Clinical Sheet

USE OF EQUINE BONE SUBSTITUTES IN THE LOW WINDOW TECHNIQUE

Equine bone substitutes combined with a computer assisted approach in maxillary sinus lift.



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The maxillary sinus lift carried out laterally entails performing a vestibular osteotomy to expose the sinus membrane by creating an access "window". The membrane is detached to create a space where a bone graft is inserted. The design and position of the window are not codified: while these are conditioned by the anatomic limitations of each patient (position of vessels, presence of septa etc.), each surgeon then designs and places the access window based on their own personal experience.

Recently, however, a technique for approaching the design and positioning of the sinus access window has been put forth, that is based on a rational analysis of sinus anatomy. This approach is called *Low Window* and entails a design based on CBCT scans to produce an appropriate template. It also involves placing the window as low and as mesial as possible: that is, with the lower side flush with the floor and the mesial one flush with the anterior sinus wall. The window is invariably 6 mm high. The only variable portion is the distal demarcation line, which coincides with the most distal implant position.

In the author's experience, this approach significantly decreases intraoperative time, patient discomfort – as it requires opening a smaller flap – and above all, the likelihood of tearing the sinus membrane due to the different access angles permitted to surgical instruments.

Materials

The case illustrated here entailed using a Bioteck equine bone substitute consisting of a 1:1 mixture of cancellous and cortical granules, sized 0.5-1 mm (Osteoxenon, Bioteck). The bone graft is obtained through the exclusive Zymo-Teck enzymatic process, which does not alter the native structure of bone collagen: its presence is one of the factors that makes the graft remodelable by osteoclasts, resulting in the formation of a significant quantity of new bone tissue. The effectiveness of Osteoxenon in maxillary sinus lift was the subject of two recent publications: the first showed how, with time frames being equal, Osteoxenon promotes the formation of a significantly higher amount of bone tissue compared to deproteinized bovine bone[1]; the second showed that by using Osteoxenon, formation of new bone tissue is particularly fast, so as to allow implants to be placed already within 3-5 months after grafting[2].

1. Di Stefano D.A. et al. Histomorphometric comparison of enzyme-deantigenic equine bone and anorganic bovine bone in sinus augmentation: A randomized clinical trial with 3-year follow-up. Int J Oral Maxillofac Implants, 30(5), 1161-1167 (2015).

2. Di Stefano D.A. et al. Bone formation following sinus augmentation with an equine-derived bone graft: a retrospective histologic and histomorphometric study with 36-month follow-up. Int J Oral Maxillofac Implants, 31(2), 406-412 (2016).

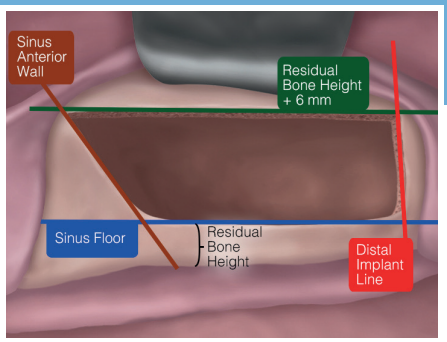


Fig. 1 *– The position of osteotomic lines in the Low Window technique.*



Fig. 2 *–Tooth 2.6 is affected by an endo-periodontal lesion and is compromised.*



Fig. 3 *– After extracting tooth 2.6, and after socket healing it is ascertained that the crestal thickness does not allow osseointegrated implants to be inserted.*

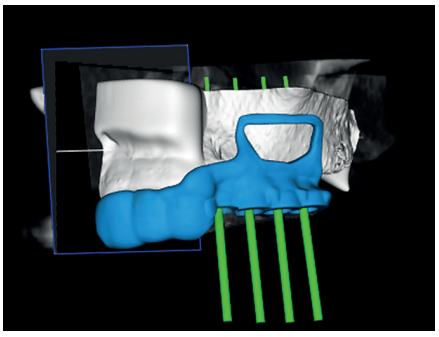


Fig. 4 *– CBCT scans are used to design implant insertion as well as design the sinus access window according to the Low Window approach.*

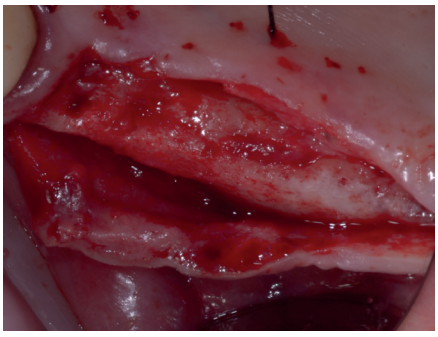


Fig. 5 *– Flap design. Notice the low invasiveness of the approach.*

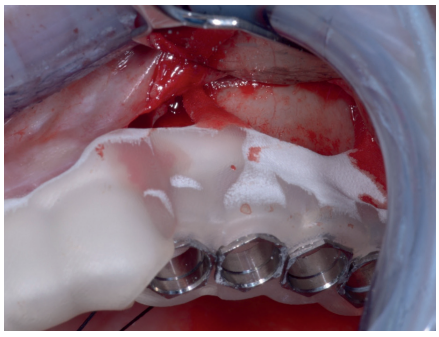


Fig. 6 *– The template in position. It will be used to design the sinus access window as well as to guide implant placement.*

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Results

The sheet summarizes a case published in 2017 in Case Reports in Dentistry[3].

