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Clinical Evaluation of Impacted Mandibular Third Molars and Their Indications for Extraction: A Cross-Sectional Study

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Abstract

Impacted mandibular third molars are a common clinical problem that frequently requires surgical removal. However, population-based information regarding indications for removal of these impacted teeth is lacking in Peshawar, Pakistan. This study aimed to determine the frequency of indications for extraction of impacted mandibular third molars, evaluate the clinical characteristics of impacted mandibular third molars, and describe the age and gender distribution of affected patients. A descriptive cross-sectional study, using non-probability convenience sampling technique, was conducted over six months at the maxillofacial department of different hospitals located in Peshawar, among 171 patients, aged 17-27 years with IMTM advised extraction. Data Were collected through proper questionnaire, clinical/radiographic assessment and were analyzed through SPSS version 25. In addition, correlations were found through Chi-square/exact test. Pain was the most common presenting complaint (70.8%), mesioangular impaction was the most frequent angulation pattern (42.7%), and dental caries of the third molar leading common indication for extraction of impacted mandibular third molar (30.4%), followed by pericoronitis (19.3%). A Chi-square exact test with Monte Carlo simulation showed a statistically significant association between impaction type and indication for extraction (chi^2 = 102.482, df = 27, $p < 0.001$), with mesioangular impaction most strongly linked to carious indications. Dental caries was the most common indication for

extraction of impacted mandibular third molars in this population, and was significantly associated with mesioangular impaction. Early radiographic screening and targeted oral health awareness are recommended for this region.

Introduction

The final set of teeth that erupt, usually between the ages of 17 and 25, are the third molars, sometimes referred to as wisdom teeth. These teeth frequently lack enough room for appropriate eruption due to evolutionary changes in human jaw size and eating habits, which results in impaction D'Amico et al. (2025).

The excision of asymptomatic, pathology-free third molars is a topic of significant international debate. Age, anatomical linkages, overall health, patient preferences, and lifestyle are just a few of the variables that influence these professional decision-making Sánchez-Grace's et al. (2024). Many international guidelines recommend a conservative approach for asymptomatic and disease-free third molars, advocating regular monitoring rather than routine extraction.

Impacted third molars are rather common in tertiary care hospitals in Peshawar along with other pathologies, including pain, pericoronitis, caries, periodontitis, cystic changes, etc., which require surgical removal Khan et al. (2021).

An impacted tooth is defined by the World Health Organization (WHO) as one that does not erupt in its typical occlusion because of impediments in its course, such as soft tissue, overlaying bone, or another tooth. Mandibular third molars have the greatest rate of impaction of any tooth Adeola et al. (2023). The mandibular third molar remains the most commonly impacted tooth in the entire human oral cavity, accounting for a striking 98% of all reported cases of impacted teeth presented in maxillofacial and clinical settings Lamichhane et al. (2023).

The etiology of impaction is multifactorial, involving genetic, environmental and anatomical factors that impede the proper eruption of these teeth Ishfaq et al. (2024). Therefore, in order to avoid more problems, impacted mandibular third molars must be extracted since they can cause pain, discomfort, infection, crowding, and damage to neighboring teeth. The primary and most effective therapy for impaction-related issues is the extraction of symptomatic impacted mandibular third molars Gaballah et al. (2025).

Third molar impaction is classified as a developmental disorder in the World Health Organization's (WHO) International Classification of Diseases (ICD-11) in the group of development diseases Pinto et al. (2024).

Patient needs and orthodontic objectives may be considered a factor in extraction of impacted mandibular third molar teeth. For patients who develop these teeth, an orthodontist must bother as their presence can complicate the alignment of teeth and the intended goals of the orthodontic treatment Ashfaq et al. (2022).

The excision of the mandibular third molar as a preventative measure is a contentious matter. Consequently, the most common procedure carried out by dental surgeons is the extraction of a third molar. It is considered the definitive treatment for the vast majority of impaction-related pathologies Peñarrocha-Diago et al. (2021).

According to winter's classification, third molars can be impacted in a vertical, mesioangular, horizontal, Inverted Molars showing a negative angle, or distoangular orientation Gebeyehu & Abaynew (2024).

