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Original Research

Analysis Of Mandibular Third Molar Impaction: A Radiographic Survey

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ABSTRACT
Background: Mandibular third molars are the most commonly impacted teeth and frequently associated with various pathologies including infection, traumatic, inflammatory and cystic lesions necessitating their surgical removal. To avoid complications, clinical and radiographic evaluation of impacted teeth is essential to provide information about tooth anatomy, position and condition of the surrounding bone. **Aim:** To radiographically assess the distribution of mandibular third molar impaction. **Materials and Methods:** A descriptive cross sectional study was conducted and a total of 160orthopantomograph (OPG) were evaluated for impacted third molar angulations. The observations were subjected to statistical analysis using Chi-square test. **Results:** Bilateral impaction (55.63%) was more common than unilateral. The mesioangular impaction was more common in both male and female followed by vertical pattern.**Conclusion:**The study showed that there was no gender predilection in the presence of impacted mandibular third molars and that the mesioangular pattern of impaction was more common.

Keywords: Impacted Teeth, Mandibular Third Molars, Mesioangular Impaction, Orthopantomograph

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INTRODUCTION

Tooth impaction is one of the most common abnormalities of tooth position [1]. Impaction is defined as a completely or partially unerupted tooth and positioned against another tooth, bone, or soft tissue so that its further eruption would be unlikely [2]. It is considered as a pathological condition in which a developed teeth fail to erupt or reach the normal functional position in the dental arch within the known physiologic time [3]. In human dentition, the third molars have the highest impaction rate of all teeth accounting for more than 95% of all impacted teeth, followed by the canines, central incisors, and premolars [3,4]. Third molars are also known as wisdom teeth as they erupt in the late adolescence or even in adulthood. at ages ranging from 16 to 24 years [5,6].

The frequency of third molar impaction varies substantially among different populations; and was reported to range from 18% to 70%. This can be attributed to racial variation in the pattern of facial growth and jaw and tooth size, which are crucial determinants of the eruption pattern[7].

Several factors have been reported to be responsible for the high rate of impaction of Mandibular Third Molar (MTM). These include less space in the dental arch, inappropriate angulations and wrong path of eruption, high thickness of overlying soft and hard tissues, and the untimely eruption sequence. Mesiodistal width of the third molar may also have a part in the tendency for impactions [6].

Although impacted third molars may remain symptom free indefinitely, they could cause a clinical table of pain and infection, pericoronitis, trismus and tumours, decay, incisor crowding, resorption of adjacent tooth roots, food impaction, cheek biting, odontogenic cysts, osteitis, osteomyelitis and periapical lesions [4,8,9].

The surgical extraction of mandibular 3rd molars is one of the maximum executed oral and maxillofacial surgical procedure all over the world. Radiography has always been used for a long time as a part of the preoperativee evaluation before the extraction of the 3rd molar [10].

Currently, the panoramic radiograph (OPG) is the technique of choice to pre-operatively evaluate status of impacted mandibular third molars. It is used to

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assess the angular position of impaction, level of impaction and amount of covering bone. In addition, panoramic radiograph is a reliable tool to evaluate the relationship between inferior alveolar canal and mandibular third molars[7,11]. Hence, with this background the present study was conducted to radiographically assess the distribution of mandibular third molar impaction.

MATERIALS AND METHODS

The present descriptive cross sectional study was conducted during a period of 05 months from January 2024 to May 2024, in the Department of Dentistry, Patna Medical College & Hospital, Patna, Bihar. Ethical clearance was obtained.

This study represents the analysis impaction pattern of mandibular third molars using orthopantomograph (OPG) of those patients who were advised the same for various purposes. A total of 160 OPGs were chosen according to the following inclusion and exclusion criteria.

Inclusion criteria

• Impacted mandibular third molars with completed root formation radiographically
• Panoramic radiographs of male and female patients in the age group of 18–30 years
• No history of trauma
• Images of good quality that had the clearest reproduction of teeth without any superimposition.

Exclusion criteria

• Agenesis of mandibular third molars
• Third molar tooth buds or third molars having underdeveloped roots (i.e., radiographically less than two-third root formation)
• Patients with history of extraction of mandibular third molars, mandibular fractures or orthodontic treatments
• Patients with developmental anomaly, congenital or systemic disease, and/or major pathology in the mandible that has/had caused severe bone resorption/destruction, bone expansion, root resorption, and tooth migration, cysts and tumors involving orofacial structures
• Impacted teeth other than mandibular third molars

Study parameters

The parameters which were evaluated in the present research were:

a. Unilateral or bilateral impaction of the mandibular third molar
b. Pattern of impaction of the mandibular third molar
c. Gender difference

Based on the above data, the impaction degree of the impacted tooth was determined according to the classifications by Winter, G. B. Winter documented impaction types based on angulation—the inclination of the crown of an impacted third molar—concerning the angle formed between the long axes of the second and third lower molars. The angle formed is used to determine the mesial, distal, horizontal, and vertical inclination in relation to the second molar [1,5].

