Penile Prosthesis: Patient Teaching and Perioperative Care

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Erectile dysfunction (ED) is defined as “the inability to achieve and maintain an erection sufficient to permit satisfactory sexual activity” (Droller et al., 1992). Some estimates indicate that ED affects as many as 10 to 20 million men in the United States, with this number increasing up to 30 million if men with mild to moderate ED are included (Feldman, Goldstein, & Hatzichristou, 1994).

Treatment of ED is a quality of life issue. ED has been associated with depression, anxiety regarding sexual function, poor self-image and self-esteem, and can affect the quality of the relationship with a patient’s partner (Bates, 2001; Meredith, 1995). Successful treatment of ED can restore a man’s confidence in his sexual potency as well as improve his quality of life.

In the era of established and popular oral erectogenic agents, and with new oral agents becoming available, it might be expected that the indications and need for implantable penile prostheses as a treatment for ED would be declining. However, not all men with ED are candidates for sildenafil citrate (Viagra®), interested in a vacuum erection device, or will respond to pharmacologic injections designed to produce an erection. As the population continues to age, and with the acceptance of ED as a topic that can be readily discussed between patient and provider, the number of penile prostheses that are implanted has remained relatively steady (Stanley, Bivalacqua, & Hestrom, 2000). A penile prosthesis remains the primary option for many patients who have failed the less-invasive treatments for ED. As more and more men continue to seek care for ED, it is important to be familiar with the concepts specific to penile prosthesis surgery, its risks, and its unique perioperative management issues.

History of the Penile Prosthesis

Surgery for ED was first reported at the turn of the century, although it typically involved penile revascularization procedures only (Virag, 1989). The first...
Implantable erectile device was introduced in 1966 and was a single rigid device implanted beneath the fascia of the penis. This device was unsatisfactory in both appearance and function to patient and surgeon alike. Subsequent improvements involved the development of various types of paired rods that were implanted into the corpora cavernosa. These later devices were still suboptimal because they could not be easily concealed and did not mimic natural erectile function.

In 1972, American Medical Systems (AMS) developed the first inflatable prosthesis: a three-piece device with two cylinders, a scrotal pump, and an abdominal fluid reservoir (Scott, Bradley, & Timm, 1973). It rapidly became the mainstay of treating all types of ED with the exception of psychogenic ED. Mentor first introduced its version of the three-piece prosthesis in 1983. These early devices and others that followed it, however, were plagued by various mechanical problems that often required surgical revision or complete replacement of the device.

Several implantable penile devices have come and gone in the last 30 years, including the AMS Hydroflex, AMS Dynaflex, Omniphase, Surgitek Flexi-Plate and Flexi-Plate II, Finney Flexirod I and Flexirod II, Surgitek Uni-Plate 1000, and Mentor Mark II. It is possible to care for patients who still have some of these previous models implanted; although due to their malfunctions, many have been replaced with a current model.

**Ideal Penile Prosthesis**

Several criteria define the “ideal” penile prosthesis. Cosmetically, the device should resemble a natural erection as closely as possible. It should also resemble a flaccid penis when the device is not in use and should feel normal when palpated. The prosthesis should preserve the shape of the penis at all times and should be convenient and easy to use to allow for spontaneity. The model of prosthesis that most closely fulfills these criteria is the three-piece inflatable prosthesis.

Selecting a penile prosthesis for a particular patient depends on a variety of factors. It may be determined by patient preference or the cost of the device if the surgery is not covered by insurance. Device selection can also be guided by a history of previous abdominal or inguinal surgeries, the manual dexterity of the patient, the existing comorbidities of the patient, and surgeon preference.

**Types of Penile Prostheses Currently Available**

Malleable. Malleable penile prostheses are available from several companies: AMS (Malleable 650 [see Figure 1]), Mentor (Small-Carrion, Malleable), and Timm Medical Technologies (Dura II). A malleable prosthesis may be made of pure silicone rubber and may have an intertwined central or metallic core. The
Dura II consists of a series of articulating discs that allow a pronounced bend and can aid in concealing the device.

Malleable prostheses are the least expensive of the three prosthesis types and are the least complicated to place surgically. The malleable prosthesis has the lowest incidence of wear-induced failure because it has no mechanical parts. This type of prosthesis is more suitable for holding a condom catheter in place as it provides a constant semi-rigid support. Its drawbacks include the fact that it can be difficult to conceal because it is always firm, it does not alter penile length, and it does not alter penile girth. A higher incidence of erosion is also seen with this type of prosthesis because it is always semi-rigid (Lewis, 1998). Malleable prostheses are implanted less frequently due to better mechanical reliability of the three-piece inflatable prosthesis.

