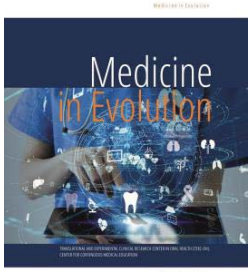
Treatment of maxillary sinus mucoceles by functional endoscopic sinus surgery



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Abstract

Computer-assisted surgery has gained momentum in recent decades. Functional endoscopic sinus surgery (FESS) is a highly sophisticated type of surgery that has revolutionized the surgical management of chronic sinus diseases. This is in constant progress along with technical advances in imaging, instrumentation and navigation. FESS follows anatomical landmarks, guides the surgeon during the procedure and helps to avoid possible complications.

Maxillary sinus mucoceles are benign formations, relatively rare among all paranasal sinus mucoceles. With the introduction of endoscopic sinus surgical techniques, surgeons prefer trans-nasal endoscopic management of sinus mucocele. The aim of this study is to describe maxillary sinus mucocele and to establish the effectiveness of its endoscopic management.

Keywords: mucocele, maxillary sinus, functional endoscopic sinus surgery (FESS)

INTRODUCTION

Endoscopic sinus surgery began to gain momentum in the late 1970s with Messerklinger's studies of mucociliary clearance and its role in the pathogenesis of sinusitis [1]. The popularity of the technique of endoscopic ethmoidectomy with opening of secondary involved sinuses increased rapidly in the latter part of the 20th century. Intranasal endoscopic surgical techniques, as a result of technological progress, have expanded to treat other pathologies besides sinusitis, including conditions of the base of the skull and orbit [2-4].

Endoscopic surgery of maxillary sinus replaces the radical Caldwell-Luc approach in some clinical situations because it is more conservative, has a lower complication rate and a higher cure rate [5]. It is also called functional endoscopic sinus surgery (FESS) because the surgery is performed to restore the way the sinuses work.

Mucocele is a benign, cyst-like formation lined by the mucoperiosteum of the involved sinus [6]. Maxillary sinus mucocele is relatively rare, representing at most 10% of paranasal sinus mucocele [7]. It may be discovered incidentally on a panoramic x-ray or on an x-ray or computed tomography (CT) scan of the sinuses. It is mostly asymptomatic. If it fills the sinus space and exerts pressure on the mucosa, it can cause periorbital, facial pain or headaches [6].

Treatment of maxillary mucocele is surgical, including external approaches, marsupialization, Caldwell-Luc technique and FESS. Endoscopic treatment is not indicated in patients with contraindications to general or local anesthesia, or those with lesions extending into the palate, soft tissue, orbit, lateral frontal sinus depressions, or advanced intracranial extension. In these cases, treatment can be done with a combined surgical approach: open and endoscopic [3,8].

The concept of FESS is to remove tissues obstructing the osteo-metal complex allowing drainage while preserving the normal non-obstructive anatomy and mucous membrane [9].

Images on plain radiography, computed tomography (CT) and magnetic resonance imaging (MRI) are characteristic, allowing differential diagnosis from other pathologies of the maxillary sinus, and histopathological examination confirms the diagnosis. Mucoceles can be associated with other pathologies such as nasal polyposis or neoplasia [10].

Aim and objectives

The aim of this study is to describe maxillary sinus mucocele and to establish the effectiveness of its endoscopic management.

MATERIAL AND METHODS

Preoperative CT imaging of paranasal sinuses reveals partially or completely opacified maxillary sinuses with homogeneous cyst-like lesions (Figure 1a, b).

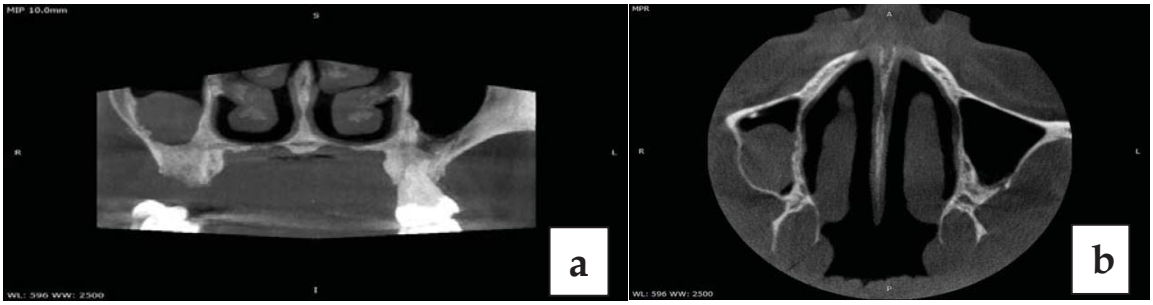

Figure 1. CBCT image of a right maxillary sinus mucocele: a-coronal section, b-axial section

Sometimes the natural ostium are obstructed, causing the sinuses to expand (Figure 2). In some cases the medial wall of the maxillary sinus is bulging, the mucosa of the ethmoid sinuses is thickened, or there is erosion of the upper wall and bulging in the orbit (Figure 3).

