



Factors associated with pericoronitis among subjects with impacted third molars teeth

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Abstract

The removal of impacted third molars is one of the most common procedures in oral surgery. This is because third molars show high incidence of impaction and are often associated with pain due to pericoronitis.

Assess the reasons for extraction and describe the type of tooth angulations and state of eruption. Determine the association of selected factors with pericoronitis as a reason for extraction.

A total of 256 patients having symptomatic third molars and referred to the oral surgery department for consultation, diagnosis and treatment of partially or completely impacted third molars in the mandible and maxilla were included in the sample. All these teeth were surgically treated.

the most common cause of surgical extraction of third molars was pericoronitis (86.7%). The condition occurs mostly in mandible and in the 25-29 years age group. Horizontal/transverse third molars were more affected by pericoronitis (96.9%) followed by vertical angulations (91.6%). Pericoronitis encountered more frequently with complete soft tissue impaction (93.3%).

pericoronitis was the most common cause of third molar extraction. Factors associated with increased risk of having pericoronitis include: age group 25-29 years, mandible location, Horizontal / transverse angulation type and complete soft tissue impactions.

Key words: third molar, impaction, pericoronitis.

Introduction

The removal of impacted third molars is one of the most common procedures in oral surgery^{1, 2}. This is because third molars show high incidence of impaction and are often associated with various pathological conditions such as pericoronitis, periodontal defects in the distal aspect of the second molar, caries of the third molar or the second molar, different

types of cysts and odontogenic tumors and neurogenic pain^{3,4,5}. In addition to pathology sometimes caused by these teeth, other criteria may also justify their removal including orthodontic and prosthodontic or restorative consideration and preventive or prophylactic removal^{6, 7, 8}.

Pericoronitis is the most common condition affecting impacted third

molars .bacteria gain access into the follicular space through an opening in the overlying gingiva or through the gingival crevice distal to the second molar. Such infections may remain localized in pericoronal region, spread via lymphatic system into the submandibular lymph nodes or extended directly into the surrounding tissues. The most frequent site of direct extension is the buccal vestibule above the attachment of the buccinator muscle which causes a vestibular abscess .occasionally; however, the infection can spread beneath the buccinator muscle and give rise to a buccal space abscess or posterior into the pterygomandibular space. Once there has been an episode of pericoronitis , there is a tendency for the infection to recur intermittently when complete eruption of the tooth is not possible⁹ . Some affected lower wisdom teeth may be in a favorable position for eruption, once the infection has been controlled, further upward movement may take place uneventfully so that a normal gingival margin is attained¹⁰ .

Aims

- 1.Assess the reasons for extraction and describe the type of tooth angulation and state of eruption.
- 2.Study the association of selected factors with pericoronitis as a reason for extraction.

Materials and methods

Study design: Cross-sectional.

Study setting: Oral surgery department in Al-Karama specialized dentistry center in Baghdad for consultation.

Study period: The study spanned a period of 6 years (2004-2009).

Study Population: All patients referred to the oral surgery

department for consultation, diagnosis and treatment of partially or completely impacted third molars in the mandible and maxilla.

Study sample: The records of all patients available during the 6years study period. A total of 256 subjects were included in the sample, 136 females and 120 males, their ages ranged between 16-49 years. Chief complaint (reason for extraction), clinical examination, combined with radio graphical evaluation and demographic information was obtained for each patient.

Definition of study variables: The operational definition of eruption state and angulations of the third molars teeth was established. The angulations of third molars teeth were classified as vertical, horizontal, mesioangular or distoangular according to Winter's classification (Winter 1926)¹¹ . Other positions such as buccoangular, lingoangular, transverse and inverted were classified as "aberrant position".

The state of eruption of the tooth was defined as "completely impacted" when the tooth was entirely covered by soft tissue and partially or completely covered by bone within bony alveolus. "Partially erupted" was the term used to define the tooth when it has failed to erupt into a normal functional position and it's partly visible in oral cavity (faculty of dental surgery 1997)¹² .

