Giant maxillary cyst with intrasinusal evolution

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Abstract
Giant maxillary cysts deserve one’s attention, mainly because of all the complication they can originate, such as facial aesthetic changes, jaw fractures, infections and occasional but the most severe one the neoplasia of its epithelium. Here we present the case of a 51-year-old man who was sent to the Clinic of Oral and Maxillofacial Surgery of Timisoara, Romania, because of a facial asymmetry due to the hyper-dimension of the right superior genian and labial region, consecutive to the volume growth of the subjacent alveolar process. The clinical and paraclinical investigations, especially the fine-needle aspiration and the 3D imagistic investigation, most likely lead to the diagnosis of maxillary cyst with intrasinusal evolution, the lesion being caused by the untreated teeth of the superior right hemiarcade. The surgery was performed in general anesthesia and consisted of a cystectomy and the curettage of the right maxillary sinus, followed by the restoration of alveolar process with the help of bone graft materials. The histopathological examination of the lesion confirmed the diagnosis of maxillary radicular cyst. This case shows the frequently asymptomatic and long-term evolution of maxillary cysts, their growing volume causing massive bone destructions and affections of the neighboring anatomic structures.

Keywords: radicular cyst, maxillary sinus, cystectomy.

Introduction
Radicular cyst is an odontogenic cystic lesion of inflammatory origin. It is the most frequent anatomic pathological form found in the maxillary bones. The incidence of radicular cysts is greater in the third to sixth decades and shows a slight male predominance. Most of the radicular cysts are found in the maxilla, especially around incisors and canines. They develop within an area of inflammation in the periodontium, usually at the apex of the tooth. The inflammation arises from pulpal inflammation and subsequent necrosis, caused by dental caries or trauma.

Usually, the radicular cyst is asymptomatic, increasing slowly in size. It produces adjacent bone lysis on minimal resistance and it extends either to the neighboring anatomical parts (nasal cavity, sinus), or to the oral vestibule or palate, externalizing in the soft tissues, under the oral mucosa. The deformation of the alveolar process with consecutive facial asymmetry can sometimes represent the first sign of a cyst and sends the patient to a medical consult [1–4].

Patient, Methods and Results
M.G., a 51-year-old patient, was referred by the dentist to the Clinic of Oral and Maxillofacial Surgery of Timișoara, Romania. He presented a facial asymmetry with a marked hyperdimension of the right genian region, with slow evolution, that had been noticed by the patient for about a month. For a week, he had been accusing pains of moderate intensity with a pulsatile character.

The clinical examination shows intra-oral an expansion of the anterior wall of the right maxillary sinus and of the alveolar bone on the buccal aspect of the jaw. The mucosa of the oral vestibule is normal. At gentle palpation and pressing of the vestibular wall of the alveolar bone, an “eggshell crackling” consistency is noted, which represents a bone wall extremely thin and fragmented. The vitality test of the teeth 21, 11, 12, 13, 14 is negative.

The initial paraclinic investigation is a digital orthopantomography, which shows a radiolucent region with a 3–3.5 cm diameter in the right superior maxilla, well defined by a cortical border. At the level of tooth 1.3, we note an ascendant radiopaque line, which suggests either the presence of a sidewall between the sinus cavity and the cystic one, or a polycystic lesion. In order to get an accurate diagnosis, the radiolucent region, the image of a bone lysis, exceeds the median line, covering the alveolar crest of the teeth from 1.4 to 2.1 (Figure 1).

Figure 1 – Orthopantomograph showing a well-defined area of radiolucency circumscribed by a sharp radiopaque margin in the anterior part of the maxilla.

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we proceed to another radiological investigation that is cone beam computed tomography (CBCT). We note the extension of the cystic lesion into the sinus cavity, with full lysis of sidewall (Figures 2 and 3).

Figure 2 – CBCT, coronal section showing two right radiolucencies separated by an ascending line of osteocondensation from the apex of the right upper canine, similar to the orthopantomography.

