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Original article

Relationship of the upper third molar to the maxillary sinus, by means of radiographic determination

Relationship of the maxillary third molar with the maxillary sinus by radiographic determination

Relation of the upper third molar to the maxillary bone by determination radiographic

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SUMMARY

The objective of this work is to evaluate the relationship of the upper third molar with respect to to the maxillary sinus, by radiographic determination. Observational research,

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Descriptive and cross-sectional study that collected information from 500 panoramic radiographs recorded in a database of the radiology department of the clinic of Manuel Cedeño specialties. The technique used was observation and as instrument, the x-rays of patients aged 14 to 30 years who attended the Radiological Department of the Clinic of Stomatological Specialties in the period 2023 - 2024. Regarding the results of 80 male and 160 female patients, the The most frequent position for Winter is vertical (48.8%) and class 3 in relation to the maxillary sinus (40.4%), it is concluded that the use of radiographic studies is essential for decision-making. The position of the upper third molar, presented most frequently in patients aged 14 to 30 years was the upright position. It is possible to affirm that there is an important relationship between the upper third molar and maxillary sinus on especially when there is a relationship of class 3, 4 and 5 according to the classification of Jung and Cho and a mesioangular position according to Winter's classification. The age group most susceptible to oro-sinusal complications is the first age range between 14 and 19 years.

Keywords: Maxillary Third Molar; Maxillary Sinus; Panoramic Radiograph; Communication Buccosinusal.

ABSTRACT

The objective of this study is to evaluate the relationship between the maxillary third molar and the maxillary sinus through radiographic determination. This is an observational, descriptive, and cross-sectional study that collected data from 500 panoramic radiographs recorded in the database of the radiology department at the Manuel Cedeño specialty clinic. The technique used was observation, and the instrument consisted of radiographs of patients aged 14 to 30 who attended the radiology department of the stomatological specialty clinic during the 2023–2024 period. Regarding the results from 80 male and 160 female patients, the most frequent position according to Winter was vertical (48.8%), and Class 3 in relation to the maxillary sinus (40.4 %). It is concluded that the use of radiographic

studies is essential for decision-making. The most common position of the maxillary third molar in patients aged 14 to 30 years was the vertical position. It can be stated that there is a significant relationship between the maxillary third molar and the maxillary sinus, especially when there is a Class 3, 4, or 5 relationship according to the Jung and Cho classification and a mesioangular position according to the Winter classification. The age group most susceptible to oroantral complications is the 14 – 19-year range.

Keywords: Maxillary Third Molar; Maxillary Sinus; Panoramic Radiograph; Oroantral Communication.

SUMMARY

The objective of this study is to evaluate the relationship between the upper third molar and the maxillary bone. by means of radiographic determination. This is an observational, descriptive research and transversal that collected information from 500 registered panoramic radiographs data bank of the radiology department of the Manuel specialty clinic Cedeno. The technique used was observation of the instrument, as x-rays of patients communities between 14 and 30 years old who appear in the radiology department of the clinic of stomatological specialties in the period of 2023–2024. How many years results, out of 80 male patients and 160 female patients, the most frequent second position Winter was vertical (48.8%) and Class 3 in relation to the maxillary bone (40.4%). It is concluded The use of radiographic studies is essential for decision making. To position Most commonly, the upper third molar in patients between 14 and 30 years old was in a vertical position. It can be stated that there is an important relationship between the upper third molar and the second. maxilla, especially when there is a relationship of Class 3, 4, or 5 second to the classification Jung and Cho have a mesioangular position second to Winter's classification. Or group The age most susceptible to oral complications is between 14 and 19 years.