All collected data were statistically evaluated using the Statistical Package for Social Sciences version 25.0 (SPSS Inc., Chicago, IL, USA). A descriptive analysis of the sample was initially conducted utilizing frequencies (proportions) for categorical variables. The chi-square test was employed to examine the proportions of different types of impaction between genders. A p-value below 0.05 was considered statistically significant.

RESULTS

Out of total 160 OPGs evaluated, 98 (61.25%) and 62 (38.75%) belonged to male subjects and female subjects (Graph 1). Bilateral impactions, with a frequency of 89 (55.63%), were more common than unilateral impactions (on either left/right side) with a frequency of 71 (44.37%) as shown in Graph 2.

The most common pattern of impaction seen in both unilateral as well as bilateral impactions was mesioangular, which was statistically significant ($P < 0.05$). In unilateral impaction mesioangular (38.0%) was most common followed by horizontal (28.2%), vertical (21.1%) and distoangular (12.7%) patterns. Whereas, in bilateral impactions, mesioangular(47.2%) was followed by vertical (22.5%), horizontal (20.9%) and distoangular (12.3%). The least common pattern in both unilateral and bilateral was distoangular (Table 1).

In the present study, bilateral impactions were studied in detail for gender distribution of the type of impaction. Gender distribution for common pattern of bilateral impaction was mesioangular, both in males (47.3%) and in females (46.9%), followed by vertical pattern both in males (23.2%) and in females (21.2%). No statistical significance was found between the gender and type of bilateral impactions (Table 2).

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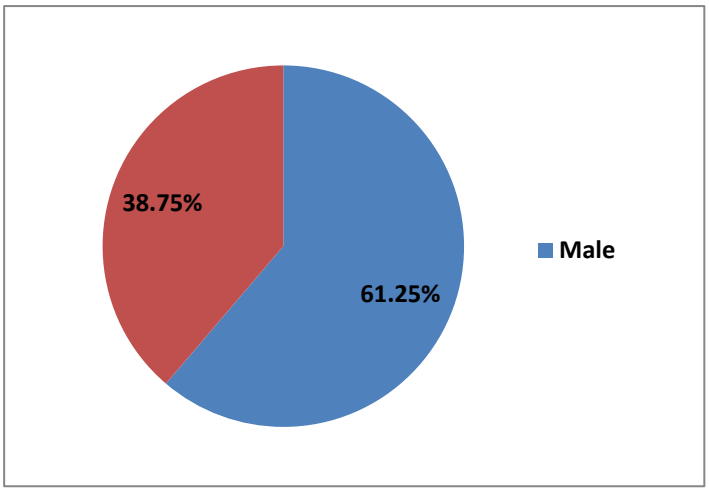
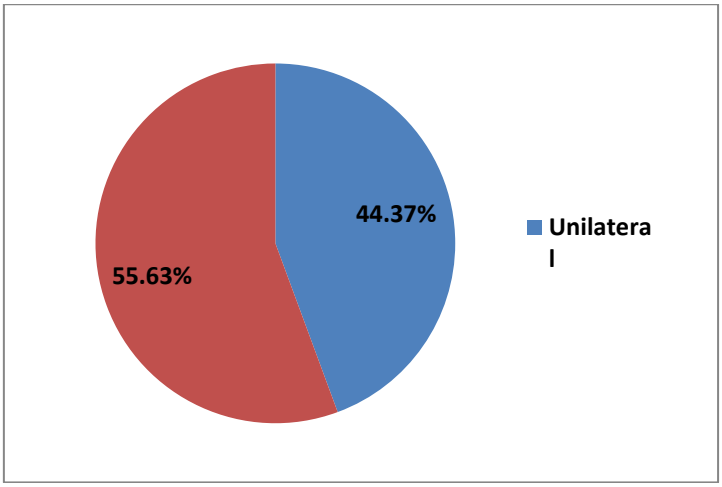


Graph 1: Gender distribution of impaction



Graph 2: Gender distribution of impaction

Table 1: Different patterns of impaction in unilateral and bilateral impactions

Side	Angulation				Total	Chi-square value	p value
	Mesioangular	Distoangular	Horizontal	Vertical			
Unilateral	27 (38.0%)	9 (12.7%)	20 (28.2%)	15 (21.1%)	71 (100%)	8.13	<0.05
Bilateral	84 (47.2%)	22 (12.3%)	32 (18.0%)	40 (22.5%)	178 (100%)		
Total	111 (44.6%)	31 (12.4%)	52 (20.9%)	55 (22.1%)	249 (100%)		