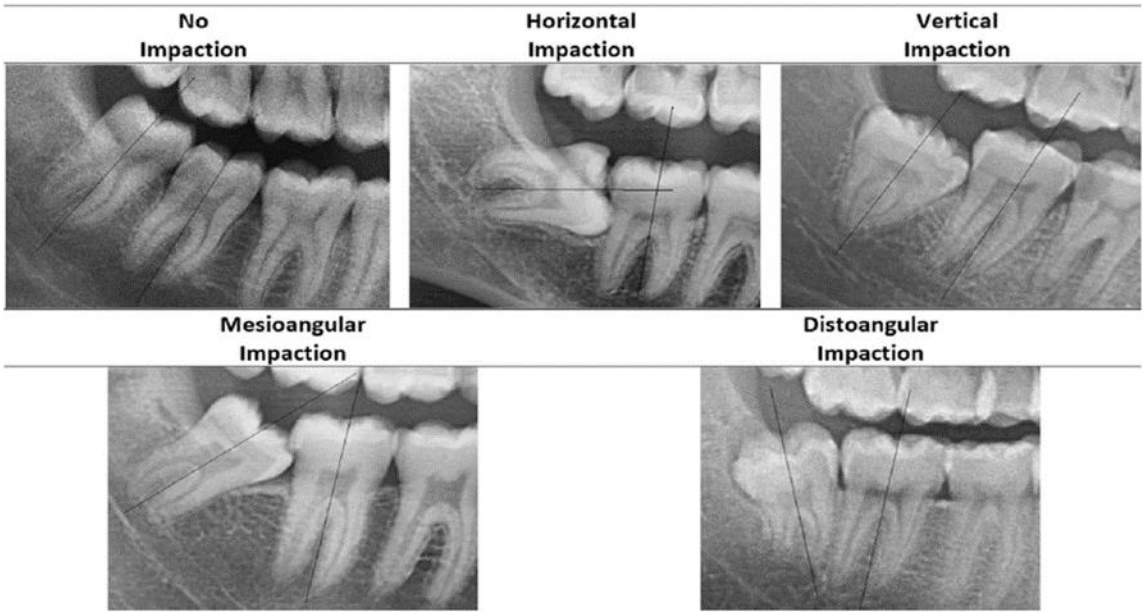


Figure 1: Angles of winter's classification

Among the most often, used methods for estimating the complexity of surgical operations are the winter and Pell and Gregory categories. The third molars are categorized as Class I, II, or III using the Pell and Gregory method.

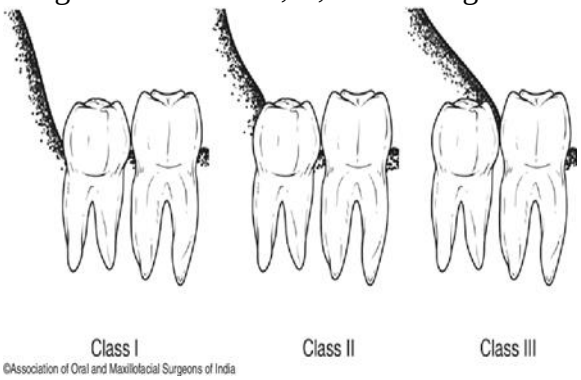
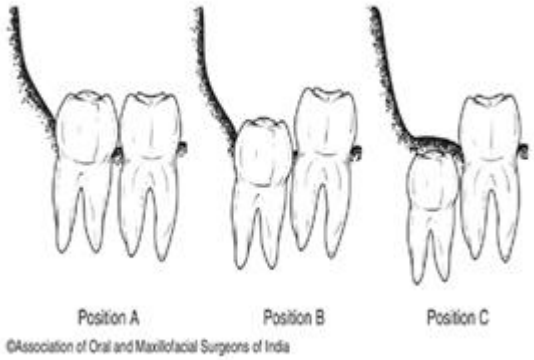


Figure 2: Class I, II, III

The ascending mandibular ramus, or the area accessible distal to the second molar, and the impacted third molar tooth are related. According to the relative depth of the impacted tooth in the bone, this categorization also takes into account levels A, B, and C for third molars Khojastepour et al. (2019).



