Original Article

Outcome of Ultra-Thin Abdominal Flap for Wrist and Forearm Wounds Coverage

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ABSTRACT

Objective: To asses outcome of ultra-thin abdominal flap for wrist and distal forearm flap wounds coverage.
Study Design: Descriptive longitudinal study
Place and Duration of Study: This study was conducted at the Department of Plastic Surgery, Jinnah Burn & Reconstructive Surgery Center/Allama Iqbal Medical College, Lahore from January 2017 to December 2018.
Materials and Methods: Sixty patients of both genders having injury of hand and distal forearm with ages 15 to 65 years were included. Soft tissue was provided with ultrathin abdominal flap. After harvesting of conventional abdominal flap, the subcutaneous fat was trimmed upto the thickness of 2 to 4 mm thereby saving the subdermal vascular plexus.
Conclusion: Ultra-thin abdominal flap is well founded and safe treatment modality for the reconstruction of trauma of hand and distal forearm as it provides reliable soft tissue coverage that gives better match and contour.

Key Words: Ultra-thin abdominal flap, Harvesting, Pliable tissue, Cosmesis

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INTRODUCTION

Soft-tissue deformity of hand and forearm are commonly seen after injury, burns and tendons of tissues and muscles. Management of these cases are very difficult for the reconstructive surgeons. In order to preserve the underlying vitalstructures immediate vascularized soft-tissue coverage is required. To achieve this objective, multiple flap options are used including local, regional, distant and free-flaps.[1-3] Due to extensive injuries local and regional flaps may be not available and other modality like free-tissue transfer required prolong anaesthesia, expertise and patient's blood-vessels out of traumazone. Many of studies illustrated that the use of abdominal flap is safer and had better outcome in term of cosmetic and better survival rate for coverage of hand and distal forearm wounds.[4,5]

If the donor tissue is not thin, then the decision is to be made to choose between a multi-stage procedure by transferring a thick flap and subsequently debunking it or transferring skin as flap-graftprinciple.[6] Many flaps have been described and used for coverage of various soft-tissue defects. Of these flaps, there are reversed flow flaps that sacrifice a great vessel like reversed radial forearm flap and reversed perforator forearm flaps that do not sacrifice vessels.[7] Also there are distant flaps that are often used for their construction of larger defects and offer a great amount of skin without other donor site morbidity to the injured hand. Distant flaps may be pedicle or free flaps.[8]

The abdominal flap is a time-tested flap that is used for resurfacing degloving injuries of the palmar and dorsum of the hand. It has the advantages of ease of elevation, ease of positioning and vascular reliability, while the groin flap is a pedicled flap which is based on the superficial circumflex iliac artery. It provides thin, compliant skin for the thumb, single finger and double finger defects. This flap has the advantage of primary donor site closure, hidden donor site, vascular reliability and versatile use.[9-13]

MATERIALS AND METHODS

This descriptive longitudinal study was carried out at Outpatient Department Jinnah Burn & Reconstructive Surgery Centre / AIMC Lahore from 26th January 2017 to December 2018. A total of 60 patients having trauma to the hand and distal forearm were included. Patients between 15 to 65 years of age were included require flap coverage with ultra-thin abdominal flap. Exclusion criteria were patients with trauma or surgery in donor area, defect size greater than primary closure of donor site, patients with arthritis and stiff joints. After

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harvesting of conventional abdominal flap, the subcutaneous fat was trimmed up to the thickness of 2 to 4 mm thereby saving the sub dermal vascular plexus (Figs. 1-4).

RESULTS

We enrolled total 60 patients out of which 45 (75%) were male and 15 (25%) were female who sustained injury to their hand or distal forearm. 20 (33.33%) patients were ages 15 to 30 years, 24 (40%) patients had ages 31 to 45 years and 16 (26.67%) patients were ages above 45 years (Table 1).

The overall flap survival found in 56 (93.33%) in which 42 (75%) were men and 25% were women (Table 2).

Figure No. 1: Right hand soft tissue defect with meta-carpal and extensor tendon exposed

Figure No. 2: Flexer tendon exposed

Figure No. 3: Doral view of 2nd stage ultra-thin abdominal flap coverage

Figure No. 4: Palmer view of 2nd stage ultra-thin abdominal flap coverage.

