

## Review Articles Cross Finger Flap for Reconstruction of Various Finger Defect

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### Abstract

**Background:** finger tip injuries and contracture of fingers are very common cases who need reconstruction that is able to provide stable padding and sensory recovery. There are various techniques used for reconstruction of finger defect but cross finger flap is effective & very simple procedure without significant complication or require special techniques.

**Method:** the study included 40 patients with finger tip defect & contracture release defect who underwent standard cross finger flap b/w November 2010 to June 2015 in JJ group of hospitals, Mumbai and NIMS superspeciality hospital, Jaipur. In order to evaluate the outcome of our surgical method, we observed two point discrimination (TPD) test up to 6 month post operatively as well as patient satisfaction in term of functionality & aesthesis.

**Result:** flap is survived in all 40 cases. Most of the cases had cosmetically & functionally acceptable outcome. The smallest defect was 1 x 0.9 cm and longest one 2.2 x 1.5 cm. Sensory return used to begin 10 weeks after flap application. The average TPD test measured was 6.1 mm (range 4 – 8 mm) on 6 month follow up.

**Conclusion:** The cross finger flap is safe & reliable procedure for finger defects. This procedure is simple to perform under local anesthesia and is able to provide both mechanical stability & sensory recovery.

### I. Introduction

Finger tips are very sensitive human body part because they are always exposed to external environment and give power to human being to recognize the things by touch sensation.

Treatment of finger tip injuries should take prime importance to restore the normal length, prevent nail deformity, recovery of normal sensation, good cosmesis, appearance & allow proper tendon excursion in fingers.

The method of finger tip & other finger defects reconstruction are volar V-Y advancement flap, cross finger flap, neurovascular island flap and distant flap like groin, abdomen or free flap using the toes.

The author used standard cross finger flap for finger tip & other finger defects reconstruction from November 2010 to June 2015 in 40 patients.

### II. Method

From November 2010 To June 2015, We Operated 40 Patients In Which Cross Finger Flap Was Done For Finger Tip Injuries & Contracture Release Defect.

Out of 40 patients, 32 were males & 8 females. Thirty five patients had finger tip defect due to trauma (machine injury mostly) and 5 had volar defect due to contracture release.

We observed TPD, stiffness of involved joint, cold intolerance, as well as patient satisfaction in term of functionally & aesthetically. The follow up period is 3 months to 12 months.

Except the 3 pediatric patients, operations were done under local anesthesia. All surgeries were done under finger tourniquet. The flap was designed over adjacent finger, mostly over dorsum of middle phalynx (not crossing the joints). Normal saline is injected in subcutaneous plane at donor site. Distal most margin of flap is just posterior to mid axial line of finger and flap is raised with subcutaneous fat but above the paratenon of extensor tendon and raise the flap up to opposite mid axial line ( never divide the neurovascular bundle).

Flap was inset over defect and flap donor area was grafted by full thickness skin grafting and tie over dressing done. Donor site check dressing done on 5<sup>th</sup> day and flap is divided after 3 weeks post operatively. After division of flap, dressing of donor as well as recipient site was continued for 7 days and wound allowed to heal secondarily.

S.NO.	Patient's Age/Sex	Two point discrimination test(mm)
1.	27/F	5.5
2.	50/M	6.7
3.	43/M	6.8
4.	34/M	6.7
5.	8/M	4.0

6.	19/F	6.5
7.	32/F	6.2
8.	47/M	6.9
9.	58/M	7.1
10.	7/F	4.3
11.	5/M	4.5
12.	24/M	6.1
13.	62/M	7.4
14.	16/M	5.4
15.	26/M	5.7
16.	33/M	6.2
17.	28/M	6.1
18.	31/M	6.0
19.	37/M	6.7
20.	45/M	6.5
21.	31/F	6.1
22.	66/F	8.0
23.	15/M	5.5
24.	37/M	6.1
25.	42/M	6.8
26.	21/M	5.2
27.	38/M	6.5
28.	40/M	6.4
29.	22/F	4.6
30.	35/M	6.6
31.	26/M	5.1
32.	45/F	7.1
33.	34/M	6.3
34.	30/M	6.1
35.	34/M	6.2
36.	51/M	6.7
37.	20/M	4.9
38.	44/M	6.8
39.	32/M	6.1
40.	36/M	6.3

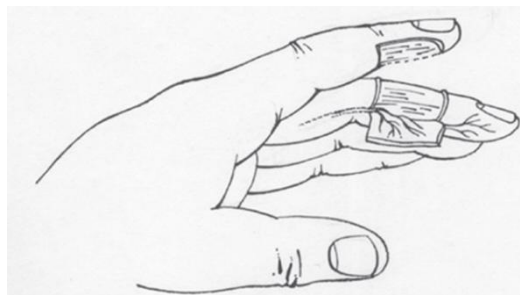


Fig -1 (diagrammatic presentation of raising the flap)



