The Prevalence of Inflammatory and Developmental Odontogenic Cysts in a Libyan Population

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Abstract

Objective: The aim of this study was to determine the prevalence of odontogenic jaw cysts in a Libyan population and to compare the data with previously published reports from other countries. Materials and methods: We retrieved and analyzed 2190 case notes and biopsy records of the Department of Oral and Maxillofacial Surgery and the Department of Oral Pathology and Microbiology, Al Arab Medical Sciences University, Benghazi, Libya, dating from January 1990 to December 2005. Among 2190 biopsies performed between January 1990 to December 2005, 326 (14.8%) cases of odontogenic cysts were diagnosed; 189 were in male patients and 137 in female patients (Table 1). The cysts most commonly encountered were radicular cyst, dentigerous cyst and odontogenic keratocyst. Five lateral periodontal cysts, three eruption cysts and one sialo odontogenic cyst were also recorded. The maxilla was more commonly involved than the mandible (ratio of 1.3:1). The anterior maxilla was the commonest site (n=132, 37.4%) followed by the posterior mandible (n=96, 29.4%). Fifty three cases were associated with impacted teeth, and the highest frequency was for dentigerous cysts (n=37). Enucleation and curettage was performed on 300 patients, marsupialization on 14, and marginal/segmental resection on 12. Conclusion: To our knowledge, this is the first such study on a Libyan population. Our results are comparable to studies from other countries. Knowledge of the relative frequencies and sites of presentation of odontogenic cysts in different ethno-geographic backgrounds is essential for the early diagnosis and management of these benign yet potentially destructive lesions.

Key words: polycystic, ovary, hirsutism, diabetes, obesity.

Introduction

Odontogenic cysts occur in the oral and maxillofacial region. Most jaw cysts are lined by epithelium derived from odontogenic epithelium associated with tooth development. Odontogenic cysts can be classified as "developmental type" or "inflammatory type".

Developmental odontogenic cysts encompass keratocyst, dentigerous cyst, lateral periodontal cyst, sialo odontogenic cyst, and eruption and gingival cysts. The inflammatory type includes radicular, residual and paradental cysts. Although some odontogenic cysts are relatively common and should pose no diagnostic challenge, they are often misdiagnosed due to the many clinical and radiological similarities. As some of these cysts are aggressive and may recur [1], all the surgically removed tissue should be examined histopathologically. Early and accurate diagnosis will often ensure appropriate treatment and follow up.

The purpose of this study was to determine the relative frequencies of odontogenic cysts in a Libyan population and compare our findings with similar studies from other countries. To our knowledge, no similar studies on a Libyan population have been published.

Materials and methods

All cases of odontogenic cysts diagnosed histopathologically between January 1990 and December 2005 were reviewed from the case notes and biopsy records of the Department of Oral and Maxillofacial Surgery and the Department of Oral Pathology and Microbiology at Al Arab Medical Sciences University, Benghazi, Libya. The cases were analyzed by age and sex distribution, location of cyst, association with impacted teeth, and treatment method. Residual cysts were not considered a separate category and were included with inflammatory/radicular cysts. To classify the location of the cysts, each jaw was divided into an anterior and a posterior zone. The anterior zone included the incisors, canines and premolars, and the posterior zone consisted of the molars and ramus/tuberosity. If a tooth could be implicated, then irrespective of the extent of the cyst, it was classified in the zone in which the tooth was located. Otherwise, it was placed in the zone that, according to radiographic evaluation, was involved to the greatest extent. Where the zones were equally represented, the cyst was placed in the most posterior zone.

Results

Among 2190 biopsies performed between January 1990 to December 2005, 326 (14.8%) cases of odontogenic cysts were diagnosed; 189 were in male patients and 137 in female patients (Table 1). The cysts most commonly encountered were radicular cyst, dentigerous cyst and odontogenic keratocyst. Five lateral periodontal cysts, three eruption cysts and one sialo odontogenic cyst were also recorded. The maxilla was more commonly involved than the mandible (ratio of 1.3:1). The majority of cysts were detected in the anterior maxilla and posterior mandible. In both sites, radicular cysts were the most common (Table 2).

