



Unexpected nuances of the penoscrotal inflatable penile prosthesis

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Abstract

The inflatable penile prosthesis was first implanted with a large vertical suprapubic incision. Nowadays, three surgical approaches are utilized: penoscrotal, infrapubic, and subcoronal. Globally the penoscrotal approach is used most often. Our first author describes nuances of the high transverse scrotal incision technique gained over 48 years of experience. Many of these methods will interest the reader because they are divergent from the common practice of implanters across the world. These distinctions are designed to diminish the risk of infection, speed up the surgery, and improve outcomes for both the patient and his surgeon.

Introduction

The inflatable penile prosthesis (IPP) was first described as being performed through a large vertical suprapubic incision [1]. In the 1970's nonkink tubing and angled connectors were not available, and tubing between prosthetic parts was routed from the pump through one inguinal canal, across the top of the urinary bladder, and out the opposite inguinal canal to avoid tubing kinking and blockage (Fig. 1a). The original reservoir was disk shaped and seamed; leakage at the seam was common (Fig. 1b). This version was soon replaced by the seamless spherical reservoir. Over the almost five decades of subsequent prosthetic surgery, a variety of incisions have been utilized including perineal, infrapubic, penoscrotal, and subcoronal. Wilson's workshops have assembled the three authors who have performed the most implants respectively using the last three surgical approaches (Perito, Wilson, Park). Each author will describe the nuances of his preferred incision location that lead to successful outcomes for our patients. JM provides historical insights and crucial editing for each nuance

article. We desire for experienced and beginning implanters alike to use the articles as both a primer for "how to" and "tips and tricks".

IPP has been performed through a penoscrotal incision since the early 1980's [2]. Over the years a variety of approaches have been utilized including vertical incision, transverse incision at the actual junction of the penis and scrotum and transverse incision in the high scrotum. The first author has performed over 11,000 IPP through a scrotal incision and wishes to share the nuances of the scrotal incision learned over 48 years of repetition. Many of the "nuances" are deviations from "common practice".

Evaluation of voiding before and after the surgery

Common practice often fails to interrogate the patient's ability to empty his bladder. We recommend cystoscopy on all implant patients. If no cystoscopy then at least perform a residual urine determination and urinary flow rate. You never want surprises when you attempt catheterization to begin the implant surgery. The age of the usual implant patients suggests that some will need prostate enlargement addressed prior to the IPP. In addition, many of our patients have had radical prostatectomy and may have bladder neck stenosis. Despite our best practices including preoperative cystoscopy, urinary retention following IPP still occasionally occurs. *Common practice* would be to place a Foley and start the patient on alpha blocker medication as initial management. If the patient fails subsequent voiding trials, then he is subjected to another uncomfortable period with the indwelling catheter.

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Fig. 1 Original Scott inflatable prosthesis. **a** Original Scott IPP placed with tubing through each inguinal canal. **b** Original seamed reservoir with fixation tab.

