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Treatment of Traumatic Injury of 2nd Digit with Reverse Cross-Finger Flap: A Case Report

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Abstract

Traumatic injuries from road traffic incidents are a major public health problem in India, accounting for a substantial share of deaths and hospital admissions, with motorized two-wheeler crashes particularly common among young adults. Hand trauma represents a significant proportion of these cases and frequently affects the dominant right hand and central digits, with important consequences for function and livelihood. The reverse cross-finger flap is a well-established option for dorsal digital soft-tissue loss, providing robust coverage and good functional outcomes with limited donor-site morbidity. We report a 22-year-old male who presented with dorsal soft-tissue loss of the right index finger following a motorcycle accident; after debridement, a reverse cross-finger flap was harvested from the adjacent middle finger to cover exposed structures, and the flap healed uneventfully with satisfactory motion and cosmesis, highlighting the usefulness of the reverse cross-finger flap as a practical reconstructive choice for digital trauma in resource-constrained, high-volume trauma settings.

Keywords: Cosmesis, Soft-Tissue, Wound Care, Upper Limb Trauma

Introduction

Road traffic injuries are a leading cause of death and disability among young adults in India, with two-wheelers disproportionately involved[1,3]. National estimates suggest that road traffic cinjuries account for roughly 10–12% of all deaths and a sizable fraction of

emergency and surgical admissions, with males in their second and third decades of life being most affected[2].Upper limb trauma, including hand and finger injuries from motorcycle crashes, is common in this demographic and carries significant implications for long-term function, employment, and quality of life[4].

Current management of lacerated and degloving wounds of the hand emphasizes early assessment of vascular status, tendon and nerve integrity, followed by meticulous debridement and irrigation to minimize infection and optimize tissue viability[5,6]. Guidelines support primary closure, when possible, but for wounds with exposed tendon, bone, or joints, timely soft-tissue coverage using local, regional, or free flaps is recommended to protect critical structures and permit early mobilization[7]. Rehabilitation with early, guided physiotherapy is considered essential to restore range of motion and prevent stiffness, and treatment plans are ideally tailored to preserve hand function needed for the patient's occupation. The reverse cross-finger flap is particularly advantageous for dorsal digital defects such as in this case because it provides well-vascularized, sensate skin from an adjacent finger with a relatively straightforward technique and low donor-site morbidity. It offers reliable coverage for exposed extensor tendons and phalangeal bone, maintains finger length, and allows acceptable range of motion and cosmetic outcome when combined with appropriate postoperative splinting and therapy. In resource-constrained, high-volume trauma settings where microsurgical options maybe limited or impractical, the reverse cross-finger flap represents an ideal, reproducible solution for complex dorsal finger injuries following motorcycle accidents in young adults.

Case Presentation

A 22-year-old right-hand-dominant male presented to the emergency department following amotorcycle accident, in which he sustained a direct impact to the dorsum of the right hand. He reported immediate pain, bleeding, and inability to move the right index finger, but denied loss of consciousness or other major injuries. On examination, there was a dorsal soft-tissue defect over the middle phalanx of the second digit of the right hand with exposed but intact extensor tendon and contaminated wound edges. Capillary refill was preserved at the fingertip, with intact gross sensation in the radial and ulnar digital nerve distributions; no associated fractures were seen on radiographs of the hand.

Figure 1: Pre-Operative image displays traumatic lacerated wound on 2nd digit of right hand.

After thorough irrigation and sharp debridement under regional anesthesia, the defect was assessed as unsuitable for primary closure or skin grafting due to exposed tendon and lack of as table, vascularized bed. Given the size and location of the defect, and the availability of adjacent healthy skin, a decision was made to perform a reverse cross-finger flap using the dorsal aspect of the third digit of the right hand as the donor site. A rectangular flap was designed over the dorsal middle phalanx of the middle finger, elevated in the

subcutaneous plane, and transposed to cover the dorsal defect of the index finger; the donor site was then covered with a split-thickness skin graft. Both fingers were immobilized together using a dorsal splint and a holding suture at the distal end of 2nd and 3rd finger.

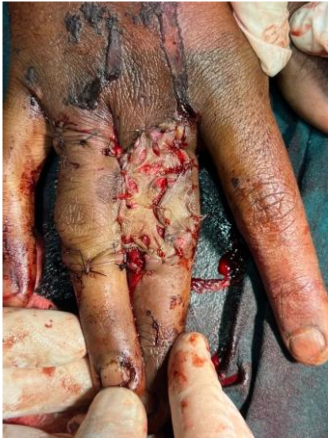

Figure 2: The 2nd and 3rd digits were joined intraoperatively upon completion of the reverse cross-finger flap. The postoperative course was uneventful. The patient was maintained on limb elevation, antibiotic prophylaxis, and regular wound care. At two weeks, the flap demonstrated complete survival, and division of the flap pedicle was performed, followed by initiation of a supervised physiotherapy program focusing on gradual range-of-motion exercises. At subsequent follow-up, the patient achieved satisfactory active motion of the index and middle fingers with good grip strength.

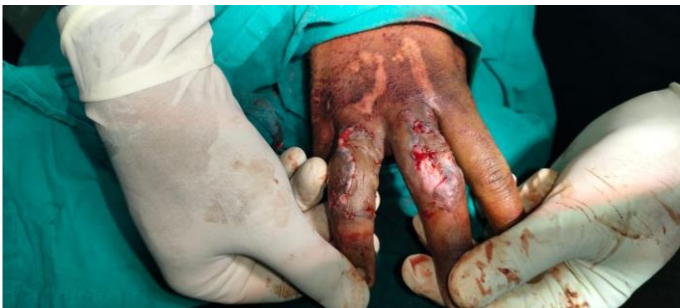

Figure 3: Three weeks postoperative image shows holding of graft and granulation tissue formation around the graft site.

Conclusion

Reverse cross-finger flap coverage from the adjacent third digit provided reliable and durable soft-tissue reconstruction of the traumatized right index finger in this young motorcycle-injury patient, resulting in full flap survival, satisfactory range of motion, and good grip strength. This case underscores that, when early debridement and careful defect assessment reveal exposed tendon or bone on the dorsal aspect of a digit, the reverse cross-finger flap remains a simple, reproducible, and function-preserving option. In resource-limited, high-volume trauma settings, such as those commonly encountered with motorcycle-related hand injuries in young adults, this technique offers an excellent balance of surgical safety, postoperative rehabilitation potential, and long-term functional and cosmetic outcomes.

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