

# Penile Reconstruction in Children using a Double Vascular Pedicle Composite Groin Flap

Tayfun Aköz, Bülent Erdoğan, Metin Görgü, M. Ruşen Kapucu and Eksal Kargı

From the Ankara Numune Hospital, Department of Plastic and Reconstructive Surgery, Ankara, Turkey

(Submitted July 5, 1997. Accepted for publication September 10, 1997)

Scand J Urol Nephrol; 32: 225–230, 1998

The purpose of this report is to describe the use of a double vascular pedicle composite groin flap for penile reconstruction in children. The flap was composed of skin, soft tissue and iliac crest bone. Both deep and superficial circumflex iliac vessels were included in the pedicle to ensure a well-vascularized extended skin and bone in the flap. The procedure was carried out in two stages to allow for the prefabrication of a neourethra which was reconstructed in the flap using a full-thickness skin graft, prior to the transfer of the flap. The large skin island and bone with a dual blood supply enabled reconstruction of the penis of appropriate size and stiffness without vascular compromise. Two boys, aged 8 and 10 years, were treated successfully with this method and followed clinically for 4–12 months.

*Key words:* composite, flap, groin, penis, prefabricated, reconstruction.

*Tayfun Aköz, Meşrutiyet cad. No. 36/6, 06420, Kızılay, Ankara, Turkey*

Several methods have been described for penile reconstruction using regional or distant flaps. Although many of these methods may achieve the goals of neopenis and normal urination, none is universally accepted as the best method (1–11). The indications and choice of a proper method for penile reconstruction are even more controversial in children (4, 8).

## CASE REPORTS

Penile reconstruction was performed in two children using a double vascular pedicle groin flap.

### *Case 1*

This patient was 8 years old when he first presented to the outpatient clinic. He was found to have ambiguous genitalia on physical examination. A diagnosis of male pseudohermaphroditism was made after a thorough physical examination and work-up. After obtaining consent from the parents, the patient underwent a penile reconstruction in two stages.

### *Case 2*

This patient was a 10-year-old boy. His past history revealed a prior surgery for microphallus 3 years previously. The result was not satisfactory, so the patient underwent a second operation for penile reconstruction.

### *Surgical technique*

A two-stage operation for penile reconstruction was planned. In the first stage the superficial iliac circumflex artery (SICA) and deep iliac circumflex artery (DICA) were detected by Doppler ultrasound. Two parallel incisions measuring 13 cm were made on the groin skin 4 cm medial and lateral to the iliac crest. The medial incision was carried through the abdominal wall, reaching the preperitoneal fat. By dissection between the preperitoneal fat and abdominal wall, the iliac crest was reached and a 9 × 2 cm piece of bone was cut. The DICA pedicle was kept intact and attached to this piece of bone. The lateral incision was made deeper down to the osteotomy site. The lateral and medial skin edges of the flap were sutured together, constructing a tube still attached to the body at its superior and inferior edges. A full-thickness skin graft from the contralateral groin was wrapped around a silicon rod with its raw surface facing outwards. This was buried within the flap for urethral prefabrication. The lateral and medial skin edges of the donor area were sutured to each other beneath the flap to close the wound. Three weeks later, the superior edge of the flap was cut and the flap was raised on its soft tissue pedicle, which included DICA and SICA. The flap was passed through a tunnel along the inguinal region and brought to the pubic region. The distal edge of the flap was shaped and closed, the prefabricated urethra was

anastomosed to the urethral stump, and the proximal edge of the flap was sutured to the skin opening overlying the symphysis pubis. Suprapubic urinary diversion was employed for 7 days after the second-stage operation (Figs. 1–3).

The first patient was followed clinically for 12 months. The flap survived completely and the neopenis retained its size and shape. A fistula developed at the suture line between the constructed and native urethral ends, which was repaired subsequently (Fig. 4).

The early postoperative course was uneventful and the neopenis retained its size and shape for second patient. However, secondary contraction of the neourethra occurred in the late period. A short silicon spacer obtained from a urinary catheter was applied into the neourethra. The patient was able to urinate during the 4-month follow-up period (Fig. 5).

## DISCUSSION

The multiplicity of techniques available for penile reconstruction makes it difficult to choose the right one for a particular patient or group of patients. Provided that certain priorities are met concerning the quality of the neopenis, this choice should probably depend on donor site morbidity, especially in children. For this reason the authors have elected to use the groin as the donor area.

The first priority was to construct a penis which would retain its shape and stiffness in the long term. Penile reconstruction in children has been reported using forearm free flaps or groin skin (4, 8). In none of these reported cases was a stiffener used. It is the authors' experience that when the soft tissue used to construct the neopenis is not supported by a rigid structure, the penis ultimately contracts and loses its shape. Later implantation of a stiffener is very difficult or impossible. Alloplastic material such as silicone rubber usually erodes through the penile skin and may be extruded (9). For this reason we used autologous bone and, as suggested by others, a vascularized bone segment to decrease subsequent resorption (9, 10). Using the fibula or part of the radius as vascularized bone would not be justified in children, owing to the possible morbidity of radius fractures or ankle instability. Sun & Huang (10) used the iliac crest as a penile stiffener based on SICA and stated that the composite flap can only be used if the SICA extends 3–4 cm beyond the anterior superior iliac spine (10). Since the iliac bone is better vascularized by the deep system, in the present study DICA was also included in the flap, which at the same time increased the blood flow to the skin.

