

Calcifying cystic odontogenic tumor in radiologically normal dental follicular space of mandibular third molars: report of two cases

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Abstract

Two cases of calcifying cystic odontogenic tumor (CCOT) of the dental follicle in an impacted third molar without clinical and radiological evidence are reported during routine histopathological examination. In both the cases left mandibular third molar was mesioangularly impacted with pericoronal radiolucency of less than 2.5 mm, which was not indicative of any pathology. As a routine protocol (which is not practiced widely) of our institution, dental follicles associated with extracted molars were sent for histopathological examination. Histopathological features were consistent with CCOT with pathognomonic ghost cell transformation of odontogenic epithelium. The patients were followed for one year with no recurrence. This paper emphasizes the importance of routine histopathological examination of dental follicles associated with asymptomatic impacted teeth without any clinical or radiographic evidence of follicular lesion.

Introduction

Extraction of impacted third molar is a routine day-to-day practice in dental clinics. Due to changes in the dietary habits the incidence of third molar impaction, especially mandibular third molar, is increasing every year. The impacted tooth is characterized by presence of follicular tissue around the crown portion, which harbors odontogenic tissue and remnants. These tissues have potential to undergo cystic and neo-

plastic transformation.^{1,2} However, there is no internationally accepted consensus in the dental literature to date on clinical and radiological criteria to differentiate between normal and pathological conditions of follicular tissues based on the radiographic features around impacted teeth.³ Radiographically, it appears as a thin pericoronal radiolucency which is considered as normal by some authors when it is less than 3 mm⁴ and by others when it is not more than 2.5 mm.⁵ However, scientific evidence supporting this assumption is limited and there is no internationally accepted consensus on the clinical criteria to differentiate between normal and pathological conditions based on radiographic features.³ In a recent study, Haghanifar *et al.*⁶ concluded that the ratio of dental follicle diameter to the mesiodistal width of the teeth cannot be employed as a diagnostic index to differentiate between normal and pathological dental follicle. An immunohistochemistry study using BCL2 and Ki67 markers on normal and pathological follicle showed that the pericoronal tissues of asymptomatic impacted third molars may be actively proliferating and normal pericoronal radiolucency cannot serve as an indicator for the differentiation potential.⁷ Several recent studies have demonstrated considerable pathologies associated with radiologically normal radiolucency and the incidence is higher than generally perceived from radiographic examination alone.^{1,2,8-16} This is especially notable since important pathological conditions such as ameloblastomas,^{10,14,15} odontogenic keratocysts,^{15,16} dentigerous cysts,^{1,8,10,14,16} odontogenic fibroma,¹⁵ odontogenic myxoma,¹⁵ and low grade fibrosarcoma⁷ have been observed in the follicles which have a potential to develop into more serious complications. Hence, it has been proposed that all impacted teeth should be removed regardless of the presence or absence of symptoms and associated follicular tissue should be sent for histopathological examination.^{1,8}

During such routine histopathological examination of dental follicles associated with impacted third molars, we came across two cases of calcifying cystic odontogenic tumor (CCOT). To the best of our knowledge no case of CCOT associated with asymptomatic impacted third molar without any clinical or radiographic manifestation has been reported in the literature till date.

Case Reports

Case #1

A 20-year-old female reported for rou-

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tine dental checkup. Intra-oral periapical radiographic examination revealed mesioangularly impacted left mandibular third molar with pericoronal radiolucency of about 2 mm (Figure 1A). The third molar was extracted under local anesthesia and follicular tissue was sent for histopathological examination. Histopathological examination revealed small cystic space lined by epithelium of variable thickness, which at places showed stellate reticulum like appearance (Figure 1B). At focal areas, islands of ghost cells were also seen associated with lining epithelium (Figure 1C). The final diagnosis of CCOT was made. Patient was followed for one year with no evidence of recurrence.

Case #2

A 21-year-old female patient reported for routine dental checkup. The intra-oral periapical radiographic examination showed mesioangularly impacted left mandibular third molar with pericoronal radiolucency of 2.5 mm (Figure 2A). The tooth was extracted and associated dental follicle was sent for histopathological examination. Histopathological examination showed a sheet of squamous odontogenic epithelium, which appeared to be present in a cystic cavity (Figure 2B). The epithelium also contained large islands of ghost cells, which were faint eosinophilic and devoid of nuclei (Figure 2C). The histopathological features were consistent

