

FAITS CLINIQUES — CASE REPORTS

RECONSTRUCTION OF THE METACARPOPHALANGEAL JOINT WITH A FREE VASCULARIZED METATARSAL HEAD

by L. DE SMET* and J. P. MOERMANS**

We describe the vascularized transfer of the second metatarsal head to reconstruct the head of the third metacarpal lost by trauma.

Keywords : free flap ; metatarsophalangeal joint ; free joint transfer ; joint ; microsurgery ; hand.

Mots-clés : lambeau libre ; transplantation articulaire libre ; articulation métacarpophalangienne ; micro-chirurgie ; main.

RÉSUMÉ

L. DE SMET et J. P. MOERMANS. Reconstruction de l'articulation métacarpophalangienne par transfert vascularisé d'orteil.

Description du transfert vascularisé d'une tête du deuxième métatarsien pour traiter la perte traumatique de la tête du troisième métacarpien.

SAMENVATTING

L. DE SMET en J. P. MOERMANS. Reconstructie van het metacarpophalangeale gewricht door gevasculariseerde teentransfer.

De transplantatie van een gevasculariseerde metatarsaalkop voor de reconstructie van een traumatisch verlies van de derde metacarpaalkop wordt beschreven.

INTRODUCTION

The reconstruction of a hand joint damaged either from trauma or from disease remains a surgical

challenge, despite modern advances in microsurgery and prosthetic surgery. Several case reports and limited series of free vascularized joint transplants of the foot to the hand have been published (2-6, 8, 9). In our case we transferred only the metatarsal head and overlying structures. This procedure has the advantage that the difference in arc of motion between metacarpophalangeal and metatarsophalangeal can be corrected, and only one osteosynthesis is required.

CASE REPORT

A 24-year-old right-handed electrician injured his left hand with a high speed drill, causing a traumatic loss of the metacarpal head, overlying extensor tendon and skin, of the third ray (fig. 1). The patient, in his spare time, was a semiprofessional guitar player. As the nondominant hand is used to determine the chords on the fingerboard of the guitar he requested a reconstruction of the joint.

In an emergency procedure elsewhere the wound was cleaned, length maintained with a bend K-wire, and the skin closed as much as possible. When we saw the patient at the first time, 3 weeks after the accident, the dorsal skin was partially necrotic (fig. 2). We explored the wound and

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found a necrotic dorsal tissue extending to the level of the bone, the defect in the depth was filled with a semi-organized hematoma. The base of the proximal phalanx was practically normal : i.e. the cartilage seemed healthy and both collateral ligaments, the palmar plate and the extensor hood were still in place. A composite free flap of the dorsum of the ipsilateral foot consisting of skin, extensor tendon and the metatarsal head of the second ray was transferred to the hand. The vascular anastomoses were done end-to-end between the radial artery and the a. dorsalis pedis in the anatomic sniffbox ; a cutaneous vein of the foot was anastomosed to a branch of the cephalic vein at the same level.

Revascularization occurred promptly ; skin healed without problems, and bone consolidation, radiologically apparent (fig. 3) at 3 weeks, was complete after 6 weeks. An intensive re-education was started in the third week, and an alternating flexion and extension dynamic splint was worn for 3 months. The interphalangeal joints recovered normal mobility, but in the metacarpophalangeal joint only a partial recovery in a functional range took place (extension : 27° , flexion : 45°) (fig. 4). This mobility allowed the patient to return to his previous job and hobby. Two years after the operation the patient continued to have a good mobility and showed no degenerative signs on X-ray (fig. 5).

