

Original Research Article

Cross finger flap cover for fingertip injuries

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ABSTRACT

Background: Fingertip injuries are the most common form of hand injuries. Restoration of the anatomy is a technical challenge and is one of the basic tenets of the management of fingertip injuries. The cross finger flap is simple and easy to do and is a very useful tool in reconstruction of the pulp of the finger. The project aimed to study the efficacy of cross finger flap in the coverage of fingertip injuries.

Methods: The study was conducted on a prospective basis in Sri Ramachandra University Hospital in Chennai. The study period was from May 2013 to August 2016. All adults who had fingertip injuries who had undergone cross finger flap cover were included in the study. Patients who had other flaps for reconstruction and who were lost for follow-up were excluded from the study. Preoperative parameters which were recorded were mechanism of injury, size of defect, size of the flap, location of donor site and method of coverage of secondary defect. Outcome measures recorded were flap viability, flap sensibility using two-point discrimination, range of motion of fingers, grip strength and presence of other complications.

Results: 40 patients were included in the study. Six were lost for follow-up. Mean follow-up was 14 months. All flaps survived. Full range of motion was obtained in 87% of patients. Average grip strength was 94% for dominant hand injuries and 78% for non-dominant hand injuries. Mean quick DASH score was 10.5. Mean two-point discrimination was 15.4 mm.

Conclusions: Cross finger flap is very effective for coverage of volar fingertip defects with minimal residual problems.

Keywords: Cross finger flap, Fingertip, Two point discrimination

INTRODUCTION

The tip of the finger is a specialized structure serving multiple functions like tactile sensation, cosmesis and performance of activities involving high precision. The hand is prone to domestic and industrial trauma with fingertips being the most frequently injured portion of the hand.¹ The pulp of the finger is a specialized structure with very high sensibility. A stable, mobile and sensate fingertip is important to the overall function of the hand.² This can be achieved by many methods.³⁻⁶ However some of these require special training and equipment which is

not available everywhere. The cross finger flap is easy to perform and does not need special equipment or a long training curve. We present the outcomes of fingertip injuries treated by cross finger flap.

METHODS

The study was done on a prospective basis in Sri Ramachandra University hospital between May 2013 and August 2016. All adult patients with volar oblique fingertip injuries who had undergone coverage with cross finger flap were included in the study. Patients who had

major crush injuries to other parts of the hand, patients who had finger fractures other than terminal phalanx and patients who had other forms of treatment were excluded from the study. Preoperative parameters which were recorded were mechanism of injury, size of defect, size of the flap, location of donor site and method of coverage of secondary defect.

All patients underwent the procedure under regional anaesthesia or digital block anaesthesia. Procedures were performed either by trained consultants or by trainees under supervision of consultants. The defect was debrided. An appropriate sized flap was elevated from the dorsum of the adjacent finger. The flap was inset with 3'0 nylon. The secondary defect was covered with split thickness skin graft harvested from the volar ulnar part of the ipsilateral proximal forearm. The donor and recipient fingers were not immobilized after the procedure. All flaps were divided at an average of two weeks. This was done under local anaesthesia in the office. The flaps were allowed to heal without any attempt at secondary suturing. The fingers were mobilised actively following this.

Parameters which were recorded during follow-up were Outcome measures recorded flap viability, flap sensibility using two-point discrimination, range of motion of fingers, grip strength and presence of other complications. Hand function was evaluated using quick DASH score.⁷ All evaluations were done by a trained hand therapist who was not a part of the surgical team.

RESULTS

40 patients were included in the study. There were 35 men and five women. Six were lost for follow-up. The minimum follow-up was nine months and maximum follow up was 34 months. The mean follow up was 14 months. The most common mode of injury was industrial accident. Three patients had pulp defects because of infections. The mean size of the defect was 160 mm² (range: 100 mm² – 180 mm²). These are shown in Table 1. There was 100% flap survival rate. All secondary defects healed. The mean total active motion was 260 degrees (180 degrees – 300 degrees). The mean grip strength was 94% of normal for dominant hand and was 78% for non-dominant hand. The mean static two point discrimination was 15.4 mm (12 mm – 19 mm). These are shown in Table 2.

Table 1: Demographics of patient population.

Characteristics	
Gender distribution (n=40)	Male- 35
	Female- 40
Mechanism of injury	Industrial accident - 37
	Post infection-3
Mean defect size	160 sq.mm

Table 2: Mean values of outcomes measured.

