Case Report

Re-emergence of a cyst-calcifying epithelial odontogenic cyst: A diagnostician's dilemma

Vani Chappidi, Alekya Oddeti*, Rauma Siddiqua, Mohammed Mujahid Ali, Keerthi Reddy Vummadi

Department of Oral Medicine and Radiology, Sri Sai College of Dental Surgery, Vikarabad, Telangana, India
*Corresponding author email: **alekya.chitty11@gmail.com**

International Archives of Integrated Medicine, Vol. 8, Issue 6, June, 2021.
Available online at http://iaimjournal.com/
ISSN: 2394-0026 (P) **ISSN: 2394-0034 (O)**
Received on: 02-05-2021 **Accepted on:** 28-05-2021
Source of support: Nil **Conflict of interest:** None declared.
How to cite this article: Vani Chappidi, Alekya Oddeti, Rauma Siddiqua, Mohammed Mujahid Ali, Keerthi Reddy Vummadi. Re-emergence of a cyst-calcifying epithelial odontogenic cyst: A diagnostician's dilemma. IAIM, 2021; 8(6): 66-72.

Abstract

The calcifying epithelial odontogenic cyst could be a developmental odontogenic cyst, which shows characteristics of both a solid neoplasm and a cyst. The definitive diagnosis of CEOC can be made more appropriately only histologically, due to the lesion's lack of characteristic clinical and radiographic features, as well as its variable biological behavior. This article aims to represent the radiological and histopathological characteristics of this rare entity.

Key words

Calcifying odontogenic cyst, Periapical cyst, Focal calcifications.

Introduction

The calcifying epithelial odontogenic cyst may be a developmental odontogenic cyst, which was first categorized as a particular entity by Gorlin in 1962 [1]. It's an unusual unique lesion, which may show characteristics of both a solid neoplasm and a cyst [2]. The odontogenic tumors, as well as cysts, have a diverse histological appearance which would be originated from the epithelium or mesenchyme or both [3]. The definitive diagnosis of CEOC can be made more appropriately only histologically, due to the lesion's lack of characteristic clinical & radiographic features, as well as its variable biological behavior [3, 4]. This article aims to represent the radiological and

histopathological characteristics of this rare entity.

Case report

A 35 year old female patient reported to the Department of Oral Medicine and Radiology, Sri Sai College of Dental Surgery, Vikarabad, Telangana, with a chief complaint of swelling followed by pain in the upper left front tooth region for 4 days. She had reported 2 years back with a similar complaint for which the patient had undergone necessary treatment including Root Canal Therapy 21, 22 followed by surgical enucleation of the palatal cyst for 22, 23, 24, 25. He had a habit of nail-biting. Extraoral examination showed that a diffuse extraoral swelling on the left middle third of the face of size 3×2 cm extending anteroposteriorly from the left ala of the nose to about 3 cm in front of the tragus of the ear and superior-inferiorly from 1 cm below the inferior border of the orbit to 1cm below the ala- tragus line. There was an obliteration of the nasolabial fold seen. On palpation, the swelling was soft in consistency, tender, compressible, non-reducible, and non-pulsatile. Intraoral examination showed discolored teeth 22, 23, and the tooth was tender on percussion 21. A provisional diagnosis of an infected Periapical cyst was made. Clinical differential diagnosis included periapical abscess and apical periodontitis (**Figure – 1**).

Figure - 1: Showing a clinical picture of the patient.

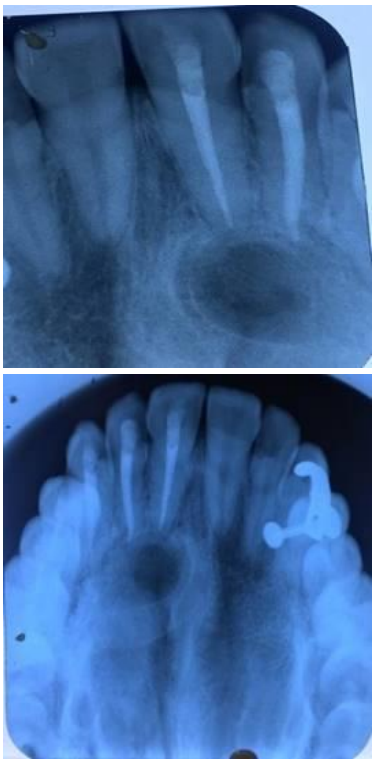
Clinical differential diagnosis:

