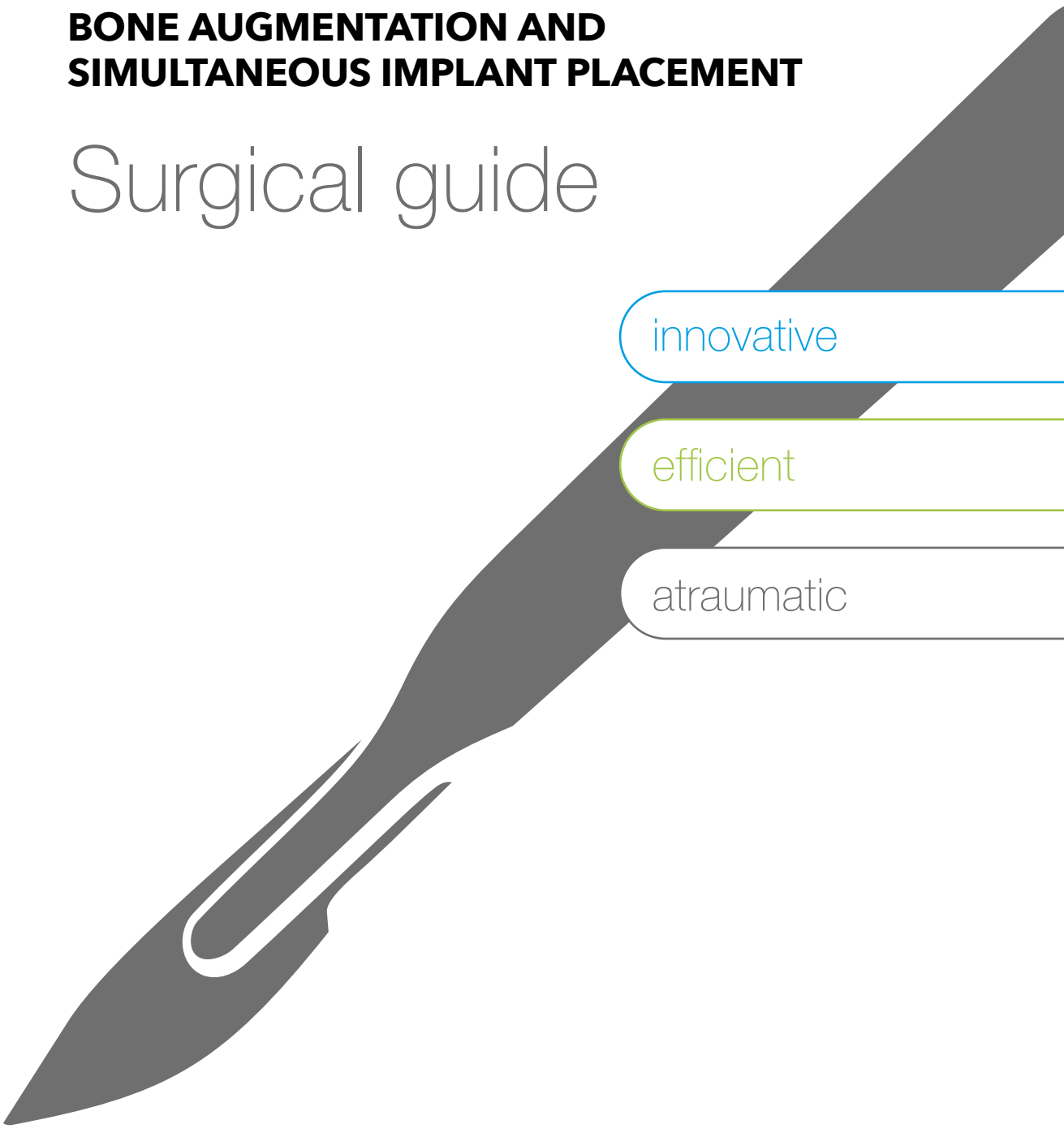
bone & tissue regeneration

botiss biomaterials

maxgraft® bonering

BONE AUGMENTATION AND SIMULTANEOUS IMPLANT PLACEMENT

Surgical guide



innovative

efficient

atraumatic

hard tissue

Introduction

This surgical guide was created with the support of renowned clinical experts to assist you in achieving the best possible results with maxgraft® bonering.

On the following pages, you will find detailed information on the application of maxgraft® bonering in different clinical situations. Each indication is described by a clinical case from an expert, demonstrating a recommended surgical procedure.

