

Phalloplasty Due to Complete Peno-Scrotal Amputation: A Report Of Surgical Technique

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1. Abstract

Total penile reconstruction is a challenging procedure considering the anatomy and physiology of the organ. A lot of penile reconstructions have been done in the past and many options have been considered, yet there are still problems associated with either function or aesthesis. Many options that were used are still leaving some dissatisfactory. The authors decided to use the anteromedial thigh flap for penile reconstruction which is not a common choice for total phalloplasty. The anteromedial thigh flap is a veritable tool in scrotoplasty. Thus, we present the use of double anteromedial thigh flaps for the reconstruction of the penis.

2. Introduction

Penile reconstruction serves as a solution to a complex patient problem. Total phalloplasty can be a challenging surgery for the reconstructive surgeons because of unsatisfactory result, psychological sequelae from inability to urinate while standing, or the effect of poor identity with a reconstructed phallus without erogenous or tactile sensibility [1]. This is because the primary goal of penile reconstruction surgery is to achieve an adequate result in terms of aesthetics and function with restoration of the capacity to void while standing from the tip of phallus and in the sexually active patient, to engage in penetrative intercourse with an adequate erogenous sensation [2]. The loss of penis impact negatively on the interpersonal relationship with the spouse, self-confidence and psychological well-being.

The aetiology of penile amputation varies from assault, self mutilation to industrial accident while other reasons for penile reconstruction are penile carcinoma, agenesis of the phallus, transgender or gender – affirming surgery. The largest patient populations for phalloplasty are those seeking gender-affirming, oncologic or traumatic reconstruction [3].

Historically, penile reconstruction dated back to 1920 when Gillies [4] used the tube-in-tube, pedicle, delay technique of phallic construction in the transgender patient and in children with aphalia. He later expanded the technology into the trauma patients of the world war 11.

In 1936, Bogoraz [5] used a bipediced abdominal flap and rib cartilage following traumatic amputations. In 1948, Gillies and Harrison [6] created a much more effective contemporary standard of “tube –in-tube” design, allowing for reconstruction of neourethra. In early 1980, Chang and Huang [7] and Song et al [8] had described the use of the radial artery forearm free flap phalloplasty for total penile reconstruction after amputation by using the microsurgical free flap technique which has revolutionized the reconstruction of the phallus. Many other techniques and types of flaps have been used for the reconstruction [9].

The authors had a case of total penile amputation due to assault and the phallus was reconstructed using antero-medial thigh flaps with good outcome. The antero-medial thigh flap has been used for scrotal reconstruction but has found its way into penile recon-

struction. We are presenting the use of antero-medial thigh flaps for phallus reconstruction and review of literature.

3. Case Report

A 38-year-old-male presented on account of complete amputation of his penis and scrotum by four unknown men while safeguarding the market at night. He bled profusely and he became weak. He had three children; two boys and a girl. He was seen by some market men in the morning on resumption of duty. On examination, it was noticed that there was complete loss of penis and scrotum (Figure 1). He was markedly pale with altered sensorium. Baseline investigations were done such as full blood count, urinalysis and retroviral screening, the results were found satisfactory, except the haemogram which was 8.1g/dl. Pre-operative counseling was done by the reconstructive surgeon. His sexual history was taken to ascertain the post operative sexual expectations and desires. An assessment of the full thickness skin graft donor site was made. Informed consent was taken. Intravenous prophylactic antibiotic [ceftriaxone & metronidazole] was given. The perineal wound measured 8.0cm by 6.0cm with urethra retracting into the wound (Figure 2).



Figure 1: Pre-operative penoscrotal amputation before debridement



Figure 2: Pre-operative wound before debridement

The designs of antero-medial thigh flaps were rectangular with 8.0cm by 4.0cm dimension, which was dependent on the length of the patient, and was intra-operatively marked on the skin. The incisions were made and the flaps dissected and raised subfascially (Figure 3). The flaps were transposed medially into the genital

area through incisions made from the base of the flaps to the root of the genitalia. The medial borders of the flaps were sutured with polyglycolic acid (vicryl)2/0. A full thickness skin graft was harvested from the iliac crest measuring 6.0cm by 4.0cm which was sutured to the flap centrally, squinted and tabularized over a size 16 silicone urethral catheter. This was the neourethra following the urethroplasty (Figure 4). Then, the flaps were sutured dorsally to complete the formation of the phallus. The flaps were tabularized in two layers around the urethral catheter. The skin graft donor site and secondary flap defects were closed primarily with vicryl 3/0. Post-operative care was uneventful except minimal flap tip necrosis. Wounds healed well at two weeks (Figure 5). At six weeks post-operative period, he was able to micturate satisfactorily with good projection and stream of urine. He was last seen at six months post operative period (Figure 6). He refused to accept the reconstruction of the glans penis, introduction of penile stiffener and the reconstruction of the scrotum.

