

# Pathologic Fracture of the Mandible Secondary to Traumatic Bone Cyst

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Craniomaxillofac Trauma Reconstruction 2013;6:201–204

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## Abstract

The traumatic bone cyst (TBC) is an uncommon and poorly understood lesion. First described in 1929, TBCs lack an epithelial lining, typically occur during the second decade of life, and are most frequently located in the jaw. Although the majority of TBCs are asymptomatic, rarely a TBC can cause a pathologic fracture of the mandible. We present a case of an adolescent suffering a sports-related pathologic mandible fracture secondary to a traumatic bone cyst.

## Keywords

- ▶ mandibular cyst
- ▶ mandible fracture
- ▶ traumatic bone cyst

The traumatic bone cyst (TBC) is an uncommon and poorly understood entity. First described in 1929, by definition, TBCs lack an epithelial lining. These lesions most frequently occur in the jaw.<sup>1</sup> Although most often asymptomatic, rarely a TBC can lead to a pathologic fracture of the mandible.<sup>2,3</sup> Only a few such cases appear in the literature. In this report, we present a case of an adolescent suffering a sports-related pathologic mandible fracture secondary to a TBC.

Facial fractures in the pediatric population are uncommon. Less than 15% of all facial fractures occur in the pediatric population.<sup>4</sup> The most common site for a mandible fracture in children is the condyle, accounting for ~45% of fractures.<sup>4,5</sup> Motor vehicle accidents account for nearly 60% of mandible fractures.<sup>5</sup> Only 2% of mandible fractures in children are caused by sports injury.<sup>5</sup>

## Case Report

A 13-year-old adolescent boy presented to our Emergency Department (ED) with persistent facial pain following a collision while playing football. During practice, the patient was struck in the chin with a teammate's knee. He was wearing a helmet, mouth guard, and football pads at the time. He was initially evaluated at an outside hospital, where a computed tomography (CT) scan was performed and identified a significantly displaced left-sided parasymphiseal mandible fracture. He was referred initially to a local surgeon as an outpatient, but presented to our ED the following day.

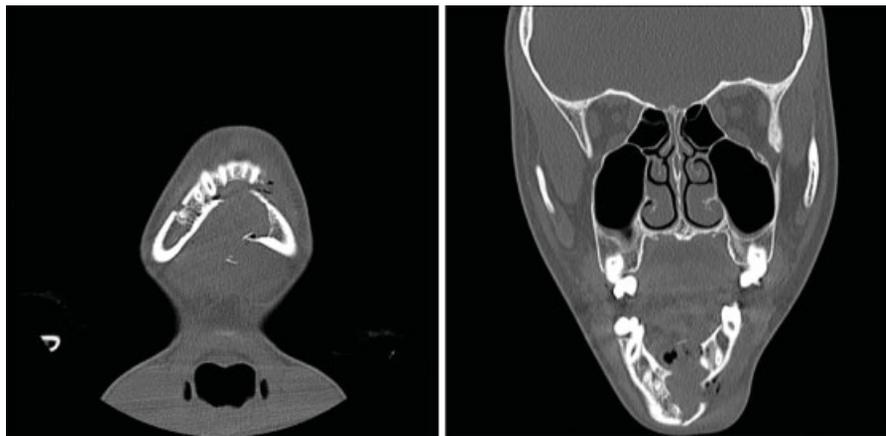
The Otolaryngology-Head and Neck Surgery department was consulted upon arrival to our ED. Physical examination revealed tenderness of the left side of the mandible and a visible intraoral step-off between the left mandibular lateral incisor and canine tooth. The CT was reviewed and demonstrated a significantly displaced fracture of the left parasymphysis. The fracture was deemed pathologic secondary to an apparent preexistent cystic lesion of the mandibular symphysis measuring 2.5 × 1.5 × 1.5 cm, with evidence of bony expansion (▶ **Fig. 1**).

The patient was taken to the operating room the next day. With evidence of a lesion in the mandible of unknown pathology, the decision was made to proceed with a transcervical approach to provide broader access that would allow for adequate curettage and resection if needed. The fracture line and cystic cavity were identified. A cystic lumen was filled with organized blood clotlike material. No definitive solid tissue was identified (▶ **Fig. 2**). The clot and the cortex of the cavity were curetted and sent for histologic interpretation. Occlusion had been established previously with maxillomandibular fixation. The mandibular fracture was reduced and repaired with a lower-border Synthes Matrix mandibular locking bar with bicortical screws (Synthes CMF, West Chester, PA). An additional 2.0 Synthes Matrix monocortical plate was used to secure a sizable secondary fragment of the cystic wall (▶ **Fig. 3**). The cystic space was packed with Gelfoam (Pfizer, Pharmacia and Upjohn Company, Kalamazoo, MI), as a means of filling the cystic dead space with a

received  
August 26, 2012  
accepted  
August 27, 2012  
published online  
May 31, 2013

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Tel: +1(212) 584-4662.