Two-piece inflatable. The currently available two-piece inflatable prosthesis (AMS Ambicor [see Figure 2]) contains a combination scrotal pump/reservoir, but does not present as natural a flaccid state as a three-piece prosthesis (Kabalin & Kuo, 1997).

The two-piece model will not provide any significant increase in girth. The main advantage to this particular prosthesis is the lack of the suprapubic reservoir, which also results in the more rapid placement of the device by the surgeon. Patients who have had extensive surgery to the inguinal regions or who have mesh as the result of previous inguinal hernia repairs may be presented with this type of device as an option. This type of prostheses also involves a single step for deflation. There is no significant mechanical advantage to the two-piece prosthesis, however, when compared with the three-piece (Dubocq, Tefillli, Gheler, Haikun, & Dhabuwala, 1998; Kabalin & Kuo, 1997).

Three-piece inflatable. The three-piece inflatable penile prostheses (AMS 700 Ultrex or Ultrex Plus [see Figure 3], AMS 700CX, AMS 700CXM, Mentor Alpha I and Alpha I narrow base [see Figure 4]) provide the most natural approximation of a patient's original erectile function (Goldstein et al., 1997). Inflatable devices are compared in Table 1.

Table 1. Types of Available Inflatable Penile Prostheses

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Description</th>
<th>Length Expansion</th>
<th>Material</th>
<th>Specific Indications</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMS Ambicor</td>
<td>Two-piece inflatable</td>
<td>No</td>
<td>Silicone</td>
<td>Previous mesh inguinal hernia repair, kidney transplant patients</td>
<td></td>
</tr>
<tr>
<td>AMS 700CX</td>
<td>Three-piece inflatable</td>
<td>No</td>
<td>Silicone</td>
<td>Peyronie's disease, long narrow penis, previous distal cylinder erosion</td>
<td>Also with Inhibizone coating</td>
</tr>
<tr>
<td>AMS 700CXM</td>
<td>Three-piece inflatable</td>
<td>No</td>
<td>Silicone</td>
<td>Fibrosis, reimplantation after infection</td>
<td>Also with Inhibizone coating</td>
</tr>
<tr>
<td>AMS 700 Ultrex or Ultrex Plus</td>
<td>Three-piece inflatable</td>
<td>Yes</td>
<td>Silicone</td>
<td>None; can be used in most situations</td>
<td>Also with Inhibizone coating</td>
</tr>
<tr>
<td>Mentor Alpha 1</td>
<td>Three-piece inflatable</td>
<td>No</td>
<td>Bioflex (polyurethane)</td>
<td>S/P radical prostatectomy or cystectomy</td>
<td>Nonrefluxing reservoir valve</td>
</tr>
<tr>
<td>Mentor Alpha 1 Narrow Base</td>
<td>Three-piece inflatable</td>
<td>No</td>
<td>Bioflex (polyurethane)</td>
<td>Peyronie's disease, reimplantation after infection</td>
<td>Nonrefluxing reservoir valve</td>
</tr>
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</table>
Indications for Penile Prosthesis

There are several reasons a man may be offered a penile prosthesis as an option for treating his ED. Men who are diagnosed with organic ED and who have failed first and second-line pharmacologic management may be offered a penile prosthesis as definitive treatment for their continued erectile dysfunction. Because this is an elective surgery that is not without risks, it is vital to establish what a particular patient's goals are in seeking surgical treatment for his ED.

During the discussion the patient must be told that once an implant is placed, pharmacologic treatment will usually not work. The patient and his partner must understand that implantation damages the corpora cavernosa and should be used only after all other options have been explored. It is imperative that the patient understands the ramifications of a penile prosthesis from the start and that there is no turning back after the prosthesis has been implanted.

Radical prostatectomy. Men who have undergone a radical prostatectomy are frequently candidates for a penile prosthesis. The strongest predictor of potency after a prostatectomy is preoperative sexual function, but potency is also influenced by patient age, comorbidities, and the ability of the surgeon to spare either one or both of the neurovascular bundles (Lue, 2000). Patients will have a “dry” orgasm (no ejaculation), as the seminal vesicles are also removed along with the prostate.

Because sexual function can improve in the 6 to 12 months following surgery (Presti, 2000), a penile prosthesis is not typically discussed until at least 12 months after the surgery. In this case, some surgeons prefer to offer the Mentor three-piece prosthesis because of its lock-out reservoir valve. This valve will prevent the autoinflation of the prosthesis due to the compression of the reservoir from postoperative scarring following prostatectomy.

Radiation therapy. Many patients with prostate cancer treated with external beam radiation will develop impotence over time. This is due to the damage that occurs to the neurovascular bundles as well as corporal fibrosis that occurs (Dubocq, Bianco, Maralani, Forman, & Dhabuwala, 1997). These patients may not respond to the first and second-line pharmacologic treatments and may be offered a penile prosthesis, although they are at a slightly increased risk of infection from the tissue and vascular damage caused by the radiation (Wilson & Delk, 1995).

