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CASE REPORT

Glove-like hand: A case of severe-circumferential hand degloving injury

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ABSTRACT

While limb amputations are a common and routine procedure for hand surgery, degloving injuries to the hand and fingers are less common and challenging for many surgeons. For degloving injuries which mostly result in limb loss, amputation has been recommended in previous studies and established classification systems, if there is a total avulsion injury. In this article, we present a replantation case in which all difficult microsurgical techniques were used in an injury where four fingers were degloved like a glove and accompanied by a second-degree burn that would prevent flap applications along the dorsum of the forearm. We also performed a detailed analysis of a rare clinical image. In conclusion, many treatment options have been described for degloving injuries, such as flaps and skin-grafting, the most optimal functional and cosmetic results can be achieved with replantation. Therefore, the first option should be replantation, if possible, but in case of failure, other surgical options should be evaluated without delay.

Keywords: Degloving, microsurgery, replantation, trauma surgery.

Hand injuries are common in daily emergency surgery routine and are mostly caused by work accidents followed by simple home accidents.[1-3] In particular, hand and finger amputations are severe injuries which cause long-term and permanent loss of work.[4] While limb amputations are a common and routine procedure for hand surgery, degloving injuries to the hand and fingers are less common and present challenges for many surgeons.[5]

These injuries occur as a result of being squeezed between a cylinder or pressing machines and as a result of reflexive pulling of the hand, separating the skin connections from the deep tissue. For degloving injuries which mostly result in limb loss, amputation has been recommended in previous studies and established classification systems, if there is a total avulsion injury.[6,7] However, amputation is a difficult decision in multiple finger avulsions and results in a serious functional loss. Therefore, many flap options have been defined to restore hand function or to achieve maximum gain. These flap options include various modifications of the groin flap and various free flaps.[8-11] However, flaps do not always provide satisfactory results considering the surface area of the fingers. In addition, the functional consequences of a hand consisting of compound and thick-textured fingers are not extremely high compared to amputation. When emergency approach is considered, the most optimal and successful results can be achieved with replantation, if possible.[5]

In this article, we present a replantation case in which all difficult microsurgical techniques were used in an injury where four fingers were degloved like a glove and accompanied by a second-degree burn that would prevent flap applications along the dorsum of the forearm.

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CASE REPORT

A 35-year-old male patient presented to the emergency department 4 h after the injury with a total complete avulsion amputation from just proximal to the metacarpophalangeal (MCP) joint of his right hand, including all fingers, except for the thumb (Figure 1). The injury occurred as a result of compression and traction in a hot belt manufacturing factory and was accompanied by a large second-degree burn involving the dorsum of the hand and forearm. When the amputate was examined, it was observed that it was transported in appropriate storage conditions. There was a degloving injury just proximal to the MCP joint, including the third, fourth and fifth fingers, and there were ecchymotic areas compatible with skin perforator injuries, as well as separate injuries for the fourth finger, suggesting segmental arterial injury (Figure 2). When the injured hand was examined on the other side, a partial avulsion of the second finger with a fracture from the proximal phalanx and multiple segmental injuries was observed, along with extensive skin loss. The digital artery nerve bundle was injured at the

