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Traumatic bone cyst with a rare anatomical record of inferior alveolar nerve branching: a case report

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CASE REPORT

ABSTRACT

Introduction: Traumatic bone cyst is a benign intraosseous lesion, often asymptomatic, characterized radiographically by a radiolucent area with defined contours, which may exhibit a classic "glove fingers" appearance, due to its rounded invasion of the interdental spaces. **Case Report**: A 12-year-old female patient presented with an asymptomatic lesion in the posterior region of the right mandible, identified radiographically. Imaging tests, such as periapical radiography and Cone Beam computed tomography, revealed a well-defined radiolucent and hypodense area close to the mandibular canal, without involvement of the bone cortex. Surgical exploration confirmed the absence of membrane or content, characterizing the traumatic bone cyst. During the procedure, a rare anatomical finding was recommended: a branching of the inferior alveolar nerve towards the root of the second right lower molar. **Discussion**: Confirmation of the diagnosis of traumatic bone cyst requires surgical intervention due to pseudocystic nature, without epithelial lining. The rare anatomical finding in this case was only possible due to the specific characteristic of the lesion in promoting selective subtraction of the bone marrow, preserving the local neurovascular bundles. The conservative approach proved to be effective in stimulating the bone regeneration process in a non-invasive manner. **Conclusion**: Knowledge in identifying the specific imaging characteristics of traumatic bone cysts guaranteed the early diagnosis that motivated the conservative approach. Appropriate management of the traumatic bone cyst promoted complete bone repair after 6 months. The documentation of rare anatomical findings appears to be specific for this type of lesion.

Keyword: Bone Cysts, Mandibular Nerve, Conservative Treatment, Bone Regeneration.

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INTRODUCTION

A traumatic bone cyst is a benign intraosseous lesion, considered a pseudocyst, due to the absence of an epithelial lining and liquid or semi-solid content inside [1], [2], [3]. Its etiology is not yet fully understood, but it is often associated with histories of local trauma or bleeding disorders that lead to clots within the bone, potentially resulting in selective bone resorption [4]. The incidence is more often in young patients, between the second and third decades of life, with a predilection for the posterior region of the mandible [5], [6].

From a clinical point of view, the lesion is usually asymptomatic, being frequently identified in routine radiographic examinations or during evaluations for other dental conditions [5], [7].

Radiographic images are characterized by a unilocular radiolucent area, well-defined contours, may involve interdental spaces and present the characteristic appearance of "glove fingers" in periapical radiographs. This pattern is crucial for formulating the diagnostic hypothesis [8]. Diagnostic confirmation, however, requires surgical intervention, at which point the absence of membranes or contents inside the cavity can be observed. This peculiarity distinguishes the traumatic bone cyst from other true cysts or aggressive tumor lesions, which may mimic its radiographic appearance [9], [10].

In the current context, surgical documentation of rare anatomical findings is extremely relevant to the scientific literature. The present report describes a case of traumatic bone cyst with an unusual finding: the branching of the inferior alveolar nerve, innervating the root region of the first lower right molar [11]. This anatomical finding was possible due to the extent and behavior of the lesion, which promoted the selective subtraction of bone tissue, revealing delicat neurovascular structures. In addition, the importance of imaging diagnosis in guiding therapeutic conduct is highlighted, avoiding unnecessarily invasive treatments and promoting a favorable prognosis [3].

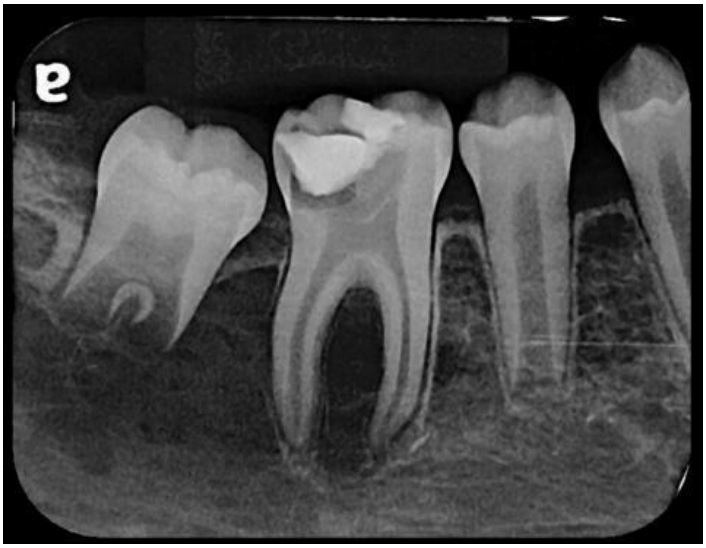
This study aims to present a case report of a traumatic bone cyst, highlighting the characteristic radiographic appearance, adequate surgical management and the rarity of the anatomical findings recorded during exploration of the lesion.

