

Original Article**Treatment and Outcome of Soft Tissue Defect of Finger***Md. Shueb-Ur-Rashid¹, Ayesha Hanna², Chhamita Sultana Chhanda³, Mousumi Kar⁴**Abstract**

Background: One of the most common hand wound is a finger injury. The activity of the entire hand is affected by finger Pain or shortened finger impairs the function of the whole hand. The proper coverage will prevent many of the distressing sequels of the finger injuries such as painful scar, cold sensitivity, poor perception, etc. for hand surgery professionals; soft tissue repair after finger damage may be difficult.

Methods: In a prospective study between January 2017 to July 2022 consisting of 30 patients with soft tissue loss of finger were treated with different local flaps. The duration of follow-up from 10th POD to 9th months. Subjective and objective evaluation was done and graded as excellent, good, and poor.

Results: In this series 16(53%) CFF, 6(20%) V-Y A flap, 3(10%) FTSG, 1(3.33%) FDMA flap, 2(6.66%) HDT flap and 2(6.66%) Fillet flap done. 22(73.33%) patient had good, 2(6.66%) had excellent and rest 6(20%) had poor finger movement. 18(60%) patients had no tenderness during finger movement. 6(20%) had slight, 4(13.33%) had moderate and 2(6.66%) patient had marked tenderness and 2(6.66%) had moderate disability. 25 (83.33%) had normal two point discrimination.

Conclusion: The main goals of finger reconstruction are to restore or recreate a responsive pain-free finger of maximum possible length, rapid healing, and a short period of functional impairment that is fully mobile.

Keywords: Soft tissue defect, finger injury, local hand flap, cross finger flap, V-Y advancement flap, First dorsal Meta carpal artery flap.

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Introduction

The hand is an integral part of the body that plays a key role in social competence, speech, efficiency, and interactions with our setting. A complex structure that not only covers the underlying structure, but also has a specialized functional and sensory component is the soft tissue envelope of the hand.¹ Finger injuries are becoming more common with the increasing use of mechanical, industrial and household appliances. Several million cases occur each year,

some of which are avulsions of the tactile pad.² A significant part of hand injury treatment is the replacement of skin loss in digital injury, especially in the volar aspect management. When skin replacement is necessary, conflicting opinions exist about the relative functional value of the different types of skin repair.³ There are both functional and aesthetic advantages in reconstructing digital skin defect using procedures that rearrange the tissues remaining on the damaged digit and prevent plundering adjacent part of the hand or looking for the flap donor site further afield.⁴ Soft tissue reconstruction after digital injury can be challenging for hand surgery specialist and non-specialist.⁵ Secure, mobile and sensate digit with a appropriate soft tissue envelope are the ultimate goals of soft tissue reconstruction of hand.⁶ There are six main types of repair for this injury: primary closure by shortening of the bone, split-thickness skin grafts,

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full thickness skin grafts (FTSG), palmar flaps, cross-finger flaps (CFF) and pedicle flaps from the chest or abdomen.⁷⁻⁹ Local flaps are most commonly performed to cover traumatic defects. Imperfect flap design or poor operation execution can lead to unnecessary reoperation. Proper design and planning of flaps should ensure satisfactory functional outcome without the need for reoperations.¹⁰ knowing the best form of cover will be of benefit, especially for sensory re-innervations as well as for subjective assessment, cosmetic appearance and freedom from complications, as there are conflicting reports on which form of the repair is the best for sensory and functional recovery.² This study was carried out with aim to evaluate the age, sex, site, pattern of injury and to compare the functional and cosmetic results of the various local flap and grafting techniques in finger reconstruction middle and distal phalanx.

Methods

This prospective study was conducted in department of burn & plastic surgery, Sir Salimullah Medical College and Mitford Hospital, Dhaka from January 2017 to July 2020. This study included 30 patients, 23 male and 7 female, with volar and dorsal soft tissue defects in the fingers of both hands. All cases in this study were post traumatic, post infective and post burn patients. Wound were covered with CFF⁸, V-Y advancement (V-Y A) flap¹¹, FTSG, first dorsal metacarpal based flap (FDMA)¹², homodigital transposition (HDT) flap and fillet flap. Management of the patient with a hand defect in soft tissue starts with a thorough history and physical examination. Skin, nail elements, neurovascular status, flexor and extensor tendon and skeletal structures are thoroughly examined. Radiographs are obtained for the diagnosis of underlying bone fracture and/or joint dislocation.. Appropriate antibiotics are given. Procedures were

done under local and regional anesthesia with loupe magnification. Flaps were chosen based on the size and location of the defect in different finger. Volar favorable or transverse amputation that required <8 mm of advancement were covered with V-Y A flap. Clean post traumatic soft tissue defect of volar surface wound middle and distal phalanx were covered with FTSG, CFF. Volar surface of thumb was covered with FDMA. Traumatic shortening of distal phalanx was closed with fillet flap. Donar site of local flap was covered with full thickness skin graft. Post operatively a dorsal plaster splint was applied to immobilizing the wrist in neutral and slight flexion of the finger to relieve any tension on skin suture. Flap checked at 1st post-operative day (POD) for viability. Donar site and flap check dressing done on 4th POD. CFF was divided on 14th POD. After flap division, hand physiotherapy was started under guidance of physiotherapists.

