Original research

Evaluation of Mandibular Third Molar of Patients Visiting SEGi University Oral Health Centre from Year 2017 to 2021 by Orthopantomography

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Abstract:

Introduction: Studies have shown that third molars are frequently associated with various problems such as impaction and agenesis in 70% of modern humans. Third molar removal is indicated if the third molars are impacted or are causing pain that interrupt a patient's daily life activities. Prior to third molar removal, assessment of the radiograph is necessary to study the status of the third molar and the difficulty level for extraction.

Aim: To evaluate the prevalence and pattern of impacted mandibular third molars based on orthopantomography (OPG) of patients and to assess the difficulty of surgical removal.

Methodology: This study was undertaken on records of patients at Segi oral Health center. After obtaining permission to access records, 200 Orthopantomographs of patients indicated for third molar removal were studied. Winter's classification, Pell and Gregory Classification (PG classification) were used. Difficulty assessment was done for all the impacted mandibular third molars using Pederson Difficulty Index. Data was analysed using SPSS.

Results: Most prevalent angulation in relation to the long axis of the mandibular second molar (Winter's classification) was mesioangular impaction (180 third molars) followed by vertical (96 third molars), horizontal (82 third molars) and, distoangular (42 third molars). As for the Pederson's Difficulty Index, it was found that the most mandibular 3rd molar extractions were of moderate difficulty (213), followed by that of minimal difficulty (135) and very difficult extractions (35). While vertical and mesioangular impactions were higher in females as compared to males, distoangular and horizontal were higher in males. Overall, the most prevalent was mesioangular. This was significant with p=0.027

Conclusion: Based on this study, a mesioangular impaction is the most common type of impaction. However, results cannot be generalized as the study has been done only on Asians. More studies are required on diverse population to confirm the results.

Introduction

Third molars are the last permanent molars to erupt in the oral cavity. Normally, they start to erupt between the age of 17 to 21 years.[1] In recent studies, it has been found that third molars are frequently associated with various problems such as impaction and agenesis in 70% of modern humans.[2] Impaction is defined as the pathologic condition in which the affected tooth is not able to erupt normally to its functional position in the jaw within an expected timeframe.[3] The cause of impaction is mostly due to smaller size of the mandible in modern humans compared to previous human species thus, there is limited space to accommodate the mandibular third molars.[4][5]

Removal of third molars is a frequent procedure that is done in the oral surgery department.[6] Depending on the case, removal of the mandibular third molar can be done by using forceps while some complicated cases like impaction need a surgical intervention. Third molar removal is indicated if the third molars are impacted or are causing pain that interrupt a patient's daily life activities.[6] Prior to third molar removal, assessment of the radiograph is necessary to study the status of the third molar. This is a significant process to avoid further complications due to the extraction. In addition, pre-operative radiographic assessment enables oral surgeons to assess and anticipate the difficulty level of the surgical removal of impacted third molars. This is vital to aid the surgeon in approaching the surgical procedures and predict whether any postoperative complications will arise or any extraordinary surgical approaches are needed.

Hence, this study has been undertaken to study the prevalence and patterns of mandibular third molars [7] of patients using panoramic radiographs and to evaluate their difficulty using Pederson's Difficulty Index to determine the required surgical procedure.

Aim

To evaluate the prevalence and pattern of impacted mandibular third molars based on orthopantomography (OPG) of patients and to assess the difficulty of surgical removal of impacted mandibular third molars based on OPG evaluation for surgical plan and procedure.

Methods and Materials

This was a patients' record based study of OPG evaluation, conducted using OPGs taken on patients for a period of 5 years, from 2017 to 2021, in SEGi Oral Health Centre. The study was approved by the institutional ethics committee and necessary permissions were obtained from the Dean to access the old records. Previous records of the patients were collected whose panoramic radiographs were assessed. 200 panoramic radiographs of patients in the age group of 20 to 30 years obtained from the Oral Radiology Department were interpreted and assessed for the status of mandibular third molar.

The panoramic radiographs were chosen according to the following criteria.

