



RESURFACING OF SOFT TISSUE DEFECTS OF DORSUM OF HAND –VARIOUS OPTIONS AND THEIR OUTCOMES

Plastic Surgery

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ABSTRACT

Background: Soft tissue defect of dorsum of hand is a difficult problem to deal with. Various factors have to be considered for planning of the reconstruction.

Method: We present our experience of resurfacing soft tissue defects of dorsum of hand in 27 patients by split thickness skin grafting, local flaps, distant pedicled flaps and free flaps.

Results: Skin grafting was used in 2 patients, distant pedicled flaps such as Groin/Abdominal flap in 13 patients, Regional flaps in 7 patients and free flap in 3 patients. Complications such as partial or complete flap necrosis was noted in 1 patient each of free and regional flap and none in distant pedicled flap. The operating time was relatively less in distant pedicled flaps.

Conclusion: Skin grafting had limited use when underlying vital structures were exposed. Distant pedicled flaps such as groin and abdominal flaps were very useful for resurfacing the defect especially in emergency situations. Regional and free flaps had limited indications.

KEYWORDS

Soft tissue defect, dorsum of hand, various options

INTRODUCTION

Post-traumatic hand always represents a challenging problem in reconstructive surgery. The soft tissue cover of dorsum of the hand is characterised by thin skin with poor subcutaneous tissue. Trauma frequently leads to loss of soft tissue cover of the dorsum of hand with exposed bones and tendons. Such defects necessitate early flap coverage to protect underlying vital structures, preserve hand functions and to allow for early rehabilitation.

Different reconstructive methods have been used to treat these defects considering the functional and cosmetic aspects. Local flaps such as reverse radial forearm flaps require sacrificing a major vessel and are not suitable in many cases. However they can be easily elevated even in emergency setup. The perforator based flaps avoid sacrificing major vessel. Other options like distant pedicled flap (abdominal and groin flap) and free flaps have their own advantages and disadvantages.

We report our experience of resurfacing soft tissue defects of dorsum of hand in twenty seven patients.

MATERIAL AND METHODS

The present study was carried out in the Department of Plastic Surgery, Medical College and Hospital, Kolkata. It was a prospective observational study carried out from January 2017 to December 2018. All the patients with soft tissue defects of dorsum of hand of traumatic aetiology attending Plastic Surgery OPD or emergency, Medical College, Kolkata, who gave their consent were included in the study.

STUDY TECHNIQUE

All patients with soft tissue defects of dorsum of hand were first stabilised haemodynamically and proper haemostasis was done. The wound was debrided and the resultant defect was resurfaced with skin graft or flap. The patients were selected on the basis of inclusion criteria. The choice between delayed and immediate coverage was decided on the local condition of the wound, exposure of the vital structures and general condition of the patient. Plain radiographs of the hand was taken to note any fractures, any bony ankylosis, presence of chronic osteomyelitis and any other skeletal defect. Exposed bone, tendon or prosthesis was also noted. A hand held ultra sound Doppler scan was performed in all the cases to ensure the patency of the local artery.

Patients were operated under general or regional anaesthesia. Template of the defect was taken with the help of lint-piece and flap was planned in reversed to mark the donor site within the previously Doppler marked area. Donor site was closed primarily in cases of small defect and skin grafting was done in cases of large defect. After inclusion in the study resurfacing was planned according to the standard treatment protocol of the institution from the following

options – 1) Regional pedicled flap include -the reverse radial forearm fasciocutaneous flap, the posterior interosseous artery flap. 2) Distant pedicled flap like the groin flap and abdominal flap. 3) Free flap- anterolateral thigh flap, latissimus dorsi myocutaneous flap. Loco regional flaps were the method of choice when the donor area was healthy and well vascularised. The choice of flap depended upon the site & size of the defect, availability and quality of the donor tissue and reach of the flap to cover the defect. However, the areas covered by the loco regional flaps are overlapping and there is no strict limitation of their use.

Distant pedicled flaps were used for large defects and in patients where local donor tissue was not available. They were also used in cases where the patients choose distant pedicled flaps for reconstruction. The free flaps were used in haemodynamically stable patients without medical co morbidities, where there was no suitable loco regional flap available as in case of mutilating trauma, large defect not manageable with local flaps etc.

RESULTS

Out of twenty seven patients twenty four patients were male and three were female. Maximum numbers of patients were in age group (20-40). The size of defect varied from 16 cm² to 110 cm².

Type of flap	No. of patients	Necrosis- partial/ complete	Operating time (minutes)	Hospital stay (days)	Patient Acceptability (donor and Recipient site)
Skin grafting	2	-	45	5	50%
Reverse radial forearm flap	3	-	150	6	67%
Posterior interosseous artery flap	4	1	180	8	75%
Abdominal flap	9	-	90	15	67%
Groin flap	6	-	80	14	87%
Free anterolateral thigh flap	3	1	330	9	67%

