



Corporal excavation and penile prosthesis placement for severe corporal fibrosis

Jason C. Chandrapal, Gregory J. Barton, Steven Brousell, Aaron C. Lentz

Division of Urologic Surgery, Department of Surgery, Duke University School of Medicine, Durham, NC, USA

Correspondence to: Jason C. Chandrapal; Aaron C. Lentz. Division of Urologic Surgery, Department of Surgery, Duke University School of Medicine, Durham, NC, USA. Email: jason.chandrapal@duke.edu; aaron.lentz@duke.edu.

Abstract: The penile prosthesis has significantly improved the lives of men with erectile dysfunction refractory to vacuum, medical, or injection therapies and has become the standard of care in this patient population. While device placement in the setting of virgin, physiologically normal tissue can be straightforward, prosthesis implantation in the presence of corporal fibrosis presents a unique challenge to even the most experienced implanter. Over the years, many different surgical tools and techniques have been utilized in these patients including corporal excavation, scar tissue resection, extended corporotomies, cavernotomes, and grafts for corporal reconstruction. Here we present our unique surgical approach for penile prosthesis implantation in a patient with severe corporal fibrosis. His pathology resulted from two episodes of prolonged priapism, two distal shunts, as well as an aborted three-piece inflatable penile prosthesis placement complicated by a wound infection.

Keywords: Penile prosthesis; corporal fibrosis; priapism; erectile dysfunction

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Introduction

The penile prosthesis is a standard treatment for men with erectile dysfunction refractory to vacuum, medical, or injection therapies. In patients with virgin tissue planes and normal anatomy, prosthesis placement can be technically straight forward and associated with minimal morbidity. Patients with corporal fibrosis, however, can present a unique surgical challenge for implantation. The process of corporal fibrosis starts with an initial insult to the corporal tissue. This triggers an inflammatory response that causes myofibroblast proliferation, collagenization, and eventual loss of functional cells. The replacement of normal corporal smooth muscle with this fibrotic, inelastic tissue prevents corporal expansion necessary to obtain an erection. On physical exam, this molecular process manifests as corpora with a hard, woody feeling. The initial insult causing corporal fibrosis has been associated with a variety of both acute and chronic conditions including aging, diabetes, heavy smoking, removal of an infected penile implant cylinder, priapism, penile trauma, Peyronie's disease, or

previous use of intracavernosal injection therapy (1-5).

Prosthesis implantation in patients with corporal fibrosis is one of the most difficult procedures in prosthetic urology and is associated with a higher risk of implant failure and infection compared to primary implantation (6,7). The most technically challenging component of this procedure is creating space within the corpora to allow appropriate accommodation and expansion of the implant cylinder. To facilitate implantation, many surgical approaches have been suggested such as corporal excavation, resection of scar tissue, use of cavernotomes, performing extended corporotomies, and the use of grafts for cylinder coverage (8,9). There is no standardized approach to prosthesis implantation in this setting, therefore selection of the appropriate surgical technique can vary depending on the extent of corporal fibrosis and surgeon experience.

Patient selection and workup

Our patient is a 39-year-old male with a history of

hypertension, Type 2 insulin dependent diabetes mellitus, liver cancer, and erectile dysfunction that was referred to our clinic for penile prosthesis placement. His history included two previous episodes of prolonged priapism, each time managed with a distal shunt. Both priapism episodes were thought to be related to an adverse effect of trazodone. Prosthesis placement was attempted by his local urologist but was aborted intraoperatively due to severe corporal fibrosis. Following surgery, his post-operative course was complicated by a wound infection at the penoscrotal incision that was successfully treated with antibiotics and local wound care. He was subsequently referred to our reconstructive urology practice to explore further treatment options. At the time of our initial evaluation, the patient endorsed complete erectile dysfunction with an IIEF-5 of 1 out of 25.

