

Frequency of Pericoronal Radiolucency in Impacted Teeth: A Panoramic Radiography Study

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Abstract

Purpose: All permanent teeth may remain impacted. Impacted teeth may exist in the jaw for a long time without any pathology; however, they may cause some complaints on the temporomandibular joint, infections, neuralgiform pain, root resorption in neighboring teeth, and other pathologies. Pericoronal radiolucency observed over 2.5 mm in radiographic imaging is suspicious. The aim of this study was to investigate the frequency of pericoronal radiolucency in impacted teeth examined on panoramic radiographs. **Methods:** The study was conducted retrospectively by examining panoramic radiographs of 1128 adult patients (>18 age) (633 females, 495 males). Permanent impacted teeth with complete root development were included in the study, and primary teeth, mesiodens, supernumerary and supplemental impacted teeth were excluded from the study. Pericoronal radiolucency was recorded as 'present' in case of pericoronal radiolucency (>3 mm) associated with impacted permanent tooth on panoramic radiographs. The SPSS v.21 (IBM Corp., Armonk, NY, USA) program was used to analyze the data. **Results:** The age average of the individuals included in the study was 31±11 years (18–85). A total of 2247 impacted teeth from 1128 individuals were evaluated. Pericoronal radiolucency was detected in 208 impacted teeth (9.3%). There was a statistically significant association between the gender and frequency of pericoronal radiolucency ($p < 0.05$). The frequency of pericoronal radiolucency is lower in females and individuals over 60 years of age. **Conclusion:** The frequency of pericoronal radiolucency associated with impacted teeth is 9.3%. This condition is more likely to be observed on radiographic examinations in males and individuals under 60 years of age. It is recommended that erupted teeth that are not located in the arch in clinical examination should be carefully examined radiologically in order to detect at an earlier pathological stage and carry out an appropriate treatment.

Key words: Pericoronal Radiolucency; Impacted Tooth; Panoramic Radiography

Introduction

All permanent teeth may remain impacted and their distribution differs mandible and maxilla. The most impacted teeth are third molars, maxillary canines, maxillary-mandibular premolars, and maxillary central incisors.¹ The causes for impacting the last erupted third molars in all races include differences in development of the face, sizes of the jaw and teeth, nutrition, space in the jaw arch, heredity, rickets, anemia, congenital syphilis, tuberculosis, endocrine disorders, and certain syndromes.² Impacted teeth may remain in the jaw for a long time without causing any pathology, as well as cause neuralgiform pain, infection, temporomandibular joint complaints, root resorptions in neighboring teeth, pathologies such as dentigerous cyst and ameloblastic fibroma. It is stated that embryonic residues found in dental follicles around impacted teeth have the potential to proliferate and transform into odontogenic lesions. It is stated that impaction is most commonly associ-

ated with dentigerous cyst, unicystic ameloblastoma, ameloblastic fibro-odontoma, adenomatoid odontogenic tumor and odontoma.³ Radiographs continue to be the primary method to diagnose jaw lesions, and panoramic radiography is the first technique that comes to mind as an initial imaging technique in the evaluation of impacted teeth and associated lesions.⁴ The radiographic appearance around the impacted tooth may not be a reliable indicator of dental follicle-related disease, and diagnosis based on radiographic findings alone may be highly misleading. However, pericoronal radiolucency exceeding 2.5 mm should be suspected in panoramic or intraoral radiographies, and it should not be forgotten that it may have the potential for various pathological transformations, especially dentigerous cysts.⁵ The problem may be resolved earlier through a careful radiographic evaluation. The aim of this study was to investigate the frequency of pericoronal radiolucency in impacted teeth examined on panoramic radiographs.

