CME

A Case of Mechanical Failure with Proximal Perforation at the Time of Revision Surgery

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ABSTRACT

Background. Implantation of inflatable penile prosthesis (IPP) is a well-established treatment for medically refractory erectile dysfunction with proven long-term reliability. However, if an IPP fails, the subsequent surgery to fix the IPP can be more difficult with higher risks of complications than the primary implantation.

Aims. To review and evaluate a case of a difficult IPP replacement surgery for ways to improve surgical techniques and outcomes.

Materials & Methods. Perform a case report of a difficult IPP replacement surgery in which the patient had proximal perforation of the tunica albuginea with a review of the pertinent literature.

Results. The rear tip sling is a successful way to repair proximal perforation of the tunica albuginea. Recent publications show new surgical techniques to lower infection rates in IPP revision surgery.

Discussion. The rear tip sling appears to have better outcomes than a synthetic windsock for repairs of proximal perforation of the tunica albuginea. Recent publications have shown that the revision washout decreases penile prosthesis infection rates in revision surgeries.

Conclusion. While revision surgery for IPPs have higher risks than primary implantation, newer surgical techniques are helping to reduce these risks. **Zanoni M, and Henry GD. A case of mechanical failure with proximal perforation at the time of revision surgery. J Sex Med 2009;6:2629–2632.**

Key Words. Surgery; Penis; Implants; Impotence

Clinical Case

T.S. is a 70-year-old man referred from his primary care physician for a penile prosthesis that had "stopped working" about 3 months before. In 2000, he underwent insertion of a three-piece inflatable penile prosthesis (IPP) for diabetes-associated erectile dysfunction (ED). The prevalence of ED is high in patients treated for diabetes mellitus: 50% of men with diabetes for more than 10 years have severe ED. The pathophysiology of ED is complex and multifactorial, involving a combination of classical risk factors (endothelial dysfunction), specific factors (diabetic neuropathy), and psychological factors. In 1999, the patient's primary care physician referred him to a urologist after progressively worsening ED had failed to respond to oral phosphodiesterase type 5 inhibitor therapy at the maximum dose on more than eight attempts. The patient had also tried a vacuum erection device and maximum dose intracavernosal trimix with no success. After being diagnosed with end-organ failure, he subsequently underwent a successful implantation of an IPP with good satisfaction postoperatively until it stopped working.

On examination, the pump was flat with no fluid in the system. There was no clinical evidence of infection or extrusion of any of the components. Medical records revealed that an IPP with 18 cm cylinders and 1 cm rear tip extenders (RTEs) bilaterally had been placed via a penoscrotal incision. Therapeutic options were discussed with the patient including: (i) observation, knowing that the

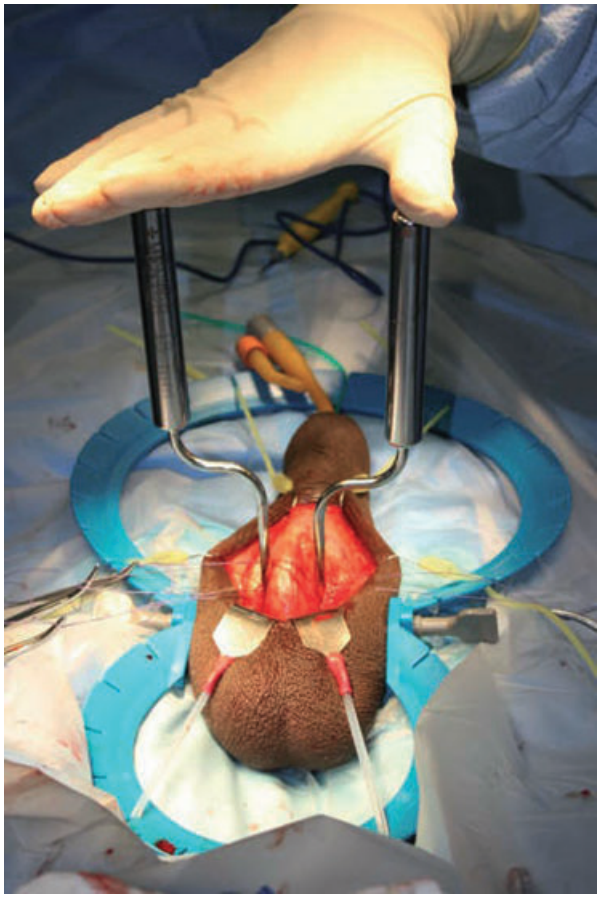

Figure 1 Field goal test: dilators at same depth and angle.

implant will not work again; (ii) revision surgery, where the surgeon tries to diagnose the failed component of the IPP and corrects just that one aspect of the IPP; or (iii) complete replacement, with an entirely new IPP. The patient was educated that most experts suggest that after 5 years the entire implant be replaced; the patient elected for replacement with a new IPP.

