

East African Medical Journal Vol. 97 No. 9 September 2020

EPIDEMIOLOGY AND MANAGEMENT OUTCOME OF FINGERTIP INJURIES: A TEN - YEAR REVIEW AT A TERTIARY HEALTH INSTITUTION IN NIGERIA

Olayinka Adebajji Olawoye, Department of Surgery, College of Medicine, University of Ibadan, Nigeria, Yusuf Olanrewaju Abdullahi, Department of Plastic, Reconstructive and Aesthetic Surgery, University College Hospital Ibadan, Nigeria, Chikodi John Onwudinjo, Department of Surgery, University College Hospital, Ibadan

Corresponding author: Dr Olayinka Adebajji Olawoye, Department of Surgery, College of Medicine, University of Ibadan. Email: yinkaolawoye@yahoo.co.uk

**EPIDEMIOLOGY AND MANAGEMENT OUTCOME OF FINGERTIP INJURIES: A TEN - YEAR REVIEW AT A TERTIARY HEALTH INSTITUTION IN NIGERIA**

O. A. Olawoye, Y. O. Abdullahi and C. J. Onwudinjo

**ABSTRACT**

***Introduction:*** Fingertip injuries are one of the most common injuries in the hand, because the fingertips are exposed in many of the activities of daily living. The goals in the reconstruction of fingertip injuries are finger length preservation, covering the defect, establishing well-padded and sensate pulp, as well as providing a bed for growing nail. All these should be aimed at achieving optimum function and aesthetic outcome.

***Methods:*** A retrospective review of patients with fingertip injuries managed at a tertiary hospital in Nigeria over a 10-year period was done. The patients' profile as well as the clinical presentation, management options and the outcome of care of the patients were documented and analyzed using descriptive statistics.

***Results:*** Forty-five fingertips of 38 patients were managed. The median age was 20.50 years, with a male to female ratio of 2:1. The leading causes of tip injuries were jamming of fingers in doors (26.3%), machines injuries (23.7%) and vehicular accidents (18.4%). Tip amputation ranked the highest (36.8%) among the injuries sustained by the patients, followed by tip avulsion (28.9%). The management offered included V-Y flap, thenar flap, cross finger flap, suturing of lacerations and refashioning of the stumps. About 87.5 % of the patients reported a satisfactory outcome.

***Conclusion:*** While accurate diagnosis and appropriate intervention are key in achieving a satisfactory outcome in fingertip injuries, the preventive public health advocacy for safer environment and workplace would help in reducing the burden.

## INTRODUCTION

The fingertip is a specialized part of the hand that has significant functional and aesthetic roles. A sensate and stable fingertip is essential for the overall function of the hand. A fingertip injury is any soft tissue, nail or bony injury distal to the insertions of the long flexor and extensor tendons of a finger or thumb.<sup>1</sup> Fingertip injuries are common presentations at the accident and emergency departments of many tertiary hospitals, the management of which will depend on the anatomy and complexity of the injury. Fingertip injuries can affect both sexes and all ages. Most of the injuries in children occur at home from jamming of the car or house door by either their parents or siblings,<sup>2</sup> while injuries in working class adults usually occur from occupational accidents.

Most injuries tend to be singular and of minor severity and can be treated as outpatient. However, powered machines and non-powered hand tools are more likely to result in multiple types of injuries,<sup>3</sup> which may require more specialized care. Fingertip injuries constitute the largest part of hand traumas in children.<sup>4</sup> Where the injury involves the bony component, the goals in fingertip reconstruction are covering the defect, establishing maximum tactile gnosis, keeping the length of the finger, protecting the joint function, acquiring a well-padded pulp tissue, providing a bed for growing nail, obtaining a satisfactory cosmetic appearance and allowing the patient to return to work as soon as possible.<sup>5</sup>

Treatment of fingertip injuries ranges in a large spectrum which correlates to the reconstruction ladder: healing by second intention, primary closure and grafting (split, full thickness and composite flaps).<sup>6,7</sup>

The aim of this study was to review the epidemiology, management options and outcome of fingertip injuries in patients presenting at the University College Hospital, Ibadan, Nigeria, over a ten-year period.

