Straumann® AlloGraft Ring technique

# Vertical augmentation and simultaneous implantation of Straumann® Bone Level and Bone Level Tapered Implants

Dr. Bernhard Giesenhagen has developed an augmentation technique which allows bone transplantation and implantation to be performed on large three-dimensional bone defects in a single operation. In the following article, the author describes the use of the botiss allogenic maxgraft® bonering (a further development with Dr. Orcan Yüksel). In North America, the product will be produced at LifeNet Health®, and distributed under the name Straumann AlloGraft Ring. The ring technique offers an alternative to vertical aumentations with autologous bone blocks.

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## INTRODUCTION

Implant treatment is often accompanied by bone augmentation procedures. Guided bone regeneration (GBR) is the most common technique used to expand bone volume height of the alveolar ridge, bone splitting and onlay osteoplasty. Harvesting autologous bone blocks for vertical augmentation is a complex and invasive procedure. They therefore developed the bone ring technique using autologous bone which was unveiled in 2003. This technique with allogenic bone rings was further developed in collaboration with Dr. Orcan Yüksel. The product was developed in cooperation with botiss biomaterial and sold under the name Maxgraft® bonering distributed in Europe through Straumann. When using this allogenic bone ring technique, treatment for the patient is optimized as an extra surgical stage and risks involved with harvesting autologous bone at a second site can be avoided. Dr. Giesenhagen has now performed approximately one thousand augmentations with autogenous bone harvested intraorally and over two hundred augmentations with maxgraft® allograft bonering.

## THE MAXGRAFT® BONERING
## THE STRAUMANN® ALLOGRAFT RING

The maxgraft® Allograft Bonering offers an alternative to autologous bone. It is manufactured by Cell+Tissuebank Austria (C+TBA). The maxgraft® bonering has a high biologic regeneration capability, as the natural collagen matrix is preserved during processing. This supports the rapid remodelling process during bone formation.

In North America, the product will be produced at LifeNet Health®, and distributed under the name Straumann AlloGraft Ring.


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## THE MAXGRAFT® BONERING / STRAUMANN® ALLOGRAFT RING TECHNIQUE

The maxgraft® bonering technique is a one-stage procedure in which the maxgraft® bonering is pressed into a bone bed that has been prepared precisely with a trephine drill. The implant is then placed through the inner hole of the maxgraft® bonering.

**Benefits**

The bone ring technique has significant benefits over conventional procedures with autologous bone blocks:

- Reduction in treatment time by 45 to 60 minutes
- Second procedure to harvest an autologous bone block and its associated risks can be avoided
- Treatment time until the start of prosthetic restoration is reduced by three to six months

**Indications**

Augmentation with bone rings is possible in the following cases, among others:

- Vertical augmentation (three-dimensional defects with low-volume horizontal defect)
- Single-tooth gaps
- Interdental spaces

# Description of clinical case: Restoration of a 3D bony defect in region 46* with pre-fabricated allograft bone rings and simultaneous implantation.

## INITIAL SITUATION

Male patient, 82 years old, non-smoker, with an unremarkable medical history. The previous clinical and radiographic diagnosis showed that teeth 44, 45, 46 and 47 were unrestorable and required extraction.

## TREATMENT PLAN

The treatment plan included extractions, simultaneous bone augmentation using the maxgraft® bonering technique with pre-fabricated allografts, and immediate implantation with Straumann® Bone Level Implants at the tooth positions 44 and 46. A healing period of 6 months followed before final restoration with a 4-unit cantilever bridge.

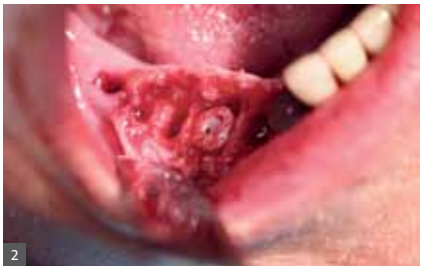
## SURGICAL PROCEDURE

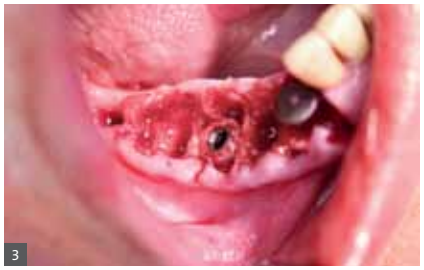
Once adequate local anaesthesia is achieved at the surgical site, teeth 44 to 47 are extracted **(Fig. 1)**. The implant bed at tooth position 44 is then prepared and a Straumann® Bone Level Implant is placed at this site. The 46 position is subsequently prepared for the insertion of the maxgraft® bonering using instrumentation specifically designed for this technique (maxgraft® bonering surgical set). The size of the defect can be measured by using the trephine drill to determine the corresponding diameter of the bone ring. A bone ring with a diameter of 7.0 mm is required in position 46.