In the field of dentistry, panoramic radiographs are frequently employed since, in contrast to other advanced diagnostic instruments, they offer a bilateral picture of the mandible and are rapid, inexpensive, and need little radiation. Additionally, it is regarded as one of the appropriate

Radiographic methods for evaluating the mandibular linear and angular dimensions as well as the lower third molar space Jeevitha et al. (2022).

Literature Review

Impacted mandibular third molars were found in 2.51% of cases, according to a retrospective research done at the Obafemi Awolowo University Teaching Hospitals Complex in southwest Nigeria. The study examined 469 patient records. Pericoronitis was the primary rationale for extraction, followed by periodontal pocket development impacting neighboring teeth, and mesioangular impaction was the most prevalent pattern, according to the research Adeola et al. (2023).

A study in Nepal reported recurrent pericoronitis (62.9%) as the main clinical indication for extracting impacted mandibular third molar, followed by dental caries (11.7%), with mesioangular impactions being most common (33%) Subedi et al. (2020).

Mesioangular impaction (48.3%) was the most prevalent angulation of impaction in the mandible, followed by horizontal impaction (29.3%), according to a research conducted in southeast Iran14 Gebeyehu & Abaynew (2024).

A 349 individuals with impacted mandibular third molars participated in another study carried out at Khyber Medical University Institute of Dental Sciences, Kohat (KP, Pakistan). Males predominated, with a mean age of 26 ± 6 years. With the exception of horizontal impactions, where second molar root resorption was more likely, mesioangular impaction was the most prevalent kind, and pericoronitis was the primary rationale for extraction Sardar et al. (2019).

A study reported, mesioangular impaction was the most common pattern, found in 43.58% of patients, followed by horizontal impaction (26.15%), vertical impaction (16.92%), and distoangular impaction (13.33%). These findings indicate that mesioangular impaction is the predominant type of impacted mandibular third molar Khan et al. (2021).

131 patients having the extraction of impacted mandibular third molars were assessed in a research carried out at Peshawar Dental College. The participants' average age was 31.90 ± 10.67 years. Pericoronitis (35.11%) was the most frequent reason for extraction, followed by chronic periodontitis (10.69%) and dental caries (25.95%). External root resorption, periapical disease, cyst development, malignancies, and tooth fracture were further indicators. External root resorption was more common in men (15.49%) than in females (3.33%), although gender-wise analysis revealed no significant differences in the majority of indications Ishfaq et al. (2024).

MATERIALS AND METHODS

This research employed a descriptive cross-sectional study design, in which data were collected from the study population at a single point in time to describe the characteristics and variables under investigation. Using Non-probability convenience sampling technique. The study was conducted at the maxillofacial department of different hospitals located in Peshawar, Khyber Pakhtunkhwa province, Pakistan. A total sample of 171 patients was calculated using https://www.openepi.com, maintaining a confidence interval taken is 95% and level of confidence or significance is taken, as 5% with anticipated frequency is 87.3%. Where we put data from Article Rizvi et al. (2020). Selection criteria for patients inclusion were patients who were 17 years to 47 years, who had third molar impacted in the mandibular region and had undergone for extraction. While Exclusion criteria were, patients have missing mandibular second molar, patients with history of jaw trauma or surgery, and Patient with pregnancy and uncontrolled diabetes

Data Collection and Analysis Procedure

Ethical letter was obtained from ETHIC BOARD COMMITTEE OF ABASYN UNIVERSITY after its approval. A written permission mentioning the reason for the study was presented to the head of Dental department at different tertiary hospitals in Peshawar. Informed consent was taken from patients before including them in the study. Data was collected through a proper structured questionnaire after collecting all the date were checked and reviewed. Finally, the collected data was analyzed by putting the entire variable in SPSS (version 25). Continuous variables (such as age) were presented as Mean ± SD, while categorical variables (such as gender, chief complaint, impaction angulation, and indication for extraction) were presented as frequencies and percentages, illustrated using bar and pie charts. The association between impaction type and indication for extraction was tested using the Chi-square test (with Monte Carlo simulation applied for the exact test), with $p < 0.05$ considered statistically significant.

