Case Report

Laser-assisted Treatment of a Dentigerous Cyst: Case Report

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Abstract: *Dentigerous cysts are benign maxillary odontogenic cysts associated with the crown of an unerupted tooth. They can expand the cortical bone to such an extent that they cause displacement of teeth and root resorption in the adjacent teeth. The purpose of this report was to describe the clinical case of a dentigerous cyst in a mandibular permanent molar of a 6-year-old child. The cyst caused the displacement of the bud of the permanent second molar and root resorption of the primary second molar. The cyst was treated by: (1) mucous fenestration using an erbium laser: (2) drainage of the fluid content; and (3) curettage of the bone cavity. The injury was successfully resolved in just 5 months with: (1) bone regeneration; (2) the repositioning of the displaced bud; and (3) correct eruption of the affected tooth. (Pediatr Dent 2007;29:521-4)*
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Dentigerous or follicular cysts are maxillary benign odontogenic cysts generally associated with the crown of an impacted, embedded, or unerupted permanent tooth.[1,2] The cyst enclosing the unerupted tooth's crown is attached to the tooth's cervical region.[3] The eruption cyst is the analogous case when it appears in the soft tissue, shortly before tooth eruption.[4] Despite there being a number of theories about their origin,[5] both seem to result from the separation of the epithelium from the enamel of the tooth's crown due to an accumulation of blood or other fluid in a dilated follicular space.[6]

In the dental literature, these cysts are considered to be the second most common odontogenic cysts of the jaws, after radicular cysts.[7] They are more common in male patients and usually appear during the second or third decade of life.[1,8] In mixed dentition, they represent less than 9% of dentigerous cysts.[9] In 75% of cases, they are located in the mandible.10 In order, the teeth most often affected are: (1) mandibular third molars; (2) maxillary third molars; and (3) maxillary permanent canines.[8,11] They have also been reported in the mandibular second premolars.[3]

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These lesions are often detected during a routine radiographic examination. This is because dentigerous cysts are typically painless, unless there is acute inflammatory exacerbation[1,7,8] (ie, in mixed dentition when a necrotic primary tooth infects the follicle of the permanent successor).[3,9] Main designated such cysts as inflammatory follicular cysts.[12] Pain is a sign of secondary infection on these sterile cysts.[13] If the cyst reaches a large size[14] (>2 cm in diameter), we may observe facial swelling due to its potential for expanding the cortical bone.[1,7,9]

Dentigerous cysts are usually solitary, and the radiographic pattern is characterized by a symmetric, well-defined, unilocular radiolucent lesion surrounding the unerupted tooth's crown, which can displace adjacent teeth and cause root resorption.[1,11]

Clinical examination and radiography provide a preliminary diagnosis, but a definitive diagnosis requires histopathological analysis.[7] Differential diagnoses should include: (1) hyperplasia of the tooth follicle[1]; (2) ameloblastic fibroma[1,15]; (3) unicystic ameloblastomas[16]; (4) glandular odontogenic cyst[17]; (5) odontogenic keratocyst[18]; and (6) adenomatoid odontogenic tumor.[19]

Several treatments have been proposed, including:

1. total enucleation[7];
2. marsupialization[20];
3. decompression opening the cyst and ensuring continual drainage[1,7,9];
4. combination of marsupialization or decompression and enucleation[1,7,21]; and

5. decompression combined with extraction of the causative infected tooth in inflammatory cysts.[3,9]

This article describes the case of a dentigerous cyst treated with an Er, Cr:YSGG laser (erbium, chromium, yttrium, scandium, gallium, and garnet; Waterlase-Biolase Technology, San Clemente, Calif). This type of laser is a hydrokinetic system that liberates photons in an air-water spray and works at a wavelength of 2,780 nm. The effect of this laser with its wavelength is favored by the water present in soft tissues.[22] The laser's energy is carried by a system of fiber optics to a terminal point made of a sapphire crystal.[23]

Case report

A 6-year-old boy was brought to the Department of Pediatric Dentistry at the Dental School of the University of Barcelona, Barcelona, Spain, because his family had noticed a swelling on his face at the mandible level on the right-hand side. The patient was asymptomatic and had no history of pain. The medical history was noncontributory.

In the extraoral examination, slight facial asymmetry was observed, with swelling at the right mandibular angle. There was, however, no noticeable presence of submandibular or cervical adenopathy. Intraoral examination revealed a bluish area on the gingiva (Figure 1) above the unerupted permanent mandibular right first molar. There was little buccolingual expansion of the bone.

