

The pulley stitch: fixation of penile prosthetic exit tubing

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Proximal positioning of the penile prosthesis cylinder is performed during inflatable penile prosthesis surgery. We describe a technique to secure a prosthetic cylinder during inflatable penile prosthesis implantation. Urologists performing prosthetic surgeries employ a variety of surgical techniques to achieve successful outcomes. A surgical technique that secures the prosthetic device may ultimately mitigate cylinder migration and erosion.

This is a simple, cost-effective technique that can be readily incorporated into conventional corporotomy closure procedures. It proves to be a feasible technique for both running and interrupted corporotomy closures. The “pulley stitch” offers an adjunctive technique for prosthesis cylinder positioning and may also help prevent migration of prosthetic devices, and it can be incorporated with corporotomy closure.

Key Words: corporotomy, closure, pulley stitch, inflatable penile prosthesis

Introduction

Inflatable penile prosthesis (IPP) implantation is the definitive option for surgical management of erectile dysfunction (ED) and may be offered as a first-line treatment option for select men.¹ These devices are designed such that they allow for both a flaccid and erect state, similar to the natural states of flaccidity and erection. Current literature demonstrates that post

implantation satisfaction rates for patients are high at 85%-90% amongst studied subjects.² Similarly, partner satisfaction has been high with studies demonstrating upwards of 82% satisfaction.³

The reliability and durability of these devices have improved over recent decades, which has led to a decrease in the risk of complications such as mechanical failure, pump auto-inflation, and device buckling.⁴ Despite these improvements, complications may arise and include cylinder malpositioning, migration and erosion with rates of revision or repair in the range of 15% at 5 years and 30%-40% at 10 years.^{5,6} Nonmechanical device failures leading to cylinder migration and tissue erosion are often the result of infectious complications, usually

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TABLE 1. Key steps and materials needed to perform the “pulley stitch” technique

Preoperative	
Labs	CBC, BMP, HgA1c (%) if diabetic
Medications	Intravenous antibiotics 1 hour prior to incision (vancomycin, gentamicin, fluconazole if diabetic)
Prep	10 minutes pre-scrub with chlorhexidine solution followed by prep with 2% chlorhexidine gluconate
Intraoperative	
Suture	2-0 synthetic absorbable polyglactin 910 suture (~30 cm) on a UR-6 needle (the “pulley stitch”)
Surgical instruments	Right angle forceps
Key steps	
One	2-3 cm corporotomies are made bilaterally
Two	Pulley stitch is placed distal to the apex of each corporotomy, Figure 1
Three	Right angle used to hook pulley stitch and pull up, Figure 2
Four	Pass Furlow device through pulley stitch with each cylinder into distal corpora and fasten pulley stitch over exit tubing only Figure 3
Closure	Running closure of each corporotomy

in the early postoperative period and in some series, have been shown to occur in 3%-11% of cases.⁷ Rates of corporal perforation are low with an estimated prevalence of 1.1%, but rates of corporal erosion have been reportedly higher between 3%-5%.⁸ We describe an intraoperative technique to help secure the penile prosthesis intracorporally, which may mitigate the risk of device erosion and migration. This technique, which we call a “pulley stitch,” is seamlessly integrated into the closure of each corporotomy to secure the exit tubing. The key steps, instruments and materials required for this technique are summarized in Table 1.

Indications for procedure

The indications for this procedure are to improve penile prosthesis surgical outcomes by mitigating the risk of cylinder migration and erosion.

Preoperative preparation

The preoperative considerations in placing a pulley stitch are consistent with standard preoperative management in patients with ED who are undergoing IPP placement.

An appropriate diagnosis of ED must be made and

the patient should provide informed consent regarding risks, benefits, and alternatives to the procedure. Patients should receive a comprehensive medical, surgical, and social history and undergo a thorough physical exam. Preoperative laboratory testing should be consistent with any patient being considered for penile prosthesis placement, including: complete blood count (CBC), basic metabolic panel (BMP) and hemoglobin A1C (HgA1c) if the patient is diabetic. Patients should also cease any anticoagulants prior to surgery.

Antibiotics should be instilled intravenously in the preoperative holding area approximately 1 hour prior to incision. Patients are then transferred to the operating room and placed in the supine position where anesthesia is induced via general endotracheal intubation. A 10-minute pre-scrub with chlorhexidine solution is then carried out followed by prep with 2% chlorhexidine gluconate.

