CORELATION BETWEEN PREOPERATIVE PATHOSES, POSITION OF IMPACTED MANDIBULAR THIRD MOLAR AND DEMOGRAPHIC CHARACTERISTICS

Albina AJETI ABDURAMANI[1*], Boris VELICKOVSKI[2], Marija PEEVA PETRESKA[2], Qanije SABRIU AJETI[3], Fjolla AJETI[4]

[1]Department of Oral Surgery, Faculty of Medical Sciences, University of Tetova, RNM
[2] Department of Oral Surgery, Faculty of Dentistry, UKIM, Skopje, RNM
[3] Specialized Polyclinic for Oral Surgery and Orthodontics Alba Ortodent, Tetova, RNM
[4] Department of Orthodontics, Faculty of Dentistry, UKIM, Skopje, RNM
*Corresponding author e-mail: albina.ajeti@unite.edu.mk

Abstract

Third mandibular molars mainly appear to be in an inappropriate position in dental arch, so become the teeth which barely erupt or stay impacted in jaws. The aim of this study is to analyze the correlation between the preoperative pathologies with the position of the impacted third mandibular molar, sex and age of the patients. The sample of the study consisted of a total of 80 patients, of both sexes, diagnosed with fully or partially impacted third mandibular molars, who were followed up after the surgery for a three-month period. All the patients were clinically examined and for each of them was registered a panoramic radiography, to analyze the factors causing the pathology, which leads to the surgical extraction of the teeth. The most manifested preoperative pathologies correlating to the position of impacted mandibular third molars were: resorption of distal root of mandibular second adjacent molar, caries of second adjacent molar, pericoronitis, periodontal disease, frontal incisal mandibular crowding. All the pathologies were associated with the tooth position, some differed by age and gender. We conclude that preoperative complaints related to the position of the impacted third mandibular molar are in positive proportion to the age of the patients, i.e. subjective complaints increase with age: pain, limited opening of the mouth, local inflammation of the gingiva and paresthesia. The position of the impacted third mandibular molar affects the occurrence of preoperative pathologies: pericoronitis was most prevalent in impacted third mandibular molars with vertical position, class II, A position and partial impaction; periodontal diseases of second adjacent mandibular molar are most prevalent in impacted third mandibular molar with mesioangular position, class III, B position and partial impaction.

Keywords: impaction, mandibular third molar, preoperative pathologies, radiography.

1. Introduction

Modern world literature elaborates oral diseases and problems related to teeth, among which pathologies and complications related to impacted teeth occupy an important place, which represent a sphere of interest for several areas of dental practice, such as oral surgery, orthodontics, oral pathology and periodontology. Eruption of third molars varies from 17 to 21 years of age in normal conditions. However, there is a deviation from this interval, depending on facial growth, jaw size and tooth size, and often the eruption is partial or does not occur at all, resulting in impaction of the third molars. These teeth are the last to join the teeth row, and at the same time show great variability in shape, size, placement, root development and eruption path. [Amanat N. et al, 2014; Verma A. et al, 2017].

Lausen S.R. et al.,2013, concluded in their research that there are several factors that influence the occurrence of impaction of third molars, such as: insufficient space in the retromolar region, angulation and ectopic position of the third molar, late mineralization and obstruction of the eruption path. In addition, gender, race, genetic and endocrinological factors can also affect the eruption process of these teeth.

A large number of researches in the dental literature talk about the pathologies related to the position of impacted or half-impacted third molars. These teeth have a predisposition to cause various pathologies, such as: pericoronitis, periodontal diseases of the second molar, orofacial infections, caries, resorption of the root of the adjacent tooth, cystic changes, changes in the bone structure, problems with the temporomandibular joint, etc.

Thomai K. et al., 2019, conducted their research on 650 recruits in the Greek army aged 20 to 30 years, of which 32 patients were diagnosed with pericoronitis, and they concluded that this pathology has a 4.92% representation, and the group of patients at the age of 20 to 25 was determined as the most predisposed to this pathology. As for the relationship between the position of the impacted molars and the appearance of pericoronitis, vertical impaction was verified in 61.11%.

Stella P.E. et al., 2017, investigated the periodontal depth of the second molars under the influence of the eruption of half-impacted adjacent third molars, before and after the extraction of the latter. The reference value of the depth of the periodontal complex was 0.26 mm, and the research took place in 23 patients with an average age of 20 years. The comparison took place 60 days and 180 days after the extraction of the third molar, and the results were satisfactory, so that after 180 days the probing depth of the periodontium of the second molar was reduced to 0.15 mm. Periodontal disease of the mandibular second molar was recorded as present with a higher percentage in patients with a half-impacted mandibular third molar in a mesioangular position.

