Original Research Article

The characteristics and patterns of maxillofacial fractures at Mangusada general hospital, Badung-Bali

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ABSTRACT

Background: Trauma is one of the leading causes of death among people under 40 years of age and approximately 10 percent of the cases have been maxillofacial trauma. There was limited number of studies on maxillofacial fractures in Indonesia. Thus, this research attempted to investigate the characteristics and patterns of maxillofacial fractures at Mangusada General Hospital in Badung-Bali.

Methods: This research was a cross-sectional descriptive study which conducted at Mangusada General Hospital in the period of 1 January 2016 - 31 December 2017. The 127 samples selected using non-probability sampling. The inclusive criteria involved all maxillofacial trauma cases and the exclusive criteria focused on maxillofacial fractures that received intervention or with incomplete medical records. Each data was collected from the medical records and then analysed descriptively.

Results: From 127 samples, male dominated the sample on the gender-based criteria (70.1%) and the highest frequency of all age groups is 21-30 years old on the age group based criteria (23.6%). Maxillary fractures are the most occurring maxillofacial cases, which took up 33.6%. The main cause of the cases is traffic accidents (89.0%).

Conclusions: Maxillary fractures are the highest maxillofacial cases at Mangusada General Hospital on 1 January 2016 - 31 December 2016 period of time. The productive male age groups are the most affected groups due to traffic accidents.

Keywords: Characteristics, Fracture, Maxillofacial, Patterns, Trauma, Traffic accidents

INTRODUCTION

Trauma is one of the leading causes of death in the age group under 40 years old.[1] Approximately 10 percent of the cases in the ER have been maxillofacial trauma.[2] An epidemiology study claims that the higher prevalence of maxillofacial fractures is on male compared to their female counterparts, with the ratio of 3:1.[1,3-5] If arranged from the highest affected face areas, maxillofacial fractures take place on mandibular, zygomatic complex, maxilla, and alveolar process.[6,7]

In general, the main cause of maxillofacial fractures are classified into: traffic accidents, violence, falling off, and sports injury.[7,8] In developing countries, the most common cause of maxillofacial fractures is traffic accidents.[7] Based on the basic health research data in 2013, Indonesia's national trauma prevalence was 8.2% in which 40.6% of it was caused by traffic accidents. Moreover, based on the same data, Bali had the highest cases of trauma caused by traffic accidents, approximately 43.3%.[9]

Based on the basic health research, Mangusada General Hospital Badung is one of the top three hospitals with the highest frequencies of trauma cases in Bali.[9] In addition, based on the patient registration in the hospital, maxillofacial fractures are the most handled case monthly.

There are no specific research and data discussing the characteristics and patterns of maxillofacial fractures in Bali. Therefore, it sparked the interest of the researchers to investigate the characteristics and patterns of maxillofacial fractures in Bali. This study results can be useful not only to identify trauma burden, but also for further research on maxillofacial fractures in Indonesia.

METHODS

This study was a cross sectional descriptive study which conducted at Department of Plastic Reconstructive and Aesthetic Surgery, Mangusada General Hospital, Badung, Bali, Indonesia from 1 January 2016 to 31 December 2017. Population of this study were all of the maxillofacial fracture cases in Mangusada General Hospital in the period of 1 Januari 2016- 31 December 2017 (152 cases).

Inclusion criteria

The inclusive criteria involved all the maxillofacial fracture cases at Mangusada General Hospital in the period of 1 January 2016- 31 December 2017.

Exclusion criteria

The exclusive criteria focused on the maxillofacial fractures that received intervention or with incomplete medical records.

The subjects were selected using non-probability sampling by including all the maxillofacial fracture cases in Mangusada General Hospital. The cases had to fulfill inclusive and exclusive criteria in the period of 1 January 2016- 31 December 2017 (127 subjects). The instruments used in collecting the data were medical records and radiologic results to identify characteristics: age and gender; and the patterns of fractures: the fractured bones and the mechanism of injury.

Statistical analysis

The process of data analysis in this study: the data were collected, scored, tabulated and entered in Microsoft Excel 2013 and then analysed descriptively by univariate and bivariate analysis with SPSS Version 23.0.

RESULTS

The 127 samples of the research were obtained at Mangusada General Hospital in the period of 1 January 2016 - 31 December 2017. Characteristics wise, the samples were classified based on the gender and age groups.

Table 1: The characteristics of the samples based on gender.

