

To Evaluate Metacarpal & Phalangeal Fractures of the Hand in a Tertiary Care Hospital: A Prospective Study

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ABSTRACT

Background: This Prospective cohort study was undertaken to evaluate the functional outcome after proper treatment of metacarpal and phalangeal fractures.

Material & Methods: Total 70 fractures were treated in 60 patients. Out of these 70 fractures 30 were metacarpal and 40 were phalangeal. Out of these 70 fractures, 41 were managed by Conservative (group C), 17 were managed by the K-wire fixation (group K) & 2 were managed by External fixation (group E).

Results: In this study mean age was 38.3±11.6 years of the study subject. Also the male female ratio was 3:1. Majority 67.5% of the patients were treated by Group C modality. According to the Mayo Wrist score, there was statistically significant difference in outcome between three modalities of treatment.

Conclusion: So we conclude that hand fractures should be treated with proper guidelines and protocols to get good results.

Keywords: Conservative, K-wire fixation, External fixation, Mayo wrist score.

INTRODUCTION

Metacarpal fractures are a common entity in both the emergency room and ambulatory care setting, making up one-third of the fractures seen in the hand. Fortunately, with proper management most patients do well after these injuries. Appropriate treatment requires a keen

understanding of the type of fracture, their inherent stability, and the available treatment options⁽¹⁾.

Hand fractures, a common presentation in Emergency Department⁽²⁾, and are the most common fractures of the human skeleton⁽³⁾.

Appropriate treatment includes a thorough assessment, physical examination, directed imaging, modality of treatment and regular follow up. Such an approach should lead to a rational treatment plan that focuses on the rehabilitation of all damaged components, including osseous, articular, and soft tissue structures⁽⁴⁾.

Fractures of the metacarpal and phalanges are very common and constitute 10% of all fractures⁽⁵⁾.

Generally these fractures commonly present in three patterns- closed undisplaced, closed displaced and open fractures. After proper clinical and radiological assessment we decided about modality of treatment. We used three modalities- 1) conservative- traction and splintage 2) k -wire fixation 3) external fixation.

After fracture stabilisation we followed all the patients at 4, 6, 12 and 24 weeks. At the time of each visit patients were assessed with respect to pain, range of motion using Mayo Wrist Score.

Objectives: To study of all kinds of hand fractures.

MATERIALS & METHODS

This prospective cohort study was conducted in the department of Orthopaedics at ESICPGIMSR and MGM hospital, Parel, Mumbai from November 2011 to November 2013. Total 60 patients were included for the study and following modality of treatment were given.

- 1) Ligamentotaxis done by dynamic traction and splintage. (Group C)
- 2) Open reduction and internal fixation by crossed K wires. (Group K)
- 3) External fixation. (Group E)

We evaluated these fractures at 4 weeks, 6 weeks, 12 weeks and 24 weeks.

Sample Size: It was calculated by using cluster surveys for design effect in population correction methods formula:

$$n = \frac{DEFF * \chi^2 * N * p(1 - p)}{d^2 * (N - 1) + \chi^2 * p(1 - p)} = 58.2$$

= 60(total)

Inclusion Criteria: All patients age more than 18 years and who attended our hospital

emergency and OPD with Metacarpal and phalangeal fractures were included.

Exclusion Criteria: Those patients were excluded who were less than 18 years & had any pathology in hand like deformities, contractures, tumors or inflammatory arthritis. This study was approved from the Institutional Ethical committee. Also informed consent form was taken from every patient who fulfilled the inclusion and exclusion criteria. Patient pro forma was filed for each patient with detail history.

RESULTS

In this prospective cohort study, total 60 patients were recruited as per inclusion and exclusion criteria. The mean age of the patients was 38.3±11.6 Years. Out of total patients, Majority 75.0% of the patients were male, 60.0% patients were less than 40 years, 58.3% were Worker, 58.3% were Right hand fractures, 43.3% of the patients sustained injuries from fall of heavy weight & 95.0% of the patients returned to activity within 24 weeks. 28.3% of the patients had complication. (table no. 1)

Table No. 1: Socio demographic profile in the study subjects.

Socio Demographic variables	Frequency	Percentage	
Gender	Female	15	25.0%
	Male	45	75.0%
Age Group	Less than 30 Years	18	30.0%
	31 to 40 Years	18	30.0%
	41 to 50 Years	12	20.0%
	More than 50 Years	12	20.0%
Occupation	Clerk	11	18.3%
	Doctor	1	1.7%
	House Wife	9	15.0%
	Student	1	1.7%
	Worker	35	58.3%
	Retired	3	5.0%
Hand Involvement	Right	35	58.3%
	Left	25	41.7%
Mode of Injury	Direct Trauma	11	18.3%
	Crush Injury	3	5.0%
	Fall	20	33.3%
	Fall of Heavy Weight	26	43.3%
Return of Activity	Return	57	95.0%
	Not Return	3	5.0%
Complication	Yes	17	28.3%
	No	43	71.7%

Table No. 2: Type of Fractures in the study subjects.

