



Case Report

## Urethral Diverticula Following Explanation of Artificial Urinary Sphincter

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### Abstract

**Introduction:** Urethral erosion accounts for one of the most dreaded complications after implantations of artificial sphincters. We report two cases involving urethral diverticula, as a result of prosthetic removal caused by urethral erosion.

**Case Report:** Case A: BG, patient aged 72, affected by urinary incontinence post-radical prostatectomy. In 1999 the patient had an implant of artificial sphincter and recovered fully continence. In 2006 the cuff was replaced due to relapsing urinary incontinence. After five months the patient was diagnosed urethral erosion and was thus subject to surgical removal of the sphincter and application of a bladder catheter for a period of 4 weeks. After 6 months, voiding cysto-urethrography showed a bulky urethral diverticulum, surgically removed, suturing the urethral injury.

Case B: PF, aged 71, affected by urinary incontinence after endoscopic treatment of a stenosis of the bladder-urethral anastomosis. In July 2000 an AMS 800 was implanted and continence was recovered. In February 2009 the patient experienced recurrent urinary incontinence due to malfunctioning of the apparatus. The sphincter was thus removed and a new one was implanted in the same operation. In March 2012 the patient was diagnosed urethral erosion and subject to removal of the device. 3 months later a voiding cysto-urethrography showed a bulky diverticulum of the urethra originating from the organ.

**Conclusions:** Urethral erosion is a dreaded complication of the implant of AMS800 device. Its occurrence does not prevent a possible re-implantation, in extremely motivated patients, but exposes the same to a greater risk of infections and erosions, and possible formation of urethral pseudo-diverticula requiring complete removal of the diverticulum sac and concurrent perineum restoration of the urethra. In our opinion these patients are no longer eligible for urethral prosthetic surgery and the poor trophic conditions of the urethra could make any other approach, even a mini invasive one, inadvisable.

### Introduction

The urinary incontinence caused by an injury of the distal urinary sphincter, can nowadays be treated with different surgical methods, the most successful one still being the implantation of an artificial sphincter AMS 800 [1]. The removal of the device could be required for repair, infection or urethral, cutaneous or vaginal erosion. Urethral erosion represents one of the most dreaded complications,

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which may affect implants of artificial sphincters. This dramatic event may occur both precociously (from 4.5% to 67% of all cases) and late (15% of all cases), due to excessive pressure applied by cuff to the urethra or due to prosthetic infection.

The urethral lesion usually heals spontaneously thanks to the bladder catheter. Implant of a new sphincter is possible, once the leak is completely healed and closed. In rare cases a urethra diverticulum may arise in the lesion area. Such a diverticulum shall be surgically removed.

We report two cases of urethra diverticula resulting from prosthetic explants due to urethra erosion.

### Case Report

**Case A:** BG, patient aged 72, diabetic, affected by high blood-pressure, in 1998 underwent to retropubic radical prostatectomy, due to Gleason 7 (3+4) pT2b M0 N0 prostate cancer, with consequent total urinary incontinence from permanent sphincter injury. In autumn 1999, the patient was implanted with AMS 800 artificial sphincter with a 4.5 cm cuff and 61-70 cm H<sub>2</sub>O balloon, with full continence recovery.

7 years later (2006) the patient was examined for recurrent urinary incontinence. The functional video-urodynamic examination showed reduced pressure applied by the device. It was decided to surgically replace the cuff with a new smaller 4 cm one. The patient immediately recovered full continence (zero pad) but, 5 months later, returned for examination experiencing acute perineum pain and recurring incontinence. An endoscopic examination of the urethra showed the erosion and fall of the cuff in the urethral lumen. Thus, the sphincter was removed and a bladder catheter was inserted: the eroded urethra was sutured with great difficulty due to urethral tissue friability. The bladder catheter was removed 4 weeks later and the patient suffered again from complete incontinence; After 6 months the patient came in for another examination and reported swelling in the perineum area and urination caused by pressure applied on. A voiding cysto-urethrography showed a bulky diverticulum of the urethra, which was surgically removed when suturing the urethral lesion (Figures 1 and 2).

The bladder catheter was removed on the 15<sup>th</sup> day. The urethra was completely healed whereas the patient was again affected by full incontinence.



Figure 1: Diverticulum.

**Case B:** PF, aged 71, affected by an auto-immune rheumatic condition, underwent radical prostatectomy in 1996, due to prostate Gleason 6 (3+3) pT2a N0 M0 cancer. The patient showed a stenosis of the bladder-urethra anastomosis treated by endoscopic surgery. Then the patient showed total incontinence requiring implant of an artificial sphincter. Operation has been performed on July 2000 and the patient fully recovered continence. On February 2009 the patient showed again urinary incontinence requiring the use of two to three pads/day. Examinations and x-ray showed loss of pressure and in April 2009 the artificial sphincter was removed and a new one was implanted together with a cuff featuring the same characteristics as the previous one (4.5 cm). In March 2012, the patient was affected by urinary septic fever, perineum pain and, again, urinary incontinence. The clinical and urethroscopic examinations confirmed urethral erosion and lapse of the cuff in the urethral lumen. The artificial sphincter was surgically explanted and a bladder catheter was applied, afterwards removed 5 weeks later. In the subsequent examination the patient reported swelling in the perineum area whose pressure caused urine leaks.