CASE REPORT

A 12-year-old female patient visited the oral and maxillofacial surgery office accompanied by her mother for a second opinion regarding a lesion. During the consultation, the mother

provided radiographic findings suggestive of an intraosseous lesion located in the posterior region of the right mandible. The patient reported no symptoms, denying any history of pain, infections or recent trauma in the region. The periapical radiograph (Fig. 1) showed a well-defined radiolucent area, located in the region of the lower molars (46 and 47), without compromising the cortical bones, highlighting the relationship of the lesion with the mandibular canal.

Figure 1. Periapical radiograph showing the lesion in the region of elements 46 and 47.

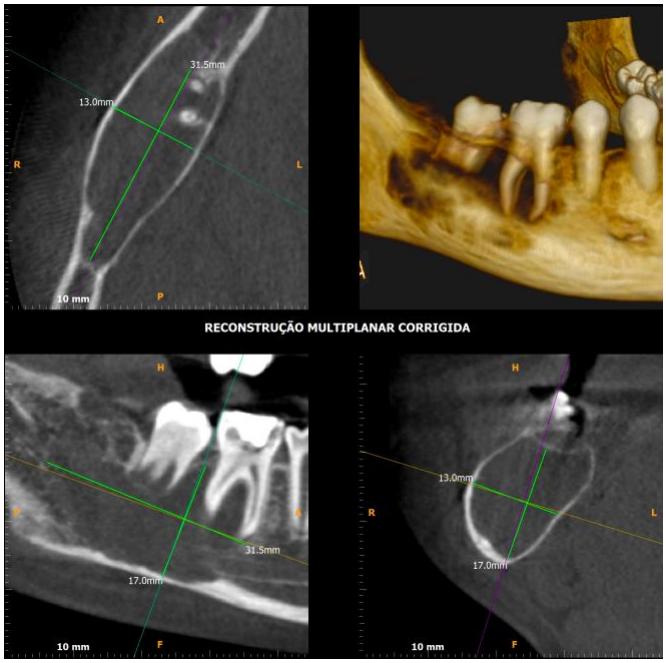


Source: Case Archive

The periapical radiograph revealed the classic "glove fingers" pattern, characteristic of a traumatic bone cyst, with the lesion surrounding the interdental spaces and close to the roots of teeth 46 and 47, with no signs of root resorption (benign behavior).

Cone beam computed tomography (CBCT) (Fig 2) provides detailed sections in the axial, sagittal and coronal planes, with precise measurements of the lesion. The hypodense cavity had dimensions of 31.5 mm in height, 13.0 mm in width and 17.0 mm in depth, with well-defined contours and proximity to the mandibular canal without signs of invasion. Three-dimensional (3D) reconstruction confirmed mild expansion of the vestibular bone plate and preservation of the adjacent root structures.

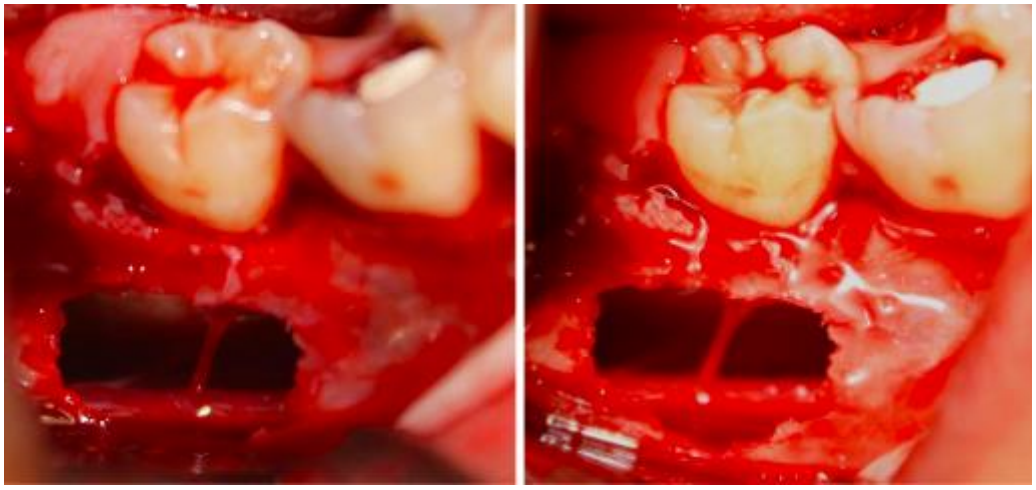
Figure 2. Cone Beam Computed Tomography Source: Patient case file.



Source: Case Archive

Based on the imaging findings, which showed a “glove-like” appearance between teeth 46 and 47, the clinical and imaging diagnosis of a traumatic bone cyst was established. A conservative approach was then planned for specific treatment of the lesion, through surgical exploration to confirm the diagnosis (Fig 3), which also served as treatment by inducing intraosseous bleeding and promoting adequate tissue repair. The procedure was performed under local anesthesia, with incision and elevation of a mucoperiosteal flap. The mandibular vestibular bone plate was accessed using low-speed drills. During exploration, the absence of membrane or content inside the bone cavity was observed, confirming the surgical diagnosis of a traumatic bone cyst (Fig 3).

