

Original article

Clinico-epidemiological study of intraarticular phalangeal fractures in eastern Nepal

GP Khanal¹, R Rijal², BP Shrestha³, P Chaudhary², R Maharjan², SR Paneru², RPS Kalawar²
¹Additional Professor and HOD, ²Associate Professor, ³Professor, Department of Orthopedics, BPKIHS, Dharan

Abstract

Background: Fractures and dislocations of the hand are the most common injuries seen in emergency departments. Intraarticular fractures have worst functional outcomes if not managed properly. **Objective:** To find out the incidence and pattern of intra articular phalangeal fractures in the eastern part of Nepal **Methods:** Patients presenting at Emergency department of B.P.Koirala institute of Health Sciences between 1st January 2009 and 31st December 2009 and who were diagnosed as phalangeal fractures of hand were included in the study. These patients were reviewed for age at time of injury, gender, location of the incident, mechanism of injury, site of injury, side, hand dominance and mode of treatment. **Results:** One hundred and one patients were included in the study after excluding twenty patients with other associated injuries like head injury (6), poly trauma (10) or those not giving consent (4). The age ranged from 3 to 76 years. Among them male were 79.2%. Farm related injuries were the most common cause in both the sexes. Left side was the most involved side. Most of the patients attended hospital more than 4 hours after injury. Among them 74% had open fracture. Proximal phalanx was involved in 54.4% of cases. Pattern of involvement was mostly oblique and transverse. Most of the patients were undergone wound debridement and Kirschner wire fixation. **Conclusion:** Farm related and household events are commonest causes of hand injuries with intraarticular phalangeal fractures in our set up. Young males belonging to economically productive age group are mostly affected by these fractures.

Keywords: fractures, hand, intraarticular, phalangeal

Introduction

Hand injuries constitute 7.2 to 30% patient population that attend the orthopedic accident and emergency department worldwide.¹⁻³ Injuries to the hand are often neglected, especially when they occur in combination with injuries to other parts of the body.³ Phalangeal fractures are the second most common injuries to hand and forearm following radius fracture.⁴ Phalangeal fractures comprised 46% of the hand fractures, metacarpal fractures 36%, and

fifth metacarpal neck fractures 9.7%.⁵ Among the phalangeal fractures 57.4% proximal phalanx, 30.4% middle phalanx, and 12.2% metacarpal.^{6,7} Male to female ratios run from 1.8:1 to 5.4:1 with higher ratios seen in the age groups associated with the greatest incidence of sports injuries in the early 3rd decade and workplace injuries in the 5th decade.⁸

No such studies have been done in this part of the world. Hence we have conducted this study to find out the incidence and pattern of intra articular phalangeal fractures in the eastern part of Nepal.

Address for correspondence

Dr Guru Prasad Khanal
Additional Professor and HOD
Department of Orthopedics, BPKIHS, Dharan, Nepal
Phone No: 00977-9842041452
Email: gurukhanal@yahoo.com

Methods

We conducted prospective descriptive study among the patients presenting at emergency department of B.P.Koirala Institute of Health sciences, Dharan from first January 2009 to 31st December 2009 for the duration of one year among the patients who fulfilled the inclusion criteria. All patients presenting at emergency department of BPKIHS with phalangeal fractures were included in the study. Patients with polytrauma, lacking fitness for anesthesia and not giving consent to participate in the study were excluded.

Ethical clearance was taken from ethical committee. Research protocol was approved by Research Committee.

Patients were evaluated clinically; detailed history regarding demographic variables, occupation of the patients, mode of injury, duration of surgery, dominance of hand and comorbid conditions were taken and splint were applied. Then radiological examination was done. Patients were informed regarding the study and informed consent was taken. Appropriate management was done using splint, plaster or open reduction and k wire fixation. Preoperative antibiotics and analgesics were administered to patients undergoing surgery. Then patients who had undergone surgery were admitted if the wounds were contaminated or had persistent swelling. Those patients on whom splints were applied or had undergone closed reduction were discharged and followed after one week. Post operative patients were followed up at two weeks and sutures were removed and k wire removed at 3 weeks and fingers were mobilized. In the non operative group, patients were evaluated at one week to check fracture displacement and at 3 weeks splints were removed and fingers were mobilized. Data were collected in the proforma, entered into Microsoft Excel 8 data sheet and were statistically analyzed using SPSS software.

