

Evaluation of Functional Outcome after V-Y Flap in Fingertip Injuries in Emergency Setting.

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Background: A V-Y advancement flap is created by making a v-shaped incision and advancing the broad base of the V into the defect. The resulting defect is closed primarily in a Y-shape. A V-Y closure that converts the distal portion of the V-shaped distal defect into a straight-line closure. The primary goals of digital reconstruction are to preserve the length and maintain full mobility of the digit while providing adequate protective cover for this purpose, Various surgical methods are used for amputation injuries including simple revision amputation, skin grafts, local flaps, distal flaps, neurovascular island pedicle flaps even free flaps (Li 2008; Zhou 2008; Zhang 2011). The reconstructive methods for fingertips include, local homodigital advancement flaps including V-Y closure from ipsilateral or bilateral sides of the finger and volar advancement flaps (Kutler 1994; Atasoy 1970; Evance 1988; Venkataswami 1980) have been popular as they are easy to do and does not necessitate expensive infrastructure. **Objective:** Our objective was to evaluate functional outcome after V-Y flap in fingertip injuries in emergency setting done by trainee surgeons. **Methodology:** The study was non Randomized prospective observational study From January 2015 to December 2018 on 15 patients with fingertip injuries aged 20 to 65 years carried out National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Sher-E-Bangla Nagar, Dhaka. The Inclusion criterion was: a) injuries presented Within 24 hours, b) patients of 20-50 years, c) Both sexes, d) Mentally fit patient to understand instruction. The known diabetic and patient with neurovascular deficit were excluded from the study. **Operative technique:** Premedication: 1.5gm of intravenous third generation of cephalosporin given 15 minutes before application of tourniquet. Position of patient: Supine on the table with injured limb on the hand rest at right angle to body. **Observations and results:** Age of the patients in this study ranged from 20 to 50 years. Most of the patients 12(80.0%) were age 20-35 years. Mean age was 32.2±6.85 years. In the sample male patients were 14(93.3%). Male female ratio 14:1. Male patients were predominant in this study and occupationally maximum 11(73.3%) patients were garments worker, 2(13.3%) patients were service holder. The machinery injury was the maximum offending factor 11(73.3%) cases; the rest was road traffic accident. In this series, right finger was injured in 12(80.0%) patients and left in 3(20.0%) patients. Majority was in single finger 14 (87.5%) patients were injured and 1(12.5%) patients was injured in double finger. In order of digit involvement index finger injuries 8(53.3%) thumb 4 (26.6%) middle finger injury 2(13.3%), ring finger 2(13.3%). Most of the patient had healed without infection 12(80.0%) cases, 3(20.0%) cases had mild infection. Among these three cases 2 patients had wound dehiscence eventually healed by dressing and antibiotics and one had partial flap loss requiring secondary procedure. **Conclusion:** The V-Y flap is a useful method for treating selected distal fingertip amputations with exposed bone. It has minimal donor site morbidity and is easy to perform without magnification.

Keywords: Atasoy flap; Fingertip injuries; V-Y flap.

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I. Introduction

Fingertip injuries occur frequently because hands are used to explore surroundings so it's prone to domestic and industrial trauma (Aboulwafa 2013; Chang 2006). (Murai 1997). Most often industrial workforce in our country, where garments factories are on the rise, is prone to this injury. Unfortunately they are often

