

# Salvage of Circumferential Multiplane Degloving Injury of Hand with Single Viable Finger – Case Report

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## Learning Point of the Article:

For circumferential degloving injuries of the hand with a large raw area, latissimus dorsi free flap in a wrapping fashion provides a reasonable alternative for coverage.

## Abstract

**Introduction:** Circumferential multiplanar degloving injuries of hand and wrist are devastating injuries which can severely compromise what is salvageable for achieving a functional hand, ending in amputations if not well managed.

**Case Report:** We described a complete multiplanar degloving injury of hand in a 27-year-old Asian male due to a compressing machine, which was successfully salvaged with a complete free latissimus dorsi flap cover with skin graft for coverage.

**Conclusion:** An unconventional one-stage surgical option for soft-tissue coverage using a complete latissimus dorsi free flap ending in a reasonably functional two-fingered hand.

**Keywords:** Degloving, multiplanar, coverage.

## Introduction

Avulsion injuries of the hand and/or fingers are common industrial accidents which are seen in emergency on daily basis. However, complete degloving avulsion injuries of the hand are serious injuries which are less common, which cause considerable challenges to a hand surgeon in terms of obtaining a functional hand, with sensation and contour/esthetic appearance [1]. A majority of total hand degloving injuries are mechanical injuries, and the degree of injury is related to the force of tearing, extrusion, and rolling [2]. Surgical decision-making involves looking through a crystal ball with retaining what is viable, what is reconstructable, and what can be done to improve the hand function in the long term. Free flaps are a viable option [3,4], with other flaps have been described [5]. Groin flap

and its modifications are considered a classical workhorse in degloving injuries [6,7]. We present a similar case of total circumferential degloving injury of hand with a viable middle intervening finger – which was challenging in retaining what was viable and what was reconstructable.

## Case Report

A 27-year-old male presented to us with complete degloving injury of the right hand, sustained when the hand was pulled by him reflexly while it was stuck in a compressing machine (for packing tissue paper). On examination, the hand was degloved from just proximal to wrist level with complete loosening of the whole integument except part of the skin covering the middle

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## Author's Photo Gallery



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**Figure 1:** (a, b, c) Anterior, lateral, and posterior images of the multiplanar circumferential degloving of the right hand, (d) – X-ray of the same.

finger (Fig. 1). All fingers were degloved with doubtful viability. X-ray revealed fractures of proximal phalanges of the index, ring, and little fingers. (Fig. 1-d)

He was immediately taken up for emergency surgical exploration, fixation with k wires, and repair to restore what would be viable. After saline irrigation and fixation of phalangeal fractures, it was noted that the radial and ulnar arteries all the way to the carpal arch were intact and the veins draining hand were also intact but stretched with severe crushing when examined under microscope. Considering the vascularity improved after surgical fixation along with these findings, it was decided to observe how this would progress. However, from post-operative day 2 the hand was getting edematous and showing up signs of compromised vascularity (Fig. 2a and 2b). He was managed with the removal of a few tight sutures after which the hand was showing signs of improved vascularity but ultimately – probably due to segmental intimal damages whole of the degloved hand had become necrotic and non-viable except the middle finger by 7th post operative day (Fig. 3a and 3b). He was taken up for debridement and all the non-viable tissues were thoroughly debrided leaving a hand with retained middle finger and part of the thumb till interphalangeal joint (Fig. 4a and 4b).

Considering the presence of a viable middle finger and a thumb

osteoligamentous framework available, he was taken up for coverage with a free latissimus dorsi flap with skin grafting (Fig. 5a to 5c). He underwent uneventful post-operative recovery and once the flap was settled he was taken up for debulking and first web deepening leaving a hand which was functionally able to hold things, write, and do his activities of daily living (Fig. 6a to 6c).

### Discussion

Clinical entity of degloving injury implies that the skin is lost but the musculoskeletal unit is intact, and hence the movements of the part can be preserved by a thoroughly well-planned reconstruction [8]. Multiple techniques are described in the literature for management of a total degloving injury of the hand ranging from Bilobed groin flaps, the combination of Groin and abdominal flap, compartmentalized abdominal flap and free anterolateral thigh flaps etc. [9] In all methods followed, the principles remain to provide thin, pliable and sensate skin that prevents contracture and stiffness, to allow the reconstructed tissue to heal quickly, to allow early mobilization, to provide skin durable enough to withstand a secondary surgical procedure and to create a result that is cosmetically acceptable [8].

What was peculiar in this case after stage debridement to retain what was viable and reconstructable was that the intervening middle finger with complete skin cover where attaching a pedicled skin flap/random flap becomes tricky considering the narrow skin edge for inset and the positioning to retain



