



Wilson's Workshop

Cylinder insertion into scarred corporal bodies: prosthetic urology's most difficult challenge: some suggestions for making the surgery easier

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Abstract

Corporal fibrosis is a process that involves excessive deposition of scar tissue in response to infection, trauma, or ischemia. It does not occur merely as a result of previous IPP surgery. Excessive development of corporal fibrosis is certain after extraneous and disastrous events such as priapism or the removal of a device for infection. The usual surgical planes and spaces are obliterated by proliferation of scar both in the tissues overlying the corpora and the space within the corpora previously occupied by erectile tissue. To maximize success, specialized instruments, downsized cylinders, and lots of experience are necessities. Prosthetic urology produces, for the most part, happy patients. Fibrosis guys, to a man are not happy. Let the expert have the unhappy patient!

Introduction

Corporal fibrosis is a process that involves excessive deposition of scar tissue in response to infection, trauma, or ischemia. It does not occur merely as a result of previous IPP surgery. In other words, routine removal of an implant for mechanical problems, physician error, or patient dissatisfaction does not result in the development of fibrotic scar tissue in the space previously occupied by erectile tissue. Fibrotic corpora difficult to dilate may result from disease processes such as diabetes, Peyronie's disease, and arterial insufficiency. Excessive development of corporal fibrosis is certain after extraneous and disastrous events such as priapism or the removal of a device for infection.

The most difficult challenge in prosthetic urology is insertion of penile implant cylinders into corpora scarred from removal of a previously infected implant or from an episode of priapism. In these cases, the usually spongy, and

easily dilated erectile tissue (Fig. 1a) has been replaced by fibrotic scar tissue (Fig. 1b). Similarly, the tissue overlying the corpora has been altered by thickening and obliteration of surgical planes. Fibrosis is worse distally in post priapism patients and worse proximally in previously infected implant patients. Shortening of the penis is particularly noticeable in the patients whose implants were removed for infection. The fibrosis defies dilatation with conventional instruments such as Hegar or Brooks dilators.

Occasional implanters should refer these patients to a tertiary center since there is no more difficult operation in prosthetic urology than the achievement of an IPP in these patients. In previous writings SKW has called this surgery, "the greatest challenge in the most miserable patients" [1]. The patients are very unhappy with their reduced length (Fig. 2a)—replacement of the corpora with fibrotic scar tissue shrinks their penis and even if the replacement IPP is successful, the outcome is disappointing (Fig. 2b, c). Even very experienced implanters will have great difficulty particularly if they are lacking the necessary specialized equipment to assist in adjusting the scarred corporal bodies of the shrunken penis to accept the inflatable components.

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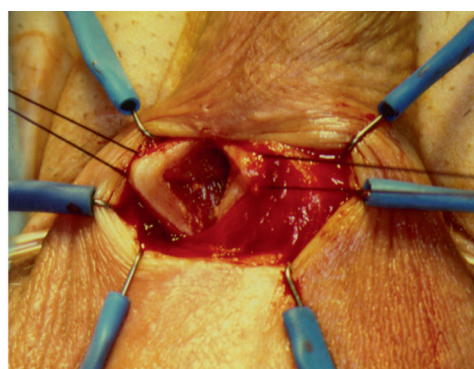
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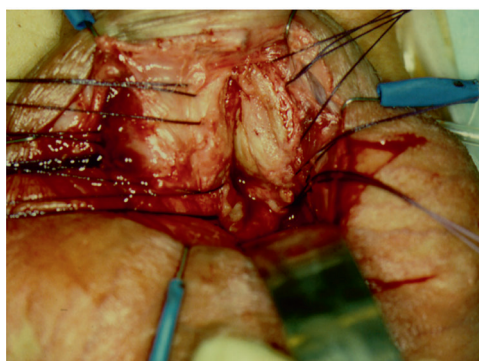
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History of insertion of cylinders into scarred corporal bodies

To create the space for placement of the cylinders without the necessity of specialized instruments, the traditional



A. Normal Erectile Tissue



B. Corporal Fibrosis: Infection/Removal

Fig. 1 Insertion of cylinders into scarred corporal bodies.

method popularized by Dr. Montague was excavation of the corporal tissue (Fig. 3a). The corporal fibrotic tissue was sharply excised out of the tunica albuginea (Fig. 3a, b), and the implant cylinder inserted into the resulting space (Fig. 3c). Frequently, it was not possible to close the tunica over the cylinder and a graft was required to span the gap (Fig. 3d). This technique remains popular today in some tertiary referral centers [2], but can be technically challenging to perform in the proximal corporal body.

Other centers reported success with multiple incisions with minimal scar tissue excision [3] and extensive corporotomy with subsequent graft coverage [2–6]. This literature enumerates 15 different graft materials [6]. Unfortunately, these operations, even in the most experienced surgeons' hands, are time consuming, fraught with complications [7], and implant survival from revision is discouraging [6–8]. In 1995 Wilson first suggested that the combination of adequate corporal incision, the use of cavernotomes, and a downsized implant could be another possible solution [8]. This method caught interest and variations have been published. Recently, to obviate the need for cavernotomes, Shaeer substituted using a resectoscope and optical urethrotome to resect the space for the cylinders [9]. Twenty-five years after our technique was first described, we offer our current thinking. This 3rd edition of Wilson's Workshop will identify techniques during the surgery that will give the surgeon an advantage at



A. Shrunken penis from corporal fibrosis

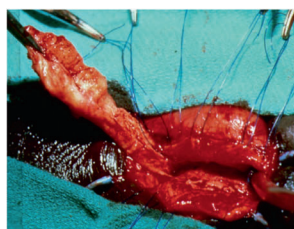


B. IPP in flaccidity



C. IPP in erection

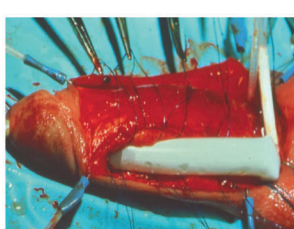
Fig. 2 The greatest challenge in the most miserable patient.



