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Odontogenic lesions associated with impacted teeth: A 5-year retrospective institutional study

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ABSTRACT

Introduction: Odontogenic lesions related to impacted teeth are common findings in routine dental exams, with the potential to cause tooth pain, displacement, bone expansion, or even bone erosion. Thus, their early detection is important. This study aimed to evaluate the frequency of such lesions based on patient age, gender, and location at the Tehran University of Medical Sciences, School of Dentistry, over five years.

Materials and Methods: This retrospective study evaluated records from the oral pathology department, covering a five-year period. The association of odontogenic lesions with impacted teeth was assessed. Data on lesion type, patient age and gender, involved jaw, lesion location, and affected teeth were extracted from patient records. Statistical analysis was performed using SPSS 24.

Results: Out of 815 odontogenic lesions, 44.4% were associated with impacted teeth. The patient distribution was 52.48% male and 47.52% female. Lesions were most prevalent in the third decade of life (24.58%), and third molars (59.39%) were frequently involved. The posterior mandible (68.5%) and mandibular third molar (55%) were common sites. Dentigerous cysts had the highest frequency (35.4%), with odontogenic cysts (developmental) occurring more frequently (70.7%) than odontogenic tumors.

Conclusion: The study underscores a significant association between odontogenic lesions and impacted or unerupted teeth. Periodic follow-ups are crucial for retaining impacted teeth based on these findings.

Keywords: Tooth; Impacted; Odontogenic cysts; Odontogenic tumors; Jaw; Pathology; Oral.

Introduction

Oral and maxillofacial lesions encompass a wide range of both benign and malignant conditions. It's crucial to evaluate the frequency of these lesions for early detection and timely intervention [1]. Among maxillofacial lesions, cysts and tumors constitute a significant proportion. There's a strong association between impacted teeth and the development of cysts and tumors [2]. Typically Peri-coronal radiolucencies manifest as a normal or slightly enlarged follicle on dental X-rays [3]. However, evidence shows that peri-coronal radiolucencies are common pathologies that are accidentally found in routine dental examinations. They often remain undetected due to being asymptomatic [2]. Occasionally, enlargement of the dental follicle becomes noticeable, potentially leading to cystic degeneration or the formation of an odontogenic tumor.

These pathological alterations, within the dental follicle of impacted teeth, can give rise to symptoms such as pain, tooth displacement, swelling, sensitivity, and mobility, especially if the lesion exceeds 2cm in size [3]. Histopathological analysis is an important diagnostic tool, which is influenced by clinical findings and other diagnostic assessments [2]. A peri-coronal space exceeding 2.5mm on intraoral radiographs or 3mm on panoramic radiographs should be considered suspicious [4]. Therefore, detection of developing pathological lesions is highly important as cystic transformations can take place within the peri-coronal follicle of unerupted teeth. The initial signs of pathological changes within the dental follicle can be identified by observing the enlargement of the peri-coronal space on dental radiographs [5]. Saravana and Subhashraj recommended histopathological and radiographic assessments in the management of impacted third molars and suggested their surgical extraction prior to the onset of pathological changes in the peri-coronal tissue [6]. Controversy exists among dental practitioners concerning the necessity of histopathological examination of the peri-coronal tissue removed during the surgical extraction of impacted teeth. However, it is universally recommended that any pathologic lesion identified through clinical or radiographic evaluations should undergo histopathological assessment. Consequently, histopathological diagnosis of cysts during surgical procedures stands as the definitive strategy for confirmation [7].

Given the considerations mentioned above and the potential association of various odontogenic lesions (requiring distinct interventions) with impacted teeth, this study aimed to assess the prevalence of odontogenic lesions linked to impacted teeth in patients presenting at the Oral Pathology Department of the School of Dentistry, Tehran University of Medical Sciences, over a 5-year period. Furthermore, the study aims to analyze the frequency of these lesions based on the patient's age and gender, as well as the type and location of the lesions.

