

The profiles of mandibular fracture patients in the emergency ward of the head and neck surgery division in Dr. Soetomo General Hospital Indonesia



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ABSTRACT

Background: Maxillofacial fracture is one of the most common injuries in trauma patients, especially in patients with traffic accident mechanisms. In this study, we aim to analyze the profile of patients with maxillofacial fractures, especially mandibular fractures, who came to tertiary hospitals.

Methods: Observational descriptive study to evaluate the profile of mandibular fracture patients who came to the Emergency Department of the Head and Neck Surgery Division of Dr. Soetomo General Hospital Surabaya in 2022. Data were analyzed using SPSS version 23.0 for Windows.

Results: Subjects were grouped according to age, sex, and mechanism of trauma. The most prevalent gender was male. The age group with the highest prevalence of accidents was 11-20 years (32.5%). Most maxillofacial traumas were caused by traffic accidents (92.5%). Associated trauma was found in 65% of subjects. Mandibular fractures tend to occur as part of multiple maxillofacial fractures compared to a single maxillofacial fracture, which is as much as 65%. The most common location of the fracture line in the mandible is the mandibular parasymphysis, which accounted for 33.3% of all samples. The most common mandibular fracture lines were 2 lines (47.5%).

Conclusion: Mandibular fractures are more likely to be part of multiple maxillofacial fractures than a single maxillofacial fracture and are often accompanied by concomitant trauma to other organs than a single trauma.

Keywords: Clinical Profile, Emergency, Mandibular Fracture, Maxillofacial Fracture.

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INTRODUCTION

Maxillofacial fractures are among the most common fractures encountered in all trauma incidents. Injuries in the maxillofacial region can range from soft tissue injuries such as abrasions, contusions, lacerations, and avulsions to fractures in facial bones. Injuries in the maxillofacial area can also occur as single injuries or in combination with injuries or trauma to other parts of the body or organs. Maxillofacial injuries rarely have serious or life-threatening consequences, except when they cause airway, breathing, and circulation disturbances. Various mechanisms of trauma are known to cause injuries in the maxillofacial area, with the highest cause of maxillofacial injuries being traffic accidents.¹

Prominence, anatomical shape, and the open position of the mandible make it more prone to trauma than other facial

bones, even though the mandible is the densest and strongest facial bone.² The mandible is divided into seven regions or anatomical areas: condylar process, coronoid process, ramus, angle, corpus, alveolus, and symphysis-para symphysis of the mandible.³ The weaker areas of the mandible are the condyle-subcondyle region, the angle, and the symphysis-parasymphysis region.

Although maxillofacial fractures share the same therapeutic principles as trauma to other body parts, they have unique characteristics, therapeutic modalities, and specific anatomical locations on the face. Thus, understanding the epidemiological features of maxillofacial fractures is essential for their prevention and treatment. Multiple factors, including population density, culture, and socioeconomic factors, can influence the incidence and causes of maxillofacial fractures.⁴ Epidemiological information

analysis is crucial for managing patients with maxillofacial fractures. According to Wusiman, most patients are male, accounting for 79.5%. The age distribution often occurs in young adults aged 21-50 years. This is because males have more activities and social involvement than females, leading to a higher risk of accidents. Other factors affecting this include traffic accidents and sports accidents.⁵

Data from Dr. Soetomo General Hospital indicated that in 2015-2016, before the COVID-19 pandemic, there were 61 cases of maxillofacial fractures in 2015, with male patients accounting for 70.5% and 68 cases in 2016 with 83.8% male patients.⁶ Meanwhile, a recent study in 2020 reported that 71 maxillofacial fracture patients came to the Emergency Department in the Head-Neck Surgery Division, 83.1% male and 16.9% female.⁷ Therefore, in this study, we aimed to

examine the profiles and the incidence of maxillofacial fractures, focusing on mandible fractures.