The patient's family history is notable for diabetes in both parents. He is single and a current cigarette smoker with 12.5 pack/year history. On physical exam his penis revealed woody fibrosis with hardened, atretic, inelastic corporal bodies bilaterally along their entire course. Due to the patient's severe and extensive corporal fibrosis, he was offered a staged procedure in which we would attempt placement of a malleable prosthesis, followed by a three piece inflatable penile prosthesis (IPP) 3–6 months later. This treatment plan was decided upon due to his significantly increased risk of infection as well as high degree of technical challenge (7,10).

Given the severity of the patient's fibrosis and the need to expose the corpora along its entire length, we opted for a perineal incision with invagination of the penis through the perineal incision. This approach was derived from our experience with complex urethroplasty. The patient was extensively counseled that this would be a difficult procedure that had a high risk of infection. The patient acknowledged all benefits and risks of the procedure and chose to proceed with the treatment plan as outlined above.

Pre-operative preparation

Our standard pre-operative work-up for patients undergoing penile prosthesis surgery includes CBC, BMP, urinalysis, urine culture, and HbA1c. Our patient's pre-operative work-up was normal and his pre-operative HbA1c was 7%. Prior to surgery, weight-based intravenous vancomycin and gentamycin were administered within 1 hour of initial incision. Following induction of general anesthesia, the patient was placed in a simple lithotomy

position. The skin of the suprapubic region, scrotum, and perineum was clipped and prepped with chlorhexidine scrub followed by a chlorhexidine and alcohol (Chloraprep) paint.

Equipment preference card

- Penile Prosthesis tray;
- Suture 3-0 Silk pops for stay suture, 2-0 PDS for corporotomy closure, 3-0 Vicryl and 4-0 Monocryl;
- Jordan Perineal Bookwalter;
- Tachosil Collagen Fleece;
- 9.5 mm Coloplast Genesis malleable implant (very important);
- Bacitracin antibiotic irrigation;
- Antimicrobial solution consisting of 1 g vancomycin, 3.375 g piperacillin/tazobactam, and 50 mg amphotericin B to soak the implant on the back table prior to insertion;
- 16 Fr Foley catheter.

Procedure

Our standard practice is to create an artificial erection by injecting 50 cc of sterile saline and 10 cc of 2% lidocaine as it both helps dilate the corpora and provides excellent local anesthesia. Due to the extreme nature of this patient's corporal fibrosis, we were unable to inject the solution. A midline perineal incision was made and we carried out our dissection of the corpora and urethra *en bloc*. The penis was then invaginated into the perineal wound and placed on traction with a Penrose drain, exposing both corpora along their entire length (*Figure 1*).

3-0 silk sutures were used to mark the medial and lateral edges of the left corporal body. Then Bovie cautery was used to make a vertical corporotomy along the full length of the left corpora (*Figure 2*). There was no bleeding from within the corporal tissue. The lumen was too narrow to accept even the smallest diameter penile implant, indicating our predicted need for extensive corporal excavation. We performed this by using a combination of both sharp and Bovie electrocautery dissection, taking extra care to remove the corporal scar from the inner surface of the tunica albuginea (*Figure 3*).

Once the diseased and fibrotic corporal tissue was removed, we then turned our attention to implant placement. A Furlow device was used to measure a corporal length of 14 cm (*Figure 4*). We elected to use a 13 cm, 9.5 mm Genesis malleable prosthesis. We closed the



Figure 1 Penile invagination. (A) Pre-operative appearance of the bilateral corporal fibrosis; (B) penile invagination for complete corporal exposure; (C) penile invagination on traction with Penrose drain.

