Ameloblastomatous Calcifying Cystic Odontogenic Tumor: A Rare Histologic Variant

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KEY WORDS

Calcifying Odontogenic cyst; Ghost Cells; Ameloblastomatous Calcifying Cystic Odontogenic Tumor.

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ABSTACT

In agreement with the new classification of the World Health Organization (WHO) 2005, calcifying odontogenic cyst (COC) or calcifying cystic odontogenic tumor (CCOT) is an uncommon developmental odontogenic lesion that demonstrates histopathologic diversity. Predominantly, it occurs in the anterior region of the mouth and in the second and third decades of life. Odontogenic tumors such as ameloblastoma have been reported to be associated with CCOT. In this paper, we report a case of ameloblastomatous CCOT in a boy with involvement of mandibular ramus- an extremely rare histologic variant. The microscopic examination revealed a CCOT; ghost cell within ameloblastic islands in the connective tissue wall was observed.

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Introduction

Calcifying odontogenic cyst (COC) is an uncommon developmental odontogenic cyst, first described by Gorlin in 1962 [1]. The term (COC) is not covered in World Health Organization (WHO) 2005 and is called calcifying cystic odontogenic tumor (CCOT) [2].

COC (CCOT) demonstrates variable clinical behavior but about 65% of cases are found in the incisor and canine areas and the mean age of the patients is 33 years [3]. Radiographically, COC may present as unilocular or multilocular radiolucencies with discrete, well demarcated margin [4]. In many respects, however, the designation of the cyst for this lesion is not entirely appropriate, because a significant number of cases presented as a solid mass without gross or microscopic features of a cyst [5]. The COC presents a wide range of histologic features but most commonly a well defined cystic lesion is found with a fibrous connective tissue wall lined by odontogenic epithelium or CCOT type I [6]. The most characteristic histopathologic feature is the presence of variable numbers of ghost cells within the epithelium component [3]. The prognosis for patients with a COC is good and only a few recurrences have been reported. COC can associate with odontogenic tumors such as odontoma, AOT and ameloblastoma [7]. Only a few reports having details about the clinical and radiographic features of COC are associated with ameloblastoma [6-10].

In this report, a case of ameloblastomatous CCOT (COC) in the mandible of a teenager is presented.

Case report

A 13-year-old Iranian boy was referred with a painless swelling in the left mandibular ramus, without parastesia, but the patient felt pain after being struck. The other part of the mouth was intact. No lymphadenopathy was observed. The radiographic examination revealed the presence of a multilocular radiolucent lesion which extended distally from the first molar to the sigmoid notch, containing the impacted third molar. The second molar showed root resorption (Fig 1).

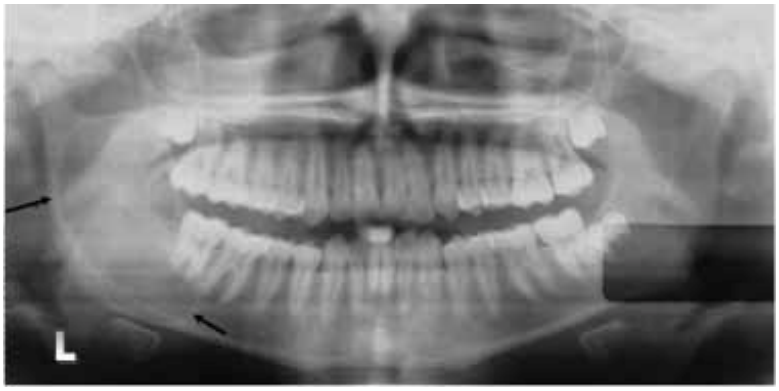

Figure 1 Panoramic radiographic image showing a multilocular radiolucent lesion extending from the distal part of the first molar to the sigmoid notch.

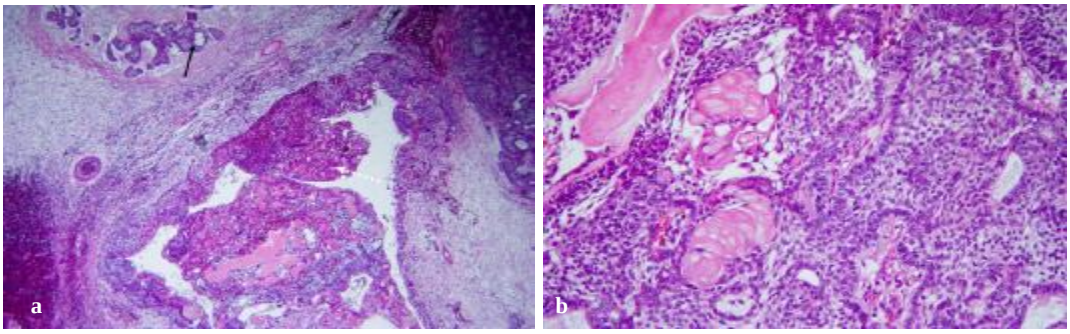

Figure 2.a Photomicrograph of the cystic lesion lining by odontogenic epithelium with ghost cells (white arrow) and ameloblastomatous proliferation (black arrow) in the connective tissue (Haematoxylin and eosin stain; original magnification ×40). **b.** The area showing ameloblastomatous proliferation in the connective tissue together with presence of ghost cells (Haematoxylin and eosin stain; original magnification ×200).

