

Prevalence of Impacted Teeth and Their Radiographic Signs in Panoramic Radiographs of Patients Referred to Hamadan Dental School in 2009

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ABSTRACT

Statement of the problem: Removal of impacted third molars is the most common oral surgical procedure. Many investigators have questioned the necessity of removal in patients who are free of symptoms or associated pathologies. There are currently no data on the prevalence of impacted teeth and associated pathologies in the Hamadani population.

Purpose: The aim of this study was to assess the status of impacted teeth and to determine the frequency and type of pathological conditions associated with these impacted teeth.

Materials and methods: This study included 900 patients who were referred to Department of Oral and Maxillofacial Radiology, Hamadan Dental School for panoramic radiography. The age range of the patients was 14–70 years. Clinical and radiographic examinations were carried out. The angulations of impaction, caries and root resorption of the adjacent teeth and increase in the pericoronal space were determined.

Results: A total of 162 patients presented with at least one impacted tooth and 72 patients presented with at least one semi-impacted tooth. Male to female ratio was 3.9 to 3.3. Among the impacted teeth, mandibular and maxillary third molars were the most common (80%), followed by maxillary canines (18%). Approximately 4% of teeth adjacent to impacted and semi-impacted teeth had root resorption. Carious lesions were also found on the distal surface in approximately 3% of second molars. Pathological lesions were found in approximately 4% of impacted and semi-impacted teeth.

Conclusion: The prevalence of impacted teeth was high, and there was a predilection for impacted third molars in the mandible. Caries, root resorption and pathological lesions were seen in relation to the impacted teeth.

Keywords: Tooth, Impacted, root resorption, dental caries, pathological lesion.

INTRODUCTION

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Impacted teeth are those with a delayed

eruption or not expected to erupt completely based on clinical and radiographic assessment.⁽¹⁾ Dental impaction may be the consequence of local factors. These factors may include mechanical obstruction (by a supernumerary tooth, cyst, or tumor), insufficient space in the dental arch due to skeletal incongruities (micrognathia), or the premature loss of deciduous teeth or a tooth-arch size discrepancy. Systemic factors such as genetic disorders, endocrine deficiencies, and previous irradiation of the jaws are also associated with a failure of tooth eruption.^(2,3) Any permanent tooth can become impacted; however, third molars, maxillary canines, maxillary and mandibular premolars, and maxillary central incisors are the teeth most frequently involved.^(3,4)

The literature shows that tooth impaction is a frequent phenomenon; however, there is considerable variation in the prevalence and distribution of impacted teeth in different regions of the jaw. Factors affecting the prevalence include the selected age group, timing of dental eruption, and the radiographic criteria for dental development and eruption.^(5,6,7) An impacted tooth can result in caries, pulp disease, periapical and

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periodontal disease, root resorption of the adjacent tooth, and even oral and

maxillofacial tumors. Its diagnosis and treatment can be very troublesome to dentists. Its management is also esthetically and functionally important to the patient.⁽⁸⁾ Although removal of impacted teeth is the most common oral surgical procedure, many investigators have questioned the necessity of removal in patients who are free of symptoms or associated pathologies. Such comments are based on the view that long-term retention of impacted teeth has little risk of pathological change in the tooth itself, or of adverse effects on adjacent structures.⁽⁵⁾ There are currently no data on the prevalence of impacted teeth and associated pathologies in the Hamadani population. The aims of this study were to investigate the prevalence and pattern of impacted teeth in patient referred to Hamadan Dental School in 2009 and to report the features of associated pathologies.

