

Synchronous Urethral Repair During Prosthetic Surgery: Safety of Planned and Damage Control Approaches Using Suprapubic Tube Urinary Diversion



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ABSTRACT

Background: Urethral injury during inflatable penile prosthesis (IPP) or artificial urinary sphincter (AUS) placement is rare, and traditionally most prosthetic surgeons abort prosthetic implantation when urethral repair is necessary.

Aim: To report our experience with synchronous urethroplasty (SU) as a planned or damage control surgery during urologic prosthetic surgery, to evaluate the safety and outcomes of the procedure.

Methods: A retrospective review of our IPP and AUS database was completed to identify patients who underwent an SU between 2007 and 2018. We included patients who underwent an SU during prosthetic surgery in either a planned procedure for known stricture or diverticulum or a “damage control” procedure after intraoperative injury.

Outcome: Patient characteristics and surgical outcomes were assessed, with success defined as the absence of urethral stricture and revision surgery.

Results: From our database of 1,508 prosthetic cases, we identified 7 patients (0.46%) who had an SU in the same setting as complete prosthesis placement (4 AUS and 3 IPP [1 combined IPP/AUS], and 1 sling). Three patients underwent planned repair of a known urethral abnormality (urethral diverticulum, urethrocutaneous fistula, and urethral stricture), and 4 underwent repair of an intraoperative urethral injury. Among the patients who experienced an intraoperative urethral injury, contributing etiologies included previous anti-incontinence surgery with periurethral fibrosis ($n = 2$), severe corporal fibrosis from priapism, and previous urethral disruption from pelvic fracture. Nearly all of the urethroplasties (6 of 7; 86%) were completed with a primary closure. The average indwelling duration of suprapubic tube (SPT) catheters was 4.1 weeks (range, 7 to 47 days). The average duration of follow-up was 21.5 months, and all patients were continent at follow-up. No device infections or urethral complications were identified.

Clinical Implications: Our study illustrates the safety of concomitant urethral repair at time of prosthetic placement as an option to avoid the use of 2 anesthetics and prevent further scarring in high-risk patients.

Strengths & Limitations: This is the first study to address definitive urethral reconstruction during anti-incontinence procedures along with planned concomitant urethroplasty during IPP placement. This promising initial experience is relevant for surgeons who may encounter concomitant urethral pathology in the setting of complex reoperative prosthetic cases. The need for SU is rare, and thus our cohort size was limited in this retrospective, single-institution experience.

Conclusion: SU with prolonged SPT urinary diversion offers a safe damage control approach for men with concomitant urethral pathology during prosthetic surgery without conferring an increased risk of infection or stricture. **Yi YA, Fuchs JS, Davenport MT, et al. Synchronous Urethral Repair During Prosthetic Surgery: Safety of Planned and Damage Control Approaches Using Suprapubic Tube Urinary Diversion. J Sex Med 2019;16:1106–1110.**

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Key Words: Urethroplasty; Prosthetics; Penile Implant; Artificial Urinary Sphincter

Table 1. Characteristics of the AUS patients

Patient	Age, y	BMI	Previous SU procedures	Urethral pathology	Planned vs damage control	Method of urethral repair	Cuff size, cm
A	76	23.6	3 previous AUS	2-mm ventral bulbar urethra injury	Damage control	Multilayer closure	Transcorporeal; 4.0
B	31	28.7	Collagen injection; 1 previous AUS	Distal bulbar urethra diverticulum	Planned	Excision of ostium of diverticulum; multilayer closure	4.0
E	64	30.7	Several AUS	5-mm ventral distal bulb fistula	Planned	Multilayer closure and dartos flap	4.0
F	74	31.2	4 previous AUS	1-mm distal bulbar urethra injury	Damage control	Multilayer closure	4.0

AUS = artificial urinary sphincter; BMI = body mass index; SU = synchronous urethroplasty.

INTRODUCTION

Since the introduction of the inflatable penile prosthesis (IPP) and the artificial urinary sphincter (AUS) in the 1970s, numerous studies have reported the outcomes and management of complications of these prosthetic devices.^{1,2} The incidence of urethral injury during penile prosthesis implantation is rare, at 1%–4%.^{3–6} Recent surveys by the Genitourinary Reconstructive Surgeons and the Sexual Medicine Society of North America have demonstrated that management of urethral injury varies across providers. During penile prosthesis placement, 55% and 41% of respondents would abort the procedure for distal urethral injury and proximal urethral injury, respectively, with no difference noted between high-volume implanters and low-volume implanters.⁷

Furthermore, little evidence exists concerning the management of urethral injury during AUS placement. Most reports highlight management of AUS erosions, not synchronous urethroplasty (SU), at the time of AUS placement because conventional dogma suggests aborting the procedure.^{8–10} We report on our series of patients who underwent SU as a planned or damage control surgery during urologic prosthetic surgery to determine the safety and outcomes in our experience.