Five (7.14%) patients had found partial necrosis without dehiscence, 2 (3.57%) patients found to had partial necrosis with dehiscence and no patients found to have total flap necrosis (Table 3). According to the cosmesis 39 (65%) were very pleased in which 32 patients were men and 7 were women, 14 (23.33%) patients were only pleased in which 9 were men and 5 were women and 7 (11.67%) patients were displeased in which 2 were men and 5 were women. There was no procedural complications was observed and no total flap necrosis was found.

Table No.1: Demographical details of all the patients (n=60)

Variable	No.	%
Gender		
Male	45	75.0
Female	15	25.0
Age (years)		
15 - 30	20	33.4
31 - 45	24	40.0
>45	16	26.6

Table No.2: Gender-wise overall flap survival (n=60)

Total flap survival	Male	Female	Total
Yes (n=56)	42 (75%)	14 (25%)	93.33
No (n=4)	2 (50%)	2 (50%)	6.67

Table No.3: According to the necrosis (n=56)

Characteristics	No.	%
P necrosis without dehiscence	5	7.14
P necrosis with dehiscence	2	3.57
Total flap necrosis	-	-

Table No.4: Frequency of cosmesis in genders (n=56)

Cosmesis	Male		Female	
	No.	%	No.	%
Very pleased	32	57.14	7	12.5
Pleased	9	16.07	5	8.93
Displeased	2	3.57	5	8.93

DISCUSSION

Soft tissue injuries are commonly found in reconstructive settings. For the coverage of hand and forearm injuries pedicle abdominal flap is a good and reliable and had better outcomes in term of cosmetic results.[14]Use of abdominal tissue as a donor for hand soft tissue defects reconstruction will help preserving the sacrifice of major blood vessel to hand as in the case with radial forearm and ulnar forearm flap. The dissection is quite easy and thus obviates the need of tedious dissection like that of posterior interosseous arteryflap.[15]

In present study, 60 patients were included and from all the patients 45 (75%) were men and 15 (25%) were women who sustained injury to their hand or distal forearm. Hand injury was more common than forearm injury. Patients having injury to their hand were 44 (73.33%) and rest of 26.67% patients had distal forearm injury. The mode of injury in most of the cases was machine injury. Some patients presented after road traffic accidents. These results were similar to some other studies conducted regarding reconstruction of distal forearm and hand injuries in which male patients population was high as compared to females.[17] In our study, all the patients underwent debridement initially and were provided soft tissue by ultra-thin abdominal flap. Patients were followed for 2weeks after second stage of division and in setting. We found that the reliability of this technique is excellent as there was the overall flap survival found in 56 (93.33%) in which 42 (75%) were men and 25% were women (Table 2).

Five (7.14%) patients had found partial necrosis without dehiscence, 2 (3.57%) patients found to had partial necrosis with dehiscence and no patients found to have total flap necrosis. Four out of5 patients with partial necrosis without dehiscence was managed conservatively and the wound was healed by secondary intension. The patient with partial necrosis of flap with dehiscence required flap advancement. These results were comparable to some other studies in which the total flap survival was 90 to 95%.[18,19] All the patients were managed by restitching at the time of division of flap pedicle.

In our study we found according to the cosmesis 39 (65%) were very pleased in which 32 patients were men and 7 were women, 14 (23.33%) patients were only pleased in which 9 were men and 5 were women and 7 (11.67%) patients were displeased in which 2 were men and 5 were women.A study conducted b Lin et al[20] reported 34 (61.8%) patients were very pleased. Only 7(12.7%) patients fell into category of displeased. It was evident from our result that displeasure was more common in females. As only38.5% women were very pleased from their final results. This may be attributed to the fact that females are more concerned about their cosmetic values. Female patients were more concerned about the scaring associated with their construction. The bulk of the flap was considered satisfactory in all the patients.

In our study, complete flap survival is fairly comparable with the mentioned study showing significant outcome with 93.33% complete survival without any complication. Our study also confirms the fact that para-umblical perforator flap can survive if the sub dermal blood vessel plexus is undamaged. This validates the results of study by Colson et al[21] used glove flap (modified thin abdominal wall flap) for the treatment of acute burns for fingers and hands and attained good results. They treated 7hands in5 patients with thin abdominal flap in glove pattern. In their study all the flaps survived in all cases. They concluded that function of hand and finger were salvaged with the preservation of range of motion in each joint.

CONCLUSION

We concluded from this study that the use of ultra-thin abdominal flap for the coverage of hand and forearm trauma is very reliable modality and had better outcome in term of cosmetics results. It is also concluded that reconstruction of soft tissue defects by ultra-thin abdominal flap is the safe procedure. In this study the overall pleased results was 93.33% this shows that procedural effectiveness and patients satisfaction. There were no procedural and other complications found.

