

Case Report

Odontogenic cysts: a clinical study of 90 cases

Banu Gurkan Koseoglu, Belir Atalay and Mehmet Ali Erdem

Department of Oral Surgery, Faculty of Dentistry, University of Istanbul, Istanbul, Turkey

(Received 21 November 2003 and accepted 9 September 2004)

Abstract: The maxillofacial region is affected by a greater number of cysts than any other part of the body. In this study, 90 odontogenic cysts were collected from 90 patients over a five-year period. Patients with radicular cysts, dentigerous cysts and odontogenic keratocysts were further analyzed with regard to age, sex and anatomical distribution. Using the histological classification of the World Health Organization, 53 cases (59%) were classified as radicular cysts, 24 (27%) as keratocysts and 13 (14%) as dentigerous cysts. Radicular cysts occurred most frequently in the anterior region of the maxilla, odontogenic keratocysts in the ramus and angular region of the mandible, and dentigerous cysts in the mandible. No recurrences were observed during the limited follow-up period. (*J. Oral Sci.* 46, 253-257, 2004)

Key words: odontogenic cyst; treatment; differential diagnosis.

Introduction

Odontogenic cysts are the most common form of cystic lesions that affect the maxillofacial region. They are classified traditionally into a developmental group, including keratocysts and dentigerous cysts, and an inflammatory group including radicular cysts (1). Developmental cysts are usually asymptomatic, but have the potential to become extremely large and cause cortical expansion and erosion (2). A dentigerous cyst encloses the crown of the unerupted tooth and is attached to the neck of the tooth (3). The exact pathogenesis of dentigerous cysts

remains unknown; however most authors favor a developmental origin from a tooth follicle (4).

Radicular cysts are the most common cysts of the jaw. They have been classified as inflammatory cysts originating from Malassez's cell rests, secondary to pulpal necrosis (5).

Odontogenic keratocysts (OKCs) are common, clinically aggressive lesions that are thought to arise from the dental lamina or its remnants (6). The most characteristic clinical aspect of OKCs is the high frequency of recurrence. The mechanism of recurrence is thought to be related to residues of cyst epithelium and an intrinsic growth potential following excision (7).

There are many studies that address the relative frequency of odontogenic jaw cysts, but to our knowledge none from a Turkish population. The purpose of this study was to investigate the relative frequency of three major types of odontogenic cysts and to review the literature on this subject.

Materials and Methods

We analyzed 90 odontogenic cysts from 90 patients treated at the University of Istanbul, Faculty of Dentistry, Department of Oral Surgery between 1998 and 2000. The age of patients ranged from 15 to 72 years. There were 48 males and 42 females. Histopathological examination was carried out at the Institute of Oncology, Department of Tumor Pathology and Oncological Cytology. Clinical and radiographic data were recorded and the histological diagnosis was made based on the criteria of the World Health Organization (6). Patients with radicular cysts, dentigerous cysts or keratocysts were further analyzed with regard to age, sex and anatomical distribution.

Results

Over a five-year period, 90 cysts in the jawbones were removed from 90 patients, of whom 48 were males and

Correspondence to Dr. Banu Gurkan Koseoglu, Fener cd. No:1/A 34800, Yeşilyurt, İstanbul, Turkey
Fax: +90 2125742405
Tel: +90 2126632166
E-mail: banugr@e-kolay.net

42 were females with ages ranging from 15 to 72 years (Table 1).

Radiographically the cyst borders were generally well defined. Lesional diameter measured across the cavity on the panoramic radiographs ranged from approximately 2 to 5 cm and the lesions were usually rounded or pear-shaped.

Of the 90 patients, 53 (59%) had radicular cysts, 24 (27%) had OKCs and 13 (14%) had dentigerous cysts (Table 2). Thirty-five radicular cysts occurred in the maxilla and 18 radicular cysts were found in the mandible. Among the 53 patients with radicular cysts, 30 (57%) were male and 23 (43%) were female, showing a slight male predominance (Table 2).