The **Bone Ring Technique** is an innovative solution for single-stage three-dimensional bone augmentation and implant placement. The simultaneous augmentation and implantation reduces treatment time compared to conventional bone block augmentation.[1,2]

In clinical practice, the application of allogenic blocks has been established as a reliable alternative to autogenous bone harvesting and alveolar ridge augmentation, thus avoiding donor-site morbidity and limitations in quantity.[3,4,5,16]

maxgraft® bonering is a sterilized graft cut into the shape of a ring that originates from living human donor bone by explantation of femoral heads (hip endoprosthesis). Characteristically, it is rapidly incorporated and subsequently remodeled into the patient's own bone.

Indications for maxgraft® bonering

Contraindications

- Thin parallel-walled crest (< 6 mm width)
- 1 mm or less bone height in the sinus

Product properties and specifications

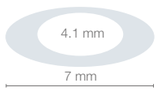
- Processed human allograft from living donors
- Osteoconductive properties supporting natural and controlled tissue remodeling
- Stable trabecular structure of the cancellous bone enables rapid revascularization
- Natural collagen for excellent biocompatibility and flexibility
- 5 years shelf life at room temperature
- Standard sizes:

Recommended for implant diameters from 3.3 - 3.5 mm

maxgraft® bonering 3.3

Art.-No.	Dimension	Content
33160	cancellous ring, ø 6 mm, height 10 mm	1 x
33170	cancellous ring, ø 7 mm, height 10 mm	1 x

Recommended for implant diameters from 4.1 - 4.5 mm



maxgraft® bonering 4.1

Art.-No.	Dimension	Content
33174	cancellous ring, ø 7 mm, height 10 mm	1 x

The implant directly fixates the bone graft. The bone ring technique does not require osteosynthesis screws. Sub-gingival healing of the implants is recommended. Therefore, maxgraft® bonering should only be used with bone level implants and is not compatible with tissue level and one-piece ceramic implants.

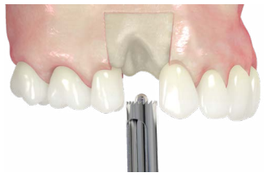
The **maxgraft® bonering surgical kit** is used to prepare the augmentation site for maxgraft® bonering. The **bonering fix** (special tweezers) is used to safely cut maxgraft® bonering to the desired length. maxgraft® bonering surgical kit instruments should not be used at speeds greater than 800 rpm.

Preoperative assessment and precautions

- Patient selection is critical to the outcome of the surgical procedure
- Special attention should be paid to patient-related risk factors that may affect bone healing: Patients with uncontrolled diabetes and heavy smokers (> 10 cigarettes a day) should be excluded from this procedure
- The soft tissue situation should be carefully evaluated; in some cases, it might be beneficial to perform soft tissue augmentation prior to bone ring surgery
- Any inflammation and infection should be treated prior to surgery
- Antibiotic treatment should be started one day pre-op
- Professional dental cleaning and chlorhexidine rinses prior to surgery are recommended for optimal operating conditions

Single-tooth gap & edentulous space

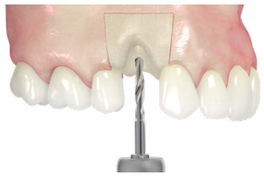
Surgical procedure and guidelines



Step 1 Determine the diameter of maxgraft® bonering

Once the flap is lifted, the diameter of the defect can be determined using the trephine drill with an outer diameter of 6 or 7 mm. This measurement helps to determine which diameter of maxgraft® bonering should be used, 6 or 7 mm.

Note: When determining the diameter of maxgraft® bonering, the required mesiodistal distance of the implant to the adjacent teeth/implants must be strictly observed. At least 1 mm distance between the ring and adjacent teeth must be kept. For instance, to place a 6 mm ring, at least 8 mm distance between the two adjacent teeth is needed; to place a 7 mm ring, at least 9 mm distance is necessary. An implant of 4.1–4.5 mm always requires a 7 mm maxgraft® bonering. 3D diagnostics are recommended.



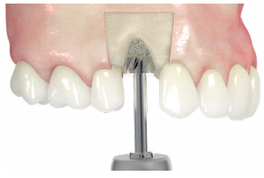
Step 2 Determine the implant position with the pilot drill

Check the mesiodistal and orofacial implant position/implant axis for optimal aesthetic positioning of the implant. The use of a surgical drill template is recommended.

