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PREVALENCE OF MANDIBULAR THIRD MOLAR STATUS IN PATIENTS WITH CONDYLE AND CORONOID FRACTURES: A RETROSPECTIVE STUDY

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ABSTRACT

Background: Mandibular fractures, particularly those involving the condyle and coronoid processes, are common in facial trauma. While the status of mandibular third molars has been linked to fracture susceptibility, its role in condylar and coronoid fractures remains unclear. This study aimed to assess the prevalence of mandibular third molar status in patients with condyle and coronoid fractures and explore any potential associations. **Methods:** A retrospective analysis was conducted at Tagore Dental College and Hospital, Chennai, from January 2019 to July 2024. Sixty-two patients with condylar fractures (59 patients), coronoid fractures (2 patients), and combined condylar and coronoid fractures (1 patient) were included. Data on demographic details, fracture site, and third molar status were collected from their clinical records and Orthopantomographs (OPG). The mandibular third molars were categorized as completely erupted, partially erupted, impacted, or missing. Impacted molars were further classified using Pell and Gregory and Winter's classifications. **Results:** The majority of patients with condylar fractures had completely erupted third molars (49.9%), followed by partially erupted (16.1%), vertically impacted (14.5%), mesioangular impacted (3.2%), and missing (11.3%) molars. Coronoid fractures were less associated with third molars, with one case each of completely erupted and vertically impacted molars. The most common positional classification for impacted molars in condyle fractures was Pell and Gregory Class I, Position A. Coronoid fractures were primarily associated with Class I, Position B.

KEYWORD:- Mandibular fractures, Condyle, Coronoid, Mandibular third molars, Orthopantomograph.

INTRODUCTION

Mandible the strongest bone of face, plays a critical role in facial aesthetics, mastication and speech. Due to its prominence, special mobility, and location, the mandible is common target for injury, any fractures in this region can significantly affect a patient's quality of life.[1] The mandibular fractures accounts for 40-65% of facial fractures.[2] Among the various fractures that can occur, condylar and coronoid fractures of the mandible are relatively common, often resulting from trauma, accidents, or other external forces. Condylar fractures, in particular, can lead to malocclusion, impaired jaw movement, and facial asymmetry, while coronoid fractures, though less frequent, can also disrupt mandibular function. The condylar fractures are about 45% and coronoid fractures are about 2%.[3]

One important anatomical structure that is constantly examined in patients with mandibular fractures is the third molar. The status of the mandibular third molar, may have implications for the management of mandibular fractures, based on whether it is impacted, erupted, or absent.[4] Tevepaugh and Dodson study reveals that mandibular fracture patients with mandibular third molars have a 3.8 times higher risk of mandibular fractures than patients without mandibular third molars.[14] Impaction of the third molar could complicate fracture reduction, while its removal might be considered during surgical interventions.[5]

In oral and maxillofacial imaging, the Orthopantomograph (OPG), a panoramic radiograph, is a commonly used diagnostic tool. It can be very helpful in assessing patients who have suffered mandibular fractures and offers a thorough image of the mandible, including the condition of the third molars. Research on the incidence of mandibular third molar status, particularly in individuals with condylar and coronoid fractures, is scarce despite its widespread use.[6] The condylar area is susceptible to head-on impacting trauma to the chin when third molars are present.[7]

Understanding the relationship between third molar status and mandibular fractures could provide valuable insights for clinicians in developing treatment plans and managing complications. Previous studies have suggested that the presence or absence of third molars could influence the fracture patterns and healing process, but these findings are still inconclusive. Therefore, this study aims to assess the prevalence of mandibular third molar status in patients with condyle and coronoid fractures using orthopantomographic analysis, with the goal of identifying any correlations that may exist between the two.

METHODOLOGY

The Ethical clearance obtained from the Institute Ethics Committee of Tagore Dental College and Hospital(No:IEC/ TDCH/84/2024) with Code number: 08022402 on 18/06/2024.

Study design

A retrospective study of condyle and coronoid fractures of the mandible was carried out at the Department of Oral and Maxillofacial Surgery of Tagore Dental College and Hospital, Chennai, from January 2019 to July 2024.

Target population and Sample size

Patients with condyle and coronoid fractures of mandible were recruited from the Department of Oral and Maxillofacial Surgery, Tagore Dental College and Hospital. Patient's consent for utilizing their records for any research purposes were obtained before the surgical procedures.

Sample size of the study was found to be 62 which was calculated using EPI Info Software with the prevalence rate of 15%.[8]

Inclusion criteria

Participants were included in the study if they met all of the following criteria:

- Aged 18 years or older.
- Patients with condylar fracture.
- Patients with coronoid fracture.
- Patients with combination of condyle and coronoid fracture
- Complete root formation of mandibular third molars.

