

ANALYSIS OF DIFFERENT PATTERNS OF CONDYLAR FRACTURES IN MAXILLOFACIAL TRAUMA

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ABSTRACT

The present study aimed to retrospectively evaluate the epidemiologic characteristics of the prevalence and types of condylar fractures of the mandible. Details of a total of 21 cases of mandibular condyle fracture were collected out of a total of 86,000 cases from databases of saveetha dental college which were undergone in the period time from June 2019 to March 2020. All these were checked for pattern or type of fracture based on Lindahl's Classification. Results of this study showed that out of 21 cases of mandibular condyle fracture 19% showed no displacement, 28.6% showed deviation of the condylar segment, 19% showed displacement of fracture segment, 9.5% showed deviation with dislocation and 23.85% showed displacement with dislocation. Also, the study showed a male predilection for the condylar fractures of the mandible. In this study within the limitations, there is significant male predilection and more number of deviation type of condylar fractures of the mandible.

KEYWORDS: Condyle fractures; Maxillofacial trauma; Mandibular fractures; Types of condyle fractures.

INTRODUCTION

Maxillofacial trauma has been investigated worldwide because it affects a significant percentage of trauma patients. (Iida *et al.*, 2001) Traumatic injury has been identified as the leading cause of reduced productivity, accounting for the loss of more working years than heart disease and cancer combined. (Gassner *et al.*, 2003)(Marimuthu *et al.*, 2018)(Patil *et al.*, 2017) Among facial bones fractures, mandible fracture has the highest incidence next to nasal bone fracture and condyle fracture most frequently occurs in mandible fracture. Condyle fracture accounts for approximately 10%- 40% of cases. The reasons for a high incidence of mandibular condyle fracture is attributable to the binding of mandibular ramus with high stiffness and mandibular condyle head with low stiffness. (Fridrich, Pena-Velasco and Olson, 1992; Gassner *et al.*, 2003)

This is generally caused by an indirect force that is delivered to the mandibular condyle head. The most common external causative factor is physical trauma, and car accidents, violence, industrial hazard, fall, sports, and gunshot wounds are also included in the external causative factors. Internal causative factors include osteomyelitis, benign or malignant tumor, and muscular spasm during electric shock treatment.

As mandibular fracture may cause disorders that are hard to recover aesthetically and functionally, appropriate treatment is required to reconstruct the shape and function of un-injured status. To do this, accurate diagnosis, appropriate reduction and rigid fixation, and complication prevention are required. In particular, the mandibular condylar fracture may cause long term complications such as mandibular

growth and functional disorders, and chronic temporomandibular joint (TMJ) complication, more caution should be given.

MATERIALS AND METHODS

Case records of a total of 86000 patients between June 2019 and March 2020 were collected and analyzed from patient records, out of which a total of 21 cases of mandibular condylar fracture cases who had undergone treatment for the same were identified and included in the present study. All these cases were checked with the details of the patient's radiographs for the classification of the type of fracture. All the details were entered into SPSS software to calculate the incidence of type/pattern of condylar fracture.

All the necessary data was collected such as patient details, radiographs, operative notes.

Inclusion criteria :

- Patients with all condyle fractures of the mandible.
- Patients with condyle fractures who were treated by ORIF and/or Closed reduction.

Exclusion criteria :

- All Fractures of mandible except condylar fractures
- Patients with maxillofacial trauma but no condyle fracture.

All the fractures of condyle were followed by the classification of Lindahl.

RESULTS AND DISCUSSION

Results of this study showed that out of a total of 21 cases of condyle fractures of mandible 19.05% showed no displacement, 28.57% showed deviation of the condylar segment, 19.05% showed displacement of fracture segment, 9.52% showed deviation with dislocation and 23.81% showed displacement with dislocation (figure 1) with males showing 23.81% of cases with deviation, 19.05% of cases with no displacement, displacement and displacement-dislocation and 9.52% of cases with deviation-dislocation and females showing 4.76% of cases with deviation and displacement-dislocation each respectively (figure 2). Study also shows more number of cases in the age group of 21-30 with 23.81% of cases with displacement-dislocation (yellow), 14.29% of cases with no displacement (blue), and 4.76% of cases with deviation, displacement and deviation-dislocation each (green, grey and violet) respectively (figure 3).