INDICATIONS FOR THE PROCEDURE

From our database of 1508 urologic prosthetic cases performed by a single surgeon at our tertiary urban medical center between 2007 and 2018, 7 SU patients (0.46%) were identified, with an average age of 64 years (range, 31–76 years). No patients had a history of radiation treatments. The presence of smoking history, diabetes mellitus, or coronary artery disease was not prevalent in this patient population, although 6 patients did have a history of hypertension.

Three patients underwent IPP placement (Table 1), 4 patients had an AUS (Table 2), and 1 patient had a sling. One patient underwent concomitant AUS and IPP placement. All 4 AUS patients had a previous AUS placement. All AUS patients had a 4.0-cm cuff placed, 1 of which was a transcorporeal cuff.

PREOPERATIVE PREPARATION

SU may be performed in patients with either known urethral pathology (stricture, fistula, or diverticulum) or with intraoperative urethral injury during prosthesis placement. In patients with known pathology, retrograde urethrography is recommended (Figure 1). A voiding cystourethrogram (VCUG) may add additional information for operative planning. In patients with intraoperative injury, imaging is not obtained beforehand. In addition to a counseling discussion of the risks of the prosthesis itself, it is important to discuss the risk of a urethral repair during the same surgery.

INTRAOPERATIVE CONSIDERATIONS

Planned Approach

In cases with known urethral pathology, the urethroplasty is performed initially, either as a primary repair or with a graft. Once completed, the catheter can be placed, and the prosthetic surgery is carried forward. Three of the 7 patients (43%) underwent planned repair of a urethral abnormality: urethral diverticulum, urethrocutaneous fistula, and a urethral stricture of unknown etiology. One patient had an AUS, another had an IPP, and the third had both an AUS and an IPP. Each had a prior prosthesis in place.

The AUS patient underwent excision of the urethral diverticulum with a multilayer closure using 5-0 PDS. The patient with both the AUS and the IPP had a large fistula that was excised around an existing IPP pump that necessitated closure with both 2-0 monocril and 5-0 PDS, with an overlying scrotal smooth muscle flap for additional coverage. In the patient with an IPP, a long bulbar stricture was identified, which required a buccal graft placed as a ventral onlay approximated with a 5-0 PDS suture. The urethral catheter was removed at 1 week after repair, and the suprapubic tube (SPT) was removed at 4 weeks.

Unplanned Approach

In the 4 unplanned repairs, urethral injury occurred in the setting of IPP with severe corporal fibrosis, history of multiple

Table 2. Characteristics of the IPP patients

Patient	Age, y	BMI	Previous IPP	Urethral pathology	Planned vs damage control	Method of urethral repair
C	44	33	No	Anterior urethral injury on dilation	Damage control	Primary repair with corporal reinforcement
D	64	35	Yes	Distal bulbar stricture 5 cm	Planned	Ventral buccal graft
E	64	30.7	Yes	Distal bulbar urethra diverticulum	Planned	Excision of ostium of diverticulum; multilayer closure

BMI = body mass index; IPP = inflatable penile prosthesis.

previous AUS with scarring (n = 2), and previous urethral disruption from pelvic fracture (sling). Each of these scenarios had a hostile operative field with obliteration of normal anatomic planes, thus jeopardizing the opportunity for any subsequent salvage procedure. All intraoperative urethral injuries in our series were small (<1 cm) and immediately recognized and repaired primarily.

The 2 patients who had an unplanned approach during AUS placement had previous AUS placements with a scarred environment. The urethral injuries were <5 mm and closed in a multilayer closure with 5-0 PDS. In the case of the IPP patient, the urethral injury was identified during corporal irrigation. The corporotomies were extended to better visualize the urethral injury, which was in the lateral urethra. This injury was closed with a 4-0 PDS. The corporal body was then redilated in a different plane to place additional tissue against the repair. In the event of urethral injuries during prosthetic procedures, the surgeon should consider the risks and benefits of aborting the

prosthetic procedure since a repeat operation may be exceedingly difficult and prone to additional complications.

Infectious Risk

It is imperative to assess the operative field for signs of infection as this may preclude a synchronous surgery. In all cases described, there were no clinical concerns for infection.

