



## Mandibular Calcifying Odontogenic Cyst: A Case Series

Burcu Sengüven\*, Basma M Aznad and Emre Baris

Department of Oral Pathology, Gazi University, Faculty of Dentistry, Ankara, Turkey

### Abstract

Calcifying odontogenic cyst or Gorlin cyst, was first described by Gorlin. The World Health Organization classified it as calcifying cystic odontogenic tumor in 2005. The most recent classification on the other hand, includes the entity under developmental cysts again. It represents less than 1% of all odontogenic tumors. Calcifying odontogenic cyst has a unique structure, so the variation in clinical, radiographic, and histologic findings makes the treatment decision difficult for these lesions. Histologically calcifying cystic odontogenic cyst consists of ameloblastoma-like odontogenic epithelium with reverse polarization and calcifying ghost cells overlying a mature connective tissue with odontogenic rest. This review consists of seven cases on calcifying cystic odontogenic cysts. All of them were from mandible, the age ranging from 50-70 years old. Only one lesion showed multilocular radiographic features.

### Introduction

Calcifying Odontogenic Cyst (COC) is a developmental odontogenic cyst lined with ameloblastic epithelium containing ghost cells within the epithelium [1,2]. COC was first introduced by Gorlin in 1962 as a counterpart of Malherbe's calcifying epithelioma (pilomatricoma) of the skin [3]. It's a rare variant that it represents about 1% of all odontogenic cysts. COC is also a member of ghost cell lesions that occurs mainly as intraosseous, although a peripheral variant also exists. The solid pattern of COC was termed as dentinogenic ghost cell tumor. The recent researches approved that it's a developmental lesion according to its pathological characteristics and biological behavior. The World Health Organization (WHO) in 2017 classified COC as a developmental cyst, again [1,4]. There is a wide age range, occurs mainly in middle aged patients. Most of the reported cases were in the mandibular, maxillary cases were less than 30 cases [5]. Clinically COC represents as an asymptomatic swelling, whereas radiographically it's a well-defined, generally, unilocular radiolucency. Varying degree, shape, and size of opacity can be found most of the cases. Root resorption and tooth displacement are not rare. This type of odontogenic cysts could be accomplished by other odontogenic lesions mainly odontomas and ameloblastomas. Odontoma associated lesions have a peak incidence in the second decade. Malignant potential has been reported in some cases [6]. In this report, we review seven cases of COC from the archive of Gazi University Faculty of Dentistry Department of Oral Pathology. The aim is to represent the clinico-histopathological characteristics of this rare entity.

### Case Presentation

Seven cases were recruited from the Oral Pathology Department of Dental Faculty Gazi University between the years 2003 and 2006. Five patients were males with the same ethnic origin and with the lesion occurring in the sixth and seven decade of life with an average age of 53.5 years. The mandible was involved in all cases with the greatest size of cyst seen being 5.0 cm × 2.7 cm. Only one case exhibited expansion of buccal and lingual plates which was not diagnosed incidentally. Six cases showed unilocular radiolucency and one case showed multilocular radiolucency with well-delineated borders (Figure 1A and 1B). The clinicopathologic characteristics of our series are summarized in Table 1.

### Histopathology

The largest diameter of the cyst was 3 cm × 2.1 cm. One case had numerous significant opacities on the cyst wall macroscopically (Figure 2). Paraffin embedded specimens were sectioned and stained with hematoxylin-eosin. Sections were reevaluated by two experienced oral pathologists (BS and EB) according to the 2017 WHO classification of odontogenic cysts. The histological examination revealed a cystic lumen lined by non-keratinized stratified squamous epithelium (Figure 3). The basal cells were mostly columnar and were frequently palisaded with obvious basal membrane (Figure 4). Reverse polarity of the nuclei in the basal cell layer in all cases. Suprabasal

### OPEN ACCESS

#### \*Correspondence:

Burcu Sengüven, Department of Oral Pathology, Gazi University, Faculty of Dentistry, Bişkek Cd. (8.Cd.) 82.Sk. No:4 06510 Emek, Ankara, Turkey, Tel: +90 312 2034394, +90 533 2555733; E-mail: bsenguven@gazi.edu.tr

Received Date: 11 Aug 2017

Accepted Date: 16 Sep 2017

Published Date: 23 Sep 2017

#### Citation:

Sengüven B, Aznad BM, Baris E. Mandibular Calcifying Odontogenic Cyst: A Case Series. *J Dent Oral Biol.* 2017; 2(17): 1100. ISSN: 2475-5680

Copyright © 2017 Burcu Sengüven.

This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Table 1:** The clinicopathologic characteristics of seven COC cases.

