

Cross-finger flap. A case report

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Case Report

Plastic Surgery



Background: Background: Fingertip defects with exposed bone, tendon, or osteosynthesis material represent a reconstructive challenge, requiring restoration of both durable coverage and fine sensation. The cross-finger flap, first described by Cronin in 1951, remains a reliable option when local advancement flaps are insufficient.

Methods: We report a case of a 70-year-old man with a 3 × 2.5 cm pulp defect on the fourth finger, reconstructed using a classic cross-finger flap from the adjacent digit. Donor site closure was achieved with a full-thickness skin graft from the thenar region. A review of the literature was performed to analyze the anatomical basis, surgical variants, outcomes, and complications associated with the technique.

Results: The flap and graft demonstrated complete integration with preserved vascularity and satisfactory aesthetic results. Literature review confirms survival rates exceeding 95%, with modifications—such as adipofascial, innervated, and reverse digital artery-based flaps—improving sensory recovery and reducing donor site morbidity. Early mobilization after pedicle division minimizes stiffness and enhances function.

Conclusions: The cross-finger flap remains a cornerstone in fingertip reconstruction, combining technical simplicity, predictable survival, and acceptable sensory restoration. Recent refinements have expanded its indications and optimized aesthetic and functional outcomes, reaffirming its essential role in modern hand surgery.

Keywords: Cross-finger flap – Fingertip reconstruction – Hand surgery.

Digital pad injuries represent a frequent reconstructive challenge in hand surgery, due to the need to restore both skin coverage and fine tactile sensation and finger function. In defects with exposed bone, tendon, or osteosynthesis material, primary closure or simple grafting options are often inadequate. The cross-finger (heterodigital) flap, initially described by Cronin in 1951, has proven to be a versatile and reliable technique for covering painful areas of the pad, especially when local V-Y or Kutler flaps are insufficient (1,2).

The principle of the cross-finger flap is to transpose a cutaneous or adipofascial segment from the dorsal aspect of an adjacent finger to cover the defect of the injured finger. Its vascular supply comes from the dorsal branches of the digital arteries, and the flap's survival depends on the integrity of this subdermal plexus (3). Multiple variants have been described, including adipofascial, innervated, and reverse digital artery-based flaps, which aim to improve sensitivity and reduce donor site morbidity (3–6).

Despite its technical simplicity and high reported success rate, the cross-finger flap is not without complications, such as joint stiffness, pigmentation changes, or partial graft loss from the donor site (7,8). Appropriate patient selection, precise

anatomical design, and early rehabilitation are crucial for the final functional outcome (9).

This paper reviews the anatomical foundations, surgical technique, and recent evidence on the functional and aesthetic outcomes of the cross-finger flap from a case report for digital pulp coverage, analyzing technical variants and strategies to minimize complications.

Case report

We present the case of a 70-year-old male patient who presented a wound on the fourth finger tip of his right hand with a raw area measuring approximately 3 x 2.5 cm while working at home (Figure 1). The patient's medical history includes type 2 diabetes mellitus and occasional smoking. It was decided to perform a cross-finger flap to cover the defect and improve sensory function. Following the surgical protocol, the right upper extremity was cleaned and a flag incision was made. The dorsal area of the third finger was marked at the level of the middle phalanx. The hinge flap was raised to a depth that preserved subcutaneous adipose tissue (Figure 2). Once the flap was raised, it was approximated toward the raw area, and cardinal points were secured using 4/0 nylon. A full-thickness graft was harvested from

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Figure 1. Wound on the fourth finger tip of his right hand with a raw area measuring approximately 3 x 2.5 cm

the thenar area to cover the donor site (Figure 3). Good integration of both the graft and the flap is observed (Figure 4).

Discussion

The cross-finger flap continues to be a fundamental tool in pulp reconstruction, especially when the use of local volar flaps is not possible. Several studies have demonstrated a survival rate greater than 95%, with satisfactory functional results and high aesthetic satisfaction (8,9).

The choice between a classic skin or adipofascial flap depends on the size and depth of the defect. The adipofascial flaps described by Imaizumi et al. (3) present lower donor site morbidity and a more favorable aesthetic result, although they require secondary coverage with a skin graft. On the other hand, innervated flaps have shown better discriminative sensory recovery without compromising flap vitality (1).

In cases of extensive loss or exposure of internal fixation, the reverse digital artery-based flap offers more reliable vascular flow and can be used even after revascularization or dorsal digital injuries (6,10). Al-Qattan (7) introduced the double cross-finger flap variant, useful for large or combined defects of the pulp and distal phalanx, with acceptable functional results.

Donor site management is critical. Total skin graft (TSG) coverage is associated with less secondary contraction and better cosmetic results than partial skin graft (STSG), although it requires an additional



Figure 2. Dissection of the Cross-Finger Flap, trying to preserve its adipose tissue.

donor area (4). In the postoperative phase, prolonged immobilization can cause joint stiffness; therefore, early physical therapy and progressive mobilization after pedicle division (at 2–3 weeks) are essential (5,9).

In terms of sensation, the classic flap rarely restores normal sensitivity, although it provides adequate protective sensitivity. In a follow-up of more than 30 patients, Gurbuz et al. (9) reported protective sensitivity in 92% and two-point discrimination in 70% of cases.

Finally, the choice of this technique must balance stable coverage, functional preservation of the donor finger, and sensory recovery in the recipient finger. Contemporary modifications, including innervated or adipofascial flaps, have improved outcomes and reduced complications, reaffirming its value in fingertip reconstruction (1,3,6,8).

Conclusion

The cross-finger flap represents a reliable, reproducible, and versatile reconstructive technique for skin coverage of painful areas of the digital pulp. Its simplicity, high success rate, and good aesthetic integration maintain it as a first-line option when local flaps are not viable. Recent innovations—such as innervated, adipofascial, and reverse digital artery-based flaps—have improved sensory recovery and reduced donor site morbidity (1,3,6). Precise surgical planning, adequate vascular control, and postoperative



Figure 3. Final result of flap mobilization and placement of full-thickness skin graft at the donor site



Figure 4. Final result 2 weeks after surgery
rehabilitation are crucial for optimizing functional and aesthetic outcomes.

In conclusion, the cross-finger flap remains an essential tool in modern hand reconstructive surgery, combining technical simplicity with predictable and functionally satisfactory results (2,8,9).

Conflicts of interests

The authors have no conflicts of interests.

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