Single Stage Reconstruction of the Amputated Penis Using a Microsurgical Radial Forearm Flap Transfer

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Introduction

Total amputation of the penis is a rare but devastating occurrence, especially in younger men. Common causes include trauma, excision for malignant disease and self mutilation[1]. Reconstruction alter amputation is a difficult procedure. There are many factors which influence the success of such a pmcedure. The neo-phallus should not only be aesthetically acceptable, it should also provide a free conduit for urine, be able to register erogenous sensation as well as being of adequate firmness to allow intercourse. We present a case of a patient with amputation of the penis who underwent a free radial forearm flap phalloplasty.

Case Report

An 18 year old boy was referred to our department in June, 1996 for reconstruction of a totally amputated penis. He had sustained the injuiy two years before due to a wheat thrasher accident. At the same time he had also suffered an amputation of his right Index fmger and a fracture of the left humerus. Examination revealed a well healed amputation scar and a patent urethral orifice at the level of the symphysis pubis (Figure 1).

Figure 1. Site of amputation at level of symphysis pubis.

The scrotum and testis were normal. Artificial erection with papavarine revealed a residual stump of the corpora measuring 2 cm. It was decided to reconstruct the penis and urethra with a free radial artery forearm flap, incorporating a costal cartilage graft. A preoperative Allen's test and Doppler sounding showed the right forearm to be suitable. The patient underwent surgery in September, 1996. A large

radial forearm flap measuring 15.5x11 cm was outlined on the right forearm and the location of the superficial veins and course of the radial artery marked. The medial 3.5 cm was designated for the urethra with a de- epithelialised 1 cm zone separating it from the rest of the flap to be used for making the penile shaft. The medial segment of the flap was 3cm longer than the rest to allow for urethral anastomosis and for creating the glans.

The fasciocutaneous flap was elevated under tourniquet control preserving the medial cubital and cephalic veins and incorporating the lateral cutaneous nerve of the forearm. After elevation of the flap but with the vascuarpedicle still attached, the tourniquet was released and adequate circulation confirmed. Now the native urethra was dissected out from the remnants of the corpora and the surrounding scar tissue. The severed deep dorsal nerve of the penis was also identified and the neuroma excised. Next the femoral vessels were exposed in the left groin through a vertical incision and prepared for anastomosis. A costal cartilage graft measuring 10 cm was harvested and sutured to the stump of the corpora using non-absorbable 0 Prolene suture (Figure 2).