Cystoprostatectomy. Patients who have undergone a radical cystoprostatectomy can also be candidates for prostheses. These patients will typically experience ED similar to that seen with the prostatectomy patients. This is again due to the removal of the seminal vesicles and varying degrees of preservation of the neurovascular bundles.

Other surgical procedures. Patients who have had any major abdominal surgery such as the repair of an abdominal aortic aneurysm or colon resection are also candidates for a penile prosthesis for treatment of ED.

Peyronie's disease. Peyronie's disease is a benign condition that often presents as a painful erection, a curved erect penis, and poor erection distal to the curved area. This curvature is caused by a fibrous plaque along the shaft of the penis, can occur anywhere along the length of the shaft, and can be so severe that it prevents vaginal intercourse. Patients may also complain of some degree of sexual dysfunction. Some men may experience remission of the disease and resolution of the plaque. For those who do not gain relief from noninvasive treatments or do not experience remission, and have poor rigidity of
erection, implantation of a three-piece inflatable prosthesis with intraoperative “modeling” is the preferred treatment (Wilson & Delk, 1994). The implantation of the prosthesis allows for the straightening of the penis intraoperatively without incising the Peyronie’s plaque. After the insertion and inflation of the prosthesis “fractures” the plaque, this “modeling” of the plaque allows the penis to be straight when the prosthesis is inflated after healing is complete.

**Contraindications to Implantation of Penile Prosthesis**

**Infection.** Patients who have active urinary tract infections (UTI) at the time of surgery are at increased risk for infection of the prosthesis postoperatively despite the use of broad-spectrum antibiotics in the holding area (Jarow, 1996; Montague et al., 1996). Men with active UTIs should have their surgery delayed until a clean urinalysis can be documented within approximately 2 weeks of the proposed operative date.

**An active infection anywhere in the body can also increase the risk of postoperative infection of the prosthesis. Infections should be eradicated prior to surgery. This includes, but is not limited to, diabetic foot infections, periodontal disease, and any lesion that would be within the operative field (Jarow, 1996).**

**Diabetes.** Some investigators have reported that a glycosolated hemoglobin greater than 11.5% presents an increased risk for postoperative infection (Bishop et al., 1992). But other investigators have shown that this does not conclusively increase the risk for postoperative infection (Jarow, 1996; Wilson, Carson, Cleves, & Delk, 1998). The role of diabetes in postoperative penile prosthesis infections may be due to its well-documented impact on healing time; the microvascular changes it causes over time, or poor diabetes management preoperatively.

**Lack of manual dexterity.** Any patient considering surgery for a prosthesis also needs to be evaluated for his level of manual dexterity. While this is of less concern with a malleable prosthesis, a patient who desires a three-piece inflatable prosthesis must possess sufficient manual dexterity to be able to manipulate the pump after it is placed in the scrotum (Lewis, 1998). This is also a consideration with the two-piece inflatable prosthesis, unless in either case the patient’s partner is committed to taking responsibility for inflating the prosthesis.

**Preoperative Evaluation**

Throughout the preoperative process, patients and their partners should be given multiple opportunities to ask questions and express any concerns they may have regarding the surgery. This particular surgery is unique in that the preoperative discussion must include not only a discussion of basic surgical principles, but discussion of a patient’s sexual function, previous ED treatment failures, and the projected improvement of his sexual function. It may be necessary at times to involve the patient in counseling with a sex therapist or psychologist who specializes in treating patients with sexual dysfunction. This can help uncover any issues the patient or couple may have regarding the nature of their sexual relationship and help prevent unrealistic expectations from either party about the postoperative function of the prosthesis.

Preoperative discussion will also include a review of the various types of prostheses and the indications, benefits, potential problems, and side effects for each. Some patients will have an expressed preference for one type over another and should be supported in their choice of device. The nurse must clearly outline that a penile prosthesis is a good treatment option, but the patient won’t be able to go back to most options after a prosthesis has been implanted.

Penile prosthesis surgery is an elective surgical procedure, and as such, time must be taken to insure that the client is medically optimized. As ED rarely exists in a vacuum, the medical management of a patient’s comorbidities can be challenging. Many conditions, such as cardiovascular disease, can increase a patient’s risk for surgery. Routine preoperative evaluation will include a urinalysis and culture, baseline chemistries, complete blood count, coagulation studies, electrocardiogram, and a chest film in patients over age 50. A glycosolated hemoglobin and albumin may be added at the provider’s discretion.