The differential diagnosis is made between the radicular cyst and other types of maxillary cysts, different benign odontogenic tumors (glandular odontogenic cyst, ameloblastoma, odontogenic myxoma, calcifying epithelial odontogenic tumors – the radiolucent ones) and non-odontogenic lesions (central giant-cell granuloma, ossifying fibroma, central hemangioma, osteoblastoma, idiopathic histiocytosis). Moreover, it must be differentiated by a normal maxillary sinus, with an enlarged alveolar recessus.

In order to orient the diagnosis, we proceeded to the fine-needle aspiration biopsy, which reveals a yellow-citrine liquid with cholesterol crystals. After centrifugation, some groups of small epithelial cells without nuclear alteration and inflammatory diathesis with cholesterol crystals at APT–Dragan staining were identified, which pleads for an inflammatory odontogenic maxillary cyst (radicular cyst) (Figure 4).

After the paraclinical and clinical investigations, it is decided to proceed to surgery. Pre-operative tests were made, laboratory tests, cardiac and pulmonary consult, which did not reveal any pathological modifications. The patient is sent to the dentist in order to do the endodontic treatment of the teeth that are to be kept. Under general anesthesia by oro-tracheal intubation, it is done the cystectomy and the curettage of the right maxillary sinus, the apical resection of teeth 1.1, 1.3 with apical seal, extraction of tooth 12 followed by the reconstruction of the alveolar crest by using bone graft materials. Postoperatively, the patient will follow an antibiotic and anti-inflammatory treatment for seven days.

The cystic lesion (Figure 5) was sent for a histopathological examination to the Laboratory of Pathological Anatomy of the Clinical Municipal Hospital of Timișoara.

Figure 3 – CBCT, a more posterior coronal section showing the extension of the cyst in the sinus cavity.

The biopsic specimen was fixed in 10% formalin for 24 hours then embedded in paraffin, sectioned at 5 μm and stained with routine Hematoxylin–Eosin method. The histopathological diagnosis confirms the presumptive diagnosis, being an inflammatory odontogenic cyst, radicular subtype, with exulcerated epithelium on extensive areas, with dense inflammatory lymphoplasmocytic and granulocytic neutrophil and eosinophil infiltrate in the subepitelial connective tissue and cholesterol crystals in the lumen (Figure 6).

Figure 5 – Intra-operative aspect of the cystic membrane.

The patient evolved without complications in the postoperative period. The sutures were removed 10 days later. We noticed a persistent marked edema with an induration of the tissues when palpating the right oral vestibule within eight weeks after the surgery. We consider
that the individual reactivity of the patient to the bone graft material caused the slow and difficult healing.

**Discussion**

The radicular cyst is the most frequent anatomo-pathological type of the maxillary cysts; because of a survey conducted in our clinic, radicular cysts represented 62.7% of the total number of the maxillary cysts [5].

The present case, similar to lots of maxillary cystic lesions, wants to draw attention on the clinical particularities of the radicular cysts. Their evolution, frequently asymptomatic, and consequently extensive, leads to large sizes of the lesions. These cysts are discovered either by chance, while a common radiological investigation, or tardily, like this case, becoming visible due to the bone deformation or over infection. The growth of the cysts size is quite slow in the intraosseous stage. When the osteoperiosteal barrier is overcome, cysts usually become clinically evident and evolution is faster, the progressive bone resorption might damage the adjacent anatomical structures – maxillary sinus in our case. While growing extensively, the cyst affects the roots of the neighboring teeth, which it surrounds, in the first phase. Later, the cyst will include them into the cystic cavity, compromising consecutively the vitality of the teeth involved [1, 6].

Mainly, the mechanism of the cysts growing is explained by the hydrostatic expansion provoked by maladjustments between the osmotic pressure of the cyst content and the blood serum, combined with the multiplication of the cells of the cyst wall and the active secretion of the epithelial cells. Slowly and progressively, it occurs the osteoclastic resorption of the bone wall of the cyst and the movement towards the periphery of the pericystic morphological structures [6]. The leukocytes of the maxillary cyst produce prostaglandins, stimulating osteoclast factors, which initiate bone resorption. In compensation, the periosteum forms new bone; the bone periosteal growing cannot keep up with the bone resorption, so that the bone wall becomes thinner and thinner until it disappears on a certain area. The chronic inflammation is considered the main cause of the cyst growing. It is due to an autoimmune reaction to epithelia altered by inflammation [7, 8].