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Keywords: Upper Third Molar; Maxillary Seio; Panoramic Radiography;

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Introduction

To successfully apply a stomatological treatment it is necessary to know the dental anatomy and how it relates to the anatomical structures that surround it. The The maxillary sinus has an important anatomical relationship with the upper teeth. posterior, which depend on the age, size and degree of pneumatization of the sinuses jaws, therefore, it is essential to analyze the proximity and correlation of these have to plan the different stomatological treatments of the surgical area and prosthetic.(1)

When analyzing the relationship between the maxillary sinus floor and the upper third molar in patients of different gender and ages, the possibility of establishing parameters in the different operative acts that compromise both structures and thus adopt the adequate precautions to avoid causing unnecessary iatrogenesis or complication with the purpose of providing safety and well-being to both dental professionals, students and the general population.(2)

The anatomical relationship between the floor of the maxillary sinus and the maxillary posterior teeth always presents a challenge in stomatology, especially during the procedure prosthetic or surgical extraction involving the maxillary posterior teeth that They are close to the maxillary sinus, which can often be affected by processes

odontogenic infectious diseases or being iatrogenically attacked by such simple maneuvers like a conventional extraction.(3)

Histological studies,(4-6)show that only a thin layer of cortical bone surrounds Most of the roots protrude radiographically into the sinus and are found actual mucosal perforations in 14 to 28% of the samples, therefore it seems clear that a thorough evaluation of the relationship of the upper posterior teeth and the sinus maxilla is essential whenever dental implants, extractions, therapy are considered endodontics and orthodontics in the posterior maxilla.

Currently there are several studies that determine the relationship between the third molar upper and the floor of the maxillary sinus, however, at the Latin American level this type of Research is scarce and limited, even more so in Cuba.(7-13)

The objective of this work is to evaluate the relationship of the upper third molar with respect to to the maxillary sinus, using panoramic radiographs of the study population on the Characteristics of the upper third molars with respect to their position and relationship with the maxillary sinus.

Methods

A descriptive cross-sectional study was carried out which was based mainly on the observation, in the Maxillofacial Surgery Service of the Carlos Manuel de Céspedes Hospital from Bayamo, Cuba, between the years 2023 and 2024.

The study population was 500 panoramic radiographs (donated for the research) of patients aged 14 to 30 years, who attended the department Radiological department of the Manuel Cedeño Stomatology Specialties Clinic in Bayamo in the period 2023 - 2024.

Non-probability sampling was used, because the information that meets the requirements was selected. with the project objectives through certain selection criteria, thus obtaining a sample of 240 X-rays.

Inclusion criteria:

- either X-rays of patients who attended the Digital Image Radiology Center in the period 2023-2024, to receive dental treatment.
- either X-rays of patients between the ages of 14 and 30 years.
- either Panoramic radiographs with minimal presence of a superior third molar in the arcade.
- either X-rays with adequate radiographic quality parameters: sharpness, contrast.

The technique used for this research was observation and as an instrument the collection form, to collect data from the analysis of the position of the third molar superior and the classification of Jung and Cho.(14)

The results obtained in the research were analyzed and interpreted through tables obtained using the statistical program SPSS version 27.

The research work was carried out in 4 phases:

PHASE I: collection of panoramic radiographs.

Panoramic radiographs were collected from the radiology department of the clinic. stomatological specialties with a total of 500 x-rays.

PHASE II: selection of radiographs according to inclusion and exclusion criteria.

Panoramic radiographs were observed in order to have a sample following the specifications of the study of a universe of 240 radiographs, according to the criteria of inclusion and exclusion.

PHASE III: analysis of panoramic radiographs

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Having the sample of 240 panoramic radiographs, the position analysis was performed of the upper third molar, according to Winter's classification to define the relationship of the third maxillary molar with the sinus on panoramic radiographs, Jung's classification was used And Cho,(14)who divided them into five types: class 1, the floor of the sinus is above the roots; class 2, the floor of the sinus touches the tips of the roots; class 3, the floor of the sinus overlaps up to one-third of the root; class 4, the sinus floor overlaps up to two thirds of the root; and class 5, the floor of the sinus extends to the neck of the tooth.

PHASE IV: completion of the registration form and obtaining results.

Once the x-rays were analyzed and a result obtained, the form was filled out. record of each patient with the corresponding data.

Results

The age variable was analyzed in 3 ranges as shown in Table 1. The age range most frequently was between 26 and 30 years, with 102 patients. The average age in This study was approximately 24 years old, with a median of 25, that is, 50 % of ages were above and below this value. The minimum age was 14 years while the maximum is 30 with a variation in the ages of approximately 5 years. Regarding gender, 66.7% of the patients corresponded to the male, while 33.3% were female; this produced an approximate ratio of 2:1. In all age groups the female sex predominated and the highest percentage was maintained difference between 20 and 25 years, the ratio of men to women was 4:1.