Due to the history and radiographic features, our clinical diagnosis favored a uni-cystic ameloblastoma or cystic ameloblastoma. Fine Needle Aspiration (FNA) revealed hemorrhage with chronic and acute inflammation. The incisional biopsy was performed, and a cystic lesion with thickened cyst wall in some areas and also the impacted third molar was observed. An apturator was installed in the incisional biopsy place. The specimen of the incisional biopsy consisted of multiple pieces of creamy, gray, band–like and solid firm tissue.

Microscopic examination revealed a cystic lesion lined by odontogenic epithelium with eosinophilic ghost cells and calcification. The stroma of the cyst also demonstrated ameloblastic islands, containing ghost cells (Figs 2). The histopathological diagnosis was an ameloblastomatous CCOT. The patient was followed up for 6 months with clinical and radiographic examination. The lesion was expanded, so the patient was treated by enucleation and the second molar was extracted. The lesion was easily separated from the bone. The specimen consisted of multiple pieces of friable and firm tan–gray tissues; the cut section showed solid appearance (Fig 3).

After this treatment, microscopic examination confirmed the former diagnosis from incisional biopsy, i.e. the presence of CCOT and ameloblastomatous proliferation in the connective tissue of the cyst wall containing many ghost cells.

The follow up, 15 months after the surgery, showed no manifestation of recurrence.

Discussion

Calcifying cystic odontogenic tumors are either an intraosseous or extraosseous lesion, the former being predominant [8]. This lesion is uncommon and shows considerable diversity in clinical and biologic behavior [11]. In new classification of the World Health Organization (2005), the term calcifying cystic odontogenic tumor (CCOT) has been replaced

with calcifying odontogenic cyst (COC) that constitutes a benign cystic neoplasia that presents an epithelium with ghost cells which may display calcification in it [2 , 6].

Before this new classification, Toida classified COC into a cystic lesion and a neoplasm [13]. The neoplasm is divided into benign and malignant types, and the term calcifying ghost cell odontogenic tumor (CGEOT) is used for the benign neoplasm type. This term was changed to dentinogenic ghost cell tumor (DGCT) as a new classification in 2005 by WHO [2, 6, 12].

The aggressive or malignant counterpart of DGCT, odontogenic ghost cell carcinoma (OGCC), combines architectural and cytologic malignant features with prominent mitotic activity, infiltrative growth pattern, locally aggressive, destructive behavior, and occasional distant metastasis [12]. Thus, the lesion showing cystic architecture and an intramural ameloblastoma- like proliferation may be classified as the cystic CGCOT [8].

It is well known that the epithelial lining of the COC has the ability to induce the formation of dental tissues in the adjacent connective tissue wall and the odontoma is a commonly associated odontogenic tumor [10]. Some reports showed that COC often coexists with other odontogenic tumors, such as ameloblastoma, ameloblastic fibroma, ameloblastic fibro–odontoma, etc [14, 6].

Among them, ameloblastoma may be the most important tumor and all recent histological classifications have established a category for different types of COC associated with ameloblastoma [13, 14, 15]. The classification advocated by Hong *et al*. has two categories for COC associated with ameloblastoma: the ameloblastomatous cystic and the neoplastic variants associated with ameloblastoma. The former is characterized by a unicystic structure in which the lining epithelium shows unifocal or multifocal intraluminal proliferative activity that resembles ameloblastoma, but it also contains isolated or clustered ghost cells and calcification. On the other hand, the latter is called ameloblastoma arising from COC (ameloblastoma ex COC). It is characterized histopathologically as comprising few or no ghost cells with calcification observed in the transformed ameloblastomatous epithelial portion, while the cyst lining of the epithelium contains a considerable number of ghost cells and calcifications [9].

According to one report, ameloblastomatous COC microscopically resembles unicystic ameloblastoma except for the ghost cells and calcifications within the proliferative epithelium. Ameloblastoma ex COC designates an ameloblastoma arising from the cyst lining epithelium of COC [8].

Up to now, none of these cases showed aggressive growth and invasion into the surrounding tissue. For this reason, all of them met the criteria for ameloblastomatous CCOT or CCOT type III [20]. The etiology of ameloblastomatous CCOT is not described in the literature.

Because of the rarity of ameloblastomatous CCOT, determination of the most common age, sex and location of this lesion is difficult. According to the case reports in the literature, it seems that most of the patients are between 10 to 30 years old, and the tumor tends to involve the posterior region of the mandible [8, 10]. Also, as far as the sex of the patients is concerned, no difference is observed. Our case appeared radiographically as a multilocular lesion with swelling of the mandibular ramus. Moreover, there are no complete reports about the treatment and recurrence of this lesion, because of the limited follow up information [9]. In this regard, Buchner suggested that if the COC was associated with an ameloblastoma, its behavior and prognosis would be that of an ameloblastoma rather than COC [14].