Inclusion criteria:

- Impacted mandibular third molars with fully developed or completed root formation
- Good quality of radiographic image without any superimposition
- Bilateral mandibular 3rd molar impaction
- Age group 20 to 30 years

Exclusion criteria:

- Teeth other than the mandibular third molars
- History of mandibular fractures or any orthodontic treatments
- Extraction history of mandibular third molars
- Any developmental anomalies associated with impacted mandibular third molars
- Congenital or systemic disease of patient
- Craniofacial anomalies
- Previous jaw trauma or fracture

Data was collected using a proforma designed for this study. It included details in relation to age and gender, angulation of impacted mandibular third molars by using Winter's classification, the level of teeth impaction and the relationship to the ramus by using Pell and Gregory Classification (PG classification). Based on that, difficulty assessment was done for all the impacted mandibular third molars using Pederson Difficulty Index.

Third molars were considered impacted if they were not in functional occlusion whereas the mandibular third molars that had reached the level of the occlusal plane in relation to the second molars were considered to be teeth with normal eruption.

Winter's Classification [8][9][10][11]

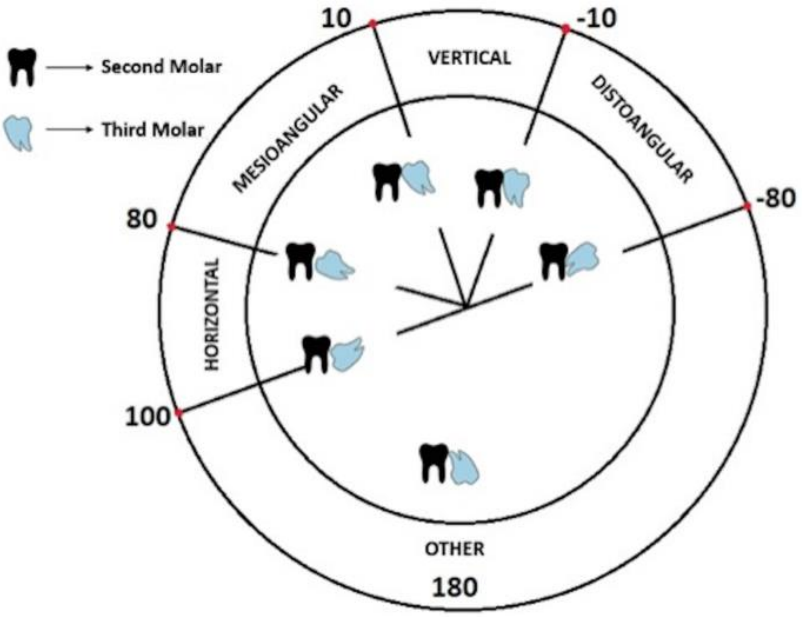
The mandibular third molars are assessed and classified according to its inclination to the long axis of the mandibular second molar. It was classified into:

(1) vertical angulation (10 to -10 degree)

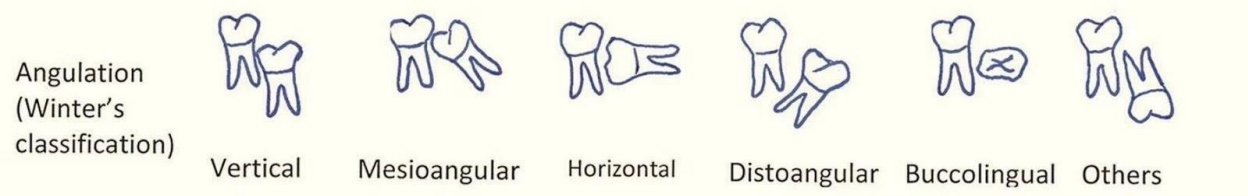
(2) horizontal angulation (80 to 100 degree)

(3) distoangular angulation (-11 to -79 degree)

