

The characteristics of mandibular fractures in Dr. Hasan Sadikin General Hospital, Bandung, Indonesia



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ABSTRACT

Background: Mandibular fractures may lead to several complications, including infection, nonunion, malunion, and temporomandibular joint ankylosis. The incidence of mandibular fractures is quite common in maxillofacial trauma. The characteristics of mandible fractures could be different among countries concerning the condition of the population. The etiological differences depend on age, demographic patterns of a country, environmental conditions, social conditions, socioeconomic status and cultural configuration. This study aimed to perceive the characteristic of mandibular fractures among patients attending The Oral and Maxillofacial Surgery Department in Dr. Hasan Sadikin General Hospital during 2017-2020.

Methods: This study was a retrospective descriptive study. Samples included medical records of patients with mandibular fractures attending The Oral and Maxillofacial Surgery Department in Dr. Hasan Sadikin General Hospital during January 2017- December 2020. Samples were chosen using inclusion and exclusion criteria. The characteristics of mandibular fracture were based on gender, fracture etiology, mandibular fracture location, and treatment.

Results: This study presented that the incidence of mandibular fracture rate was higher in males with 284 cases (82.08%) than females with 62 cases (17.92%) with a ratio of 4.5 to 1. Based on age, mandibular fractures were often found in the adult age group (20-60 years old) with 215 cases (62.14%). The most common etiology was road traffic accidents, with 287 cases (82.95%). Parasymphysis region was the most common site of mandibular fracture with 94 cases (25.26%). Most treatments performed were open reduction internal fixation with 199 cases (57.51%).

Conclusion: Mandibular fracture characteristics vary considerably among different study populations depending on demographic characteristics and socioeconomic status. The most frequent mandibular fracture site in Dr. Hasan Sadikin General Hospital Bandung was the parasymphysis region in a young adult age group.

Keywords: fractures; mandibular; parasymphysis; reduction; symphysis.

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INTRODUCTION

Mandibular bone is an essential component of the facial bones anatomically and functionally. The mandible plays a fundamental role in digestive and speech function, as well as facial aesthetics.¹ It is a 'V' shaped bone that articulates with the temporal bone in the temporomandibular joint.² The mandibular bone is divided into horizontal and vertical segments. The horizontal part of the mandibular bone is composed of two main parts, the basal bone and the alveolar bone. The symphysis, parasymphysis, corpus and alveolar processes are the components that make up the horizontal segment of the mandibular bone. The vertical segment

of the mandible consists of the angulus, ramus, condyle process and coronoid process.^{3,4,5}

The mandible is the bone with the second most frequent fracture after the nasal bone in the maxillofacial region.⁶ Mandibular fracture is the discontinuity of the mandibular bone.⁷ Mandibular fracture can lead to airway destabilization, malocclusion, joint dysfunction, pain, infection, and paresthesia.⁷ Several literatures have mentioned that mandibular fracture can be classified based on fracture type, fracture etiology, fracture conditions based on fracture fragment reduction, anatomical location, interfragmentary conditions, and the presence or absence

of teeth.^{8,9} Classifications of mandibular fractures based on anatomical location are⁷ (a) symphysis; (b) parasymphysis; (c) mandibular corpus; (d) angulus; (e) condyles; (f) coronoid. The symphysis is the area between the roots of the central incisors along the alveolar process towards the inferior border of the mandibular bone in a vertical orientation. The parasymphysis is the area between the vertical median line and the canines extending from the alveolar process to the inferior border of the mandibular bone. The orientation of the fracture line can be linear or oblique.^{3,7} The bilateral tug from digastricus and suprahyoid muscle might pull the fracture fragments inferiorly,