RESULTS

This study included 171 patients undergoing extraction of impacted mandibular third molars (IMTMs). Continuous variables (e.g., age) are reported as Mean ± SD, and categorical variables gender, side of impaction, chief complaint, impaction type, and indication for extraction — are reported as frequencies and percentages, presented in descriptive tables and bar charts.

Table 1: Demographic and Impaction-Side Distribution of Study Participants (n = 171)

Variables	Category	N (%)
Gender	Male	108 (63.2%)
	Female	63 (36.8%)
Age groups (years)	17–27	79 (46.2%)
	27–37	60 (35.1%)
	37–47	32 (18.7%)
Impaction side	Right	87 (50.9%)
	Left	84 (49.1%)

Chief Complaint

Patients presented with a range of chief complaints at the time of consultation.

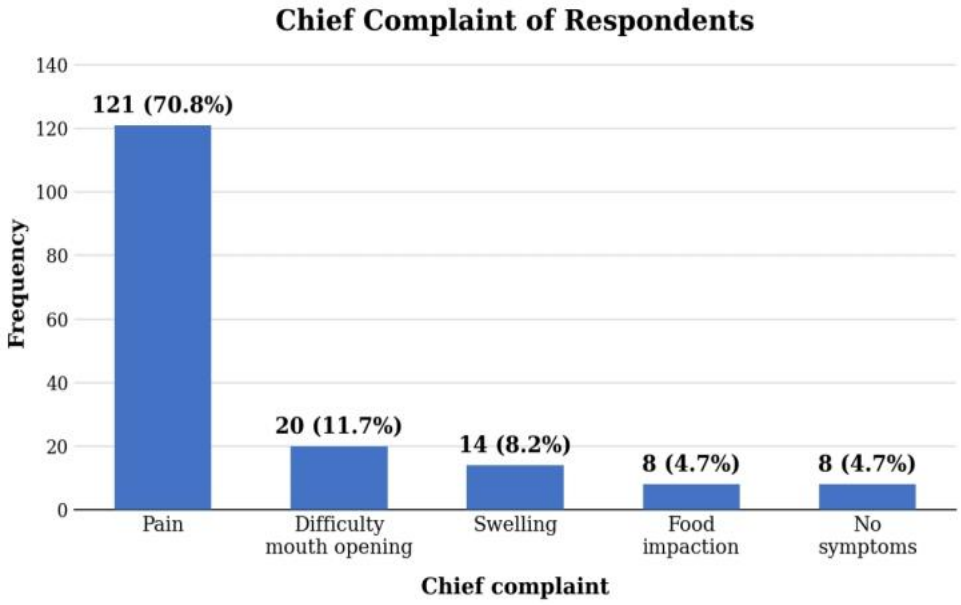


Figure 4.4: Chief Complaint of Respondents (N = 171)

Pain was the predominant chief complaint (70.8%, n = 121), followed by difficulty in mouth opening (11.7%, n = 20), swelling (8.2%, n = 14), and food impaction and absence of symptoms (4.7% each, n = 8), as shown in Table 4.4.

Types of Impactions

The angulation pattern of impaction was classified according to winter's classification.

