

A Prospective Study of Incidence and Management of Fingertip Injuries

¹Neelima M., Post graduate , department of plastic surgery, Gandhi hospital and medical college , Secunderabad, Telangana , India.

²Arige Subodh Kumar, Professor and HOD, Department of plastic surgery, Gandhi medical college and Hospital, Secunderabad, Telangana state, India,

³Sura Anitha, Assistant professor, Department of plastic surgery, Gandhi medical college and hospital, Secunderabad, Telangana state, India.

⁴Erugula Mahender, Associate professor, Department of plastic surgery, Gandhi medical college and hospital, Secunderabad, Telangana state, India.

⁵Baliram Chikte, Associate professor, Department of plastic surgery, Gandhi Medical College and hospital, Secunderabad, Telangana state, India

Corresponding Author: Arige Subodh Kumar, Professor and HOD, Department of plastic surgery, Gandhi medical college and Hospital, Secunderabad, Telangana state, India,

Citation this Article: Neelima M., Arige Subodh Kumar, Sura Anitha, Erugula Mahender, Baliram Chikte,“A Prospective Study of Incidence and Management of Fingertip Injuries”, IJMSIR- June - 2021, Vol – 6, Issue - 3, P. No. 41– 46.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Introduction: The fingertip is defined as the part of the digit distal to the insertion of the extensor and flexor tendons on the distal phalanx. In the thumb it is the inter phalangeal joint. It is the most common injury of the hand because of their prominent position.

Aim: To study the incidence, mode of injury and management and the outcome of the fingertip injuries of hand.

Material and Methodology: This study is a prospective, observational cohort of 17 Patients who presented with fingertip injuries to the department of plastic surgery in Gandhi medical college and hospital, Secunderabad between August 2018 and July 2020. After clinical assessment and required investigations,

treatment was offered and on follow up, observed for any complications.

Results: Males were more involved than the females. The Industrial workers aged between 20-30 years were more followed by children below 10 years.

Most common mode of injury in adult patients was machine crush injury and in children door trap injury. Most of the patients had injury of dominant hand. Middle finger was more frequently injured followed by ring and index. 10 out of 17 patients required primary suturing, four needed skin graft. Volar V-Y flap cover was given in three patients and Lateral kutler flap in one patient to ensure preservation of finger length/ contour and retention of sensation, while revision amputation was done in one patient. Three out of

17(18%) developed parathesia. Cold intolerance was present in two(12%) patients. One patient treated with V-Y plasty (6%) had nail deformity.

Conclusion: Majority of the fingertip injuries are machine related. Patient treated by primary suturing and flap cover had good subjective result, faster wound healing, good pulp contour, restored finger length, less cold sensitivity and near normal static two point discrimination

Keywords: Fingertip Injuries, Split thickness skin grafting (STSG), flaps (volar V-Y), Zones, Primary closure, Paresthesia, Cold intolerance, deformity.

Introduction

The fingertip is composed of skeletal elements (distal phalanx, tendons, and ligamentous structures), the nail complex or perionychium (germinal and sterile matrices, nail plate, sheaths, and skin folds), fibrous connective tissue network with the subcutaneous tissues, vascular network, nerves with end organs, and the non-paronychial skin.

The fingertip is the most distal portion of the finger providing the tactile and sensory functions. Injury to the fingertip and nail bed is the most common injury of the hand because of their prominent position. The long finger is the most commonly injured, followed by the ring, index, and small fingers and the thumb with equal frequency bilaterally. In the paediatric population fingertip injuries account for two thirds of all hand injuries with the most common mechanism of injury being a crush between a door and its frame. Goals of treatment should include minimization of pain, optimization of healing time, preservation of sensibility and length, prevention of painful neuromas, avoidance or limiting of nail deformity, minimization of time lost from work, and provision of an acceptable cosmetic appearance.

Aim of the Study

The purpose of this study is to study the incidence, mode of injury and management and the outcome of the fingertip injuries of hand.

Objectives of the Study

1. To study the incidence and etiology (mechanism) of fingertip injuries.
2. To study the mode of injury, types of injury, distribution of incidence in different age groups, gender and different occupations.
3. To study the management modalities and outcome of the management

Patients and Methods

Study Design: The study was conducted in Department of Plastic and Reconstructive Surgery, Gandhi Medical College, Secunderabad from September 2018 to Feb 2021. A total of 17 patients comprising 11 males and 6 females were included in the study. Ethical committee clearance was taken for the study.

