

# A Degloved Hand Was Resurfaced with Sandwich Flaps

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## ABSTRACT

The right hand of a 35-year-old man trapped in a roller machine and sustained an entire degloving injury of the right hand involving fingers, thumb and a part of palmar and dorsal surfaces of the hand. The denuded hand and fingers were covered with two anteriorly based random paired flaps, forming a hand sandwich, from the opposing surfaces of medial left arm and adjacent left lateral chest wall. The denuded thumb was covered with a separate pocket of paired random vis-à-vis flaps. Finally, the right hand was turned to a functional mitten hand with a 15x13 cm flap on the dorsal surface, 10x10 cm flap on the palm surface. The thumb's covered surface with flaps was 7x6 cm.

## KEYWORDS

Degloved hand; Hand sandwich flaps; Flaps; Paired flaps; Mitten hand

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## INTRODUCTION

A complete degloving of the entire hand involving both the dorsal and volar surfaces of the fingers and thumb is a difficult reconstruction problem. Skin grafts are not appropriate long-term solution to resurface the hand because mobility of the underlying structures is utmost important and probable secondary surgeries may be required. Large random abdominal flaps may be used to cover extensive skin defects of the hand; however, the technique is not suitable for simultaneous coverage of the volar and dorsal surfaces of the hand and digits<sup>1-6</sup>.

In the current case, we share our experience about resurfacing a degloved hand and fingers with large flaps.

## CASE PRESENTATION

The right hand of a 35-year-old man trapped in a roller machine while he was trying to push some plastic materials through the roller. He sustained an entire degloving injury of the right hand involving the fingers, thumb and major parts of palmar and dorsal surfaces of the hand. The neurovascular structures of the fingers also were avulsed (Fig. 1). The degloved skin was not available. As with all major hand reconstruction operations, the possibility of amputation and utilizing a functional prosthesis was discussed with the patient; however, the patient wanted to keep his remained hand as much as possible. The denuded hand and fingers were covered with two anteriorly based

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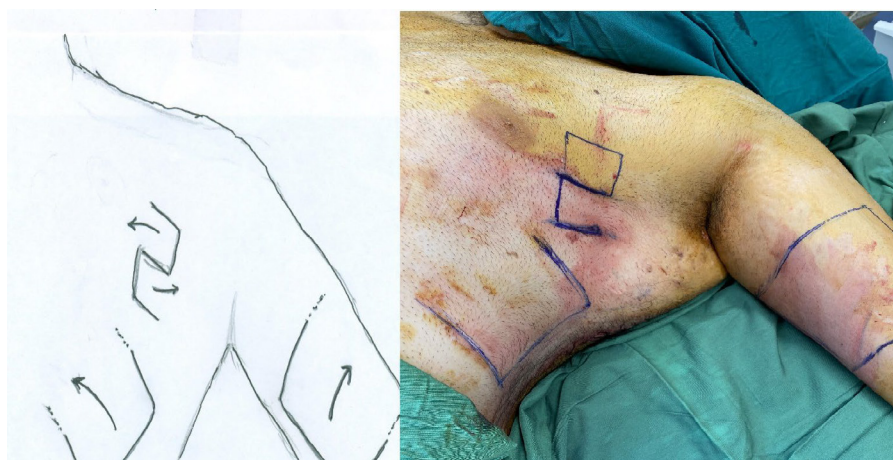
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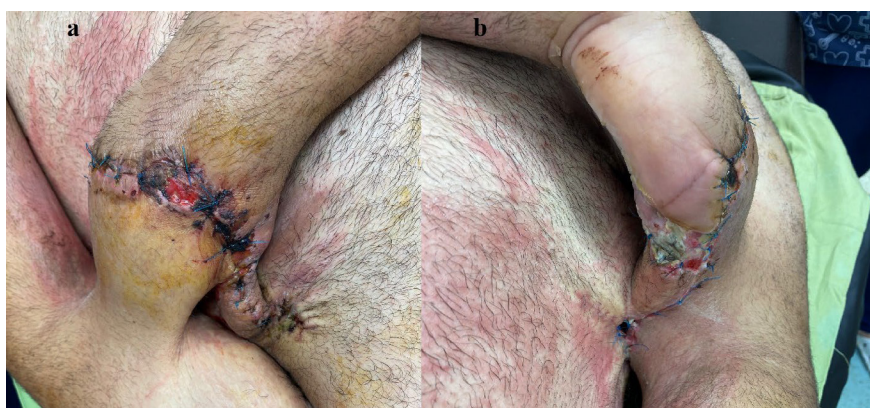
**Figure 1:** The right hand of a 35-year-old man was trapped in a roller machine and degloved.



