

Single-surgery implant placement using maxillary sinus augmentation and allograft bone rings

Orcan Yüksel, Bernhard Giesenhausen and Kris Chmielewski demonstrate a new method for reducing treatment time when augmenting the maxillary sinus

In cases where sinus elevation treatment is indicated, a crestal bone height of less than 4mm at the maxilla usually makes a two-stage protocol necessary.

This two-stage protocol takes time for healing and the maturation of the grafting material, and requires a second surgery for the implant placement. Prosthetic treatment can take place as much as 12-18 months after the first surgery.

In many cases, complications – such as perforation of the Schneiderian membrane – can occur, which can delay treatment by another three to six months, or even render the whole treatment impossible.

This article aims to present a new treatment option whereby the implant is fixed in the sinus with an allogenic bone ring (Botiss), held together with a 6mm diameter membrane screw (Dentsply Implants).

This technique has also been used by the authors in the three dimensional



Aims and objectives

This article aims to demonstrate a one-stage technique for using allogenic bone grafts to vertically augment the maxillary sinus where a two-stage surgical technique would normally be necessary.

Readers will:

- Learn where this protocol can be applied
 - See the requirements for implementing it successfully
 - Understand the role of allogeneic bone grafts in dental implant treatment.
- Implant Dentistry Today* subscribers can answer the CPD questions on page 54 to earn one hour of verifiable CPD from reading this article.

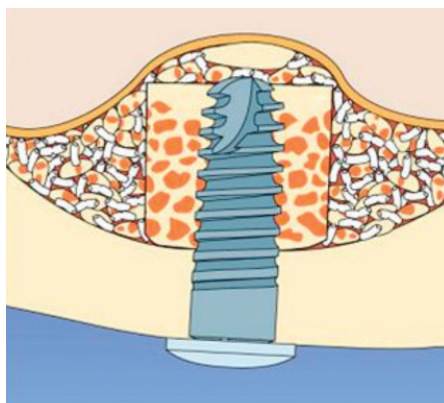


Figure 1: Graphic shows the correct positioning in the sinus, the implant and the membrane screw

reconstruction of maxillary and mandibular bone for many years with very good clinical results.

Method

The method presented here aims to combine the use of a bone block graft with implant placement in the maxillary sinus in a single surgical procedure. The treatment protocol starts with the lateral window technique.

After opening the sinus and lifting the membrane, some requirements must be met to achieve full treatment success:

1. The allograft bone ring must provide primary stability for the dental implant. The implants should preferably be 3.5-3.8mm in diameter
2. At the recipient site, the larger platform of the membrane screw head should be in

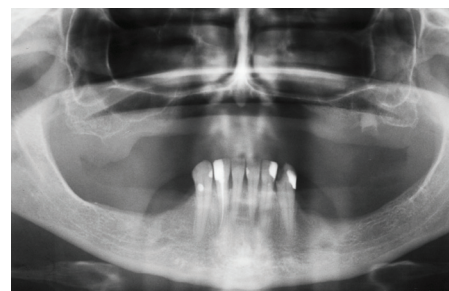


Figure 2: Panoramic X-ray before sinus lift

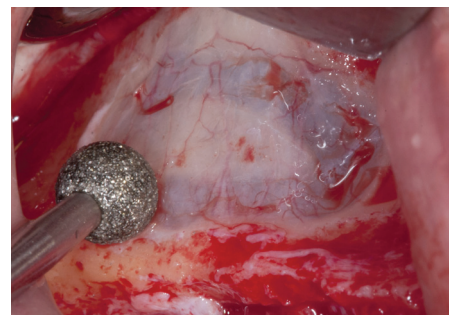


Figure 3: Lateral window technique used to open the maxillary sinus

close contact with the crestal bone to provide stability. The screw should also fix the implant rigidly within the bone ring itself

4. The implant must be correctly positioned for a successful prosthodontic rehabilitation.
5. The wound closure must be achieved using tension-free sutures
6. No pressure should come from the prosthodontics to the soft tissue above the

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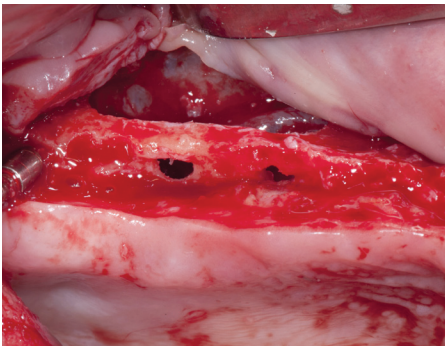