Forty-two of the 90 patients (46.6%) had swelling at first admission, 15 patients (16.6%) reported pain and 20 patients (22.2%) had both symptoms simultaneously. Thirteen patients (14.4%) were asymptomatic and cystic lesions were found incidentally by radiographic examination.

The maxilla was involved in 44 cases and the mandible in 46 cases. Of 13 dentigerous cysts, three enclosed the crown of the mandibular third molar, two enclosed the germ of the mandibular third molar, one enclosed a premolar,

two enclosed a maxillary canine, one enclosed a maxillary third molar, one enclosed a supernumerary tooth in the anterior maxilla, one enclosed a mandibular canine, one enclosed a mandibular molar and one enclosed a mandibular second premolar. Five cases of OKC were localized in the maxilla and one of them included both the lateral incisor and canine teeth. Nineteen other cases were located in the ramus and angular region.

All cases were treated by extraction of the nonvital deciduous or impacted tooth involved in the cyst and the cysts were removed by enucleation with primary closure of the wound. Every effort was made to remove the cyst wall in one piece when possible. During the three to five year period of follow-up, no recurrences were found.

Discussion

Cysts are more common in the jaws than in any other bone because of the ubiquitous presence of epithelial rests after odontogenesis (8,9). These lesions are often difficult to evaluate on the basis of their radiographic features alone. The final diagnosis must be done based on macroscopic and microscopic examination because several other lesions (including ameloblastoma, adenomatoid odontogenic tumor, calcifying odontogenic cyst, etc.)

