

Odontogenic cysts: a clinicopathological study of 507 cases

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Abstract: The purpose of this study was to determine the prevalence of odontogenic cysts at the Pernambuco School of Dentistry – Universidade de Pernambuco (Brazil) and compare this prevalence with other international studies. Data for the study were obtained from reports of patients diagnosed with odontogenic cysts between 1992 and 2007. Case records of patients who fit the Histological Classification of the World Health Organization (2005) were included. The following variables were analyzed: gender, age group, anatomical location, histological type and ethnic background. Odontogenic cysts accounted for 9.94% of all lesions biopsied throughout the study period. Mean patient age was 28.9 years and 57.6% of the patients were males ($P > 0.05$). Radicular cyst was the most prevalent histological type (52.2%), followed by dentigerous cyst (30.7%). Regarding ethnic background, 41.8 % of the patients were of African descent, followed by Caucasians and other ethnic groups ($P > 0.05$). The mandible was the most prevalent site of the lesions (56%). Odontogenic cysts appear to have a distinct predilection for the male gender, the second and third decades of life ($P < 0.05$) and are more frequent in the mandible. The removal of odontogenic keratocysts from the new WHO classification has not altered the order of the most prevalent cysts in the maxillofacial complex. (J Oral Sci 51, 581-586, 2009)

Keywords: odontogenic cysts; bone cysts; maxilla; mandible.

Introduction

Maxillary odontogenic cysts are characterized by a pathological cavity either completely or partially covered with epithelial tissue (1). These lesions are characterized as bone-destructive (2) and develop from components of the odontogenic epithelium or its residuals that remain trapped within the bone or gingival tissue. The cystic proliferation and degeneration of the epithelium are considered to lead to the development of odontogenic cysts (3). Odontogenic cysts are divided into two groups depending on their origin: developmental and inflammatory. Developmental cysts are of unknown origin, but do not appear to result from an inflammatory process. As their name implies, inflammatory cysts are associated with inflammation (4).

Studies on the prevalence of odontogenic cysts have been carried out in a number of countries (3,5-11), including Brazil (4,12). Nonetheless, information is scarce. Thus, the aim of the present study was to determine the frequency of different types of odontogenic cysts diagnosed at a pathology clinic in a city in northeastern Brazil and compare the findings with information reported in other parts of the world following the new WHO classification (13) before and after the removal of keratocystic odontogenic tumor from the group of odontogenic cysts.

Materials and Methods

A retrospective study was conducted between January 1992 to March 2007, based on histopathological reports regarding cases of odontogenic cysts diagnosed at the

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Oral Pathology Department of the Pernambuco School of Dentistry (Universidade de Pernambuco, Brazil). This study was duly recorded by the Research Ethics Committee of our institution (protocol number 135717/07).

The following variables were studied: type of cyst, anatomical location, age group, gender and ethnic background. The patients were classified in terms of ethnic background as of African-descent, Caucasian or other (mulatto, Asian-descent, Indigenous-descent).

After obtaining the sample, a databank was constructed using the SPSS (v. 17.0) statistical package, in which the chi-square test was applied to analyze the statistical significance of the data. A *P*-value less than 0.05 was considered statistically significant. In 2005, the WHO released a new odontogenic cyst and tumor classification (13), renaming odontogenic keratocyst as keratocystic odontogenic tumor and classifying this lesion among the odontogenic tumors, with current reports in the literature of this tumor in this group (14).

Results

In the 15 years analyzed, 5,100 medical reports were examined at the Oral Pathology Laboratory of the Pernambuco School of Dentistry – Universidade de Pernambuco (Brazil). A total of 507 (9.94%) of these were regarded as odontogenic cysts. The most prevalent lesions were radicular cysts and dentigerous cysts.

An analysis of radicular cysts (265 cases) revealed that 136 cases (51.3%) occurred in the mandible (Fig. 1). A total of 56.2% of these cases were in male patients (*P* > 0.05). The analysis of ethnic background revealed that 102 (38.5%) of the radicular cysts occurred in Caucasian patients, 106 (40%) occurred in patients of African-descent and the remaining 21.5% occurred in individuals of other ethnic backgrounds (Table 2).