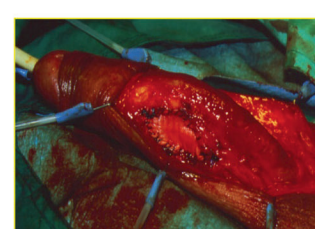
A. Removal of corporal fibrosis



B. Resultant corporal space



C. Cylinder placed



D. Graft closure of defect

Fig. 3 Traditional excavation of corporal tissue.

overcoming these harsh conditions and give the patient a satisfactory penis which will function in sexual relations.

More modern tools assist the surgeon to insert into scarred corporal bodies

Note: It is impossible to adequately describe surgical technique with simply words and photos. For complete expositions of these surgical maneuvers, the reader is referred to www.vjpu-issm.info. Wilson SK. VJPU 2013; 1:011, Wilson SK VJPU 2014; 1: 021, Simhan J VJPU 2017; 2: 105

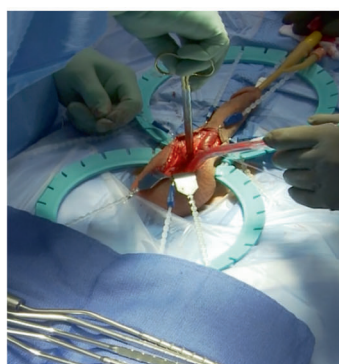
The late 1990's saw the introduction of two instruments that improved success in these difficult cases [8, 10]. Dr. Carrion and Rossello, giants in the infancy of prosthetic urology, invented the Carrion–Rossello cavernotomes [8]. Over the years these cutting dilators have been available from a variety of sources. Present availability is restricted to Porges, the surgical instrument company owned by

Coloplast. These dilators have a surface similar to a wood rasp with backward cutting teeth that resect when withdrawn forcibly against the stenotic tissue (Fig. 4a). The non-cutting side of the cavernotome teeth allows advancement through the scar tissue by twisting your hand in an oscillating fashion (Fig. 4c). Then after forcible withdrawal, reinsert the cavernotome and move it back and forth it as you would a rongeur. The dilators are sized 8–12 mm. The space is created by progressively increasing cavernotome size until a space the size of the cylinder tip and base is fashioned. Using these instruments, we introduced the new concept of drilling into a fibrous cavernous body instead of resecting the scar tissue [8]. The diameter of the tunnel necessary to pass a Furlow Insertion Tool distally is 9 mm. Depending upon the manufacturer and model of cylinder 9–11 mm dilatation is required proximally (Fig. 13).

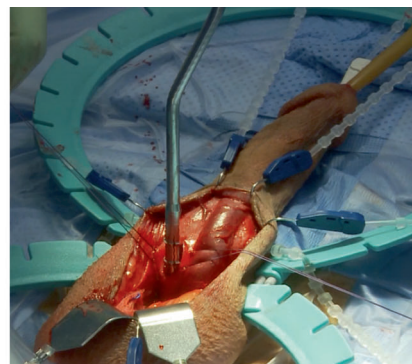
The other model of cutting dilator is the Uramix cavernotome (Fig. 5). These metal, nondisposable dilators were invented by Mike Mooreville, a Philadelphia urologist [10]. The instruments are sized 6–13 mm in diameter and



A. Carrion-Rossello cavernotomes



B. Make a space with backward cutting scissors for teeth to engage

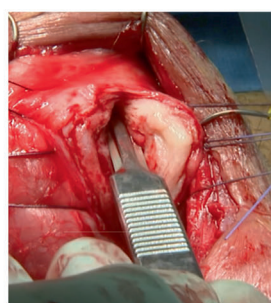


C. Advance progressive sized cavernotome by oscillating hand

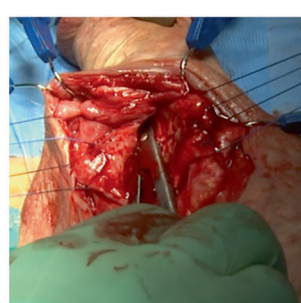
Fig. 4 Use of Carrion–Rossello cavernotomes.



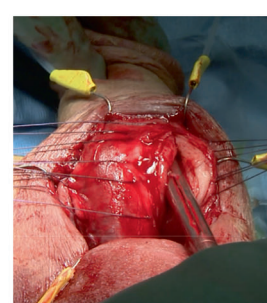
A. Uramix cutting dilator



B. Making space for dilator to engage with knife



C. Space made with scissors

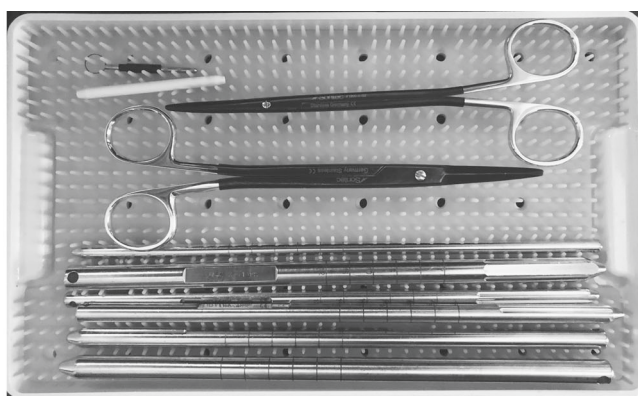


D. Advance dilator oscillating motion

Fig. 5 Uramix cutting dilators.



