Traumatic Bone Cyst of Mandible

L. K. Surej Kumar · Nikhil Kurien ·
Khaleel Ahamed Thaha

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Abstract The traumatic bone cyst, an uncommon lesion of the jaws, belongs to the category of ‘pseudocyst’ owing to its lack of a lining epithelial membrane. It is an asymptomatic lesion, which is often diagnosed accidentally during routine radiological examination commonly present in the posterior mandible as a unilocular radiolucency with scalloping borders. The exact etiopathogenesis of the lesion is still debated, though the role of trauma is often associated. Here we report a rare case of traumatic bone cyst in the anterior mandible, in a 16-year-old female patient with a previous history of trauma to chin; diagnosed and treated successfully in our surgical unit. The case is discussed in relation to its clinical presentation, etiopathogenesis, diagnosis, management and prognosis.

Introduction

Traumatic bone cyst was first described by Lucas and Blum [1] in 1929 as separate disease entities, it is an uncommon lesion that may be incidentally diagnosed on routine dental treatment. The diagnostic criteria of the cyst was established in 1946, according to which traumatic bone cyst is a single lesion without an epithelial lining, surrounded by bony walls and either lacking contents or containing liquid

and connective tissue. The lesion often presents asymptotically without any bone expansion, the most common location being the posterior mandible.

WHO classified traumatic cyst as a non neoplastic osseous lesion due to absence of epithelial lining, which demarcates it from other true cysts and is being included along with other lesions like aneurysmal bone cyst, fibrous dysplasia, ossifying fibroma, osseous dysplasia, central giant cell granuloma and cherubism.

The origin of lesion remains unresolved which is also known by variety of names like solitary bone disease, progressive bone cyst, traumatic hemorrhagic cyst, extravasation cyst, hemorrhagic extravasation cyst, unicameral cyst etc. [2].

The lesion is mostly diagnosed in patients below 30 years of age with an approximate mean age of 20 years [3]. Though some studies have found no gender predilection, some state a masculine predominance [2, 4]. In majority of the cases the cyst remained asymptomatic and is revealed during routine radiographic examination.

Radiographically traumatic bone cyst presents as a radiolucent image with well defined irregular or scalloped margins. Confinement of the lesion within medullary bone seldom exhibits cortical plate expansion. Tooth resorption is rare.

The article reports an uncommon case of Traumatic bone cyst of anterior mandible which was surgically managed in our unit.

Case Report

A 16-year-old female was referred to the Oral and Maxillofacial Surgery Unit, for evaluation of an asymptomatic

L. K. Surej Kumar (✉) · N. Kurien · K. A. Thaha
Department of OMFS, PMS College of Dental Science and
Research, Golden Hills, Vattapara, Trivandrum, Kerala, India
e-mail: surejkumarlk@gmail.com

L. K. Surej Kumar
Department of OMFS, PMS College of Dental Science and
Research, 10-C, Alpine heights, Near AIR, Vazhuthacaud,
Trivandrum 695014, Kerala, India

unilocular radiolucency of anterior right mandible which was discovered as part of routine radiographic screening for orthodontic treatment (Fig. 1). Patient revealed no contributory medical history, but reported a minor trauma to the chin 10 years back. She was asymptomatic since then.

On local examination the teeth were vital and they responded normally to both thermal and electrical pulp testing. Periodontitis was ruled out so was caries and fracture of teeth. No swelling or draining sinuses were noticed and the overlying mucosa was normal.

On radiographic examination, panoramic view revealed a $1 \times 1.5 \text{ cm}^2$ unilocular lobulated radiolucent area with sclerotic border extending from inferior aspect of apices of lower right central incisor to canine, 1.5 cm above the inferior border of mandible. Lobulated extensions were well defined between lateral incisor and canine. Radiolucency between the teeth showed scalloping, but lamina dura of all teeth involved were found to be intact. There was no expansion of buccal or lingual cortical plates. Aneurysmal bone cyst or traumatic bone cyst was suspected.

Surgical exploration was done under local anesthesia. Intraoperatively a bluish hue was seen over the labial bone (Fig. 2). Aspiration revealed a negative result. The thin bone covering was removed with a sharp instrument (Fig. 3). On exploration an empty cavity with bare bone was found (Fig. 4). The walls were curetted to induce “fresh” bleeding and wound closure was done with 4-0 vicryl.

