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# The ulnar palmar perforator flap: Anatomical study and clinical application

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**Summary** *Background:* Defects sustained at the little finger and the ulnar aspect of the hand are common and pedicled perforator flaps have unique advantages in resurfacing it. The purpose of this study is to reappraise the anatomy of the septocutaneous perforator in the postero-medial aspect of the hand and present our clinical experience in using perforator flaps based on it.
*Methods:* This study was divided into anatomical study and clinical application. In the anatomical study, 30 preserved upper limbs were used. Clinically, 16 patients with defects at the little finger or the ulnar aspect of the hand underwent reconstruction with flaps based on the perforator from the ulnar palmar artery of little finger. The defects ranged from $2.3 \times 1.3$ cm$^2$ to $5.7 \times 3.0$ cm$^2$.
*Results:* The septocutaneous perforator was constantly located $1.3 \pm 0.3$ cm superior to the fifth metacarpophalangeal joint with a diameter of $0.8 \pm 0.2$ mm. It travelled through the space between the superficial layer and the deep layer of hypothenar muscles, and ramified into three branches before entry into the skin. The ascending branch of the perforator has two patterns of anastomoses with the descending dorsal carpal branch of the ulnar artery: true anastomoses and choked anastomoses. Clinically, flaps in all 16 cases survived uneventfully, and donor sites healed without deformity.

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*Conclusion:* The location of the perforator at the postero-medial aspect of the hand is consistent; the ulnar palmar perforator flap is particularly suitable to cover defects in the little finger or the ulnar aspect of hand.


Soft-tissue defects on the little finger or the palm can be caused by trauma, tumour resection, surgical infection and scar release. Under the circumstance when the underlying bone and tendon are exposed, the defect requires flap coverage. There are already numerous options in the literature in terms of flap coverage for defects on the little finger or the hand, which have their respective advantages and disadvantages,[1–7] making the final reparative choice ultimately determined by the size, the location of the defect and the individual preference of the doctor and patient. However, to the best of our knowledge, there are still few reports about the perforator flap from the ulnar palmar artery of little finger (the ulnar palmar perforator flap). Therefore, we present our anatomic study and clinical application of the ulnar palmar perforator flap.

## Materials and methods

### Anatomic study

Thirty cadaveric upper limbs, 16 male and 14 female, were used for this anatomic study. The average age of the cadavers used was 55 years old, ranging from 30 to 76 years old. Each cadaver was injected with a mixture of red gelatin (natural rubber with red-coloured paint) with manual pressure through the axillary artery until the incisions within the pulp of the fingers stained red. In each cadaveric upper limb, a longitudinal incision was first made at the middle of palm and gradually extended to the ulnar margin of the hand. The skin, subcutaneous fat and aponeurosis were raised. The abductor digiti minimi muscle and the flexor digiti minimi brevis muscle were divided and raised to observe and record the trajectory of the perforator from the ulnar palmar artery of little finger. Then, the perforator extending to the postero-medial aspect of the hand was carefully identified. The fifth metacarpophalangeal joint was adopted as the anatomic landmarks for localisation of the perforator. A steel rule and a Vernier caliper were used for obtainment of the related data. All data were expressed as mean ± standard deviation (SD).

### Clinical application

Between March 2011 and February 2013, 16 patients with soft-tissue defects on the little finger or the ulnar aspect of the palm (Table 1) underwent reconstruction with the ulnar palmar perforator flap. Among them, 11 cases were male, and the other female. The age of patients ranged from 17 to 62 years, with an average of 31.5 years. The aetiology of injury: five cases were caused by crush of press machines, three by crush of punching machines, four by planers, two by explosion and two by burn. The defect location were as

**Table 1** Patients demographic data.

| Case | Gender | Age | Cause | Location of defects | Size of defects ($cm^2$) | Size of flaps ($cm^2$) | Flap complications | Donor-site complications | Follow-up (weeks) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Male | 19 | Explosion | Little finger | 2.3 × 1.3 | 2.5 × 1.5 | No | No | 7 |
| 2 | Female | 30 | Crush of press machines | Little finger | 3.0 × 2.3 | 3.5 × 2.8 | No | No | 9 |
| 3 | Male | 17 | Explosion | Ulnar palm | 3.6 × 1.8 | 4.0 × 2.2 | No | No | 13 |
| 4 | Male | 25 | Empyrosis | Little finger | 5.0 × 2.7 | 6.0 × 3.0 | No | No | 8 |
| 5 | Male | 33 | Planer | Little finger | 2.4 × 1.2 | 3.0 × 1.5 | No | No | 10 |
| 6 | Female | 37 | Crush of press machines | Ulnar palm | 3.9 × 1.3 | 4.5 × 1.8 | No | No | 9 |
| 7 | Female | 36 | Punching | Little finger | 5.7 × 3.0 | 6.0 × 3.5 | No | No | 10 |
| 8 | Male | 26 | Crush of press machines | Ulnar palm | 4.2 × 2.8 | 4.6 × 3.0 | No | No | 8 |
| 9 | Male | 20 | Punching | Little finger | 4.3 × 2.5 | 4.6 × 2.9 | No | No | 9 |
| 10 | Male | 62 | Planer | Little finger | 5.1 × 2.2 | 5.5 × 2.5 | No | No | 16 |
| 11 | Female | 41 | Crush of press machines | Ulnar palm | 4.7 × 2.6 | 5.1 × 3.0 | No | No | 8 |
| 12 | Male | 27 | Planer | Little finger | 3.6 × 1.3 | 4.0 × 1.5 | No | No | 9 |
| 13 | Male | 22 | Punch | Little finger | 5.7 × 1.8 | 6.0 × 2.0 | No | No | 7 |
| 14 | Male | 36 | Empyrosis | Ulnar palm | 4.6 × 2.5 | 5.0 × 2.9 | No | No | 8 |
| 15 | Female | 24 | Crush of press machines | Little finger | 4.0 × 2.1 | 4.3 × 2.5 | No | No | 11 |
| 16 | Male | 49 | Planer | Little finger | 4.6 × 2.0 | 5.0 × 2.3 | No | No | 8 |