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Case Report

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Double, Distally Based, Axial Pattern, Distal Perforator Thenar Flap; A Case Report

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ABSTRACT

The provision of the glabrous skin with acceptable sensation is the main objective of any fingertip reconstruction. Thenar flaps can be medially based, laterally based and proximally based. However, all of them are randomly based. A distally based, axial pattern thenar flap could provide stable, like-with-like, palmar skin to the fingertip of an injured distal phalanx. We present a double, distally based axial pattern thenar flap, which we used to simultaneously reconstruct two fingers.

Keywords: Finger pulp reconstruction, finger injuries, distally based thenar flap

INTRODUCTION

There are many flaps which have been described for fingertip reconstruction, which include cross-finger flaps, dorsal metacarpal artery flaps, v-y advancement flap and thenar flaps1,2,3,4.

Because of its anatomical location, the fingertip is always prone to injury either in the industrial setting or in the domestic setting. Reconstruction of the soft tissue defect over the pulp of the injured finger, (like with like tissue) demands soft tissue replacement from the palmar aspect of the hand4.

We are presenting a case report of a double, distally based, axial pattern thenar flap used for the reconstruction of the pulp of the whole distal phalanx of the middle and the ring fingers, simultaneously.

CASE REPORT

A young male with no known comorbidities and right-hand dominant, sustained a degloving injury of the right middle, ring and the little finger. The middle and ring fingers were the most severely affected. There was associated fracture of the middle phalanx of the middle finger and degloving injury of the distal interphalangeal joint (DIPJ) of the right ring finger. Initially, the injury was managed conservatively with a few simple interrupted sutures and splinting of the injured fingers until the final assessment of the viability of the soft tissue was done (pre-operative picture).

Once the non-viable skin area had demarcated, it was decided to raise distally based thenar flaps (per-operative pictures) for the tissue

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reconstruction. There was significantly more tissue loss over the pulp of right ring finger compared to the right middle finger. The necrotic skin was debrided. As per the defect dimensions, two distally based, axial pattern thenar flaps were raised. These included the muscle fascia of the thenar eminence as well. Each flap had at least one subcutaneous arterial perforator at the base and a draining vein. The proximal free ends of the flaps were inset into the proximal edges of the soft tissue defects over the injured fingers with 4-0 PDS. The tips of the injured fingers rested over the raw areas of the bases of the flaps. In this way, the contact of the raw surfaces of the flaps with the defects was maximized to optimize the potential of developing the new vascular connections between the flaps and the defects. The donor site was reconstructed with full-thickness skin grafts which was harvested from the right groin. Tie-over dressings were applied.

Surgical technique:

Four points over the thenar eminence of the hand (pre-operative picture) are marked. The first point "a", over the base of the thumb, 1 cm medial to the flexor crease of the meta-carpo-phalangeal joint (MCPJ), in the area where the palmar crease ends. The second point "b", 1 cm lateral to the palmar crease, which separates the thenar area from the hypothenar area. The third point "c", 1 cm lateral to the palmar crease, which separates the thenar eminence from the hypothenar area over the distal border of the thenar eminence. The fourth point "d", 1 cm medial to the flexor crease of the MCPJ at the distal border of the thenar eminence. When all four points are joined, the resulting square shaped area should have a curved proximal border while the other borders of the square should be straight. The flap is raised commencing from the proximal end at the area where the palmar creases terminate. The thenar muscle fascia is included in the flap and diathermy is sued to control the intervening small veins and arteries (per-operative pictures). It is one of the advantages of this flap design as multiple veins can be included over the axis of the flap and multiple arterial perforators emerge along the distal border of the thenar eminence, which will vascularize the flap. The thenar muscle fascia is included into the flap as it offers two advantages. The first advantage is that it gives a relatively avascular plane and the second is that it increases the vascularity of the flap. The intervening small muscular perforators have to be controlled with diathermy as the flap has to be raised till its distal border at the thenar eminence. However, the flap length is enough to reconstruct the defect, then it is not necessary to raise the flap till the distal limit of the base of the flap. At the distal border of the thenar eminence multiple perforators emerge that supply the distally based thenar flap and must be preserved and include in the flap (per-operative pictures). This technique facilitates a 4 x4 cm distally based fascio-cutaneous flap to be easily raised, which can be used to reconstruct the total pulp of the two fingers. The patient was followed-up till 3 months post-operatively with good range of motion of the reconstructed fingers (3-months post-operative pictures and video)

Figure 01: Pre-operative picture.1

Figure 02: Pre-operative picture.2

Figure 03: Peri-operative picture.1

Figure 04: Per-operative picture.2

Figure 05: Per-operative picture.3

Figure 06: 2-week post op picture.1

Figure 07: 2-week post op picture.2

Figure 08: 2-week post op picture.3

Figure 09: 2-week post op picture.4

Figure 10: 2-week post division picture.1

Figure 11: 2-week post division picture.2

Figure 12: 2-week post division picture.3

Figure 13: 2-week post division picture.4

Figure 14: 3-month post op picture.1

Figure 15: 3-month post op picture.2

DISCUSSION

Fingertips injuries are the most common domestic and occupation related hand injuries (4). Stable and sensate soft tissue coverage is indicated in these types of injuries. There are many local and regional flaps which have been described, including cross finger flaps, reverse dorsal metacarpal artery flaps, V-Y advancement flaps, and free toe pulp to finger transfer flaps (1,2,3,4).

The medially based, random pattern, thenar flaps have first been described by Gatewood, and later refined by Brody and Meals (7,8,9). Rinker described the laterally based thenar flap, however it is a random pattern flap (10).

Sahu et al. analyzed and compared the functional and aesthetic outcome of their case series in comparison with the then published data and found that the outcomes ranged from fair to good with regard to static and dynamic two-point discrimination (4). The simultaneous double thenar flaps were used by Polatsch et al. for the coverage of the soft tissue defects over amputated stumps of two fingers but both were proximally based5. Although Dellon et al. first described the indirect distally based thenar flap (11), they concentrated on their way of insetting the thenar flap as a proximal inset thenar flap but did not mention the dimensions of the flap nor the technique by which one could increase the arterial and venous supply of the flap. These points have been clearly described in this case report. In the literature, authors are more cautious about the incidence of flexion contracture of the proximal interphalangeal joint (PIPJ) of the injured finger, which could be prevented by early and supervised physiotherapy. In addition, the PIPJ flexion contracture is less common in the motivated and in the young patient of age less than 30 years (4).

CONCLUSION

Distally based fascio-cutaneous thenar flaps are a viable option for the reconstruction of the whole pulp of the distal phalanx of two fingers simultaneously.

Author declaration

Authors' contributions:
Primary treating physician: AR; Collect the data and literature search and prepare the manuscript: AA.

Conflicts of interest:
The authors declare that there is no financial or non-financial conflict of interest.

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