Intraoperative considerations

Dissection

Once the appropriate dissection has been carried out exposing the corpora ventrally, 2-3 cm longitudinal corporotomies are made.

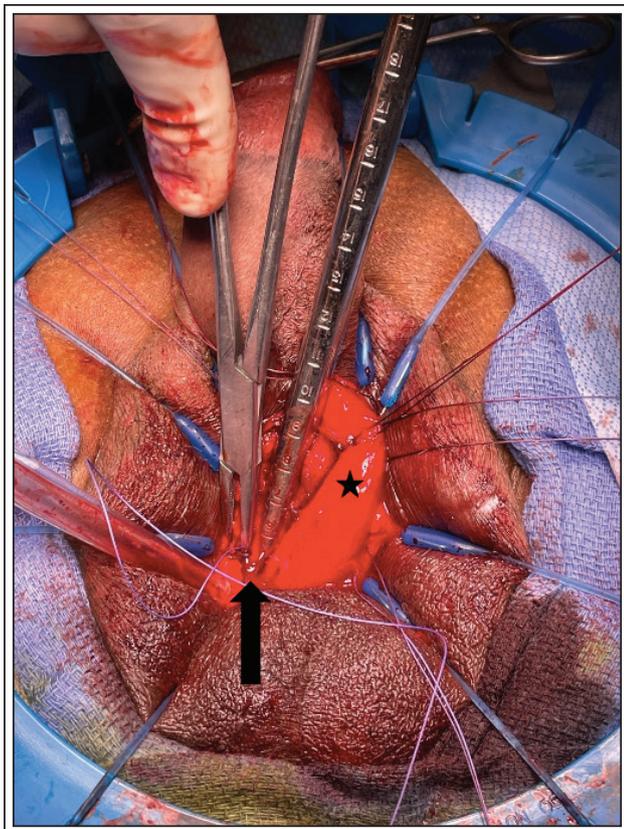


Figure 1. Placement of the pulley stitch 2-3 mm from the proximal aspect of the corporotomy is demonstrated (after dissection by a penoscrotal approach). The solid arrow shows a 2-0 synthetic absorbable polyglactin 910 suture being placed from the lateral tunica albuginea through the medial aspect of the tunica albuginea. The star identifies the urethra.

Placement of the “pulley stitch”

After corporal measurements are made and an appropriate device has been selected, the “pulley stitch” (2-0 synthetic absorbable polyglactin 910 suture) is placed across the corporotomy approximately 2-3 mm distal to the apex of the proximal extent of corporotomy, Figure 1. This is done bilaterally.

After device preparation (per surgeon and manufacturer specifications) the prosthetic cylinders are inserted. A right-angle instrument is passed into the corporotomy to hook the pulley stitch and pull it out of the operative field. In standard fashion, after preparing the Furlow device, it is then passed under the pulley stitch into the distal corpora and deployed in standard fashion, Figure 2. This step is performed bilaterally without pulling the cylinders into the corpora.

