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Maxillary Sinus Lifting with the Balloon Technique

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Abstract

A 49-year-old female patient, Kennedy class II, with pneumatization of the maxillary sinus (Misch condition SA-3) underwent a maxillary sinus lift using the balloon technique followed by osseointegrable titanium implant installation. Thus, in order to minimize surgical mishaps during the surgical procedure, a special drill to access Schneider's membrane was used in this case, as well as a syringe containing an inflatable balloon for minimally traumatic detachment of the membrane. Thus, after rehabilitation and follow-up after three years (2015-2018), it can be emphasized that a good planning of the surgical technique as well as of the implant properties can promote the success of osseointegrated implants.

Introduction

The use of osseointegrable implants in dentistry is a complementary alternative to prosthetic rehabilitation [1]. However, the individual planning of each case needs to be identified in order to promote a better rehabilitation with a better longevity. Thus, a correct osseointegration between the endosseous implant and the bone tissue can be established [2]. Thus, one of the possible obstacles for implants in the posterior maxilla region is the proximity of the maxillary sinus to the alveolar ridge. Thus, sinus augmentation surgeries have emerged as a pre-implantation planning step to enable the availability of bone tissue in the vertical region [3]. Among the several surgical techniques explored in implant dentistry for maxillary sinus lift, the hemostatic balloon technique will be articulated here. This technique can elevate the sinus membrane with minimal risk of fracture, low incidence of infection and bleeding, and shorter surgical time [4].

This case report describes a Kennedy class II female patient with maxillary sinus pneumatization (Misch SA-3 condition) who underwent a maxillary sinus lift using the balloon technique followed by osseointegrable titanium implant installation.

Case Report

A 49-year-old female patient came to the private practice in April 2015 reporting discomfort and difficulty in using a conventional removable denture and was interested in treatment with dental implants. Intraoral clinical examination observed the absence of dental elements 14, 15, 16 and 17. This in addition to the presence of a unilateral removable denture with extensive looseness. Patient classified as unilateral posterior edentulous and thus Kennedy class II (unilateral free end). When analyzing the panoramic radiography, a maxillary sinus pneumatization was identified in this region, classified as Misch's SA-3 condition (bone height between 5 to 8 mm between the floor of the maxillary sinus and the ridge) (Figure 1). In these cases, access is established via the maxillary lateral wall in order to elevate the sinus membrane and deposit a bone graft in the cavity. Moreover, implants can be installed at the same surgical time.



Figure 1: Initial Panoramic Radiography



Figure 2: Conebeam CT scan.

Next, a Cone Beam CT scan was requested with a surgical guide produced on a 2mm acetate plate to determine the best region for implant installation. For this condition it is recommended to elevate the sinus membrane of the maxillary sinus with a lateral window with optional implant installation (Figure 2).

Thus, this technique, traditionally, is done through an incision, followed by osteotomy of the lateral window with a spherical carbide bur and subsequent detachment of the membrane with specific curettes. However, the stages of osteotomy and membrane detachment present risks of rupture, which requires a change in surgical protocol, thus making the execution of the initial planning unfeasible. Thus, in order to minimize surgical mishaps during the execution of the surgical procedure, a special drill was used in this case to access Schneider's membrane, as well as a syringe containing an inflatable balloon for minimally traumatic membrane detachment.

Surgical Stage



Figure 3: LS-Reamer Drill (IM3)

Three articaine 1:100,000 tubes were used for local anesthesia (low tuberosity anesthesia technique) in the surgery. A 15c scalpel blade (Solidor) was used for the incision. The osteotomy of the lateral maxillary sinus wall was performed using the LS-Reamer Drill (IM3) (Figure 3) at a speed of 2000rpm in a Driller 20:1 contraangle (Driller).



Figure 4: Inflatable BSL balloon

The use of this osteotomy drill minimizes the classic membrane perforations in the final stage of access contouring, thus allowing for a geometrically more uniform osteotomy, as well as faster and more precise. Besides, a curiosity about this type of drill is that it is an adaptation of the neurosurgical drills used for cranial cap osteotomy without causing lesion in pia mater and dura mater membranes. After lateral access to the sinus wall, the maxillary sinus curette n°1 (Quinelato) was used only to remove the contact of the membrane with the inferior wall of the sinus. Then, the BSL inflatable balloon (Indusbello) was used for rapid, minimally invasive and atraumatic detach-

ment (Figure 4) of Schneider's membrane.