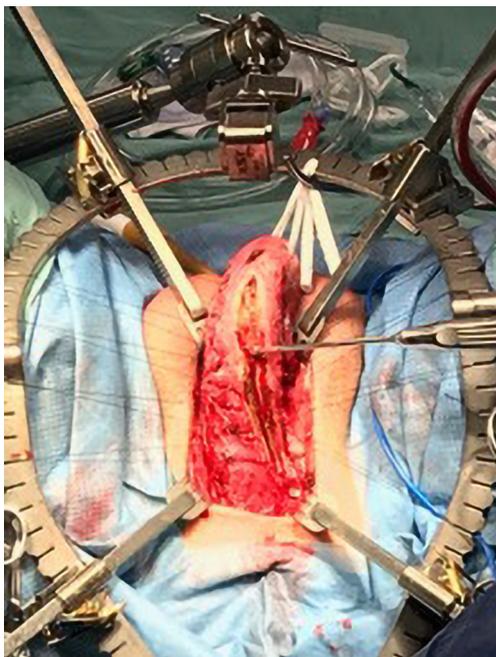


Figure 2 Longitudinal left corporotomy.

corporotomies with 2-0 PDS suture in a running fashion. For reinforcement of the closure, we overlaid Tachosil, a self-adhesive collagen fleece (*Figure 5*). We then repeated the same procedure on the right side (*Figure 6*).

Following completion of the right side, the penis was reduced to its anatomic position. The cosmetic appearance was excellent and both implant tips were symmetrical and palpable in the mid glans. The incised fibers of the

bulbocavernosus muscle were then reapproximated to the corpora bilaterally. The perineal wound was copiously irrigated with antibiotic solution and closed in standard fashion (*Figure 7*). The patient was awoken from anesthesia and transferred to the recovery room in stable condition.

Role of team members

- Aaron C. Lentz, MD—Attending surgeon;
- Steven Brousell, MD—Resident surgeon;
- Jason C. Chandrapal, MD—Videographer/Photographer and Urology Resident;
- Gregory J. Barton, MD—Videographer/Photographer and Urology Resident.

Post-operative management

The patient was admitted to the urology service and had an uncomplicated postoperative course. His Foley catheter was removed on postoperative day 1 and he was discharged home comfortably on a multimodal oral pain regimen and five days of broad-spectrum antibiotic prophylaxis, which is our standard practice.

On postoperative follow-up, approximately 7 weeks following his procedure, the patient had no complaints and stated that he was able to ejaculate without difficulty. His perineal incision was well healed with no signs of infection or wound dehiscence. The corporal cylinders were in place with symmetrical implant tips that were palpable in the mid glans and no sign of cylinder cross-over or impending

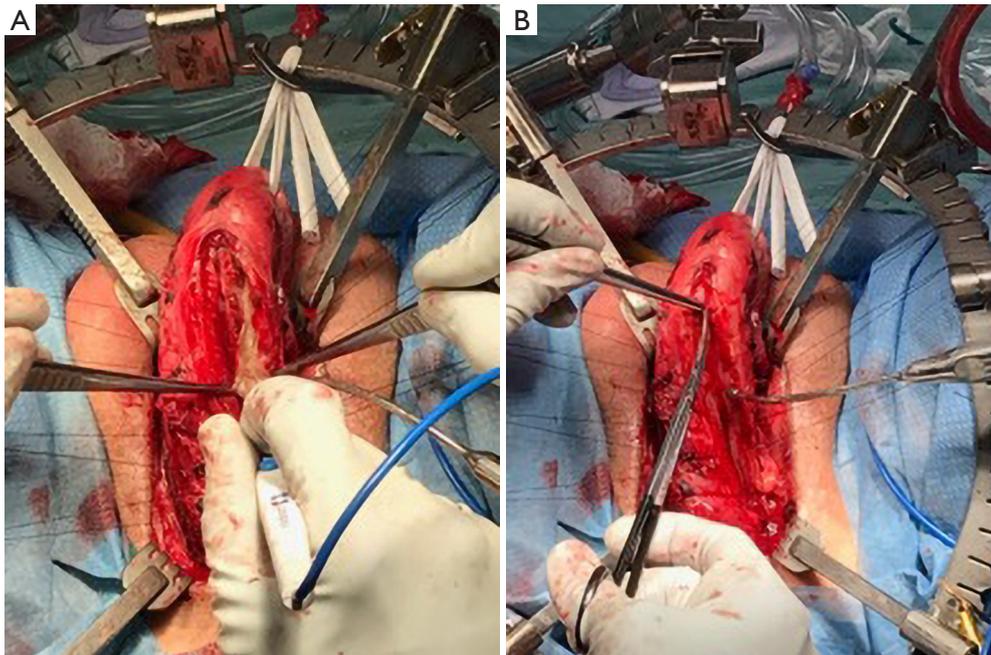


Figure 3 Left corporal fibrosis excavation using Bovie cauterly to separate the rind of scar from the inner surface of the tunica albuginea (A) and excision of fibrosis using scissors (B).