Gender	Frequency	Percentage (%)
Male	89	70.1
Female	38	29.9
Total	127	100

As for the gender, the highest frequency was male with the number of 89 people (70.1%) and the frequency of female was only a quarter of the total cases (29.9%). This showed that the samples of the research were mainly male (Table 1).

Table 2: The characteristics of the samples based on age groups.

Age groups	Frequency	Percentage (%)
0-10	1	0.8
11-20	27	21.3
21-30	30	23.6
31-40	25	19.7
41-50	19	15.0
51-60	17	13.4
>60	8	6.3
Total	127	100

Regarding the age group samples, they were classified into 7 different groups, namely: 0-10 years old, 11-20 years old, 21-30 years old, 31-40 years old, 41-50 years old, 51-60 years old and more than 60 years old.[8] The highest frequency of cases was in the age group of 21 - 30 years old while the lowest was 0-10 years old as there was only one case recorded (0.8%) (Table 2).

Table 3: The patterns of maxillofacial fractures.

Fracture	Frequency	Percentage (%)
Maxilla	78	33.6
Zygoma	66	28.4
Mandibular	36	15.5
Orbital	26	11.2
Nasal	24	10.3
NOE	2	0.9
Total	232	100

The maxillofacial fractures in this research were categorized based on the areas of the fractures and the mechanism of injury. Based on the area, the fractures were divided into the specific affected facial bones. There was a case when a patient suffered from having more than one fractured bone. Thus, one area of the fracture was considered as a different fracture case. There were 233 cases that involved bone anatomy area with maxillary fracture as the most common case (33.6%)

whereas NOE (nasoethmoid complex) was the least common one (0.9%) (Table 3).

Regarding the mechanism of injury, 89.0 % of them were triggered by traffic accidents. On the other hand, only 11.0% were caused by falling (Table 4).

Table 4: The mechanism of injury.

Mechanism of injury (MOI)	Frequency	Percentage (%)
Traffic accidents	113	89.0
Falling	14	11.0
Total	127	100

Table 5: The distributions of maxillofacial fracture cases based on age groups, gender, and mechanism of injury.

Variables	Fractures						Total (%)
	Zygoma (%)	Maxilla (%)	Mandibula (%)	Nasal (%)	Orbital (%)	NOE (%)	
Age groups							
0-10	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	1 (100)
11-20	8 (17.4)	19 (41.3)	6 (13.0)	7 (15.2)	5 (11.0)	1 (2.1)	46 (100)
21-30	18 (28.6)	19 (30.2)	11 (17.5)	8 (12.7)	6 (9.5)	1 (1.5)	63 (100)
31-40	10 (27.0)	13 (35.1)	9 (24.3)	2 (5.4)	3 (8.2)	0 (0)	37 (100)
41-50	13 (35.1)	11 (29.7)	2 (5.4)	4 (10.8)	7 (19.0)	0 (0)	37 (100)
51-60	12 (40.0)	9 (30.0)	5 (16.6)	2 (6.7)	2 (6.7)	0 (0)	30 (100)
>60	5 (27.8)	7 (38.9)	2 (11.1)	1 (5.6)	3 (16.6)	0 (0)	18 (100)
Gender							
Male	49 (28.5)	57 (33.1)	27 (15.7)	19 (11.0)	18 (10.5)	2 (1.2)	172 (100)
Female	17 (28.3)	21 (35.0)	9 (15.0)	5 (8.4)	8 (13.3)	0 (0)	60 (100)
Mechanism of injury							
Traffic accident	56 (27.1)	70 (33.8)	34 (16.4)	20 (9.7)	25 (12.1)	2 (0.9)	207 (100)
Falling	10 (40.0)	8 (32.0)	2 (8.0)	4 (16.0)	1 (4.0)	0 (0)	25 (100)

Table 5 shows the distribution of maxillofacial fractures based on the age groups, gender, and mechanism of injury.

Based on the age group, almost all the age groups experienced maxillary fractures with the breakdown as follows: 41.3% in the age group of 11-20 years old, 30.2% in the age group of 21-30 years old, 35.1% in the age group of 31-40 years old, and 38.9% in the age group over 60 years old. However, in the age groups of 41-50 and 51-60 years old, they experienced zygoma fractures the most (35.1% and 40.0%).

Different result occurs in the age group 0-10 years old. The only case on this age group was mandibular fracture. This made the percentage hit an absolute number of 100%. Based on gender, maxillary fractures dominated both male and female with the percentage of 33.1% and 35.0% respectively.