7A. Two sizes of backward
Cutting scissors



7B. Wilson's travel instruments:
Uramix dilators sized 6-11,
two pair of backward cutting scissors
and loop electrode

Fig. 6 Specialized instruments for tunneling in scarred corpora.

available on the internet (www.uramix.com). One or two dull knife blades are embedded in the distal part of the cavernotome. These allow the surgeon to drill a space in the fibrotic corpora with controlled 1 mm cuts thereby creating a cavity in the scar tissue (Fig. 5a). Passage of these instruments is the same oscillating motion as the Rossello cavernotomes (Fig. 5d). Before either the Rossello or Uramix cavernotomes can drill a passage, a space must be created for 1–2 cm in the stenotic scar both distally and proximally (Figs. 4b, 5c). This can be done by spreading the backward cutting scissors (Figs. 4b, 5c) or making a cruciate incision with the #15 scalpel (Fig. 5b). We prefer to use the Uramix instruments in the distal penis because they begin with a smaller size and the Carrion–Rossello in the proximal penis because the dull teeth tend to prevent perforation of the proximal corpora and its bayonet configuration allows better leverage.

Another helpful instrument is the Wilson backward cutting scissors available in two sizes and known formally as the Freeman Kaye or Gourney (Fig. 6) [1]. These special heavy-duty titanium scissors cut both in the traditional scissor manner, and allow cutting when the scissor blades are spread in dense tissue because the outside of the scissor blade is sharp. These instruments are also available from the Uramix company and can be ordered on the internet (www.uramix.com). The scissors are advantageous for making a space for the cavernotomes to engage with the fibrotic tissue (Figs. 4b, 5c). Often the fibrosis is so dense the space cannot be created. Whenever that happens, do not force the instruments. Extend the corporotomy. Whenever the corporal incision is extended, always place a new set of stay sutures. Sometimes, it is necessary to open the corpora extensively, like the belly of a fish (Figs. 7, 14B). Occasionally, it is advisable to make the second corporotomy just



Fig. 7 Extensive corporotomies necessary in corporal fibrosis insertions.

under the glans so that this dilatation can be performed under direct vision [11] (Fig. 8). Eventually one should be able to engage the teeth or knife of the cavernotome and create a tunnel through the dense tissue that will accept a deflated cylinder. Due to the difficulty these challenging cases pose, we suggest periodic interrogation of the corporotomy with an irrigation syringe (Fig. 9a) to test for unintended urethral injury that might preclude complete device placement (Fig. 9b). If the above disciplines are followed, the risk of urethral injury should be minimized.

Our senior author proctored his first IPP in Sydney Australia in 1985. Since that time, he has done hundreds of these cases on his own and instructing others as visiting surgeon. Wilson jokes that these difficult cases are always awaiting him whenever he proctors surgery. He says, “the patient has a different name, but it is the same small fibrotic penis in every city.” He likes to be prepared SKW's travel set of instruments is shown in Fig. 6b: Size 6–11 Uramix dilators, two sizes of backward cutting scissors and a loop electrode for coring out corporal tissue.

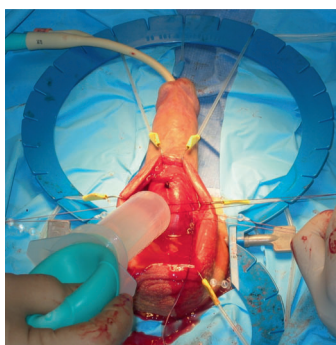
Pointers to increase the odds of successful implantation

1. **The disposable Scott retractors.** Both manufacturers of the inflatable penile prosthesis also feature their own disposable version of the original metal Scott



Fig. 8 Difficult dilatation distally? Make a second corporotomy.

Fig. 9 Always test for urethral injury before cylinder placement.



A. Interrogation of corporal space with irrigation



B. Urethral laceration: abort implantation

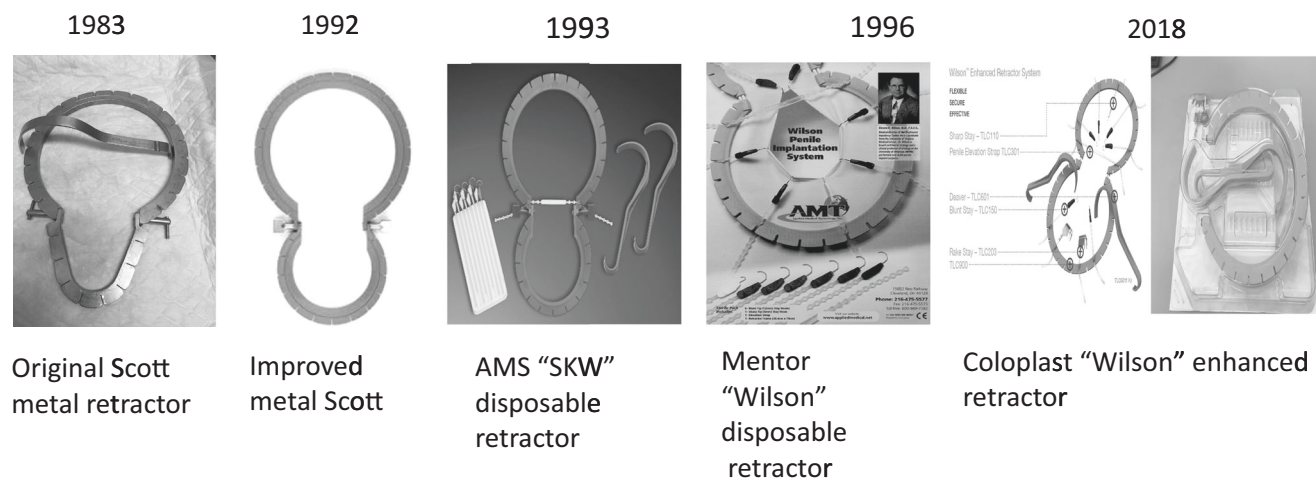


Fig. 10 Evolution to disposable "scott retractor.

retractor. The Boston Scientific is called the SKW scrotal retractor and the Coloplast version is the Wilson Retractor (Fig. 10). As in all surgery, exposure is the key to accomplishing the operation efficiently. Use of the disposable retractor is mandatory for these tough surgeries. The disposable retractors have all the tools needed to achieve excellent exposure without the necessity of surgical assistants. Sure, you can cobble together some hooks and a metal retractor, but you never have everything perfect. If you are a non-believer, please refer to the VJPU and watch the phenomenal penile exposure effected by proper setting of the retractor (Wilson S. VJPU 2016; 2: 092).

