

Diagnosis and Management of Traumatic Bone Cyst of Mandible in a 12-year-old Child: A Case Report

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ABSTRACT

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A traumatic bone cyst (TBC) is an atypical jaw lesion that is frequently asymptomatic, slow-growing, and typically associated with trauma. Injury to the permanent teeth affects not just the tooth itself but also the pulp, periodontal ligament (PDL), alveolar bone, gingiva, and other related components. These lesions are unexpectedly detected in routine radiographic examinations as unilocular radiolucencies with scalloped borders. Associated teeth are usually vital with no resorption or displacement. The incidence of cysts affecting the jaws is 1% of all cysts. Nearly 89% of the lesions occur in the mandible and 11% in the maxilla. It can lead to complications such as pain, swelling, tooth sensitivity, fistulas, root resorption, and in rare cases, pathologic fractures, or paresthesia.

This article presents a case 12-year-old female patient diagnosed with TBC in the anterior mandible managed endodontically and with surgical curettage. An uneventful healing was seen at 6-month follow-up.

Keywords: Mandible, Periapical lesions, Radiographic examination, Traumatic bone cyst.

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INTRODUCTION

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Periapical lesions of the oral region are of two types: Odontogenic and developmental (nonodontogenic) origin.¹ Regular dental check-ups can aid in the early detection of periapical lesions, minimizing potential complications. The majority of lesions found in the periapical area are derived from pulpal inflammation or necrosis and are referred to as endodontic periapical lesions (EPLs). However, several other conditions unrelated to the pulp health of the involved and/or neighboring teeth can also arise in the periapical area, potentially resembling an EPL.^{2,3}

In dentistry, an accurate diagnosis is fundamental for effective clinical management. Dental diagnosis should be seen as a synthesis of the obtained history, clinical examination, special tests, and radiological examination, rather than the outcome of one specific test. The main objective is to identify the cause, understand the type of lesion, and determine the tissue involved, as well as whether it represents a developmental disturbance. This, in turn, along with the diagnostic process, aids in developing the differential diagnosis and treatment alternatives.⁴

In endodontic periapical lesions (EPLs), the initial inflammatory stage is acute apical periodontitis characterized by widening of the periodontal ligament (PDL), pain, and swelling. Chronic lesions may also be present as painless, asymptomatic lesions at the periapical area. Most of the nonodontogenic origin lesions are asymptomatic and lack cardinal signs of inflammation, such as heat, redness, and pus discharge.³

Traumatic bone cyst (TBC) is an intraosseous cyst that is typically located in the mandibular region of young patients.⁵ The most widely accepted etiological theory suggests bleeding within bone due to trauma, in which incomplete resolution of intramedullary hemorrhagic materials results in empty bone cavity formation.⁶ Most individuals are clinically asymptomatic, and the lesion is found

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during a regular dental radiographic examination.⁵ The incidence of cysts affecting the jaws is 1% of all cysts. Nearly 89% of the lesions occur in the mandible and 11% in the maxilla. It can lead to complications, such as pain, swelling, tooth sensitivity, fistulas, root resorption, and in rare cases, pathologic fractures or paresthesia.⁷

The purpose of this paper is to report the diagnosis and management of a TBC in a 12-year-old female patient.

CASE DESCRIPTION

A 12-year-old girl was referred by her orthodontist due to the presence of a radiolucent lesion in the symphysis region of the mandible. The lesion was discovered during a radiographic examination before orthodontic treatment and was referred to the Department of Pediatric and Preventive Dentistry for further evaluation and treatment. During her visit, the patient complained of pain in the lower front tooth region since 3–4 days, presented with a history of trauma due to a hit from a volleyball in the chin

region 2 years back, and had no memory of pain, swelling, or any other associated symptoms. The patient did not consult any doctor for the same at the time of injury. On clinical examination, there were no extraoral findings. Intraorally, buccal vestibular swelling was seen in 44–34 region, and overlying mucosa was free from inflammation, and elicited tenderness on palpation of the swelling (Fig. 1).

The panoramic view revealed a well-defined unilocular radiolucency with a sclerotic border in the periapical area from 43 to 33 with a typical scalloped shape between the roots of the concerned teeth, measuring about 4 × 4 cm. (Fig. 2) Heat and electric pulp testing of 43 showed no response, and 42 showed delayed response (Fig. 3).

A cone-beam computed tomography (CBCT) confirmed a well-defined hypodense cystic lesion in the alveolar cortex of the mandible in the region of right canine to left canine measuring approximately 27.72 × 18.21 mm, with axial section showing expansion of the lingual cortical plate and sagittal section showing thinning of the labial and lingual cortical plate and the lower border of the mandible (Fig. 4).

Treated endodontically, access opening in 42 and 43 revealed necrotic pulp (Fig. 5). Considering the periapical lesion, Ca(OH)₂ dressing was given, and aspirational biopsy was planned, which gave negative results; hence, surgical excision of the lesion was planned. Parents' consent was taken before the treatment.