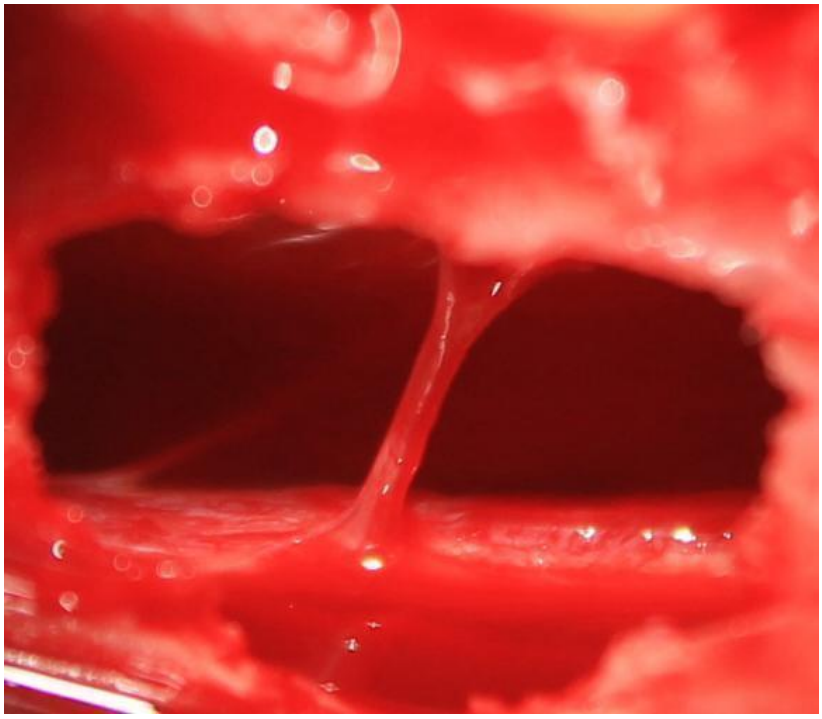
Figure 3. Surgical exploration of the lesion to confirm the diagnostic hypothesis Source: Patient case file.



Source: Case Archive

The main anatomical finding was the visualization of the inferior alveolar neurovascular bundle and a thin branch (Fig 4), extending toward the root of the second lower molar (47).

Figure 4. Inferior alveolar vascular-nervous bundle with the branch for element 47 Source: Patient case file.



Source: Case Archive

The treatment consisted of promoting controlled internal bleeding of the cavity, to stimulate the bone repair process. The patient was advised and monitored through periodic clinical and radiographic evaluations. Currently, after 6 years of follow-up, complete bone regeneration of the region has been observed, with no recurrence and a successful treatment outcome (Fig 5).

Figure 5. Panoramic image of the case after 6 years of follow-up.

Source: Case Archive

DISCUSSION

Traumatic bone cyst is an uncommon lesion with a controversial etiology. Its relationship with local trauma and intraosseous hemorrhage is widely suggested in the literature, but studies indicate that not all patients report a history of overt trauma. This condition has led to discussions about other pathophysiological mechanisms, such as metabolic alterations, bone development defects, and genetic factors that may predispose to selective bone tissue resorption [1], [6]. The present case was especially relevant due to the patient's age and the presence of the classic "glove fingers" radiographic pattern, an aspect considered pathognomonic for the diagnosis of traumatic bone cyst [8].

From an anatomical perspective, the identification of a rare branch of the inferior alveolar nerve innervating the first lower molar represents a significant finding. To date, the authors

have not found similar reports in the literature. This finding highlights the importance of knowing how to interpret two-dimensional imaging exams and applying specific knowledge in initial diagnoses. However, in some cases, higher resolution exams may be required for better planning and execution of surgical procedures [12], [13].

Another relevant point of discussion is the therapeutic approach. Although traumatic bone cysts are considered benign and self-limiting lesions, their resemblance to other cystic and tumoral lesions can lead to misdiagnosis and unnecessarily invasive treatments [14]. Studies have shown that conservative surgical exploration, including cavity curettage and control of internal bleeding, is sufficient to stimulate the bone repair process, as evidenced in this case [15]. The favorable clinical progression, with radiographic follow-up for 6 years, corroborates the efficacy of this approach and reinforces the importance of long-term monitoring to rule out recurrences [16].

This case not only contributes to the understanding of traumatic bone cysts, but also highlights the relevance of image interpretation during the search for a diagnosis. The conservative approach proved to be effective in this clinical case. The documentation of anatomical findings demonstrates the rarity of this condition, which appears to be specific to this type of lesion and provided the in vivo visualization of an exceptionally delicate structure, which may not be possible otherwise.

CONCLUSION

The study highlights the effectiveness of conservative surgical exploration in the management of traumatic bone cysts, promoting controlled internal bleeding to stimulate bone repair. The rare anatomical finding of the inferior alveolar nerve branch reinforces the importance of a precise and minimally invasive approach. The clinical success, demonstrated by complete bone restoration after 6 years of follow-up and absence of recurrences, highlights the benefits of this conservative approach in the treatment of injuries. In addition, the interpretation of lower resolution exams should be interpreted first, as they can guide the diagnosis. However, in some cases, three-dimensional images are necessary for better visualization of the case.

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