Step 3 Prepare the ring bed with the trephine

Use a 6 or 7 mm trephine depending on the ring size chosen for the circular osteotomy. The preparation depth can be determined by the markings (2–10 mm, in 2 mm increments) on the trephine. The depth of the maxgraft® bonering bed is defined by the size of the defect. Bone chips can be removed using a blunt instrument and reintroduced in other regions of the augmentation site.

Note: The bone level of the neighboring teeth is the reference for the height of maxgraft® bonering.



Step 4 Straighten/decorticate the ring bed

The planator is used on the bottom of the defect to achieve a uniform surface for implanting maxgraft® bonering with a press fit.

Step 5 Prepare maxgraft® bonering

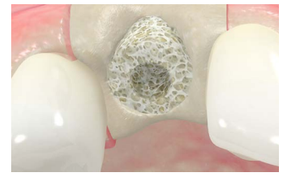
Use the diamond disc from the maxgraft® bonering surgical kit and the bonering fix to trim the bone ring to the required length.

Note: Before application, it is recommended to rehydrate maxgraft® bonering (10 min in saline solution). Hydration results in a bit more flexibility of the ring (especially for the 7mm ring), therefore it is less prone to crumble or break and can be more easily adapted to the defect area. Above that, preparation of the ring bed using the maxgraft® bonering surgical kit ensures close contact of the bone ring to the vital bleeding bone, enabling fast bony integration of implant and bone graft.

Step 6 Insert maxgraft® bonering

maxgraft® bonering is ‘press-fit’ in the prepared bone bed.

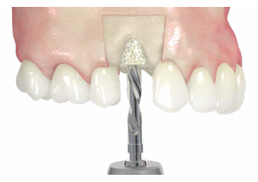
Note: A precise congruence of the ring base to the bone bed is critical for the primary stability of maxgraft® bonering and implant.



Step 7 Prepare the implant bed

After inserting maxgraft® bonering, the osteotomy for the implant is prepared through the bone ring according to the surgical procedure of the implant system used.

Note: The length of the implant chosen should be sufficiently long so that the implant is situated at least 3 mm deep in the residual alveolar bone. Enlargement of the inner ring diameter to match the size of the implant used can be performed extraorally.

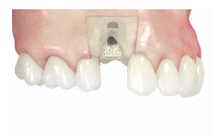


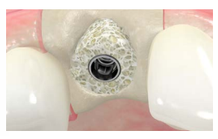
Step 8 Place the implant through maxgraft® bonering

The implant fixates the ring in the jawbone.

Note: The implant should be placed approximately 1 mm below the surface to compensate for possible resorption of the bone ring. If it cannot be stably seated, maxgraft® bonering should be secured with a special screw with a head larger than the diameter of the implant.

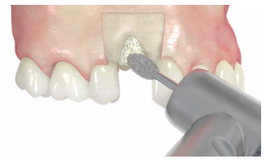
Ask botiss representatives which implant systems provide these screws: product-management@botiss.com





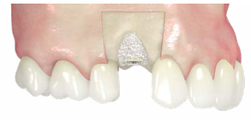
Step 9 Round off the edges of maxgraft® bonering

After placing the implant, the edges of maxgraft® bonering must be smoothened using a diamond tulip bur to prevent perforation of the soft tissue.



Step 10 Cover defects with a bone substitute material

The defect should be covered with non- or slowly resorbable granules. cerabone® with a particle size of 0.5–1.0 mm is recommended.



Step 11 Cover the graft with a barrier membrane and close the wound

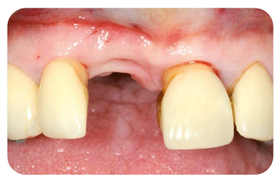
The entire augmentation area needs to be covered with a membrane that has a long-barrier function to prevent soft tissue cell invasion and exposure of the augmentation site. The Jason® membrane with its delayed degradation is recommended. Close the wound in a tension-free manner.

