

## CASE REPORT

**Ameloblastoma ex calcifying odontogenic cyst in the mandible: report of a rare case**

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**ABSTRACT**

The calcifying odontogenic cyst (COC), or Gorlin's cyst, is now classified by the World Health Organization as a tumor. Ameloblastoma is the most common pathology associated with a COC. This association occurs in two forms, an ameloblastomatous variant of COC and ameloblastoma ex COC. Ameloblastoma ex COC is very rare. In this report, we present the case of an 11-year-old girl with ameloblastoma ex COC, possessing a well-defined unilocular radiolucent lesion with significant bucco-lingual expansion in the anterior mandible. Upon histologic examination, the basal layer of the epithelial cells showed an ameloblastic pattern. Some layers resembling stellate reticulum were present, and in some parts, globules similar to ghost cells were evident in the cyst lining. Surgical enucleation of the lesion was performed and no recurrence was observed after a six-month follow-up.

**Keywords:** Calcifying odontogenic cyst, ameloblastoma ex coc, ghost cell, mandible.

**INTRODUCTION**

The World Health Organization now categorizes the calcifying odontogenic cyst (COC), also known as Gorlin's cyst, as a tumor. This new classification is based on the tumoral nature of the lesion.<sup>1</sup> It is a rare growth and accounts for 0.37 to 2.1% of all odontogenic tumors.<sup>2,3</sup> Most of the lesions occur centrally in the jaw bones, but peripheral (extraosseous) lesions have also been reported in the gingival or edentulous alveolar ridges, in 12 to 20% of cases.<sup>4</sup> COCs usually occur as a slow growing painless tumor.<sup>4</sup> Previous studies have shown that there is no predilection to either

the maxilla or mandible,<sup>2,5,6</sup> however some studies have mentioned the mandible as the more commonly involved site.<sup>4,7</sup> The lesion has a tendency to form in the anterior regions of the jaws.<sup>5,8</sup> The growths occur in both young and old patients, and affect both genders similarly.<sup>5,9</sup> The mean age of the affected individual is 30.3 years old, and most of the patients are in the second or third decades of their lives.<sup>5</sup> Most studies have reported a peak frequency in the second decade, but other research has revealed a bimodal distribution with a second peak in the sixth/seventh decades of life.<sup>5,10</sup>

From a histopathologic point of view, COC is defined as a tumor with a proliferation of fibrosed connective tissue, lined with an odontogenic epithelium of varying thicknesses, associated with

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masses of ghost cells, which may undergo calcification.<sup>5,6,8</sup>

On radiographs, these cysts often appear as a unilocular radiolucency (dark area). The dimensions of these radiopaque foci vary from small particles to large masses.<sup>5,8</sup> Radiopaque areas are reported in 50% of cases and root resorption and divergency of the roots are common features. One third of cases can be related to impacted teeth, and association with odontoma is reported in 24% of cases. In half of the patients, alveolar bone expansion was observed.<sup>5, 11-13</sup> Treatment of these lesions is diverse, and may be in the form of marsupialization, curettage, enucleation, or bone resection.<sup>14</sup>

### CASE REPORT

In September 2012, an 11-year-old female was referred to the Department of Oral and Maxillofacial Radiology, of the Mashhad Faculty of Dentistry, with the complaint of facial asymmetry due to swelling in the right portion of the chin (Figure 1), and with crowding in the anterior teeth of the mandible. The swelling had been present for approximately three years and had shown a remarkable increase in size two months prior to referral. She did not experience



**Figure 1.** A photograph of the patient's face.

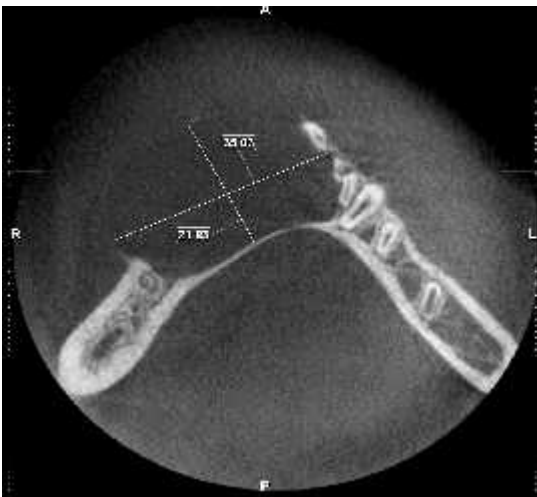
pain in the region, and the lesion was non-tender in palpation. The patient had no noteworthy medical history. On clinical evaluation, there was an asymmetry involving the right portion of the chin. Palpation revealed non-tender hard bony expansion of the involved region, but no enlarged lymph nodes were detected. Intra-oral examination revealed the absence of the right mandibular lateral incisor and dental crowding in mandibular anterior region. Expansion of buccal and lingual cortices was evident. In the panoramic radiograph, a well-defined radiolucent unilocular lesion, extending from the mesial aspect of the right mandibular second premolar to the mesial portion of the left mandibular canine, was detected (Figure 2a).