2. **Exposure of proximal corpora with Deaver maneuver.** The majority of corporal fibrosis patients have much worse proximal stenosis than distal. This is unfortunate since it is much easier to extend the corporotomy distally than proximally. For this reason, we believe the surgeon is miles ahead if they

Note: plastic baby Deavers and Rake retraction hooks come with both company's disposable retractors

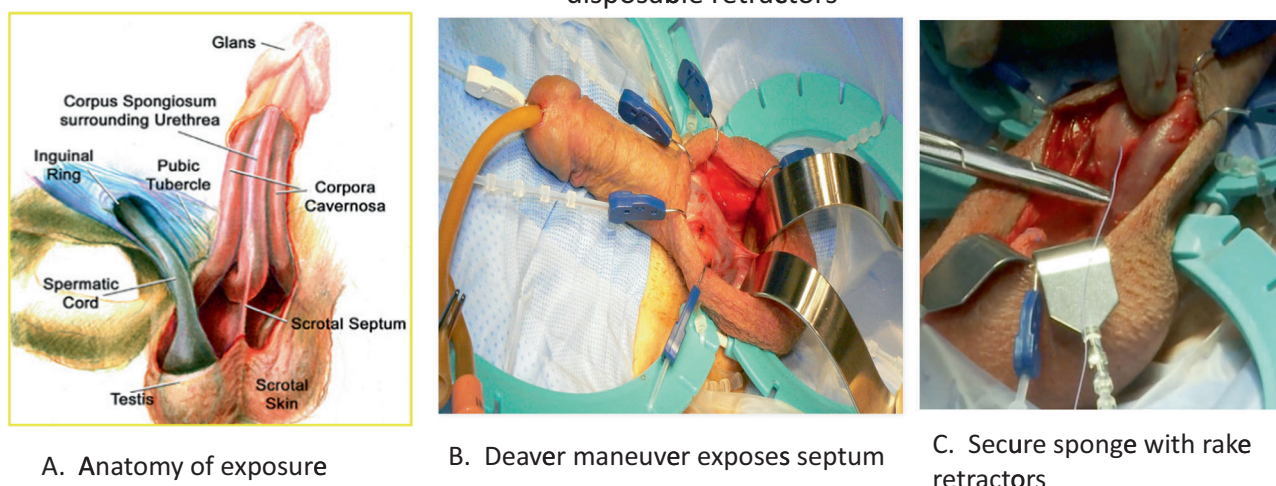


Fig. 11 Access to the proximal corpora is key to successful implantation.

completely expose the proximal corpora before incising the tunica. This aids in preventing proximal corporal perforation and gives exposure for extending the corporotomy, if necessary, under direct vision rather than covered by overlying tissue. It is easy; dissect the tunica squeaky clean and then before the corporotomy is made, pass the scissors alongside the proximal corpora until you feel the pubic bone—the same feeling as when you pass a dilator to the bone proximally. Then insert a baby Deaver into the hole and pull to the feet. This cleans the proximal penis completely except for the septum (Fig. 11b), which is then taken down sharply near the urethra. Finally, a rolled Raytec® sponge (Wilson calls it the “cowboy blanket roll”) is placed in the wound and the Rake retractors secure the exposure (Fig. 11c). The Deaver maneuver and extensively incising the septum creates such good exposure that with the help of the weighted vaginal retractor it even allows insertion of an artificial urinary sphincter through one scrotal incision (Fig. 12).

3. **The necessity of downsized cylinders.** Experienced implant surgeons have traditionally turned to downsized cylinders in these challenging cases [1–3, 6–8, 11, 12]. These cylinders were designed to be implanted in stenotic corpora because the bladder of the cylinder expands less than standard cylinders and their bases are not as wide. Both Boston Scientific and Coloplast market these downsized devices. It is only required to dilate to 9 mm for insertion of the Furlow and to 10 mm for proper proximal seating of the cylinder base. The 700 CXR (controlled expansion) from Boston Scientific has the capability to add as

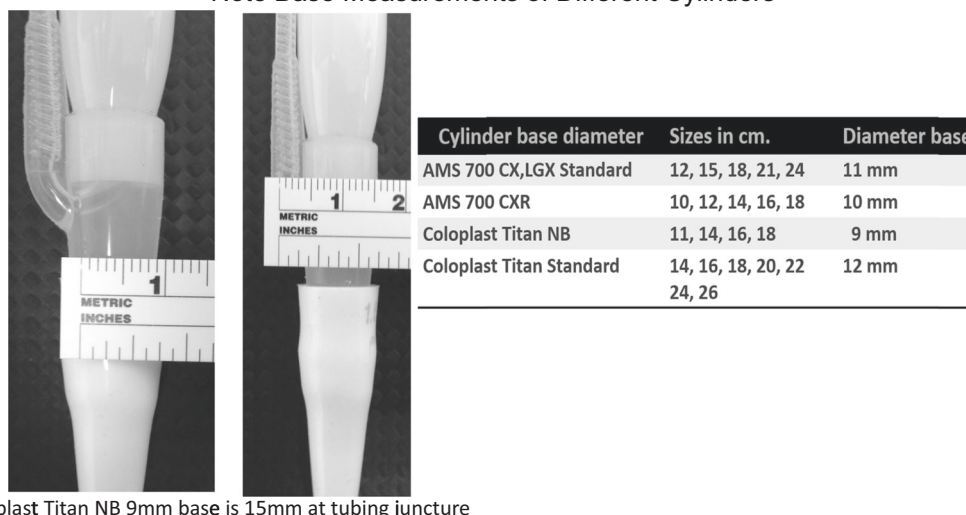


After taking down the septum, weighted vaginal speculum exposes deep urethra for AUS

