

Bilateral Partial Sinusectomy Using Bichat's Fat Pads and Collagen Membrane to Close Access, With Immediate Installation of Implants Using All-On-Four Technique: A Case Study

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Abstract

Rehabilitation with dental implants is considered a reliable practice that continues to evolve. In resorbed alveolar ridges, such as in posterior regions of the maxilla, they present challenges to the dental surgeon, due to the pneumatization of the sinus cavity. Maxillary sinus elevation is a safe and predictable technique in these cases, however complications such as the migration of implants to the paranasal sinuses can occur, resulting in oroantral communications and secondary infections. The objective of this article is to present a case report in which bilateral partial sinusectomy was performed using Bichat's adipose body and collagen membrane to close the access, followed by implant installation using the all-on-four technique.

Patient who, after six months of surgery, presented displacement of 2 of the 4 implants installed in the maxilla into both cavities of the maxillary sinus, resulting in bilateral oral-sinus communication. Access to the maxillary sinuses was performed, followed by a partial sinusectomy maneuver, removal of the displaced implants, decontamination of the cavity, displacement of the Bichat adipose body into the cavity on the right side and on the left side, a type 1 collagen membrane was adapted for closure. and protection of the anteroposterior window of the maxillary sinus. Conclusion: Partial sinusectomy using Bichat's adipose body and collagen membrane to close the access with immediate implant installation showed promising results in maxillary rehabilitation.

Keywords: Rehabilitation; Dental implants; Alveolar ridges; Dental surgeon; Sinus cavity

Introduction

Implant-supported rehabilitation in partially or completely edentulous patients has become a reliable and common practice in recent decades,

and variations thereof are being widely studied and are constantly evolving. Major challenges for dental surgeons are perceived in highly reabsorbed alveolar ridges, especially in the posterior region of the maxilla (where

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reabsorption is more pronounced), resulting in pneumatization of the sinus cavity [1, 8, 9].

In order to solve the problems presented by this reabsorption and the consequent pneumatization of the maxillary sinus, bone grafting techniques such as “sinus lift” as well as the use of short implants are used [1, 5].

Sinus lift is a safe and predictable technique for bone augmentation in the posterior maxilla. Despite being widely used due to its biological properties, autogenous grafting has disadvantages as a filling material for maxillary sinus surgeries, due to increased morbidity, limited availability of bone in donor areas, and the rapid rate of remodeling of the graft material [16]. These techniques are firmly established in the literature, and have high predictability; however, accidents with the displacement and/or migration of implants to the paranasal sinuses have been occasionally reported, resulting from technical/surgical inexperience or poor planning [5, 9]. This transient condition may not be followed by immediate relevant signs and symptoms, but it is associated with oroantral communication and infections that will involve the maxillary, ethmoid, sphenoid, and frontal sinuses [1].

Once detected, these foreign bodies must be removed as quickly as possible from within the maxillary sinus to avoid subsequent complications [1].

The accidental displacement of endodontic materials, dental implants, and even residual or fractured roots in the maxillary sinus are relatively common events in the daily practice of dental surgeons. This fact will result in several negative factors in the surgical course and in the proper progress of the rehabilitation process, requiring surgical intervention to remove the foreign body from the sinus cavity [15].

Two surgical approaches have been widely used for removing implants and roots in the sinus and for the treatment of infections associated with this event: the Caldwell-Luc technique, performed by opening a bone window anterolaterally to the wall of the maxillary sinus, and removal of the foreign body by clamping or suction and washing by swirling with sterile

0.9% saline solution; for oral-sinus communication, rotated buccal flaps, palatal gingival flaps, and even the use of Bichat's fat pads are proposed, and also through biomaterials such as membranes and barriers, whether resorbable or not [2, 3, 5, 6, 9, 14]. Another technique widely used by ear, nose and throat specialists is the Functional Endoscopy Sinus Surgery (FESS) technique, which consists of a transnasal approach via endoscopic sinus surgery, allowing the removal of the implant and/or root displaced from the paranasal sinus, treating sinusitis, and recreating the patency of the maxillary ostium naturally, with a minimally invasive procedure, however without success in closing the oroantral communication [4, 5, 9]. Bichat's fat pad was first described by Heister in 1732; its adipose histology was subsequently observed by Bichat in 1801 and was widely studied in cadavers by anatomists at the time [2, 3].

The use of Bichat's fat pad was first reported as a pedicled graft by Egyedi; its vascularization, embryology, function, and volume were studied by Tideman, Marx, and other authors [7, 12, 13]. Bichat's fat pad is a circular and biconvex structure circumscribed in a thin capsule; its size and volume are rather variable and independent of the individual's weight and body mass [7, 12]. Its irrigation depends on small branches of the maxillary, temporal and facial arteries, requiring an axial-shaped graft pattern when removed from its usual pattern [12].