The horizontal impacted mandibular lateral incisor, which was displaced to the anterior portion of the inferior border of the mandible, was evident. Loss of lamina dura in the involved teeth was present but there was no root resorption evident. To localize the intraosseous lesion and to further investigate the effects of the lesion on the surrounding structures, we carried out cone beam computed tomography (CBCT) with a Planmeca Promax 3D system (Planmeca Oy, Helsinki, Finland). The CBCT examination revealed a large (35.03× 21.83 mm) expansile lytic lesion with a thinned, and in some parts perforated, cortical outline due to this large expansion, which was more noticeable in the buccal cortical plate (Figure 2b). Based on age, clinical behavior, and radiographic findings, differential diagnoses of central giant cell granuloma, aneurismal bone cyst, and calcifying odontogenic cyst were made. To obtain a definite diagnosis, an incisional biopsy was taken from the buccal cortex, between tooth #41 and #43.

Gross inspection during the biopsy procedure, revealed a cystic lesion filled with pultaceous fluid. Following the incisional biopsy, a fenestration operation

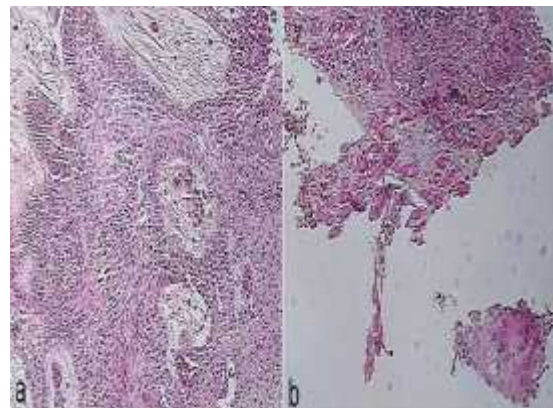


**Figure 2a.** Panoramic radiograph of the case before surgery. A well-defined unilocular radiolucent lesion is seen in the anterior mandible.



**Figure 2b.** Cone beam computed tomography revealed an expansile lytic lesion without any internal structure and a perforated buccal cortex.

was performed. Histologic examination of the biopsy tissue revealed a cystic cavity lined by odontogenic epithelial cells, in approximately ten rows, which had a smooth interface with the underlying connective tissue corion. The basal layer of the epithelial cells showed an ameloblast-like pattern. Some layers resembling



**Figure 3.** Photomicrograph of ameloblast-like proliferation in the cyst lining (a) and eosinophilic clusters of ghost cells (b) (H&E,  $\times 400$ ).

stellate reticulum were present and in some parts, globules similar to ghost cells were evident in the cyst lining (Figure 3a, b). The cystic fibro-vascular corion contained collagen fibers, abundant blood vessels, sections of nerves and muscles accompanied by regions of active osteogenesis. Histologic examination confirmed the diagnosis of ameloblastoma ex COC. Enucleation of the lesion, with removal of the impacted tooth #42, was

performed to treat the patient (Figure 4a, b).

Histopathologic examination of the enucleated lesion showed similar findings to the incisional one. After a six-month follow-up, there was no evidence of recurrence in the panoramic radiograph, and the intra-osseous defect was filled with normal bone (Figure 5).



**Figure 4a.** Intra-oral photograph of the lesion after surgical enucleation.

## DISCUSSION

COC is an uncommon benign odontogenic lesion, which was first diagnosed as a separate entity by Gorlin and associates in 1962.<sup>7,15</sup> Although initially presented as a cyst, there is no agreement in the literature, as to whether it is cystic or tumoral in nature, some of the COC cases have shown regions of neoplasia as well.<sup>8,16</sup> Additionally, some classifications have been proposed in the literature, which have tried to separate the cystic and solid variants, but none of them have been completely accepted.<sup>1,4,8</sup>

Some studies have shown that the COC is usually associated with other odontogenic tumors such as ameloblastoma, ameloblastic fibroma, and ameloblastic fibro-odontoma.<sup>5, 17</sup> Among these, ameloblastoma is the most common and the new classifications have established a separate category for this variant associated with COCs.<sup>5,13,17,18</sup> The classification which was proposed by Hong et al.,<sup>8</sup> has two categories for COCs



**Figure 4b.** An orthopantomograph of the patient immediately after surgery showing that tooth #42 was extracted during surgery.