## PATIENTS AND METHODS

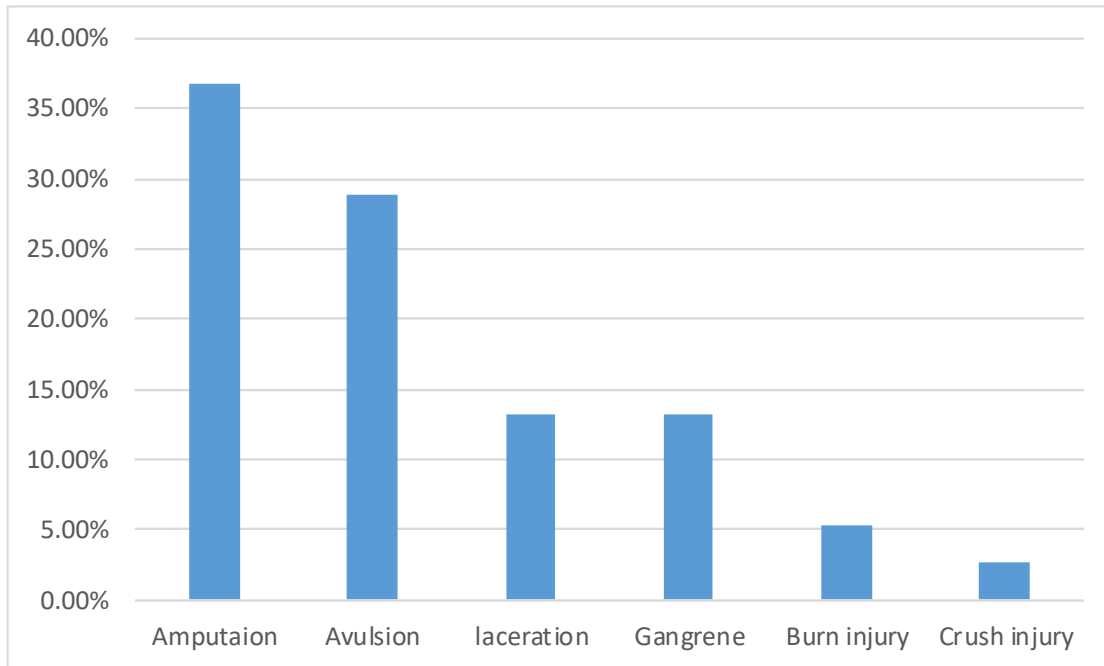
A retrospective review of patients with fingertip injuries seen and managed at the University College Hospital, Ibadan, over a 10-year period, from July 1 2007 to June 30<sup>th</sup> 2017, was done. The biodata as well as the clinical presentation, management options and the outcome of care of the patients were extracted from their case notes. The result was analyzed using descriptive statistics.

## RESULTS

A total of 45 fingertips of 38 patients were managed and reviewed over a 10-year period. There were 25 males and 13 females, with a male to female ratio of 2:1. The patients' ages ranged from 9 months to 60 years, with mean and median ages of 20.18 and 20.50 years, respectively.

The three leading causes of tip injuries were door trap accidents (26.3%), occupational injuries sustained from different types of machines (23.7%) and injuries from vehicular accidents (18.4%). Others were injuries from burns, assault, fence gate and generator part.

The types of injuries sustained (Figure 1) were as diverse as the aetiology, with tip amputation being the leading presentation (36.8%), followed by tip avulsion (28.9%). The other presentations were laceration of the tip (13.2%), tip gangrene (13.2%), full thickness burn injury (5.3%) and crush injury. (2.6%)



