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Solitary Bone Cyst in the Mandibular Symphysis

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Abstract

Solitary bone cysts, more commonly known as traumatic bone cysts, are a little-known disorder of the maxilla. These multiple names illustrate the theoretical proposals to explain the etiopathogenesis of solitary cysts. Since it has no membrane, it is classified as an intraosseous pseudo cyst. It most often occurs in the 2nd decade of life, preferentially affecting the mandibular bone. It is generally asymptomatic and is discovered by chance on radiological examination. Surgical exploration confirms the diagnosis with the discovery of an empty cavity or a cavity filled with a serohematic fluid. The aim of this paper is to illustrate, through a clinical case, the diagnostic and therapeutic approach employed in managing solitary bone cysts.

Subject Areas

Oral Surgeon

Keywords

Solitary Bone Cyst, Traumatic, Mandibular

1. Introduction

Solitary bone cysts (SBC) are non-neoplastic bone lesions, first described by Lucas and Blum in 1929 as distinct disease entities that may be discovered incidentally during routine dental procedures [1] [2] [3].

The diagnostic criteria for this cyst were established in 1946, defining a traumatic bone cyst as a solitary lesion without an epithelial lining, surrounded by bony walls, and either devoid of contents or filled with liquid and connective tissue [4].

Hemorrhagic bone cyst, extravasation cyst, progressive bone cavity, simple bone cyst, and unicameral bone cyst are among the various names used in the literature to refer to this cyst. However, the World Health Organization has rec-

ommended the term "solitary bone cyst" since 1992 [2] [3].

According to the World Health Organization classification (2023), solitary bone cysts are classified within a group of giant cell lesions and bone cysts. This group includes also aneurysmal bone cyst, peripheral giant cell granuloma, central giant cell granuloma, and cherubism.

The article reports an uncommon case of traumatic bone cyst of anterior mandible which was successfully diagnosed and treated within our surgical unit. The case is thoroughly discussed concerning its clinical presentation, etiopathogenesis, diagnostic approach, management, and prognosis.

2. Case Report

A 16-year-old male was referred to the Oral Surgery Unit for assessment of an asymptomatic unilocular radiolucency in the anterior mandible, which was identified during routine radiographic screening for orthodontic treatment. The patient did not disclose any relevant medical history.

The exobuccal clinical examination did not reveal any swelling or tenderness upon palpation of the mandibular symphyseal region, and the examination of the lymph nodes was normal (**Figure 1**).

The endobuccal clinical examination did not show any vestibular swelling in the area of the mandibular incisors. These teeth exhibited no signs of endodontic or periodontal infection, no mobility, and no displacement. Their pulp vitality was preserved (**Figure 2**).

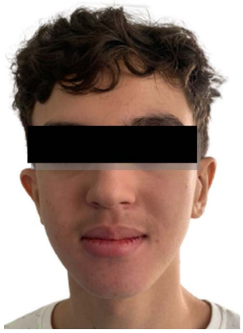

Figure 1. Extraoral view.

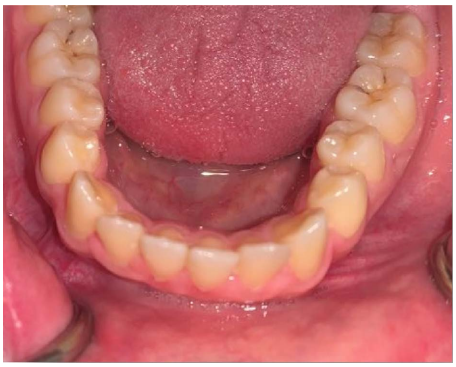

Figure 2. Pre operative intra oral image.

Orthopantamograph disclosed an extensive, well-defined radiolucent image surrounded by a radio-opaque scalloped border between the roots extending from the 43 to the distal surface of the 34 (Figure 3).

Cone beam computed tomography (CBCT) confirmed the presence of a well-defined radiolucent unilocular lesion progressing within the spongy bone with preservation of the buccal and lingual cortical plates and the root apices of the teeth (Figure 4).

