Two Stage Penile Reconstruction with Free Prefabricated Sensate Radial Forearm Osteocutaneous Flap

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SUMMARY

Penile reconstructive surgeries are performed mainly as radical treatment for conditions associated with congenital abnormalities of the urethra or penis, after penile trauma, penile cancer, short penis, corporal fibrosis and in cases of gender reassignment. We present here a method of penile reconstruction with a pre fabricated radial forearm free flap incorporating the segment of the radius for structural support.

KEY WORDS:
Neourethra, Radial forearm osteocutaneous flap, Neophallus

INTRODUCTION

Penile amputations whether in a traumatic scenario or in the case of a penile carcinoma serves a severe blow to the male ego and psyche. The first case of microsurgical reconstruction of a phallus was reported in China by two groups in 1984[1] in which the radial forearm flap "tube in a tube" simultaneous reconstruction of a neourethra and phallus was devised. Ever since, there has been various flaps designed for the purpose of penile reconstruction namely from the lower abdomen, dorsalis pedis, lateral arm and lower extremity to name a few. A common problem which plagues the various flaps devised was stricturing and fistula formation of the neourethra. Japanese reconstructive surgeons have even suggested the use of the vermiform appendix transfer by supramicrovasvular surgery to address the problems. Here we present, possibly, the first successful case of penile reconstruction in Malaysia.

CASE REPORT

The 49 year old patient had his penis severed by his wife following an argument at their home in January of 2005. The penis was cut off at the base with a kitchen knife leaving a small stump of penile tissue around half an inch from the pubic symphisis. The testes and scrotal skin were intact. (Figure 1)

He was admitted to a nearby district hospital and refashioning of the penis was done and he was then put on daily dressings and intravenous antibiotics. A urinary catheter was inserted at the time of debridement for bladder drainage. As there was no immediate access to a microvascular surgeon or urologist an appointment was made with our urologist a month after the incident.

At the first appointment with our urologist it was found that although the patient was able to pass urine without a catheter, he had developed stricturing of the urethral opening causing him to take longer to pass urine than normal and he also had frequency in micturition. He underwent urethral dilatation and meatoplasty four months later and subsequently had a good flow. The problem of increased frequency was also no longer present. The patient however was depressed regarding the absence of a phallic structure on his groin and complained of feelings of inadequacy as a male member of society. Being reduced to squatting to pass urine posed problems to him habitually as well as psychologically. He was then referred to our plastic surgeon for the option of a penile reconstruction.

The patient was planned for a 2 stage reconstruction of his penis, the first stage was to begin a year from the date of the trauma. The first stage reconstruction involved harvesting a full thickness graft from the groin crease to form a pseudo-urethra. A tunnel was created axially in the subcutaneous tissue of his left forearm where the radial forearm flap was to be harvested and the harvested groin skin was then attached at both ends to a Fr 16 bladder catheter. (Figure 2) The catheter carrying the skin graft was then passed through the subcutaneous tunnel. Both ends of the urethral cylinder were transfixed to the proximal and distal openings with absorbable sutures.

Penile reconstructions are never without its inherent complications and we encountered similar such circumstances in this patient. Initially he developed a localized infection along the fabricated tunnel which resolved with intravenous antibiotics and daily flushing. Once the infection was resolved the fabricated tunnel was examined with a ureteric scope. We encountered two separate strictures, one at the proximal tunnel opening and another around 1cm from the distal tunnel opening. The rest of the skin graft was noted to be healthy. The scope however could be passed through the entire tunnel and so the second stage procedure was planned.

In the second stage of the operation, four months from first stage, the prefabricated urethra along with a forearm, osteocutaneous flap was raised with a small axial segment of radial bone measuring 6cm in length and 0.5cm wide. The cephalic vein was included into the flap along with the superficial branch of the radial nerve to supply a sensate, structured phallus to the patient. (Figure 3)

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Fig. 1: Pre-operative picture showing penile stump

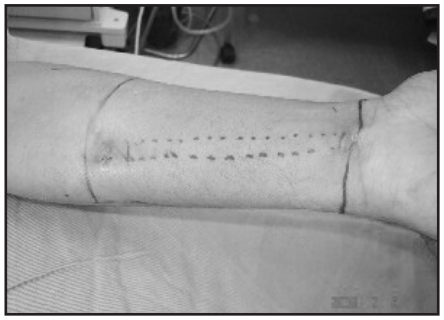

Fig. 2: Markings for the neourethra and dimension and design of the radial forearm flap