Materials and Methods

This retrospective descriptive study was conducted on all patients presenting to the Oral Pathology Department of School of Dentistry, Tehran University of Medical Sciences from 21 March 2014 to 20 March 2019. Pathologic reports of patients with odontogenic lesions were retrieved from the archives, while the patients' personal information remained confidential. The cases of odontogenic lesions related to impacted teeth were identified based on the exact lesion location in the pathology report and by reviewing radiographic images. Relevant data, including the type of lesion, patient's age and gender, affected jaw, specific lesion location within the jaw, and the teeth involved, were meticulously extracted from the patient records. In this study, a census sampling method was employed, and all peri-coronal odontogenic lesions with a definite pathological diagnosis were recorded. Data were analyzed by descriptive statistics using SPSS version 24.

Results

Of a total of 3,238 pathology reports retrieved from the archives of the Oral Pathology Department of School of Dentistry of Tehran University of Medical Sciences over a 5-year period, 815 (25.16%) belonged to patients with odontogenic lesions; out of which, 362 cases (44.4%), the odontogenic lesion was associated with an impacted or unerupted tooth (Figure 1). Of a total of 362 odontogenic lesions associated with impacted teeth, 104 (28.7%) were odontogenic tumors including odontogenic tumors with epithelial origin, mixed, and ectomesenchymal origin, and 233 (64.4%) were odontogenic cysts. Moreover, 6.9% of the lesions were hyperplastic dental follicle. Table 1 presents the frequency of pathological lesions and the mean age of patients in all studied groups. Of all patients, 190 (52.48%) were males and 172 (47.52%) were females, with a male-to-female ratio of 1.1 to 1, with no significant difference between males and females regarding the frequency of odontogenic lesions (P=0.883).

Overall, odontogenic lesions were most frequently observed during the third decade of life, accounting for 24.58% of cases, with a mean age of 29.3 years. However, there was no significant difference in the frequency of odontogenic lesions across various age groups (P=0.804). Subsequently, the occurrence of peri-coronal lesions exhibited a declining pattern following the third decade of life, and the fewest cases were seen among those in their nineties (0.55%), as shown in Figure 2. Odontogenic lesions were more frequent in the mandible (81.5%) than in the maxilla (18.5%). Figure 3 presents the frequency distribution of these lesions in different parts of the jaw. Peri-coronal odontogenic lesions had the highest frequency in the posterior mandible (68.5%) and the lowest frequency in the posterior maxilla (5.5%). Also, the left side of the mandible (43%) had the highest, and the right side of the maxilla (7%) had the lowest frequency of peri-coronal odontogenic lesions (Figure. 4). Table 2 presents the frequency distribution of involved teeth with peri-coronal odon-

togenic lesions. As shown, peri-coronal odontogenic lesions had the highest frequency around the mandibular third molar crown (n=199, 55%). Furthermore, no lesion was found in the pre-coronal area of the maxillary lateral incisors and second premolars. Figure 5 summarizes the frequency distribution of all peri-coronal odontogenic lesions. Of a total of 362 peri-coronal lesions, dentigerous cyst (n=128, 35.4%) had the highest, and calcifying epithelial odontogenic tumor (n=1, 0.3%) had the lowest frequency. Table 3 presents the frequency of common peri-coronal odontogenic lesions based on the type of lesion, common age of involvement, gender, commonly associated tooth type, and side and location of involvement.

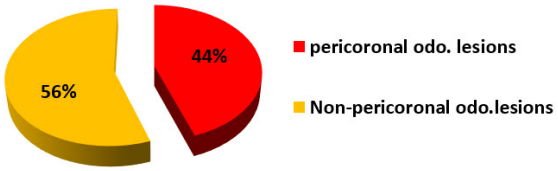

Figure 1. Total frequency of odontogenic lesions (peri-coronal and non-peri-coronal).

