

# Simultaneous Excision of an Antral Pseudocyst and Maxillary Sinus Augmentation

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## INTRODUCTION

Antral pseudocysts (APs) are common lesions of the maxillary sinus.<sup>1</sup> Radiographically, they appear as homogenous domes with a smooth and distinct border but without any evidence of bone erosion.<sup>2</sup> APs are typically asymptomatic and can be left untreated. However, there may be a need to manage the APs when planning for a maxillary sinus augmentation (MSA). To prevent complications, some authors recommend the resolution of sinus pathologies before MSA.<sup>3</sup> Conventionally, this can be accomplished via an endoscopic sinus or trans-oral approach. In the endoscopic approach, the AP is removed through the maxillary sinus ostium.<sup>4</sup> This requires a referral to an otolaryngologist and is typically performed under general anesthesia. Alternatively, trans-oral excision can be performed by the dental practitioner under local anesthesia.<sup>5</sup> In both scenarios, subsequent implant placement will require a secondary surgical procedure, and re-entry into the antrum may be technically challenging because of fibrosis.

Recently, there have been an increasing number of reports where MSAs were done without excision of the AP. This eliminates the necessity of a separate surgery under general anesthesia and the accompanying complications. However, elevation of the AP superiorly may potentially obstruct the maxillary ostium, leading to maxillary sinusitis.<sup>6</sup> There were also reports of the AP rupturing during the MSA procedure. This led to infection and loss of graft material.<sup>7,8</sup> Some practitioners overcame these problems by needle aspiration of the AP before the MSA.<sup>9</sup> Although this helps to decompress the AP and reduce the risk of rupture, it does not resolve 1 key problem: the lack of a definitive diagnosis. The ideal approach would be one that allows for the excision of the AP without delays in the MSA. In this report, we will highlight 1 of 4 cases performed from 2018 to 2019 at our center as an illustration and then summarize all 4 cases in the Table.

## DESCRIPTION OF THE CASE

A 52-year-old Chinese woman with no significant comorbidities wished to replace her missing upper right first molar with an implant-supported prosthesis. An MSA was indicated because there was insufficient subantral bone height of only 4 mm. The bucco-lingual and mesio-distal widths were 13 and 8 mm, respectively. The preoperative radiographs revealed a homogenous dome-shaped radiopacity on the right maxillary sinus floor. It was measured to be 18.3 × 14.9 × 23.7 mm on cone beam computerized tomography (CBCT) with no evidence of bony erosion (Figure 1, Patient 1). After establishing a provisional diagnosis of AP, an excisional biopsy and simultaneous MSA were planned.

After local anesthesia was achieved, a trapezoidal flap was raised at the surgical site. A 5-mm diameter circular bone window was created 5 mm above the planned lateral window osteotomy (Figures 2 and 3). Care was taken to keep the AP lining intact at this stage. A 22-gauge needle was introduced through the osteotomy, perforating the sinus membrane, toward the lesion. Positive aspiration of a clear yellowish fluid established the cystic nature of the lesion and aided with decompression (Figure 4). The clinician should suspect a noncystic lesion or a solid tumor if aspiration cannot be achieved despite multiple attempts. This would warrant delaying the MSA until a definitive diagnosis is confirmed. A small-bore metal evacuator was then introduced into the osteotomy to draw the decompressed lesion toward the bone window, after which an artery forceps was used to remove the lesion (Figure 3). Subsequently, MSA via a lateral window approached was performed from a separate inferior bone window, 5 mm away from the initial osteotomy used for the antral pseudocyst removal. This will preserve a strut of bone between the 2 osteotomies. After making an outline with a bur, the bone window was lifted off from the sinus membrane. The sinus membrane was then elevated off from the sinus wall. Care must be taken to not lift the sinus membrane off the bone strut. This presents the iatrogenic perforation made previously from communicating with the augmentation site. The space created between the sinus membrane and the sinus wall was grafted with a Bio-Oss xenograft. A dental implant of 4.8 mm diameter and 10 mm length was placed simultaneously. Before the closure, a Bio-Gide collagen membrane was placed over the osteotomy window. Postoperative radiographs did not demonstrate any graft leakage into the sinus (Figure 1, Patient 1). The histologic specimen was reported to be a benign cyst with features highly suggestive of an AP. Prosthetic rehabilitation was completed after 3 months. No postoperative complications were reported at the 1-year review (Figure 5).

