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Prevalence and Pattern of Impacted Mandibular Third Molar An Institution-based Retrospective Study

Ankita Raj, Prasanna Kumar P, Ankur Rathaur, Paras Kasal, Francis John Alapatt , Ayushi Agarwal

Rama Dental College Hospital & Research Centre, Rama University, Mandhana, Kanpur, Uttar Pradesh- India 209217

ABSTRACT

Impacted third molar removal is one of the common minor oral surgical procedures performed in routine dental practice. In human history, the earliest recorded case of impaction was discovered in the mandible of girl who lived in the Magdalenian cultural period. Tooth is considered impacted when its eruption into normal functional occlusion has been interfered with teeth, overlying bone, or soft tissue and it is not fully erupted by its expected age of approximately 20 years.A retrospective cohort study was conducted by taking the first 1000 orthopantamogram (OPG) from the Department of Oral Medicine and Radiology, rama dental college , hospital and Research from August 2021 to December 2022 aged between 20 and 40 years From this study, we concluded that third molar impactions have a mandibular predominance, males have increased predilection of third molar impaction than females and were equally common on both sidesand mesioangular impaction occurs more commonly followed by vertical impaction. The most common pattern of impaction was Level A and Class II.

Keywords: *Angulation*; *impaction*; *third molar*

INTRODUCTION

Impacted third molar removal is one of the common minor oral surgical procedures performed in routine dental practice. In human history, the earliest recorded case of impaction was discovered in the mandible of girl who lived in the Magdalenian cultural period (18,000–10,000 BC).[1]

Tooth is considered impacted when its eruption into normal functional occlusion has been interfered with teeth, overlying bone, or soft tissue and it is not fully erupted by its expected age of approximately 20 years.[2]

The third molar is the commonly impacted tooth with a frequency of 18%– 32%.[3] In third molar impaction, panoramic radiographs are used generally to assess the angular position, level of impaction, amount of covering bone, and relationship between inferior alveolar canal with the third molar.

MATERIALS AND METHODS

Study design

A retrospective cohort study was conducted by taking the first 1000 orthopantamogram (OPG) from the Department of Oral Medicine and Radiology, rama dental college , hospital and Research from August 2021 to December 2022 aged between 20 and 40 years.

Inclusion criteria

The inclusion criteria of the study included the following:

1. Patients of age 20–40 years
2. Presence of second molar adjacent to the impacted third molar
3. No filling for wisdom teeth or the second molar been undertaken before the study
4. Healthy patients with no systemic disease

Exclusion criteria

The exclusion criteria of the study included the following:

1. Age under 18 years and over 40 years
2. A history of extraction of permanent second molar
3. History of orthodontic treatment
4. History of endocrine disturbances
5. Craniofacial syndrome or anomaly
6. Incomplete records of patient's physical finding or medical history
7. Poor-quality OPG
8. Presence of any pathological lesions in the molar area such as cyst and tumors
9. Trauma/any pathology in the jaw that affects the alignment of dentition
10. Third molars without root completion

The examiners evaluated OPGs . The angle of impaction, its depth, location, caries in second and/or third molar, and relationship of impacted mandibular molar with inferior alveolar canal were noted

Angle of impaction

The angulation of the mandibular third molar was evaluated from the panoramic radiographs using the software. An imaginary line was drawn from the midpoint of the occlusal surface till the bifurcation of mandibular second molar and the third molar representing the long axis of the teeth. The angle formed between the intersected long axis gave either a mesial or distal inclination of the mandibular third molar in relation to the second molar.[4] The classification of

impaction was measured using Quek *et al*.[2] and also adapted from Winter's classification as follows:

1. Mesioangular: 11–79
2. Distoangular: 11–79
3. Horizontal: 80–100
4. Vertical: 10–10
5. Others: 111–80

Uncommon angulations (mesioinverted, distoinverted, and distohorizontal) were categorized under others. In case of absence of second molar where angle of impaction was unable to be recorded was excluded from study.