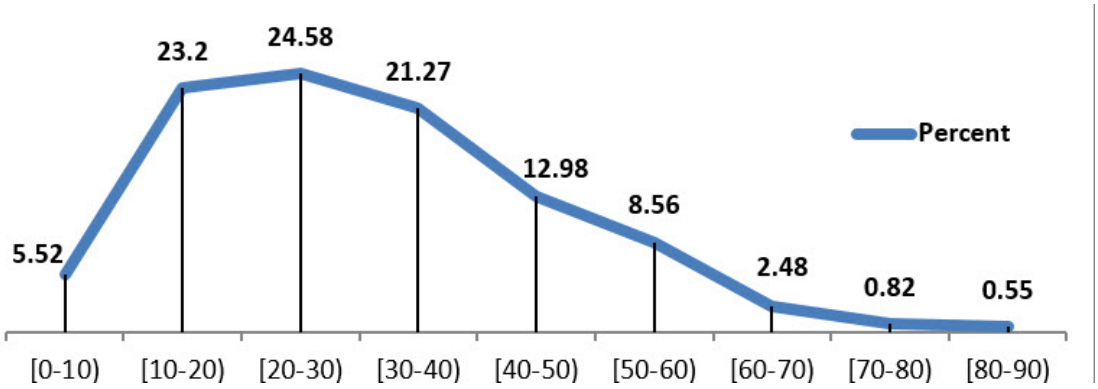

Figure 2. Frequency distribution of age range of patients with peri-coronal odontogenic lesions.

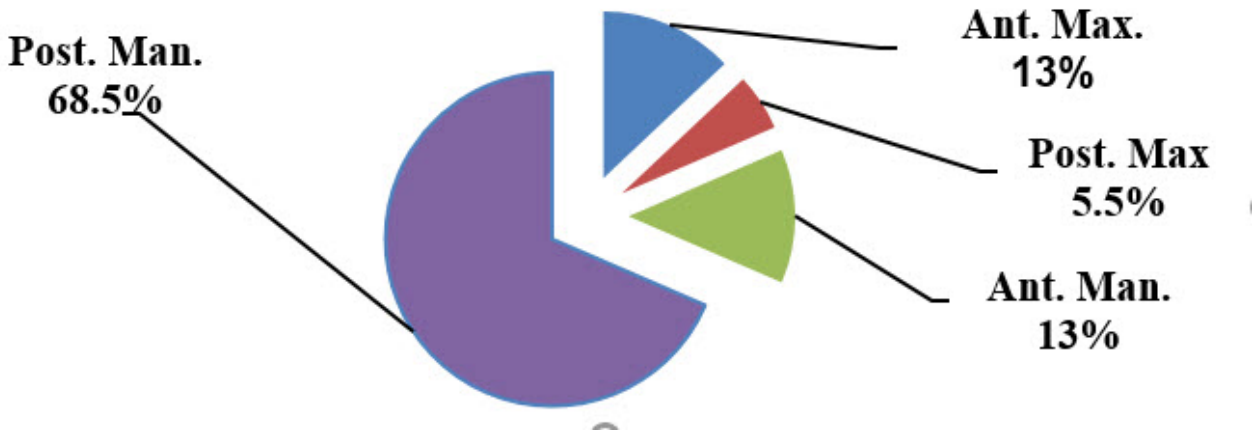

Figure 3. Frequency distribution of peri-coronal odontogenic lesions in different parts of the jaws.

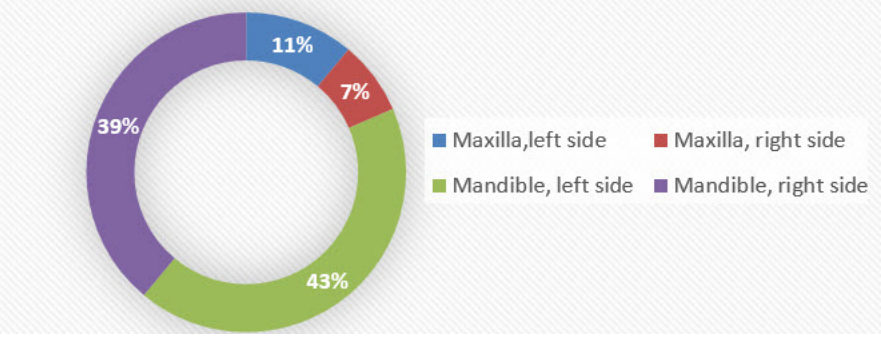

Figure 4. Frequency distribution of all peri-coronal odontogenic lesions based on jaw and side involvement.

