

Odontogenic Cysts and Tumors: A Five Year Study in an Indian Teaching Hospital

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Abstract

Introduction: Odontogenic lesions are a diverse group of lesions which include odontogenic cyst and tumors. Very little information is available about their prevalence in north west Rajasthan. The aim of this study is to determine the frequency of odontogenic cysts and tumors and their distribution according to age, gender, site and histopathologic types of those reported over a period of 2014-2019 in a tertiary health care center in north west Rajasthan.

Material and method: A descriptive cross-sectional study was performed on 123 oral and maxillofacial specimens during 2014-2019. The age and the gender of patients, the site of lesion and their histopathology were recorded. The data were analyzed using SPSS software.

Results : A total of 123 cases were received. Among them, 89 cases were diagnosed as odontogenic cysts and 34 cases were odontogenic tumors. Radicular cyst was the most frequently diagnosed cyst and ameloblastoma was the most frequently diagnosed tumor. A strong male

predilection was observed for both the lesions. Odontogenic cysts were more commonly seen in individuals in the age range 21–40 years, while odontogenic tumors were frequently seen in individuals in the age range 0–20 years.

Conclusion: This study showed similar as well as contradictory results compared to other studies, probably due to geographical and ethnic variations which are yet to be corroborated.

Keywords: Odontogenic lesions, Ameloblastoma, Radicular cyst, dentigerous cyst

Introduction

The jaws are the common site for the presence of a diverse range of cysts and tumors. These lesions originate from the tissue remnants of the tooth forming apparatus or due to inflammation. ^{1,2} The World Health Organization (WHO) published the classification of odontogenic tumors in 1971³ and later revised it in 1992⁴, 2005² and 2017⁵. The World Health Organization (WHO) has classified epithelial cysts as odontogenic cysts which are

inflammatory in origin, and developmental cysts which may be odontogenic or non-odontogenic.⁵ In 2005 WHO classification, odontogenic keratocyst was classified as keratocystic odontogenic tumor (KCOT)² which was again put in the category of odontogenic cyst in 2017 classification.⁵

Odontogenic tumors are derived from epithelial, ectomesenchymal or mesenchymal elements of the tooth forming apparatus. These lesions range from hamartomatous to benign neoplasms to malignant tumors with metastatic potential.⁶ The most frequent odontogenic tumors are odontomas and ameloblastomas.⁷

There seems to be regional variations in the distribution of odontogenic cysts and tumors in the literature. Very few studies have been reported among Indians, especially from Rajasthan. This study was undertaken to address the distribution and histopathological analysis of odontogenic cysts and tumors in a tertiary health care center in Bikaner, Rajasthan.

Material and method

This was a five year retrospective and prospective study from 2014-2019. The Departmental records and all the biopsies or surgically excised specimens and reference

Table 1: Gender Distribution of Odontogenic Lesions with Mean Age

Type	Total	Male	%	Female	%	M:F	Mean age in years
Odontogenic cyst	89	62	69.66%	27	30.33%	2.3:1	29.29
Odontogenic tumor	34	18	52.94%	16	47.05%	1.12:1	31.61

As illustrated in table 2, odontogenic cysts mostly occurred in the third and fourth decades of life (37.08%) followed by the age 0-20 years (35.95%). This table also

material received in the pathology department for histopathological examination from oral cavity of patients visiting the department of dentistry were analysed. The histopathologic diagnoses were confirmed by studying the hematoxylin and eosin stained slides. The variables which were studied are age, gender, site of the lesion and histopathology of cysts and tumors. Descriptive statistical analysis was performed using the computer software, Statistical Package for Social Sciences (SPSS) version 22.

Results

A total of 345 dental biopsies were received in the study period of five years among which odontogenic lesions were 123 in number. Out of 123 cases, 89 cases (72.36%) were odontogenic cysts and 34 cases (27.64%) were odontogenic tumor. Both cysts and tumors presented with male predilection. The mean age of patients with odontogenic cysts and tumors were 29.29 and 31.61 years respectively. (table1)

indicates that odontogenic tumors were more predominant in the age range of 0-20 years (41.18%).

Table 2: Frequency Distribution of Odontogenic Lesions Based on Age

Type	0-20 year	%	21-40 year	%	41-60 year	%	61-80 year	%
Odonto-genic cyst	32	35.95	33	37.08	15	16.85	9	10.11
Odonto-genic tumor	14	41.18	9	26.47	7	20.59	4	11.76
Total	46	37.40	42	34.15	22	17.89	13	10.57

Mandible is the most commonly affected site for odontogenic cyst and tumor both which is 57.30% and 61.76% respectively. Maxilla was the second most common location for the lesions (table 3).