The ages of patients ranged from 8 to 75 years, and most of them were in the age group of 21-50 years (Table 3). Impacted teeth most commonly associated with odontogenic cysts were the lower third molars and the upper canines (Table 4). Three treatment options were employed to manage the patients: enucleation and curettage (n=300), marsupialization (n=14) and marginal/segmental resection (n=12).
Table 1- Relative frequency, sex distribution and mean ages of patients with cysts.

| Type of cyst                        | Number | Percent | Mean age ± SD | Male (n) | Female (n) |
|-------------------------------------|--------|---------|---------------|----------|------------|
| Radicular cyst                      | 222    | 68.1    | 31.7 (± 12.8) | 129      | 93         |
| Dentigerous cyst                    | 49     | 15.0    | 22.7 (± 12.1) | 29       | 20         |
| Odontogenic keratocyst              | 46     | 14.1    | 36.1 (± 12.8) | 27       | 19         |
| Lateral periodontal cyst            | 5      | 1.5     | 22.7 (± 12.1) | 2        | 3          |
| Eruption cyst                       | 3      | 0.9     | 22.7 (± 12.1) | 2        | 1          |
| Sialo Odontogenic cyst              | 1      | 0.3     | 22.7 (± 12.1) | 0        | 1          |
| Total                               | 326    |         | 22.7 (± 12.1) | 189      | 137        |

Table 2- Site distribution of cysts.

| Type of cyst      | Anterior Maxilla (n) | Posterior Maxilla (n) | Anterior Mandible (n) | Posterior Mandible (n) |
|-------------------|----------------------|-----------------------|-----------------------|------------------------|
| Radicular cyst    | 108                  | 34                    | 35                    | 45                     |
| Dentigerous cyst  | 17                   | 2                     | 10                    | 20                     |
| Odontogenic keratocyst | 5                  | 13                    | 2                     | 26                     |
| Lateral Periodontal cyst | 1              | 0                     | 2                     | 2                      |
| Eruption cyst     | 0                    | 0                     | 1                     | 2                      |
| Sialo Odontogenic cyst | 0                 | 0                     | 1                     | 0                      |
| Total             | 131                  | 49                    | 51                    | 95                     |

Table 3- Age distribution of patients with odontogenic cysts.

| Type of cyst      | ≤ 20 years | 21-50 years | ≥ 51 years |
|-------------------|------------|-------------|------------|
| Radicular cyst    | 44         | 158         | 20         |
| Dentigerous cyst  | 24         | 23          | 2          |
| Odontogenic keratocyst | 3      | 37          | 6          |
| Lateral Periodontal cyst | 0     | 2           | 3          |
| Eruption cyst     | 3          | 0           | 0          |
| Sialo Odontogenic cyst | 1       | 0           | 0          |
| Total             | 75         | 220         | 31         |

Table 4- Frequency of odontogenic cysts associated with impacted teeth

| Impacted tooth                  | Type of cyst | Lower 3rd molar (n) | Upper canines | Lower canines/premolars | Others |
|---------------------------------|--------------|---------------------|---------------|-------------------------|--------|
| Radicular cyst                  | 6            | 0                   | 0             | 0                       | 0      |
| Dentigerous cyst                | 15           | 9                   | 6             | 7                       | 7      |
| Odontogenic keratocyst          | 6            | 3                   | 0             | 1                       | 1      |
| Total                           | 27           | 12                  | 6             | 8                       | 8      |

Discussion

Most studies on odontogenic cysts concern clinicopathological and etiological factors. Most incidence studies tend to be small [2-5]. Knowing the incidence and prevalence of odontogenic cysts and their commoner sites of presentation may help clinicians to determine a likely clinical diagnosis.

Published studies show that odontogenic cysts account for 0.8-49% of all submitted specimens. In this study, odontogenic cysts constituted 14.8% of all the biopsies performed during 15 years. This frequency is comparable to those found in Mexico [6,7], Singapore [8], Britain [9], USA and Canada [10-12] and Chile [13]. In contrast, studies by Arotiba [14] and Mosadoni [15] on Nigerian patients reported frequencies of 8.8% and 23.4%, respectively. On a critical reading of these studies, we found that this wide difference could be explained by the small sample sizes and the erroneous inclusion of both odontogenic cysts and periapical granulomas as a single entity.