The treatment of the maxillary cysts must be individualized according to the clinic characteristics. It is aiming the removal of the cyst lesion and the restoration of the affected area. Consequently, in our case, beside the classical cystectomy we had to follow a more complex procedure: the dentist proceeded to a preoperative endodontic treatment of the teeth that he had anticipated to be kept. The cyst invaded the sinus cavity, so we had to remove the Schneiderian membrane, which was done together with the cystectomy. In the anterior alveolar process of the tooth 1.3 until the tooth 2.1, the cyst extension as well as the extraction of the tooth 1.2 led to a bone defect of about 3.5 cm in diameter, with the lack of a portion of the vestibular cortex. The bone defect affects a big part of the structure of the right maxillary bone, reducing the bone resistance and the support of the suprajacent soft tissues (Figure 7).

It is known that the spontaneous post-cystectomy bone regeneration is slow, between 1 and 5 years, and it depends on the localization and the size of the bone defect, on the ratio of the surface and the size of the defect and on the individual osteogenic capacity [7, 9]. In our case, the reduced osteogenic potential in the anterior maxilla, the size of the bone defect, the lack of the vestibular cortex and the assurance of the anatomic support for the aesthetic rehabilitation of the right labiogenian region and the morpho-functional rehabilitation of the superior dental arcade were the main reasons for using a bone graft in the reconstruction of the alveolar process. The bone graft material was a mixture of human cortical bone granules and alloplastic substances (β-TCP and hydroxyapatite) with osteo-inductive and osteoconductive properties. In the large bony defects, bone augmentation with alloplastic materials is justified by the creation of an initial scaffold necessary for the neo-osteogenesis. βTCP is biodegradable, being replaced by the bone tissue while resorption [10]. The nanoparticle hydroxyapatite, unlike the traditional one considered non-resorbable [11], presents a higher water solubility that makes it completely resorbable. Jensen SS et al. shows that a combination of HA with βTCP in ratio of 20/80 showed bone formation and degradation of the filler material similar to autografts [12]. To avoid the dispersion of bone augmentation material in the sinus cavity, we reconstructed the intern sinus wall with a titanium mesh modeled and fixed properly with titanium screws in the adjacent bone (Figure 8). Over the augmentation material (Figure 9), we applied a resorbable membrane (Figure 10). The mucoperiosteal flap was repositioned and sutured.
Different studies show, in the first year of healing, an increased rate of bone regeneration of the defects augmented with bone grafts materials in comparison with the defects without augmentation, but after two years or more there are not important differences any more [9]. In our case, we considered useful the post-cystectomy bone augmentation in the anterior part of the maxilla for the restoration of the anatomic architecture of the maxilla and the early prosthetic rehabilitation.

Of a major importance is the total removal of the cystic membrane to prevent the recurrence of the lesion as well as to allow a complete histopathological exam. The setting of the cell varieties in the lesion area of the cyst wall and of the extracellular behavior allows the classification of cystic lesions and the postoperative prognostic predictions.

Conclusions

The present case demonstrates the extensive-destructive character of radicular cysts. We want to emphasize the importance of the fine-needle aspiration biopsy and of the 3D imagistic investigation in assessing the diagnosis of large cystic bony lesions. The orthopantomography performed once a year may discover the presence of the maxillary cysts in incipient stages, thus avoiding the massive bone destructions, which may result due to the extensive growth of cystic lesions. Such cases need more complex preoperative investigations, complex surgeries, interdisciplinary collaboration – oral and maxillofacial surgeon, endodontic dentist, anesthesiologist, anatomical pathologist – the postoperative follow up becoming compulsory.

References


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