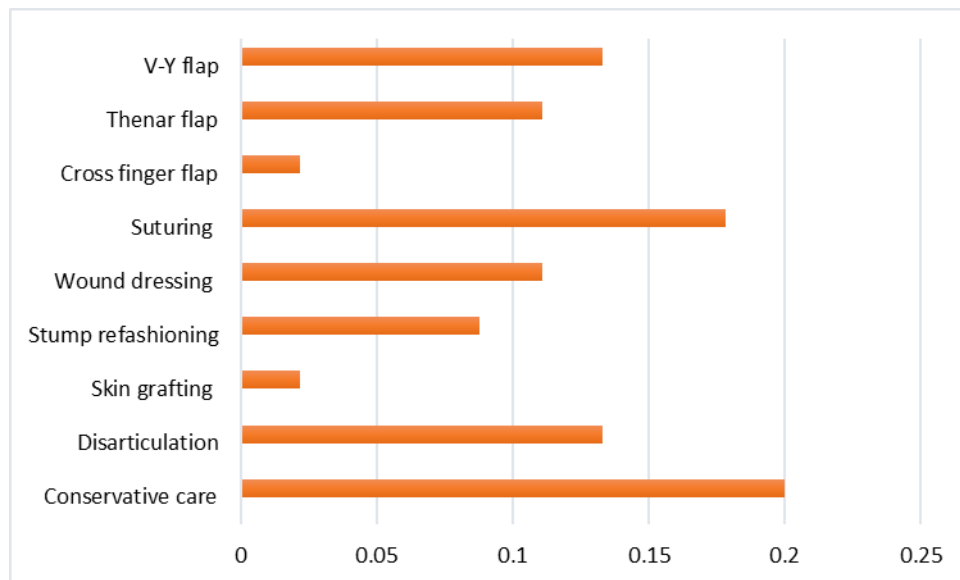
*Figure 1. Profile of the types of fingertip injuries sustained*

Some of the different management options offered to the patients include V-Y flap, thenar flap, cross finger flap, suturing of lacerations, wound debridement and wound dressings (Figure 2). The other options were amputation and refashioning of the stumps, disarticulation and split skin grafting. The indication for the various procedures depended on the anatomy of the tip injury and the extent of tissue viability. Suturing

alone was adequate where there were only lacerations, while the direction of the oblique injuries determined whether a V-Y flap or thenar flap was suitable. Crush injuries with devitalized tissues usually required amputations. A cross tabulation of the type of injury sustained by the patients in relation to the management offered was provided in table 1.

**Table 1**  
*Cross tabulation of the types of fingertip injury and the treatment offered*

|              | Conservative care<br>n (%) | Disarticulation<br>n (%) | Skin Grafting<br>n (%) | Stump Refashioning<br>n (%) | Wound Dressing<br>n (%) | Suturing<br>n (%) | Cross finger flap<br>n (%) | Thenar flap<br>n (%) | V-Y flap<br>n (%) | Total<br>n (%) |
|--------------|----------------------------|--------------------------|------------------------|-----------------------------|-------------------------|-------------------|----------------------------|----------------------|-------------------|----------------|
| Amputation   | 2 (4.4)                    | -                        | -                      | 4 (8.8)                     |                         |                   |                            | 5 (11.1)             | 6 (13.3)          | 17 (37.6)      |
| Avulsion     | 6 (13.8)                   | -                        | -                      | -                           | 4 (8.8)                 | 2 (4.4)           | 1 (2.2)                    | -                    | -                 | 13 (29.2)      |
| Laceration   | -                          | -                        | -                      | -                           | -                       | 6 (13.3)          | -                          | -                    | -                 | 6 (13.3)       |
| Tip gangrene | -                          | 6 (13.3)                 | -                      | -                           | -                       | -                 | -                          | -                    | -                 | 6 (13.3)       |
| Burn injury  | -                          | -                        | 1 (2.2)                | -                           | 1 (2.2)                 | -                 | -                          | -                    | -                 | 2 (4.4)        |
| Crush injury | 1 (2.2)                    | -                        | -                      | -                           | -                       | -                 | -                          | -                    | -                 | 1 (2.2)        |



*Figure 2. Type of treatment offered*

Thirty-two of the 38 patients were seen in the follow-up clinic at least once after discharge and 28 (87.5 %) of these patients were satisfied with the outcome of their care in terms of function and cosmesis of the reconstructed fingertip. The outcome was not stratified along the specific type of management that was offered. Unfortunately, the specific type of conservative care that was offered was not documented in one-fifth of the patients.

## DISCUSSION

The fingertips are rich with nerve endings and are very sensitive. They serve very vital roles in humans. The fingertips are the eyes to the blind. Also, they are important sensual organs and have unique security roles for the biometric identification of individuals. Fingertip injuries are one of the most common injuries in the hand, because the fingertips are exposed in many of the activities of daily living.