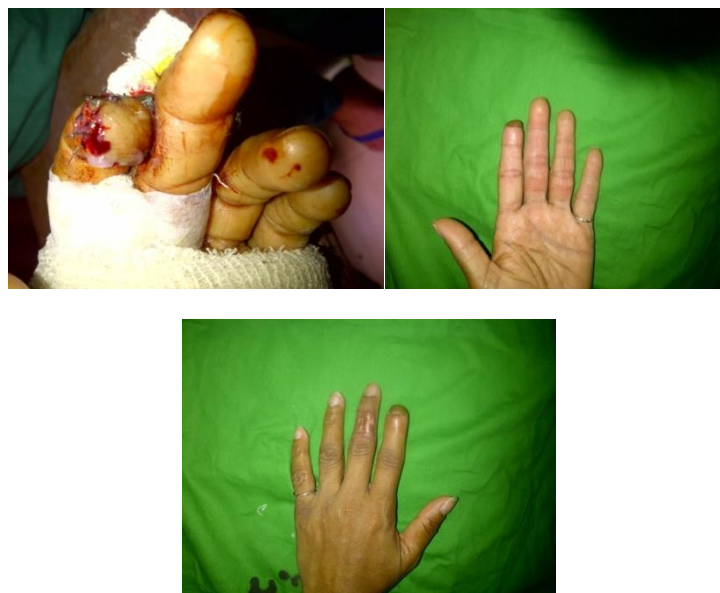


Fig- 2 (execution of cross finger flap)

### III. Result

We reconstructed the finger tip & other finger defects of 40 patients with full thickness tissue defects with bone exposure & exposed tendons. We used standard cross finger flap to cover those defects. The flap survived in all cases. The smallest size of flap in our study is  $1 \times 0.9 \text{ cm}^2$  and largest one is  $2.2 \times 1.5 \text{ cm}^2$ . The mean surgical duration was 52 min.

The follow up period was up to 12 months. Sensation starts in the flap as early as 10<sup>th</sup> week post operative and recovers up to 6-8 month post operative.

Average two point discrimination (TPD) our study is 6.1mm as compared to study done by Nae-Ho LEE et al (Arch Plast Surg. 2012 Nov; 39(6): 637–642.) in which TPD was 7.2mm (cross finger flap without neurotaphy) and 4.6mm (cross finger flap with neurotaphy).

In satisfaction survey of 40 patients in view of functionality & aesthesis 2 patients were unsatisfied in because of aesthetic appearance of donor finger (because of depressive scar over dorsum). None of the patients complained about interference in their day to day activities.

Joint stiffness as a result of immobilization for flap stability was present temporarily and resolved completely by physical therapy. There is no impairment of joint movement.

Cold intolerance was present in 7 patients and the TPD was above average in those patients leading to a conclusion that they are hypersensitive.

### IV. Discussion

The idea of the distant transposition of flap arose in ancient time, the Indian method of nose reconstruction being associated with name of “Sushruta”.

The first article that dealt with cross finger flap was published by “Michael Gurdin & John W. Pangman” in 1950. The author named the procedure Trans –digital flap. At the same time T.D. Cronin did same procedure and give name the “Cross Finger Flap”.

In various type of finger tip injuries , microsurgical reimplantation is most effective in case of complete amputation proximal to DIP joint. But finger tip injuries are technically not suitable for microsurgical reimplantation. We did mostly neurovascular island flap or cross finger flap.

Major disadvantage of neurovascular island flap are that dissection is tedious & learning curve is very steep and it cannot cover a large defect as well as if defect is covered undertension then there are chances of nail deformity(hook nail deformity).

In contrast cross finger flap is easy to perform & very simple to learn for newsurgeons. Sensation also starts early and reaches at acceptable level with in 6-8 months. In our study average TPD was 6.1mm, and it can be more precise & improved up to 4.8mm if neurotaphy is done with cross finger flap inseting over recipient site and TPD is improved up to 4.8mm which was with in satisfactory range. But solidity & durability decreased when the patient pinches an object because dorsal skin was used , which was different from the pulp tissue.

Several articles were devoted to the studies of the recovery of sensation, donor site morbidity and the function after the procedure using innervated and non-innervated cross-finger flaps literature shows that there is

no doubt that although re-innervation is different in a non-innervated and innervated cross-finger flaps, the recovery of sensation (innervation) is advanced comparing with that of a skin grafting. Personal experience and literature show that using innervated cross-finger flaps the two point discrimination in innervated flaps in general is 1.5 –2 times greater than in noninnervated ones.

## V. Conclusion

We believe that this overview might be of interest to hand surgeons and residents and may also inspire some new ideas.

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