

# Pathologic Conditions Associated with Impacted Mandibular Third molar Angulation in an Iranian Population

## ***Original Article***

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## **Abstract**

### **Introdouction:**

The aim of this study was to determine the associations between commonly found pathologic conditions and angulation of the lower third molar teeth.

### **Materials and methods:**

In this retrospective study, 370 panoramic radiographs consisting of 724 lower third molars were evaluated for any pathologies according to their angulation(mesioangular, distoangular, vertical, or horizontal). The data were analyzed using chi-squared tests, and a P value of  $P \leq 0.05$  was considered significant

### **Results:**

In total,83.6% of the cases had at least one complication. It was ascertained that mesioangular and vertical impactions had higher risks for pericoronitis and caries development on second molar, while horizontal and distoangular impactions had lower risks. There was a significant relationship between the frequency of third molar impaction and the type of angulation.

### **Conclusion:**

Mesioangular and vertical impactions, especially those with class A impaction depth, were found to be associated with a higher risk of pathologic conditions. To decide whether to extract or follow up on an impacted third molar, the angulation and impaction depth should be taken into consideration.

### **Key words:**

•Molar •Third •Radiography •Panoramic  
•Pathology •Mandible

## Introduction

An increasing incidence of impacted third molars has been reported in the literature.<sup>(1,2)</sup>

Although the justification for the prophylactic removal of asymptomatic third molars is controversial among dental practitioners, third molar removal is the most frequent treatment decision a general dentist may encounter due to the high impaction rate.<sup>(1-5)</sup> An oral surgeon usually follows decision-making guidelines when making removal decisions, but the referring general practitioners often experience confusion in deciding whether or not to advise a patient to retain asymptomatic wisdom teeth or to remove them. Although some other countries have devised ethic guidelines, no guidelines have been developed in Iran at the time this study was conducted.<sup>(3,4)</sup>

Not every impacted third molar causes a clinical problem, and an unknown percentage of unerupted third molars may remain asymptomatic for years.<sup>(3)</sup> However, the data on the prevalence of clinical pathologic conditions for retained third molars are limited.

An unerupted or partially erupted tooth can cause mild to severe symptoms.<sup>(1)</sup> Pericoronitis, pain, swelling, infection, distal carious lesions, bone loss, root resorption, and follicular diseases including cysts and tumors are some of the symptoms and pathological conditions associated with incompletely erupted third molars.<sup>(3,6)</sup> Because treatment decisions concerning mandibular third molar removal have important clinical and cost implications related to the possible risks and morbidities resulting from surgery<sup>(7)</sup>, we decided to investigate associated symptoms and pathological conditions related to the angulation of impacted mandibular third molars. Moreover, we desired to present a practical guideline for Iranian dental health practitioners.

## Materials and Methods

The sample included 370 panoramic radiographs consisting of 724 mandibular third molars, which had been obtained from healthy patients referred to the Shiraz University of Medical Sciences Oral Radiology Department for any reason between January 2012 and July 2012. In this study, 221 females and 149 males (aged 18–55 years) were evaluated. Each patient was investigated for

eight pathologic conditions. Root resorption, bone loss, and caries of the distal second molar; caries of the third molar; osteitis; and follicular space abnormalities were detected using panoramic radiographs. The symptoms of referred pain and pericoronitis were evaluated clinically for each individual. All clinical and radiographic investigations were performed by an expert oral and maxillofacial radiologist and a dental student separately.

The third molar inclination was determined using Winter's method<sup>8</sup>, measuring the anterior angle made between the occlusal plane of the first and second premolars and a line drawn through the occlusal surface of the third molar. Data obtained from the panoramic radiographs were classified as follows: vertical (V), mesioangular (M), or distoangular (D); horizontal (H) and inverted (I) impactions.

Statistical analysis of the study data was performed using the Statistical Analysis System (SPSS version 13) using chi-squared tests. Inter-observer reliability was assessed as  $\kappa = 0.86$ .

