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Relationship of the Severity of Maxillofacial Trauma Based on Facial Injury Severity Scale (FISS) Against the Severity of Head Injury

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ABSTRACT

Introduction. Facial bone fractures can be accompanied by life-threatening complications such as head injuries. Maxillofacial trauma increases with time. The maxillofacial facial injury severity scale (FISS) scoring system was introduced to assess the patient's severity, prognosis, and outcome. Maxillofacial FISS has predictive value on the severity of head injuries.

Method. This research uses analytic observation method with cross sectional design approach. The population and sample were all maxillofacial trauma patients who had been treated at RSUP dr. Moehammad Hoesin Palembang from January-September 2018. Data is taken from secondary data, namely the patient's medical record.

Results. The incidence of maxillofacial trauma at RSUP dr. Moehammad Hoesin Palembang is 95 cases. The most cases occurred in the age group <30 years (62.1%). Gender male (85.3%), the scene outside the city (52.6%). There were 21 maxillofacial trauma patients undergoing neurosurgery (22.1%). There was no relationship between FISS and the severity of head injury ($p = 0.063$), there was a significant relationship between FISS and neurosurgery ($p = <0.001$).

Conclusion. There is a relationship between the severity of maxillofacial trauma based on the Facial Injury Severity Scale (FISS) score on the severity of the head injury.

Keywords: maxillofacial trauma, facial injury severity scale, head injury

Introduction

Facial bone fractures due to trauma are the most common events causing fragility of the facial bones and anatomically exposed facial positions, impaired function and aesthetics. Facial bone fractures can also be accompanied by a variety of other life threatening complications such as head injuries. [1-3]

Based on studies in several countries, the etiology of maxillofacial trauma events consists of many factors, including traffic accidents, work accidents, sports and even acts of violence. Traffic accidents are the most dominant case in developing countries while for developed industrial countries, violence is the most frequent case. For the cause of traffic accidents, men are frequently found than women.[1,7,8] The incidence of maxillofacial trauma continues to increase over time. In 2011, the number of visits of maxillofacial trauma sufferers at Brisbane Australia hospitals had increased by 28% compared to 2010.[2,5,7]

Diagnosis and management of maxillofacial trauma remains a challenge in the medical field, as hematoma and swelling can be masked by the underlying injury. Apart from facial fractures is not an emergency case, but this case can cause facial deformity, functional and permanent disability.[3,5,6]

The scoring system for maxillofacial trauma cases has emerged since 1970. Initially the scoring system was introduced to assess patient prgnostics and research measuring tools. Injury Severity Score (ISS), Trauma and Injury Severity Score (TRISS), New Injury Severity Score (NISS) are used for trauma in general, then begin to be introduced to certain cases such as Acute Physiology and Chronic Health Evaluation (APACHE), MMHS, Hand Injury Severity Score (HISS). Nearly these scores do not generally assess specific organ disability, where failure to assess and define the organ specifically will cause the organ's morbidity.

Therefore, the organ-specific scoring system was introduced, and even the scoring system can be used to measure the severity, as a prognostic and patient outcome. The maxillofacial trauma scoring system most widely used is the MFISS (Maxillofacial Injury Severity Score) and FISS (Facial Injury Severity Score). MFISS was introduced by Zhang in 2006, this score combines the history of injury to the functional parameters of the face. Zhang et al. stated that MFISS has a correlation between the severity of the costs and the length of patient care. FISS which was introduced by Bagheri in 2006, is simpler than the MFISS score but is not widely known and also has predictive value. FISS are more widely

reviewed than MFISS.4-6 In Indonesia, FISS were introduced by Ayu et al at RSCM as epidemiological data. Rampisela et al in Prof. Dr. dr. Kandou getting the FISS has a relationship with length of stay. Manalu et al at Adam Malik General Hospital performed a FISS score test for head injuries. [7-9]