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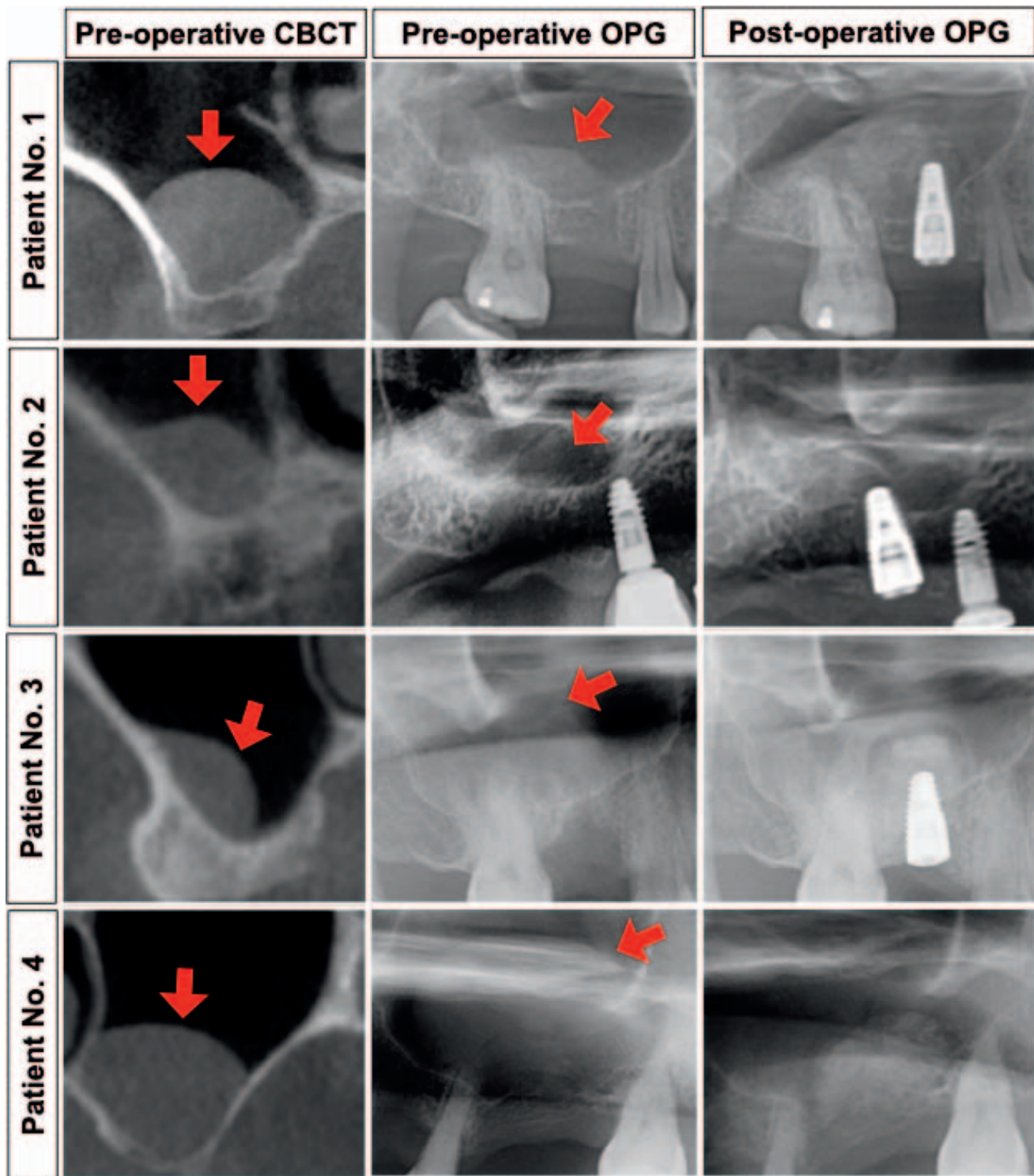


FIGURE 1. Preoperative CBCT and preoperative and postoperative orthopantomograms of the 4 cases. The red arrows points to the APs.