Suprapubic Tube Catheter

Patients were managed with 4 weeks of SPT bladder drainage postoperatively to prevent urinary extravasation, thereby reducing the likelihood of secondary infection. All SPT catheters were placed using a 16 Fr peel-away sheath. Among AUS cases, urethral catheter removal at 1 week was performed to prevent AUS cuff-related damage and/or erosion.

POSTOPERATIVE MANAGEMENT AND FOLLOW-UP

The patients underwent VCUG at 4 weeks to verify urethral healing and have the SPT removed. VCUG can be performed via an SPT catheter to ensure patency and absence of leak (Figure 2).

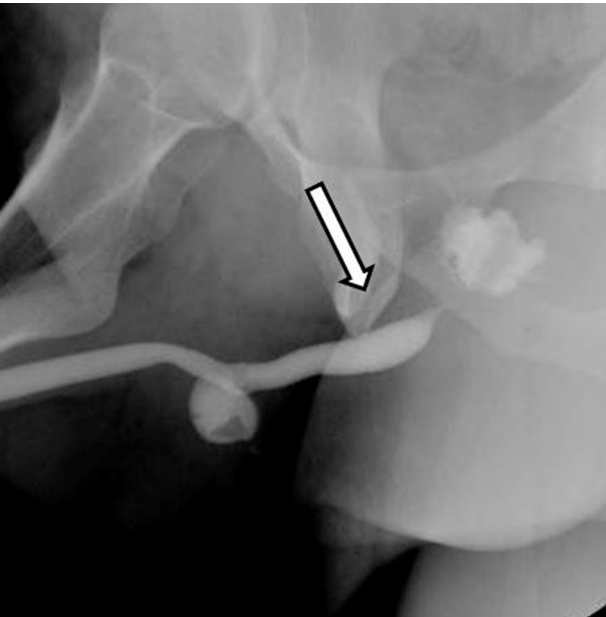


Figure 1. Preoperative retrograde urethrogram showing urethral diverticulum for planned urethroplasty at the time of operation. The arrow denotes the location of the artificial urinary sphincter cuff placement proximal to the urethral repair.



Figure 2. Voiding cystourethrogram obtained via a suprapubic tube at 4 weeks after successful repair of intraoperative urethral injury during penile prosthesis placement.

They then had the device activated 6 weeks later. The patients returned for a 3-month visit to ensure adequate symptom control and comfort with prosthetic. SPT catheters were used in 6 of the 7 patients, with an average indwelling time of 4.1 weeks (range, 7–47 days).

OUTCOMES

In our database of 1508 prosthetic cases (2007–2018), 7 SU patients (0.46%) were identified with an average age of 64 years (range, 31–76 years). No patients had a urethral stricture at follow-up. No infectious complications were noted. The average duration of follow-up was 21.5 months (range, 1–78 months), and all patients were continent.

Traditional views suggest that the safest management of a urethral injury during prosthesis placement may be to abort the procedure to prevent risk to the implant, especially with a distal perforation.^{11–13} Lentz et al¹⁴ reviewed urethral injuries during penile prosthesis placements and identified high-risk populations, such as those with corporal fibrosis, during Peyronie's modeling and in older patients. Anele et al⁴ report 4 patients (1.6%) who had a urethral injury during penile prosthesis placement. They also advocated SPT with urethral repair to avoid a second surgery, along with addressing further fibrosis during another surgery.⁴ Minhas¹⁵ suggested that the management of a urethral injury is dependent on the surgeon's experience level along with the location of the urethral injury. However, caution is warranted for concomitant surgery secondary to longer operative times, which may theoretically increase the risk of prosthetic infection and concern for fistula.

This study is the first to report successful SU during an AUS placement. Although limited by the small size of our series, this study suggests that SU may be a safe option for selected patients to avoid additional difficult surgery. Our patient population was notably high risk with corporal fibrosis and previous surgeries, representative of the types of patients that implanters may encounter in clinical practice at many tertiary referral centers. This study further illustrates the safety of prolonged SPT urinary diversion in prosthetic patients.

COMPLICATIONS

One patient underwent AUS revision with downsizing of the cuff at 13 months from the first surgery. This was completed secondary to persistent leakage. One patient had an AUS explant at 6 months after surgery secondary to cuff erosion.

TAKE-HOME MESSAGE

SU with an SPT offers a safe “damage control” approach for men with urethral pathology during prosthetic surgery, in contrast to the traditional guidance to abort the prosthetic portion of the case when the urethra is injured. SU at the time of

prosthesis placement does not confer increased risk of infection or urethral stricture.

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