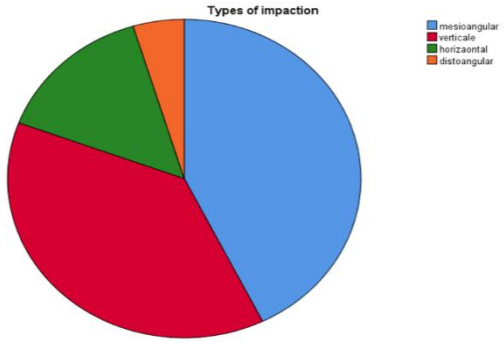
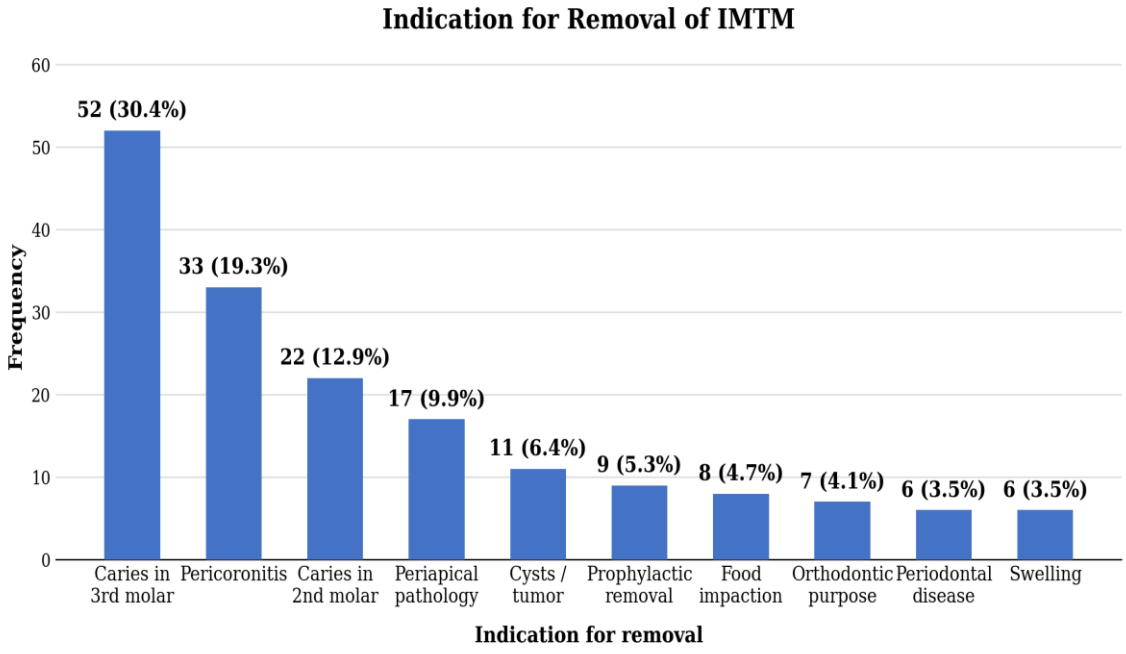


Figure 4.5: Types of Impaction of Respondents (N = 171)

Impaction type distribution was as follows: mesioangular (42.7%, n = 73), vertical (38.0%, n = 65), horizontal (14.6%, n = 25), and distoangular (4.7%, n = 8) — with mesioangular and vertical impactions together comprising 80.7% of cases, as shown in Table 4.5.

Indication for Removal of IMTM

The most common indication for IMTM extraction was third-molar caries (30.4%, n = 52), followed by Pericoronitis (19.3%, n = 33), second-molar caries (12.9%, n = 22), periapical pathology (9.9%, n = 17), and cysts/tumors (6.4%, n = 11). Less common indications included prophylactic extraction (5.3%, n = 9), food impaction (4.7%, n = 8), orthodontic purposes (4.1%, n = 7), and periodontal disease and swelling, each accounting for 3.5% (n = 6), as shown in Table 4.6.



4.7 Association between Impaction Type and Indication for Extraction

A Chi-square test using Monte Carlo exact simulation (10,000 sampled tables) was performed to analyze the relationship between the type of third molar impaction angulation and the clinical indication for removal.

Table 4.7: Chi-Square Tests – Impaction Type × Indication for Extraction (N = 171)

Test	Value	df	Asymptotic Sig. (2-sided)	Monte Carlo Sig. (2-sided)
Pearson Chi-Square	102.482	27	.000	.000
Likelihood Ratio	86.890	27	.000	.000
Fisher's Exact Test	73.755	—	—	.000
Linear-by-Linear Association	3.954	1	.047	.045

