Original Article

Odontogenic and Nonodontogenic Cysts: An Analysis of 526 Cases in Turkey

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Date of Acceptance: 27-Jan-2016

ABSTRACT

Purpose: The aim of this study was to determine the age, gender, and sites of different types of odontogenic cysts (OCs) and non-OCs (nOCs) (seen in eastern Anatolian population in Turkey. Materials and Methods: The following data were collected from the clinical records and histopathology reports of the Department of Oral and Maxillofacial Surgery and the Department of Oral Pathology, Ataturk University, Turkey, during a period of 10 years. They were analyzed descriptively in terms of incidence, age, sex, cyst type, and site. Results: A total of 526 cysts were diagnosed during a 10-year period. Of these, 330 (62.7%) were in males, and 196 (37.3%) were in females, the male:female ratio was 1.7:1. There were 509 (96.8%) OCs and 17 (3.2%) nOCs. There were 406 (77.2%) inflammatory OCs and 103 (19.6%) developmental OCs. Radicular cysts were the most frequent (66.4%), followed by dentigerous (19.2%) and residual (10.8%) cysts. Only nasopalatine duct cyst was found as nOC in this study (3.2%). Conclusion: The distribution of jaw cysts in the Turkish Eastern Anatolian population is relatively similar to that of other populations reported in previous studies in the literature, in which most OCs were of inflammatory origin. However, the relative rates of cysts were higher than those reported in other studies.

KEYWORDS: Histopathological subtypes, nonodontogenic cyst, odontogenic cyst

INTRODUCTION

Jaw bone cysts are represented by a pathological epithelium-covered cavity that usually contains fluid or semisolid material. Odontogenic cysts (OCs) arise from the epithelial components of structures and remnants associated with tooth development.[1] OCs, which are one of the most common lesions of the jaws, are divided into two basic groups including developmental or inflammatory.[2] Non-OCs (nOCs) arising from the ectoderm involved in facial tissue development may also occur in the jaw.[1] The prevalence of OCs and nOCs may vary according to the population or geographic location. There have been many studies in various countries on OCs and nOCs. However, there are only a few studies in the English-language literature on OCs in the Turkish population,[3-5] and there is no information on these cysts in the Turkish Eastern Anatolian population.

Access this article online
Quick Response Code: Website: www.njcponline.com
DOI: 10.4103/1119-3077.212448

patient were recorded and descriptively analyzed. With regard to the cystic sites, the maxilla, and mandible were divided into three anatomic regions: Anterior, premolar, and molar. The molar area of the mandible also included the angle and ramus. Incomplete clinical data reports with a doubtful or controversial diagnosis were excluded from the study.

**RESULTS**

A total of 526 cysts were diagnosed during a 10-year period. Of these, 330 (62.7%) were in males, and 196 (37.3%) were in females, the male:female ratio was 1.7:1. There were 509 (96.8%) OCs and 17 (3.2%) nOCs. There were 406 (77.2%) inflammatory OCs and 103 (19.6%) developmental OCs.

With regard to the OCs, radicular cysts were the most frequent (66.4%), followed by dentigerous (19.2%) and residual (10.8%) cysts. Only nasopalatine duct cyst (NPDC) was found as nOC in this study (3.2%).

Table 1 shows the distribution sites of the different types of cysts according to gender. The male:female ratio was 1.4:1 for radicular cysts, followed by 2.7:1 for dentigerous cysts 2:1 for residual cysts, and 2.4:1 for NPDCs.

The age of the patients with OCs and nOCs ranged from 5 to 81 years (mean age: 33.1 years, standard deviation: 15.6 years). Table 2 shows the distribution of the cysts according to the age group. The cysts were most common in the second (92 cases, 17.5%), third (148 cases, 28.1%), fourth (105 cases, 20%), and fifth (75 cases, 14.3%) decades, with a peak in the third decade (148 cases, 28.1%). The radicular and dentigerous cysts were most frequent in the third decade. The residual cysts were most frequent in the fourth and fifth decades.

Table 3 shows the distribution of cysts according to their locations. As shown, 51.5% of cases were located in the maxilla, and 48.5% of cases were located in the mandible, with an almost equal distribution.

The most frequent sites were the maxillary anterior region (33.5%), followed by the mandibular molar/ramus region (22.1%), mandibular anterior region (15.2%), and maxillary posterior region (14.3%). The male:female ratio was 1.4:1 for radicular cysts, followed by 2.7:1 for dentigerous cysts 2:1 for residual cysts, and 2.4:1 for NPDCs.