Traumatic brain injury (TBI) is a leading cause of disability in all countries. Global traumatic brain injury incidence is estimated at 200 / 100,000 per year.[10] TBI in the United States accounts for 30% of total deaths. In 2013, data on 2.8 million head injuries with visitation, illness and death in the United States.[11] McGoldrick et al said that head injuries were found together with maxillofacial trauma of 60.6%. You N, et al. obtained severe maxillofacial fractures associated with severe head injuries of 16.2% - 43.7% .[12]

There have been many reports of a relationship of maxillofacial trauma and head injury. The location of facial bones close to the head increases the risk of head injury besides the more severe the maxillofacial injury, the higher the incidence of head injury.[13] Maxillofacial fractures are often associated with 47-56% of brain injuries. But some authors say that the maxillofacial bone functions as an energy absorber or is supposed to be transmitted to the brain. With the presence of a fracture, facial bones function as impact energy absorbers to reduce traumatic brain injury.[14-16] Patil SG et al, You N et al and Tanuhendrata et al get a significant relationship between maxillofacial trauma and FISS score on head injury.[17] However different results obtained by Ahmed T et al get data on maxillofacial fracture with head injury having low risk, Manalu EE et al & Bagheri did not get a significant relationship between FISS scores and head injuries. [18-20]

From various backgrounds and the differences between the results of research obtained between maxillofacial fractures and the incidence of head injuries, the researcher has the desire to conduct research on the severity of maxillofacial trauma to determine its relationship to the severity of head injuries.

Methods

This study was an observational analytic study with a cross sectional design using secondary data through the patient's medical record. The study sample was maxillofacial trauma patients who had been treated at the Emergency Department of the Mohammad Hoesin Hospital in Palembang. Inclusion criteria were all patients with maxillofacial trauma,

no manipulation had been done, aged over 14 years. Exclusion criteria are patients accompanied by other complications such as thoracic and abdominal injuries, patients known to suffer from brain abnormalities, patients known to suffer from bone malignancy, patients with facial bone malformations.

The FISS score is a score used to assess the severity of maxillofacial trauma based on abnormalities obtained on physical examination and support. The FISS score is calculated in the first 24 hours by calculating points based on the abnormality or fracture found, a score of <5 is declared not severe, whereas if > 5 is declared severe.

Data analysis includes descriptive analysis and hypothesis testing. In descriptive analysis, categorical scale data such as age, sex, trauma mechanism, domicile and education level are expressed as frequency and proportion distributions. Description of data using tables and diagrams. Bi-variate data analysis was performed by testing the FISS Scoring of the Glasgow Coma Scale (GCS) and the presence of intracranial lesions, which then displayed the relationship in table 2 x 2. The p value was considered significant if p <0.05 with 95% confidence intervals.

Results

Of a total of 95 maxillofacial trauma patients in the January to September 2018, obtained the most age of patients in the age range 0-30 years, as many as 59 (62.1%) and the average age was 28 ± 16.211 years. The most common type of maxillofacial injury is maxilla-zygomatica bone, which is 43 cases (45.3%). Maxillofacial trauma patients with the most sex are male, ie 81 patients (85.3%). The most etiology is due to traffic accidents, ie 85 patients (89.5%). Most of the accident sites were from outside the city of Palembang, namely 50 patients (52.6%). From a total of 95 maxillofacial trauma patients, there were 21 head injury surgery patients (22.1%).

In this study, the average FISS value was 3.93 ± 2.598. The highest FISS was FISS 1 & 2, which was 20%, with the highest FISS <5, ie 70 patients (73.684%). Most head injuries with GCS (Glasgow Coma Scale) were 67 patients (71.23%) minor head injuries.