A statistically significant association was found between impaction type and extraction indication ($\chi^2 = 102.482$, df = 27, Monte Carlo $p < .001$). Third-molar caries was the most frequent overall indication (30.4%, n = 52), predominating in vertical (38.5%) and mesioangular (32.9%) impactions. Second-molar caries was strongly associated with horizontal (24.0%) and mesioangular (20.5%) angulations but rare in vertical cases (1.5%). Pericoronitis was most common among vertical impactions (27.7%), prophylactic extraction occurred exclusively inmesioangular cases (12.3%), and cystic/tumor pathology was heavily concentrated in distoangular impactions (62.5%), as shown in Table 4.7

DISCUSSION

The mean age of 29.05 ± 7.38 years observed here is comparable to the 26 ± 6 years reported at the same Kohat centre [30] and the 25.45 ± 7.95 years reported in a separate 360-patient cohort Ashfaq et al. (2022). Pain was the most common complaint, experienced by 70.8% of respondents, while mouth opening difficulty and swelling were other complaints. Pain in this regard conforms to the results obtained in Muradnagar, Ghaziabad, where 75% of impacted third molar cases presented pain Kukreja et al. (2011), and also follows the trend that pain is the primary factor leading to patient seeking treatment for impacted third molar throughout the available literature D'Amico et al. (2025) Gaballah et al. (2025). The most common type of impacted tooth was the mesioangular impaction (42.7%), followed by vertical (38.0%), horizontal (14.6%) and distoangular impaction (4.7%). This is very much in conformity with the results obtained by a study performed in Peshawar itself where the prevalence rate for mesioangular impaction was 43.58%, Khan et al. (2021), as well as with the results of Ethiopia (48.3% mesioangular) Gebeyehu & Abaynew (2024) and Nigeria Adeola et al. (2023). This finding aligns with a review of 1,763 third molar extractions at Lagos University Teaching Hospital, Nigeria, where dental caries and its complications were also the leading indication for extraction, ahead of Pericoronitis and periodontal disease Adeyemo et al. (2008). Despite a higher overall proportion in the Nigerian cohort, both studies identify caries as the primary driver of third molar extraction, suggesting that delayed care-seeking and progressive decay are common contributors across different populations. The most frequent cause of removal of the third molar in the current study is caries of the third molar (30.4%) followed by pericoronitis (19.3%) and caries of the second molar (12.9%). Together, caries-related problems and pericoronitis comprised almost two-thirds of the extracted cases. It contrasts with some other local studies conducted earlier which have reported pericoronitis to be the major cause of extraction. Some such studies include those conducted at Peshawar Dental College (35.11%) Ishfaq et al. (2024), KMU-Kohat Sardar et al. (2019), 360 patients' sample (48.3%) Ashfaq et al. (2022) and a Nepalese centre (62.9%) Subedi et al. (2020). Similarly, the pattern of prevalence of caries as a main problem has also been reported in Muradnagar, where 38.07% cases were related to caries and 68.67% pericoronitis Kukreja et al.

(2011). Furthermore, a statistically significant association was found between type of impaction and indication for extraction ($\chi^2 = 102.482$, df = 27, Monte Carlo $p < 0.001$ based on 10,000 sampled tables), with mesioangular impaction showing the highest proportion of carious indications (32.9%) alongside vertical impaction (38.5) among all impaction types. This finding was further indicating the association is robust and not an artifact of category grouping.

CONCLUSION AND RECOMMENDADATIONS

Conclusions

Impacted mandibular third molars (IMTMs) are a significant clinical burden that primarily affects young adult males between the ages of 17 and 27. The most common presenting complaint is pain. Caries in the third molar itself is the primary indication for extraction, followed by pericoronitis and caries in the neighboring second molar. The most prevalent radiographic patterns are mesioangular and vertical impactions. Impaction pattern and extraction indication are highly significantly correlated ($p<0.001$), highlighting the importance of early screening and public oral health awareness to prevent tooth loss and safeguard neighboring teeth.

Recommendations

Future studies should explore modifiable risk factors linked to IMTM extraction to guide prevention strategies, and larger, multi-center prospective studies are needed to further validate the impaction–indication association. Public awareness campaigns should also promote earlier care-seeking to reduce delayed, symptom-driven presentations

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