

# Maxillary Antral Mucocele and Its Relevance for Maxillary Sinus Augmentation Grafting: A Case Report

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*Paranasal sinus mucoceles are benign, locally expansile cystlike masses that are filled with mucus and lined with epithelium. Most occur in the frontal sinus. Maxillary sinus mucoceles are presumably uncommon in the United States and European countries, although they have been frequently reported in Japan, particularly following Caldwell-Luc surgery. Clinical symptoms may not appear for at least 10 years postoperatively. Chronic sinus inflammation and allergic disease are also common causes of paranasal mucoceles. This paper provides an overview of maxillary sinus mucoceles and presents a case study involving a 62-year-old Latin male whose asymptomatic maxillary sinus mucocele was not revealed until he presented for maxillary sinus grafting and implant placement. (INT J ORAL MAXILLOFAC IMPLANTS 2000;15:287-290)*

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Paranasal sinus mucoceles are benign, cyst-like, locally expansile masses that are filled with mucus and lined by the mucoperiosteum of the involved sinus. Most sinus mucoceles seem to be formed as the result of an obstructed sinus outflow that leads to an accumulation of fluid in a mucoperiosteal-lined cavity.<sup>1-6</sup> As fluid continues to accumulate, the mucocele slowly enlarges, distending the bony walls of the sinuses, and, most notably, eroding and remodeling surrounding bone because of the pressure. This feature differentiates mucoceles from retention cysts, as does the typically larger size of mucoceles, which often allows them to be seen radiographically.<sup>7</sup>

As they enlarge, mucoceles can eventually herniate into adjacent cavities, such as the cranium or orbit, or onto the skin surface.<sup>5,8-14</sup> When a secondary infection is present, the mucocele may expand rapidly and pose a significant risk of infectious and noninfectious complications.

Clinical symptoms can include headache, facial numbness, painless cheek swelling, poorly localized pain and tenderness, nasal obstruction or fullness, diplopia, visual impairment, dentition displacement, and enophthalmos, depending on the size and location of the mucocele.<sup>7,15</sup> Significantly enlarged mucoceles can mimic malignant growths, although these can usually be differentiated by biopsy or even computed tomographic (CT) scanning.<sup>2</sup> Smaller, early masses may be present without any symptoms.<sup>16,17</sup>

Most mucoceles described in the literature are attributed to trauma, either from an injury or, more frequently, sinus surgery, particularly the Caldwell-Luc procedure.<sup>4,18</sup> Postoperative scarring can divide the antrum into walled-off compartments, which creates ideal conditions for mucocele formation. While the compartment close to the ostium might drain readily, the compartment that is separated from the ostium by a fibrous septum cannot drain at all.

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**Fig 1** The mass is removed and the window is enlarged.



**Fig 2** Fragments of the encapsulated cyst that was removed from the maxillary sinus.

Another common cause of mucocoeles is chronic infection or allergic sinonasal disease, which may cause inflammatory adhesions that also form walled-off compartments.<sup>2,19</sup> Children with cystic fibrosis frequently have mucocoeles because of the stasis of sinus secretions,<sup>20</sup> and a very small number of sinus mucocoele cases have been linked to naturally compartmentalized sinuses.<sup>4,21,22</sup> In some cases, including that presented here, the underlying cause remains unclear.<sup>2,23–25</sup>

Most paranasal sinus mucocoeles occur in the frontal sinus, which is drained by the long frontonasal duct. They are seen less frequently in the ethmoid and sphenoid sinuses.<sup>23</sup> According to the literature in the United States and Europe, maxillary sinus mucocoeles are very uncommon, yet in some series they reportedly comprise as many as 10% of mucocoele cases in Japan.<sup>2,26,27</sup> The reason and the validity of this difference in incidence is uncertain.

The following is a patient history involving a maxillary sinus mucocoele that was not discovered until the patient presented for a sinus graft to accommodate dental implants.

## CASE PRESENTATION

A 62-year-old Latin male who practices dentistry referred himself for maxillary sinus augmentation and implant placement. His medical history was not significant, although he reported feeling minor nasal stuffiness every morning. The clinical, radio-

graphic, and CT scan evaluation of this patient revealed no abnormalities or pathologies.

During the procedure, the Schneiderian membrane appeared to be very friable and perforated. A small piece of yellow tissue was removed from the antrum (Fig 1). Although no mucus was seen at this point, it was concluded that a sinus antrum abnormality existed and that the appropriate treatment would be to continue enlarging the opening with a Caldwell-Luc procedure and then remove the pathologic content of the antrum. When the window was enlarged, a cyst was found and removed.