The goals of fingertip reconstruction include the following: providing durable coverage, preserving sensation and length, minimizing discomfort, and expediting return to work and leisure.<sup>8</sup>

Without prompt and proper treatment, a fingertip injury can cause problems with hand function, and may even result in permanent deformity or disability, with significant cosmetic concerns.

Fingertip amputations are among the most common injuries of the upper extremity. With the fingertip being the end organ for touch, preserving maximal function is of the utmost importance.<sup>9</sup> A good understanding of the anatomy of the fingertip as well as the nature of the injury is important in selecting the optimum method of care. The general management principle of length preservation in tip amputation is sacrosanct. Next is the

preservation of a sensate pulp followed by a well-rounded and contoured tip. Minor injuries such as lacerations of the tip can be easily managed by emergency physicians and general practitioners. More complex injuries usually require specialized care by the plastic surgeons.

The epidemiological profile of the patients in this study was similar to those from several studies,<sup>10-15</sup> with a male preponderance and most of the injuries resulting from door jamming and occupational injuries from machines. Door jamming may cause diverse injuries depending on the severity of impact and the length of finger involved. A special type of injury from door jamming is nail bed injuries. Nail bed injuries have also been reported from sport injuries from a ball or a weight resulting in closed or open injuries. These types of injuries require more specialized care in order to prevent complications and resultant late deformities.<sup>16</sup>

Occupational accidents and door jamming were responsible for 50% of all the aetiologies in the patients. This clearly demonstrates the public health importance of the findings, especially from a preventive point of view. The design and utilization of specific door protective devices would be useful in curtailing these injuries. In addition, modifiable occupational culture with the use of hand protective devices in the work environment would be useful in reducing traumatic finger injuries.

The median age of the study population (20.5 years) clearly demonstrates that a significant percentage of the patients are in the working class, with a resultant loss in working time and income following injury.

The types of injury sustained cut across a wide range, from simple laceration to crush injury. Understanding the anatomy of the fingertip provides the basis for accurate

diagnosis and the optimum care of these specialized structures. The more complex the injury, the more specialized the care that is required to preserve optimum function and cosmesis. Further shortening of the amputated fingertip is never an option, except in the face of tip gangrene.

The approach to the management of fingertip injuries depends on many variables, including patient age, sex, hand dominance, profession, hobbies, finger involvement, location, depth, angle of the defect, nail bed involvement, status of the remaining soft tissue, co-morbid conditions and the anatomy of the fingertip defect.<sup>17</sup>

Local flaps are the preferred options to cover amputated tips, as they provide bulk for the preservation of the pulp. For this reason, V - Y flaps, thenar flaps and cross finger flaps were mostly employed for tip coverage. Where the use of flaps was not necessary, simpler techniques such as skin grafting and other less technical options using the principle of reconstructive ladder were employed.

Perhaps, the most technical and challenging treatment is microsurgical replantation for tip amputation. Distal replantation is defined as the replantation of the fingertip at the level of or distal to the distal interphalangeal joint.<sup>18</sup> Replantation is attempted when the amputated stump has near to normal architecture. This allows the preservation of finger length and the irreplaceable nail bed. The functional and cosmetic outcomes are usually good, even if the distal interphalangeal joint is fused for the replant.<sup>19</sup> Sadly, the infrastructure for replantation is less than optimum in many institutions in sub-Saharan Africa.

Interestingly, a majority of the patients reported a satisfactory outcome in terms of function and cosmesis during their follow-up visit. It was not possible to standardize the

follow-up period as some of the patients presented only once or twice after discharge and this limited the comparison of the outcome in relation to the surgical option employed. It would have been more desirable to use some more objective criteria for the assessment of outcome.

## CONCLUSION

The fingertip is the most commonly injured part of the hand. Therefore, fingertip injuries are among the most frequent injuries that are referred to plastic surgeons. A good understanding of the anatomy of the fingertip provides a basis for a practical and systematic approach to the care. Restoration of function and a good aesthetic outcome remains the desired outcome, and methods that preserve length and restore a sensate tip should be explored for all injuries.

