

# A radiographic evaluation of impacted third molar teeth of patients in the South-east of Turkey: a retrospective study

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*Received: 11 October 2019*

*Accepted: 15 December 2019*

## Abstract

**Aim:** The aim of this study was to retrospectively evaluate the radiographs of the region of the third molar teeth in adults who presented with various complaints. The impaction status of these teeth was examined according to the positions shown, gender and the jaw.

**Methodology:** A retrospective evaluation was made of the panoramic radiographs of a total of 664 patients, comprising 341 males and 323 females with a mean age of 23.96 years (range, 17-35 years). The impaction status and position were examined in a total of 1331 third molar teeth; 456 maxillary and 875 mandibular.

**Results:** Of the 875 mandibular third molar teeth, 545 were seen to be in a vertical position, 234 were mesioangular, 54 distoangular, 32 horizontal and 10 buccoangular. Of the 456 maxillary third molar teeth, 322 were seen to be in a vertical position, 71 were mesioangular, 47 distoangular, 5 horizontal and 11 buccoangular.

In the examination of the impaction status of the third molar teeth, there was seen to be more impaction of teeth in the mandible than in the maxilla. The most frequent impaction position of maxillary third molar teeth was vertical (70.61%) followed by mesioangular (15.57%), and in mandibular teeth, the most frequent impaction position was vertical (62.28%) followed by mesioangular (26.74%).

**Conclusions:** In conclusion, it can be said that when third molar teeth are impacted which may cause pathologies, the negative effects of these must be taken into consideration.

**Keywords:** Third molar, impaction status, incidence.

## Access Online



DOI:

10.5577/intdentres.2019.vol9.no3.6

**How to cite this article:** Çolak M. A Radiographic Evaluation of Impacted Third Molar Teeth of Patients in the South-east of Turkey: A retrospective study. Int Dent Res 2019;9(3):127-32.

## Introduction

Impacted tooth is the term used to refer to a tooth which has not taken its place in the dental arch at the expected time (1, 2, 3). As the third molar teeth are the last to emerge in the dental arch, they may remain impacted for various reasons. Factors causing these teeth to remain impacted include delayed facial growth, other teeth pushing distally, insufficient

mandibular growth, early physical maturation, late mineralisation of the third molar teeth, absence of the previous milk teeth and growth in the reverse direction. In addition, insufficient space in the retromolar region and early loss of the mandibular second molar may have an effect on the third molar remaining impacted (4, 5).

Previous studies have reported that third molar teeth are the most commonly impacted teeth and comprise 98% of all impacted teeth (6, 7). Studies have

also stated that of all impacted teeth, the highest rate is seen in mandibular third molars, followed by maxillary third molars (1, 2, 8, 9). Just as there are differences in jaw development, facial growth and teeth dimensions between different populations and races, so there are also differences in the incidence of impacted third molar teeth and age of eruption. However, there are also studies that have shown no significant difference in distribution of impacted third molar teeth according to gender in different races and communities (1, 8, 10-14).

It is known that third molar teeth remaining impacted may cause a clinical table of pain and infection, trismus and tumours, decay and resorption in adjacent teeth, odontogenic cysts, pericoronitis, osteitis, osteomyelitis and periapical lesions (2, 6). Just as impacted teeth may remain within the jaw for years without showing any symptoms or causing any pathology, they may also cause pathologies such as neuralgiform pain, local infections, temporomandibular joint complaints and ameloblastic fibroma (1, 13).

It has been reported in literature that the eruption time of third molar teeth varies according to populations, and the rates of impacted teeth show variation between populations (1, 10). Although there are studies that have reported no difference in the incidence of impacted teeth between males and females, there are also studies that have reported higher incidence rates in males (1, 12, 13, 15-17).

The aim of this study was to evaluate the distribution of impaction positions by making a retrospective radiological examination of maxillary and mandibular impacted third molar teeth in individuals living in the south-east region of Turkey.