This technique consists in introducing an inflatable balloon connected to a Leuer syringe in the lower portion of the cavity wall and then the plunger is gently inflated in order to detach the sinus membrane. Then, two Titamax ex (Neodent) Hexagon External 4.0x11mm implants were installed in the region referring to elements 14 and 17, following the drilling sequence indicated by the manufacturer (Figure 5).

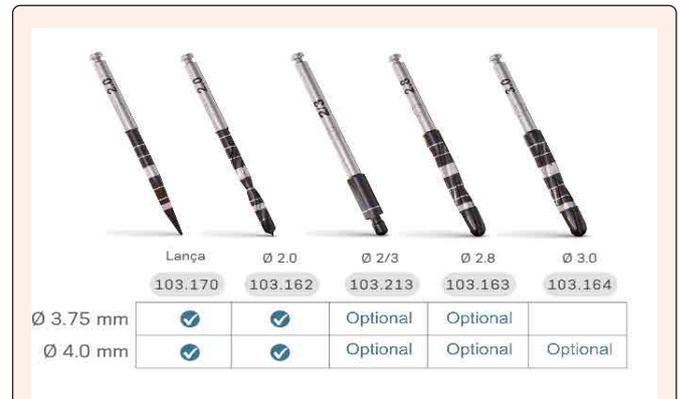


Figure 5: Drill sequence indicated by the manufacturer



Figure 6: Maxillary Sinus Lift and Titanium Implant Installation

For implantation, an Implantmed (W&h) motor was used at a speed of 800rpm for milling and 30rpm for implant installation. Furthermore, the counter angle used was Driller 20:1 (Driller) (Figure 6 and Figure 7).

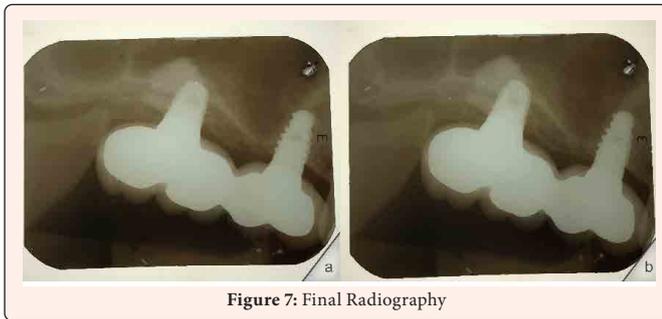


Figure 7: Final Radiography

The grafting of the region was done using the PRF technique associated with synthetic graft. After the venipuncture of 6 blood tubes from the patient, they were centrifuged (Montserrat centrifuge) at a speed of 1800rpm for 10 minutes to obtain the PRF Plugs. They were then mixed with 1.0g of ALOBONE synthetic graft (osseocon) and immediately inserted into the cavity. A 5.0 nylon thread (Shalon) was used for suturing.

Follow-Up 3 Years Later and Final Considerations

Patient returned three years later for evaluation and follow-up of implant integrity. This time without any complaints. Figure 8 shows the patient now three years after rehabilitation.

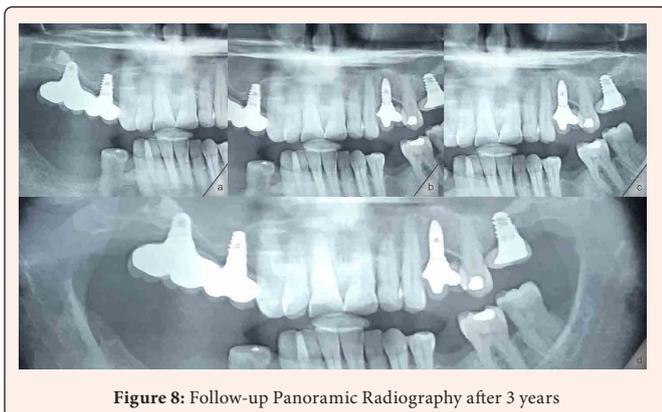


Figure 8: Follow-up Panoramic Radiography after 3 years

Conclusion

The success of titanium implant planning is due especially to the knowledge about biomaterial properties, surgical techniques that can be used, types and characteristics of bone tissue, and load distribution. This is in addition to considering the three implant stabilities for a good longevity and workability of the implants. The availability of bone in the maxillary region can become a determining factor for the installation of osseointegrable implants, which ends up requiring a maxillary sinus lift. This sinus lift can be explored by several techniques, but in this case the balloon technique was chosen because this technique presents a surgical protocol with fewer complications and higher chances of success.

Contribution: the authors also contributed to this paper.

Note: The surgery was performed by implant dentist Bruno Martins de Souza.

Conflict of Interest: We declare no competing interests.

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