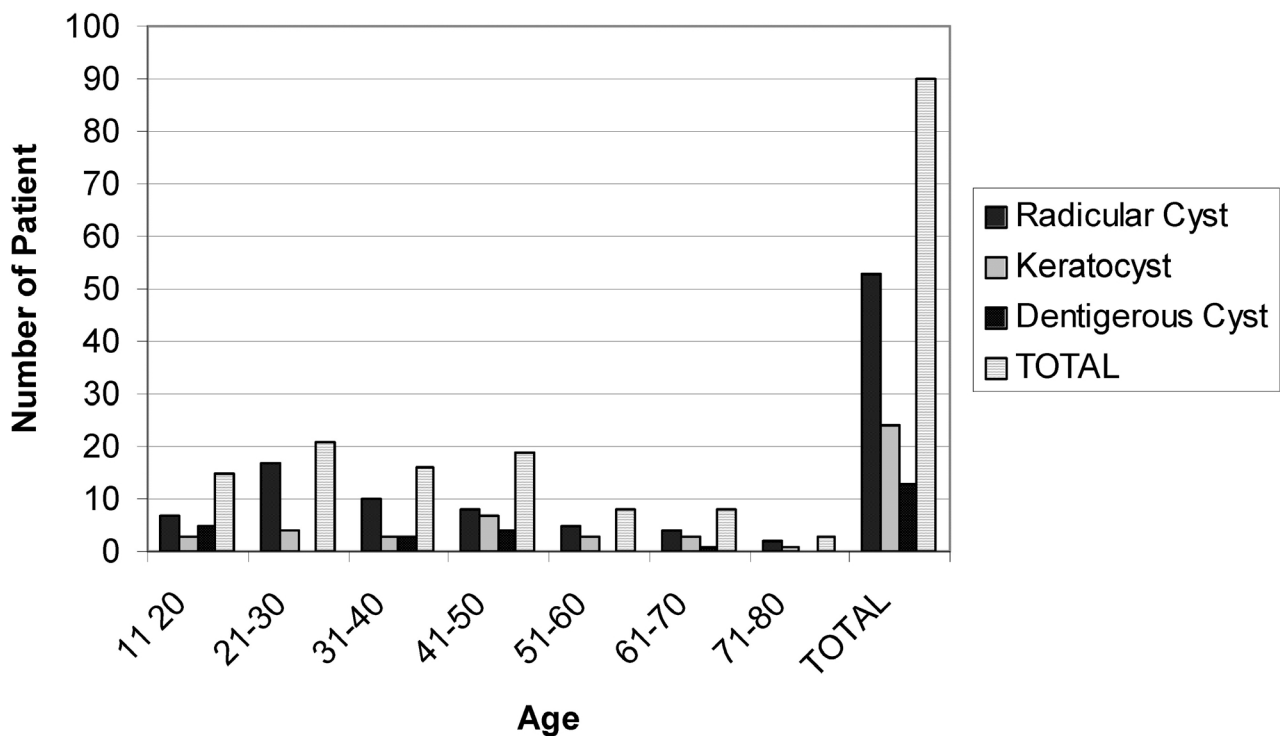


Table 1 Age distribution of 90 patients with odontogenic cysts

Odontogenic Cysts	Number of Patients	Maxilla	Mandible	Male	Female
Radicular	53	35	18	30	23
Keratocyst	24	5	19	11	13
Dentigerous	13	4	9	7	6
Total	90	44	46	48	42

Table 2 Jaw and sex distribution of odontogenic cysts

show similar radiographic findings (10).

Radicular cysts

Radicular cysts, the most common cysts of the jaws, are classified as an inflammatory cyst, originating from Malassez's cell rests (4). Nakamura et al. (11) reported that in a survey of 1234 odontogenic cystic lesions, 41.2% were diagnosed as radicular cysts, 27% as dentigerous cysts, 7.7% as odontogenic keratocysts and 21.6% as postoperative maxillary cysts. The proportion of 59% for radicular cysts in the present study lies within the range of 52.3% reported by Shear (2), 65.1% reported by Daley et al. (12) and 41.2% reported by Nakamura et al. (11). Radicular cysts were found to occur most frequently in the maxilla, as reported previously by Nakamura et al. (11) and Bhaskar (13).

Radicular cysts are rarely seen in individuals younger than 10 years, and are most common between the ages of 20 and 60 (11). The vast majority, like other cysts of the jaws, cause slowly progressive painless swellings. There are no symptoms until they become quite large. If infected, the swelling becomes painful and may rapidly increase in size, partly due to inflammatory edema (8,9).

Radiographically most radicular cysts appear as round or pear-shaped unilocular radiolucent lesions in the periapical region. The cysts may displace adjacent teeth or cause mild root resorption (10).

The present study showed that the proportion of radicular cysts was 59% of all odontogenic cysts. This rate is essentially similar to that reported by Kreidler et al. (14), who also observed mild root resorption in ten cases.

Dentigerous cysts

The exact histogenesis of dentigerous cysts remains unknown, but most authors favor a developmental origin from the tooth follicle (4). Uncomplicated cysts cause no symptoms until the swelling becomes noticeable. Most lesions are detected during routine radiographic

examination. They most frequently involve the mandibular third molar followed in order of frequency by the maxillary canine, mandibular second premolar and maxillary third molar (3). In our own 13 cysts, the mandibular third molar was involved in three cases, two enclosed the germ of the mandibular third molar, one enclosed a premolar, two enclosed a maxillary canine, one enclosed a maxillary third molar, one enclosed a supernumerary tooth in the anterior maxilla, one enclosed a mandibular canine, one enclosed a mandibular molar and one enclosed a mandibular second premolar. None of these patients underwent marsupialization because of the unfavourable condition of the teeth. Dentigerous cysts occur over a wide age range with a peak frequency in the 2nd to 4th decades (3). The age of the patients in our study ranged from 15 to 65 years.

Odontogenic keratocysts

The most characteristic clinical aspect of OKCs is the high frequency of recurrence. Since the lining of the OKC is thin and friable, removal of the cyst in one piece may sometimes be difficult. Complete removal of the cyst lining without leaving behind remnants attached to the soft tissue or bone is necessary to avoid recurrence (15). OKCs were the second most common odontogenic cyst in our series (27%) in contrast to other studies such as Daley et al. (12) (4.88%), Nakamura et al. (11) (7.7%), Shear (2) (11.2%), Aritoba et al. (16) (26%) and Ledesma-Montes et al. (17) (18.8%). The published recurrence rate ranges from a maximum of 62% (18) to a minimum of 0% (15,19,20), depending on surgical technique used and length of follow-up period. During three to five years of follow-up, no evidence of recurrence was found. The zero rate of recurrence in our study is similar to that of Bataineh's and Qudah (15), Brandum and Jensen (19), and Blanchard (20).

