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Radiographic assessment of distribution of mandibular third molar impaction: A retrospective study

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Abstract
Introduction: Third molars are the most frequently impacted teeth because of their particular topography, phylogeny and ontogeny. They are directly or indirectly associated with numerous disorders in the mouth, jaw and facial regions. Therefore, the extraction of third molars is one of the most common surgical procedure for Oral and Maxillofacial surgeons.
Aims and Objectives: The present study evaluated (1) the distribution of the impaction of mandibular third molar; (2) the distribution of the patterns of impaction radiographically.
Materials and Methods: This hospital‐based retrospective study was conducted over a course of 6 months in the Department of Oral Medicine and Radiology and presents the analysis of 120 panoramic radiographs of patients between the age group of 18–35 years. They were interpreted and assessed for the impaction of mandibular third molars. Statistical analysis was done by Chi‐square test.
Results: Bilateral impaction of mandibular third molar is more common than unilateral in both the sexes, with mesioangular being the most common pattern. In males, mesioangular pattern is most common was followed by horizontal, whereas in females it was followed by vertical.
Conclusion: The present study provides useful data regarding the radiographic position of impacted mandibular third molars in patients.

Keywords: impaction, mandibular third molar, panoramic radiograph, topography

1. Introduction

Third molar, also known as the "wisdom tooth," is the only tooth to erupt in adolescents or even in adults. Impaction is defined as completely or partially unerupted and positioned against another tooth, bone or soft tissue, such that its further eruption would be unlikely [1]. Third molars are the most frequently impacted teeth because of their particular topography, phylogeny and ontogeny. They are directly or indirectly associated with numerous disorders in the mouth, jaw and facial regions. Therefore, the extraction of third molars is one of the most common surgical procedure for Oral and Maxillofacial surgeons [2].

Impacted teeth were seldom a problem in human being. Their highly abrasive diet caused attrition of teeth resulting in a reduction of mesiodistal distance of the dentition. This allows the mesial migration of teeth and adequate space was available for the eruption of the third molars. However, with the arrival of refined food and consequential reduction in the masticatory functional load, today, the rate of impaction of third molars shows a significant increase (John Hunter theory of nature and nurture). Mead believed that delay in eruption causes impaction of teeth [3].

Pattern of impacted third molar (Winter's classification) is determined by the angle formed between the intersected longitudinal axis of the second and third molars [Vertical impaction (10° to -10°), mesioangular impaction (11° to 79°), horizontal impaction (80° to 100°), distoangular impaction (-11° to-79°)] [4].

This study aimed to determine A) The status of maxillary and mandibular third molars in a sub-population of the district of Jharkhand by evaluating the following factors Prevalence, Incidence of agenesis of third molars, Angulation, Level of eruption and Available space of eruption and mesiodistal diameter of impacted third molars.

2. Materials and Methods

This hospital‐based retrospective study was conducted, in the Department of Oral Medicine and Radiology. This study represents the analysis of panoramic radiographs of those patients who were advised the same for various purposes. ORTHOPHOS XG, by Denstply Sirona, USA, panoramic (OPG) machine, took all panoramic radiographs. A total of 120 panoramic radiographs of patients in the age group of 18-30 years were interpreted and assessed for the mandibular third molar impactions. The panoramic radiographs were chosen according to the following 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
- Images of good quality that had the clearest reproduction of teeth without any superimposition.

Exclusion criteria

- Agenesis of mandibular third molars
- 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.
- Impacted teeth other than mandibular third molars.

The results were analyzed by Chi‑square test by a statistician using Statistical Package for Social Sciences Software (SPSS) version 11.0

3. Results

122 panoramic radiographs for impacted mandibular third molars were studied and recorded by performing Chi‑square test. They were then classified according to sex; 50 (58.3%) were males and 70 (41.6%) females [Table 1]. Bilateral impactions, with a frequency of 67 (56%), were more common than unilateral impactions (on either left/right side) with a frequency of 53 (44.3%) [Table 2].