Periapical abscess	Mild circumscribed area of suppuration that will show little tendency spread to the local area
Apical periodontitis	Excruciating pain associated with a necrotic pulp

Diagnostic assessment

Radiographic investigations included maxillary occlusal topographic view and intraoral periapical radiograph. Radiographic evaluation showed a single well-defined radiolucency involving 21 and 22 which was roughly round in the shape of size 1×2 cm surrounded by well demarked sclerotic borders and radio-opacity in the crown and all along the length of the roots of 22 and 23. Occlusal radiograph revealed a well-defined radiolucency superiorly extending from 1cm above 21 and 22 inferiorly not crossing the cortical plates mesially not crossing the midline. No radio-opacity was appreciated inside the lesion (**Figure – 2**).

Figure - 2: IOPA and occlusal radiograph showing the radiographic appearance of the cyst.



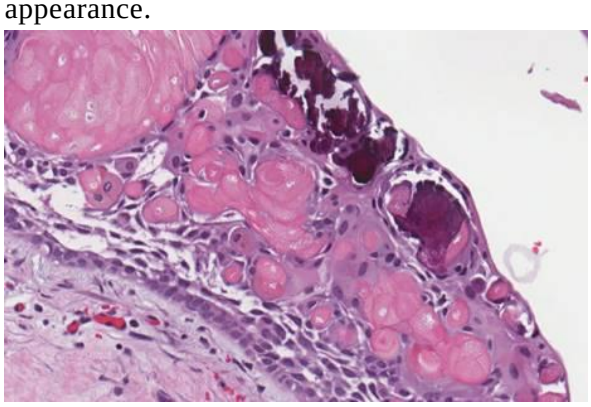
Radiographic differential diagnosis:

Calcifying Epithelial Odontogenic Cyst	It appears as unilocular, or multilocular, or mixed radiolucencies with some radio-opaque deposits inside of differing sizes and opacities
Nasopalatine Cyst	The radiolucency gives a heart shape due to the superimposition of the nasal spine. No root resorption is noted.
Adenomatoid Odontogenic Tumor	Well-defined expansile radiolucency, Root divergence, calcified flecks.

Figure - 3: Showing the excised lesion.

Excisional biopsy of the lesion followed by curettage was performed under local anesthesia. Microscopic sections showed fragments of the cystic lesion and underlying collagenous wall, the inner surface is lined by odontogenic squamous epithelium and focal nodular lesions with hyaline deposits and focal calcification and patchy areas of hemorrhage and focal infiltrate of lymphocytes and plasma cells and focal epithelial invaginations which were suggestive of the calcifying odontogenic cyst with chronic inflammation of left maxillary region. The patient is kept under regular follow-up and a 6month follow-up has shown satisfactory healing with no evidence of infection or recurrence (**Figure – 3, 4**).

Figure - 4: Showing the histopathologic appearance.



Discussion

Odontogenic tumors and cysts are derived from the cells of odontogenic apparatus and their remnants within the jaw or rarely within the gingiva, mostly benign and constituting but 1% of all oral tumors. Both odontogenic tumors and cysts have diverse histological appearances which would be originated from epithelial, mesenchymal, or both. This diversity causes difficulties in consensus about the classification of these lesions since the 1960s. It was termed as keratinizing cyst and referred to as a cyst by Chen and Miller although many solid lesions were reported [11]. In I963, Gold has found keratinization as a prominent feature and thus renamed the lesion as a keratinizing and calcifying odontogenic cyst (KCOC) [6, 7]. Due to the Nailed histopathological characteristics, various terminologies have been proposed which incorporates calcifying ghost cell odontogenic tumor (CGCOT) proposed by Fejerskov and Krogh in 1972 [8], cystic

calcifying odontogenic tumor proposed by Freedman et al. (CCOT) in 1975 [9]. 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 tumors 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 [10]. The lesion accounts for 1% of all odontogenic jaw cysts. The cystic or non-neoplastic variant of COC is found to occur in 80-98% of cases [14] and related to odontoma in 24% of cases [16, 17]. The solid or neoplastic variant of COC accounted for about 11.5% of cases. The COC is typically intra-osseous (70% of the cases) with extra-osseous presentation accounting for 16-22% mostly seen in individuals above the age of 50years [5, 9]. Recent reevaluation of cases was done by Piaetorious, Hjorting, Hansen. Gorlin, and Vteker [12] for classification of the COC by its range, variation, and neoplastic potential [13]. They suggested that the lesion consists of two entities, a cystic form and a neoplastic form, the review includes the classification of the lesion into 3 cystic variants type I A (Simple uni-cystic). type I B (odontoma producing), type I C (ameloblastomatous proliferating), and a singly neoplastic type (type II) designated as dentinogenic ghost cell tumor. The World Health Organization (WHO) recognized COC as a separate entity in 1971 [7, 14] and currently classifies COC and every one of its variants as odontogenic tumors instead of as odontogenic cysts [14].