OKCs may cause cortical thinning, displacement of teeth and root resorption (8). OKCs in the midline region

of the anterior maxilla tend to occur in older patients and especially in males (21). They are most often seen in the mandible with a strong predilection for the molar/ramus region (6,11,14,22-24). Out of 24 cases in this study, five were in the maxilla, and one of these had impacted canine and lateral incisor teeth. Fifteen cases were in the ramus and angular region and four were in the body of the mandible.

In contrast to previous studies (23-26), no male predilection was apparent in our patient group. The female-male ratio was 1.1:1 which is consistent with one previous report (22). The localization of OKCs in this study was also quite similar to the findings of previous reports (14,15,19,26,27).

OKCs have been treated in many ways including radical surgery, application of Carnoy's solution, cryotherapy and decompression (15,19). Successful treatment by marsupialization alone or by marsupialization followed by enucleation has been reported (3). Nakamura et al. (28) and Myoung et al. (24) found that OKCs in the angle-ramus region of the mandible had a higher tendency to recur than those in the mandibular body. They explained this difference because of the difficulty in removing OKCs from the ramus. Nakamura et al. (28) stated that marsupialization was highly successful in decreasing the size of the OKC before surgery, and marsupialization itself did not adversely affect the recurrence rate. Our standard approach for preoperatively diagnosed OKCs was enucleation. Fissure burs were used to perform a resection of the cortical bone approximately 0.5 cm around the lesion. Teeth observed in the border of the lesion were extracted. Before suturing, surgical burs were also used to remove the residual cystic tissues. During the three to five year follow-up period, no evidence of recurrence was registered. However long-term follow-up of OKCs in particular should be considered because of the well-known potential for recurrence. There is a need for additional studies in the Turkish population to establish the clinicopathological features of odontogenic cysts.

References

1. High AS, Robinson PA, Klein CE (1993) Discrimination of parakeratinized odontogenic keratocysts from other odontogenic and non-odontogenic cyst types by expression of a 38kd cell-surface glycoprotein. *J Oral Pathol Med* 22, 363-367
2. Shear M (1994) Developmental odontogenic cysts. An update. *J Oral Pathol Med* 23,1-11
3. Waldron CA (1995) Odontogenic cysts and tumors. In *Oral and Maxillofacial Pathology*, Neville BW, Damm DD, Allen CM, Bouquot JE eds, W.B.Saunders, Philadelphia, 493-540
4. Benn A, Altini M (1996) Dentigerous cysts of inflammatory origin. A clinicopathologic study. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 81, 203-209
5. Wood RE, Nortje CJ, Padayachee AP, Grotepass F (1988) Radicular cysts of primary teeth mimicking premolar dentigerous cysts: report of three cases. *ASDC J Dent Child* 55, 288-290
6. Kramer IRH, Pindborg JJ, Shear M (1992) Histological typing of odontogenic tumours. 2nd ed, Springer Verlag, Berlin, 35-36
7. Brannon RB (1976) The odontogenic keratocyst. A clinicopathological study of 312 cases. *Oral Surg Oral Med Oral Pathol* 42, 54-72
8. Cawson RA, Odell EW, Porter S (2002) Cawson's essentials of oral pathology and oral medicine. 7th ed, Churchill Livingstone, Edinburgh, 102-121
9. Regezi JA, Sciubba JJ, Jordan RCK (2003) Oral Pathology: clinical pathologic correlations. 4th ed, WB Saunders, St Louis, 241-254
10. Scholl RJ, Kellett HM, Neumann DP, Lurie AG (1999) Cysts and cystic lesions of the mandible: clinical and radiologic- histopathologic review. *Radiographics* 19, 1107-1124
11. Nakamura T, Ishida J, Nakano Y, Ishii T, Fukumoto M, Izumi H, Kaneko K (1995) A study of cysts in the oral region. Cysts of the jaw. *J Nihon Univ Sch Dent* 37, 33-40
12. Daley TD, Wysocki GP, Pringle GA (1994) Relative incidence of odontogenic tumors and oral and jaw cysts in a Canadian population. *Oral Surg Oral Med Oral Pathol* 77, 276- 280
13. Bhaskar SN (1968) Oral pathology in the dental office: survey of 20,575 biopsy specimens. *J Am Dent Assoc* 76, 761- 766
14. Kreidler JF, Raubenheimer EJ, van Heerden WFP (1993) A retrospective analysis of 367 cystic lesions of the jaw - the Ulm experience. *J Craniomaxillofac Surg* 21, 339-341
15. Bataineh AB, Al Qudah MA (1998) Treatment of mandibular odontogenic keratocysts. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 86, 42-47
16. Arotiba JT, Lawoyin JO, Obiechina AE (1998) Pattern of occurrence of odontogenic cysts in Nigerians. *East Afr Med J* 75, 664-666
17. Ledesma-Montes C, Hernandez-Guerrero JC, Garces-Ortiz M (2000) Clinico-pathologic study of odontogenic cysts in a Mexican sample population. *Arch Med Res* 31, 373- 376