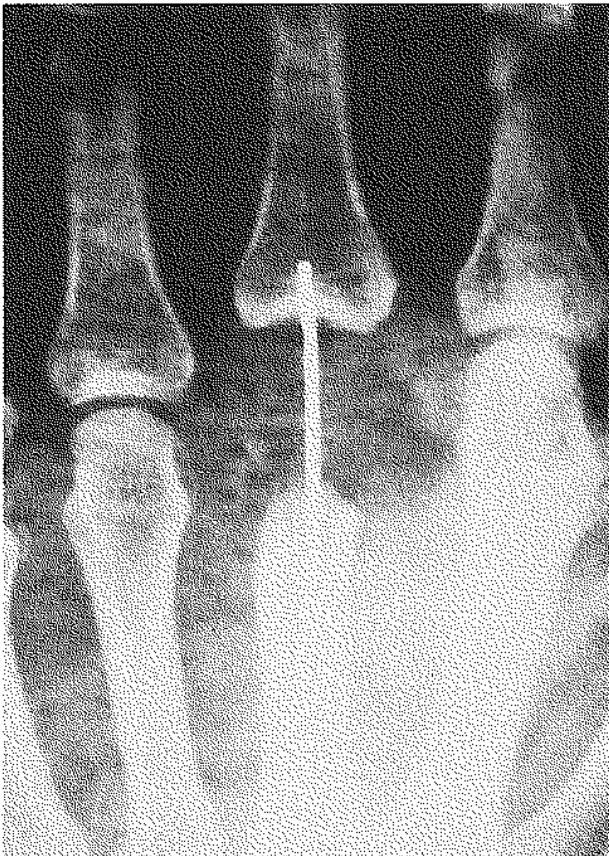


Fig. 1. — Radiograph of the injured hand. The distal fourth of the third metacarpal is missing.



Fig. 2. — The skin condition preoperatively. The necrosis extended to the bony level.



Fig. 3a



Fig. 3b

Fig. 3. — Radiograph of the reconstructed metacarpal, 3 months postoperatively, showing good bone healing and a near normal joint.



Fig. 4a

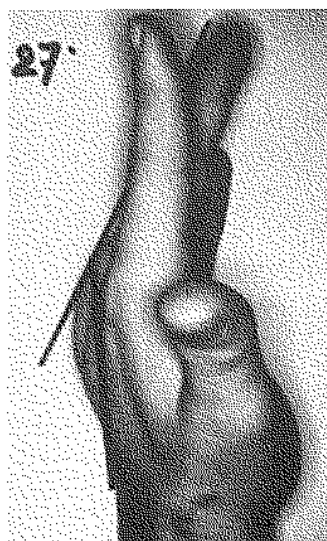


Fig. 4b

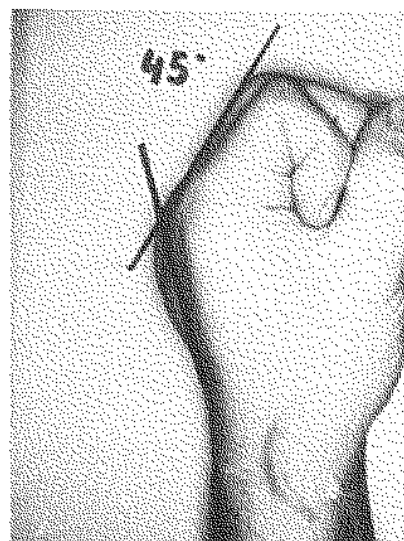


Fig. 4c

Fig. 4a, b, c. — Appearance and active extension and flexion of the third finger.

DISCUSSION

In such complex lesions when there is loss of bone, articulation, tendon and soft tissue coverage, only a composite flap can meet most of the objectives required for good hand function. Multiple staged procedures using a skin flap, spongy bone graft and arthrodesis and a tendon graft were consid-

ered, but it would have not only condemned the mobility of the metacarpophalangeal joint, but also endangered the mobility of the interphalangeal joints. A prosthesis without adequate bone stock and good protective coverage is out of the question.

Campbell (1) demonstrated good incorporation of non-vascularized articulation grafts, but after

1 year a rapidly progressing degenerative arthritis developed. In 1983 Verecauteren and Van Vynckt reported a case of free total phalanx transplant. Four years after the operation, X-ray films demonstrated acceptance of the graft and satisfactory function of the finger (10).

Although the experiences with vascularized joints are limited, those in the metacarpophalangeal joints seem promising (4, 6). The physiological difference in the arc of motion of the metatarso-

phalangeal and that of the metacarpophalangeal joint requires some technical adaptations (7). By transferring only the head of the metatarsal this inconvenience can be avoided. Also, a major technical problem in small joint transplantations is the osteosynthesis. By using our technique only a proximal bone fixation was necessary. This composite flap is useful in selected cases to reconstruct joints of the hand.



Fig. 5a



Fig. 5b

Fig. 5a, b. — Radiograph of the hand, 2 years postoperatively.

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