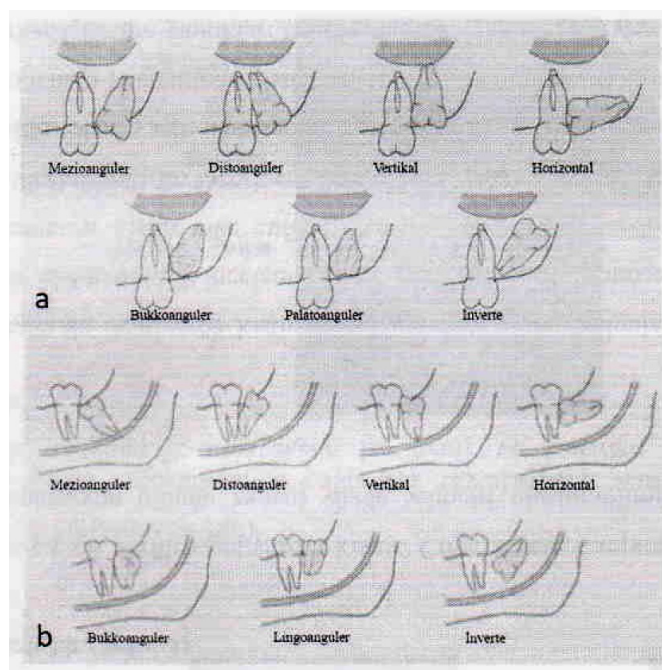
## Materials and Methods

A retrospective evaluation was made of the panoramic radiographs of 664 patients who presented for various reasons at the Dental and Oral Health Radiology Clinic of the Dentistry Faculty of Dicle University between 2017 and 2019. The study included a total of 664 patients, comprising 323 females and 341 males with a mean age of 23.96 years (range, 17-35 years) who presented with complaints related to an impacted tooth. Evaluations were made by examining the position of the impacted third molar tooth. The digital panoramic films were obtained on a panoramic radiography machine (Progeny, Midmark Co., USA) with 0.5mm focal spot, 3.2 filtration and 70 kVp, 10 mA, 15.9s scanning parametric properties.

Patients were excluded from the study if they had any hereditary disorder, syndrome, incomplete root development, occlusion or any other reason causing the third molar tooth not to have erupted at the normal time. The impaction positions of the teeth were evaluated according to the deep position within the bone. By evaluating the localisation of the teeth observed in the vertical position, the teeth included in

the study were those that did not have the potential for eruption.

The eruption positions of the impacted teeth were classified with the Archer classification system according to the long axis of the impacted third molar tooth (6, 22). The impaction status of each tooth was analysed according to the charts shown in Figures 1a and 1b, according to the depth and position within the bone.



**Figure 1.** Figure 1a-b. Impaction status of each tooth according to the depth and position within the bone.

The distributions of the impaction positions of the third molar teeth were compared according to upper or lower jaw and gender.

## Statistical Analysis

Statistical analysis of the data in our study was done using the SPSS (IBM®; 21.0 Windows, Chicago, USA) statistical program. In the statistical evaluations of the data obtained, the Chi-square test was used. The differences between the groups were considered statistically significant at  $p < 0.05$ .

## Results

The distributions of the panoramic films of the patients according to gender is shown in Table 1. Evaluations were made of a total of 664 patients comprising 323 females and 341 males with a mean age of 23.96 years (range, 17-35 years). The mean age was 24.17 years for females and 23.77 years for males. No statistically significant difference was determined between the genders in respect of mean age ( $p > 0.05$ ).

