

Panorama-Radiographic Assessment of Impacted Teeth and Associated Pathosis Among Selected Males in Sana'a City, Yemen

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Abstract

Objectives: To assess the prevalence of both impaction and its associated pathosis in males in Sana'a city, Yemen based on digital panoramic radiographs.

Methods: This study was conducted from January 2020 to December 2020 and reviewed the panoramic radiographs of 665 male patients who attended Al-Murtada Dental Clinic. All images were evaluated to determine the prevalence and type of affected third molars and concomitant pathosis.

Results: Of the 665 panoramic radiographs examined, 268 (40.3%) patients had an impacted tooth. The impacted mandibular third molars were the most extensively (24.2%). The impacted tooth had a class II pattern of impaction (42.5%) among the impacted maxillary third molar. Overall, mesioangular impaction was the most common (75%), the overall, B position of impaction was the most common one (71.6%), with associated odds ratio equal to 1.3 times ($p=0.03$). Pathosis occurred in 48.1% of impacted patients compared to 26.3% in un-impacted patients. Loss of lamina dura of adjacent teeth was the most encountered pathosis of 34.7% with an associated OR equal to 4.1 times ($p<0.001$). There was an association between impaction and younger age group (43.4%) with OR equal to 1.5 times ($p<0.001$).

Conclusion: The prevalence and pattern of impacted third molars among adult male in Sana'a city is roughly similar to that of other racial populations. The number of third molar impaction increases with age. Although the percentage of pathosis associated with impaction is quite high, it is imperative that patients have regular oral examinations to keep the asymptomatic affected tooth in good health.

Introduction

Since eruption is a complex process, a delayed tooth eruption or failure of eruption may arise, so permanent teeth eruption and subsequent impaction is a common dental anomaly [1]. Previous literature reported that dental impaction is a common occurrence and many factors influence its prevalence including aging and eruption time [2]. Genetic and environmental factors play a role in developmental disorders. The incidence of impacted teeth is contrasting in different populations and ethnicities [3]. The complications associated with impaction can range from simple problems to serious, life-threatening problems. The hyperplastic follicular space, the subsequent dentigerous cyst or odontogenic keratocyst is the most common minor problem with impaction [4,5] Serious complications include a malignant transformation of the

cystic wall into squamous cell carcinoma or mucosal melanoma. Thus, the life-threatening conditions may be a series of simple problems such as impaction, which, if solved from the start, would be less costly and more easily solved [6]. Panoramic radiography is a simple tomography technique that provides a panoramic view of the maxillofacial area [7]. The radiographs are either digital or conventional imaging. Digital imaging has many advantages over conventional imaging, such as reducing radiation exposure, and the ability to process and analyze images, which improves sensitivity and reduces errors [8]. The United States guidelines state that the panoramic radiograph is one of the screening images for Adolescent with Permanent Dentition and Adult, Dentate or Partially Edentulous [9]. During the daily oral examinations, we notice the patient's poor awareness of oral health and its effects in Yemen. Additionally, there is no current data on

the prevalence of impacted teeth, and associated pathologies in Sana'a, Yemen. The aim of this study was to determine the prevalence and pattern of occurrence of impacted teeth in adult male ages based on a digital panoramic radiograph. Additionally, to report the radiographic features of associated pathologies in the study population, in order to correlate the impaction with associated pathosis.

Methods

This study was a retrospective observational study, which was conducted from January 2020 to December 2020; where 665 patients attended the Al-Murtada Dental Clinic, between the ages of 20-39 years; high-quality digital panoramic radiographs were obtained for all patients. The patients were divided into two groups, the first group from 20 to 29 years old, and the second group from 30 to 39 years old. After evaluating the patient's records, patients who had demonstrated one or more of the following disease conditions were excluded from the study. Any conditions that may affect the normal development of permanent teeth, such as diseases or trauma to the jaw, as well as any syndromes or genetic diseases, such as craniosynostosis, Down's syndrome, or fissured cranial ossification dysfunction. Digital panoramic radiographs were acquired with Proline XC. All patients' panoramic radiographs were examined carefully by 2 skilled Oral and Maxillofacial radiologists in order to detect impacted teeth and associated pathosis. Classification of impacted mandibular third molar level, position, and depth determined by panoramic radiograph according to the following classification: A) Pell and Gregory radiographic classification with respect to mandibular ramus into: Class I, Class II, and Class III; [10]. B) Pell and Gregory radiographic classification for the occlusal plane: Class A, Class B, and Class C; [10] and C) based on winter's

classification: mesio-angular, distoangular, horizontal, vertical, buccal/lingual obliquity, and transverse [11]. Classification of impacted maxillary third molar: Class A, Class B and Class C, and sinus approximation/no sinus approximation [12]. The classification of diseases associated with infected teeth includes: 1. Caries of affected or adjacent teeth. 2. The expansion of the periodontal ligament area of the adjacent tooth. 3. Loss of lamina dura of adjacent teeth. 4. Resorption of the adjacent tooth root. 5. Increase the area of the follicle around the affected tooth. 6. The formation of a cyst or tumor associated with the impacted tooth or neighboring teeth.