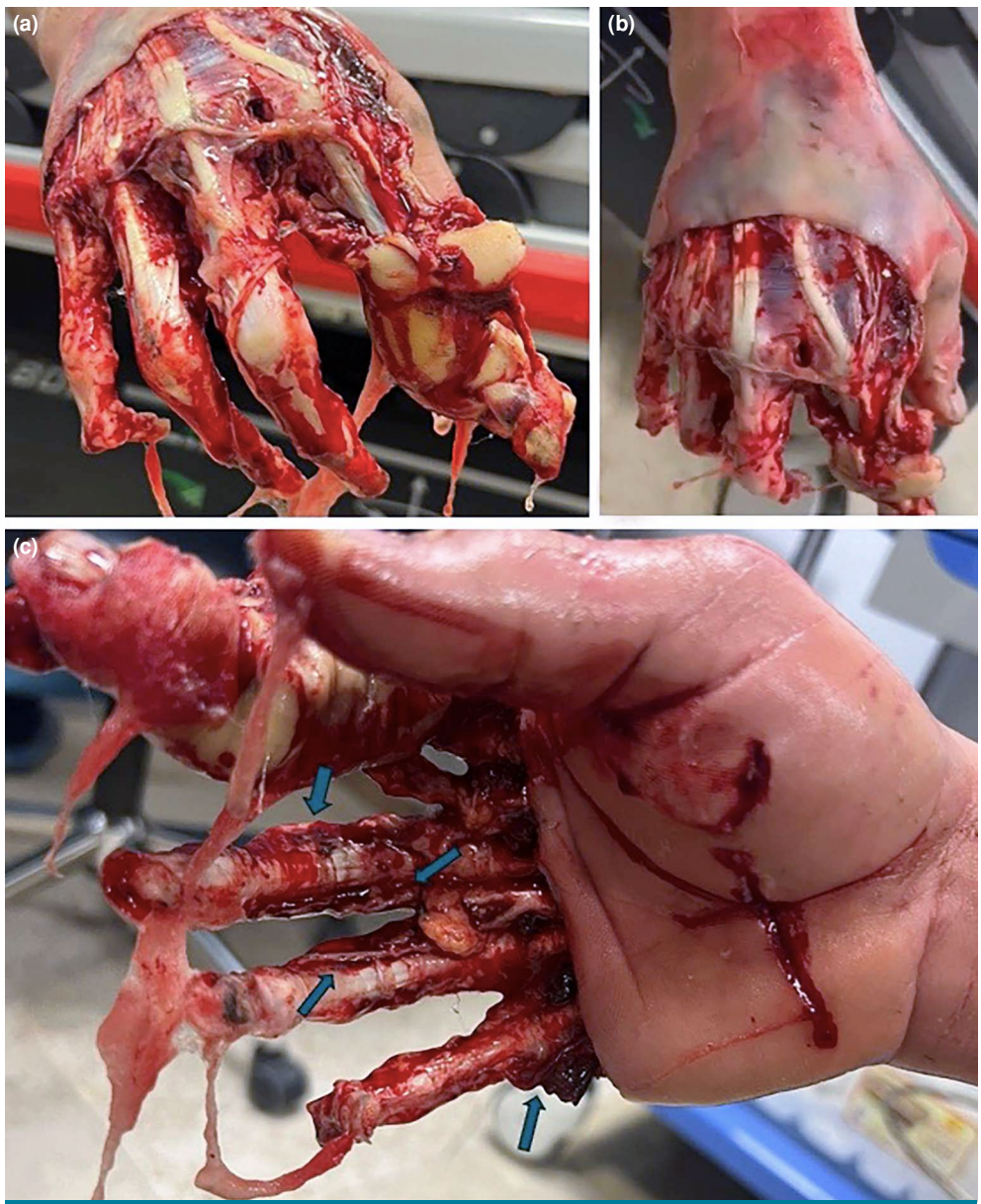


FIGURE 1. (a, b) Appearance of the injury site. **(c)** Blue arrows show neuro-vascular bundles.

