

Implantation of Penile Prosthesis in Cases of Corporeal Fibrosis: Modified Shaeer's Excavation Technique

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ABSTRACT

Introduction. Implantation of penile prosthesis in case of corporeal fibrosis poses a greater risk of complications because of the blinded aggression involved. Penoscopic excavation and ultrasonography-guided excavation can decrease these complications but still have limitations.

Aim. This work described the combination of penoscopy-guided and ultrasound-guided excavation in a trial to eliminate the limitations inherent to both.

Methods. Twelve patients with penile fibrosis were operated upon. A guide wire was inserted under ultrasound monitoring, along which penoscopic corporotomy and resection was performed. Ultrasound was also used to monitor penoscopic excavation toward the tip of the corpus cavernosum and crus.

Main Outcome Measures. Ease of the procedure, safety, extent of dilatation, and girth of prosthesis implanted.

Results. The procedure was relatively easy. Ten cases were dilated up to size 13.5 Hegar, and two up to size 14. Size 13 prosthesis was implanted in all cases.

Conclusions. The relative safety of the procedure, the low incidence of complications, the possibility of restoring length and girth to an extent, and the resultant generous dilatation of the corpora for accommodating a sizable unhindered inflatable penile prosthesis all make ultrasound-guided penoscopic corporotomy and resection a valid option for prosthesis implantation in cases of penile fibrosis. **Shaeer O. Implantation of penile prosthesis in cases of corporeal fibrosis: Modified Shaeer's excavation technique. J Sex Med 2008;5:2470–2476.**

Key Words. Prosthesis; Implant; Fibrosis; Infection; Penoscopy; Excavation

Introduction

In 2006, this author introduced the visually monitored excavation of corporeal fibrous tissue to facilitate the implantation of penile prosthesis in cases of corporal fibrosis [1,2], as an alternative to classic techniques such as multiple small corporotomy incisions [3], extensive pan-corporotomy [4–6], the utility of cavernotomes [7,8], Otis urethrotome [9], implantation of an undersized prosthesis [10], and expansion of the corpora cavernosa by grafting to accommodate the prosthesis besides fibrous tissue [11].

The rationale behind visually monitored techniques is to allow safer dilatation of the fibrosed corpora cavernosa through minimal access incisions. The utility of sharp instruments eliminates the need for forceful—sometimes aggressive—dilatation necessary with blunt instruments.

However, visual monitoring is necessary to guide the sharp instrument within the boundaries of the tunica albuginea, to avoid perforation. Unaggressive safer dilatation through fibrous tissue became possible with visually monitored sharp instruments. In addition to the higher safety profile, visually monitored techniques allow excavation and elimination of fibrous through minimal access incisions. The interior of the corpora cavernosa is inspected, fibrous tissue projections and rings or shelves are resected, thereby creating a wide, uniform, and unhindered space to accommodate the inflatable prosthesis.

Visual monitoring is conducted via penoscopy [1] or ultrasonography [2]. Penoscopy comprises a cystoscope guiding optical corporotomy, whereby a blade cuts through the fibrous tissue just as with visual urethrotomy, or guiding resection of fibrous tissue remnants and protrusions by diathermy loop

just as with prostatic resection. The blade cuts three incisions, one dorsal, one lateral and a third one dorsomedial, to an average depth of 1 cm into the corpora. Hegars are then used to dilate this 1-cm-deep track. The process is repeated until the whole length of the corpus cavernosum is dilated, both proximally and distally, with no force required. The interior of the corpus cavernosum is then inspected by the penoscope and any fibrous tissue projections are resected to smooth out the inner surface: penoscopic resection.

Regarding ultrasound-guided excavation, a sharp instrument is gently driven through the fibrous tissue, guided by intraoperative ultrasonography, maintaining its tip within the confinements of the tunica albuginea at all times to avoid perforation. In transverse sonographic sections, the instrument and the hyperechoic tunica albuginea are clearly visualized and the former is maintained amidst the round contour of the corpus cavernosum. In longitudinal sections, the instrument is maintained parallel to and in-between the dorsal and ventral hyperechoic borders of the corpora cavernosa [2]. Any sharp instrument can be used: a laparoscopy trochar, scissors, Otis urethrotome, as long as it is ultrasound-guided.

Nevertheless, penoscopic- and ultrasound-guided excavation have their limitations. As to penoscopy, a preinserted guide wire would decrease the possibility of perforation and speed up corporotomy, even if perforation had been a rare possibility in earlier reports [1]. Guidance of the penoscope from without would decrease the possibility of perforation at the tips of the corpora and crura.

