

Treatment of Industrial Fingertip Crushing Injury with Cross Finger Flap

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Abstract

Fingertip crushing injuries are severe hand injuries. It is a very common industrial injury. Treatment goals include reducing pain, optimizing the healing time, preserving local tissue, pulp sensitivity and finger length, preventing neuromas and restoring an appearance that is acceptable to the patient. A cross-finger flap is a simple and reliable flap among the various reconstructive options available for fingertip injuries.

Keywords: Fingertip injuries, Cross finger flap, Industrial injuries

Introduction

Fingertip crushing injury with tissue loss is a very serious injury that can lead to significant functional loss. If the amputated portion is not recovered or cannot be repositioned, treatment requires covering the defect with flap or skin graft.

The best way to treat fingertip amputation, treatment goals include reducing pain, optimising the healing time, preserving local tissue metabolism, pulp sensitivity and finger length, preventing neuromas and restoring an appearance that is acceptable to the patient.

The cross-finger flap (CFF) first described in the 1950s [1,2,3] is one of the flaps than can be used to treat fingertip amputations, as it provides a solution to the various criteria listed above. The goal of this study was to assess the long-term clinical results of using this flap.

Case Presentation

A 37 year old male presented in the emergency department with crushing injury to the tip of the right index finger. The mechanism of injury was direct contact with a sharp machine at the workplace resulting in fingertip tissue loss.

On clinical examination in emergency department found Severe crush injury at the distal end of the right index finger with soft tissue loss around 3x2 cm with loss of skin & Subcutaneous tissue. Active bleeding present from the wound was present. Bone was not exposed. Patient had Painful restricted ROM+. There was No neurological deficit. X ray of the hand was normal. Primary treatment was given in the emergency department as washing of the wound and wet bactigras dressing was applied. Patient was offered surgical intervention in terms of cross finger flap surgery. All risk benefits and complications of surgery were verbalized to the patient and written surgery consent was taken for the same. Preop evaluation and anesthesia checkup was done. Surgery was planned on urgent basis under regional anesthesia.



Figure 1. Pre-op Tissue Loss in Index Finger.



Figure 2. Pre-op Evaluation of Deficient Area showing 2.5/3 cm Tissue Loss.

X-ray showed No bony injury to the distal phalanx.

The procedure was done under a digital block and short GA.

After debridement of the injured fingertip, the defect size was measured. (Figure 2)

For a pulp defect, the flap was designed on the dorsum of the middle phalanx of an adjacent digit. Middle finger in this case. The proximal and distal extent of the flap was incised first, and dissection was carried down to the paratenon of the extensor tendon. The flap was then separated from the paratenon with blunt dissection. A rectangular flap was harvested, leaving the edge of the flap closest to the recipient's finger intact. To ensure the paratenon of the extensor tendon is intact, a good take of the skin graft is essential. Flap inset was then performed. One end was anchored at the distal defect's lateral aspect to get a good fingertip contour, and about 5 mm of the excess flap was left hanging out distally.

After the proximal part of the flap inset was done, the tip was turned down and sutured to the sterile matrix. A full-thickness skin graft was harvested and applied to cover the donor site defect and the exposed skin bridge. A tie-over dressing was placed over the skin graft recipient site.

Dressings were applied, and two fingers were immobilized with a splint to prevent undue tension on the flap.



Figure 3. Flap marked from another Finger Dorsum.



Figure 4. Donor Site covered with Full Thickness Skin Graft.

The patient was discharged and reviewed for dressing after 4 days, which showed good uptake. On the 10th day, the next dressing was done, which showed excellent graft uptake. (Figure 6) and also the donor site skin graft uptake was good (Figure 7).



Figure 5. Flap Crossed and attached to the Injured Finger.



Figure 6. Post-op 10th day follow-up showing Good Graft Uptake.



Figure 7. Donor Site also showing Good Uptake.

Post Procedure

The patient tolerated the procedure well. Post-division, the patient was advised to wear regular dressing and follow up in the outpatient department, and range-of-motion exercises were advised with the dressing in place.

At the end of 6 weeks, the finger's full function was seen with a well-healed scar, and full ROM was achieved. (Figure 8,9,10)



Figure 8,9,10. Final outcome showing full Extension, full Flexion and well-healed Scar.

Discussion

Fingertip amputations are prevalent hand injuries in industrial areas and are also common in households/kitchens. Finger injuries are frequently encountered as they are the most exposed parts of the body, and they are in contact with devices and tools, so they are exposed to a multitude of risks. Fingertip amputation is a potentially serious injury to the hand that can lead to significant functional loss.

Different surgical options are available, such as skin grafting, stump closure, and microvascular reconstruction (1).

Treatment goals include reducing pain, optimizing the healing time, preserving local tissue, pulp sensitivity and finger length, preventing neuromas and restoring an appearance that is acceptable to the patient (2).

The cross-finger flap is a 2-staged procedure first published by Gurdin and Pangman (3). The cross-finger flap was described initially in 1950 and is one of the workhorse flaps for finger reconstruction. It can be done as described originally or as a modification in multiple scenarios of finger trauma (2,3).

The flap is taken from the dorsum of an adjacent digit, usually at the level of the middle phalanx, and is used to resurface a volar unfavorable pulp amputation. This flap does not require the patient to place the arm in an awkward position, is easier to perform, and is less time-consuming than raising an island flap (4,5).

Conclusion

A cross-finger flap is a simple and reliable flap among the various reconstructive options available for fingertip injuries. The main criticism of the cross-finger flap is that it is a two-stage procedure, uses an uninjured digit, and may result in stiffness of the donor finger.

In addition, it does not provide glabrous skin for coverage. Although the flap is not innervated, it has been shown to achieve good sensory recovery and results in younger patients.

Conflicts of interest

The author has no conflict of interests.

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