Urethral Strictures and Artificial Urinary Sphincter Placement

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KEYWORDS

• Artificial urinary sphincter • Urethral stricture • Incontinence • Erosion • Complication

KEY POINTS

- Patients undergoing artificial urinary sphincter (AUS) placement often have complex medical and surgical histories, such as radical prostatectomy, endoscopic treatment of urethral strictures, previous AUS placement, and prior open urethral surgery.
- Urethral strictures at the bladder neck, membranous urethra, or site of a previous AUS erosion are problems that profoundly affect the timing and treatment success of AUS placement.
- Understanding the complexities and outcomes in this subset of patients is the only way to inform shared decision making about treatment of urinary incontinence.

BACKGROUND

The artificial urinary sphincter (AUS) was pioneered by Dr F. Brantley Scott in collaboration with University of Minnesota and was first implanted in approximately 1972. There are several AUSs available; however, the most commonly used by far is the AMS 800 (American Medical Systems, Minnetonka, MN). The AMS 800 has been available since 1987 after introduction of a narrow-backed urethral cuff (acting to more safely distribute pressure to the urethra). Other modifications have included a quick-connect tubing system, antibiotic coating, and smaller cuff sizes. However, the essential design of the current AMS 800 has undergone little change in the last 30 years.

The AUS is irrefutably the gold standard for treatment of high-volume postprostatectomy incontinence and it is estimated that it has been implanted in more than 150,000 patients worldwide.[1] In a 2013 systematic review, continence rates (defined as $\leq$1 pad per day) vary from 61% to 100% after AUS implantation.[1] Patient satisfaction was also high and in the few studies the few studies that reported various measures of quality of life (QoL), including the American Urologic Association QoL index and the Incontinence Impact Questionnaire Short Form, showed significant improvements after AUS implantation.[1] The trade-off for this improved QoL in patients after AUS placement is a high revision rate. These revisions arise from a variety of causes, such as lack of initial efficacy, urethral atrophy, erosion, infection, and mechanical failure. Some studies report as high as 53% revision rate in the first 5 years after implantation even at tertiary referral centers.[2]

The complexity of surgical care for patients undergoing AUS placement is highlighted by the procedures surgical learning curve.[3] Patients needing

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AUS implantation often a have past history of pelvic irradiation, AUS erosion, rectourethral fistula, prior urethroplasty, and urethral stricture or bladder neck contracture. Describing outcomes for AUS placement in the setting of such complex anatomy is essential to counsel patients about their risks, and understand whether further revision surgery for urinary incontinence is in their best interests. This article reviews the recent evidence regarding urethral strictures/bladder neck contracture and how these conditions affect the use of AUS in incontinent men.

This article is divided view into 3 categories that pertain to different aspects of urethral stricture or bladder neck contracture and AUS placement. These categories are:

- Bladder neck contracture and AUS placement.
- Management of AUS erosion and subsequent stricture risk.
- AUS placement after urethral reconstruction or urethroplasty.

BLADDER NECK CONTRACTURE AND ARTIFICIAL URINARY SPHINCTER PLACEMENT

Incidence of Bladder Neck Contracture

Bladder neck contracture is a common occurrence after prostate surgery. The most common surgical causes are radical prostatectomy for prostate cancer and transurethral prostate surgery for benign prostatic enlargement (BPE). In a recent Surveillance Epidemiology and End Results (SEER)–Medicare analysis the cumulative incidence of bladder outlet obstruction after radical prostatectomy was 5% greater than that of controls and 12% higher for men who were also receiving adjuvant or salvage radiotherapy after radical prostatectomy.[4] These findings are similar to those of other large population-based studies of prostate cancer treatment complications, in which the cumulative need for either internal urethrotomy or incision of bladder neck contracture after radical prostatectomy was 7.5% to 8.4%.[5,6] The advent of robotic-assisted radical prostatectomy and the ability to perform continuous and precise suturing of the vesicourethral anastomosis has been shown in some single-center studies to decrease the rate of bladder neck contracture,[7,8] whereas in other studies this has not been shown to be true.[9,10]

Transurethral prostate surgeries for BPE also can result in bladder neck contracture. A recent meta-analysis of 31 trials comparing monopolar with bipolar transurethral resection of the prostate (TURP) reported a pooled 3.5% incidence of bladder neck contracture.[11] Incontinence after TURP is rare, but in some studies of AUS placement that reported on patients with mixed causes of incontinence, post-TURP incontinence was the reason for implant in 7.5% to 18.5% of cases.[2,12]

Endoscopic Management of Bladder Neck Contracture

The first-line treatment of bladder neck contracture, regardless of its cause, is generally endoscopic management. Some studies show that endoscopic management is successful in greater than 80% of bladder neck contractures with a single transurethral incision of the bladder neck (TUIBN).[13] A recent analysis of SEER-Medicare data for the burden of bladder outlet obstruction in men after treatment of prostate cancer showed at a median of 8.8 years that 56% of men required only 1 procedure for bladder neck contracture.[14] More recent studies have focused on recalcitrant bladder neck contractures that have not responded to initial endoscopic management, and the success of further endoscopic interventions before AUS placement. The Lahey Clinic published a recent small series of men undergoing treatment of bladder neck contracture with intralesional injection of mitomycin C at the time of TUIBN.[15] They found very high success (72%) at a median follow-up of 12 months with this approach despite most of the men having failed prior endoscopic management. The Trauma and Urologic Reconstruction Network of Surgeons (TURNS; TURNSresearch.org) subsequently published a retrospective case series of men undergoing treatment of bladder neck contracture with mitomycin C injection.[16] The study had major limitations because there were a variety of mitomycin C doses and endoscopic techniques. However, the strength of the study was a strict criterion for anatomic success based on cystoscopic examination. They found a lower success rate of 58% at a median follow-up of 9.2 months compared with the Lahey Clinic study; however, because of restricting follow-up to men with cystoscopic examination only, asymptomatic recurrences were detected, thus decreasing the overall apparent success. Other contemporary studies report similar or better outcomes to the TURNS study with endoscopic management alone (no injection). These studies vary by follow-up protocols and reporting of how many procedures were required, but the successful resolution of bladder neck contracture with endoscopic management was 72% to 73%.[17,18] These study results are summarized in **Table 1**. In all of these recent studies, investigators emphasize the need for a deep incision to perivesical fat with either a urethrotomy or Collins hot knife (**Fig. 1**). Some factors that influenced the success of the procedure were smoking and 2 or more previous failed endoscopic procedures.[18]