Ultrasound-guided cavernotomy lacks the option of inspecting and smoothing out the inner surface of the tunica albuginea and eliminating projections and constriction rings that may hinder an inflatable prosthesis. Simultaneous manipulation of the ultrasound probe and the sharp instrument requires precision and accurate synchronization.

This work described an approach to corporeal excavation that combines penoscopy-guided and ultrasound-guided excavation in a trial to eliminate their limitations.

Methods

Patients

Twelve patients with penile fibrosis referred to a tertiary referral center were operated upon. Five had fibrosis following removal of an infected pros-

thesis, four had postpriapism, and two were afflicted by fibrosis on account of home therapy with intracorporeal injections. Two of the postinfection patients had controlled diabetes. The last patient in the series had no specific etiology to which fibrosis could be attributed. He has had venoligation surgery performed 1 year prior to presentation. He was referred to us by a specialist who tried implanting a prosthesis but failed to dilate the corpora except for 3 cm distally on one side, despite the absence of palpable fibrous tissue. Operations were performed 5 days later.

All patients provided written informed consents.

An oral quinolone was administered the night before surgery, followed by intravenous aminoglycoside and cefazolin intraoperatively and postoperatively.

Setup

The patient was positioned supine on the operating table. The surgeon stood on the patient's right-hand side. The assistant stood on the patient's left-hand side, and so were the penoscopy (cystoscopy) and ultrasound units.

The penoscopy unit was a 21 French rigid cystoscopy set with a 0- or 30-degree lens, a urethrotomy blade, or a resection loop mounted on a working element. Glycine was the irrigation solution used during penoscopy, to which bacitracin was added.

As to ultrasonography, a high-resolution ultrasound unit with a linear 7.5-MHz probe was used. The ultrasound probe was passed through sterile cylindrical drapes and into the palm area of a gel-filled, powder-free surgical glove.

Procedure

Under general anesthesia, a stay suture was placed in the glans penis, the urethra was catheterized, and a longitudinal penoscrotal incision was cut along the median raphe. The corpora cavernosa were exposed and 1-cm-long corporotomies were incised.

Ultrasound-Guided Insertion of a Guide Wire

The ultrasound probe was applied to the ventral aspect of the corpora cavernosa, and under ultrasound guidance, a central venous pressure catheter size 14-G is driven through the fibrous tissue right in the middle of the corpus cavernosum as monitored by alternating transverse and longitudinal ultrasound sections, and advanced slowly until the tip of the corpora (Figures 1 and 2). The sharp tip of the rigid catheter can easily cut through fibrous



Figure 1 Ultrasound-guided insertion of the central venous pressure catheter—a view from without.

tissue, however dense it is. The needle cast a clear sonographic shadow that enabled easy identification, especially in transverse sections (Figure 2). Following full introduction, the trochar was withdrawn, leaving the sheath along and amidst the corpus cavernosum. A guide wire was inserted through the sheath. The sheath was then withdrawn, leaving the guide wire in the exact middle of the distal corpus cavernosum, spanning its whole length (Figure 3). The ultrasound probe was set aside. Despite easy introduction of the needle, one should not be tempted to drive it in hastily, otherwise perforation may occur. Although perforation has not occurred in this series, I believe that if it does, it should be harmless, and should not predispose to future extrusion of the

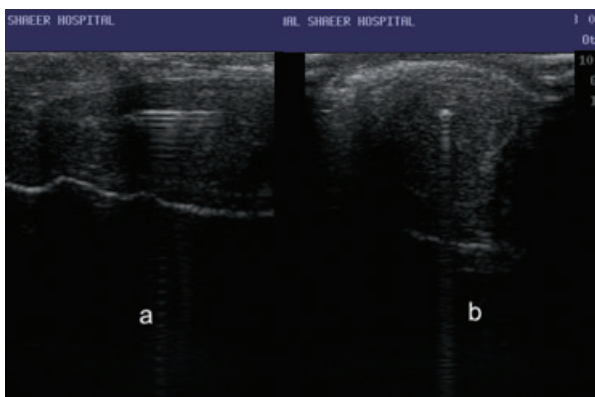


Figure 2 Ultrasound-guided insertion of the central venous pressure catheter. (A) Longitudinal section showing the catheter within the corpus cavernosum reaching the distal tip. (B) Transverse section showing the needle amidst the corpus cavernosum, casting a sonographic shadow.



Figure 3 Guide wire in place.

prosthesis, based on experience with the needle introducers of the inflatable penile prosthesis.