Preventive measures such as the use of appropriate hand protective gloves and the modification of the household environment to make them safer would be most useful in reducing the burden of fingertip injuries.

The retrospective nature of this study precluded a more objective evaluation of the outcome of care. A prospective longitudinal design would be useful to assess and document this.

## REFERENCES

1. Murai M, Lau HK, Pereira BP, Pho RW. A cadaver study on volume and surface area of the fingertip. *J Hand Surg* 1997; 22: 935-41..
2. Doraiswamy NV. Childhood finger injuries and safeguards. *Inj Prev* 1999; 5: 298 -300.
3. Sorock GS, Lombardi DA, Hauser RB, Eisen, EA., Herrick, RF., Mittleman, MA.. Acute traumatic occupational hand injuries: type, location, and severity. *J Occup Environ Med* 2002; 44:345-51.

4. De Alwis W. Fingertip injuries. *Emerg Med Australas.* 2006;18 (3):229–37.
5. Sungur N, Kankaya Y, Yıldız K, Dolen,UC, Kocer, U. Bilateral V–Y rotation advancement flap for fingertip amputations. *HAND* 2012; 7: 79–85.
6. Rose EH, Norris MS, Kowalski TA, Lucas, A., Fleegler, EJ. The “cap” technique: nonmicrosurgical reattachment of fingertip amputations. *J Hand Surg Am.* 1989;14(3): 513–8.
7. Uysal A, Kankaya Y, Gurhan M, Sungur, N., Karalezli, N., Kayran, O. An alternative technique for microsurgically unreplantable fingertip amputations. *Ann Plast Surg.* 2006; 57(5): 545–51.
8. Lemmon, JA, Janis JE, Rohrich RJ. Soft-tissue injuries of the fingertip: Methods of evaluation and treatment. An algorithmic approach. *Plast. Reconstr. Surg.* 2008; 122: 105e – 117e.
9. Thoma A, Vartija LK. Making the V-Y advancement flap safer in fingertip amputations. *Can J Plast Surg* 2010;18(4): e47-e49.
10. Panagopoulou P, Antonopoulos CN, Dessypris N., Kanavidis, P., Michelakos, T., Petrdou, ET. Epidemiological patterns and preventability of traumatic hand amputations among adults in Greece. *Injury* 2013; 44(4): 475-480.
11. Davas Aksan A, Durusoy R, Ada S., Kayalar, M., Aksu, F., Bal, E. Epidemiology of injuries treated at a hand and microsurgery hospital. *Acta orthopaedica et traumatologica turcica* 2010; 44(5): 352-360.
12. Davas Aksan A, Durusoy R, Bal E. Kayalar, M., Ada, S., Tanik, FA. Risk factors for occupational hand injuries: Relationship between agency and finger. *American Journal of Industrial Medicine* 2012; 55(5): 465-473.
13. Namazi H, Mahdaviazad H, Vosoughi AR, Shouroki, ZK. Epidemiological patterns and preventability of trauma leading to finger amputation: A prospective hospital-based study. *SIGURNOST* 2017; 59(1): 1 – 5.
14. Oluwatosin OM, Adigun IA, Tahir C, Abikoye, F., Olawoye, OA., Gana, J. J. Pattern and management of hand injuries in Ibadan, Nigeria: A 5-year review. *Trop. J Health Sc* 2005; 12(2): 19 – 22.
15. Saraf S, Tiwari VK. Fingertip injuries. *Indian J Orthop* 2007; 41: 163-8.
16. Bharathi RR, Bajantri B. Nail bed injuries and deformities of nail. *Indian J Plast Surg* 2011; 44:197-202.
17. Lister G. Injury. In: G. Lister. 3<sup>rd</sup> edition. *The Hand: Diagnosis and Indications.* Churchill Livingstone, Edinburgh, 1993, p. 121-5.
18. Tamai S. Twenty years’ experience of limb replantation – review of 293 upper extremity replants. *J Hand Surg Am* 1982; 7: 549-56.
19. Lim BH, Tan BK, Peng YP. Digital replantations including fingertip and ring avulsion. *Hand Clin* 2001; 17: 419-31, viii-ix.