Exclusion criteria

Participants were excluded in the study if they met all of the following criteria:

- Age of the patient less than 18.
- Incomplete root formation of mandibular third molars.
- Patients with mandibular fractures other than fractures involving condyle and coronoid.

Collection of data

A complete analysis of the clinical records and the radio-graphical data of the patients was done. Orthopantomograph of the 62 patients with condyle and coronoid fractures of the mandible presenting to the Department of Oral Medicine and Radiology, Tagore Dental College and Hospital was collected. Orthopantomograph of the patients were retrieved using the medical ID number.

From each patient, data on demographic information and details of fracture site like condyle, coronoid and combination of condyle and coronoid fracture, and the status of mandibular third molars including completely erupted, partially erupted, impaction and missing were collected.

The main predictor variable was whether third molars were present or absent, along with their positional status if they were present. The classification provided by Pell and Gregory was used to determine the positional status. According to the space present for the eruption of the third molar between the distal section of the second molar and the anterior border of the ascending ramus, the horizontal position was divided into three categories: it was classified as Class I when adequate space was available, Class II if half of the crown was obscured by the ramus and Class III if the tooth was entirely situated within the ramus. The vertical position indicating the depth component was categorized into three: Position A if the peak of the third molar crown was at the same height as the occlusal plane of the second molar, Position B if it resided between the occlusal plane and the cementoenamel junction of the second molar and Position C if the tooth was located underneath the cervical line of the second molar.[9] Winter's classification was employed to evaluate the angulation of third molars as mesioangular, vertical, horizontal and distoangular.[10]

All the collected information were tabulated under following headings age and gender distribution of the patient, fracture site and prevalence of the status of mandibular third molars of patients with condyle and coronoid fractures.

Statistical analysis

The collected data were analyzed with IBM SPSS Statistics for Windows, version 24.0; SPSS Science, Chicago, IL, USA. For describing the data, descriptive

statistics, frequency analysis and percentage analysis were used.

RESULTS

Sixty two patients were identified with condyle and coronoid fracture of mandible in the Department of Oral and Maxillofacial Surgery between January 2019 to July 2024. Table 1 presents the age and gender distribution of the patients with condyle and coronoid fractures. Majority of the condyle and coronoid fracture patients were of the 20-29 (41.9%) years age group followed by 30-39 (24.2%) years group. A male preponderance was observed 45 (73%) in this study [Figure 1].

Table 1: Age and Gender distribution of condyle and coronoid fractures of the mandible.

Age group (years)	Male (n=45), n (%)	Female (n=17), n (%)	Overall (n=62), n (%)
18-19	2 (4.4)	2 (11.8)	4 (6.5)
20-29	19 (42.2)	7 (41.2)	26 (41.9)
30-39	13 (28.9)	2 (11.8	15 (24.2)
40-49	8 (17.8)	5 (29.4)	13 (20.9)
50-59	3 (6.7)	1 (5.8)	4 ()

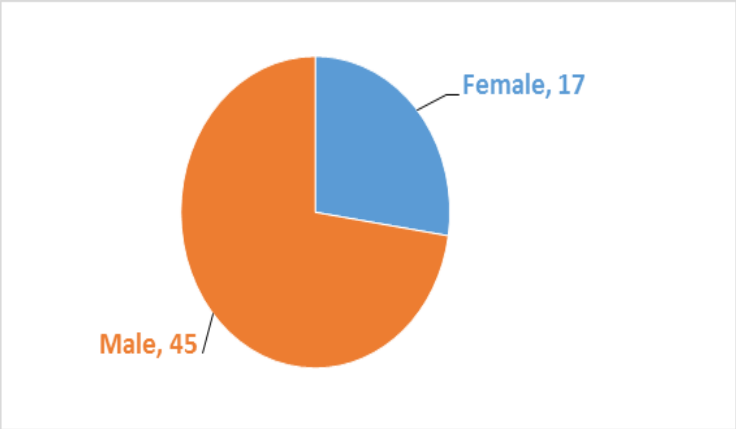

Figure 1: Gender distribution of condyle and coronoid fractures.

Table 2 presents the fracture site. Out of 62 collected samples, 59 (95%) were condyle fractures, 2 (3%) were coronoid fractures and 1(2%) were combination of condyle and coronoid fractures. In this study, condyle fractures of the mandible was found to be the most common fracture site [Figure 2].

Table 2: Fracture site.