Ethical consideration: The data obtained for the study was part of routine daily work in oral surgery department. All the procedures used in patients management were standard procedures.

Statistical analysis: SPSS version 13 computer software was used for statistical analysis. Frequency

distribution for selected variables was done first. The statistical significance of association between 2 categorical variables was tested by Chi-square test. Multiple logistic regression analysis was used to assess the risk of having pericoronitis for selected explanatory variables. P value less than 0.05 was considered statistically significant.

Results

The results were based on the analysis of a sample of 256 patients with symptomatic impacted third molars. The age of the subjects ranged from 16-49 years of age with mean of 24.4 years (+/- 5.8 years standard deviation). The highest proportion of cases (43.4%) was young (20-24) years of age. Females constituted a slightly higher proportion (53.9%) than males, table 1.

Most of the cases had the problematic tooth located in mandible (93.4%). Partially erupted third molars were more commonly seen (68.4%) while complete soft tissue impactions constituted (29.3%) and the lowest percentage were for the complete bony impaction (2.3%). Pericoronitis was the most common cause of extraction (86.7%). Extraction for orthodontic treatment accounted for 9% of cases. Other causes like chronic pulpitis, cheek bite, TMJ pain and cystic lesion accounted for only 4.3% of cases. Mesioangular impactions were the most commonly identified angulation (43%), vertical impaction (37.1%), and horizontal / transverse (aberrant) (11.3%) and only 8.6 of the cases were distoangularly impacted, table 2.

As shown in table 3, age was significantly associated with pericoronitis. The rate of pericoronitis was lowest in the <20 years age group (71.1%) and highest in age group (25-

29) years (98.5%). Mandibular location for the impacted tooth was associated with a statistically significant higher rate of pericoronitis (88.3%) compared to maxillary location (64.7%). Gender had no important or statistically significant association with rate of pericoronitis.

The angulations of impacted tooth were significantly associated with pericoronitis. The highest rate of pericoronitis was recorded in association with horizontal / transverse impaction (96.6%), followed by vertical impaction (91.6), then the mesioangular impaction (83.6%) and the lowest percentage was for distoangular impaction (68.2%). Complete soft tissue impaction was associated with a statistically significant higher rate of pericoronitis (93.3%) compared to partially erupted third molars (86.9%). There were no cases of pericoronitis involving impaction teeth that were completely covered by bone.

To study the net and independent effect of mandibular location, type of tooth angulations and type of tooth impaction after adjusting for age and gender on the risk of having pericoronitis a multiple logistic regression model was used (table4). The backward elimination algorithm (method) showed that gender had no important association with the risk of pericoronitis and therefore was eliminated from the final regression model. The 25-29 years age group significantly increased the risk of having the outcome by 20.1 times compared to <20 years age group, after controlling for the remaining explanatory variables included in the model. Mandibular location for the impacted tooth significantly increased the risk of pericoronitis by 10.2 times compared to maxillary location after controlling for the remaining explanatory variables included in the

model. The horizontal/transverse location significantly increased the risk of pericoronitis by 10.4 times compared to distoangular, while the vertical type significantly increased the risk of pericoronitis by 5.2 times compared to distoangular after controlling for the remaining explanatory variables included in the model. Complete soft tissue impaction significantly increased the risk of having pericoronitis by 5.1 times compared to partially erupt after controlling for the remaining explanatory variables included in the model. The model was statistically significant and had an overall accuracy of 89.1%.

Discussion

The third molars are the most frequently impacted teeth because they are the last to erupt; therefore, they are the most likely to have inadequate space for eruption¹³. In this study the mandible accounted for 93.4% of impaction and 6.6% were in maxilla. Jasser k ma'aita (2000)¹⁴, studied 600 patients with symptomatic impacted third molars in Jordanian patients and found 60.6% of impactions located in mandible and 39.4% were in maxilla, which is in agreement with our results although mandible accounted for a much higher percentage (93.4%). This may explain why many other studies^{15, 16, 17} took only impacted mandibular third molars in their samples. Sasano et al. (2003)¹⁸, found that the risk of developing symptoms was significantly higher for the mandible than for the maxilla. This may explain why more cases with mandibular impaction come to medical attention than maxillary impaction.