METHODS

Study design

This research is a descriptive observational cross-sectional study designed to provide a profile description of mandible fracture patients in the Head-Neck Surgery Division of Dr. Soetomo General Hospital, Surabaya, during the COVID-19 pandemic from January to December 2022. The study population comprises all mandible fracture patients who visited the Emergency Department of Dr. Soetomo General Hospital, Surabaya, in the Head-Neck Surgery Division, from January to December 2022. The research sample consists of all mandible fracture patients who visited the Emergency Department of Dr. Soetomo General Hospital, Surabaya, in the Head-Neck Surgery Division, from January to December 2022. The sampling technique employed is Total Sampling. Samples are consecutively collected based on inclusion and exclusion criteria implemented from January 2023 to March 2023. The inclusion criteria were patients with mandible fractures confirmed by radiological 3-dimensional CT-scan reconstruction of the head during the COVID-19 pandemic period from January to December 2022. We performed a 3-dimensional CT-scan reconstruction of the head examination to ensure the homogeneity of the subjects and to get clear details on the maxillofacial fractures of each subject. The exclusion criteria were maxillofacial trauma patients who registered as patients other than the Head-Neck Surgery Division, maxillofacial trauma patients from the Surgical Polyclinic of Dr. Soetomo General Hospital (Surabaya, Indonesia), and patients with no 3-dimensional CT-scan reconstruction of the head. As diagnostic modality.

Data Collection

Patient data on mandible fractures were collected using secondary data in the form of medical records from patients in the Emergency Department of Dr. Soetomo General Hospital, Surabaya, registered in the Head-Neck Surgery Division with maxillofacial fractures during the

Covid-19 pandemic period from January to December 2022. The collected data was then recorded, including age, gender, type of maxillofacial fracture, and associated trauma in mandible fracture patients. Data management was carried out using SPSS version 23.0 for Windows. The data will be subsequently described according to the research subjects.

Statistical analysis

Data management was carried out using SPSS version 23.0 for Windows. The data will be subsequently described according to the research subjects.

RESULTS

Study design

This study is an observational descriptive study with a cross-sectional research design. The study was conducted by collecting data from patients who visited the Emergency Department of the Head and Neck Surgery Division at RSUD Dr. Soetomo for 12 months, from January 2022 to December 2022. Patients who

met the inclusion and exclusion criteria were included in the study. Out of the total occurrences of maxillofacial fractures in the Emergency Department of the Head and Neck Surgery Division at RSUD Dr. Soetomo over 12 months from January 2022 to December 2022, a total of 71 patients were identified, and 40 research subjects who met the inclusion criteria were included in the study.

Characteristics of search subjects

Out of 40 patients with mandibular fractures, a proportion of 32 patients (80.0%) were male, and 8 individuals (20.0%) were female. The age distribution ranged from the second to the seventh decade, with the highest number in the second decade (ages 21-30). The highest count in the second decade was 13 patients (32.5%). We collected data on the mechanism of injury when the patients came to the emergency department. The most common mechanism of trauma was due to traffic accidents, with 37 patients (92.5%), while the least common were

Table 1. Distribution of subjects' characteristics

Demographic data	Number	Percentages (%)
Gender		
Male	32	80.00
Female	8	20.00
Age		
<20	13	32.50
21-30	9	22.50
31-40	4	10.00
41-50	6	15.00
51-60	6	15.00
>60	2	5.00
Trauma		
Traffic Accident	37	92.50
Violence	1	2.50
Fall From Height	0	0.00
Sport	0	0.00
Occupational	1	2.50
Household	1	2.50

Table 2. Description of maxillofacial fractures locations

Maxillofacial Fractures Locations	Number	Percentages (%)
Maxilla	40	29.60
Mandible	40	29.60
Nasal	9	6.70
NOE	12	8.90
Zygoma	23	17.00
Orbita	11	8.20

Table 3. Distribution of mandibular fracture characteristics

Mandibular fracture characteristic	Number	Percentages (%)
Associated injury involvement	14	35.00
With associated injury	26	65.00
Without associated injury		
Maxillofacial fracture		
Mandible fracture only	14	35.00
Mandible with other maxillofacial fracture	26	65.00
Number of fracture lines		
1 line	13	32.50
2 line	19	47.50
3 line	8	20.00

Table 4. Distribution of associated injury types

Associated Injury Types	Number	Percentages (%)
Intracranial	17	44.70
Thorax	2	5.30
Abdomen	2	5.30
Pelvis	0	0.00
Extremity	17	44.70
Spinal	0	0.00

Table 5. Location of fracture lines in the mandible

Location of fracture lines in the mandible	Number	Percentages (%)
Condyle	13	17.30
Coronoid Process	0	0.00
Ramus	1	1.30
Angulus	5	6.70
Corpus	10	13.40
Symphysis	12	16.00
Parasymphysis	25	33.30
Dentoalveolar	9	12.00

work-related accidents, violence, and domestic accidents, each accounting for 1 patient (2.5%). The traffic accident in this study was defined as a situation when a vehicle collides with another vehicle, pedestrian, animal, road debris, or other moving or stationary obstruction. There were no patients with trauma caused by sports or falling from a height. The distribution of patients' characteristics is shown in [Table 1](#).