The present pathologies that are a consequence of the difficult or impossible eruption of the impacted third molars, and the accompanying symptoms, are an indication for the extraction of these teeth. However, oral surgical intervention for the extraction of the impacted or half-impacted third molar is often associated with complications of a different nature.

2. Material and methods

The study sample consists of 80 patients diagnosed with an impacted or half-impacted mandibular third molar. The diagnosis is defined according to the clinical examination and radiographic imaging of the patients, followed in the Polyclinic by the Specialized Consultative Activity "Alba Ortodent", in Tetovo, under the scientific supervision of the Clinic for Oral Surgery, PHI University Dental Clinical Center "St. Pantelejmon", Skopje.

The aim of the study: For this study, we were motivated by desire to try to prove the relation between the position of the impacted third mandibular molars and the pathologies they may cause. So we aimed to:

- To analyze and determine the location of non-erupted, i.e., impacted third mandibular molars
- To identify the relation of the position of the impacted TMM with the patient's subjective complaints
- To evaluate the connection of the placement of the impacted third mandibular molar with the pathology, i.e. with the clinical manifestation of the preoperative pathologies caused by that
- To define a therapy plan in relation to the pathology of impacted mandibular third molar

Classification of impacted molar by their position: A very important moment is the determination of the exact position (localization, depth in the jaw bone, inclination of the tooth and the relation to the adjacent anatomical and morphological structures) of the impacted mandibular third molar. For that purpose, generally accepted and confirmed classification systems are used, according to George Winter and Pell and Gregory. The classification according to Winter defines deviation of the eruption path of the impacted third

molar from the normal position of the tooth in the tooth row, that is, the angle formed between the average normal axis of the second and third mandibular molar. Classification according to Pell and Gregory, is based on the size of the space between the distal side of the lower second molar and the mandibular ramus. The following classification according to Pell and Gregory determines the depth of the impaction of the lower third molar and the level of the crown of the lower third molar in relation to the lower second molar (the amount of bone tissue that covers the impacted tooth). [Ajeti Abduramani A. et al, 2023]

An individual analysis and evaluation of the orthopantomographic images was made according to: a) classification according to Winter [Christian K. et al, 2022]; b) classification according to Pell and Gregory; c) depth classification of the impacted molar in relation to the occlusal plane. [Leila K. et al, 2019] (example pic.1)

Picture 1 - Patient 1:
- female
- 19 years old
- tooth 38
- mesioangular position
- class II
- C position

3. Results

Preoperative examinations

This part of the research deals with preoperative pathologies based on subjective assessment of the sample of patients with impacted third mandibular molar.

3.1 Winter classification and demographic parameters: For this purpose, the orthopantomographic images of each patient were evaluated individually. An analysis was made of the classification according to Winter in terms of gender, and age in years, ie age groups. (Table 1).

Table 1. Analysis according to Winter's classification and demographic parameters

Parameters		Winter classification						[1]p
		1	2	3	4	5	6	
Gender								
Male	N	12	13	5	5	1	1	Winter (1-5); p=0,986
	%	32,43%	35,14%	13,51%	13,51%	2,70%	2,70%	
Female	N	14	14	6	8	1	0	
	%	32,56%	32,56%	13,95%	18,60%	2,33%	0%	
Total	N	26	27	11	13	2	1	
	%	32,50%	33,75%	13,75%	16,25%	2,50%	1,25%	
Age groups								
10 – 19	N	1	8	0	0	0	0	Winter (1-2) 10-19/20-29/30-39 p=0,003*; Winter (1-4) 20-29/30-39 p=0,064
	%	11,11%	88,89%	0%	0%	0%	0%	
20 – 29	N	14	17	8	11	2	0	
	%	26,92%	32,69%	15,38%	21,15%	3,85%	0%	
30 – 39	N	11	2	3	2	0	1	
	%	57,89%	10,53%	15,79%	10,53%	0%	5,26%	
[1]Fisher Feaman Halton exact test *significant for p<0,05								
[2]classification: 1-vertical, 2-mesioangular, 3-horizontal, 4-distoangular, 5-bucoangular, 6-linguoangular								

3.2 Winter classification and gender: The analysis of the entire sample of patients with impacted third mandibular molar according to the Winter classification indicated that in the majority of them 27 (33.7%) the position of the impacted mandibular third molar was mesioangular followed by 26 (32.5%) in which the position was vertical, 13 (16.2%) with a distoangular position and 11 (13.7%) with a horizontal position. The lowest proportional representation was the buccoangular position in 2 (2.5%) of the patients and the linguoangular position present in 1 patient. (Table 2). No inverted or atypical position of the tooth according to Winter's classification was observed in any of the patients in the sample.

