Original Article

# What is the Most Prevalent Type of Third Molar Impaction in Patients with Pericoronitis?

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## ABSTRACT

**Background:** Pericoronitis is a common pathological condition related to mandibular third molar teeth (wisdom teeth). It is an inflammation of the soft tissue surrounding the crown of an erupted or partially erupted tooth that causes pain and discomfort. We aimed to investigate the relation between third molar impaction types and pericoronitis.

**Methods:** This cross-sectional study assessed 60 patients referred to the Oral and Maxillofacial Surgery Department of Mashhad Dental School, Mashhad University of Medical Sciences, Mashhad, Iran in 2022 for totally and partially impacted mandibular third molar tooth surgery with pericoronitis. Their demographic data, including age and gender, was recorded. The impacted tooth's side and the symptoms of pericoronitis were identified using clinical examination and panoramic radiography imaging, based on the Pell & Gregory criteria and Peterson's classification. Third-molar tooth surgery was performed according to standard protocol. Patients' data were recorded and were analyzed using Excel 2019 and SPSS ver 21.

**Results:** The prevalence of pericoronitis symptoms in women was higher than in men ($P< 0.001$). The Class B type of third molar teeth impaction had a relation with the majority of pericoronitis cases ($P< 0.001$). Pericoronitis and systemic symptoms were more likely to occur in Class II than in Class I type of third molar teeth impaction ($P< 0.001$). The most frequent kind of impaction linked to pericoronitis and systemic symptoms such as malaise was mesio-angular ($P< 0.001$). The symptoms of pericoronitis were substantially correlated with smoking ($P< 0.001$).

**Conclusion:** Class B, Class II, and mesio-angular types of third molar impaction are linked with a higher risk of pericoronitis. This information might help in the early diagnosis and management of pericoronitis in patients with impacted third molar teeth.

**KEYWORDS**
Pericoronitis; Mandibular third molar tooth; Impaction

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## INTRODUCTION

Surgery and extraction of wisdom teeth is a common outpatient dental procedure, primarily performed on the mandible rather than the maxilla. The most commonly reported impacted teeth are the upper and lower third molars, followed by upper canines and lower premolars.

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The high prevalence of wisdom tooth impaction can be attributed to the time of their eruption. As they are the last teeth to erupt, there may not be enough space for them to emerge fully. Extraction is recommended for all impacted teeth, unless there are contraindications [1].

Surgery to remove impacted third molar teeth, like any other surgery, can result in complications and post-operative symptoms that range from mild to severe. The most common pathological condition associated with mandibular wisdom teeth is pericoronitis, which is an inflammation of the soft tissue around the crown of an erupted or partially erupted tooth. This condition typically causes pain for up to seven days and is typically diagnosed in individuals between 17 and 26 years of age [2]. The position of wisdom teeth in the lower jaw is one of the most important factors contributing to and even exacerbating pericoronitis. A study has reported a relationship between the position of wisdom teeth and the incidence of mandibular angle fractures, mandibular condyle disorders, dental caries, and certain periodontal conditions [3]. The likelihood of developing deep periodontal pockets and caries in the distal second molar is greatly increased in cases where horizontal or mesio-angular depressions are present. Additionally, the vertical position of the wisdom tooth is closely associated with the onset of pericoronitis. This is due to the increased contact between the soft tissue and the occlusal space, as well as the presence of pits and fissures, which allow for bacteria accumulation. Consequently, the risk of infection in the tissue surrounding the crown and the occurrence of pericoronitis are both heightened [4, 5].

Pericoronitis is strongly linked to impaction of wisdom teeth and can have a significant impact on an individual's quality of life. Given the relatively high prevalence of wisdom tooth impaction in various societies, we aimed to determine the prevalence of mandibular third molar impaction types in patients with pericoronitis referred to the Department of Oral and Maxillofacial Surgery at the Mashhad Faculty of Dentistry.