Table 1. The characteristics of the maxillofacial trauma research subjects were based on FISS

Variable	Frequency	%
Age		
<30 years	59	62,1%
>30 years	36	37,9%
Sex		
-Men	81	85,3%
-Women	14	14,7%
Maxillofacial injury type		
-Maxilla, Zygomatica	43	45,3%
-Mandibula fracture	32	33,7%
-Le Fort Fracture	21	22,1%
-Orbital Roof/Rim	6	6,3%
-Nasal fracture	9	9,5%
-Frontal fracture	24	25,30%
Etiology		
- Traffic accident	85	89,5%
- Non traffic accident	10	10,5%
Scene		
- Palembang	45	47,4%
- Outside Palembang	50	52,6%
Neurosurgery Procedure		
- Yes	21	22,1%
- No	74	77,9%
FISS		
> 5	25	26,316%
< 5	70	73,684%
Brain Injury (GCS)		
Ringan	67	71,23%
Sedang	23	24,21%
Berat	5	5,26%

An alternative fisher exact test was performed between FISS and the severity / level of head injury, p value (0.063) which means FISS value does not have a significance value with the severity / level of head injury (α <0.05).

Table 2. Cross Tabulation of Head Injuries and FISS

		Head Injury level				
		GCS ≤ 13	GCS >13	Total	P value	CI
FISS	>5	11	14	25	0,063	0,938-6,399
	≤5	17	53	70		
Total		28	67	95		

Chi square test

Discussion

This study aims to determine the relationship of maxillofacial trauma based on FISS values with the severity of head injuries, the sample of this study was maxillofacial trauma patients from January s.d. September 2018. How to take samples through medical record data (secondary data), the minimum sample is 34 patients. As many as 95 maxillofacial trauma patients were obtained in this time frame, and all data were taken for the study sample.

The location of facial bones close to the head increases the risk of head injury and the more severe the maxillofacial injury, the higher the incidence of head injury.[21] Maxillofacial fractures are often associated with brain injury.[22] However, some authors say that the maxillofacial bone serves as an absorbent of impact energy or should passed on to the brain. With the presence of a fracture, facial bones function as impact energy absorbers to reduce traumatic brain injury. [23]

In this study, there will be an analysis of the relationship between the severity of maxillofacial trauma based on Facial Injury Severity Scale (FISS) on the severity of head injuries. In the patient characteristic data, the mean age of the patient was 28 ± 16,211 years. The most is male sex, that is 81 patients (85.3%). The results of this study are the same as the results of the research of Esses DFS et al, Bagheri SC et al, Aita TG et al, Lee K, Manalu et al namely the age of the decade of the 30s and male sex. According to Lee K, the age factor in the 30s was that this age was dominated by work in the active age. [24-27]

Facial fractures are rare in children, 1-15% of all facial fractures. This is because the frontal prominence and sinus pneumatization is incomplete. In children, the ratio of cranium: face 8: 1, in adults 2: 1. With this ratio, if children are traumatized directly it will directly affect the head, whereas in adults more often on the face.[28] Intracranial injuries occur more at a young age and decrease with increasing age due to craniofacial bone development, with the presence of sinus pneumatization which is formed perfectly in adulthood as a barrier to trauma energy. [29]

Whereas male gender is dominant than female, namely (4: 1) while Bagheri SC et al with a ratio (3: 1) because workers are dominated by men rather than women. Men have physical activity and are often involved in violence[30]. In terms of work, women work a lot at home, but if women's work is the same as men's work, then women can have this risk. [31] The most etiology is due to traffic accidents of 85 patients (89.5%), the results of this study are the same as the results of the study of Esses DFS, Bagheri SC, Aita TG, Lee K which is due to traffic accidents. According to Lee K, the etiological dominance of traffic accidents due to traffic accidents is predominantly in developing countries, vehicle users do not comply with traffic regulations, do not comply with the use of seat belts or compliance with helmet use. In this study, traffic accident dominates the causes of maxillofacial trauma because Indonesia is still a developing country. In our study, the use of driving safety and compliance with traffic regulations was not good.[33]