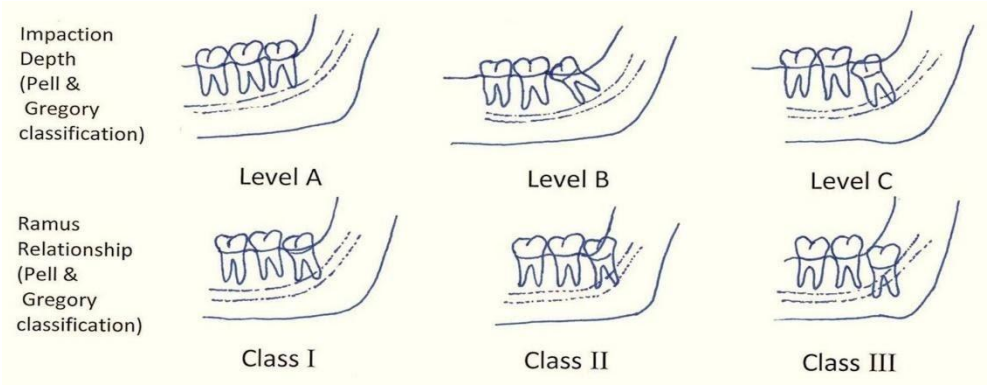
(4) mesioangular angulation (11 to 79 degree)



Generally, mesioangular impaction is the most common impaction seen and is the least difficult impaction to remove followed by horizontal impaction and vertical impaction. The most difficult impaction to be removed is the distoangular impaction.



Pell & Gregory's Classification [8][9][10][11]



This classification is based on the relationship between the impacted mandibular third molar to the ramus of the mandible and impacted mandibular third molar to the mandibular second molar

● Classification: space

- Class I - There is sufficient or adequate space available between the anterior border of the ascending ramus and at the distal aspect of the second molar for the normal eruption of the third molar.

- Class II - The space that is available between the anterior border of the ramus & the distal aspect of the second molar is less than the mesiodistal width of the crown of the third molar.

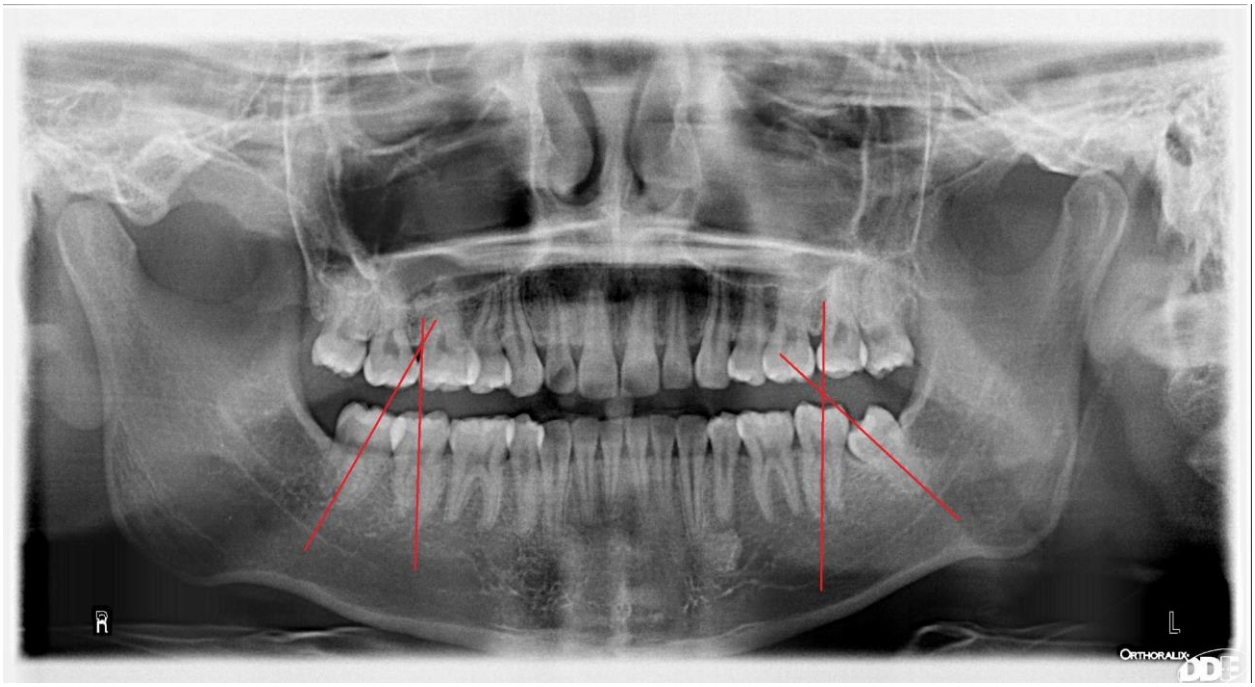
- Class III - The third molar is completely or totally embedded in the bone of the anterior border of the ascending ramus due to the absolute lack of available space.

