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The Relationship between Maxillofacial Injury Severity Score (MFISS) and Outcomes of Maxillofacial Trauma Patients at Dr. Mohammad Hoesin General Hospital (RSMH) Palembang, Indonesia

Deo Valendra[1*], Iqmal Perlianta[2], Erial Bahar[3]

[1]Surgical Resident, Department of Surgery, Faculty of Medicine, Universitas Sriwijaya/Dr. Mohammad Hoesin General Hospital, Palembang, Indonesia

[2]Division of Plastic and Reconstructive Surgery, Department of Surgery, Faculty of Medicine, Universitas Sriwijaya/Dr. Mohammad Hoesin General Hospital, Palembang, Indonesia

[3]Faculty Member, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia

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***Corresponding author:**
Deo Valendra

E-mail address:
valendradeo@yahoo.co.id

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A B S T R A C T

Introduction: Maxillofacial trauma is an important public health problem, and understanding the relationship between injury severity and patient outcomes is critical for effective management. This study aimed to determine the relationship between the maxillofacial injury severity score (MFISS) and the outcomes of maxillofacial trauma patients at Dr. Mohammad Hoesin General Hospital, Palembang. **Methods:** An analytical observational study was conducted involving 121 maxillofacial trauma patients from April to May 2023. Data regarding patient characteristics, MFISS scores, type of management, length of stay, and mortality were collected and analyzed using statistical tests. **Results:** The majority of maxillofacial trauma patients were male (74.4%) and aged over 18 years (63.6%). Traffic accidents are the main cause of trauma (84.3%). The distribution of MFISS scores showed that 75% of patients had mild scores, 18.2% had moderate scores, and 5.8% had severe scores. Most patients underwent surgical management, with the majority having a length of stay of ≤7 days. The mortality rate was 2.5%. There was no significant relationship between the MFISS score and type of management ($p > 0.05$). However, there was a significant difference in the length of stay based on the MFISS score ($p = 0.000$). Patients with severe MFISS scores had significantly longer lengths of stay compared with patients with mild or moderate scores. In addition, there was a significant relationship between MFISS score and mortality ($p = 0.000$). Patients with severe MFISS scores had a higher risk of death compared with patients with mild to moderate scores. **Conclusion:** The MFISS score is associated with length of stay and mortality in maxillofacial trauma patients. However, there was no significant relationship between the MFISS score and the type of management.

1. Introduction

Maxillofacial fractures are one of the most common types of trauma encountered in trauma centers throughout the world. Facial trauma is an important public health problem, and its patterns and characteristics differ between developed and developing countries.[1-3] Globally, in 2017, there were 7,538,663 new cases and 117,402 years lived with disabilities (YLD) due to maxillofacial trauma. In terms of age-standardized incidence, prevalence, and YLD, global rates were 98 (80 to 123) per 100,000, 23 (20 to 27) per 100,000, and 2 (1 to 2) per 100,000, respectively. Maxillofacial trauma is most concentrated in Central Europe. Falls are the leading cause in most areas. In 2018, the incidence of trauma to the head and face reached 11,064 cases.[1-5]

Properly diagnosing an injury to the facial bones is the primary step in determining a management plan. Prompt diagnosis and appropriate management result in good occlusion. Both internal fixation and archbars are effective treatments. Scoring systems have emerged since the 1970s to measure the level of severity in patients, especially trauma patients. This scoring system aims to find prognostic value for trauma patients so that it can be used as a measuring tool in research. Initially, most scoring systems only evaluated trauma in general, such as the injury severity score (ISS), trauma and injury severity score (TRISS), and new injury severity score (NISS). The scoring system is believed to have predictive value in trauma patients. Some of them are able to combine previous injury scores with facial functional parameters, such as maxillofacial injury severity score (MFISS) and mandible injury severity score (MISS). Other scoring systems are simple but proven to have predictive value, such as the facial injury severity scale (FISS) and the Chinese maxillofacial trauma registry, analysis and injury severity score system (CMISS). In this scoring system, points will be added to each fracture site, laceration, and facial function to get a final score, which will then be divided based on severity. With a total of 247 patients in the study conducted, MFISS has a correlation with the total cost of surgery and the length of patient care.[6-10] This study aimed to determine the relationship between the maxillofacial injury severity score (MFISS) and the outcomes of maxillofacial trauma patients at Dr. Mohammad Hoesin General Hospital, Palembang, Indonesia.

2. Methods

This study is an analytical observational research with a cross-sectional approach and uses secondary data obtained from the medical records installation of Dr. Mohammad Hoesin General Hospital, Palembang, Indonesia. A total of 121 research subjects participated in this study, where the research subjects met the inclusion criteria. The inclusion criteria for this study were all patients with a diagnosis of maxillofacial trauma at Dr. Mohammad Hoesin General Hospital and who had never had any manipulation done. This study has received approval from the medical and health research ethics committee of Dr. Mohammad Hoesin General Hospital, Palembang.

The MFISS score is a score used to assess the severity of maxillofacial trauma based on abnormalities obtained on physical and supporting examinations. Score 1-14 (mild); 15-28 (moderate); >28 (severe). All analyses used the statistical package for the social science (SPSS) data computer program version 25. Significance was determined based on a p-value <0.05. Univariate analysis was carried out on the basic characteristics data of the research subjects. This univariate analysis aims to describe the research sample. Descriptive analysis in the form of numerical data and categorical data. Numerical data will be presented in the form of values cut-off and standard deviation. Meanwhile, categorical data will be presented in the form of graphs or frequency distribution tables, proportions or percentages, and narratives. Bivariate data analysis with management, length of stay, and mortality, each of which is a categorical variable using Pearson's Chi-Square Correlation/Fisher's exact test. Data from statistical analysis results are displayed in tables, graphs, and text.

