

Influence of anatomical variation of canine in parasymphyseal fracture: A retrospective study

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ABSTRACT

Aim: The aim of this study was to analyze the influence of anatomical variation of canine in parasymphysis fracture. **Materials and Methods:** A retrospective study was conducted in the Department of Oral and Maxillofacial Surgery at Rajah Muthiah Dental College and Hospital analysing parasymphysis fracture over a period of 5 years from 2009 to 2014 and 103 parasymphysis fracture patients were evaluated. Only patients with parasymphysis fracture were taken into the study. Sex, age, incidence, site of fracture with reference to canine, canine length, and associated fractures are evaluated from the data available. The statistical analysis was constructed and analysis performed using Statistical Package of Social Studies. **Result:** The unilateral parasymphysis fracture is the most common site in mandibular fracture. The male patients are more in number. The road traffic accident is considered to be the most common etiological factor. The length of the canine root is approximately 17–18 mm with no pathological features, deformities, or hypercementosis, and none of our case were impacted, and the pattern of the fracture occurred either mesial or distal to canine and not exactly in the midline of the tooth; hence, it does not influence in parasymphysis fracture. **Conclusion:** Increased number of samples and a prospective analysis of the influence of canine during preliminary management of fracture will give a definitive idea on the anatomical variation and influence contributing to the fracture in parasymphysis region.

Key words: Anatomical variations, canine, parasymphysis fracture

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INTRODUCTION

The increasing number of vehicles and the deleterious conditions of roads had led to a significant increase in

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craniofacial trauma. Mandibular fractures occupy the second most incidence of facial fracture with incidence of 38%; they are mainly caused by two-wheeler accidents. The mandible is a resistant bone and it takes a relatively heavy impact to the fractures, which apart from road traffic accident (RTA) can also be a consequence of sports activities,^[33] fire arms, interpositional violence, work-related accidents, and pathological conditions. The most fractured part of the mandible is body (28%) followed by parasymphysis (24%) and angle (17%). The mandible is the only mobile bone of facial skeleton which plays a role in mastication and deglutition. Apart from the etiological factors, there are numerous predisposing factors which contribute to the fracture of mandible and maxilla.^[25,30,34]

Recent literature has led credence to the fact that the presence and state of eruption of canine contribute to the weakness of the parasymphysis region, thereby predisposing to parasymphysis fractures. This is regardless of the fracture of the mandible that is usually influenced by the factors such as direction, severity, and impact of force and the presence of soft tissue bulk and occlusal loading and pattern of bone density and anatomical structures that weaken the mandible.^[15]

Another important predisposing factor is the status of the teeth and occlusion, missing teeth, crowding, root forms, hypercementosis makes the bone harder and the insolence is reduced in these clinical situations and these factors are also responsible for the undisplacement of the fragments if fracture occurs in these areas.

Dimension of the dental structures and the occlusion of the teeth play a major role in mandibular fractures. Especially canine is the longest teeth and the most common teeth to be impacted or in malocclusion. The canine which is outstanding in the arch, rotated, long roots may influence the fractures in the parasymphysis region. Embryological fusion fills the parasymphysis region thus making it weak.

Based on these literature reviews, a retrospective study was conducted in the Department of Oral and Maxillofacial Surgery of Rajah Muthiah Dental College and Hospital with records of 103 parasymphysis fracture patients being analyzed from the year 2009 to 2014. Data including root form, root length, tooth in line of fractures, unilateral/bilateral fracture, incidence and etiological factors, and fracture in relation to canine are analyzed by clinical and radiographic method and all these are recorded.

Aim and objectives

Aim

The aim of this study was to analyze the influence of anatomical variation of canine in parasymphysis fracture.

Objectives

- To analyze the retrospective clinical records of parasymphysis fracture on patients attended to the Department of Oral and Maxillofacial Surgery for 5 years
- To analyze the type and site of fracture on the radiographs available of these records
- To analyze the length and width of canine with reference to parasymphysis fracture
- To analyze the type and pattern of fracture involving the roots of the canine
- To analyze the incidence of tooth in line of fracture along with parasymphysis fracture
- To analyze the presence of malocclusion with reference to parasymphysis fracture
- To analyze the presence of missing 34 and 44 in parasymphysis fracture
- To analyze the presence of various root forms of canine in parasymphysis fracture.