The injuries were evaluated in a careful and systematic manner for finger involvement, crush versus sharp injuries, location, depth, angle of the defect, nail bed involvement and status of the remaining soft tissue and the configuration of the fingertip defect. Standard radiographs of the finger and photographs were obtained to assess the extent of bone injury.

Allens classification of fingertip was applied.

Inclusion Criteria: Isolated fingertip injuries and multiple fingertip injuries of all age group admitted in the Department of Plastic Surgery during the study period.

Exclusion Criteria: Patients with poly trauma.

Method of collection of data

All the study subjects admitted due to fingertip injuries under the Department of Plastic Surgery were studied over a period of 2 years.

All routine investigations like complete blood count, Random blood sugar, Viral Markers, Blood Group and Typing, X ray hand lateral and AP view were done.

While gathering the history from the patient, the following information was noted.

Patient demographics, mechanism of injury, hand dominance, occupation, duration since injury, tetanus immunization status and co-morbidities.

Informed consent was taken from all the patients for inclusion in the study.

Detailed analysis of these 17 cases with fingertip injuries was performed.

Operative procedures

Primary suturing: All the nail bed lacerations were repaired under loupe magnification (4.5 X) with 6-0 Monocryl. In partial nail avulsion, the edges of the nail were trimmed, and nail repositioned back into the nail fold, taking care to prevent complete avulsion.

Split thickness skin grafting (STSG)

Split thickness skin grafting (STSG) was performed in volar oblique wounds larger than 1cm surface area without exposed bone or tendon.

Local flaps

A local flap was considered in cases where bone, tendon or both were exposed. Atasoy flaps (volar V-Y) preferred in transverse amputations beyond the mid-nail level and dorsal oblique amputations beyond the proximal nail level. In fingertip wounds with volar and transverse avulsions with exposed bone with excess lateral skin, Kutler flaps (lateral V-Y) were considered.

Revision amputation

Revision amputation with stump closure was performed in 45 year elderly patient, labourer by occupation with co-morbid conditions, who had total crush injury below the level of the nail matrix.

Post-operative care

Patients with pulp laceration who underwent primary repair or skin grafting or flap cover, alternate day non adherent dressing using paraffin impregnated gauze was done. Sutures removed between 10-14days.

Complications

In one patient marginal necrosis of the flap occurred after V-Y plasty, which was managed conservatively with regular dressings.

Results

The patients were in the age ranging between three years to 45 years, six (35%) were females 11(65%) were males.

In our study the youngest patient who was treated was three years old and the oldest was 45 years.

There were five patients (29.4%) in each of the age group 0-10 years, 11 to 20 years and 20 to 30 years.

Industrial machine workers were 10 in number (58.8%), followed by students who were six (35.3%).

Majority of the patients were right hand dominant. 12 patients (70.6%) sustained injury to right hand fingers and Left hand was involved in five patients (29.4%). Middle finger was involved in 11 patients followed by Ring finger in six patients, little finger in four, Index finger in three and Thumb in two patients.

Of the total 17 patients, 11(6.7%) patients had work place machine trap crush injuries, four (23.5%) patients had house hold door trap injury, two (11.8%) patients had crush injury due to stone fall.

Most common type of defect was Pulp Laceration and was seen in 10 patients (58.8%), Avulsion in six patients (35.2%) and Amputation in one patient (6%)

Most of the patients had injuries of Zone-II and accounted for 11 (64.7%) followed by Zone-I in Five (29.4%) and Zone-III in One (5.9%).

Most common surgical procedure done was primary suturing for simple lacerations involving zone-II and it was done in 10 patients, Split Skin Grafting was done in four patients, Volar V-Y Advancement was done in three patients, Lateral Kutler Flap in one patient and Revision Amputation was done in one patient.

In our study 3 patients, who were treated with split skin grafting developed paraesthesia. Hook nail deformity was seen in little finger treated by lateral V-Y flap.

Functional Outcome

Patients were evaluated for Sensitivity of fingertip, on follow-up.

The Static two-point discrimination test was performed using a simple hand-operated device, i.e., by drawing compass with blunt or sharp-pointed tip.

This discrimination was identical to that in contralateral digits i.e., 2-5mm (normal) in 11 Patients.

Distance (in mm)	Number of patients	Percentage
2-5mm (normal)	11	64.7
6-10mm (Fair)	4	23.5
11-15mm (Poor)	2	11.8

Patient Satisfaction

Satisfaction	No. Of patients	Percentage (%)
Excellent	12	70.5
Good	4	23.5
Poor	1	6

In our study, 12 patients (70.5%) expressed the aesthetic outcome as excellent, four patients expressed as good outcome (23.5%) and one patient expressed as poor (6%).