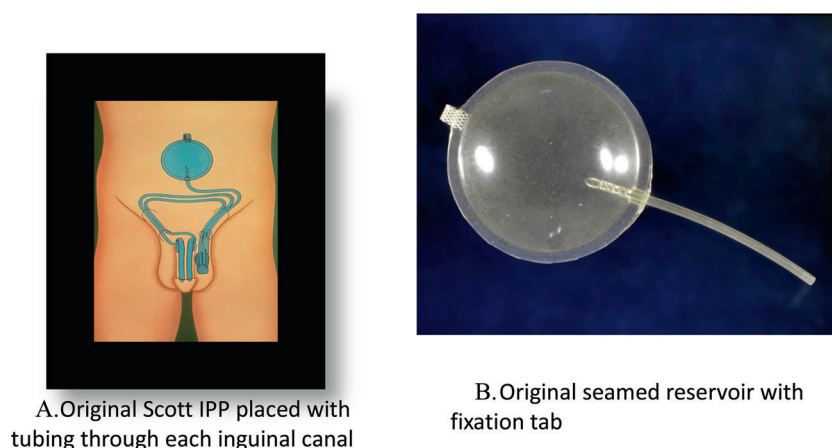
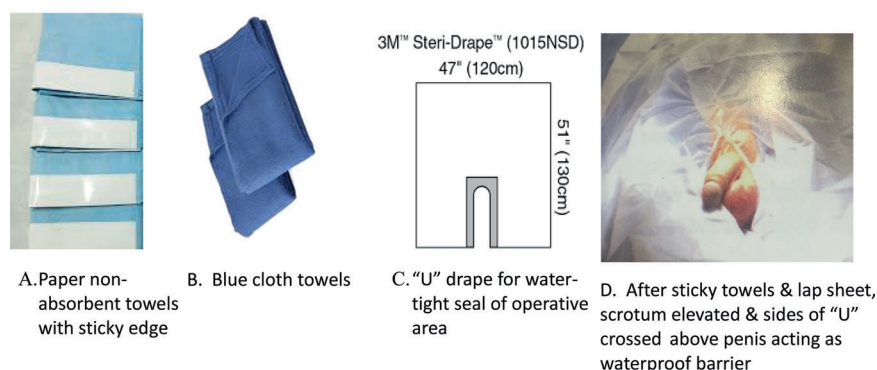


Fig. 2 Surgical wound draping suggestions. **a** Paper nonabsorbent towels with sticky edge. **b** Blue cloth towels. **c** “U” drape for water-tight seal of operative area. **d** After sticky towels and lap sheet, scrotum elevated and sides of “U” crossed above penis acting as waterproof barrier.



Our practice evolved after experiencing a number of subsequent device infections in urinary retention patients. We now place a Bonanno disposable suprapubic catheter if the patient cannot void which allows voiding trials but avoids the discomfort of an indwelling Foley and, most importantly, repetitive instrumentation of the urinary tract.

Preoperative preparation of the patient

Common practice employs a myriad of rituals aimed at host optimization of infection risk. These practices include pre-op bathing in antibacterial soaps, oral antibiotics, urine and nares culture, assessment of diabetic control by hemoglobin A1C, cessation of aspirin, and various elaborate preoperative skin antisepsis preparations. We employ none of these practices as no contemporary studies validate their effectiveness. Only if the patient has a history of smoking [2] or methicillin resistant *Staphylococcus aureus* [3] do we react. These are validated risks. In these patients we counsel cessation of smoking and we culture the nares. Otherwise our preoperative preparation consists of not washing the patient’s skin and simply painting the patient with two Chlorhexidine sticks immediately before the incision is made [4].

Draping the patient

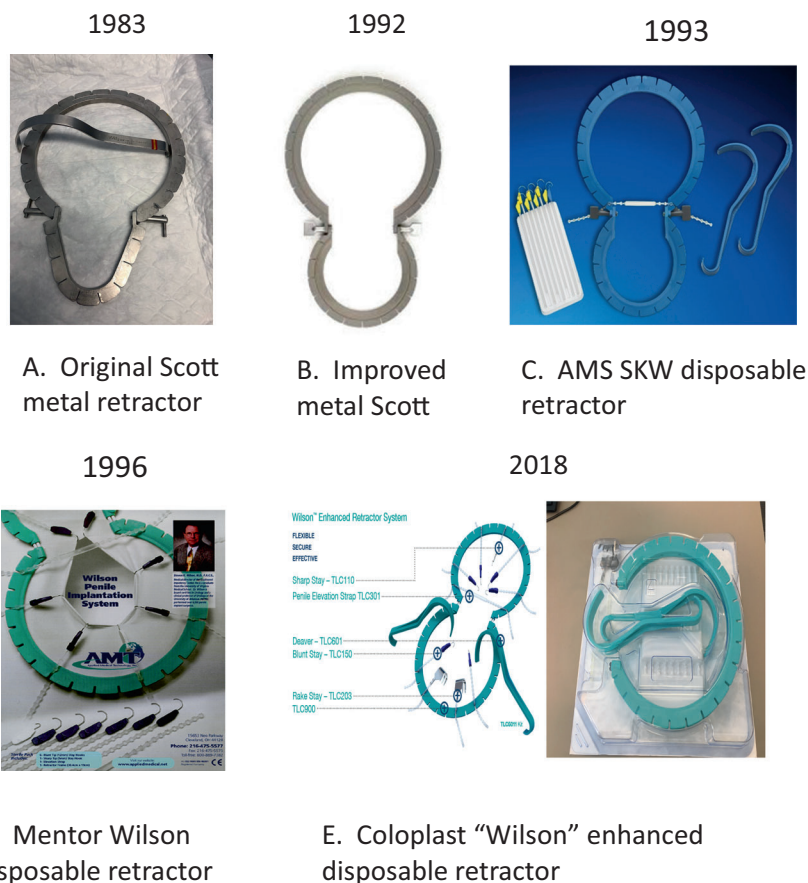
For wound towels, *common practice* uses the ubiquitous blue cloth towels supplied with most disposable surgical kits utilized to drape patients for surgery (Fig. 2b). All the other drapes in the kit are water resistant except the blue towels. Penile prosthesis surgery is accompanied by copious wound irrigation to reduce the bacterial inoculum occurring during surgery. The cloth wound towels can become saturated increasing the potential for pathogenic bacteria in the perineum to migrate into the surgical site. It is suggested the blue cloth towels not be used. Instead substitute the separately packaged and readily available paper towels with sticky edges (Fig. 2a). They are water repellant.