In 1991, a review of 92 cases of COC resulted in an alternate sub-classification supported the histological and immunohistochemical features. The cystic lesion was classified as [7, 15]:

1. Non-proliferative COC
2. Proliferative COC
3. Ameloblastomatous COC
4. COC related to odontoma

The neoplastic lesion was classified as:

1. Ameloblastoma ex COC
2. Peripheral epithelial odontogenic ghost cell tumor [7, 15].

In 1994, consistent with studies by Wirshberg, Kaplan, and Buchner, it had been suggested that COC related to an odontoma should be considered as a separate entity and classified as benign mixed odontogenic tumor and termed as odontocalcifying odontogenic cyst [16].

The age ranges from 1 year to 82 years with a peak within the 2nd decade. In observation of 215 lesions, Bruchner [17] and Praetorius, et al. [12] have drawn attention to bimodal age distribution in support of their contention that two different entities could also be involved[18] with a second peak within the sixth/seventh decade [8, 12].

An Equal predilection for both sexes. CEOC is typically asymptomatic and should be an incidental radiographic finding. The lesion is typically an asymptomatic swelling causing a hard bony expansion, rarely affecting the lingual surface of the jaw. The enlarging lesion can occasionally perforate the cortical plate and commonly cause displacement of adjacent teeth or root tipping with resorption of teeth adjacent to the lesion.

The present case may be a transformation of a residual cyst to CEOC. This is often evident from the past dental history of the patient which revealed that the patient had undergone endodontic treatment for 21, 22, 23, 24, 25 followed by surgical enucleation of the periapical cyst under local anaesthesia 2 years back. Secondarily, in this case, the patient had a habit of nail-biting frequently. Such minor repeated trauma could compromise the vitality of the pulp. It had been also observed within the radiographs that the cuspal tips of the teeth are blunt indicating the extent of the habit of nail-biting.

The clinical appearance and radiological features of this case gave an impact that it had been an infected periapical cyst. However, its histopathology revealed features suggestive of Calcifying Epithelial Odontogenic Cyst (CEOC).

In a retrospective study of non-endodontic periapical lesions in Chile, only 26 cases (0.65%) out of 32,423 biopsy specimens had a histopathological diagnosis of non-endodontic pathology. Out of those 26 cases, there was just one case of CCOT [20]. There are case reports where persistent apical periodontitis with unsuccessful attempts at Root canal therapy (RCT) turned out to be CCOT on histopathological examination of the surgically enucleated periapical tissue [21]. The authors opined that CCOT can mimic apical periodontitis and thus, should be considered within the differential diagnosis of huge lesions related to the root apex of the tooth. Usually, the lesion presents radiographically in a unilocular form with well-defined corticated margins. The interior structure may vary in appearance it's going to be completely radiolucent but is typically mixed (radiolucent – radio-opaque) and may even show large solid amorphous masses. The present case shows a unilocular radiolucency, but without the mixed radiolucent- radio-opaque internal structures.

Central COC has been reported to be associated with an odontoma in 24 to 35% of cases and with impacted teeth (35%) [16, 17] mostly canine [14, 17]. The histological features of a classic calcifying odontogenic cyst are characteristic and present few diagnostic problems. The microscopical features of classical COC includes a fibrous capsule with a lining of odontogenic epithelium. The basal layer is made from ameloblast-like columnar or cuboidal cells of 4-10 cell thickness [7, 14, 22] overlined by loosely arranged epithelial cells hearing similarity to stellate reticulum of the enamel organ [7, 14, 23]. There exists a varying number of epithelial cells barren of nuclei which are eosinophilic and retain their basic cell outline (ghost cells). These ghost cells may undergo calcification and lose their cellular outline to a firm sheet-like area of calcified keratin [7, 24, 25]. Ghost cells could also be due to the effect of coagulative necrosis and dystrophic calcification or it's going to be a sort of normal or abnormal keratinization of the odontogenic epithelium. Ghost cells aren't unique to COC, but are also seen in odontoma, ameloblastoma and other odontogenic tumors and may undergo calcification, which is believed to be dystrophic [14, 25]. The ability to induce dental hard tissue formation appears to be a property of the epithelial cell lining of the COC. In 1964, Seward & Duckworth [18, 26] suggested the arrangement of areas of calcification within COC in layers parallel with the outline of the bony cavity, which provides a means of radiological differentiation from other calcifying odontogenic lesions [26, 27]. Occasionally ghost cells can evoke a foreign body reaction once they're present close to the connective tissue, resulting due to the disintegration of the basal layer with subsequent growth of granulation tissue and will undergo subsequent calcification.

