Introduction

Dentigerous cysts are odontogenic lesions, that usually appear in the second or third decade of life, arising from the crown of impacted, embedded, or unerupted teeth (1, 2). Large dentigerous cysts can displace impacted teeth into ectopic positions, such as in the nasal cavity, mandibular condyle, coronoid process, and maxillary sinus (3, 4, 5).

Ectopic displacement might occur from genetic, environmental or local factors which cause tooth bud migration at the initial stages of embryogenesis. The etiology of ectopic eruption is not completely clear, but theories include trauma, infection, developmental anomalies and pathological conditions, such as dentigerous cyst (1). In most cases, dentigerous cysts are located in the mandible and involve third molars; however, maxillary localization is more frequently associated with canines (6, 7). Similar unilocular radiolucencies include other odontogenic cysts, odontogenic keratocysts, and odontogenic tumors, such as odontoma, odontogenic fibroma, ameloblastoma, cementomas and aneurysmal bone cyst (7). However, intra-cavity mucocele, retention cyst, and pseudocyst are also included in the differential diagnosis when a maxillary sinus cyst is noticed involving maxillary expansion.

The aim of this work is to report a case of dentigerous cyst associated with an ectopic third molar in the maxillary sinus and a piezoelectric technique used for the removal of the impacted tooth and cyst enucleation in order to improve visibility, help atraumatic dissection, and minimize bone loss.

Case Report

A 40-year-old woman presented to our clinic complaining of right maxillofacial edema, sinusitis, temporomandibular joint arthralgia, trismus and migraine, that had progressed over the previous six months.

Maximum incisal opening was about 15 mm. Intraoral examination revealed a soft, painless, painless upper right vestibular edema, extending from the second premolar to the maxillary tuberosity. The involved teeth were vital and with physiological mobility.

Panoramic radiograph showed a unilocular lesion associated with the third molar located in the roof of the right maxillary sinus (Figure 1). Computerized tomography (CT) revealed a 4.5 x 3.5 x 3.5 cm hypointense, well-circumscribed lesion occupying and expanding the entire right maxillary sinus. The impacted third molar crown was erupted into the cystic lesion, but roots definition was not clearly visible, suggesting ankylosis (Figure 2). The radiolucency extended from the sinus floor to the orbital floor (Figure 3a) causing bone resorption of the vestibular and palatal walls of the right maxilla. The diagnosis was giant follicular cyst.

The patient underwent enucleation of the cyst and...
removal of the ectopic third molar under general anesthesia with the following procedure.

Transoral access was obtained with a vestibular incision (Figure 3b). A 20 mm diameter lateral sinus window osteotomy was performed using the piezoelectric insert OT1 (Mectron Piezosurgery®, Medical Technology, Carasco, GE, Italy) connected to a piezoelectric device (Piezosurgery 3, Mectron Piezosurgery®) and cooled with sterile saline solution. The lower margin of the window was at least 4 mm above the original position of the sinus floor. The cyst was incised and the liquid content was drained (Figure 3c), then the cystic walls were removed by dissection of cystic adhesions to adjacent tissues using the piezoelectric insert EL1 (Mectron Piezosurgery®).

Suspicion of third molar apical ankylosis at the level of the pterygopalatine suture from CT examination was confirmed by no movement after elevator luxation (Figure 2). Atraumatic tooth extraction was achieved through periradicular osteotomy using a piezoelectric insert EX3 (Mectron Piezosurgery®) (Figure 3d, Fig 4a). The residual cavity was filled with 20 ml of fibrin sealant (Tisseel, Baxter International Inc., USA). The mucoperiosteal flap was repositioned and a single-layer suture was applied (Figure 4b). Prophylactic antibiotic therapy was continued for seven days postoperatively, and the sutures were removed fourteen days after the procedure (Figure 4c).

No complications were observed during the postoperative period.

The histological examination confirmed the diagnosis of dentigerous cyst (Figure 4d). Panoramic (Figure 5) and CT radiographs taken twelve months after surgery showed that sinus “re-pneumatization” of the maxillary had occurred (Figure 6). No periodontal nor endodontic complications occurred to the adjacent teeth.

