Atypical Aggressive Periapical Granuloma: A Case Report

Corresponding Author:
Prof. Sergio E Cury,
DDS PhD, Oral Pathology - UniFOA - University of Volta Redonda, 27.310-060 - Brazil

Submitting Author:
Prof. Sergio E Cury,
DDS PhD, Oral Pathology - UniFOA - University of Volta Redonda, 27.310-060 - Brazil

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Abstract

We reported a atypical and aggressive case of a periapical granuloma, located in the mandibular right first and second molars region of the caucasian 32 year-old woman.

Introduction

The jaws are host to several cysts and neoplasms, mainly due to the tissues involved in tooth formation (Regezi, 2002). Periapical lesions resulting from pulp necrosis are among the most frequent pathologies of the alveolar bone (García et al, 2007). Nevertheless, a number of benign jaw tumors and some cysts (some of them recently described) of both odontogenic and non-odontogenic origin can exhibit a biologically aggressive course and may be difficult to diagnose. The traditional histopathology is still the main basis for the diagnosis of these lesions, since the impact of molecular and immunohistochemical techniques has been scant in this field so far (Regezi, 2002). Apical periodontitis is a disorganization of the periradicular tissue caused by etiologic agents of endodontic origin characterized by a chronic inflammatory infiltrate, which can result in formation of the lesion with concomitant resorption of hard tissues and destruction of the periodontal ligament (Fusaka et al, 2009). Thus, it is consequence of an infection in the root canal that can result in progressive stages of inflammation and periradicular bone destruction. Alveolar bone resorption around the tooth apex involves the production of direct regulators of osteoclastic activity and chemotactic osteoclastic factors and receptors (Fusaka et al, 2009).

Many cases of periapical granuloma are completely asymptomatic. There is no perforation of the bone and overlying mucosa with the formation of a fistulous path, unless the lesion undergoes acute exacerbation. With the proliferation of granulation tissue and concomitant bone resorption, the periapical granuloma appears as a radiolucent area of variable size abutting the root apex (Shafer, 1987). Six possible biological factors have been described as causes of asymptomatic apical periodontitis followed by root canal treatment: persistent intraradicular infection, extraradicular infection (mainly actinomycosis), foreign body reaction related to obturating material, accumulation of endogenous cholesterol crystals that irritate the periapical tissue, true cystic lesions, and cicatricial tissue (García et al, 2007). The interaction of microbiological factors and the host's defense mechanism, destroying a large quantity of periapical tissue, originates the different types of periapical lesion (García et al, 2007). When the dental pulp is invaded by bacteria, the root canal provides the habitat for a mixed microbiota that leads to an inflammatory response in the periapical region (Fusaka et al, 2009); this is the most common etiologic factor responsible for apical periodontitis such as those that manifest as dental granulomas, radicular cysts, and periapical abscesses (Estrela et al, 2009). The latter develops in response to the intracanal antigenic content, mediated by immunopathological mechanisms (Soares & Queiroz, 2001; Soares et al, 2006). Typically, periapical inflammatory lesions of endodontic origin are 5 to 8 mm in diameter. Traditionally, lesions larger than 10 mm are considered granulomas, and the largest are considered apical cysts (Soares et al, 2006). The differential diagnosis of apical periodontitis can include some lesions of non-endodontic origin (Rodrigues et al, 2008).

The aim of this article is to report a radiographic finding of an expansive and osteolytic lesion in the posterior region of the mandible suggestive of an odontogenic tumor or apical cyst, whose histopathological examination revealed to be an apical granuloma. The radiographic, clinical, and histological aspects of the lesion, as well as the postsurgical follow-up after 5 and 8 months are described.

Case Report(s)

A 32 year-old caucasian woman sought a routine clinical examination at the dentist complaining of pain and discomfort on the mandibular left first molar; the clinician requested a panoramic radiograph and periapical radiographs to complement the examination. A radiolucent lesion circumscribed by a radiopaque halo, expansive and causing thinning of the right mandible cortical bone in the region of mandibular right first and second molars was observed in the
panoramic radiograph (Illustration 1A). The mandibular right first molar was endo-perio impaired, and the root canals were filled. The last visit to the dentist had been around 5 years earlier and no record of the lesion was noted.

The patient did not report any symptomatology in the region, since the complaint of discomfort concerned the opposite side, where there was an apical lesion on the mandibular left first molar. However, she mentioned sporadic abscesses in the buccal apical region of the mandibular right first molar.

The physical extraoral examination revealed an inconspicuous facial asymmetry in the basal and angle region of the mandible, as shown in Figure 2. The intraoral examination revealed an increase of the buccal volume and an altered (reddish) coloration of the gingiva (Figure 3).

The radiologist requested a cone beam computed tomography to better evaluate the size and extent of the lesion and tooth impairment. The examination revealed an osteolytic, hypodense lesion, circumscribed by a hyperdense halo, impairing the right mandibular canal, expansive to the lingual cortical and the mandibular base, involving the apex of mandibular right second molar and communicating with the endo-perio lesion of the mandibular right first molar (Illustration 1B, C, D, E, F, G and H). The mandibular right third molar was not affected. The diagnostic hypotheses considered were unicystic ameloblastoma, keratocystic odontogenic tumor, and apical cyst.

