ORIGINAL RESEARCH

Salvaging The Amputated Non-Viable Finger Using Degloved Amputated Part and Groin Flap Cover Technique in a Tertiary Care Centre, Tamil Nadu, India

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ABSTRACT

Background: Degloving injury is characterised by the avulsion of skin from the underlying structures. Groin flap cover is one of the techniques used in the management of degloving injuries. The objective of this study is to describe the cases where there was salvaging the amputated non-viable finger using degloved amputated part and groin flap cover technique. **Methods:** The present study is a descriptive study carried out in the plastic surgery department of a tertiary care hospital in Tamilnadu. The study was carried out over a period of one year between January 2023 to December 2023. The data for the study was collected using a pretested proforma. All the cases admitted to the department with degloved injury of the hand and were treated using groin flap cover technique was included into the study. The data was collected using a semi structured proforma and summarised in the form of table. **Result:** 5 patients (83.3%) were males. The age group ranged between 25 to 43 years. K wire and ipsilateral sandwich was performed in two. For one participant index finger PIPJ repair and ipsilateral sandwich was performed. With regard to flap division, for two cases it was performed at the 3rd week and in remaining four in fourth week. One participant developed partial graft necrosis. **Conclusion:** The groin flap as described in the present study produced good outcomes among the participants in whom it was performed with very few developing complications.

Key words: Degloving injury, groin flap, flap division, graft necrosis, case series, prognosis, avulsion.

INTRODUCTION

Degloving injury is characterised by the avulsion of skin from the underlying structures. Such injury to hand is profound as the skin here is of irreplaceable quality and there are numerous delicate structures present in the hand that get exposed due to the trauma[(1)]. The force that causes such kind of injuries usually hold to the skin and the avulsion occurs when the hand is pulled at low velocity in outward direction. It can be either the force moving away as in case of run over by vehicle or the hand being pulled by the patient as in case of a hand caught into machinery. The common reasons for such injuries include ring avulsion injuries, conveyer belt injuries and road traffic accidents.

It was found that the plane of separation to be similar across the different types of degloving injuries occurring in fore arm and hand. In these injuries the musculoskeletal unit and the remnant tissues vascularity usually will be preserved. So do the entire length of the fingers or hangs. The underlying structures would have been exposed. The separation of the skin usually occurs at the subcutaneous plane. In case of fingers what get exposed is flexor tendon sheath along with neurovascular bundle. In case of dorsum of hand, the extensor tendons get exposed and in palm it would be palmar fascia and retinacular system of hand[(2,3)].

The commonly used flaps to reconstruct a degloved finger included abdominal flap, free vascularised flap, groin flap, quadrant flap and abdominal pocketing operation[(4)]. Addressing the challenge of degloving injuries in hand surgery is a formidable task, yet successful outcomes can often be achieved, encompassing both functional and aesthetic considerations, particularly in finger-related cases.

Though Microsurgical replantation is the commonly used one it becomes increasingly complex when there is significant damage to the skin, underlying tissues, and vasculature. For injuries involving the thumb or ring finger, alternative strategies may be necessary if replantation is deemed unfeasible, these include the utilization of a free flap from the big toe or the employment of a thinned groin flap[5,6].

The present study was carried out with the objective of describing cases where there was salvaging the amputated non-viable finger using degloved amputated part and groin flap cover technique.

MATERIALS AND METHODS

The present study is a descriptive study carried out in the plastic surgery department of a tertiary care hospital in Tamilnadu. The study was carried out over a period of one year between January 2023 to December 2023. The data for the study was collected using a pretested proforma. All the cases admitted to the department with degloved injury of the hand and were treated using groin flap cover technique was included into the study.

The management of the cases usually start with debridement followed by bony stabilisation. Then the groin flap coverage was performed. Early flap coverage was said to be performed when the flap coverage was done within 40 days of injury. The main thing considered during the preoperative period included what is thought of was to replace and replant the degloved and the amputated tissues, so as to get good cosmetic and functional outcomes.

During the debridement of the avulsed tissue, both the unusable and unstable tissues were thinned. If required the bony, tendinous and ligaments reconstruction was performed. In some cases, the MPJs were stabilised in their functional position, temporarily. Following which after either 3 or 4 weeks, flap division was performed. The participants were then followed to find out the prognosis and the development of any complications.

The data collected using a semi structured proforma and summarised in the form of table (Table 1).

RESULT

This study describes the experience among 6 patients treated with groin flap technique. Of the 6 patients, 5 (83.3%) were males and one (16.7%) was female. The age group ranged between 25 to 43 years. The mechanism was injury was degloving in all the participants. In about 3 (50%) participants, degloving alone led to injury and in remaining 3 (50%) it was both degloving and crush.