## METHODS

This study was conducted at the Faculty of Dentistry in Mashhad, Mashhad University of Medical Sciences, Mashhad, Iran. The participants were selected from among the clients of the Mashhad Dental School's educational clinic. The study period spanned from June 2022 to December 2022.

The study included patients who were candidates for wisdom tooth surgery and had a diagnosis of pericoronitis. Individuals with a history of systemic diseases, immunodeficiency, chemotherapy or radiotherapy, as well as women during breastfeeding and pregnancy, were excluded from the study. Sixty patients, consisting of 40 women and 20 men, were enrolled.

Patient demographic information, including age and gender, as well as the position of the tooth in the quadrant, degree of wisdom tooth impaction, wisdom tooth angle, and the presence of systemic symptoms with inflammation were recorded. Panoramic and periapical radiographic images were used to check the side of the impacted tooth and the severity of pericoronitis symptoms.

Based on the Pell & Gregory criteria and Peterson's classification, the angle of tooth placement, relationship with the anterior edge of the ramus, and relationship with the occlusal plane were recorded.

The most common method of classifying mandibular wisdom teeth is based on the angle of the longitudinal axis of the tooth relative to the adjacent tooth, which is typically the second molar. Based on this, the teeth were classified into five categories: mesio-angular, vertical, disto-angular, horizontal, and transverse.

The positioning of mandibular wisdom teeth can be determined by two factors: their relationship with the anterior edge of the ramus, and their relationship with the occlusal plane.

The positioning of the tooth relative to the anterior edge of the ramus is determined by the extent to which the tooth is covered by the ramus bone. This classification system includes three classes:

1. Class 1: The tooth is entirely in front of the anterior border of the ramus.
2. Class 2: The mesial half of the crown is positioned in front of the ramus, while the distal half is covered by the ramus.
3. Class 3: The entire tooth is covered by the ramus.

Meanwhile, the classification of the tooth's position relative to the occlusal plane is based on the depth of the mandibular wisdom tooth in comparison to the height of the second molar. This classification system also has three categories:

- Class A: The occlusal surface of the third molar is

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nearly level with that of the second molar.
• Class B: The occlusal surface of the third molar is positioned between the occlusal surface and the cervical surface of the second molar.
• Class C: The occlusal surface of the third molar is located below the cervical line of the second molar.

### Statistical Analysis

The results were analyzed using SPSS 21 statistical software (IBM Corp., Armonk, NY, USA). Two statistical tests were utilized to investigate the significant association between the variables: the independent *t*-test and the chi-square test. A *P*-value less than 0.05 was considered statistically significant.

### Ethical Approval

This study was approved by the Ethics Committee of Mashhad University of Medical Sciences (with code IR.MUMS.DENTISTRY.REC.1401.022).

## RESULTS

Sixty patients (comprising 40 women and 20 men) who sought pericoronitis treatment were enrolled for the prevalence of third molar impaction types.
Table 1 presents the demographic information of the patients. Out of the patients, 40 were women and 20 were men.
Table 2 demonstrates that malaise is the most commonly observed accompanying symptom. The incidence of pericoronitis symptoms was found to be associated with the tooth position relative to the ramus (*P* Value < 0.001).
Table 3 exhibits the relationship between pericoronitis symptoms and tooth distance from the occlusal plane (*P* Value < 0.001).
Smoking had a significant relationship with the occurrence of systemic symptoms associated with pericoronitis (*P* value > 0.001). The incidence of pericoronitis symptoms was higher in women than in men.
Table 4 reveals that the lowest systemic symptoms associated with pericoronitis were related to the horizontal placement angle, and the highest were related to mesio-angular (*P* Value < 0.001).
Figure 1 presents that Class A was more prevalent in men than women, and Class C was more prevalent in women than men (*P* Value < 0.001).
Figure 2 shows that the disto-angular positioning angle was not observed in men, and the horizontal positioning angle was also higher in men than in women (*P* Value < 0.001). Gender was not related to the position of wisdom teeth relative to the ramus of the mandible (*P* Value = 0.13).