Case	Age	Sex	Localization	Radiography	Treatment	Recurrence
1	69	M	Mandible right posterior	1.5 cm x 1.0 cm. unilocular radiolucent	Enucleation	No, 5 years follow up
2	50	M	Mandible anterior	2.0 cm x 0.8 cm. unilocular radiolucent	Enucleation	No, 7 years follow up
3	54	M	Mandible left posterior	3.0 cm x 1.5 cm. multilocular radiolucent/radioopaque	Enucleation	No, 4 years follow up
4	38	M	Mandible right posterior	2.5 cm x 1.5 cm. unilocular radiolucent	Enucleation	No, 8 years follow up
5	65	F	Mandible right premolar	1.5 cm x 1.0 cm. unilocular radiolucent/radioopaque	Enucleation	No, 11 years follow up
6	45	M	Mandible anterior	1.5 cm x 1.0 cm. unilocular radiolucent	Enucleation	No, 6 years follow up
7	NA	F	Mandible right posterior	NA	Enucleation	No, 12 years follow up

NA: not available

Excisional biopsy was done for diagnosis for all cases and was diagnosed as features suggestive of developmental odontogenic cyst with areas showing ghost cells.



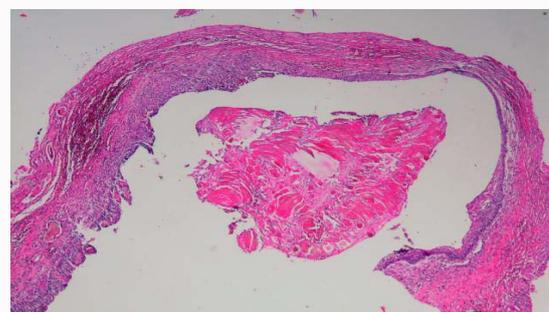
**Figure 1A:** The unilocular radiolucency with sclerotic border on the right edentulous mandible.



**Figure 1B:** The large cystic unilocular radiolucent lesion association with impacted tooth. Noted that root resorption of premolar and molar teeth.



**Figure 2:** Gross specimen of enucleated cystic lesion. Calcified foci (arrow) were observed in the cystic cavity and the cyst wall.



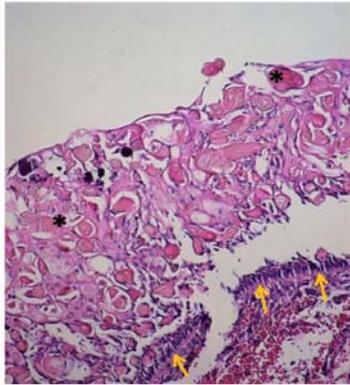
**Figure 3:** Cystic lesion with epithelial lining was observed. Lumen was filled with ghost cell keratinization and calcification (Hematoxylin-Eosin x20).

cells resembling stellate reticulum cells could be seen easily (Figure 5). Within the epithelium groups of eosinophilic "ghost cells" were observed in the superficial layer of the lining. Dystrophic calcifications were also detected of the ghost cells which were also in the cystic lumen. Fibrovascular connective tissue contained numerous cord-like odontogenic epithelial rests.

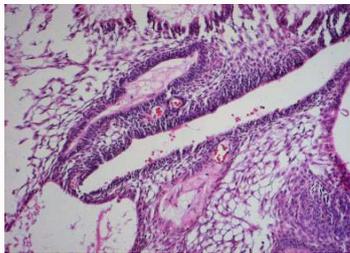
### Discussion

Odontogenic tumors and cyst are derived from cells of odontogenic apparatus and their remnants in the jaw or rarely in the gingiva, mostly benign and constituting less than 1% of all oral tumors [1,4]. Both odontogenic tumors and cysts have diverse histological appearances which would be originated from epithelial, mesenchymal or both [1-7]. This diversity causes difficulties on consensus about the classification of these lesions since 1960's. The tumors are classified based on originated tissue, histological features, and biological behavior. Odontogenic cysts are inseparable from odontogenic tumors. Once, calcifying odontogenic cysts were classified as calcifying cystic odontogenic tumor under the list of benign mixed epithelial and mesenchymal odontogenic tumors. Recently, in early 2017, this unique lesion was reclassified as a developmental odontogenic cyst since most cases behave as non-neoplastic clinically. It represents

less than 1% of all odontogenic cysts [8]. From our records, COC is the third common developmental cyst with glandular odontogenic cyst after dentigerous cyst and odontogenic keratocyst, respectively. Calcifying odontogenic cyst is a type of odontogenic ghost cell lesion, presents a wide patient age, and most commonly in mandible [9]. Our all cases from this series were in mandible with an average age of 53.5. Lesions are identified most commonly on radiographic imaging frequently as an incidental finding due to COC's painless, slow growing nature. Mostly unilocular radiolucent lesions may be associated with an odontoma or impacted tooth, and root resorption or tooth displacements are not rare. One case from our mini-series had multilocular radiologic appearances which were at the same time only case with clinical symptoms as buccal and lingual expansions. Calcifying odontogenic cysts are characterized by cystic proliferation of ameloblastomatous odontogenic epithelium and formation of ghost cells. Ghost cells appear pale eosinophilic and lack of nuclei under the light microscope. Ghost cells may undergo calcification by time which induces radiopaque appearance and obvious chalky