The present study showed that patients at (20-24) years age group were the most likely to present with symptomatic impacted third molars

(43.4%) followed by patients between (25-29) years age group (25.4%). It is evident that symptomatic cases with impactions were mainly seen in third decade of life. Prophylactic removal of asymptomatic third molars is not recommended as the probability of having symptoms decrease with advancing age. Similar finding were reported by jasser k.moa'ata (2000)¹⁴.

Mesioangular impaction was more associated with symptoms (pericoronitis) than distoangular type in the present study. This conclusion was also reported in published articles^{2,19,20}. It was stated that mesioangular impactions were predominantly associated with pathology. The latter followed by vertical and horizontal impactions. The explanation is the increased likelihood of food particles accumulating in such third molars.

The present study showed that partially erupted symptomatic third molars were more common (68.4%), followed by complete soft tissue impaction (29.3%) while only small number 6 (2.3%) were complete bony impaction. Sasano et al (2003)¹⁸ showed that for both the maxillary and mandibular third molars the risk of developing a symptom correlated neither with angular position nor with impaction level if good oral hygiene is maintained.

Pericoronitis was the most common cause for third molar removal in this study accounting for 86.7% of cases. The mandibular location was more frequently associated with pericoronitis than maxillary location. Sasano et al (2003)¹⁸ also found that the most frequent cause of symptoms was pericoronitis in the maxilla (43.8%) and in the mandible (80.2%). Other studies done on impacted mandibular third molars showed the same result with different percentage, Gbotabrun 2007 (63.1%)²¹ Qirreish 2005 (50%)¹⁵

, Bataineh et al. 2002 (46.8%)²² Rosfaima 2009 (43.1%)¹⁷ while the study of Adeyemo et al. 2008²³ showed that carries and it's sequela (63.2%) was the major reason for teeth extraction followed by recurrent pericoronitis (26.3%).

Using multivariate modeling in the current study it was shown that mandibular location for the impacted tooth significantly increased the risk of pericoronitis by 10.2 times compared to maxillary location. This may be attributed to the anatomical variation between maxilla and mandible where in mandible the arch is limited posteriorly by vertical ramus making the cleansing of this area difficult when the patient insert the tooth brush it come in contact with ramous and the area cannot be cleaned well leading to accumulation of plaque and food debris. The role of age, gender, type of angulations and type of tooth impaction on the occurrence of pericoronitis was assessed. The study of Lee et al. (1989)²⁴ and Nyachhyon et al. (2009)²⁵ found that pericoronitis frequently seen in third decade of life while the study of Abdulla Hazza'a et al. (2009)²⁶ showed that most of the cases (71.1%) were within 16-25 years old age group, while in our study the rate of pericoronitis was lowest in <20 years age group but this rate increase after 20 years of age with peak occurrence at 25-29 years age group. It is well known that eruption of third molars occurs most frequently between 17-21 years^{27,28} thus most of the cases of pericoronitis do not occur during eruption but rather some years later and this may be attributed to many factors:

- 1-long exposure to irritant from the oral cavity
- 2- Complete eruption of upper third molars and impingement on operculum of lower third molars

- 3- Change in life style from collage to work or from single to married with accompanied increase in stress at this period¹⁰.

Many studies suggest that teeth at most risk to develop pericoronitis were vertically placed mandibular third molars^(24,25,29), unlike the result of present study where horizontal transverse (aberrant) angulations had the strongest association with pericoronitis 96.6% followed by vertical position 91.6%. Mevlut et al (2010)³⁰ on the other hand agreed that pathological changes mostly occur with horizontal position of impacted third molars.

