

## Odontogenic cysts: a clinical study of 695 cases

Jean-Paul Meningaud, Nicoleta Oprean, Poramate Pitak-Arnnop  
and Jacques-Charles Bertrand

Department of Maxillofacial Surgery, Teaching Pitié-Salpêtrière Hospital, Pierre et Marie Curie University,  
Paris, France

(Received 28 February and accepted 30 May 2006)

**Abstract:** The aim of this study was to analyze the files of 695 consecutive patients operated on under general anesthesia for odontogenic cysts in an adult French teaching hospital for comparison with findings in world surveys. A retrospective survey of cysts of the jaws was undertaken at the Maxillofacial department, Pitié-Salpêtrière University Hospital, Paris, France. Data were retrieved from case notes, imaging, histopathology records and follow-up reports from January 1995 to January 2005. The mean age of patients was  $41.8 \pm 15.8$  years. There was an overall male to female ratio of 1.86:1. Mandible to maxilla ratio was 3:1. Regarding the mandible, the angle was involved in 36% of the cases, horizontal branch in 32%, parasymphysis in 18%, ramus in 11.6%, coronoid process in 1.5% and condyle in 0.9% (total = 100%). Regarding the maxilla, the canine to canine region was involved in 40% of the cases, premolar and molar region in 45%, and wisdom tooth region in 15% (total = 100%). The three most frequently diagnosed odontogenic cysts were radicular cysts (53.5%), dentigerous cysts (22.3%) and odontogenic keratocysts (19.1%). Together, these three entities represented 94.9% of all odontogenic cysts. The mean number of operation per patient was 1.16 (SD: 0.6, range: 1-10). The mean cumulated duration of hospitalization for one patient was 2.46 days (SD: 1.9, range: 1-28). The mean length of follow-up was 8.4 months (SD: 15.2, range: 0-120). Sixty five percent had a follow-up inferior to 6 months and 18% had no follow-up at all. The two most

important findings of this case series are 1) the important number of radicular cysts that could be avoided because most of these cysts develop as a consequence of advanced carious lesions and 2) regarding other types of cysts, the dramatic rate of patients lost to follow-up. (J. Oral Sci. 48, 59-62, 2006)

Keywords: odontogenic cyst; dentigerous cyst; keratocyst; orthokeratinized odontogenic cyst

---



---

### Introduction

Odontogenic cysts are rare entities that appear in tooth-bearing areas. The importance of a correct diagnosis is that some variants, i.e. keratocysts are aggressive and subject to recurrence.

Surprisingly there have been few studies on the precise prevalence of these lesions in Europe. However, these data are important to assess geographic differences. They are also helpful in creating a syllabus for both dental and medical students. Finally, these data are valuable to improve the information that has to be given to patients with nonspecific clinical and radiographic lesions.

The purpose of this study was to analyze the files of 695 consecutive patients operated on under general anesthesia in an adult French teaching hospital for comparison with findings in world surveys.

### Materials and Methods

A retrospective survey of odontogenic cysts based on the classification published by Kramer et al. (1), was undertaken at the department of maxillofacial surgery, Pitié-Salpêtrière University Hospital, Paris, France. The records of 695 consecutive adult patients operated on under general anesthesia for odontogenic cysts were

---

Correspondence to Dr. Jean-Paul Meningaud, Service de chirurgie maxillo-faciale, CHU Pitié-Salpêtrière, 47 bd de l'hôpital, 75651 Paris cedex 13, France  
Tel: +33-1-42-16-13-03  
Fax: +33-1-42-16-13-69  
E-mail: meningaud@noos.fr

included in the study. Data were retrieved from case notes, imaging, histopathology records and follow-up reports from January 1995 to January 2005. In every case the following information was obtained: age, gender, imaging procedures, location of the lesion, surgical treatment, histopathologic diagnosis, number of operations for the same lesion, cumulated duration of the hospitalization for one patient, and length of follow-up. Information was analyzed using descriptive statistics.

## Results

The mean age of patients was  $41.8 \pm 15.8$  years. There was an overall male to female ratio of 1.86:1. The imaging procedures were: 100% of orthopantomogram, 43% of ct-scan. An MRI was prescribed for only 3 patients. The overall mandible to maxilla ratio was 3:1. Regarding the mandible, the angle (wisdom tooth region) was involved in 36% of the cases, horizontal branch (premolar and molar region) in 32%, parasymphysis (canine to canine region) in 18%, ramus in 11.6%, coronoid process in 1.5% and condyle in 0.9% (total = 100%). Regarding the maxilla, canine-to-canine region was involved in 40% of the cases, premolar and molar region in 45%, and wisdom tooth region in 15% (total = 100%). All the cysts were enucleated except for 1 orthokeratocyst and 1 parakeratocyst. These two cases lead to a mandibulectomy.

