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CLINICAL AND RADIOGRAPHIC FEATURES OF ODONTOGENIC CYSTS OF JAW PRESENTED TO THE DEPARTMENT OF ORAL AND MAXILLOFACIAL SURGERY, KHYBER COLLEGE OF DENTISTRY PESHAWAR

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ABSTRACT

Objectives: *To determine frequency, clinical and radiographic features of different types of odontogenic cysts in patients reported to the department of Oral and Maxillofacial surgery, Khyber College of Dentistry Peshawar.*

Materials and Methods: *This descriptive, cross sectional study was conducted at department of Oral and Maxillofacial Surgery, Khyber College of Dentistry, Peshawar from November 2019 to October 2021.This study was conducted on 89 patients with histopathologically confirmed reports of odontogenic cysts. Data with respect to age, gender, type of odontogenic cyst, clinical and radiographic features of these cysts were analyzed from the data obtained through a customized structured proforma.*

Results: *Out of the total 89 patient, there was male predilection (2.17:1). The most frequent age group was 2nd and 3rd decades. Among different types of odontogenic cysts, radicular cyst (37.1%) was the most common cyst followed by dentigerous cyst (33.7%) and odontogenic keratocyst (27%). The most common affected site was posterior mandible (46.1%). Paresthesia was present in 22.5% cases. Unicortical expansion was present in 59.6 % and bicortical expansion in 38.2% cases. Tenderness was present in 50.6% cases and teeth mobility in 28.1% cases. Needle aspiration test was positive in 78.7% cases. Mean size was 32.23mm + 14.53 standard deviation. Unilocular radiolucency was present in 74.2% and multilocular radiolucency in 25.8%. Root resorption was present in 64% cases and impacted tooth was associated with 52.2% odontogenic cysts.*

Conclusion: *It is concluded from this study that odontogenic cysts frequently encountered during 2nd and 3rd decades of life and more common in males with a predilection for the posterior mandible. Radicular cysts are most frequent among the other types of odontogenic cysts. Majority of patients has cortical expansion and positive needle aspiration test. Impacted tooth is associated with all the dentigerous cysts and most of OKC's and none of radicular cyst. Odontogenic cysts can reach to a considerable size to involve even half of the mandible.*

Key words: *Odontogenic cysts, Dentigerous cyst, Radicular cyst, Odontogenic keratocyst*

INTRODUCTION

A cyst is a cavity lined with epithelial cells that contains fluid or semi fluid contents[1]. Jaw cysts are categorized as odontogenic and non-odontogenic cysts. Odontogenic cysts have a higher prevalence compared to non-odontogenic cysts[2-3]. The World Health Organization (WHO) has classified odontogenic cysts into two groups: developmental and inflammatory cysts[4-5]. Developmental cysts include dentigerous cyst, odontogenic keratocyst, glandular odontogenic cyst, lateral periodontal cyst, eruption

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cyst, gingival cyst of newborn, and gingival cyst of adult. Inflammatory cysts encompass radicular cyst, residual periapical cyst, and paradental cyst[6]. Studies indicate that the most common type of odontogenic cyst is the radicular cyst, followed by dentigerous cyst and odontogenic keratocyst[7-8]. Odontogenic cysts predominantly occur in the maxillary incisor/canine region and mandibular molar region[9].

Most jaw cysts are typically without symptoms unless they become infected secondarily[10]. The affected area may exhibit carious, displaced, mobile, or missing teeth, and in some cases, deciduous teeth may be involved[11]. Radiographically, cysts appear as unilocular or multilocular radiolucent areas of varying sizes, with smooth or scalloped periphery[9]. Tooth displacement, root resorption, and impacted teeth can also be associated with these lesions[12]. Some cysts display aggressive growth patterns and have a higher likelihood of recurrence. It has been reported that certain odontogenic cysts may undergo both benign and malignant transformations within their epithelial lining[13]. Diagnosis of jaw cysts relies on a comprehensive assessment of medical history, clinical examination, radiological imaging, and histopathological examination[14]. Treatment options for odontogenic cysts include surgical enucleation with or without prior marsupialization. Aggressive lesions may require curettage, peripheral ostectomy, or even local resection[9].