Fig. 12 Wilson Retractor & Deaver Maneuver expose proximal corpora.

much as 7.5 cm of rear tip extender (RTE). The Coloplast Titan NB (narrow base) can add as many as 6 cm. **Warning:** in cases of scarred proximal corporal bodies a long length of RTE must be used so that the tubing directly exits the corporotomy and does not lie adjacent to the base of the cylinder. Burying the tubing in the proximal corpora, as is done routinely in first time, uncomplicated implantations, increases the

Note Base Measurements of Different Cylinders



Coloplast Titan NB 9mm base is 15mm at tubing juncture

Fig. 13 Base of cylinder is narrower than tubing juncture note base measurements of different cylinders.

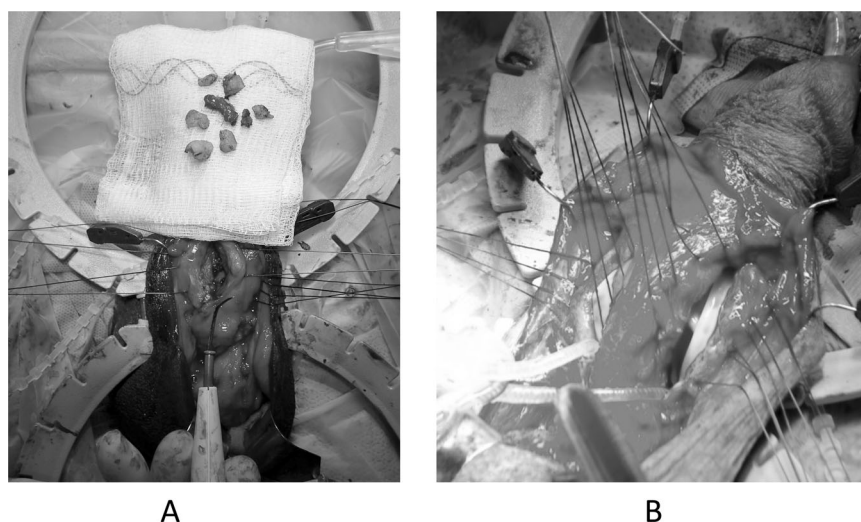
diameter of the base to 15 mm or more, even with the downsized cylinders (Fig. 13).

4. **Use lots of rear tip extenders (RTE).** During these difficult cases, the surgeon is advised to be generous with RTE and select the shorter size of cylinder. The implanter should also know that both company's downsized cylinders have a 4 cm base length before getting to the tubing juncture, which should exit the corporotomy. Both Coloplast and Boston's downsized implants increase in length in 2 cm increments. We give the following example to assist in determining the proper measurement that allows the tubing to exit the corporotomy so the surgeon can take advantage of the narrow base. Let's say the combined measurement of this hypothetical patient was 18 cm with the proximal sizing at 8 cm. That means that at least 4 cm of RTE must be used to exit the tubing from the corporotomy. The proper selection of cylinder should be 14 cm plus 4 cm RTE. If one instead runs the tubing inside the stenotic corpora, thus allowing it to be compressed by the tightness, the input tubing may be compressed despite its "kink proof" construction. Under this circumstance, inflation would be possible, but deflation would not succeed. If this is noted at surgery, one should incise the tunica albuginea over the tubing with the cutting current of the electro-surgical pencil (≤ 35 watts) until the tubing exits the corporotomy at its junction with the cylinder base.
5. **The best cylinder for scarred corporal bodies is the 16 cm Titan NB.** It is not an admission of defeat to place a narrow cylinder. Clinical appearance of the penis is initially excellent even with the downsized cylinders because of the stenotic corpora. If the patient is dissatisfied with resultant penile appearance, he can

be assured that the downsized cylinders will accomplish preparation of the space for a longer, wider standard size device for the next revision. The Coloplast cylinders grow progressively in girth as the cylinder lengthens while all Boston cylinder's width is identical (18 mm), no matter how long the component is. The 16 cm NB expands almost as much as the standard CX cylinder from Boston (18 mm) while the 16 cm downsized Boston CXR only expands to 14 mm. **Note:** in the example of cylinder sizing in the previous paragraph, we would not be able to use the 16 cm length because we required at least 4 cm of RTE to properly exit the corporotomy. In the above case, the experienced surgeon would extend his corporotomy 2 cm reducing the depth of the proximal corpora to 6 cm. Then a 16 NB cylinder with an RTE of 2 could be used rather than use the less capacious 14 cm cylinder from either company. As surgeons who must listen to the patient's complaints one year after the tissue expansion caused by usage of downsized prosthetics, we strive valiantly to place the 16 NB as it may obviate the need for an additional upsizing reoperation.