After informed consent and 3 days of preoperative alcohol-based surgical scrub showers, the patient underwent explantation/replacement of the prosthesis, through a penoscrotal approach. During the removal, there was no clinical evidence of infection. The cylinders, all RTEs, and pump were easily removed, but explantation of the reservoir on the right side became very difficult. As it was deep behind the pelvis, the tubing to the reservoir was pulled up and cut as far down as possible, allowing it to retract back into the patient. After implant removal, all exposed implant spaces were washed out with several liters of antiseptic solution, consistent with the technique of "revision washout."

While measuring the length of the corpora, there was a large difference between the two sides proximally, with the right side measuring 10 cm and the left side measuring greater than 15 cm. To the best of our knowledge, the perforation resulted from passing the Furlow down proximally during corporal body measurement. The diagnosis of left proximal perforation was confirmed by passing two dilators proximally, with a large discrepancy between the two dilators (failed field goal test), with the left dilator dropping more than 5 cm deeper than the right-sided dilator (Figures 1 and 2). The corporal measurement on the right was 10 cm proximally and 11 cm distally; an 18 cm cylinder and 3 cm RTE IPP were chosen for replacement. A rear tip sling was utilized using a 0 permanent monofilament suture on the left side (see Table 1). A new 100 cc reservoir was placed in the left space of Retzius (opposite to the original reservoir side), in the standard fashion. At 6 weeks postoperatively, the patient was taught to cycle his IPP lightly for 6 more weeks, then to resume sexual activity a full 3 months after surgery.

Comment

Prosthetic devices are a well-established form of treatment for medically refractory ED. Satisfaction rates cited for this approach are generally very high [1]. The three-piece IPP has the highest patient satisfaction and lowest mechanical rate of

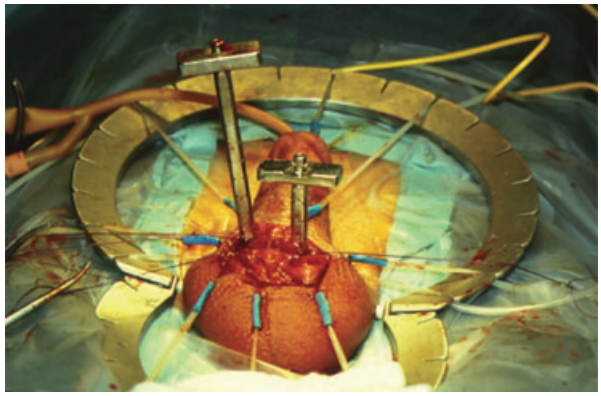

Figure 2 Failed field goal test: dilators uneven in depth with the left dilator dropping significantly proximal, indicating a proximal perforation on the left side.

Table 1 The steps of rear tip sling placement for perforation of the proximal tunica albuginea

1. Using a large permanent monofilament stitch (the sling), go outside-in of the tunica albuginea at the proximal end of the corporotomy site.
2. Drive the stitch through the rear tip extender (RTE) (the outermost one if more than one RTE is used) near the open of the RTE, not the narrow part of the RTE.
3. Take the stitch inside-out the corporotomy.
4. Fire the Furlow inserter and secure the strings.
5. Carefully place the cylinder base with RTE proximally.
6. Pull on the secured strings to bring the cylinder's distal tip out as far distally as it will go.
7. Close the corporotomy carefully.
8. Maximally inflate the cylinders with the secured strings pulled with constant force out distally.
9. Meticulously tie down the sling stitch while the inflated cylinder is pulled out distally. Typically, the author has found that "rocking the suture" back and forth assists in getting the suture pulled up tightly.

virtually any medically implanted device, as compared to breast implants, and hip and knee replacements [2]. Revisions of inflatable penile prostheses are more often required for nonmechanical reasons than for device failure [3]. It has been shown that 60% of IPPs are working at 15 years after placement [2].

