Original Article

Evaluation of the Maxillary Third Molars and Maxillary Sinus Using Cone-Beam Computed Tomography

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Abstract

Objectives: The purpose of this study was to assess the relationship of the maxillary third molars to the maxillary sinus using cone-beam computed tomography (CBCT) in a Turkish population. **Materials and Methods:** A total of 300 right and 307 left maxillary third molars were examined using CBCT images obtained from 394 patients. Data including the age, gender, the angulation type, depth of the third molars, and horizontal and vertical positions of the maxillary sinus relative to the third molars were examined. **Results:** Among 394 patients, 215 (54.6%) were male and 179 (45.4%) were female. The most common angulation of impaction was vertical (80.2%). Based on the depth of the third molars in relation to the adjacent second molar, Class A was the most common. Regarding the relationships of the third molars with the maxillary sinus, vertical Type I (43.5%) and horizontal Type II (59.3%) were seen most frequently. There was a significant difference between the vertical and horizontal relationships ($P < 0.05$). **Conclusions:** Knowledge of the anatomical relationship between the maxillary sinus floor and maxillary third molar roots is important for removing a maxillary third molar. CBCT evaluation could be valuable when performing dental procedures involving the maxillary third molars.

Keywords: *Cone-beam computed tomography, maxillary sinus, maxillary third molar*

Date of Acceptance:
20-Feb-2018

Introduction

The largest and the first developing paranasal sinuses are the maxillary sinuses, and its development process is completed with the third molar teeth eruption around at the age of 20.[1-3] The inferior sinus wall is a curved structure shaped by the lower third of the medial wall and the buccoalveolar wall,[1,4] and the sinus floor is shaped by the processus alveolaris of the maxilla. The maxillary sinus has variant extension in adults and extends between adjacent teeth or separate roots by forming ridges on the antral surface in about half of the population.[1,5,6]

A tooth is called impacted if it cannot or will not erupt into its normal physiological position.[7,8] An impacted tooth is a pathological condition, whereas the impaction ratio of maxillary third molars is high.[9,10] Impacted maxillary third molars are related with various situations, for instance, orofacial pain, approximal caries of the second molar, tumors of odontogenic origin, the specific variety of cysts, pericoronitis, root resorption, and tooth crowding.[9,11,12]

Sinus perforation or displacement of the tooth into the sinus may occur during extraction of maxillary third molars.[9,13,14] There are several studies reporting that a high ratio of these complications.[9,15,16] Thus, it is important for clinicians to be informed of the relationship between the maxillary sinus and the root of the maxillary third molar for a preoperative treatment plan and diagnosing of sinus pathologies.[9,13]

Orthopantomography (OPG) and computed tomography (CT) are the most common imaging

Access this article online

Quick Response Code:

Website: www.njcponline.com

DOI: 10.4103/njcp.njcp_420_17

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How to cite this article: Yurdabakan ZZ, Okumus Ö, Pekiner FN. Evaluation of the maxillary third molars and maxillary sinus using cone-beam computed tomography. Niger J Clin Pract 2018;21:1050-8.

methods used to assess the relationship between the roots of the maxillary posterior teeth and the maxillary sinus. Low cost, widespread availability, and the ability to demonstrate numerous anatomical features are major advantages of OPG, whereas superposition of anatomical formations, vertical and horizontal magnification (10%–33%), distortion, blurred images, the two-dimensional image, and lack of cross-sectional data are the disadvantages of OPG.[2,17-19]

There are various studies evaluating the horizontal and vertical relationships between the inferior wall of the maxillary sinus and the tooth root apex using CT.[20,21] CT provides three-dimensional and multiplanar images with uniform low magnification.[20,22] However, limited availability, high cost, and higher doses of radiation are the disadvantages of CT.[17,19] Furthermore, cone-beam CT (CBCT), which is widely used in dentistry in the recent years, is preferred to CT due to low cost, high resolution, a lower dose of radiation, and better image quality.[9,20,23-25]

Recently, CBCT has become standard in the evaluation of maxillary sinuses since both soft tissue and bone can be viewed in multiple images within thin sections.[26,27] CBCT allows diagnosis by providing three-dimensional data about the anatomical formations.[26,28] The data acquired by CBCT present coronal, sagittal, and axial sections, decreasing the superposition of anatomical formations.[26,29] These advantages help the clinician to understand the whole anatomical formation of the tissue.

