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Clinical case

Secondary mobilization of the first dorsal metacarpal artery flap for first web space reconstruction in a child: A case report

Mobilisation secondaire du lambeau cutané de la première artère métacarpienne dorsale pour une reconstruction de la première commissure chez l'enfant

A. Trimaille [a,*], N. Kerfant [a], D. Le Nen [b], B. Fenoll [c], W. Hu [a]

[a] *Service de chirurgie plastique, reconstructrice et esthétique, CHRU de Brest, boulevard Tanguy-Prigent, 29609 Brest cedex, France*
[b] *Service de chirurgie orthopédique, traumatologique et réparatrice, CHRU de Brest, boulevard Tanguy-Prigent, 29609 Brest cedex, France*
[c] *Service de chirurgie orthopédique pédiatrique, CHRU de Brest, 2, avenue Foch, 29609 Brest cedex, France*

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Abstract

The authors report the case of an iterative mobilization of a skin flap based on the first dorsal metacarpal artery. This flap was initially associated with a toe-to-hand transfer to provide adequate skin coverage in the reconstruction of a post-traumatic thumb defect in a 5-year-old child. More than 8 years after initial surgery, this flap was mobilized again for recovery of the first web space opening, which was retracted. This case illustrates the possibility of remobilizing the first dorsal metacarpal artery flap to reduce donor site sequelae in children.

Keywords: First dorsal metacarpal artery flap; Reconstruction; Thumb; First web space; Child

Résumé

Les auteurs rapportent le cas d'une mobilisation itérative d'un lambeau cutané, vascularisé par la première artère métacarpienne dorsale. Ce lambeau avait été initialement associé à un transfert d'orteil afin de permettre une couverture cutanée suffisante dans le cadre d'une reconstruction post-traumatique du pouce chez un enfant de 5 ans. Plus de 8 ans après la chirurgie initiale, le lambeau a été remobilisé pour permettre une meilleure ouverture de la première commissure rétractée. Ce cas illustre la possibilité de réutiliser le lambeau vascularisé par la première artère métacarpienne dorsale afin de minimiser les séquelles du site donneur chez l'enfant.

Mots clés : Lambeau ; Première artère métacarpienne dorsale ; Reconstruction ; Pouce ; Première commissure ; Enfant

1. Introduction

Post-traumatic thumb reconstruction in children aims at providing satisfactory recovery of thumb function with preserved growth potential and reduced donor site sequelae.

We report the case of a child managed for thumb reconstruction using a great toe-to-thumb transfer combined with 1st dorsal metacarpal artery island flap. This flap was remobilized more than 8 years after initial surgery for reconstruction of 1st web space retraction, in order to avoid sequelae at a new skin flap donor site.

2. Observation

A 5-year-old child had sustained a complex thumb avulsion injury in October 2006. After initial replantation failure, the authors had managed the child. Initial lesions included right

* Corresponding author.
E-mail address: alexandra.trimaille@wanadoo.fr (A. Trimaille).