Inclusion criteria: 1) Age from 3 to 55 years, 2) Both sex, 3) Patient with soft tissue defect in palmer and dorsal aspect of all fingers of both hand, 4) Middle and distal phalanx.

Exclusion criteria: 1) Flexor or extensor tendon injury, 3) Unstable poly trauma patient, 4) Severe co-morbidity. The follow-up period was 9 months from the date of surgery. Follow up done at 1st, 3rd, 6th and 9th months after surgery. During follow up Subjective complaints of tenderness, and disability were graded as none, moderate, and marked in comparison with normal finger of opposite hand. Two prong compass and measuring scale were used to measure two point discrimination. Disability was assessed on the basis of difficulty in picking up objects, grasping, tying shoes, buttoning clothes. The clinical results were analyzed and the criteria for the ratings were as follows:^{2,3} a) Excellent: Full range of motion in both digits; good or excellent appearance of the sites; and no functional disability noted by the

patient, b) Good: Slight limitation of finger movement either single or both fingers; hyperesthesia in the flap with more than minimum dysesthesia in either the donor or recipient area; and good appearance of the graft sites, 3) Poor: Moderate to severe limitation of motion in either the donor or the recipient digit; or more than slight dysesthesia in either digit; or both of these deficiencies.

Results

In this prospective study 30 patients were treated, age varies from 3 years to 55 years with mean age of 26.2 ± 13.56 . Commonest age group were 21 to 30 years. 25(83.33%) injuries occurred on right hand and 5(16.66%) on left hand. Commonly affected finger was index 12(40%) then middle 10(33.33%), ring 5(16.66%), little 2(6.66) and thumb 1(3.33%) respectively. 27(90%) patients did not have any immediate complication, 3(10%) had donor site infection and 1(3.33%) had partial necrosis of flap which was managed conservatively. At the end of 9 months 18(60%) patients had no tenderness on finger movement whereas 6(20%) had slight, 4(13.33%) had moderate and 2(6.66%) patient had marked tenderness. 24(80%) patients had no disability, 4(13.33%) had slight and 2(6.66%) had moderate disability. Most of the patient 25(83.33%) had normal two point discrimination at the end of 9 month follow-up.

Table 1 shown mean age (SD) 26.2 ± 13.57 years, with male predominance. Table 2 shown right hand 25(83.33%), index 12(40%) and middle 10(33.33%) fingers are commonly affected; mean wound size was $1.126 \pm 0.50 \text{ cm}^2$. Figure 1 shown 21(70%) finger defect were traumatic then burn 5(16.66%) and infection 4(13.33%) respectively. Figure 2 shown fingers were treated with CFF 16(53.33%), V-Y A flap 6(20%), FTSG 3(10%),

fillet flap 2(6.66%), HDT flap 2(6.66%) and FDMA flap 1(3.33%).

Table 1: Demographic characteristics of study population (n=30)

Parameters		Frequency	Percentage
Age M (SD)	26.2 years (SD $\pm$ 13.57)		
Sex			
	Male	23	76.66
	Female	7	23.34
	Ratio	3.2:1	

Table 2: Site, wound size and affected fingers of study population (n=30)

Parameter		Frequency	Percentage
Site			
	Rt hand	25	83.33
	Lt hand	5	16.66
Wound size M (SD)	1.126 cm^2 (SD $\pm$ 0.50)		
Affected finger			
	Thumb	1	3.33
	Index	12	40.00
	Middle	10	33.33
	Ring	5	16.66
	Little	2	6.66

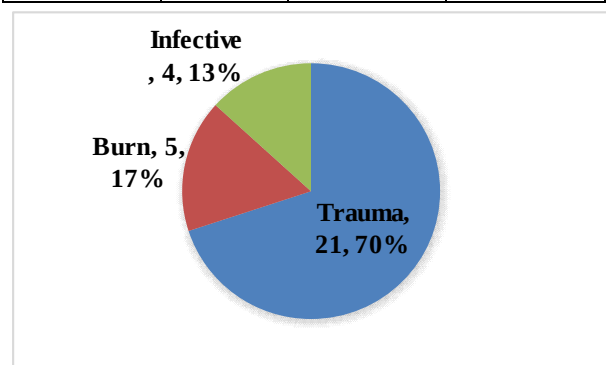


Figure 1: Aetiology of soft tissue defect of finger of study population (n=30)