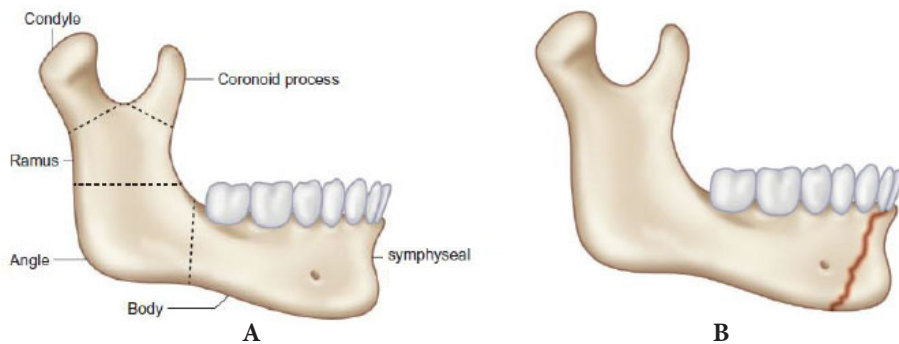


Figure 1. A. Classifications of mandibular fractures based on the anatomical location of the fracture B. Parasympysis fracture line.⁵

leading to acute airway obstruction.⁹ The mandibular corpus is the area of the mandibular bone that is confined by the anterior border of the masseter muscle and the canines. Fractures of the mandibular body are often found in conjunction with another fracture line on the contralateral side or fracture of the ramus or condyle on the ipsilateral side. The mandibular angulus is defined as a triangular-shaped area based on the anterior border of the masseter muscle with the posterosuperior attachment usually located distal to the third molar. The ramus is the area between the posterior masseter borders to the level of sigmoid notch. Schematically depicted in Figure 1.

Yu Lin, et al. conducted a study on the pattern of mandibular fractures that occurred in the city of Taiwan in October 2010 to September 2013. The most common fractures were fractures of the symphysis and parasymphysis regions (38.9%), followed by condyle fractures (26%), angulus fractures (14.3%), mandibular corpus (14.3%), and ramus (6.6%), with the most common etiology due to motor vehicle accidents (82%), with the distribution of male:female sex is 9:5, with most frequent age of 21-30 years (31.3%).¹⁰ In a study conducted by Ragupathy and Pasupathy on incidence, etiology, and pattern of mandibular fractures in the Pondicherry, India in January 2011 to December 2014, it was revealed that the most frequent fractures were parasymphysis fractures (37.7%), angulus fracture (19.8%), and condyle fracture (19.8%), with the most frequent etiology due to traffic accidents (56.5%) and the male:female distribution is 16:1, with

the largest incidence at the age range of 21-30 years (37.7%).⁶ Astuti et al. mentioned that the results of their research on analysis and trends of mandibular fractures at the Arifin Achmad Regional Hospital in Riau Province, which were carried out in January 2011 to December 2013, revealed that the incidence rate of mandibular fractures based on anatomical location was as follows: No information (42.10%), alveolar fracture (5.40%), angulus fracture (9.20%), condyle (7.10%), symphysis/parasymphysis fracture (26.70%), corpus fracture (7.90%), ramus fracture (1.70%), with male to female distribution of 3:1, and the largest incidence was at the age of between 18-40 years (59%).¹¹

The etiology of mandibular fractures varies and changes over time and is related to the culture of the people. The etiological differences depend on age, demographic patterns of a country, environmental conditions, social conditions, socioeconomic status and cultural configuration.^{8,12,13} In remote areas or developing countries, the general etiology of mandibular trauma is motor vehicle accidents, whereas for urban areas in developing countries, the most common etiology of mandibular trauma is interpersonal violence and gunshot wounds or falls from a high place.^{5,8,14}

Diagnosis of mandibular fractures can be done by using panoramic radiographs, posteroanterior Caldwell radiographs, lateral Oblique radiographs, occlusal mandibular radiographs, periapical radiographs, Reverse Towne's radiographs, and computed tomography (CT).^{3,5} Management of mandibular fractures can be performed by closed reduction or open

reduction.^{9,15}

Various epidemiological studies on the incidence, etiology, and pattern of mandibular fractures have shown varying results concerning the condition of the population in an area. Therefore it is necessary to study the characteristics of mandibular fracture cases at Dr. Hasan Sadikin General Hospital, Bandung. This study was conducted to determine the characteristics of mandibular fracture cases in the Oral and Maxillofacial Surgery Department of Dr. Hasan Sadikin General Hospital. Epidemiological studies regarding the characteristics of mandibular fractures are expected to become a reference for preventive measures of the public health system in the city of Bandung.

