Mandibular Cholesterol Granuloma Mimicking a Dentigerous Cyst

Ana Carolina de Mesquita Netto, João Artur Ricieri Brito, Camila de Nazaré Alves de Oliveira, Ronaldo Raivil Arruda, Ricardo Santiago Gomez, Ricardo Alves Mesquita

Abstract
Cholesterol granuloma is an inflammatory foreign body reaction to cholesterol crystals. In this case report, it was described a rare cholesterol granuloma associated with a crown of the impacted tooth, resembling an early dentigerous cyst. Histopathologically, a large collection of longitudinal clefts could be observed, which proved to be cholesterol crystals surrounded by foreign body giant cells and macrophages filled with hemosiderin. The lesion and the third molar were fully excised. The patient is currently under follow-up and is free of disease.

Key Words: Cholesterol Granuloma; Cholesterol Crystals; Dentigerous Cyst; Foreign Body;

Introduction
Cholesterol granuloma (CG) is a histopathological term used to describe an inflammatory foreign body reaction to cholesterol crystals. CG can most frequently be found in the mastoid antrum and air cells of the temporal bone in association with chronic middle ear disease, but is generally rare in the jaw region. Chao performed a systematic literature review of sources from Medline (1966-2004) and analyzed 37 cases of CG in the maxillary sinus, along with three other cases of CG in other jaw regions. The dentigerous cyst is the most common developmental odontogenic cyst and most often involves the mandibular third molars. Dentigerous cysts can be found in patients in a wide age range, with a slight predilection for male patients. Radiographically, the dentigerous cyst typically shows a unicocular, corticated, well-defined, usually symmetric, radiolucent area that is associated with the crown of an unerupted tooth. In this light, the present study analyzed a case of mandibular CG mimicking a dentigerous cyst in a 62-year-old man.

Clinical Report
A 62-year-old man was referred to the Oral Medicine Clinic of the School of Dentistry at the Universidade Federal Minas Gerais (UFMG) for evaluation and management of an asymptomatic radiolucency associated with a crown of the impacted tooth 38. The lesion was discovered incidentally upon routine dental examination. Periapical radiographs demonstrated a unicocular, circular, corticated, well-defined radiolucency with the epicenter in the pulp chamber of the impacted tooth 38. The higher distance between crown of tooth 38 and the periphery of the radiolucency was 8mm. The tooth 37 presented with satisfactory endodontic treatment (Fig 1). No effects of the lesion on surrounding structures, no overlying mucosal changes, and no symptoms in the mandible could be observed. The patient's medical and social histories proved to be noncontributory.

According to the benign features of the lesion, and considering the diagnoses of a dentigerous cyst or hyperplastic follicles, the lesion and the third molar were fully excised, and specimens were submitted for histopathological examination to the Department of Oral Pathology. During surgical procedure, no bone cavitation or liquid content could be observed. The tissue specimens were set in 10% buffered formalin, embedded in paraffin, and sectioned in 4µm. The sections were routinely processed and stained with haematoxylin and eosin. Histological examination revealed a large collection of longitudinal clefts, which were suggestive of cholesterol crystals surrounded by foreign body giant cells and macrophages filled with hemosiderin. Scarce chronic inflammation could also be observed (Fig 2). In addition to the cholesterol crystals, oxalate crystals were also considered a possibility. To exclude this possibility, the oxalate test was performed. Paraffin-embedded tissue specimens were cut into sections of 10 µm.
and placed in tube trials with 4% chlorhydric acid. This test proved to be negative, and the possibility of the oxalate crystal was excluded. The final diagnosis was cholesterol granuloma. The patient is currently under follow-up and is free of disease.

Figure 1: Periapical radiograph showing a unilocular, circular, corticated, well-defined radiolucency. The greatest distance between crown of tooth 38 and the periphery of the radiolucency was 8 mm (white line).

Figure 2: Photomicrograph presenting longitudinal clefts of cholesterol crystals, surrounded by foreign body giant cells (blue asterisks) and macrophages filled with hemosiderin (blue #) (Haematoxylin and eosin stain, x400).

Discussion
Hirschberg et al described the first case of the CG in the mandible, which was clinically diagnosed as a residual cyst. Chao performed a literature review and found 37 cases of CG in the maxillary sinus, one of the most common sites to find CG in the facial skeleton. The present study reported a CG associated with a crown of the impacted tooth. Thus, CG should be considered in clinical-radiographic differential diagnoses of odontogenic cysts or tumors. Some etiological mechanisms have been proposed for CG, but no clear pathogenesis has been produced.

Granulomatous reactions are diffused cellular tissue responses to various stimuli triggered by infectious agents from foreign bodies. CG originates from foreign body reactions to cholesterol crystals that are formed during inflammatory processes. Main et al produced CG in temporal bones of monkeys by obstructing the Eustachian tube, suggesting that hemorrhaging within a bone cavity with hemolysis may lead to cholesterol precipitation. Others authors also agree with the idea that the pathogenesis of CG is associated with a poor drainage and stagnation of a blood hemorrhage inside a cavity.

Considering these facts, the following questions arise: Should it be hypothesized that the CG in the present case may have originated from a temporary periapical inflammatory process in tooth 37, which, by proximity, induced the formation of CG in tooth 38? Moreover, can this be considered a formation of hemorrhage located between tooth 38 and the follicular space? As such, studies are warranted to clarify the pathogenesis of this lesion in the jaws.

The incidence of impacted teeth is high, most of which happen to the third molars. Radiographic analyses of impacted third molars without obvious diagnostic features are often assumed to be normal. Very few radiographic alterations can be definitively diagnosed without microscopic evaluation. The clinical-radiographic features are generally consistent with a diagnosis of either a dentigerous cyst or a hyperplastic follicle. The age, sex, location, and clinical-radiographic appearance of the lesion in this patient were compatible with the diagnosis of a dentigerous cyst. Stanley et al and Dachi and Howell suggested that the critical width of the hyperplastic follicle, as seen radiographically, can be estimated to be between 2 and 5 mm. These studies represented the first differential diagnoses proposed, as this can be considered by far the most common pathologic pericoronal radiolucency associated with an impacted tooth. Hyperplastic follicles are normal, frequently observed developmental structures which appear radiographically as semicircular pericoronal radiolucent images observed in association with unerupted or impacted teeth. Typically, the hyperplastic follicles do not grow to a large size and seldom exceed 4 mm in width. Eliasson et al suggested that pericoronal radiolucency of lesions smaller than 2.5 mm in width is non-pathologic. However, Stephens et al
believed that a diagnostic criterion of a dentigerous cyst which appears as a pericoronal radiolucency of greater than 2.5 mm will lead to false-positive diagnoses and an excessively high prevalence rate. At present, the only reliable means through which to differentiate a small dentigerous cyst from a hyperplastic follicle is to perform the surgical procedure, by identifying a cystic cavity, and to correlate this with the histopathology. 

As a result of the rare occurrence of CG in the jaws, the ideal treatment approach has not been conclusively determined. Nevertheless, as it represents a benign process, surgical management is appropriate. Definitive diagnoses of CG are most commonly produced by histology; however, the present case showed an interesting and attractive clinical-radiological picture, which mimicked an early dentigerous cyst.

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Author Affiliation

References