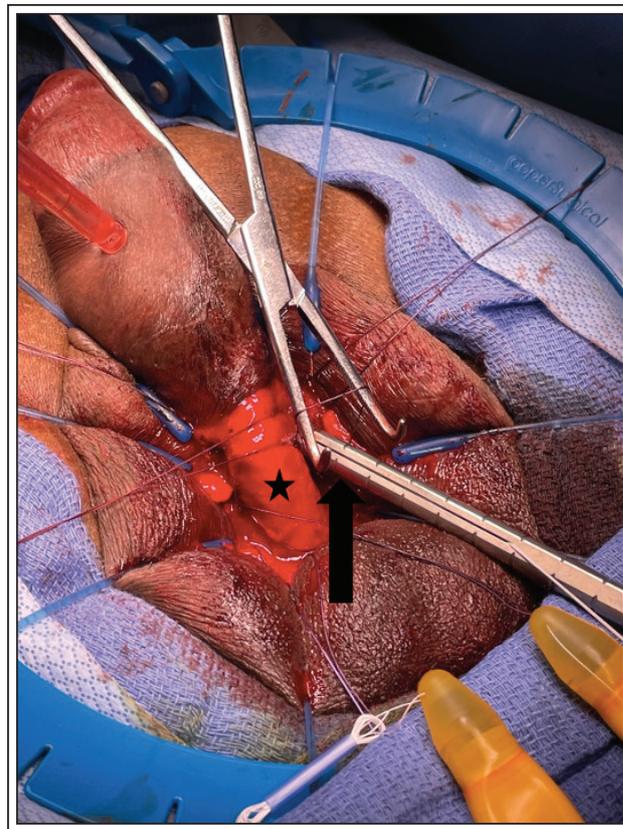


Figure 2. Passage of the Furlow device through the pulley stitch is depicted by the solid arrow. The star identifies the urethra.

The prosthetic cylinder with its proximal aspect and rear tip extender is brought entirely through the pulley stitch, which is fastened only over the exit tubing, Figure 3.

The cylinder is then inserted proximally into the corpora and the free end of the pulley stitch is tightened thereby securing the device in its proper position. The distal end of the prosthetic cylinder is subsequently pulled towards the glans and seated in its appropriate position, Figure 4. This is done bilaterally.

Corporotomy closure and surgical completion

The pulley stitch is then tied down over the exit tubing. The corporotomy is closed in a continuous running fashion. Alternatively, pre-placed interrupted sutures can be utilized instead of running the corporotomy closure. Once the corporotomies are closed, the reservoir and pump are implanted in routine fashion and the surgery is completed.

Postoperative management and follow up

Incorporating the pulley stitch into corporotomy

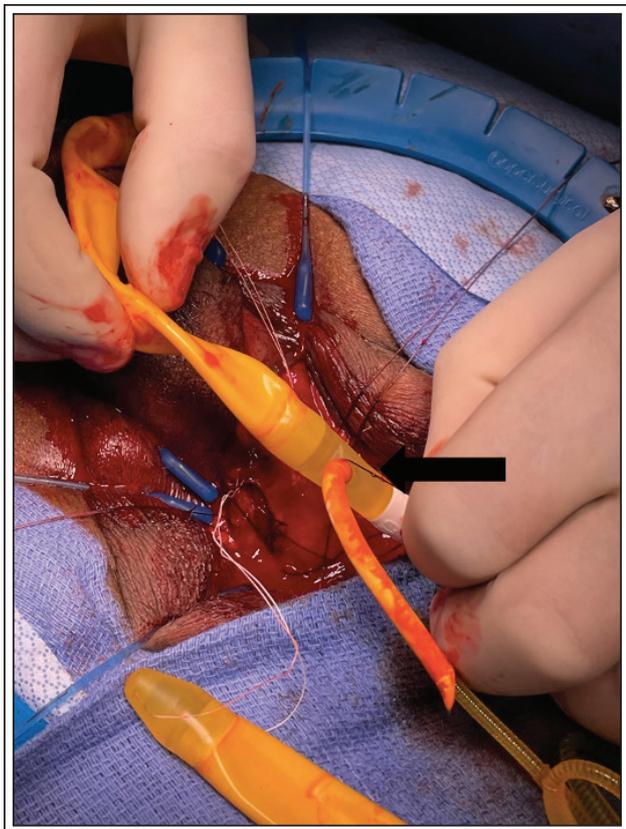


Figure 3. The pulley stitch (2-0 synthetic absorbable polyglactin 910 suture) secured only around the penile prosthesis exit tubing is depicted (solid arrow).