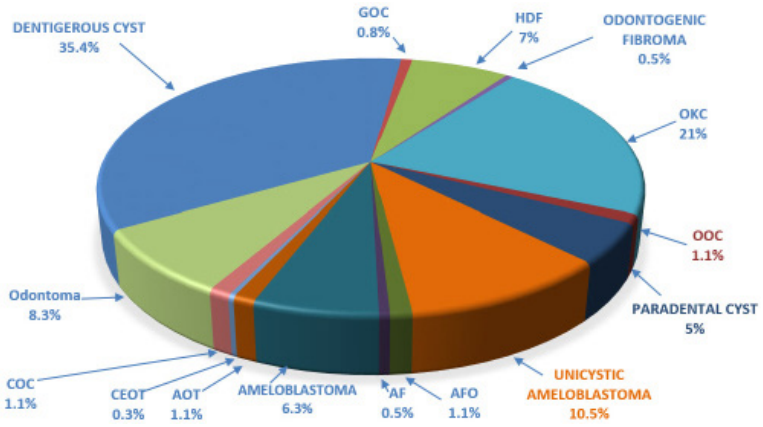

Figure 5. Frequency distribution of all peri-coronal odontogenic lesions.
GOC; Glandular odontogenic cyst, HDF; Hyperplastic dental follicle, OKC; Odontogenic keratocyst, OOC; Orthokeratinized odontogenic cyst, AFO; Ameloblastic fibro-odontoma, AF, Ameloblastic fibroma; AOT; Adenomatoid odontoenic tumor, CEOT; Calcifying epithelial odontogenic tumor, COC; Calcifying odontoenic cyst.

Table 1. Frequency distribution of peri-coronal odontogenic lesions.

Pathological group	*Percentage*	*Number*	*Mean age*	*Minimum*	*Maximum*
Odontogenic epithelial tumors	*18.2%*	*66*	*15.1±33.9*	*7*	*88*
Mixed odontogenic tumors	*9.9%*	*36*	*15.4±23.2*	*4*	*75*
Odontogenic ectomesenchymal tumors	*0.6%*	*2*	*9.2±38.5*	*32*	*45*
Odontogenic (developmental) cysts	*64.4%*	*233*	*15.3±29.9*	*6*	*73*
Hyperplastic dental follicle	*6.9%*	*25*	*8.5±20.9*	*5*	*51*
Total	*100%*	*362*	*11.9±29.3*	*4*	*88*

Table 2. Frequency distribution of the teeth with peri-coronal odontogenic lesions.

Tooth number	Mandible N/%	Maxilla N/%	Total number Percentage
1	1 0.3%	5 1.4%	6 %1.7
2	2 0.5%		2 %0.5
3	42 11.6%	41 11.3%	83 %22.9
4	9 2.5%	2 0.5%	11 %3
5	28 7.7%		28 %7.7
6	4 1.1%	1 0.3%	5 %1.4
7	10 2.8%	2 0.5%	12 %3.3
8	199 55%	16 4.5%	215 %59.5
Total	295 81.5%	67 18.5%	362 100%

Table 3. The most frequent peri-coronal odontogenic lesions based on the type of lesions.

Order	Lesion	Number	Percentage	Most common associated tooth		Side		Location		Jaw		Gender		Mean age
				Tooth number	N/%	Right N/%	Left N/%	Anterior N/%	Posterior N/%	Mandible N/%	Maxilla N/%	Male N/%	Female N/%	
1	Dentigerous Cyst	128	35.4%	8	57% 73	49.2% 63	50.8% 65	31.3% 40	68.8% 88	78.9% 101	21.1% 27	57% 73	43% 55	28.5 ±16.1
2	Odontogenic Keratocyst	76	21%	8	66.2% 49	41.9% 31	58.1% 43	12.2% 9	87.8% 65	89.2% 66	10.8% 8	56.8% 42	43.2% 32	35.1 ±14.4
3	Unicystic Ameloblastoma	38	10.5%	8	60.9% 27	31.6% 12	68.4% 26	10.5% 4	89.5% 34	100% 38	0%	53.3% 21	44.7% 17	33.5 ±16.5
4	Hyperplastic Dental Follicle	25	7%	8	56% 14	44% 11	56% 14	32% 8	68% 17	72% 18	28% 7	16% 4	84% 21	20.9 ±8.8
5	Compound Odontoma	24	6.6%	3	54.1% 13	54.1% 13	45.8% 11	66.6% 16	33.3% 8	54.1% 13	45.8% 11	54.1% 13	45.8% 11	21.9 ±19