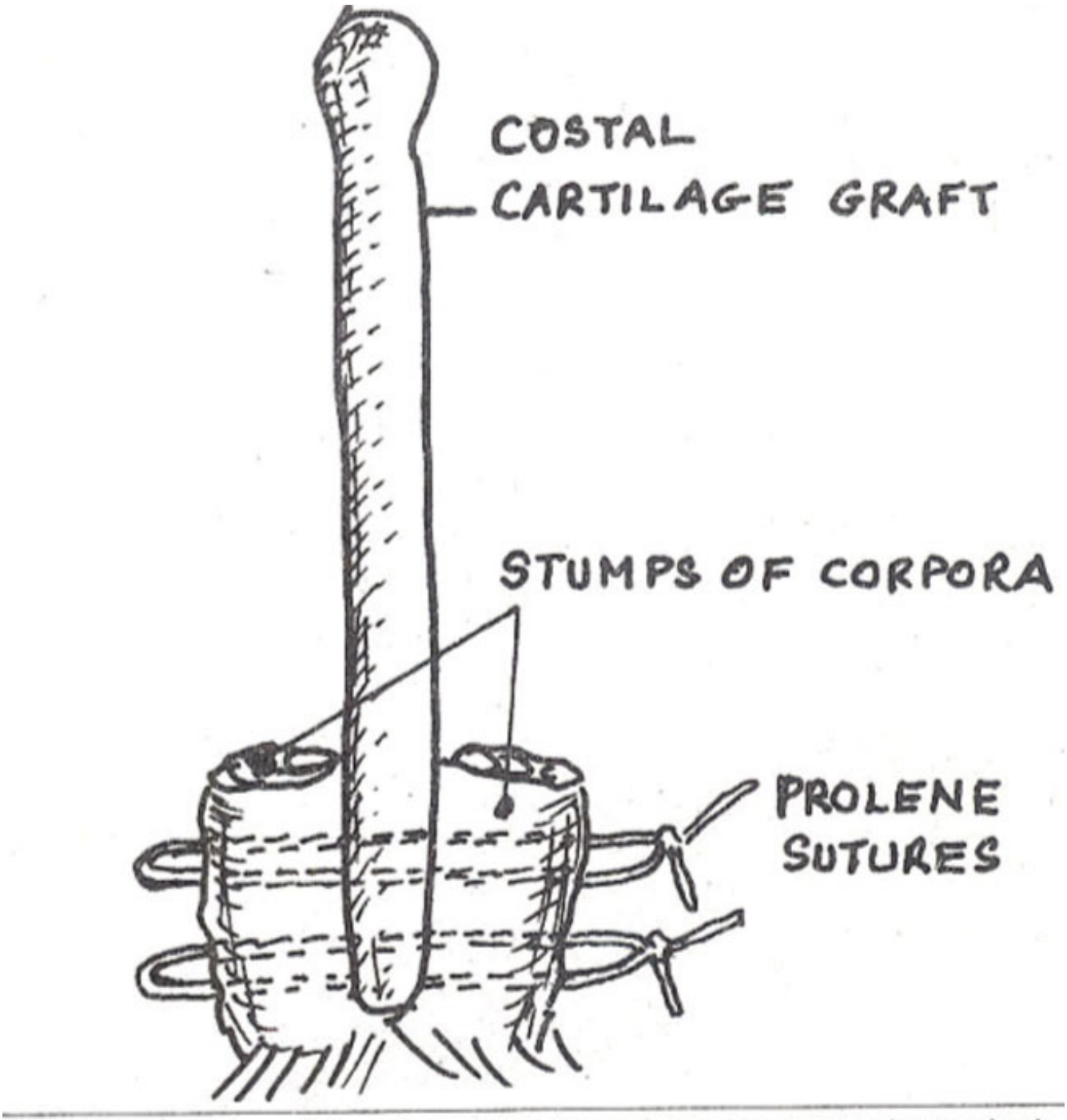

Figure 2. Costal cartilage graft harvested and sutured to the stump of the corpora using non-absorbable O Prolene suture.

The medial part of the flap was tubed around a 20 Fr. Foley catheter to form the new urethra using continuous intradermal 6/0 Vicryl suture. The rest of the flap was then rolled to form the shaft of the penis
(Figure 3).