DOI <http://dx.doi.org/10.1055/s-0033-1343782>.  
ISSN 1943-3875.



**Figure 1** Coronal computed tomography (CT) scan revealing a parasymphiseal fracture in line with a cystic cavity.

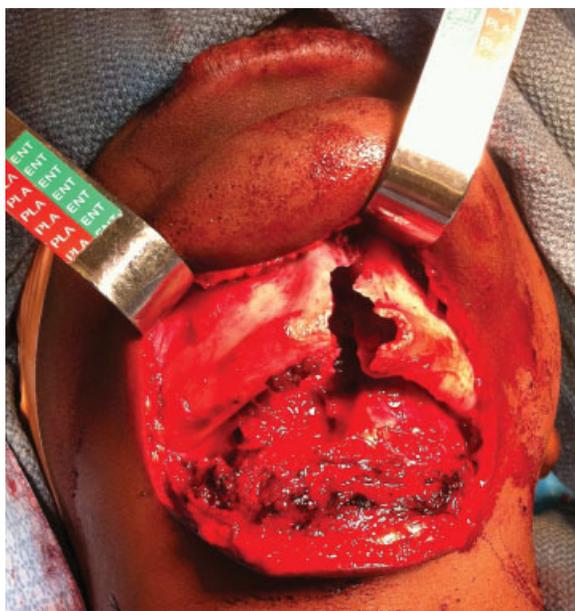
nonpermanent material that would not interfere with later osteogenesis. The remainder of surgery was uncomplicated and a small suction drain was placed at closing. A postoperative image revealed satisfactory alignment (►Fig. 4). The drain was removed on postoperative day 2, and the patient was discharged home 3 days later, tolerating a soft diet. Fifteen days after discharge, the patient returned to our ED with worsening pain and swelling at the surgical site. He was diagnosed with a small submental abscess. The patient was admitted and treated successfully with bedside incision and drainage and a short course of intravenous antibiotics. The remainder of his recovery was uneventful, with good occlusion and function. Follow-up CT imaging at 6 weeks showed good fracture healing and some early osteogenesis within the cystic cavity (►Fig. 5). One year after surgery, he had normal occlusion and no evidence of hardware complications. Additionally, CT imaging

demonstrated ossification of the majority of the cystic space, with only a few small lateral areas of persistent cyst (►Fig. 6).

Histopathology of the curetted material from the mandible confirmed the diagnosis of a TBC, revealing granulation tissue, old hemorrhage, and reactive woven bone. No epithelial or other cystic elements were identified. Apart from the patient's current injury, he denied any history of previous mandibular trauma.

## Discussion

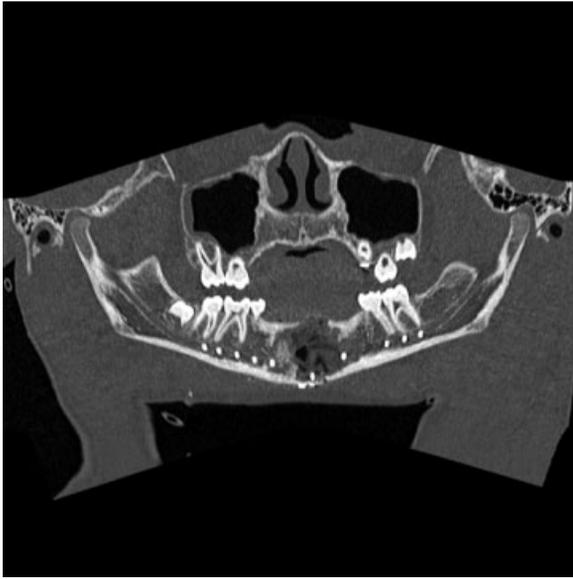
Lucas and Blum first described the TBC in 1929. Somewhat of a misnomer, TBCs lack an epithelial lining and thus are not true cysts.<sup>1</sup> TBCs are also referred to by various other names in the literature, including *extravasation cyst*, *hemorrhagic bone cyst*, *progressive bone cavity*, *simple bone cyst*, *solitary bone cyst*, and *unicameral bone cyst*.<sup>6</sup> *Traumatic bone cyst* is



**Figure 2** Intraoperative photograph demonstrating a parasymphiseal mandibular fracture through the cavity of a preexisting mandibular cyst.

