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Clinical applications of the pedicled anterolateral thigh flap in penile reconstruction ☆

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Summary *Background:* Penile reconstruction remains a major challenge in plastic surgery and, over the years, a myriad of techniques has been employed to achieve a functional phalloplasty. Unfortunately, the more commonly used forearm free flaps also have significant drawbacks. The pedicled anterolateral thigh flap (ALTF) has numerous attributes, which make it a comparable, if not a better option, for penile reconstruction.
Methods: Between January 2007 and December 2009, 14 patients with partial or complete penile loss underwent reconstruction with a pedicled ALTF. The demographic data of the patients, cause of the defects, technique of reconstruction and the details about different flap parameters are presented here.
Results: All the 14 patients were males, and the age range was between 27 and 60 years. Nine flaps were used for total penile reconstruction and five for partial penile reconstruction. The size of the flap ranged from 5×4 cm to 15×15 cm and was based on two perforators in four cases, while a single perforator was used in the rest. The perforators were musculocutaneous in 11 and septocutaneous in three patients. Primary urethral anastomosis was performed in three cases of total phalloplasty and all cases of partial phalloplasty ($n = 8$), while in the rest, urethral continuity was established in a second stage. All the flaps survived completely.
Conclusions: We have found the pedicled ALTF to be a very versatile flap with wide range of applicability for partial as well as total phalloplasty.

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Inroduction

Penile reconstruction remains a major challenge in plastic surgery and, over the years, a myriad of techniques has been employed to achieve a functional phalloplasty. These range from local or regional flaps to free flaps for more complex defects involving penile loss. For partial and complete phalloplasty, techniques such as the radial forearm (RFFF), the ulnar forearm and the lateral arm free flaps are well established and have generally provided satisfactory results. We have used the RFFF for penile reconstruction in more than 100 patients. Unfortunately, the more commonly used FFFs also have significant drawbacks. As nearly the entire circumference of the distal forearm is used for phalloplasty and covered with a graft, it leaves a visible stigma of the surgery and the events leading to it. This may be an even bigger issue in transsexual communities and in societies where gender reassignment is still taboo. The fact that it is a free flap can limit its wider application and despite the high rates of success, can on occasion result in major flap loss. The search has therefore been on for a flap, which can offset some of the disadvantages of the forearm flaps.

Since its initial description by Song[1] in 1984, the anterolateral thigh flap (ALTF) has seen extensive usage as a free flap for reconstructing upper[2,3] and lower limb[4,5] defects and is now considered by many as a workhorse for reconstruction of defects after tumour resection in the head and neck.[6,7] Recently, considerable attention has focussed on its use as a pedicled flap, and there are numerous reports in the literature of short case series describing this application.[8–12] The pedicled ALTF has numerous attributes, which make it a comparable, if not a better option, for penile reconstruction. It has a long pedicle, large amount of pliable tissue that can be harvested, a donor site that is hidden in everyday clothing and no requirement of microvascular expertise or equipment with the attendant chances of total flap loss.

In this article, we present our experience of using the pedicled ALTF for complete and partial penile reconstruction.

Material and methods

Between January 2007 and December 2009, 14 patients with partial or complete penile loss underwent reconstruction with a pedicled ALTF. The study was approved by the hospital ethics committees and informed consent was taken from all the patients. The cases were non-consecutive and the decision to use this particular technique was individualised. The demographic data of the patients, cause of the defects, technique of reconstruction and the details about different flap parameters are presented below, followed by illustration of five representative cases from our series.

Operative technique

The technique of flap elevation is well described,[2,7] and is the same as that employed for the elevation of a free ALTF. The planning and designing of the pedicled ALTF are very important when used for penile reconstruction, as there is less room for altering the orientation of the flap once it has been transferred to the recipient site. For total phalloplasty,

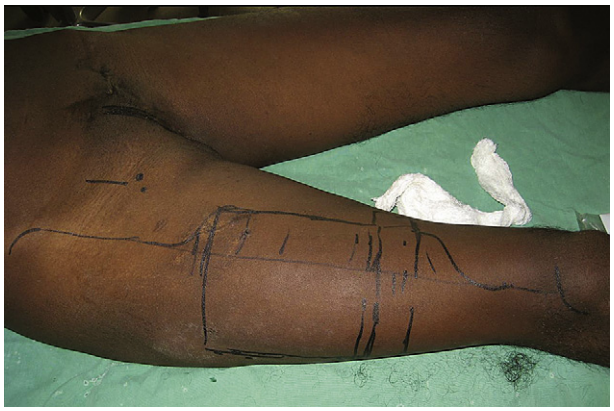

Figure 1 Marking of pedicled ALTF for complete phallus reconstruction. The urethral portioned has been designed distally with a medial extension to gain extra urethral length.

an almost square design was used with average dimensions of 13 × 14 cm. This shape allows minor flap design adjustments at the recipient site. The distal 3–4 cm wide part of the flap was used for urethral reconstruction and a 1.5-cm wide strip adjacent to the area designed for the neo-urethra was de-epithelialised. This 'urethral' part of the flap was extended medially to give extra urethral length and mushroomed laterally to fabricate a neo-glans (Figures 1–3). For partial defects, the flap was designed using a reverse template technique. Careful thinning of the flap *in situ* was required in most patients to reduce the bulk of the flap. In the cases in which total phalloplasty was planned, the lateral cutaneous nerve of thigh was identified at the proximal border of the flap and dissected back for an extra length of nearly 3–5 cm.

After elevation, the islanded flap was brought medially beneath the rectus femoris and the sartorius muscles to gain extra length of pedicle, and then through

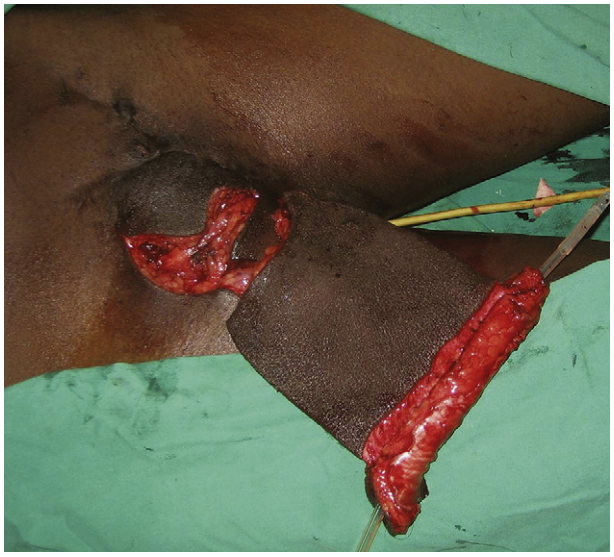

Figure 2 Urethra formation in 'tube within tube' fashion around a silicone catheter after transferring the flap across the groin. Note the lateral extension of the urethral portion for neo-glans formation.