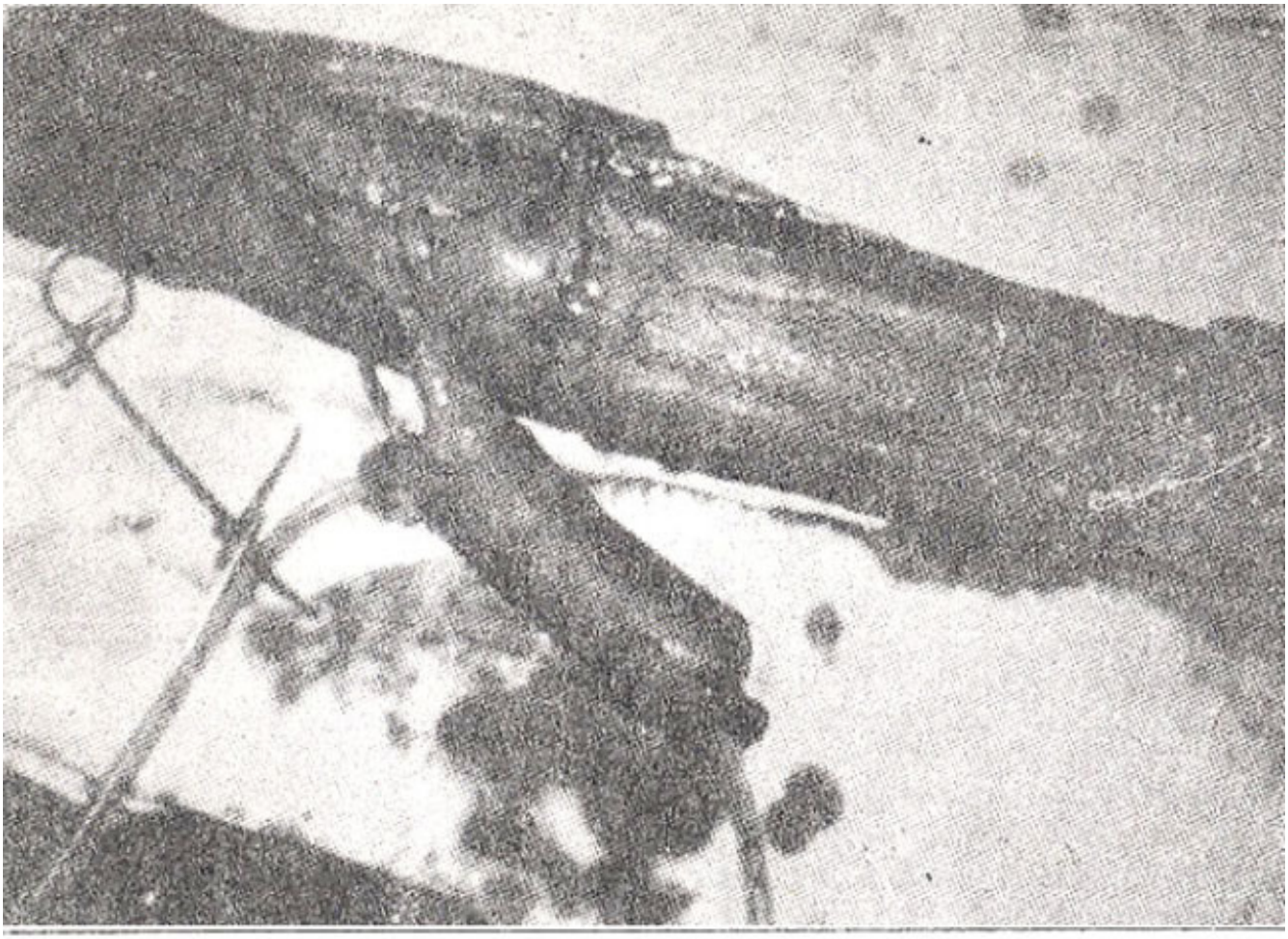

Figure 3. Remaining flap rolled to form shaft of penis.

The pedicle vessels were now divided and the prefabricated penis transferred to the pubic area. The donordefect over the forearm was covered with a partial thickness skin graft taken from the thigh. The nco-urethra was anastomosed to the native urethra in two layers using 5/0 Vicry l and thetip of the Foley catheter passed into the bladder. The radial artery of the flap was anastornosed end-to-side to the femoral artery using interrupted 9/0 Ethylon under magnification. An end-to-end anastomosis between the medial cubital vein and the superficial epigastric vein was performed using the same technique. Finally the lateral cutaneous nerve of the forearm was sutured to the deep dorsal nerve of the penis in a similar manner. The proximal end of the flap was sutured to the recipient skin while the distal end was fashioned into a glans.

There was instantaneous revascularisation of the flap following removal of the micro-clamps as evidenced by normal skin colour and bright red bleeding on pricking with a needle (Figure 4).