viewed as a relatively minor injury but their improper management can lead to considerable loss of skilled hand function. A fingertip injury significantly not only affects the occupational and social activities but also affects aesthetic and psychological aspect of the patient. (Gaulke 2000). Hence approach to the management depends age, sex, hand dominance, profession & hobby, finger involvement, location, depth, angle of the defect, nail bed involvement, status of the remaining soft tissue, co-morbid conditions (Lister 1993). The primary goals of digital reconstruction are to preserve the length and maintain full mobility of the digit while providing adequate protective cover for this purpose. Various surgical methods are used for amputation injuries including simple revision amputation, skin grafts, local flaps, distal flaps, neurovascular island pedicle flaps even free flaps (Li 2008; Zhou 2008; Zhang 2011). Unfortunately, hand and plastics surgeon are rarity in developing countries, and injures are often presented in the emergency OR so early definitive management is the best option for these patients. The reconstructive methods for fingertips include, local homo-digital advancement flaps including V-Y closure from ipsilateral or bilateral sides of the finger and volar advancement flaps (Kutler 1994; Atasoy 1970; Evance 1988; Venkataswami 1980) have been popular as they are easy to do and does not necessitate expensive infrastructure. Our objective was to evaluate functional outcome after V-Y flap in fingertip injuries in emergency setting done by traineesurgeons.

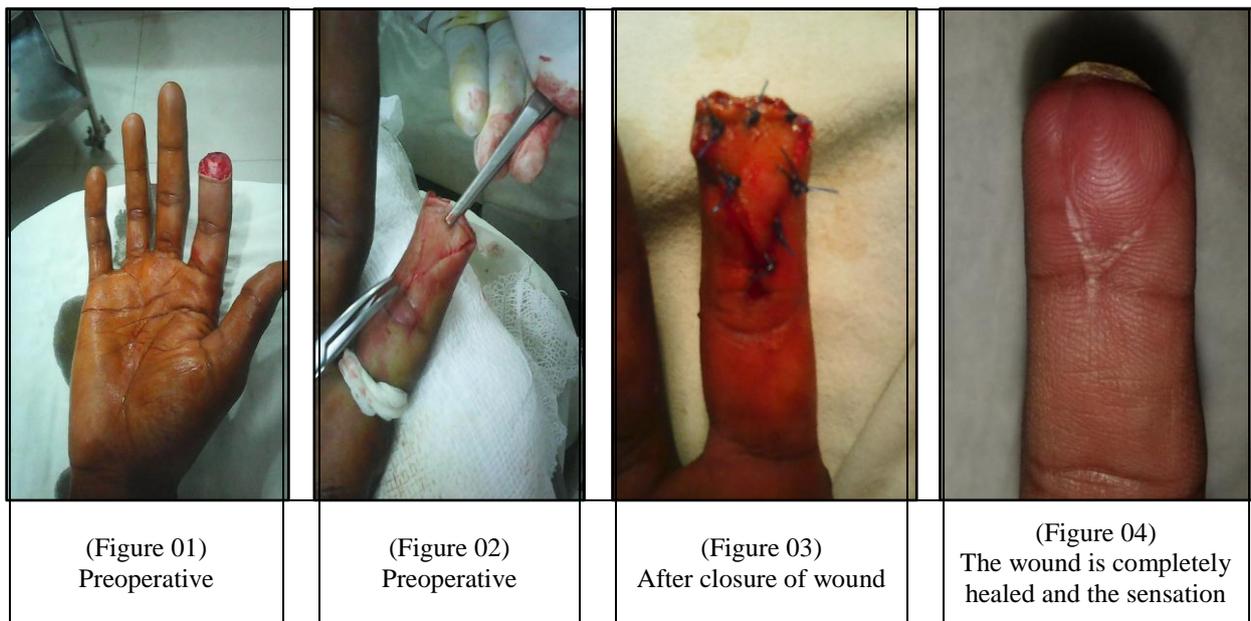
II. Methodology And Materials

The study was Non Randomized prospective observational study From January 2015 to December 2018 on 15 patient with fingertip injuries aged 20 to 65 years carried out National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Sher-E-Bangla Nagar, Dhaka. The Inclusion criteria was: a) injuries presented Within 24 hours, b) patients of 20-50 years, c) Both sexes, d) Mentally fit patient to understand instruction. The known diabetic and patient with neurovascular deficit were excluded from the study.