3.3 Winter classification and age groups : The analysis according to the three age groups of the patients in the sample and the classification according to Winter, indicated that in the age group of 10-19 years, the most common was the mesioangular position of third mandibular molar - 88.9%, while in the group of 30 - 39 years, the most common was the vertical position with 57.89%. In the age group of 20-29 years, these two positions were represented approximately equally and consequently 26.9% vs. 17 32.7%. For p<0.05, a significant association was observed between the age group to which the patients belong and the vertical or mesioangular position. (Fisher Feaman Halton exact test: p=0.003). Patients 10-19 years had a significantly more frequent mesioangular position of the impacted third mandibular molar compared to patients 20-29 and those 30-39 years. At the same time, patients aged 30-39 years had a significantly more frequent vertical (Table 1).

3.4 Winter classification and preoperative observations: Below in the text we analyzed three of the preoperative findings (paresthesia, pericoronitis and periodontal diseases of second adjacent molar) in relation to the classification according to Winter (Table 2)
Paresthesia – the analysis indicated equal representation of preoperative paresthesia in patients with vertical and distoangular position for consecutive. In patients with mesioangular and horizontal position, preoperative aparesthesia was present in 4 vs. 2. Preoperative paresthesia was not determined in any of the patients with buccoangular and linguoangular

position. For p>0.05, there was no significant association between paresthesia and classifications according to Winter (1-4 according to Table 12) (Fisher Feaman Halton exact test: p=0.891)

Pericoronitis – of the patients in the sample, there was pericoronitis in 80.8% with vertical position, 44.4% with mesioangular and 84.6% with distoangular position. For $p<0.05$, a significant association was determined between pericoronitis and classifications according to Winter (Fisher Feaman Halton exact test: p=0.007). Pericoronitis was 5.2 times significantly more common in patients with vertical compared to those with mesioangular position [OR=5.25 (1.52-18.07) 95% CI; p=0.0063] ie 6.87 times significantly more often in patients with distoangular compared to those with mesioangular position [OR=6.87 (1.27-37.15) 95% CI; p=0.0161].

Periodontal diseases of second adjacent molar - the highest proportion of periodontal diseases were registered in mesioangular, followed by horizontal - and mesoangular. In about a quarter of the patients with vertical or distoangular position, periodontal disease of second adjacent molar was registered and for $p<0.05$, it was significantly less compared to horizontal and distoangular position (Fisher Feaman Halton exact test: p=0.001) (Winter 1-4 according to Table 12). This preoperative finding was not registered in patients with buccoangular position (Table 2).

Table 2. Analysis according to Winter's classification and preoperative findings

Parameters		[2] Winter classification						[1]p
		1 N=26	2 N=27	3 N=11	4 N=13	5 N=2	6 N=1	
Preoperative pathologies								
Paresthesia	N	6	4	2	3	0	0	Winter (1-4); p=0,891
	%	23,08%	14,81%	18,18%	23,08%	0%	0%	
Pericirinitis	N	21	12	11	11	0	0	Winter (1,2,4); p=0,007*
	%	80,77%	44,44%	100%	84,62%	0%	0%	
Periodontal disease of adjacent second molar	N	6	19	9	3	0	1	Winter (1-4); p=0,001*
	%	23,08%	70,37%	81,82%	23,08%	0%	100%	
[1]Fisher Feaman Halton exact test *significant for p<0,05								
[2]classification: 1-vertical, 2-mesioangular, 3-horizontal, 4-distoangular, 5-bucoangular, 6-linguoangular								

3.5 Pell and Gregory classification and demographic parameters: To determine the classification according to Pell and Gregory, an evaluation was made of the orthopantomographic images of each of the patients and they were analyzed in terms of gender and three pre-defined age groups (Table 3).