METHODS

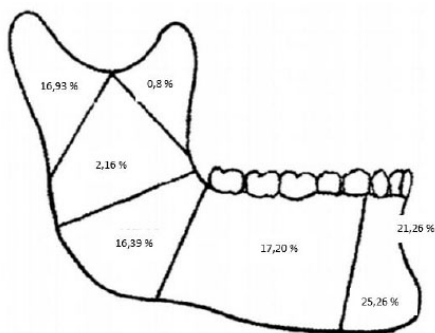
This research is a retrospective descriptive study. The sample consisted of medical records of patients with mandibular fractures in the Oral and Maxillofacial Surgery Department, Dr. Hasan Sadikin General Hospital, from January 2017 to December 2020. The sample selection was based on inclusion and exclusion criteria. The inclusion criteria were hospitalized patient with mandibular fractures in the Oral and Maxillofacial Surgery Department, Dr. Hasan Sadikin General Hospital, from January 2017 to December 2020 who were received the treatment of mandibular fractures. Medical record with incomplete information of patient identification, trauma etiology, no panoramic roentgen, and refused the treatment of mandibular fractures were excluded. Characteristics recorded included age, gender, etiology of trauma, fracture location, and fracture treatment. The collected data were then tabulated and analyzed descriptively using SPSS version 17 software for windows. This study is permitted by the Ethical Commission of Faculty of Dentistry, Universitas Padjadjaran, with letter number No.LB.02.01/X.6.5/19/2021.

RESULTS

Based on the results, cases of mandibular fractures at the Dr. Hasan Sadikin General Hospital from January 2017 to December

Table 1. Distribution table of the mandibular fracture case characteristics in Dr. Hasan Sadikin General Hospital for the period January 2017-December 2020.

No	Characteristics	Frequency	Percentage (%)	
1	Age (year)	0-1	1	0.29
		2-10	20	5.78
		11-19	96	27.74
		20-60	215	62.14
		>60	14	4.05
2	Gender	Male	284	82.08
		Female	62	17.92
3	Etiology	Traffic accident	287	82.95
		Abuse	13	3.76
		Pathologic	2	0.58
		Condition	32	9.25
		Fall		
		Workplace accident	7	2.02
4	Anatomical Location	Condyle	63	16.93
		Coronoid	3	0.8
		Corpus	64	17.20
		Ramus	8	2.16
		Angulus	61	16.39
		Parasymphysis	94	25.26
		Symphysis	79	21.26
5	Treatment	Open reduction	199	57.51
		Close reduction	147	42.49

**Figure 2.** Schematic of Mandibular Fracture Distribution based on anatomical location.

2020 were 346 patients with 372 cases of mandibular fracture. The distribution of data based on gender showed 284 male patients (82.08%) and 62 female patients (17.92%). The ratio of male to female patients was 4.5:1. (Table 1).

The etiology of mandibular fracture at Dr. Hasan Sadikin General Hospital mainly was due to traffic accidents with 287 cases (82.95%) and falls (9.25%). The age group with the most cases of mandibular fracture was in the adult age range of 20-

60 years, with 215 cases (62.14%) (Table 2). It was found that in 101 cases (35.19%) the patients did not wear a helmet while riding, and was most frequently at the age range of adolescents (11-19 years), consisted of 58 people (57.42%).