Table 1. Distribution of patients according to age range and sex of the sample.

Age group	men	women	total	H:M*	%
14-19	18	22	40	1.2	16.7
20-25	18	80	98	4.1	40.8
26-30	44	58	102	1.3	42.5
total	80	160	240	2	100
	33.3%	66.7%			

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Table 2 shows the frequency of position and relationship of the upper molars with the sinus. maxilla according to sex. In the 240 radiographs, 322 molars were found. Regarding Winter's classification, according to the female sex, the position found with the greatest frequency was the vertical position with 85 molars (54.0%) followed by the position distoangular with 57 (50.0%).No molars were found in an inverted position. As for the male sex, 57 (50.0%) appear in the distoangular position and 72 (45.9%) in the vertical position. Inverted positions are not observed either. Here it was shown that the Vertical and distoangular positions occur more frequently in both sexes masculine as well as feminine.

When analyzing the relationship of the maxillary sinus according to sex, it was found that 48 molars (52.1%) had a class 2 relationship; and 70 (53.8%) had a class 3 relationship. In the male sex, It showed that, as in the female sex, there is no class 5 maxillary sinus relationship. As for the relationship with sex, it is mentioned that the roots of the molars are located closer to the breast in men than in women but the difference between them is not considerable.

Table 2. Frequency of position and relationship with the maxillary sinus according to sex.

Dimension	Values	Female		Male		Total	
		N0	%	N0	%	N0	%
Position of the third molar Superior (Winter)	Mesioangular	21	65.7	11	34.3	32	9.9
	Horizontal	11	57.9	8	42.1	19	5.9
	Vertical	85	54.1	72	45.9	157	48, 8
	Distoangular	57	50.0	57	50.0	114	35.4
	Invested	0	0.00	0	0.00	0	0.00
Relationship with the breast maxillary	Class 1	19	57.6	14	42 ,4	33	10.2
	Class 2	48	52.21	44	47.8	92	28.6
	Class 3	78	53.8	60	46.2	140	40.4
	Class 4	37	55.2	30	0.00	67	20.8
	Class 5	0	0.00	0		0	0.00
	total	174	50.85%	148	49.5%	322	100%

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Table 3 shows, with respect to the frequency of the third molar position higher in relation to the Winter classification according to the age range 14-19, which is not found inverted positions, in the same range were found, 38 (48.7%) in vertical position and the most frequent 74 (51.4%) in distoangular position. According to the Age range 20 to 25 no inverted positions were found, 75 (10.62%) in position vertical and 93 (13.17%) in distoangular position. In the range 26 to 30 years no were found inverted positions and 30 (38.5%) in vertical position.

In correspondence with the maxillary sinus according to the age range 14 to 19 years, no lesion was found. Class 5 maxillary sinus link; and 36 (48.0%) had a class 1 relationship, 53 (52.0%) with class 2 and 45 (39) ratio¸ 1%) in class 3.

According to the range of 20 to 25 years, no relationship was found between class 5.29 (28.4%) of class 2 and 10 (8.7%) class 3.

In the age group of 26 to 30 years there is no reference to class 5 either.;10 (8.7%) belonged to class 3 and 20 (19.6%) to class 2.

Table 3. Frequency of position and relationship with the maxillary sinus according to age.

		14-19		20-25		26-30		total	
Dimension	Values	No	%	No	%	No	%	No	%
Position of the third Molar superior (Winter)	Mesioangular	25	15.3	16	16.8	5	7.8	46	14.3
	Horizontal	15	9.2	14	14.7	3	4.6	32	10
	Vertical	30	18.4	10	10.5	22	34.3	62	19.2
	Distoangular	70	43	32	33.6	23	35.9	125	38.8
	Invested	0	0.00	0	0.00	0	0.00	0	0.00
	None	23	14.1	23	24.2	11	17.1	57	17.7
Relationship with the one of the breast maxillary	Class 1	36	22.0	-	-	4	6.25	40	12.4
	Class 2	53	32.5	50	54.6	20	31.2	123	38.2
	Class 3	45	27.6	20	21.0	15	23.4	80	24.8
	Class 4	0	0.00	0	0.00	0	0.00	0	0.00
	Class 5	0	0.00	0	0.00	0	0.00	0	0.00
	None	29	17.8	25	26.3	25	39.0	79	24.5
	total	163	50.6%	95	29.5%	64	19.9%	322	100%