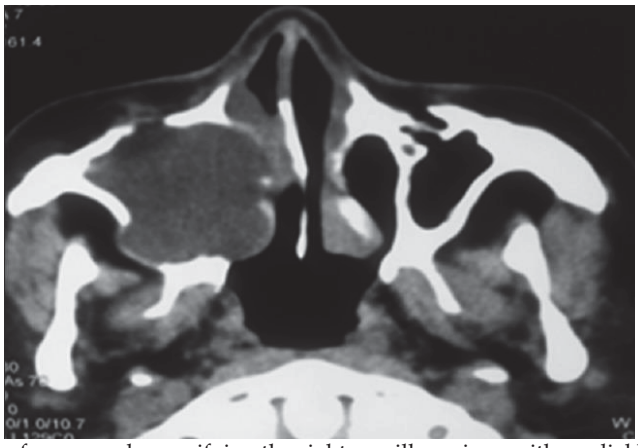

Figure 2. CBCT image of a mucocele opacifying the right maxillary sinus with medial bulging causing sinus expansion and obstruction of the right nasal cavity

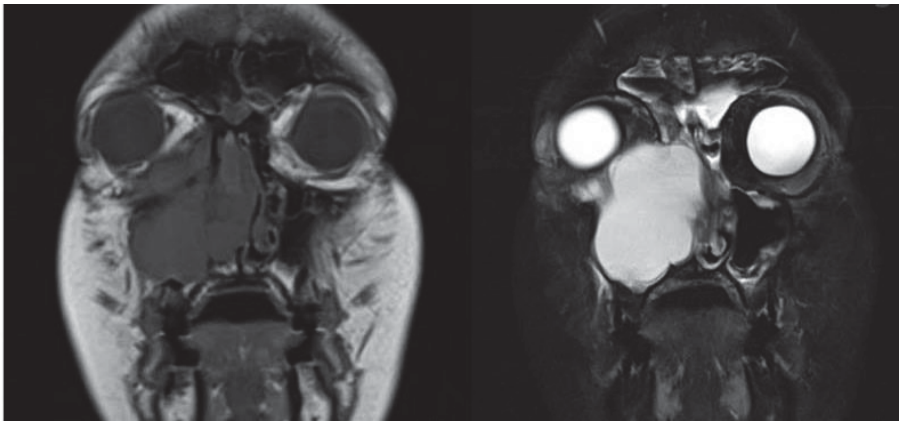

Figure 3. MRI with and without intravenous contrast of a right maxillary sinus mucocele that has eroded the right orbital floor

A thorough nasal endoscopy is required preoperatively to visualize the mucocele (Figure 4). The lateral nasal wall near the uncinate and the axilla of the middle turbinate are infiltrated with anesthetic. After removal of the uncinate, the natural ostium of the maxillary sinus is visualized and enlarged posteriorly and inferiorly to avoid damage to the superior orbit and the anterior nasolacrimal duct. Endoscopic ethmoidectomy, middle meatal antrostomy and marsupialization with mucocele drainage are performed. Mucocele can be aspirated and extracted with forceps.

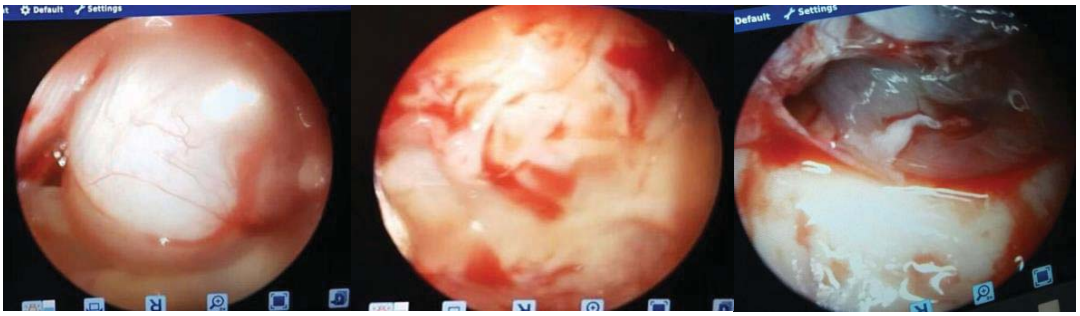

Figure 4. Endoscopic images of a maxillary sinus mucocele

The rigid fiber optic nasal telescope provides intra-operative visualization of the osteo-meatal complex, allowing the surgeon to precisely focus on key areas. The image is projected onto a monitor through a small camera attached to the eyepiece of the endoscope.

