Surgical Pneumatization through Maxillary Sinus Wall and the Schneiderian Membrane: A New Technique to Facilitate Augmentation of the Maxillary Sinus

Abstract
A minimum subantral bone height in the posterior maxilla may require a bone augmentation where a sinus lift procedure is the most commonly used technique, either preceding or simultaneously with the implant installation. While elevating the Schneiderian membrane ruptures are common, possibly resulting in less bone formation. In this paper, we propose the surgical pneumatization of the Schneiderian membrane as a new technique to minimize the risk of such complications. This can be achieved mainly by creating a hole for the immediate and increased passage of air through the Schneiderian membrane and the maxillary sinus wall above the region of augmentation.

Keywords: Dental implants, maxillary sinus augmentation, maxillary sinus floor elevation, surgery

Introduction
Lack of bone in the posterior parts in the maxilla, because of the extension of the maxillary sinuses, is often a problem in implant treatment in this region. The sinus lift is the most common choice of treatment with the lateral approach[1] being the most commonly used technique for maxillary sinus augmentation. Simultaneous installation of implants can be performed with the use of bone grafts or bone substitutes.[2] Bone graft or bone substitutes can also be used for augmentation with the insertion of the implants after a period of healing. During the past decade, this approach has also been successfully used when lifting only the Schneiderian membrane to create conditions for bone formation from a blood clot without the use of grafts of any kind.[3] During maxillary sinus augmentation, the Schneiderian membrane is dissected and elevated from the floor of the maxillary sinus. However, as the membrane is very thin, ruptures are common and an undesirable intraoperative complication.[4] Pressure from the air inside the maxillary sinus toward the Schneiderian membrane makes it difficult to elevate the membrane safely. We propose the surgical pneumatization of the Schneiderian membrane (SPSM) as a new technique to minimize the risk of such complications. This can be achieved mainly by creating conditions for the immediate and increased passage of air through the Schneiderian membrane and the maxillary sinus wall above the region of augmentation [Figures 1 and 2].

Technique
The surgery is initiated as a standardized maxillary sinus augmentation. After elevation of the mucoperiosteal flap, the lateral sinus wall and the Schneiderian membrane are perforated with a small (∅ = 2.1 mm) round burr [Figure 3]. The perforation is located at about the level of the first maxillary molar and 25-25 mm superior to the alveolar crest. After the perforation, a bone window is created in the lateral sinus wall [Figure 4], and the procedure is continued as a standard maxillary sinus augmentation [Figure 4]. The only difference will be reduced resistance during mobilizing of the Schneiderian membrane due to reduced air pressure in the sinus.

Discussion
A rupture of the membrane reduces the prognosis of implant treatment[5] and is less likely to occur if the SPSM technique is used. Although intended to be used before bone fenestration of the lateral wall, the SPSM can also be used in cases where difficulty in elevation of the Schneiderian membrane is encountered, when surgery has
been initiated as standardized maxillary sinus augmentation. The perforation of the lateral sinus wall and the Schneiderian membrane should be placed superior to the vertical height of the implant. Inferior positioning can cause a puncture that mimics a small rupture in the membrane. Hence, manipulation of the membrane before implant placement can broaden the puncture of the membrane and create a larger rupture.

Discussion

The SPSM is a safe and time-saving technique that can be easily incorporated into the standard augmentation of the maxillary sinus floor, whether performed with or without simultaneous graft material. While facilitating augmentation of the maxillary sinus, future investigations will be required to determine the prognosis of the SPSM.

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Conflicts of interest

There are no conflicts of interest.

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