Dentigerous cysts accounted for 156 cases (30.7%), 59% of which were in the mandible (Fig. 1). The majority of these cysts occurred in the second decade of life (28.2%). Patients over 61 years of age had the lowest prevalence of

Table 1 Prevalence of odontogenic cysts according to age

Cyst	Age (Years)						
	1-10	11-20	21-30	31-40	41-50	51-60	>61
Dentigerous	10	44	42	25	12	18	05
Radicular	11	56	66	64	38	26	04
Residual	02	08	06	07	02	05	-
Lateral Perio*	02	-	04	02	-	01	02
Paradental	01	06	15	02	02	02	-
Glandular	-	-	01	02	01	-	-
Eruption	04	03	-	01	-	-	-
Gingival of adult	01	-	01	01	01	01	-

P = 0.003, * Lateral periodontal

Table 2 Prevalence of odontogenic cysts according to sex and ethnicity

Lesion	Sex		Ethnicity			
	Female <i>n</i> (%)	Male <i>n</i> (%)	White <i>n</i> (%)	Black <i>n</i> (%)	Others <i>n</i> (%)	
Dentigerous	57 (36.5)	99 (63.5)	54 (34.6)	65 (41.7)	37 (23.7)	156
Radicular	116 (43.8)	149 (56.2)	102 (38.5)	106 (40)	57 (21.5)	265
Residual	17 (56.7)	13 (43.3)	7 (23.3)	18 (60)	5 (16.7)	30
Lateral Perio*	5 (45.5)	6 (54.5)	1 (9.1)	7 (63.6)	3 (27.3)	11
Paradental	11 (39.3)	17 (60.17)	8 (28.6)	12 (42.9)	8 (28.6)	28
Glandular	1 (25)	3 (75)	4 (100)	-	-	4
Eruption	6 (75)	2 (25)	3 (37.5)	2 (25)	3 (37.5)	8
Gingival of adult	2 (40)	3 (60)	3 (60)	2 (40)	-	5
	215 (42.4)	292 (57.6)	182 (35.9)	212 (41.8)	113 (22.3)	507

P > 0.05, * lateral periodontal

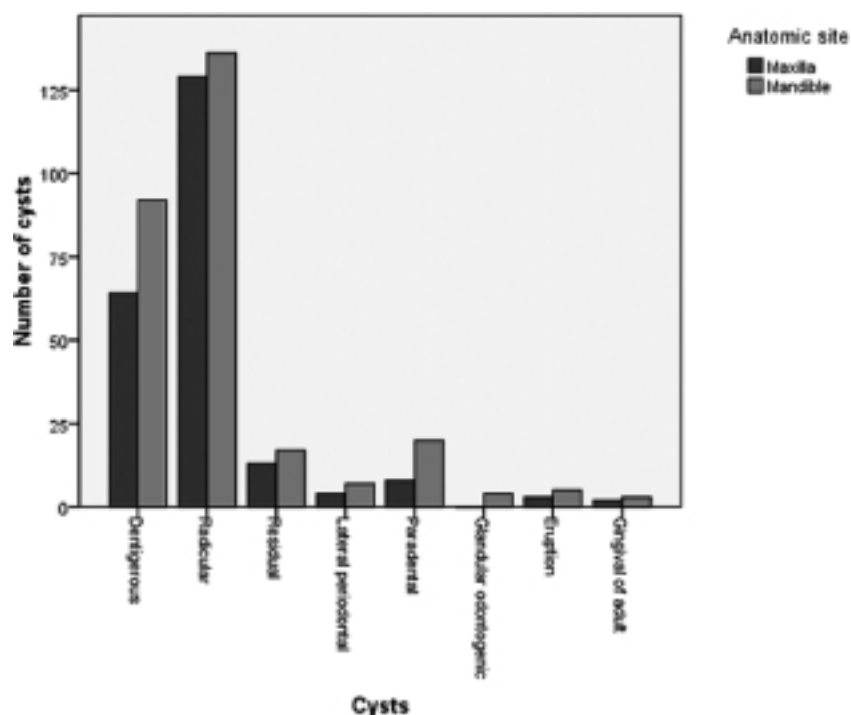


Fig. 1 Distribution of odontogenic cysts according to anatomic site.

these lesions (3.1%) (Table 1). The largest number of cases of dentigerous cysts occurred in patients of African descent (65 cases; 41.7%).