MATERIALS AND METHODS

A retrospective study was conducted in the Department of Oral and Maxillofacial Surgery at Rajah Muthiah Dental College and Hospital analysing parasymphysis fracture over a period of 5 years from 2009 to 2014 and a total of 103 cases were evaluated. Only patients with parasymphysis fracture were taken into the study. Male to female ratio is 7:1; age varies from 18 to 60 years; incidence [Table 1 and Figure 1], site [Table 2 and Figure 2], and line of fracture with reference to canine [Table 3 and Figures 3-4], canine length, and associated fractures [Table 4 and Figure 5] are evaluated from the data available. The statistical analysis was constructed and analysis performed using Statistical Package of Social Studies.

Table 1: Mode of injury

Incidence	Number of patients (%)
RTA	66 (64.1)
Self-fall	26 (25.2)
Assault	11 (10.7)
Total	103 (100.0)

RTA: Road traffic accident

Table 2: Site of fracture

Fracture type	Number of patients (%)
Unilateral fracture	99 (96.1)
Bilateral fracture	4 (3.9)
Total	103 (100.0)

Table 3: Fracture line

Fracture pattern	Number of patients (%)
Between lateral incisor and canine (mesial)	49 (47.6)
Between central and lateral (mesial)	29 (28.2)
Between canine and premolar (distal)	25 (24.3)
Total	103 (100.0)

RESULTS

From the retrospective study conducted in Rajah Muthiah Dental College and Hospital to evaluate the influence of anatomical variation of canine in parasymphseal fracture, the following results were arrived.

- The parasymphysis fracture is the most common site in mandibular fracture
- The male patients have reported more in number compared to female patients
- The RTA is considered to be the most common etiological factor [Table 1 and Figure 1]
- Unilateral fracture [Table 2 and Figure 2] is more common than bilateral fracture in the incidence of parasymphysis fracture
- The length of the canine root is almost straight; hence, it does not influence in parasymphysis fracture
- The size of the canine is 17–18 mm; hence, it does not influence in parasymphysis fracture
- The fracture line [Table 3 and Figures 3-4] falls either on mesial to canine or distal to canine and not exactly in the midline of the tooth; hence, it does not influence in parasymphysis fracture
- There was no pathological features in relation to canine in this study; hence, it does not play any role in influence of parasymphysis fracture
- As none of our cases the canine was found impacted, the incidence and influence of fracture are minimal
- There is no evidence of deformities/hypercementosis in relation to canine; hence, it does not have any influence on the parasymphysis fracture.

DISCUSSION

The mandible is the only mobile bone of the face and it participates in basic functions such as mastication, phonation, swallowing, and maintenance of dental occlusion. Despite the fact that it is the heaviest and strongest facial bone, the mandible is prone to fractures for some specific reasons: (1) it is an open arch; (2) it is located in the lower portion of the face; (3) it is the mechanism hyperextension and hyperflexion of the head in traffic accidents; (4) it gets atrophied. Worldwide, mandibular fracture generates discussion among researchers due to its functional and

cosmetic deformities affecting the victims. The result of epidemiological survey on the causes and incidence of mandibular fracture tends to vary with geographic region, socioeconomic condition, and cultural characteristics and era. Based on this, a retrospective study was conducted in Rajah Muthiah Dental College and Hospital from 2009 to 2014. In our study, only parasymphysis fracture was analyzed based on case records and X-rays on evaluation and analysis of 103 case sheet and X-rays. The fracture predominantly occurred in age groups of 21–30 years. These findings are similar with previous studies of Ahmad Kahn *et al.* and Rajanikanth *et al.*^[20,21] The high incidence is seen in the second and third decades of life. Male shows high incidence compared to females, males 88.3% and females 11.7%, with male to female ratio of approximately 7:1. This study coincides with the study done by Monali *et al.*^[2,6,30]

There are two basic etiologies for mandible fractures. One the pathological fractures related with tumors, osteoporosis, and other diseases which directly or indirectly affect the bone.^[22] Traumatic fractures are the most frequent mandible fractures and are related to traffic accidents, falls, violence, sport activities, among others. The most common cause of fracture analyzed in the present study was RTAs with or without influence of alcohol^[5] which accounted large number of cases in our study with 64.1%, and it constitutes to other studies which were conducted in developing countries such as India, and second self-fall with 25.2% and assault 10.7%. This related to similar study done by Sunita *et al.*, 2014. However, Adi *et al.*^[4] reported, in developing countries, assaults and interpositional violence as leading etiological factors. Use of drugs and alcohol in younger generations also plays the important etiological factors in mandibular fracture Agnihotri *et al.* (2013).^[2,3]