The patient presented with pain in the upper left maxilla at a bridge that had been placed years earlier following extraction of tooth 2.5 to connect teeth 2.4 and 2.6. On X-ray examination tooth 2.6 appeared to be affected by a perio- and endodontic lesion and deemed lost. The patient was then proposed with a treatment plan including extraction of the compromised molar, lateral execution of sinus lift and simultaneous placement of 3 osseointegrated implants. The patient accepted the treatment plan and provided his informed consent.

After atraumatically extracting the lost tooth, a CBCT maxillary scan was collected in order to correctly plan implant placement. At the same time as planning the fixture position, the position of the sinus access window was also identified, according to the *Low Window* approach. In this manner it was possible to fabricate a single surgical guide, to be used in the surgery stage, that included both the guides for implant placement and the template to design the sinus access window. Because of the low and mesial window position, during surgery the surgeon was able to operate making use of a flexible aid (Optragate, Ivoclar) instead of the retractors operated by the assistant. After performing the osteotomy as planned and detaching the sinus membrane, the equine bone substitute was grafted after hydrating it with sterile saline. Three osseointegrated implants sized 4 x 13 mm were placed at the same time. Six months later the implants were exposed and the healing screws were placed; after another three months the final metal-ceramic prosthesis was applied.

The patient healed without any complications and after one year the implants met the Albrektsson and Zarb success criteria. The volume obtained following grafting appeared unchanged compared to X-ray observations upon completion of the regeneration procedure.

3. Zaniol T. & Zaniol A. A rational approach to sinus augmentation: the Low Window sinus lift. Case Rep Dent, ID 7610607 (2017).

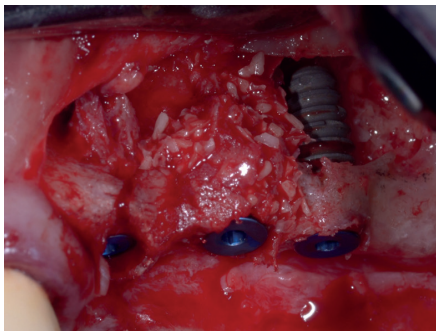


Fig. 7 *– The sinus is grafted with a physiologically remodeling equine bone substitute.*

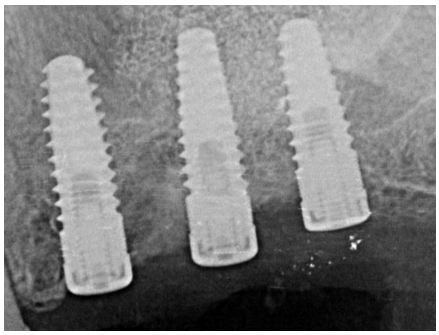


Fig. 8 *– Post-surgery control radiograph.*

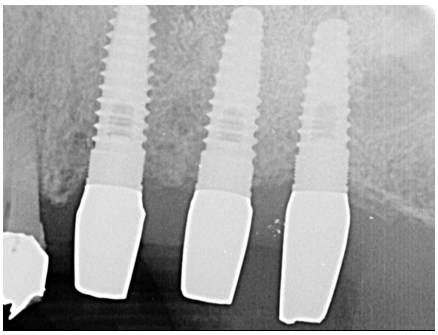


Fig. 9 *– Follow-up X-ray 9 months after the procedure.*



Fig. 10 *–The prosthesis fitted on the patient.*

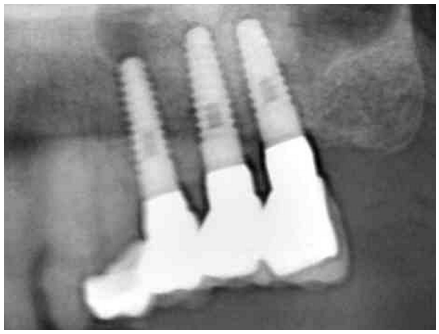


Fig. 11 *– One-year follow-up X-ray; notice preservation of the grafted bone volume.*



Fig. 12 *– Appearance one year after prosthetic rehabilitation.*

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