Ethical Approval

The Medical Ethics and Research Committee at the Faculty of Medicine and Health Sciences at Sana'a University gave us ethical approval. The patient identification and x-ray were kept confidential.

Statistical analysis

Epi Info version 7 was used for analysis data. Difference in proportions and associated odds ratio and test of significance were calculated using 2X2 tables and selected uncorrected statistical test for chi square and 2 tailed p values for significance. Level of statistical significance was assumed at $p < 0.05$.

Results

Table 1 presents the distribution of fully erupted and impacted third molars by arch and age; and association of the impacted third molars arch with age, a total of 268 (40.3%) patients had all third molars impacted, the prevalence of impacted mandible third molars (24.2%) was slightly higher than that of impacted maxillary third molars (16.1%) which was statistically significant ($p = 0.013$).

Age	Impacted Upper (Maxilla)		Impacted Lower (Mandible)		Total Impacted		OR	95%CI	P
	No	%	No	%	No	%			
20-29 years n=458	84	18.2	115	25.1	199	43.4	1.5	1.1 -2.2	0.013
30 - 39 years n=207	23	11.1	46	22.1	69	33.3	0.6	0.4 - 0.9	0.013
Total n=665	107	16.1	161	24.2	268	40.3			0.013

Table 1: Distribution of fully erupted and impacted third molars by arch and age; and association of impacted third molars arch with age

Table 2 shows the distribution of impacted third molars by jaw and side of the jaw; and association of impacted third molars arches with side of the jaw. There was no

statistically significant difference between the right and left impacted third molars within each arch (Table 2).

Side of the Jaw	Impacted Upper (Maxilla)		Impacted Lower (Mandible)		Total Impacted		OR	95%CI	P
	No	%	No	%	No	%			
Right	83	12.5	51	7.7	134	20.2	2.4	1.7 - 3.4	<0.001
Left	24	3.6	110	16.5	134	20.2	5.3	3.6 - 7.6	<0.001
Total	107	16.1	161	24.2	268	40.4			<0.001

Table 2: Distribution of impacted third molars by jaw and side of the jaw; and association of impacted third molars arch with side of the jaw.

Table 3 presents the distribution of impacted third molars by angulations and side of the jaw; and association of impacted third molars with angulations types. Overall,

mesioangular impaction was the most frequent (75%), with associated odds ratio equal to 14.7 times and 95% CI=10 - 21 (p < 0.001).

Angulations	Right n=134		Left n=134		Total Impacted n=268		OR	95%CI	P
	No	%	No	%	No	%			
Mesioangular	100	74.6	101	75.4	201	75	14.7	10 - 21	<0.001
distoangular	28	20.9	28	20.9	56	20.9	0.2.4	0.16 - 0.3	<0.001
Vertical	6	4.5	5	3.7	11	4.1	0.02	0.01 - 0.04	<0.001

Table 3: Distribution of impacted third molars by angulations and side of the jaw; and association of impacted third molars with angulations types.

Table 4 presents the distribution of impacted third molars by level of impaction and side of the jaw; and association of impacted third molars with level of impaction. Overall, II

position of impaction was the most common one (42.5%), with associated odds ratio equal to 1.4 times.

Level of Impaction	Right n=134		Left n=134		Total Impacted n=268		OR	95%CI	P
	No	%	No	%	No	%			
I	58	43.3	39	29.1	97	36.2	0.74	0.5 - 1	0.07
II	53	39.7	61	45.5	114	42.5	1.4	0.83-1.5	0.38
III	23	17.2	34	25.4	57	21.3	0.2	0.16 - 0.3	<0.001

Table 4: Distribution of impacted third molars by level of impaction and side of the jaw; and association of impacted third molars with level of impaction.

Distribution of impacted third molars by position and side of the jaw; and association of impacted third molars with position of impaction. Overall, B position of impaction was

the most common one (71.6%), with associated odds ratio equal to 1.3 times and 95% CI=1.1 - 1.8 (p=0.03) (Table 5).

Positions	Right n=134		Left n=134		Total Impacted n=268		OR	95%CI	P
	No	%	No	%	No	%			
A	3	2.2	6	4.5	9	3.3	0.01	0.009-0.03	<0.001
B	97	72.4	95	70.9	192	71.6	1.3	1.1-1.8	0.03
C	34	25.4	33	24.6	67	25	0.3	0.2-0.4	<0.001

Table 5: Distribution of impacted third molars by position and side of the jaw; and association of impacted third molars with position of impaction.

Table 6 shows the types of pathologies and association of impacted third molars by pathologies types. Pathosis occurred in 48.1% of impacted patients versus 26.3% in un-impacted patients. Loss of lamina dura of adjacent teeth

was the most pathosis occurred in impacted third molars patients at 34.7% with an associated OR equal to 7 times (p<0.001).