Discussion

Fingertip injuries are extremely common and comprise the most common hand injuries. Fingertip injuries lead to significant morbidity affecting the occupational as well social activities.

They account for approximately 10% of all accidents reported in the casualty and two-thirds of hand injuries in children. The fingertip injury in children is described as door smashed finger since closing door is the most common cause. In adults major cause is occupational.

This study included 11(65.3%) male patients and 6(34.7%) female patients. Similar results were described by SANJAY SARAF et al (male 60(60%), female40(40%))

Number of male patients were more compared of female patients which might be due to the occupational nature of activities that the male get involved in.

Most common mode of injuries in the present study was crush injury (64.7%) (door trap, Sugar cane and other machine crush injuries). Similar finding was noted in the study by Karthi Sundar et al Crush(72%), Ravinder Singh et al, (68%), Kubus M et al (78%).

In this study majority of the patients (64.7%) were industrial laborers. The same was seen in other studies conducted by Karthi Sunder et al(72%), Sanjay Saraf et al(68%), Ravinder Singh Et al(72%).

In this study, most common procedure performed was primary closure followed by skin grafting and the most common flap given was v-y advancement flap. Similar results were found in the study by Sanjay sarag et al(71%).

Conclusion

Fingertip injuries are common. They need to be addressed well for fine activities of day to day life and in certain professions.

In our study total 17 patients were included. Males were more involved than the females. The middle-aged group 20-30 years industrial workers who presented with workplace injuries were more followed by children below 10 years.

Most common mode of injury in adult patients was machine crush injury and in children door trap injury.

Most of the patients had injury of dominant hand middle finger followed by ring and index.

Ten patients had pulp laceration in zone II, six patients had an avulsion injury involving zone I and zone II. One carpenter worker had amputation at zone III level of fingertip.

All patients with pulp laceration in zone I presented early and were amenable to primary closure as there was not much pulp loss.

Patients with volary directed wound larger than one centimeter without bone and tendon exposed were treated by split thickness grafting.

Patient treated by primary suture had good subjective result, faster wound healing, good pulp contour, restored finger length, less cold sensitivity and near normal static two point discrimination.

Three patients with zone II injury with exposed bone was addressed by local flap cover, i.e., V-Y advancement in middle, ring finger injuries and lateral V-Y advancement in injury of little finger.

Aesthetic appearance of fingertip following V-Y advancement flap was superior compared to split skin grafting and there was less donor site morbidity.

In our study average period of recovery to normal work was four weeks. The time to return to work was less in patients treated with primary closure and revision amputation as the duration of hospital stay was less.

The above patients could return to their routine pre injury work earlier than the patients who were treated with split skin graft and local flap cover.

References

1. Zook EG, Van Beek AL, Russell RC, et al. Anatomy and physiology of the perionychium: a

review of the literature and anatomic study. *J Hand Surg Am.* 1980;5:528–536

2. Kawaiah A, Thakur M, Garg S, et al. (May 26, 2020) Fingertip Injuries and Amputations: A Review of the Literature. *Cureus* 12(5): e8291. doi:10.7759/cureus.8291

3. Weir Y. Fingertip injuries in children: a review of the literature. . 2018 Sep 11;26(3):17-20

4. Flint MH. Some observations in the vascular supply of the nail bed and terminal segments of the finger. *Br J Plast Surg.* 1956;8:186

5. The amputated part may be replaced as a composite graft after defatting.47

6. Moiemmen N, Elliot D. Composite graft replacement of digital tips. *J Hand Surg (Br).* 1997;22:346

7. Jacques M. Kite flap in reconstruction of distal thumb, Fingertip and Nailbed injuries. Churchill Livingstone 1991.

8. Yeo CJ, Sebastin SJ, Chong AK. Fingertip injuries. *Singapore Med J.* 2010;51(1):78–86.

9. Lister G2, Beasley RW. Reconstruction of amputated fingertips. *Plast Reconstr Surg.* 1969;44:349–52.

10. Allen MJ. Conservative management of fingertip injuries in adults. *Hand.* 1980;12:257–65 [PubMed: 7002744].

Legend Figure

Figure 1: A Male patient 21yr old rt hand middle finger tip injury treated by volar v-y plasty

Intraop



Figure 2: A 21 years male patient with right hand machine cut injury of middle ,ring ,little finger. Primary suturing was done for Middle finger tip injury ,lateral v-y advancement for ring finger,volar v-y plasty for little finger tip injury.

Pre op

Intraop



Post op



Figure 3: A 3years old Female baby,crush injury (Door trap), Presented with in 4 hours of injury primary suturing was done.

Pre op

Post op



Post op

