Evaluation of pattern of impacted third molar in known population

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Abstract:

Background: The third molar located in the mandible is the tooth that commonly becomes impacted. Therefore, the purpose of this study was to assess the manner in which the third molar becomes impacted in a specific population. Materials & Methods: A total of 50 panoramic X-rays were included in the study. The assessment involved evaluating both the depth of impaction and the relative positioning of impacted mandibular third molars concerning the mandibular ramus. The data collected was subjected to analysis using the Chi-square test, and the resulting outcomes were processed employing SPSS software. **Results:** The distribution of impaction levels among mandibular 3rd molars was investigated individually for both the right and left sides. For both sides, Level C emerged as the predominant depth of impaction, accounting for 42.8% on the right side and 40% on the left side. **Conclusion:** The most common patterns of impaction were characterized by level C impaction and Class I impaction.

Keywords: impaction, third molar, pattern.

Introduction:

The term "impaction" is derived from the Latin word "impactum," which refers to a structure that, due to an abnormal mechanical situation, has been hindered from taking its usual position. William's definition of an impacted tooth is one that is either entirely or partially unerupted and is situated against another tooth, bone, or soft tissue in a way that makes its continued eruption improbable.¹ Impacted teeth refer to those that do not successfully emerge or progress to their intended functional position within the oral cavity within the expected timeframe. The underlying causes are often varied and can stem from factors such as neighboring teeth, compact bone or soft tissue obstructing the way, limited space in the jaw due to the size of the mandible or maxilla, irregular path of eruption, abnormal positioning of the tooth bud, uneven growth of roots between the mesial and distal ends, or the presence of pathological lesions.² This condition is a prevalent anomaly in tooth

positioning.³ A tooth that is impacted (also referred to as dens retens) is characterized by having a fully developed root and complete growth, yet it is either partially or entirely covered by both hard and/or soft tissues.⁴ This situation occurs outside the expected timeframe for natural eruption. ⁵ The surgical removal of impacted wisdom teeth is a standard procedure commonly carried out in dental surgeries. Published research has indicated a range of prevalence for impacted teeth, varying from 7% to 76.5%. ⁶ The third molars, particularly in the mandible, are the most frequently impacted teeth. They stand out as one of the most commonly affected teeth, along with the maxillary canine and mandibular 2nd premolar.⁴

The reasons behind the impaction of third molars can be categorized as either general or local factors. ⁷ Over the past few decades, there has been a noticeable rise in the occurrence of impaction. This trend can be attributed to heightened levels of hygiene, reduced instances of tooth loss, and the impact of changes in dietary habits leading to a decrease in natural tooth attrition.⁸

The degree of impaction was assessed using the Pell and Gregory classification system, outlined as follows. For Position A, it was noted if the uppermost part of the impacted mandibular third molar aligned with or exceeded the occlusal plane. In the case of Position B, it was documented if the uppermost part of the impacted mandibular third molar lay below the occlusal plane but still remained above the cervical line of the second mandibular molar. Position C was recorded when the highest point of the impacted mandibular third molar was situated beneath the cervical line of the second mandibular molar. ⁹

The pathological positioning of the impacted mandibular 3rd molar was ascertained using the subject's Orthopantomogram (OPG), wherein the presence of lesions was examined based on whether the widest section of the distal aspect of the mandibular third molar measured >2.5 mm, and the existence of caries within the impacted third molar.¹⁰ Digital panoramic radiography provides a comprehensive view of all the maxillofacial regions and has been widely employed for diagnosing variations in impacted third molars. The assessment of the type of impaction can aid in devising a treatment plan and determining the appropriate surgical approach. ¹¹ Among different types of teeth, third molars in humans exhibit the highest rate of impaction. This incidence of impaction varies among various ethnic groups and populations. ¹² Thus, the objective of this study was to analyze the pattern of impaction of the third molar within a specific known population.