Under local anesthesia, the lesion was exposed by access window *via* the buccal cortical bone, and only one small blood clot was visualized in the osseous socket, which was carefully curetted and filled with fresh blood, and sutures were placed (Fig. 6). After 1 week, sutures were removed, and at subsequent appointments, obturation followed by composite restoration was done (Fig. 5) At 6-month follow-up patient showed satisfactory healing (Fig. 7).

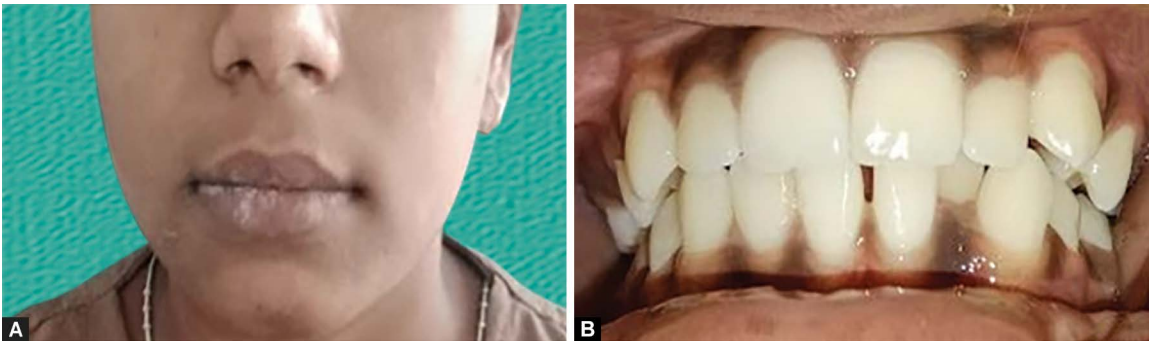
DISCUSSION

Dental trauma is the injury sustained by a tooth and its supporting structures from acute transmission of impact energy that involves not only the teeth but also the pulp, the PDL, the alveolar bone, the gingiva, and other associated structures.⁸ Tissue responses will determine the treatment required for the involved teeth.⁹ In this case, it is the combination of the response of the tooth and the surrounding alveolar bone leading to the formation of TBC.¹

In the present case, the impact and direction of force would have caused the changes in the surrounding bone, leading to destruction by enzymatic activity. The temporary compressive, tensile, or shear stresses result in hemorrhage and edema, causing rupture and contusion of the PDL. Each of these injuries can induce various wound-healing signals.¹⁰ Different etiological factors have been proposed for the occurrence of TBC: Bone tumor degeneration, altered calcium metabolism, low-grade infection, local bone growth alterations, venous obstruction, increased osteolysis,



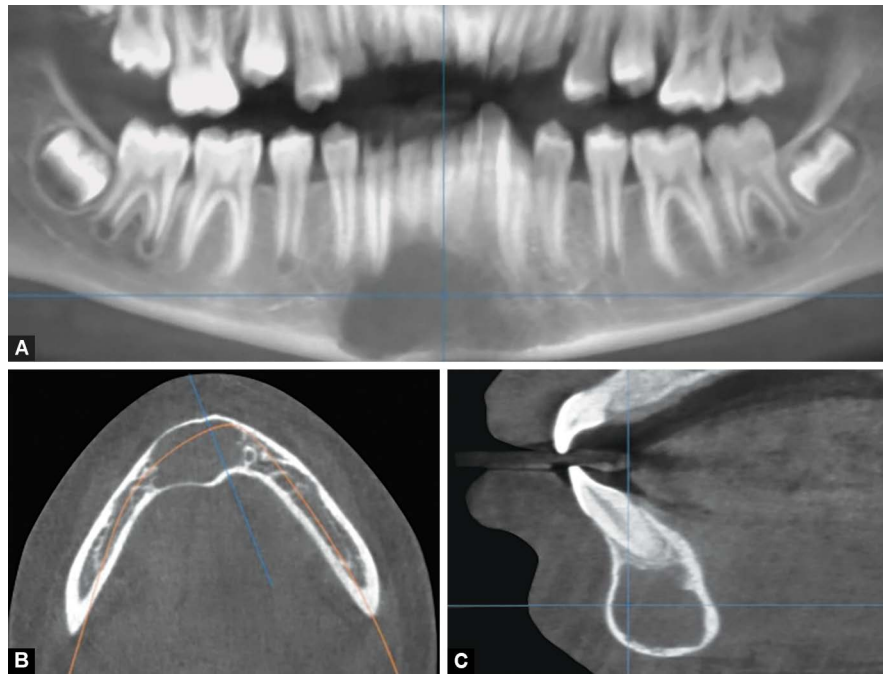
Fig. 2: Orthopantomograph



Figs 1 A and B: (A) Extraoral photograph; (B) clinical examination



Fig. 3: Heat testing and electric pulp testing



Figs 4A to C: (A) Cone-beam computed tomography; (B) axial view; (C) cross-sectional view