The panoramic radiograph revealed a large unilocular radiolucency (osteolytic lesion) measuring 1.6 cm in diameter and associated with the crown of an unerupted permanent mandibular right first molar with open apices. There was resorption of the distal root of the primary mandibular second molar and distal displacement of the permanent second molar bud (Figure 2).

The lesion's clinical appearance was compatible with a dentigerous cyst.We decided to incise the upper limit of the cyst to expose the cavity. A total of 36 mg of 2% lidocaine with epinephrine 1:100,000 in a mandibular block and buccal infiltration was used for local anesthesia. The settings for the laser were those recommended by the manufacturer for soft tissue surgery (1.50 watts, 10% water, and 11% air). The sapphire point of the erbium laser used to fenestrate the cystic membrane was applied 1 to 1.5 mm from the tissue for maximum cutting effectiveness.[4] The cystic content was an amber-yellowish fluid (Figure 3). A 2 x 2 mm fragment of the cystic lesion was excised (incisional biopsy) for histological study. A hypomineralized molar could be seen in the cavity (Figure 4). The surgical opening was widened to enhance access in order to aspirate the cystic content and curette the cyst cavity thoroughly. Histological examination confirmed the diagnosis of a dentigerous cyst with the following findings: a

Figure 1. Clinical lesion demonstrating bluish appearance and handpiece with sapphire tip of the erbium laser.

Figure 3. Initial ablation with the laser. The amber-yellowish color of the cystic liquid can be appreciated.

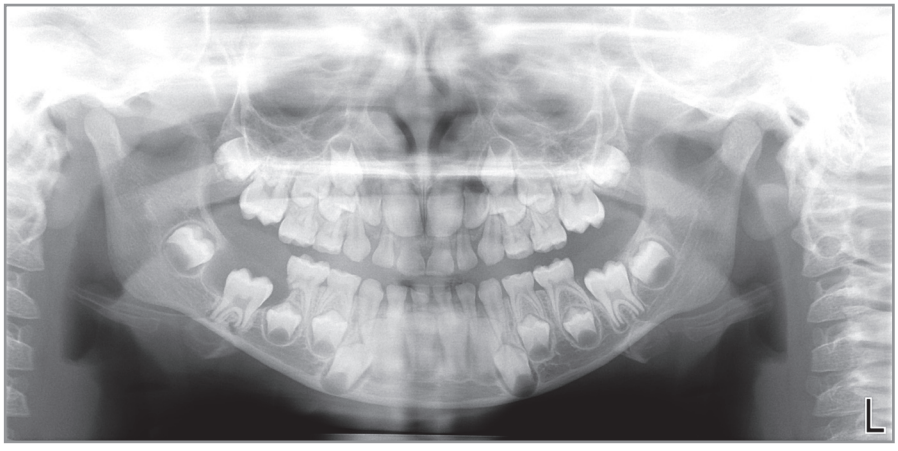

Figure 2. Panoramic radiograph demonstrating a dentigerous cyst related to an unerupted permanent mandibular first molar, with displacement of the permanent second molar bud and resorption of the distal root of the primary second molar.

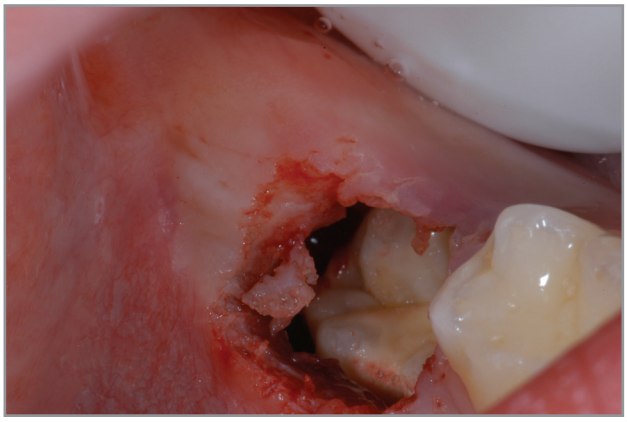

Figure 4. Intraoperative appearance of the molar in the cystic cavity. Rough laser incisions with tissue tags can be seen. The margins of the incision were subsequently smoothed with the laser. A cleaner incision margin could have been achieved by the use of a scalpel blade.