Results

There were 121 patients meeting the eligibility criteria. But only 121 patients were studied after excluding 20 patients who had other associated injuries like head injury (6), or had polytrauma (10) or were not giving consent (4).

Mean age of the patient was 30.8 ± 17.86 years ranging from 3 to 76 years. Among them 79.2 % (80) patients were male. Nearly fifty percent patients were from Sunsari and Morang districts where as 4% patients were from as far as Taplejung district. Regarding the occupation, farmers were 35.6 % (36), rest of the patients were students, housewives, factory worker, carpenter and children comprising 27.7%, 13.9%, 13.9%, 2% and 7% respectively. Left side was involved in 57.4 % (58) of the patients. Right hand was dominant in 82.2 % (83) of the patients.

Median injury to hospital duration was 6 hours in which most of the patients (80%) had presented at less than 8 hours of injury whereas 4 % (4) patients had presented at 5 days of trauma.

Mean time of admission to surgery duration was 4.6 ± 1.73 hours.

Incidence of injury due to sharp cut by Khukuri was 22.8 % (23) whereas due to machinery events was 21.8%, farm related events 18.8%, RTA 9.9% and rope related events 9.9%. Others modes included gunshot injury and crushing due to door edge. In this study there were 28.9% fractures of thumb, 26.3% in index finger, 14.5% in middle finger, 13.2% in ring finger and 13% in little finger. The number of patient having open fractures constituted 73.3%.

Among the phalangeal involvement, proximal phalanx constituted 54.4 % (55) whereas middle phalanx and distal phalanx 28.7% and 16.8% respectively. Oblique fractures were present in 39.6% while 33.7% patients had transverse fractures, 16.8% spiral fractures and 9.9%

comminuted fractures. Nearly 48 % patients had either end of the bone involved. Nearly 23 % patients had intraarticular involvement. Of all, 54.5 % (55) patients required wound debridement and K wire fixation while 12.9 % (13) underwent closed reduction and K wire fixation. Among them 10.9% (11) patients underwent closed reduction and plaster of Paris slab application. Of all, 17.8 % (18) patients underwent wound debridement and amputation of the finger. Wound debridement and flap coverage was required in three percent and one metal splint in one.

Discussion

The hand is a very intricate and important tool used for daily living activities. In the developing world, it establishes the individual in society, allowing them to meet social and economic responsibilities. It is therefore important to understand the causes of injury to this part of the body to minimize the occurrence of injury and to forestall poor treatment outcomes that may result in dramatic reduction in quality of life. In this study, young adults were most commonly affected. This finding is consistent with other series in which the average age was less than 30 years.^{2, 9,10} However, studies in areas with considerable post productive populations show a slightly higher average age group of 40 years. Most studies show a male predominance, with a male-to-female ratio of 4:1⁹⁻¹¹ which are consistent with our finding of 80% male involvement.

In our study left hand injuries were common than right as observed by Mink and colleagues in their study in which 63% of the patients had non dominant hand.¹² The report of hand injuries by Beaton and colleagues showed results different to ours, where right-hand injuries were more common than left-hand injuries¹³

Trybus and colleagues¹⁴ performed a study in an industrial city in Poland. In the study about 50% of workers with a hand injury were manual workers. However in our study, farmers were

35.6 % (36), rest of the patients were students, housewives, factory worker, carpenter and children; 27.7%, 13.9%, 13.9%, 2% and 7% respectively.

In our study, incidence of sharp cut by Khukuri was 22.8 % (23) whereas machinery related injury constituted 21.8%, farm related injury 18.8%, RTA 9.9% and injury due to rope 9.9%. Others modes in our study included saw use related gunshot injury and injury due to stick and door edge. Unlike our findings other studies have reported more workplace related injuries.^{10, 12,}

Our study is consistent with some earlier reports which showed home injuries to be commonly due to glass or knife cuts.^{9, 14, 16} In our study 28.9% patients sustained fractures of thumb, 26.3% index finger, 14.5% middle finger, 13.2% ring finger and 13% little finger.