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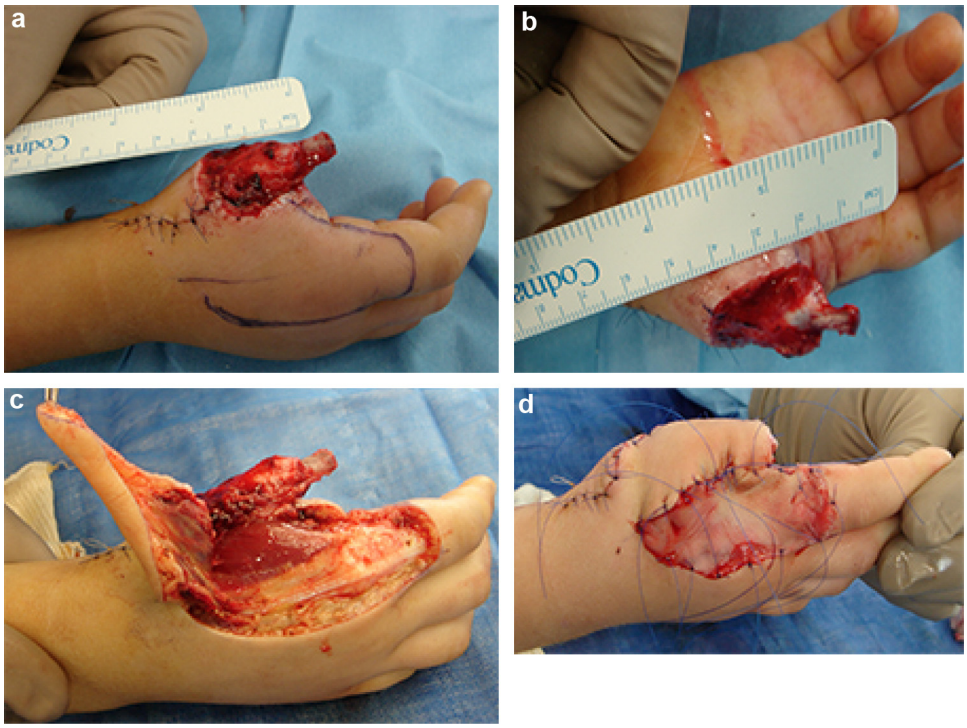

Fig. 1. Preoperative aspect and initial management. Amputation stump (a, b). First dorsal metacarpal artery flap (c). Skin grafting for coverage of 1st web space defect (d).

thumb amputation at the level of the proximal phalanx and soft tissue defect extending from the base of the trapezio-metacarpal joint up to the 1st web space.

While awaiting a secondary reconstruction, five days after initial management by replantation, the amputation stump had been covered with a 1st dorsal metacarpal artery flap to maintain sufficient length of the residual thumb (Fig. 1a–c). Coverage of the 1st web space defect had been performed using a full-thickness skin graft (Fig. 1d).

Secondary thumb reconstruction by means of a great toe-to-thumb transplantation had been carried out 3 months after initial trauma. The custom-made composite great toe transfer had been performed using the standard technique described by Foucher et al. [1] (Fig. 2a–c). Postoperative management was simple. A plaster splint had been applied for a 6-week immobilization.

At the age of 13, the child reported contracture of the 1st web space with a measured opening angle of 30° due to progressive retraction after skin grafting (Fig. 3a).

A local plasty to release the 1st web space contracture was decided. The 1st dorsal metacarpal artery island flap initially used for amputation stump coverage was remobilized. As shown on postoperative ultrasonography, the flap was based on the 1st dorsal metacarpal artery and transferred to the first web space to improve its width. No vascular complications could be observed. Complete healing was obtained after 10 post-operative days.

Both the right-handed child and his parents were satisfied with the results of surgery. The child reported good active mobility of trapezio-metacarpal and metacarpophalangeal joints. Recovery of a stable and strong pollici-digital pinch was achieved. The pinch strength (pinch test) was 12 kg bilaterally, the grip strength as measured with a Jamar dynamometer was 24 kg on the reconstructed side and 28 kg on the uninjured side. The sensory score using the Weber's static two-point discrimination test was 4 mm at the radial edge and 6 mm at the ulnar edge of the hand. Postoperative 1st web space angle was 80° using a completely viable 1st dorsal metacarpal artery flap (Fig. 3b).

Furthermore, the growth potential of this vascularized epiphyseal bone transfer was preserved as proven by open growth plate still visible on recent comparative radiographs (Fig. 3c and d).

3. Discussion

Digit amputations in the pediatric population are rare events and often occur secondary to avulsions or crushing injuries. An attempt at replantation should be systematically carried out, resulting in significantly better functional and aesthetic outcomes than in adults. However, the mean survival rate following replantation in the published literature is approximately 70%, which is lower than the reported rates in adults, when taking into account the injury mechanisms [2,3].

After thumb replantation failure, the utmost caution should be used when considering the most appropriate reconstructive procedure [3]. A reflection period thus appeared necessary between the information given to the patient and his parents and the selection of a reconstruction technique for the amputated thumb. In our case, skin coverage of the proximal phalanx and 1st web space were considered emergency procedures. A 1st dorsal metacarpal artery flap was selected for coverage of the