Radiographically, majority of the lesions present in a unilocular form [17, 27, 28] with a well-defined margin, while in 5-13% of the cases they're multilocular [9, 28], they have scattered irregular-sized calcifications producing a variable range of opacities (salt and pepper kind of patterns) [23, 29]. They'll be associated with tooth-like densities in 50% of the cases and one-third of the cases show association with the unerupted tooth, most frequently a canine [14]. COC in its earlier stages resembles dentigerous cyst, odontogenic keratocyst, or unicystic ameloblastoma and in later phases resembles adenomatoid odontogenic tumor, partially mineralized odontonia, calcifying epithelial odontogenic tumor, ameloblastic fibro

odontoma [23]. The extraosseous sort of COC may resemble a gingival fibroma, gingival cyst, or peripheral giant cell granuloma [7, 14, 30]. Locally aggressive lesions and even malignant degeneration are reported. These lesions appear histologically almost like benign lesions but show prominent mitotic activity, nuclear and cytoplasmic pleomorphism, necrosis, and invasion of surrounding structures [14, 30].

The treatment of cystic lesions involves enucleation with long-term follow-up. Enucleation followed by the removal of a 1 to 2 mm layer of bone round the edges of the cystic cavity with a sharp curette or bone bur. The aim of this procedure is to get rid of the epithelial debris that might cause recurrent lesions. Recurrence depends on the completeness of cyst removal. In the present case also an excisional biopsy of the lesion followed by curettage has been done. Prognosis is good for cystic COC and fewer certain for neoplastic COC [14, 23]. The COC could even be associated with other odontogenic tumors like an adenomatoid odontogenic tumor, ameloblastic fibroodontoma, ameloblastic fibroma, and ameloblastoma [14, 17] where the treatment and prognosis in such cases are supported the associated tumors [14, 23].

Conclusion

COC may be a unique lesion possessing both cystic and neoplastic potential and showing a considerable number of variants clinically, radiographically, and histopathologically. Whether these variants represent unrelated lesions developing simultaneously or one lesion with ghost cell change is an open question and awaits further study. Separation of cases of variants of COC may cause a much better understanding of each variant and will aid in its classification. Specific knowledge in histopathology is required to differentiate all other odontogenic lesions from the calcifying epithelial odontogenic cyst.

References

1. Gorlin RJ, Pindborg JJ, Clausen FP, Vickers RA. The calcifying odontogenic cyst. A possible analog of the cutaneous calcifying epithelioma of Malherbe. Oral Surg Oral Med Oral Pathol., 1962; 15: 1235-43.
2. White SC, Pharoah MJ. Cysts of the jaws. In: White SC, Pharoah MJ, editors. Oral Radiology: Principles and Interpretation. 5th edition, Missouri: Mosby-Elsevier; 2005, p. 399-400.
3. Rajkumar K, Kamal K, Sathish M R, Leena S. Calcifying odontogenic cyst. J Oral Maxillofac Pathol., 2004; 8: 99-103.
4. Swabna V, et al. Calcifying Epithelial Odontogenic Cyst. A case report. J Adv Med Dent Scie Res., 2018; 6(7): 31-33.
5. Shear M. Developmental Odontogenic cysts-An update. J.Oral Pathology Med, 1994; 23: III.
6. Gold L. The Keratinizing and calcifying odontogenic cyst Oral surgery, Oral med, Oral Pathol., 1963; 16: 1414.
7. James, W Sike. GF, Ghali JE, Maria J Troulis. Expansile intrasseous lesion of the Maxilla. J Oral Maxillofacial Surgery, 2000; 58: 1395¬1400.
8. Fejerskov O & Krogh J. The calcifying ghost cell odontogenic tumor or calcifying odontogenic cyst. J Oral Pathol, 1972; 1: 272-287.
9. Freeman PD, Lemurman H., Gee JK. Calcifying odontogenic Cyst. A review and analysis of seventy cases. Oral surgery, oral med. Oral Pathol., 1975; 40: 93-106.
10. Sivapathasundharam B, Biswas PG, Preethi S. The World Health Organization classification of odontogenic and maxillofacial bone tumors: An appraisal. J Oral Maxillofac Pathol., 2019; 23: 178-86.