DISCUSSION

Soft tissue defects of dorsum of hand always present as a

reconstructive challenge to plastic surgeons. The lack of adequate subcutaneous tissue frequently exposes the underlying tendons, bones and nerves. Adani et al.(3) mentions reconstruction of the dorsal surface of hand defects requires thin, pliable, well-vascularised tissue with a gliding surface for the extensor tendon course. These defects are frequently not amenable to skin grafting thus requiring flap coverage. In our study out of 27 patients only two patients could be treated with resurfacing by skin grafting as they had adequate subcutaneous tissue covering the tendons. Skin grafting is usually not an option in patients with dorsal soft tissue defects as the skin with thin subcutaneous tissue in dorsum of hand is easily lost in trauma. This option should be reserved for patients having loss of only skin of dorsum of hand. The recipient site acceptability was not good in these patients as they frequently developed hyper/hypo pigmentation of the site. Fifteen patients with soft tissue defects of dorsum of hand were resurfaced by abdominal and groin flaps. These flaps required less operating time, minimal technical requirements and were very suitable for emergency situations. These flaps were also useful where the local tissue was not available as in extensive trauma involving forearm. However they require two stage procedures and are associated with increased patient morbidity and hospital stay. Another disadvantage is donor site scarring in some patients. They are recommended in emergency setup or when patient is not fit for free flap surgery and in patients requiring large area to be resurfaced ($>100\text{ cm}^2$). However they can also be used to resurface smaller defects. In their study Ricardio monreal et al (6) mention that ultra-thin abdominal flap is safe, easy to harvest, has no donor site morbidity, and does not require a secondary debulking surgery. The recipient and donor site acceptability was high especially in patients treated with groin flap. Hassan M I et al (2) in their study mention that in contrast to the complexity of free flaps, the pedicled groin flap is simple and easy to handle in emergencies. The loco regional flaps were technically demanding. They were suitable for smaller defects with trauma limited to dorsum of hand and wrist. Operating time was longer than abdominal flaps. However advantage was that they required single stage procedure and were thin flaps. They are recommended for smaller defects in haemodynamically stable patients where local tissue of forearm is available for reconstruction. They are also recommended when hospital stay is required to be short. Kaufman MR et al (4) in their study found the reverse radial forearm flap potentially offers thin, mobile skin with similar characteristics to the skin over the dorsum of the hand. The last group consisted of free flaps. They were technically highly demanding. The operating time was also long. Their advantage was that they could cover a large area. They were aesthetically acceptable. They are indicated for large defects in haemodynamically stable patients and when sufficient technical support is available. However in our study there was loss of anterolateral flap in one patient. Thus free flap should be done in patients after screening for co morbid conditions. The donor and recipient site acceptability was good in free flap patients. Moustafa Meky et al.(5) in their study of resurfacing dorsal hand defects found that one out of twelve patients developed full flap necrosis and two patients developed partial flap necrosis

CONCLUSION

Abdominal flap and Groin flap are very useful in resurfacing soft tissue defect of dorsum of hand especially in emergency situations. Other flaps such as Posterior Interosseous artery flap and free flaps are technically demanding and should be used in haemodynamically stable patients with adequate technical support for the operation. Skin grafting has limited role due to frequently underlying vital structures being exposed.

CLINICAL PHOTOGRAPHS



Figure 1: Seven months follow up of skin grafting of soft tissue defect of dorsum of hand



Figure 2 Six months follow up of soft tissue defect of dorsum of hand resurfaced by abdominal flap



Figure 3: Seven months follow up of soft tissue defect of dorsum of hand resurfaced by Anterolateral thigh flap.



Figure 4: Showing follow up pictures of soft tissue defect of dorsum of hand resurfaced by Posterior Interosseous artery flap.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

- Hassan M I. Hand Reconstruction by Pedicled Groin Flap. AAMJ 2011;9:1
- Moustafa Meky. Versatility of Anterolateral Thigh Flap in Dorsal Hand Reconstruction. AAMJ, VOL 13, NO 3, JULY 2015 – Suppl 2 108.
- Adani R. Dorsal hand coverage, BMC Proceedings 2015; 19:59
- Moustafa Meky. Versatility of Anterolateral Thigh Flap in Dorsal Hand Reconstruction. AAMJ, VOL 13, NO 3, JULY 2015 – Suppl 2 108.
- Kaufman MR, Jones NF. The reverse radial forearm flap for soft tissue reconstruction of the wrist and hand. Tech Hand Up Extrem Surg. 2005 Mar;9(1):47-51.
- Ricardo Monreal, Damian Gomez, Giovanni Osinaga, Paul I de la Cruz and Eilen Monreal. Reconstruction of the Hand Defects by Pedicled Abdominal Thin Skin Flaps. JOJ Orthoped Ortho Surg 1(1): JOJOOS.MS.ID.55555 (2017).
- Karim Bakri. Clinical anatomy and recipient vessel selection in upper extremity flaps and reconstructive surgery, 2nd edition, Fu Chan Wei, Samar Mardini, page 104.
- William C. Pederson, Randolph Sherman. Reconstructive surgery of mutilated hand, Plastic surgery, edited by Peter C. Neligan, Volume, Fourth edition, pages 271-302.
- Yamamoto Y, Igawa H, Minakawa H, Yoshida T, Minamimoto T, Ohura T. Reconstruction of iatrogenic dorsal skin defects of hands with reverse forearm flaps European journal of Plastic Surgery 1994;17:104-5.
- Ioannis A Ignatiadis, Adrian Avram, Christos K. Yiannakopoulos, Konstantinos Sarantos, Vassiliki Tsiamba, Christos Kyriakopoulos, Nikolaos Gerostathopoulos. Distal Ulnar Artery Perforator Based Fascial Flaps for Covering Dorsal and Palmar Hand defects TMJ 2005;55:1.
- C.R. Gschwind, M.A. Tonkin, Grabb's encyclopedia of flaps, third edition, chapter 291, pages 1-12.
- Gavaskar A S. Posterior Interosseous Artery Flap for Resurfacing Posttraumatic Soft Defects of The Hand Hand 2010;5:397-402
- Costa H, Pinto A, Zenha H. The posterior interosseous flap-a prime technique in hand reconstruction. The experience of 100 anatomical dissections and 102 clinical cases Journal of Plastic Reconstructive & Aesthetic surgery 2007;60:740-7.
- Rehim S A, Chung K C. Local flaps of The Hand Hand Clinics 2014;30:137-51
- Michael R. Zenn, Glyn Jones. Reconstructive surgery, Anatomy, Technique and Clinical applications, Volume two, page 1268.