Fracture site	No. of patients (n)	Percentage (%)
Condyle	59	95
Coronoid	2	3
Combination	1	2

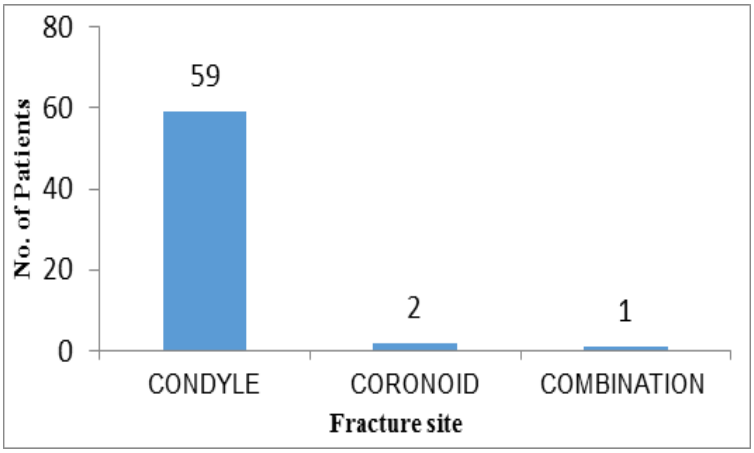

Figure 2: Fracture site.

Table 3 provides a comprehensive overview of the prevalence of mandibular third molars status in patients diagnosed with condylar fractures. The largest group, comprising 31 patients (49.9%), had completely erupted third molars. This high percentage suggests that a significant number of patients with condylar fractures retain their third molars. The partially erupted third molars were present in 10 (16.1%), the vertically impacted were 9 (14.5%), the mesioangular impacted were 2 (3.2%) and the missing third molars were 7 (11.3%).

Table 3: Third molar status in patients with condyle fractures.

Condylar fractures (Mandibular third molar status)	No. of Patients (n)	Percentage(%)
Completely erupted	31	49.9
Partially erupted	10	16.1
Vertical impaction	9	14.5
Mesioangular impaction	2	3.2
Missing	7	11.3

Table 4 provides a comprehensive overview of the prevalence of mandibular third molars status in patients diagnosed with coronoid fractures. In patients with coronoid fractures the completely erupted third molars were 1 (1.5%) and the vertically impacted were 1 (1.5%).

Table 4: Third molar status in patients with coronoid fractures.

Coronoid fractures (Mandibular third molar status)	No. of Patients (n)	Percentage (%)
Completely erupted	1	1.5
Vertical impaction	1	1.5

Table 5 provides a comprehensive overview of the prevalence of mandibular third molar status in patients with combination of condyle and coronoid fractures. In combination the third molar status was completely erupted 1 (2%).

Table 5: Third molar status in patients with condyle and coronoid fractures.

Combination of condyle and coronoid fractures (Mandibular third molar status)	No. of Patients (n)	Percentage (%)
Completely erupted	1	2

Table 6 presents the position of impacted mandibular third molars in condyle and coronoid fractures using Pell and Gregory's classification. High frequency was observed for condylar fractures in Pell and Gregory Class I Position A; for coronoid fractures Class I Position A and Class I Position B and for combination of condylar and coronoid fractures in Class I Position A.

Table 6: Position of impacted mandibular third molars (Pell and Gregory) in condyle, coronoid and combination of condyle and coronoid fractures.

Pell and Gregory's Class	Fractures			Total (%)
	Condyle (%)	Coronoid (%)	Combination (%)	
I A	31(52.5)	1(50)	1(100)	33(53.2)
I B	8(13.6)	1(50)	0	9(14.5)
II A	7(11.9)	0	0	7(11.3)
II B	6(10.2)	0	0	6(9.7)
NIL	7(11.9)	0	0	7(11.3)
Total	59(100%)	2(100%)	1(100%)	62(100)

DISCUSSION

The purpose of the study is to investigate the prevalence of mandibular third molar status in patients with condyle and coronoid fractures of the mandible. The findings from this retrospective study provide valuable insights into the relationship between the presence of mandibular third molars and the occurrence of fractures in the condylar and coronoid processes. Mandibular fractures, especially involving the condyle and coronoid, are common traumatic injuries often associated with road traffic accidents, physical assault and falls, with the role of mandibular third molars in these fractures remaining a topic of interest and debate in oral and maxillofacial surgery.