Maxillofacial fracture characteristics

During the period from January 2022 to December 2022, a total of 71 cases of maxillofacial fractures were identified. Out of these 71 patients, 40 cases (56.3%) were mandibular fractures, either as single or multiple maxillofacial fractures, and the remaining 31 cases (43.7%) were maxillofacial fractures without mandibular involvement, either as single or numerous maxillofacial fractures. The overall

distribution of types of maxillofacial fractures can be seen in [Table 2](#). The most prevalent distribution of maxillofacial fractures was found in the mandibular and maxillary regions, each with 40 cases (29.6%). Additionally, fractures located in the nasal region accounted for 9 cases (6.7%), the NOE region for 12 cases (8.9%), the zygomatic region for 23 cases (17%), and the orbital region for 11 cases (8.2%).

Description of mandibular fracture characteristics

We analyzed the characteristics of mandibular fracture based on the associated injury, mandible fracture with/without other maxillofacial fracture occurrence, and the number of fracture lines. Out of 40 patients with mandibular fractures, single mandibular fractures were observed in 14 patients (35.0%). The occurrence of mandibular fractures

as part of multiple maxillofacial fractures was found in 26 patients (65.0%). The most common distribution of the number of fracture lines in mandibular fracture cases was found to be 2 fracture lines in 19 cases (47.5%), followed by 1 fracture line in 13 cases (32.5%), and 3 fracture lines in 8 cases (20%). We also observed that 14 patients had maxillofacial injury without associated injury involvement (35.0%), while 26 patients (65.0%) had maxillofacial injury with other related injuries. The characteristics are shown in [Table 3](#).

Associated injury of patients with mandibular fracture

The characteristics of mandibular fracture are shown in [Table 4](#). The occurrence of mandibular fractures without associated injuries was found in 14 patients (35.0%), while subjects with associated injuries were 26 patients (65.0%). The distribution of associated injuries showed the highest incidence of intracranial injuries and extremity injuries, each with 17 patients (44.7%). Meanwhile, chest and abdominal injuries each accounted for 2 patients (5.3%) as associated injuries, and there were no cases of mandibular fractures with pelvic and spinal injuries (0%).

The location of fracture lines in the mandible fracture

The distribution of mandibular fracture lines overall can be seen in [Table 5](#). The most prevalent distribution of mandibular fracture lines was found in the parasymphyseal region with 25 cases (33.3%), followed by the condyle region with 13 cases (17.3%), symphysis region with 12 cases (16%), corpus region with 10 cases (13.4%), dentoalveolar region with 9 cases (12%), angular region with 5 cases (6.7%), ramus region with 1 case (1.3%). No fracture lines were observed in the coronoid process region (0%).

DISCUSSION

This research was conducted to investigate the profiles of patients with maxillofacial fractures, specifically in the Emergency Department of Dr. Soetomo General Hospital (Surabaya, Indonesia) in 2022. From studies conducted abroad, it has been reported that there was a decrease

in the number of maxillofacial fracture cases from 285 cases in 2019 to 106 cases in 2020. Although this study did not mention community activity restrictions as in Indonesia, considering the pandemic period starting from March 2020 and the surges of the first wave of COVID-19 in December 2020 and the second wave in May 2020, a significant decrease in the trend of maxillofacial fracture patient visits was observed.⁸

Based on gender, we found that most of the research subjects were male, and the prevalence was four times higher than the prevalence in females. The possible reason for this result might be that males tend to be more active than females, and males are also more commonly involved in traffic accidents in Indonesia. Therefore, it is logical that the prevalence of maxillofacial fracture was higher in males than in Indonesia.