● Classification : depth

- Level A - The occlusal plane of the impacted mandibular third molar is at the same level with the occlusal plane of the second molar.

- Level B - The occlusal plane of the impacted third molar is in between the occlusal plane and the cervical margin of the second molar

- Level C - The impacted third molar below the cervical margin of the adjacent second molar



The figure above shows an example of how Winter's angulation is being measured from the OPG.

Pederson's Difficulty Index[12]

Difficulty index for removal of impacted mandibular third molar

Classification	Difficulty Index Value
Angulation	
Mesioangular	1
Horizontal	2
Vertical	3
Distoangular	4

Depth	
Level A Level B Level C	1 2 3
Ramus relationship	
Class I Class II Class III	1 2 3

Difficulty index :-

- Very difficult : 7-10
- Moderately difficult : 5-7
- Minimally difficult : 3-4

Data Analysis

Data was analysed using SPSS version 22. Descriptive statistics and Chi-square tests were used. $P<0.05$ was considered significant.

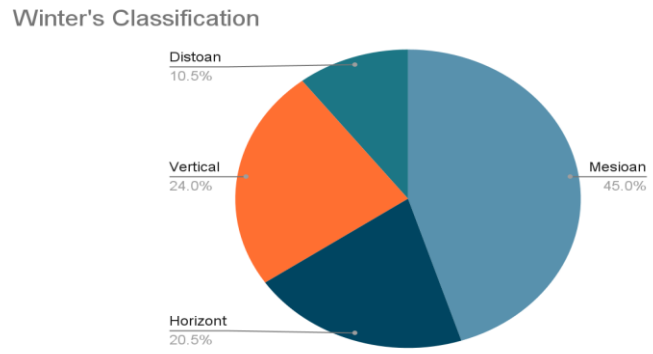
Results:

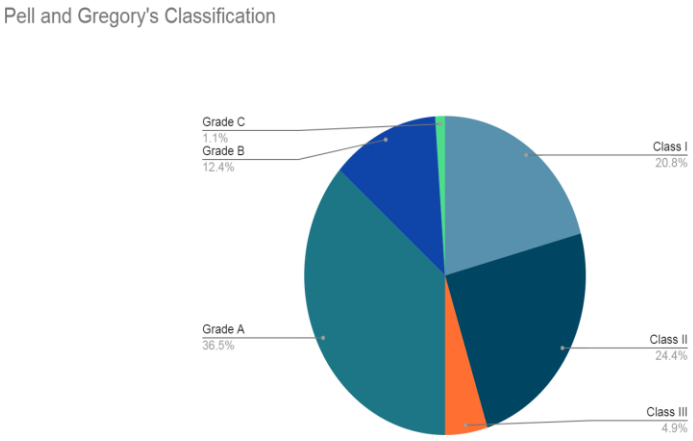
In this study, a total of 200 participants were selected based on their OPGs to assess the pre-operative difficulty of 400 impacted mandibular third molars indicated for surgical extraction. The male to female proportion in this study was found to be 74 males to 126 females between the age of 20-30 years old, giving a ratio of around 1:1.58.

From the results obtained in the study, we found that the most prevalent angulation in relation to the long axis of the mandibular second molar (Winter's classification) is mesioangular impaction (180 third molars) followed by vertical (96 third molars), horizontal (82 third molars) and finally, distoangular (42 third molars). As for Pell and Gregory's classification with respect to the eruption of the mandibular third molar and the space available between the mandibular second molar and the anterior border of the ramus, we found that Class II relationship was the most common (195) followed by class I (166) and lastly, Class III (39). With regards to the level of impaction of the mandibular third molar with respect to the occlusal plane of the mandibular second molar, our study suggests that Level A is the most common (292), followed by Level B (99) and finally Level C (9).

As for the Pederson's Difficulty Index, we found that the most mandibular 3rd molar extractions were of moderate difficulty (213), followed by that of minimal difficulty (135) and finally very difficult extractions (35).

Figures 1, 2 and 3 show the distribution of various types and difficulty levels of the third molars.