3. Results

In this study, it was found that the majority of maxillofacial trauma patients were male (74.4%), with the majority aged > 18 years (63.6%). The cause of trauma due to traffic accidents (KLL) was found to be 84.3%.

In this study, there was no difference in management based on the MFISS score (p = 0.310). Maxillofacial trauma patients who underwent surgical management with mild, moderate, and severe MFISS scores were 92.4%, respectively, 100% and 100%. Meanwhile, maxillofacial trauma patients with conservative management were only found in patients with mild MFISS scores (7.6%). In the Fisher Exact

test, the results showed that there is a non-significant relationship between the MFISS score and the management of maxillofacial trauma. (p > 0.05).

Table 1. General characteristics of maxillofacial trauma patients.

Characteristics	Frequency	Percentage (%)
Gender		
Male	90	74,4
Female	31	25,6
Age		
≤ 18 years	44	36,4
> 18 years	77	63,6
Causes of trauma		
KLL	102	84,3
Not KLL	19	15,7
Total	121	100

Table 2. Relationship between MFISS score and management of maxillofacial trauma patients.

Characteristics	Management		Overall P-value	OR	CI95%	P-value
	Operation	Conservative				
MFISS score						
Mild	85	7	0,310[a]	1,000		
Moderate	22	0		-	-	0,343[b]
Severe	7	0		-	-	1,000[b]

[a]Pearson Chi-Square test, *p < 0,05.
[b]Fisher exact test, *p < 0,05.

In this study, there was a difference in length of stay based on the MFISS score (p = 0.000), where the heavier the MFISS score, the longer the mean and median length of stay. Patients with severe MFISS scores had a significantly longer mean length of stay than patients with mild and moderate MFISS scores.

Table 3. Relationship between MFISS score and length of stay for maxillofacial trauma patients.

Characteristics	Length of treatment		P-value
	Mean ± SD	Median (Min-Max)	
MFISS score			
Mild	5,337 ± 2,868	5 (1-17)	
Moderate	12,09 ± 3,221	11,5 (5 -18)	0,000*
Severe	16,20 ± 8,643	15 (3 -24)	

Kruskal Wallis, *p < 0,05.

In this study, it was found that 3 out of 7 patients (42.9%) died with severe MFISS scores, while no patients with MFISS scores died. With statistical analysis, the results showed that there was a significant relationship between the MFISS score and mortality (p = 0.000). Patients with severe MFISS scores are at greater risk of death than patients with mild-moderate MFISS scores.

Table 4. Relationship between MFISS score and mortality in maxillofacial trauma patients.

Characteristics	Mortality		OR	CI95%	P-value
	Yes	No			
MFISS score					
Severe	3	4	-	-	0,000*
Mild-moderate	0	114			

Fisher exact test, *p < 0,05.

4. Discussion

Based on the MFISS scoring, the results showed that there was an insignificant relationship between the MFISS score and the management of maxillofacial trauma. (p > 0.05). The majority of maxillofacial trauma patients with mild, moderate, or severe MFISS scores are treated with surgery. This is in line with other Wiarghita research, which reported that the majority of maxillofacial trauma subjects were treated with the gold standard, namely single open reduction surgery and internal fixation (83.73%). Following a recent agreement between hospitals and insurance providers agreeing to cover the cost of miniplate ORIF, most patients are treated with closed reduction with arch bar fixation. Since insurance covered the cost of miniplates in 2001, open reduction and internal fixation became the first choice. The surgical approaches used are intraoral sublabial, coronal, transcutaneous, transconjunctival, and subciliary approaches.[11-14]

In this study, it was found that patients with severe MFISS scores had a significantly longer average length of stay than patients with mild and moderate MFISS scores. The greater the MFISS score, the longer the maxillofacial trauma patient is treated. These results are in line with other research, which shows a significant positive relationship between the MFISS score and the duration of hospitalization (r = 0.415; p <0.05), where the greater the MFISS score, the longer the patient is treated. Other studies also report a correlation between maxillofacial trauma scoring and length of stay, but in that study, the scoring system used was FISS; patients with severe FISS (> 3) received significantly longer treatment than patients with mild FISS (< 3).[15-18]

Furthermore, the results showed that patients with severe MFISS scores were at greater risk of death than patients with mild-moderate MFISS scores. No patients with mild and moderate MFISS scores died, but 3 of 7 (42.9%) patients with severe MFISS scores died in this study. Other studies have not found a link between the MFISS score and mortality, but there are several other scores that have a relationship with mortality in maxillofacial trauma patients. A NISS score > 41 (AUC = 0.92; 95% CI 0.89–0.99) is a strong indicator of mortality in maxillofacial trauma patients. Maxillofacial injuries are often associated with a risk of other serious injuries, particularly traumatic brain injury. Injury severity score (ISS) is a significant predictor of mortality in facial trauma patients.[19-22]

5. Conclusion

There was a difference in length of stay based on the MFISS score (p = 0.000). Patients with severe MFISS scores had a significantly longer mean length of stay than patients with mild and moderate MFISS scores. There was a significant relationship between MFISS score and mortality (p = 0.000). Patients with severe MFISS scores are at greater risk of death than patients with mild-moderate MFISS scores.

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