III. modification

Operative technique:

Premedication: 1.5gm of intravenous third generation of cephalosporin given 15 minutes before application of tourniquet. Position of patient: Supine on the table with injured limb on the hand rest at right angle to body. Tourniquet was applied at the base of the finger.



Preparation of surgical field: Painting of limb by povidone iodine after hexiscrubwash. The 12 steps of the single V-Y plasty technique follow:

| Step No. | Description |
|--|---|
| Step 1 (Anesthesia): | Perform a digital block using 1 percent lidocaine (Xylocaine) without epinephrine administered on both sides of the proximal finger to achieve adequate anesthesia. Sometimes sedation was required for anxious patients. |
| Step 2 (Tourniquet): | Drain blood from the finger and apply a tourniquet using a rubber band or a small Penrose drain at the base of the affected digit. |
| Step 3(washing): | Clean the wound thoroughly using saline or water. |
| Step 4 (debridement): | Debride any devitalized tissue. |
| Step 5(nibbling): | If there is a portion of the bone protruding from the distal phalanx, smooth or trim it using a rongeur to allow for the advancement of the flap. |
| Step 6 (Design): | Reverse triangular-shaped flap keeping the base of the flap at the cut edge of the skin defect. The base of the triangle being as wide as the width of the defect (Figure). |
| Step 7 (Raising the flap): | Skin incisions are made through the full thickness of the skin. Without undermining it as it an island pedicle flap and the blood supply for this comes from beneath. |
| Step 8 (Advancement of the flap): | Advance the flap over the defected area and suture it to the nail bed with either 5-0 or 6-0 nylon sutures (Figure 2). |
| Step 9 (inset): | Place corner stitches to avoid interference with the blood supply to the corners. |
| Step 10(Remove the tourniquet): | After removal of the tourniquet, the flap Observed 5 to 10 minutes for good capillary refill and color. |
| Step 11(Dressing): | Moist dressing with sofratulle and topical antibiotic ointment. |
| Step 12(immobilization): | A short arm protective splint is applied with the wrist at 30-45° of extension, the MCP joints in full extension. |

IV. Post-Operative Care

The patient was discharged after operation and was advised to keep the operated limb elevated and to attend the outpatient department subsequently for dressing, stitch off and follow up visits at OPD in regular interval was advised and finally the outcome was assessed considering a) General Appearance, b) Sensation, c) Tenderness on stump, d) appearance of nail e) Movement of distal interphalangeal joint f) Two-point discrimination.

V. Observations And Results

Age of the patients in this study ranged from 20 to 50 years. Most of the patients 12(80.0%) were age 20-35 years. Mean age was 32.2±6.85 years. In the sample male patients were 14(93.3%).Male female ratio 14:1. Male patients were predominant in this study and occupationally maximum 11(73.3%) patients were garments worker, 2(13.3%) patients were service holder. The machinery injury was the maximum offending factor 11(73.3%) cases; the rest was road traffic accident. In this series, right finger was injured in 12(80.0%) patients and left in 3(20.0%) patients. Majority was in single finger14 (87.5%) patients were injured and 1(12.5%) patients was injured in double finger. In order of digit involvement index finger injuries 8(53.3%) thumb 4 (26.6%) middle finger injury 2(13.3%), ring finger 2(13.3%). Most of the patient had headed without infection 12(80.0%) cases, 3(20.0%) cases had mild infection. Among these three cases 2 patients had wound dehiscence eventually healed by dressing and antibiotics and one had partial flap loss requiring secondary procedure. Final out come is in the table below

| Criteria Patient response | Satisfactory | Unsatisfactory | |
|--|--------------|----------------|-----------------|
| | | | Patient comment |
| General Appearance | 11 | 4 | Ugly |
| Sensation | 11 | 4 | Paraesthesia |
| Stump tenderness | 13 | 2 | Can't work |
| Movement of distal interphalangeal joint | Full ROM | Restricted | |
| | 13 | 2 | |

| | | | |
|--------------------------|---------|-----|--------|
| Curving of nail | Present | | Absent |
| | 13 | | 2 |
| Two-point discrimination | 6mm | 4mm | 2mm |
| | 10 | 1 | 4 |

Finally considering these factors functional outcome was satisfactory (good) in 13(86.7%) cases and unsatisfactory (fair) in 2 cases (13.3%).