Gross examination revealed an encapsulated mass measuring approximately 3 cm × 2 cm with several smaller soft, yellow masses around it; the smaller masses were removed as well (Fig 2). Also noted was a small amount of bone resorption on the distal and medial walls of the maxillary sinus. The remaining mucosal lining was scraped and removed with curettes, the sinus was irrigated with sterile water, the mucoperiosteal flap was sutured closed, and the patient was given appropriate postoperative care instructions.

Histologic review of the removed tissue specimens was undertaken by a pathologist (Fig 3). The pathology report concluded that the gross specimen was a maxillary antral mucocoele. Microscopic examination with hematoxylin and eosin staining revealed a single layer of mucus-producing columnar epithelium that was lining a mucus protein-filled cystic area. The submucosal tissue contained a moderate degree of lymphocytic inflammation.

To date, the patient has not experienced a recurrence of the mucocele. He also reported that the chronic, minor nasal congestion experienced before the surgery and removal of the maxillary sinus mucocele had subsided.

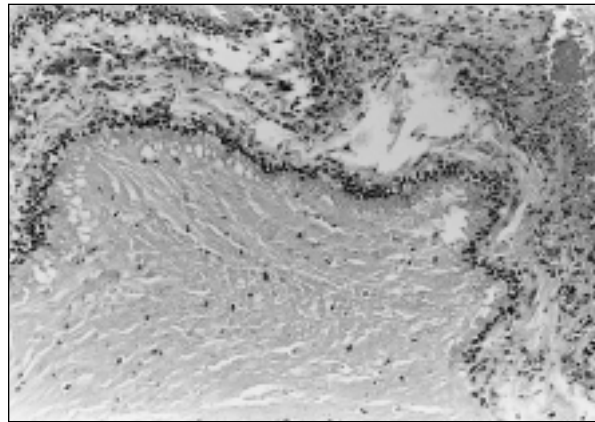
## DISCUSSION

Although the general consensus is that sinus outflow obstruction is the primary cause of mucocele formation, the precise mechanism is still unknown. Most mucoceles reportedly can be seen on conventional sinus radiographs,<sup>23</sup> although that was not the case with this patient.<sup>16</sup> Mucoceles following from inflammatory or allergic diseases appear radiographically in the early stages as a nonspecific, uniformly clouded pathology with normal bony walls. In later stages, the sinus cavity appears expanded, and the walls are thinned and eventually perforate. Scattered calcifications may also be seen radiographically in late-stage mucoceles.<sup>7</sup>

With postoperative mucoceles, the entire sinus and bony walls are not initially affected.<sup>7</sup> Early radiographs may reveal a nonspecific increase in the sinus cavity density, making mucoceles difficult to distinguish from inflammatory or allergic disease processes.<sup>23</sup> Eventually, they often appear spherical, as opposed to the dome-shaped appearance of pseudocysts and retention cysts,<sup>16</sup> although the natural sinus structure can alter this shape as the mucocele expands.<sup>7</sup> With maxillary cysts, sinus expansion may be reflected by a bulge of the medial bony wall into the inferior portion of the nasal cavity and loss of normal posterior contour with a convex bulge.<sup>28</sup>

Magnetic resonance imaging (MRI) can easily differentiate fluid-filled structures from tumors, as fluid within the mass reveals a high-intensity signal on T-1 and T-2 weighted images. However, the apparent low incidence of maxillary sinus mucoceles makes routine MRIs unwarranted. During surgery, mucoceles appear as firm, encapsulated masses filled with fluid that can be clear or mucinous and may be yellow, yellow-green, brown, or gray.<sup>7</sup>

Considering that the mass was not revealed by panoramic radiographs or CT scans of the sinuses and the relative lack of clinical symptoms, other than the recurrent minor nasal stuffiness and the very small amount of bone resorption, this patient's maxillary sinus mucocele appears to have been in a very early stage.<sup>29</sup> It may have gone undetected and remained fairly asymptomatic for a number of years had the sinus augmentation surgery not been initiated. Nonetheless, having proceeded with the aug-



**Fig 3** Microscopic examination with hematoxylin and eosin stain reveals a single layer of mucus-producing columnar epithelium lining a mucus protein-filled cystic area. The submucosal tissue contains a moderate degree of lymphocytic inflammation.

mentation surgery and implant placement without having removed the mucocele would no doubt have given rise to significant complications at some point. It is important, therefore, for the surgeon to recognize and address this potential pathology among patients.

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