ANATOMICAL STUDY OF THE PALMAR INTERMETACARPAL PERFORATOR FLAP

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The authors present an anatomical study of a small flap that may be harvested from any of the palmar intermetacarpal spaces while performing fasciectomy in Dupuytren's contracture. The flap is diamond-shaped, vascularised by two perforating branches originating from the underlying true digital arteries and may be rotated through 90° to 180° in either direction to provide skin cover and subcutaneous padding over the distal palm and/or the base of the finger.

Keywords: dupuytren, flap, palmar, anatomy, hand, surgery

Skin excision is often necessary when performing fasciectomy in patients presenting with Dupuytren's contracture. The resulting skin defect is often located on the palmar aspect of the distal palm and/or at the base of the finger resulting in exposure of the neurovascular bundles and/or the flexor tendon sheath. Local flaps from the dorsum and lateral aspects of the finger or skin grafts have been proposed to cover this area. However, it seems more appropriate to replace palmar skin with tissues having similar mechanical properties as this part of the hand is submitted to mechanical constraints while grasping; the palmar intermetacarpal flap (Figs 1-3) was designed with this in mind (Pelissier et al., 2007).

The aim of this study was to identify the perforating branches of the true digital arteries supplying the palmar intermetacarpal flap and determine the potential territory perfused by these arteries.

MATERIAL AND METHODS

An anatomical study was performed on two upper limbs from embalmed cadavers and eight upper limbs from fresh cadavers. A catheter was placed in the brachial artery of the fresh specimens and infused with blue dye (two specimens), commercially available coloured gelatine (four specimens) or a radio-opaque mixture combining sulphite barium 250ml (Micropaque, Guerbet, Roissy, France), gelatine 12g (Vahiné, Nestlé, France) and blue dye 10ml (two specimens).

In six hands, a fascio-cutaneous flap including the superficial palmar aponeurosis was raised from the level of the thenar eminence distally to the palmar aspect of all four proximal interphalangeal joints (Fig 4). Dissection was performed under 3× magnification, progressing from proximal to distal and identifying the common digital and true digital arteries. Perforating branches arising from the latter arteries and supplying the skin were isolated and their cutaneous projection marked with a transcutaneous suture (Figs 5 and 6). The distance between the suture and the distal palmar crease was then measured.

In the two specimens injected with the radio-opaque mixture, the fasciocutaneous flap was raised as previously described, but also included the superficial palmar arch as well as the common and true digital arteries. An anteroposterior radiograph of the flap was taken.

Then, a 1-cm wide transverse cross-sectional specimen was harvested distal to the distal palmar crease and radiographs obtained to include a transverse view of the vascular supply to the skin from the perforating branches.

RESULTS

During infusion of each specimen, colouring of the palmar aspect of the hand was noticed. Coloured spots, 1.5 cm wide, were always observed simultaneously on the palmar aspect of the second, third and fourth intermetacarpal spaces (Fig 4).

The dissections identified two rows of perforating branches. The first row arose from the common digital arteries and was located 0.5-1 cm proximal to the distal palmar crease. The second row arose halfway between the distal palmar crease and the base of each finger from the true digital arteries (Figs 5 and 6). The true digital arteries constantly provided perforating branches that reach the skin and colour an area of skin, as shown in Fig 4. Each intermetacarpal space was constantly found to be vascularised by two perforating branches, coming from the adjacent true digital arteries. The flap could then be rotated 90° clockwise or anticlockwise.
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Fig 1 Pre-operative marking of a palmar intermetacarpal flap in the fourth intermetacarpal space before performing fasciectomy for Dupuytren’s contracture. The chord is marked with a dotted line.

Fig 2 Intraoperative view following fasciectomy. The diseased skin at the base of the ring finger was removed. The flap was pedicled on the ulnar true digital artery of the ring finger and rotated 90°.

Fig 3 Postoperative result at 12 months.

Fig 4 Infusion of the specimen through the brachial artery provides colouring of the angiosomes of the collateral digital arteries (black arrows). The flap to be raised for the anatomical study is outlined.

Fig 5 Identification of the perforating branches (distal row) on the deep side of the flap. The perforators to reach the skin above (Fig 7).

DISCUSSION

Diseased skin in Dupuytren’s contracture, often in the distal palm and/or at the base of the finger, has to be excised to avoid recurrence (Hueston, 1985). As this area is submitted to pressure while grasping, we believe that flap reconstruction is appropriate.

Few described flaps are appropriate. The ulnar parametacarpal flap is only intended for the little finger...
island arteries. White branches and above), transversal (a) with arrows based harvested of above). Black and cross-sectional show the perforators issued from the true digital arteries. Dotted lines indicate the slice of flap to be harvested and radiographed in Fig. 4b. A 1-cm wide transversal cross-sectional specimen of the flap (palmar skin above), harvested distally in relation to the distal palmar crease and radiographs obtained of transverse view of the perforating branches. Black arrows show the common digital arteries. White arrows show the perforators issued from the true digital arteries. 

(Bakhch et al., 1996). The first dorsal metacarpal artery island flap, based on a dorsal branch of the radial artery, and used by Ozdemir et al. (2004) in Dupuytren’s disease, is only intended to cover the first web space. Flaps from the dorsum of the hand (Bruner, 1949; Ekerot, 1995; Gregory et al., 2007; Vuppalaapati et al., 2004) are complicated and leave scar on the back of the hand.

This anatomical study demonstrated that perforating branches of the true digital arteries supply the palmar intermetacarpal flap constantly in all three finger intermetacarpal spaces. The flap is vascularised by two perforators arising from the adjacent true digital arteries and may be raised on either one.

The palmar intermetacarpal flap (Pelissier et al., 2007), although limited in size, is immediately available for use for any digital ray, easy to raise and, use and is wide enough to cover defects in the distal palm and proximal part of the fingers with primary closure of the donor defect. It also provides adequate coverage for this area, which is the main indication for its use.

References