For skin coverage, *common practice* uses the large Iodine impregnated sticky drapes applied to large expanses of skin (e.g., 3M Ioban®). We have found the copious irrigations tend to loosen the attachment of the clear plastic to the patient’s skin before the implant incision is closed. The possibility of contamination of the wound from the patient’s skin then exists. Instead of the sticky plastic drape we are able to isolate the operative area in a water-tight manner for the duration of the surgery by employing a “U” drape, originally developed by our orthopedic colleagues for isolating limbs. The best size

Fig. 3 High transverse scrotal incision. **a** High transverse scrotal incision. **b** Move incision onto penoscrotal junction. **c** Secure scrotal incision onto penoscrotal junction w/hooks.



Fig. 4 Metal and disposable “Scott” retractors. **a** Original Scott metal retractor. **b** Improved metal Scott. **c** AMS SKW disposable retractor. **d** Mentor Wilson disposable retractor. **e** Coloplast “Wilson” enhanced disposable retractor.



is the 3M #1015 (Fig. 2c). After the wound towels and the lap sheet have been placed, we elevate the scrotum and pass the limbs of the U cephalad crisscrossing above the penis isolating the operative field from the rest of the body (Fig. 2d). It might interest the reader to know that on several occasions Wilson has been asked by an implant company to investigate an increased incidence of device infection in another hospital. By simply switching the draping materials from cloth wound towels and sticky plastic drape to paper towels and a “U” drape, the rash of infections ceased.

The high scrotal transverse incision

A high scrotal transverse incision was popularized by Montague [2] in the 1990’s (Fig. 3a). It has advantages over

common practice—the vertical penoscrotal or a transverse incision exactly on the junction of the penis and scrotum. Wound healing is better because there is no possibility of penile flexion stressing the incision and access to the proximal corpora is easier to obtain. We move the high scrotal incision over the penoscrotal junction (Fig. 3b) and secure it with the disposable retractor supplied hooks (Fig. 3c).

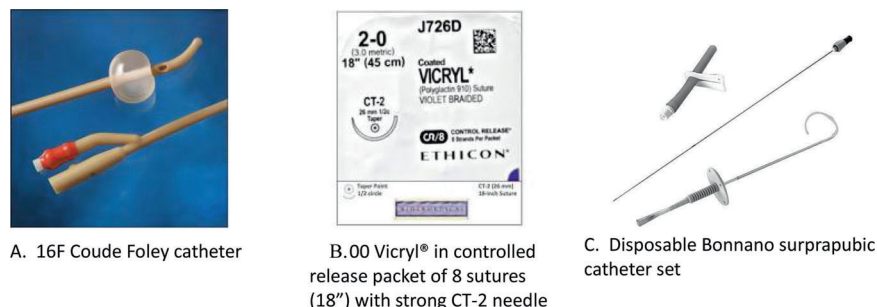
Retractor set up and exposure

This is one of the most important parts of the case. If done well, the rest of the case is very straightforward. If done poorly, a lot of time is wasted looking for the corpora and worrying about the anatomy:

Fig. 5 Proper use of disposable retractor and accessories saves time. a Penis stretched and elevated by retractor and penile strap. **b** Generous dartos dissection. Tunica cleaned of overlying tissue. **c** Exposure of proximal corpora w/Deaver maneuver.



Fig. 6 Wilson recommended accessories for IPP. a 16F Coude Foley catheter. **b** 00 Vicryl® in controlled release packet of eight sutures (18") with strong CT-2 needle. **c** Disposable Bonnano surrapubic catheter set.



Learning surgery from prose and pictures is difficult. It is suggested you consult the internet www.vjpu-issm.info for videos on implantation. For penoscrotal we suggest Wilson SK. Tips of Penoscrotal IPP. VJPU 2014; 1: 028.

Always use the disposable Scott Retractor that comes with the implant inventory. All the tools necessary to perform IPP or artificial urinary sphincter are included in the set. *Common practice* attempts cost savings by using a reusable metal model and cobbling together the disposable hooks, rakes, strap etc. from different vendors (Fig. 4a, b). The Scott Retractor without the proper adjuncts provides suboptimum exposure, keeps the wound open longer and skilled assistants are necessary as substitutes to provide retraction. Frequently the rakes, baby Deavers and tight durometer penile strap are unobtainable (Fig. 4c–e). Because a penile strap that fits the metal retractor and does not stretch is particularly difficult to procure, *common practice* dictates using the metal or plastic retractor without the strap designed for elevating and stretching the penis. Failure to elevate and stretch the penis increases the difficulty of dissecting the dartos tissue off the tunica albuginea. If the penis is on stretch and elevated by the penile strap (Fig. 5a), the tunica is “squeaky clean” with three quick cuts of sharp dissection (Fig. 5b). The amount of time the surgical wound is open increases the likelihood of device infection [5]. The reader is advised to study surgical technique, insist on state-of-the-art equipment (disposable Scott retractor), deploy the retractor correctly and rehearse these details until you can perform an IPP in an hour or less. If so, there is an excellent chance your infection rate will be less than 1% if you do 25 IPP or more per year [6].

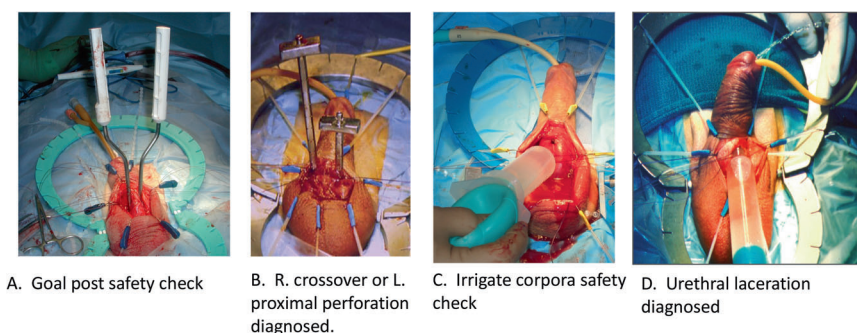
Draining the bladder

Common practice uses a 16F standard Foley catheter to drain the bladder and help identify the urethra during subsequent execution of the IPP surgery. We suggest substitution of a 16F Coude Foley catheter (Fig. 6a). If bladder neck stenosis is encountered, this catheter will usually negotiate it rather than force the surgeon to remove the standard Foley and begin instrumentation (and, of course, compromise sterility) of the urethra.