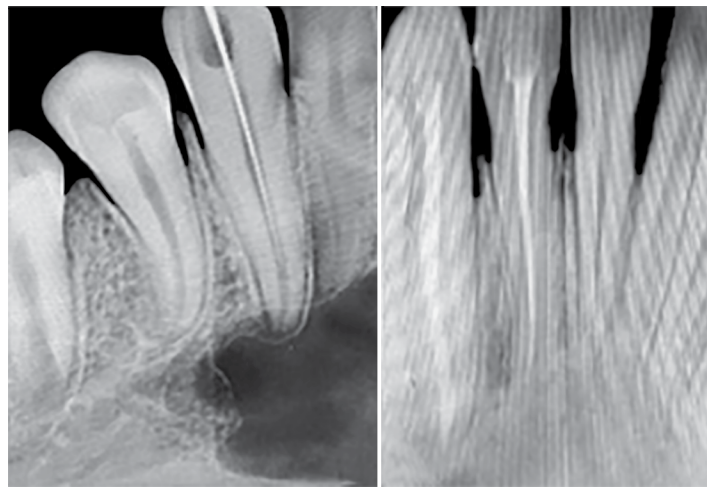


Fig. 5: Endodontic treatment in 42 and 43



Fig. 6: Surgical exploration

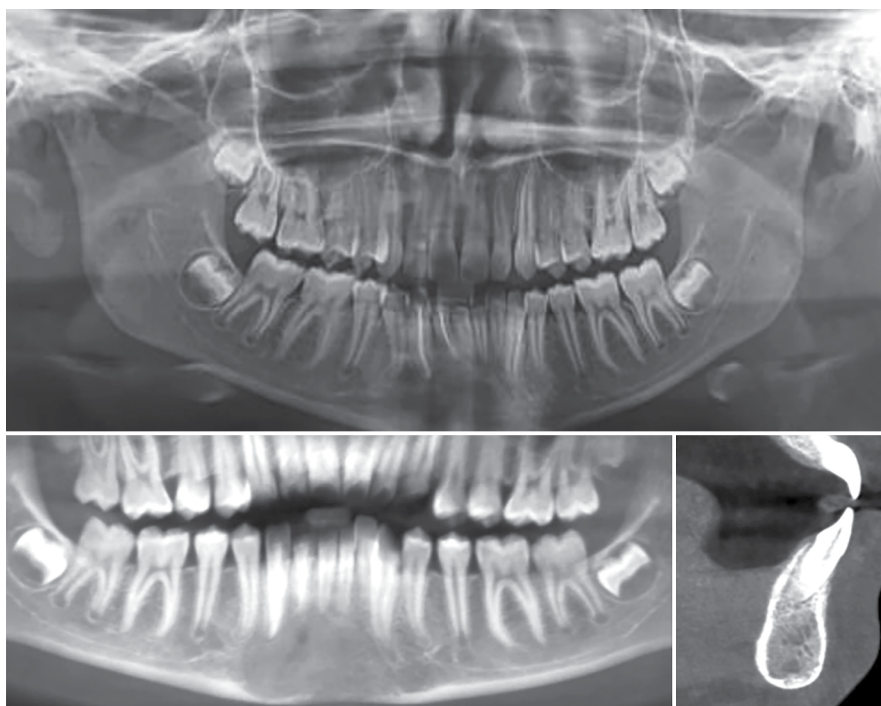


Fig. 7: Orthopantomograph and CBCT at 6-month follow-up

intramedullary bleeding, local ischemia, sometimes combination of these factors have been suggested, with any trauma, including tooth extraction, potentially leading to this type of cyst.¹

Although TBC is asymptomatic, a tiny proportion of individuals have reported experiencing associated oedema, pain, and paraesthesia.¹¹ In the present case, 42 and 43 were treated with root canal treatment to relieve the pain. The dental pulp is often involved in dental trauma. There are two main scenarios involved in pulp injuries. The first one is direct pulp exposure in case of uncomplicated/ complicated crown fractures. The second scenario as seen in the present case, is that the pulp may also be “sterile-exposed” to the PDL following the rupture or severance of the neurovascular supply to the pulp, which may occur at the apical foramen as seen mostly in luxation injuries or due to the enlargement of the lesion cavity affecting the integrity of vital structures compromising and rupturing the vascular supply leading to infarction and coagulation necrosis of the pulp.⁹

The diagnosis of traumatic cyst depends mostly on clinical and radiological findings, as done in the current scenario. However, they may be mistaken for a wide range of odontogenic cysts, malignant neoplasms, and other radiolucent lesions of the bone. The management involves surgical exploration of the cystic cavity, which followed by curettage allows rapid resolution. Other treatment methods include aspiration or injection of autogenous bone. Because of recurrence (between 2 and 26%), radiographic and clinical follow-up is strongly advised.¹²

CONCLUSION

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In conclusion, any mandibular swelling with no symptoms in a young patient with or without a traumatic history would lead to a suspicion of TBC. Since the features of this cyst can be varied, correlation of clinical, radiographic, and histological examinations is required as soon as possible for a young adult who presents with bony enlargement of the mandible

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in attaining a definitive diagnosis. Surgical exploration of larger lesions will expedite healing and promote healthy bone formation.

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