Penile Prostheses

Ervin Kocjancic, MD[a,*], Valerio Iacovelli, MD[b]

KEYWORDS

• Penile prosthesis • Trans men • Gender reassignment • Female to male • Erectile function

KEY POINTS

- After phalloplasty surgery, a penile prosthesis is used for erectile function and sexual intercourse.
- After phalloplasty, specific considerations include the absence of a crus penis or corpora cavernosa, the difference in the soft tissue between a flap phalloplasty and a cis-male penis, the implantation of the prosthesis in an area of previous surgery, and associated scar tissue.
- The 3-piece inflatable penile implants are the most commonly used devices.
- Although the complication rate is high, erectile prostheses are the best option for achieving sexual intercourse in trans men.

INTRODUCTION

Gender confirmation surgery represents one of many therapies for transgender individuals, and it can be pivotal in allowing individuals to realize their true selves. Phalloplasty represents the most complete genitoperineal transformation for trans men and may be divided into pedicled flaps and free flaps. Pedicle flaps transfer tissue, typically from the thigh, groin, or lower abdomen, to reconstruct the penis, whereas free flaps involve the microsurgical transfer of tissue from a remote location.

The aim of phalloplasty is to create a phallus of satisfactory cosmetic appearance as well as erectile function. With the majority of the phalloplasty techniques, an inflatable penile prosthesis must be used if erectile function for sexual intercourse is desired.[1]

Depending on the type of phalloplasty, erectile function may be achieved without a prosthesis. When a latissimus dorsi myocutaneous free flap is used, sexual intercourse may be possible by contraction of the latissimus muscle. This stiffens, but also shortens, the penis.[2] Flaps harvested with bone (for example, osteocutaneous fibula or osteocutaneous radial forearm flaps) may not require stiffeners. These flaps may result, however, in permanent stiffness/erection, and the results are variable. In the authors' opinion, the radial forearm free flap remains the gold standard for phallic reconstruction. The anatomy of the forearm neophallus, however, is quite different from that of a cis-male phallus. The forearm phalloplasty lacks a tunica albuginea as well as a corpora cavernosa or crus. This makes implantation and stabilization of the prosthesis more challenging. Following the recommendations from the International Consultation on Sexual Medicine, to achieve erection, a prosthesis can be placed on return of protective sensation. This typically occurs 9 months to 12 months after neophallus construction.[3]

TERMINOLOGY

A penile prosthesis is also known as penile implant. To better define the terminology, the terms, *penile prosthesis* and *penile prosthetic*, have also been used to refer to a *nonsurgical packer*. A nonsurgical packer is a polymer or silicone penis that is worn in a harness or affixed with medical adhesive. Similarly, the term, *erectile device*, is sometimes used interchangeably with the term, *penile implant*. Erectile devices can refer to external devices that assist with erections via

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[a] Department of Urology, College of Medicine, University of Illinois at Chicago, 820 South Wood Street, 515 CSN-Chicago, Illinois 60612-7316, USA; [b] Department of Experimental Medicine and Surgery, Urology Unit, Tor Vergata University of Rome, Via Montpellier 1, Rome 00133, Italy

* Corresponding author.

E-mail address: ervkoc@gmail.com

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vacuum pressure, vascular constriction, nerve stimulation, stretching, and so forth. This article uses the terms *penile prosthesis* and *penile implant* exclusively to describe those penile prosthetic devices that are surgically implanted.

TYPES OF PENILE IMPLANTS

Currently, there are 3 types of penile implants used after phalloplasty procedures: the noninflatable implant, the 2-piece inflatable implant, and the 3-piece inflatable implant.

1. Noninflatable penis implants—this category includes semirigid malleable and nonmalleable rods. One or 2 cylinders are surgically inserted into the penis. The rods have an outer coating of silicone and an inner stainless-steel core or interlocking plastic joints. Noninflatable implants are always rigid but flexible enough to position up or down. They can be bent into different positions for erect (intercourse) and flaccid states (conceal). These devices are entirely contained in the neophallus and designed to be easy for patient and partner use. These devices have multiple configurations to allow for a wide range of patient sizes. Additionally, rear tip extenders may be included for additional length if needed. Although this penile implant procedure is both less complex and less expensive, it is the least commonly used.
2. Two-piece inflatable penile implants—2 cylinders are surgically inserted into the shaft of the penis, and a reservoir containing saline is placed in the scrotum. The erection is provided by a hydraulic pump, which transfers saline from the reservoir to the cylinders. The release valve on the pump drains the saline from the cylinders into the reservoir for deflation. The 2-piece inflatable implant has the reservoir at the beginning of the cylinders (the base of the penis) and the pump and release valve in the scrotum. This implant is entirely contained in the neophallus and more easily concealed under clothing compared with the semirigid/noninflatable implant. The 2-piece inflatable prosthesis requires manual dexterity for inflation. Because only a small amount of fluid is transferred into the cylinders during an erection, the penis is not as rigid as with a multicomponent 3-piece inflatable penile implant. Additionally, the pump can be felt more easily in the scrotum compared with the softer pump of the 3-piece inflatable implant.
3. Three-piece inflatable penile implants—these are the most common type of penile implants and are used in approximately 75% of cases. A pair of cylinders are implanted into the penis, a pump is implanted in the scrotum, and a reservoir is implanted in the lower abdomen. Compared with 2-piece inflatable implants, the reservoir is larger and physically separate from the cylinders. The implant may be placed via either an infrapubic or penoscrotal approach, and it is available with a proprietary combination of antibiotics (ie, minocycline and rifampin as well as a parylene coating technology). By squeezing the concealed scrotal pump several times, saline is transferred from the reservoir into the cylinders. As the cylinders fill, the penis becomes erect and firm. To deflate the device, a "deflation site" on the pump is pressed. Deflating the cylinders transfers the fluid back into the reservoir, and the penis becomes flaccid. This prosthesis is totally concealed in the neophallus and is more easily concealed under clothing compared with a semirigid/noninflatable implant. The 3-piece inflatable prosthesis most closely resembles the process and feel of a nonassisted erection and it is easy to use and to inflate. This implant provides better rigidity and flaccidity but does require manual dexterity to inflate. This is also the most expensive implant, and it has a higher chance of mechanical failure compared with other implants. Although cylinders are designed to address both length and girth, sometimes trans men do not see an increase in length or girth due to the thickness of the flaps used to create the phallus.

TECHNIQUE

General Considerations and Recommendations

The final stage of penile reconstruction entails placement of an erectile device. Currently, no commercially available devices are designed for placement within a flap phalloplasty. Flap phalloplasties lack a corporal body within which to place and anchor the implant. As such, device placement and retention remain a challenge. Although synthetic meshes have been used to wrap and fix the base of the implant to the pubis, the synthetics are a foreign body and rely on scar formation.

Preoperative antibiotics covering gram-positive and gram-negative organisms are administered such that therapeutic antibiotic levels are attained prior to the surgical incision (level of evidence [LE] 2, grade of recommendation [GR] B).[3] Removal of scrotal hair, whether by shaving or clipping, is left to a surgeon's discretion. Care is taken to avoid traumatic skin disruptions (LE 4, GR C).[3] Whenever available, surgeons should use alcohol-based skin preparations (LE 1, GR A).[3] Penoscrotal and