**Table 1.** Distribution of panoramic films by gender and mean age

Gender	N Number of Patients	%	Age Range	Age Mean	Standard Deviation	Total Age
Females	323	48,64	15-35	24,17	5,262	7809
Males	341	51,35	15-35	23,77	5,550	8106
Total	664	100	17-35	23,96	5,383	15915

Radiographic evaluation was made of a total of 1331 third molar teeth, comprising 456 maxillary third molars and 875 mandibular molars. Of the 875 mandibular third molar teeth, 545 were seen to be in a vertical position, 234 were mesioangular, 54 distoangular, 32 horizontal and 10 buccoangular (Table 2). In the statistical evaluations using the Chi-square test, there were determined to be statistically significantly more impacted mandibular third molar

teeth in males than females (Chi-square =33.65,  $p<0.001$ ).

Of the 456 maxillary third molar teeth, 322 were seen to be in a vertical position, 71 were mesioangular, 47 distoangular, 5 horizontal and 11 buccoangular (Table 3). In the statistical analyses, no significant difference was determined between the genders (Chi-square =3.930,  $p=0.4155$ )

**Table 2.** Distribution of mandibular third molar teeth according to gender

Impaction Position	Females	%	Males	%	Total	%
Vertical	292	66,66	253	57,89	545	62,28
Horizontal	3	0,68	29	6,63	32	3,63
Mesioangular	103	23,51	131	29,97	234	26,74
Distoangular	36	8,21	18	4,11	54	6,17
Buccoangular	4	0,91	6	1,37	10	1,14
Total teeth	438	100	437	100	875	100
N	146		241		387	

**Table 3.** Distribution of impaction position of maxillary third molar teeth according to gender

Impaction Position	Females	%	Males	%	Total	%
Vertical	174	71,60	148	69,48	322	70,61
Horizontal	1	0,41	4	1,87	5	1,09
Mesioangular	37	15,22	34	15,96	71	15,57
Distoangular	27	11,11	20	9,38	47	10,30
Buccoangular	4	1,64	7	3,28	11	2,41
Total teeth	243	100	213	100	456	100
N	177		100		277	

When the impaction positions were compared according to gender, the vertical position was seen in 466 (68.42%) third molar teeth of females and in 401 (61.69%) of males. The horizontal position was determined in 4 (0.58%) teeth of the females and in 33 (5.07%) of the males. The mesioangular position was seen in 140 (30.55%) teeth of the females and in 165 (25.38%) of the males.

The distoangular position was seen in 63 (9.25%) teeth of the females and in 38 (5.84%) of the males, and the buccoangular position was seen in 8 (1.17%) teeth of the females and in 13 (2%) of the males (Table 4). The impaction rate was determined to be statistically significantly greater in females than males (Chi-square = 36.328,  $p < 0.001$ ).

**Table 4.** Distribution of third molar teeth according to gender

Impaction Position	Females	%	Males	%	Total	%
Vertical	466	68,42	401	61,69	867	65,13
Horizontal	4	0,58	33	5,07	37	2,77
Mesioangular	140	20,55	165	25,38	305	22,91
Distoangular	63	9,25	38	5,84	101	7,58
Buccoangular	8	1,17	13	2	21	1,57
Total	681	100	650	100	1331	100

When the impacted teeth were compared according to upper or lower jaw, in females 243 (35.68%) teeth were impacted in the maxilla and 438

(64.31%) in the mandible. In males, 213 (32.76%) teeth were impacted in the maxilla and 437 (67.23%) in the mandible (Table 5).

**Table 5.** Distribution of third molar teeth according to jaws and genders

Impaction Position According to Jaws	Females	%	Males	%	Total	%
Maksilla Impaction Position	243	35,68	213	32,76	456	34,25
Mandibular Impaction Position	438	64,31	437	67,23	875	65,74
Total Impaction Position	681		650		1331	

When the total 1331 teeth were evaluated according to gender, there were found to be 681 (51.16%) impacted teeth in females and 650 (48.83%) in males. The rates of impacted third molar teeth in the maxilla were 35.68% in females and 32.76% in males, and in the mandible, 64.31% in females and 67.23% in males.