In this study, radicular cysts were the most common type, accounting for 68.1% of all cyst specimens. This frequency is similar to that described in studies by Rud and Pindberg (66.5%) [16], Daley (65.2%) [11], and Oschenius (65.7%) [13]. Radicular cysts were more common in males (M:F ratio of 1:4:1) and most patients were 21-50 years old (71.8%). The most common location was the anterior maxilla (48.6%) followed by the posterior mandible (20.3%) and is comparable to those studies reported by Oschenius (50.7%) [13] and Jones (52.8%) [9]. Enucleation and curettage was the preferred method of management for all radicular cysts.

Dentigerous cysts accounted for 15% of diagnosed cysts, and the male:female ratio was 1:4.1. Similar frequencies have been noted by Shear (16.6%) [17], Tay (15.2%) [8], Oschenius (15%) [13], and Killey and Kay (16.2%) [18]. In contrast, higher frequencies were reported by Mosqueda (33%) [6], Bataineh (24.8%) [3] and Ogunlewe (22.2%) [19]. A near equal prevalence was seen in age groups <20 years and 21-50 years. The posterior mandible (n=20) was the most common site of presentation, followed by the anterior maxilla (n=17). This was expected because the lower 3rd molars and the upper canines are the most commonly impacted teeth. Cystic lesions have been documented around impacted teeth [20], and 37 of the dentigerous cysts in our study were associated with impacted teeth. Of these, 24 were associated with lower third molars or upper canines. Fourteen cysts, all in young patients, were managed by marsupialization to permit the eruption of the affected tooth. As dentigerous cysts arise from the dental follicle, they are more commonly associated with impacted teeth than other cysts. Radicular cysts were rarely observed with impacted teeth (<3%). Radicular cysts require a carious pulpal involvement which is not possible with fully boury impacted teeth. Pulpal involvement of lower third molars is often associated with significant pain and
discomfort which may prompt the patient to obtain an early opinion and appropriate management.

Odontogenic keratocysts previously included both para- and orthokeratinized variants [21]. The new WHO guidelines of 2005 [22] reclassified these cysts as keratocystic odontogenic tumors and jaw cysts with keratinization, respectively. But to make comparison with other studies possible, we used the previous classification system. In the present study, odontogenic keratocysts were the third most common diagnosis (n=46). Earlier studies [2,6,7,10,11], reported prevalence rates of odontogenic keratocysts ranging from 1.8% to 21.5%. The prevalence rates in our study resemble those reported by Arotiba [14], Oschenius [13], Jones [9] and Radden [4]. The male-female ratio of 1:4:1 is similar to those observed elsewhere [23,24]. Sixty percent of the keratocysts were in the mandible, and the posterior mandible was the most common site of presentation (n=26), followed by the posterior maxilla (n=13).

Woolgar et al [25] in a review of 682 keratocysts found that the mean age of the patients was 40 years. In our study, 80% of all keratocysts occurred in 21-50 years of age. Most keratocysts were treated by enucleation and curettage, and 12 cases of large keratocysts were managed by marginal/segmental resection. Details of postoperative follow-up were not available for some patients.

Only three eruption cysts were diagnosed, all in children younger than 15 years. However, it is likely that these cysts are more common than reported, as they tend to rupture following eruption of the teeth.

Lateral periodontal cyst is an uncommon type of developmental odontogenic cyst that typically occurs along the lateral root surface of a tooth and is believed to arise from the epithelial rests of dental lamina. It accounts for less than 2% of all epithelium-lined jaw cysts [23]. The small number of cases seen in our study makes comparisons meaningless.

Some of the disadvantages of inferences made from hospital based studies could be that some people suffering from cystic lesions might not have reported to the dental school at all and may have been seen by private practitioners and other specialties. Also, some patients may refuse surgical treatment and demand only the extraction of the affected tooth. Such patients were not included in this study. Conversely, patients with cystic lesions are more likely to be treated at the dental school and inclusion of data from private clinics could actually lower the observed prevalence rate. Knowledge of the relative frequencies and sites of presentation of odontogenic cysts in different ethno-geographic backgrounds is an essential step in the early diagnosis and management of these benign yet potentially destructive lesions.

References

1. Carlson RE. Odontogenic cysts and tumors. In: Michael Miloro, ed. Peterson’s Principles of Oral and Maxillofacial Surgery, 2nd edn. London: BC Decker Inc. 2004; 576-96.

2. Kreidler JF, Raubenheimer EJ, Van Heerden WF. A retrospective analysis of 367 cystic lesions of the jaw—the Ulm experience. J Craniomaxillofac Surg 1993; 21:339-41.