**Figure 2:** Two simultaneous pocket flaps were designed to resurface the hand.

random paired flaps, forming a hand sandwich, from the opposing surfaces of medial left arm and adjacent left lateral chest wall. The raw surfaces of the flaps brought forward and formed a pocket to receive the hand. The flaps sandwiched the denuded areas of the hand and fingers (Fig. 2). The posterior incisions of the flaps were sutured together to form the posterior extension of the pocket and a temporary arm-chest adhesion<sup>3</sup>. The denuded thumb was covered with a separate pocket of paired random vis-à-vis flaps<sup>4</sup>. The flaps and arm-chest adhesion were separated

at 3 weeks (Fig. 3). The flaps were closed over the fingers and thumb. The donor surfaces were covered with split thickness skin grafts. Finally, the right hand was turned to a functional mitten hand with a 15x13 cm flap on the dorsal surface, 10x10 cm flap on the palm surface. The thumb's covered surface with flaps was 7x6 cm. At six-month post-operative he was able to use his hand for prehensile of objects (pinch and hook functions). He was able to do daily activity with the functional outcome (Fig. 4).



**Figure 3:** Proximal view of the flaps at three weeks and distal view of the flaps at three weeks.



**Figure 4:** Six months after surgery; dorsal surface & volar surface.

### **Ethical approval declaration**

The study was approved by the medical research and Ethics Committee of the Urmia University of Medical Sciences with registered Number: ir/IR.UMSU.REC.1401.323

### **Informed consent declaration**

Written informed consent was obtained from the patient for patient's anonymized information to be published in this article.

### **DISCUSSION**

Miura and Nakamura<sup>4</sup> recommended paired random

flaps lying side by side to cover simultaneously the dorsal and volar surface of a raw hand; however, it cannot resurface the whole hand including the thumb simultaneously. Smith et al.<sup>3</sup> reported in the two patients with degloved hand two separated, opposing body flap to covered volar and dorsal of the hand. Among other possible candidates to sandwich, the hand with flaps was groin flap plus epigastric flap; however, in the current case we needed two separate sandwich flaps to cover the hand and thumb and maintain the first web space. Kleinman and Dustman<sup>5</sup> used simultaneous groin flap, random abdominal flap and split thickness skin graft to preserve function following complete degloving injuries of the hand and digits. They resected the second ray and all the distal phalanges



including the thumb's distal phalange to reconstruct a functional mitten hand. Watson and McGregor<sup>6</sup> used ipsilateral groin, tensor fasciae latae axial flaps and split thickness skin graft to sandwich a complete degloved hand. They resected the fifth finger at the level of the metacarpo-phalangeal joint and removed the terminal phalanges of the thumb and fingers.

Microvascular techniques provide the opportunity that a single latissimus dorsi muscle flap covered by skin graft wraps around and bun rather than sandwich the hand and fingers; however, the muscle may produce a bulky soft tissue and it cannot resurface the thumb separately and reconstruct the first web space simultaneously. Meanwhile, sacrificing an artery for anastomosing in a crushed hand is a major concern. Our report is one of the few reports about used of sandwich flaps and it has been done after many years in this field.

In the current case, in spite of extensive skin defect the whole hand with was re-surfaced with two distinctive paired sandwich flaps without a preliminary narrowing and shortening the hand skeleton and applying skin graft on the hand. The flaps were thin and pliable that allow early small joints mobility and exercises and maintain the first web space from the outset.

## ACKNOWLEDGEMENTS

Not applicable.

## CONFLICT OF INTEREST

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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