The present study found that third molars completely covered with soft tissue significantly increased the risk of having pericoronitis by 5.1 times compared to partially erupted teeth. Abdulla Hazza'a et al (2009)²⁶ Shephard et al. (1994)³¹ found that soft tissue adjacent to partially erupted third molars were more frequently affected by pericoronitis. It seems logic that when a tooth is completely covered by soft tissue become more difficult to cleansed when plaque and food debris accumulated under the tissue, to clean this area, the patient needs to irrigate the area using syringe or the dentist can clean this area by simple scaling.

Conclusions

1. pericoronitis was the most common presentation of impacted third molar tooth accounting for 86.7% of cases.
2. The following factors increase the risk of having pericoronitis. These factors ordered from strongest to weakest are: age group 25-29 years, mandible location compared to maxillary location, Horizontal / transverse angulation type and complete soft tissue impactions.

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Table 1: Frequency distribution of the study sample by age and gender.

		N	%
1.	Age group (years)		
	<20	38	14.8
	20-24	111	43.4
	25-29	65	25.4
	30-34	23	9
	35+	19	7.4
	Mean+/-SD (24.4+/-5.8 years)		
2.	Gender		
	Female	138	53.9
	Male	118	46.1
	Total	256	100

Table 2: Frequency distribution of the study sample by descriptive variables.

		N	%
1.	Mandibular location Vs Maxilla		
	Mandible	239	93.4
	Maxilla	17	6.6
2.	State of tooth eruption		
	Partially erupted	175	68.4
	Complete soft tissue impaction	75	29.3
	Complete bony impaction	6	2.3
3.	Reason for exo		
	Pericoronitis	222	86.7
	Orthodontic	23	9
	Others (Chronic pulpitis, Cheek bite, TMJ pain and Cystic lesion)	11	4.3
4.	Type of angulation in tooth		
	Distoangular	22	8.6
	Mesioangular	110	43
	Vertical	95	37.1
	Horizontal / transverse (Aberrant)	29	11.3
	Total	256	100

Table 3: The rate of pericoronitis by selected independent variables.

	Total	Pericoronitis		P
	N	N	%	
1. Age group (years)				<0.001
<20	38	27	71.1	
20-24	111	93	83.8	
25-29	65	64	98.5	
30-34	23	20	87	
35+	19	18	94.7	
2. Gender				0.54[NS]
Female	138	118	85.5	
Male	118	104	88.1	
3. Mandibular location Vs Maxilla				0.006
Maxilla	17	11	64.7	
Mandible	239	211	88.3	
4. Type of angulation in tooth				0.008
Distoangular	22	15	68.2	
Mesioangular	110	92	83.6	
Vertical	95	87	91.6	
Horizontal / transverse (Aberrant)	29	28	96.6	
5. State of tooth eruption				<0.001
Partially erupted	175	152	86.9	
Complete soft tissue impaction	75	70	93.3	
Complete bony impaction	6	0	0	

Table 4: Multiple logistic regression model (backward elimination method) with risk of having pericoronitis as the dependent (response) variable and selected explanatory variables.

	OR	P
Age group (years)		0.09[NS]
Age group 20-24 compared to <20	1.6	0.42[NS]
Age group 25-29 compared to <20	20.1	0.008
Age group 30-34 compared to <20	1.6	0.57[NS]
Age group 35+ compared to <20	4.7	0.18[NS]
Mandible compared to Maxilla	10.2	0.006
Angulations type		0.036
Mesioangular compared to Distoangular	1.7	0.37[NS]
Vertical compared to Distoangular	5.2	0.015
Horizontal / transverse (Aberrant) compared to Distoangular	10.4	0.05
Type of tooth impaction		0.044
Complete soft tissue impaction compared to partially erupted	5.1	0.012

Note: Complete bony impaction decreased the risk of having pericoronitis compared to partially erupted, but the odds ratio cannot be calculated

Overall predictive accuracy=89.1%

P (model)<0.001

Note: gender failed to be included in the model