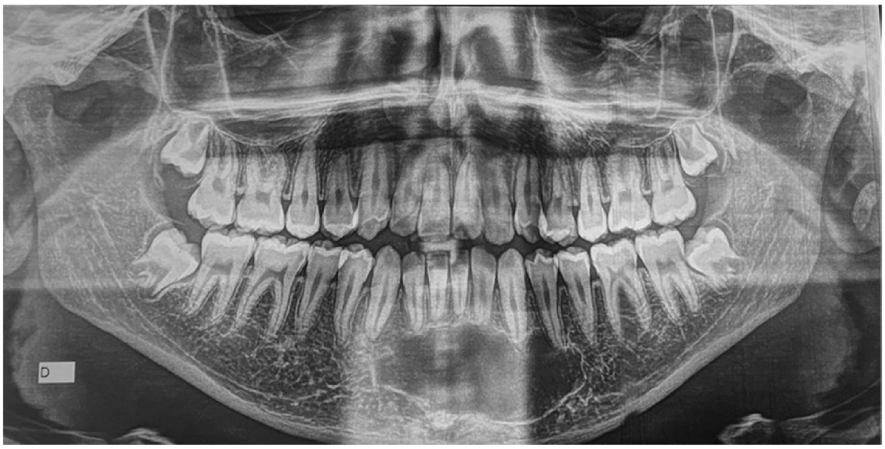

Figure 3. Pre operative panoramic x-ray showing unicystic unilocular and well defind osteolytic lesion in the mandibular symphysis.

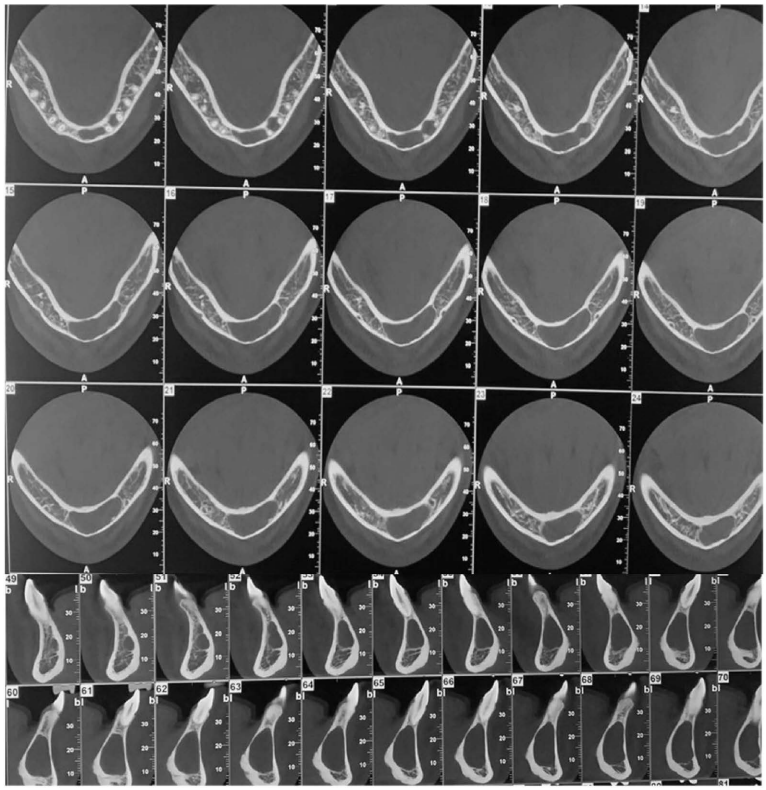

Figure 4. Cone beam computed tomography reveals a radiolucent region with no evidence of perforation in the buccal or lingual cortical bones, nor any root resorption.

In light of these clinical and radiological findings, we considered the possibility of unicystic ameloblastoma, keratocyst or solitary bone cyst.

Minimally invasive surgery after flap reflection was planned in order to access the buccal cortical plate of the mandibular symphysis.

After trepanning, the cavity was empty, the inner surface of the lesion was curetted using a surgical curette. The surgical site was rinsed with normal saline. Therefore, the diagnosis of solitary bone cyst was made (Figure 5).

In the immediate postoperative course, antibiotic coverage was provided (amoxicillin 1000 mg, twice daily, 7 days) along with analgesic and anti-inflammatory medication (Prednisolon 60 mg, once a day, 5 days). Local cold application and home oral care instructions were advised.

A follow-up panoramic radiograph taken after 6 months duration showed a reduction in the volume of the lesion and peripheral corticalization, indicating favorable bone healing.

The mandibular anterior teeth continued to exhibit responsiveness to pulp vitality tests during this follow-up appointment. Furthermore, the panoramic radiograph taken 24 months after the treatment revealed a gradual but incomplete bone regeneration (Figure 6).

