

Review article

Frequency of Impacted Teeth in Patients Referred to a Radiology Center and the Radiology Department of Mashhad School of Dentistry

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Abstract:

Aim: This study aimed to evaluate the frequency and distribution of impacted teeth and the associated pathologies. **Materials and Methods:** In this descriptive cross-sectional study, 10,000 panoramic radiographs of patients referred to a private radiology center and the radiology department of the School of Dentistry of Mashhad University of Medical Sciences were assessed from 2009 to 2012. All the radiographs were observed by an oral and maxillofacial radiologist, The number, position and inclination of impacted teeth and the associated pathologies were recorded. **Results:** Of 10,000 radiographs, 3,374 impacted teeth were observed. Third molar was the most prevalent impacted tooth of both jaws (95%), followed by canine, second premolar, second molar, and lateral incisor and first premolar teeth. The vertical position accounted for 36% of all impacted third molars positions, followed by mesioangular (30%), distoangular (22%), horizontal (11%), and buccolingual (1.5%) positions. The most common pathological feature related to impacted teeth was adjacent dental caries (64.7%). Moreover, root resorption of the adjacent tooth (0.6%) and increased follicular space (0.5%) were among the observed complications. **Conclusion:** In this study, the prevalence of tooth impaction was 33.74%, and the most common impacted teeth were vertically angulated third molars, accounting for most of the cases. In addition, adjacent dental caries was the most prevalent related pathology.

Keywords: dental impaction; panoramic radiograph; frequency

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Introduction

Impaction is defined as failure in tooth eruption, which can be the result of obstruction in the eruption path or inappropriate tooth position¹. The prevalence and distribution of tooth impaction in different sites of the jaws have been evaluated in a number of studies²⁻⁸. Factors affecting the prevalence of impaction include the age range of the target sample,

radiographic features of tooth development and the timing of dental eruption².

The management of impacted teeth is a matter of controversy. Some dentists believe that there is no need for surgical intervention in cases free of symptoms or related pathologies, since the risk of pathological changes in a long-term retained impact tooth is low, and in elderly patients, the surgical

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extraction of the impacted tooth is quite complicated. On the other hand, due to several complications caused by impacted teeth such as periodontal problems³⁻⁵, root resorption of the adjacent tooth, odontogenic cysts and tumors, some clinicians believe that surgical extraction of these teeth should be performed to prevent the mentioned complications. However, there is still limited data available in Iran and other areas regarding the prevalence of impacted teeth and their associated complications.

The objective of the current study was to determine the prevalence and pattern of impacted teeth and the related pathologies in an Iranian population.

Material and methods

The present retrospective study was carried out by analyzing 10,000 records of patients, referred to a private radiology center and the radiology department of The School of Dentistry of Mashhad University of Medical from January 2009 to February 2012. The records were only evaluated if they belonged to patients over 21 years of age, since it is believed that tooth eruption is normally finished by that age⁹. In addition, after checking thr records the patients with a history of impacted tooth surgery were excluded from the study.

All the panoramic radiographs had been taken using panoramic machine (Planmeca 2002 cc, Planmeca, Helsinki, Finland), and processed with an automatic X-ray film processor (HOPE,USA). An oral and maxillofacial radiologist examined all radiographs on a 19” LCD 1550V flat screen monitor (Samsung® South Korea) to determine the number, orientation, type of impacted teeth and the presence of associated pathologies.

In the present study, an impacted tooth was defined as when the tooth was fully or partially covered by the bone. The orientation of impacted teeth was assessed according to Winter’s classification¹⁰, which is based on the inclination of the 3rd molar to the long axis of the 2nd molar. According to this categorization, the orientation is:

- * vertical- when the long axis of the 3rd molar is parallel to the long axis of the 2nd molar;
- * mesioangular- when the long axis of the third molar is in the mid position in relation to the long axis of the 2rd molar;
- * distoangular- when the long axis of the 3rd molar is in a distal position in relation to the long axis of the 2nd molar; and
- * horizontal- when the long axis of the third molar is perpendicular to the long axis of the 2nd molar.

Moreover, Pell and Gregory’s classification¹¹ was used to compare the mandibular third molar with the anterior edge of the mandibular ramus:

Class 1- if the mesiodistal diameter of the crown is totally in front of the anterior edge of the mandibular ramus;

Class 2- if the tooth is located so close to the rearthat almost half of it is covered by the ramus;

Class 3- if the tooth is completely located inside the mandibular ramus.

This model also compares the third molar to the occlusal plane of the 2ndmolar, and is classified as below:

Class A-if the occlusal surface of the third molar is at the same level as, or above the 2nd molar;

Class B- if the occlusal surface of the third molar is between the occlusal level and the cervical level; and

Class C- if the occlusal surface of the third molar is below the cervical line of the 2nd molar.

According to the present study, the pathologies associated with impacted teeth included caries of impacted and/or adjacent tooth, root resorption of the adjacent tooth, and an increase in the pericoronal space of the dental follicle of more than 3 mm around the impacted tooth. The collected data were calculated and analyzed by Chi-square non-parametric test using SPSS software version 14.0 . P-value less than 5% was considered statistically significant.

Results

The panoramic radiographs of 10,000 patients aged 21-80 years (mean 41.2years) were examined. A total of 2880 patients (33.7%) presented with at least one impacted tooth. The male to female ratio of the study group was 4350:5650, and the ratio of the patients with impacted tooth was 1409:1965.