When the maxillary sinus is traumatically perforated and an oral-sinus communication occurs, it is believed that the bone defect can be repaired with new bone formation or with a fibrous union, thus resulting in closure of the mucoperiosteum in the oral cavity and the sinus cavity. The result may also be nonunion and formation of a fistula. This occurs when the communication between the oral cavity and the maxillary sinus cavity becomes covered by epithelial tissue, arising from the proliferation of tissues surrounding the bone defect [14].

Case Report

Patient JCN, white, male, 63 years old, with trigeminal neuralgia, but in normal overall health conditions, underwent surgery to install

implants using the all-on-four technique. However, after approximately four months, two of the four implants installed in the maxilla were compromised, which resulted in the displacement of the implants into both cavities of the right and left maxillary sinus, after adaptation of removable dentures, resulting in bilateral oral-sinus communication and the onset of a fistulated lesion in the maxillary sinus on the left side, and apparent encapsulation of the implants in both paranasal sinuses (Figures 1, 2, and 3). For pre-operative medication, 2g of amoxicillin was prescribed preoperatively, along with 4mg of dexamethasone, both administered one hour before the surgical procedure, as a pre-operative prophylactic element. We performed extraoral antisepsis with 2% chlorhexidine and intraoral antisepsis with 0.012% chlorhexidine. An infiltrative anesthetic technique was performed with articaine (100,000:1 dilution), followed by inverted-base trapezoid-shaped relaxing incisions, with accesses in the regions posterior to teeth 17 and 27 (in the FDI notation system), plus a central incision in the midline towards the superior labial frenulum, followed by diffusion and detachment of the entire surgical flap, through a supracrestal longitudinal incision throughout the body of the maxilla (Figure 4), thus allowing for the possibility of rehabilitation with implants in the ALL-ON-FOUR® maxillary technique, where — among the possibilities — we continued with the use of a traumatic technique to open the vestibular wall of the sinus as well as the left and right floor in order to expand communication. The opening was performed using neurological type burrs for access to the sinus (Bullet Access, Critéria Biomateriais – São Carlos, SP – Brazil), coupled to the 20:1 contra-angle, rotating at 1500 RPM, and plentiful saline irrigation using sterile 0.9% sodium chloride solution, directly at the end of the drill to create as much cooling as possible and to regularize the edges of the access with a “elephant’s foot” bit (Bullet Enlargement, Critéria Biomateriais – São Carlos, SP – Brazil) (Figure 5), and a partial sinusectomy maneuver was performed, followed by partial removal of the lowest portion of both Schneiderian membranes.

The flap was peeled back with the utmost delicacy and precision using CLSM sinus lifting curettes, until the sinus membrane was completely displaced without any complications (Figure 6). After decontamination and partial debridement of the membrane, the dislocated implants were removed from the most anterior superior portion of the cavity of both maxillary sinuses, also without complications. The “swirling” maneuver was performed with sterile saline solution (0.9% sodium chloride), throughout the cavity and in both structures, right and left (Figures 7 and 8). An internal incision was made in the buccal mucosa, above the region of tooth 27 (FDI notation), exposing and displacing the Bichat’s fat pad, rotating it to the internal part of the left maxillary sinus cavity (Figure 9).

On the right side, as a less invasive access was performed, only the adaptation of a type-1 collagen membrane (Lumina Coat – Critéria Biomateriais – São Carlos, SP – Brazil) was performed, so as to close and protect the anteroposterior window of the maxillary sinus (Figure 10). Drilling was then carried out with burrs for installing implants, according to the manufacturer’s specifications, sequentially: 2.0 mm lance burr at 1200 RPM; 2.0 mm, 2.5 mm and 2.8 mm helical burr at 800 RPM, Counter Sink bit, to create an entry profile for the E-FIX cylindrical implant of 3.75X13 angled at 17 degrees in the region of the canine pillars on the right and left side; and 3.75X10 straight in the region of the incisor pillar on both sides (Titanium fix – São José dos Campos, SP – Brazil).

The insertion of the implants was performed with an internal torque adapter at 40 RPM, both with a torque of 25–35 NCM, measured by a digital torque meter and present in the drilling and implant installation motor program (Figure 11).

After insertion of the implants, the implant covers were installed. All incisions were closed with multifilament absorbable type 5-0 Microcyl suture (Microsuture, São Paulo, SP – Brazil), using a continuous scalloped suture technique followed by a few single stitches. Post-

operative analyses were performed after 3, 7, 15, and 30 days (Figures 12 and 13).



Figure 1: Panoramic X-ray showing the displacement of the implants into both maxillary sinuses.