A urinary cystography showed a bulky diverticulum of the urethra originating from the organ's bulbar area (Figure 3). The diverticulum was surgically removed and urethra repaired during the same operation.

## Discussion

The AUS has now been in use for more than 30 years. Despite its reliability for achieving urinary continence the AMS 800 is not perfect. The AMS 800 (American Medical Systems, Minnetonka, Minnesota) provides urinary continence in 61-100% of cases (no pad or one pad per day). Dry rates (no pad) were only available in seven studies and varied from 4% to 86%. A pooled analysis showed that infection or erosion occurred in 8, 5% of cases (3, 3-27, 8%), mechanical failure



Figure 2: Diverticular neck.



Figure 3: Voiding cysto-urethrography.

in 6,2% of cases (2-13, 8%) and urethral atrophy in 7,9% (1,9-28,6%). Re-operation rate was 26% (14, 8-44, 8%) [2].

The most serious complication of sphincter implant is infection; traditionally staphylococcus epidermidis (SE) has been the primary organism responsible for genitourinary prosthetic infection.

The treatment for this potentially life-threatening complication includes aggressive surgical debridement, and requires device explants, administration of broad-spectrum antibiotics, removal of infected implants and supportive therapy.

Another cause of failure is represented by urethral erosion, which may originate from progressive ischemia and atrophy of the urethra exposed to continuous pressure.

For this reason, some urologists advise their patients to deactivate their prostheses overnight in order to restrict pressure on the urethra.

Erosion may occur immediately or at any time after insertion (late erosion). The reported risk of early infection/erosion is about 4.5% but the risk is higher in neuropathic cases (15%), after failed sling surgery (67%) and after radical pelvic radiotherapy (57%). Mundy results indicate a late erosion rate of 15%, occurring maximally 7 years after implantation, presumably due to urethral atrophy caused by cuff pressure.

Sphincter explants as a result of urethral erosion did not jeopardise a possible re-implant of the prosthesis, even because these patients are, usually, extremely motivated towards repeating the implant process. However, re-implants may pose higher risks of urethra erosion, above all if the cuff is re-implanted on the same section. Couillard et al. [3] suggested relocating the cuff to a more proximal site on the bulbar urethra, but often the cuff is already positioned as far proximal as possible. Guralnick et al. [4] presented a new technique for distal cuff placement using transcorporal dissection that leaves corporal tunica albuginea on the dorsal surface of the urethra, allowing for its safer mobilization and adding to its bulk. This technique has been used for patients who experience a recurrence of incontinence, which is attributable to urethral atrophy beneath the cuff. If the patient already has 4 cm cuff, this problem cannot be remedied by simple cuff downsizing and a new cuff site must be sought or a second tandem cuff must be implanted.

Christine and Knoll [5] were the first to describe placing a second artificial urinary sphincter cuff distal in tandem with a proximal cuff to improve continence in men with a functioning artificial urinary sphincter. Using this technique 90% of patients achieve satisfactory continence. The impressive results using a tandem cuff led these groups to recommend tandem cuff placement primarily in patients with severe in-continence.

Although an acquired urethral diverticulum is rare in male individuals, it may be caused by prolonged use of an indwelling catheter or a condom type urinary collecting device for neurological disease, and theoretically after urethral erosion due to an artificial urinary sphincter. In progress literature Carpio and Cespedes [6] reported an unusual case of an acquired urethral diverticulum that developed after erosion of an artificial urinary sphincter into the bulbar urethra with subsequent use of a Cunningham penile clamp. The patient was treated successfully with diverticulectomy and a cadaveric pub urethral sling procedure.

The complications we presented concern two complex cases of

post artificial sphincter explants-reimplant recurring incontinence. Such a condition arises as a result of complete destruction of the urethral wall, overstressed by the repeated implants, so as to determine formation of a pseudo-diverticulum of a notable size.

### Conclusions

Urethral erosion is a dreaded complication of an artificial sphincter implant: not only does it require removal of the prosthesis but a prolonged implant of a catheter could also expose patient to the risk of formation of a urethra diverticulum. This is a very serious complication as it determines formation of an infected urine sac with septic symptoms and serious deterioration of the urethral channel. Surgery in these cases is always required and, in our opinion, these patients shall no longer be eligible for further prosthetic implants, even a mini invasive one, for poor trophic conditions of the urethra.

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