A Retrospective Study of condylar fracture in Dr. Hasan Sadikin Central General Hospital, Bandung (2020-2024)

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ABSTRACT

Background: *Condylar fractures are among the most common mandibular fractures resulting from maxillofacial trauma, primarily caused by traffic accidents, occupational injuries, and sports activities. These fractures can lead to complications such as pain, mandibular deviation, malocclusion, and pathological changes in the temporomandibular joint. This study aims to identify the characteristics of condylar fractures in the Oral Surgery Department of Dr. Hasan Sadikin General Hospital Bandung from 2020 to 2024.*
Method: *A retrospective analysis was conducted using medical records of maxillofacial trauma patients. A total of 111 cases were analyzed based on gender, age, occupation, education level, fracture classification, trauma etiology, and management.*
Result: *Results showed that the majority of patients were male (72%), aged 13–24 years (48,6%), students (51,3%), and had a bachelor's degree as the educational background (49,6%). The AO classification predominantly involved condylar neck fractures (52,3%), with traffic accidents being the leading cause (51,4%). The most common management method was open reduction and interdental wiring (76,6%).*
Conclusion: *These findings highlight the need for targeted road safety education, strict traffic regulations, and improved preventive measures to reduce the incidence of such injuries. Therefore, an effort must be made to improve the completeness of medical record data in order to support more accurate analysis and the implementation of future research involving more comprehensive data collection.*

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INTRODUCTION

The mandible is the largest and strongest bone of the craniofacial structure. The upward projection of the mandibular corpus is called the ramus, which ends anteriorly as the coronoid process and posteriorly as the condyle.[1,2] The mandible is the second most commonly fractured bone after the nasal bone.[2] Traffic accidents, physical violence, falls, sports, and weapon trauma all constitute potential causes of mandibular fractures.[3,4] According to research conducted in India, Saluja et al. (2022) found that traffic accidents (62.8%), sports injuries (18.2%), assaults (9.8%), falls (5.5%), and tooth extractions (3.7%) were the leading causes of mandibular fractures in the 20-30 age group.[5] Mandibular fractures are common in maxillofacial trauma. Condylar fractures are the second most common presentation, accounting for 24-41%.[6]

Condylar fractures are discontinuity of the bone, either partially or completely, in the condylar region, with a higher proportion in children compared to adults and a male-to-female ratio of 3:1. Additionally, 84% of these fractures are unilateral condylar fractures. Condylar fractures are classified according to the intra- and extra-capsular anatomical position as well as the degree of dislocation of the articular head. Condylar fracture complications may include discomfort, limited mandibular opening, muscle spasms, mandibular deviation, malocclusion, pathological alterations in the temporomandibular joint, osteonecrosis, facial asymmetry, and ankylosis.[7,8] According to research in Germany, Maurer et al. (2023) showed that the highest incidence of condylar fractures occurred in males (66.3%) and females (33.7%) within the age range of 19-53 years, dominated by type II fractures (50.1%) Spiessl and Scroll classification. The most common anatomical location of fractures occurred in the bilateral condyles (37.4%).[9] Based on Khan's (2019) research in Pakistan, the distribution of condylar fractures by gender predominantly occurs in males (79.20%), with the most common etiology being traffic accidents (38.3%). The most frequent classification of condylar fracture types is unilateral fractures (65%), and the most common fracture location is the condylar head (58.60%).[10]

Management of condylar fractures can be done conservatively (closed reduction) and surgically (open reduction). The conservative approach involves intermaxillary fixation with wires, while the surgical approach involves using plates to provide fixation to the fragments, thereby restoring mandibular joint function.[2,11] The advantages of closed reduction are minimally invasive, minimal complications, no need for hospitalization, and this procedure can be performed using local anesthesia.[11] Closed reduction in cases of condylar fractures is still a choice due to considerations of the difficulty level of surgical access to the condylar area and the difficulty of fragment repositioning. Complications in closed reduction that often occur include chronic pain, facial asymmetry, with a higher incidence of malocclusion.[7] Open reduction or surgical reduction can benefit the surgeon due to maximum visibility in the placement of plates and screws, including in pediatric fracture.[12] However, complications often occur in the form of extraoral scars, facial nerve lesions, and condylar segment necrosis due to periosteal blood supply deficiency during surgical dissection.[7,11] Based on the research conducted by Khan in Pakistan in 2019, the management of condylar fractures was mostly done with closed reduction (54.2%) compared to surgery.[10] Meanwhile, the research conducted by Saluja in India (2022) found that the most common treatment for condylar fractures was open reduction/surgery (64.8%) compared to closed reduction.[5]