As the instrumentation closely involved the roots of lateral incisor, canine and first premolar, the patient was advised intentional root canal treatment of these teeth as per endodontic opinion.

Post operative period was uneventful and the patient was reviewed at 3 and 6 months intervals. Panoramic radiograph was taken after 6 months (Fig. 5) which revealed excellent wound healing with adequate bone formation.

Fig. 1 Preoperative panoramic radiograph showing unilocular radiolucency apical to mandibular right anterior teeth

Fig. 2 Bluish hue over the bone

Fig. 3 Initial exploration using a sharp instrument

Fig. 4 Internal view of lesion showing empty cavity with bare bone

Fig. 5 Post operative panoramic radiograph after 6 months revealing adequate bone formation

Discussion

Traumatic bone cysts are generally detected in patients in the second and third decade of life, though in 15% it was found above 40 years of age [5]. As in most cases the lesion remains asymptomatic and it is mostly discovered during routine radiographic examination [6]. The present case also harmonizes the above mentioned features.

Traumatic bone cyst occurs in the mandible predominantly in the posterior region, usually extending from canine to third molar region [7]. However, in our case the lesion was located in the mandibular anterior region extending from central incisor to distal aspect of canine; a variation from common.

Considering the diversity of theories put forward in the literature, whatever the location of traumatic bone cyst, the etiology remains unclear. Among the many theories, three predominate: (1) an abnormality of osseous growth, (2) a degenerating tumoral process, and (3) a particular factor triggering hemorrhagic trauma. The first theory arose from clinical observations, the time of diagnosis (preadolescence or adolescence), and the development within or near osseous remodeling areas. The earlier term osteodystrophic cysts support this hypothesis.

In the mandible, the primary ossification spot is located near the mental foramen. Because this area is the preferential zone of traumatic bone cyst occurrence, it is possible to consider the hypothesis of an abnormality in cellular differentiation during ossification and growth related to local environmental factors inducing mechanical constraints during osteogenesis and angiogenesis.

The tumour degeneration theory is based on the fact that most of the cases were reported in osteodystrophic pathological conditions, such as fibrous dysplasia and central giant cell granuloma. The liquefaction in the middle part of a central giant cell granuloma is purported to lead to cyst formation, and hence is likened to a healing process.

Among the various etiologic factors coined for occurrence of traumatic bone cyst, the role of trauma has been constantly highlighted [8]. It is believed that trauma leads to intraosseous hematoma formation. The blood clot formed undergoes liquefaction and eventually the ensuing enzymatic activity results in destruction of adjacent bone. Thoma suggested that trauma initiates a subperiosteal hematoma that causes a compromised blood supply to area leading to osteoclastic bone resorption [9]. Vascular alterations are supposedly related to the resorption phenomena. The process by which osteoclasts differentiate remains unknown. Nevertheless, the traumatic etiology hypothesis is challenged by the fact that more than 50% of cases have no traumatic history. Moreover, the preferential sites of long-bone traumatic bone cysts are not systematically found at the most exposed areas. This theory could

apply to the mandible due to numerous micro traumas to the teeth and alveolar process.

Literature review has shown that traumatic bone cyst occurred together with cemento-osseous dysplasia. Cystic degeneration has been reported in patients with fibrous dysplasia which resulted in a non epithelial lined cavity. However, in the jaw bones and extracranial bones, fibrous dysplasia accompanied aneurysmal bone cyst rather than traumatic bone cyst [10].

The radiographic features are characterized by the radiolucency with well defined irregular or scalloped borders. Involvement of the radiolucency into the interdental bone spaces, presents a lobular, scalloped or festooned pattern [11]. The radiographic appearance here coincides well with the above mentioned features, like lobulation between the lateral incisor and canine, and appearance of sclerotic border around the lesion and scalloping; which classically suggests Traumatic bone cyst.

A high recurrence rate in cases with a scalloped margin (multilocular appearance) was confirmed in a long-bone study. This has not been assessed in jawbones, although it was observed in a recent study a recurrence rate of 65.4% (17/26) of cases with a scalloped margin versus 4.8% (1/21 cases) of cases with a smooth margin. Therefore, a scalloped margin is a sign of possible recurrence, although this should not be confused with the interdental scalloping associated with an intact lamina dura.