3. Bataineh AB, Rawasheh MA, Al Qudah MA. The prevalence of inflammatory and developmental odontogenic cysts in a Jordanian population. A clinicopathologic study. Quintessence Int. 2004; 35(10):815-9.

4. Radden BG. Odontogenic cysts. A review and a clinicopathological study of 368 odontogenic cysts. Aust Dent J. 1973; 18:218-25.

5. Rengaswamy V. Clinical statistics of odontogenic cysts in west Malaysia. Br J Surg 1977-78; 15:160-65.

6. Mosqueda TA, Irigoyen MF, Diaz MA, Torres MA. Odontogenic cysts. Analysis of 856 cases. Med Oral. 2002; 7:89-96.

7. Ledesma-Montes C, Hernandez-Guerrero JC, Garcés-Ortiz M. Clinicopathologic study of odontogenic cysts in a Mexican sample population. Arch Med Res. 2000; 31:373-76.

8. Tay AB. A 5-year survey of oral biopsies in an oral surgical unit in Singapore: 1993-97. Ann Acad Med Singapore. 1999; 28:665-71.

9. Jones AV, Craig GT, Franklin CD. Range and demographics of odontogenic cysts diagnosed in a UK population over a 30-year period. J Oral Pathol Med. 2002; 35:500-7.

10. Bhaskar SN. Oral pathology in the dental office. Survey of 20,575 biopsy specimens. J Am Dent Assoc. 1968; 76:761-6.

11. Dally TD, Wysocki GP, Pringle GA. Relative incidence of odontogenic tumors and oral and jaw cysts in a Canadian population. Oral Surg Oral Med Oral Pathol. 1994; 77:276-80.

12. Thompson CC. A six year regional report on the oral tumor registry and lesions diagnosed in the School of Dentistry Biopsy Service University of Oregon Health Service Center (Portland, Oregon). J Oral Med. 1981; 36:11-5.

13. Oschenius G, Escobar E, Godoy L, Penafiel C. Odontogenic cysts: analysis of 2,944 cases in Chile. Med Oral Patol Oral Cir Buccal. 2007; 12:E85-91.

14. Arotiba JT, Lawayin JO, Obiechina AE. Pattern of occurrence of odontogenic cysts in Nigerians. East Afr Med J. 1998; 75:664-6.

15. Mosadoni A. Tumors, cysts and allied lesions of the jaws and oral mucosa in Lagos, Nigeria, 1969-74. Int J Oral Surg. 1975; 4:219-24.

16. Rud J and Pindborg J. J Oral Surg. 1969; 27:323.

17. Shear M. Cysts of the oral regions, 3rd ed. Oxford: Wright. 1992; 56-75.

18. Killey HC and Kay LW. Benign cystic lesions of the jaws. Edinburgh and London: Churchill Livingstone. 1972; 139-44.

19. Ogunlewe MO, Odukoya O, Akinwande JA. Epithelial jaw cysts. Analysis of 126 Nigerian cases. Afr Dent J. 1996; 10:1-8.

20. Güven O, KeskinA, Akal UK. The incidence of cysts and tumors around impacted third molars. Int J Oral Maxillofac Surg. 2001; 29:131-5.

21. Kramer JR, Pindborg J, Shear M. Histologic typing of odontogenic tumors, 2nd edn. Geneva: WHO, 1992

22. Philipsen HP. Keratocystic odontogenic tumor. In: Barnes L, Eiverson JW, Reichart P, Sidenvsky A, eds. World Health Organization classification of tumors: Pathology and genetics of head and neck tumors. Lyon: IARC Press. 2005; 306-7.

23. Neville BW, Damm DD, Allen CM, Bouquot JE. Odontogenic cysts and tumors. In: Neville BW, Damm DD, Allen CM, Bouquot JE, eds. Oral and Maxillofacial Pathology. Philadelphia: WB Saunders. 2002; 589-642.

24. Brannon RB. The odontogenic keratocyst. A clinicopathologic study of 312 cases. Part I. Clinical features. Oral Surg Oral Med Oral Pathol. 1976; 42:54-72.

25. Woolgar JA, Rippin JW, Browne RM. Odontogenic keratocyst and its occurrence in the nevoid basal cell carcinoma syndrome. Oral Surg Oral Med Oral Pathol. 1987; 64:727-30.