DOI: https://doi.org/10.53350/pjmhs221641019

ORIGINAL ARTICLE

Impact of Conservative and Operative Treatment on Functional Consequences in Patients with the Fracture of Metacarpals Bones: A Longitudinal Study

ALI MUHAMMAD BHUTTO[1], HASSAN AMIR US SAQLAIN[2], AZIZULLAH BHAYO[3], SIJAD AHMED MAHAR[4], RASHEED AHMED BHATTI[5], NISAR AHMED SOOMRO[6], NIAZ HUSSAIN KEERIO[7]

[1]*Consultant Orthopedic Surgeon , Ghulam Mohammed Mahar Medical College Sukkur Pakistan*
[2]*Specialist Orthopaedics, Al Qassimi Hospital Sharjah UAE*
[3]*Assistant Professor Orthopaedics, Ghulam Muhammad Mahar Medical College Sukkur Pakistan*
[4]*Assisant Professor Orthopaedics, Ghulam Mohammed Mahar Medical College Sukkur Pakistan*
[5]*Senior Registrar Orthopaedics, Bilawal Medical College, LUMHS Jamahoro Pakistan*
[6]*Consultant Orthopaedic Surgeon Orthopaedics, Alhada Armed Forces Hospital Taif KSA*
[7]*Assistant Professor Orthopaedics, Muhammad Medical College and Hospital Mirpurkhas, Pakistan*
Corresponding author: Ali Muhammad Bhutto, Email: rajabhutto2002@gmail.com

ABSTRACT

Aim: The aim of this study was to compare the healing and functional outcomes of metacarpal bone fractures treated conservatively versus surgically.

Study design: A longitudinal study

Place and Duration: This study was conducted at Ghulam Mohammed Mahar Medical College Sukkur Pakistan. from June 2020 to June 2021

Methodology: The study comprised a total of 80 people with varied forms of metacarpal fractures. The fractures were treated conservatively or surgically in the orthopedic department. The Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire score, which was used to assess the ability to execute various tasks, inspired the creation of the questionnaire. The least level of disability was assigned a score of 0, and the most degree of disability was assigned a score of 100.

Results: In the DASH questionnaire, a scale score ranging from Zero to 100 was calculated. The greater the score, the worse the scenario. The majority of the subject obtained a score of 21 to 25, suggesting that they were generally pleased with their therapy. The Michigan questionnaire was used to assess patient satisfaction as the next questionnaire. Patients' primary expectation is restoring maximum hand function, and the functional outcome is critical. **Conclusion:** Most metacarpal fractures have a satisfactory outcome with nonoperative therapy because there is a lot of tolerance for angulation and shortening. Physical therapy and mobilization are critical components of treating these fractures and are an important part of the rehabilitation process. More study is required to help develop a definite treatment regimen while maintaining our patients' quality of care and overall wellness.

Keywords: Fracture, Metacarpals, Conservative Treatment,

INTRODUCTION

The most common injury is a metacarpal fracture, which accounts for 5–6% of all fractures observed in primary care settings. The fifth limb metatarsal is involved in 45–70% of these injuries. (1) Patients most typically present between the ages of 20 and 50, with an incidence as high as 1.8 per 1000 person-years observed. (2) Metacarpal fractures are distinct events that are typically simple, closed, and stable, resulting in them being regarded as minor injuries, although they can result in significant handicaps. (3)

A direct hit to the hand or a fall onto the hand are the most prevalent causes of metacarpal fractures. Athletic activity, particularly contact sports, is prone to these fractures. (4) Almost a quarter of all incidents occur while participating in sports. Younger patients are more likely to be involved in a sporting accident, whereas middle-aged patients are more likely to be involved in a work-related injury, the elderly are more likely to fall, and fifth metacarpal fractures are most commonly produced by punching a wall or other solid object. (5)

Metacarpal shaft fractures are more difficult to repair and typically necessitate surgery or conservative treatment is required. Surgeons frequently resort to their understanding of fracture stability as a foundation for nonarticular fracture therapy. (6) Some authors believe that if unstable fractures are not appropriately treated, they will cause stiffness, a weak grip, discomfort, malrotation, or nonunion, as well as impaired functioning due to angulation or shortening. (7) Only a few studies compared the nonsurgical and surgical treatment of hand fractures. Patients treated nonoperatively had improved arm, shoulder, and hand impairments, as well as superior aesthetic scores. (8)

Kirschner wire (K wire), screws, or intraosseous wiring, as well as hand plates, can be used to repair metacarpal fractures. The surgeon's preference and expertise choose each option more than any particular benefit provided by the various treatments. In the vast majority of cases, intraoperative radiography is required. (9) For immobilisation of more than two weeks, K wire fixation is advised, and this type of fixation is commonly believed to be the least intrusive method with the best long-term function.

As a result, the current study was aimed to investigate and compare the healing, functional outcomes, and long-term effects of metacarpal fractures treated conservatively versus surgically.