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Table 4: Prevalence of cysts in some studies according to cyst type

<table>
<thead>
<tr>
<th>Study</th>
<th>Radicular</th>
<th>Residual</th>
<th>Dentigerous</th>
<th>Lateral</th>
<th>NPDC</th>
<th>OKC</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
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<tr>
<td>Our study</td>
<td>349</td>
<td>57</td>
<td>101</td>
<td>2</td>
<td>17</td>
<td></td>
<td></td>
<td>526</td>
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<tr>
<td>Percent</td>
<td>66.35</td>
<td>10.84</td>
<td>19.2</td>
<td>0.38</td>
<td>3.23</td>
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<td>Grossmann et al.</td>
<td>1772</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>735</td>
<td>735</td>
<td>2697</td>
<td>100</td>
</tr>
<tr>
<td>Avelar et al.</td>
<td>265</td>
<td>30</td>
<td>156</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>45</td>
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<tr>
<td>Percent</td>
<td>52.26</td>
<td>5.92</td>
<td>30.77</td>
<td>2.17</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>Prockt et al.</td>
<td>493</td>
<td>29</td>
<td>151</td>
<td>2</td>
<td>-</td>
<td>293</td>
<td>267</td>
<td>100</td>
</tr>
<tr>
<td>Percent</td>
<td>72.5</td>
<td>4.26</td>
<td>22.2</td>
<td>0.29</td>
<td>-</td>
<td>72.5</td>
<td>267</td>
<td>100</td>
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<tr>
<td>Ochsenius et al.</td>
<td>1494</td>
<td>328</td>
<td>546</td>
<td>17</td>
<td>-</td>
<td>1494</td>
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</tr>
<tr>
<td>Percent</td>
<td>59.22</td>
<td>13</td>
<td>21.64</td>
<td>0.67</td>
<td>-</td>
<td>59.22</td>
<td>562</td>
<td>100</td>
</tr>
<tr>
<td>Meningaud et al.</td>
<td>372</td>
<td>32</td>
<td>154</td>
<td>2</td>
<td>-</td>
<td>133</td>
<td>562</td>
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</tr>
<tr>
<td>Percent</td>
<td>66.19</td>
<td>5.69</td>
<td>27.4</td>
<td>0.36</td>
<td>-</td>
<td>66.19</td>
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<tr>
<td>Sharifian et al.</td>
<td>465</td>
<td>99</td>
<td>303</td>
<td>7</td>
<td>-</td>
<td>239</td>
<td>138</td>
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<td>10.02</td>
<td>30.67</td>
<td>0.71</td>
<td>-</td>
<td>47.06</td>
<td>138</td>
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<tr>
<td>Tortorici et al.</td>
<td>1107</td>
<td>-</td>
<td>149</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>37</td>
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<tr>
<td>Percent</td>
<td>85.61</td>
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<td>11.52</td>
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<td>-</td>
<td>37</td>
<td>100</td>
</tr>
<tr>
<td>Ali (Kuwait)</td>
<td>95</td>
<td>8</td>
<td>51</td>
<td>11</td>
<td>9</td>
<td>19</td>
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<td>100</td>
</tr>
<tr>
<td>Percent</td>
<td>53.37</td>
<td>4.49</td>
<td>28.65</td>
<td>6.18</td>
<td>7.3</td>
<td>53.37</td>
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<tr>
<td>Mosqueda-Taylor et al.</td>
<td>342</td>
<td>19</td>
<td>283</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>21</td>
<td>100</td>
</tr>
<tr>
<td>Percent</td>
<td>50.89</td>
<td>2.83</td>
<td>42.11</td>
<td>1.04</td>
<td>-</td>
<td>50.89</td>
<td>21</td>
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<tr>
<td>Nuñez-Urrutia et al.</td>
<td>210</td>
<td>18</td>
<td>91</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>92</td>
<td>100</td>
</tr>
<tr>
<td>Percent</td>
<td>50.24</td>
<td>4.31</td>
<td>21.77</td>
<td>1.67</td>
<td>-</td>
<td>50.24</td>
<td>92</td>
<td>100</td>
</tr>
<tr>
<td>Jones et al. (UK)</td>
<td>3724</td>
<td>573</td>
<td>1292</td>
<td>28</td>
<td>-</td>
<td>3724</td>
<td>676</td>
<td>100</td>
</tr>
<tr>
<td>Percent</td>
<td>59.18</td>
<td>9.11</td>
<td>20.53</td>
<td>0.44</td>
<td>-</td>
<td>59.18</td>
<td>676</td>
<td>100</td>
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<tr>
<td>Daley et al. (USA)</td>
<td>4468</td>
<td>-</td>
<td>1662</td>
<td>106</td>
<td>-</td>
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<td>37</td>
<td>100</td>
</tr>
<tr>
<td>Percent</td>
<td>64.31</td>
<td>-</td>
<td>23.92</td>
<td>1.53</td>
<td>-</td>
<td>64.31</td>
<td>37</td>
<td>100</td>
</tr>
</tbody>
</table>

Note: Prevalence of cysts excluding OKC. Prevalence of cysts including OKC.
NPDC = Nasopalatine duct cyst; OKC = Odontogenic keratocyst.
mandibular premolar region (11.2%), maxillary premolar region (9.1%), and maxillary molar region (8.9%).