Level of impaction

- The level of impaction of mandibular third molar was considered with the level of the cementoenamel junction (CEJ) of the impacted tooth in relation to bone. It was evaluated using Pell and Gregory classification. According to this, we obtained the following:
- Level A: Third molar not covered by the bone and its highest part was on the same level or above the occlusal plane of the adjacent second molar.
- Level B: Third molar partially covered by the bone and its highest part was below the occlusal plane, but above the cervical line of the second molar.
- Level C: Third molar completely covered by the bone and its highest part was beneath the cervical line of the second molar.[3]

The relationship of the impacted third molar with the ramus of the mandible and the second molar is classified as follows:

Class I: Space available between the anterior border of the ascending ramus and distal side of second molar is sufficient to accommodate the third molar.

Class II: Space available between the anterior border of the ramus and the distal side of the second molar is less than the width of the crown of the third molar, that is, portion of the third molar crown lies inside the ascending ramus.

Class III: There is absolute lack of space and the third molar lies completely in the ascending ramus.

Proximity to inferior alveolar nerve

The relation of the roots of the impacted third molar with the inferior alveolar canal is assessed to plan a surgical technique avoiding trauma to the canal and its contents. The prediction for nerve proximity is based on Rood's criteria:

1. Darkening of root apex

2. Deflection of root
3. Narrowing of root
4. Dark and bifid apex
5. Diversion of canal
6. Narrowing of canal
7. Interruption of borders of canal

As a result, the molars were categorized as proximity of root end to the nerve or no contact with the nerve.

RESULT

Of 1000 OPGs, 458 radiographs of 260 males and 198 females reported with impacted mandibular third molars [Figure 1]. The average age of subjects with impacted third molars was 30.5 years. There were significantly more males (57%) than females (43%) with impacted mandibular third molar ($P < 0.05$). The number of impacted third molars in each subject was significantly different ($P < 0.01$) between the sexes. Males were 1.7 times more expected to have bilateral mandibular impacted teeth than females. The proportion of impacted mandibular third molars was significantly equal between the right and left sides. The incidence of the different angulations of impaction in the mandible . Mesioangular impaction (60%) was the most common. The incidence of different levels of impaction is shown in Figure 2. Level A impaction was the most common (71%). There was no significant association between the gender and the level of impaction. Figure 3 shows the relationship of the third molar with the ramus of mandible. The most frequently encountered relationship was Class II (50%, 229 of 458). Relationship of roots of the mandibular third molar with the inferior alveolar nerve is shown in Table 2. There is no involvement in 33% of cases (150 of 458). The prevalence of dental caries in second and/or third molar is 20% of population

Figure 1. Distribution of the impacted mandibular third molar with the gender and side of the mandible