Maxillofacial fractures based on the mechanism of injury, maxillary fracture was the highest proportion (33.8%) due to traffic accidents but in the cases of falling, zygoma fractures were the most common (40.0%). A different case of NOE fracture was only experienced by the samples experiencing traffic accidents (0.9%) (Table 5).

DISCUSSION

Maxillofacial region is a sensitive part of the body prone to trauma.[1] This trauma can affect both skeletal and soft tissue structures of the maxillofacial region.[3-5] Maxillofacial fractures generally happens to male young adults in the age of 30s and 40s due to active lifestyle and carelessness on the road.[10-13] The main causes of maxillofacial fractures world-wide are violence, traffic accidents, falling, and sports injury.[1,14] Among the contributors is traffic accident which is considered as the main reason for morbidity and mortality in developing countries.[8]

In this study, as for gender is considered, the male group took the lead of maxillofacial fractures (70.1%) than female (29.9%) with the ratio of 2:1. The result was in line with the previous studies where the male ration was higher than the female.[13-15] One of the related studies conducted in Nigeria showed the ratio of 3:1. Even in India a bigger ratio took place about 8.09:1 where 89% was male and only 11% was female.[15] That was due to the fact that men led more active lifestyle. Also, men were more careless and tended to ignore the traffic rules. The most common type for this was speeding.[3,6,10-16]

The majority of the maxillofacial cases were mostly experienced by the age groups of 20s to 40s, with the

highest patients were from the age group of 21-30 (23.6%). The result was in parallel with the previous studies claiming that this age group was the most productive and led more active lifestyle. Also, they had the inclination to do risky sports, drive carelessly, and commit themselves with violence. [6,17,18]

The rarest case was in the age group of 0-10 years old with the percentage of 0.8%. This is due to the tight supervision from the parents so that the trauma will not bound to happen.[6,17] The age group over 60s was in the second lowest for having the trauma due to limited outdoor activities.[17]

Traffic accidents were the main cause of maxillofacial fractures with the percentage of 89.0%. The result was again in line with the previous study results that claim traffic accidents as the main reason for maxillofacial fractures in developing countries, especially in Indonesia. In the contrary with developed countries, violence was the most common trigger for the trauma.[6,8] The high rate of traffic accidents was mainly spurred by poor access, lenient traffic rules and license, helmetless riders, and disobedience to the traffic rules.[17,19]

Based on the high rate of traffic accidents, from the anamnesis on some subjects, almost all subjects experienced traffic accidents while they were on the motorbikes. The similar case interestingly happened to the age group of 11-20 with the percentage of 21.3% as they were not supposed to have their driving licenses yet.

The patterns of the maxillofacial fractures based on involved anatomy parts based on the previous studies stated that the highly affected facial part was mandibula. This is due to the characteristics of it for being more mobile and a less bony support than the midfacial parts. The second most affected area was zygoma in the area of one-third of the facial half by the study of Baylan JM et al.[20] This is due to the structure of zygoma which is more prominent than the other facial bones and has multiple articulations with other facial bones making it vulnerable to fractures on impact.[3,11]

A totally different case happened in this study, where the highest prevalence of trauma was maxillary fractures (33.6%) followed by zygoma fractures (28.4%) and mandibula fractures (15.5%) respectively. The discrepancy between this study and the previous ones was because of the varied samples in the current study based on demography, social status, economy, and culture. Moreover, Grenbeg et al, asserted that mechanism of injury affects parts of face involved. If one has a traffic accident, so the one that is affected the most is maxillary bones. However, if it is caused by other events, the most affected one is likely to be mandibular, zygoma and nasal bones.[18] This was in line with the current study where patients experience maxillofacial fractures caused by traffic accidents, the maxillary bones were the most

affected. As for the falling cases, zygoma fractures took up the highest percentage (40.0%).

CONCLUSION

The highest prevalence of maxillofacial fractures was caused by traffic accidents. This was dominated by male in the age group of 21 - 30. The most frequent cases were maxillary fractures, followed by zygoma and mandibula fractures.

The limitation of this research was the incomplete medical records that made some samples were labelled exclusive. This also led to the limited number of samples. For that reason, it is high advisable for Mangusada General Hospital to do a better medical record filing management. Thus, more samples could be obtained more accurately to represent the whole population.

Due to the high rate of traffic accidents in this study, the government is hoped to provide a program to increase the awareness of safety riding on the road in Bali.

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