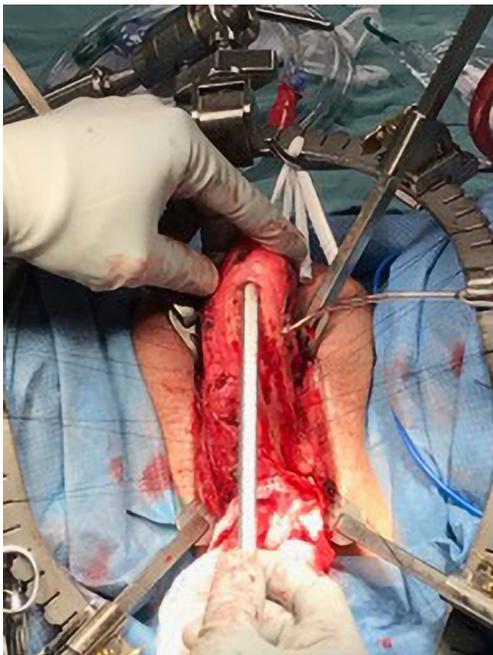


Figure 4 Left corporal Furlow measurement following scar removal.

erosion (*Figure 8*). Given his excellent postoperative outcome, the decision was made to continue with the previously planned second stage of the procedure, removal and replacement with a three-piece IPP, in 5–6 months. The entire operative video and follow-up can be viewed in *Figure 9*.

Tips, tricks, and pitfalls

- Careful pre-operative treatment planning guided our decision to utilize a malleable prosthesis. This was driven by the degree of corporal fibrosis and the concern for a high risk of complication if three-piece IPP placement was attempted.
- Utilization of the technique of penile invagination allowed us to achieve complete longitudinal corporal exposure while avoiding multiple incisions or overlapping incision near the corporotomy and cylinders.
- Tachosil or other biologic graft should be available for use in cases where the surgeon has suspicion of a