Table 3. Analysis according to Pell and Gregory classification and demographic parameters

Parameters		Pell и Gregory classification			P
		I class	II class	III class	
Gender					
Male	**N**	5	21	11	X^2=0,8457; df=2; [1]p=0,6551
	%	13,51%	56,76%	29,73%	
Female	**N**	6	28	9	
	%	13,95%	65,12%	20,93%	
Total	**N**	11	49	20	
	%	13,75%	61,25%	25%	
Age groups					
10 - 19	**N**	1	8	0	[2]p=1,0000
	%	11,11%	88,89%	0%	
20 - 29	**N**	7	30	15	
	%	13,46%	57,69%	28,85%	
30 - 39	**N**	3	11	5	
	%	15,79%	57,89%	26,32%	
[1]Pearson Chi-square test [2]Fisher Feaman Halton exact test *сигнификантно за p<0,05					

The analysis of the entire sample of patients with impacted third mandibular molar according to the Pell and Gregory classification indicated that the majority of them, 49 (61.2%) were in class II, and at least in class 1 (Table 3). For p>0.05, no statistically significant association was determined between the sex of the respondents and the three classes according to Pell and Gregory (Pearson Chi-square=0.8457; df=2; p=0.6551).

3.6 Classification according to Pell and Gregory and preoperative pathologies: According to the classification of Pell and Gregory, an analysis of 3 preoperative parameters was performed, paresthesia, pericoronitis and periodontal diseases of second adjacent mandibular molar.(Table 4)

Table 4. Analysis according to Pell and Gregory classification and preoperative pathologies

Parameters		Pell и Gregory classification			p
		I class N=11	II class N=49	III class N=20	
Preoperative parameters					
Paresthesia	**N**	2	10	3	[1]p=0,871
	%	18,18%	20,41%	15%	
Pericoronitis	**N**	7	33	15	X^2=0,542; df=2; [2]p=0,7624
	%	63,64%	67,35%	75%	
Periodontal disease of second adjacent molar	**N**	5	20	13	X^2=3,352; df=2; [2]p=0,1871
	%	45,45%	40,82%	65%	
[1]Fisher Feaman Halton exact test [2]Pearson Chi-square test *significant for p<0,05					

Paresthesia – the analysis indicated the highest proportion of preoperative paresthesia in class II patients – 20.4% followed by class I – 18.2% and class III – 15%. For p>0.05, there was no significant association between preoperative paresthesia and the Pell and Gregory classification (Fisher Feaman Halton exact test: p=0.871).

Pericoronitis – of the patients in the sample, 7 had pericoronitis in class I, 33 in class II and 15 in class III. For p>0.05, there was significant association between preoperative pericoronitis and Pell and Gregory classification (Pearson Chi-square test=0.542; df=2; p=0.7624).

Periodontal diseases of second adjacent mandibular molar – this finding was registered in 5 patients in class I, 20 in class II and 13 in class III. For p>0.05, there was significant association between preoperative periodontal diseases of second adjacent mandibular molar and classification according to Pell and Gregory (Pearson Chi-square test=03.352; df=2; p=0.1871).

3.7 Evaluation of depth of impacted third mandibular molar in bone according to Pell and Gregory: To determine the depth of second mandibular molar in the bone according to Pell and Gregory, an evaluation was made of the orthopantomographic images of each of the patients and they were analyzed in relation to gender and three pre-defined age groups (Table 5).

Table 5. Analysis by depth of TMM in bone and demographic parameters

Parameters		Classification by depth			P
		Position A	Position B	Position C	
Gender					
Male	**N**	8	20	9	$X^2=0,2130$; df=2; [1]p=0,8989
	%	21,62%	54,05%	24,32%	
Female	**N**	11	21	11	
	%	25,58%	48,84%	25,58%	
Total	**N**	19	41	20	
	%	23,75%	51,25%	25,00%	
Age groups					
10 - 19	**N**	0	2	7	[2]p=0,082
	%	0%	22,22%	77,78%	
20 - 29	**N**	1	40	11	
	%	1,92%	76,92%	21,15%	
30 - 39	**N**	2	16	1	
	%	10,53%	84,21%	5,26%	
[1]Pearson Chi-square test [2]Fisher Feaman Halton exact test *significant for p<0,05					

Depth of impacted mandibular third molar in bone by gender - Analysis of the entire sample of patients according to depth indicated that the majority of them, namely 41 were in Position C, while similar proportions of there were patients in the group with Position A and Position C for 19 vs. 20 (Table 5). For p>0.05, no statistically significant association was determined between the sex of the subjects and the three positions of depth of impacted third mandibular molar in bone.