**Table 1:** Demographic information of the patients

| Row | Variable | | Number (Percentage) |
|---|---|---|---|
| **1** | Gender | Female | 40 (66.7) |
| | | Male | 20 (33.3) |
| **2** | Smoking | Negative | 50 (83.3) |
| | | Positive | 10 (16.7) |
| **3** | Alcohol Consumption | Negative | 54 (90) |
| | | Positive | 6 (10) |

**Table 2:** Investigating the relationship between the tooth and the ramus and the symptoms of pericoronitis

| Symptoms of Pericoronitis | Relationship of tooth with ramus | | Chi-square statistical test result |
|---|---|---|---|
| | Class I | Class II | |
| **No symptoms** | 12 (66.7) | 31 (72) | |
| **Ague** | 0 (0) | 3 (6.9) | |
| **Trismus** | 2 (11.2) | 1 (2.3) | <0.001 |
| **Malaise** | 4 (22.1) | 8 (18.6) | |
| **Total** | 18 (100) | 43 (100) | |

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**Table 3:** Scrutinizing the relationship between pericoronitis symptoms and tooth distance from the occlusal plane

| Symptoms of Pericoronitis | Tooth distance from the occlusal plane | | | Chi-square statistical test result |
|---|---|---|---|---|
| | A | B | C | |
| No symptoms | 12 (85.7) | 29 (72.5) | 3 (37.5) | |
| Ague | 0 (0) | 1 (2.5) | 2 (25) | |
| Trismus | 2 (14.3) | 2 (5) | 1 (12.5) | <0.001 |
| Malaise | 0 (0) | 8 (20) | 2 (25) | |
| Total | 14 (100) | 40 (100) | 8 (100) | |

**Table 4:** Examining the angle of impaction with the symptoms of pericoronitis

| Symptoms of Pericoronitis | Angle of impaction | | | | Chi-square statistical test result |
|---|---|---|---|---|---|
| | Disto-angular | Horizontal | Mesio-angular | Vertical | |
| No symptoms | 0 (0) | 9 (81.8) | 12 (50) | 17 (80.96) | |
| Ague | 6 (100) | 1 (9.1) | 1 (4.2) | 1 (4.76) | |
| Trismus | 0 (0) | 0 (0) | 3 (12.5) | 0 (0) | <0.001 |
| Malaise | 0 (0) | 1 (9.1) | 8 (33.3) | 3 (14.28) | |
| Total | 6 (100) | 11 (100) | 24 (100) | 21 (100) | |