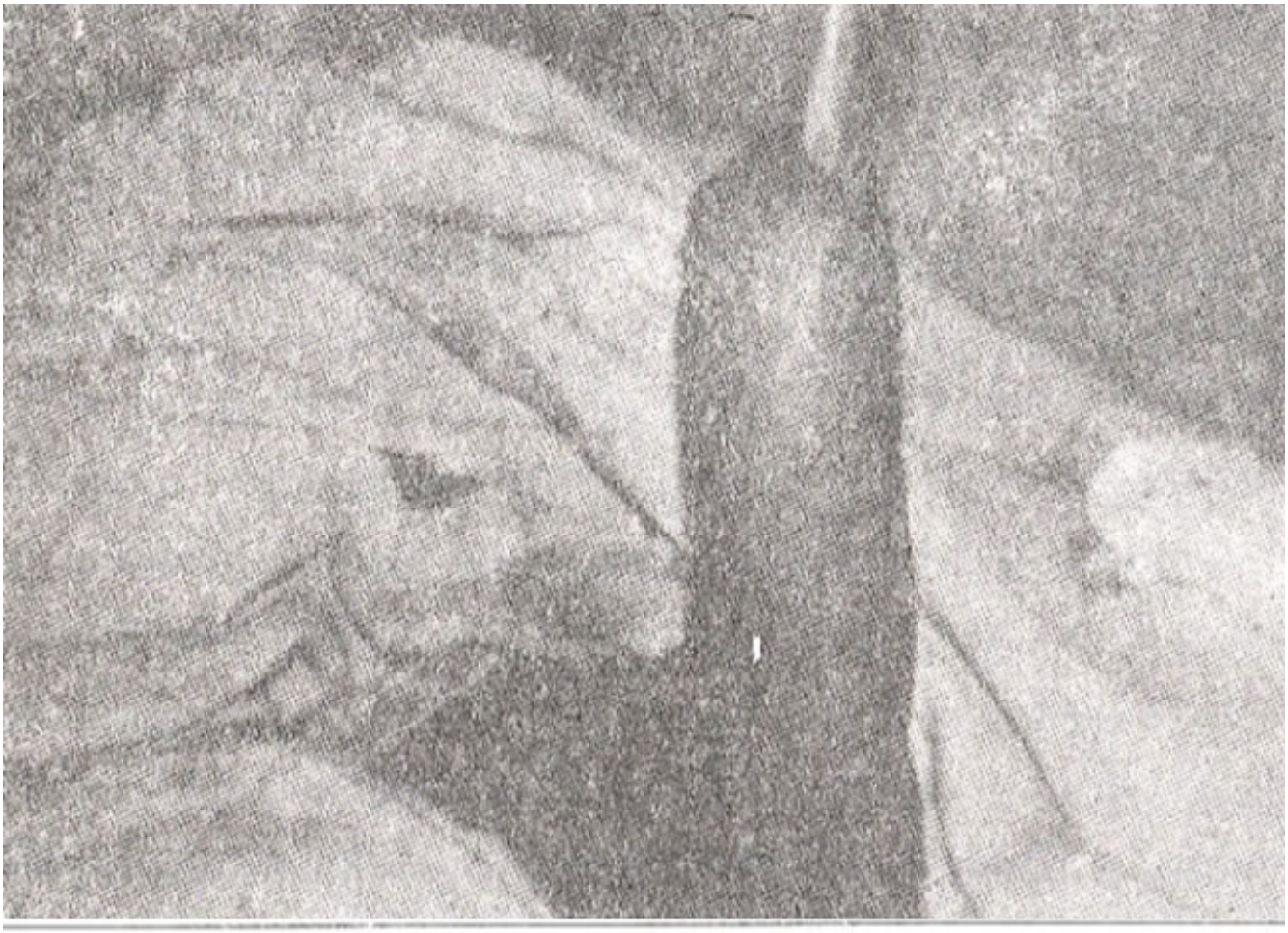

Figure 4. Result at end of procedure on completing microvascular anastomosis.

The whole procedure took seven and a half hours. Postoperatively, the patient was kept in a warm environment in the ICU with diligent recording of intake and output and frequent flap monitoring. The penis was supported in an upright position with the help of loose dressings to preventvenous engorgement. Onday four he was shifted to the ward. The Foley catheter was removed on the 18th postoperative day and a trial of micturition given. Apart from afew drops, which leaked, from the urethral anastomosis there was free and forceful flow of urine (Figure 5).

Figure 5. Forceful flow of urine through the neo-phallus on 20th post-operative day.