The three most frequently diagnosed odontogenic cysts were apical and lateral cysts (53.5%), dentigerous cysts (22.3%) and odontogenic keratocysts (19.1%). Together,

these three entities represented 94.9% of all odontogenic cysts. Eight odontogenic keratocysts were associated with a nevoid basal cell carcinoma syndrome. Table 1 summarizes the relative frequencies of the diverse lesions. Among the keratocysts, 78 out 133 had a more precise diagnosis: 72% of these were classified as parakeratocysts, 12% as orthokeratocysts and 16% as ortho + para keratocysts (total = 100%). Three entities were not found: gingival cyst of infants, gingival cyst of the adult and eruption cysts, as this case series investigated only adults operated on under general anesthesia.

The mean number of operations per patient was 1.16 (SD: 0.6, range: 1-10). The relative incidence of the three most diagnosed cysts operated on one time was: apical and lateral cysts (58.0%), dentigerous cysts (24.5%), odontogenic keratocysts (12.2%). The relative incidence of the three most diagnosed cysts operated on more than one time was as follows: odontogenic keratocysts (72.5%), apical and lateral cysts (18.7%), dentigerous cysts (3.7%).

The mean cumulated duration of hospitalization for one patient was 2.46 days (SD: 1.9, range: 1-28). The relative incidence of the three most diagnosed cysts with a cumulated duration of hospitalization inferior to 2 days was: apical and lateral cysts (58.7%), dentigerous cysts (23.6%), odontogenic keratocysts (12.2%). The relative incidence of the three most diagnosed cysts with a cumulated duration of hospitalization superior or equal to 3 days was: odontogenic keratocysts (39.5%), apical and lateral cysts (38.4%), dentigerous cysts (18.1%).

Table 1 Frequency of odontogenic cysts

Type of cyst		N (male/ female)	Region involved (mandible/ maxilla)	Mean age SD	%	%
Developmental	dentigerous cyst	154 (108/46)	135/19	$44.9 \pm 16.8$	22.3	41.8
	keratocyst	133 (87/46)	111/22	$38.4 \pm 17.9$	19.1	
	lateral periodontal cyst	2 (1/1)	1/1	$21.5 \pm 12$	0.3	
	glandular odontogenic cyst	2 (2/0)	2/0	$47.5 \pm 10.6$	0.2	
Inflammatory	apical and lateral (radicular cyst)	372 (234/138)	257/115	$40.8 \pm 14.6$	53.5	58.2
	residual (radicular cyst)	32 (20/12)	16/16	$50.8 \pm 13.2$	4.6	
Total		695 (452/243)	522/173	$41.8 \pm 15.8$	100	100

The mean length of follow-up was 8.4 months (SD: 15.2, range: 0-120). Seventeen percent had a follow-up superior to 6 months (apical and lateral cysts: 38.4%, odontogenic keratocysts: 34.1%, dentigerous cysts: 21.3%), 65% percent had a follow-up inferior to 6 months (apical and lateral cysts: 60.12%, dentigerous cysts: 22.5%, odontogenic keratocysts: 12.6%) and 18% had no follow-up at all (apical and lateral cysts: 68.8%, dentigerous cysts: 17.6%, odontogenic keratocysts: 9.6%).

## Discussion

The most important finding of this case series is the problem of the dramatic rate of patients lost to follow-up. It is an important concern because the risk of recurrence is not negligible. These cysts may be asymptomatic during a long period of time, leading to a significant destruction of bone. The follow-up should last at least until the complete reossification of the cyst cavity, i.e. at least two years. It involves performing an orthopantomogram every 6 months and a CT scan in case of doubt. The follow-up should be even longer for odontogenic keratocyst (notably parakeratinized). But even regarding the specific diagnosis of keratocysts, Chirapathomsakul et al. (2) reported a rate of 39 % (20 out 51) of patients lost to follow-up after a short period of time (less than 1 year). Concerning this kind of cyst, most recurrences presented within 5 years, but late recurrences did occur even after 25 years (3). A follow-up every two years seems appropriate. The explanation for this important rate of patients lost to follow-up is the usual asymptomatic features of these cysts. The information may be insufficient or not well understood. The rate of patients lost to follow-up is probably more important in public hospitals where the percentage of patients with social problems is higher. Subsequently, our data about the recurrence rate may not delineate the reality and did not allow us to make comparisons between types of cysts.

Radicular cysts were the most frequently diagnosed lesions. This is an important concern too, because most of these cysts develop as a consequence of advanced carious lesions and thus in a large number of cases may be prevented. The rate for radicular cysts found in our study (53.5%) lies within the range of 52% reported by Shear (4) and 56.9% reported by Kreidler et al. (5).

The male predominance is consistent with the findings of other studies (6,7) in which it has been considered that men are more likely to neglect their hygiene and to have trauma of the maxillary anterior teeth.