This study will help the oral and maxillofacial surgeons to determine the most common type of odontogenic cyst and their treatment accordingly. Clinical and radiographic presentation is mostly similar for many of these cystic lesions leading to the possibility of misdiagnosis. As some of these lesions are locally aggressive and hence propensity to recur, so correct pattern and diagnosis of these lesions is very essential for adequate treatment.

MATERIALS AND METHODS

This descriptive, cross sectional study was conducted at department of Oral and Maxillofacial Surgery, Khyber College of Dentistry, Peshawar from November 2019 to October 2021. The Sampling technique was Non-probability, Consecutive sampling. A total of 89 patients were included in this study. All the patients showing clinicoradiographic features of odontogenic cyst with subsequent confirmation on histopathological examination were included in the study. Recurrent cases and cyst associated with syndromes were excluded.

Approval to carry out the study was sought from the institutional Ethical Review Committee at Khyber College of Dentistry vide letter no. 585-AD/PG/KCD.A detailed history followed by clinical examination of the patient was performed. Clinical examination was done to evaluate any swelling, paresthesia, or tenderness associated with the cyst, anatomic location of the cyst and teeth mobility was recorded. Needle aspiration test was done to see whether the lesion is cystic or solid. Radiographical analyses were carried out either with Periapical x-ray and Orthopantomogram (OPG). Computerized Tomography scan (CT scan) or Cone bean computed tomography (CBCT) was used to evaluate large and/or aggressive odontogenic cysts. Biopsy (incisional/excisional biopsy) was taken under local or general anesthesia. The histopathological diagnosis was considered as final diagnosis. Inclusion and exclusion criteria were strictly followed to eliminate bias.

The collected data was stored and analyzed in statistical package for social sciences (SPSS) version 20. Frequencies and percentages were calculated for categorical variables like gender, type of odontogenic cyst, anatomic location, paresthesia, expansion, tenderness, tooth mobility, needle aspiration test and radiologic features such unilocular/multilocular radiolucency, root resorption, association with impacted teeth. Means and standard deviation were calculated for numerical variables like age and size of cystic lesion. Types of odontogenic cysts were stratified among age, gender, clinical and radiological features to see effect modifiers. This post stratification analysis was done through Fisher‘s Exact test/chi-square test. P-value < 0.05 was considered as significant. All the data was presented in the form of tables and graphical charts.

RESULT

A total of eighty nine patients with odontogenic cyst, following inclusion and exclusion criteria, were recruited in this study. Among different types of odontogenic cysts, radicular cyst (37.1%) was the most common cyst followed by dentigerous cyst (33.7%), odontogenic keratocyst (27%) and residual cyst (2.2%). The mean age of the patients was 26.56+ 12.75 SD. The most common age group was 21-30 years (37.1%), followed by 11-20 years (34.8%),

31-40 years (13.5%), 0-10 years/41-50 years (4.5%) and 61-70 years (3.4%). The least common age group was 51-60 years (2.2%). Male outnumbered female with a ratio of 2.17:1. Sixty one patients (68.5%) were males and 28 patients (31.5%) were females.

A total of 6 clinical features were included in this study. The most common affected site was posterior mandible (46.1%) followed by anterior maxilla (24.7%), posterior maxilla (18%) and anterior mandible (11.2%). Paresthesia was present in 22.5% cases. Unicortical expansion was present in 59.6%, bicortical expansion in 38.2% and no expansion in 2.2% cases. Tenderness was present in 50.6% cases and teeth mobility in 28.1% cases. Needle aspiration test was positive in 78.7% cases. Detail is given in table 1.