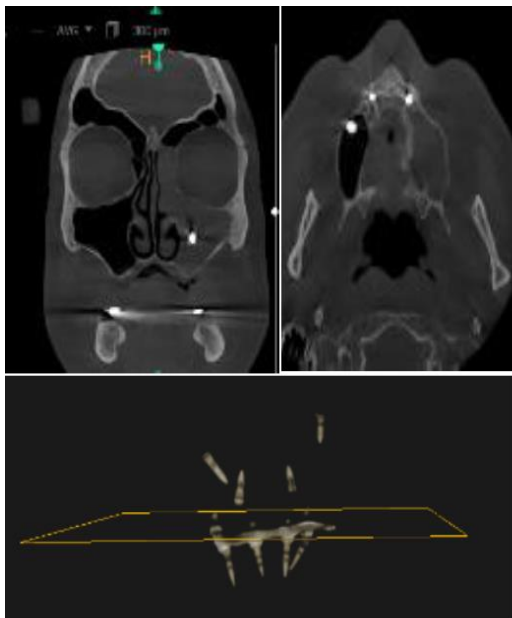


Figure 2: CT scans in sections: A – Coronal; B- Axial; C – 3D Reconstruction.

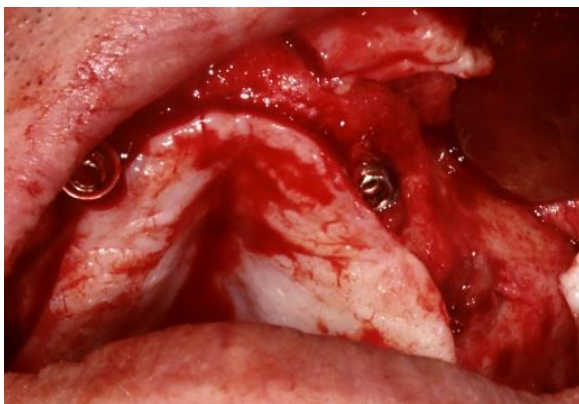


Figure 3: Intraoral aspect, presence of oral communication.

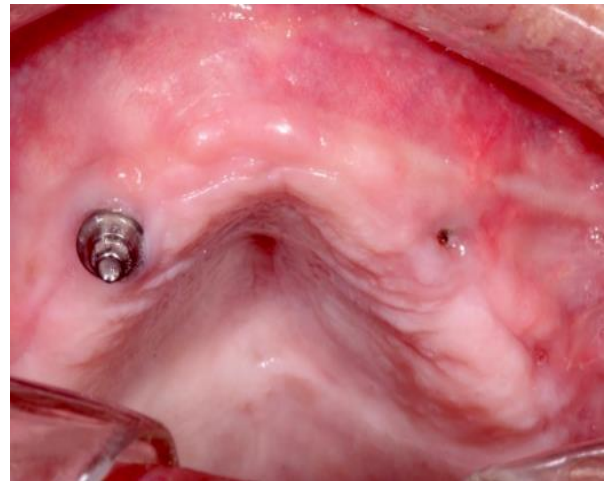


Figure 4: Displacement of the surgical flap.



Figure 5: Neurological drill for access to the sinus coupled with a 20:1 contra-angle.



Figure 6: Access to the maxillary sinus and elevation of Schneiderian membrane.

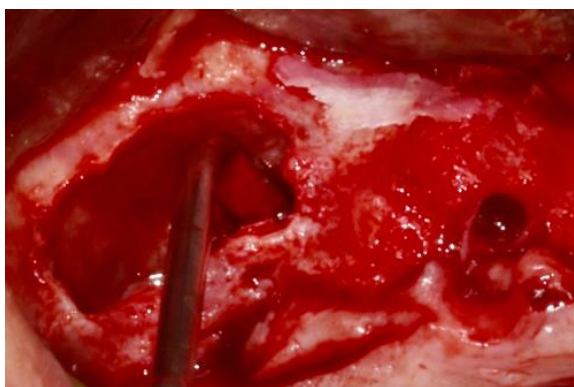


Figure 7: implants removed from the inside of the maxillary sinuses: A – Right, and B – Left, respectively.

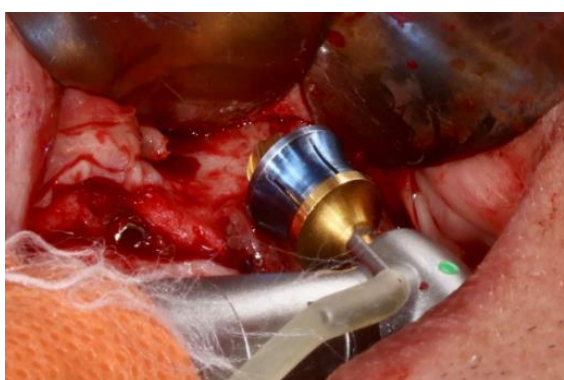


Figure 8: Implants removed from the inside of the maxillary sinuses: A – Right, and B – Left, respectively.