The second priority, reconstruction of the neourethra, has been notoriously difficult. Using a vascular-

ized portion of the main flap or a separate flap has been advocated for this purpose (2, 4–8, 10). However, the advantage of this method over the more conventional full-thickness skin graft urethra reconstruction remains theoretical. Biemer (1) reported that in nine of 14 transsexual patients urethral fistulae developed despite the fact that their urethra were constructed with vascularized tissue. Sadove et al. (9) used full-thickness skin grafts for urethra reconstruction in conjunction with their free fibula osteocutaneous flap for penis reconstruction. They suggested that prefabricating the urethra in a previous operative stage may be beneficial to ensure healing of skin graft, although they did not use this option in their series. Theoretically, prefabrication of the urethra may shorten the duration of urinary diversion, which usually accompanies penis reconstruction procedures. Prefabrication of the urethra was the main reason for designing our technique as a two-stage procedure which, at the same time, functioned as a delay procedure for the rest of the flap. However, the benefits of this prefabrication are theoretical at the moment, and a delay may not actually be necessary.

The third priority in penile reconstruction is to provide a protective and erogenous sensation to the neopenis, which was not addressed in the present study. Theoretically, this is a disadvantage of our technique compared to reconstruction with free flaps where a cutaneous nerve in the flap is anastomosed to one of the nerves supplying the genital area. Gilbert et al. (4) examined patients who had penile reconstruction with forearm flaps and had anastomosis of antebrachial nerves to dorsal penile nerves. They concluded that pressure vibratory thresholds were perceived in all patients, but were grossly inaccurate compared to normal controls. Furthermore, little correlation between the extent of sensation and the patients' ability to achieve orgasm was observed (3). Sadove et al. (9) suggested that the patients should be cautioned against unrealistic expectations regarding the achievement of erogenous sensibility via direct nerve anastomosis (9). Although there has been no long-term follow-up in our patients to assess the return of protective sensation, Perovic did not observe any long-term complication in his 24 patients who had penile reconstruction using a groin flap (8).

The last, but not the least concern, was the limitation of donor site morbidity. The use of the groin region as the donor area has a clear advantage over other donor areas in limiting the donor site morbidity. All of the resulting scar can be covered by underwear in this technique. Even if the bone is not included, use of the radial forearm flap creates an unpleasant forearm scar, sacrifices an important artery and many veins to the hand, needs a split-thickness skin graft donor site,

