Total Phallic Reconstruction using Radial Artery Free Flap

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Introduction

The evolution of phallic reconstruction parallels the advances in reconstructive surgery. The procedure has gone through various changes from random tube skin flaps to island skin and/ or musculocutaneous flaps, to the modern microsurgical free tissue transfers that now form the state of art technique in phallic reconstruction.

The loss of phallus in case of trauma, whether accidental, felonious or self - inflicted has a devastating psychological consequence that persists in a victims life. An optimally reconstructed phallus should provide tactile and erogenous sensibility, neourethra allowing voiding while standing, capability of successful vaginal intromission with insertion of prosthesis, cosmetically acceptable neophallus, cosmetically acceptable flap donor site and capability to grow with age in paediatric patients.

Though modern reconstructive and microsurgical procedures permit us to achieve most of these aims but a single stage reconstruction still eludes us.

Case Report

A 32 year old married male patient with two living children and happy married life during an acute phase of depressive psychosis amputated his penis at its base along with right half of scrotum and right testes using a meat chopping knife and threw away the part (Fig. 1). After initial management at a peripheral hospital and gaining adequate psychiatric insight, he was planned for phallic reconstruction. Neophallic reconstruction was planned using radial artery forearm free flap as described by Gottlieb et al [1] in 1991.

The flap was designed on the right forearm based on radial artery measuring 17 cms long, 15 cms wide proximally and 12 cms wide distally over the volar aspect of forearm (Fig. 2). After pre-operative Allen's test, the flap was outlined. Under

tourniquet control, radial artery and its venae comitantes were identified at the wrist and isolated at the distal edge of the flap. A centrally positioned neourethra was marked and two strips, each one-centimetre wide were de-epithelized on either side of the planned neourethra. The flap was raised deep to the deep fascia preserving the vascular continuity in the conventional manner.

Central neourethra was tubed over a silicone 12 F Foley's catheter with 4- layered closure (Fig. 3) followed by dorsal and ventral 'shaft' skin closure. The dorsal portion of the 'shaft' was de-epithelized and neoglans rolled back and sutured with full thickness non-absorbable polypropylene mattress sutures. The constructed neophallus was left attached to its proximal vascular pedicle on the arm duly perfused by its vessels till the recipient site was prepared.

The recipient site was prepared for anastomosis of the donor vessels with deep inferior epigastric artery and saphenous vein. The dorsal penile branches of pudendal nerves were prepared for anastomosis with the medial and lateral cutaneous nerves of forearm. At this stage, 5000 units of injection heparin was given intravenously. The formed 'neophallus' was detached from the forearm and transferred to the recipient site in pubic area. Native urethral opening and the neourethra were anastomosed over the Foley's catheter. Neurovascular anastomosis was established and the wound was closed over a percutaneous suprapubic catheter inserted into the urinary bladder to achieve urinary diversion. The catheter in the neophallus was tied off. The donor site in the forearm was covered with split thickness skin graft.

In the post operative care broad spectrum antibiotics were given for 10 days, low molecular weight heparin was exhibited for five days and low dose aspirin was given for 6 weeks. Neourethral catheter was capped and removed after 4 weeks. The sutures were removed on 14th postoperative day (Fig.4) and suprapubic catheter was removed five days after normal micturition was established (Fig. 5). The results of the surgery were good. The neophallus was of adequate size with a

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Fig. 1 : Pre-operative photograph

Fig. 4 : Neophallus after suture removal

Fig. 2 : Flap marking on right forearm

Fig. 3 : Reconstruction of neourethral tube in progress

centrally located urethra, there was no meatal stenosis, urinary stream was good and projectile, patient developed two small urethral fistulas that closed spontaneously, there was increased self-confidence in the patient and he accepted the results positively.

The long term follow up over two years has shown that the patient developed near normal sensations over the

Fig. 5 : The final result: Reconstructed phallus

neophallus. He was able to perform the sexual function near normally. He has been provided with a prosthetic erectile device of inflatable type at a tertiary care centre. The patient was lost to follow up thereafter.

Discussion

The necessity to manage genital trauma predates to man's earliest history. In ancient civilizations, amputation of penis of vanquished foes formed part of the ritualistic plundering. Modernization and mechanization has added to the incidence. The incidence is further multiplied by the felonious assaults, athletic injuries and attempts at

self- emasculation. Whether traumatic or self-inflicted, amputation of penis is a major physical and psychological trauma to a patient.

Rashid et al [2], have classified phallic injuries based on location of the native urethra at presentation:

- *Type I injury*: Meatus is at the corporal stump
- *Type II injury*: Loss of corpora with preservation of crura leaving the meatus near pubic symphysis
- *Type III injury*: There is a perineal urethrostomy
- *Type IV injury*: Urinary diversion via a supra-pubic catheter

Penis is anatomically complex with a dual function of voiding urine and sexual activity. Modern methods have been able to achieve the function of sperm and urine transport but its unique anatomical and biomechanical properties have still not been duplicated. Phallic reconstruction is a challenging procedure involving a multidisciplinary approach. The rule of the thumb is – ‘when in doubt- replant’. The radial artery forearm free flap is the gold standard for modern phallic reconstruction. The flaps are versatile, dependable with large vessels that are easy to anastomose and are relatively hairless [1-3].

All the currently employed free forearm flap designs share some common features, including arterial inflow from either radial or ulnar artery, venous outflow via venae comitantes and/ or basilic and cephalic veins. The medial and lateral cutaneous nerves of the forearm provide the erogenous sensations. The only drawback with the forearm flaps is the cosmetic results of a large grafted flap donor site. This may not be a major problem in a dark skinned individual as the graft merges fairly well with the surrounding skin. The graft design by Gottlieb et al [1] overcomes the limitations of all other types of forearm flaps with a centrally located neourethra in continuity with the neoglans. The technique eliminates circumferential meatal suture line with out sacrificing the phallic length. The present design allows a penile length of about 15 cms. Patients develop good sensations in about four to six months to allow insertion

of prosthetic device and sexual activity without problems of erosion or infection and with good erogenous sensations leading to orgasm.

The advent of microsurgical techniques has greatly expanded the options available for penile reconstruction [4]. Expanded sensate lateral arm flap as advocated by Shenaq et al [5], uses hairless skin on the lateral arm and expanded tissue provides adequate flap length. Mutaf [6], combined an osteocutaneous radial forearm flap with radial recurrent fasciocutaneous flap from anterolateral aspect of upper arm while keeping a fasciovascular connection between them. It has an advantage of minimizing donor site scar without compromising the length of the phallus while providing hairless neourethra. While phallic reconstruction remains a challenge to a reconstructive surgeon, it has evolved over the ages. The modern techniques allow a aesthetically acceptable phallus of adequate length for the patient. The search for autogenous tissue source to facilitate rigidity continues. For the present, prosthetics is a satisfactory alternative.

Conflicts of Interest

None identified

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