METHODOLOGY

The current study was conducted in our hospital. A total of 80 individuals with various types of metacarpal fractures either treated conservatively or surgically were incorporated in the current research. Permission was taken from the ethical review committee of the institute.

The victims were first sent to a trauma centre or an emergency room, where they were given supportive care in the form of splints and painkillers. Investigations were carried out that were relevant and routine, and history was taken. A basic radiological evaluation was performed based on the type and nature of the fracture. The study comprised patients who had a closed fracture were over the age of 20 and signed a consent form. An open fracture, dislocated fracture, and tendon injury were all exclusion criteria.

The patients were examined for discomfort as well as functional movement impairments. The necessary radiological evaluation was performed by X-RAY that assessed the joint space, bone deformity presence, displacement degree, and if further estimation was mandatory, a computed tomography (CT) examination was recommended.

The patients were treated conservatively with a gutter and an ulnar splint. At the end of the three-week estimate the pain and inflammation. The splint was removed after a four-week evaluation period, and the patients were given a dynamic splint and taught

grip exercises. To avoid stiffness and oedema, finger movements were started right away. Antibiotics were given intravenously for two days and orally for seven days. For up to 4 weeks, the pin tract was inspected weekly. Between 3-6 weeks, the K wires were withdrawn.

The Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire score, which was used to assess the ability to execute various tasks, inspired the creation of the questionnaire. The minimum severe disability was given a score of 0, and the most severe disability was given a score of 100. The Michigan hand questionnaire was filled at 12 weeks and/or 24 weeks. (1) Overall hand function, (2) activities of daily living (ADLs), (3) pain, (4) work performance, (5) aesthetics, and (6) patient satisfaction with hand function are all included in the MHQ. The higher the score on the pain scale, the more agony there was. The higher the scale, the greater the hand performance. After inverting the pain scale (pain=100 pain score), add the values for all six scales and divide by six to get an overall MHQ score. It was given at 12 and 24 weeks after procedure.

All data were entered into a pre-filled datasheet and analyzed with SPSS version 21, the statistical tool for social sciences. Significant was defined as a p-value of less than 0.05. Chi-square test and two independent sample t-tests were employed to establish the association between the two groups.

RESULTS

This study includes 80 patients. Most of the patients (n=30, 37.5%) were between the ages of 20 and 30 years. Metacarpal fractures were shown to be most common in young individuals. Least number of patients were found in the age group of more than 60 years. **(**As shown in Table 1). A total of 62 (77.5%) were male and 18 (22.5%) were females. Males experience more fractures than females because they engage in greater physical activities. There were more incidences of injury on the right side (n=42; 52.5%) than on the left side (n=38; 47.5%) due to the side of injury. The fracture due to trauma was observed in 29 (36.25 %) of the patients, the fracture due to a fall injury was seen in 27 (33.7 %) of the patients, and the fracture due to a sports injury was seen in 24 (30 %) of the patients. (As shown in Table 2)

A scale score ranging from 0 to 100 was calculated using the DASH questionnaire. The higher the score, the more serious the situation. A lower number suggests less disability and more patient satisfaction. The majority of patients received a score of 21 to 25, indicating that they were satisfied with their treatment. The Michigan questionnaire was utilised as the next questionnaire to gauge patient satisfaction. The Michigan Hand Questionnaire (MHQ) is a hand-specific survey that is frequently used to assess health status in patients with hand problems. (As shown in Table 3)

Table 1: Frequency and Percentage of Patient's Age group

Age (Years)	No. of participant	%
20 – 30	30	37.5
31– 40	25	31.25
41– 50	14	17.5
51 – 60	6	7.5
> 60	5	6.25
Total	80	100

Table 2: Characteristics of the study participants

Characteristics	No. of patients n=80	%	P-value (< 0.05)
Gender			
Male	62	77.5	0.899
Female	18	22.5	
Mode of injury			
Fall	27	33.7	0.455
Blunt trauma	29	36.25	
Sports Injury	24	30	
Side Effected			
Left	38	47.5	0.678
Right	42	52.5	

Table 3: Quick DASH and MHQ score

Scores	No. of patients n=80	%
DASH Score		
< 20	6	7.5
21 – 25	52	65
26-30	18	22.5
> 30	4	5
Michigan questionnaire score		
55 – 60	2	2.5
61 – 65	4	5
66 – 70	8	10
71 – 75	28	35
76 – 80	25	31.5
81 – 85	8	10
86 - 90	5	6.25

DISCUSSION

Fractures of the phalanges and metacarpals account for 10% of all fractures in the upper extremity, accounting for at least 41% of all fractures. Metacarpal fractures make up 18–44 % of all fractures. The fifth finger is the most commonly involved in non-thumb metacarpal fractures, accounting for approximately 88 % of all metacarpal fractures. The most prevalent types of fractures are simple, closed, and stable injuries. While many metacarpal fractures may not necessitate surgery, there is a lack of information and ongoing dispute to assist the treating physician in determining the best treatment strategy. (4)

In this study, 80 individuals were included and majority of the patients (n=30, 37.5%) were among the ages of 20-30 years. The incidence of metacarpal fractures was found to be highest in young patients. In our study, males were (77.5%) and females were (22.5%).

