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
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.)

![Graph](image.png)

**Table 1** Age distribution of 90 patients with 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 keratoctysts 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

<table>
<thead>
<tr>
<th>Odontogenic Cysts</th>
<th>Number of Patients</th>
<th>Maxilla</th>
<th>Mandible</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radicular</td>
<td>53</td>
<td>35</td>
<td>18</td>
<td>30</td>
<td>23</td>
</tr>
<tr>
<td>Keratocyst</td>
<td>24</td>
<td>5</td>
<td>19</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Dentigerous</td>
<td>13</td>
<td>4</td>
<td>9</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>44</td>
<td>46</td>
<td>48</td>
<td>42</td>
</tr>
</tbody>
</table>

Table 2 Jaw and sex distribution of odontogenic cysts
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


