



Laparoscopic Implantation of Artificial Urinary Sphincter around Prostate-Preliminary Results

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Abstract

Objectives: The aim of this study was to present outcomes of men urinary incontinence treatment by laparoscopic implantation of Artificial Urinary Sphincter (AUS).

Material and Methods: From 2015 to 2017, we have performed 6 procedures of AUS implantation around the prostatic urethra in male. Urinary incontinence was resulted from pelvic trauma in 2 patients, Transurethral Resection of the Prostate (TURP) in 3 patients, and open prostatectomy in 1 patient. The laparoscopic implantation of AUS was performed. A catheter was removed 3 days after the surgery. Follow-up was conducted in an outpatient manner.

Results: The surgery duration ranged from 155 min to 235 min (mean 199.6 min). Sphincter activation, performed 6 weeks after the surgery, was successful in all the patients. Continence was evaluated as total in all the patients, both directly after activation and during further follow-up. None of the patients required protective pads, and some of them were able to resume their professional activity involving physical labour, with no continence deterioration. To date, no mechanical system malfunctions have been noted. One patient died 3 years after the procedure due to myocardial infarction with a functional sphincter system. Erosion of the scrotal pump was noted in one patient as a consequence of trauma sustained to that region. The follow-up period ranged from 17 months to 44 months (mean 30.2 months).

Conclusion: Laparoscopic AUS implantation around the prostate is safe and offers good functional outcome. This initial outcome needs further evaluation and more cases done.

Introduction

Urinary Incontinence (UI) in men, occurring as a result of damage or inactivity of the sphincter, significantly impairs the quality of life. Artificial urinary sphincter implantation is the treatment of choice in these cases [1]. One of the first AUS was produced by American Medical System (AMS) and has been used ever since its introduction and known as AMS 800. It consists of a sphincter control pump, a pressure-regulating balloon and a urethral cuff. This element directly occludes the urethral lumen and is produced in sizes ranging from 3.5 cm to 11 cm in length, making it possible to perform implantation procedures in men and women with the cuff placed around the bulbous urethra and the neck of the urinary bladder [2]. A variant in the latter form of implantation is cuff placement around the prostate gland. This method has been used in our centre since 2004. Initially, these procedures were conducted using the open retro pubic approach. Due to the invasiveness of the classical method, we have developed a laparoscopic technique [3]. To date, there have been several reports describing the technique and outcomes of laparoscopic AUS implantation around the bladder neck in men and women [4]. However, no report has been found in the PubMed base presenting outcomes of laparoscopic AUS implantation around the prostatic urethra.

Material and Methods

From 2015 to 2017, we have performed 6 procedures of AUS implantation around the prostatic urethra in males at a mean age of 69.6 years (range 45 to 82). Severe stress UI or total UI resulted from pelvic trauma in 2 patients, (TURP) in 3 patients, and open prostatectomy in 1 patient. Standard diagnostic work-up was supplemented with an urodynamic examination, cystoscopy

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and Transrectal Ultrasound (TRUS) [5]. When all contraindications were excluded and patient consent was obtained in writing, the implantation of AMS 800 was performed by laparoscopic approach. In all patients, the course of the surgery as described in previously published report regarding this procedure [3]. Detailed data about the aetiology and individual elements of the AUS system are presented in Table 1. A catheter was removed 3 days after the surgery. In the case of residual urine of more than 100 ml or urinary retention, a catheter was re-inserted for 10 days. Follow-up was conducted in an outpatient manner. The sphincter was activated after 6 weeks. Upon ensuring that the patient knew how to use the sphincter, the subsequent follow-up appointments were scheduled every 3 months. Follow-up involved the assessment of wound healing, complications and continence quality in accordance with the following criteria: full continence (negative pad test), good continence (volume of urine leakage ≤ 10 ml daily), poor continence >10 ml <100 ml daily) and bad continence (≥ 100 ml daily).

Results

The surgery ended with a safe and successful AUS implantation in all the patients. There were no cases of death during and directly after surgery. Neither were there serious general complications within the first 3 months after the surgery. The surgery duration ranged from 155 min to 235 min (mean 199.6 min). During the surgery, the urinary bladder was opened in 1 patient, and a 12F catheter was therefore retained for 3 weeks. After voiding cystography the catheter was removed. There was no extravasates urine, and the patient emptied the bladder efficiently. Urinary retention after catheter removal was observed in two cases. That is why, a catheter was re-inserted for the next 10 days, and repeated removal was successful. After catheter removal, 3 patients presented total continence that gradually decreased over time. The remaining 3 patients reported stress urinary incontinence of varied severity. Sphincter activation, performed 6 weeks after the surgery, was successful in all the patients. Continence was evaluated as full continence in all the patients, both directly after activation and during further follow-up. None of the patients required protective pads, and some of them were able to resume their professional activity involving physical labour, with no continence deterioration. To date, no mechanical system malfunctions have been noted. One patient died 3 years after the procedure due to myocardial infarction with a functional sphincter system. Erosion of the scrotal pump was noted in one patient as a consequence of trauma sustained to that region. The sphincter needed to be explanted despite its good performance. The follow-up period ranged from 17 months to 44 months (mean 30.2 months). The evaluation of effects on erectile function was impossible in these patients as 2 of them (trauma patients) had no spontaneous erection, one (after prostatectomy) was

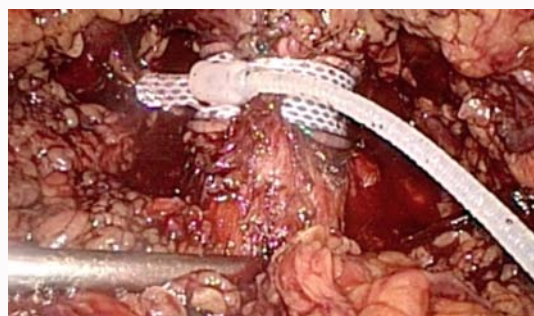


Figure 1: Manner of fixing the cuff of AMS 800 urinary sphincter around the prostate.

not sexually active due to a family situation, and the patients after TURP had erectile dysfunction before the surgery, requiring Viagra at a dose of 50 and 100 mg.

