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Original Research Paper

Surgery

A STUDY OF FLAPS IN HAND INJURY

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ABSTRACT A local flap consists of skin and subcutaneous tissue that is harvested from a site near a given defect while maintaining its intrinsic blood supply. Local skin flaps can be a used as a reliable source of soft tissue replacement that replaces like with like. Flap circulation is considered the most critical factor for the flap survival. This article is based on various flaps options available for hand injury.

KEYWORDS : Cross finger flap, Reverse cross finger flap, Foucher flap, Littlers flap, Posterior interosseous Flap, Radial Forearm Free Flap

INTRODUCTION

The soft tissue envelope of the hand is uniquely designed to provide tactile input from our environment and must also withstand substantial wear over a lifetime. Today 1/3rd of all injuries consist of hand injuries and they are quite often sufficient enough to restrict daily activities accounting for days lost from work.

Where other body parts have ample skin, fat, and muscle, allowing easy primary or secondary closure, the hand's neurovascular and musculo-tendinous structures are just beneath the skin's surface.

Therefore, soft tissue loss in the hand requires a thoughtful approach to coverage that enables simultaneous restoration of the aesthetic appearance and the function of the hand Soft tissue reconstruction of the upper extremity requires strict adherence to standard surgical principles. With options of primary closure, secondary closure, skin grafting, local flaps, regional flaps, distant flaps and free tissue transfer our Goal is to restore a functional, sensate, and aesthetically acceptable hand.

Ideally, any soft tissue defect of the hand should be covered with 'like' tissue; we should attempt to close a wound with skin that has the same properties and qualities as the tissue that was lost. Unfortunately, it is not always possible to use 'like with like' tissue because of the extent of the defect or the location and mechanism of the injury.

There are many instances in upper extremity soft tissue reconstruction where "less is more" –an example being the healing of a fingertip injury by secondary intention, when more complex solutions would prolong impairment. The surgeon must be comfortable with all rungs of the reconstructive ladder if the appropriate reconstruction is to be performed in a wide range of clinical scenarios.

MATERIALS AND METHODS

Study Design:

Prospective study of patients admitted at Rajah Muthiah Medical College Hospital, Chidambaram for Hand Injuries Requiring Flaps.

Source Of Data:

Study to be conducted among the patients who are diagnosed to have Hand Injury Requiring Flaps and admitted at Rajah Muthiah Medical college Hospital, Chidambaram during the study period.

Study Period: October 2020 to September 2022

Study Population:

50 patients with Hand Injury Requiring Flaps admitted in Rajah Muthiah Medical College Hospital, Chidambaram.

Inclusion Criteria:

Patients with hand injury with soft tissue defects more than 0.5 cm were included.

Exclusion Criteria:

Patients with multiple injuries violating regional flap options were excluded. Patient not willing for any study.

OBSERVATION AND RESULTS

Total 50 patients with hand injury included in the study with 41 patients having <5 cm size defect on finger/thumb and 9 patients having >5 cm size defect on palm and dorsum of hand with all potential donor sites available for regional flaps.

	REGIONAL FLAPS FROM HAND	REGIONAL FLAPS FROM FOREARM
FLAPS (NUMBER)	CFF (20),RCFF (8), Foucher flap (7), Littler flap (6)	RFFF (6) PIA Flap (3)
SIZE OF THE DEFECT	<5cm (41)	>5 cm (9)
SITE OF THE DEFECT	Fingers/thumb (41)	Dorsum of the hand/palm (9)
COLOR MATCH	Good (41)	Bad (9)

