

## CLINICAL REPORT



# Sinus Lift with bone regeneration graft in presence of odontogenic sinusitis: A Case Report

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## INTRODUCTION

Odontogenic sinusitis is a condition of the maxillary sinus with a bacterial etiology, associated with teeth undergoing inflammatory/infectious processes and surgical failures. They represent between 25 to 40% of all chronic sinusitis cases, and they occur unilaterally with a frequency of 45 to 75%, commonly diagnosed through CBCT by observing the opacity (radiopacity) of the maxillary sinus. It is common in the 5th decade of life and presents in a 1:1 ratio between men and women. Clinical symptoms are characterized by halitosis, cacosmia, headaches, postnasal discharge, and pain that worsens when bending over. The diagnostic process should include imaging confirmation of the unilateral or bilateral maxillary sinus opacity, associated with intraoral pathological conditions. Currently, CBCT is the goldstandard<sup>(1,2)</sup>.

Maxillary Sinus Elevations. Elevating the Schneiderian membrane to address bone deficiency in atrophic maxillae has been extensively studied in the literature<sup>(3)</sup>. The first surgical technique was described in the 1970s by Tatum, who designed a lateral window osteotomy in the maxillary bone. It can be performed using rotary or piezoelectric instruments. The lateral access is indicated when there is less than 5 mm of remaining alveolar crest<sup>(3)</sup>.

After the surgical access to the area, the Schneiderian membrane should be lifted to create space for bone gain, using blunt instruments to prevent membrane perforation<sup>(4)</sup>.

Sinus lifts, as a general treatment approach, have low morbidity and a high success rate of over 90%<sup>(2,3,4)</sup>.

The literature demonstrates that the use of particulate grafts has similar predictability to no graft use, with a success rate of over 90% for both. The survival rate of osseointegrated implants over 5 years is 99.6% and 96%, respectively<sup>(4,8)</sup>.

Meta-analyses have shown a correlation between Schneiderian membrane perforation during maxillary sinus lift and the loss of dental implants with statistical significance. Despite lateral window sinus lifts having a higher rate of perforations, the surgical technique used and implant loss don't have a direct association<sup>(5)</sup>.

One way to decrease the risk of Schneiderian membrane perforation and the subsequent decrease in the survival of osseointegrated implants is by using piezoelectric instruments for the lateral window approach. Compared to using rotary instruments, the perforation rate drops from 24% to 3%, respectively. This statistically improves the implant prognosis<sup>(6)</sup>.

## Treatment

The management of chronic odontogenic sinusitis starts with the

## ABSTRACT

The case of a 30-year-old female patient, ASA I, with partial edentulism in the upper jaw and severe bone atrophy for implant rehabilitation is presented. Radiographic examination reveals an image in the area of the left maxillary sinus compatible with chronic odontogenic sinusitis and a deficient alveolar ridge in height. Upon confirming the diagnosis, a maxillary sinus lift surgery is scheduled using the lateral window technique and particulate bone grafting. The surgical technique's outcomes are presented in a patient with chronic odontogenic sinusitis.

## KEY WORDS:

Sinus lift; Dental implants; Chronic sinusitis; Odontogenic sinusitis.

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removal of infectious sources from the oral cavity through actions such as extractions, endodontic procedures, periodontal treatment, surgeries involving the maxillary sinus tissues, along with nasal corticosteroid treatment and antibiotic management<sup>(9)</sup>.

## CASE REPORT

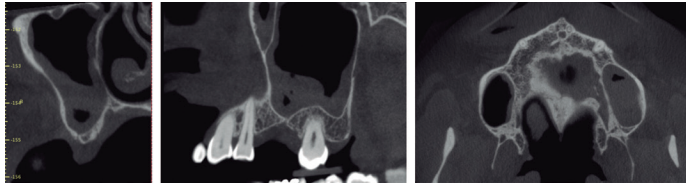
A 30-year-old female patient with no significant medical history presented to Implantology service at Universidad del Desarrollo in Santiago, Chile. She reported partial upper left edentulism following a failed bone graft surgery that had been performed one year earlier. Upon intraoral physical examination, there was an absence of teeth 2.5 and 2.6, associated with a bone defect classified as type 4 according to the Benic and Hammerle classification (2014). An orthopantomogram (panoramic X-ray) was requested, confirming the loss of bone tissue in the alveolar cortical region of the site, and notable opacification of the left maxillary sinus. (Fig 1)



Figure 1. Orthopantomography.