Table 3: Regional Distribution of Odontogenic Lesions

Site	Odontogenic cyst	%	Odontogenic tumor	%
Mandible	51	57.30	21	61.76
Maxilla	34	38.20	8	23.53
Gingiva	2	2.25	1	2.94
Mucosa	-	-	1	2.94
Tongue	1	1.12	-	-
Palate	1	1.12	2	5.88
Vestibule	1	1.12	-	-
Total	89	100%	34	100%

Among 82 reports of odontogenic cysts, radicular cyst (75.28%) revealed a higher incidence in men (67.16%) and in the mandible (49.25%). According to the table 4, the prevalence of other odontogenic cysts has correspondingly been the dentigerous cyst (14.61%), more prevalent in men (69.23%) and the mandible (76.92%) and OKC (7.86%), more common in men (71.43%) and the

mandible (71.42%). Ameloblastoma was the most common odontogenic tumor (47.06%) that showed a higher prevalence in male (68.75%) than female individuals; which was also more common in the mandible (75%).

Table 4: Frequency of Different Odontogenic Lesions in Relation to Gender, Site and Mean Age

Lesions	Frequency	Female	Male	Most common site	Mean age in years
Dentigerous cyst	13	4	9	Mandible	17.67
Odontogenic keratocyst	7	2	5	Mandible	34.2
Radicular cyst	67	22	45	Mandible	32.52
Periapical granuloma	1	0	1	Mandible	5
Residual cyst	1	0	1	Gingiva	62
Ameloblastoma	16	6	10	Mandible	25.02
Ameloblastic fibroma	1	1	0	Mandible	23
Complex odontoma	1	0	1	Mandible	23
Calcifying cystic odontogenic tumor	1	1	0	Mandible	70
Odontogenic fibroma	1	0	1	Mucosa	39
Odontogenic myxoma	2	0	2	Mandible, maxilla	26
Cementoblastoma	1	0	1	Mandible	17
Ossifying fibroma	5	3	2	Mandible	24.92
Fibrous dysplasia	4	2	2	Maxilla	22
Giant cell containing lesion	2	2	0	Mandible, maxilla	48.5
Total	123				

In the 0-20 year age group, the most common lesion was radicular cyst followed by dentigerous cyst and ameloblastoma. In the 21-40 year age group, the radicular cyst was followed by dentigerous cyst, odontogenic keratocyst and ossifying fibroma. In the 41-60 year age group, radicular cyst was followed by ameloblastoma and

in the elderly (61-80 year) the most common lesion was radicular cyst.(table 5)

Table 5: Age wise distribution of odontogenic lesions

Lesions	0-20 year	21-40 year	41-60 year	61-80 year
Dentigerous cyst	8	4	1	0
Odontogenic keratocyst	3	3	1	0
Radicular cyst	16	29	13	9
Periapical granuloma	1	0	0	0
Residual cyst	0	0	0	1
Ameloblastoma	7	1	7	1
Ameloblastic fibroma	0	1	0	0
Complex odontoma	0	1	0	0
Calcifying cystic odontogenic tumor	0	0	0	1
Odontogenic fibroma	0	1	0	0
Odontogenic myxoma	1	1	0	0
Cementoblastoma	1	0	0	0
Ossifying fibroma	2	3	0	0
Fibrous dysplasia	0	1	2	1
Giant cell containing lesion	0	1	0	1

Histopathological features of different lesions

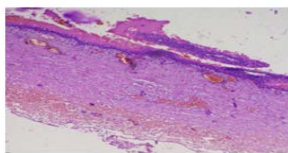


Fig. 1

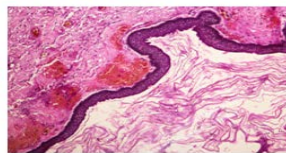


Fig. 2

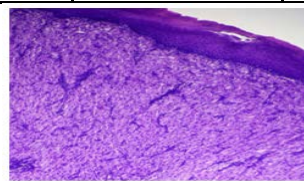


Fig. 5

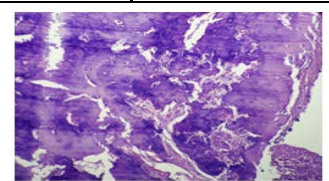


Fig. 6

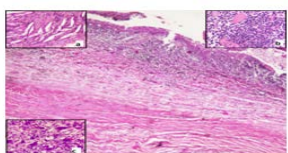


Fig. 3

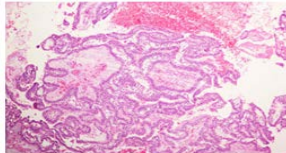


Fig. 4

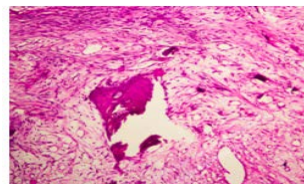


Fig. 7

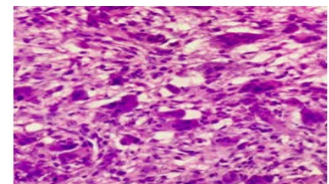


Fig. 8

Fig. 1: Dentigerous Cyst- thin connective tissue wall with a thin layer of stratified squamous epithelium lining the lumen. (H&E 10x).