There are many studies evaluating the relationship between maxillary sinus and posterior maxillary teeth in the literature.[1,17,26,30] However, prevalence studies are limited on the types of impaction of the maxillary third molars and the anatomical relationship between the maxillary sinus and maxillary third molar in the literature by age and gender in a Turkish population by CBCT imaging.[7,9,31,32] The aim of this research was to assess the location and the relationship of maxillary third molars to the maxillary sinus by age and gender in a Turkish population by CBCT imaging.

Materials and Methods

In this retrospective study in which 1000 patients assessed, a total of 300 right and 307 left maxillary third molars were examined using CBCT images obtained from 394 patients. The CBCT was taken to assess patients requiring dental implant surgery, impacted third molar surgery, cysts, and trauma and to assess orthodontic anomalies or the maxillary sinus. Informed consent was received from all patients for radiographic examinations before any CBCT images were taken. Inclusion criteria were patients with no history of tooth removal or surgeries involved sinus, orthodontic treatments including tooth movements or any other treatment intervention that affect the morphologic situation of the maxillary posterior region (from canine to the third molar bilaterally). CBCT views of patients with any syndrome or craniofacial anomaly, any pathological dentoalveolar condition, poor-quality CBCT images with incomplete root formation, or loss of the adjacent second molar were excluded from our research. Our research contained only patients at least 19 years old because upper third molar root development is completed around 18 years of age,[33,34] and the maxillary sinus is not entirely developed until around 20–30 years of age.[1-3,7,20] As a result, we determined that patients under 19 years of age should not be contained in our sample. The maxillary third molars were noted impacted if they did not have functional occlusion, and at the same time, root formations were totally completed.[7] The study protocol numbered as 09.2017.631 was approved by the Local Committee of Research of Ethics of Marmara University.

The same technician carried out all CBCT images by the same radiographic equipment (Planmeca Promax SD Mid CBCT device, Helsinki, Finland, with 90 kV and 12 mA). Romexis 2.92 software program (Planmeca Oy, Helsinki, Finland) was used for reconstruction and evaluation of all projections. The data were saved and exported as a single frame DICOM files. The evaluation of images was performed directly on the monitor screen (N56VZ-S4283H model of Asus Computer, ASUSTeK Computer Inc., Beitou District, Taipei, Taiwan, with NVIDIA GeForce GT 650M 4GB screen cart and 15.6inch Full HD LED 1920 × 1080 pixel monitor). To ensure a professional and efficient evaluation, two oral diagnosis and radiology clinician and specialist (Z. Z. Y. and Ö. O) who had been working in the Department of Oral Diagnosis and Radiology evaluated the radiological images. During meetings for the pilot study, the clinician and radiology specialist trained to evaluate tomographic images by specialist (F. N. P.) who had been working in oral diagnosis and radiology for 15 years or more, and an agreement on the objective criteria for the qualitative evaluation of the images was forged among the evaluators.

In our research, modified Archer classification was used to assess the depths of the impacted maxillary third molars in relation to the occlusal surface of the adjacent tooth including four categories[9,32] [Figure 1].

- Class A: The occlusal plane of the adjacent tooth and the bottom tubercle of the third molar are on the same line
- Class B: The bottom tubercle of the third molar is between the occlusal plane and the cervical line of the adjacent tooth

- Class C: The bottom tubercle of the third molar is between the cervical line and the middle third of the root of the adjacent tooth
- Class D: The bottom tubercle of the third molar is at or above the apical third of the root of the adjacent tooth.

