

Hand Fracture Management: 15 Years of Experience from a Tertiary Care Center

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Abstract

Background: Hand bone fractures predispose a man to severe disability by limiting everyday working ability. We'd like to share our expertise with hand fractures and how they affect hand injuries.

Methods : Data from a tertiary care hospital dating back 15 years was retrieved and analysed for age, gender, comorbidities, aetiology, fractures implicated, management, and outcome in terms of days to return to everyday activities.

Results : We treated 969 individuals with hand bone fractures, totaling 1764 bones. The presentation's median age was 41 years. Wrist bones made up 187 (10.6%), metacarpals 627 (35.5%), and phalanges 950 (53.8%) of the total. The majority were managed with K-wires (63.2%) and screws (3.9%), with everyday activity returning in 4510 days. Soft tissue infections were the most prevalent complication, followed by osteomyelitis due to nature of injuries.

Conclusion : Early surgical treatment and mobilisation of the hand following fracture fixation is critical for a favourable functional outcome of the hand. For timely intervention of associated complications, close monitoring is needed.

Keywords: *Carpal bones; Fractures; Hand injuries; Surgical options*

Introduction

Hand fractures can cause significant impairment in men. Because the hand is the body's third eye, injuries to the hand not only impair function but also interfere with making a living. Though many hand fractures can be treated non-operatively, most will result in hand deformity or stiffness if not addressed [1,2]. Multidisciplinary team interventions are needed for maximum functional return of the hand, with the hand surgeon playing the most important role in the early stages of management. In the United States, there was a bimodal pattern of age distribution in patients with hand fractures, with the preponderance involving the metacarpal bones [3]. Another 6-year retrospective study from Saudi Arabia found that the majority of hand fractures happened at home among 13-18-year-olds [4]. In an Indian survey of patients presenting to the emergency room with fractures, 5.4% had hand fractures [5]. Many authors have given rationales and principles for managing hand fractures [6-8], with the majority emphasising surgical treatment in the early stages of fractures for stabilisation. The majority of hand fractures are caused by phalange and metacarpal fractures [9,10]. Krischner (K-) wiring, metallic plates, external support, or screw fixation are surgical alternatives [11,12]. A study from Pakistan found that after K-wire placement in phalangeal and metacarpal fractures, patients had adequate post-operative range of motion [10].

Method

This is a 15-year retrospective observational study performed at the department of plastic surgery at a private hospital in Karachi, Pakistan, from May 2000 to January 2016. This department is unusual in that it is the only unit in the city with two hand surgeons

who offer hand fellowship training. This is a 700-bed private tertiary care facility that has been in operation for more than 50 years. Because of this specialised department, this hospital has had the privilege of receiving referrals for hand injuries not only from within the nation but also from neighbouring countries such as Afghanistan, particularly in the last decade. It is departmental policy to inform patients about the use of their data for future study while maintaining their anonymity. This research has been approved by the institutional ethical review board. We retrieved 15 years of data and reviewed it for injuries, particularly hand bone fractures, management, and outcomes. Age, gender, aetiology of injury, comorbidities, fracture sites, treatment chosen, and outcome in terms of days to return to normal activities were all examined. Statistical Package for Social Sciences (SPSS) version 19.0 was used to evaluate the data for mean and frequency. For substantial co-relations, the Chi-square test with a 95% confidence interval was used.

Results

We treated 1859 individuals with hand injuries over the last 15 years, 969 of whom had underlying bone fractures. The ratio of male (608; mean age 31.5 8 years) to female (361; mean age 38 6 years) was 1.6:1, with a median age of 41 years (range: 6 - 58 years). The majority of patients, 930 (92%), had right hand dominance, and 459 (47.3%) had skilled occupations. A total of 492 males (81%) were addicted to smoking, while 141 women (39%) had systemic joint diseases (osteoporosis: 26.9%, osteoarthritis: 43.2%, rheumatoid disease: 29.7%). Motor vehicle collisions dominated the aetiology of hand fractures in our study.

The fractures were diagnosed using two-dimensional X-ray images, but a computed tomography (CT) scan was also used in some carpal bone injuries. shows the distribution of 1764 fractures in various hand bones, with the bulk involving phalanges of the third and fourth digits (528), metacarpals of the third (145), fourth (128), and fifth (128) digits (156). There were 187 carpal fractures (10.6%), 42 (22.4) scaphoid fractures, 29 (15.5) lunate fractures, and 28 (14.9%) compression injuries of carpal rows. The total number of open fractures was 524 (29.7%), compared to 1240 (70.1%) closed fractures. The open approach reduced an extra 274 (22%) closed fractures ().

illustrates the management of our patients, in which 1061 (60.1%) fractures were treated with K-wires, 69 (3.9%) screw fixations (mostly for carpal fractures), 48 (2.7%) with plates, and

28 (2.8%) with row carpectomy. Three hundred and sixty patients (37.1%) had a finger amputated early or late. As previously stated, 163 (9.2%) were managed conservatively.