Table 1: Demographic profile of patients

Sno	Age	Sex	Mechanism	Extent	Management	Flap division	Complications
1	37	M	Deglove	Ring Finger To MPJ	Debridement	3 weeks	Nil
2	28	M	Deglove + Crush	Volar to MPJ Dorsum to wrist	K-wire Ipsilateral sandwich	4 weeks	Nil
3	43	M	Deglove + Crush	Index finger Middle finger To MPJ	Index finger PIPJ repair Ipsilateral Sandwich	4 weeks	Partial Graft Necrosis
4	41	F	Deglove	MPJ Thump	K-Wire Debridement	4 weeks	Nil
5	25	M	Deglove + Crush	Volar to MPJ Dorsum to wrist	K-Wire Ipsilateral Sandwich	4 weeks	Nil
6	29	M	Deglove	MPJ thumb	Debridement	3 weeks	Nil

With regard to the extent of injury, one had injury from ring finger to MPJ. Two participants had injury up to MPJ thump. Two participants had injury from volar to MPJ dorsum to wrist. Debridement was the management of choice in two cases. K wire and debridement was performed in one. K wire and ipsilateral sandwich was performed in two. For one participant in whom the injury was in both index and middle finger, index finger PIPJ repair and ipsilateral sandwich was performed.

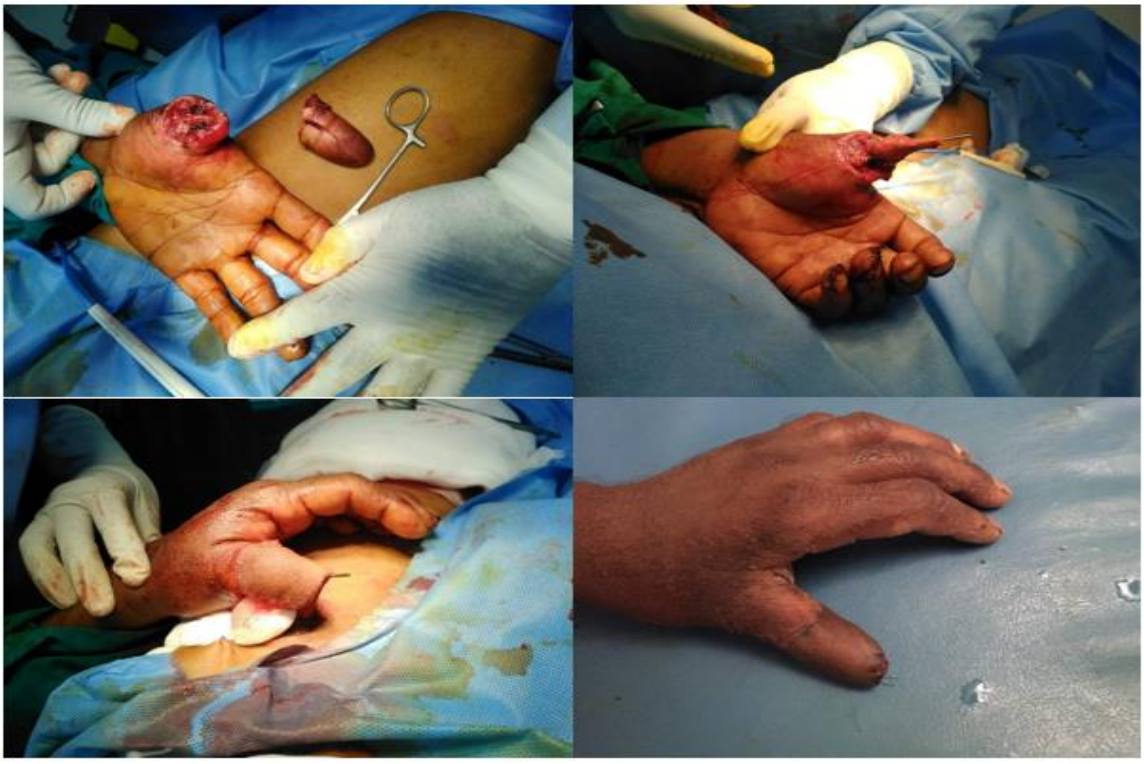

Fig 1: Degloving injury followed by groin flap cover.

With regard to flap division, for two cases it was performed at the 3rd week and in remaining four in fourth week. In one participants complication developed and the complication was partial graft necrosis (Table 1).

DISCUSSION

The avulsion of skin from underlying structures leads to degloving injuries. The characteristic of the injury is such that the musculoskeletal units along with the vascularity will be preserved[1,2,3]. the usual management of such injuries involves debridement followed by stabilisation and flap cover. Abdominal flap, free vascularised flap, groin flap and quadrant flap were some of the flaps used[4]. The present study was carried out with the objective of describing cases where there was salvaging the amputated non-viable finger using degloved amputated part and groin flap cover technique.