Regarding age distribution, the highest cases occurred in the second decade (11-20 years), followed by the third decade (21-30 years). A similar study in 2015 reported that the highest incidence of mandible fractures occurred in the age range of 18-40 years, accounting for 45.7%-59.2% of cases.⁷ This data indicates that the most frequent occurrences of mandible fractures are in the productive age range, where high mobility and a higher risk of trauma contribute to the high incidence in this age group.

In terms of the mechanism of trauma, the most common mechanism was traffic accidents, where more than ninety percent of all subjects were involved in traffic accidents. This finding is in concordance with the results of a previous study conducted in 2022, where traffic accidents were the most common cause of maxillofacial fracture, with a prevalence of as high as 85.1%.⁹

In the distribution of fracture locations, the mandible was the most frequent, with 40 patients (47.6%) for single maxillofacial fractures and the maxilla, with 20 patients (76.9%) for multiple maxillofacial fractures. These findings are in line with a study conducted in 2021, where the most common locations were the mandible, with 10 patients (47.6%) for single fractures and the maxilla, with 20 patients (76.9%) for multiple fractures. This difference

could be attributed to variations in the mechanisms of trauma.⁹ This result also showed that other facial bones are very likely to occur in the case of maxillofacial fractures. Therefore, clinicians should be more careful when assessing patients with facial trauma in the emergency room. Multiple facial bone fractures may also lead to another emergency, such as airway obstruction, which may lead to high mortality if not treated accordingly.

Regarding the presence of associated trauma with mandible fractures, it was found that 26 patients (65.0%) had associated trauma, while 14 patients (35.0%) did not. Another study showed similar results, where associated trauma was present in 37 patients (78.7%), indicating that most maxillofacial fracture cases were not single isolated traumas but often involved associated trauma to other organ systems.¹⁰

Based on the pattern and location of associated trauma, the most common locations were intracranial and extremity trauma, each accounting for 17 patients (44.7%). This result is consistent with a previous study that reported 28 patients (34.1%) with maxillofacial fractures accompanied by intracranial trauma. This indicates that intracranial trauma is more frequently associated with maxillofacial fracture cases seen in the Emergency Department of the Head and Neck Surgery Division of Dr. Soetomo General Hospital.⁹ Most subjects in this study have associated injury in the extremity, either the upper extremity or lower extremity. Traffic accidents might cause this condition, the most common cause of injury in this study. Traffic accidents or motor vehicle collisions are common in developing countries like Indonesia. Urban movement and industrial development in developing countries lead to a higher prevalence of traffic accidents compared to the risk in developed countries.¹⁰⁻¹² Therefore, it is understandable that limb injury, either upper limb or lower limb injury, were highly associated in most motor vehicle accident, and these kinds of injury became the most commonly associated injury in maxillofacial traumas.

Regarding fracture lines on the mandible bone, the most frequent location was the parasymphyseal region, followed

by the condylar region, the symphysis. According to a study by Anyanechi CE et al., mandible fractures resulting from trauma are influenced by factors such as the degree of force, the side of the trauma impact, the position of the jaw, whether open or closed during trauma, and the presence of teeth on the side that experienced trauma. Fractures can occur on the side that undergoes direct trauma or on the distant or contralateral side due to indirect trauma. If the trauma is not severe, fractures will appear on the side that comes into direct contact with the trauma.^{13,14}

There are limitations in this study. First, this study was conducted in a single tertiary hospital. Therefore, the findings of this study may not be adequate to adequately describe the circumstances facing the entirety of the population in Indonesia. However, the outcomes of this study could be regarded as preliminary data in Indonesia. Second, the number of subjects included in this research was not large. Additional research with more participants or a study conducted across multiple centers nationwide may be required to obtain more detailed results.

CONCLUSION

Mandibular fractures are more likely to be part of multiple maxillofacial fractures than a single maxillofacial fracture. They are often accompanied by concomitant trauma to other organs than a single trauma.

CONFLICTS OF INTEREST

No competing interests were declared.

ETHICAL CONSIDERATION

Ethical approval was obtained from the Ethical Committee of Dr. Soetomo General Hospital, Surabaya, Indonesia (Ref No: 1347/LOE/301.4.2/VI/2023; Date: June 21st, 2023).

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AUTHOR CONTRIBUTION

All authors contributed equally to this study.

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