

Characteristics of Metacarpal Fracture Patients in Orthopaedic and Traumatology Department of Dr. Mohammad Hoesin General Hospital Period January 2017 - December 2019

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Abstract

Introduction: Metacarpal fracture is the most common injury of manus region found in the emergency department (ER). Injuries to the manus region, especially metacarpal fractures, can cause great losses, especially in the productive age range. The diagnostic accuracy of metacarpal fractures is required for further operative or nonoperative management as indicated.

Methods: This research is a retrospective study with a descriptive design. The aim of this study was to describe patient characteristics based on age, gender, fracture position, fracture location, mechanism of injury, and metacarpal fracture management. There are 48 cases in this study.

Results: The metacarpal fracture patients dominated by male. Most common found in 20-29 years age. The youngest age was 5 years and the oldest was 60 years (mean age 31.06 ± 14.23 years). Most fracture position found on the right side of the fifth metacarpal location. Mechanism of injur dominated by low energy trauma (LET). Open reduction management with miniplate-type dominant in this study sample.

Conclusion: Early prevention and treatment of orthopedic surgery can be considered as the most important for the management of metacarpal fracture patients.

Keywords: fracture, trauma, metacarpal bone

1. Introduction

Metacarpal fractures are the most common injuries in the human region found in the emergency department (ER) with an incidence rate of 12.5 sufferers per 100.000 in the United States, and the incidence of injuries affecting the upper limbs in Indonesia in 2018 was 32.7%.^{[1][2][3]} The incidence of metacarpal fractures accounts for up to 40% of all fractures of the superior limb. Anatomically fractures most often occur in the fifth metacarpal (\pm 25% of all fractures of the human region) which are often called boxer fractures.^[4]

Injuries that occur in the human region, especially metacarpal fractures can cause great losses, especially in the productive age range, which have negative implications in several areas of life. According to Swanson in 1970 that fractures of the human region can cause morbidity from neither treatment nor excessive medication (stiffness). So it requires accuracy in diagnosing metacarpal fractures based on history, clinical examination and supporting examinations.^[5]

Since there is no definitive agreement on the best management for the treatment of this case, the patient can be managed with non-operative and operative management. With consideration of several factors, including the mechanism of trauma, time needed to receive therapy, the location of the fractured metacarpal, fracture pattern, fracture position, number of fractured metacarpals, fracture-induced abnormalities and comorbidities.^[6] Each management has advantages and disadvantages, and the best treatment method is controversial.

The goals of metacarpal fracture management are to maintain and restore the normal range of motion (ROM), restore motor strength, overcome ongoing pain, reduce joint stiffness, restore good anatomical position of the hand, properly graft bones, and restore normal hand functional capacity.^{[7][8]}

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In this study, we will discuss the characteristics of findings in patients with metacarpal fractures based on the etiology, diagnosis and treatment obtained by the patient in carrying out treatment at Dr. Mohammad Hoesin Palembang in the period 1 January 2017 - 31 December 2019.

2. Method

This research is a retrospective study with a descriptive design. The data used are secondary data, namely the patient's medical record.

This research took place from June 2020 to July 2020 at RSUP Dr. Mohammad Hoesin Palembang, namely the Medical Records section.

The study population was all patients diagnosed with metacarpal fractures at RSUP Dr. Mohammad Hoesin Palembang and met the inclusion criteria and exclusion criteria.

The inclusion criteria of this study were patients with a diagnosis of metacarpal fractures through medical records who were treated at Dr. Mohammad Hoesin Palembang in the period January 2017 - December 2019 and all variables were researched completely. The exclusion criteria of this study were patients with a diagnosis of metacarpal fractures and the variables studied were incomplete.

The characteristics of patients with metacarpal fractures were divided into sex, age, fracture position, fracture location, mechanism of injury, and management to be described descriptively and the data were presented in tabular form and analyzed using SPSS version 21.

3. Results

In that time span, there were 48 patients diagnosed with metacarpal fractures with complete data

Table 1. General Characteristics of Research Subjects

Characteristics		n	%		
Age	< 20 years old	11	22.9		
	20 – 29 years old	14	29.2		
	30 – 39 years old	11	22.9		
	40 – 49 years old	7	14.6		
	50 - 59	4	8.3		
	60 - 69 years old	1	2.1		
Fracture Location	Metacarpals I	6	12.5		
	Metacarpal II	8	16.67		
	Metacarpals III	11	22.91		
	Metacarpals IV	8	16.67		
	Metacarpal V	15	31.25		
Injury Mechanism	High energy trauma	18	Traffic accident	37.5	
			Work accident	7	
	Low energy trauma	30	Fall down	10	
			Sports	2	62.5
			Sharp trauma	7	
			Blunt trauma	4	
Management	Open Reduction	43	Miniplate	38	89.6
		5	K Wire	5	
	Closed Reduction	5		10.4	