Residual cysts were the third most prevalent type of odontogenic cyst (30 cases; 5.91%). These lesions were more prevalent in female patients (17 cases; 56.7%; $P > 0.05$) (Table 2). The majority of residual cysts occurred in the mandible, accounting for 17 cases (53.7%) (Fig. 1). As for the prevalence of these cysts in terms of ethnic background, patients of African descent accounted for 60% of cases (Table 2). The most frequent age at the time of diagnosis was the second decade of life (26.7%) ($P < 0.05$).

Parodontal cysts were found in 28 of the histopathological results. Twenty were located in the mandible and 53.6% of these cases occurred in the third decade of life ($P < 0.05$) (Table 1). A total of 60.17% of these cases occurred in males, primarily in patients of African descent, followed by Caucasian and other ethnic backgrounds at the same proportion (28.6% each) (Table 2).

There was a lower prevalence of lateral periodontal cysts (2.1%), eruption cysts (1.55%), adult gingival cysts (0.9%) and glandular odontogenic cysts (0.7%). All these lesions occurred more often in the mandible than the maxilla, but this difference did not reach statistical significance ($P > 0.05$) (Fig. 1). Only eruption cysts were more prevalent among the females, while the other three

aforementioned lesions occurred with greater prevalence in males (Table 2). Lateral periodontal cysts were more prevalent in the third decade of life.

Glandular odontogenic cysts were more common in the fourth decade of life. Eruption cysts occurred more often in the first decade of life. Adult gingival cysts had no significant prevalence in any decade of life (Table 1). Lateral periodontal cyst was the only condition that had a greater number of patients of African descent, whereas the other conditions were diagnosed in Caucasian patients (Table 2).

Discussion

According to some previous studies (3,6), odontogenic cysts were diagnosed in 7 to 12% of all oral and maxillofacial biopsies, which is in agreement with the findings presented here (9.94%). In the present study, odontogenic cysts occurred in adult men with more frequency than in women, which confirmed conclusions reported in other studies (4-6). The mandible was the most frequently affected anatomical site, which agreed with findings described by Meningaud et al. (7) and Koseoglu et al. (9). Other studies disagree with this prevalence (5,8).

Radicular cysts are lesions produced as the consequence of pulp necrosis and are therefore considered to be of an inflammatory nature. In the present study, radicular cysts accounted for 52.2% of all odontogenic cysts and were the

Table 3 Comparison of the relative frequency of odontogenic cysts in the present study and selected references from different Latin American countries

	Brazil (Current study)		Chile (5)*		Mexico (6)*		Mexico (3)*		Brazil (4)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Radicular cyst	265	52.2	1494	59.2	118	47.8	342	50.9	493	72.5
Dentigerous Cyst	156	30.7	546	21.6	108	43.7	281	42.1	151	22.2
Residual cyst	30	5.9	328	13	15	6.1	18	2.7	29	4.3
Eruption cyst	08	1.6	11	0.4	03	1.2	07	1.1	01	0.1
Lateral periodontal cyst	09	2.3	17	0.7	03	1.2	07	1.1	02	0.3
Paradental cyst	28	5.5	113	4.4	-	-	12	1.8	04	0.6
Glandular odont. cyst	04	0.8	01	0.03	-	-	02	0.3	-	-
Gingival cist of adult	05	1.0	10	0.4	-	-	-	-	-	-
Others	-	-	03	0.1	-	-	-	-	-	-
Total (n cases)	507 cases		2523 cases		247 cases		672 cases		680 cases	

* Data obtained without keratocystic odontogenic tumors

most frequent of all lesions in relative terms. This finding is similar to that described by Tay (15), who reported a frequency of 50.7% and the same as that described by Mosqueda et al. (3) (52%) and Shear (16), (52.3%). The prevalence among the male gender (56.2%) was slightly higher than the female gender in the present study, which is in disagreement with some studies (5,6).

The greater prevalence in the male gender in some studies may be explained by the fact that men customarily have worse oral hygiene habits and are more susceptible to trauma than women (4). According to the literature, the most affected site is the anterior region of the maxilla (3,5,8). This finding was not corroborated by the present study, which was in agreement with a study by Meningaud et al. (7), who reported that the mandible is the most affected site. The fact that the anterior region of the maxilla is the most frequently affected site in a number of studies (3,5,8) may be explained by esthetic factors, as patients may wish to preserve their anterior teeth even when endodontic treatment is inadequate (4,5). The third and fourth decades of life were the most frequent in the present study, which is in agreement with findings described in the literature (4-6,8,9).