Results also show the mean age of 33.1 ± 12.6 years for condyle fracture cases and also male predilection with 90.5% of cases of condyle fracture of the mandible.

Dentistry comprises practices related to the oral cavity. Oral diseases are a major problem among the general population and there are various procedures carried out to prevent and treat them. Oral health has a direct impact on general health patterns as it helps to talk, eat, and feel confident. (Patturaja and Pradeep, 2016) Surgical alterations in the position of the bony facial skeleton will inevitably affect the soft tissues. (Vijayakumar Jain *et al.*, 2019)

In the entire spectrum of maxillofacial trauma, no other topic has created so much debate and controversies than that of mandibular condyle fractures. Though a small non-weight-bearing joint, the significance of its nominal functioning has been best demonstrated by Ellis III and Gaylord (Ellis and Throckmorton, 2005) - "complications of trauma to the TMJ are for reacting in their effects and not always immediately apparent. Disturbance of occlusal function, deviation of the mandible, internal derangements of TMJ, and ankylosis of the joint with the resultant inability to move the jaw are all sequel to this injury." Thus, proper assessment and choosing an appropriate treatment strategy is very important.

Injuries to the condylar cartilage as well as gross condylar head dislocation in children can reduce the capacity for complete remodeling and often result in mandibular deviation, but a guidance system exists to rebuild the condylar process in children sustaining fractures. (Hollender and Lindahl, 1974; Lindahl and

Hollender, 1977) In children between the ages of 3 and 11, the dislocated fractured condylar segment tends to be resorbed after successful therapy. (Zide and Kent, 1983)

According to Lindahl, complete remodeling can occur in children, which he called “restitutional” remodeling and with advancing age this becomes less satisfactory though not completely lost, which he termed as “functional” restitution. The ability of condyle to remodel and regenerate is more impaired and unpredictable in adults and thus there is a greater need for open reduction postpubertal patients. (Takenoshita, Oka and Tashiro, 1989)

An analysis of the frequency of fractures at different anatomic sites of mandible revealed that the mandibular condyle sustains a fracture in 10-40% of cases and it is also found that condylar fractures to be the second most common form of fracture. (Fridrich, Pena-Velasco and Olson, 1992)

The status of lateral pterygoid muscle contraction at the time of impact and kinematics of the condylar movement plays an important role in the dislocation of mandibular condylar fractures. Lateral pterygoid muscle is one of the chief depressors of the mandible and caused translation of the condylar head anteriorly in the glenoid fossa. At the time of impact to the mandible when the subject is in the process of opening the mouth as in yelling out or shouting, the lateral pterygoid is in the process of continued contraction. If the fracture of condyle occurs at this situation below the level of muscle insertion, then muscle fibers snap like the stretched elastic fibers and thus result in severely dislocated proximal fragments. This situation is similar to what happens in high-speed collisions where the subject tends to open the mouth wide in shock.

In interpersonal violence, subjects generally tend to keep their mandible tightly closed with teeth in firm occlusion like clenching. Also, Most patients are not aware of the complications of surgery. (Jesudasan, Abdul Wahab and Muthu Sekhar, 2015)(Kumar and Rahman, 2017)(Christabel *et al.*, 2016) This act will keep the condyle firmly seated at the center of the glenoid fossa and thus results in a laterally deviated fracture or a compression type of fracture with minimal displacement.

In kinematics of mandibular movements, rotation of the condyle head is followed by the translation. If the impact on the mandible occurs when the mouth is partially open, which is when the head is still in rotation, the degree of displacement is much less than when the mouth is wide open, as condyle shifts to translatory motion. This is because of the continuity of movements of the condyle in its anterior direction even after the fracture due to inertia which is coupled with a lateral pterygoid muscle pull.

Due to a significant number of associated fractures of the mandible with condyle, it is concluded that condylar fractures result from an indirect force applied to the mandible, associated with at least one other mandibular fracture, mostly symphyseal or para symphyseal. This suggests that condylar fractures may be the result of the transmission of force which is not fully absorbed in the majority of cases in the area of its primary application i.e, mental region.