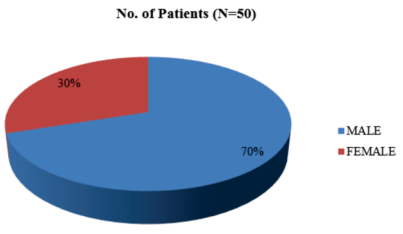

Fig 1: Sex Distribution

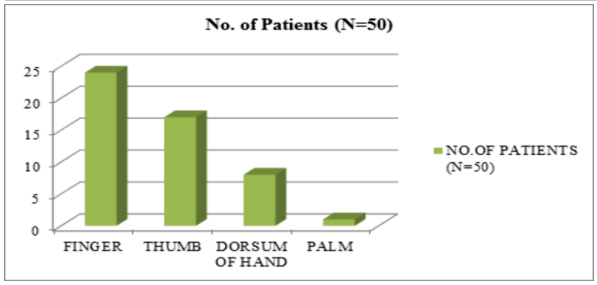

Fig 2: Site of Defect

Table 1: Size of defect

SIZE	NO.OF PATIENTS (N=50)	PERCENTAGE (%)
LESS THAN 5CM	41	82
MORE THAN 5CM	9	18

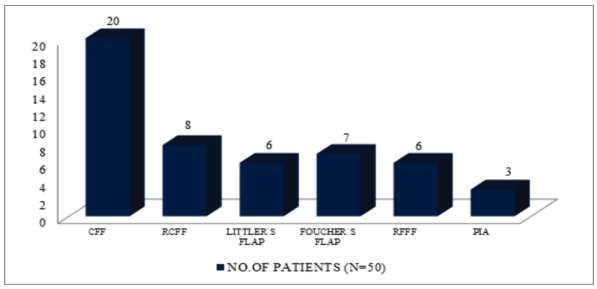

Fig 3: Flap used

Table 2: Colour Match

MATCH	NO.OF PATIENTS (N=50)	PERCENTAGE (%)
GOOD	41	82
BAD	9	18

Table 3: Donor defect

DONOR DEFECT	NO.OF PATIENTS (N=50)	PERCENTAGE (%)
STG	43	86
FTG	7	14

Table 4: Sensation of flap

SENSATION OF FLAP	NO.OF PATIENTS (N=50)	PERCENTAGE (%)
SENSATE	13	26
NON SENSATE	37	74

Table 5: Physiotherapy required

PHYSIOTHERAPY REQUIRED	NO. OF PATIENTS (N=50)	PERCENTAGE (%)
LITTLER`S (6WKS)	6	12
CFF/RCFF/FOUCHERS/ RFFF/PIA (3WKS)	44	88

DISCUSSION

Defects on the hand with exposure of functional structures such as tendons, nerves, vessels and bone require flap coverage.

Flap selection begins with a careful analysis of the patient's defect. This includes a measurement of the defect size, including in the calculation also surgical needs for debridement.

Possible infection with the need for secondary debridement or additional tissue loss in complex injury mechanism has to be taken into account and possibly influences the timing of flap coverage. Next is an evaluation of the tissues needed for reconstruction, which may also include tendons, nerves, vessels or bone. The global evaluation of the defect reduces the number of possible flaps. In a second step, the possible donor sites are evaluated regarding their possibilities in matching the needs of the defect. A careful evaluation of the donor-site defect is necessary; this includes assessment of functional losses due to muscle, nerve or vessel losses and aesthetic defects due to visible scar formation, loss of contours or needs for skin grafts.

Next, the patient's needs, which are determined not only by age, dominant or non-dominant injured hand, gender and profession, but also by the patient's hobbies in sports and music, have to be taken into account. The time for rehabilitation might be of importance for the patient in his or her work. Males may also be less disturbed by scars and defects at the donor site than females.

Finally, the selection of flaps must also take into account the skill, experience of the operating surgeon with various techniques and the reliability of the various techniques. Primary flap coverage is best but secondary coverage may be unavoidable in the presence of infection or additional tissue loss in complex injuries or burns.

In present study we came across 50 such hand defects which were not manageable with local flap and it was possible to cover them with regional flaps due to undamaged regional skin. In these 50 cases we used regional flaps from hand and forearm for coverage and analyzed their final results. We found that we were able to cover all isolated defects <5 cm on fingers/thumb with regional flaps from hand and all isolated defects 3-10 cm on palm and dorsum of hand with regional flaps from forearm.

Littler's flaps and Foucher's flaps found to have good sensations but we found difficulty in terms of cortical sensory rehabilitation. No other flap in study shown sensory recovery till 1 year.

Littler flap required prolonged physiotherapy (6 weeks) than other flaps which required physiotherapy for 3 weeks. Littler flap (due to long post-operative physiotherapy) and CFF/RCFF (due to 2 stages of surgery) had longer treatment period (6 weeks) than other flaps. Regional flaps from hand itself had relatively good color match than regional flaps from forearm.

Distant flaps always require 2 stages of operation, uncomfortable position, more hospitalization and restriction of movements. Also they are bulky and color match is poorer. Still they have a definite place when regional flaps are not available and larger defects

Free flaps are emerging as an option for regional flaps as a single stage, pliable, sensate alternative; they require a particular setup, trained surgeon, more cost, more hospitalization. Often free flaps are bulky and color match is not good If available, regional flap is the best option, in terms of good color match, less donor site morbidity, better sensation recovery, pliability of flap, ease of operation and post-operative positioning, early recovery.

CONCLUSION

Hand injuries are complex and involve highly specialized tissue components. Basic reconstructive principles include provision of durable, sensate tissue coverage, preservation of length and the utilization of available component tissues to simplify the reconstructive algorithm.

No clear consensus exists as to the optimal method for reconstructing hand injuries and thus individual practice is based on familiarity and personal preference. The

advantages and disadvantages of each technique regarding difficulty of harvest, reliability of anatomy, donor-site defect and other issues have to be carefully weighed one against the other when choosing the best technique suitable for each patient.

For defects of finger/thumb sizing 2- 5 cm and defects of dorsum of hand and palm sizing 3-7 cm regional flap is a better option if available

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