

# Current Surgical Management of Erectile Dysfunction

## Erektıl Disfonksiyonun Mevcut Cerrahi Tedavisi

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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 intraurethral 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 İhbitör, erectile dysfunction, penile revascularization, penile prostheses

### ÖZET

Erektıl disfonksiyonlu erkeklerin tedavisine oral PDE5 İhbitörlerin devreye girmesiyle ilk tedavi seçeneği olarak kabul gördü. Oral ajanların tedavisinin yetersiz kaldığı erkeklerde sekonder tedavi yöntemlerine geçilir. İntrauretral prostaglandinler, penil enjeksiyon tedavisi, seks terapisi, ya da vakum erek-siyon cihazları gibi tedavi yöntemleri bu grubu oluşturur. Bununla birlikte bu tedavi yöntemleri yetersiz kalabilmekte ya da bazı hastalar tarafından hoş karşılanmayabilmektedir. Bu tedavi seçeneklerinden sonraki hastalar cerrahi olarak tedavi edilecek hasta adayları oluşturur. Bu derlemede, genellikle pelvik travmalara bağlı penil arteriyel yetersizlik gelişen erektil disfonksiyon hastalarına yapılan penil revaskülarizasyon ve penil implant ameliyatları anlatılmıştır. (*JAREM 2011; 1: 61-4*)

**Anahtar Sözcükler:** PDE5 İhbitör, erektil disfonksiyon, penil revaskülarizasyon, penil protezler

Three sentinel events define the history of the treatment of erectile dysfunction (ED). These are introduction of the inflatable penile prosthesis in 1973, intracavernous injection therapy in 1982, and effective systemic therapy with sildenafil citrate in 1998 (1, 2). Today, the treatment of ED can be likened to the treatment of osteoarthritis, another common disorder that also becomes more prevalent with age. In both, a progressive treatment model may be employed. Most men with ED are initially offered systemic therapy with a phosphodiesterase type 5 (PDE-5) inhibitor. When that fails and the man wishes to continue treatment, second-and third line therapies should be discussed. When these fail or are rejected, penile prosthesis implantation is usually appropriate.

### Penile implants

Penile implants were introduced into the marketplace over 30 years ago with the marketing of three piece inflatable and semi rigid rod almost simultaneously (Table 1, 2) (3, 4). A patient would be considered a good candidate for a penile prosthesis if he had failed medical therapy or if medical therapy was contraindicated. Patients are usually advised to consider a vacuum device before a penile implant. There are three classes of penile implants, hydraulic, semirigid, and soft silicon (Table 1, 2, Figure 1, 2). This early inflatable penile prosthesis was associated with mechanical failure rates ranging from 21 to 45% within a few years after implantation (5, 6). The two piece inflatable penile prosthesis (Table 1, Figure 1) consists of two cylinders connected to a small scrotal pump. Squeezing this pump transfers a small volume of fluid from the rear tip reservoirs of the cylinders into a nondistensible central chamber, producing rigidity comparable to that of a mal-

leable device. When the device is deflated, the central chamber partially collapses, providing better flaccidity than a malleable implant. The two-piece prosthesis has as its primary advantage ease of implantation because there is no third piece (abdominal fluid reservoir). A disadvantage compared with malleable devices is the increased risk of mechanical failure. Three-piece prostheses (Table 1, Figure 1) have paired corporeal cylinders, a scrotal pump, and an abdominal fluid reservoir. All three-piece devices provide penile girth expansion and rigidity similar to that of a normal erection (7). Malleable prostheses are semirigid devices with 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).

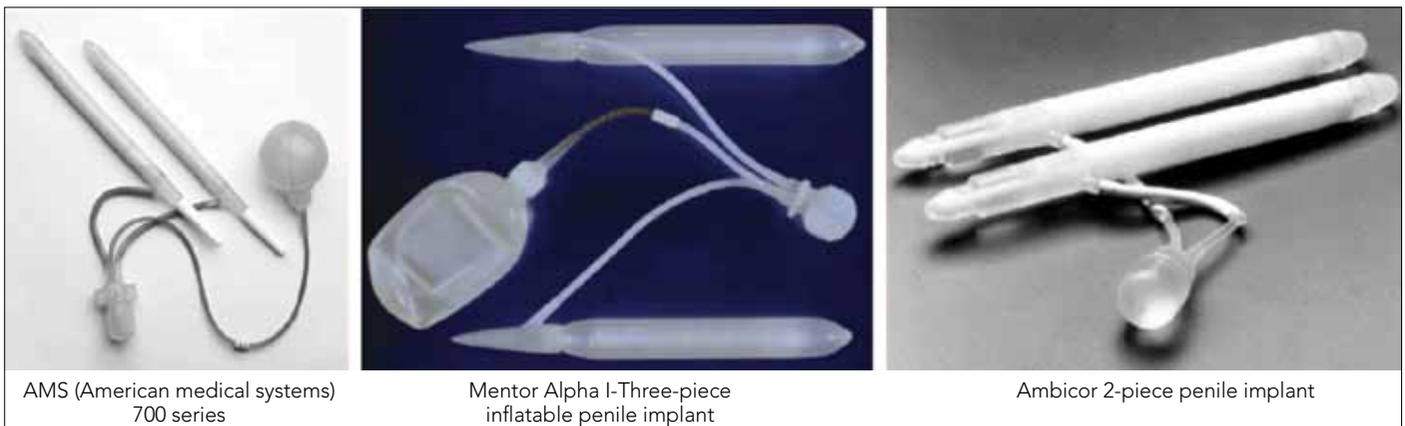
**Pre-operative preparation:** It is recommended that the patients bathe the genital area with a strong soap for a few days prior to surgery. Shaving of the genital area is performed in the operating room to minimize the chance of nicks in the skin being colonized by bacteria with prior shaving. The 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.