6. **Specialized instruments are necessary.** Use of cavernotomes and backward cutting scissors allows the operator to create tunnels in the proximal and distal fibrotic scar tissue. Extensive corporotomies may be necessary because the scar is resistant to dilatation for long distances. It is much easier and safer to only have to dilate for a short distance (Figs. 7, 14). The reader is advised that while tunnels of adequate girth have been created to contain the cylinder proximally and distally, the corporotomy itself has not been dilated and is not sufficiently wide

Fig. 14 Resection of fibrotic corporal tissue to create space for cylinder without grafting necessity.



to suture the two sides of the tunica covering the added bulk of the cylinder (Fig. 3c, d). In our opinion, a graft to cover the space adds an increased risk of device infection and should be avoided if possible. While the literature is replete with many techniques of corporal resection [2–5, 9], we believe the easiest is to simply use the electrosurgical pencil to core out the corpora the extent of the corporotomy. There are commercially available loop electrodes (Fig. 6b) or you can simply bend the disposable tip of the pencil into an L or U shape and shave out the thickened scar tissue (Fig. 14). This is the first publication of this clever solution that was suggested to me by Professor Robert Andrianne of Liege Belgium (Andrianne R. VJPU 2017; 2: 101).

7. **Never be reluctant to make a second distal incision.** Blind poking of sharp instruments from the original proximal corporotomy traversing the long distances in the distal corpora should be avoided. If you are still having difficulty even after extending your corporotomy and placing additional stay sutures, make a separate distal corporotomy (Fig. 8). This allows for tunnel creation in the distal corpora under direct vision and decreases the possibility of urethral damage [11]. Distal dilatation is the most dangerous maneuver during the reinsertion of cylinders into scarred corporal bodies. Virtually all other surgical misadventures (distal/proximal corporal perforation, crossover) can be corrected, but if distal urethral laceration occurs the case must be aborted [1, 7, 11].
8. **Vacuum devices prepare fibrotic penis for a more successful outcome.** The shortened penis patients after device removal for infection are difficult to manage. While an experienced surgeon using all the above tricks may define success as the achievement of reimplantation in these difficult cases, most of the

patients are distinctly unhappy The patients routinely exclaim, “it’s not as long as it formerly was.” He is correct. Typically, the cylinder reimplanted after removal for infection is 4–6 cm shorter than the one used on the original implantation [13, 14]. We have found that it is useful to have the post infection patient employ the vacuum device for at least 7 weeks prior to the reinsertion attempt into scarred corpora [15]. He places his penis twice daily in a vacuum device and pumps it up to discomfort, leaving it there for 10 min without the constriction ring. This seems to ameliorate the severe shortening and if the patient marks on the device his penile length, its increasing length is documented [15] (Fig. 15). Other groups have noted similar results [12]. After vacuum preparation the implant is performed, and the cylinders oversized 2 cm to allow for subsequent tissue expansion which will result from the device’s repetitive usage. Much like the tissue expansion in Peyronie’s disease whereby the hour-glass deformity from circumferential scar recedes with use, tissue expansion following implantation into fibrotic corpora is always noted. The patient is encouraged to inflate his prosthesis fully each evening for 3 h. Frequently, after 8–12 months the original downsized cylinder can be replaced by a standard size cylinder with more girth and a larger base without additional dilatation [14]. Best of all, the expanded corporal cavity will also accept 2–3 cm longer cylinders resulting in an improved appearance [14] (Figs. 16, 17).

9. **Timing to reimplantation.** The amount of time that passes between the event causing the fibrosis and the reinsertion of cylinders is one of few modifiable factors to minimize the extent of fibrosis after infection. Reimplantation within 16 weeks allows

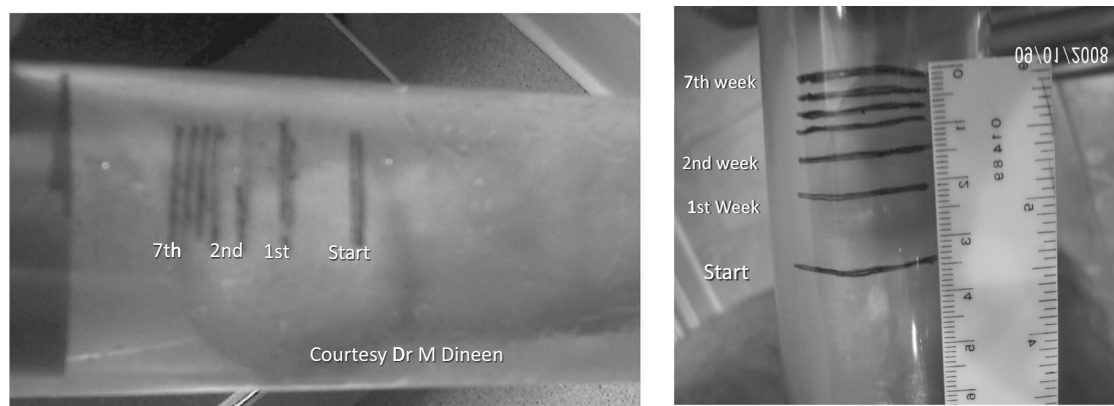


Fig. 15 Use of vacuum helps ameliorate penile shrinkage after infection.

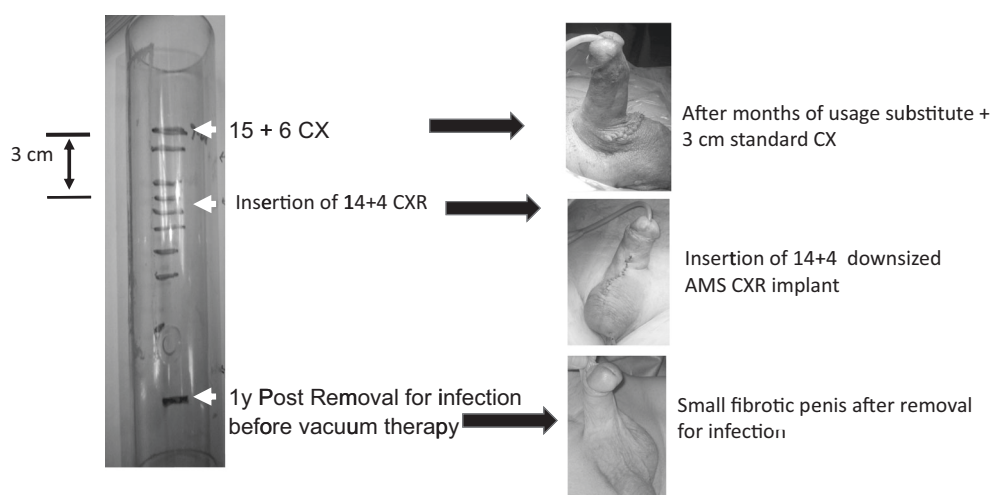


Fig. 16 Vacuum therapy & downsized implants effect tissue expansion.