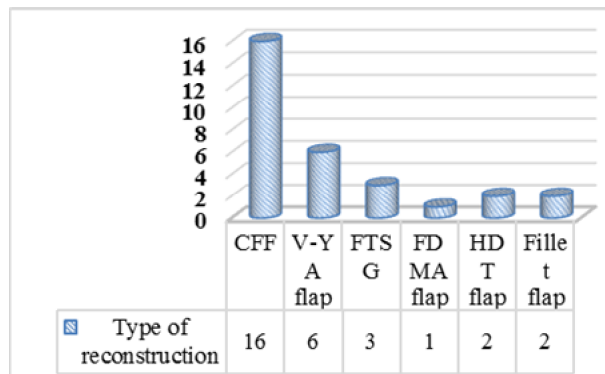


Figure 2: Column chart shows different procedures use for finger defect reconstruction of study population (n=30)

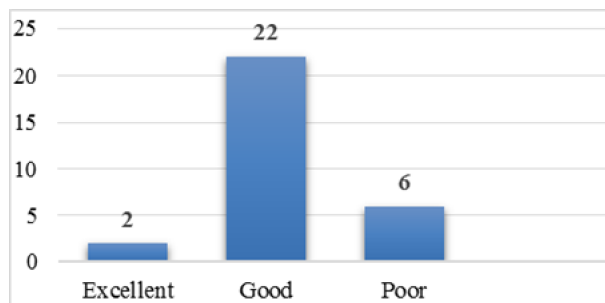


Figure 3: Outcome of finger movement of study population 9 months after operation (n=30)

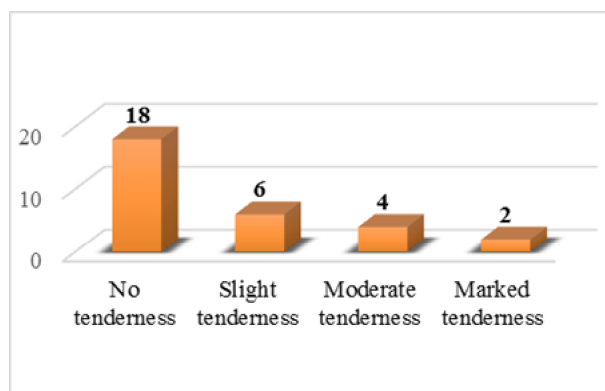


Figure 4: Tenderness during finger movement after 9 months (n=30)

Figure 3 shown that most of the patient had good finger movement 22(73.33%), 2(6.66%) had excellent and rest 6(20%) had poor finger movement. Figure 4 shown most 18(60%) the

patients had no complaints during finger movement, but 6(20%) had slight, 4(13.33%) had moderate and 2(6.66%) had marked tenderness.

Discussion

In this study, we have evaluated different method of finger reconstruction and postoperative complication and overall outcomes. In this prospective study 30 patients were treated, age varies from 3 years to 55 years with mean age of 26.2 ± 13.56 . Maximum incidence of cases occurred between the age group of 21 to 30 years, 23(76.66%) patients were males and 7(23.33%) patients were females with male to female ratio of 3.2:1. *Khan SA et al.*³ conducted a study where 50 patient were treated, age range 2 years to 54 years of age, the mean age was 28.9 years, maximum incidence of cases occurred between the age group of 21 to 30 years. 44(88%) patients were males and only 6(12%) patients were females with male to female ratio of 7.3: 1 which is similar to our study. In our study 25 (83.33%) affected on right hand and 5 (16.66%) on left hand which was similar to *khan SA et al*³ where 74% in right hand and left hand 26% . Common cause of finger defect was traumatic 21(70%) and commonly affected finger was index 12(40%) which was similar to *Tanvir A*¹³ series where common cause was trauma and commonly injured finger was index 36(59.01%). Commonly used flap is CFF 16 (53.33) which was similar to, *khan SA et al*³ study. In our study most of the patient had good finger movement 22(73.33%), 2(6.66%) had excellent and rest 6(20%) had fair finger movement. During finger movement 18 (60%) patients had no tenderness, 6(20%) had slight, 4(13.33%) had moderate and 2(6.66%) patient had marked tenderness. In this series; 24(80.00%) patients had no disability, 4(13.33%) had slight and 2 (6.66%) had moderate disability. in *khan Sa et al*³ 46(92%) patients did not have any complication, 2(4%) had stiffness of fingers,