Penile implant sutures

Common practice uses 00 braided or 00 monofilament sutures for corporotomy and dartos closure. When stay sutures are fashioned, the surgeon attempts to get two stays out of one packaged 24" suture. He passes the needle, then adjusts the length of the stay suture, clips the stay suture with a hemostat and cuts the suture. Then he regrips the needle and deploys the second stay suture with the same laborious scenario. We use 00 Vicryl® on a strong CT-2 needle from an Ethicon controlled release package of eight sutures (Fig. 6b). This packaging of “pop offs” was specifically designed for IPP’s by Wilson. The needle pops off and a new 18" suture is used for the second stay. Four stays are deployed, and the four additional sutures are available for dartos closure. Only one package is opened for each IPP and operating room (OR) supervisors indicate cost savings by opening only one controlled release package for each IPP rather than the multiple solitary suture packages. Inevitably, more solo suture packs are opened than needed.

Fig. 7 Safety checks should be done on every IPP. a Goal post safety check. **b** R. crossover or L. proximal perforation diagnosed. **c** Irrigate corpora safety check. **d** Urethral laceration diagnosed.



Penile implant inventory

Have a meeting with your penile implant sales representative and request additional inventory for your *common practice* “loaner kit.” This is the industry term for the consignment inventory of devices shipped to your OR in anticipation of the IPP. What typically comes is all the sizes of cylinder/pump and reservoirs in duplicate plus the packaged disposable retractor. Never operate without also having downsized inventory available. You never know when unexpected corporal fibrosis/stenosis will be present in your patient or when he may present with a very narrow (pencil) penis. These conditions prevent dilatation broad enough to place the base of the standard implant cylinder. Insist on always having downsized inflatable inventory or at the minimum, a slender malleable, available in your loaner kit. The implant companies will do it on specific request. Otherwise you will have a very unhappy patient who awakens to find himself without the enhancement of a penile implant because you did not have the proper inventory for the unexpectedly compromised patient.

Exposure of the proximal corpora on every case

Common practice is to do the IPP with the smallest incision possible. We have learned that if you make a generous 5–6 cm transverse incision (Fig. 5b), clean a plentiful space of the dartos completely off the tunica (Fig. 5b), expose the proximal corpora with the twin Deaver maneuver (Fig. 5c), and place the Rake retractor hooks from the disposable retractor accessories, you are miles ahead if trouble strikes [2, 7]. While proximal corporal exposure is easy to obtain prior to corporotomy with the Deaver maneuver (Fig. 5c), it is quite difficult to accomplish if you do not sweep the tissues away prior to making your corporotomy. We recommend surgeons get into the habit of doing it on every case; It only adds a couple of minutes and saves a world of anxiety if things go south during the surgery and you have an urgent need for proximal visualization. It also is good

practice for when you need the deep urethral exposure for a one scrotal incision placed artificial urinary sphincter.

Always do the three safety checks

- (1) The goal post sign: place dilators proximal and make certain they are the same depth and angle (Fig. 7a); this allows you to avoid failing to diagnose a proximal perforation or crossover (Fig. 7b) [8].
- (2) Interrogation of distal corpora with irrigation (Fig. 7c); this allows the operator to make certain the urethra is not compromised at the fossa navicularis (Fig. 7d) [8].
- (3) After the base of the first cylinder has been placed and before placing the base of the second cylinder, pass an instrument such as the back of a Debaquey forceps or a dilator down to the ischial tuberosity on the contralateral side. If difficulty with the passage of the instrument to the bone, the base of the first cylinder has crossed over proximally [8].

Common practice is for the implant surgeon to start off his or her implant career by doing all the safety checks on every case. After all, that is how you were instructed in residency. As the surgeon becomes more experienced, he or she tends to skip some steps since they had not been helpful in the past. At some time in our prosthetic careers all the authors of this workshop have skipped steps. Let us assure you, this practice of skipping the safety checks always penalizes—serving up an out of place cylinder in an unhappy patient which requires a revision operation [9]. A full 90% of cylinders out of place can be detected and corrected intraoperatively if the safety checks are employed on every patient [8, 9].