- A. 1 yr. post Infection removal of 19cm IPP 14 Titan NB inserted B. After 11 mo. cylinders too short patient has SST C. 16 cm Titan Standard Substituted also scrotoplasty and circumcision

Fig. 17 Substitution wider longer cylinders improves patient satisfaction ("scrotal scar documents it is the same patient").

sufficient time for the infection to be adequately treated, and a remnant of the old corporal cavity may be found. Similarly, in post priapism patients, the erectile tissue has not been completely obliterated and a cavity of damaged erectile tissue will facilitate development of the space necessary to place the

cylinder [7]. We find the surgery more difficult if over 4 months pass from either priapism or device removal for infection. We have also noted that the intraoperative and post-operative complications increase significantly beyond 4 months [7]. Unfortunately, while operating sooner on these patients is advantageous, it

can be difficult to secure the patient's enthusiasm for a quick return to surgery.

10. **Management of these unhappy and discouraged patients.** The shrunk penis patient requires encouragement from both physician and spouse. I tell both patient and partner that all is not lost. With our program of:

- 7 weeks vacuum preparation before surgery,
- deliberate cylinder oversizing at the surgery,
- daily repetitive inflation post operatively for months and finally
- substitution of a wider, longer model,

we can affect much improvement (Figs. 16, 17). I show pictures of other patients whose penile appearance was enhanced similarly. I take the wife aside and ask her for help. She is a very willing partner because since men and women are wired differently, she is baffled why he is so unhappy about penile length. To keep her man from becoming a penile cripple, I ask her to marvel repetitively at how good his penis looks during the journey—after all, she is his only reference. In addition, I suggest she be sure to indicate lots of pleasure during their first intimate usage. With this program which starts 7 weeks before the surgery and is only completed after the substitution of longer, wider cylinders a year later, the couple has “skin in the game.” I can honestly tell the reader none have come back complaining about length. These previous “penile cripples” are

having sex and have become refocused on the more pleasurable aspects of life than his penile size.

11. **Cosmetic procedures to increase perceived size of penis.**

- A. Scrotoplasty or ventral phalloplasty in conjunction with IPP has become popular in the United States recently [16]. The need for this adjunctive procedure is peculiarly American. Most male babies in this country undergo circumcision at birth by the Pediatrician with a Gomco clamp. Invariably, too much foreskin is removed, thus displacing the penoscrotal junction onto the penile shaft rather than remaining on the true penoscrotal junction. The problem afflicts both the large and small American penis (Fig. 18). Scrotoplasty was first described as very useful for the penis shortened by fibrosis by Wilson in 2006 [14]. This described procedure was to make a transverse scrotal incision and after implantation of the IPP, reorient it vertically (Fig. 19b). Then trim the excess skin and the resultant skin incision is closed vertically (Figs. 17c, 19d).
- B. In the uncircumcised patient, the scarred corporal bodies shrinkage makes his foreskin excessively redundant—the resultant erection will not displace his glans beyond the surplus foreskin. A circumcision further enhances the penile appearance of these patients [14] (Figs. 17, 19).
- C. Recently a new technique of dorsal phalloplasty has been described. Shaeer describes increasing visible

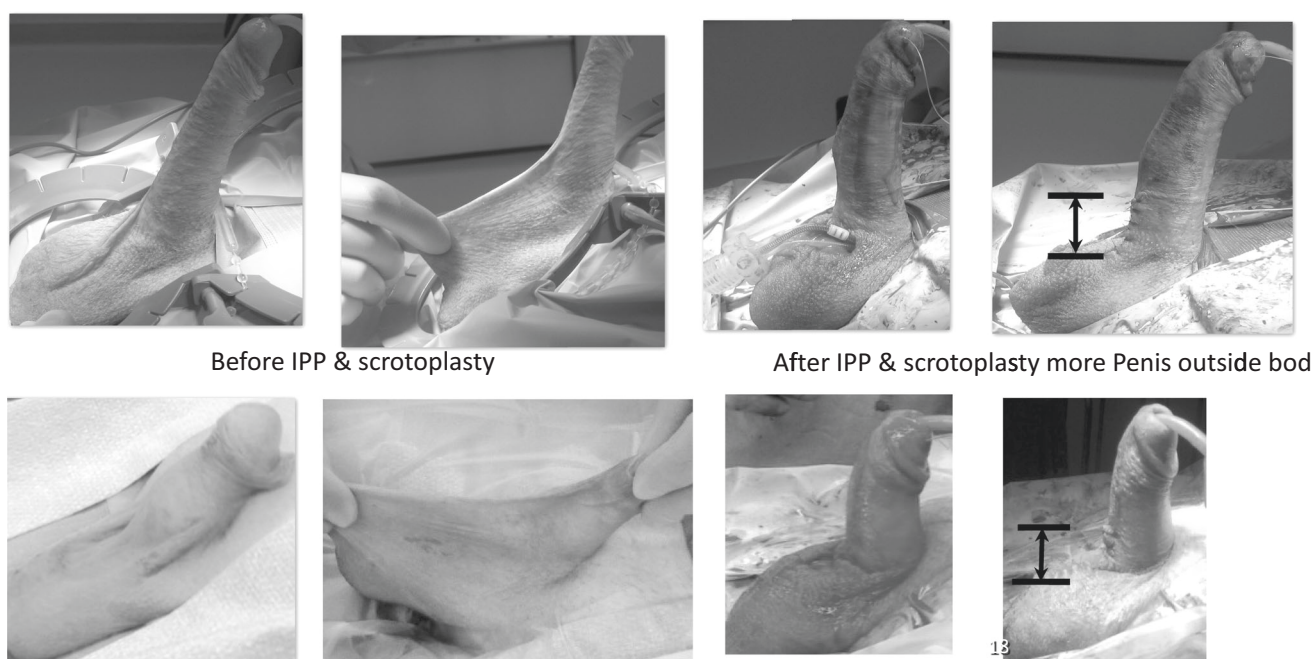


Fig. 18 Scrotoplasty in association with IPP improves penile appearance.