## Results

Out of 370 subjects, 149 (40.3%) were males and 221 (59.7%) were females. The mean age of the patients was  $22.61 \pm 1.5$  years.

Using 370 panoramic radiographs, 724 mandibular third molars were evaluated, and 605 had at least one complication. Out of 605 mandibular third molars with complications, 175 (28.93%) were erupted, 222 (36.69%) were partially erupted, and 208 (34.38%) were impacted (Table 1). No significant difference in the eruption status of the teeth was observed between male and female participants ( $p = 0.328$ ); however, there was a significant difference in the eruption status when the age groups were compared ( $p = 0.000$ ).

Of the mandibular third molars, 324 (53.55%) were mesioangular, 182 (30.08%) were vertical, 81 (13.39%) were horizontal, and 18 (2.98%) were distoangular impactions (Table 2). The mesioangular and vertical impactions had significantly higher frequencies than others ( $p = 0.000$ ). No significant difference was found between age groups or genders in terms of angulation ( $p = 0.48$ ). Mesioangular and vertical impactions had significantly higher frequencies than other impactions when evaluating pericoronitis and caries on these second

and third molars ( $p=0.000$ ). Pericoronitis had a significant relationship with partially erupted third molars. Mesioangular and horizontal impactions showed significantly higher prevalence than other impactions ( $p=0.000$ ) for periodontal bone loss of the distal aspects of the second molars. Vertical impactions had a significantly higher prevalence than other impactions in relation to osteitis in radiographs and partial mucosal coverage on clinical examinations.

When all of the results were considered together, 16.4% of all cases were found to lack associations with any of the pathological alterations. Therefore, 83.6% of the cases were explained by at least 1 of the 8 pathologic changes assessed in this study.

**Table 1.** number of teeth presenting with pathologies according to eruption status

	Erupted	Partially erupted	Impacted	Total
Pericoronitis	3	76	16	95
2 <sup>nd</sup> molar caries	22	17	8	47
2 <sup>nd</sup> molar bone loss	20	39	115	174
3 <sup>rd</sup> molar caries	70	20	2	92
Root resorption	1	3	10	14
Osteitis	26	33	12	71
Follicular space	0	0	0	0
TMD	33	34	45	112
Total	175	222	208	605

**Table 2.** number of teeth presenting with pathologies according to type of angulation

	M	V	D	H	Total
Pericoronitis	42	40	2	11	95
2 <sup>nd</sup> molar caries	20	14	3	10	47
2 <sup>nd</sup> molar bone loss	119	19	4	32	174
3 <sup>rd</sup> molar caries	46	38	2	6	92
Root resorption	10	1	0	3	14
Osteitis	22	37	5	7	71
Follicular space	0	0	0	0	0
TMD	65	33	2	12	112
Total	324	182	18	81	605

## Discussion

Studies have demonstrated that, for the removal of asymptomatic mandibular third molars, there are no systematic guidelines for decision-making that general dental practitioners or oral surgeons can use.<sup>(9,10)</sup> Some authors believe that, because of the risks of surgery and postoperative complications, and the costs of redundant removal of impacted third molars, there is insufficient evidence to support the prophylactic removal of these teeth.<sup>(7,11,12)</sup> Patient age, impaction depth, and angulation of mandibular third molars have been the main factors studied that have been found to predominantly influence extraction decisions and predict extraction difficulty in several previous studies.<sup>(4,7,12-17)</sup>

Partially erupted third molars have been found to have a higher occurrence of symptoms than complete or unerupted third molars.<sup>(13,14,18,19)</sup> A 5-year follow up of untreated, partially impacted mandibular third molars confirmed that they are more subjected to complications.<sup>(20)</sup>

In our study, partially erupted third molars showed higher degrees of pericoronitis and osteitis, while caries on second and third molars were higher among erupted molars. Bone loss and root resorption were higher in impacted molars. We found that pathological conditions are significantly related to erupted or impacted third molars, which calls attention to all types of eruption status, as opposed to past studies that were primarily concerned with partially erupted molars.