Radicular cysts were the most frequently seen cysts in all the regions, except for the mandibular molar/ramus. Dentigerous cysts were the most frequent (52 cases, 9.9%) in the molar/ramus of the mandible.

**DISCUSSION**

Cysts are more common in the jaws than in the other bones in the body due to tooth development. The WHO classified jaw cysts, including OCs and nOCs. According to the latest WHO update in 2005, odontogenic keratocysts involved in the developmental OC class are now included in the classification of benign odontogenic epithelial tumors as a keratocystic odontogenic tumor. The present study was based on the 2005 classification, and odontogenic keratocysts were excluded. Table 4 provides a comparison of the findings of our study with those of earlier work. As can be seen from the table, many other studies also adopted the 2005 classification system.

In this study, cysts were more frequent in men than in women, similar to the findings of previous studies. The maxilla was the most frequently affected anatomical site, which is in agreement with the findings of some previous studies but not all studies.

Inflammatory OCs accounted for a large percentage of the cysts, similar to the findings of previous studies. Radicular cysts are the most common type of jaw cyst and are generally found in the apex of a tooth. They usually occur following the development of periapical granuloma from the necrotic remnants of the dental pulp. Chronic inflammation of this tissue initially stimulates the cell rests of Malassez, resulting in epithelial proliferation. This initiation phase is followed by a phase of cystic development, followed by cystic growth.

In this study, radicular cysts were the most commonly observed lesions. They were more common in the maxillary anterior region, similar to that reported in most studies. This situation can be caused by patients not wanting to lose their teeth in this region due to aesthetic concerns, even when treatments fail. As a result, long-term chronic inflammation may occur and induce cyst development in periapical tissues. In the present study, radicular cysts were most common in the second, third, and fourth decades, with a peak incidence in the third decade, similar to that found in other large series.

With regard to gender, in the current study, radicular cysts were the most prevalent in males (M:F, 1:5:1), in agreement with the findings of some but not all studies. In the literature, the higher prevalence of radicular cysts in males was attributed to men usually having poorer oral hygiene habits than women and to them being more susceptible than women to oral trauma.

Dentigerous or follicular cysts are fluid-filled expansions of the dental follicles and are attached to the crown of the unerupted tooth at the cementoenamel junction. Dentigerous cysts were the second most frequent OCs in this study, in agreement with most previous reports. The higher male prevalence among those with dentigerous cysts in the present study is in agreement with the findings of many studies, although one study reported a slight female predominance. In this study, the prevalence of dentigerous cysts was highest in the second and third decades of life, in accordance with most other studies. A study reported a greater prevalence of dentigerous cysts in the fifth and sixth decades. In the current study, the most common settlement areas were the mandibular ramus/molar region, followed by the anterior maxilla, which is in agreement with that of other studies. This may be due to the fact that mandibular third molars and maxillary canines are the most commonly impacted teeth.

Residual cysts develop from residual periapical infections or cystic fragments left following extraction of a nonvital tooth. In this study, residual cysts were the third most common cyst, in agreement with the findings of some studies. However, in the majority of studies including odontogenic keratocysts were reported to be the fourth most frequent type of cyst. In this study, the cases occurred more often in males than in females in accordance with previous reports and those in the fourth decade of life and later were most affected. The peak age of incidence was the sixth decade of life. Most studies reported that these cysts were more common in the fourth decade of life and later. Similar to an earlier study, the mandible was more frequently affected than the maxilla in the present study. In other studies, residual cysts were most frequently found in the maxilla. In this study, residual cysts were seen most frequently in the maxillary and mandibular molar region. This may be due to the loss of more molars.

Nasopalatine or incisive canal cysts are nOCs that arise from the epithelial remnants of the embryonic nasopalatine ducts. They occur during the creation of the incisive canal by the fusion of the premaxilla with the palatine processes of the maxillary bones. In the present study, NPDCs were only non-OC, accounting for 3.2% of cases. Previous studies reported a prevalence of...
NPDCs of between 1.3% and 2.2%\textsuperscript{[3,7,11,15]} which is lower than what was found in our study.

**Conclusion**

Based on our findings, the distribution of jaw cysts in the Turkish eastern Anatolian population is relatively similar to that of other populations reported in previous studies in the literature, in which most OCs were of inflammatory origin. However, the relative rates of cysts were higher than those reported in other studies. The difference is likely due to the fact that we did not include odontogenic keratocysts in the present study.

**Financial support and sponsorship**
Nil.

**Conflicts of interest**
There are no conflicts of interest.

**References**