Five categories were used to evaluate the vertical relationships between the roots of the maxillary third molars and the maxillary sinus floor[9,22] [Figures 2 and 3].

- Type I: The maxillary sinus floor was located at the top of the level connecting the buccal and palatal root tips
- Type II: The maxillary sinus floor was located at a lower level connecting the buccal and palatal root tips without an apical protrusion over sinus floor
- Type III: Buccal root tips protruded into the sinus floor
- Type IV: Palatal root tip protruded into the sinus floor
- Type V: Buccal and palatal root tips protruded into the sinus floor.

Besides, three categories were used to evaluate the horizontal relationships between the roots of the maxillary third molars and the maxillary sinus floor[9,22] [Figures 4 and 5].

- Type 1: The sinus floor was protruded more toward the buccal side than toward the buccal root
- Type 2: The sinus floor was protruded between the buccal and palatal roots
- Type 3: The sinus floor was protruded more toward the palatal side than toward the palatal root.

Winter's classification[9,35] is the relationship between the long axis of the second molar and the long axis of the third molar containing six categories of angulations (vertical, horizontal, mesioangular, buccopalatal, distoangular, and others) was used to evaluate the angulations of the maxillary third molars in our research [Figures 6 and 7].

For the statistical analyses, the IBM SPSS Statistics 22 (IBM SPSS, Turkey) program was used while assessing the findings of the study. Shapiro–Wilks test was used to evaluate the normal distribution of the parameters. Chi-square test was used to compare qualitative data as well as descriptive statistical methods (mean, standard deviation [SD], and frequency). Values of < 0.05 ($P < 0.05$) were considered as significant statistically.

Results

Among 1000 patients, we evaluated 607 maxillary third molars only in 394 patients matched with our inclusion criteria, 215 (%54.6) were male and 179 (%45.4) female. The age range was 19–80 years (mean age ± SD: 37.06 ± 11.18 years). In our research, there are four groups by age containing 19–29, 30–39, 40–49, and >50 years. Thus, 31.2% of patients were between 19 and 29 years, 34.5% were between 30 and 39, 18.3% were 40–49, and 16% were >50 years [Table 1].

Table 1: Number of patients by age and gender

	n (%)
Age (decades)	
19-29	123 (31.2)
30-39	136 (34.5)
40-49	72 (18.3)
50 and up	63 (16.0)
Gender	
Male	215 (54.6)
Female	179 (45.4)

n=Number of patients

Table 2: Incidencess and classifications according to impaction level, angulation, vertical, and horizontal relationships of the maxillary third molars of the patients

	n (%)
Impaction level (*n*=607)	
Class A	458 (75.5)
Class B	44 (7.2)
Class C	79 (13.0)
Class D	26 (4.3)
Angulation (*n*=607)	
Buccopalatal	3 (0.5)
Distoangular	46 (7.6)
Mesioangular	25 (4.1)
Vertical	487 (80.2)
Horizontal	2 (0.3)
Others	44 (7.2)
Vertical relationship (*n*=607)	
Type I	264 (43.5)
Type II	98 (16.1)
Type III	112 (18.5)
Type IV	6 (1.0)
Type V	127 (20.9)
Horizontal relationship (*n*=607)	
Type 1	152 (25.0)
Type 2	360 (59.3)
Type 3	95 (15.7)

n=Number of teeth

In our research, the depths of the 607 maxillary third molars were categorized as A for 458 (75.5%), C for 79 (13%), B for 44 (7.2), and D for 26 (4.3%). According to the Winter classification,[35] the most frequent angulation was vertical (80.2%), then distoangular (7.6%), others (7.2%), mesioangular (4.1%),