Uncircumcised males should undergo a circumcision prior to considering prosthesis surgery if they have a history of recurrent balanitis or postitis or apparent poor hygiene. This will eliminate a potential source of postoperative infection. If a phimosis or paraphimosis is noted on the preoperative examination, the patient will also be advised to pursue a circumcision or dorsal slit prior to implantation of a prosthesis. This will prevent any potential complications due to the swelling of the penile shaft immediately after surgery. In both instances, these additional procedures would only delay the implantation of the prosthesis until the incision sites are healed.

**Preoperative Counseling**

When counseling the patient considering a penile prosthesis, it is important to include the patient’s significant other to help avoid unrealistic expectations regarding the results of the surgery. Patients and their partners must be informed that the erections created by an inflatable penile prosthesis will be approximately one to two centimeters shorter than their native erection.
This is because the cylinders of the prosthesis only extend the length of the corpora cavernosa and therefore provide firmness throughout the length of the corpora only. In contrast, a natural erection would also create firmness throughout the glans of the penis as both the corpora cavernosa and corpora spongiosum fill with blood. This loss of length is the primary reason for dissatisfaction with prosthesis surgery, and the patient should be reminded to expect this difference in length.

Preoperative Teaching

If any type of prosthesis must be removed, the patient must be cautioned that the likelihood of response to any of the pharmacologic methods of producing an erection is small (Mulcahy, 2000). The patient must also be informed that if the prosthesis is removed for any reason, repeat surgery to implant another prosthesis carries with it a slightly increased infection risk as compared with the original implantation surgery.

The patient planning to proceed with prosthesis surgery, regardless of the type of implant, must be cautioned against sexual activity of any kind for 6 to 8 weeks after the surgery. Use of the prosthesis prior to proper healing of the incision could cause damage to the incision and loss of its containment structures. Resuming sexual activity will be discussed at a later postoperative visit. After 6 weeks, most patients are sufficiently healed to resume sexual activity after being instructed in the use of their prosthesis.

Once the appropriate device has been determined, patients should be given the opportunity to examine a model of the prosthesis they will have implanted. This will reinforce preoperative teaching regarding the prosthesis components and their role in the function of the prosthesis as a whole. It should also be mentioned that the model prosthesis is not representative of the prosthesis that will be implanted. Each patient is carefully measured intraoperatively to ensure that the prosthesis implanted is correctly sized.

The patient and his partner should also be given clear written instructions detailing their roles in the immediate preparation the night before surgery (see Table 2). In addition, the patient and his partner should be taught about untoward side effects and what to look for as well as the need to take prophylactic antibiotics before an invasive procedure such as a cystoscopy, colonoscopy, or teeth cleaning.

Risks of Penile Prosthesis Surgery

Penile prosthesis surgery carries with it some unique risks due in part to a foreign object being implanted into the human body. Recovery after this surgery can be further complicated by the fact that ED is commonly seen in patients with existing comorbidities that can prolong and complicate healing. These risks should be reviewed with the patient as often as possible prior to surgery to ensure that the patient is familiar with them, and also because this is an elective surgery. These risks are a dynamic group of potential postoperative complications, which can themselves be interrelated and which can be devastating both physically and psychologically to the patient.

Infection is the primary risk of this particular surgery. This is more commonly seen with patients who have diabetes or a spinal cord injury, or who have had repeat prosthesis surgery where there has been a delay between the removal of a prosthesis and the reimplantation of another one. Infection commonly presents within the first 12 weeks after implantation and is thought to originate at the time of surgery (Knoll, 1998). The patient may complain of pain, swelling, induration, or erythema of the scrotum or the shaft of the penis. He may also complain of drainage from the incision site, a discharge from the scrotum if the pump has eroded through the scrotal skin, or drainage from the urethra if there has been erosion of a cylinder. The patient and his partner should be instructed to report any of these clinical manifestations to the surgeon immediately.

There are two methods by which an infected prosthesis may be addressed. The first is a conservative approach to simply

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Table 2.
Preoperative Instructions for Penile Prosthesis Surgery

<table>
<thead>
<tr>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop taking aspirin, ibuprofen (Motrin®, Advil®), and naproxen</td>
</tr>
<tr>
<td>(Naprosyn®) 7 days before your surgery date. These drugs can thin your</td>
</tr>
<tr>
<td>blood.</td>
</tr>
<tr>
<td>If you take the blood thinner warfarin sodium (Coumadin®), you will</td>
</tr>
<tr>
<td>be given special instructions about when to stop this medication.</td>
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<tr>
<td>You will be given separate instructions about which medications you</td>
</tr>
<tr>
<td>may take the morning of surgery.</td>
</tr>
<tr>
<td>Do not shave your groin for the 2 weeks before your surgery date. This</td>
</tr>
<tr>
<td>prevents any nicks to your skin that can provide an entrance for bacteria.</td>
</tr>
<tr>
<td>You will be given four chlorhexidine (Hibiclens®) sponges, which</td>
</tr>
<tr>
<td>have special antibiotic soap. Use two to bathe or shower the night</td>
</tr>
<tr>
<td>before surgery: use one to clean your entire body, and one to clean your</td>
</tr>
<tr>
<td>groin. The morning of surgery, bathe or shower again, using one sponge to</td>
</tr>
<tr>
<td>clean your entire body, and one to clean your groin.</td>
</tr>
</tbody>
</table>