The relative incidence of cyst of the three most common cysts found in our study (radicular cyst, dentigerous, keratocyst) is consistent with other studies such as Mosqueda et al. (6) from Mexico (39.9%, 33%, 21.5%),

Ledesma-Montes (7) (38.8%, 35.5%, 18.8%) from Mexico too, Daley et al. (8) from Canada (65.1%, 24%, 4.8%), Nakamura (9) from Japan (41.2%, 27%, 7.7%), Shear (4) from South Africa (52.3%, 16.6%, 11.2%), Arotiba et al. (10) from Nigeria (61.9%, 19%, 14.3%), Kreidler et al. (5) from Germany (56.9%, 21.3%, 10.6%) and Bataineh et al. (11) from Jordan (41.7%, 24.8%, 6.0%). Unlike most studies, our cases are not selected directly from the records of a pathology laboratory, but from the records of the patients operated on under general anesthesia. Comparing only cysts removed under general anesthesia to other general studies of odontogenic cysts tends to bias the data. Nevertheless, it is interesting to note that this does not seem to affect the relative incidence of the three most common cysts. Another possible bias in this study is that the histopathology of the cysts was not reviewed for verification of the diagnosis. However, all the pathologists that made histopathologic diagnoses have had a formal training in odontogenic tumors and cyst pathology. Discrepancies in diagnoses of odontogenic lesions, between general surgical pathologists and oral pathologists are frequent. Besides, the reviewing could have made possible the precise diagnosis of all orthokeratocyst and parakeratocyst. This distinction was not usual in our files before 2000.

Koseoglu et al. (12) (Turkey) and Oji (13) (Nigeria) found a different relative incidence regarding dentigerous cysts and keratocysts, but their case series included only 90 and 20 patients, respectively. Bhaskar (14) (USA) found the same relative incidence but with a very small number of keratocysts (1.7%). The lack of uniform criteria at the time of the study may explain this discrepancy.

The orthopantomogram is the chief imaging procedure to track the cysts. The CT scan is currently more demanded. It is considered as the best imaging procedure to assess the size of the cyst and the position relative to the dental nerve and the dental apices. The MRI is rarely demanded, except when there is a doubt with a tumor. In this case, MRI and notably contrast enhanced MRI is able to provide decisive information (15).

Mandibulectomies are exceptional, even in the case of very big cysts. The enucleation in one piece is the rule. The mandibulectomy is the exception. When there is a doubt with a tumor, a biopsy is recommended.

## References

1. Kramer IRH, Pindborg JJ, Shear M (1992) Histological typing of odontogenic tumors. 2nd ed, Springer-Verlag, Berlin, 34-42
2. Chirapathomsakul D, Sastravaha P, Jansisyanont P (2006) A review of odontogenic keratocysts and the

- behavior of recurrences. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 101, 5-9
3. Stoeltinga PJ (2001) Long-term follow-up on keratocysts treated according to a defined protocol. *Int J Oral Maxillofac Surg* 30, 14-25
  4. Shear M (1992) *Cysts of the oral regions*. 3rd ed, Wright, Oxford, 75-98
  5. Kreidler JF, Raubenheimer EJ, van Heerden WF (1993) A retrospective analysis of 367 cystic lesions of the jaw- the Ulm experience. *J Craniomaxillofac Surg* 21, 339-341
  6. Mosqueda-Taylor A , Irigoyen-Camacho ME , Diaz-Franco MA , Torres-Tejero MA (2002) Odontogenic cysts. Analysis of 856 cases. *Med Oral* 7, 89-96
  7. 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
  8. 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
  9. 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
  10. Arotiba JT, Lawoyin JO, Obiechina AE (1998) Pattern of occurrence of odontogenic cysts in Nigerians. *East Afr Med J* 75, 664-666
  11. Bataineh AB, Rawashdeh MA, Al Qudah MA (2004) The prevalence of inflammatory and developmental odontogenic cysts in a Jordanian population: a clinicopathologic study. *Quintessence Int* 35, 815-819
  12. Koseoglu BG, Atalay B, Erdem MA (2004) Odontogenic cysts: a clinical study of 90 cases. *J Oral Sci* 46, 253-257
  13. Oji C (1999) Statistical observations on jaw cysts in Enugu, Nigeria, 1987-1996. *Odontostomatol Trop* 22, 33-36
  14. Bhaskar SN (1968) Oral pathology in the dental office: survey of 20,575 biopsy specimens. *J Am Dent Assoc* 76, 761-766
  15. Hisatomi M, Asaumi J, Konouchi H, Shigehara H, Yanagi Y, Kishi K (2003) MR imaging of epithelial cysts of the oral and maxillofacial region. *Eur J Radiol* 48,178-182