The statistical analysis showed that there was no significant difference in the prevalence of impacted teeth with regard to gender (P=0.07). Of 3,374 impacted teeth, mandibular third molars were most

Impacted teeth	Maxilla (%)	Mandible (%)	Total
2	2(0.14%)	4 (0.19%)	6
3	80 (5.88%)	16 (0.79%)	96
4	1 (0.07%)	0 (0.00%)	1
5	8 (0.58%)	23 (1.17%)	31
7	6 (0.44%)	9 (0.44%)	15
8	1262 (92.86%)	1963 (97.41%)	3225
	1359 (40,2%)	2015 (59,8%?)	3374

Table 2: The orientation of impacted teeth according to Winter's classification

Orientation	Maxilla	Mandible	Total
Mesioangular	226 (17.76%)	760 (38.8%)	986
Distoangular	355 (28.1%)	379 (19.3%)	734
Vertical	605 (47.9%)	568 (28.93%)	1173
Horizontal	38 (3.01%)	230 (11.71%)	268
Buccolingual	29 (2.29%)	26 (1.32%)	55
	1262	1963	3225

Table 3: Distribution of third molars based on Pell and Gregory's classification

Impacted teeth	Maxilla (%)	Mandible (%)	Total
A	77 (6.10%)	548 (27.91%)	625
B	314 (24.88%)	894 (45.54%)	1208
C	871 (69.01%)	521 (26.54%)	1392
	1262 (39,2%)	1963 (60,8%)	3225

commonly encountered (1963, (58.1%)), followed by maxillary third molars (1262, (37.4%)), maxillary canines (80, (2.3%)), and others (69, (2.04%)). According to the results, 1,359 impacted teeth were seen in the maxilla and 2,015 teeth (59.8%) in the mandible. based on the results of χ^2 test, distribution of impacted teeth was different between the maxilla and mandible ($P < 0.001$). The prevalence of impacted teeth is presented in Table 1.

There were 2,450 patients with one, 253 patients with two, 47 with three, and 27 with four impacted third molars; also, in 46 patients, the impaction of the third molar could be seen with other impacted teeth. The analysis of the orientation of the impacted teeth showed that the greatest number of impacted third molars (1,173) was observed in the vertical position, followed by mesioangular (986, (30.6%)), distoangular (743,(23%)), horizontal (268,(8.3%)), and buccolingual (55, (1.7%)) orientations.

According to the Winter's classification¹⁰ as demonstrated in Table 2, the vertical position of the third molar was more prevalent in the maxilla and the mesioangular position in the mandible.

The distribution of mandibular third molars according to Pell and Gregory's classification¹¹ showed that 548 teeth (27.9%) were in position A, 913 (46.51%) in position B, and 527 teeth (26.5%) in position C. Moreover, 706 (37.5%), 1,073 (56.8%), and 109

teeth (5.7%) were type I, type II and type III, respectively. The χ^2 test results showed that according to Pell and Gregory's classification, there was no difference in the prevalence of different positions of impacted mandibular third molars. Distribution of impacted mandibular third molars based on Pell and Gregory's classification is presented in Table 3. The most prevalent pathologic condition caused by impacted teeth was carious lesions of adjacent tooth (219, (64.7%)), followed by root resorption of the adjacent tooth (63, (18.7%)), and increased pericoronal space (56, (16.6%)).

Discussion

Commonly, panoramic radiographs which show both dental arches and the surrounding structures are the first tools to assess impacted teeth. There are several studies in which the prevalence of impacted teeth was evaluated according to panoramic radiographs^{2, 6-8}.

In the present study, impacted teeth were assessed using panoramic radiographs of 10,000 patients, referring to a private radiology center and the radiology department of Mashhad School of Dentistry. Although

this sample may not represent the whole Iranian population, the collected data might be useful for health workers as it represents the range of patients referring to dental clinics.

The prevalence of impacted teeth in this study was 33.7 percent. In contrary to other similar studies in which patients within a specific age range were studied^{7, 12-16}, in the present study, the sample included patients across a wide age range which was in keeping with that of the Iranian population.

Third molars were the most prevalent impacted teeth accounting for 95.6% of all impacted teeth, followed by canines (2.8%); this pattern is similar to that of previous studies^{2, 6, 7, 12, 17-22}.

In previous studies, horizontal and mesioangular orientations were reported as the most prevalent orientations of impacted mandibular third molars^{20, 23}. On the contrary, in the present study, vertically angulated third molars of both jaws accounted for 36.4% of cases. In addition, 30.6% of cases had mesioangular and distoangular orientations, followed by horizontal and buccolingual orientations.

Yamaoka (1995) noted that the angulation of impacted tooth is clinically important²⁴, since it may affect the plaque accumulation on the distal side of the adjacent teeth and lead to the decay and periodontal diseases of the adjacent teeth. In the current study, adjacent tooth

decay was the most prevalent pathology associated with impacted teeth with the incidence of 2.2% of all cases; this finding is similar to Stanley's study which also reported 3% incidence of adjacent tooth decay²². Root resorption of the adjacent tooth (0.6%) and increased follicular space (0.5%) were reported as other associated complications of impacted teeth.

Conclusion

In this retrospective study on 10,000 panoramic

radiographs, the prevalence of impacted teeth was 33.7% (3,374 cases). The majority of impacted teeth were mandibular third molars, mostly in vertical positions. Moreover, decay in the adjacent teeth was the most common associated complication, followed by root resorption and increased follicular space.

Conflict of interest: The authors have no conflict of interest.

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