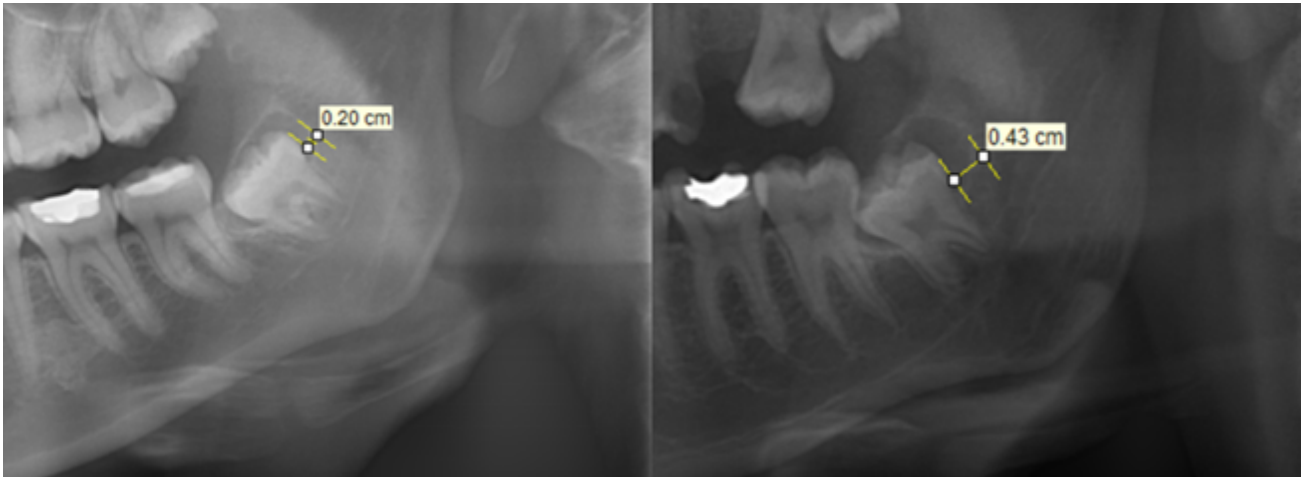


Figure 1. Pericoronal radiolucency was recorded as 'present' in case of pericoronal radiolucency (>3 mm, right side) 'absent' in case of pericoronal radiolucency (<3 mm, left side) associated with impacted permanent tooth on panoramic radiographs.

Methods

Study design The study protocol was approved by the Research Ethics Committee of Dentistry Faculty of Necmettin Erbakan University (no. 2021/04-54). The patients who have referred to the Department of Oral, Dental and Maxillofacial Radiology at Faculty of Dentistry of Necmettin Erbakan University between the years 2020-2021 were reviewed retrospectively. Permanent impacted teeth of individuals over the age of 18 who have completed their root development were included in the study. The primary teeth, mesiodens, supernumerary and supplemental impacted teeth were excluded from the study. Radiological examination Pericoronal radiolucency was recorded as 'present' in case of pericoronal radiolucency (>3 mm) associated with impacted permanent tooth on panoramic radiographs Figure 1.⁵ The panoramic radiographs were obtained (Morita Veraviewepocs 3D R100-P, J Morita MFG Corp., Kyoto, Japan) at 70 kVp, 10mA, and 10 s, according to the manufacturer's recommended protocol. All assessments were performed through i-Dixel software (J Morita MFG Corp., Kyoto, Japan) on a flat-screen monitor by the same examiner. Statistical analysis SPSS v.21 (IBM Corp., Armonk, NY, USA) program was used in order to analyze the data. Descriptive statistics (mean, standard deviation) were calculated for all parameters in the study. Chi-square test was used to determine the relationships between categorical variables; and any p value below 0.05 ($p < 0.05$) was considered to be significant.

Results

The mean age of the individuals included in the study was 31 ± 11 years (18-85). A total of 2247 impacted teeth from 1128 individuals were evaluated. The most common impacted teeth groups were lower third molars, upper third molars, upper canines, lower canines, upper premolars, and lower premolars Table 1. Pericoronal radiolucency was detected in 208 (9.3%) of 2247 impacted teeth examined in the present study. The frequency of pericoronal radiolucency in different tooth groups showed a statistically significant difference ($p < 0.01$). Although the rate of pericoronal radiolucency is high because the number of teeth examined in some groups is lower, third molars are in the first place in terms of pericoronal radiolucency Table 1. The mean age of 633 women included in the study was 30.62 ± 10.96 (18-85) years, and the mean age of 495 men was 31.86 ± 11.98 (18-78) years. There was a statistically significant association between gender and the frequency of pericoronal radiolucency ($p < 0.01$). The frequency of pericoronal radiolucency in women is lower than in men. The frequency of pericoronal radiolu-

ency according to age groups did not show a statistically significant difference ($p > 0.05$). However, the frequency of pericoronal radiolucency is lower in individuals over 60 years of age Table 2.