The most frequent positions of the impacted third molar teeth were determined to be vertical and mesioangular positions followed by distoangular, buccoangular and horizontal. In the third molar teeth impacted in the mandible, the most common positions were vertical and mesioangular, followed by distoangular, horizontal and buccoangular (Table 2, Table 3).

## Discussion

Third molar teeth are known to erupt at the age of 17-21 years (4). In this study, the lower age limit was set as 17 years, and the mean age of the 664 patients in the 17-35 years age range was determined as 23.96 years. A retrospective evaluation was made of the panoramic radiographs of a total of 664 patients who presented at our clinic for various reasons. Third molars impacted in the vertical position which were thought could erupt in the future were not included in the study and those without the potential to erupt were included.

Previous studies in literature have reported that the most frequently impacted teeth are mandibular third molar teeth (6, 7, 10, 13). However, there are also studies that have reported a higher incidence of impacted maxillary third molar teeth (6, 18, 19). The results of the current study demonstrated an impaction rate of 65.74% for mandibular third molars and 34.25% for maxillary third molars. In a study by Sağlam et al, it was reported that in a Turkish population the most frequently impacted teeth were mandibular third molar teeth in males and maxillary third molar teeth in females (18). In the current study, the rate of impaction of mandibular third molar teeth was 64.31% in females and 67.23% in males. When comparisons were made according to gender, the results of mandibular impacted third molar teeth were determined to be similar (Table 6). In the current study, the rate of impaction of third molar teeth was determined to be higher in the mandible at 65.74% than in the maxilla at 34.35%.

Venta et al reported that the incidence of impaction of third molar teeth could vary between 22% and 66% (20). In the current study, the rate of impaction was found to be 51.16% in females and 48.83% in males, which was similar to the findings of Venta et al. Etöz et al reported that molars were impacted in the mesioangular position at the rate of 33-36% in the mandible and at 16% in the maxilla (6). In the current study, mesioangular impaction was determined at the rate of 26.74% in the mandible and 15.57% in the maxilla. Thus the results of the current study were seen to be consistent with those of Etöz et al. Beyza et al reported that mandibular third molar teeth were the most frequently impacted followed by maxillary third molars, as reported by several researchers (21). The results of the current study were seen to be similar.

The incidence of impacted third molar teeth varies according to race and populations. It is known that third molars remaining impacted can cause a clinical table of pain and infection, trismus and tumours, decay and resorption in adjacent teeth, odontogenic cysts, pericoronitis, osteitis, osteomyelitis and periapical lesions (2, 6). Therefore, it is necessary to extract impacted teeth when there are associated pathological findings or as prophylaxis. Regular clinical follow-up and radiological examinations of these teeth that remain impacted can be considered necessary. The importance of orthodontic treatments is emphasised when there is involution in the dental arch.

The risk of impacted third molar teeth causing periodontal defect and decay in the adjacent tooth must be taken into consideration. Just as there are differences in jaw development, facial growth and teeth dimensions between different populations and races, so there are also differences in the incidence of impacted third molar teeth and age of eruption. However, there are also studies reporting no significant difference in different races and populations in respect of the distribution of impacted third molar teeth according to gender (1, 8, 10-14). In the current study, the overall incidence of third molar impaction was seen to be higher in females than in males. The rate of

impacted maxillary third molar teeth was determined to be higher in females and the rate of impacted mandibular third molar teeth was higher in males.

## Conclusions

In conclusion, it can be said that when third molar teeth are impacted which may cause pathologies, the negative effects of these must be taken into consideration. Therefore, the evaluation of the impaction position can be considered a subject of importance.

**Ethical Approval:** Ethics committee approval was received for this study from Dicle University.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Conception- M.Ç.; Design- M.Ç.; Supervision - M.Ç.; Materials - M.Ç.; Data Collection and/or Processing - M.Ç.; Analysis and/or Interpretation- M.Ç.; Literature Review - M.Ç.; Writer - M.Ç.; Critical Review- M.Ç.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study has received no financial support.

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