Four radiographical features were studied, where the most common size range of the cystic lesion was 21 to 40mm (50.6%) followed by 41-60mm (21.8%), 1-20mm (12.4%) and 61mm and above (9%). Mean size was 32.23mm +14.53SD. Unilocular radiolucency was present in 74.2% and multilocular radiolucency in 25.8%. Root resorption was present in 64% cases and impacted tooth was associated with 52.8% odontogenic cysts. Detail is given in Table 2.

Different types of odontogenic cysts were cross tabulated with age, gender, clinical and radiographical features to see the effect modifiers. Radicular cyst was reported to be the most common in 2nd decade of life, odontogenic keratocyst in 2nd and 3rd decades, dentigerous and residual cysts were more common in 3rd decades. All types of odontogenic cysts were reported to be more common in males as compared to females.

Cross tabulation of types of odontogenic cysts with clinical and radiographical features showed that in 33 patients presented with radicular cyst, anterior maxilla (n=17) was most commonly involved. Paresthesia was present in none of the case, tenderness in 25 cases, teeth mobility in 13 cases and positive needle aspiration in all the 33 cases. Unicortical expansion was present in 28 cases and bicortical expansion 5 cases. The most common size range was 21-40mm (n=19). All the radicular cysts have unilocular radiolucency (n=33). Root resorption was present in 28 cases and impacted tooth was associated with none.

In two patients presented with residual cyst, anterior maxilla (n=2) was most commonly involved. Paresthesia was present in none of the case. Tenderness was present in 1 case, teeth mobility in none of the case and positive needle aspiration in all the cases. Unicortical expansion and unilocular radiolucency was present in both the cases. Root resorption and impacted tooth was associated with none.

Out of thirty patients presented with dentigerous cyst, posterior mandible (n=20) was most commonly involved. Paresthesia was present in 9 cases, tenderness in 13 cases, teeth mobility in 8 cases and positive needle aspiration in 25 cases. Unicortical expansion was present in 13 cases and bicortical expansion in 17 cases. The most common size range was 21-40mm (n=13) and 41-60mm (n=13). Unilocular radiolucency was present in 21 cases and 9 cases presented

Table 1: Descriptive statistics of Clinical features

Variables	Categories	N	%
Anatomical location of Cyst	Anterior Maxilla	22	24.7
	Posterior Maxilla	16	18
	Anterior Mandible	10	11.2
	Posterior Mandible	41	46.1
Paresthesia	Yes	20	22.5
	No	69	77.5
Cortical Expansion	Unicortical	53	59.6
	Bicortical	34	38.2
	No Expansion	2	2.2
Tenderness	Yes	45	50.6
	No	44	49.4
Teeth Mobility	Yes	25	28.1
	No	64	71.9
Needle Aspiration test	Positive	70	78.7
	Negative	19	21.3

Table 2: Descriptive statistics of Radiographical features

Variables	Categories	N	%
Size of Cystic lesion	1-20	11	12.4
	21-40	45	50.6
	41-60	25	28.1
	61 and above	8	9
Type of radiolucency	Unilocular	66	74.2
	Multilocular	23	25.8
Root Resorption	Yes	57	64
	No	32	36
Association of impacted tooth	Yes	47	52.8
	No	42	47.2

with multilocular radiolucency. Root resorption was present in 17 cases and impacted tooth was associated all the dentigerous cysts (n=30).

Out of twenty four patients presented with odontogenic keratocyst, posterior mandible (n=18) was most commonly involved. Paresthesia was present in 11 cases, tenderness in 6 cases, teeth mobility in 4 cases and positive needle aspiration in 10 cases. Unicortical expansion (n=10), bicortical expansion (n=12) and no cortical expansion in 2 cases. The most common size range was 21-40mm (n=12). Unilocular radiolucency was present in 10 cases and 14 cases presented with multiulocular radiolucency. Root resorption was present in 15 cases and impacted tooth was associated with 17 cases of odontogenic keratocyst.

