Current Surgical Management of Erectile Dysfunction

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ABSTRACT
Since the introduction of PDE5, oral systemic therapy has become the first line of therapy for men with erectile dysfunction (ED). Men who are not candidates for, or who fail treatment with an oral agent may choose second-line therapies such as intracavernosal prostaglandins, penile injection therapy, sex therapy, or a vacuum erection device. These second-line therapies may be unpalatable or inadequate for some men, and these constitute the candidates for surgical intervention for ED. This article reviews the surgical management of vascular ED, and surgical management of penile prosthesis implantation. Currently, the appropriate candidate for penile revascularization is a young man with proven arterial insufficiency resulting from pelvic trauma. (JAREM 2011; 1: 61-4)

Key Words: PDE5 inhibitor, erectile dysfunction, penile revascularization, penile prostheses

ÖZET

Özelleştirilen cihazlar (Table 1, Figure 1) have paired corporeal cylinders, a scrotal pump, and an abdominal fluid reservoir. All three-piece devices provide a central core that allows the penis to be bent down for dressing and bent upward for coitus. However, for most men, this malleable core does not maintain these positions very well. Malleable devices have the advantage of very low mechanical failure rates and ease of use. Disadvantages include constant penile rigidity and increased risk of erosion (8).

Pre-operative preparation: It is recommended that the patients bathe the genital area with a strong soap for a few days prior to surgery. Shaving of the genital area is performed in the operating room to minimize the chance of nicks in the skin being colonized by bacteria with prior shaving. The urine culture should be negative if possible. Antibiotics are usually started prophylactically one hour prior to the procedure. The antibiotics are usually continued for 48 hours postoperatively. Some surgeons prefer to maintain antibiotics for a week after surgery. A catheter is sometimes used to identify the corpus spongiosum during the procedure and may be removed at the conclusion of the operation or continued for up to 24 hours in the post operative period.

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### Table 1. Inflatable penile prostheses

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMS Ambicor</td>
<td>Two piece</td>
<td>American Medical system</td>
</tr>
<tr>
<td>Excel</td>
<td>Two piece</td>
<td>Coloplast Corporation</td>
</tr>
<tr>
<td>AMS 700MS series</td>
<td>Three piece</td>
<td>American Medical system</td>
</tr>
<tr>
<td>Titan Inflatable penile prosthesis</td>
<td>Three piece</td>
<td>Coloplast Corporation</td>
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### Table 2. Noninflatable penile prostheses

<table>
<thead>
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<td>Brazil</td>
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<tr>
<td>Jonas (ESKA)</td>
<td>Malleable</td>
<td><a href="http://www.Eska-medica.com">www.Eska-medica.com</a></td>
<td>Germany</td>
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<tr>
<td>Shah Implant</td>
<td>Nonmalable</td>
<td>Gigant Medical</td>
<td>India</td>
</tr>
<tr>
<td>Virilis I and II</td>
<td>Nonmalable</td>
<td>Gigant Medical</td>
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</tr>
<tr>
<td>Apollo Implant</td>
<td>Tissue expander</td>
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<td>Genesis Malleable</td>
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<tr>
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<td>Malleable</td>
<td>American Medical Systems</td>
<td>USA</td>
</tr>
<tr>
<td>AMS Dura II</td>
<td>Positionable</td>
<td>American Medical Systems</td>
<td>USA</td>
</tr>
</tbody>
</table>

**Figure 1. Inflatable penile prostheses**

![AMS (American medical systems) 700 series](image1)
![Mentor Alpha I-Three-piece inflatable penile implant](image2)
![Ambicor 2-piece penile implant](image3)

**Figure 2. Noninflatable penile prostheses**

![Accuform semirigid rod penile implant](image4)
![Dura II mechanical penile implant](image5)
![Virilis soft silicone](image6)
Surgical approaches: Surgical approaches for penile prosthesis implantation include subcoronal (used only for implantation of malleable or postionable devices), infrapubic, and penoscrotal. Infrapubic is the secure placement of the midline location (9). If the prosthesis is placed through an infrapubic incision on the dorsal surface of the corpora cavernosa, care should be taken to avoid damaging the neurovascular bundle. The pump is placed around the side of the penis into the scrotum. During placement of a hydraulic implant, in the penoscrotal or transverse scrotal approach, the resevoir is passed blind through the inguinal canal. Care should be taken in this approach to place this part medially to avoid injury to the ialiac vessels. The advantages to this approach are the secure placement of the pump in the scrotum and the fact that the skin is not violated in the prepubic area, for more acceptable cosmetic result (Figure 3). The ambicor prosthesys can only be placed through penoscrotal approach. The semi rigid rods and soft silicone implant are commonly placed through a subcoronal, penoscrotal or ventral penile incision.