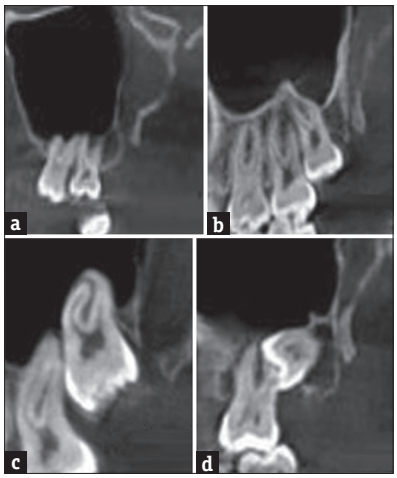

Figure 1: Cone-beam computed tomography images of the maxillary third molars according to the modified Archer classification: (a) Class A, (b) Class B, (c) Class C, (d) Class D

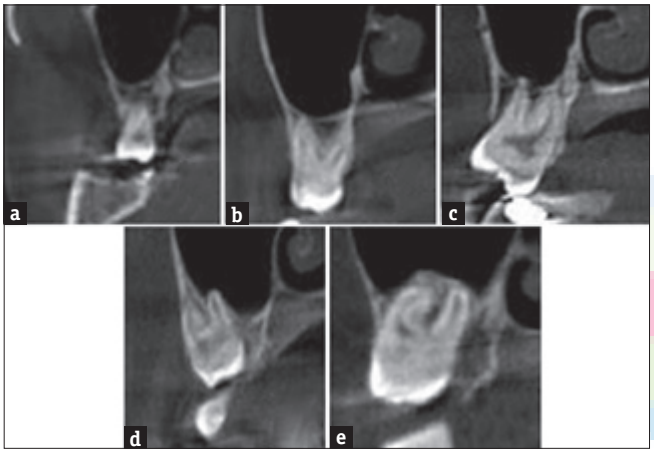

Figure 3: Cone-beam computed tomography images of the maxillary third molars according to the vertical relationships between the roots of the maxillary third molars and maxillary sinus floor: (a) Type I, (b) Type II, (c) Type III, (d) Type IV, (e) Type V

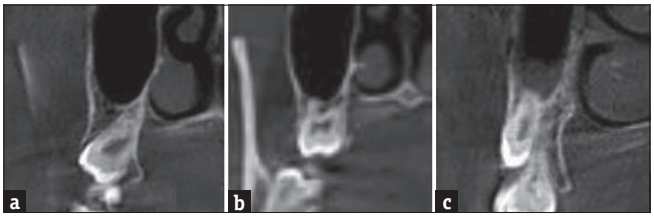

Figure 5: Cone-beam computed tomography images of the maxillary third molars according to the horizontal relationships between the roots of the maxillary third molars and maxillary sinus floor: (a) Type I, (b) Type II, (c) Type III

buccopalatal (0.5%), and horizontal (0.3%). The vertical relationship between the roots of the maxillary molars and the maxillary sinus floor was categorized into five types. The most frequent vertical relationship was Type I (43.5%), then Type V (20.9%), Type III (18.5%), Type II (16.1%), and Type IV (1.0%). Regarding the horizontal relationships, the most frequent horizontal

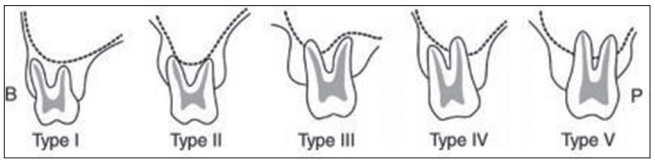

Figure 2: Illustrations of the five categories of the vertical relationships between the roots of the maxillary molars and maxillary sinus floor (B: buccal, P: palatal)

Figure 4: Illustrations of the three categories of the horizontal relationships between the roots of the maxillary molars and maxillary sinus floor (B: buccal, P: palatal)

