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CASE REPORT

Dorsal digital perforator flap for reconstruction of distal dorsal finger defects

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KEYWORDS
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Summary Three patients are presented in whom defects of the distal part of the dorsum of the finger were covered with a rotation flap or V-Y advancement flap based on a single perforating branch of the digital artery running from the volar to the dorsal side. This method is useful for the reconstruction of the distal dorsal region of the fingers, because the flap is more mobile, has a smaller skin island and is less invasive compared to the previous flaps. This type of flap conforms to the concept of a perforator flap arising from the main artery.

It is difficult to cover distal defects of the dorsum of the finger like those of the nail matrix or a terminal extensor tendon, because there is little soft tissue in this region. Therefore, various flaps have been employed, including a rotation flap,[1] dorsal V-Y advancement flap,[2] reverse dorsal metacarpal flap[3] and a reverse dorsal digital island flap.[4] However, the reported flaps can only be used to cover small defects, require a large skin island or are too invasive.

Our flap is a rotation or a V-Y advancement flap based on a single perforating branch of the digital artery running from the volar to the dorsal side of the finger. Thus, the flap conforms to the concept of a perforator flap.[7] The advantages of our flap are that it is more mobile, has a smaller skin island and is less invasive compared with previous flaps reported for use in reconstruction of distal defects on the dorsum of the finger. To our knowledge, this is the first report about the use of a dorsal digital perforator flap (DDPF) to reconstruct a distal defect on the dorsum of the finger in the literature published in English.

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Surgical technique

First, the locations of dorsal perforators arising from the proper digital artery are identified by Doppler flowmetry and are marked near the defect for reconstruction. Then a rotation flap or V-Y advancement flap that has a single digital dorsal perforator at its base is designed [Figures 1-A, 2-A, 3-B, 4-B, 5-B]. Under a digital block and tourniquet, the flap is elevated in the distal to proximal direction along a plane above the extensor paratenon. The base of the flap is dissected carefully so as to preserve the dorsal perforator arising from the proper digital artery [Figures 1-B, 2-B]. The perforator is very small; however, it is not difficult to detect a single perforator at the lateral border of the extensor tendon near the marked position as a slightly whitish string-like structure (due to the tourniquet) using a loupe and microsurgical techniques [Figures 3-D, 4-C]. Once the perforator is identified, the circumference of the pedicle of the flap is narrowed gradually. The fascia or soft tissue near the perforator needs to be retained for allowing venous return, but it is better for it to be as thin as possible [Figures 1-C, 2-C] because a flap with a broad pedicle cannot be easily mobilised in this region. However, the most important point is not the width of the pedicle, but the definite identification of the perforator within the pedicle. The rotation flap has a narrow strip of skin on its pedicle, but the V-Y advancement flap has no skin cover for the pedicle. When a rotation flap cannot cover the defect sufficiently, skin grafting should be performed [Figures 1-D, 3-E]. A V-Y advancement flap is then elevated as an island flap, while taking care to avoid rupture or kinking of the very thin and weak dorsal perforator [Figures 2-D, 4-D, 5-D].

Case reports

Case 1

A 20-year-old woman sustained a heat-press injury to the right index while ironing clothes. She presented to our hospital with soft tissue damage to the finger, that had developed localised necrosis at 2 weeks after injury [Figure 3-A].

Examination showed necrotic skin on the dorsum of the right index finger from the distal interphalangeal (DIP) joint to the nail matrix. Although the finger could be extended, the terminal extensor tendon was suspected to have a partially necrotic region.

After 1 week, debridement of the finger was carried out and it was found that the terminal extensor tendon only showed necrosis of its superficial layer [Figure 3-B]. The patient did not want scarring proximal to the proximal interphalangeal (PIP) joint, so a rotation flap (1.5 × 1.2 cm) was designed as a DDPF with a narrow pedicle based on a single, small dorsal perforator. This flap was elevated including a thin layer of fascia and transposed to cover the extensor tendon and nail matrix [Figures 3-C, D]. The perforator maintained flap viability and there was also

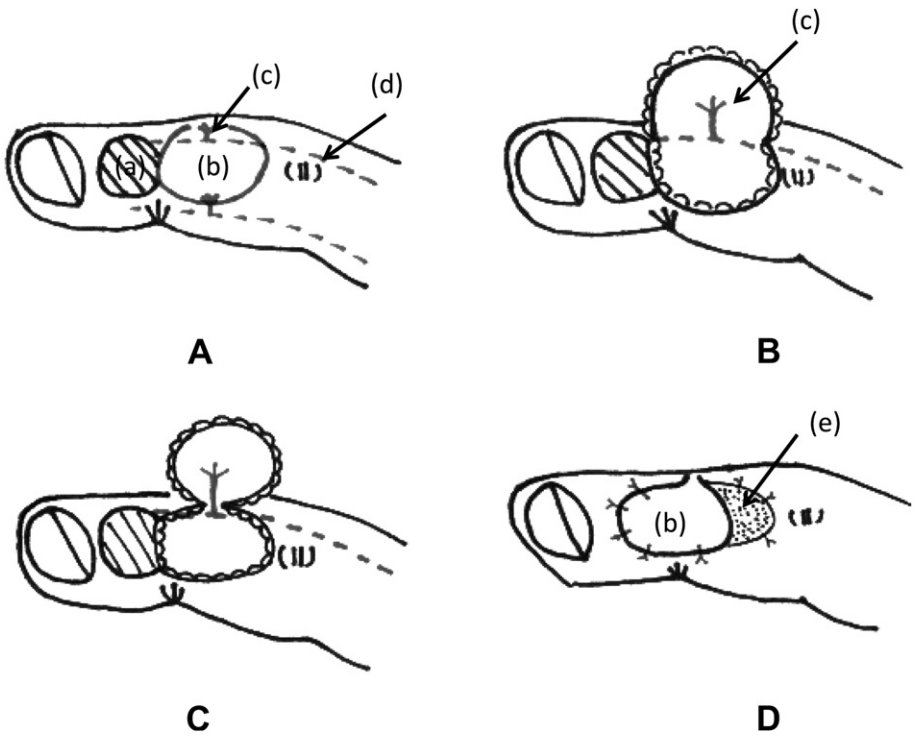

Figure 1 Surgical procedure for the rotation flap. (A) A rotation flap (b) is designed near the defect (a). The pedicle of the flap contains a dorsal perforator (c) arising from the proper digital artery (d). (B) The flap is elevated above the plane of the extensor paratenon. (C) The base of the flap is dissected carefully so as to preserve the perforator and must be made narrow as possible along with the skin pedicle. (D) Skin grafting should be performed if the flap does not cover the defect sufficiently(e).