Dr. Hasan Sadikin Central General Hospital in Bandung serves as a referral center for hospitals in West Java region, including maxillofacial trauma. This study aimed to provide information on the characteristics of condylar fracture at Dr. Hasan Sadikin Central General Hospital's Oral Surgery Department between 2020-2024.

RESEARCH METHOD

This research is a retrospective study with a descriptive-analytical method using medical record data of maxillofacial trauma patients who received treatment at the Oral Surgery Department of RSUP Dr. Hasan Sadikin Bandung through the emergency unit, outpatient, and inpatient services.

The population consists of all patients diagnosed with condylar fractures at the Oral and Maxillofacial Surgery Department of Dr. Hasan Sadikin Central General Hospital Bandung through the emergency unit, outpatient, and inpatient services recorded in the medical records. The research sample consists of medical records of patients diagnosed clinically and radiologically with condylar fractures at the Oral Surgery Department of Dr. Hasan Sadikin Central General Hospital, Bandung. Data collection was conducted using the total sampling method. This study included all patient medical records from the Department of Oral and Maxillofacial Surgery at Dr. Hasan Sadikin Central General Hospital, Bandung, who received treatment through the emergency, outpatient, or inpatient services between January 2020 and December 2024. Patients were eligible for inclusion if they were diagnosed with maxillofacial trauma and confirmed, both clinically and radiologically, to have sustained condylar fractures, whether unilateral or bilateral in nature.

Exclusion criteria consisted of medical records that were incomplete or lacked essential clinical or radiographic information required for analysis. Additionally, patients with maxillofacial trauma diagnosed solely with fractures in regions other than the mandibular condyle without associated condylar involvement were excluded from the study.

Fracture classification was performed using the AO CMF classification system for mandibular condylar fractures, which divides the fractures into three anatomical levels: condylar head, condylar neck, and condylar base (coronoid process region). The AO CMF Classification is internationally recognized and widely applied for mandibular trauma and has been validated for its reproducibility and utility in surgical planning and outcome evaluation.[13] Classification was based on orthopantomogram (OPG) and cross-validated by two oral and maxillofacial surgeons to ensure diagnostic consistency.

RESULTS

The research was conducted at Dr. Hasan Sadikin Central General Hospital in Bandung, from September to December 2024. The data obtained comprised 111 cases. Data were obtained from secondary data through patient medical records with a diagnosis of condylar fracture who were hospitalized at Dr. Hasan Sadikin General Hospital Bandung during January 2020 to December 2024 to determine the characteristics based on age, gender, occupation, education degree, classification of condylar fractures, etiology, and case management (Table 1).

Table 1. Patients demographic distribution

Characteristic	Frequency (n=111)	Percentage (%)
Gender		
Male	80	72%
Female	31	28%
Age interval **(years)**		
0-12	5	4,5%

13-24	54	48,6%
25-36	21	18,9%
37-48	12	10,8%
>48	19	17,2%
Occupation		
Unemployed	2	0,9%
Student	57	51,3%
Housewife	14	12,6%
Enterpreneur	28	25,2%
Laborer	4	4,5%
Retiree	6	5,4%
Educational background		
Not yet schooled	4	3,6%
Elementary School	15	13,5%
Junior High School	16	14,4%
Senior High School	21	18,9%
Bachelor degree	55	49,6%

Among the 111 cases, the majority of patients were males (72%), with the most affected age group being 13–24 years (48.6%), followed by 25–36 years (18.9%). Based on the occupation, there are 2 patients (0,9%) who are unemployed/not yet working, 57 students (51,3%), 14 housewives (21,6%), 28 entrepreneurs (25,2%), 4 laborers (4,5%), and 6 retirees (5,4%).Students represented over half of the cases (51.3%), and a large proportion held a bachelor's degree (49.6%).