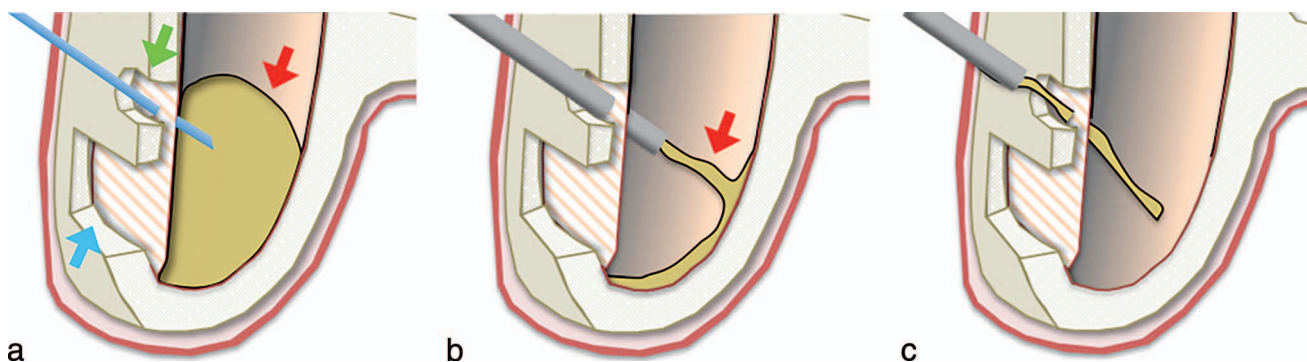
**DISCUSSION**

The AP is a result of an accumulation of serous inflammatory exudate in the mucosal layer of the Schneiderian membrane. This results in a classical dome-shaped appearance on radiographs.<sup>2</sup> However, a definitive diagnosis can only be achieved with biopsy and histopathologic analysis. In this

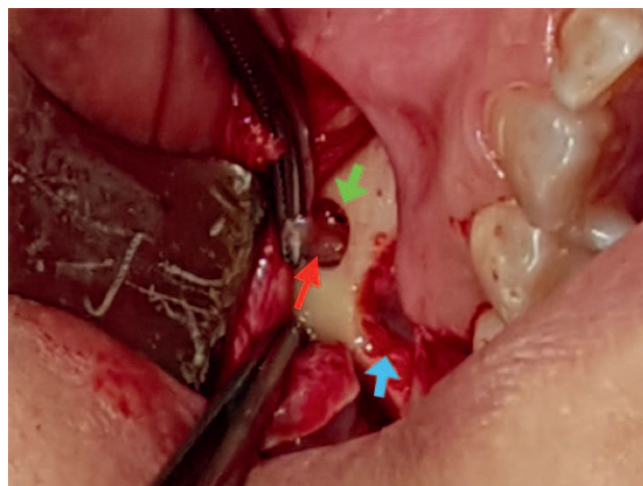
article, we described a technique whereby the excision of the AP was done through a separate osteotomy window, superior to the actual lateral window osteotomy (Figures 3 and 6).

Apart from achieving a definitive diagnosis, this technique has several other advantages. First, the lesion can be removed without perforating the Schneiderian membrane involved in

Case No.	Profile	Residual Bone Height (mm)	Size of AP Measured on CBCT (mm)	Laterality (Dentition Replaced)	Simultaneous Implant Placement
1	52/Female	4	18.3 × 14.9 × 23.7	Right maxilla (#16)	Yes
2	61/Male	7	9.4 × 6.3 × 8.9	Right maxilla (#17)	Yes
3	31/ Male	7	12.9 × 6.9 × 14.1	Right maxilla (#16)	Yes
4	67/Female	3	20.6 × 15.8 × 21.9	Left maxilla (#15 and 16)	No



**FIGURE 2.** Sequence of the biopsy. (a) Fluid aspiration. (b) Suctioning of the decompressed pseudocyst. (c) Delivery of the lesion out of the antrum. The blue arrow points to the lateral window osteotomy, the green arrow points to the additional circular osteotomy, and the red arrow points to the antral pseudocyst (held by the artery forceps).