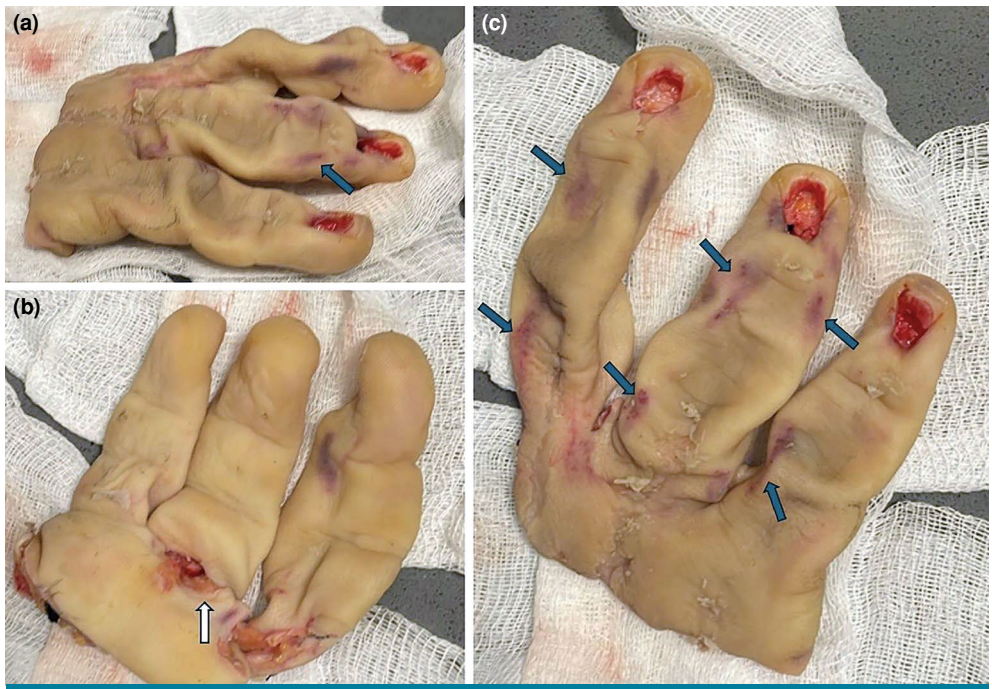


FIGURE 2. (a) Side view of the amputated part. **(b)** Volar view of the amputated part, white arrow indicates segmental vascular injury. **(c)** Dorsal view of the amputated part, blue arrows indicate the area of ecchymosis indicating injury to the skin perforators.

proximal phalangeal and middle phalangeal levels in the third finger, the fourth finger was injured at the middle phalangeal level, and the fifth finger was injured again at the proximal phalangeal level. X-ray showed that the second finger was amputated at the proximal phalangeal level, and the third, fourth and fifth fingers were disarticulated at the distal interphalangeal joint (Figure 3). The patient was taken into emergency surgery under general anesthesia for replantation exploration at 5 h of the injury. In the first evaluation, amputation of the second finger from the proximal phalangeal



FIGURE 3. Preoperative X-rays of right hand.

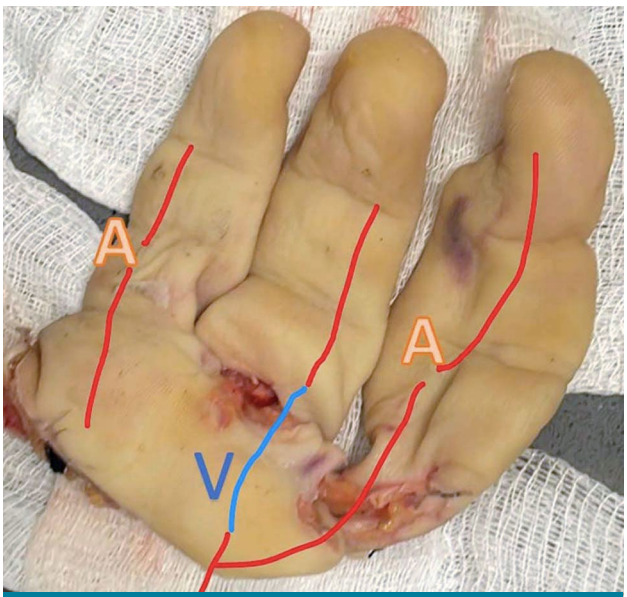


FIGURE 4. Diagram of revascularization.
A: The area where the artery anastomosis is performed; V: The area where the anastomosis is performed with a vein graft.

level was planned and the stump was closed. When the amputate was explored, the dominant artery of the third finger's ulnar side was found to be suitable for repair, the dominant artery of the fourth finger's radial side was suitable for repair with vein graft due to cementum injury, and the fifth finger ulnar side artery was suitable for repair and was revascularized. The revascularization repair diagram is shown in Figure 4. Following the arterial anastomoses, circulation was evaluated and all fingers had blood circulation. The digital nerve of the third finger ulnar side was suitable for repair and digital nerve repair was performed. No bone fixation was made. Afterwards, four veins suitable for repair were seen under the second-degree burn area on the dorsum of the hand. Four-vein anastomoses were performed. All structures were primarily sutured with the existing skin tissue. There was blood circulation in the amputate. No signs of intraoperative congestion were observed (Figure 5).



FIGURE 5. (a, b) Early postoperative view of the hand. **(c)** View of second degree burn of the forearm.



FIGURE 6. Final functional result of the right hand.