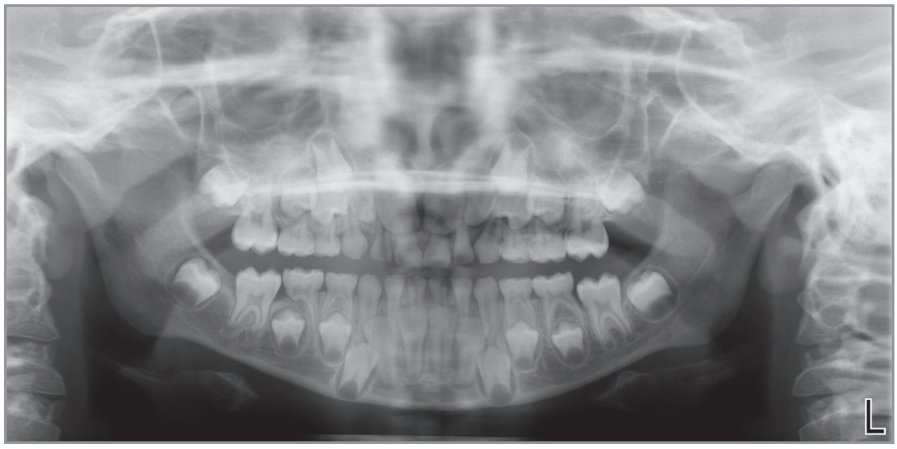

Figure 5. Panoramic radiograph 5 months after surgery showing the resolution of the lesion.

Figure 6. Erupted hypomineralized permanent mandibular first molar 5 months after surgery.

dense connective fibrous wall covered with a fine layer of nonkeratinized squamous epithelium and containing variable amounts of myxoid tissue and odontogenic epithelial remnants.

The patient was observed after surgical treatment, and no symptoms or signs of recurrence were detected. Five months after treatment, a panoramic radiograph revealed that the cystic lesion had disappeared and there was new bone growth (Figure 5). The unerupted molar had reached a proper position in the arch without orthodontic traction. Bone regeneration was also observed around the resorbed root of the mandibular primary second molar, which presented no signs of the pulp being affected. Furthermore, the permanent second molar's bud had corrected its position within the bone. The only pathologic finding was that the molar associated with the cyst was hypocalcified, while none of the other permanent molars was affected (Figure 6).

Discussion

The case described presents all the typical characteristics of a dentigerous cyst—they:

1. are more frequent in men[7,11];
2. appear at the neck of an unerupted tooth's crown;
3. displace teeth; and
4. resorb roots as they grow.

The discovery of a hypomineralized molar in the cyst could be just a coincidence, due to the high incidence of this anomaly in the last decade.

Early diagnosis of this type of cyst in children is important, as growth can be rapid and can cause bone fractures and deformation.[1] Eruption cysts usually do not require treatment, and the affected tooth erupts normally. In the case of dentigerous cysts, however, treatment is always necessary.[4] Children have a much greater capacity than adults to regenerate bone and teeth with open apices have a greater eruptive potential.[9,20,24] These factors should make one consider large dentigerous cysts in children as entities distinct from those in adults, with much better prognosis for the teeth involved.

We employed conservative treatment. Exposing the cyst, aspirating the fluid content, and curetting the cavity proved to be sufficient. The erbium laser provided a good vision of the operational field, as we could take advantage of its coagulating effect, even though this effect is limited compared to CO_2 lasers.[25] It also provides the possibility of remodelling the bone if necessary.[26,27] The antibacterial[28] and anti-inflammatory properties attributed to the laser may improve postoperative prognosis.[29] The only medication the patient required was 200 mg of ibuprofen on the day of the surgery. No sutures had been used, and the soft tissues scarred quickly and without any problems.

Kozelj et al,[9] Ertas et al,[20] and Martinez et al[24] have also presented cases of conservative treatment in the mixed dentition, which permitted spontaneous eruption of the affected permanent tooth. In these cases, complete ossification of the bony defect occurred in 1 or 2 years. In the present case, ossification occurred in a shorter time since the origin was not due to an infection of a primary tooth as in the cases presented by these other authors.

The laser technology currently available can considerably help in the treatment of some cases that require surgery in pediatric dentistry.[30] Erbium lasers are the most versatile for pediatric dental patients, as they can be used for both soft and hard tissues. They are an additional tool for improving and modernizing the authors' treatments.

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