Postoperative infection is the most feared complication of any genitourinary prosthetic surgery. Whereas the incidence of infection with primary implantation is only 1% to 3%, traditional revision surgery carries a 7% to 18% risk [2–4]. This increased incidence of infection associated with reoperation is postulated to be caused by decreased host resistance factors, impaired antibiotic penetration of the area caused by the capsule surrounding the components, and decreased wound healing related to scar formation. The organism most often responsible for the infection in reoperation is *Staphylococcus epidermidis* [4]; this bacterium is also the most common cause of infection during the original implantation, accounting for 35% to 80% of all positive cultures. The revision washout protocol, i.e., vigorously washing out the implant spaces with antiseptic irrigation, decreases subsequent infection in case of clinically uninfected IPPs [5]. Bacterial biofilm is present on most IPPs at the time of revision surgery for noninfectious reasons [3]. Revision washout decreases risk of subsequent infections by more than half [5]. While the antimicrobial/adherence coatings on the outside of IPPs have been shown to decrease infection rates for primary implantation surgeries, they appear to have less dramatic effect on revision cases [5]. Therefore, washing out the implant spaces to remove the biofilm and re-sterilize the surgical capsule prior to replacement with a coated IPP should decrease the bacterial presence and lower infection rates. Revision washout has been shown to decrease bacterial presence on the surgical capsule [6].

If the entire implant is not removed at revision surgery, there is a possibility of reactivation of the biofilm existing on the retained components. While complete removal of all components seems ideal, we acknowledge the difficulty involved in removing the reservoir. In my opinion, reservoir removal should not be construed as the standard of care. If reservoir removal proves difficult and there is no evidence of clinical infection on the pump and cylinders, the original reservoir can be retained [7]. Most experts feel that the reservoir should be removed if it is easy to access, even via a counter-incision, but several high-volume implant surgeons essentially never remove the reservoir and claim minimal to no complications [7]. The case for removal of all reservoirs can be made that it could possibly be the nidus of a future infection, with some experts preferring to remove all reservoirs at the time of revision surgery.

Similar to this case, most revision/replacement surgeries require longer device cylinders. In this case study, the patient required an additional 2 cm of total length. Other articles have shown that patients typically require 2–3 cm longer total length at the time of revision surgery, even in cases of corporal fibrosis [8]. For the inexperienced prosthetic urologist, it is important to know the number of RTEs at the time of revision surgery, as it can be difficult to extract them if they do not slide out with the cylinders at the time of cylinder removal. Leaving the old device's RTEs behind in the patient can be the source of measurement discrepancy, or worse, the source of an abscess if the device is being removed for overt clinical infection. It is always best to try to extract all RTEs.

During dilation of the corpora cavernosa, if perforation occurs, the rear tip sling is a wonderful addition to the prosthetic surgeon's repertoire for proximal perforation. Traditional correction for proximal perforation involved the use of synthetic graft material to form a "wind sock." Use of synthetic grafts in repairs of the tunica albuginea with penile implants resulted in infection rates as high as 30%. This increased infection rate is thought to

be caused by bacteria being able to grow in the protected environment between two synthetic surfaces—the "wind sock" graft and the penile implant [5].

The RTE sling uses a large permanent monofilament stitch that fixes the rear tip to the proximal tunica albuginea at the level of the corporotomy, going outside-in of the tunica albuginea at the proximal end of the corporotomy site, through the RTE (the hindmost one if more than one is used), to inside-out at corporotomy (see Table 1). A permanent suture is used because many experts feel that the scar tissue may take up to 6 months to fully mature. The key step is tying down the RTE sling—slowly rocking the suture back and forth—to secure the RTE behind the maximally inflated cylinder pulled as distally as possible via the Furlow strings, thereby acting like a back stop for the cylinder from then on. This repair works well because 6 months postoperatively, the body will have encased the RTE in fibrous scar. The patient is instructed not to resume sexual intercourse for at least 12 weeks after surgery. In the authors' opinion, cycling the implant lightly for 6 weeks after the postoperative instructional visit helps to strengthen this fibrous scar tissue, prior to resuming sexual activity in cases of tunica albuginea weaknesses or perforations.

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Conflict of Interest: Gerard D. Henry, MD serves as speaker and researcher for Coloplast and American Medical Systems.

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