The age range of the study sample was 31.06 ± 14.23 years with a median of 28.5 years and a minimum age of 5 years and a maximum age of 60 years. In this study, 48 cases were obtained, the most consecutive ages were 20-29 years as many as 14 cases (29.2%), aged <20 years and 30-39 years respectively as many as 11 cases (22.9%) and 11 cases (22.9%), 7 cases aged 40-49 years (14.6%), 4 cases aged 50-59 years (8.3%) and 1 case aged 60-69 years (2.1%).

Metacarpal fractures occurred in men in 34 cases (70.8%) and women in 14 cases (29.2%). Based on the gender distribution, it was found that there were more males than females.

The position of metacarpal fracture occurred on the right side in 27 cases (56.3%) and left metacarpal fracture in 21 cases (43.7%).

The fracture sites were metacarpal I (6 cases), metacarpal II (8 cases), metacarpal III (11 cases), metacarpal IV (8 cases) and metacarpal V (15 cases).

The mechanism of metacarpal fracture injury was HET as much as 37.5% and LET as much as 62.5%. The distribution based on the mechanism of injury can be seen based on the incidence, including sharp trauma 14.58%; sports 4.2%; blunt trauma 8.3%; fell 20.8%; work accidents 14.58%; and traffic accidents as much as 37.5%.

Management of metacarpal fractures mostly used open reduction as many as 43 cases (89.6%) including the selection of K-wire as much as 10.4% and Miniplate as much as 79.2%. However, the closed reduction option was only in 5 cases (10.4%).

4. Discussion

In this study, there were 48 cases of metacarpal fractures during the period January 1, 2017 to December 31, 2019. The age distribution of metacarpal fractures occurred mostly in young people with an age range of 20-29 years, and the mean age in this study was 31.06 years. This study is in accordance with several other studies, including the study of Anakwe et al (2011), where metacarpal fractures in the UK mostly occur in the age range of 20-39 years.^[14] Similar to the study by Tarek, et al. (2017) in Egypt the incidence of metacarpal fractures was most prevalent at the age of 20-40 years with a percentage of up to 61.9%.^[19] Likewise in the study of Al Mugren, et al (2016) in Saudi Arabia, the highest incidence of metacarpal fractures occurred at the age of 18-30 years.^[20] Therefore, the incidence of metacarpal

fractures based on age is often found in the productive age range that requires high mobility, thus increasing the likelihood of trauma causing injury.

In this study, it was found that the most fracture cases were in men as much as 70.8%. Likewise, in the study of Aitken et al. (2008) in the UK, metacarpal fractures were the most common in men, with a male to female metacarpal fracture ratio of 6: 1.^[12] In addition, a study by Al-Shammari et al. (2008) in Kuwait showed a directly proportional result, namely the ratio of metacarpal fractures in men to women was 5: 1.^[21]

This study obtained results based on the location of the fracture, namely that on the right side metacarpal fractures were more dominant by 56.3% and this is directly proportional to the study of AlMugren, et al. (2015) in Saudi Arabia which showed that the right arm metacarpal fractures were more common.^[20] As well as research Al-Shammari, et al (2008) in Kuwait showed the ratio of metacarpal fractures between right and left is 1.2: 1.^[21]

The results of the study based on the location of the fracture found that the most incidence of metacarpal V was 15 cases (31.25%).^[20] According to a study by Haughton DN, et al (2012), showed that the incidence of boxer's fracture is 25% of the total fracture incidence in the human region.

In this study, it was found that the most types of trauma energy were LET as much as 62.5% and HET as much as 37.5%. Based on Meals, et al. (2013) stated that the same thing which is divided by age group shows the mechanism of trauma is more often caused by LET, as follows children and young adults often experience injuries due to sports, productive age adults are prone to work-related injuries, while age old people are prone to hand trauma due to falls.^[22] Based on Balitbangkes (2018), the house and its environment are mentioned as the most frequent places of injury with a percentage of 44.7%.^[3] This is related to most of the trauma mechanisms that can occur at home are LET.

In this study, it was found that the most management was using open reduction as much as 89.6%, with the choice of miniplate as much as 79.2%. The choice of treatment is determined based on the time of occurrence and fracture characteristics, but in this study there are limited data such as the time from the incident to the therapy, the fracture characteristics based on clinical and radiological features.

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