



Cysts of the Jaws in Pediatric Population: A 12-Year Institutional Study

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ABSTRACT

Aim: The aim of the study was to find the clinicopathological correlation of the cysts of the jaws in the pediatric population from the data obtained from a major tertiary dental care institution in the state of Kerala.

Materials and methods: The cases dated between 1st January 2001 and 31st December 2012 were retrieved from the archives of the Department of Oral Pathology and Microbiology, Government Dental College, Thiruvananthapuram, India. The data were analyzed for age, gender, site of the cyst and histopathologic type.

Results: Out of a total of 5894 biopsies received, cysts of the jaws accounted for 1396 (23.68%) cases. Among the cystic lesions, pediatric cysts were found to be 187 (13.39%) in number. Of these, 125 were intraosseous cystic lesions of the jaws of which, 81 (64.8%) were developmental in origin, 42 (33.6%) were inflammatory in origin.

Conclusion: From the data, it is possible to conclude that among all types of cysts of the jaws, developmental cysts are the most commonly encountered in the pediatric population. The lesions show a male predominance with anterior maxilla being the most common site.

Keywords: Odontogenic cyst, Pediatric population, Developmental cyst, Inflammatory cyst.

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INTRODUCTION

Kramer (1974) has defined a cyst as 'a pathological cavity having fluid, semifluid or gaseous contents and which is not created by the accumulation of pus'.¹ Epithelium-lined cysts in bone are seen only in the jaws, with rare exceptions.² Cysts of odontogenic origin are among the commonest lesions encountered in dental practice and

hence, it is imperative for oral and maxillofacial pathologists to get well-acquainted with these pathologies.

Cysts of the jaws are known to occur across different age and ethnic groups. Although existing literature on the incidence and clinicopathological features of cysts of the jaw is extensive, little has been discussed about these cysts occurring in the pediatric population. To the best of our knowledge, there is limited reported literature on jaw cysts in the pediatric age group within the South Indian population.

The present study was aimed at clinicopathological correlation of cysts of the jaws in the pediatric population reporting to a tertiary government dental healthcare educational institution located in the state of Kerala, in the southern most part of India, with a predominantly Dravidian population.

MATERIALS AND METHODS

The past 12-year records of the Department of Oral Pathology and Microbiology, Government Dental College, Thiruvananthapuram, India, were retrieved from the archives dated between 1st January 2001 and 31st December 2012. A total of 5894 biopsies were obtained, out of which, cysts of the jaws accounted for 1396 cases. Since our study was aimed at estimating the frequency of jaw cysts in the pediatric population, only cases belonging to the age group 0 to 14 years were included in the sample population.

All the cases were analyzed for age, gender, site of the cyst and histopathologic type. The hematoxylin and eosin stained slides were retrieved for all of these cases and reviewed by two investigators to confirm or modify the diagnosis. The clinical data was cross checked for recurrences, in order to avoid reduplication of cases. The age range was categorized into three class intervals viz. 0 to 6 years accounting mostly for primary dentition, 7 to 12 years accounting mainly for mixed dentition and 13 to 14 years accounting mainly for the young permanent dentition. The site distribution of the cysts were divided into three classes, class 1 including the dentoalveolar region involving the central incisors, lateral incisors and canines, class 2 spanning between mesial aspect of first premolar/ first primary molar to the tuberosity in the maxilla and ramus in the mandible and class 3 including both classes 1 and 2.

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The data were collected and entered into a Microsoft Excel spread sheet and descriptive statistical results were drawn using the SPSS version 16.0 statistical software package.

RESULTS

Out of a total of 5894 biopsies received at our department during the 12-year-period, cysts of the jaws accounted for 1396 (23.68%) cases. Among the cystic lesions, pediatric cysts were found to be 187 (13.39%) in number. Of these, 125 were intraosseous cystic lesions of the jaws of which, 81 (64.8%) were developmental in origin, 42 (33.6%) were inflammatory in origin and the rest of the cases included aneurysmal bone cysts, epidermoid cyst and nasopalatine cyst. Table 1 shows the 2005 WHO classification of cysts of the head and neck region which was the basis for our case segregation.

Among the developmental cysts, dentigerous cysts (45.6%) were found to be the most common followed by

odontogenic keratocysts (5.6%) and among the cysts of inflammatory origin, radicular cysts (31.2%) were found to be the predominant type. In our study, we also noted that mucoceles accounted for 95.08% of the total number of intraoral soft tissue cysts.