Use the rule of 10 for determining size of cylinder and rear tip extender (RTE)

Common practice is to simply “guesstimate” the combination of cylinder and RTE. It has been particularly

confusing for surgeons who utilize both manufacturer's implants. Now that Boston Scientific has recently changed the lengths of tubing between cylinder and pump, we propose a discipline which works for both implants. This is an easy solution to the dilemma of what is the optimum size cylinder and RTE while minimizing the RTE's. The system works for both company's implants even though the cylinder sizing is different. This method of measurement assures that even with minimization of RTE, there will be sufficient tubing remaining outside the corporotomy to allow the pump to rest in a dependent fashion in the scrotum.

Measure the distal and proximal corporal distances from the bottom on the corporotomy. For every unit over 10 on the proximal measurement, that is how many centimeters of RTE is needed. Here are some examples: remember that Coloplast Titan cylinders are sized every 2 cm (14, 16, 18, 20, 22, 24, 26) and AMS 700 cylinders are sized every 3 cm (12, 15, 18, 21, 24):

- (1) If the measurement is 13 proximal and 11 distal = 24 cm: the surgeon must use at least 3 cm of RTE:
 - (a) For Coloplast Titan choose 20 cm cylinder plus 4 cm of RTE.
 - (b) For AMS 700 choose 21 cm cylinder plus 3 cm of RTE.
- (2) If the measurement is 10 proximal and 10 distal = 20 cm: the surgeon can implant with no RTE if the cylinder size is available that is exactly the measured sum:
 - (a) For Coloplast Titan you could simply use 20 cm cylinders with no RTE.
 - (b) For AMS 700 choose 18 plus 2 cm of RTE.
- (3) If the measurement is 12 proximal and 14 distal = 26 cm: the surgeon should implant a cylinder with at least 2 cm of RTE:
 - (a) For Coloplast Titan you could use 24 cm cylinder plus 2 cm RTE.
 - (b) For AMS 700 choose 24 cm cylinder plus 2 cm RTE.

The rule of 10 also works for subcoronal incision placed IPP's but not infrapubic incision. For the exceptionally long and wide penis it is important to minimize RTE's. The axial rigidity (resistance to buckling during intercourse) of this implanted penis when erect is much better by maximization of the inflatable cylinder

and fewer RTE's. *Common practice* is to allow the patient to influence the choice of manufacturer's implant. In the case of the long, wide penis, we insist on Coloplast Titan cylinders because the girth is not limited to 18 mm per cylinder as is AMS and the 2 cm increments of cylinder length offer increased opportunity to minimize RTE's. Kohler's group confirmed this recent trend of longer cylinders and minimization of RTE's in the USA [10].

Reservoir positioning

When placing reservoirs through a penoscrotal incision, the *common practice* is to pass the reservoir blindly into either the traditional retropubic or the novel ectopic (aka high submuscular or abdominal wall location). No thought of redundancy of pump tubing is acknowledged by the operating surgeon. We prefer to shorten the tubing so that in the traditional location the hub of the tubing is snug against the inguinal ring. We also believe it is important to shorten the tubing on an ectopic placement, so it is a straight run of tubing to the hub of the reservoir. Shortening the tubing makes the reservoir easier to remove in retroperitoneal placement for a future revision and if a Coloplast Cloverleaf® reservoir is utilized, assures there will be no compromise of the auto inflation button on the top of the reservoir. If an AMS Conceal® reservoir is used for ectopic placement, snugging up the reservoir tubing length, may prevent folding of the component or tubing torsion which compromises its function and precipitates a revision operation [11].

Do not fixate the pump

Common practice suggests using suturing techniques known as "pexing" the pump to prevent migration. Surgeons do this in a myriad of ways. We suggest that securing the pump's position with sutures can backfire. Pumps end up in crazy positions even in the hands of the most experienced surgeons. As Wilson says, "pumps have a mind of their own." If the pump was sutured into position during implant surgery, it has to undergo a revision surgery to change the position. If the pump is simply placed in a dependent position between the testicles without suture fixation, the poorly positioned pump can be manually rectified by the patient when the swelling and discomfort has receded. Since the pump is not sutured into a particular position in the scrotum, it is usually possible for the patient to simply repetitively pull on the pump and relocate it to a more desired scrotal location.