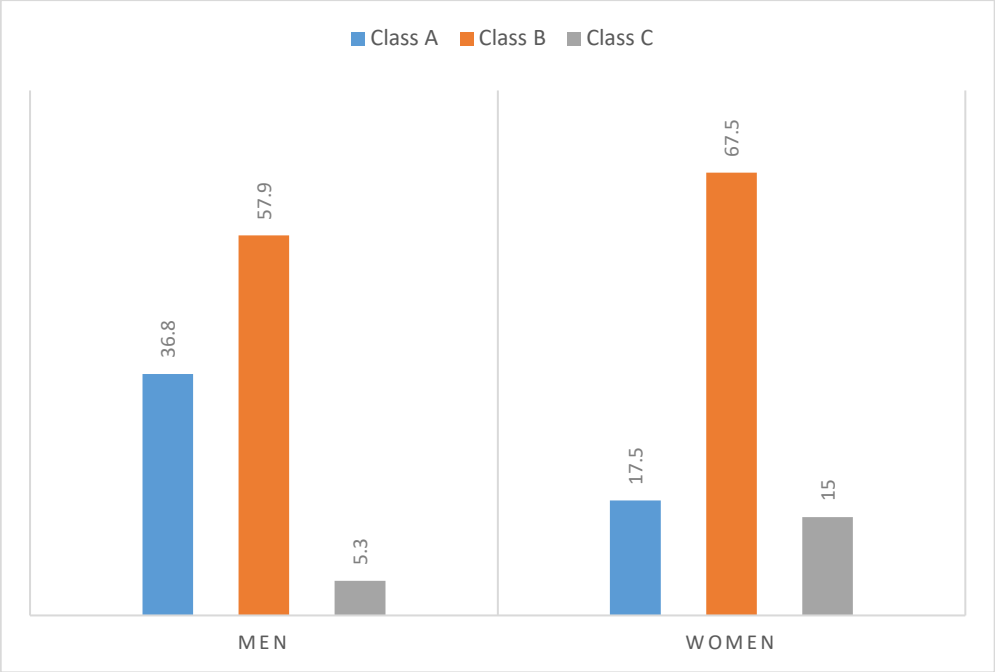



**Figure 1:** The prevalence of Class A, B and C (*P* Value < 0.001).

## DISCUSSION

The correct growth process of teeth is influenced by several factors [6]. Disruptions in the growth process can occur due to various local or systemic factors, resulting in teeth becoming embedded in the jaw [7]. Incorrect growth or impaction can lead to several issues, including changes in the condition of adjacent teeth, malocclusion, periodontal disease, loss of arch length, cysts or tumors, root resorption of adjacent teeth, pericoronitis, and others [8]. Nagahara et al. [9] reported that 3.9% of 3979 patients in Japan had impacted teeth.

Approximately 72.7% of the world's population has at least one impacted tooth, typically the mandibular third molar, and that impaction is

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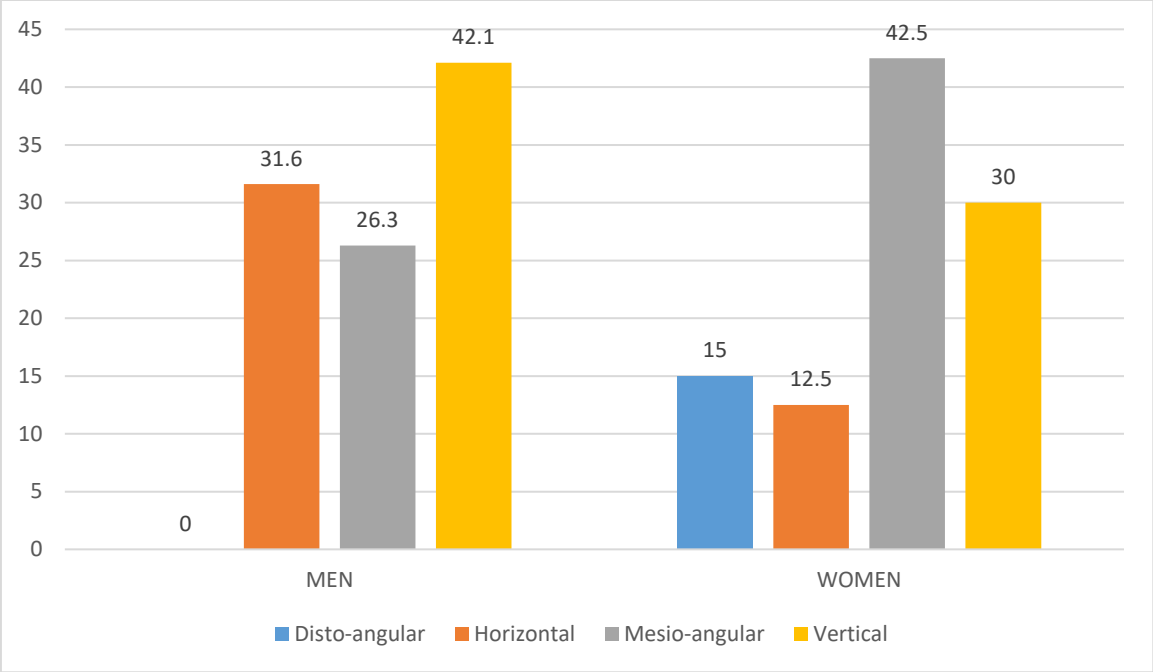



**Figure 2:** The disto-angular positioning angle

more prevalent in women than in men [10, 11]. In the current study, the number of female participants was double that of males, which is consistent with the findings of Eshghpour et al. [12], Arabiun et al. [10], and Hashmipour et al. [13]. A significant reason for the higher prevalence of impaction in women than in men is likely the smaller size of their jaws and arch lengths.