Among the 125 cysts, 71 (56.8%) were in males and 54 (43.2%) were in females. This male predominance was however not significant statistically ($p > 0.05$). The overall male:female ratio was found to be 1.3:1. The overall frequency and gender distribution of various cysts is shown in Tables 2 and 3. Graph 1 shows distribution of various cysts of the jaws and Graph 2 shows gender distribution among predominant cysts.

A recurrence was noted in five cases, two each of odontogenic keratocyst and radicular cyst and one of calcifying odontogenic cyst type I-C. In addition to this, two neoplastic transformations of dentigerous cysts into ameloblastoma were encountered, both in females aged 13 years. Five syndromic cases were also recorded.

Table 1: WHO classification of the cysts of the head and neck region (2005)

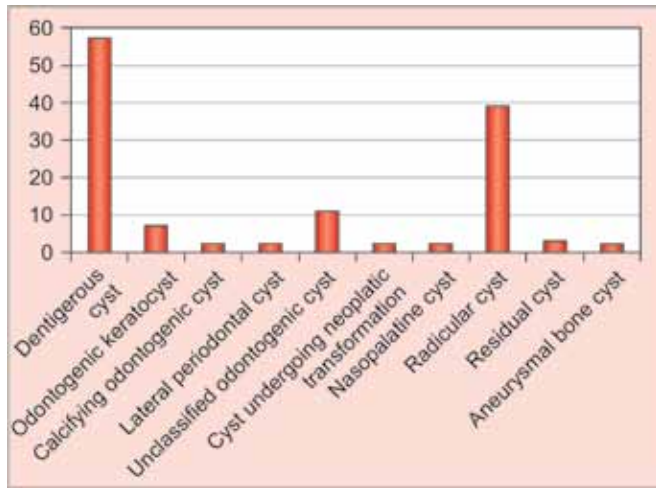
I. Cysts of the jaws	
A. Epithelial-lined cysts	
1. Developmental origin	
(a) Odontogenic	
• Gingival cyst of infants	4. Postoperative maxillary cyst
• Odontogenic keratocyst	III. Cysts of the soft tissues of the mouth, face and neck
• Dentigerous cyst	1. Dermoid and epidermoid cysts
• Eruption cyst	2. Lymphoepithelial (branchial) cyst
• Gingival cyst of adults	3. Thyroglossal duct cyst
• Developmental lateral periodontal cyst	4. Anterior median lingual cyst (intralingual cyst of foregut origin)
• Botryoid odontogenic cyst	5. Oral cysts with gastric or intestinal epithelium (oral alimentary tract cyst)
• Glandular odontogenic cyst	6. Cystic hygroma
• Calcifying odontogenic cyst	7. Nasopharyngeal cyst
(b) Nonodontogenic	8. Thymic cyst
• Midpalatal raphé cyst of infants	9. Cysts of the salivary glands: mucous extravasation cyst; mucous retention cyst; ranula; polycystic (dysgenetic) disease of the parotid
• Nasopalatine duct cyst	10. Parasitic cysts: hydatid cyst; Cysticercus cellulosae; trichinosis
• Nasopalatine duct cyst	
• Nasolabial cyst	
2. Inflammatory origin	
• Radicular cyst, apical and lateral	
• Residual cyst	
• Parodontal cyst and juvenile parodontal cyst	
• Inflammatory collateral cyst	
B. Nonepithelial-lined cysts	
1. Solitary bone cyst	
2. Aneurysmal bone cyst	

Table 2: The frequency and gender distribution of cysts of the jaws

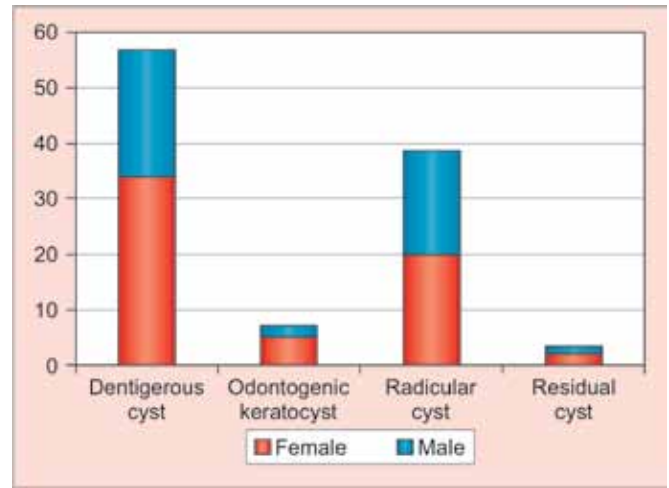
Type of cyst	Frequency		Male	Female	M:F
	N	%			
Dentigerous cyst	57	45.6	34	23	1.5
Odontogenic keratocyst	7	5.6	5	2	2.5
Calcifying odontogenic cyst	1	0.8	1	0	NA
Lateral periodontal cyst	2	1.6	2	0	NA
Unclassified odontogenic cyst	11	8.8	6	5	1.2
Cyst undergoing neoplastic transformation	2	1.6	0	2	NA
Nasopalatine cyst	1	0.8	1	0	NA
Radicular cyst	39	31.2	20	19	1.1
Residual cyst	3	2.4	2	1	2
Aneurysmal bone cyst	2	1.6	0	2	NA
Total	125	100	71	54	1.3