MATERIALS AND METHODS

Consecutive panoramic radiographs and clinical records of 900 patients who attended the Primary Care Clinic at Hamadan Dental School in 2009 were retrieved for the purpose of this study. The minimum age for inclusion was 14 years because the accepted view is that all the teeth except the third molars normally have finished erupting by that age but for wisdom teeth 21 years is selected because eruption of third molars finishes at this age. The maximum age for inclusion was 70 years. All the panoramic radiographs had

been taken with the Planmeca Model 2002CC Panoramic machine (Planmeca, Finland, Helsinki). All the panoramic radiographs had been processed with an automatic x-ray film processor (HOPE, USA). One oral & maxillofacial radiologist examined the radiographs at the same time on standard light boxes to determine the number and types of impacted teeth, and the presence of associated pathologies.⁽⁵⁾ A tooth was defined as impacted when it was obstructed on its path of eruption by an adjacent tooth, bone, or soft tissue. A tooth was defined as semi-impacted when it was in the occlusion line but partially erupted. The angulations of impaction were measured using long axes of the impacted and adjacent teeth. Pathologies associated with impacted teeth included: (1) carious lesions of the adjacent tooth; (2) root resorption of the adjacent tooth; and (3) an increase in the pericoronal space of the dental follicle of more than 3 mm around the impacted tooth. Although it is possible

to observe the profile of soft tissue in relation to third molars, there are currently no standardized clinical criteria for the assessment of soft tissue associated with impacted teeth. These difficulties in the accurate recording of the clinical condition of soft tissue should be recognized and addressed to aid future studies.^(5,9) Data collected were recorded on a spreadsheet (Excel 2007; Microsoft) and analyzed subsequently using the Statistical Package for Social Sciences (Windows Version XP 2003; SPSS Inc).

RESULTS

Panoramic radiographs of 900 Hamadan patients aged 14–70 years (mean 42 years) were examined. A total of 162 (18%) patients presented impacted teeth. The 22–30-year age group had the highest prevalence of tooth impaction (29.8%) and semi-impaction (19.4%), but this trend decreased with increasing age (Tables 1 and 2). The male to female ratio of the study group was 5.1:3.9.

Table 1. Prevalence of semi-impacted teeth in different age groups of patients

Age group (years)	Total no.of patients	Patients with impacted teeth
		NO. (%)
14–21	203	3 (1.5%)
22–30	299	58 (19.4%)
30–40	159	10 (6.3%)
Up to 40	239	1 (0.4%)
Total	900	72 (8%)

Table 2. Prevalence of impacted teeth in different age groups of patients

Age group (years)	Total no. of patients	Patients with impacted teeth NO. (%)
14–21	203	13 (6.4%)
22–30	299	89 (29.8%)
30–40	159	27 (17%)
Up to 40	239	31 (13%)
Total	900	160 (17.8%)

Of the 248 impacted teeth, third molars were most commonly encountered (80%), followed by maxillary canines (18%) and other teeth (2%). Analysis of the eruptive status of third molars in patients with impacted tooth/teeth showed that the distribution of impacted teeth was similar between the left and right sides ($P>0.05$). There were 78 patients with one, 45 patients with two, 20 patient with three, and 19 patients with four impacted teeth. There were 25 patients with one, 30 patients with two, 10 patient with three, and 7 patients with four semi-impacted teeth. More than 81% of impacted mandibular third molars

are either horizontally or mesially angulated toward second molars while more than 84% of impacted maxillary third molars were either vertically or distally angulated in relation to second molars. Approximately 1.4% of mandibular second molars adjacent to impacted third molars had root resorption on the distal surface. Carious lesions were also found in approximately 1.6% of the distal surfaces of adjacent mandibular second molars. Only 2% of maxillary second molars adjacent to impacted third molars had distal caries or root resorption (Table 3).