Pericoronitis is a systemic condition characterized by a high recurrence rate of acute episodes. Although most pericoronitis patients report only mild discomfort, in some cases, it can result in severe pain, disruption of normal function, systemic symptoms, and serious complications [14]. Generally, pericoronitis symptoms are reported more frequently in women than in men. In the present study, systemic symptoms of pericoronitis were observed in 20% of men and 34.2% of women. Hazza'a et al. [15] reported similar results with symptoms in 55.4% of women and 44.6% of men. In a study conducted [16] in Jordan, symptoms of pericoronitis were more common in women (56.7%) than in men (43.3%), similar to the present study. Pericoronitis symptoms were more prevalent in women (62.7%) than in men (37.3%) [17].

In the current study, Class B type had the systemic symptoms related to it. Mesio-angular impaction and Class B status were found to have the highest risk for developing pericoronitis [18]. The soft tissue surrounding the vertically impacted molar has the highest risk for developing pericoronitis [15]. Class A status was observed to have the highest risk, and Class C status the lowest risk, for developing pericoronitis. In Singh et al.'s study [17], Class B had the highest risk for developing pericoronitis. Galvão et al. [4] observed that Class A had the highest risk of pericoronitis. Almendros-Marqués et al. [19] also found the highest prevalence of pericoronitis in Class B.

In the present study, most of the cases with pericoronitis and accompanying systemic symptoms were related to mesio-angular impaction. AL-Hamdani et al. [20] reported that mesio-angular impaction had more cases of pericoronitis than other types of impaction, which is likely due to the possibility of food entrapment in this type of impaction. Singh et al. [17] stated that disto-angular impaction had the highest risk for pericoronitis. Yamalik and Bozkaya [21] observed the highest prevalence of pericoronitis in wisdom teeth with vertical impaction. Hazza'a et al. [15] also observed that pericoronitis mostly occurs in vertically impacted wisdom teeth.

In the current study, the most common type of impaction was associated with mesio-angular impaction, followed by vertical impaction, which is consistent with the findings of Shirinbak et al.

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[22], Quek et al. [23], and Syed et al. [24]. During normal development, the lower third molar grows in the horizontal angle of the mandible, then the angle changes to mesio-angular, and finally to the vertical position. If the tooth does not rotate from the mesio-angular position to its vertical position, it can be one of the factors causing mesio-angular impaction of the lower third molar [24]. The difference in the growth of the mesial and distal roots of the wisdom tooth, caused by insufficient growth of the mesial root, has been suggested as a reason for mesio-angular impaction of the wisdom tooth [25].

One limitation of this study is that the patients examined were limited to those at the Mashhad Dental Faculty, which may limit the generalizability of the results to other populations. Additionally, the difficulty in obtaining complete information on the patients, including clinical documents and radiographic images, may have impacted the accuracy and comprehensiveness of the study's findings.

## CONCLUSION

Patients had a higher risk of pericoronitis and developing systemic symptoms if they had mesio-angular impaction, a Class II ramus position, or a Class B position relative to the occlusal plane.

Additionally, smoking was directly related to the occurrence of systemic symptoms in patients with pericoronitis, and that these symptoms were more commonly seen in women than in men. The Class B status was also more common in women than in men. Furthermore, the study found that the most common type of impaction in men was vertical placement angle, while mesio-angular impaction was more common in women.

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## CONFLICTS OF INTEREST

None.

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