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Knoll, 1998

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Mulcahy, 2000
remove the prosthesis, treat the patient with an appropriate combination of antibiotics, and document that the infection is eradicated before attempting to implant another prosthesis. The drawback to this approach is that the corpora can scar during the intervening period of time if it is greater than 4 to 6 weeks. This can result in a more challenging second surgery, which can also increase the subsequent risk of infection; the resulting scarring can also cause the patient to lose an additional one-half to one inch of the length of his erection (Mulcahy, 2000; Wilson & Delk, 1995). This approach can also lead to prolonged postoperative pain due to the additional dissection of the tunica albuginea that may be required (Lewis, 1998).

The second option for addressing the infection is a prosthesis salvage protocol. This involves removal of the infected prosthesis, aggressive irrigation of the tissues with seven antibiotic and antiseptic solutions, redraping the patient, rescrubbing and regowning by the surgical team, and the implantation of a second prosthesis during a single operation (Furlow & Goldwasser, 1987; Mulcahy, 2000). Because there is no time delay between the implantation of the two prostheses, length of erection is preserved and there is no scar tissue that can potentially complicate a second surgery.

The cylinders of the prosthesis can erode through the corpora cavernosa and into the urethra, which can also result in infection. Erosion can be caused by the incorrect sizing of the cylinders intraoperatively or by unrecognized damage to the urethra during the dilation of the corpora (Montague et al., 1996). The patient may complain of pain to the shaft of the penis along the side with the erosion, or drainage from the urethra. The prosthesis must be removed to provide the urethra time to heal. Patients who undergo repeated urethral instrumentation or who are on a regimen of clean intermittent catheterization may be at higher risk for erosion due to the potential for repeated trauma to the urethra.

Incorrect sizing of the cylinders can present with what is termed an SST deformity (after the Concorde aircraft), or a downward hooking of the glans when the cylinders are inflated. This would require surgery to replace the cylinders and correct the deformity. Incorrect cylinder sizing can also contribute to postoperative pain.

The typical life span of an inflatable prosthesis is given as 8 to 10 years of “regular use.” While there exists no clear definition of “regular use,” the incidence of mechanical failure is approximately 8.5% (Dubocq et al., 1998) and can be seen several years after the original implantation. Often mechanical failure presents as complaints of the prosthesis not inflating correctly or fully when previously it had functioned as intended. This can indicate a leakage of fluid from the system or a rupture of one of the cylinders. While it is possible to replace only the failed part (if it can be determined), many surgeons will prefer to replace the entire prosthesis. The possibility of mechanical failure must be discussed with the patient and his partner.

Prolonged postoperative pain can indicate a subclinical infection. Complaints may include penile pain with inflation of the prosthesis, pain to the side of the scrotum in which the pump is placed, swelling, erythema, and possible groin pain to the side in which the reservoir is placed. This can be treated with oral or intravenous antibiotics, but usually requires prosthesis removal.

Over time, a capsule will form around the prosthesis components. But it is also possible that a thick capsule may form around the reservoir, leading to autoflation of the device. This can be corrected by surgical release of the capsule by overdistension and does not necessarily require that the entire device be replaced.

**Immediate Preoperative Patient Preparation**

Patients scheduled to receive a penile prosthesis should have a documented clean urinalysis within the 2 weeks prior to the surgery date. If a documented urinalysis is not available, one may be ordered as part of the preoperative orders. The patient should be made aware that the surgeon may chose to cancel the surgery if the urinalysis is suspicious for an infection. The patient must be instructed to shower the night before and morning of surgery with chlorhexidine soap that is provided to him.

Antibiotics, such as vancomycin followed by gentamicin, will be given in the holding area to provide broad-spectrum coverage against common skin flora and gram-negative bacteria. The specific antibiotics will be surgeon and/or facility dependent. The patient’s genital area should be carefully inspected in the holding area to confirm the absence of lesions which could be a source for infection.