There is no single concept in the entire spectrum of maxillofacial trauma which has created so much excitement as that of mandibular condyle fracture treatment due to its complex involvement of multiple factors. Also, several factors may influence the perception of pain as it is a complex process. Dental pain and needs to be considered more often as a possible diagnosis also. (Kumar, 2017b)(Rao and Santhosh Kumar, 2018)(Kumar, 2017c)(Sweta, Abhinav and Ramesh, 2019)

The classification for the fractures mandibular condyle is determined by the radiographic and computed tomography findings of the injury and have great variability. It can be recommended that the choice of investigation can depend on the size of the defect. (Packiri, Gurunathan and Selvarasu, 2017) However, a consensus has been reached regarding the anatomic sites of the trauma, which include fractures inside the temporomandibular joint capsule, fractures of condylar neck, and fractures at the level of or below, the sigmoid notch.

Rowe and Killey (Rowe and Killey, 1968) classified condylar fractures as intracapsular fractures, extracapsular fractures, fractures associated with injury to the capsule, ligaments, and meniscus, and fractures involving adjacent bone. Lindahl classified condylar fractures as condylar head, condylar neck, and subcondylar and also as no displacement, deviation, displacement, deviation with dislocation, and displacement with dislocation. Zachariades et al classified condylar fractures as the intracapsular, condylar neck, and subcondylar. (Zachariades and Papavassiliou, 1990) The present study used the classification proposed by Lindahl and the results were based on radiographic aspects of condyle process fracture. (Lindahl and Hollender, 1977)

According to the degree of fracture fragment displacement condyle fracture is classified into a non-displaced fracture that has fracture with no displacement of fracture segment, deviated fracture where fracture segments are displaced but some of them contact the mandibular joint, displaced fracture where fracture segment is separated from the mandibular body and displaced but exists in the TMJ, and dislocation where condyle head deviates from TMJ.

The displacement of fracture is observed mainly by the traction of the masseter muscle, lateral pterygoid muscle, and temporalis muscle. The most commonly observed type is the displacement of the condyle head to the anteromedial side. Maxillofacial surgeons need to improve their knowledge to enable the diagnosis and management of patients to have a more positive attitude toward these patients. (Abhinav *et al.*, 2019)(Kumar and Sneha, 2016)(Kumar, 2017a) The treatment of mandibular condyle fracture depends on the biological character and adaptive capability of the masticatory system. These will differ widely among patients, and it is the lack of sound biology and adaptation that can lead to an unfavorable outcome. Therefore, we must understand the functional mechanism of the mandible. Furthermore, the success of treatment depends on adherence to sound surgical principles, proper diagnosis, stable fixation, and rehabilitation of patients.

CONCLUSION

Within the limitations of the study, there is a significant male predilection to condylar fractures of the mandible and there is more number of deviation type of condylar fractures.

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AUTHOR CONTRIBUTIONS

Ramvihari Thota wrote the manuscript and provided data and Senthilnathan Periasamy reviewed the study design and data analysis Mahathi N conducted all statistical analysis. All the authors reviewed the final manuscript.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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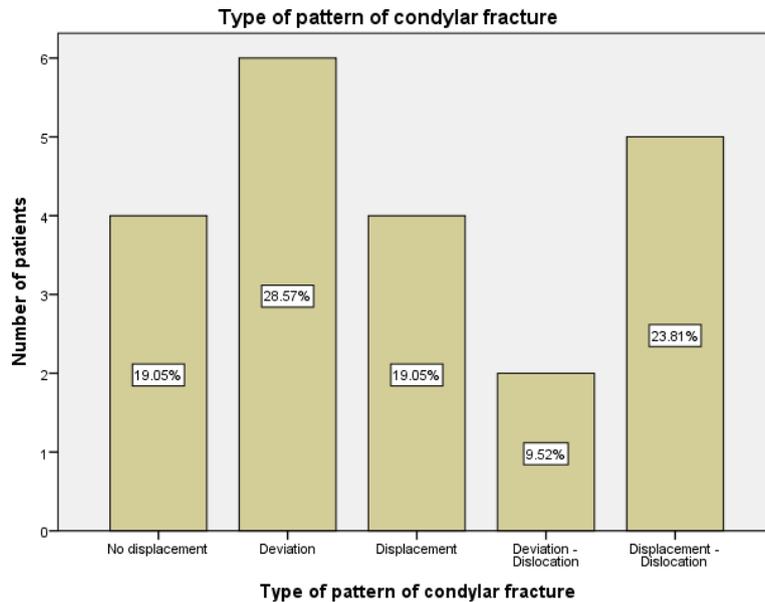