Fig. 2: Odontogenic keratocyst - thin flat cyst is lined with a corrugated, para-keratinized surface with palisaded and often polarized cuboidal to columnar basal cells. (H&E 10x).

Fig. 3: Radicular cyst: connective tissue wall lined by stratified squamous epithelium (H&E 10x). The wall contains inflammatory infiltrate, cholesterol crystals (a), Rushton bodies (b) and multinucleated giant cells (c).

Fig. 4: Plexiform ameloblastoma- tumor cells arranged as a network of interconnecting strands of cells.(H&E 10x).

Fig. 5: Ameloblastic fibroma - interlacing thin strands of odontogenic epithelium within a stroma of primitive mesoderm. (H&E 10x).

Fig. 6: Cementoblastoma- trabecular arrangement of cementum, indistinguishable from bone, exhibits numerous reversal lines with highly vascular stroma. (H&E 10x).

Fig. 7: Ossifying fibroma- benign fibro-cellular stroma containing woven and lamellar bone. (H&E 10x).

Fig. 8: Central giant cell lesion- fibroblastic spindled cells with clustered osteoclast like giant cells. (H&E 40x)

Discussion

Knowledge about the frequency of odontogenic lesions is a very important aspect of oral health practice and provides epidemiological information on the distribution of such lesions. For this purpose a retrospective and prospective study was done for assessment and distribution of odontogenic lesions in the north-west Rajasthan. The study was carried out on the received specimens that were sent from the department of Dentistry of this institute to the Pathology department of Sardar Patel Medical College, Bikaner for a period of five year.

A total of 345 cases of oral lesion were received out of which 123 cases (35.65%) were of odontogenic origin. Cyst comprises of 25.80% cases and odontogenic tumor account for 12.46% cases of oral lesions. The prevalence of odontogenic cysts in this study (25.80% of all the biopsies of oral and jaw lesions) was relatively similar to those related to Singapore and Brazil;^{8,9} The mean age of our patient was 30.45 year overall while it was 29.29 year for cysts and 31.61 years for odontogenic tumors. In the present study more number of male subjects (65.04%) were suffering from odontogenic lesions as compared to females with a male: female ratio of 1.86:1. This is in concordance with other studies.^{10,11,12}

In the current study, radicular cyst was the most prevalent odontogenic cyst, followed by dentigerous cyst and OKC in the population. This was in accordance with the findings of Jones AV et al and other authors.¹³⁻¹⁶ The frequency of odontogenic cysts in male individuals was slightly higher than the female cases, which was similar to the other studies.^{15,17} Inclusively, this study showed that odontogenic cysts were more common in mandible than maxilla which was in agreement with the results of Meningaud JP et al¹⁶ and in contrast with other studies who reported higher prevalence in maxilla.^{13,17} The peak incidence of odontogenic cysts occurred in the third and fourth decades of life. This is in accordance with the study of Cabrini et al, who has shown the highest prevalence of oral cysts in the age of 30-50 years.¹⁸ Bataineh et al.¹⁵ also reported the third to fifth decades of life as the most common age range.

Odontogenic tumors are uncommon lesions and their frequency varies geographically in the oral biopsies. In our study odontogenic tumors were 12.46% of all oral lesions which correlated well with other studies done in Asia and Africa.^{10,19,20} Ameloblastoma was found to be the most prevalent tumor which was in accordance with study

from Japan, Nigeria, China, Tanzania, Sri Lanka²¹ and India.²² The odontogenic tumors occurred more frequently between the age of 0-20 years, being rare after seventh decade, with a male prevalence.^{10,22,23} Mandible was found to be the most common site of occurrence which are comparable to other studies.^{10,20,22,23}

Odontogenic cyst and tumors usually originate through some deviation from the normal pattern of odontogenesis and show the diversity of the development of the dental structures. Many of these lesions share the same clinical and radiographic features so the diagnosis of odontogenic cyst and tumors should be based on careful examination of clinical, radiographic and histopathological features. The strength of this study is the inclusion of the histological description which proves the accuracy of diagnosis compared with those studies for which the diagnosis is only clinical.

The authors believe that patients should be encouraged for periodic clinical and radiological examinations to prompt the treatment of oral and maxillofacial tumors and cysts. Dentists should also be responsible in taking the biopsies from the suspicious patients and send them for histopathological examinations. All these issues will increase the precise diagnosis of odontogenic lesions and would enhance their efficient treatments.

Conclusion

The present study provides epidemiological information of odontogenic cysts and tumors at an institutional level. The variation in relative incidences of odontogenic cysts and tumors among different populations were noted which may be attributed to the geographic variations. According to the present study we found a higher incidence of odontogenic cyst than odontogenic tumors, with a male predilection, age range of 1 to 20 years for odontogenic tumors, whereas odontogenic cysts were found more

frequently between the age range of 21–40 years, mandible being the most common site.

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