Similar to the current study, a study performed in Pakistan reported that the male-to-female ratio was 5:1. It was also observed that 38.9 % of fractures were metacarpal and 61.1 % were phalangeal. They operated on 78.3 % of the patients, whereas 21.7 % were managed conservatively. (10) Likewise, Ahmed M et al. (11) observed a male-female ratio of 5:1. The average age was 32.6 years. In addition, the patients were separated into two groups: 15 fractures were treated conservatively and 44 fractures were treated surgically. In contrast to our study, the ratio of left site fracture was about 47%, and left was 52%. According to Friedrich et al., study of nonsurgical treatment yielded the highest level of evidence in the treatment of metacarpal fractures.(12)

In a study of 42 individuals, Al-Qattan observed that 54 metacarpal spiral fractures, which are commonly thought to be intrinsically unstable, had a normal range of motion when treated with rapid mobilisation. (13) Only a few studies compared the nonsurgical and surgical treatment of hand fractures. According to Westbrook et al, patients treated nonoperatively had improved arm, shoulder, and hand impairments, as well as superior aesthetic scores. (8) Shah et al. determine that Patients who underwent surgery for intra-articular calcaneus fracture had more complications and required repeated procedures. (14)

Regardless of the fact that all patients completed both the Questionnaires, they concluded that the scales were somewhat relative and that some criteria were not what they genuinely paid attention to or considered, indicating that the scales should be streamlined for increased relevance and efficiency. Patients who received either conservative or surgical therapy had a good quality of life and were able to return to productive members of society without severe limitations in a short period, according to the overall scores of both of these evaluation categories.

CONCLUSION

Most metacarpal fractures, especially those of the little finger metacarpal shaft and neck, have a satisfactory outcome with nonoperative therapy because there is a lot of tolerance for angulation and shortening. Physical therapy and mobilization are

critical components of treating these fractures and are an important part of the rehabilitation process.More research is needed to assist establish a precise treatment plan while keeping the quality of service and overall satisfaction of our patients in mind.

Funding source: None

Conflict of interest: None

Permission: It was taken from the ethical review committee of the institute

REFERENCES

1. Gu Y, Ren X, Li J, Lake M, Zhang Q, Zeng YJIo. Computer simulation of stress distribution in the metatarsals at different inversion landing angles using the finite element method. 2010;34(5):669-76.
2. Fujitaka K, Taniguchi A, Isomoto S, Kumai T, Otuki S, Okubo M, et al. Pathogenesis of fifth metatarsal fractures in college soccer players. 2015;3(9):2325967115603654.
3. Kollitz KM, Hammert WC, Vedder NB, Huang JIJH. Metacarpal fractures: treatment and complications. 2014;9(1):16-23.
4. Hirani A, Gagal NJIJoO. Comparative study to assess the effect of conservative versus operative management on functional outcome in patients with metacarpal fracture. 2020;6(4):231-3.
5. Moore A, Varacallo M. Metacarpal hand fracture. 2019.
6. Mukhopadhaya J, Jain AJIJoO. AO principles of fracture management. 2019;53(1):217-.
7. Neumeister MW, Winters JN, Maduakolum EJP, Open RSG. Phalangeal and Metacarpal Fractures of the Hand: Preventing Stiffness. 2021;9(10).
8. Westbrook A, Davis T, Armstrong D, Burke FJJoHS. The clinical significance of malunion of fractures of the neck and shaft of the little finger metacarpal. 2008;33(6):732-9.
9. Marandi P, Chandan RKJIJoO. A comparative study of volar plate fixation versus percutaneous Kirschner wire fixation in the management of distal radius fracture in adults. 2019;5(4):553-6.
10. Ali H, Rafique A, Bhatti M, Ghani S, Sadiq M, Beg SAJJ-PMA. Management of fractures of metacarpals and phalanges and associated risk factors for delayed healing. 2007;57(2):64.
11. Ahmad M, Hussain SS, Rafiq Z, Tariq F, Khan MI, Malik SAJJoAMCA. Management of phalangeal fractures of hand. 2006;18(4):38-41.
12. Wong VW, Higgins JPJP, surgery r. Evidence-based medicine: management of metacarpal fractures. 2017;140(1):140e-51e.
13. Al-Qattan MJJoHS. Outcome of conservative management of spiral/long oblique fractures of the metacarpal shaft of the fingers using a palmar wrist splint and immediate mobilisation of the fingers. 2008;33(6):723-7.
14. SHAH GA, KHAIR MAM, QURESHI MA, AZIZ MA, SOOMRO ZI, KEERIO NH. Operative Versus Non-Operative Management of Closed, Displaced Intra-Articular Calcaneus Fractures: a Randomized Control Trial.