Table 2. Case distribution based on fracture classification, etiology, and their management

Cases	Frequency (n=111)	Percentage (%)
Fracture classification		
Condylar head	17	15,3%
Condylar neck	58	52,3%
Coronoid process basis	36	32,4%
Etiology		
Traffic accident	57	51,4%
Sports injury	21	18,9%
Occupational injury	33	29,7%
Management		
Close reduction	11	9,9%
Condylectomy	15	13,5%
Open reduction	85	76,6%

As described in Table 2, based on the AO classification of condylar fractures, there were 17 cases (15,3%) of condylar head fractures, 58 cases (52,3%) of condylar neck fractures, and 36 cases (32,4%) of coronoid process basis fracture. The most common etiology of trauma occurred in traffic accidents with 57 cases (51,4%), followed by occupational injury with 33 cases (29,7%), and sports injury with 21 cases (18,9%). The management of condylar fracture with the close reduction was found in 11 cases (9,9%), condylectomy in 15 cases (13,5%), and the most common treatment was open reduction in 85 cases (76,6)%.

DISCUSSION

This study focuses on the demographic characteristics of condylar fracture patients in the Inpatient Installation of Dr. Hasan Sadikin Central General Hospital from January 2020 to December 2024, using a descriptive method that examines patient medical records. This study aims to examine the demographic characteristics of condylar fracture patients based on gender, age, occupation, education, classification of condylar fractures, etiology, and management.

1. Gender

The percentage of patients based on gender shows that the highest numbers are found in males compared to females. This likely occurs as men are more likely to engage in outdoor activities, driving, sports, and alcohol addiction, all of which can lead to accidents and maxillofacial injuries.[14] Additionally, societal and cultural expectations may contribute to behavioral differences that influence exposure to trauma. Studies by Segura-Palleres et al. (2022) noted that male dominance in trauma statistics may also reflect occupational roles and lifestyle choices that expose them to higher physical risk.[15]

2. Age

The most affected age group in this study was 13–24 years (48.6%), which corresponds to a transitional period marked by increased independence, mobility, and engagement in high-risk activities. In Indonesia, this age group frequently begins operating motorcycles at an early age, often without proper safety training or adherence to traffic regulations. The rising incidence of maxillofacial fractures among this productive age group is closely linked to the use of motor vehicles, particularly two-wheelers, without adequate protective measures such as helmets or seat belts. These behavioral patterns significantly increase the risk and severity of facial trauma in this demographic. The age of 13-24 years is a productive age and it is difficult to enforce discipline in the use of protective gear while driving.[15]

3. Occupation

Students represented the highest proportion of patients in this study, followed by entrepreneurs, housewives, and retirees. The high incidence of trauma among students may be attributed not only to early and often unsupervised use of motorized vehicles, but also to behavioral factors such as lack of driving experience, low risk perception, and poor adherence to safety protocols. Additionally, this age group is frequently involved in outdoor activities, sports, and high social mobility, all of which may increase their exposure to injury. In contrast, entrepreneurs and laborers may face occupational hazards related to physical work or commuting, while housewives and retirees may be more prone to domestic accidents or falls.[14,15]

4. Educational background

The distribution of patients based on educational background revealed that the majority held a bachelor's degree, followed by those with senior high school, junior high school, elementary school, and no formal

education. This pattern appears to reflect a consistent trend when correlated with age and occupation, particularly among students and young adults. Individuals in this category are typically engaged in active daily routines, including commuting, academic-related travel, and participation in social or recreational activities. These increased levels of mobility and exposure raise the likelihood of trauma-related incidents.[15]

5. Fracture classification

The AO Foundation (2010) classifies condylar fractures as follows (Figure 1):

a. The condylar head, the reference line of the condylar head runs perpendicular to the posterior ramus below the lateral point of the condylar head.
b. Condylar neck, the sigmoid notch line that passes through the deepest point of the sigmoid notch is perpendicular to the ramus line and extends superiorly to the head of the condyle.
c. Condylar process basis, the sigmoid notch line that passes through the deepest point of the sigmoid notch is perpendicular to the ramus line and extends inferiorly.[16]