Classically histological presentation is a vacant cavity of cancellous bone usually unlined or very occasionally lined with a thin connective tissue layer with a scant liquid content. The hall mark of traumatic bone cyst is the absence of epithelial lining. One of the reviews [12] have shown that in only 9.52% of the cases could a histological evaluation be made of the material obtained, revealing the presence of vascular connective tissue without evidence of an epithelial component. This suggests that the absence of epithelial tissue is one of the most characteristic features of these lesions. In our case, on exploration; bare bone was seen and no sample could be collected for histopathological examination.

When discovered early, the lesion usually contains blood or serosanguineous fluid. The fluid aspirated from the cyst cavity usually has electrolyte and protein concentrations similar to that of serum. It is suggested that the fluid is extravasated blood [13]. The amount of fluid diminishes with the age of the lesion, and the lesion eventually becomes empty. In the case presented, the cystic lesion was devoid of fluid.

Diagnosis of Traumatic bone cyst prior to surgical intervention is greatly difficult in most of the instances. Surgical exploration not only confirms the diagnosis but also is curative as the curettage performed during the procedure induces bleeding and further osseous

regeneration [3]. Other alternative treatments such as filling of cavity with bovine lyophilized bone or introduction of autologous blood with bone from the patient or hydroxyapatite is also advocated [14]. In the present case, careful curettage of the lesion itself favoured bone formation and healing.

Traumatic bone cyst is an asymptomatic lesion, mostly discovered during routine radiographic examination. The lesion seldom causes any complications, but the possibility of pathologic fracture in larger lesions cannot be completely ruled out. Moreover, simple surgical intervention and careful curettage to induce bleeding can itself lead to resolution of smaller lesions. For larger lesions other alternatives like bone grafting or the use of synthetic materials like hydroxyapatite, bio-glass etc. could favour a harmonious outcome.

References

1. Cortell-Ballester I, Figueiredo R, Berini-Aytés L, Gay-Escoda C (2009) Traumatic bone cyst: a retrospective study of 21 cases. *Med Oral Pathol Oral Cir Bucal* 14(5): E239–43, 1 May 2009
2. Ahmed KA, Al-Ashgar F (1991) Maxillary solitary cyst: review of literature and case report. *Saudi Dent J* 3(3):109–113
3. Donkor P, Punnia-Moorthy A (1994) Biochemical analysis of simple bone cyst fluid—report of a case. *Int J Oral Maxillofac Surg* 23(5):296–297
4. Dellinger TM, Holder R, Livingston HM, Hill WJ (1998) Alternative treatments for a traumatic bone cyst: a longitudinal case report. *Quintessence Int* 29(8):497–502
5. Freedman GL, Beigleman MB (1985) The traumatic bone cyst: a new dimension. *Oral Surg Oral Med Oral Pathol* 59:616–618
6. Lucas CD, Blum T (1929) Do all cysts in the jaws originate from the dental system? *J Am Dent Assoc* 16:647–661
7. Toller PA (1964) Radioactive isotope and other investigations in a case of haemorrhagic cyst of the mandible. *Br J Oral Surg* 2:86–93
8. Xanthinaki AA, Choupis KI, Tosios K, Pagkalos VA, Papanikolaou SI (2006) Traumatic bone cyst of the mandible of possible iatrogenic origin: a case report and brief review of the literature. *Head Face Med* 2:40
9. Beasley JD III (1976) Traumatic cyst of the jaws: report of 30 cases. *J Am Dent Assoc* 92(1):145–152
10. Hansen LS, Sapone J, Sproat RC (1974) Traumatic bone cysts of jaws. *Oral Surg Oral Med Oral Pathol* 37(6):899–910
11. Swei Y, Taguchi A, Nagasaki T, Tanimoto K (2010) Radiographic findings and prognosis of simple bone cysts of the jaws. *Dentomaxillofac Radiol* 39(2):65–72
12. Hara H, Ohishi M, Higuchi Y (1990) Fibrous dysplasia of the mandible associated with large solitary bone cyst. *J Oral Maxillofac Surg* 48(1):88–91
13. Saito Y, Hoshina Y, Nagamine T, Nakajima T, Suzuki M, Hayashi T (1992) Simple bone cyst. A clinical and histopathologic study of fifteen cases. *Oral Surg Oral Med Oral Pathol* 74(4):487–491
14. Thoma KH (1955) A symposium on bone cysts (editorial). *Oral Surg* 8:899–901