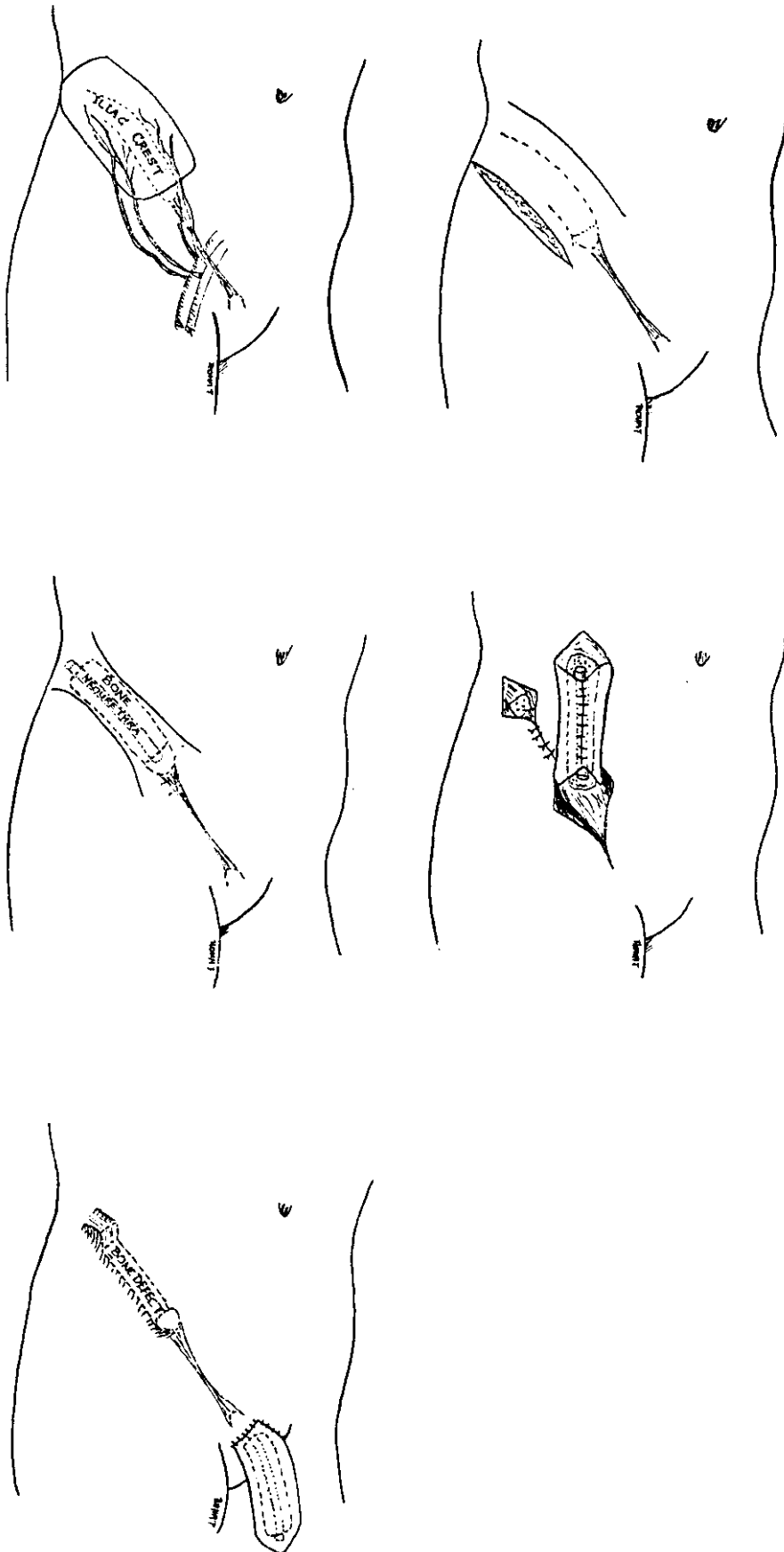


Fig. 1. Schematic presentation of the surgical procedure.



*Fig. 2.* Preoperative planning and intraoperative appearance of the region. Note that the full-thickness skin graft was wrapped around the silicon rod. In the second stage, the prefabricated tube flap was elevated. Double vascular pedicles are shown in front of the mosquito clamps.



*Fig. 3.* The second case was operated with the same technique. The dual blood supply of the flap is shown.

sacrifices cutaneous nerves of forearm, and may leave inguinal scarring and possible scars on the lower extremities if additional vein grafts are needed. The fibular flap can be used with the bone to provide stiffness to the neopenis; however, sacrifice of the fibula may limit the future athletic abilities of the child.

The groin flap, in various modifications, has been

used for penile reconstruction by many surgeons. The groin flap, incorporating a vascularized iliac bone segment, provides a reasonable balance between the quality of reconstruction and donor site morbidity, and should be considered whenever penile reconstruction is indicated in children. However, penile sensation was only achieved in the proximal portion of about 2 cm. Following adolescence, these patients could undergo



Fig. 4. Penile construction was completed. However, the glanular side of the penis was covered with split skin grafts. Postoperatively, acceptable urination was obtained, but a small fistula was present on the conjunction of the neourethra and urethral stump.

flap transfers carrying neurovascular pedicles. Therefore, the problem of lack of sensation could be overcome.

In conclusion, an acceptable penis reconstruction could be obtained. However, urethral reconstruction still presents a challenge to the surgeon.

REFERENCES

1. Biemer EI. Penile construction by the radial arm flap. *Clin Plast Surg* 1988;15: 425.
2. Chang TS, Hwang WY. Forearm flap in one-stage reconstruction of the penis. *Plast Reconstr Surg* 1984;74: 251.
3. Gilbert DA, Horton CE, Terzis JK, Devine Jr CJ, Winslow BA, Devine PC. New concepts in phallic reconstruction. *Ann Plast Surg* 1987;18: 128.
4. Gilbert DA, Jordan GH, Devine Jr CJ, Winslow BA, Schlossberg SM. Phallic construction in prepubertal and adolescent boys. *J Urol* 1993;149: 1521.
5. Gilbert DA, Winslow BH, Gilbert DM, Jordan GH, Horton CE. Transsexual surgery in the genetic female. *Clin Plast Surg* 1988;15: 471.
6. Gottlieb LJ, Lewine LA. A new design for the radial forearm free-flap phallic construction. *Plast Reconstr Surg* 1993;92: 276.
7. Lai CS, Chou CK, Yang CC, Lin SD. Immediate reconstruction of penis with an iliac flap. *Br J Plast Surg* 1990;43: 621.
8. Perovic S. Phalloplasty in children and adolescents using the extended pedicle island groin flap. *J Urol* 1995;154: 848.
9. Sadove R, Şengezer M, McRoberts JW, Wells MD. One-stage total penile reconstruction with a free sensate



Fig. 5. Early and late postoperative appearance of the constructed penis. Low calibrated urination was due to secondary contraction of the neourethra. This problem was solved with a spacer obtained from a silicon urinary catheter.

- osteocutaneous fibula flap. *Plast Reconstr Surg* 1993;92: 1314.
10. Sun G, Huang J. One-stage reconstruction of the penis with composite iliac crest and lateral groin skin flap. *Ann Plast Surg* 1985;15: 519.
  11. Xiong S, Zhan W, Li G. Penis reconstruction with an island composite flap of the deep inferior epigastric vascular pedicle. *Plast Reconstr Surg* 1996;97: 1083.