Outcomes

Nine hundred and ten (94%) patients were observed once a week for at least eight weeks. Post-operative splints were removed after 4 weeks (6 weeks for conservatively managed patients), and patients were advised to wear night splints for 2 weeks with physiotherapy to improve joint range of motion. Sutures were removed 10-14 days after surgery, and K-wires were removed 6 weeks later, following a follow-up X-ray picture. Secondary operations were performed on 375 (21.2%) of the patients .

52 (13.8%) required out-patient wound debridement, and 87 (23.2%) required finger amputation (after 24 hours of intervention). With light weight bearing, the mean number of days to return to daily exercise was 45 10 (p-value: 0.04). (2 pounds). The average day for phalangeal fractures to achieve 1 cm finger to palm distance was 187 days. At 8 weeks, the mean flexion angles at the metacarpo-phalangeal joint (MCPJ) were 500 (p-value: 0.06), 700 at the proximal inter-phalangeal joint (PIPJ; p-value: 0.10), and 10 at the distal inter-phalangeal joint (DIPJ; p-value: 0.08).

Discussion

Hand fractures are a frequent injury that presents challenges for hand surgeons. The treatment must be tailored to the location and pattern of the fracture, with the aim of restoring congruity, stability, and alignment, allowing for early range of motion and preventing stiffness and arthritis. As seen in our observations, it is most prevalent in males in their thirties to forties [13,14]. Trauma or workplace injuries (crush and machine sharp cut) account for up to 34% of fractures[15], with other causes including trivial injuries. The complicated anatomical arrangement of the eight carpal bones, which is sustained by ligaments, makes fractures difficult to see in simple radiographs, necessitating Computed Topography. Carpal bone injuries occur in 8 to 19% of hand accidents, with 90% affecting the proximal row[16,17]. We found 22.4% scaphoid, 15.5% lunate, and 14.9% capitate fractures when compared to a research that found triquetrum, lunate, and scaphoid in decreasing frequencies in distal radius fractures[17]. In our facility, we managed scaphoid with AO lag screws (2mm mini fragment), with a shift to cannulated compression screws (2.4mm) in recent years. Greater than 1 mm displacement, lateral intrascaphoid angle

higher than 35 degrees, bone loss or comminuted fracture, perilunate fracture or dislocation, and proximal pole fractures were all indications for intervention. Metacarpal fractures account for the majority of hand fractures, accounting for 40% of all hand fractures in the literature contrasted to our observation of 35.5%[18]. Even so, phalangeal fractures account for 53.8% of all fractures in our research. The 5th metacarpal bone fracture, known as 'Boxer's fracture' by many authors[18-20], accounts for 24.8% of all metacarpal fractures in our dataset. K-wires were used to control phalanges, but those that were un-displaced, incomplete, or stable after closed reduction were managed conservatively.

Open, intra-articular, unstable (oblique, comminuted, transverse), irreducible fractures and those with angulation greater than 30 degrees were treated surgically, whereas closed fractures with angulation less than 30 degrees and rotation less than 10 degrees were treated carefully. K-wires to intraosseous wires, tension wire bands, compression screws, open reduction and internal fixation with plates and screws, or external fixation[21] are surgical alternatives, particularly for phalanges fixation. According to our findings, most fractures were treated with K-wires, both for phalanges and metacarpals, but compression screws were used for carpal fracture fixation, particularly in scaphoid fractures. Many patients, particularly those with an underlain distal phalangeal fracture, needed nail bed repair. Close reduction and a splint in James' intrinsic plus position (70-degree bending at the metacarpo-phalangeal joint and 90-degree extension) were used as conservative measures. Early mobilisation is required for a favourable functional outcome of the hand, regardless of whether conservative or surgical treatment is used. Outcomes following hand fracture fixation have been evaluated using objective, subjective, or radiologic measures, but no single measure has been recognised as the gold standard for correctly evaluating functional improvement [13,15,23]. On follow-up, we evaluated functional outcomes in terms of return to daily tasks and angle of joint flexion. We observed early compliance to at least 2lb of weight bearing and housekeeping tasks as a team work with occupational and physiotherapists, with statistical significance when compared to joint mobility angles. We managed cases of soft tissue and bone infections, even after the initial washout, debridement, and antibiotic coverage suggested by the etiology[24].

Conclusion

Early intervention with a variety of surgical management methods results in excellent and prompt return of hand

functions, reducing joint stiffness and traumatic arthritis. Though vigilant teamwork and follow-up are needed in the initial phase to manage associated outcomes on time.

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