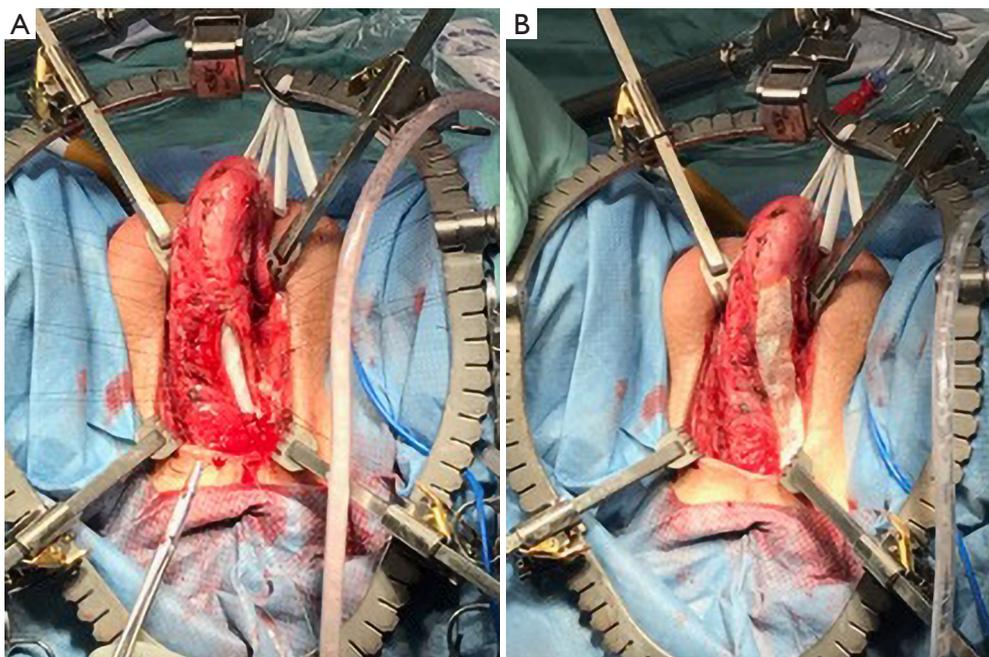


Figure 5 Left cylinder placement (A) and Tachosil reinforcement (B).



Figure 6 Right cylinder placement.

difficult primary corporotomy closure.

- A staged approach to placement of a three-piece implant 3–6 months following malleable placement may maximize corporal length and reduce unwanted complications.

Conclusions

Penile prosthesis surgery in patients with severe corporal fibrosis can be one of the most challenging procedures in prosthetic urology. While many various surgical techniques have been previously described, there is no current standard surgical approach. We demonstrated that perineal penile invagination, corporal excavation, and implantation with a malleable prosthesis is a safe and effective treatment for these patients.

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Conflicts of Interest: All authors have completed the

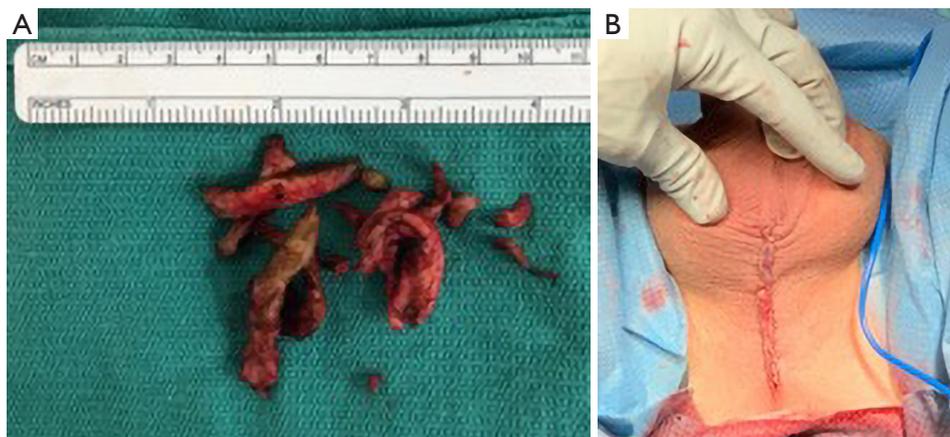


Figure 7 Corporal fibrosis and wound closure. (A) Fibrotic corporal tissue removed from the right corpora; (B) completion and closed perineal incision.

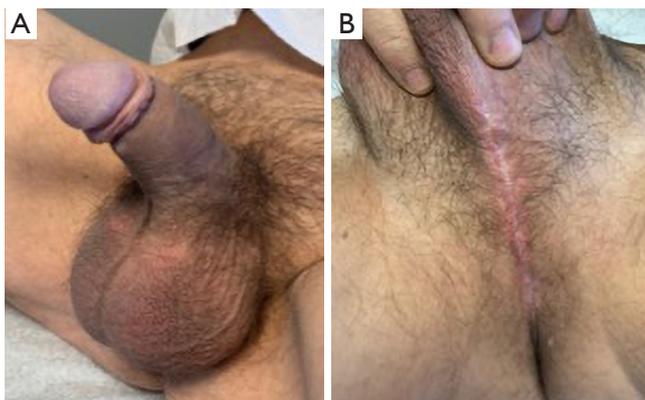


Figure 8 Postoperative follow-up. (A) Penis with malleable prosthesis at postoperative follow-up; (B) well healed perineal incision at postoperative follow-up.



Figure 9 Corporal excavation and penile prosthesis placement for severe corporal fibrosis (11).

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