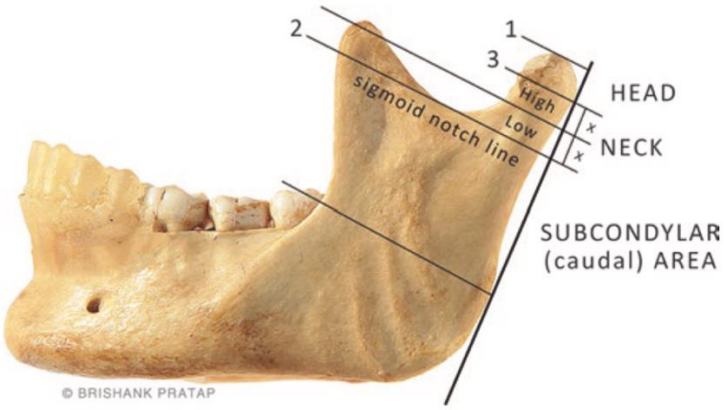

Figure 1. Condylar fracture based on AO foundation classification[16]

The highest number found in condylar neck fractures, followed by coronoid process basis fracture, and the lowest in head condylar fractures. Condylar fractures can be influenced by trauma mechanisms in the maxillofacial region. Different mechanisms affecting the symphysis and corpus of the mandible can lead to different fracture patterns.[17] Fractures of the condyle most often affect the neck of the condyle because vertical external forces will be distributed along the mandible and impact the weakest and thinnest part of the mandible, which is the condylar neck. Whether the mandible is subjected to horizontal pressure and stress, it can result in bilateral fractures or contralateral fractures on one side of the condyle, which usually leads to fractures at the coronoid process basis.[18]

6. Etiology

Traffic accidents account for the majority of condylar fractures in patients, followed by occupational injury, and sports injury is the least common cause. The tendencies of productive age patients to be active using motor vehicles, along with the tendency of individuals in big cities to ride motorcycles to avoid traffic jams, is a cause of traffic accidents, which contribute to the incidence of condylar fractures.[15]

8. Management

The majority of patients with condylar fractures are treated by open reduction and interdental wiring (ORIF), followed by condylectomy and closed reduction (CR). ORIF is more commonly used to manage condylar fractures than CR because unilateral or bilateral condylar neck fractures can be stabilized and decreased more

effectively with ORIF. Close Reduction may be more effective in cases of condylar fractures in children snce children are in a period of optimal bone growth so that with CR growth in the condylar area is not disturbed by the presence of a plate device. CR can correct the patient's occlusion, returning the condylar position in a normal position and aiding in recovery in the condylar area.[19]

Study Limitations

This study is subject to several limitations. As a retrospective analysis, it relies heavily on the availability and completeness of medical records, which introduces the potential for information bias due to incomplete or inconsistent documentation. Additionally, differences in the quality of radiographic imaging and the subjectivity of interpretation may have affected the accuracy of fracture classification, even though dual examiner verification was employed to minimize this risk. Furthermore, important clinical parameters such as pain severity, mandibular mobility, and long-term functional outcomes could not be assessed due to a lack of follow-up data. To address these limitations, future research should adopt a prospective design with standardized data collection protocols and comprehensive clinical outcome evaluation.

CONCLUSION

This study on condylar fractures at Dr. Hasan Sadikin Central General Hospital reveals that most cases occur in males aged 13–24, primarily due to traffic accidents caused by risky behaviors like poor helmet use and high motorcycle reliance in urban areas. Students are the most affected group, reflecting their frequent vehicle use and limited driving experience. The fractures commonly involve the condylar neck, the weakest part of the mandible, and are primarily treated with open reduction and internal fixation (ORIF) in adults, while closed reduction is favored in children to preserve bone growth. These findings highlight the need for targeted road safety education, stricter traffic regulations, and improved preventive measures to reduce the incidence of such injuries. Therefore, an effort must be made to improve the completeness of medical record data in order to support more accurate analysis and the implementation of future research involving more comprehensive data collection.

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