The Importance of the Three-Dimensional Image in the Early Diagnosis of Cementoblastoma

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ABSTRACT

The cementoblastoma is a very rare odontogenic neoplasm characterised by the formation of cementum-like tissue in connection with the root of a tooth. An 18-year-old boy was referred to the Clinic of Oral Pathology of the School of Dentistry, Universidade Federal de Minas Gerais, Brazil, complaining of an irradiating, itching pain from the region of the lower right first molar. He reported that the symptoms began three months prior, with a gradual increase in intensity during this period. The pain episodes were of short duration, with characteristics of toothache originating from the pulp. Upon intra-oral clinical examination, an open bite and slight increase in volume at the buccal alveolar region of the lower right first molar was observed. He also reported palpation and percussion pain symptoms in this region. Electrical, heat and cold pulp vitality tests were performed, and the tooth was vital. Periapical and panoramic radiographs showed radiolucent images with diffuse, poorly defined borders at the mesial root periapex extending to the interradicular region suggesting an inflammatory periapical lesion. In this early presentation, the three-dimensional image was fundamental to the final diagnosis of cementoblastoma.

Keywords: Cementoblastoma; Cone Beam CT; Dental Radiography

1. Case Report

An 18-year-old boy was referred to the Clinic of Oral Pathology of the School of Dentistry, Universidade Federal de Minas Gerais, Brazil, complaining of an irradiating, itching pain from the region of the lower right first molar. He reported that the symptoms began three months prior, with a gradual increase in intensity during this period. The pain episodes were of short duration, with characteristics of toothache originating from the pulp. Upon intra-oral clinical examination, an open bite and slight increase in volume at the buccal alveolar region of the lower right first molar was observed. He also reported palpation and percussion pain symptoms in this region. Electrical, heat and cold pulp vitality tests were performed, and the tooth was vital. Periapical and panoramic radiographs showed radiolucent images with diffuse, poorly defined borders at the mesial root periapex extending to the interradicular region suggesting an inflammatory periapical lesion. In this early presentation, the three-dimensional image was fundamental to the final diagnosis of cementoblastoma.

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Figure 1. (a) Intraoral view of the left lower quadrant showing discrete swelling and a normal oral mucosa; (b) A slight radiolucent area that showed images of ill-defined margins related to the tooth root. A radiolucent point suggests involvement of the furcation region; (c) A axial image showed a slight cortical expansion and perforation of the cortical buccal bone; (d), (e) The sagittal and coronal images showed a hyperdense, heterogeneous image of irregular borders associated with the hypodense line. The lesion attached to the roots at an early stage of development; (f) Tissue with a compact arrangement, presenting basophilic deposits, interspersed with loose, cellularised connective tissue that was poorly vascularised; (g) Surgical specimen showing cementum-like tissue in connection with the root of the right lower first molar (arrows); (h) Radiological follow-up. Newly formed trabecular bone in the region of the lower right first molar.

2. Discussion

Cementoblastoma is a slow-growing, benign odontogenic tumour that arises from cementoblasts. Cementoblastoma is rare and accounts for less than 1% of all odontogenic tumours [1, 2], exhibiting a relatively limited tendency to recur and with unlimited growth potential [3, 4]. This tumor is characterised by the formation of cementum-like tissue in connection with the root of a tooth and primarily affects young adults in the second and third decades of life [1, 5]. Some studies have reported that cementoblastoma arises slightly more frequently in males [6], others reported a predominance in females [1], whereas others have found no difference between the sexes [7].

The mandible is the preferential site of occurrence, with the first molar tooth being the most common tooth involved [5, 8]. Cementoblastomas associated with primary teeth are extremely rare lesions [3]. Expansion and perforation of the cortex are noted in a higher proportion of patients with recurrent cementoblastoma [9]. Some patients may also complain of associated pain with varying degrees of intensity and occasional paresthesia. The pain is caused by occlusal pressure resulting from extrusion of the tooth caused by pressure from the tumor [10], other patients may be completely asymptomatic [11]. The clinical and radiographic features may be varied, causing difficulties in definitive diagnosis and patient management. The diagnosis is rarely made before significant bone expansion occurs [12].