Outcomes of the study	
Flap failure	0 cases
Donor site problems	Nil
Mean TAM (total active motion)	260 degrees
Mean grip strength	94% (dominant hands)
	78% (non-dominant hands)
Average 2 point discrimination	15.4 mm
Quick DASH	10.5

DISCUSSION

The cross finger flap was first described by Gurdin and Pangman in 1950.⁸ Although the flap is very versatile, problems of lack of sensation, multiple surgical sittings and decreased sensation have been its problems. Many modifications have been introduced which principally aimed at increasing the sensation of these flaps.^{9,10} The duration from inset to division has also been reduced from three to two weeks.

Woon et al studied outcomes of cross finger flap cover for volar oblique thumb defects.¹¹ Out of nine patients who were evaluated, eight patients had satisfactory results and normal sensation. Ahmed et al reported their study on 31 cross finger flaps.¹² In a study of 54 patients with cross finger flaps, 92 percent had satisfactory results. Cold intolerance was present in 53 percent of patients. Although all patients had protective sensation, recovery of tactile gnosis was not present in any of the patients. In general, the consensus seems to be an outcome comprising of satisfied patient with sub-optimal sensory recovery.

In our patient series, all flaps survived. Mean quick DASH score was 10.5. The mean total active motion was 260 degrees. In spite of these good results, none of the patients had normal two point discrimination. The mean static two point discrimination was 15.4 mm. None of the patients had any trophic ulcers over their flaps.

We had partially circumvented some of the problems of cross finger flaps. All our flaps were divided within two weeks which lessened the chances of stiffness of fingers. Only two patients in our series who were sequelae to previously existing hand infections had residual stiffness of fingers. All flaps were divided on an outpatient basis under local anaesthetic. No flap inset with suturing was done. We do not consider this necessary as shown in our series where all flaps have healed well. No infection was present in any of these following divisions.

Our study had only modest numbers and did not have a control group. Only two point discrimination was checked. Other modalities of sensation were not checked.

CONCLUSION

Cross finger flaps provide reliable coverage for pulp loss with very good functional outcomes. However although protective sensation will be present, the fingertip covered by the flap will always have suboptimal sensation.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Kelsey JL, Pastides H, Kreiger N, Harris C, Chernow RA. Upper extremity disorders: A survey of their frequency and cost in the United States. Mosby: St Louis, Mo; 1980.
2. Yeo CJ, Sebastin SJ, Chong AKS. Fingertip injuries. Singapore Med J. 2010;51(1):78-87.
3. Mennen U, Wiese A. Fingertip injuries management with semi-occlusive dressing. J Hand Surg Br. 1993;18:416-22.
4. Atasoy E, Ioakimidis E, Kasdan ML, Kutz JE, Kleinert HE. Reconstruction of the amputated fingertip with a triangular volar flap. J Bone Joint Surg Am. 1970;52:921-6.
5. Xarchas KC, Tilkeridis KE, Pelekas SI, Kazakos KJ, Kakagia DD, Verettas DA. Littler's flap revisited: an anatomic study, literature review, and clinical experience in the reconstruction of large thumb-pulp defects. Med Sci Monit. 2008;14(11):568-73.
6. Ratcliffe RJ, McGrouther DA. Free toe to pulp transfer in thumb reconstruction. Experience in the West of Scotland Regional Plastic Surgery Unit. J Hand Surg. 1991;16:165-8.
7. Hudak PL, Amadio PC, Bombardier C. Development of an Upper Extremity Outcome Measure: The DASH (Disabilities of the Arm, Shoulder, and Hand). The Upper Extremity Collaborative Group. Am J Ind Med. 1996;29:602-8.
8. Gurdin M, Pangman JW. Repair of surface defects of fingers by trans-digital flaps. Plast Reconstr Surg. 1950;5(4):368-71.
9. Joshi BB. A sensory cross-finger flap for use on the index finger. Plast Reconstr Surg. 1976;58:210-3.
10. Hastings H. Dual innervated index to thumb cross finger or island flap reconstruction. Microsurg. 1987;8:168-72.
11. Woon CY, Lee JY, Teoh LC. Resurfacing hemipulp losses of the thumb: the cross finger flap revisited: indications, technical refinements, outcomes, and long-term neurosensory recovery. Ann Plast Surg. 2008;61(4):385-91.
12. Ahmed M, Ahmed N. Experience of cross finger flap. JRM. 2011;15(2):90-1.

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