Table 2: Gender distribution of patterns of bilateral impactions

Gender	Angulation				Total	Chi-square	p value
	Mesioangular	Distoangular	Horizontal	Vertical		2.14	0.50
Male	53 (47.3%)	11 (9.9%)	22 (19.6%)	26 (23.2%)	112 (100%)		
Female	31 (46.9%)	11 (16.7%)	10 (15.2%)	14 (21.2%)	66 (100%)		
Total	84 (47.2%)	22 (12.3%)	32 (18.0%)	40 (22.5%)	178 (100%)		

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DISCUSSION

Teeth that fail to erupt into their normal position in the jaws on the expected eruption time due to many reasons are considered impacted. These teeth may stay intact throughout the life of the person with no signs or symptoms. However, at any time, pathological conditions may develop with the association of the impacted teeth, which indicates the necessity for the removal of the impacted teeth. However, the removal of impacted teeth may carry some risks and complications that affect the quality of life of patients in the short term or even for the long term [12].

The presence of an impacted mandibular 3rd molar as a developmental anomaly is widely recognized all over the world. It is included within the World Health Organization definitions of the International Classification of Diseases (ICD-10) [10]. Classifications of the spatial location of impacted lower third molars allow us to determine the degree of impaction of the tooth, which allows preoperative determination of the degree of difficulty of the procedure and the best methodology for the surgical removal procedure [13].Winter's classification is the most commonly chosen method for spatial assessment of impacted teeth in the literature because of its simplicity of use. It does not require the use of additional measuring instruments, which influences its widespread use in clinical practice [1] and thus has been applied in the present study to radiographically assess the pattern of mandibular third molar impaction.

A total of 160 panoramic radiographs for impacted mandibular third molars of subjects in the age group of 18 – 30 years were included in this study, similar to those in the study of Nagraj T *et al.* [14] and Colak M since third molar teeth are known to erupt at the age of 17 – 21 years [8].

In the present study, 61.25% were males and 38.75% were females which showed androcentric results which is in accordance to the study conducted by Ujwala et al. (51% males and 49% females) [6] and Siddharth Gupta et al. (53.11% males and 6.89%% females) [11]. The study by Aljajj MN et al[3]showed that the prevalence of impacted third molars was slightly higher in males than in females similar to our study.However the assessments by Nagraj T *et al.* [14], Preethi and Deepak [5] and Shaari et al. [15] showed female predominance which is not consistent with our study. The differences might be attributed to the differences in the sample size and ethnic groups.

The current investigation demonstrated bilateral impactions with a frequency of 55.63% being more common than unilateral impactions which had a frequency of 44.37%. This may be due to the small sample size of the study. This finding was in agreement with the study conducted by Nagraj T *et al.* [14] that reported 55.7% bilateral impactions.

It is difficult to compare the prevalence of angular position of impaction in different populations, since the classification criteria vary among authors. Our method for determining the angular position was based on winter's classification.

In the present study, mesioangular impaction was the most common angular position seen in both unilateral (38.0%) as well as bilateral (47.2%) impactions. This finding is similar to the results of the study done by Nagraj T *et al.* [14].

The conducted assessment showed a maximum number of mandibular third molar were in mesioangular (44.6%) position followed by vertical (22.1%) andhorizontal (20.9%) positions. Same results were obtained by Obiechina A.E et al. [16]. The mesioangular pattern of impaction was more common in our study which is in accordance with the study of Jaron A [1], Aljajj MN et al. [3], Preethi and Deepak [5],Ujwala et al. [6], Hatem M et al[07], Nagraj T *et al.* [14]. However, contrasting findings were observed in studies done by Gebeyehu T [9], Siddharth Gupta et al. [11], Shaari et al. [15] and Poudel DC [17] found that the highest number of impacted third molars was in vertical position. These results demonstrate that angular position of impacted third molars varies among population groups included in each study.

In the present study, gender distribution for the pattern of impaction was also investigated. Mesioangular was the most common pattern seen in both males (47.3%) and in females (46.9%), followed by vertical pattern both in males (23.2%) and in females (21.2%), similar to those reported by Nagraj T *et al.* [14].

CONCLUSION

Currently, the panoramic radiograph is the preferable radiographic approach to pre – operatively assess the impacted mandibular third molars. From the above study it can be concluded that bilateral impactions are more common than the unilateral. It was also found that mesioangular was the most common type of impaction in both unilateral and bilateral impactions, and also the common pattern of impaction was in both the genders, followed by vertical pattern.

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