Penile prosthesis complications: Periprosthctic infection is an important concern for both doctors and patients, not only because it can cause serious illness, but also requires the complete removal of the device. Spontaneous inflation is a potential and bothersome problem with the three-piece inflatable penile prosthesis. Additionally, lack off full glans tumescence, shorter erections, unwanted movement of the pump or reservoir, erosion into the urethra, fibrosis, and mechanical failure are other potential complications.

Vascular surgery for erectile dysfunction

For the young male with erectile dysfunction (ED) or the result of pelvic/perineal trauma, vascular surgery offers an option for potential cure. Penile revascularization is one of the treatments that have the potential to permanently cure patients, that is, allow return of spontaneously developing erections without the necessity for any medications or internal/external device. This procedure has undergone many refinements since its first description (10).

Virag and colleagues described a procedure in which the inferior epigastric artery was anastomosed directly to the deep dorsal vein, introducing concept of venous arterialisations (Virag I-IV) (11). The principles of surgery remain the same, consisting of distal or proximal ligation of the arterialized vein, windows between the artery and vein, and ligation of circumflex vessels and destruction of the valves in the dorsal vein. In concept, these procedures may be attractive not only in men with pure arteriogenic ED, but also those with a venoogenic component. The specific objective of the surgery is to increase the erectile (cavernosal) artery blood inflow in patients with blood flow related ED secondary to trauma. Young men, without other vascular risk factors (diabetes, high flow pressure, lipid disorders, cigarette smoking), who have ED due to pure arterial blockage, represent the ideal patient population for this procedure.

A list of criteria has been developed that the patient and surgeon must meet to ensure optimum results. The criteria include: 1- Patient must have strong sex drive, 2- Patient must experience a consistent reduction in erectile hardness during sexual activity, 3- Normal hormonal evaluation, 4- Normal neurologic evaluation, 5- Arterial insufficiency on vascular testing, 6- Arterial blockage located in the common penile artery or cavernosal artery, 7- The presence of a donor (inferior epigastric) artery of sufficient length and 8- The surgeon must be trained in microvascular surgery.

The operation is generally performed in a 23-hour fashion (the patient returns home after surgery). Complications are minimal and include abdominal or scrotal pain/swelling and occasional temporary numbness on the top surface of the penis. Abstinence from sexual activity involving the erect penis is recommended for the first 6 weeks after operation. In the hands of a surgeon trained to perform this procedure, this form of surgery is potentially curative for the carefully selected patient with ED. Any young male with ED that may be related to pelvic fracture, trauma to the perineum or prolonged bicycling may be a candidate for this form of surgery.

Cavernous veno-occlusive erectile dysfunction may develop due to congenital factors and trauma in young men, and to acquired factors such as Peyronie’s disease, diabetes and late onset hypogonadism in older men. Surgery for penile venous leakage is not recommended in older men because penile venous leakage often results from atrophy of the intracorporeal muscles or the tunica albuginea (12, 13). However, when venous leakage is congenital, the deficiency is usually in the large, ectopic, superficial and deep dorsal veins or the large crural veins (12-15). Treatment options for penile venous leakage in men with erectile dysfunction initially included PDE-5 inhibitors as first line treatment and transurethral alprostadil, vacuum construction device or intracavernosal injection as second line treatment (16, 17). Surgical treatment may be an option in patients who do not have a response or are not satisfied with less invasive treatments (18). The technical goal of therapy addresses the identified malfunctioning or ectopic deep dorsal, crural, or cavernosal veins. The surgical procedure has, over time, been expanded from simple deep dorsal vein ligation to extensive surgical exposure and vein ligation, excision, crural plication and spongiosis performed alone or in combination (12).

Alternatively, venous arterialisations has been applied to decrease venous outflow, particularly when coupled with crural venous ligation or crural ligation and can be used in cases of mixed (arterial/venous) vasculogenic erectile dysfunction (19-22).
Key points in vascular surgery for erectile dysfunction: Vascular surgical procedures are recommended only for a select group of patients. The overall goal of penile revascularisation surgery is the bypass of specific obstructive arterial lesions in the hypogastric-cavernosal arterial bed. This surgery is not indicated in the patient with generalized arterial disease or diabetes mellitus. For penile revascularisation, a common iliac arteriogram and selective internal pudendal arteriogram are absolutely necessary. The most common donor artery for penile revascularisation is the inferior epigastric artery, usually connected to the dorsal artery of the penis by microvascular surgery (Figure 4). Also, end to end anastomosis from the arterial donor site to the recipient vessel is the most physiological choice. Penile veno-occlusive surgery, indicated in a select group of patients, should consist of a thorough complete penile vein dissection and ligation. Early results of penile veno-occlusive surgery are much better than long-term results after 2 years. Complications of penile vascular surgery are penile numbness and hypoesthesia and some minor penile shortening (Campbell-Walsh urology).

Conflict of interest: No conflict of interest was declared by the authors.

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