In the postoperative period, first-generation cephalosporins and antibiotics, low-molecular-weight heparin 0.4 mg/dL twice daily, continuous dextran infusion and acetylsalicylic acid 300 mg once daily were applied. Analgesic treatment was applied in steps. The amputate maintained its viability until Day 4; however, on Day 4, severe venous congestion was observed due to the pressure of the burn tissue. The patient was taken to the second operation, and the fourth and fifth fingers were found to lose their vitality, while the third finger maintained its vitality. The fourth and fifth fingers were amputated, and superficial debridement was performed on the areas where there were volar and dorsal tissue losses consistent with the injury.

The patient was discharged on Day 4 of the second operation with a prescription for first-generation cephalosporin and acetylsalicylic acid (100 mg/day). During weekly follow-up in the outpatient setting, the remaining tissues maintained their vitality. One month later, joint range of motion exercises were initiated with the assistance of physiotherapists. At four months of follow-up, the patient could perform grasping and pinching movements with the second finger stump and the replanted third finger (Figure 6). A written informed consent was obtained from the patient.

DISCUSSION

In the present case, we achieved a favorable, but limited result with replantation despite the indication for amputation in a severe degloving injury accompanied by burn tissues, and that there was a middle finger and second finger stump which could make a grasping motion against a functional thumb. The major problem in degloving injuries of the hand is that the skin perforators are separated from the deep tissue.[12,13] Therefore, it is well known that adequate perfusion may not be provided even if arterial anastomosis is performed. Although there is an indication for amputation, we cannot clearly establish before the operation how much vitality the tissue would show when revascularized. Therefore, replantation appears as a significant option in injuries which will cause serious loss of work, such as multiple phalangeal amputations.[14]

In previous studies, groin flap modifications and free flaps have been recommended for degloving

injuries of the hand. It has also been reported that the applied flaps form very thick tissues and are far from creating a functional finger structure.[7,15,16] From this perspective, tissue preservation can be given a chance by replantation, as in this case. In a study comparing both flap options and replantation, although the expectation of success was low, replantation was applied to suitable patients and groin flap or free flap options were applied to other groups, and when compared, functional and cosmetic results were more favorable in cases where replantation was applied and successful.[17] In our case, a functional middle finger and dorsum of the hand were obtained with replantation, and a more favorable result was obtained compared to amputation or a non-functional flap surgery, and the patient was able to perform grasping movements.

Although it has been documented that vascular repair is unnecessary in these cases due to tissue perfusion not being ensured, in the current case, no circulatory problems or venous insufficiency were observed in the first four days, and perfusion of the tissue was achieved. As the accompanying burns turned into eschar tissue, venous congestion occurred and, therefore, a partial loss occurred. Therefore, as in the limited number of replantation cases in the previous studies, giving the tissue a chance is the key to getting the most optimal result.[7,18] In cases where replantation is unsuccessful, the second surgical decision should be made quickly. The resulting hard necrotic structure may cause tendon, muscle and bone structures to lose their vitality.[19] Therefore, when necrosis is observed, it is recommended to evaluate free flap options and skin grafting after rapid debridement for the remaining tissue, which has extremely satisfactory results.[17] In this case report, unfortunately, the conditions under which we evaluate flap options were limited due to the extensive burned area, many recipient arteries passed under the burn tissue, or there was limited healthy tissue available for rotational movement. Therefore, we believe that the most optimal option for this patient is replantation.

In conclusion, degloving injuries of the hand are challenging injuries for many surgeons. Even if excellent vascular anastomoses are made, tissue viability may not be achieved. Although many treatment options have been described for these conditions, such as flaps and skin-grafting, the most optimal functional and cosmetic results can be achieved with replantation. Therefore, the first option should be replantation, if possible, but in case of failure, other surgical options should be evaluated without delay.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: Idea/concept, design, control, processing, analysis, literature review, writing the article, references: Ç.P.; Design, supervision, literature rewiew, critical review, materials: M.U.; Design, data collection, literature review, references, control: Ü.M.