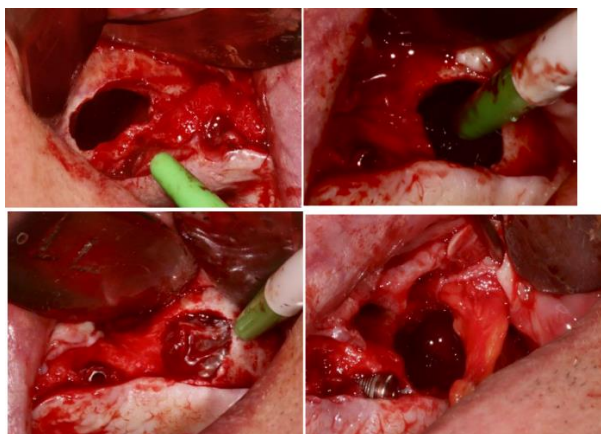


Figure 9, 10: Adaptation of type-1 collagen membrane in the right maxillary sinus cavity (Lumina Coat Critéria Biomateriais, São Carlos, SP – Brazil).



Figure 11: A – E-Fix 3.75x13 cylindrical implant; B – E-Fix 3.75x10 cylindrical implant (Titanium Fix, São José dos Campos – SP – Brazil). **Figure 11 B:** Continuous scalloped suture with a few single stitches.



Figure 12: 30-day post-operative period, proving the closure of accesses and showing that there is no longer any foreign body inside the maxillary sinuses after the sinusectomy.

Discussion

The bibliographical discussion of this case highlights the complications that occurred after implant installation surgery using the “all-on-four” technique in the maxilla of patient JCN, a 63-year-old male with trigeminal neuralgia, but in normal overall health conditions (17, 19).

The complications reported were that two of the four implants installed were compromised, leading to the displacement of these implants into both cavities of the right and left maxillary sinus. As a result of these complications, the patient developed bilateral oral-sinus communication and a fistulated lesion in the left maxillary sinus. Furthermore, apparent encapsulations of the implants were observed in both paranasal sinuses (20, 21, 17).

It is believed that several factors may have contributed to these complications, including the specific anatomy of the patient's maxillary sinus, the quality of the bone in the maxillary region, the surgical technique used, and possible post-operative complications (17, 18, 19).

Regarding treatment, prior to surgery, the patient received pre-operative medication, including amoxicillin and dexamethasone, with the aim of preventing infections and inflammation (20, 19). The surgical technique adopted involved opening the maxillary sinus to expand communication, as well as partial removal of the Schneiderian membranes. Collagen membranes were used to close and protect the anteroposterior window of the maxillary sinus. These approaches were chosen with the aim of correcting complications caused by displaced implants (18, 20). After surgery, post-operative analyses were performed at various times to monitor the healing process and the reintegration of the implants, as well as to identify any additional complications (17, 18, 21). This case highlights the importance of dental surgeons' experience and skill in managing unexpected complications during dental implant surgeries in the maxillary sinus.

Moreover, careful planning — including detailed assessment of the patient's anatomy — is essential to minimize risks and maximize successful outcomes (18, 21). It is concluded that each case is unique, and it is crucial for dental health professionals to be aware of possible complications and to have the necessary expertise to deal with these situations appropriately, ensuring the best possible outcome for the patient (17, 20). Continuous research and clinical studies are essential to improve surgical techniques and the use of biomaterials, aimed at reducing complications in bone augmentation procedures in the maxillary sinus with dental implants.

Conclusion

Bilateral partial sinusectomy using Bichat's fat pads and collagen membrane to close the access, with immediate installation of implants using the “all-onfour” technique, showed promising results in maxillary rehabilitation. The histological and histomorphometric evaluation of the tissues after six months of healing proved that Criteria Lumina Bone Porous – used as a biomaterial in this approach – showed results comparable to Geistlich Bio-Oss.

The results of histological evaluations showed similar percentages of newly formed bone, residual biomaterial, and connective tissue, as compared to Geistlich Bio-Oss. This suggests that Criteria Lumina Bone Porous may be a viable option as a biomaterial for bone augmentation in the maxillary sinus, jointly with the “all-on-four” technique. Therefore, bilateral partial sinusectomy with the use of Bichat's fat pad and collagen membrane, combined with the immediate installation of implants using the “all-on-four” technique, appears to be a promising approach for maxillary rehabilitation. Criteria Lumina Bone Porous, with results comparable to Geistlich Bio-Oss, is an interesting alternative biomaterial for bone augmentation in the maxillary sinus using this technique.

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