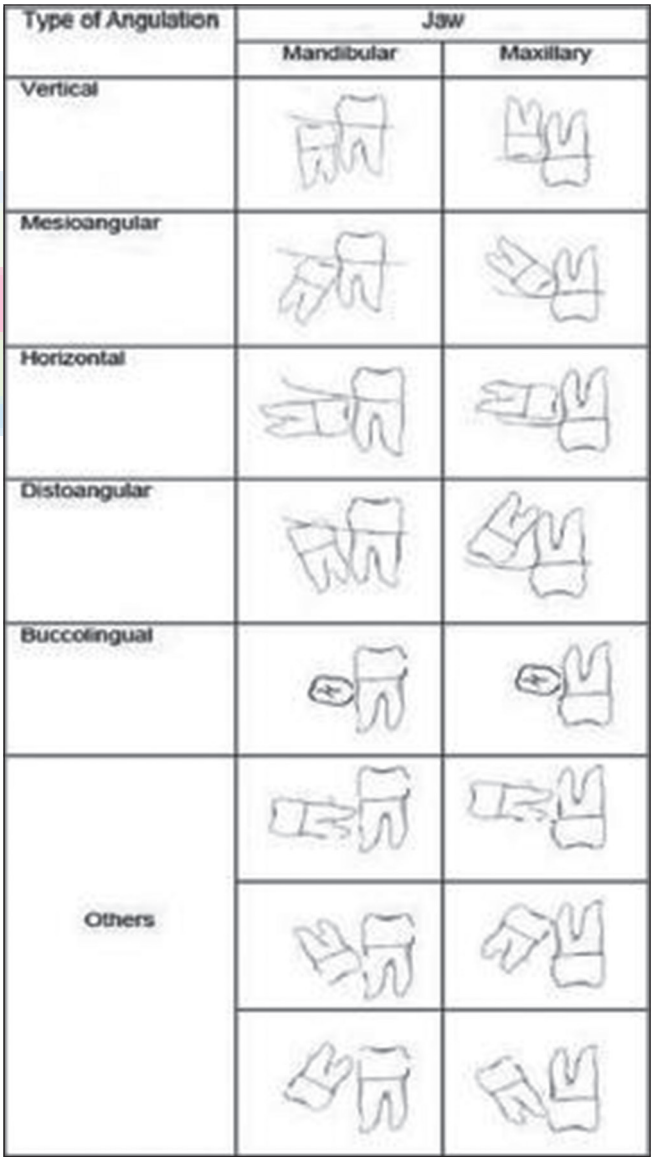

Figure 6: Winter's classification

Table 3: Incidences and classifications according to impaction level, angulation, vertical, and horizontal relationships of the maxillary third molars of the patients by gender

	Gender		*P*
	Male, *n* (%)	Female, *n* (%)	
Impaction level (*n*=607)			
Class A	271 (80.4)	187 (69.3)	0.014*
Class B	20 (5.9)	24 (8.9)	
Class C	33 (9.8)	46 (17)	
Class D	13 (3.9)	13 (4.8)	
Angulation (*n*=607)			
Buccopalatal	1 (0.3)	2 (0.7)	0.001*
Distoangular	19 (5.6)	27 (10)	
Mesioangular	12 (3.6)	13 (4.8)	
Vertical	292 (86.6)	195 (72.2)	
Horizontal	0	2 (0.7)	
Others	13 (3.9)	31 (11.5)	
Vertical relationship (*n*=607)			
Type I	149 (44.2)	115 (42.6)	0.020*
Type II	67 (19.9)	31 (11.5)	
Type III	59 (17.5)	53 (19.6)	
Type IV	2 (0.6)	4 (1.5)	
Type V	60 (17.8)	67 (24.8)	
Horizontal relationship (*n*=607)			
Type 1	89 (26.4)	63 (23.3)	0.004*
Type 2	210 (62.3)	150 (55.6)	
Type 3	38 (11.3)	57 (21.1)	

Chi-square test. *P<0.05. *n*=Number of teeth

Figure 7: Cone-beam computed tomography images of the maxillary third molars according to Winter's classification: (a) Vertical, (b) mesioangular, (c) distoangular, (d) buccopalatal, (e) horizontal

relationship was Type 2 (59.3%), followed by Type 1 (25.0%) and Type 3 (15.7%) [Table 2].