Author's Contribution:

Concept & Design of Study:	Muhammad Nasrullah
Drafting:	Waseem Humayoun
Data Analysis:	Husnain Khan
Revisiting Critically:	Muhammad Nasrullah, Waseem Humayoun
Final Approval of version:	Muhammad Nasrullah

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Khan MM, Yaseen M, Bariar LM, Khan SM. Clinical study of dorsal ulnar artery flap in hand reconstruction. Indian J Plast Surg 2009;42(1): 52-7.
2. Kaufman MR, Jones NF. The reverse radial forearm flap for soft tissue reconstruction of the wrist and hand. Tech Hand Up Extrem Surg 2005; 9(1):47-51.
3. Bocchi A, Quarta L, Castri AD, Boschi E, Caleffi E. Reverse perforator flaps in the reconstruction of the hand. our clinical experience. Open Orthopaed J 2017;11(4):-15-9.
4. Takahashi M, Kasai T, Nishisho T, Takai M, Endo H, Hirose T, et al. Reverse adipofascial flap after resection of a malignant perineurioma of the forearm. Orthopedics 2014;37(7): e661-4.

5. Krishnamoorthy R, Karthikeyan G. Degloving injuries of the hand. Ind J Plast Surg 2011;44(2): 227-36.
6. Matsui J, Piper S, Boyer MI. Non-microsurgical options for soft tissue reconstruction of the hand.Curr Rev Musculoskelet Med 2014;7(1): 68-75.
7. Goertz O, Kapalschinski N, Daigeler A, Hirsch T, Homann HH, Steinstraesser L, et al. The effectiveness of pedicled groin flaps in the treatment of hand defects: results of 49 patients. J Hand Surg 2012; 37: 2088-9.
8. Sabapathya SR, Venkatramania H, Playab PM. The use of pedicled abdominal flaps for coverage of acute bilateral circumferential degloving injuries of the hand. Trauma Case Reports 2015;3-4:25-31.
9. Brian PK, Chung KC. MS2 soft tissue coverage for elbow trauma. Hand Clin 2015; 31(4): 693-703.
10. Sang WK, Ho JL, Jeong TK, Youn HK. Multiple-digit resurfacing using a thin latissimus dorsi perforator flap. J Plast Reconstr Aesthet Surg 2014; 67: 74-80.
11. Bajantri B, Latheef L, Sabapathy R. Tips to orient pedicled groin flap for hand defects. Tech Hand Up Extrem Surg 2013; 17(2): 68-71.
12. Koshima L, Mardini S,WeiFW. Groin flap and superficial circumflex iliac artery perforator flap. In: Wei FC, Mardini S, editors. Flaps and reconstructive surgery. 2nd ed. London: Elsevier; 2017.p.358-74.
13. Sabapathy RS, Venkatramani H, Bhardwai P. Reconstruction of the thumb amputation at the carpometacarpal joint level by groin flap and second toe transfer. Injury 2013;44(3): 370-75.
14. Mishra S, Sharma RS. The pedicled thoraco-umbilical flap: a versatile technique for upper limb coverage. Ind J Past Surg 2009; 42(2):169-75.
15. Cheema TA, Lakshman S, Cheema MA, Durrani SF. Reverse-flow posterior interosseous flap: a review of 68 cases. Hand 2007;2(3):112-6.
16. Ricardo M, Damian G, Paul GO, Eilen M. Reconstruction of the hand defects by pedicled abdominal thin skin flaps. JOJ Orthoped Ortho Surg 2017;1(1):555555.
17. Balakrishnan C, Pane TA, Khalil AJ. Use of groin flap in the closure of through and through defects of a forearm a case report. Can J Plast Surg 2004; 12(1):47-8.
18. Koul AR, Patil RK, Nahar S. Unfavourable results in free tissue transfer, Indian J Plast Surg 2013; 46(2):247-55.
19. Hough M, Fenn C, Kay SP. The use of free groin flaps in children. Plast Reconstr Surg 2004; 113(4): 1161-66
20. Lin W, Zheng T, Wang Q. Study on the effect of pedicle skin flap of subdermal vascular plexus on repairing the hand injury. Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi 2005; 19 (7): 528-530
21. Colson P, Houot R, Gandolphe M, de Mourgues A, Laurent J, Biron G, et al. Use of thinned flaps (flap-grafts) in reparative hand surgery. Ann Chir Plast Esthet 1967;12(4):298–308.