Table 3: The frequency and gender distribution of the intraoral soft tissue cysts

Type of cyst	Frequency		Male	Female	M:F
	N	%			
Epidermoid cyst	1	1.6	1	0	NA
Mucocele	58	95.6	29	29	1.0
Ranula	3	4.8	0	3	NA
Total	62	100	30	32	



Graph 1: Frequency of types of cysts



Graph 2: Gender distribution of dentigerous cyst, odontogenic keratocyst, radicular cyst and residual cyst

Table 4: The age distribution of cysts of the jaws

Type of cyst	Primary dentition (0-6 years)	Mixed dentition (7-12 years)	Permanent dentition (13-14 years)
Dentigerous cyst	5	43	9
Odontogenic keratocyst	0	4	3
Calcifying odontogenic cyst	0	0	1
Lateral periodontal cyst	0	2	0
Unclassified odontogenic cyst	2	6	3
Cyst undergoing neoplastic transformation	0	0	2
Nasopalatine cyst	0	0	1
Radicular cyst	4	28	7
Residual cyst	0	2	1
Aneurysmal bone cyst	0	2	0
Total	11	87	27

Table 5: The mean age distribution of developmental and inflammatory cysts

Type of cyst	Mean age (years)	Standard deviation	Minimum	Maximum
Developmental	10.14	2.5	3.5	14.0
Inflammatory	9.98	2.4	5.0	14.0

a maxilla to mandible ratio of 1.03:1. The site distribution of various cysts is shown in Tables 6 and 7.

DISCUSSION

Literature concerning the epidemiology of cysts in the jaws, within the pediatric population is relatively scarce. Although several such analyses have been reported by various groups in Europe³ and America, we found a gross scarcity in the reported literature among Asians and in particular, the Dravidians. In our retrospective analysis spanning over 12 years, out of the 5894 cases, only 125 accounted for the cysts of the jaws in the pediatric population. These figures have been reported from a premier tertiary government dental healthcare institution in the southern most part of India, where we receive patient referrals from several surrounding districts as well. This part of the country is populated by a relatively homogenous population of Dravidian origin. We thus feel that figures projected in our study would be representative of this population.

The occurrence rate of cysts in pediatric age group is relatively low. In the present study, we found the incidence of pediatric jaw cysts to be predominated by cysts of developmental origin (63.2%) while those of inflammatory origin accounted only for 33.6%. Similar findings were reported by Bodner et al⁴ in 2012 where in developmental cysts were 44% and inflammatory cysts were 17% in the pediatric population. da Cruz et al⁵ reported 66.7% developmental cysts in their 21-year retrospective study. Our findings however were not in

The highest frequency of jaw cysts of the three age intervals which we had considered in the study was noted in the mixed dentition period. 68.75% of odontogenic cysts and 71.42% of the cysts of inflammatory origin were encountered in the mixed dentition cases. The distribution of cysts according to the age of occurrence is shown in Table 4. The mean age of occurrence of developmental cysts and inflammatory cysts were found to be 10.14 and 9.98 years respectively, as shown in Table 5.

Most of the cysts of developmental origin were seen in the maxillary anterior region (28.39%), with a maxilla to mandible ratio of 1.2:1. In the case of inflammatory cysts, mandibular posterior region was the most frequently encountered site with 45.23% of cases, followed by maxillary anterior region (38.09%). However, the overall distribution of cysts was found to be more or less uniform with



Table 6: The site distribution of cysts of the jaws

Type of cyst	Maxilla			Mandible			Not recorded	Max:Mand
	Class 1	Class 2	Class 3	Class 1	Class 2	Class 3		
Dentigerous cyst	20	10	6	4	14	2	1	1.8
Odontogenic keratocyst	0	0	1	3	1	1	1	0.2
Calcifying odontogenic cyst	0	0	0	0	0	1	0	NA
Lateral periodontal cyst	2	0	0	0	0	0	0	NA
Unclassified odontogenic cyst	0	2	0	2	6	0	1	0.25
Cyst undergoing neoplastic transformation	0	0	0	2	0	0	0	NA
Nasopalatine cyst	1	0	0	0	0	0	0	NA
Radicular cyst	16	3	0	1	17	1	1	1
Residual cyst	0	0	0	0	2	0	1	NA
Aneurysmal bone cyst	0	0	0	1	0	1	0	NA
Total	39	15	7	13	40	6	-	-

accordance with the distribution of cysts in the general population in Southern India as reported by Donoghue et al⁶ which showed a predominance of inflammatory cysts. Also Telang et al⁷ had reported 43.2% of radicular cysts and 20.2% dentigerous cysts in their 19-year retrospective study of cystic lesions of pediatric and adolescent population.