The small fistula closed spontaneously four days later. The patient was discharged from hospital on the 22nd post-op day. On the last follow-up visit, six months after surgery, the patient was very pleased with the reconstruction. He had no problems with urination, which was free and with a good stream. He claimed that he had erections in the corporal stump and had also hadepisodes of spontaneous emissions at night. Examination revealed a well healed flap rendered somewhat stiff with the costal cartilage graft. There wast tactile sensation in the proximal 3/4 of the skin over the shaft.

Discussion

Historically, the various techniques ofphalloplasty have closely minored advancements in plastic and reconstructive surgery. Most of the early efforts like those of Frumpkin and Gilles involved the delayed formation and transfer of tubed abdominal flaps[2,3]. These tubes were formed from random skin flaps after a series of "delay" procedures to improve their vascularity. Inthe "tube within a tube" technique the innertube was used for the placement of a stiffener during intercourse while the outer tube provided skin cover, The patients usually voided using a perineal urethrostomy. A later modification was to use the inner tube for the urethra. Till the introduction of nwocutaneous flaps in the 1970's this was "state of the art' penile reconstruction. Orticochea's description of phalioplasty using a gracilis myoocutaneous flap and Hester's modifications provided a single stage solution[4,5]. In 1978 Pucket described a tubed groin flap for penile reconstruction[6]. The advent of clinically safe microsurgery brought the report by Change of single stage penile reconstruction using a free radial forearm flap in 1984[7] . Different variations of this flap have been devised, They are modifications in the design of the

skin island and the relative position of the urethral strip rather than alterations in the technique of flap elevation. Currently, forearm flaps are one of the most popular methods for total penile reconstruction. The radial forearm flap is a fasciocutaneous flap supplied by the radial artery. The artery vascularises the skin and underlying subcutaneous tissue through the fascial plexus. The venous drainage is through the paired venae cornmitantes and the cephalic, basilic and median cubital veins[8]. The lateral cutaneous nerve of the forearm provides sensation to the volar and dorsal radial aspects of the forearm. We have had the opportunity of using other methods of phalloplasty in the past, but were generally unhappy with the results. The radial forearm free flap was selected for this patient due to its unique advantages. Firstly, although the operating time may be long, it is a single stage procedure. A penis of adequate size and shape can be constructed which is aesthetically very acceptable as well. Since the urethra is formed by very well vascularized tissue the chances of fistula formation arc minimal. It incorporates a cutaneous nerve, which after anastomosis to the deep dorsal nerve of the penis is capable of erogenous sensation. Finally, with the incorporation of a costal cartilage graft it allows intercourse and the potential for fathering a child[9].

References

1. Strauch, B., Sharzer, L A., Petro, J. et al. Replantation of amputated parts of the penis, nose ear and scalp. Clin. Plast. Surg. 1983; 10:115-119.
2. Frumkin, A.P. Reconstruction of the male genitalIa. Am Rev. Soy. Med., 1944.2 14-20.
3. Gilles, H.D ‘and Harrison. R.H. congenital absence of the penis. Br. J. Pleat. Surg.,.1948:1:8-12.
4. Orticochea, M. New method of total reconstruction of the penis. Br. J. Plast. Surg., 1 972;25:347-366.
5. Hester, T.R., Hill, L.H. and Jurkiewitz, M.J. One stage reconstruction of the penis. Br. J. Plast. Surg., 1978;3 1:279- 285.
6. Pocket, CL. and Montie, J.E. Construction of the male genitalia in the transsexual, using A tubed groin flap for the penis and a hydraulic inflation device. Plast Reconstr. Surg. 1 978;6 1:523- 532.
7. Chang, T.S. and Hwang, W.Y. Forearm flap in one stage reconstruction of the penis. Plast. Reconstr. Surg. 1984,74:251-260.
8. Cormack, G.C. and Lamberty, B.G.H. The arterial anatomy of skin flaps. 1st edition, London, Churchill I.ivingstone, 1983.
9. Devine, C.J., Jordan, G.H. and Schlossberg, SM. Surgery of the penis and urethra. In Campbells operative Urology, 4th Edition, Mosby, St. Louis, 1991.