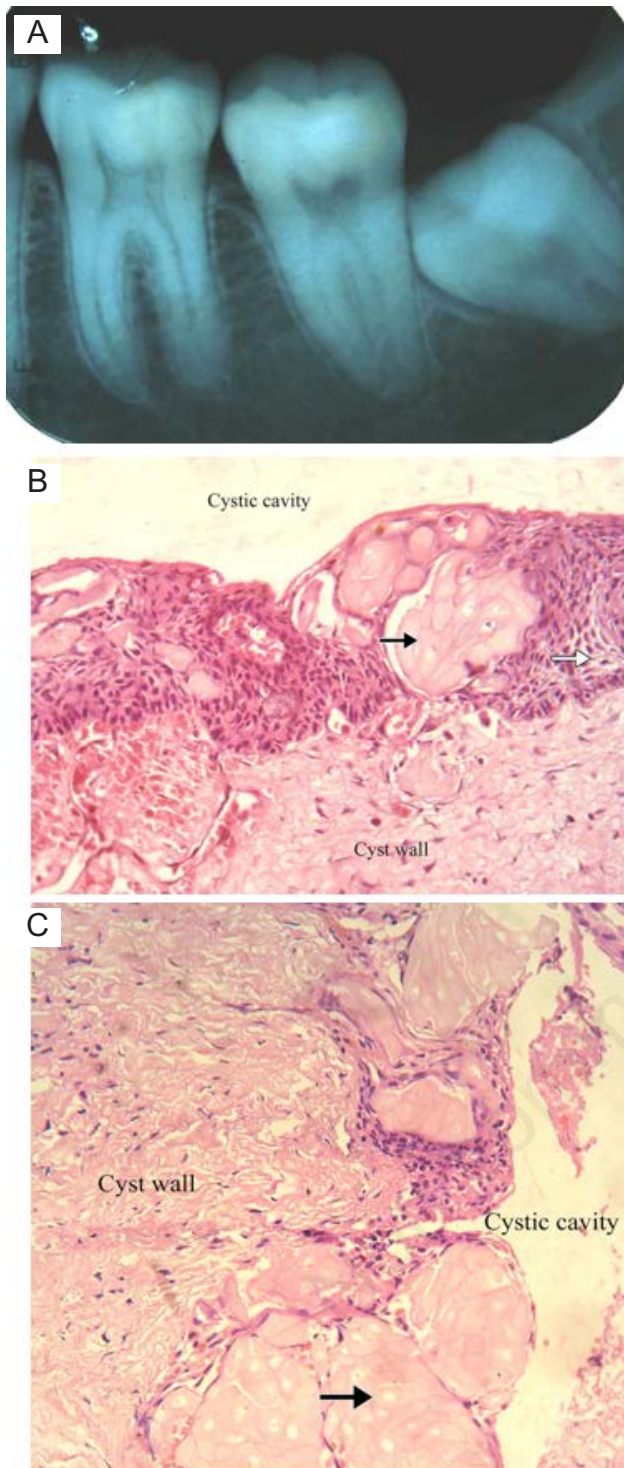


Figure 1. A) Intra-oral periapical radiograph showing mesioangularly impacted left mandibular third molar. B) Histopathological picture showing small cystic space lined by epithelium of variable thickness with ghost cells (black arrow) and stellate reticulum like cells (white arrow). C) Photomicrograph showing large island of ghost cells (black arrow) and cystic space. (HE stain, magnification X100).