- 18 Pindborg JJ, Hansen J (1963) Studies on odontogenic cyst epithelium. 2. Clinical and roentgenological aspects of odontogenic keratocysts. *Acta Pathol Microbiol Scand* 58, 283-294
- 19 Brondum N, Jensen VJ (1991) Recurrence of keratocysts and decompression treatment. A long-term follow-up of forty-four cases. *Oral Surg Oral Med Oral Pathol* 72, 265-269
- 20 Blanchard SB (1997) Odontogenic keratocysts: review of the literature and report of a case. *J Periodontol* 68, 306-311
- 21 Neville BW, Damm DD, Brock T (1997) Odontogenic keratocysts of the midline maxillary region. *J Oral Maxillofac Surg* 55, 340-344
- 22 Stoelinga PJW (2001) Long-term follow-up on keratocysts treated according to a defined protocol. *Int J Oral Maxillofac Surg* 30, 14-25
- 23 Garlock JA, Pringle GA, Hicks ML (1998) The odontogenic keratocyst. A potential endodontic misdiagnosis. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 85, 452-456
- 24 Myoung H, Hong SP, Hong SD, Lee JI, Lim CY, Choung PH, Lee JH, Choi JY, Seo BM, Kim MJ (2001) Odontogenic keratocyst: review of 256 cases for recurrence and clinicopathologic parameters. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 91, 328-333
- 25 Tsukamoto G, Sasaki A, Akiyama T, Ishikawa T, Kishimoto K, Nishiyama A, Matsumura T (2001) A radiologic analysis of dentigerous cysts and odontogenic keratocysts associated with a mandibular third molar. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 91, 743-747
- 26 Tsukamoto G, Makino T, Kikuchi T, Kishimoto K, Nishiyama A, Sasaki A, Matsumura T (2002) A comparative study of odontogenic keratocysts associated with and not associated with an impacted mandibular third molar. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 94, 272-275
- 27 Vuhahula E, Nikai H, Ijuhin N, Ogawa I, Takata T, Koseki T, Tanimoto K (1993) Jaw cysts with orthokeratinization: analysis of 12 cases. *J Oral Pathol Med* 22, 35-40
- 28 Nakamura N, Mitsuyasu T, Mitsuyasu Y, Taketomi T, Higuchi Y, Ohishi M (2002) Marsupialization for odontogenic keratocysts: long-term follow-up analysis of the effects and changes in growth characteristic. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 94, 543-553