As suggested in previous literature this difference in the distribution of developmental and inflammatory cysts may probably be attributed to the state of dynamism of dentoalveolar complex.⁴ This may be a result of interplay of several factors including the development and eruption of the succedaneous dentition and the simultaneous skeletal growth of the maxilla and mandible in this age group. In addition, we also suggest that the incidence of jaw cysts in the pediatric population is probably under reported owing to the fact that exfoliation/loss of primary teeth may result in the resolution of certain cystic lesions that are limited in size and are asymptomatic particularly when they do not involve the underlying tooth follicles of permanent teeth. The exfoliation of primary teeth may also limit the development and expansion of these cystic lesions which again would help in widening the disparity in reported incidence of developmental and inflammatory cysts in the pediatric population when compared to that of the adult population.

The increased number of developmental cysts also suggests a probable role of genetic factors in its formation where as inflammatory cysts have obviously more of an environmental etiology.⁴

The odontogenic cysts and inflammatory cysts showed a male predominance with an overall male to female ratio of 1.3:1. This is in accordance with the previous studies done by da Cruz et al⁵ who found 66.7% cases in males. Nineteen-year institutional study by Telang et al⁷ reported a male to female ratio of 1.52:1. In the general population too, similar findings were reported

Table 7: The site distribution of intraoral soft tissue cysts

Type of cyst	Labial mucosa	Buccal mucosa	Tongue	Floor of mouth	Total
Epidermoid cyst	0	0	0	1	1
Mucocele	51	2	5	0	57
Ranula	0	0	0	3	3

by Bodner et al,⁴ Ramachandra et al,⁸ Donoghue et al,⁶ Varinauskas et al,⁹ Ackigoz et al,¹⁰ Ansari et al,¹¹ Meningaud et al¹² and Tortoici et al¹³ Relatively poor oral hygiene and increased susceptibility to trauma among boys might be the reason for male predominance.¹²

Anterior maxilla (28.39%) was found to be the predominant site of cyst occurrence in the case of developmental cysts. Similar results were reported by Donoghue et al,⁶ Varinauskas et al,⁹ Ackigoz et al,¹⁰ Ansari et al,¹¹ Tortoici et al¹³ Gehani et al¹⁴ and Prock et al¹⁵ in their studies on the general population. But, mandibular predominance was reported in other studies done by Meningaud et al¹² and Avelar et al.¹⁶

Out of all the cystic lesions, we encountered five syndromic cases, two of which were associated with multiple dentigerous cysts and three cases presented with multiple odontogenic keratocysts. The associated syndromes were one case each of Sotto syndrome, Carpenters syndrome and cleidocranial dysplasia and two cases of nevoid basal cell carcinoma syndrome (NBCCS).

The most common presenting complaint was swelling and/or delayed or noneruption of permanent teeth, a finding that is consistent with previously reported literature.¹³ Imaging modalities like intraoral periapical radiograph, panoramic radiograph and occlusal radiograph were employed in the evaluation of these pathologic jaw cysts.¹² Extraoral radiographs, computed tomography (CT) scans had also proved useful in a few cases. The utility of CT scans is limited usually to cases of larger lesions where it is difficult to discern the

borders and extent of these lesions.¹⁰ It may also prove useful in lesions which have the potential for neoplastic transformation.

Marsupialization is the most commonly performed surgical treatment modality for pediatric jaw cysts in our institution, in order to salvage the involved/underlying permanent tooth.¹⁷ Enucleation is done only in a few cases. This is in sharp contrast to the treatment usually rendered in case of the jaw cysts in adults where enucleation is the most commonly employed technique in the management of jaw cysts.¹²

CONCLUSION

From the data, it is possible to conclude that among all types of cysts of the jaws, developmental cysts are the most commonly encountered in the pediatric population. The lesions show a male predominance with anterior maxilla being the most common site. Marsupialization was the most preferred surgical treatment modality. Further studies across different age groups are warranted in order to better establish the variability in the frequency of jaw cysts in individuals of various racial and ethnic backgrounds.

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