Table 3 shows incidences and classifications according to impaction level, angulation, horizontal, and vertical relationships of the maxillary third molars of the patients by gender. Impaction level, angulation, and vertical and horizontal relationships of the maxillary third molars were statistically significant between male and female groups (P < 0.05). The incidence of impacted maxillary third molar teeth was more common in males than in females.

Table 4: Incidences and classifications according to impaction level, angulation, vertical, and horizontal relationships of the maxillary third molars of the patients by age

	Age				*P*
	19-29, *n* (%)	30-39, *n* (%)	40-49, *n* (%)	50+, *n* (%)	
Impaction level (*n*=607)					
Class A	131 (62.7)	176 (80.7)	91 (88.3)	60 (77.9)	0.001*
Class B	26 (12.4)	11 (5)	2 (1.9)	5 (6.5)	
Class C	47 (22.5)	24 (11)	4 (3.9)	4 (5.2)	
Class D	5 (2.4)	7 (3.2)	6 (5.8)	8 (10.4)	
Angulation (*n*=607)					
Buccopalatal	0	0	0	3 (3.9)	0.001*
Distoangular	35 (16.7)	7 (3.2)	1 (1)	3 (3.9)	
Mesioangular	14 (6.7)	11 (5)	0	0	
Vertical	149 (71.3)	180 (82.6)	91 (88.3)	67 (87)	
Horizontal	0	0	2 (1.9)	0	
Others	11 (5.3)	20 (9.2)	9 (8.7)	4 (5.2)	
Vertical relationship (*n*=607)					
Type I	59 (28.2)	99 (45.4)	63 (61.2)	43 (55.8)	0.001*
Type II	30 (14.4)	46 (21.1)	14 (13.6)	8 (10.4)	
Type III	65 (31.1)	31 (14.2)	7 (6.8)	9 (11.7)	
Type IV	4 (1.9)	1 (0.5)	1 (1)	0	
Type V	51 (24.4)	41 (18.8)	18 (17.5)	17 (22.1)	
Horizontal relationship (*n*=607)					
Type 1	59 (28.2)	56 (25.7)	21 (20.4)	16 (20.8)	0.273
Type 2	115 (55)	135 (61.9)	60 (58.3)	50 (64.9)	
Type 3	35 (16.7)	27 (12.4)	22 (21.4)	11 (14.3)	

Chi-square test. *P<0.05. *n*=Number of teeth

Meanwhile, impaction level, angulation, and vertical relationships of the maxillary third molars were statistically significant between age groups (P < 0.05), but there was no significant difference statistically in the horizontal relationship (P > 0.05) between age groups [Table 4].

There was a significant difference between the tooth angulation and the relative depth of impaction of maxillary third molars statistically (P < 0.05) [Table 5]. Moreover, there was a significant difference between the vertical and horizontal relationships of maxillary third molars statistically (P < 0.05) [Table 6].

Table 5: Angulation and depth of maxillary third molars

Angulation	Depth of maxillary third molars				*P*
	Class A, *n* (%)	Class B, *n* (%)	Class C, *n* (%)	Class D, *n* (%)	
Buccopalatal	0	1 (2.3)	1 (1.3)	1 (3.8)	0.001*
Distoangular	13 (2.8)	15 (34.1)	13 (16.5)	5 (19.2)	
Mesioangular	0	2 (4.5)	20 (25.3)	3 (11.5)	
Vertical	432 (94.3)	20 (45.5)	30 (38)	5 (19.2)	
Horizontal	1 (0.2)	0	0	1 (3.8)	
Others	12 (2.6)	6 (13.6)	15 (19)	11 (42.3)	

Chi-square test. *$P<0.05$

Table 6: Vertical relationship according to horizontal relationship between maxillary third molars and maxillary sinus