Discussion

The authors analyzed the relationship of the upper third molars to the sinus maxilla in panoramic radiographs using the Winter method and Jung classification and Cho.(14)

Panoramic radiography is a very valuable tool in the diagnosis and execution of the different treatments in the stomatological field, especially in the third molars, since they have a high prevalence of impaction.(12,13)

Regarding the angulation of the upper third molar, it has been shown to be related with the impact of the same,(14)which may be due to several factors such as lack of space in the distal area of the second permanent molar, physical maturation at an early age, Delayed mineralization of the third molar, a condition that occurs most frequently in women, since it is related to the growth process.

The age group of the research included ages between 14 and 30 years, because the Patients in this age range who come to a dental consultation are more likely to frequency for third molar extractions. In relation to the angulation of the third molar according to Winter's classification, the research showed that the most frequent position It was the vertical followed by the distoangular; which coincided in a similar way to studies like those of Hoyos Cabañas,(15)Mosquera-Valencia,(4)Ragab,(5)and Motiwala.(6)

As for the inverted position of the TMS, it is unusual and has currently been reported in Few investigations. No cases were found in this investigation. Jung YH, Cho BH, (14)reported that the pieces were in mesioangular, distoangular and transverse are the most likely to create orosinusal communication.

Regarding the relationship of the maxillary sinus according to Jung and Cho,(14)the investigation led to the class 3 as the most frequent with respect to age and sex, which is defined as class in which the apical third of the root is radiographically superimposed on the floor of the maxillary sinus in one third of the dental root, thus agreeing with Jung and Cho.(14)Erika Briggite Sanaicela Uvidia,(3)shows in his study that classes 3, 4 and 5 have greater risk of orosinusal communication.

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In several investigations it is mentioned that biological factors such as sex, age and race are of great importance in the relationship that exists between the roots of the teeth posterior superior and maxillary sinus.(12-15)Chang,(1)in his study in a population China concluded that the distance increases with age, in its study it indicated that the apices They were closer to the maxillary sinus before the age of 20 and further away after the age of 20. 60, which indicates that age played a role. Younger people are more likely to present the roots of the upper third molars displaced into the sinus.(5).

As for the relationship with sex, it is mentioned that the roots of the molars are located closer to the breast in men than in women, because men have roots longer and a more extensive maxillary sinus, but the difference between them is not considerable.(7,10-12)

During certain dental procedures performed on the upper jaw there is the risk of injuring the maxillary sinus and even creating a buccosinusal communication.(9)Is It is important to evaluate the patient radiographically before performing any procedure.

Panoramic radiographs provide the visualization needed to detect the relationship of the upper posterior teeth with the maxillary sinus. The panoramic image is enough to evaluate and observe the relationship between the maxillary sinus and the roots of the teeth posterior maxillae. Panoramic radiography, despite the distortion and problems of The sharpness that it presents due to being a two-dimensional image can alert the professional Stomatological information on root protrusion of teeth into the maxillary sinus**,**which allows to determine the need for a CT scan.

As for diagnostic examinations, panoramic radiography is still in use. everyday and easily accessible, but you can opt for a beam computed tomography conical (TCHC) when there are doubts regarding the assessment and treatment plan.(2.8)

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Conclusions

Through this study it can be concluded that the position of the upper third molar, The most frequently presented condition in patients aged 14 to 30 years was the upright position. There is an important relationship between the upper third molar and maxillary sinus, especially when there is a relationship of class 3 and 4 according to the classification of Jung and Cho and a position mesioangular according to Winter's classification. The age group most susceptible to oro-sinusal complications is the first age range between 14 and 19 years.

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Conflict of interest

The authors declare no conflicts of interest.

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