RESULTS AND DISCUSSIONS

Mucoceles of the maxillary sinuses are rare, expanding, cyst-like benign lesions that develop slowly. They present a secretory respiratory mucosa of pseudostratified columnar epithelium. Mucoceles are mucoid formations and develop after obstruction of the sinus ostium and drainage pattern. The researchers concluded that the release of cytokines would stimulate the fibroblasts to secrete prostaglandins and collagenases, which could stimulate bone resorption, leading to the expansion of the mucocele [11-13].

The cause frequently incriminated in the development of mucocele is represented by sinus ostium obstruction [14].

Mucoceles of the maxillary sinuses are an excellent indication for endoscopic surgery. External approach combined with endonasal surgery is suitable in maxillary sinus mucoceles [15,16].

Martel-Martín *et al.* analyzed 58 patients with paranasal sinus mucocele and found that the recurrence rate was lower in patients treated endoscopically (4.8%) compared to those treated externally (28.5%) [17].

Waizel-Haiat *et al.* in a study of 59 patients diagnosed with mucocele, they found no statistically significant relationship between the type of surgery and recurrence or between the presence or absence of a predisposing factor and recurrence [18].

Literature studies show that most cases treated endoscopically have a recurrence rate that varies from 0.9% to 2.2%. In other studies with fewer patients, this relapse rate increases from 11% to 13% of cases [18,19].

Hadar *et al*. [6] used endoscopic access in 60 patients. In 37 patients it was possible to remove the cyst through the natural opening, in 23 an additional access was necessary (inferior nasal meatus, less often through the canine fossa). The histological examination revealed, in most patients, fragments of tissue covered with ciliated pseudostratified respiratory epithelium and infiltrated by cells with chronic inflammation under the epithelium. The authors highlighted the advantages of the endoscopic approach: it can be performed with local anesthesia, does not require incisions, has a low recurrence rate (3%) and recommends that this approach be used in the management of mucosal cysts of the maxillary sinus.

Busaba and Salman published a study on endoscopically assisted treatment of 13 patients with maxillary sinus mucocele. Treatment involved infundibulotomy, widening of the natural ostium and marsupialization of the cyst, without complete removal of the

membrane. The authors concluded that functional endoscopic surgery (FESS) is the method of choice in the treatment of mucoceles with good long-term results [20].

FESS is a minimally invasive, effective method, but like any surgical intervention it has its risks. There have been reported cases of synechiae, endonasal scarring, which makes it difficult to drain the paranasal sinuses effectively [20,21]. A surgical intervention also entails a psychological stress on the part of the patient, no matter how atraumatic it is.

We have come across articles in which the authors demonstrate that mucocele of the maxillary sinus does not require surgical treatment, but the studies were carried out either on a small number of cases or on a short period of follow-up of patients [22,23].

Halstead showed in a study that 60% of maxillary sinus mucoceles do not increase in size, while 25% gradually shrink or disappear altogether. The follow-up period was less than 20 months and the follow-up period of the majority of cysts that did not change in volume was less than 16 months [24]

Other long-term follow-up studies have generally revealed no significant change in the size of maxillary sinus mucoceles. Some cysts gradually increase in size, but most resolve spontaneously.

Gothberg *et al.* [25] in a study carried out over a period of 32 months determined that 45.4% of these cysts regressed in volume.

Wang *et al.* [26] monitored the natural evolution of incidentally diagnosed maxillary sinus mucoceles in 40 patients for 5 years. 17 patients were monitored for a period from 38 to 102 months, with the help of Waters' view films. In 7 patients (38.9%) the cyst disappeared completely, in 2 (11.1%) it decreased in volume, in 4 patients (22.2%) it did not change in volume, and in 5 patients (27.8%) it increased in volume. The authors concluded that after incidental detection of mucocele and the patient's lack of symptoms, follow-up radiography should be performed after 48 months. In the absence of complications, the strategy is waiting and monitoring and not surgery.

Albu conducted a study that included 80 patients with symptoms caused by maxillary sinus mucocele, in order to determine the relationship between symptomatic relief and endoscopic sinus surgery with or without endoscopic excision of maxillary cysts. He concluded that there were no differences in treatment success between cases where the cyst was excised (the study group) and where it was not (the control group) [27].

CONCLUSIONS

To evaluate any rhinosinusal mass, a thorough clinical, radiological and endoscopic correlation is mandatory for an early and differential diagnosis.

The endoscopic approach to the mucocele is presented as a safer and more effective technique with fewer recurrences than the open sinus approach. It is better tolerated by patients and involves less costs.

The results of endoscopic and open approaches are comparable. The frequent use of open approaches may reflect the effectiveness or lack of expertise and equipment for endoscopic management. Most contemporary authors prefer endoscopic management, limiting open approaches for specific indications (unfavorable anatomy, lateral disease and scarring).

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