3.8 Depth of impacted third molar in bone and preoperative pathologies: According to the classification of Pell and Gregory for the depth of the impacted mandibular third molar in bone, an analysis of 3 preoperative parameters, paresthesia, pericoronitis and periodontal diseases of second adjacent molar, was made. (Table 6).

Table 6. Analysis according to depth of impacted mandibular third molar in bone

Parameters		Classification by depth in bone			p
		Position A N=19	Position B N=41	Position C N=20	
Preoperative parameters					
Paresthesia	N	4	7	4	[1]p=0,9220
	%	21,05%	17,07%	20%	
Pericoronitis	N	18	36	1	[1]p=0,0001
	%	94,74%	87,80%	5%	
Periodontal disease of second adjacent molar	N	4	25	9	[1]p=0,0152
	%	21,05%	60,98%	45%	
[1]Fisher Feaman Halton exact test		[2]Pearson Chi-square test			*significant for p<0,05

Paresthesia – the analysis indicated the highest proportion of preoperative paresthesia in patients with Position A – 21 followed by Position B – 7 and Position C – 4. For p>0.05, there was no significant association between preoperative paresthesia and the classification according to Pell and Gregory for the depth of tooth in bone (Fisher Feaman Halton exact test: p=0.922).

Pericoronitis – the proportion of patients with pericoronitis with Position A was 18, Position B- 36, in contrast to Position C where the representation was 1. For p<0.05, there was a significant association between preoperative pericoronitis and the classification according to Pell and Gregory for the depth in the bone (Fisher Feaman Halton exact test: p=0.0001), in addition to a significantly lower occurrence of pericoronitis in patients with Position C.

Periodontal diseases of second mandibular molar – this finding was registered in 25 of patients with Position B and consequently in 4 vs. 9 of Position A and Position C patients. For p<0.05, there was a significant association between preoperative periodontal diseases and the classification according to Pell and Gregory for the depth in bone (Fisher Feaman Halton exact test: p=0.0152).

4. Discussion and conclusion

On our own clinical material, we examined the position of the impacted third mandibular molar in the patients who are part of the study, according to the classification of Winter and Pell & Gregory in relation to gender, age groups, preoperative pathologies such as: paresthesia, pericoronitis, periodontal diseases of the second mandibular molar.

Research by Barunawati Y. et al. 2020, confirms our results. In 76 patients, the author investigated the position of the impacted third mandibular molar in relation to gender and age, according to the Pell&Gregory classification, analyzing orthopantomographic images. The results of his study based on the gender of the patients show that for the presence of impacted third mandibular molar there is no significant difference between the two genders. Based on age, the most common group of patients diagnosed with impacted TMM was 21-30 years of age.

According to a study by Venta I.L.D.S. et al.2001, in our research, when analyzing the position of the TMM, we came to the conclusion that the mesioangular position (33.7%) by Winter classification is the most common among patients, followed by the vertical position (32.5%) with a non-significant difference between them. According to Pell & Gregory, the most statistically significant was class II and position C.

The results of the author Thomai K. et al. 2019, who investigated 650 patients with impacted third mandibular molars, show that pericoronitis, as a preoperative pathology, is most common in the vertical position of the tooth, class II and A position. These results coincide with the results of our research, where a statistically significant correlation was found between pericoronitis and the age of the patients, so that the presence of this preoperative pathology significantly increased with the increase in the age of the patients. Regarding the position of the impacted third mandibular molar, a significant association between pericoronitis and the angulation of the impacted TMM with a vertical position was determined in the patients in the sample of our study. In relation to the accommodation space of the mesiodistal diameter of the TMM, pericoronitis was most prevalent in class II impacted third mandibular molars. There was a significant association between this preoperative pathosis and position A of these impacted teeth. On the other hand, the prevalence of pericoronitis in the group of patients with partial impaction of the impacted mandibular third molar was dominant.

Based on the results obtained from our investigations, the author Stella PE et al. 2017, in their study recorded that there is a connection between the position, that is, the angulation of the impacted or semi-impacted third molar with the periodontal status of the second molar, so that the mesioangular position of the third molar favors bacterial colonization and appearance of a periodontal pocket in the second molar. Also, in the study of Stella PE et al. 2017, more impacted third mandibular molars determined with B position and class III were involved with this pathology, which completely coincides with our findings.

Impacted third mandibular molars in the preoperative period and after surgical extraction cause discomfort in patients. In order to minimize adverse events, the oral surgeon should be careful when planning and performing the surgical intervention.

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