration.com).

Disclosure of interest

R. Andriane is consultant for both Boston Scientific/American Medical Systems and Coloplast United States Patent and Trademark Office: Jul-6-2007: Foreign License Granted Number 40636—Number of priority application: US60/944,944.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.purol.2019.05.003>

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