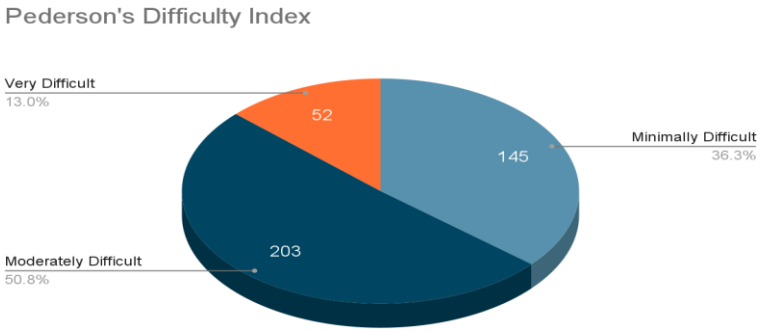


Table 1: shows the comparison of different types of impaction between males and females. While vertical and mesioangular impactions were higher in females as compared to males, distoangular and horizontal were higher in males. Overall, the most prevalent was mesioangular. This was significant with p=0.027

Gender	Distoangular	Horizontal	Mesioangular	Vertical	Total	P value

Females	10 (8.0)	21 (16.8)	60 (48.0)	34 (27.2)	125 (100.0)	0.027
Males	11 (14.7)	22 (29.3)	31 (41.3)	11 (14.7)	75 (100.0)	
Total	21 (10.5)	43 (21.5)	91 (45.5)	45 (22.5)	200 (100.0)	

Discussion

The study included patients from the age of 20-30 years old. The rationale of not selecting patients below the age of 20 is the fact that root completion of mandibular third molars usually ends at 20-21 years of age. Although studies have shown that it is easier to extract mandibular third molar of patients below the age of 20 due to the fact that the root formation is only from 1/3rd to 2/3rd of the way of completion, these patients were excluded from the study as it only assesses the difficulty of surgical extraction of mandibular third molars pre operatively and does not include a post-operative assessment.

Studies regarding mandibular third molar impaction have been carried out by various authors from other states in Malaysia as well as from different countries. This study has shown a high prevalence of mandibular third molar impaction in mesioangular pattern. This result confirms the findings of other similar studies that was carried out in different states of Malaysia by Jaffar et al. which found that 52.3% of third molars impaction in patients attending Hospital Universiti Sains Malaysia in Kelantan was in mesioangular pattern.[13] Besides, Kanneppady et al. carried out a study on patients attending AIMST Dental Institute in Kedah and found that mesioangular impaction (49.8%) followed by distoangular (22.9%) were the most common impactions.[14] Based on Goyal et al. mesioangular impaction was the most common impaction pattern (53.8%) seen in mandible.[4] However, Al Dajani et al. found that vertical impaction was the most common angulation (53.1%) in the Saudi population whereas mesioangular impaction was the second most frequent angulation seen in the mandible.[3]

Based on Pell and Gregory's (PG) classification, this study has found that ramus relationship of Class II with Level A impaction has the highest prevalence among the other depths and levels. This confirms the findings of study by Jaffar et al.[13] and Gupta et al.[7] However, this finding conflicts with the findings of a study carried out in the Central Anatolian Turkish population by Yilmaz et al. which has shown that level C was the most common level of impaction in the mandible was (61%).[11] In addition, study by Eshghpour et al. found the most prevalent type of impaction level and ramus relationship was level B (63.85%) and Class II (48.46%).

Based on this study, majority of female participants have impacted mandibular third molars which indicates that impacted mandibular third molars may have a female predilection. Besides, other studies also have reported predominance of female associated with impacted molars. There are a few reasons that may be the factors of gender specific mandibular traits. The possibility of larger jaw bone size, dietary intake, role of genetic factors or a combination of genetic and dietary factors have been said to have effect on low prevalence of impacted third molars in males. As said earlier in the introduction, impaction of mandibular third molars are most commonly due to lack of space in the mandible between second molar and the ascending ramus. This may be the cause for why more females are associated with mesioangular impaction as mandibular growth stops in females leading to lesser space.[15]

Conclusion

Based on this study, a mesioangular impaction according to winter's classification with Pell and Gregory's classification of IIA is the most common type of impaction. However, results cannot be generalized as the study has been done only on Asians. More studies are required on diverse population to confirm the results.

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