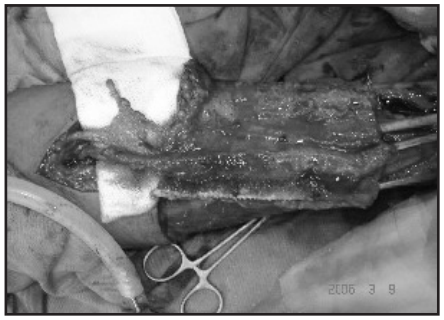

Fig. 3: Flap showing the radial bone, cephalic vein, radial artery and superficial branch of radial nerve

Fig. 4: Flap inset with recipient vessel site on the right groin

Fig. 5: The final result

Fig. 6: Post op 5 months

Immediately after the second stage reconstruction the flap was healthy with bright red blood on pin prick. The following week was free of any complications. In the second week, we encountered a problem at the peno-scrotal area of anastomosis as the skin broke down giving rise to a urethral fistula. The patient was subsequently taken into operating room again and a random scrotal flap was devised to close the area of dehiscence which addressed the problem for about a week before they are broke down again to reveal another stubborn fistula. With a suprapubic catheter and a urinary catheter for urinary diversion a simple closure of the fistula was done and the patient was sent home for daily dressings at a district hospital. On his review two months later it was found that the breakdown had healed. However there were two sites of stricturing of the urethra which were at the site of anastomoses and around 2cm from the meatal opening. Dilatation was then done by our urologist upto a size 16Fr to 18Fr catheter. The urinary catheter and the suprapubic catheter was removed and the patient was sent home on regular self urethral dilatation with a size Fr16 catheter. On his review with us eight months post reconstruction, the patient was noted to have a renewed vigour and was satisfied with the cosmetic appearance of the phallus. He retains sensation over the shaft of his neo-penis and is able to proudly pee while in a standing position. He also has found a new love in his life and has a healthy and happy sexual relationship.

Operative Technique

The length of the phallus to be reconstructed was discussed with the patient and premarked on the forearm from where the flap was to be harvested. After incising down the distal and proximal openings to the subcut tissue, a Percutaneous Nephrolithotripsy dilator was used to create a tunnel in the subcutaneous tissue and then serially dilated to the required size to comfortably accommodate the bladder catheter with the full thickness graft folded over itself to create a cylinder over the carrier catheter. The full thickness graft was sutured to both down to the catheter to prevent displacement during insertion into the tunnel. Once passed through the tunnel the openings/ ends of the full thickness graft was sutured to the openings created at either ends of the radial forearm tunnel to create an open tunnel in the area of the radial forearm flap. The patient then returned to the ward with the catheter and pseudo-urethra in-situ. On the fifth post operative day the catheter was removed and the patient was instructed to flush the tunnel daily to keep the pseudo-urethra patent.

In the second stage of the surgery, a paper model was used to determine the width and length of radial forearm to be harvested and the flap is harvested with the/pseudo-urethra placed in the middle of the flap harvested. The flap is harvested down to fascia with the radial artery, cephalic vein, superficial branch of length of radial bone included in the flap. The radial artery was anastomosed to the superficial epigastric artery and the cephalic vein to the superficial epigastric vein. The nerve was anastomosed to one of the dorsal penile nerves. The Pseudourethra is anastomosed to the remaining urethra on the penile stump using absorbable sutures. A foley catheter was left in situ during the period of healing.

CONCLUSION

The goal of reconstruction of a neophallus in our patient was to achieve an aesthetically acceptable penis enabling the patient to urinate while standing and to allow for sexual intercourse. Although the goal standard for phallic reconstruction over the years has been a single stage reconstruction of the penis with a tube in tube method using the radial forearm flap, our method allows for a greater portion of the radial forearm flap being incorporated into the phallic design as opposed to part of it being tubed as a neo-urethra thereby decreasing the amount of tissue loss by atrophy giving the patient a phallic structure with a near to normal girth.

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