Figure 4: Sinus lifted and osteotomy prepared for implant insertion. Note the very thin crestal bone



Figure 5: The Botiss Maxgraft bone ring is processed human allograft material

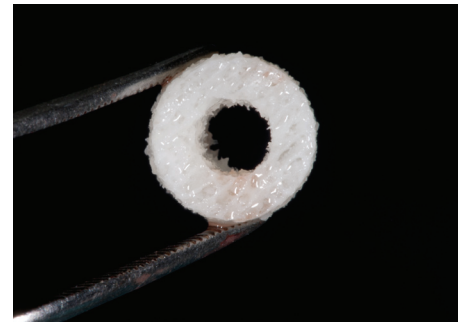


Figure 6: The bone ring measures 10mm in height, with an exterior diameter of 7mm and an internal diameter of 3.5mm

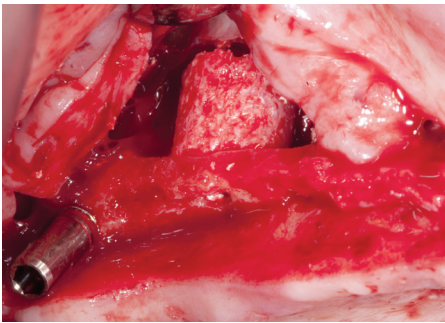


Figure 7: The bone ring is placed above the osteotomy after filling the back side wall of the sinus with a xenograft

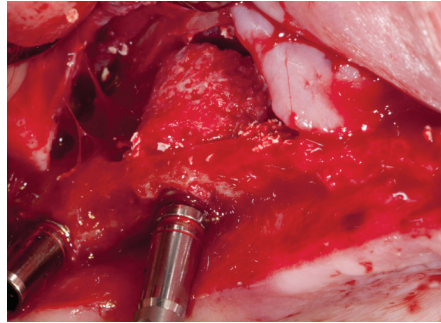


Figure 8: The implant is completely inserted into the ring so the crestal bone and the bone ring are touching

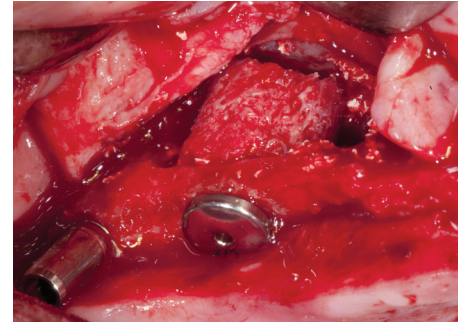


Figure 9: A membrane screw (6mm in diameter, with a 1mm pin height) is used to fix the implant and bone ring to the crestal bone

membrane screw: all contact should be avoided in this region during the healing phase (Figure 1).

Case report

A 58-year-old woman presented, who had previously received a total removable denture, followed by the extraction of both premolar and molar teeth at each site and further extractions in the frontal region.

These extractions had contributed to a significant amount of bone loss in the maxilla. The preoperative radiograph (Figure 2) showed that a sinus graft would be necessary in order to place the six implants required for an implant-supported denture. The treatment was defined as a two-stage protocol.

After discussing the need for general anaesthesia, it became evident that the idea of a single operation was very attractive to the patient, and so a single-stage procedure was agreed upon.

A lateral window was opened to the sinus (Figure 3). The height of the crestal bone was considered as 1-2mm maximum. The Schneiderian membrane was lifted without any perforation.

A 3.5mm diameter osteotomy was prepared in the crestal bone (Figure 4).

From the lateral window, a bone ring (Botiss) was then placed in the sinus. An

Ankylos implant (3.5mm x 11mm, Dentsply Implants) was inserted from the crest into the sinus through the bone ring (which measured 10mm in length and 7mm in diameter) (Figures 5 to 8). The bone ring was gently held in situ with forceps as the implant was inserted.

A cover screw was attached to the implant once it sunk to 11mm and the insertion adaptor removed.

A membrane screw with a pin height of 1mm was then fixed into the internal threads of the cover screw (Figure 9) until the implant/allograft membrane complex was tight.

The cavity was filled with a small particulated xenograft (Cerabone, Botiss) (Figure 10). The lateral window was covered with a collagen membrane (Jason, Botiss) and fixed with titanium membrane fixation pins (Ustomed) (Figure 11).