**FIGURE 3.** Use of the artery forceps and suction to deliver the lesion (Patient 1). The blue arrow points to the lateral window osteotomy, the green arrow points to the additional circular osteotomy, and the red arrow points to the AP.

the MSA. As a result, there was no loss of graft material in all 4 of the cases operated on with this technique (Table and Figure 1). Second, the additional osteotomy was made in the same anatomical site of the lateral window osteotomy. There is no need to make additional incisions or access through other anatomical sites such as the nasal cavity. Third, the aspiration of a yellowish fluid reduces the size of the AP, and thus, a small 5-mm window is sufficient to remove the lesion. Most importantly, this technique does not significantly increase the technical difficulty of the procedure. Four excisions of AP and

simultaneous MSAs were performed successfully by trainees in our center (Table and Figure 1). No complications were reported in any of the cases. Although the provisional diagnosis of AP was accurate in all 4 cases, the definitive diagnosis provides assurance to the patient. In the unlikely event that the diagnosis is not an AP and further management is required, the grafted material can still be evacuated.

This approach is not without disadvantages. The graft material is prevented from entering the deliberate sinus membrane perforation by the unelevated sinus membrane (between the lateral window osteotomy and the additional osteotomy). However, if the osteotomies are unintentionally placed too close together, the shorter distance of unelevated sinus membrane may not provide sufficient resistance against the pressure during the packing of the graft material, resulting in extrusion of material into the maxillary sinus. Also, the thin bone strut between the 2 osteotomies may be prone to fracture. The clinician is also unable to visualize the biopsy process directly and must rely on suction to remove the lesion. This would mean that there is the potential for incomplete removal of the lesion, which may be inconsequential for an AP. This approach is also a novel one, and currently there is a lack of studies investigating the different approaches to this issue. Long-term comparative studies will be necessary to validate this approach.

#### CONCLUSION

This technique provides the opportunity to obtain a definitive diagnosis of suspected AP without the need to delay the MSA procedure. This technique has been shown to be relatively safe and reproducible.

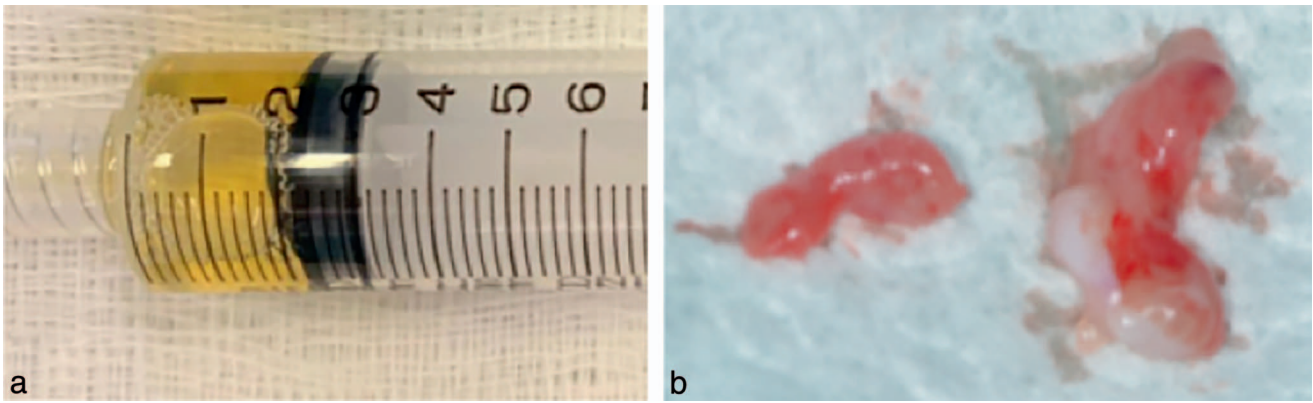


FIGURE 4. (a) Yellow fluid aspirated from the lesion. (b) Specimen.