Vertical relationship	Horizontal relationship between maxillary third molars and maxillary sinus			*P*
	Type 1, *n* (%)	Type 2, *n* (%)	Type 3, *n* (%)	
Type I	59 (28.2)	99 (45.4)	63 (61.2)	0.001*
Type II	30 (14.4)	46 (21.1)	14 (13.6)	
Type III	65 (31.1)	31 (14.2)	7 (6.8)	
Type IV	4 (1.9)	1 (0.5)	1 (1)	
Type V	51 (24.4)	41 (18.8)	18 (17.5)	

Chi-square test. *$P<0.05$

Discussion

The extraction of the maxillary third molar teeth may cause sinus perforation due to the anatomic adjacency. Therefore, the anatomical relationship of the maxillary third molars and the maxillary sinus should be considered in the dental surgery carefully. The proximity and the relationship between the maxillary third molars and the maxillary sinus are most commonly assessed by OPG. However, the several disadvantages of OPG such as distortion, magnification, superposition of anatomical formations, and lack of cross-sectional data make it difficult to determine the real distance between the maxillary sinus floor and the maxillary third molars. Due to its disadvantages, OPG is not a reliable method and CBCT may be the best technique to evaluate the distance of the maxillary third molars to the sinus floor. Therefore, in our study, only CBCT images were assessed to determine the anatomical proximity of the sinus floor and the maxillary third molars.

There are many studies in the literature that assess the relationship between the maxillary sinus floor and the maxillary posterior teeth.[1,17,26,30] These studies used different types of classifications for the evaluation of the maxillary sinus floor and the maxillary posterior teeth. However, there are few studies that examined the relationship of the maxillary sinus floor with the maxillary third molars in terms of horizontal and vertical relationship, angulation, and types of impaction according to age and gender in a Turkish population using CBCT.[7,9,31,32] In our study, we used classification for angulation by Winter, for impaction by Archer. Horizontal and vertical relationship of the maxillary sinus floor with the maxillary third molars was evaluated on the classification used by Kwak *et al*.[22]

In our results, the most frequent tooth position was vertical, and this is in accordance with Quek *et al*.,[36] Hashemipour *et al*.,[7] Jung and Cho,[37] and Demirtas and Harorli.[9] However, it disagrees with Kruger *et al*.,[38] who observed that the most common impaction pattern in the maxilla was mesioangular position. The difference between the studies may be associated with the selected group age, sample sizes, races, and differences in the imaging technique used.

Regarding the depths of impaction, Class A was observed most frequently in our study. Similar to our study, Hashemipour *et al*.,[7] Jung and Cho,[37] and Demirtas and Harorli[9] were reported that most common impacted maxillary third molars were not buried in bone; the occlusal plane of the adjacent tooth and the impacted maxillary third molar was on the same line.

Kwak *et al*.[22] in a topographic and measurement evaluation of maxillary premolar and molar teeth performed with a Korean population suggested three horizontal and five vertical relationships in only CT images and observed that the most common vertical relationship was the teeth roots were not contacting with the sinus floor (Type I). In another research, Kilic *et al*.[1] analyzed the relationship with the maxillary sinus floor and maxillary posterior teeth root tips obtained from 92 patients using CBCT. In their study, the most frequent vertical relationship was found to be one in which the maxillary sinus floor had no contact with the root tips.

Pagin *et al*.[39] were examined the relationship of posterior teeth roots and the sinus floor in a CBCT study and their results did not show a tendency in reducing the adjacency of the maxillary third molars to the sinus floor when compared to the second premolar and the first and second molars. This may be related to the convex shape of the sinus floor where the lowest area is situated around the first and second molars.[40]

Vertical Type I and horizontal Type 2 have found the most common in maxillary third molars in our study. The results of our study are similar to those of Kwak *et al*.,[22] Kilic *et al*.,[1] and Pagin *et al*.[39] in terms of the vertical relationship of the sinus floor and the maxillary third molars. However, in contrast to Kwak *et al*.,[22] Kilic *et al*.,[1] and Pagin *et al*.,[39] and our results, Demirtas and Harorli,[9] were examined Type III (buccal root tips protruded into the sinus floor) most frequently according

to the vertical relationship. Besides, Shokri *et al*.[20] have reported that an apical protrusion of the first and second molars was seen over the sinus floor. This result is similar to the result of Demirtas and Harorli.[9]