The correlation between the angular positioning of mandibular third molars and relative pathoses has been reported by many authors.<sup>(13,21-23)</sup> Mesially inclined third molars have been suggested to be associated with more frequent complications.<sup>(13)</sup> Knutsson and Rohlin concluded that most third molars associated with pathoses were either in a vertical or mesioangular position.<sup>(22)</sup> The frequency of mesioangular positioning in the present study was 54%, which was higher than that reported by other studies.<sup>(3,13,22)</sup> In the present study, pericoronitis ( $p=0.000$ ), second molar caries ( $p=0.000$ ), third molar caries ( $p=0.000$ ), bone loss ( $p=0.000$ ), and root resorption ( $p=0.02$ ) of the second molar were significantly higher among mesioangular molars compared to other angulations; however, this might

be due to the fact that such type of impaction has a higher incidence of occurrence.

Some studies have suggested that the correlation between elevated risk of pathoses and the magnitude of postoperative complications for impacted third molars increases with age.<sup>(24)</sup> Many impacted third molars can alter their position and erupt by the middle of the third decade of life.<sup>(25)</sup> In the present study, all complications were compared using two age groups. There was a significant increase observed in the rates of carious lesions in the second and third molars in the younger group ( $p=0.000$ ). The probability of developing pathologic conditions for mandibular third molars determines the decision to remove them. Due to regional and socio-economic variations, the age determined appropriate to remove impacted teeth may vary.<sup>(26,27)</sup> Recent studies suggest that the incidence of pathoses associated with retained third molars is low; therefore, the most appropriate treatment for asymptomatic impacted third molars in young adults might be observation instead of prophylactic removal.<sup>(3,22,28-31)</sup>

In contrast, the majority of cases (83.6%) in our study illustrated at least one pathological condition. This is not in agreement with previous studies, and suggests that previously reported guidelines in removal decision-making need

methodical revisions in economically developing countries such as Iran.

In the present study, the population consisted of patients referred to the radiology department for any reason, including surgical removal of third molars. Although our study has some bias in this regard, obtaining radiographs from the general population to create a random sample was not approved by the ethical committee.

## Conclusion

In conclusion, angulation of third molars should be taken into consideration when making a decision on prophylactic extraction. Prophylactic removal of mesioangular and vertical third molars is recommended with all forms of eruption status, particularly in females.

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## References

1. Punwutikorn J, Waikakul A, Ochareon P. Symptoms of unerupted mandibular third molars. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1999;87:305–10.
2. Bataineh AB, Albashaireh ZS, Hazza`a AM. The surgical removal of mandibular third molars: A study in decision making. *Quintessence Int*. 2002; 33:613–617.
3. Polat HB, Özcan F, Kara I, Özdemir H, Ay S. Prevalence of commonly found pathoses associated with mandibular impacted third molars based on panoramic radiographs in Turkish population. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2008;105:e41–e47.
4. Ozec S I, Herguner Siso U, Tasdemir S, Ezirganli G, Goktolga. Prevalence and factors affecting the formation of second molar distal caries in a Turkish population. *Int J Oral Maxillofac Surg*. 2009; 38: 1279–1282.
5. Kruger E, Thomson WM, MComDent, Konthasinghe P. Third molar outcomes from age 18 to 26: Findings from a population-based New Zealand longitudinal study. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2001;92:150–5.
6. Akarlan ZZ, Kocabay C. Assessment of the associated symptoms, pathologies, positions and angulations of bilateral occurring mandibular third molars: is there any similarity? *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2009;108(3):e26–32.
7. Adeyemo WL. Do pathologies associated with impacted lower third molars justify prophylactic removal? A critical review of the literature. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2006; 102: 448–452.
8. Mercier P, Precious D. Risks and benefits of removal of impacted third molars. A critical review of the literature. *Int J Oral Maxillofac Surg*. 1992; 21:17–27.
9. Song F, Landes DP, Glenny AM, Sheldan TA. Prophylactic removal of impacted third molars: an assessment of published reviews. *Br Dent J*. 1997; 182:339–346.
10. Eliasson S, Heimdahl A, Nordenram A. Pathological changes related to longterm impaction of third molars. A radiographic study. *Int J Oral Maxillofac Surg*. 1989; 18:210–212.
11. Knutsson K, Brehmer B, Lysell L, Rohlin M. Pathoses associated with mandibular third molars subjected to removal. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 1996; 82: 10–17.
12. Lysell L, Rohlin M. A study of indications used for removal of the mandibular third molar. *Int J Oral Maxillofac*

Surg. 1988; 17: 161–164.

