Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Orthopaedic Surgery

Management of Traumatic Degloving Injury of the Hand: A Case Report

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DOI: https://doi.org/10.36347/sjmcr.2026.v14i01.015 | **Received:** 28.10.2025 | **Accepted:** 01.01.2026 | **Published:** 10.01.2026

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Abstract | **Case Report**

A 33-year-old man sustained a severe hand degloving injury involving the index, middle, and ring fingers after entrapment in a brick machine. Emergency management included debridement, fixation, tendon repair, and skin reimplantation. Partial necrosis required secondary surgery. Despite the crush mechanism, recovery was favorable with good function and aesthetics. Early surgery and rehabilitation are key to optimal outcomes

Keywords: Hand degloving injury, Reimplantation, Crush injury, Functional outcome.

INTRODUCTION

Hand degloving injuries are severe traumatic avulsion injuries characterized by separation of skin and subcutaneous tissue from deeper structures, often resulting from high-energy industrial accidents. These injuries pose major reconstructive challenges due to the complexity of tissue loss and vascular compromise. Optimal management includes reimplantation and revascularization whenever technically feasible. Although the success rate of reimplantation is limited, it may offer superior functional and aesthetic results [1].

We report a case of complex degloving injury involving the second, third, and fourth fingers caused by a brick-manufacturing machine. Despite extensive damage, prompt surgical repair and rehabilitation led to a successful recovery. This case highlights the importance of early management and individualized decisions to optimize functional and cosmetic outcomes.

CASE REPORT

A 33-year-old right-handed male sustained a degloving injury to his right hand when it was trapped in a brick-making machine during maintenance. The index and middle fingers showed circumferential skin avulsion, and the ring finger had volar skin loss from the metacarpophalangeal to the proximal interphalangeal joint (Figure 1). Radiographs revealed a comminuted fracture of the second metacarpal neck and a fracture-dislocation of the ring finger PIP joint (Figure 2).

Figure 1: Figure showing traumatic degloving injury of the patient's right hand with extensive soft tissue damage

Figure 2: Radiographic image showing fracture-dislocation of the PIP joint of the ring finger and a comminuted fracture of the neck of the second metacarpal

Initial management included irrigation, debridement, tetanus prophylaxis, and intravenous first-generation cephalosporin. The patient was transferred to the operating room for emergency surgery. Exploration revealed contamination with sand and necrotic soft tissue. Thorough debridement and irrigation were performed.

The ring finger fracture-dislocation was stabilized using an extension-block pinning technique. The second metacarpal fracture was shortened slightly and fixed with retrograde intramedullary K-wires. Intraoperatively, the flexor digitorum profundus and superficialis tendons of the index, middle, and ring fingers were completely lacerated in zone II, while the extensor tendons were stretched but intact. The vascular supply to the index finger was maintained only by surrounding soft tissue.

Primary tendon repair was achieved using a modified Kessler suture with 4-0 nonabsorbable monofilament. After hemostasis and tension-free tendon gliding assessment, the avulsed skin was repositioned and sutured. The wounds were closed with interrupted nylon sutures, and a dorsal splint was applied (Figure 3).

Figure 3: Intraoperative view after debridement showing extension-block pinning of the ring finger PIP joint, shortening and retrograde intramedullary K-wire fixation of the second metacarpal, flexor tendon repair, and skin closure

On postoperative day three, dorsal skin necrosis developed on the index and middle fingers (Figure 4). The patient underwent secondary debridement and skin closure using the elasticity of the remaining dorsal skin (Figure 5). No graft or flap was required. Antibiotic therapy continued for ten days, and early passive mobilization began after one week.

Figure 4: Figure illustrating the hand on postoperative day three, showing necrotic changes on the posterior aspect

Figure 5: Figure showing the appearance of the hand after debridement and skin closure

At six months, all wounds had healed completely. The patient regained near-complete flexion and extension of the index, middle, and ring fingers, performing daily tasks comfortably. The cosmetic outcome was satisfactory (Figure 6). Functional evaluation using the Disabilities of the Arm, Shoulder and Hand (DASH) score showed a value of 19, indicating mild residual disability and good recovery.

Figure 6: Appearance of the hand six months post-trauma, demonstrating complete healing of the injured areas. The aesthetic outcome is highly satisfactory

DISCUSSION

Degloving injuries are among the most complex hand traumas due to simultaneous damage to skin, vessels, tendons, and bones. The main surgical objective is to restore vascularity and provide stable coverage that allows early motion. When vascular conditions allow, microsurgical revascularization should be attempted, as it offers the best results [2,3]. However, in severe crush injuries, venous and neurovascular destruction often precludes successful anastomosis.

Industrial machinery trauma generates strong shearing forces that detach skin and subcutaneous tissue as a single unit. The reflex withdrawal of the limb may aggravate the damage by tearing vessels and nerves. When reimplantation is possible, outcomes are superior to secondary reconstructions such as distant flaps. When not feasible, local or free flaps remain reliable alternatives for coverage and tendon protection [4,5].

Risk factors for necrosis after reimplantation include smoking, little finger involvement, ischemia exceeding eight hours, severe crush injury, infection, and postoperative hypothermia [6,7]. In this case, despite the crush mechanism, absence of ischemia, infection, and smoking likely contributed to the favorable result. Early debridement, stable fixation, and careful tissue handling were key to preventing necrosis and stiffness.

Early physiotherapy is essential to avoid adhesions and joint contracture. It should start as soon as wound conditions allow, emphasizing progressive range-of-motion and tendon gliding. In this patient, adherence to rehabilitation permitted near-full digital motion, consistent with literature showing better outcomes after early mobilization [8]. The DASH score of 19 aligns with reported cases achieving good function after reimplantation.

From an aesthetic perspective, using the avulsed skin provides better color, contour, and texture match compared with distant flaps or grafts. In this case, the use of original skin preserved hand shape and avoided donor-site morbidity. Secondary closure after limited necrosis using adjacent dorsal skin further improved the result without requiring additional flaps [9,10].

This case demonstrates that even when complete microsurgical revascularization is impossible, conservative reimplantation using viable tissue and preservation of partial blood supply can succeed. Attention to gentle handling, minimal tension on closures, and protection of residual vascularity can lead to favorable outcomes in carefully selected patients.

Hand degloving injuries commonly involve extensive exposure of tendons, bones, and joints, which underscores the critical importance of prompt wound coverage and early initiation of functional rehabilitation to improve clinical outcomes and preserve hand function. [9,10]

Conflict of Interest: No conflicts of interest.

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