Majority of our patients (54.4%) had involvement proximal phalanx followed by middle phalanx 28.7% and distal phalanx 16.8%. High-energy injuries from gunshots and machinery have a higher risk of involving of all the tissue components and increasing the potential of digit amputation.^{10,15}

From the present study, we have found that hand injuries due to farm related and household injuries are common in our part of the world for which adequate health education regarding use of sharp object should be taught. It is imperative to impart proper education for drivers and other road users coupled with adequate enforcement of traffic regulations to reduce the incidence of hand injury. Although a large percentage of machine injuries are minor, more than half of the people with this type of injury are from the working class and are the driving force of the country's economy. A substantial number of these workers face the risk of losing their employment and having their social status irreparably altered. This, in turn, leads to major economic loss. We also observed that workers who sustained machine injuries usually had

severe to major forms of injury, which included amputation in almost one-fifth of our cases. It is therefore recommended that employers and government focus more effort toward worker education, particularly with regards to occupational health and safety, provision of quality services at district hospital because patients from remote region like Taplejung, Panchther districts often present late with gangrene of fingers necessitating amputation of digits. Adequate provision of early hospital services for compound hand injuries is needed to prevent infection, stiffness, loss of function and consequent functional disabilities of the hand. The provision of a safe and work-friendly environment includes training in equipment operation and maintenance and the provision of appropriate protective clothing and safeguarding of machinery. Furthermore, it is essential that policy measures be put in place for insurance and adequate compensation of the hand injury-related disability.

Conclusion

Farm related and household events are commonest causes of hand injuries with intraarticular phalangeal fractures in our set up. These types of hand injuries mostly affected young males of economically productive age group warranting enforcement of workplace education and improvement of policies.

References

1. Hansen TB, Carstensen O. Hand injuries in agricultural accidents. *J Hand Surg Br* 1999; 24(2):190-2.
2. Rosberg HE, Dahlin LB. Epidemiology of hand injuries in middle-sized city in southern Sweden: a retrospective comparison of 1989 and 1997. *Scand J Plast Reconstr Surg Hand Surg* 2004; 38(6):347-55.
3. Ihekire O, Salawu S, Opadele T. Causes of hand injuries in a developing country. *Can J Surg*. 2010; 53(3): 161-66.
4. Chung KC, Spilson SV. The frequency and epidemiology of hand and forearm fractures in the United States. *J Hand Surg* 2001; 26:908-15.
5. Hove LM. Fractures of the hand: distribution and relative incidence. *Scand J Plast Reconstr Surg* 1993; 27:317-19.
6. Ip WY, Ng KH, Chow SP. A prospective study of 924 digital fractures of the hand. *Injury* 1996; 27:279-85.
7. Van Onselen EBH, Karim RB, Hage JJ, et al. Prevalence and distribution of hand fractures. *J Hand Surg* 2003; 28B:491-95.
8. Gaul JS. Identifiable costs and tangible benefits resulting from the treatment of acute injuries of the hand. *J Hand Surg* 1987; 12A:966-90.
9. Trybus M, Lorkowski J, Brongel L, et al. Causes and consequences of hand injuries. *Am J Surg* 2006; 192:52-7.
10. Ahmed E, Chaka T. Prospective study of patients with hand injuries: Tikur Anbessa University Teaching Hospital, Addis Abba. *Ethiop Med J* 2006; 44:175-81.
11. O'Sullivan ME, Colville J. The economic impact of hand injuries. *J Hand Surg Br* 1993; 18:395-8.
12. Mink van Der Molen AB, Ettema AM, Hovius SER. Outcome of hand trauma: the Hand Injury Severity Scoring system (HISS) and subsequent impairment and disability. *J Hand Surg Br* 2003; 28:295-9.
13. Beaton AA, William L, Moseley LG. Handedness and hand injuries. *J Hand Surg Br* 1994; 19:158-61.
14. Trybus M, Guzik P. Occupational hand injuries. *Med Pr* 2004; 55:341-4.
15. Saxena P, Cutler L, Feldberg L. Assessment of the severity of hand injuries using "Hand Injury Severity Score" and its correlation with functional outcome. *Injury* 2004; 35:511-6.
16. Ousby J, Wilson DH. 1086 consecutive injuries caused by glass. *Injury* 1982; 13:427-30.