**Surgical Procedure**

The patient is shaved in the operating room to prevent potential exposure to skin pathogens. After a 10-minute Betadine® scrub of the surgical field, the patient is draped with paper drapes (paper drapes are used as wet cloth is permeable to bacteria). The surgical team scrubs for 10 minutes and dons paper gowns. It is also recommended that the scrub technician or nurse stay in the operating room for the duration of the case. Traffic in the surgical suite should be limited to prevent contamination. The prosthesis is assembled on a separate stand and soaked in a solution consisting of two antibiotics, such as 50,000 U of bacitracin and 160 mg of gentamicin in 1,000 mL of

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**CONTINUING EDUCATION**
normal saline. This mixture will again be surgeon and/or facility dependent. The new AMS Inhibizone prostheses, which do not require soaking in antibiotic solution prior to implantation, are the exception to this procedure.

A penile prosthesis can be implanted under general, regional, or local anesthesia. The first step of the surgery itself is the placement of the Foley catheter. If the catheter cannot be placed, the surgery will be aborted, as the inability to insert the catheter can be an indication that the patient has a vesical neck contracture or a urethral stricture. Either of these conditions would require surgical correction and appropriate postoperative healing time before implantation of a prosthesis can be rescheduled.

The prosthesis can be implanted via an infrapubic or penoscrotal approach. The infrapubic approach allows the surgeon to place the reservoir for a three-piece prosthesis under direct vision but provides limited exposure of the corpora. The penoscrotal approach allows for better visualization of the corpora but requires blind placement of the reservoir through the external inguinal ring. The surgical approach will be influenced by the patient’s surgical history and the surgeon’s preference.

The implantation of a three-piece prosthesis via the penoscrotal approach begins with a vertical incision at the penoscrotal junction. After dissecting to the tunica albuginea, parallel corporotomies are made between preplaced rows of closure sutures, and the corpora cavernosa are dilated in preparation for the insertion of the cylinders. Once the corpora cavernosa are measured and the correct size for the prosthesis chosen, the cylinders are inserted into the corpora and the corporotomies are closed. The cylinders are filled with isotonic normal saline.

Next, a pouch for the pump is created midline in the scrotum and the pump is placed. The external inguinal ring is then bluntly dissected, the inguinal floor is pierced, and the reservoir is placed in the retropubic space and filled. The connections between the pump and the reservoir and between the pump and the two cylinders are made. The prosthesis is inflated to confirm that it is functional and then fully deflated (although in some cases it may be left partially inflated to promote hemostasis). The skin incision is closed with absorbable suture, and the penis is placed in an upward position on the abdomen. A dressing is applied to the penis, antibiotic ointment and sterile fluffs are applied to the incision, and a mesh brief is placed on the patient.

The surgical procedure for a malleable prosthesis would be complete following the insertion of the cylinders. Implantation of a two-piece inflatable device would conclude following placement of the combination pump/reservoir in the scrotum.

Postoperative Management

Patients undergoing implantation of a three-piece penile prosthesis are commonly kept in the hospital overnight for a full 24 hours of intravenous antibiotics, although in some centers, implantation of any type of prosthesis may be considered outpatient surgery. Pain medications are ordered on an as-needed basis. Ice bags may be used to elevate the scrotum and can provide some relief from any discomfort, but should only be used for 15 minutes at a time. Patients may find that the use of a scrotal roll will decrease any discomfort related to the surgery as it may alleviate the swelling of the scrotum. A small towel can be rolled up and placed under the scrotum when lying down or resting. Patients may also be encouraged to limit the amount of standing for the first few days to minimize scrotal swelling.

Discharge Instructions

A Foley catheter will be in place and will be removed the morning following surgery. The patient may be discharged once he is able to void. The wound should be checked every 2 hours to evaluate for excessive drainage to the dressing. The patient may also have a drain placed in the scrotum which will be removed prior to discharge.

Since the reasons for this surgery are usually kept quiet by the patient, he may receive little family support while in the hospital or during the initial postoperative period. Nursing staff will have an important support role, especially with the patient who is not involved in a relationship. Opportunities for the patient to discuss his feelings regarding the surgery and his recovery should be encouraged.

On discharge, the patient will receive a prescription for 7 days of a broad-spectrum antibiotic. He will also be given a modest supply of pain medication as well as a stool softener. Common postoperative complaints should also be discussed with the patient, including bruising and edema to the genitals, discomfort when sitting, discomfort with patient’s usual clothing, or discomfort with urination. The patient should also be instructed in the usual signs and symptoms of infection at the incision site: pain, erythema, swelling, and drainage.

Prosthesis patients must also be instructed to contact their urology clinic if they notice hematuria, have difficulty starting their stream, or experience any dysuria due to the proximity of the urethra to the corpora cavernosa. Specific written discharge instructions should be given to each patient (see Table 3), as well as a copy of the company’s patient information pamphlet for the specific type of prosthesis the patient has had implanted.