The patient was referred to the head and neck surgeon, who decided to perform an excisional biopsy. Transoperatively the access was first intraoral, with removal of a fragment of the buccal periodontal lesion of the mandibular right first molar. Because the lesion was lingually located, the surgeon decided to access it extraorally, via the neck, until the concerned region was reached. During removal of the lesion, it was found to be encapsulated and enclosing a certain quantity of granulomatous material (Illustration 2A).

Upon removal, curettage was performed in the surgical site (Illustration 2B); the teeth involved were not removed considering the risk of pathologic fracture. The pieces were then sent to histopathological examination.

The histological sections were stained with hematoxylin-eosin and examined by light microscopy. They revealed fragments of connective tissue of variable density, the outer portion presenting more densely packed and randomly distributed collagen fibers, interspersed with fusiform fibroblasts, some more basophilic, some bulky in focal area; the inner portion presented an intense, mixed inflammatory infiltrate composed by lymphocytes, plasma cells, neutrophils, and epithelioid and foamy macrophages. Additionally, numerous blood vessels, some of which engorged, were found. Areas of erythrocyte extravasation bacteria colonies completed the panel (Illustration 2 C, D, E and F).

The diagnosis was a chronic nonspecific inflammatory process, and hence a dental granuloma. The pathologist further added that, since the histologic panel was strongly associated with the endo-periodontal impairment of the mandibular right first molar, elimination of the infection focus in the region and radiographic follow-up was recommended. After four months, the involved mandibular right first molar was removed and a new computed tomography was taken to monitor the involution of the lesion. The examination revealed that the lesion had regressed and the expansion had reduced, nevertheless it was not possible to assess if the bone had been repaired.

Another computed tomography was taken after eight months and allowed observation of bone formation and repair.

Discussion

Clinically and radiographically, the extent, enucleation and bone destruction gave the lesion an atypical pattern of granuloma.

One of the diagnostic hypotheses was a keratocystic odontogenic tumor (KOT). According to Regezi (2002) and Neville (2004), the KOT is commonly classified as a developmental cyst of considerable importance due to its potential for aggressive and recurrent clinical behavior. Radiographically, they describe it as a well-defined and generally multilocular radiolucency. KOTs represent 5-15% of all odontogenic cysts. Another diagnostic hypothesis was ameloblastoma, since the unicystic subtype pattern is entirely cystic, generally consists of a single space, occurs in the second and third decades of life and in the mandibular molar region (Regezi, 2002), corroborating the reported clinical case. Furthermore, cystic ameloblastomas can expand and perforate the maxillary bone cortex (Regezi, 2002). The apical cyst hypothesis was not discarded when the clinical, radiographic and surgical panels were evaluated together, considering, on the other hand, that this is the most frequent maxillary cystic lesion (Romero et al, 2002). Notwithstanding, the hypothesis of apical granuloma was not precisely considered because of the atypical behavior of the lesion.

The healing of lesions associated with apical periodontitis, such as granulomas, abscesses, and cysts, fails after root canal therapy due to persistent
intra and extraradicular infection (Lin et al, 2009). The root canal treatment performed in the mandibular right first molar in the present case was not enough to cease the infection in the region and probably would be the etiologic factor for the growth and persistence of the lesion. Soares et al (2006) contended that, among the surgical therapies of extensive osteolytic lesions, marsupialization should be the less invasive, although some discomfort is associated with the prolonged use of drains, hygiene maintenance can be difficult, healing can be prolonged, and another surgery may be necessary. Since the most likely diagnostic hypotheses involved odontogenic tumors, the choice fell onto excisional biopsy. Soares et al (2006) added that, in the case of enucleation, larger vessels and nerves should be protected and reconstructive grafts may be necessary, requiring special hospital care. In this case, reconstructive grafts were not necessary, since bone destruction was largely restricted to the lingual bone plate and did not impair the patient’s function or esthetics.

As to the preoperative evaluation, attempts to diagnose periapical lesions before surgery with medium contrast, Papanicolaou smear, albumin tests and electrophoresis proved to be inaccurate (Simon et al, 2006; Trope et al, 1998). Traditionally, it is instituted that periapical cysts and granulomas can be differentiated in periapical radiographs. The radiographic characteristics ascribed to a cyst are: circumscribed, well delineated, with sclerotic border, and larger than 10 mm in diameter. Conversely, supposedly a granuloma would have a diffuse, ill-defined appearance, any shape, and generally a diameter smaller than 10 mm (Trope et al, 1989). Yet, Lin et al (2009) contended that extensive periapical lesions and radicular cysts cannot be diagnosed before treatment, and the diagnosis can only be confirmed upon biopsy. Shafer (1987) mentioned that different aspects in conventional radiography cannot be used to distinguish the different forms of periapical illness.