The most common type of maxillofacial fracture was Maxillo-Zygomatica or midface fracture in 43 patients (45.3%). Pappachan et al reported that frontal bone fractures most often cause direct trauma to the head. [16] Hohlrieder et al reported that Le Fort II, III, orbital, nasal, zygoma, and maxilla (midface) fractures have 2-4 times the risk of intracranial hemorrhage. While mandibular fractures do not have an increased risk of intracranial bleeding. [25] This study has the same results as Ahmed T et al and Esses DFS, which is the most zygomatico-maxillaris fracture, but results differed by Lee K and Aita TG studies dominated by mandibular fractures.[27] Kloss et al reported that zygoma and orbital fractures were the most frequent fractures with intracranial bleeding and facial fractures. Le Fort III fracture is a strong predictor of intracranial hemorrhage. Hung et al reported a low incidence of mandibular fracture to the level of consciousness. The highest incidence was from out of town, which was 50 patients (52.6%). These results are the same as the results

of research Batista AM et al, which is outside the city. According to Lee K, vehicle users outside the city do not have good traffic compliance as in the city, this may be the cause of more maxillofacial trauma dominated from outside the city. In this study, the average FISS score was 3.926 ± 2.598 and the highest FISS score was FISS 1 & 2 (20%; 20%), the highest FISS <5 was 70 patients (73.684%). Manalu get an average FISS value in the range of 3 (± 1.43), Rampisela with the most FISS values 1-3 (80.7%), Kesuma AD with a mean FISS value of 3.37 (± 1.9) of 24.7% , and Nasser F with a mean FISS value of 3.46 (± 3.594). In this study, head injuries with the GCS scale (Glasgow Coma Scale) were the most minor head injuries 67 patients (71.23%). The results of this study are the same as the Manalu study with 87.1% of minor head injuries.

From a total of 95 maxillofacial trauma patients, there were 21 head injury surgery patients (22.1%). While the results of research by Aita TG et al, obtained head injury surgery data as much as 7.9%. [32] Tests of the characteristics of research subjects (age range, etiology, and sex) were performed on the FISS value using the Fisher Exact Test, with a value of α (<0.05) considered significant. Gender (p 0.018), etiology (0.720). Chi Square Test for age and place of occurrence on the value of FISS with results (p 0.464 & p 0.645). Age, etiology, and the scene has no significant relationship to FISS (p> 0.05), while gender has a significant relationship to FISS, namely p: 0.018 (p <0.05). Research by Nasser F, found no relationship of etiology and sex on FISS. [33] The relationship between sex and FISS is based on the high male sex ratio which is higher than women, which is an average of 4: 1 in maxillofacial trauma, physical activity and a greater risk of violence. So indirectly, the high ratio of men to maxillofacial trauma also affects the relationship of male sex to the value of FISS.[24]

In the FISS score test with the severity / level of head injury with the Chi Square test, there was no significant correlation (p 0.063). According to Rahman and Chandrasala, the heavier the level of maxillofacial trauma, the lower the head trauma is because facial bones remove energy that can injure the head. However, Keenan et al stated that the energy received by the bone supporting the face that exceeds its ability, then the location of the midface and upperface bones close to the intracranial will cause damage to the anterior fossa, media fossa, and duramater, causing head injuries.[16-20]

This study is different from the results of research Patil SG et al, Anda N et al,

Tanuhendrata et al, Manalu et al, and Siber S, who get a research relationship between the maxillofacial trauma FISS score on head injuries. This result is also different from the results obtained by Nasser F, namely the FISS value of GCS has a relationship with (p = 0.041). [25-27]

In the FISS score test with head surgery with the Chi Square test, the contribution relationship is obtained (p <0.001) with the p value <0.05. FISS> 5 has a 18-fold longer predictive value, need for internal fixation, and multiprofession-related interventions FISS has more multitrauma faces and intracranial lesions that require surgical protection.[30,31] The results of the study by Nasser F have an important relationship between FISS scores with surgery. Research by Aita and colleagues, also stated that patients with a FISS score> 5 have an interest in performing surgery and care together with other subspecialists (p <0.001) [33]

Conclusion

There is no significant relationship between the severity of maxillofacial trauma based on the Facial Injury Severity Scale (FISS) and the level of head injury in patients at Dr. dr. Moehammad Hoesin Palembang.

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