The technique was performed in a total of 6 participants. 83.3% were males and 50% had both degloving and crush. For all participants, debridement was performed. K wire stabilisation was done in 3 participants and ipsilateral sandwich in 3 participants. The flap division was performed after 3rd or the 4th week. In one participant, partial graft necrosis occurred.

The skin of the hand is really unique and hosts several structures with different characteristics. Replantation will be the optimal procedure to be performed in the above scenario. In case of complete deglove injury the reimplantation procedures can never be opted for. The injuries of the latter type were treated with different kinds of flaps[7].

The groin flap has its roots based on the superficial circumflex iliac arteriovenous system. This versatile flap is frequently utilized in hand reconstruction, as it can be designed in a bilobed Y pattern or other tailored shapes to adequately cover diverse defects on the hand and the distal two-thirds of the forearm. The beauty of the groin flap lies in its application as a pedicled flap, allowing for extensive defect coverage without the need to sacrifice a major artery or perform complex microvascular anastomosis[8,9,10]. These flaps can cover larger extent of the skin defect and also the requirement of any microsurgical procedure was lesser[11].

The indications for employing this groin flap technique are indeed multifaceted. It finds particular utility in addressing complex defects in children under the age of two, providing coverage for digit stump defects, preserving vascularity in electrical burns of the hand, addressing traumatic amputations, preserving the length of multiple digit amputations in manual workers, and managing a variety of deformities in the upper extremity. However, one must exercise caution, as anatomical malformations, previous groin surgery, and the presence of cancer or prior radiotherapy in the groin area would serve as contraindications for this procedure[8,9,10].

The crucial point in the procedure is the time of flap division. Some studies have recommended for assessing the neovascularization using doppler

fluximetry[12] and photoplethysmography[13]. In the present study, the flap division was performed at 3rd or the 4th week, based on clinical assessments and one case have developed partial graft necrosis.

CONCLUSION

Skin coverage continues to be a challenge for plastic surgeons, particularly in hand injuries. The scarcity of local flaps that can provide a sufficient amount of tissue is problematic in many cases, especially in degloving injuries, where regional flaps offer a valuable solution for patients. Regional flaps, particularly pedicled ones, remain viable options for addressing various skin coverage needs, especially in the hand and forearm regions. The groin flap as described in the present study produced good outcomes among the participants in whom it was performed with very few developing complications.

REFERENCES

1. Adani R, Castagnetti C, Landi A. Degloving injuries of the hand and fingers. Clin Orthop. 1995 May;(314):19–25.
2. Krishnamoorthy R, Karthikeyan G. Degloving injuries of the hand. Indian J Plast Surg Off Publ Assoc Plast Surg India. 2011;44(2):227–36.
3. Adani R, Busa R, Castagnetti C, Castagnini L, Caroli A. Replantation of degloved skin of the hand. Plast Reconstr Surg. 1998 May;101(6):1544–51.
4. 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. 1994 Nov;19(6):1032–7.
5. Kudsk KA, Sheldon GF, Walton RL. Degloving injuries of the extremities and torso. J Trauma. 1981 Oct;21(10):835–9.
6. Kleinman WB, Dustman JA. Preservation of function following complete degloving injuries to the hand: use of simultaneous groin flap, random abdominal flap, and partial-thickness skin graft. J Hand Surg. 1981 Jan;6(1):82–9.
7. Senda H, Muro H, Terada S, Okamoto H. A Case of Degloving Injury of the Whole Hand Reconstructed by a Combination of Distant Flaps Comprising an Anterolateral Thigh Flap and a Groin Flap. J Reconstr Microsurg. 2011 Jun;27(05):299–302
8. Watson AC, McGregor JC. The simultaneous use of a groin flap and a tensor fasciae latae myocutaneous flap to provide tissue cover for a completely degloved hand. Br J Plast Surg. 1981 Jul;34(3):349–52.
9. Petrone P, Inaba K, Wasserberg N, Teixeira PGR, Sarkisyan G, Dubose JJ, et al. Perineal injuries at a large urban trauma center: injury patterns and outcomes. Am Surg. 2009 Apr;75(4):317–20.
10. Amouzou KS, Berny N, El Harti A, Diouri M, Chlihi A, Ezzoubi M. The pedicled groin flap in resurfacing hand burn scar release and other injuries: a five-case series report and review of the literature. Ann Burns Fire Disasters. 2017 Mar 31;30(1):57–61.
11. Ng RW, Chan JY, Mok V, Li GK. Clinical use of a pedicled anterolateral thigh flap. J Plast Reconstr Aesthet Surg 2008; 61:158–164
12. Khan MS, Kairinos N, Cadier M. The use of laser Doppler in determining timing for division of cross leg free flaps. Br J Plast Surg 2005;58:120–121
13. Jones ME, Withey S, Grover R, Smith PJ. The use of the photoplethysmograph to monitor the training of a cross-leg free flap prior to division. Br J Plast Surg 2000;53: 532–534.