The most common pattern of impaction seen in both unilateral as well as bilateral impactions was mesioangular, which was statistically significant ($P < 0.001$). In bilateral impactions, mesioangular (33%) was followed by vertical (21%) and horizontal (31%). The least common pattern in both unilateral and bilateral was distoangular [Table 3, & Table 4]

Table 1: Gender Distribution of Impaction

Gender	Frequency	%
Male	50	41.66%
Female	70	58.33%
Total	120	100%

Table 2: Bilateral or Unilateral Distribution of Impaction

Side	Frequency	%
Unilateral	53	44
Bilateral	67	56
Total	120	100

Table 3: Different Patterens of Bilateral & Unilateral Impaction

Side	Angulation	Frequency	%
Unilateral	Mesioangular	19	36%
	Distoangular	4	8%
	Horizontal	14	27%
	Vertical	15	29%
	Total	53	100%

Table 4: Different Patterens of Bilateral & Unilateral Impaction

Side	Angulation	Frequency	%
Bilateral	Mesioangular	22	33%
	Distoangular	10	15%
	Horizontal	21	31%
	Vertical	14	21%
	Total	67	100%

4. Discussion

Impaction may be defined as the failure of complete eruption into a normal functional position of one tooth within normal time due to lack of space in the dental arch, caused by obstruction by another tooth or development in an abnormal position. The most often congenitally missing as well as impacted teeth are the third molars, which are present in 90% of the population with 33% having at least one impacted third molar. They account for 98% of all the impacted teeth. The mandibular third molar is the most frequently impacted tooth. The incidence varies from 9.5% to 68% in different populations [5].

Peterson characterized impacted teeth as those teeth that fail to erupt into the dental arch within the expected time [6]. Studies conducted by Kramer and Williams reported that maxillary third molar is commonly impacted (62.57%) compared to mandibular third molars (47.44%). Impaction of mandibular third molar is more symptomatic and disturbs an individual's routine [7]. Impaction of mandibular third molars is a common condition related with the difficulty of extract tion and risk of various associated complications such as pain, swelling, inferior alveolar nerve damage, alveoli is, incomplete root removal, bleeding, delayed healing, postoperative infection and bony spicules [8].

At present, orthopnea tomography is the radiographic technique of choice to evaluate impacted mandibular third molars. The estimated specificity for radiographic signs, as predictor of nerve injury ranges from 96 to 98%. The radiation dose of a panoramic radiograph is lower than that from four periapical views and the diagnostic yield is higher [4].

The present study was conducted to record the distribution of impacted tooth, its unilateral or bilateral involvement, Out of a total of 120, the OPG interpretation were classified according to sex; 70 (58.3%) were males and 50 (41.6%) were females. There was not as much sexual difference in this study in relation to prevalence of third molar impaction, which was in agreement with Kramer and Williams and raised the question against Hellmen's statement that jaws of the females stopped growing, when third molar just started to erupting, whereas in males the growth of the jaws continued beyond the time of third molar and hence, he proposed that impaction of third molar is very common in females than in males [9].

In the present study, even though bilateral impactions with a frequency of 67 (55.7%) were more common than unilateral impactions with a frequency of 53 (44.3%), the difference was not statistically significant. This may be due to the small sample size of the study. This finding was in agreement with the study conducted by Guthua and Mwaniki in 1992 that reported 68.2% bilateral impactions [10].

5. Conclusion

Radiographic diagnosis of the, position and angulation of third molar formation is very importent for treatment planning. Panoramic radiographs can be used as valuable predictor of the outcome of the impacted mandibular third molars position as they appear to have good quality. From the above study it can be concluded that Bilateral impactions are more common than unilateral, Mesioangular is the most common pattern of impaction in both unilateral and bilateral impactions cases.

The only limitation of present study is its small sample size. However, this study can be added to future comprehensive studies involving impacted mandibular third molars to set a gold standard for early prediction, evaluation and to avoid all possible complications during post‑disimpaction procedures.

6. References

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