Stratification of types of odontogenic cysts was done among age and gender using Fisher's Exact test which showed statistically insignificant P values for age (0.821) and gender (0.779). Stratification of types of odontogenic cysts was done among clinical and radiographical features using Fisher's Exact test/

Table 3: Cross tabulation of type of cyst and clinical features

		Type of odontogenic cyst				P-valve
		Radicular cyst	Residual cyst	Dentigerous cyst	Odontogenic keratocyst	
Anatomical location of cyst	Anterior Maxilla	17(51.5%)	2(100%)	2(6.7%)	1(4.2%)	0.001*
	Posterior Maxilla	6(18.2%)	0(0%)	6(20%)	4(16.6%)	
	Anterior Mandible	7(21.2%)	0(0%)	2(6.7%)	1(4.2%)	
	Posterior Mandible	3(9.1%)	0(0%)	20(66.6%)	18(75%)	
Paresthesia	Yes	0(0%)	0(0%)	9(30%)	11(45.8%)	0.001*
	No	33(100%)	2(100%)	21(70%)	13(54.2%)	
Tenderness	Yes	25(75.7%)	1(50%)	13(43.3%)	6(25%)	0.002**
	No	8(24.3%)	1(50%)	17(56.6%)	18(75%)	
Teeth mobility	Yes	13(39.4%)	0(0%)	8(26.6%)	4(16.7%)	0.258*
	No	20(60.6%)	2(100%)	22(73.3%)	20(83.3%)	
Needle Aspiration	Positive	33(100%)	2(100%)	25(83.3)	10(41.7%)	0.001*
	Negative	0(0%)	0(0%)	5(16.7%)	14(58.3%)	
Cortical expansion	Unicortical	28(84.8%)	2(100%)	13(43.3%)	10(41.7%)	0.001*
	Bicortical	5(15.2%)	0(0%)	17(56.7%)	12(50%)	
	No expansion	0(0%)	0(0%)	0(0%)	2(8.3%)	

Fisher's Exact Test*, Chi Square Test**

Table 4: Cross tabulation of type of cyst and radiographical features

		Type of odontogenic cyst				P-valve
		Radicular cyst	Residual cyst	Dentigerous cyst	Odontogenic keratocyst	
Size of Cystic lesion	1-20mm	8(24.2%)	1(50%)	2(6.7%)	0(0%)	0.013*
	21-40mm	19(57.6%)	1(50%)	13(43.3%)	12(50%)	
	41-60mm	5(15.2%)	0(0%)	13(43.3%)	7(29.2%)	
	61mm and above	1(3%)	0(0%)	2(6.7%)	5(20.8%)	
Type of radiolucency	Unilocular	33(100%)	2(100%)	21(70%)	10(41.7%)	0.001*
	Multilocular	0(0%)	0(0%)	9(30%)	14(58.3%)	
Root resorption	Yes	25(75.8%)	0(0%)	17(56.7%)	15(62.5%)	0.104*
	No	8(24.2%)	2(100%)	13(43.3%)	9(37.5%)	
Impacted teeth	Yes	0(0%)	0(0%)	30(100%)	17(50%)	0.001*
	No	33(100%)	2(100%)	0(0%)	17(50%)	

Fisher's Exact Test*

Chi square test which showed highly significant P values for anatomical location (0.001), paresthesia (0.001), tenderness (0.002), needle aspiration test (0.001), cortical expansion (0.002), size of cyst (0.013), type of radiolucency (0.001), association of impacted tooth (0.001) while P values for teeth mobility (0.258) and root resorption (0.104) were statistically insignificant. Details are given in Table 3 and 4.

DISCUSSION

Cysts occurring in the jaws are significant pathologies within the oral and maxillofacial region, and they can be categorized as odontogenic and non-odontogenic cysts[9]. Odontogenic cysts exhibit a higher prevalence compared to non-odontogenic cysts[2-3]. The most prevalent types of jaw cysts are radicular cysts and dentigerous cysts. Several cystic lesions in the jaws exhibit similar clinical, radiographic, and certain histological characteristics. Understanding the frequency of odontogenic cysts, along with their common presentation sites and age distribution, aids practitioners in making accurate clinical diagnoses[7].