13. Punwutikorn J, Waikakul A, Ochareon P. Symptoms of unerupted mandibular third molars. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1999; 87:305–310.

14. Hill CM, Walker RV. Conservative, non-surgical management of patients presenting with impacted lower third molars: a 5-year study. *Br J Oral Maxillofac Surg.* 2006; 44:347–350.

15. Ventä I, Turtola L, Ylipaavalniemi P. Change in clinical status of third molars in adults during 12 years of observation. *J Oral Maxillofac Surg.* 1999;57:386–9.

16. Blondeau F, Daniel NG. Extraction of impacted mandibular third molars: postoperative complications and their risk factors. *J Can Dent Assoc.* 2007;73:325.

17. Winter GB. Principles of exodontia as applied to the impacted mandibular third molar: a complete treatise on the operative technique with clinical diagnoses and radiographic interpretations. St Louis: American Medical Book Company; 1926.

18. Renton T, Smeeton N, McGurk M. Factors predictive of difficulty of mandibular third molar surgery. *Br Dent J.* 2001;190:607–610.

19. Santamaria J, Arteagoitia I. Radiologic variables of clinical significance in the extraction of impacted mandibular third molars. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1997 Nov;84(5):469-73.

20. Garcia AG, Sampedro FG, Rey JG, Vila PG, Martin MS. Pell-Gregory classification is unreliable as a predictor of difficulty in extracting impacted lower third molars. *Br J Oral Maxillofac Surg.* 2000; 38(6):585–587.

21. Yuasa H, Kawai T, Sugiura M. Classification of surgical difficulty in extracting impacted third molars. *Br J Oral Maxillofac Surg.* 2002; 40(1):26–31.

22. Knutsson K, Brehmer B, Lysell L, Rohlin M. Asymptomatic mandibular third molars: Oral surgeon's judgment of the need for extraction. *J Oral Maxillofac Surg.* 1992;50:329–33.

23. Lysell L, Brehmer B, Knutsson K, Rohlin M. Judgment on removal of asymptomatic mandibular third molar: influence of the perceived likelihood of pathology. *Dentomaxillofac Radiol.* 1993;22:173–7.

24. Venta I. Predictive model for impaction of lower third molars. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1993;76:699–703.

25. Tate TE. Impactions: observe or treat? *J Calif Dent Assoc.* 1994;22:59–64.

26. Stanley HT, Alattar M, Collett WK, Springfellow HR Jr, Spiegel EH. Pathological sequelae of neglected impacted third molars. *J Oral Pathol.* 1988;17:113–7.

27. Güven O, Keskin A, Akal UK. The incidence of cysts and tumors around impacted third molars. *Int J Oral Maxillofac Surg.* 2000;29:131–5.

28. Berge TI. Third molars in Norwegian general practice. *Acta Odontol Scand.* 1992;50:17–24.

29. Berge TI, Boe OE. Symptoms and lesions associated with retained or partially erupted third molars. Some variables of third molar surgery in Norwegian general practice. *Acta Odontol Scand.* 1993;51:115–21.

30. Von Wowern N, Nielsen HO. The fate of impacted lower third molars after the age of 20. A four-year clinical follow-up. *Int J Oral Maxillofac Surg.* 1989;18:277–80.

31. Ventä I, Murtomaa H, Turtola L, et al. Clinical follow-up study of third molar eruption from ages 20 to 26 years. *Oral Surg Oral Med Oral Pathol.* 1991;72:150–3.