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ANALYSIS OF CROSS FINGER FLAP AND NEUROVASCULAR ISLAND FLAP COVER FOR VOLAR THUMB DEFECTS

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ABSTRACT

AIM

To compare and study the functional , sensory and aesthetic outcomes of thumb injuries with volar soft tissue defects managed with neurovascular island flap and cross finger flap.

MATERIALS AND METHODS

- It is a retrospective study of patients treated for acute thumb injuries with volar soft tissue defects by neurovascular Island flap and cross finger flap, in the period of January 2021- August 2022.
- Follow up period- four months to one and half years.
- Functional movement of thumb and donor finger assessed.
- For sensory outcome static and moving two point discrimination were assessed.
- Colour match, subjective aesthetic acceptance were assessed.

RESULTS

- Total number of patients- 41, Neurovascular Island group- 18, Cross finger flap- 23
- All flaps settled well.
- Two point discrimination of both neurovascular Island flap and cross finger flap were comparable, Sensory reorientation of neurovascular island flap in 4 patients were not complete by one year and dual in 4 patients.
- Aesthetic acceptance was more with neurovascular Island flap group.

CONCLUSIONS

- Both functional and sensory outcomes were comparable.
- Cross finger flap group patients returned to work earlier and had fewer complications.
- Our study population mostly comprises of manual labourers and hence cross finger flap is a preferable option to cover volar thumb soft tissue defects.

key words- volar thumb defects, cross finger flap, neurovascular island flap.

INTRODUCTION

- Ideal reconstruction of volar thumb defects may warrant durable tissue, glabarous skin, restoring length., does not cause adjacent joint contracture,

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good aesthetics and retaining optimal sensory innervations.

- Most of the above mentioned qualities are fulfilled by the Littler's heterodigital neurovascular island flap cover.
- disadvantages noted were lack of reorientation of stimuli, hyperesthesia, donor digit deformity and scar over the palm.
- In contrast cross finger flap has less incidence donor digit morbidity, no scar over the palm, no hyperesthesia, and no need for sensory reorientation.
- disadvantages noted were two staged technique, non glabarous skin, less sensory innervation.
- Our study population comprises mostly of daily labourers undertaking heavy work, hence a scar over the palm is more concerning for the group.
- Comparing the two flaps for sensory, functional and aesthetic outcomes in our population.

MATERIALS AND METHODS

- Study period- january 2021 to august 2022
- study population: 41patients
- Group 1: cross finger flap- 23 patients
- Group 2: heterodigital neurovascular island flap- 18 patients
- Follow up period: 4 months – 18 months
- Nature of study- retrospective study

Inclusion criteria

- Acute thumb injuries exposing bone or tendon.
- Nail bed should be intact and more volar soft tissue loss.
- Age group- 13-60 years.
- All patients were explained about pros and cons of neurovascular island flap and cross finger flap, those who are not willing for scar over the palm and defect over volar surface of mid finger were taken up for cross finger flap.

Exclusion criteria

- Age group less than 12 and more than 60
- Multiple finger injuries
- Mangled hand
- Previously injured and stiff index or mid finger
- Patient with osteoarthritis, dupuytrens contracture.

Operative technique

NV ISLAND FLAP:

Done as a single stage procedure. The ulnar aspect of middle finger was selected as donor site. Digital allen's test was performed pre op, to confirm perfusion of the finger. Flap was planned on middle phalanx ulnar aspect, and if needed extended proximally. Proximal dissection was carried out as a nerve-vessel pedicle upto the pivot point near superficial palmar arch. Flap is perfused and

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tunneled into thumb defect. Donor site covered with split thickness skin graft. Physiotherapy and sensory reorientation programme was started once the flap settles.

CROSS FINGER FLAP:

Done as a two staged procedure. Dorsal aspect of index finger proximal phalanx was selected as donor site. Flap raised above paratenon level after planning in reverse. Flap inset given and donor site covered with split thickness skin graft.

Flap division was done on average by two weeks. Physiotherapy was initiated as soon as the flap settles.

Fig:1 Representative image of NV island flap

Fig 2: Representative image of cross finger flap.

RESULTS

- Mean duration of surgery in NV ISLAND group- 120 mins
- Mean duration of surgery in CFF group- 35 mins.
- Mean duration of follow up- 13 months.
- All flaps settled well.

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- All the patients went to their previous work.

Table 1: flap distribution

Total	41
NV island flap	18
Cross finger flap	23

Table 2: hand dominance

	Dominant	Non dominant
Total	25	16
Nv island	11	7
CFF	14	9

Table 3: mechanism of injury

Total	41
Crush injury	25
Avulsion injury	10
Slicing injury	6

Table4 : Gender distribution

Gender	NV island	Cross finger flap	Total
Male	16	18	34
Female	2	5	7

Table 5 : Age distribution

Age group in years	NV island	CFF
16-30	8	10
31-60	10	13

Table 6: sensory reinnervation

	Mean static 2PD(mm)		Mean moving 2PD(mm)	
	NV island	CFF	NV island	CFF
Flap side	5.5+/-2	7.4+/-2.5	5+/-2	7.1+/-2.5
Contralateral side	3+/-1		3+/-0.6	

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Table 7: sensory reorientation in NV island flap patients

	More than 1 year			Less than 1 year		
	Complete	Dual	Absent	Complete	Dual	Absent
Dominant	4	3	0	1	2	1
Non dominant	1	2	1	0	1	1

Table 8: subjective assessment (based on questionnaire)

	Poor (%)		Fair (%)		Good (%)		Excellent (%)	
	NV island	CFF	NV island	CFF	NV island	CFF	NV island	CFF
Sensibility	6	13	18	32	43	38	22	17
Function	0	0	6	13	33	17	61	70
Appearance	0	6	6	13	28	33	66	48

DISCUSSION

- Most common cause for traumatic thumb injury is industrial accident.
- Sensory recovery of the NV island group was better than CFF but all the patients in the CFF group developed protective sensation.
- NV island group patients had a problem of dual innervation in both recipient and donor site which reduced after 1 year.
- Function wise both cross finger flap and NV Island flap group had similar outcomes.
- Return to work was earlier in CFF than NV island group.
- Hyperesethesia and painful scar over the palm were noticeable in NV island group.
- Aesthetic acceptance of the finger was superior in NV island group.
- Donor site was inconspicuous for the CFF group while NV island group had conspicuous palmar scar and contour deformity of the middle finger.

CONCLUSION

Both NV Island flap and cross finger flap provides an excellent option for coverage of thumb defects.

NV island flap provides a good sensory recovery and aesthetic appearance. CFF has advantages such as

- ease of dissection.
- minimal duration of surgery.
- early return to work.
- No scar over the palm and volar aspect of finger.

Hence cross finger flap can be considered as good primary option for thumb volar defects in our population**.**

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