The present study included a total of 89 cases of odontogenic cysts, with males (68.5%) being more commonly affected than females (31.5%). Among all the studies, radicular cysts were reported as the most frequent type of odontogenic cysts. However, the incidence of radicular cysts varied across different studies. In our study, the frequency of radicular cysts was 37.1%, which aligned with the findings of Ledesma-Montes et al[15], reporting an incidence of 33.8% in the Mexican population. Other studies reported radicular cyst incidences ranging from 50.2%[16] to 54.7%[17]. We speculate that the lower incidence of radicular cysts in our study may be attributed to not submitting the radicular cyst specimens to the pathology laboratory. The second most common cyst was the dentigerous cyst (33.7%), followed by the odontogenic keratocyst (27%) and residual cyst (2.2%). These results are consistent with the findings of Grossmann et al[18], Jones[19], and other studies[20]. However, in contrast, some studies mentioned a higher prevalence of odontogenic keratocysts compared to dentigerous cysts[21,22].

Radicular cyst was most common in second decade of life, odontogenic keratocyst in second and third decade, dentigerous and residual cysts were more common in third decades. This finding was also in agreement with a study done on Maxican[15] population and some other study[9,23].

In our study males are more affected than females. Similar results are shown by a study conducted in Karachi[24] and Iranian population[25]. The higher prevalence of odontogenic cysts among males may be attributed to their tendency to neglect oral hygiene and their increased susceptibility to trauma affecting the maxillary anterior teeth. Radicular and residual cysts are commonly observed in the anterior maxilla, while dentigerous cysts and odontogenic keratocysts tend to occur more frequently in the posterior mandible. Similar findings have been reported in other studies[26]. However, some studies have indicated a higher ratio of odontogenic cysts in the mandible[27]. Once again, this could be linked to the fact that a significant number of younger patients in our study developed radicular cysts as a result of dental trauma to the maxillary anterior teeth.

The cortical expansion, tenderness and teeth mobility associated with different types of odontogenic cysts had a higher prevalence compared to a study done by Ali et al[9]. This might be due to the fact that most of these cysts presented late to our hospital having advanced clinical features[9].

The most frequent radiographic appearance of the cysts was a unilocular radiolucency, observed in 66 cases, while the remaining cystic lesions exhibited multilocular radiolucencies, noted in 23 cases. All radicular and residual cysts were unilocular radiolucencies. Root resorption was observed in 64% of the cases. Dentigerous cysts manifested as either unilocular or multilocular radiolucencies in the posterior mandible, with an associated impacted tooth in every case. Odontogenic keratocysts predominantly were multilocular radiolucencies (14 cases) and unilocular radiolucencies (10 cases). The size of the cysts, as measured on the radiographs, ranged from 1 to 8 cm, with an average of 3.22 cm. The radiographic presentation of odontogenic cysts in our study aligns with findings in contemporary literature[28]. However, in contrast to our study, Ali et al. reported all dentigerous cysts as multilocular, and root resorption was present in 10% of cases. Radicular cysts, on average, were smaller lesions (mean = 1.58 cm) compared to dentigerous cysts (mean = 3.22 cm) and odontogenic keratocysts (mean = 3.67 cm)[9].

CONCLUSION

It is concluded from this study that odontogenic cysts are frequently encountered during 2nd and 3rd decades of life and more common in males with predilection for the posterior mandible. Radicular cysts are most frequent among the other types of odontogenic cysts. Majority of patients has cortical expansion and positive needle aspiration test. Impacted tooth is associated with all the dentigerous cysts and most of OKC's and none of Radicular cyst. Odontogenic cysts can reach to a considerable size to involve even half of the mandible.

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