Figure 1: Graph shows graphical representation of the incidence of occurrence of type/pattern of condylar fractures in percentages. The graph shows 19.05% showed no displacement, 28.57% showed deviation of the condylar segment, 19.05% showed displacement of fracture segment, 9.52% showed deviation with dislocation and 23.81% showed displacement with dislocation.

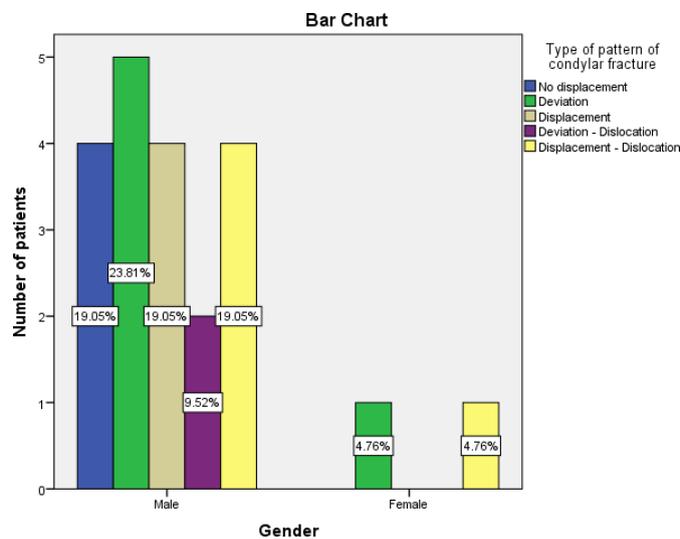


Figure 2: Bar chart representing the association between the type of condylar fracture and gender. The X-axis represents the gender and the Y-axis represents the number of patients. Association between type/pattern of condylar fracture and gender was done using the Chi-square test (P-value = 0.728, Pearson Chi-square value 2.045) and was found to be statistically not significant showing that there is no association between type of condylar fracture and gender.

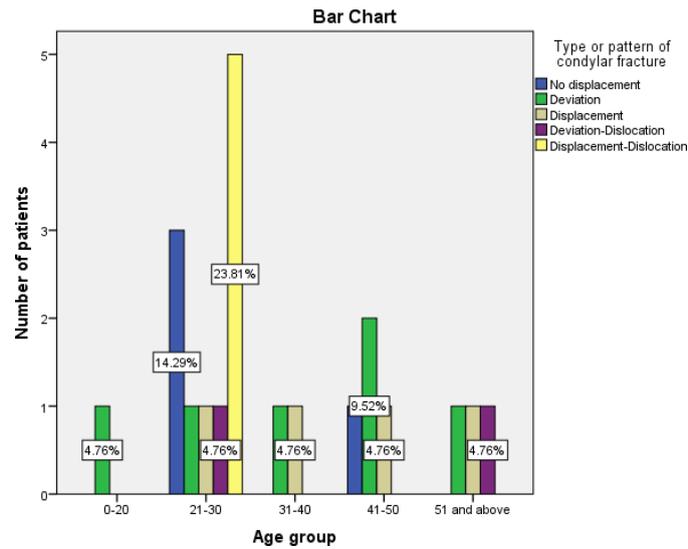


Figure 3: Bar chart representing the association between the type of condylar fracture and age. The X-axis represents the age groups and the Y-axis represents the number of patients. Association between type/pattern of condylar fracture and age group was done using the Chi-square test (P-value = 0.524, Pearson Chi-square value 15.008) and was found to be statistically not significant showing that there is no association between type of condylar fracture and age.