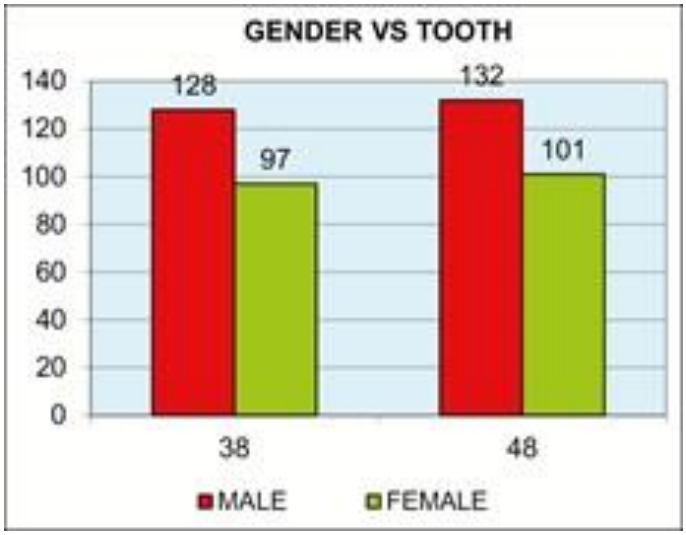


Figure 2 Distribution of level of the impacted mandibular third molar

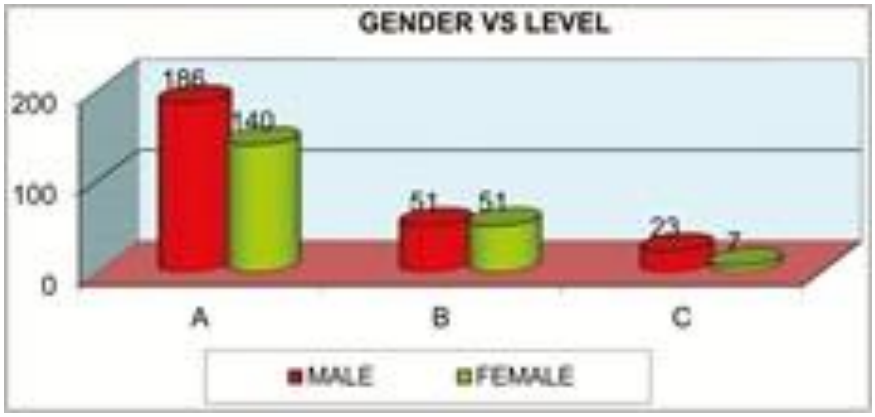


Figure 3 Distribution of the impacted mandibular third molar in relation to the ramus of the mandible

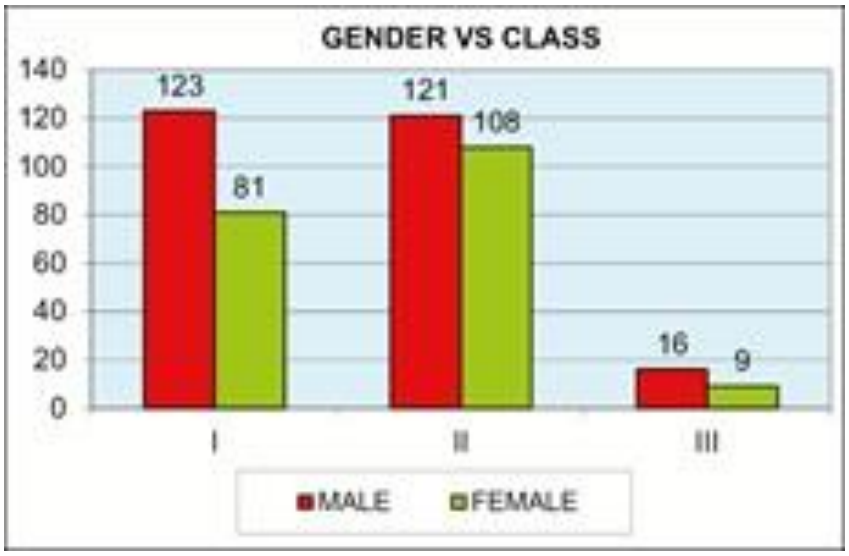
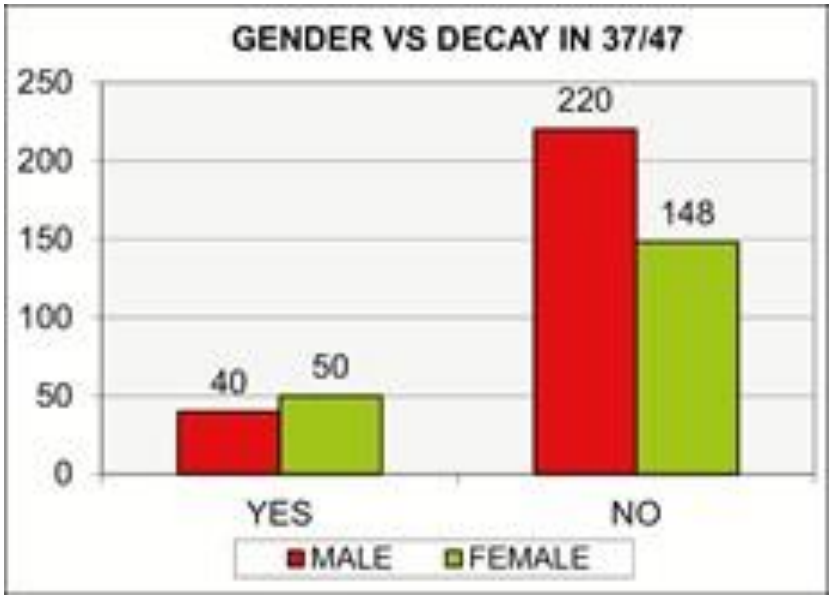


