

should be considered in all cases of extremity necrosis caused by meningococcal septicaemia, and that the radiologist should be included in the multidisciplinary approach to the assessment of patients with meningococcal septicaemia.

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Free hand-to-toe transfer: a method to minimise donor-site morbidity in free joint transfers

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SUMMARY. Reconstruction of a congenital hand anomaly in a child using single free vascularised transfer of the proximal interphalangeal joint of a second toe with the simultaneous microvascular reconstruction of the donor toe using the stiff joint and its dorsal skin paddle from the hand is described. This is not the first reported case of a toe–finger switch, but it is the first in a free joint transfer, for which it is especially indicated. © 2003 The British Association of Plastic Surgeons. Published by Elsevier Science Ltd. All rights reserved.

Keywords: free toe joint transfer in children, donor-site morbidity, toe–finger switch.

Case report

A 2-year-old girl presented with a congenital left hypoplastic forearm and a cleft hand with three fingers. The radial digits were connected by complete simple syndactyly; the ulnar digit showed clinodactyly. The radial digits were surgically separated, and a rotation osteotomy of the radial border digit was undertaken. Skin cover was provided using local flaps from the dorsum of the hand and full-thickness skin grafts from the medial upper arm. The ulnar clinodactyly was corrected. Following this, the child could grasp objects with an opposition grip between the radial and ulnar digits. However, she could not use the middle digit because of stiffness of the proximal interphalangeal joint (PIPJ). The option of a free vascularised joint transfer to replace the stiff PIPJ was discussed. As the parents were anxious about removing the toe, the possibility of transferring the finger joint to the toe was raised.

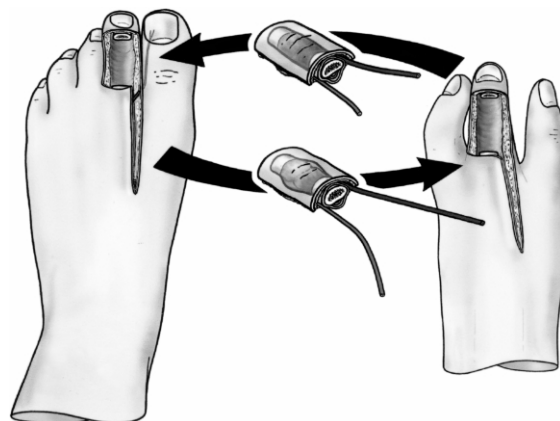


Figure 1—The ankylosed PIPJ of the left middle digit (top) was transferred to the left foot in exchange for the functional PIPJ of the second toe (bottom). Indicated in the diagram of the foot is the lateral digital artery of the great toe, to which the arterial anastomosis was performed as a reverse-flow flap.

The free joint transfer from the left second toe to the left middle digit was performed when the patient was 5 years old (Fig. 1). The pedicle was joined to a palmar artery and a dorsal vein. The extensor tendons were reconstructed immediately, and a silicone rod was inserted into the flexor sheath for secondary reconstruction. The stiff PIPJ on a microvascular pedicle with a dorsal skin paddle was transferred to the toe and fixed with a single longitudinal K-wire. The arterial anastomosis was performed to the lateral digital artery of the great toe as a reverse-flow flap, and the venous anastomosis was to a dorsal vein of the foot. To avoid tension on the anastomosis, both wounds were left partially open. Secondary wound closure was achieved 6 days postoperatively by direct closure and split-skin-graft cover. The K-wire from the hand was removed 6 weeks later. The K-wire in the foot migrated proximally and was removed through a separate plantar incision.

We reviewed her donor site 1 year after joint transfer (Fig. 2). She has symmetrical feet, with a donor toe of similar shape and size to the contralateral side. She is running without problems, has no gait disturbances and is pleased with the cosmetic appearance of the foot—as are her parents.

Discussion

In children, toe transfers to correct congenital or post-traumatic hand anomalies usually involve the second toe. Preoperatively, the parents of children undergoing toe-transfer surgery are usually concerned about the donor defect. Although the loss of a lesser toe may cause symptoms, this is rare.¹ The cosmetic appearance of the foot can be much improved by a ray amputation, with appropriate resection of skin, soft tissue and the metatarsal bone, to avoid a gap between the toes.² A psychological review of 37 patients following transfer of second toes showed that nearly all patients and parents were 'not at all concerned' or 'fairly unconcerned' about the appearance of the donor site.³

As a result of cultural differences, the cosmetic appearance of the foot is more important in Asia than in Europe. Non-functional reconstruction of the fourth and fifth toes, without bones, to improve cosmesis has been reported.⁴ A recent paper from Japan describes the transfer of a deformed finger to the foot in exchange for the transferred toe in two children.⁵ In one case a triphalangeal thumb was exchanged with a second toe. In the other case second and third toes were transferred to correct a post-traumatic deformity of the hand. Whilst the transferred third toe was replaced by the deformed finger, the transferred second toe from the contralateral foot could not be replaced from the hand. This left the foot with an obvious gap.

We feel that free toe-joint transfer including overlying skin is the most suitable indication for a toe-finger switch. Although conventional bone grafting can be used, lack of skin cover makes preservation of the second toe difficult and will frequently result in a shortened and deformed donor toe or in its total loss.^{6,7} Unilateral loss of a lesser toe results in asymmetry of the feet, either in width after a ray amputation or with an obvious gap between the toes. The free vascularised transfer of a stiff finger joint and its dorsal skin paddle to the donor joint of the toe provides the patient with symmetry of the feet and a donor toe of matching size



Figure 2—Cosmetic appearance of the donor site and the contralateral foot 1 year after free joint transfer.

and shape, albeit stiff at the PIPJ. We, therefore, recommend this option to optimise the donor defect in patients undergoing free joint transfer.

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