Order	Lesion	Number	Percentage	Most common associated tooth		Side		Location		Jaw		Gender		Mean age
				Tooth number	N%	Right N/%	Left N/%	Anterior N%	Posterior N%	Mandible N%	Maxilla N%	Male N%	Female N%	
6	Ameloblastoma	23	6.3%	8	60.9% 14	73.9% 17	26.1% 6	13% 3	87% 20	91.3% 21	8.7% 2	65.5% 13	43.5% 10	37.17 ±12.2
7	Paradental Cyst	18	5%	8	100% 18	38.9% 7	61.1% 11	0%	100% 18	94.4% 17	5.6% 1	55.6% 10	44.4% 8	11.09 ±11.1
8	Complex Odontoma	6	1.7%	8	66.6% 4	66.6% 4	33.3% 2	33.3% 2	66.6% 4	66.6% 4	33.3% 2	33.3% 2	66.6% 4	17.23 ±6.2
9	Adenomatoid Odontogenic Tumor (AOT)	4	1.1%	3	100% 4	50% 2	50% 2	100% 4	0%	50% 2	50% 2	25% 1	75% 3	24.50 ±12.5

Discussion

Impacted teeth, particularly third molars that have a high rate of impaction [8], can cause problems such as gingival edema and ulceration, adjacent bone and tooth loss, and development of cysts and tumors. Generally, there is a consensus that impacted third molars should be surgically extracted if symptomatic. However, management of asymptomatic impacted molars is a matter of debate [9], because extraction of impacted teeth can cause complications such as pathological bone fracture, fracture of adjacent tooth, maxillary sinus perforation, etc., making it difficult for dental clinicians to make a decision in this regard [10]. In the case of retaining an impacted tooth, however, regular follow-ups would help in early detection and management of possible problems [9]. Impacted teeth that are retained in the jaw can also cause complications such as resorption of the adjacent teeth, infection, and development of odontogenic cysts and tumors. Odontogenic cysts and tumors may develop around the crown of impacted teeth following pathological changes in dental follicle or odontogenic epithelium present at the site [11]. Since different types of lesions with different managements may develop around impacted teeth, knowledge about their prevalence in each region is imperative. Many studies have addressed the frequency of odontogenic lesions in association with impacted teeth. However, statistical reports regarding the percentage of odontogenic lesions associated with impacted teeth compared with the total prevalence of odontogenic lesions are scarce. Nonetheless, Kadeh et al. [12] assessed the prevalence of odontogenic tumors in Zahedan, Iran, and found that 24% of odontogenic tumors were associated with impacted teeth. However, in the present study, 44.5% of odontogenic lesions were associated with impacted teeth. This difference between the results of the two studies may be due to the fact that both odontogenic cysts and tumors were considered as odontogenic lesions in the present study. Also, the frequency of peri-coronal odontogenic lesions and those associated with impacted or unerupted teeth was slightly higher in males than females in studies by Shoaee et al, [11] Khalesi et al, [13] Saghravanian et al., [14] and Sina et al, [15] which was in agreement with the present findings. However, Anand et al, [16] in India reported that the frequency of such lesions in males was twice that in females. It should be noted that their study had a smaller sample size and was conducted in a different geographical location compared with the present study, and the abovementioned investigations. The most common age range of involvement was the third decade of life in studies by Shoaee et al., [11] Khalesi et al., [13] Sina et al., [15] and Vigneswaran et al [17]. Similarly, the third decade of life followed by the second decade of life were the most common age

ranges of involvement in the present study. The second decade of life was the most common period of involvement in the study by Saghravanian et al [14]. The mean age of patients was 37.2, 32.7, and 43 years in studies by Curran et al, [18] Stathopolus et al, [19] and Anand et al., respectively [16]. Variations in the mean age of patients in different studies may be due to early extraction of impacted teeth at lower ages in some communities, and retaining the impacted teeth until becoming symptomatic in some other communities.