When discharged, patients with inflatable penile prostheses
must be cautioned against inflating the device prematurely, as this can damage the corporotomy closure or reopen the incision. All penile prosthesis patients must be strongly cautioned against using the prosthesis for sexual activity of any kind for at least 6 weeks. If the prosthesis is used before the incision has healed, the incision may reopen and place the entire system at risk for infection, or the entire containment of the cylinders may be lost.

**Followup Appointment**

Most patients can be instructed in the use of their prosthesis at the initial postoperative visit 6 weeks after the surgery. If there is no tenderness or pain at the site of the scrotal pump, the patient can be shown how to inflate the prosthesis. He should also be encouraged to inflate the prosthesis at least twice a day, whether he plans to engage in sexual activity or not. This will help him become familiar with the degree of manual dexterity required to activate the device. If there is no pain associated with the fully inflated prosthesis, he may be instructed to resume sexual activity. The patient may use a water-soluble lubricant when resuming intercourse as early attempts may provoke anxiety.

Reported rates of patient satisfaction for patients receiving penile prostheses are high, 80% to 90%, when compared with other ED interventions (Kabalin & Kuo, 1997; Tefilli et al., 1998). There are reported increases in the frequency of intercourse, satisfaction with intercourse, and improvements in self-image. The prosthesis is a reliable device that works without need for arousal, in contrast to some pharmacologic treatments. Therefore, its efficacy is unrelated to a patient’s level of anxiety.

However, because patients with a penile prosthesis can initiate and sustain sexual activity...
without being aroused, it may be possible for them to exhaust themselves before reaching orgasm (Montague et al., 1996). The patient with a prosthesis should be reminded that while the implant will enable him to have intercourse, it will not affect his libido. Penile prostheses also do not affect orgasm, penile sensation, ejaculation, or urination.

The primary complaint of patients who have had a prosthesis implanted is the loss of length to their erection, which underscores the importance of discussing this point prior to surgery. Loss of length is due to a simple fact of anatomy: the corpora cavernosa, where the cylinders are implanted, do not extend the entire length of the penis and so the cylinders do not provide any firmness to the glans when inflated. Many patients also complain about the softness of the glans, which is inherent to an erection produced by a prosthesis. This occurs because the cylinders do not extend into the glans and also because there is decreased blood flow to the penis commonly seen with impotence.

Another possible outcome of prosthetic surgery is the rejection of the patient by his partner. If their relationship has existed without physical intimacy for an extended period of time, or if the partner did not enjoy intercourse, the surgery can add a significant strain to their relationship. This illustrates why it is vital to include both patient and partner in decision making and education preoperatively. Patient satisfaction, good surgical outcome, and device reliability have all been studied, but few studies have addressed this particular aspect of postoperative outcome involving the penile prosthesis.

Patients who have any of the three-piece inflatable prostheses available from AMS can safely have a magnetic resonance imaging (MRI) scan (Shellock, Morisoli, & Kanal, 1993). Despite the presence of the metallic components of the anti-reflux reservoir valve, those patients who have a Mentor Alpha I prosthesis can also have an MRI scan safely (Shellock et al., 1993). The only prostheses for which an MRI scan is not recommended are the Dacomed Duraphase and OmniPhase (Shellock et al., 1993). Patients may still have either of these models implanted despite the fact that they are no longer available.

Patients with any type of penile prosthesis should be cautioned about engaging in any contact sports during which they may sustain injury to the groin. Such injury can potentially damage the components of the prosthesis.

Men with a penile prosthesis should also be encouraged to carry a prosthesis identification card or MedicAlert bracelet at all times. This will help prevent the misinterpretation of a pelvic x-ray and misdiagnosis of priapism in the case of the patient with a malleable prosthesis. The patient should also be reminded that he will need prophylactic antibiotics with any invasive procedure.

**Conclusions**

Management of erectile dysfunction is a significant quality of life and self-esteem issue, especially as ED can be the result of a malignancy or other chronic medical condition and can impact the patient's social functioning. The device reliability, increased rigidity, patient and partner satisfaction, and natural appearance, both inflated and deflated, of the penile prosthesis characterize it as a definitive treatment for ED for many men. A penile prosthesis is one method of successfully managing ED and results in the improvement of a patient's self-image, but this can also be complicated as a patient prepares for this elective surgical procedure.

As the population continues to age, and as increasing numbers of men continue to seek treatment for ED, referrals to urologists for managing this multi-faceted condition will increase. Both pharmacologic and surgical options for treating erectile dysfunction will continue to improve. The option of a penile prosthesis will remain as a definitive, albeit invasive, treatment for those patients who fail or who are not candidates for primary and secondary pharmacologic treatments.