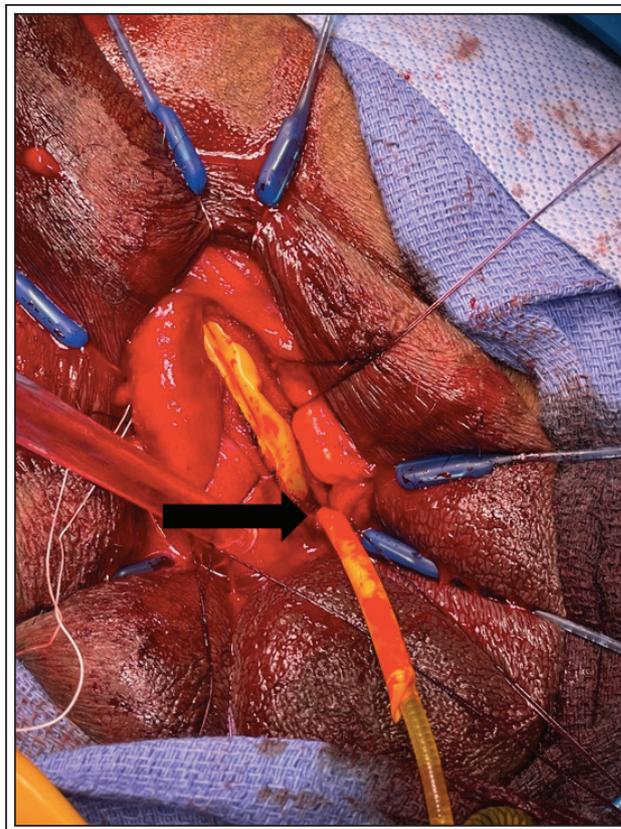


Figure 4. The properly positioned prosthesis cylinder with the exit tubing secured by the pulley stitch is demonstrated (solid arrow).

closure of IPP placement does not change postoperative management for the patient.

Discussion

Properly placing and securing prosthesis cylinders within the corpora are important technical aspects of penile prosthesis implantation. This execution is fundamental for reducing complication risks such as device migration, erosion, infection, and patient or partner dissatisfaction. In this paper, we have described a technique that anchors the prosthetic cylinder within the corporal body with the objective to mitigate these risks.

Prior reports regarding occurrences of cylinder migration after penile prosthesis placement have generally been described in the context of proximal corporal perforation.⁹ Migration of components of the prosthetic device, including the connecting and exit tubing have all been described, sometimes long after initial implantation.¹⁰ A variety of known risk factors exist for prosthesis cylinder or tubing migration.

Intracavernosal fibrosis secondary to a variety of causes including Peyronie's disease, prior penile injection therapy, and histories of priapism or diabetes, has been associated with difficult corporal dilation and cylinder placement both distally and proximally, increasing the risk for crural perforation, crossing over, or urethral injury.^{11,12} Risk for corporal fibrosis is associated with a history of prior device placement, or complications from an infected implant with device explant. Device infection and erosion risks are understood particularly in men with poorly controlled diabetes, in association with immune dysfunction resulting from the persistently hyperglycemic environment.¹³ In cases of individuals with extreme abdominal girth, patient anatomy also may lead to difficult corporal dilation and insertion whether from an infrapubic or penoscrotal approach during device implantation.¹⁴ For all of these conditions, techniques that optimize positioning and securing penile prosthesis cylinders are well considered.

Surgical techniques to mitigate malposition and erosion of penile prosthesis have been described

previously. For instance, Pearlman and Terlecki described both rear tip extender as well as shod fixations.⁹ Their technique uses a non-absorbable suture, which is passed through the rear tip and into the tunica at the lateral edge of the corporotomy, and similarly, a non-absorbable suture, which is passed through the protective material covering the exit tubing and through the edge of the corporotomy. While modes of fixation offer supplemental support there is risk for injury to the prosthetic device, particularly when attempting to secure the protective covering overlaying the tubing. The pulley stitch technique poses minimal risk of device injury compared to previously described techniques. Furthermore, this adjunctive technique is inexpensive and can be performed quickly in the intraoperative setting with relative ease.

Device tubing exits from each cylinder and connects to the device pump, which is subsequently placed in the scrotum. Given that tension on the tubing is created with pump manipulation, there is the risk of extrusion of prosthesis cylinders from their intracorporal positions despite prior corporotomy closure (which has been observed in revision surgeries by the senior author). By situating the pulley stitch across exit tubing at the proximal aspect of the corporotomy, the stitch pulls the cylinder into place and secures it, minimizing its risk of malposition or migration. Notably, this technique can be utilized in both index and revision surgeries and employed using both penoscrotal and infrapubic approaches. While this technique may be applied to both 2- and 3-piece IPP devices, limitations of this technique extend to the malleable penile prosthesis. Due to the lack of exit tubing on malleable devices, this technique cannot be utilized to fix the malleable cylinders in place.

Take home message

The pulley stitch may be incorporated into the prosthetic surgeon's armamentarium of surgical techniques to help secure exit tubing of IPPs that may aid in the prevention of tubing and/or proximal cylinder migration or erosion. □

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