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REFERENCES

1. Tang JB, Wang ZT, Chen J, Wong J. A global view of digital replantation and revascularization. Clin Plast Surg 2020;47:437–59. doi: 10.1016/j.cps.2020.06.002.
2. Pet MA, Ko JH. Indications for replantation and revascularization in the hand. Hand Clin 2019;35:119–30. doi: 10.1016/j.hcl.2018.12.003.
3. Hatipoğlu MY. Thumb dorsal skin composite tissue replantation: A case report. Jt Dis Relat Surg 2024;35:706–10. doi: 10.52312/jdrs.2024.1783.
4. Pamuk Ç. Is microsurgical experience essential in Zone II flexor tendon injuries? Jt Dis Relat Surg 2023;34:183-9. doi: 10.52312/jdrs.2023.931.
5. Zhang G, Ju J, Jin G, Tang L, Fu Y, Hou R. Replantation or revascularization for the treatment of hand degloving injuries. J Plast Reconstr Aesthet Surg 2016;69:1669-75. doi: 10.1016/j.bjps.2016.09.003.
6. Ju J, Li J, Wang H, Hou R. Classification and treatment of whole hand degloving injury. 2012;26:453-6
7. Ju J, Li J, Hou R. Microsurgery in 46 cases with total hand degloving injury. Asian J Surg 2015;38:205-9. doi: 10.1016/j.asjsur.2015.01.004
8. Dodakundi C, Saraj B, Seidam M, Saravanamurthy G, Alawadi K, Badawi H. Salvage of circumferential multiplane degloving injury of hand with single viable finger - case report. J Orthop Case Rep 2024;14:74-8. doi: 10.13107/jocr.2024.v14.i11.4920.
9. Ilenghoven D, Ibrahim S, Mohd Yussof SJ. Harnessing the degloved palm in crush injury management. Cureus 2024;16:e63386. doi: 10.7759/cureus.63386.
10. Liu H, Guo T, Wang B, Wu F, Zhang W, Xu T, et al. A two-stage surgery for completely degloving injury of multiple fingers: A retrospective cohort study. J Hand Microsurg 2024;16:100151. doi: 10.1016/j.jham.2024.100151.
11. Sorg H, Tilkorn DJ, Hager S, Hauser J, Mirastschijski U. Skin wound healing: An update on the current knowledge and concepts. Eur Surg Res 2017;58:81-94. doi: 10.1159/000454919.
12. Ishii H, Moriya K, Narisawa H, Tsubokawa N, Maki Y, Shimada K. Long-term follow-up of hand-degloving injury treated by conventional methods. Plast Reconstr Surg Glob Open 2024;12:e5777. doi: 10.1097/GOX.0000000000005777.

13. Hayashi K, Hattori Y, Sakamoto S, Gour V, Sasaki J, Doi K. Reconstruction of total hand degloving injury with combined free and pedicled flaps and ilizarov minifixator. Plast Reconstr Surg Glob Open 2024;12:e5976. doi: 10.1097/GOX.0000000000005976.
14. Chouquet L, Berkane Y, Paleu G, Gandolfi S, Camuzard O, Lupon E. Hand and wrist complete degloving: A case report and litterature review. Ann Chir Plast Esthet 2024:S0294-126000169-9. doi: 10.1016/j.anplas.2024.09.005.
15. Ali SKA, Mohamed M. Degloving soft tissue injuries of upper limbs and their management in Khartoum - Sudan: A cross-sectional study. Ann Med Surg (Lond) 2024;86:7016-22. doi: 10.1097/MS9.0000000000002686.
16. Woo SH, Kim JS, Seul JH. Immediate toe-to-hand transfer in acute hand injuries: Overall results, compared with results for elective cases. Plast Reconstr Surg 2004;113:882-92. doi: 10.1097/01.prs.0000105340.26227.b5.
17. Lin TS. One-stage debulking procedure after flap reconstruction for degloving injury of the hand. J Plast Reconstr Aesthet Surg 2016;69:646-51. doi: 10.1016/j.bjps.2016.01.012.
18. Venkatramani H, Sabapathy SR, Zhang D. Revascularization of a circumferential hand and forearm degloving injury using an arteriovenous shunt. J Hand Surg Am 2021;46:629.e1-6. doi: 10.1016/j.jhsa.2020.08.005.
19. Hirakawa A, Komura S, Masuda T, Matsumoto K, Akiyama H. Destructive arthropathy of the interphalangeal joint following revascularization after degloving hand injury: A case report. Hand (N Y) 2022;17:NP6-10. doi: 10.1177/15589447211003174.