**Figure 5.** A six-month follow-up showed normal healing of the bone defect and no evidence of recurrence.

associated with ameloblastomas: an ameloblastomatous cystic variant and a neoplastic variant associated with ameloblastoma. The first one is defined as a unicystic structure with an epithelial lining, which has unifocal or multifocal intra-luminal proliferative activity similar to an ameloblastoma. It also has separate or clustered ghost cells and calcifications. The second kind is called an “ameloblastoma arising in COC” or “ameloblastoma ex COC.” In this type, ghost cells and calcifications in the transformed ameloblastomatous epithelial portion are rare or scarce, whereas the cystic epithelial lining shows considerable amounts of both ghost cells and calcifications. Ameloblastoma ex COC is very rare.<sup>8,19</sup> In the study of Hong et al.,<sup>8</sup> among the 92 reported cases of COC, only two cases of ameloblastoma ex COC and 11 cases of ameloblastomatous COC were found. In our case, according to the already described histopathologic findings, the COC is the ameloblastoma ex COC variant.

In the present case, the COC occurred as a painless swelling, with clinical displacement of the teeth, which is found

in most intra-osseous benign lesions. The radiographic examination revealed a single well-defined radiolucent region, which had displaced the adjacent teeth. In the panoramic radiograph, no calcification was observed. Due to the absence of fever, lymphadenopathy and erythema (intra-oral and extra-oral), and vitality of the teeth, the presence of inflammatory lesions was ruled out. As COC is so rare, preoperative diagnosis, based solely on clinical and radiographic findings, was difficult. From a clinical point of view, differential diagnoses of central giant cell granuloma (CGCG), keratocystic odontogenic tumor (KOT) and ameloblastoma were made.<sup>20-22</sup> As these lesions require different treatments, incisional biopsy, and histopathologic analysis are essential in obtaining a definitive diagnosis.

CGCG is a very important differential diagnosis as it has a tendency to be seen in females under the age of 30. It is often found in the anterior portion of the jaws (anterior to the mandibular first molar) and affects the mandible in 70% of cases. This lesion is usually occurs as a unilocular or multilocular radiolucency with indistinct borders.<sup>23,24</sup>

Another important lesion, which should be included in the differential diagnosis, is KOT. It is usually found in males with a wide variety of ages, and is most often observed in the second and third decades of life. This lesion occurs twice as often in the mandible than the maxilla, and in 90% of cases it is found posterior to the canines.<sup>1,11,25</sup> Ameloblastoma, especially the unicystic variant, is observed in the second and third decades of life, and should be included in the differential diagnosis.<sup>24</sup> KOT and ameloblastoma usually grow slowly, but if not aggressively operated on, they exhibit locally aggressive behavior and a high recurrence rate. COC and CGCG also have a slow growth rate, but they are not invasive and so the treatment usually involves enucleation of the lesion.<sup>1</sup>

An absence of radiopaque structures in the radiographs has been reported in other studies, where calcified bodies were microscopically evident. Some studies have shown that computed tomography may be superior to plain films, in showing such calcifications, since they may be obscured by the superimposition of anatomical structures.<sup>12,13</sup> In the presented case, no evidence of calcification was observed in the CBCT images.

In the study of Tanimoto and associates, root resorption was found in 75-77% of COCs.<sup>13</sup> Iida et al., however, have reported that root resorption is a rare event in COCs.<sup>7</sup> In our patient, root resorption was noted in the apical one-third of tooth #41. In this case, the expansion of the buccal and lingual cortices was observed in the axial sections of the CBCT images, and the lesion and oral mucosa were in close contact in the regions in which the cortical bone was perforated. This finding was also reported in the study of Praetorius et al.<sup>17</sup>

Due to the absence of clinical and radiographic pathognomonic features, a definitive diagnosis of a COC is made from the histopathological findings. The most noticeable histologic finding of this

particular lesion was a cyst lining containing clear cells called "ghost cells." These ghost cells have a tendency to calcify and the hyaline areas are suggestive of immature or dysplastic dentine. The histologic observations described in this case, are consistent with other studies.<sup>1,4,8,10-13</sup> The microscopic findings confirm the fact that the calcified masses may not necessarily be observed in radiographic examinations, despite their visible presence under a microscope.

Treatment for COC is usually conservative and includes enucleation with curettage for intra-osseous lesions, and local excision for peripheral ones. The prognosis is positive and only a few cases of recurrence have been reported.<sup>26,27</sup>

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