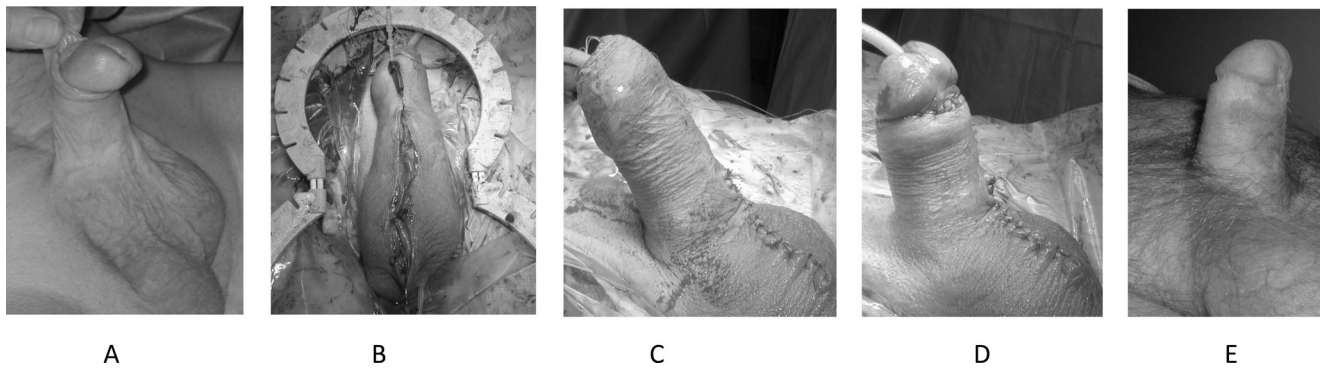


Fig. 19 Scrotoplasty and circumcision for patients with scarred corporal bodies.

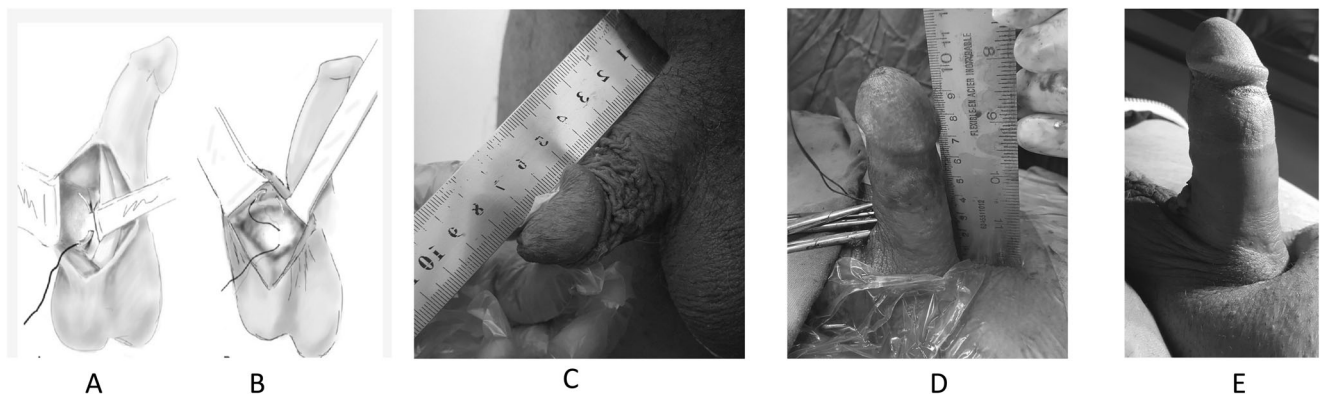


Fig. 20 Ventral phalloplasty useful to increase perceived size.

penile length outside the plane of the body by using permanent suture to tack the dermis to the pubic bone in conjunction with a rod or IPP implant [17]. This approximates the pubic skin to the symphysis pubis better defining the penopubic junction (Fig. 20). We may use all three procedures on the same individual in our effort to enhance his appearance.

Conclusion

Penile prosthesis implantation into scarred corporal bodies is daunting, even for the experienced implanter. The usual surgical planes and spaces are obliterated by proliferation of scar both in the tissues overlying the corpora and the space within the corpora previously occupied by erectile tissue. To maximize success, specialized instruments, downsized cylinders and lots of experience are necessities. History has shown that even experienced implanters have only a 50% chance of success without these assets [8]. The infection retardant coatings placed upon today's prosthetic components and other technique enhancements have drastically decreased the number of device infections making experience with these cases more difficult to accrue. While this 3rd edition of

Wilson's Workshop outlines a number of tips and tricks to improve the reader's surgical outcomes, we still encourage most readers to refer these patients to a tertiary center with very experienced surgeons. Prosthetic urology produces, for the most part, happy patients. Fibrosis guys, to a man are not happy. Let the expert have the unhappy patient!

Compliance with ethical standards

Conflict of interest SKW: Consultant for Consultant AMT, Coloplast, International Medical Devices. Stockholder Neotect. Lecturer Boston Scientific.

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