Treatment Group	Type of Fractures	
	Metacarpal (%)	Phalangeal (%)
Group C	15 (50.0%)	27 (67.5%)
Group K	13 (43.3%)	10 (25.0%)
Group E	2 (6.7%)	3 (7.5%)
Total	30 (100.0%)	40 (100.0%)

In the above table no. 2 shows that the majority of the patients were treated by Ligamentotaxis, done by dynamic traction and splintage modalities in phalangeal type of fractures. Also half of the patients were

treated by Ligamentotaxis done by dynamic traction and splintage in Metacarpal type of fractures.

Below table no. 3 shows that the average mean (SD) score of first visit was 8.42 (0.87), in the second visits score was

32.36 (2.04), in third visits score was 47.30 (1.92), in fourth visits score was 62.60 (2.03) & fifth visit score was 78.94 (1.81). Also showing the mean difference of Mayo Wrist score was statistically significant between all three treatment modalities.

Table No. 3: Mean difference of Mayo Wrist Score between Treatment Modalities in the study subjects.

Treatment Group	Mayo Wrist Score				
	1st	2nd	3rd	4th	5th
Group C	14.39 ± 3.39	44.88 ± 7.29	62.20 ± 7.25	79.27 ± 7.03	91.22 ± 5.89
Group K	10.88 ± 3.64	34.71 ± 9.76	54.71 ± 8.38	73.53 ± 10.12	85.59 ± 9.50
Group E	0.00 ± 0.00	17.50 ± 3.54	25.00 ± 0.00	35.00 ± 0.00	60.00 ± 7.07
Total	8.42 ± 0.87	32.36 ± 2.04	47.30 ± 1.92	62.60 ± 2.03	78.94 ± 1.81
P value	0.001 (S)	0.001 (S)	0.001 (S)	0.001 (S)	0.001 (S)

DISCUSSION

In this prospective cohort study, during the study period a total 70 fractures were treated in these 60 patients according to the three modalities of treated. Out of these 70 fractures 30 were metacarpal and 40 were phalangeal.

In this study observed that male female ratio was 3:1. In our study mean (SD) age of the patient was 38.3 (11.6). Majority 35 (58.3%) of the patients were Workers followed by 11 (18.3%) were Clerk & so on. In this study observed that maximum patients were injured by the fall of heavy weight (26), followed by the 20 (33.3%) of the patients were direct fall on hand. Out of the 60 patients, 35 (58.3%) had right hand fractures & 25 (41.7%) had left hand fractures.

In this study divided the 60 patients into three groups according to the type of fractures, reduction technique, stability and soft tissue injury. In group C had 41 (68.3%) patients followed by group K having 17 (28.3%) & only 2 (3.3%) of the patients were in group E.

In the study done by Bora & Didizan⁽⁶⁾ divided the patients in the following two groups: 1st group they treated intra-articular fractures with no or minimal displacement within a forearm-based wrist immobilisation splint or POP. In 2nd group they included patients with disruption of the joint surface that were reduced and K-wired with wrist immobilization in a POP for 4–6 weeks.

Similarly Zyluk & Budzynski⁽⁷⁾ divided the patients in two groups. 1st group is Conservative & 2nd group is Operative group using K-wire fixation.

In a study done by Ali H et al⁽⁸⁾ shows that male female ratio was 5:1. Also found that the 38.9% fractures were metacarpal & 61.1% fractures were phalangeal. They treated 78.3% patients surgically while 21.7% were managed conservatively.

Similarly study done by Ahmed M et al⁽⁹⁾ shows that male female ratio was 5:1. The mean age was 32.6 years. They had 64% left side fractures and 36% right side fractures. Also divided the patients into two groups, 15 fractures were treated by conservatively & 44 fractures were treated operative modality.

Also the study done by Yan YM⁽¹⁰⁾ shows the male to female Ratio was 3:2 which was lower compared to ours. Mean age of the patients was 30.4 years with the minimum age was 18 years and maximum age was 56 which were similar to our study. Also found 63.4% fractures on right side & 36.6% fractures on left hand side. Similarly 60.1% were metacarpal & 39.9% were phalangeal fractures.

In a study by Robyn Midgley and Angela Toemen⁽¹¹⁾ they evaluated 36 patients of hand fractures and found that out of this 36 patients 25 were employed and 11 unemployed. Out of the 25 employed patients 20 had sedentary job and 5 were manual workers. Out of the 11 unemployed

2 were non-employed, 7 were students and 2 were retired.

In a study by Michael N. Nakashian⁽¹²⁾, they found that the most common mechanisms of injury were contact with a wall or door, and falls. The most common setting was in the home, followed by recreational locations.

CONCLUSION

Hand trauma is very common and associated loss of function can impact almost all activities. Immediate and prompt stabilisation of metacarpal and phalangeal fractures of the hand and regular follow up and assessment seems to give good functional outcome. So we conclude that hand fractures should be treated with proper guidelines and protocols to get good results.

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