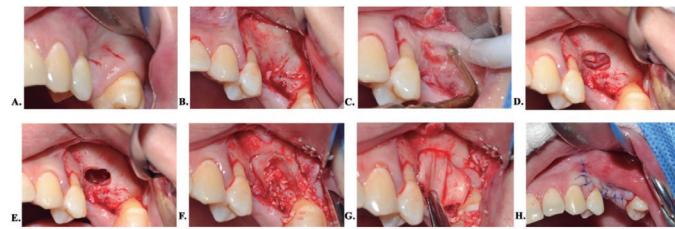
CBCT scan reveals a unilateral intrasinus lesion that reaches a height of 15 mm (20 mm from the ostium), extending across the entire maxillary sinus floor. A fractured alveolar bone with a communication feature is observed in the alveolar cortical area. (Fig 2) The patient is referred to otorhinolaryngology for confirmation of the diagnosis and treated with antibiotics (Amoxicillin/Clavulanic acid 875/125 mg).

The surgical procedure is planned in an operating room for maxillary sinus lift using the lateral window technique. Preoperative antibiotic



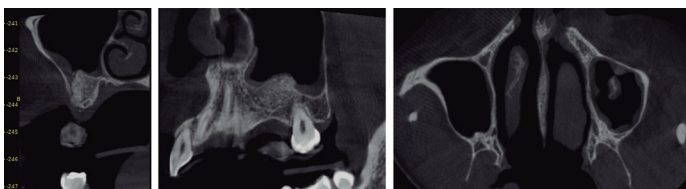
**Figure 2.** Inicial CBCT.

prophylaxis is prescribed (Amoxicillin/Clavulanic acid 875/125 mg) to help decrease postoperative infections. Piezoelectric instrument is used (NSK Variosurg 3, Japan) to minimize the risk of Schneiderian membrane perforation. After elevating the Schneiderian membrane, a crosslinked collagen membrane, Biomend Extend (20 mm x 30 mm) from Zimmer Biomet (USA), is used to close the lateral window and create an upper barrier. 1 cc. of mixed particulate allogeneic bone, Puros from Zimmer Biomet (USA), is compacted within the sinus, without the use of PRF or other blood-derived concentrates. Primary wound closure was achieved by 4-0 Nylon simple sutures. (Fig 3)



**Figure 3.** A. Zone defect B. Flap C. Osteotomy D. Lateral window technique E. Schnider’s membrane elevation F. Membrane and allogenic bone G. Lateral window closing H. Primary closure.

An 8-month follow-up control is conducted, and a new CBCT scan reveals the presence of mature bone tissue gain and the disappearance of the pathological condition. (Fig 4.)



**Figure 4.** Control CBCT.

**RESULTS**

Following the lateral window maxillary sinus lift surgery with particulate bone graft, the patient underwent follow-up appointments at 7, 14, 28, and 56 days post-surgery. During clinical examinations, the patient did not report any symptoms related to the surgical procedure. Both oral and extraoral examinations revealed no signs of postnasal discharge, infection, edema, or erythema. At the 8-month mark, a control CBCT scan was taken, demonstrating the successful gain of mature bone tissue and the resolution of the chronic odontogenic sinusitis. (Fig 5)



**Figure 5.** Pre and Post comparison.

**DISCUSSION**

Maxillary sinus elevation has been extensively documented as a predictable bone regeneration alternative with low morbidity and a success rate exceeding 90%. Dental implants placed in these surgical sites have demonstrated long-term stability according to the literature, ranging from 100% at 5 years to 99% at 6 years<sup>(7,8)</sup>.