VI. Discussion

Fingertip injuries are extremely common among the industrial workers, in our country it is the garments worker mostly affected. In our scenario management has to be prompt and optimum to minimize the cost and complication. The study was taken to see the outcome of the procedure done by the junior surgeons under a consultant’s supervision. The procedure was all performed on the same day of the injury at the emergency OT. The management of fingertip injuries is intricate and not without controversy because of diversity of treatment options but the ultimate goals of is to preserve sensation, augmenting useful length, avoiding joint contractures, providing satisfactory appearance and avoiding donor disfigurement and operational loss of the digit. (Beasley 1969).

Patients age range in our study ranged from 20 to 50 years (mean age 32.2±6.85 years). Corresponding to a similar study by Sungur et al. (2012) performed V–Y rotation advancement flap on seven male patients. Patients’ age ranged from 21 to 65 years old (average, 37.6 years). This age is most vulnerable, as industrial work demands young and strong personnel. Regarding Sex distribution male 14(91.67%), female 1(8.33%).Abood and daood (2007) showed 10 patients were male, 3 were female. The mode of injury is machinery injury was found 11(73.3%), as garments industry is blooming, and more and more jobs are creating in this sector.

In this study, 14 patients (87.5%) had single finger and 1 patient (12.5%) had double finger injury. In the study by Frandsen (1978) all patient had injury in single finger. Distribution of finger -Thumb 4 patients (20%), index finger 8 patients (53.3%),middle finger 2patients (13.3%),ring finger 2 patients(13.3%).A similar study by Sonjoy (2007) showed middle finger 38 patients, index finger 29 patients, ring finger 18 patients, little finger 10 patients.

Post operatively 3 patients had infection in my study.one of the case hadmarginal necrosis of flap exposing critical area partly requiring secondary procedure; the other two patients had partial wound dehiscence which was managed conservatively with dressing and antibiotics.Frandsen (1978) showed 6 patients had infection, due to total or partial flap necrosis.

Curving of nail is a cumbersome problem which was present in 13 patients (86.7%).Other study showed less incidence of curved nail as with Frandsen (1978) having (32%). In Frandsen’s (1978) study all patients had free movement of the joint we had 13 patients (86.7%) with full range of movement of Distal Interphalangeal joint, and other 2 patients (13.3%) had restricted movement.

Finally, two-point discrimination is o vital importance we had 10 patients (66.6%) with 6mm comparing with the study of Sonjoy (2007) where all the patients achieved measurable averageof 6mm two-point discrimination.

The evaluation was done for general appearance, use, sensations and static two-point discrimination employing 1, 2, 3 grading. The results were classified as good (10), fair (5–10) and poor (< 5) depending upon the total aggregate. For static two-point discrimination the scoring criteria was: 6mm or more: 1, 3 to 6 mm: 2 and 3 mm or less: 3 (Sanjay 2007).

Out of 15 patients, 13 patients scored (good), 2 patients scored (fair). So that total 13 patients developed satisfactory outcome (86.7%) and 2 patients developed unsatisfactory outcome (13.3%).

LIMITATIONS OF THE STUDY

Limitation the study is small sample size done over a short period of time.Moreover the cases were not turning up for follow-up for economicalconstraint.Fingertip injury can achieve almost normal sensibility and satisfactory motion by V-Y flap and patients can expect to return to work on average approximately 3 weeks after operation more over it can be performed at the emergency OT.

VII. Conclusion And Recommendations

The V-Y flap is a useful method for treating selected distal fingertip amputations with exposed bone. It has minimal donor site morbidity and is easy to perform without magnification.

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