Discussion

The preliminary outcomes acquired from 6 patients after laparoscopic artificial sphincter implantation indicate that this procedure is safe and offers high continence quality. The laparoscopic approach is associated with less pain, requiring less analgesia after the surgery. Moreover, we observed faster re-convalescence: all patients were fully mobilized in first day after the surgery. However, no hospital stay reduction was noted, because the catheter was routinely removed at 3-day after surgery. Based on the experience with patients undergoing open procedures, we believe that catheter removal 1 day after the surgery is associated with a high risk of urinary retention, which can be linked with postoperative edema. The 30 degree laparoscopic approach offers superior vision into the surgical field, especially in the crucial moment of dissecting the posterior aspect of the prostate from the rectum and driving through the neurovascular bundles. This stage is conducted without the visual control during the open surgery and is therefore less precise with much more difficulty with gentle dissection of the neurovascular bundles [6]. The proper selection of the cuff length without the full tension control over the tape may be a certain problem [6]. By contrast with the situation when the cuff is placed around the bulbous urethra, where the cuff selection does not involve stretching. Cuff stretching at the prostatic urethra approach, offers very good continence without the risk of urethral erosion [7]. In the case of a large prostate gland, it may happen that the prostatic circumference is larger than 11 cm (the largest available cuff). That is why TRUS should be performed to evaluate the size of the prostate and its circumference. In justified cases, it may be necessary to perform TURP prior to sphincter placement. Cuff implantation under pressure also results in the

Table 1: Detailed data about the urinary incontinence aetiology used elements of the AUS system and continence after the operation.

Age	Reason of UI	Op. Time	Balloon	Volume	Cuff	Continence
68	pelvicinjury	187 min	71-80	24 ml	10 cm	full continence
78	prostatectomy	165 min	71-80	24 ml	11 cm	full continence
68	TURP	155 min	71-80	24 ml	10 cm	full continence
82	TURP	223 min	71-80	24 ml	11 cm	full continence
45	pelvicinjury	230 min	71-80	24 ml	7.5 cm	full continence
75	TURP	225 min	71-80	24 ml	10 cm	full continence

UI: Urinary Incontinence; TURP: Transurethral Resection of the Prostate; Volume- volume of fluid inside AMS 800 system; Balloon- pressure of balloon 71 cm to 80 cm H₂O; continence: full continence (negative pad test); good continence (volume of urine leakage ≤ 10 mL daily), poor continence >10 mL <100 mL daily) and bad continence (≥ 100 mL daily).

occurrence of a certain degree of outlet obstruction. For this reason, an urodynamic examination should be conducted before the surgery. In the case of considerably weakened detrusor muscle or detrusor areflexia, the risk of urinary retention is high [8]. Xenge et al. [4] propose an implantation technique around the neck of the urinary bladder, which is the method of choice in females. In the case of males, particularly after TURP and prostatectomy, ureteral orifice displacement towards the neck of the bladder and even prostatic urethra may happen; in these cases, sphincter implantation in the prostatic may be a safer option. The procedure requires significant experience in both artificial sphincter AMS 800 implantation and laparoscopic surgery, particularly in transperitoneal laparoscopic prostatectomy (Figure 1). The presence of scar tissue in patients after prostatectomy or pelvic trauma, or even TURP, may be another challenge. As the open procedure, this technique is intended for patients with the preserved prostatic urethra. That is why the number of candidates can be expected to be rather low. However, due to the high quality of continence and lower risk of complications especially associated with urethra atrophy this surgical technique should be considered. The location of the cuff around bulbous urethra often causes urine leakage when sitting down on a hard surface in a significant number of patients. This effect is certainly absent when the cuff is placed at the prostatic urethra [9]. The quality of continence after the standard surgery is considered very well, and the method is referential for all new surgical techniques. However, only approximately 57% of patients need no protection [10]. The presented technique offers very good continence, allowing a return to physical labour and sport. We have observed no complications associated with urethral atrophy. As there are no outcomes in the literature, we can refer to the outcomes of this surgery performed with the open approach [11]. The location of the cuff at this position does not preclude cystoscopy, TURP (transurethral resection of tumor) or TURP. Young patients may develop benign prostatic hyperplasia and prostate enlargement that might result in symptoms of an outlet obstruction.

Conclusion

Principal advantages of this surgical technique are the minimally invasive approach compared to the open surgery and full visual control in all stages of the procedure. When compared to the transperineal approach with cuff placement around the bulbous urethra, full continence is acquired without the necessity to wear protective pads. This enables a wider safety margin when performing

physical work or practicing sport. Based on the outcomes from first patients, laparoscopic artificial sphincter implantation around the prostate is safe and offers good effects, equal to those obtained with the open approach.

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