In the present case, the radiographic presentation was not the classic presentation reported by other authors: a radiopaque mass most often fused with the root or roots of a tooth, surrounded and limited peripherally by a radiolucent halo [1, 13]. On the contrary, the two-dimensional image of the lower right first molar presented an ill-defined radiolucent image associated with mild sclerosis. Based on these images, the diagnosis formulated was an inflammatory cyst or a granuloma and focal cemento-osseous dysplasia (FCOD) [6, 12]. Inflammatory conditions of the pulp were differentiated by performing tests of pulp vitality, such as the electrical, heat and cold tests. FCOD cannot be distinguished radiographically from an early developing cementoblastoma; both would be associated with vital teeth. The biopsy of FCOD will yield gritty haemorrhagic fragments of tissue because the lesion is difficulty to separate from the adjacent bone [13].
A few authors have reported a more radiolucent form of the lesion, and they assumed that it represented an early uncalcified matrix stage [14]. Depending on the stage of maturation, the radiological appearance and clinical interpretation may vary. Occasionally, transitional zones are present between the tumour mass and the tooth substance, so radiographically, opacity gradations at the tumour root structure are hazy and indistinct. Immature lesions are radiolucent, and the differential diagnosis might include an inflammatory cyst, osseous dysplasia, central giant cell lesion or ameloblastoma [8,15].

Radiographically, the cementoblastoma is adhered to the apical or lateral area of the root and appears as a dense radiopaque mass, well defined and circumscribed by a thin radiolucent and uniform halo [9,15]. Radiographic image aspects (such as signs of root resorption, loss of contour of the root, obliteration of the periodontal space) associated with the vitality of the involved tooth are precise, pathognomonic signs [3,16]. All of these signs can be seen in two-dimensional images, but that is not what occurred in the present case: root resorption and loss of contour of the root were not visualized. Therefore, in early lesions, when the two-dimensional images do not show defined characteristics, three-dimensional images become necessary. The CBCT images showed no root resorption, however, the CBCT in the axial, coronal and sagittal planes showed, in detail, lesion attachment to the roots at an early stage, discrete jaw expansion and perforation of the cortex, which facilitated diagnosis. These features associated with the histopathological picture allowed the final diagnosis.

In its histological aspects cementoblastoma may sometimes resemble osteoblastoma, or atypical osteosarcoma, and may be difficult to distinguish from these tumours. Osteoblastoma and cementoblastoma are essentially identical histologically; the only distinguishing feature is the attachment of cementoblastoma to the root of the tooth [1,5,17-19]. In cases of osteoblastoma, the symptoms of pain are reduced with the use of a non-narcotic analgesic. The osteoblastoma produces a round, well-demarcated, lytic radiolucent lesion surrounded by a zone of reactive sclerosis [12]. In contrast to the osteoblastoma, the cementoblastoma is an odontogenic tumour that recapitulates cementum deposition, similar to what occurs during formation in the late stages of odontogenesis [12]. Histologically, the cementoblasts in cementoblastoma may be plump with pleomorphic and hyperchromatic nuclei; however, mitotic figures are not seen in cementoblastoma like they are in osteosarcoma [20]. Differentiation of the aforementioned lesions from cementoblastoma requires correlation with radiographic findings, including proximity of the lesion to the roots as well as clinical information, such as age, gender, location and symptoms. Such an approach will allow the clinician to make a definitive diagnosis of these lesions [21].

The usual treatment for cementoblastoma is complete surgical excision because the tumour has the potential for unlimited growth. Extraction of the associated tooth is necessary because of the fusion of the lesion to the root cementum, even though the pulp may be vital [8,9,15]. Although this type of early lesion is rarely seen two-dimension image, it is important to increase the awareness of this condition among dentists. In conclusion, because of the characteristics of cementoblastoma, the CBCT images are a resource of fundamental importance for evaluation of pathognomonic features related to fusion of the tumour at the root of the tooth in the early stages of development.

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