**References**


Penile Prosthesis
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Penile Prosthesis Case Study

Susanne A. Quallich
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History
A.H. is a 64-year-old gentleman who has been followed in urology clinic for management of his organic erectile dysfunction (ED). He had been successfully treated with sildenafil citrate (Viagra®) 100 mg until he was started on sublingual nitroglycerin for management of his coronary artery disease (CAD). A.H. was then prescribed alprostadil (Caverject®) to manage his ED, but lately has found that even the maximum dose, 40 mcg, does not produce an erection that is satisfactory for intercourse.

A.H. has a medical history that is significant for Type 2 (non-insulin dependent) diabetes mellitus, CAD with two-vessel angioplasty 14 months ago, hypertension, and benign prostatic hyper trophy (BPH). He has no allergies to food or medication. A.H.'s surgical history is significant for two left inguinal hernia repairs, the second which required mesh. His medical history is remarkable for 60 pack years of smoking, which he quit when diagnosed with diabetes 6 years ago, and is negative for both alcohol and illicit drug use. His current medications include glyburide (Diabeta®), metformin (Glucophage®), sublingual nitroglycerin, prazosin (Minoxidil®), enteric-coated aspirin, and simvastatin (Zocor®). A.H. and his wife have been married for 35 years.

Preoperative Evaluation
After discussion of other possible interventions for treating his ED (vacuum erection device and penile prosthesis), A.H. and his wife decided to proceed with the evaluation for a three-piece inflatable prosthesis. They were counseled on the following points: that the length of the natural erection will be shortened by 1 to 2 cm; there is a slightly higher risk to prosthesis surgery because a foreign body is being implanted; that should the prosthesis have to be removed, the chances that A.H. will respond to Caverject again is small; and the expected lifespan of the device is 8 to 10 years.

The preoperative evaluation for A.H. showed that his laboratory values were all within normal limits, with the exception of his glycosolated hemoglobin at 8.7%. His urinalysis was also within normal limits, again with the exception of a small amount of glucose. The chest x-ray showed no active disease and his preoperative EKG showed normal sinus rhythm, with inferior T-wave abnormalities consistent with his medical history. A.H. also demonstrated adequate manual dexterity to operate the pump on the prosthesis model in the clinic.

Physical examination showed A.H. to be a mildly obese male, who was circumcised, with no evidence of open areas or lesions to the penis, scrotum, or inguinal area; however, there were several small areas of folliculitis noted to his medial upper thighs bilateral-ly. There were also no diabetic foot ulcers that might provide a source of infection. He was given a prescription for cephalexin (Keflex®) 500 mg QID, which he was instructed to begin taking 7 days prior to surgery. A.H. was encouraged to maintain tight glycemic control to prevent infection and promote healing, and to stop taking aspirin 7 days before his surgery, which was scheduled for 10 days later.

Surgery
Examination of A.H.'s groin in the preoperative holding area showed that he was free of any lesions. A.H. underwent an uneventful placement of an AMS 700 Ultrex prosthesis with Inhibizone coating, placed via the penoscrotal approach with reservoir placement through the right external inguinal canal. A.H. was able to void without difficulty when the Foley catheter was removed the following morning. He was then discharged home after 24 hours of intravenous antibiotics with written postoperative instructions and the manufacturer's patient education brochure.

Followup
Two weeks later at his initial postoperative visit, A.H. complained of soreness to his scrotum. On physical examination, his scrotum was slightly edematous and ecchymotic, his sutures were intact, and there was no evidence of infection. He was instructed to manage this soreness with local treatments, such as ice bags to the scrotum, a scrotal roll to elevate his scrotum, and to minimize extended periods of continued on page 92
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standing or sitting. He was also encouraged to use over-the-counter pain medications as needed, and to contact the urology clinic for any changes in his condition, such as a fever greater than 100 degrees F, drainage from the incision, or an increase in pain.

At his second postoperative visit 6 weeks after his surgery, A.H. had no complaints, stating that his soreness had resolved a few days after the previous visit. His incision was well healed, and he had no tenderness to palpation of his scrotum, penis, or right inguinal region. He was instructed to begin to use his prosthesis; the initial inflation of the prosthesis was done without any complaints of pain from the patient. Proper inflation and deflation techniques were demonstrated to both the patient and his wife, and A.H. was advised to inflate and deflate the prosthesis two to three times a day to help him become proficient with its use. A.H. left the clinic able to correctly use the prosthesis, and he and his wife were also advised that they might find a water-soluble lubricant helpful during their initial attempts at intercourse.

A.H. subsequently returned to the urology clinic several months later for routine followup of his BPH. He reported that while it initially took some time to become familiar with the use of the prosthesis, he is very pleased with the outcome of his surgery. He and his wife have been able to return to spontaneous sexual activity, something that they had found difficult when he was using alprostadil (Caverject). □