



Case report

## DISTANT SOFT TISSUE FLAPS IN A DEGLOVING SKIN INJURY

Mancho Kovachev, Hristo Gigov, Vihar Kovachev, Denis Dimitrov.  
*Department of Orthopedics and Traumatology, Medical University of Pleven, Bulgaria.*  
*Clinic of Orthopedics and Traumatology, University Hospital "Georgi Stranski" - Pleven, Bulgaria.*

### ABSTRACT

Avulsion skin injuries of the glove removal type are one of the most challenging and difficult problems in reconstructive hand surgery. Immediate or early coverage of the hand is of utmost importance. Several options are proposed for early covering the preserved structures (tendons, bones and nerves) early, mainly skin grafting on the preserved viable structures.

**Case description:** We present a case of a patient with 4th and 5th finger crushing and avulsion skin injury of thumb and index finger and lost distal phalanges. The 4th and 5th fingers had been amputated due to gangrene. Two anterior abdominal wall flaps were applied: a thoraco-umbilical flap and a horizontal Filatov stem" flap. On the 25th day, the flaps were separated from the fingers and following commissuroplasty 10 months later.

**Result:** Fusion between the donor flap and the recipient structures was obtained without clinical evidence of infection, ulceration and flap necrosis.

**Conclusions:** The usage of remote skin flaps is a safe and simple method to restore hand function when microsurgery cannot be applied.

**Keywords:** subcutaneous defects, glove injury, abdominoplasty, thoraco-umbilical flap, thoracoabdominal flap, Filatov's pedicle flap, commissuroplasty,

### BACKGROUND:

Degloving finger and hand injuries are common in industrial and road traffic accidents. The main point in treatment is adequate skin-subcutaneous coverage.

A loose skin graft usually does not survive. Due to the lack of skin fat, it adheres to exposed tissues and will interfere with the movement of underlying muscles, tendons and joints. This results in chronic ulceration, necrosis, and infection, which compromise the method [1]. In addition, the opportunity for a safe approach is lost in cases when subsequent reconstruction of deep structures is

needed. Due to the demands on skin grafts in recent decades, along with microsurgery, using remote flaps with preserved native circulation can survive on avascular structures has become necessary. They survive on tissue fluids from their new site until capillary circulation is restored [2]. In modern settings, the development of microsurgery has allowed for preserving circulation and the possibility of survival-free myocutaneous fascia late, free flap from the omentum, distally based radial-forearm flap, etc[3]. With the help of microanastomoses, these flaps can be repositioned in any injured area by searching for an optimally preserved donor artery and vein [4]. When reimplantation of the original skin is not possible and the subcutaneous tissue (vessels and nerves) is damaged, another solution is sought. Remote flaps have subcutaneous fat in addition to full-thickness skin and their own blood circulation (axial or randomized), all of which prevent infection of the exploded tendons and complex fractures [5,6]. These flaps do not collapse or adhere thanks to the subcutaneous fat and can be undermined if reconstruction of the underlying structures is required [7,8]. In most cases, only the skin and subcutaneous tissue are avulsed, leaving tendons and vessels intact. Early debridement and immediate coverage of the defect are vital for preventing infection and restoring proper function of the hand, while delayed intervention and free skin graft compromise the tendinous functions of the hand [9].

### CASE DESCRIPTION:

We present a case of traumatic finger contusion of the hand with damage to the vascular, nerve and bone structures of the 4th and 5th fingers and gloved skeletonization of the thumb and index finger in the absence of distal phalanges. The patient presented on the third post-injury day with gangrene of the 4th and 5th fingers (after attempted reimplantation and fixation with Kirschner needles), necessitating their amputation, and avulsion skin damage of the thumb and index finger (Fig. 1).

**Fig. 1.** Preoperative condition of the hand.



The operative technique involved complete debridement, followed by measuring the length to width of the defect then tracing the figures onto the anterior abdominal wall. After defining the paraumbilical perforators with a Doppler probe, 2 flaps were delineated: one thoracombilical flap using the hexagonal Holevic figure that hermetically closes the donor site and a suprainguinal anterior abdominal wall flap of the „Filatov’s Stem” type, with the flap brought together laterally to medially by elevating it to the fascia of the underlying abdominal muscles. Immobilization was performed with several sutures along the ulnar side of the palm and along the body. The length-width ratio was 1:1. The flap axis was between the thoracombilical compartment and the horizontal portion of the anterior abdominal wall, incorporating the subdermal vascular plexus originating from the terminal perforators of the inferior epigastric artery, abundant anastomoses to the paraumbilical vessels, and the superior epigastric artery, enabling the use of randomized flaps. The stripped fingers are inserted into the pockets thus created. Followed by aseptic closure of the donor site and sealing (Fig. 2).

**Fig. 2.** Postoperative.



On day 25, the flap was separated, and reconstruction of the finger sheath followed. The flaps thus created lacked clinical evidence of infection and skin necrosis, providing a good functional and aesthetic appearance (Fig. 3).

After the 8th month, minimization of the flap was performed (reducing the volume of the 1st and 2nd digits), and on the 10th month, a commissuroplasty was performed between the 1st and 2nd fingers and between the 2<sup>nd</sup> and 3rd finger reinforced with a free graft, resulting in a 40-degree angle between the 1st and 2nd metacarpals, which is within normal anatomical limits.