Age and Gender Distribution

The study revealed that the majority of patients with condylar and coronoid fractures were in the 20-29 years age group (41.9%), with a male preponderance (73%). These findings are consistent with previous studies that

report a higher incidence of facial fractures among younger individuals, particularly males. According to Zaki et al. (2017), facial fractures are more common in males aged 20-30 years, likely due to higher engagement in physical activities, motor vehicle accidents and interpersonal violence.[11] Additionally, the higher rate of fractures in younger adults aligns with the literature suggesting that peak trauma incidence occurs in this age group due to the increased vulnerability of the facial skeleton to external forces, especially in individuals with active lifestyles.

Fracture site distribution

The study found that condylar fractures were the most common, comprising 95% of the cases, while coronoid fractures were much rarer, accounting for only 3% of the cases. This distribution is consistent with the anatomical structure and biomechanics of the mandible. The condyle, as the most mobile part of the mandible, is more susceptible to trauma, particularly in cases of blunt force impact or motor vehicle accidents.[12] The coronoid process, on the other hand, is less frequently fractured as it is situated farther from the site of impact and is primarily involved in muscular attachments rather than direct trauma. Research by Démir et al. (2019) also highlighted the higher frequency of condylar fractures compared to coronoid fractures, with condylar fractures representing approximately 45% of all mandibular fractures.[13]

Mandibular Third Molar Status in Condylar and Coronoid Fractures

A key finding of this study was the significant prevalence of erupted and impacted third molars in patients with condylar fractures. Nearly 50% of the patients with condylar fractures had fully erupted third molars, while 16.1% had partially erupted third molars and 14.5% had vertically impacted third molars. These results are consistent with earlier studies that have observed a correlation between the presence of third molars and mandibular fractures. Tevepaugh and Dodson (2010) demonstrated that individuals with mandibular third molars were at a 3.8-fold higher risk of sustaining mandibular fractures than those without third molars.[14] The study by Pietrzak et al. (2018) also suggested that impacted third molars may alter fracture patterns by influencing the direction and magnitude of applied trauma.[15]

The impact of third molars in condylar fractures can be explained by their anatomical location and the mechanical forces involved during trauma. The mandibular third molar is situated in close proximity to the condylar region, and when impacted or erupted, it may serve as a point of increased vulnerability during direct trauma, such as a blow to the chin.[16]

On the other hand, coronoid fractures in this study showed a very low prevalence of third molars, with only one patient having a vertically impacted molar and one having a completely erupted molar. The coronoid process, being farther from the third molar and primarily involved in muscular attachments, is less likely to be influenced by its presence and this may explain the relatively low correlation between third molar status and coronoid fractures. This observation is in line with the findings of Song et al. (2017), who also noted that third molars have less of an impact on coronoid fractures due to the different biomechanics of the injury.[17]

Position of impacted third molars

The study further explored the positional status of impacted third molars using Pell and Gregory's classification. A significant proportion of condylar fractures were associated with third molars in Class I, Position A, which indicates sufficient space for eruption. This is the most favorable position for third molars and may reflect that patients in this group have the structural capacity for normal eruption, but the molars still influence the fracture pattern. For coronoid fractures, a notable proportion was observed in Class I, Position B, where the tooth is partially obscured by the ramus, suggesting that even less favorable positions might play a role in fracture dynamics. The presence of third molars in Class II (limited space) was also observed in a minority of cases, suggesting that space constraints may exacerbate trauma in these patients.[18]

The relationship between the position of third molars and mandibular fractures has been discussed in several studies. For instance, Winter (2007) noted that horizontally impacted third molars are more likely to be associated with trauma and fractures of the mandible.[18] While the present study found that mesioangular impaction were less common, the general trend towards Class I positions, especially Position A, suggests that while eruption space might not directly correlate with fracture occurrence, the alignment and angulation of the molars could influence the direction and severity of fractures.

Limitations

While this study provides valuable insights into the relationship between third molar status and mandibular fractures, it has certain limitations. The retrospective nature of the study limits the ability to establish a clear cause-and-effect relationship between third molar status and fracture occurrence. Additionally, the sample size of 62 patients, though adequate for initial analysis, is relatively small and a larger cohort may offer more statistically significant results. Furthermore, the study excluded patients with fractures other than condylar and coronoid fractures, which limits the generalizability of the findings to other types of mandibular fractures.

CONCLUSION

This study highlights the potential role of mandibular third molars in the occurrence of condylar and coronoid fractures. While the presence of third molars, especially erupted and impacted molars, was more prevalent in

condylar fractures, their role in coronoid fractures appears minimal. This study findings suggest that the condylar fractures were associated with third molars when they were completely erupted and Class I, Position A in case of impaction and coronoid fractures were observed in Class I, Position B. Further studies are to be done to conclude the association of coronoid fractures with mandibular third molar status since only fewer studies were already available.

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