Penoscopic Corporotomy

The corporotomy (urethrotomy) blade was mounted on the working element of the penoscopy kit, and advanced along the preinserted guide wire, cutting into the fibrous tissue (Figure 4). Penoscopic corporotomy was performed in increments of 1- to 2-cm depth, alternating with Hegar dilatation of the incised segment, with the guide wire still in place. This is repeated up to the tip of the corpus cavernosum, at which point ultrasound guidance can be reintroduced to avoid perforation.

The same process is repeated proximally into the crus until full dilatation is achieved. The tip of the crus can be clearly identified by ultrasonography (Figure 5).

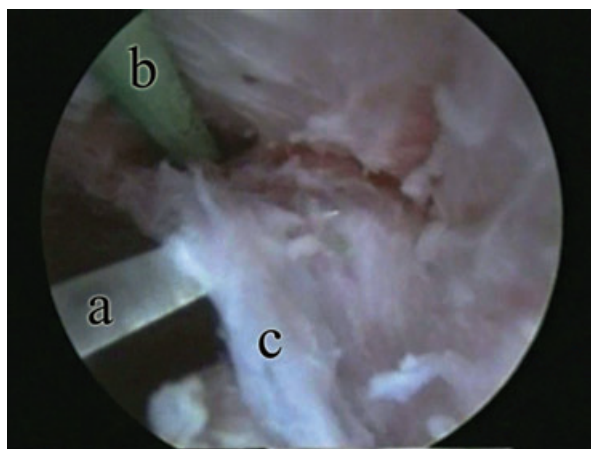


Figure 4 Penoscopic corporotomy along the guide wire. (A) Blade; (B) guide wire; (C) fibrous tissue.



Figure 5 Tip of the crus (arrow).

Corporotomy is considered adequate only when the thickest dilator can be inserted and retrieved with ease. Otherwise, if insertion or retrieval of the dilator requires force, corporotomy is repeated further along the whole length of the corpora with significant widening of the corpora. The guide wire is not needed at this time. Ultrasonographic monitoring may be reintroduced whenever there is doubt as to the safety of further corporotomy to evaluate the remaining thickness of the tunica albuginea.

Ten cases were dilated up to size 13.5 Hegar, and two up to size 14. As difficult as this may sound, slitting the inner surface of the corpora along its length results in noticeable increase in girth.

It is to be noted that the preinserted guide wire was threaded into the penoscopy unit in a reverse

direction (from tip of the penoscope backwards) through a ureteric catheter in the working channel. Alternatively, the penoscope can be inserted alongside the guide wire rather than mounted onto it.

Penoscopic Resection

Penoscopy-guided corporeal resection followed. The interior of the dilated corpora cavernosa was inspected by the penoscope along its whole length, identifying fibrous tissue projections, which were resected by the diathermy loop using low amplitude cutting current (Figure 6). Upon resection, the penis was dorsiflexed and coapted to the pubis to allow dissipation of the current to the abdomen. Whenever there was doubt as to the thickness of the tunica albuginea and the risk of perforation upon resection, a transverse ultrasonography section was used to determine the extent of the next cut. Throughout the process, the corpus cavernosum was irrigated with antibiotic-supplemented glycine, issuing through the penoscope.

Prior insertion of a guide wire was not absolutely necessary. Penoscopic corporotomy and corporeal resection can be conducted under ultrasound guidance throughout the procedure, without a guide wire (Figure 7). However, in such case, it is necessary to observe the ultrasound and penoscope monitors simultaneously, and to keep the ultrasound probe applied to the penis throughout the procedure, which is cumbersome. Ultrasound-guided preplacement of a guide wire eliminates the need for ultrasound monitoring throughout penoscopic corporotomy and resection.

Following full excavation (Figure 8), an inflatable two-piece prosthesis was implanted in four