Pathologies	Impacted third molars n=268		OR	95%CI	P
	No	%			
Caries of impacted adjacent teeth	32	11.9	4.2	2.7-7.8	<0.001
Widening of periodontal ligament space of adjacent teeth	37	13.8	5.7	3-10	<0.001
Loss of lamina dura of adjacent teeth	93	34.7	7.0	4.5-10.7	<0.001
Root resorption of adjacent teeth	28	10.4			<0.001
Increasing in follicular space around the impacted teeth	17	6.3	6.5	3-14	<0.001
Total pathosis in impacted patients	129/268	48.1	4.1	2.9-5.7	<0.001
Total pathosis in non-impacted patients	102/387	26.3			<0.001

Table 6: Types of pathologies and association of impacted third molars with pathologies types.

Discussion

It is important to examine the oral cavity beyond what can be directly observed during a clinical examination in order to make an accurate diagnosis. The auxiliary use of imaging examination provides valuable information for this scenario [13]. In order to achieve effective treatment and allow preventive measurements of a decayed or impacted tooth, early detection is necessary [14]. The current study 268 (40.3%) patients had all third molars impacted, indicating how common impaction is and the need to discover the possible aetiological factors of this condition. This will assist decide whether this is an emerging problem or as a result of influences of the population's ethnic background. The aetiology of third molar impaction has never been investigated among Yemeni population and there is a need to conduct future studies to assess the causes of this condition more extensively. Also, the prevalence of third molar impaction (40.3%) in the current study is in the range of other studies conducted in Yemen or elsewhere [ranging from 16.7% to 68.6%] [15-21]. The impacted mandibular third molars were the most prevalent impacted tooth in the male sample (24.2%) and this was in according to Al-Hadi et al. [18], Al-Shamahi et al [19] and [Othman et al [22] who found the same distribution between Yemeni and Malaysians populations. The second most prevalent impacted tooth is the maxillary third molar (16.1%). This was in agreement with Al-Faleh [23] who mentioned that the most frequently involved teeth in descending order were the mandibular and maxillary third molar, among Pakistani patients. There was a similar distribution of teeth impaction among the Brazilian subpopulation and Tanzanian patients [13,24]. Our study found that 40.3% of 665 patients had impacted mandibular third molars, and this was different from the study by Chu et al [25] who conducted a retrospective study among a Hong Kong Chinese population and reported a prevalence of 28.3% of impacted third molars. The different results of these studies may stem from racial differences and differences in study methodology. In the current study, the total, mesioangular impaction was the most common (75%), with an associated odds ratio equal to 14.7 times and 95% CI=10 - 21 (p < 0.001) (Table 3). This was in agreement with Bokhari et al [26] who reported that, among the impacted mandibular third molars, most of the patients had mesio-angular impaction (50.75%), and only 4% of the patients had vertical impaction. This was different from Bokhari et al. [26] in which the vertical impaction was the most common type of maxillary arch (52%), and horizontal impaction was the least prevalent (1.5%). Conversely, Jung and Cho [27] found that horizontal impaction was more common in the third molars of the mandible. Our study noted that the most prevalent pathosis associated with impaction is the loss of the lamina dura of the adjacent tooth (34.7%) (Table 6), followed by widening of the periodontal ligament space of the impacted or the adjacent tooth (13.8%) and then caries of the affected or adjacent tooth (11.9%), followed by an increase in the follicular space around the impacted tooth (6.3%). This was in contradiction to Jung and Cho [27] who confirmed that the most frequently observed disease was caries (5.4%) of

the third molars of the mandible). Cyst or tumor formation was not associated with any impacted third molar in the present study. Jung and Cho [27] also claim that cysts rarely develop with impaction. This prevalence was similar to the previous study by Polat et al, [28] but lower than in other studies such as Punwutikorn et al, [29] and Al-Khateeb and Bataineh studies [30].

In the current study there was a significant difference between the ages of 20 to 29 and the age group 30 to 39. The age group 20-29 was the most prevalent for impaction but decreased in the age group 30-39. This finding is in agreement with Gunduz et al [31] who have conducted their research on Turkish patients. Jung and Cho [27] also found that older patients had fewer third molars.

In support of our results, a similar study was conducted among Yemeni residents of Sana'a city, and the Saudi population, they concluded that the highest incidence of dental impaction was found in the age group 20-25 years [18,26]. The higher prevalence of impaction in the younger age group can be explained by the greater number of missing wisdom teeth examined in the over 30 years of age group, compared to the age group under 30 years.

Conclusion

In conclusion, the prevalence and pattern of impacted third molars among Sana'a patients is roughly similar to other ethnic groups. The incidence of impaction decreases with age. The percentage of co-morbidities is quite high and regular oral examinations are necessary to keep the affected tooth without symptoms in good health.

Author Contribution

Prof. Dr. Nashwan Yahya Al-Shamahi, Professor of Radiology, Faculty of Medicine and Health Sciences, examined the panoramic radiographs to assess signs of proximity with Dr. Al-Kasem M Abbas, Professor of Dental Surgery, Faculty of Dentistry, Sana'a University. Other authors analyzed the data and wrote the manuscript and reviewed it.

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Conflict of Interest

"No conflict of interest associated with this work".

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