Recently, with the advent of other types of imaging examinations, such as computerized tomography, magnetic resonance imaging, and cone beam computed tomography (CBCT), density differences have improved the accuracy of preoperative diagnosis (Simon et al, 2006). The clinical application of cone beam technology can favor the differential diagnosis of periapical lesions. According to Rodrigues & Estrela (2008), cone beam tomography and magnetic resonance can supplement, and in some cases possibly avoid, the need for aspiration. Trope et al (1989) proposed that a cyst could be differentiated from a granuloma in computed tomography by a marked difference in density between the cystic cavity content and the granulomatous tissue. Granulomas have a narrower extension and a lower gray scale value than apical cysts (Simon et al, 2006). Periapical lesions generally consist of solid soft tissue (granulomas) or include a semi-solid and liquefied area (bay or true cyst) (Simon et al, 2006). The measurement of gray values allows the differentiation of soft or fluid tissue or empty areas. A radicular cyst can be differentiated from a periapical granuloma with computed tomography by a markedly lower density of the cystic cavity than granulomatous tissue (Trope et al, 1989). Simon et al (2006) concluded that CBCT provides a better, more accurate, and quicker method to differentiate the diagnosis of a solid lesion from another filled with fluid or cavity. If a positive gray value is obtained, then the lesion is a granuloma. This allows the clinician to decide whether or not the surgery is necessary without waiting for the return period to assess if healing occurred. In the present clinical case, the gray scale value obtained was positive, thus corroborating the aforementioned studies. However, Estrela et al (2009) do not agree, since they argue that it is impossible to clinically and radiographically differentiate granulomas from cysts, as well as true apical cysts from bay cysts, or when the epithelial tissue is inert or proliferative. Thus, the histopathological exam would be mandatory for a conclusive diagnosis, but the importance of studying the image to obtain a more adequate treatment plan cannot be ruled out or minimized. Camps et al (2004) further assert that variation in the gray scale value of a periapical lesion is associated with histological changes, with a direct correlation between the value and the type of material that fills the lesion.

Rodrigues & Estrela (2008) concluded that the challenge in endodontic diagnosis involves the management of information obtained in the anamnesis (present condition’s history), clinical examination, pulp vitality test, and analysis of the radiographic aspect. Therefore, care during diagnosis is mandatory to decide the best therapeutic option, because periapical illnesses of non-endodontic origin cannot emulate the most common infections of endodontic origin, and vice-versa. The behavior of endodontic lesions should not be underrated, as demonstrated in the reported clinical case, where an apparently nonaggressive pathologic disorder ultimately caused extensive osseous and dental impairment.

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Illustrations

Illustration 1

3D reconstruction (A); Coronal view of the tooth 46 (B); Coronal view of the tooth 47 (C); Coronal view of the tooth 48 (D); Sagittal buccal view of the lesion (E); Sagittal view of the lesion envolving tooth 47 (F); Sagittal lingual view of the lesion (G); Axial view of the top of the lesion (H)
Illustration 2

Extraoral surgical access (A); granulomatous material (B); connective tissue with inflammatory cells and new blood vessels H and E stained - low magnification (C, D and E); connective tissue with randomly distributed collagen fibers, and intense mononuclear inflammatory cells H and E stained - high magnification (F)
Reviews

Review 1

Review Title: WMC002874: Atypical Aggressive Periapical Granuloma: A Case Report

Posted by Dr. Tomofumi Hamada on 07 Mar 2012 02:06:03 AM GMT

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Rating: 6

Comment:
The authors described a case report of atypical and aggressive periapical granuloma, located in the right mandibular. This is a well-written, interesting case report. It will be helpful to make differential diagnosis (e.g. spindle cell tumors, inflammatory reactive conditions) if the authors provide the information of immunohistochemical findings.

Competing interests: No

Invited by the author to make a review on this article? : No

Experience and credentials in the specific area of science:
DDS and PhD in oral oncology.

Publications in the same or a related area of science: No

Review 2

Review Title: Atypical Aggressive Periapical Granuloma: A case report

Posted by Prof. Brunno S Freitas on 12 Jan 2012 11:26:44 AM GMT

1. Is the subject of the article within the scope of the subject category? Yes
2. Are the interpretations / conclusions sound and justified by the data? Yes
3. Is this a new and original contribution? No
4. Does this paper exemplify an awareness of other research on the topic? Yes
5. Are structure and length satisfactory? Yes
6. Can you suggest brief additions or amendments or an introductory statement that will increase the value of this paper for an international audience? Yes
7. Can you suggest any reductions in the paper, or deletions of parts? No
8. Is the quality of the diction satisfactory? Yes
9. Are the illustrations and tables necessary and acceptable? Yes
10. Are the references adequate and are they all necessary? Yes
11. Are the keywords and abstract or summary informative? Yes

Rating: 7

Comment:
This is a well written case report.

There is some controversy in the definition of KOT in the discussion. I suggest the 2005 World Health Organization definition.

Invited by the author to make a review on this article? Yes

Experience and credentials in the specific area of science:
PhD and MSc in oral pathology.

Publications in the same or a related area of science: No

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