Cholesterol Granuloma in Dentigerous Cyst: A Diagnostic Dilemma

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Introduction

Cholesterol deposition is seen in association with chronic middle ear diseases and represents an inflammatory foreign body reaction in response to cholesterol crystals. It often is termed as cholesterol granuloma in respect to middle ear infections and affects the mastoid antrum and air cells within the temporal bone and can rarely develop in the paranasal sinuses.1

In the jaw region the deposition of cholesterol is seen in association mainly with cysts of inflammatory origin. Inflammatory cysts show the highest incidence of cholesterol crystals, particularly the radicular cysts, while the lowest incidence is reported for cysts of noninflammatory origin such as dentigerous cyst and odontogenic keratocyst.2

Accumulation of fluid between the enamel surface and reduced enamel epithelium results in the formation of dentigerous cyst in which the cystic lumen encloses the crown of an impacted tooth.3 Although dentigerous cyst do not show signs of inflammation but inflamed dentigerous cyst walls occasionally may contain cholesterol crystals, hemosiderin pigments, and Ruston’s hyaline bodies similar to those reported in radicular cysts.4 So, here we present a rare case of dentigerous cyst with cholesterol clefts. The main aim of the case presentation is its unique nature and rare prevalence.

Case Report

A 29-year-old female patient reported to a private dental clinic with a mild swelling in the right posterior region of the
Jaw. The patient did not complain of any pain pertaining to this region. There was neither a past dental history nor a significant medical history was noted.

**Radiographically:** A unilocular radiolucency was observed enveloping the crown of impacted molar which suggested toward a lateral variant of the dentigerous cyst (►Fig. 1). The cystic lesion was enucleated surgically and sent for histopathological examination.

**Macroscopically:** The tissue submitted presented as a cystic wall around the crown of the molar and was attached to the cementoenamel junction of the tooth.

Histological examination revealed a thin epithelium overlying a fibrocellular connective tissue stroma with cleft-like spaces within the stroma (►Fig. 2). The epithelium is 2 to 3 cells thick resembling reduced enamel epithelium (►Fig. 3A). Moderately dense connective tissue interspersed with fibroblasts was evident. Deeper section within the stroma showed an inflammatory infiltrate with numerous cholesterol clefts (►Fig. 3B). Hence, correlating with the clinical findings a diagnosis of dentigerous cyst with cholesterol clefts was made.

The patient was prescribed preoperative antibiotic prophylaxis to reduce the risk of postoperative infections after completion of the procedure. The patient was first evaluated for any type of allergy or hypersensitivity reaction prior to the surgery and was given cefazolin (2 g) along with vancomycin (15 mg/kg) intravenously 60 to 120 minutes prior to surgical incision. The main reason behind administration of systemic antibiotics was to prevent complications such as alveolitis and other bacterial infections. To reduce the risk of bacterial infection topical home therapies are also prescribed along with disinfection of the operating field topically. Also, antibiotic resistance can also occur in some of the healthy patients because of inappropriate antibiotic use and sometimes can also lead to adverse reactions. For the prevention of pain, edema, and other postoperative inflammatory reactions, corticosteroids are the first line of defense with strong anti-inflammatory activity by inhibition of chemotaxis and are administered by intravenous, intra-alveolar, and submucosal means.

The surgical technique we followed was complete enucleation of the cyst along with extraction of the impacted tooth. To reduce the risk of postoperative pain and swelling, 4 g of dexamethasone was prescribed as an anti-inflammatory drug. The patient was on amoxicillin postoperatively (500 mg for 7 days every 6 hours). Note that 0.2% chlorhexidine gel being a powerful bactericide with strong bacteriostatic action was also used postoperatively to reduce postoperative pain. Chlorhexidine antiseptic with no side effects can replace systemic anti-inflammatory therapy in patients with the risk of liver or kidney disorders. Also, a study done by Haraji and Rakhshan showed that chlorhexidine gel reduces the risk of dry socket and also alveolar osteitis as concluded by a study done by Torres-Lagares et al.
Criticism is also created against this antiseptic because of its ability to remove enamel film from the tooth and thus makes it susceptible to pigments in food and beverages. The patient was on follow-up for 6 months after the surgery to monitor dry socket, alveolitis, and recurrence of the cyst.

Discussion

Dentigerous cyst is one of the most common odontogenic cysts always associated with an unerupted tooth or developing tooth bud and most frequently seen in association with mandibular third molars followed by maxillary canines and maxillary third molars. These are discovered usually when radiographs are taken to investigate a failure of tooth eruption/malaligned/missing tooth and are asymptomatic unless infected or growing to a considerable degree causing bony expansion and asymmetry.