Table 3. Root resorption, carious and pathologic lesions associated with impacted tooth in different age groups

Age group (years)	Caries	Root resorption	Pathologic lesion
14–21	1 (0.5%)	5 (2.5%)	4 (2%)
22–30	17 (5.7%)	14 (4.7%)	26 (8.7%)
30–40	4 (2.5%)	5 (3.1%)	1 (0.6%)
Up to 40	2 (0.8%)	8 (3.3%)	6 (2.5%)
Total	24 (2.7%)	32 (3.6%)	37 (4.1%)

DISCUSSION

The literature shows that tooth impaction is a frequent phenomenon.⁽¹⁻¹⁰⁾ Patients who have impacted teeth increase in number every year. They comprise a wide range of age groups and also have symptomatic or asymptomatic impacted teeth.⁽⁹⁾ The panoramic radiograph, which provides information about all the teeth in both arches and the surrounding structures, is often the initial radiograph for the evaluation impacted teeth. The most prominent aim of this study was to determine the prevalence of impacted teeth according to age, sex, type, and features of associated pathologies in a sample of Hamadani population. Although this study may not represent the Hamadani population as a whole, the results are useful for primary health workers because the patients studied represent a group of dental patients presenting to a dental school.

The prevalence of impacted teeth in the study population was 18%. Unlike some previous studies that have investigated specific age groups only^(7,11,12) this study sampled patients across a range of ages. More than 30% of patients in this study were 22 and 30 years of age, which is similar to that reported by Unwerawattana et al.⁽⁹⁾ In this study the prevalence of impacted teeth decreased with increasing age, consistent with the results of a study carried by Ahlqwist et al.⁽¹³⁾ Regarding sex-related impaction, a statistically significant difference was found ($P < 0.05$), consistent

with the results of a study carried out by Haug et al.⁽¹⁴⁾

The pattern of impacted tooth types seen was similar to previous reports, with the most common being third molars, then upper canines, and others.^(2,3,5,15) Most impacted mandibular third molars were either horizontally or mesially angulated while most impacted maxillary third molars were either vertically or distally angulated, similar to that reported by Kramer et al and different from the results of studies carried out by Hazza'a et al and Rajasuo et al.^(16,17,18) In mesio-angular and horizontally impacted lower third molars partially exposed in the oral cavity, the occlusal surfaces form plaque accumulating crevices against the distal surfaces of second molars. Clinically, a combination of erupted upper and impacted lower third molars requires special attention because of the risk of overeruption of unopposed upper third molars. Additional or pre-existing pericoronitis associated with the lower third molars may exacerbate the discomfort experienced by patients, unless extraction or occlusal adjustment is attempted for the upper third molars.

In this study the highest incidence of pathologic conditions were detected in 21-30-year age group. Controversy persists with respect to the incidence of pathological conditions associated with impacted third molars. In fact, the prevalence of caries in lower second molars (1.6%) seen in the present study is similar

to the corresponding figures of 3%, reported by Stanley et al.⁽¹⁵⁾ In the study reported here, there were only 32 (3.6%) cases of root resorption and 2% of maxillary second molars adjacent to impacted teeth showed root resorption. Kahl et al reported that 8% of upper second molars and 9.5% of lower second molars had signs of root resorption.⁽¹⁹⁾ Conversely, Sewerin and Von Wovorn did not find any resorption caused by impacted third molars.⁽²⁰⁾

Stanley et al commented that it is difficult to determine radiologically whether coronal radiolucency adjacent to an impacted third molar is due to caries or root resorption.⁽²¹⁾

It is believed that intact tooth cementum should normally be able to withstand 'pressure' from neighboring impacted teeth, but differentiating resorption radiolucency from caries radiolucency is difficult, even on periapical radiographs.

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Pathologic condition of impacted third molars is another major concern in the literature because if such changes develop, the management of the pathological lesion becomes more complicated. In this study the prevalence of pathologic condition in the impacted teeth was 37 cases (4.1%). Thus, the risk of pathologic changes associated with long-term impacted third molars should be considered as an indication for elective removal of asymptomatic impacted teeth.

CONCLUSION

Impacted teeth were found in 18% of the 900 patients in this study. The order of impacted tooth types found was identical to previous reports, but there was a predilection for impacted mandibular third molars in this study population. Caries, root resorption and pathological lesions were seen in relation to the impacted teeth.

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