In this study, the mandible (81.5%), particularly the posterior mandible (68.8%), along with the left side (43%) and mandibular third molar(55%) were the most common sites of involvement. Similarly, various studies [11,13,16,19] indicated a higher frequency of odontogenic lesions in the mandible compared to the maxilla. Moreover, Saghravanian et al, [14] Stathopolus et al., [19] and Seyedmajidi et al. [20] showed that the left side of the mandible was the most commonly affected quadrant, which was in agreement with the present findings. However, the right side of the mandible was the most commonly involved quadrant in the study by Khalesi et al [13]. The frequency of odontogenic lesions on the right and left sides of the mandible probably depends on the rate of impaction of teeth at each side of the mandible in different populations.

In the present study, dentigerous cyst (n=128, 35.4%) was the most common peri-coronal odontogenic lesion followed by odontogenic keratocyst (n=76, 21%), and unicystic ameloblastoma (n=38, 10.5%). The most common site of involvement was the posterior mandible for all three lesions. The frequency of dentigerous cysts, odontogenic keratocysts, and unicystic ameloblastoma in the posterior mandible was 68.8%, 87.8%, and 89.5%, respectively. The location of all cases of unicystic ameloblastomas (100%) was in the mandible. The mean age of patients with dentigerous cyst, odontogenic keratocyst, and unicystic ameloblastoma was 28.5, 35.1, and 33.5 years, respectively. Curran et al, [18] reported the prevalence of dentigerous cyst to be 77.5% among all peri-coronal odontogenic lesions, while this rate was 58.7% in the study by Saghravanian et al [14]. Also, the dentigerous cyst was most commonly associated with impacted mandibular third molars, similar to previous studies. Consistent with the present findings, most previous studies reported that dentigerous cyst was the most common odontogenic lesion associated with impacted teeth [11,13-15,18-20]. The frequency of dentigerous cyst was 46.6%, 76.6%, 58.7%, 51.5%, and 77.5% in studies by Shoaee et al, [11] Khalesi et al, [13] Stathopolus et al, [14] Sina et al, [15] and Curran et al, [18] respectively. Similar to the present study, odontogenic keratocyst was the second most common odontogenic lesion in studies by Shoaee et al, [11] and Khalesi et al, [13] in Tehran, Iran with a prevalence rate of 21% in the present study, 29.8% in the study by Shoaee et al, [11] and 9.7% in the study by Khalesi et al [13]. Odontogenic keratocyst was also the second most common odontogenic cyst in studies by Curran et al [18] and Stathopolus et al, [19].

Despite the existing consensus in the literature regarding the most common odontogenic cyst, the results are variable regarding odontogenic tumors associated with impacted or unerupted teeth. In the present study, unicystic ameloblastoma was the most common odontogenic tumor associated with impacted tooth with a frequency of 10% while the most common odontogenic tumor was ameloblastoma in studies by Shoaee et al, [11] and Stathopolus et al [19]. Moreover, odontoma was the most common odontogenic tumor with a prevalence of 6.6%, 5%, and 8.2% in studies by Khalesi et al, [13] Saghravanian et al, [14] and Curran et al, [18] respectively. The differences in results regarding odontogenic tumors associated with impacted or unerupted teeth are likely due to a combination of factors including study populations, sample sizes, geographic locations across different research studies and diagnostic criteria.

Conclusion

This study revealed that odontogenic lesions associated with impacted or unerupted teeth comprised a considerable percentage of odontogenic lesions. Therefore, regular follow-ups for impacted teeth are imperative for the early detection and treatment of these lesions. Timely identification and intervention can prevent complications, improve patient outcomes, and enhance overall oral health and quality of life.

Conflict of Interest

There is no conflict of interest to declare.

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