Figure 4 Distribution of dental caries in impacted mandibular third molar and/or second molar



DISCUSSION

Mandibular third molar impactions are prevalent developmental condition in this modern civilization and approximately more than half of patients (60.8%) with a mean age of 33.5 years-old revealed possessing at least one impacted third molar.[1] Because of numerous complications associated with impacted third molar, it is mandatory to assess the eruption pattern. Peer group of 20–40 years were selected as growth essentially completed by age of 17 years and possible to evaluate the eruptive status of third molar. However, it was observed that there are some changes seen in angulation till 32 years of age. The upper limit of 40 years were planned to avoid bias in relation to hard and soft-tissue remodeling.[2]

Various theories have been proposed for the etiology of impaction of third molar including physical disruption of dental lamina, facial growth retardation, decreased anteroposterior and transverse dimensions, eruption in distal direction, early physical maturity, delayed mineralization of third molar, and lack of sufficient eruption force. The rate of impaction is higher in mandible compared to maxilla. This is because of the imbalance between bone remodeling process at the ramus region leading to either increase or decrease in mandibular plane angle. The nature of diet and degree of using masticatory apparatus also affect jaw and tooth size, incidence, and prevalence of impacted third molars on different populations.

In previous studies, angulation of impacted third molars was evaluated visually based on Winter's classification. But in this study, angulation was determined using Planmeca software to avoid errors from visual interpretation enabling reproducibility of results. Panoramic radiograph is the workhouse in third molar surgery assisting the surgeons in reaching diagnosis and clinical decisions with interventions near vital structures. It gives both anatomical and pathological information.

In this study, 35% of mandibular third molars were mesioangular in position, which is greater than that reported by Sewerin and von Wowern[5] (18%) and Hugoson and Kugelberg[6] (30%)

but lesser than Quek *et al*.[2] (60%), Kruger *et al*.[7] (62.9%), Richardson[8] (71%), and Sandhu *et al*.[9] (49%). This observation was also supported by Obiechina *et al*.[10] in Nigerians, Celikoglu *et al*.[11] in the Turkish population, and Leung *et al*.[12] in Hong Kong.

The level of impaction indicates the depth in which the tooth is buried in bone. In this study, Level A was most common (71.1%) as that of the studies conducted by Hugoson and Kugelberg *et al*.[6] Quek *et al*.[2] reported that Level B was the most common. The eruption of third molar is usually predicted with the space available between the second molar and the ascending ramus of the mandible. If the available mesiodistal space is equal or greater than the mesiodistal width of the crown, then there is 70% probability for its eruption. Class II mandibular impaction occurs more frequently in this study.

The common complication following surgical removal of mandibular third molar is injury to the inferior alveolar neurovascular bundle. Here, approximately 33% of impacted third molars have no relation of with the inferior alveolar canal.

CONCLUSION

From this study, the following conclusions can be drawn:

- Third molar impactions have a mandibular predominance.
- Males have increased predilection of third molar impaction than females and were equally common on both sides.
- Mesioangular impaction occurs more commonly followed by vertical impaction. The most common pattern of impaction was Level A and Class II.

This study provides only preliminary data. Further comprehensive large-sized studies are required to substantiate its usefulness. The regular monitoring of the status of impacted third molars should become an integral part of the appropriate oral health care due to considerable differences.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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