Materials & Methods:

A total of 50 panoramic X-rays were included in the study. The assessment involved evaluating both the depth of impaction and the relative positioning of impacted mandibular third molars concerning the mandibular ramus. This assessment was carried out utilizing Pell and Gregory's classification system. Determining the position in relation to the mandibular ramus entailed identifying where the rear surface of the third molar's crown was positioned compared to the front border of the ascending ramus. Pell and Gregory's classification system categorized this as follows:

Type I: The rear surface of the molar is anterior to the front border of the ramus (the crown is not covered by the ramus).

Type II: The rear surface of the molar is posterior to the front border of the ramus (a section of the crown is covered by the ramus).

Type III: The rear surface of the molar is posterior to the front border of the ramus (the entire crown is covered by the ramus).

The data collected was subjected to analysis using the Chi-square test, and the resulting outcomes were processed employing SPSS software.

Results:

The distribution of impaction levels among 3rd mandibular molars was investigated individually for both the right and left sides. For both sides, Level C emerged as the predominant depth of impaction, accounting for 42.8% on the right side and 40% on the left side. Statistical examination demonstrated no notable correlation between the side (right or left) and the depth of impaction (p=0.4). Likewise, the arrangement of impacted mandibular third molars in relation to the mandibular ramus was scrutinized separately for the right and left sides. In both instances, Class I was the most prevalent position, with 57.2% observed on the right side and 66.7% on the left side. The analysis indicated no substantial connection between the side (right or left) and the positioning of impaction (p=0.7).

Table 1: Frequency distribution of the level of impaction according to the side.

Side	Level A	Level B	Level C	Total	P - value
Right	8 (22.8%)	12 (34.4%)	15 (42.8%)	35	0.4
Left	4 (26.7%)	5 (33.3%)	6 (40%)	15	

Side	Class I	Class II	Class III	Total	P - value
Right	20 (57.2%)	10 (28.6%)	5 (14.2%)	35	0.7
Left	10 (66.7%)	3 (20%)	32 (13.3%)	15	

 Table 2: Frequency distribution of position according to the side

Discussion:

A tooth that cannot naturally progress to its intended functional anatomical position within the expected time frame is considered impacted. Typically, third molars emerge between the ages of 18 to 25 years.¹³ More than a third of third molars become impacted due to a lack of adequate space. Third molars are the last teeth to erupt and have a relatively higher likelihood of becoming impacted. The causes of third molar impactions have been explored by various researchers over time. Factors such as insufficient space, delayed facial growth, eruption directed towards the back of the mouth, early physical maturation, late mineralization of the third molar, inadequate force for eruption, encounters with adjacent structures like follicular collision, and obstructions created by physical or mechanical barriers such as scar tissue. fibromatosis, dense bone, unattached mucosa, and tumors are commonly implicated reasons. Furthermore, the higher occurrence of impactions in the lower jaw can be attributed to an imbalance in the bone remodeling process at the mandibular ramus, leading to alterations in the angulation of the mandible or the mandibular plane. ¹⁴ Impacted third molars are often associated with various pathological conditions, including pericoronitis, caries, accumulation of food debris, formation of pockets, loss of bone around the teeth due to periodontal issues, and resorption of neighboring teeth's roots.¹⁵ Given these potential complications, the aim of this study was to analyze the characteristic patterns of third molar impaction within a specific, well-defined population.

In the present study, the distribution of impaction levels among mandibular 3^{rd} molars was investigated individually for both the right and left sides. For both sides, Level C emerged as the predominant depth of impaction, accounting for 42.8% on the right side and 40% on the left side. Statistical examination demonstrated no notable

correlation between the side (right or left) and the depth of impaction (p=0.4). According to a study conducted by Shaari RB et al., the findings indicated that the prevalence of impacted third molars was 34.71%, with a male-to-female ratio of 0.83:1. Impacted mandibular third molars were notably prevalent. The occurrence of different angulations-vertical, mesioangular, types of horizontal, and inverted-was significantly associated with impacted mandibular third molars (P < 0.05). Regarding the depth of impaction, Level C was the most common for impacted maxillary third molars, while Levels A and B were significantly prevalent for mandibular third molars. Among the classes of impaction, Class II was significantly the most frequent, followed by Classes III and I. The occurrence of vertical angulation and Level C impaction was associated with maxillary third molars, while Levels A and B of impaction were correlated with mandibular third molars. Class II impaction was the most frequently observed condition. 16