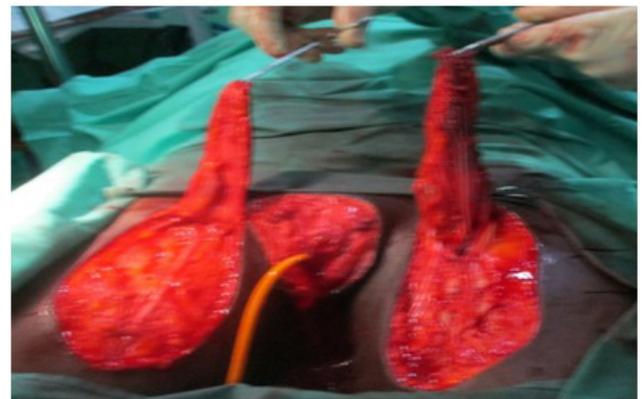


Figure 3: Bilateral antero-medial thigh flaps for phalloplasty

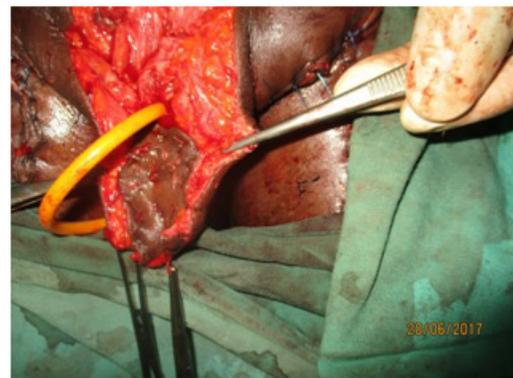


Figure 4: Full skin thickness urethroplasty



Figure 5: Two weeks post operative wound



Figure 6: Six months post-operative reconstructed phallus

4. Discussion

The term phallus originated from the Greek word meaning 'penis-like' or primordial penis. In emergency situations, such as trauma, avulsion or partial or total excision of the penis optimal management includes time-sensitive repair and salvage of the viable tissue as much as possible. Total phalloplasty can be reconstructed using free and pedicle flaps.

The anatomical peculiarity and a highly created vascularized phallus without close tissue resemblance in term of structure and function poses a reconstructive dilemma to the reconstructive surgeon. Various flaps and techniques have been used for the construction of the phallus but none can meet all the parameters required.

In attempt to meet the near optimal condition for penile construction, Gilbert [10] outlined the following criteria to achieve ideal phallic reconstruction:

- Microsurgical procedure that takes place in one stage and reproducible.
- Construction of neourethra that facilitate voiding while the patient is standing.
- Sufficient bulk to permit prosthetic stiffener placement to make sexual intercourse possible.
- An aesthetic result that the patient finds satisfactory.

Meeting these criteria continues to challenge reconstructive surgeons in the twenty first century. Reproducing the anatomy and physiology of the erect penis through present day reconstructive options is still difficult. Complications of the procedure could be fistula formation, unacceptable donor site morbidity and stigmatization while no technique has managed to encompass all criteria and there is still a lack of consensus about ideal reconstructive options, satisfactory penile reconstruction can be achieved through various techniques.

The options for total penile amputations are radial forearm flap [11] free fibular flap [12] and the thoracic dorsal artery perforator flaps [13] have been used. The anteromedial thigh flap has been frequently used for scrotoplasty. However, the anteromedial thigh flap has been used for penile reconstruction with significant out-

come. Patient's evaluation for total penile reconstruction is often very complex, requiring both physical and emotional support. Hence, a thorough psychiatric history and mental state evaluation is essential as many of these patients suffer from depression and suicidal ideation. Patient sexual history should be evaluated to determine such issues as primordial length of the penile shaft and whether the patient is currently able to achieve orgasm. Furthermore, the patient's tactile and protective sensation in the region of the penile remnant should be assessed and whether nerves such as the pudendal, ilioinguinal or genitofemoral nerves are intact. In total penile reconstruction like ours, these nerves may be re-approximated to the neophallus to achieve protective and erogenous sensation. A trusting relationship must be cultivated between the physician and patient to ensure realistic patient expectations which are imperative to postoperative success.

Another challenge is the length of the phallus. Patient should be advised that even though the operations are successful and the reconstructed penis is functioning properly, the patient is not likely to have the same sensation and length as he did previously.

The common questions asked by reconstructive surgeons are: what is the next option? Or what can bioengineering technology add to the current strides to reconstruct a phallus considering its components [14]. Since the issue of current penile reconstructive techniques is limited by issues of tissue compatibility and availability, physicians have begun to explore tissue bioengineering for penile reconstruction in order to reduce or eliminate complications of donor sites [15]. Tissue bioengineering allows the development of biological substitutes which could potentially restore normal function. This bioengineering method involves the use of synthetic or natural matrices labeled scaffolds when used alone, some scaffolds can facilitate the body's natural ability regenerate by directing new tissue growth [16]. This scaffold can also be seeded with cells and the resulting construct can be implanted into the patient in order to restore the structure and function of the damaged tissues and organs. The bioengineered tissue would be biocompatible and the risk of rejection would be eliminated [17].

Recent advances in tissue engineering promise new options for penile reconstruction. Bioengineered penile prosthesis, corporal bodies and tunica albuginea are also in progress [18]. A cellular corporal collagen matrices seeded with autologous cells have been used to replace entire pendular penile corporal bodies in a rabbit model [19].

5. Conclusion

Penile reconstruction still posed a challenge, even in the twenty-first century. There are various options for the reconstruction yet none is very satisfactory. Bioengineering technology is a laudable option in literature yet not available to all reconstructive surgeons. We present the use of anteromedial thigh flap as a good option in penile reconstruction despite its common use in scrotoplasty.

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