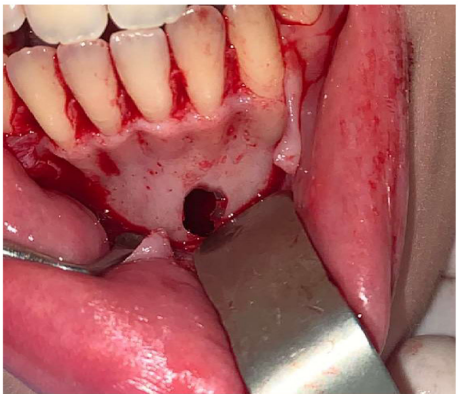

Figure 5. The surgical approach to the lesion. Note the vacant cavity, which is characteristic of traumatic bone cyst.

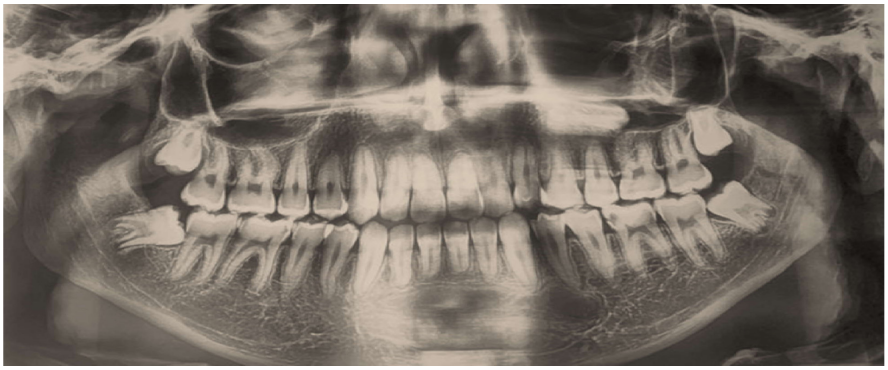

Figure 6. Post operative panoramic x-ray, 1 year after surgical treatment. the process of good bone regeneration was detected.

The spontaneous bone healing achieved without any postoperative symptoms once again confirmed the diagnosis of a solitary bone cyst.

3. Discussion

Solitary bone cysts, often recognized as traumatic bone cysts, are defined as non-neoplastic bone lesions without an epithelial lining, predominantly found in the proximal part of the metaphyses of long bones in children and adolescents. Their occurrence in the maxillary bones is rare, constituting less than 1% of all maxillary cysts [1] [3] [4] [5] [6].

The pathogenesis of the solitary bone cyst is not yet completely understood, several theories have been suggested to explain its origin:

- The theory of "trauma-intramarrow hemorrhage" has long been the most recognized. Trauma leads to the development of a hematoma in the medullary spaces by the rupture of sinusoidal capillaries, resulting in the formation of a blood clot in most cases. The liquefaction of this blood clot leads to the creation of a cavity, which enlarges due to increased intra-cavity pressure resulting from decreased venous or lymphatic drainage [3] [7] [8]. No history of trauma was identified in this patient.
- The association of florid osseous dysplasia and solitary bone cyst, where pseudo-cysts could result from a local aberration in the formation and evolution of bone tissue.
- The solitary bone cyst may result from deficient calcium metabolism, for example, in hyperparathyroidism.
- Sickle cell anemia is accompanied by bone infarcts, which could be the cause of solitary bone cysts.
- Some authors have suggested that these lesions represent the final stage of a chronic infection evolving silently [2] [3] [7] [9].

After reviewing multiple etiopathogenic factors, our patient does not present with any of the previously mentioned etiopathogenic conditions. Thus, the specific etiological factor could not be established in this case.

The lesion is primarily diagnosed in young patients during the second decade of life [1], with a higher incidence in males [3] [4] [9]. Most traumatic bone cysts (TBCs) are situated in the body between the mandibular canine and third molar, and are rarely seen in mandibular symphysis [3] [6] [9] [10]. However, there are infrequent cases reported in the literature where the cysts are found in the ramus or condyle [1] [5] [10]. Additionally, multiple lesions have been documented, including bilateral mandibular or bimaxillary occurrences [2].

Clinically, the majority of cases are asymptomatic, and the lesion is frequently incidentally detected during routine radiological examinations [1] [3] [4] [5] [9]. All these data are in agreement with the elements reported in this case, since the male patient was 16 years old and presented with a solitary cyst discovered incidentally, located in the horizontal branch of the mandible.

The majority of maxillofacial solitary bone cyst cases reported in the literature

are asymptomatic and do not result in cortical bulging. The affected teeth are vital and show no evidence of root resorption [1] [2] [4] [8]. In the case presented here, the patient exhibited no swelling, experienced no painful symptoms, and the lesion was identified through a panoramic radiograph requested for orthodontic treatment planning.