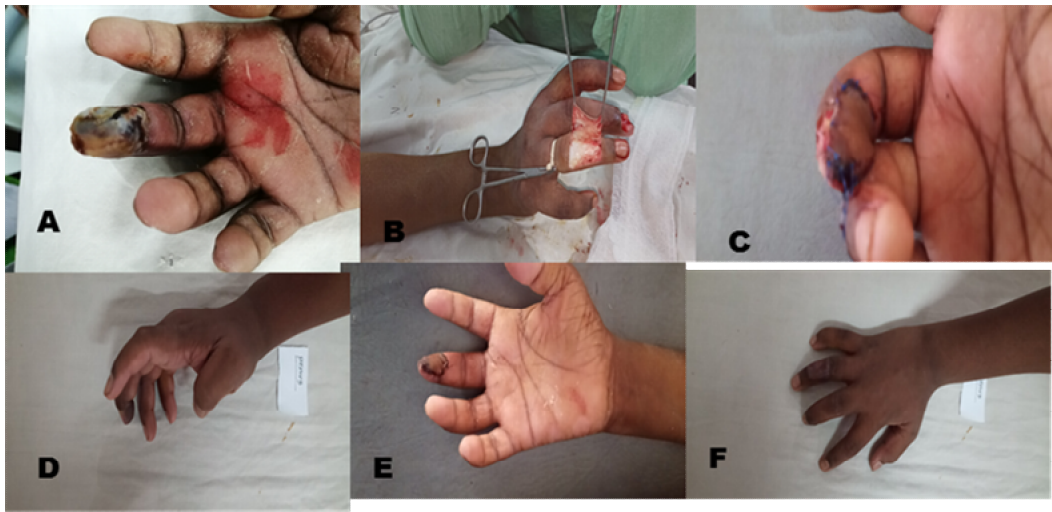


Figure 4: Show different steps of cross finger flaps. A: defect, B: flap harvesting, C: flap insetting D: After flap division, E&F: Follow up picture

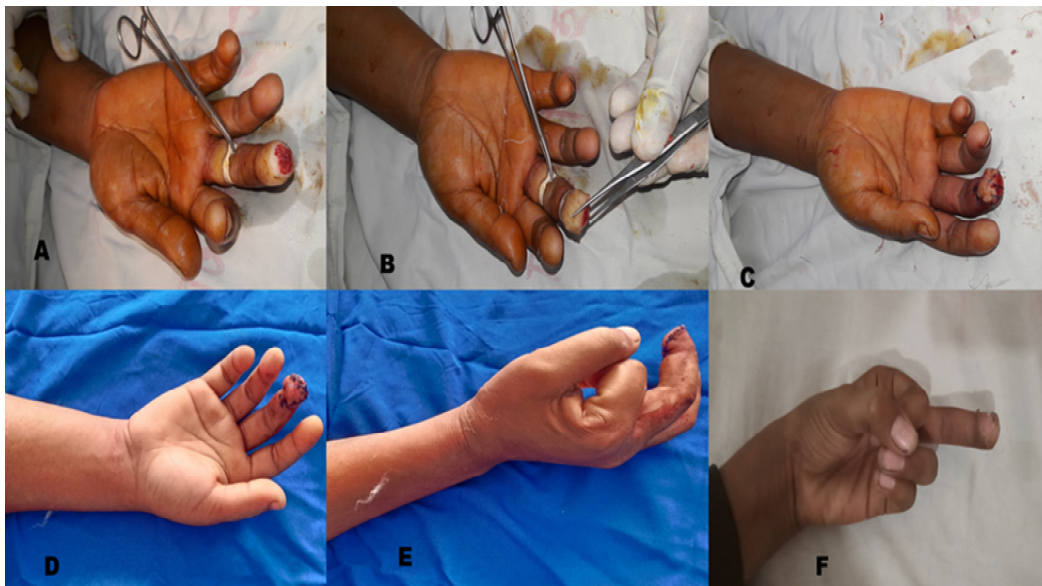


Figure 5: Shown different steps of V-Y A flap. A: wound, B: flap harvesting, C: flap setting, D,E: Post operative pictures of flap F: Follow up picture

28(56%) patients had no tenderness, 10(20%) had slight, 11(22%) moderate and 1(2%) patient had marked tenderness. 31(62%) patients had no disability, 12(24%) had slight and 7(14%) had moderate disability. In *Sturman and Duran*² series among 20 patients with cross-finger flap 20%

complained of mild tenderness but none had marked tenderness that were similar to our study. Most of the patient 25(83.33%) had normal two point discrimination at the end of 9 month follow-up. *Khan SA et al*³ and *Ahmed T*¹³ series shows that the two-point discrimination testing was good for CFF and V-Y A flap.

Limitation of this Study

In our series sample size, study duration and follow up period was small and all procedures done by different surgeon in a hospital.

Conclusion

Treatment decisions for finger injuries are dictated by the individual needs of the patient, the nature of the wound, and the knowledge and experience of the attending clinician. The main objectives of finger reconstruction are the restoration or recreation of the maximum possible length of a sensitive pain free digit in a fully mobile digit, rapid recovery and a minimal functional impairment duration.

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