Histopathologically, our case has been diagnosed as ameloblastomatous CCOT due to the ghost cells in the ameloblastomatous epithelial islands [9], and it fits into the category of cystic CGCOT, as suggested by Toida [13], or CCOT type III (ameloblastomatous) [6]. Since, only 15 months have passed from the surgery of the reported case, and the short follow up time, no real conclusion would be drawn regarding the recurrence. In one case reported by Toida, no evidence of recurrence was seen even thirteen years after extirpation [13]. In none of the articles on ameloblastomatous CCOT, a special method such as IHC study or ultrasonic study was performed, but immunohistoch-emically, there was no difference in amelogenin or CK19 expression among COC with

various histological features; there was only a slight difference in bcl-2 and Ki-67 expression [16].

Conclusion

In accordance with new classification of WHO (2005) and the most recent paper (20), our case is classified in the less common type of CCOT; CCOT type III; and in this variant only three cases were reported before, so our case is the fourth one. In addition, the mean age of the latter cases in this group is 40 y/o but this introduction case is a 13 y/o boy.

References

[1] Gorlin RJ, Pindborg JJ, Odont, Clausen FP, Vickers RA. The calcifying odontogenic cyst--a possible analogue of the cutaneous calcifying epithelioma of Malherbe. An analysis of fifteen cases. Oral Surg Oral Med Oral Pathol 1962; 15: 1235-1243.

[2] Barnes L, Eveson JW, Reichart P, Sidransky D. WHO classification of tumors: pathology and genetics of tumors of the head and neck. Lyon: IARC; 2005. p.313.

[3] Neville BW, Damm D, Allen CM, Bouquot JE. Oral and Maxillofacial Pathology 2nd cd. Philadelphia: WB Saunders Company: 2002. p.604-605.

[4] Regezi JA, Sciubba JJ, Jordan CK. Oral Pathology: Clinical Pathologic Correlation. 4th ed. Saunders Company; USA: 2003. p.254, 270.

[5] Waldron CA. Odontogenic tumors and selected jaw cysts. In: Genpp DR, ed Pathology of the head and neck, contemporary issues in surgical pathology. 1st ed. New York: Churchill Livingstone; 1988 .p. 403-458.

[6] Ledesma-Montes C, Gorlin RJ, Shear M, Prae Torius F, Mosqueda-Taylor A, Altini M, et al. International collaborative study on ghost cell odontogenic tumours: calcifying cystic odontogenic tumour, dentinogenic ghost cell tumour and ghost cell odontogenic carcinoma. J Oral Pathol Med 2008; 37: 302-308.

[7] Tajima Y, Yokose S, Sakamoto E, Yamamoto Y, Utsumi N. Ameloblastoma arising in calcifying odontogenic cyst. Report of a case. Oral Surg Oral Med Oral Pathol 1992; 74: 776-779.

[8] Aithal D, Reddy BS, Mahajan S, Boaz K, Kamboj M. Ameloblastomatous calcifying odontogenic cyst: a rare histologic variant. J Oral Pathol Med 2003; 32: 376-378.

[9] Hong SP, Ellis GL, Hartman KS. Calcifying odontogenic cyst. A review of ninety-two cases with reevaluation of their nature as cysts or neoplasms, the nature of ghost cells, and subclassification. Oral Surg Oral Med Oral Pathol 1991;72: 56-64.

[10] Iida S, Ueda T, Aikawa T, Kishino M, Okura M, Kogo M. Ameloblastomatous calcifying odontogenic cyst in the mandible. Dentomaxillofac Radiol 2004; 33: 409-412.

[11] Lin CC, Chen CH, Lin LM, Chen YK, Wright JM, Kessler HP, et al. Calcifying odontogenic cyst with ameloblastic fibroma: report of three cases. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2004; 98: 451-460.

[12] Yun KI, Lee JA, Lee YS, Kim TJ, Park JU. Dentinogenic ghost cell tumors. J Oral Maxillofac Surg 2007; 65: 1816-1819.

[13] Toida M. So-called calcifying odontogenic cyst: review and discussion on the terminology and classification. J Oral Pathol Med 1998; 27: 49-52.

[14] Buchner A. The central (intraosseous) calcifying odontogenic cyst: an analysis of 215 cases. J Oral Maxillofac Surg 1991; 49: 330-339.

[15] Tanimoto K, Tomita S, Aoyama M, Furuki Y, Fujita M, Wada T. Radiographic characteristics of the calcifying odontogenic cyst. Int J Oral Maxillofac Surg 1988; 17: 29-32.

[16] Yoshida M, Kumamoto H, Ooya K, Mayanagi H. Histopathological and immunohistochemical analysis of calcifying odontogenic cysts. J Oral Pathol Med. 2001; 30: 582-588.