Traumatic bone cysts generally show up as well-definded radiolucent lesions without bone expansion, margins could be irregular or scalloped and surrounded by a thin border of bone condensation [1] [3] [4] [6] [7]. Its borders are sharp but irregular. The bone cortices are thinned but not interrupted. However, extensive lesions can present a multilocular appearance and may lead to a diagnostic error (ameloblastoma, Keratocyst) [8]. In the present case report, solitary bone cyst appears as a unilocular large radiolucent lesion with well definded scalopped margins, with preservation of the buccal and lingual cortical plates and the root apices of the teeth.

Several studies have highlighted the significance of magnetic resonance imaging (MRI) in the diagnosis of these cysts. It enables the differentiation between solitary bone cysts and benign tumors by assessing their distinct contents (liquid, sero-hematic, versus parenchymal) [2]. The MRI typically reveals a uniformly intermediate signal in T1-weighted sequences, a uniformly high signal in T2-weighted sequences, and a subtle peripheral enhancement in T1-weighted sequences enhanced by gadolinium [2] [11] [12].

Classically, the histological presentation involves an empty cavity of cancellous bone, typically unlined or very occasionally covered with a thin connective tissue layer, and containing scant liquid content [9]. A review [13] indicated that in only 9.52% of the cases, a histological evaluation could be conducted on the material obtained, revealing the presence of vascular connective tissue without evidence of an epithelial component [8]. This suggests that the absence of epithelial tissue is one of the most characteristic features of these lesions. In our case, during exploration, bare bone was observed, and no sample could be collected for histopathological examination. A positive diagnosis of a solitary cyst can only be made by surgical exploration (as was the case with this patient). Surgeons usually find an empty cavity, although it can be filled with blood, serum, or both [1] [8].

The differential diagnosis for traumatic bone cyst should encompass various radiolucent lesions, including:

- Odontogenic keratocyst, which is commonly found between the second and fourth decades of life. It may present as multilocular with cortical expansions and perforations, along with tooth displacement and resorption. Frequently located in the mandible, it is often associated with an impacted tooth.
- Ameloblastoma, typically diagnosed in the second and third decades of life, may exhibit a radiological multilocular appearance with internal septa, resembling a “soap bubble” or “honeycomb”. It can lead to tooth displacement, root resorption, and cortical perforation, often associated with an impacted tooth.

- Odontogenic myxoma, common in the second and third decades of life, tends to localize preferentially in the mandible, particularly in the ramus. It may present with intraluminal osseous trabeculations, causing dental resorption and displacement.

In addition to these, other potential differential diagnoses for solitary bone cysts include central giant cell granuloma, arteriovenous malformations, brown tumors associated with secondary hyperparathyroidism, and mucoepidermoid carcinomas [2] [7] [8].

The widely recommended treatment for (TBCs) involves surgical exploration followed by curettage of the bony walls. This approach serves both as a diagnostic procedure and a definitive therapy. The curettage performed during the procedure induces bleeding and promotes additional osseous regeneration [1] [2] [3]. However, spontaneous resolution of TBCs is possible in some untreated cases [2] [3]. Other treatment modalities have been carried out as filling the cavity with platelet-rich plasma, a bone graft or hydroxyapatite [14] [15] [16] [17]. or decompression of the lesion using a microperforated catheter [18]. For our case, surgical exploration was sufficient to visualize the initial signs of healing after only six months.

The follow-up of patients with solitary bone cysts includes clinical and radiographic monitoring over a sufficiently long period, often two years. Six months or longer after surgery, initial signs of healing may be observed, depending on the size of the lesion, with full recovery expected within two years. Recurrences are infrequent and typically manifest within three months post-surgery. Cases involving multiple cysts or those linked with florid cemento-osseous dysplasia exhibit elevated recurrence rates, approximately 71% and 75%, respectively.

Due to the risk of recurrence (between 2% and 26%), regular radiographic and clinical follow-up is strongly recommended [3] [8].

The prognosis is usually excellent, although in some cases, solitary bone cysts are difficult to treat and require annual follow up until radiographic healing has been completely verified [8].

4. Conclusion

Panoramic dental radiography is crucial for detecting solitary bone cysts, often asymptomatic and incidentally discovered. Positive diagnosis occurs intraoperatively in the absence of cystic walls, revealing an empty cavity or one filled with serosanguinous fluid. Treatment is straightforward, involving surgical exploration and irrigation to prevent overtreatment. Preserving pulp vitality is important during treatment to maintain dental health. Long-term clinical and radiological monitoring is necessary until complete bone healing to detect potential recurrence.

Conflicts of Interest

The authors declare no conflicts of interest.

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