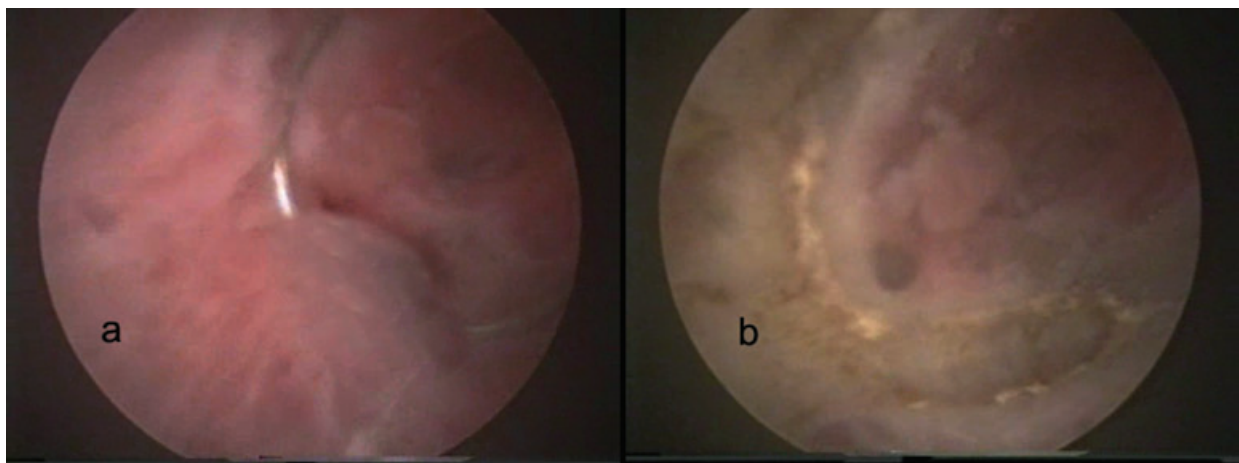


Figure 6 Penoscopic resection of a fibrous tissue projection. (A) Before; (B) after.

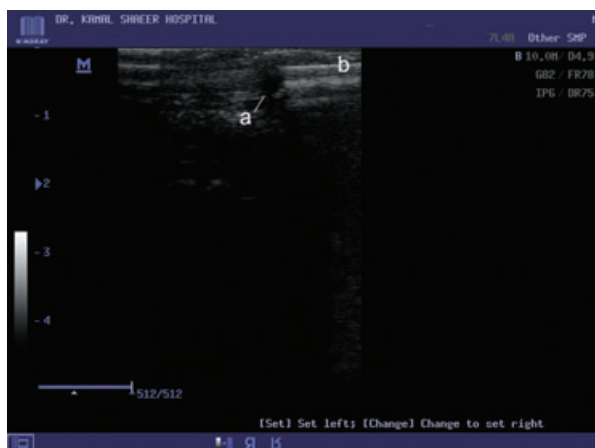


Figure 7 The penoscope visualized by ultrasound. (A) Blade; (B) penoscope.

cases and a semirigid prosthesis in eight. The choice of semirigid rods in some patients was based on financial considerations rather than patient or physician preferences.

My policy was to dilate to the maximum possible girth and resect all fibrous tissue projections regardless of the type of prosthesis used. However, other surgeons practicing this technique may choose to be more conservative on dilatation and excavation if a semirigid is to be used. Otherwise, with an inflatable device, I recommend full excavation. Size 13 was implanted in all cases. The urethral catheter was removed, and the patients were discharged the next day.

Results

The procedure was relatively straightforward. The average operative time was 80 minutes. Ten cases were dilated up to size 13.5 Hegar, and two up to size 14. Size 13 prosthesis was implanted in all cases, inflatable in four and semirigid in eight. In three of the five reimplantation cases, girth of the reimplanted prosthesis was larger than that of the removed one.

Our cases were followed up for a range of 1 month to 1 year. Inflation/deflation was easy and unhindered. No considerable complications were issued from the procedure apart from edema that was common to all patients, resolving spontaneously after 7–10 days, and a mild subcutaneous hematoma in one patient.

Patient and partner satisfaction was noticeable, particularly with the girth and length of the penis following implantation, though no validated pre-

operative and postoperative questionnaire measuring satisfaction was applied for that purpose. This is a shortcoming in my work that I hope to address in future cases series. Preoperative and postoperative dimensions could not be fairly compared because of the lack of preoperative erection. The impression of increased length and girth was obtained from the patients' own subjective reports as well as from comparing the size of the removed rods to the replanted ones in the replantation group. Correction of deviation was clearly reported by the two patients who were afflicted by fibrosis because of the frequent use of intracorporeal injections.

Discussion

Fibrosis of the penis adds tremendous difficulty to the process of penile prosthesis implantation, to the extent of failure of the procedure in some cases. Blunt dilatation against resistance is usually aggressive and blindfolded, with the resultant notorious complications. Complications include a higher rate of infection, and urethral injuries and perforation, whether distal or proximal. Compromises include implantation of a narrower girth of prosthesis and implantation of a semirigid prosthesis instead of an inflatable.

There exists an inverse proportional relationship between compromises and complications. Going for a larger girth lengthens the aggressive procedure on the expense of safety.