If the present case is evaluated without clinical history then it histopathologically resembles radicular cyst because of the presence of cholesterol clefts, but on detailed examination, we conclude this case as dentigerous cyst with the presence of cholesterol clefts which is a rare finding. Unlike the radicular cysts which usually develops in response to pulpal death and subsequent tissue necrosis, the dentigerous cyst develops around the crown of unerupted teeth apparently in the absence of an inflammatory stimulus. The dentigerous cyst is thought to develop in two ways: by accumulation of fluid between the reduced enamel epithelium and the crown or between the layers of the reduced enamel epithelium.

This case also signifies the importance and combination of clinical, radiographical, and histopathological findings in framing the final diagnosis of any case without bypassing any minute detail. Inflammatory origin of dentigerous cyst has been reported in literature. Bloch-Jorgensen gave the discernment of dentigerous cyst originating from inflammatory response. According to him the overlying necrotic deciduous tooth, results in the formation of dentigerous cyst. The resultant periapical inflammation extends concerning the follicle of the unerupted permanent successor; inflammatory exudate results in dentigerous cyst formation.

Although rare but inflamed dentigerous cyst walls occasionally may contain cholesterol crystals similar to those reported in radicular cysts. Sahuran et al in 2018 also reported a case of infected dentigerous cyst with cholesterol clefts in the mandible in a 58-year-old man with type 2 diabetes. A similar case was reported by Bhullar et al in which he presented an unusual case with the presence of longitudinal cholesterol clefts in dentigerous cyst histopathologically in 43-year-old male patient.

Cholesterol granuloma is a large collection of longitudinal clefts representing sites of cholesterol crystals which have dissolved during processing, with surrounding foreign body giant cells and macrophages filled with hemosiderin and embedded in fibrous granulation tissue. It is known to develop in a variety of body areas such as: the middle ear which is the most common site, followed by mastoid process, testis, lungs, apex of temporal bone pyramid, and paranasal sinuses. In the jaw region cholesterol cleft formations are seen in radicular cyst and in rarely few other cysts.

Cholesterol crystals origin is principally hypothetical with little facts. Two schools of thought might be helpful in explaining the pathogenesis.

1. It is postulated that cholesterol accumulates in the tissues as a result of the degeneration and disintegration of cells, in particular epithelial cells.

2. It is suggested that the cholesterol is of hematogenous origin.

The presence of cholesterol accounts for 39% in dentigerous cyst followed by lateral periodontal cyst (26%) and odontogenic keratocyst (17%). Besides this, hemosiderin is present in abundant proportion in dentigerous cyst (50.7%). This illustrates that the incidence of hemosiderin is greater than cholesterol consequently. There is a significant correlation between hemosiderin and cholesterol both in the cyst capsule and cystic cavity of cysts. In majority of the cases absence of hemosiderin corresponds to cholesterol nonappearance and vice versa. Dentigerous cyst can originate either from reduced enamel epithelium enveloping unerupted tooth crown or from displacement of apical dental cyst present in erupted tooth underneath unerupted teeth crown. In both the cases, there is an appreciable presence of inflammatory cells in cyst wall containing cholesterol.

Inflammation in cystic capsule is always preceded by repeated hemorrhages. The deposition of hemosiderin is caused by disintegration of extravasated red blood cells (RBCs). The source of cholesterol in the cysts is from RBC breakdown along with collection of serum due to its seclusion from adequate lymphatic drainage. This marks the formation of clefts from the crystallization of cholesterol. The presence of multinucleated giant cells denotes a foreign body reaction against cholesterol clefts which are considered as foreign by the defense cells of body.

A similar lesion known as solid plasmacytoma resembles radiographically to the dentigerous cyst with cholesterol clefts as both show radiolucency without sclerotic border and sharp margins mostly occurring in the third molar region and hence must be distinguished on the basis of clinical history and histopathology.

This article signifies the importance of clinical features and radiographic features in framing the final histopathological diagnosis. Without observing the radiographs this present entity may be misdiagnosed as a radicular cyst as histological features such as cholesterol clefts are most common with radicular cyst and rarely seen in association with a dentigerous cyst.

Conclusion

Dentigerous cyst occasionally may show the presence of longitudinal clefts histologically, that is, cholesterol crystals but these still remain a renowned feature of radicular cyst which is an inflammatory lesion. Very few cases of cholesterol clefts within the wall of dentigerous cyst occurring in jaws were reported in the English literature. Also, equal
importance should be given to every aspect related to the
diagnosis of any lesion and maximum details of the patient
regarding the clinical history and abundant knowledge of the
case should be provided before jumping to final histopatho-
logical diagnosis.

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Competing Interest
None.

Patient Consent
None.

Conflict of interest
None declared.

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