**Figure 4:** Epithelial lining of the lesion consist of ameloblastomatous cells (arrow) in the basal layer and the masses of ghost cells with pale eosinophilic cytoplasm (\*) and dystrophic calcifications (Hematoxylin-Eosin x100).



**Figure 5:** Bottom part of the lesional epithelium consist of hyperchromatic nuclei reverse polarized cells and stellate reticulum like cell layer called ameloblastomatous appearance (Hematoxylin-Eosin x200).

spots on the cyst wall macroscopically. The nature of ghost cells has been thought to be aberrant keratin formation. Although it has been demonstrated positive expression of amelogenin protein which may show ameloblastomatous differentiation of cyst epithelium, calcified part seems different from the enamel matrix morphologically. On the other hand, BRAF or any other driver mutation has not been defined for COC as for ameloblastoma [7-10]. Ameloblastoma should be considered for differential diagnosis of COC in the first place due to palisaded, typical ameloblastomatous epithelium lining. The absence of calcified material in ameloblastoma makes the differentiation easier. The presence of ghost cells appears to be sufficient to diagnose. Treatment choice for COC is enucleation. Recurrence is extremely rare. Recurrent COCs are more common in the maxilla. Ghost cell odontogenic carcinoma is malignant counterpart of COC, which may rise to de novo or 40% of the cases from a COC. Carcinoma occurs in the maxilla twice as common as in the mandible. No recurrence was reported from our series from 14 years' follow-up [1-3,11].

## Conclusion

Calcifying odontogenic cyst is a rare developmental odontogenic cyst with a debated history of its nature. Although enucleation seems convenient to manage COC, long-term follow-up data and additional cases are still needed. A similar study design should be applied to larger number cases. Molecular studies defining any substantial mutations would also be significant for both diagnosis and treatment of this unique odontogenic lesion.

## References

1. Takana T, Slootweg PJ. Odontogenic and maxillofacial bone tumours. In: El-Naggar AK, Chan JKC, Grandis JR, Takana T, Slootweg PJ, editor. WHO Classification of Head and Neck Tumours. 4th ed. Lyon: IARC; 2017. p. 205-42.
2. Vatsayayan A, Adhyapak AK, Debnath SC, Malik K. Calcifying odontogenic cyst: Case report and review of literature. *Int J Dent Mod Res.* 2014;1(4):69-75.
3. Kolte VS, Sheno R, Gadve V, Rajderkar A, Dive A. Peripheral calcifying cystic odontogenic tumour - a rare case report. *J Clin Diagn Res.* 2015;9(7):ZD04-6.
4. Wright JM, Vered M. Update from the 4th Edition of the World Health Organization Classification of Head and Neck Tumours: Odontogenic and Maxillofacial Bone Tumors. *Head Neck Pathol.* 2017;11(1):68-77.
5. Khandelwal P, Aditya A, Mhapuskar A. bilateral calcifying cystic odontogenic tumour of mandible: a rare case report and review of literature. *J Clin Diagn Res.* 2015;9(11):ZD20-2.
6. Dhawan P, Kang AS, Solanki NH. Calcifying odontogenic cyst associated with odontome. A case report. *J Adv Med Dent Sci Res.* 2016;1(4):100-2.
7. Yukimori A, Oikawa Y, Morita KI, Nguyen CTK, Harada H, Yamaguchi S, et al. Genetic basis of calcifying cystic odontogenic tumors. *PLoS One.* 2017;12(6):e0180224.
8. 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(4):451-60.
9. Chindasombatjaroen J, Poomsawat S, Boonsirirath K. Two unique cases of calcifying cystic odontogenic tumor in the maxillary posterior region. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2014;118(4):497-504.
10. Gültekin SE, Sengüven B, Aziz R, Heydt C, Buettner R. Molecular profiling of odontogenic tumors -pilot study. *Balk J Dent Med.* 2017;21:112-5.
11. Tarakji B, Ashok N, Alzoghbi I, Altamimi MA, Azzeghaiby SN, Baroudi K, et al. Malignant transformation of calcifying cystic odontogenic tumour - a review of literature. *Contemp Oncol (Pozn).* 2015;19(3):184-6.