Most surgeons are content with dilatation of the corpora alongside fibrosis rather than excavation of the fibrous tissue. However, this barely allows



Figure 8 Penoscopic view of the corpus cavernosum following excavation.

implantation of a modest semirigid rod, and poses limitations on the inflatable device as inflation may be hindered by the narrow space available. Shortening, narrowing, and deviation of the shaft are frequent complications of fibrosis. Those can be resolved by excavation and not by dilatation alone.

Blind sharp excavation is extremely risky. Excavation through extensive pan-corporotomy lengthens the procedure and poses increased morbidity.

Minimally invasive, visually monitored safer excavation of the fibrous tissue became possible with the advent of penoscopic optical corporotomy—transcorporeal resection [1] and ultrasound-guided cavernotomy [2]. This work is a trial to resolve the limitations of both techniques.

Ultrasound-guided penoscopic excavation of fibrous tissue allows adequate dilatation, and restoration of length and girth to the fibrosed corpora, with a relatively high safety profile. Ultrasonography enables the preinsertion of a guide wire that guides penoscopic corporotomy and resection through the exact middle of the corpora and up to the predefined proximal and distal tips, thereby avoiding the formation of a false passage and perforation. Ultrasonographic guidance accurately defines the safe extent of penoscopic corporotomy and resection by delineating the thickness of the tunica albuginea and the tips of the corpora and crura. Moreover, ultrasound-guided preinsertion of a guide wire allows penoscopic corporotomy and resection to proceed without simultaneous ultrasound guidance, thereby making the procedure easier and more familiar to the urologist.

Although safe corporotomy is possible with an ultrasound-guided sharp instrument [2] and not necessarily by ultrasound-guided penoscopy, the former lacks the potential of penoscopic resection of fibrous tissue protrusions that may hinder an inflatable prosthesis or limit restoration of length, girth, and straightness of the penis. In addition, resection along a preinserted guide wire is much easier than the simultaneous manipulation and synchronization of the ultrasound probe and the sharp instrument.

Ultrasound-guided penoscopic excavation requires skills at both endoscopy and ultrasonography, in addition to implantation. While some urologists master these skills separately, a learning curve for the combination of ultrasonography and penoscopy is to be expected. It is possible to have a radiologist scrub and insert the guide wire if the surgeon is not comfortable with this step.

Some concerns arise regarding penoscopy such as how easy is it to introduce the penoscopy sheath into the tight fibrosed corpora, the theoretically higher incidence of infection, and the potential complications resulting from the utility of unipolar diathermy upon corporeal resection.

The caliber of the corporotomy (urethrotomy) set is 21 French, which is equivalent to 6 mm, a relatively narrow caliber compared with the dilators and cavernotomes in use today. Moreover, the set digs into the fibrous tissue rather than along its side, making its way through fibrosis 1 cm at a time. Every incised segment is dilated by blunt dilators to a caliber of 13 Hegars before further corporotomy. The penoscopic corporotomy unit thus clears the way ahead of itself. Following dilatation to 13 Hegars, introduction of the resection unit thereafter is very easy considering its caliber: 26 French, equivalent to 8.6 mm. The pediatric set is much slimmer, but its modest length limits its value in many cases.

As to the possibility of infection with the use of the endoscopy set, the author encountered no infection neither in the 12 cases reported upon in this work nor in the six cases reported upon in the original article on penoscopy [1]. This is particularly important considering the higher incidence of infection with the classic techniques [12]. It is believed that supplementation of the irrigation fluid that issues from the penoscope with antibiotics plays an important role. Sterilization with ethylene oxide gas can decrease the risk of infection even further. The author use a penoscopy (cystoscopy) set exclusively restricted for these procedures, and not for use in other urologic procedures.

As to the theoretical risk of complications on account of the utility of unipolar diathermy, the author can confirm that no such complications were encountered in our cases. Resection with diathermy is limited to sporadic localized fibrous tissue masses and projections. These sparse projections do not require extensive resection, only superficial cuts. The use of diathermy is therefore minimal. Moreover, upon resection, the penis is dorsiflexed and coapted to the mons veneris to allow dissipation of the—originally weak and brief—current to the abdomen.

Despite my positive experience with this technique, the author cannot yet confirm its superiority to other surgical options, considering the limited number of cases operated upon. Further experience may confirm its safety, value, and applicability by other specialists.

Conclusion

The relative safety of the procedure, the low incidence of complications, the possibility of restoring length and girth to an extent, and the resultant generous dilatation of the corpora for accommodating a sizable unhindered inflatable penile prosthesis all make ultrasound-guided penoscopic corporotomy and resection a valid option for prosthesis implantation in cases of penile fibrosis.

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Category 3

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