Jung and Cho[30] examined the roots of 332 normally erupted maxillary first and second molars and sinus floor according to the horizontal relationship in a study using CBCT images. In this study, Jung and Cho[30] reported that the most common horizontal relationship was a sinus recess that was located between the buccal and palatal roots in molars. Similarly, Kwak *et al*.[22] and Demirtas and Harorli[9] were observed that the lowest point of the sinus floor was most frequently located between palatal and buccal roots (Type 2). These findings are similar to our results regarding the horizontal relationship.

In some studies, the maxillary third molar impaction was more frequent in females,[7,36,37,41,42] whereas some have reported no gender preference.[43,44] Hashemipour *et al*.[7] have reported that the maxillary third molar impaction was frequent in females and more than half of the patients were in the third decade of their lives. Jung and Cho[37] were reported that the maxillary third molars with occlusal planes apical to the cervical line of the second molar were more common in females on panoramic radiographs. Demirtas and Harorli[9] observed that there was a significant difference between the angulation and the depth of impaction and age groups but no significant difference according to gender ($P > 0.05$). According to Kilic *et al*.,[1] no significant differences were found between female and male patients statistically ($P > 0.05$).

In contrast to the previous investigations, in our research, impacted maxillary third molars were more common in males. There was a significant difference between the angulation, the depth of impaction, and vertical and horizontal relationship according to gender ($P < 0.05$). These differences between studies may be due to differences in sample sizes and racial differences.

Shokri *et al*.[20] also confirmed that protrusion of posterior teeth roots into the sinus floor is more common in males than females. Ok *et al*.[26] evaluated 2486 maxillary molars obtained from 849 patients using CBCT scans. Several differences were found between genders in their study. The roots of maxillary molars penetrated into the sinus floor were more prevalent in males, whereas the roots of maxillary molars located below the sinus floor were more prevalent in females. In our study, an apical protrusion of the buccal root apex observed over the sinus floor (Type III) was more common in males, whereas an apical protrusion of the palatal root apex (Type IV) and an apical protrusion of the buccal and palatal root apices (Type V) observed over the sinus floor were seen more common in females.

The number of studies in the literature concerning the distribution of impaction level, angulation, and vertical and horizontal relationships between age groups is limited. There was a significant difference between the age groups according to impaction level, angulation, and vertical relationship statistically, but no statistically significant difference in the horizontal relationship was observed in our study. Demirtas and Harorli[9] observed that there was a significant difference between the relative depth of impaction and angulation and the age groups ($P < 0.05$). Consequently, the findings of our study are in agreement with Demirtas.[9]

Conclusions

The following conclusions may be obtained from this retrospective study:

1. The relationship between the maxillary sinus and the third molar roots should be evaluated carefully against the risk of sinus perforation. Furthermore, the proximity of these anatomic structures should be considered to prevent an iatrogenic procedure and minimize the risk of an infectious disease within the sinus. Thus, precautions should be taken before surgery and CBCT technology is required to assess the true relationship of the maxillary sinus and the maxillary third molar root apices during the treatment planning
2. Our results suggest that the relationship between the maxillary third molar and the sinus floor varies according to age and gender. There was a significant difference between the angulation, the depth of impaction, and vertical and horizontal relationship according to gender. Impacted maxillary third molars were more frequent in males than in females
3. There was a statistically significant difference between the age groups according to impaction level, angulation, and vertical relationship, but no statistically significant difference in the horizontal relationship was observed, and most of the patients were in the fourth decade of their lives in all groups in our study
4. Regarding the depths of impaction, Class A was observed most frequently in our study. The most frequent tooth position was vertical angulation and vertical Type I and horizontal Type 2 found the most common in maxillary third molars in this study.

Acknowledgment

This study was presented at 22nd BaSS Congress, Thessaloniki, May 4–6, 2017.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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