Fig. 8 IPP accessories may minimize infection and hematoma. a Dermabond (Ethicon). b Blake drain (Bard). c Closed suction drainage w/ scrotal exit and mummy wrap.



A. Dermabond (Ethicon)



B. Blake drain (Bard)



C. Closed suction drainage w/ scrotal exit & mummy wrap

Postoperative protocol

We use Dermabond® (Fig. 8a) or a similar product to seal the incision. After the mummy wrap and drain [Fig. 8c] are removed on postoperative day 1 (POD), we employ no additional incision dressing. We allow the patient to shower on POD1. We instruct the patient to have very limited activity and to use icepacks on his scrotum for 48 h to prevent additional swelling. After 72 h if the incision is intact and the drain skin puncture is dry, we start hot tub baths. We treat the scrotal swelling just as we would treat a sprained joint—icepacks to stop the swelling and heat to promote blood absorption out of the joint. *Common practice* forbids the patient from getting his incision wet. We believe the early hot tub baths markedly lessen morbidity by promoting welcome swelling resolution. The Dermabond seal protects the incision but the patient must also certify the drain puncture site is not moist before starting the genitalia soaking.

We whole heartedly believe in the following distinctions

- (1) *Common practice* amongst occasional implanters is not to drain. We counsel always use a closed suction drain for 24 h (Fig. 8b, c) [12]. Our favorite is the 10 or 11Fr. Blake (Fig. 8b). There is a reason why most of the highest volume implanters (including all the authors of this paper) place a drain on every case. This is because the scrotum, like the eyelid, is a unique structure. If you get bumped with minimal force in the region of the eye, a black eye results. If you get bumped with the same intensity on the arm, nothing happens. The eyelid and scrotum swell remarkably with minimal trauma. The rate of scrotal hematoma following IPP without a drain is 4% [12]. That is not a very large risk unless you do 100 IPP per year. Then you will see a hematoma every 3 months! Use a drain ... hematomas markedly increase both patient morbidity and risk for subsequent device infection [13].
- (2) The mummy wrap is the best, most comfortable pressure dressing of the scrotum; it was invented by Gerard Henry specifically for the IPP. Learn how to do it properly (Fig. 8c) to minimize the occurrence of scrotal hematoma.
- (3) Use copious amounts of irrigation fluid during the IPP procedure. As JM says, “dilution is the solution to the pollution.”
- (4) The last person that thinks the patient needs another (corrective) surgery is the person who performed the first surgery. If you are puzzled by a postoperative development, pick up the phone and call another implanters—chances are good he will tell you the patient needs to be returned to the operating theater.
- (5) The first implant operation has the best chance of a successful outcome. If things go south during the surgery, abort, and return to fight another day.
- (6) When in doubt, take it out. Penile implant surgery is elective and aimed at improvement in quality of life. As Irwin Goldstein tells his residents, “its only impotence.”
- (7) When patients are unhappy or not doing well, see them often. Nothing is harder than to listen weekly to the bitter patient. Fortunately, tincture of time heals many angry patients. If you ignore them, they find another physician, and this can be the genesis of a lawsuit or complaint to the state medical board. You may have not done anything incorrect and eventually the complaint or litigation goes away. Nevertheless, you will suffer immensely for the time period it takes for the proceedings to play out.
- (8) Finally, we warn, “never implant a stranger” [14]. Get to know the patient. We learned this via painful experiences after impulsive surgery. It does not matter how many surgeons have operated upon him in the past, if you touch him surgically, he is yours henceforth. If he

had unrealistic expectations going into the IPP, you will be miserable taking care of him postoperatively [15]. Make certain you know his expectancy in full and if it is improbable, simply refuse to be the motor effector of his surgery.

Compliance with ethical standards

Conflict of interest SW: Consultant: AMT, Coloplast, International Medical Devices. Lecturer Boston Scientific. Stockholder NeoTract. PP: Consultant Boston Scientific, Coloplast. SP: Consultant Boston Scientific, Coloplast. JM: Consultant: Boston Scientific, Coloplast.

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