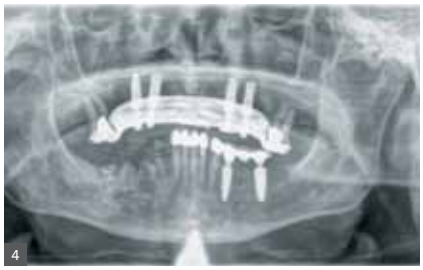
The position and axis of the implant in the extraction site 46 is defined using a metal tulip drill and the ∅ 2.0 mm pilot bur. The ring bed is then prepared with the ∅ 7.0 mm trephine with pin. The pin has the same 2.0 mm diameter of the pilot bur so that the position of the trephine drill matches the planned implant position. The depth of the ring bed is determined by the vertical extent of the defect, with the corresponding markings on the trephine drill. Autogenous bone chips from the drilling procedure can be collected and used to fill any residual defect.

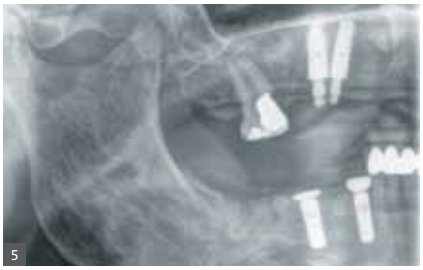
The ring bed is smoothed with the scalar to achieve a completely uniform surface for the maxgraft® bonering. At the same time, this step serves to remove any cortical bone from the

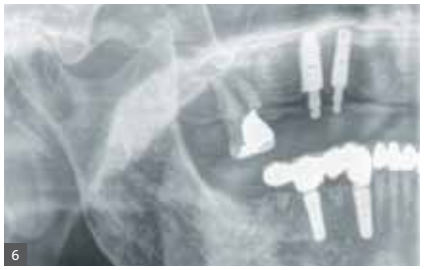
* The article uses the dental notation of the International Standard Organization Designation System (ISO System) by the World Health Organization.


prepared site to provide a good nutritive blood supply to the bone ring. The bone level of the neighboring teeth can be used as a reference for the vertical stop of the bone ring. If needed, the diamond disc from the surgical kit can be used to adjust the height of the maxgraft® bonering. The maxgraft® bonering should then be pressed into the bleeding prepared ring bed to ensure rapid vascularization. **(Fig. 2)**.

Final implant bed preparation is carried out through the hole of the bone ring, and the implant is inserted through the maxgraft® bonering into the residual bone apically **(Fig. 3)**. The primary stability of the maxgraft® bonering and the Straumann® Bone Level Implant is highly dependent on the maxgraft® bonering making full contact with the walls of the prepared ring bed, when pressed into the site. The implant should also be inserted approximately 3.0 mm deep into the residual natural bone apically. After placing the implant, the edges of the maxgraft® bonering must be smoothed using the diamond tulip bur to prevent perforation of the soft tissue.

If threads are still exposed buccally after implantation in three-dimensional defects or if gaps remain, they should covered or filled with a particulate bone substitute material. We recommend a stable bone substitute material with low resorption properties such as a xenograft. This provides the bone ring with protection against rapid resorption. The augmentation is covered with a collagene membrane that has a long barrier function to ensure undisturbed and stable healing. The site is then closed in a tension-free manner, which is crucial for the success of the procedure. The sutures are removed approximately ten days postoperatively. Recommended post-operative medication: antibiotics (Clindamycin 600 mg per day for five days) and an analgestic, if required.

## OUTCOME

Pre-op X-ray images **(Fig. 4)** and six-month post-op **(Fig. 5)** show good healing at the site with no complications. Re-entry to the implant site was done after 6 months of healing and the final prosthetic restoration was completed. One year after loading of the implants, a stable osseous condition is still present **(Fig. 6)**, with no inflammation of the soft tissue.

## CONCLUSION

Use of the maxgraft® bonering, also known as the Straumann AlloGraft Ring technique offers an alternative to vertical augmentation with an autologous bone block. The success of this technique depends largely on compliance with the treatment protocol and good soft tissue management. If both criteria are met, the bone ring technique can be considered as an alternative bone augmentation method for vertical defects.

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