Discussion

The appearance of the follicle space surrounding the crown in impacted teeth is called pericoronal radiolucency. It is decided that it is normal or pathological depending on the width, and radiolucency larger than 3mm is considered abnormal.⁵ The aim of this study was to investigate the frequency of pericoronal radiolucency in impacted teeth examined on panoramic radiographs. A total of 2247 impacted teeth from 1128 individuals were evaluated in the study. The most common impacted teeth groups are lower third molars, upper third molars, upper canines, lower canines, upper premolars, and lower premolars, respectively. In the Greek population, 940 teeth were examined including 406 teeth (43.2%) on the maxilla and 534 (56.8%) teeth on the mandible. According to this study, 91.6% of third molars, 5.3% of canines, 1.6% of premolars, 1.4% of molars and 0.1% of incisors were impacted.⁶ The difference between the results of various studies is due to racial and genetic differences between populations. Our study concluded that third molars showed more pericoronal radiolucency than other teeth. It may be considered that the reason for this higher impaction rate of third molars than other teeth. Pericoronal radiolucency was detected in 208 of 2247 impacted teeth examined in our study (9.3%). In the literature, there is limited number of studies on the prevalence of pericoronal radiolucency radiologically, and it is observed that the majority of such studies included histological analysis. In a histological analysis study conducted by Kotrashetti et al.⁷, cystic changes were observed in 21 (51.2%) of 41 follicles. Two of these were odontogenic keratocysts, one was calcified epithelial odontogenic cysts, and 18 were dentigerous cysts. Edamatsu et al.⁸ examined mandibular third molars in 80 patients (39 males and 41 females). They found that the width of the pericoronal space was less than 3 mm (76.3%) in 61 cases and between 3mm and 10 mm in 19 cases (23.7%). However, they showed that the width of the pericoronal space was more than 3 mm in 27 teeth that developed dentigerous cysts. It was detected in the study of Villalba et al.⁵ on 140 patients that the width of pericoronal space was less than 2.5 mm in 127 patients and between 2.6 and 5 mm (hyperplastic) in 13 patients. Cystic changes were detected in 18 of these patients, and pericoronal width was normal in 15 of the patients with cystic changes and hyperplastic in three of them. In our study, pericoronal radiolucency was recorded as 'present' in case of radiolucency more than 3 mm in width, and it should be kept in mind that cystic

Table 1. The distribution of impacted tooth

Tooth number	Frequency, n	Percentage	Pericoronal radiolucency		Percentage	p
			Absence	Presence		
14	1	,0	1	0	0	0.005*
15	1	,0	1	0	0	
17	1	,0	1	0	0	
18	412	18,3	386	26	6	
22	1	,0	1	0	0	
23	54	2,4	51	3	5	
25	5	,2	5	0	0	
28	436	19,4	410	26	6	
33	6	,3	6	0	0	
34	1	,0	0	1	100	
35	3	,1	3	0	0	
37	2	,1	2	0	0	
38	685	30,5	604	81	13	
43	4	,2	3	1	25	
44	1	,0	1	0	0	
45	1	,0	1	1	1	
47	2	,1	1	1	50	
48	602	26,8	534	68	13	
Total	2247	100,0	2039	208	9,3	

*The significance level is $p < 0.01$ **Table 2.** The distribution of pericoronal radiolucencies according to age and gender groups

Age and Gender Groups	Pericoronal radiolucency			Total	p
	Absence, n	Presence, n	Percentage (%)		
18-40	1756	180	9.2	1936	0.367
41-60	233	26	10.0	259	
61-85	50	2	3.8	52	
Total	2039	208	9.3	2247	
Female	1202	86	6.6	1288	0.000*
Male	837	122	12.7	959	
Total	2039	208	9.3	2247	

*The significance level is $p < 0.01$

transformation may occur in cases below this value (3 mm). The incidence of cystic epithelium and squamous metaplasia is more common in hyperplastic follicles.⁵ The limitation of our study is the lack of histological confirmation. The normal pericoronal width does not confirm that there is no pathology. In the study conducted by Glosser and Campbell⁹, dentigerous cystic changes were found in approximately 37% of the mandibular third molars and 27% of the maxillary third molars by the histological examination of impacted third molars with normal follicle widths radiographically. In the literature, the incidence of hyperplastic follicles is reported to be higher in males and younger individuals.¹⁰ The reason of gender difference is not known exactly. Similarly, in this study, the frequency of pericoronal radiolucency was found to be lower in women. There was not any statistically significant difference between the frequency of pericoronal radiolucency according to age groups. However, the frequency of pericoronal radiolucency is lower in individuals over 60 years of age. This may be explained with the fact that the incidence of impacted teeth decreases as age increases.

Conclusion

The frequency of pericoronal radiolucency associated with impacted teeth is 9.3%. This condition is more likely to be seen on radiographic examinations in males and individuals below 60 years of age. It is recommended that erupted teeth that are not located in the arch in clinical examination should be carefully examined radiologically in order to detect at an earlier pathological stage and to carry out an adequate treatment. In addition, since cystic changes may occur in impacted teeth without pericoronal radiolucency, histopathological examination of teeth which are planned to be extracted is recommended.

None

Author Contributions

Conception / design of the work: M.T. Acquisition, analysis and interpretation of the data: M.T., M.A. Drafting the work: M.T., M.A. Final approval of the version to be published: M.T. Investigation of accuracy and integrity of any part of work: M.T.

Conflict of Interest

Authors declare that they have no conflict of interest.

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