The clinical history is extremely important for the diagnosis of mandible fractures. We classically find a set of signs and symptoms comprising pain, edema, hematoma, dental occlusion, facial contour deficit, cracking, and mobility of

Table 4: Associated fracture

Associated fracture	Number of patients (%)
Nil	36 (35.0)
Condyle	39 (37.9)
Angle	12 (11.7)
Zygomatic	6 (5.8)
Body	6 (5.8)
Symphysis	1 (1.0)
Dentoalveolar	1 (1.0)
Coronoid	1 (1.0)
Infraorbital rim	1 (1.0)
Total	103 (100.0)

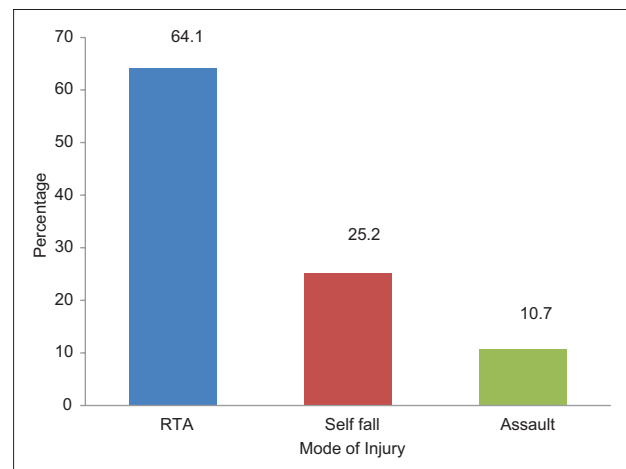


Figure 1: Mode of Injury

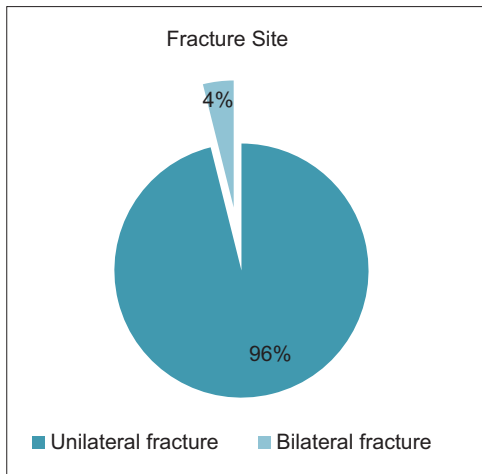


Figure 2: Site of Fracture

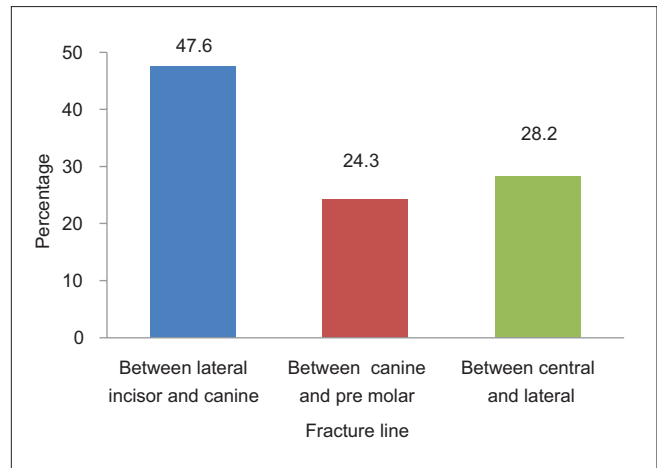


Figure 3: Fracture Line

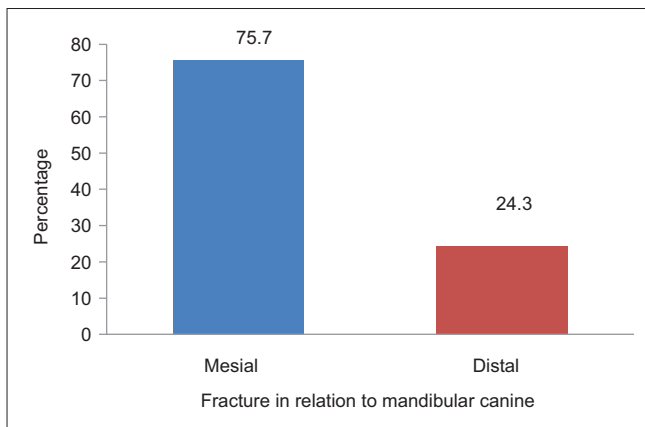


Figure 4: Fracture in relation to Mandibular Canine

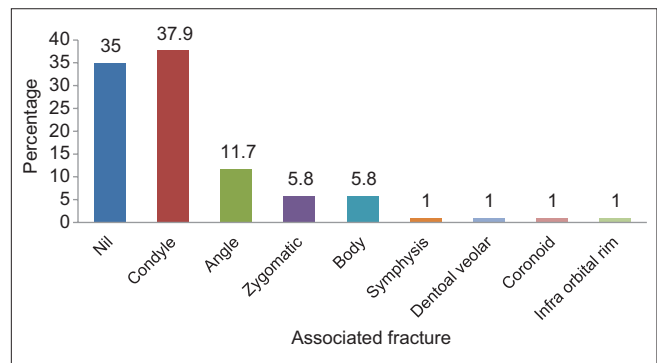


Figure 5: Associated Fracture

bone fragments. The main radiological findings are done using orthopantomogram,^[27] anteroposterior view of the mandible, facial absolute profile with open mouth, right and left oblique lateral view.

The anatomical variations in the permanent mandibular canine stated that the lower canine tooth has two distinct and proportionate roots with each containing a root with 24 and 25 mm long.^[7,8] The anatomical variations related to lower canine must properly be identified mainly when tooth is involved in diagnosis and treatment planning the pattern of fracture which was reported in our study was, fracture occurred either to mesial or distal aspect of the tooth, but not exactly tooth in line of fracture. The size of the canine root in our study was approximately 15–16 mm in length and there was no pathology related to the root. All the root analyzed in the study were straight.^[15,24,28,29]

Impacted teeth are generally common in the third molar region. Hence, it is believed that third molar region of the mandible constitutes a natural region of weakness.^[9,23] Impacted teeth are more common in mandible than maxilla.

Decrease in bone content causes the bone to be more prone to fracture. Preexisting periodontal disease or pathology in the region may render the mandible even more prone to fracture.^[11,13,26] Preexisting periodontal disease or pathology in the region may render the mandible even more prone to fracture. However, in our study, we did not encounter any impacted tooth in parasymphysis region. There are two schools of thought regarding the management of impacted teeth along the line of fracture.^[2] If the impacted teeth interfere with the reduction of the fragments, then it should be removed. If there is adequate stability of the fragments, then it may be retained. There is a possibility of infection spreading if the fracture line passes through it.^[16]