The most common type of mandibular fracture at Dr. Hasan Sadikin General Hospital during the period of January 2017 to December 2020 was parasymphysis fractures in 94 cases (25.27%) followed by symphysis fractures (21.26%), corpus (17.20%), condyles (16.93%), angulus (16.39%), ramus (2.16%), and coronoid (0.8%) (Table 1, Figure 2).

Management of mandibular fractures at Dr. Hasan Sadikin General Hospital was performed with the open reduction in 199 patients (57.51%) and closed reduction in 147 patients (42.49%).

DISCUSSION

The incidence and characteristics of mandibular fracture cases are closely related to the population's geographical, cultural, and socioeconomic conditions in a region. The increase in socioeconomic

conditions will improve the quality of life, affecting the etiological factors of the trauma. This study indicates that the distribution of mandibular fracture incidence is higher in male patients than in female patients. This result is following the statements of several previous pieces of literature.^{6,10,13,16} The high incidence of mandibular fractures in male patients indicates natural male aggressiveness and refers to the cultural fact that women do more activities at home than physical activities outside of home.¹³

This study stated that the incidence of mandibular fracture in patients aged 20-60 years was 215 cases (62.14%). This result also follows Jung et al.'s statement, who stated that the highest incidence of mandibular fractures was found in patients aged 20-29 years.¹⁶ This range is the productive age where most of the population in this age group has physical activity outside the home.¹³

The biggest etiology of mandibular fracture cases in this study was traffic accidents. This result follows Mohammed et al., which stated significant differences in the etiology of mandibular fractures in developing and developed countries.¹⁴ The etiology of mandibular fracture in developing countries is dominated by traffic accidents, while in developed countries, the mandibular fracture is primarily violent.^{10,11,14,17} This condition reflects the different socioeconomic, behavior, infrastructure and regulations of a country.¹⁴ Poor road conditions may cause a high incidence of mandibular fracture due to traffic accidents, low public awareness of safe driving and low public compliance with traffic regulations. This condition can be seen in the results of this study, which states that of the 287 cases of mandibular fractures caused by traffic accidents, 101 cases (35.19%) of riders did not wear a helmet, and was primarily recorded in patients with the age range of adolescents (11-19 years), consisted of 58 people (57.42%).

Based on the research data, the mandibular fracture most often occurs in the parasymphysis region, consisting of 94 cases (25.26%). This result follows Sultana et al.'s statement, who revealed that the protruding nature of the mandible in the facial region makes it vulnerable

to trauma, especially the parasymphysis region.¹² Various studies also stated that the anatomical location of mandibular fracture is influenced by several other factors, such as injury mechanism, the direction of trauma, the magnitude of trauma, and characteristics of the mandibular bone of each person.^{6,8,10,17}

The data of this study stated that the most mandibular fracture treatments conducted in Dr. Hasan Sadikin General Hospital in the period January 2017 - December 2020 was the open reduction, which was given to 199 patients (57.51%). Anggayanti et al. (2020) stated that maxillofacial trauma treatment with open reduction might improve patients' quality of life.¹⁸ Arviana et al. (2015) in their study stated that in Dr. Hasan Sadikin General Hospital, maxillofacial trauma patients could be treated with the open reduction despite the price being relatively expensive due to the support from the JAMKESMAS, ASKES, and GAKIN Card insurance system which has now changed to BPJS and the Indonesia Health Card.¹⁹

CONCLUSION

This study found that mandibular fractures were more common in male patients with a ratio of 4.5:1; the highest age range is adults (20-60 years); the adolescent age range (11-19 years) is the age group that has the lowest level of awareness in wearing a helmet. The most common etiology of mandibular fractures is traffic accidents. The most common type of mandibular fracture is a parasymphysis fracture, and the most common treatment is open reduction.

DISCLOSURE

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Conflict of Interests

The author states that he has no conflict of interest regarding the publication of this research.

Author Contribution

All authors are equally contributed to this study from the conception, design, defining intellectual content, literature research, data acquisition and analysis before reporting this study.

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