**Table 1. Inflatable penile prostheses**

Name	Type	Company
AMS Ambicor	Two piece	American Medical system
Excel	Two piece	Coloplast Corporation
AMS 700MS series	Three piece	American Medical system
Titan Inflatable penile prosthesis	Three piece	Coloplast Corporation

**Table 2. Noninflatable penile prostheses**

Name	Type	Company	Country
Promedon tube	Malleable	Cesarorizpromedon.com.ar	Argentina
HR Penile prostheses	Malleable		Brazil
Silimed Malleable	Malleable	www.silimed.com.br	Brazil
Jonas (ESKA)	Malleable	www.Eska-medica.com	Germany
Shah Implant	Nonmalleable		India
Virilis I and II	Nonmalleable	Gigant Medical	Italy
Apollo Implant	Tissue expander	Gigant Medical	Italy
Genesis Malleable	Malleable	Coloplast	USA
AMS Malleable 650/600M	Malleable	American Medical Systems	USA
AMS Dura II	Positionable	American Medical Systems	USA

**Figure 1.** Inflatable penile prostheses**Figure 2.** Noninflatable penile prostheses

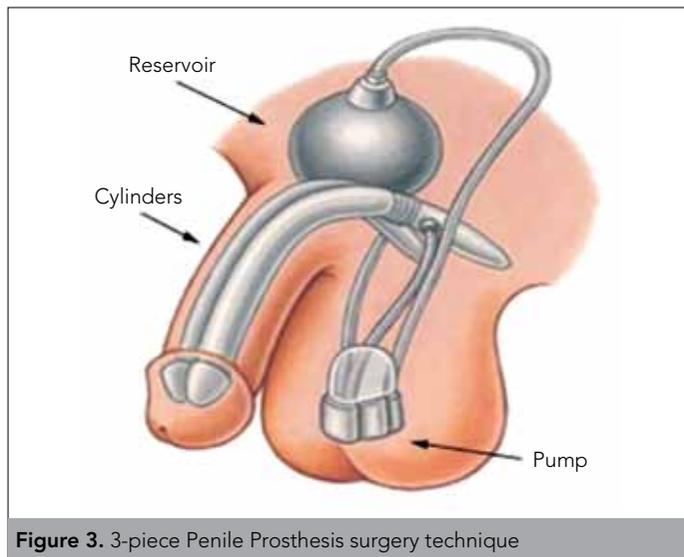
**Surgical approaches:** Surgical approaches for penile prosthesis implantation include subcoronal (used only for implantation of malleable or positionable devices), infrapubic, and penoscrotal. Infrapubic is the secure placement of the midline location (9). If the prosthesis is placed through an infrapubic 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 reservoir is passed blind through the inguinal canal. Care should be taken in this approach to place this part medially to avoid injury to the iliac 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 prosthesis 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:** Periprosthetic 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 of 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).



**Figure 3.** 3-piece Penile Prosthesis surgery technique

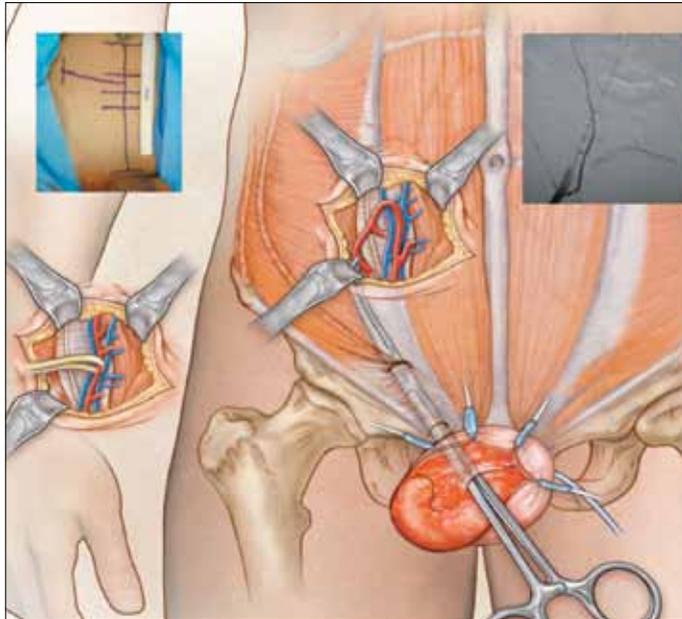
The principles of surgery remain the same, consisting of distal or proximal ligation of the arterialized vein, windows between the artery and vein, and ligation of circumflex vessels and destruction of the valves in the dorsal vein. In concept, these procedures may be attractive not only in men with pure arteriogenic ED, but also those with a venogenic 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 spongiolysis 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).



**Figure 4.** Penile revascularisation surgery technique

*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 pudental 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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