The long term effect of mobility is analyzed in 2% of the cases after the removal of arch bar. Few patients had nonvital tooth and complaint of sensitivity in relation to canine and lateral incisors.^[10,14] Root resorption was not reported in our study. The management of infection is one of the most common and occasionally intriguing jobs in practice. Infection superimposed on jaw fractures may be somewhat more challenging. A number of factors have been implicated as causative to this infection. Oral hygiene is a key factor to eliminate and prevent postoperative infection.

In the immediate postoperative period, patients suffer pain, edema, and difficult chewing.^[5,12,32] Therefore, they usually try to mitigate against discomfort by restricting mandibular movement.

In our study, all the patients had undergone open reduction and internal fixation in 98% of the patient and 2% of the patients had only MMF.^[1] Wound healing was satisfactory in all patients who had undergone surgery. There is no wound gapping or any complaint associated.^[17,31] However, few patients had recurrent infection in site of fracture and 4% of the patient had undergone plate removal.^[18,19]

Other factors such as neurological complications and bite efficacy and temporomandibular joint-related complications were not reported in our study based on the data available.

CONCLUSION

From this short study, most of the relating factors of canine with relation to malocclusion, deformities, and root resorption, impacted or partially erupted were found very minimal from this available data. Hence, we could neither come to the conclusion whether such deformities play definitive role in influence of parasymphysis fracture in that site nor influence the fracture management.

Anyway increased number of samples and a prospective analysis of the influence of canine during preliminary management of fracture will give a definitive idea on the anatomical variation and influence contributing to the fracture in parasymphysis region.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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