The sinus implants were uncovered after nine months (Figure 12), and three weeks later – after soft tissue healing and impression taking – a removable denture prosthesis was made.

The treatment fulfilled all the patient's expectations, and in a short time. The follow-up radiograph taken after six months of loading shows the perfect healing of the maxilla (Figure 13).

Conclusion

This technique allows for successful bone augmentation with maxillary sinus floor elevation. The authors believe the shortening of the treatment time and the avoidance of a second operation makes the bone ring technique unique in this type of indication.

It is possible that unsuccessful sinus lifts where the Schneiderian membrane has been perforated could be dealt with at a single visit too, by using a collagen fleece in the sinus and bone rings without particulate material.

Allogeneic graft material

Autologous bone, representing the current 'gold standard', has certain limitations, with the availability of sufficient quantities of autologous bone from intraoral donor sites being restricted.

The recent progress in the field of maxillofacial surgery and oral implantology means the need for a predictable and convenient bone grafting material has become increasingly essential.

Although allografts are known to provide a well-established platform for inducing significant osseous regeneration, allogeneic bone tissue appears an adequate alternative.

Approximately 40,000 US citizens annually receive allogeneic grafts in the maxillo-mandibular region.



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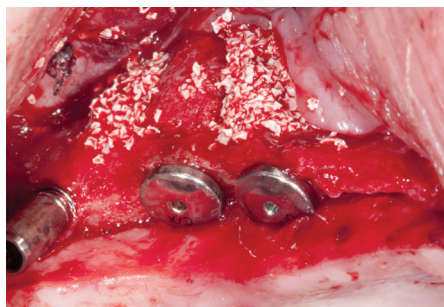


Figure 10: The cavity is filled with xenograft material

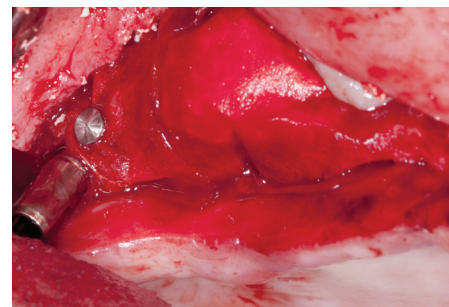


Figure 11: The lateral window is covered with a collagen membrane and fixed with titanium membrane fixation pins



Figure 12a: Gingival situation nine months after sinus lift surgery, following reopening with sulcus former



Figure 12b: Three weeks later – after soft tissue healing

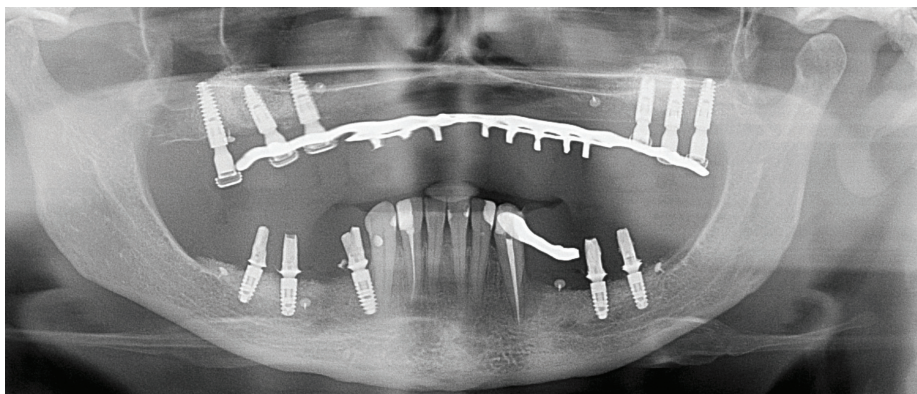


Figure 13: Follow-up X-ray after six months of loading shows the maxilla (and the mandibular with two rings on each side) healing well and success of augmentation procedure

Maxgraft allograft

Maxgraft is exclusively produced from the bone tissue of German, Swiss and Austrian donors. All pure cancellous bone regeneration material (blocks and granules) originating from living donors are procured from certified procurement centres. All donations from living donors are based on written consent from the patient and highly selective exclusion criteria.

Certain risk factors for infectious diseases and internal diseases as well as current or previous malignancies are strictly excluded.

Blood samples for serological testing are taken during the explantation of the donor bone tissue, which derives from femoral heads during total hip replacement. **IDT**

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