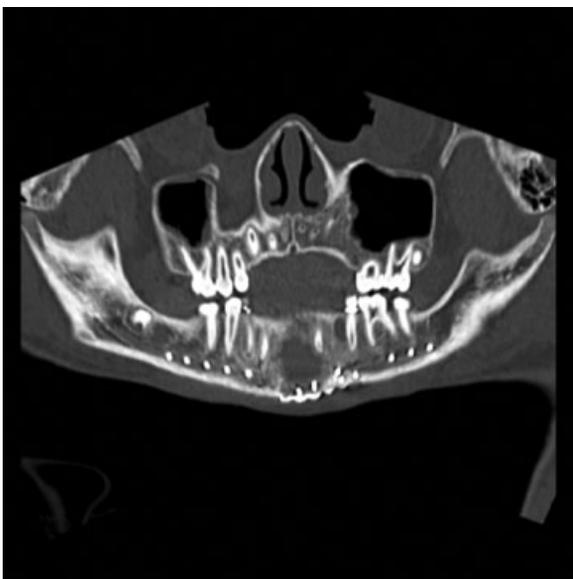


**Figure 3** Intraoperative photograph after further stabilization of the parasymphiseal mandibular fracture with the use of a second, smaller profile plate.



**Figure 4** Panorex computed tomography scan obtained in the immediate postoperative period showing improved anatomic alignment.

currently the most commonly used name.<sup>6,7</sup> TBCs occur most frequently during the second decade of life.<sup>8-10</sup> The gender predilection is reported to be roughly equal in most literature,<sup>9,11</sup> although a recent study has suggested women may be affected more than men.<sup>12</sup> The body of the mandible and mandibular symphysis are predominant locations for TBCs to form.<sup>9,10,13</sup> The exact pathogenesis of TBCs is unknown, but a multitude of theories have been suggested. Most believe that trauma, including tooth extraction, causes intraosseous bleeding. The blood eventually clots and osteoclasts destroy the surrounding bone, resulting in formation of the cyst cavity.<sup>14</sup> The role of trauma in the formation of TBCs remains unknown. Kaugars and Cale reported that incidence of trau-



**Figure 5** Panorex computed tomography scan obtained 7 weeks postoperatively demonstrating improved anatomic alignment with some neo-osteogenesis and persistent cystic defect of the mandible.



**Figure 6** Panorex computed tomography scan obtained 1 year postoperatively demonstrating near-complete ossification of the cystic defect of the mandible.

ma in TBC to be equal to the general population,<sup>11</sup> but others reported a clear history of trauma in less than 29% of cases.<sup>12,15</sup>

TBCs are asymptomatic in the majority of cases. They are frequently discovered incidentally during routine radiologic examination. If symptomatic, pain is the most common symptom but is present in less than 20% of cases.<sup>8-10</sup> Other symptoms are far less common and include tooth sensitivity, paresthesia, and pathologic fracture of the mandible.<sup>2,7,9</sup> A pathologic fracture as the presenting sign of a TBC is rare, and is mentioned in the literature sparsely.<sup>2,3</sup>

Radiographically and histopathologically, traumatic bone cysts are bland. On X-ray or CT, TBCs are unilocular lesions with well-defined and irregular borders. The classic description of “scalloping” can be seen with cystic involvement of the interdental space.<sup>16</sup> At biopsy, fibrous connective tissue and normal bone are the most common histologic findings. As TBC is not a true cyst, there is never evidence of epithelial lining to the cavity.<sup>9</sup> Uncommonly, bony expansion or erosion may be noted.<sup>9</sup> Because tissue for histologic examination is frequently inadequate, observation during surgery of an empty bone cavity lacking an epithelial lining is often the predominant finding.<sup>9</sup>

Although there have been reported cases of spontaneous resolution,<sup>17,18</sup> curettage is the definitive treatment, serving as both a diagnostic and therapeutic procedure. Curettage causes bleeding within the cystic cavity.<sup>6</sup> This forms a clot and ultimately reossifies with complete healing within 17 months.<sup>19</sup> Although initially believed to be rare,<sup>10</sup> a recent review of the literature suggests the recurrence rate following treatment is ~26%.<sup>19</sup> Packing the cavity appears to increase healing and reduce the rate of recurrence.<sup>19</sup> Although in our case the patient’s recovery was complicated by development of a submental abscess, the cyst appears to be healing well with significant neo-osteogenesis on follow-up imaging. The

abscess was likely attributable to the partially open cystic cavity, providing a location for bacteria to colonize. Follow-up at 1 year reveals continued good clinical and radiographic result, with viable dentition and normal function.

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