**Figure 2:** (a and b) Images showing edematous hand with signs of compromised vascularity.



**Figure 3:** (a and b) Non-viable fingers with viable middle finger.

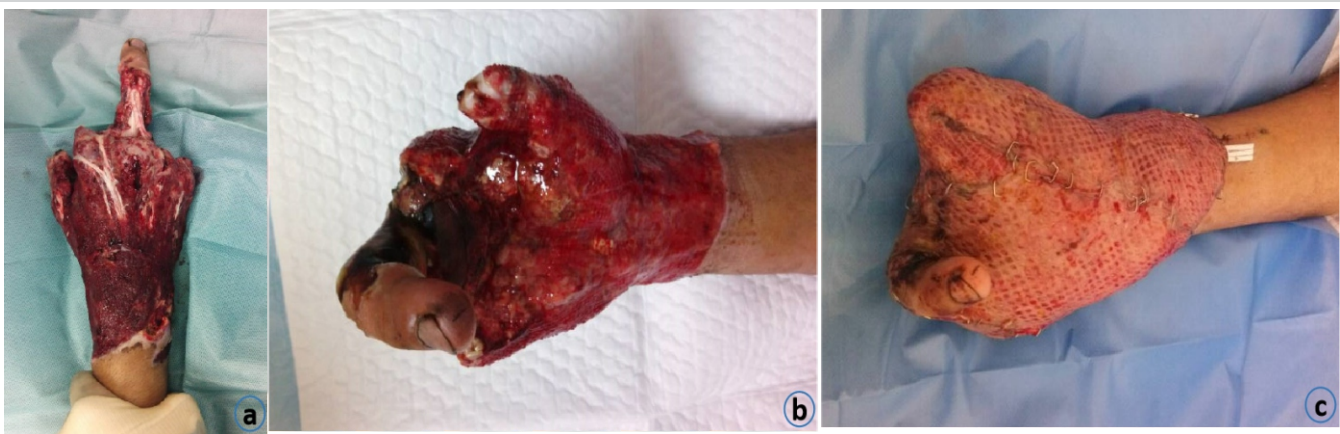


**Figure 4:** (a and b) Images after excision of all non-viable necrotic fingers and tissues with retained viable middle finger and thumb post.

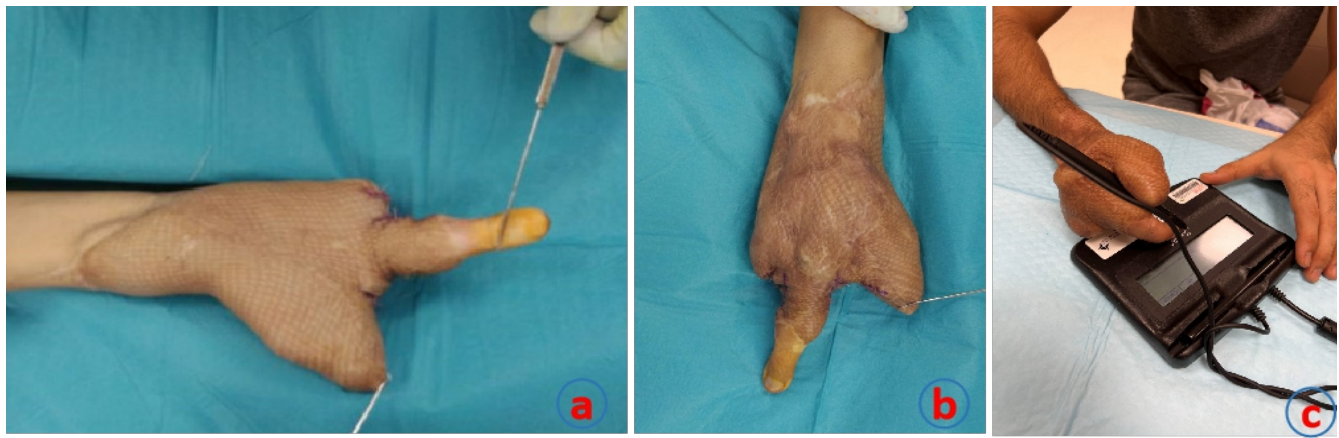
the fragile vascularity in the middle finger till the whole flap heals. Pocketing the degloved hand was not an option as the middle finger with viable skin could not allow this to be done. Hence, it was planned to do single-stage coverage with a free latissimus dorsi flap with skin graft which bought in its own vascularity after anastomosis with the donor vessels (radial artery and veins in forearm.) and did not depend on the vascularity of middle finger to heal. This large flap entailed complete coverage in a single stage with an uneventful post-operative recovery. He further underwent 1st web deepening around 6 months after flap settling and was able to have a two-

fingered hand capable of holding a spoon, writing, and typing which helped him in his activities of daily living. At the last follow-up, even though objectively his sensory assessment was not substantial, he was able to sense through the flap items held in his hand probably due to the proprioceptive feedback from the finger joints, retained sensate middle finger, and abundant sensory nerve endings in the degloved hand.

However, there are some fallacies which we would like to mention here in retrospect which included our failure to plan for an aggressive excision of the degloved segments in the form of excision of distal phalanges and flap cover which has been a



**Figure 5:** (a and b) Images just before final flap coverage, (c) after latissimus dorsi free flap coverage and skin grafting.



**Figure 6:** (a and b) appearance at 6th month when he underwent 1st web deepening and debulking. (c) patient is able to hold a pen and write.

method followed in multiplanar circumferential degloving injuries of hand [10]. In carefully selected patients with complete hand multiplanar degloving injury, this type of muscle flap also can be an option for coverage with providing a functionally salvageable hand, where the surgeon should try to see through the crystal ball what the hand would look like finally and counsel in detail the same to the patient.

### Conclusion

An unconventional one-stage surgical option for soft-tissue coverage using a complete latissimus dorsi free flap ending in a

reasonably functional two-fingered hand for a case of complete degloving with retained viable middle finger.

### Clinical Message

A complete degloving injury of the hand with partly retained viable fingers is a challenging case for any hand surgeon for providing coverage keeping in view the multiple reconstructive procedures needed in the future for providing a functional hand. By describing, this method of using a complete latissimus dorsi free flap for coverage in such cases, we would mention that this could also be an option in such difficult cases for coverage.

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Conflict of interest:** Nil **Source of support:** None

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