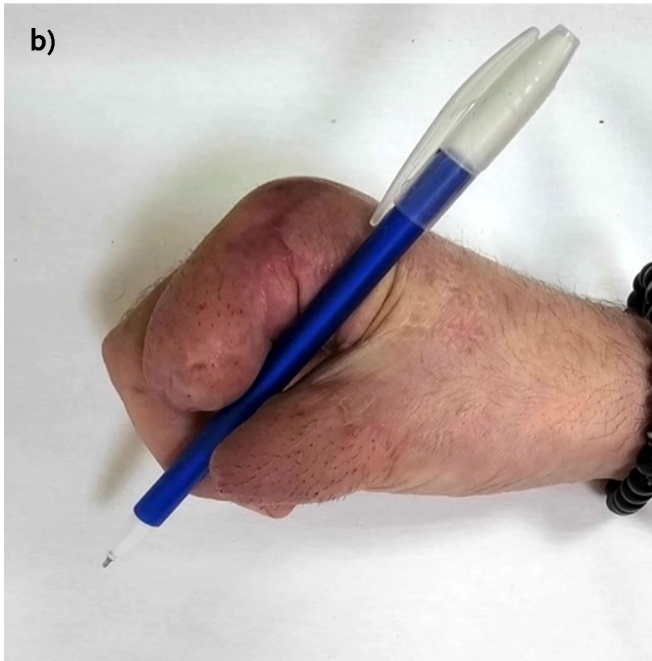
**Fig. 3.** Good aesthetic result.



Early rehabilitation was started. Between the 3rd and 6th month, there were signs of recovery of pain, touch sensation, and superficial sensation (Fig. 4 a, b)

**Fig. 4. A) B)**





## DISCUSSION:

Despite the advances in microsurgery, these severe hand injuries remain a difficult reconstructive problem. Simultaneous reconstruction of multiple fingers in an emergency setting is still a challenge and difficult reconstructive problem [10]. Therefore, the use of alternative methods for multiple injuries in such settings has led to the development of self-sufficient remote skin flaps with their own blood supply [11]. This is a relatively easy and quick technique when it is impossible to reimplant the original skin in multiple finger injuries, despite being unfavorable for microsurgery[12].

## CONCLUSIONS:

Distant soft tissue flaps are very useful in complex injuries like “degloving skin” injuries and any other case when microsurgery isn’t possible. This method is preferred because of the subcutaneous fat, which protects the underlying structures like tendons, nerves, etc., without adhesion. Distant soft tissue flaps have their own blood supply, which makes them more reliable, infection resistant and higher percentage of survival. This method also provides an approach for further reconstruction of the underlying structures, if it is necessary.

## REFERENCES:

1. Yamada N, Ui K, Uchinuma E. The use of a thin abdominal flap in degloving finger injuries. *Br J Plast Surg.* 2001 Jul;54(5):434-8. [PubMed]
2. Naalla R, De M, Dawar R, Chauhan S, Singhal M. Thoracoubilical Flap: Anatomy, Technique, and Clinical Applications in Upper Limb Reconstruction in the Era of Microvascular Surgery. *J Hand Microsurg.* 2018 Apr;10(1):29-36. [PubMed]
3. Yu YD, Zhang YZ, Bi WD, Wu T. Functional sensory function recovery of random-pattern abdominal skin flap in the repair of fingertip skin defects. *Exp Ther Med.* 2013 Mar;5(3):830-834. [PubMed]
4. Sharma A, Kumar A, Singh K, Beniwal M, Yadav U. Reconstruction of forearm and elbow defects by pedicled periumbilical perforator based Thoracoubilical flap: an alternative to free flaps. *J Orthop Trauma Surg Rel Res.* 2023 Mar 31;18(3):1-6. [Internet]
5. Krishnamoorthy R, Karthikeyan G. Degloving Injuries of the hand. *Indian J Plast Surg.* 2011 May;44(2):227-36. [PubMed]
6. Ramadevi V, Kumar KS. Pedicle Thoracoubilical flap for soft tissue coverage defects around elbow region. *IOSR-JDMS.* 2019 Feb;18(2 Ser.17):23-27. [Internet]
7. Arnez ZM, Khan U, Tyler MP. Classification of soft tissue degloving in limb trauma. *J Plast Reconstr Aesthet Surg.* 2010 Nov;63(11):1865-9. [PubMed]
8. Mir MA, Khurram F, Kumar D. Pedicled thoracoubilical flap coverage for wounds around elbow. *Turk J Plast Surg.* 2020 Jan-Mar;28(1):14-18. [Internet]
9. Adani R, Busa R, Castagnetti C, Castagnetti L, Caroli A. Reimplantation of degloved skin of the hand. *Plast Reconstr Surg.* 1998 May;101(6):1544-51. [PubMed]
10. Pshenisnov K, Minachenko V, Sidorov V, Hitrov A. The use of island and free flaps in crush avulsion and degloving hand injuries. *J Hand Surg Am.* 1994 Nov;19(6):1032-7. [PubMed]
11. McGeorge DD, Stilwell JH. The management of the complete ring avulsion injury. *J Hand Surg Br.* 1991 Nov;16(4):413-4. [PubMed]
12. Kaufman R, Nguyen J, Williams B, Lopez R, Boc SF. Treatment of Traumatic Degloving Injury of the Foot Using a Biologic Dressing in a Pediatric Patient. *Wounds.* 2019 Dec;31(12):E77-E81. [PubMed]

*Please cite this article as:* Kovachev M, Gigov H, Kovachev V, Dimitrov D. Distant soft tissue flaps in a degloving skin injury. *J of IMAB.* 2024 Jul-Sep;30(3):5700-5702. [Crossref - <https://doi.org/10.5272/jimab.2024303.5700>]

Received: 15/05/2024; Published online: 26/08/2024

### Address for correspondence:

Mancho Kovachev  
 Clinic of Orthopaedics and Traumatology of G. Stranski University Hospital - Pleven;  
 89, Ruse Blvd., Pleven, Bulgaria.  
 E-mail: [mani.rivera@abv.bg](mailto:mani.rivera@abv.bg),