In the present study, the arrangement of impacted mandibular third molars in relation to the mandibular ramus was scrutinized separately for the right and left sides. In both instances, Class I was the most prevalent position, with 57.2% observed on the right side and 66.7% on the left side. The analysis indicated no substantial connection between the side (right or left) and the positioning of impaction (p=0.7). In a retrospective analysis by Passi D et al., panoramic radiographs and intraoral periapical radiographs of 960 patients were examined. Among these, 250 patients were identified to have impacted mandibular third molars, consisting of 152 (60.8%) males and 98 (39.2%) females. The prevalence of third molar impactions was nearly equal on both the left (45.8%) and right (54.2%) sides. Mesioangular impactions (49.2%) were the most frequent type of impaction encountered, while transverse impactions were the least common (2%). They found that the prevalence of impacted mandibular

third molars was approximately 26%. Among the impacted cases, males were more affected than females, and mesioangular impactions were the most prevalent type of impaction.¹⁷ In the study conducted by Al-Angudi SM et al., their investigation the study of population's orthopantomograms (OPGs) revealed that 543 cases (54.3%) displayed at least one impacted third molar. In total, there were 1,128 impacted molars. The most frequent occurrence was two impacted third molars (41%). In the mandible, the most angulation impaction common for was mesioangular (35%), and the most prevalent level of impaction was categorized as level A. Among the 388 instances of bilateral impacted third molars, 377 were located in the mandible. Interestingly, there was no significant discrepancy in the occurrence of impaction between the right and left sides of both jaws.¹⁸ In the study conducted by Yilmaz S et al., the mean age of the participants was 30.58 years, ranging from 19 to 73. Among a total of 2,133 impacted third molar teeth analyzed, the most frequent angulation of impaction in both upper and lower jaws was vertical (1,177 cases; 55%). Level B impaction was most prevalent in the maxilla, accounting for 425 out of 1,037 cases (39%), while level C impaction was most common in the mandible, with 635 out of 1,096 cases (61%). Furthermore, a notable variation in retromolar space was observed based on the jaw area (maxillary: 11.3 mm; mandibular: 14.2 mm) and the level of impaction (Level A: 14.7 mm; Level B: 11.1 mm; Level C: 10.3 mm; p < 0.05). ¹⁹ n the research led by Al-Dajani M et al., a total of 1551 patients (60.8%) were examined, with an average age of 33.5 years. The study identified 2650 impacted third molars. Third molars were notably more prevalent among patients aged 20 to 39 years (p < 0.001) and were more common in the mandible compared to the maxilla (p < 0.001). The study indicated a higher incidence of vertical impactions and a greater rate of impaction in the mandible than in the maxilla. Among different impaction levels, Level A impaction was the most frequent, accounting for 1365 cases (53.5%). Vertical impaction emerged as the predominant pattern, with 1354 patients (53.1%) presenting this type. In the mandible, mesioangular impaction was the second most common, while distoangular second impaction ranked in the maxilla. Interestingly, there was no statistically significant distinction between males and females in terms of the frequency of impaction, the depth of impaction levels, and angulations. The most prevalent pattern of third molar impaction in the northern region of Saudi Arabia was found to be vertically impacted mandibular third molars with their occlusal plane at the same level as the adjacent tooth.²⁰

Conclusion:

Impaction of mandibular third molars was found to be quite prevalent within the population studied. The most common patterns of impaction were characterized by level C impaction and Class I impaction.

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