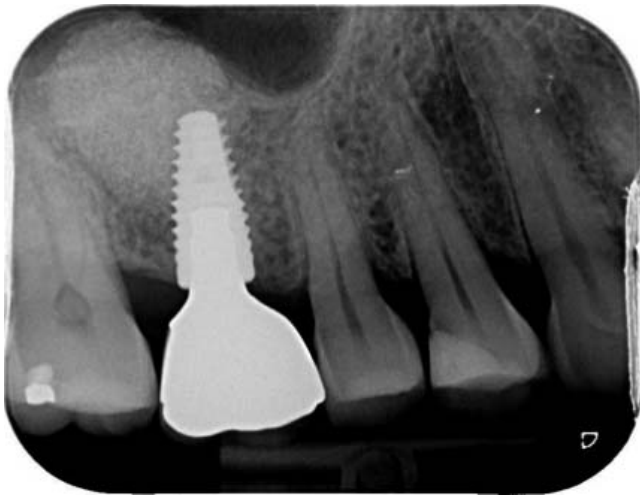


FIGURE 5. Peri-apical radiograph of the implant 1 year after simultaneous MSA and implant insertion (Patient 1).

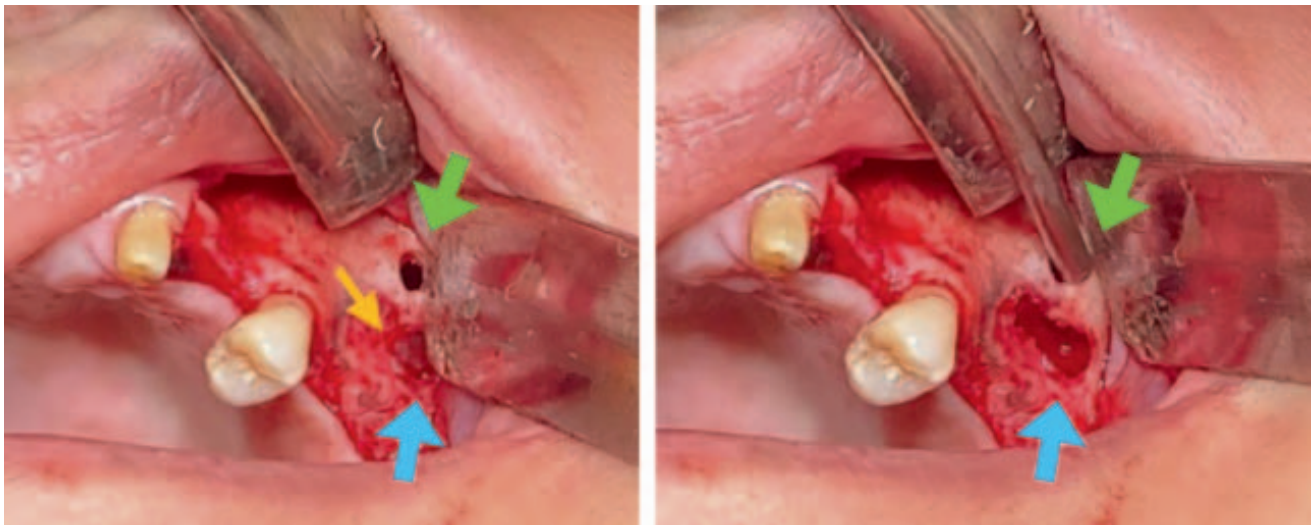


FIGURE 6. Use of the suction to check for integrity of the sinus membrane. By using the suction, a negative pressure was created within the sinus cavity (Patient 4). This will lift up the sinus lining from the lateral window osteotomy site if there was not perforation. The blue arrow points to the lateral window osteotomy, the green arrow points to the additional circular osteotomy, and the yellow arrow points to the sinus membrane.

**ABBREVIATIONS**

AP: antral pseudocysts  
 CBCT: cone beam computerized tomography  
 MSA: maxillary sinus augmentation  
 RBH: residual bone height

**NOTE**

The authors declare no conflicts of interest.

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