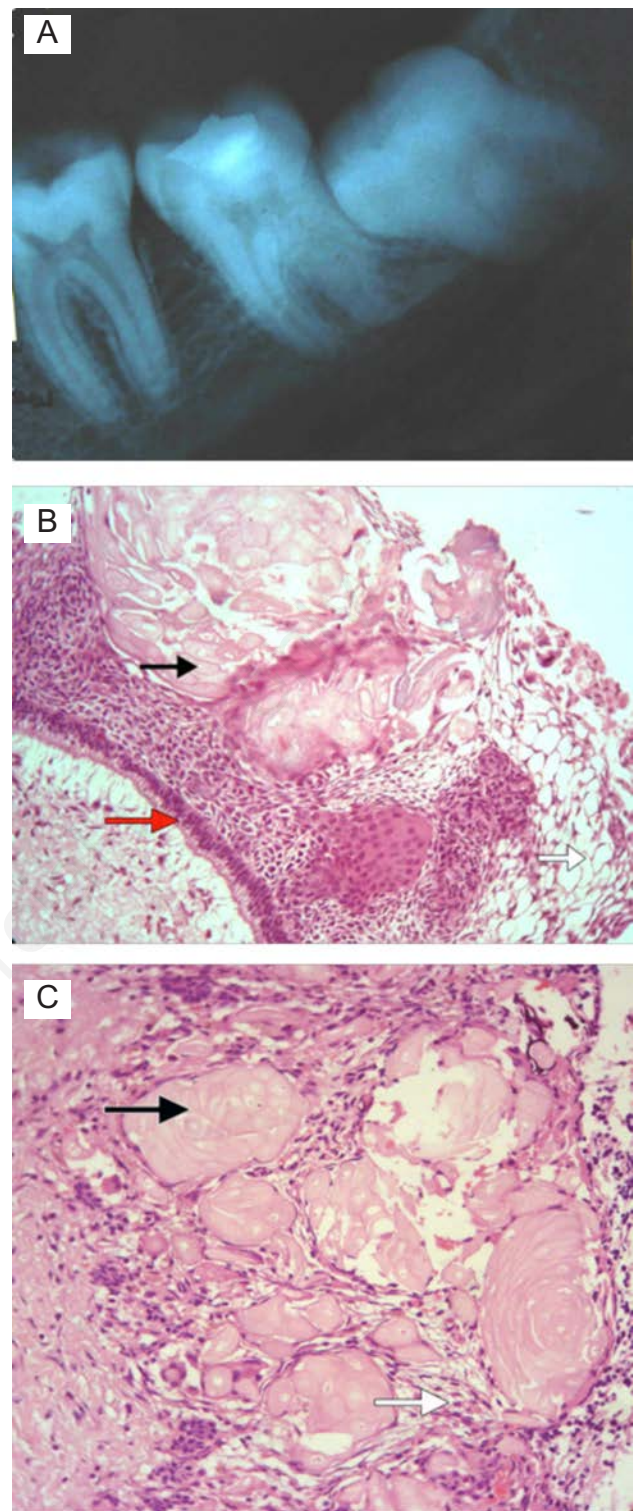


Figure 2. A) Intra-oral periapical radiograph showing mesioangularly impacted left mandibular third molar. B) Histopathological picture showing cystic cavity lined by squamous odontogenic epithelium with basal tall columnar cells (red arrow), islands of ghost cells (black arrow) and stellate reticulum like cells (white arrow). C) Photomicrograph showing islands of ghost cells (black arrow) with admixed stellate reticulum like cells (white arrow). (HE stain, magnification X100).

with CCOT. Patient was followed for one year with no evidence of recurrence.

Discussion and Conclusions

After formation of tooth in the jaw, it is surrounded by odontogenic tissue composed of remnants of odontogenic epithelium and connective tissue called dental follicle. Dental follicle is manifested radiologically as 2-4 mm semilunar shaped radiolucency surrounding the crown of unerupted tooth. The remnants of reduced enamel epithelium and dental lamina present in the dental follicle carries potential for pathological transformation and origin of many odontogenic tumors and cysts are thought to be attributed to these cells.¹⁷

Radiological guidelines for diagnosis of any pathology always carry certain limitations. Similarly, in case of dental follicle, size cannot be considered as the measure for presence or absence of pathology associated with impacted tooth. In this regard, Miller and Bean⁹ stated that disease conditions may be found in minute follicular spaces and enlarged radiolucent areas may show histologically normal tissues. There are several reports in the literature on pathologies associated with follicular tissues of apparently normal impacted teeth on radiographs.^{1,2,8-10,13-16} The available literature depicts the variation in incidence of pathologies detected in follicular tissues associated with radiographically normal impacted tooth. Glosser and Campbell⁸ found pathological changes in 32% of follicles associated with impacted third molars. Adelsperger *et al.*¹ found pathologies in 34% of follicles while Rakprastikur¹² reported pathologies in 59% of follicles associated with impacted teeth. Baykul *et al.*² and Kotrashetti *et al.*¹⁵ have also described a incidence rate of 50% and 58.5% in dental follicles of mandibular impacted third molars with normal radiological features, respectively. Saravan *et al.*¹⁸ reported cystic changes in 46% of dental follicle. One of the problems that we face as clinicians is regarding the availability of limited data from the studies^{1,2,9,13-15} regarding the pathologies associated with radiographically normal dental follicle. These pathological changes include dentigerous cyst,^{1,8,10,13,14,16} odontogenic keratocyst,^{13,15,16} ameloblastoma,^{10,13-15} and low grade fibrosarcoma.⁹ Minor pathological alterations such as presence of hyperplastic squamous epithelium, foreign body granulomas, and sulphur granules have also been reported.¹⁰ We believe that pathological variations in dental follicles associated with radiologically normal impacted teeth is

highly limited because many dental surgeons discard the follicular tissue after extraction. Thus, we are actually loosing out on very important information about the incidence of pathologies associated with radiologically normal follicular space. Unfortunately, it is generally believed by the dental surgeons that the normal follicular radiolucency indicates a healthy dental follicle without any pathology. Findings from the previously reported cases and the present cases contradict this belief and raise the question as to whether routine histological examination of all the removed dental follicles should be carried out or not. It is our opinion that further prospective studies by experienced oral pathologists are needed to be carried out to establish the true incidence of pathologies of dental follicles of unerupted third molars.

Praetorius *et al.*¹² suggested that CCOT develops in the dental follicle, gingival tissue or bone from remnants of either odontogenic epithelium or reduced enamel epithelium. The pathogenesis is, however, still controversial. In the present case, authors believe that neoplastic epithelium could probably arise from reduced enamel epithelium or cell rests of odontogenic epithelium present in the dental follicular tissue. Studies on immunohistochemical markers related to oncogenes, tumor suppressor genes and proliferation on normal dental follicular tissue would be an interesting future research to bring more insight into the pathogenesis of odontogenic cysts and tumors arising from odontogenic epithelial rests present in the dental follicle.

The central CCOT presents as an asymptomatic hard swelling of the jaw that produces expansion rather than erosion of bone. Early lesions are usually detected following routine radiographic examination and they are often associated with an unerupted tooth as seen in the present case.¹² CCOT can be present in various clinical and radiological forms however, the present cases were seen in the dental follicle of impacted third molars without any clinical and radiological evidences of a follicular lesion. We believe that this could be the presentation of early stages of developing CCOT. To the best of our knowledge, this is the first description of CCOT of the dental follicle of an impacted third molar without any clinical or radiographic evidence of any follicular pathology.

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