The use of allografts is considered a safe option as a filler compared to alloplasts and xenografts, as they are more rapidly resorbed due to their embryonic origin, which avoids a second surgical approach for graft removal in case of infection. The use of long implants (13 mm) is recommended since there is a bone loss of 1.5 mm per year and 4 mm at 5 years after implant placement and loading<sup>(10,11)</sup>.

PRF has heterogeneous results. When combined with xenografts, 40% of studies show positive effects and 60% show no effect. When combined with allografts, results are split 50% positive and 50% non-significant. Only one study with PRF as the sole filler for maxillary sinus lift reports positive outcomes<sup>(10,11)</sup>.

In a 2019 study by Ragucci et al., bicortically stabilized dental implants in the maxillary sinus without particulate graft regenerative techniques or PRF achieved a success rate of over 99.5% when protruding <4 mm and 98.5% when protruding >4 mm. This challenges the recommendation of having a maximum of 2 mm of implant apex within the maxillary sinus and calls for further investigation<sup>(7)</sup>.

Hammuda et al. presents a case series of 40 patients aged 22 to 60 years, comparing maxillary sinus lifts in the presence of chronic odontogenic sinusitis with healthy patients. They propose a classification for surgical decision-making. Category 1, with no radiographic signs and a Schneiderian membrane thickened by 2 mm, allows for maxillary sinus augmentation without risk. Category 2, with a radiographic image of 2-5 mm thickening, doesn't contraindicate the procedure but should be approached with caution. Category 3, with 6-9 mm radiographic thickening, contraindicates the procedure. Category 4, with 6-9 mm radiographic thickening + local infection, contraindicates maxillary sinus lift<sup>(12)</sup>.

In the present clinical case, it's identified that the origin of the pathological condition stemmed from previously failed surgical approaches, without an active acute infection. According to Hammuda et al., it falls under category 3. Despite the contraindications outlined in their article, it's noted that compared to other surgical resective mucosal techniques or pharmacological therapies, these would not have provided a long-term resolution. Taking into account the specific anatomical characteristics of the patient, a decision was made to perform Schneiderian membrane elevation and bone graft, resulting in the definitive resolution of chronic odontogenic sinusitis<sup>(12)</sup>.

**CONCLUSION**

The surgical approach selected in this case is due to the positive evidence in the literature regarding the outcome of this surgical technique and subsequent implant rehabilitation, along with the suspicion that the maxillary sinus pathology stemmed from the fractured alveolar bone, which needed resolution. It's important to emphasize that a patient-specific evaluation of the maxillary sinus is crucial for decision-making. Key factors include the local anatomy of the maxillary sinus, such as the alveolar antral artery (for lateral window access) and the height of the nasal ostium, which should be considered to avoid blockage.

Maxillary sinus lift procedures have a high success rate (over 90%) and low morbidity. Due to the few papers in this subject, further investigation is necessary to determine sinus lift with graft as an alternative to odontogenic sinusitis treatment.

**CLINICAL RELEVANCE**

We present a clinical case where a maxillary sinus lift with grafting was performed on a patient with a 15 mm thickening odontogenic sinusitis with alveolar bone communication. The lateral window sinus lift surgical access resulted in the resolution of the underlying pathology. There are only few cases on the literature like this, and further primary studies are needed to assess the success of odontogenic sinusitis treatment with maxillary sinus lifts approach.

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**ETHICS APPROVAL:**

informed written consent.

**CONFLICT OF INTEREST:**

The authors declare no conflict of interests.

Alemana de Santiago and Faculty of Medicine of the Universidad del Desarrollo, reviewed and approved the protocol "Sinus Lift with bone regeneration graft in presence of odontogenic sinusitis: A Case report" Approval record 2023-96

**ETHICS COMMITTEE**

On October 17, 2023, the Ethical - Scientific Committee of the Clínica

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