11. Chen SYS, Miller AS. Ultrastructure of Keratinizing and calcifying odontogenic cyst. Oral Surgery, Oral Medicine, Oral pathology, 1975; 39: 769-750.
12. Regezi JA, Courtney R.M., Ken DA. Keralinizaton in odontogenic tumors. Oral surgery Oral med. Oral Pathol., 1975; 39: 447.
13. Seward GR & Duckworth RA. Review of the Pathology of the calcifying odontogenic cysts and tumors. Dental practitioner, 1967; I8: 83-98.
14. Pindhorg JJ, Kramer IR. Toronto H. (1971): histological typing of Odontogenic Tumors, jaw cysts, and allied lesions. Geneva. Switzerland, World Health Organization, 1971, 28-35.
15. Buchner A, Merrel PW, Carpenter WM, et al. Central (Intraosseous) Calcifying odontogenic cyst. Int J Oral Maxillofacial Surg., 1990; 19: 260.
16. Hirshherg Avraham., Buchner Amos, Kaplan Ilana. Calcifying odontogenic cyst associated with odontoma: A possible separate entity (odontocalcifying odontogenic cyst). J. Oral Maxillofac. Surg., 1984; 52: 555-558.
17. Buchner A. The central (intraosseous) calcifying odontogenic cyst. J. Oral maxillofacial surgery, 1991; 49: 330.
18. Shear M. Cysts of the Oral regions P 102-I10. (3rd edition). Varghese Publishing House, 1996.
19. Huang YL, Lin LM, Lin CC, Yan YH. Calcifying odontogenic cyst presenting as a lateral periodontal cyst--a case report. Zhonghua Ya Yi Xue Hui Za Zhi., 1990 Mar; 9(1): 42-5.
20. Ortega A, Fariña V, Gallardo A, Espinoza I, Acosta S. N"art-18" >Persistent apical periodontitis associated with a calcifying odontogenic cyst. Int Endod J., 2009, Jun, 01; 42(6): 539-45.21.
21. Estrela C, Decurcio DA, Silva JA, Mendonça EF, Estrela, C R A. Persistent apical periodontitis associated with a calcifying odontogenic cyst. Int Endod J., 2009, Jun, 01; 42(6): 539-45.
22. Shafer WG, Wine MK. Levy BM. A textbook of Oral Pathology, 4th edition, Harcourt India Private Ltd., 1997; 174-275.
23. Rushton VE & Horner K. Calcifying odontogenic cyst a characteristic CT finding. British Journal of Oral and Maxillofacial surgery, 1997; 35: 196-198.
24. Neville W Brad., Damn D Douglas., Allen tvl Caul, Bouquout E Jerry. (1995): Odontogenic cyst & tumor. Oral & Maxillofacial Pathology, IV. Ii- Saunders Company, Philadelphia, 1995; 506-509.
25. Regeii A Joseph, Sciubba J James. Oral Pathology Clinical Pathologic correlations cyst of the oral region, 3rd edition, W.B. Sunders Company, 1999, p. 304-305.
26. Altini VIS & Farman AG. The calcifying odontogenic Cyst: Eight new cases and a review of the literature. Oral surgery. Oral medicine, Oral pathology, 1975; 40: 751-759.
27. Tanimoto K., Tortilla S. Aoyama Metal. Radiographic characteristics of the calcifying odontogenic cyst. J Oral pathology, 1972; 1: 273-287.
28. Lello GE & Makek M (1986): Calcifying odontogenic cyst Int J. Oral Maxillofac Surgery, 1986; 15: 644.
29. Burket's Oral Medicine Diagnosis and treatment, 1997. Cysts of the Jaws and Benign Odontogenic Tumours, 9th edition, Lippincott Raven Publishers.
30. Buehner A., Werrel PW, Hanes LS, et al. Peripheral (extraosseous) calcifying odontogenic cyst. A review of forty-five cases. Oral sug. Oral med, Oral pathol., 1991; 72: 65.