Five years after surgery the patient is asymptomatic and maximum mouth opening is almost 5 cm.
Discussion

Maxillary edema can be the result of several diseases. Differential diagnosis can be narrowed by symptoms and radiographs. The vitality of the adjacent teeth can suggest a benign lesion. However, the presence of a cystic structure, its position and location around an associated tooth further narrows the working diagnosis (3).

In the present case report, the likelihood of a pre-operative diagnosis of a giant dentigerous cyst though a benign pathology created two treatment plan dilemmas: lesion access and suspected root ankylosis. In order to entirely remove the lesion in order to prevent recurrence, provide the best access with the least trauma, and remove the ankylosed tooth, the past literature of giant dentigerous cyst was reviewed and the application of piezosurgery was planned.

The literature on dentigerous cysts reports them as benign expansile lesions resulting from fluid accumulation between crown and enamel organ of an unerupted tooth (8). The cystic fluid is supposedly a capsular vessels exudate (2). Dentigerous cysts are believed to be derived from the remnants of odontogenic epithelial cells (1). They are associated with unerupted teeth that are usually found by dentists during routine dental radiography (3). Most of these cysts have a benign appearance and can cause thinning of the surrounding bone and a mass effect as they enlarge. When a dentigerous cyst expands into the maxillary sinus, it can rapidly grow, remodeling the antral walls and elevating the maxillary sinus cortex (9). When the maxillary sinus is invaded, symptoms usually occur later in the process. These may include nondescript facial pain, paresthesia, headache, dysgeusia, trismus, sinusitis and chronic rhinorrhea (3). A large maxillary cyst involves the whole sinus and can transmit pressure to the sinus walls; consequently ophthalmologic and nasal symptoms may develop (1). Fortunately, there are no reports of metaplastic or dysplastic changes arising from maxillary dentigerous cyst associated with an ectopic third molar (10). Giant dentigerous cysts associated with ectopic teeth within the maxillary sinus are rare lesions (6, 7); indeed, a recent literature review reported of only 26 documented cases published between 1980 and 2016 (11).

In the literature various treatment options for cystic removal are reported, and the universally accepted
The most common treatments for follicular cyst removal in the maxillary sinus are the Caldwell-Luc operation and endoscopic sinus surgery (1, 5, 12). Endoscopic transnasal extirpation of the tooth may be attempted if the tooth is small and is placed near the maxillary ostium. These treatments are considered to be safe and effective, although Caldwell-Luc is more traumatic than endoscopic sinus surgery when vestibular incision and size of the osteotomy are considered. Decompression and marsupialization can be beneficial in some circumstances. Both methods provide diagnosis by incisional biopsy, minimal access, reduced morbidity and complications, and considerable reduction in cystic volume (5, 13). However, usually both techniques are not a definitive treatment and require lengthy multiple-staged procedures and continued patient cooperation with repeated post-operative follow-ups and instructions. Furthermore, biopsy collected from initial decompression or marsupialization may be unrepresentative of the remaining pathology (1).

Simple enucleation and primary wound closure may be adequate when clinical and radiographic presentations are without suspicion of an aggressive pathology (7). A diligent approach to all cases is to remove the cyst in toto, submitting the specimen to pathological examination so as to determine the risk of recurrence and the need for close follow-up (6).

This case report documents the first case of a giant dentigerous cyst removed using piezoelectric surgery. Piezoelectric surgery is considered to be less traumatic to both hard and soft tissues than traditional procedures (14); moreover mechanical removal of debris improves intra-operative visibility and rapid haemostasis (15, 16). Success entails optimal dissection at the bone and soft tissue interface, which is possible by oscillating low frequency precision tips. Applications include difficult extractions, sinus lifts and osteotomies for distraction osteogenesis (17, 14, 18). The use of piezoelectric surgery for the removal of this giant dentigerous cyst provided excellent visibility of the maxillary sinus, rapid hemostasis, and safe dissection of the ankylosed tooth in a critical anatomic region. This minimally-invasive procedure avoided the risk of venous pterygoid plexus hemorrhage which would ensue in case the pterygo-maxillary space is violated.

Conclusion
The method presented for giant dentigerous cyst removal is connected to low morbidity and highlights the benefits of piezoelectric surgery, such as excellent
visibility, safe access to the maxillary antrum, a comfortable enucleation of the cystic lesion, and atraumatic third molar extraction. The site and the use of pathology specific piezoelectric surgery allowed a conservative treatment, with optimal clinical results.

References