Regarding dentigerous cysts, this lesion occupied second place in relative frequency (30.7%) (Table 3), which is the same as that described in a study carried out in Mexico (3-6). The exception was the series described by Tay (15), in which dentigerous cysts were ranked third place, with a frequency of 15.2%. A greater frequency of dentigerous cysts was found among the male gender (63.5%). This type of cyst was found to occur mainly in the second and third decades of life, which corroborates the findings of previous studies (4,6). Concerning the preferential site of dentigerous

cysts, the results of the present study (mandible) differ from those described by Waldron (1), who found the upper third molars to be the most prevalent site.

Residual cysts are those retained from extracted teeth (13). In the present study, residual cysts were the third most frequent type of odontogenic cyst, which is in agreement with the findings described by Varinauskas et al. (10) and Bataineh et al. (8) However, our findings differ from those reported by other authors (3,6,7), who found this type of lesion to be the fourth most frequent. As in previous studies, keratocystic odontogenic tumor was classified as an odontogenic cyst. Prock et al. (4) found that residual cysts occurred more often in men, which differed from the present study as well as a number of studies in the literature (3,7,8). This type of lesion was slightly more prevalent in the mandible than in other sites in the present study.

A study carried out in Chile (5) found that residual cysts were more frequently found in the anterior region of the maxilla and found that the diagnosis of this pathology was more prevalent in patients in the second and fourth decades of life. In contrast, these lesions were found more frequently in the third, fifth and sixth decades of life in studies carried out by Ledesma-Montes et al. (5) and Ochsenius et al. (6). The conclusion is that these lesions are well distributed among different age groups and, even while prevalent above the seventh decade of life in many of the aforementioned studies, may also appear in young patients when teeth are lost prematurely.

Paradental cysts are inflammatory lesions that normally affect either the vestibular or distal surfaces of partially erupted third molars with a history of pericoronitis (1). This type of cyst was the fourth most frequent in the present study, accounting for 5.5% of cases, which is very close

to the percentage reported by Jones et al. (17) (5.6%) and higher than that reported in studies carried out in Chile (5) (3.8%). In the present study, there was a predilection for the male gender (60.1%), which is in agreement with a number of series (3,17). Our results reveal that these cysts were more prevalent in the third decade of life (53.6%) which agrees with previous studies (18), whereas a series also carried out in Brazil (4) found a greater prevalence in the second decade of life. The most frequent anatomical site in the present study was the mandible, where cysts were associated to the third molar. This finding is in agreement with that reported by Souza et al. (18), who studied a series of patients aged 6 to 9 years and found that the first molar was the site most frequently associated to this type of cyst.

Lateral periodontal cysts occur laterally to the root of a vital tooth, causing no clinical signs or symptoms, and are therefore normally found in routine radiographic examinations (4). Studies have found a frequency of this type of cyst ranging from 0.3% to 8% of all odontogenic cysts (2-7,18), which is corroborated by the present study (2.2% of cases). A predilection for the male gender (3,7,17) is found in the literature, which was also observed in the present study (54.5%).

Eruption cysts are the counterparts of dentigerous cysts in soft tissues (17) and was only found in eight cases (1.5%), demonstrating a slightly higher prevalence than that described in a study carried out in Mexico (3). According to the literature, the maxilla (5) is the most frequently affected site and males (17) are more frequently affected. These findings differ from those in the present study. Studies report that eruption cysts occur most frequently in the first decade of life (6) and are more commonly found in Caucasian individuals (19); these findings were corroborated by the present study, with 50% and 37.5% of cases, respectively. The small number of eruption cysts found in the present study may be explained by the fact that such lesions are often not biopsied because spontaneous resolution occurs during dental eruption.

Glandular odontogenic cysts and adult gingival cysts were the lesions with the lowest prevalence (0.7% and 0.9%, respectively), which confirmed findings of studies carried out in Chile (5) and Brazil (4). In the study carried out in Chile, these lesions were more prevalent in the female gender (100% of the cases studied), which is in disagreement with the findings of the present study, in which these lesions were more prevalent among the male gender.

The majority of studies do not offer data on the ethnic background of the patients. Thus, the ethnic origin of the individuals studied can only be compared to a small number of studies, such as one carried out in Brazil (4).

The findings of the present study reveal that the cysts studied were predominant in patients of African descent. Moreover, a large portion of the population in northeastern Brazil is made up of individuals of African descent.

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