CLINICAL CASE BY

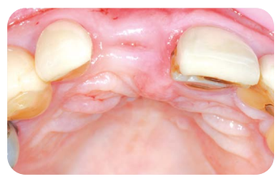
Amit Patel, Birmingham, United Kingdom

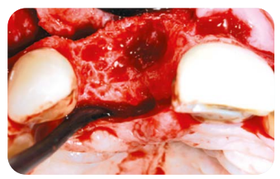
BONE AUGMENTATION AND IMPLANT PLACEMENT IN SINGLE-TOOTH GAPS

Restoration of buccal bone with maxgraft® bonering

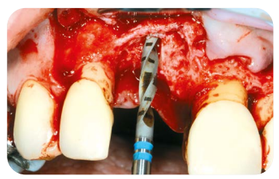


Initial situation shows bone loss due to lack of physical load of bridge retained region 11

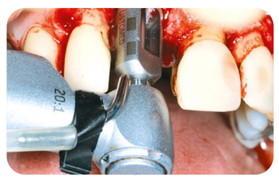




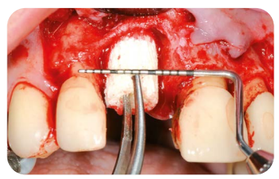
Clinical situation at time of entry shows loss of buccal bone lamella



Pilot drill to determine later implant position

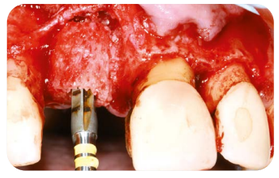


Trephine drill 7 mm for maxgraft® bonering 7 mm

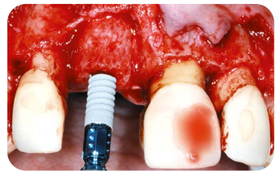


After preparation with the planator, the necessary length of maxgraft® bonering is estimated (7 mm)

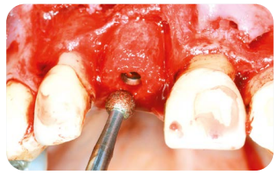
Cutting maxgraft® bonering to the required size



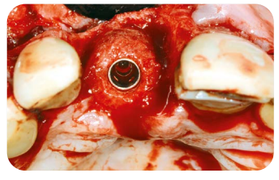
Implant bed preparation through maxgraft® bonering



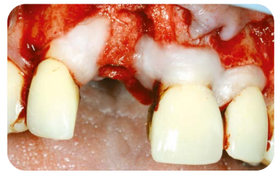
Placing the implant in order to fixate maxgraft® bonering



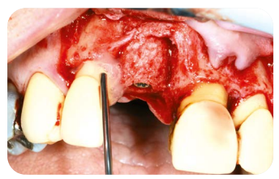
Smoothing the edges of maxgraft® bonering



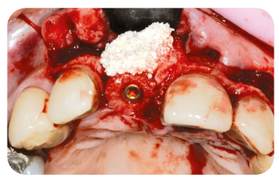
maxgraft® bonering and implant in place



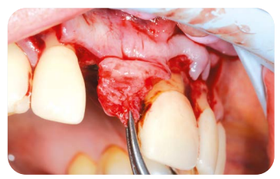
PrefGel applied as root surface conditioner prior to applying Straumann® Emdogain®



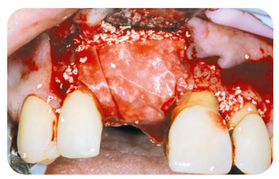
Application of Straumann® Emdogain® for regeneration of bone around the roots of adjacent teeth



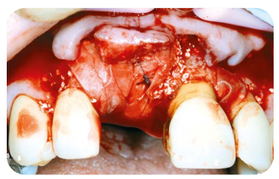
cerabone® granules for contouring the defect and to help slow down resorption of the bone



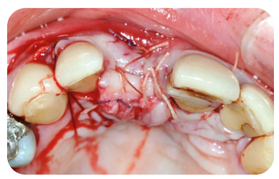
Mobilization of soft tissue; double layered



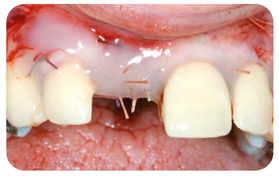
Jason® membrane to protect the bone graft from soft tissue ingrowth



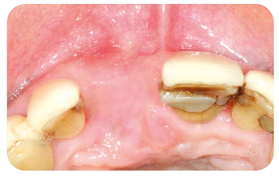
Flap is sutured with mattress suture to prevent micromovements of the grafted area



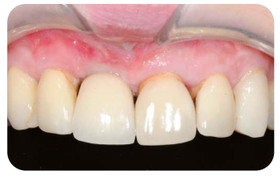
Sutured free of tension



Rest of Straumann® Emdogain® applied to support wound healing



Four weeks after surgery uneventful healing and healthy soft tissue



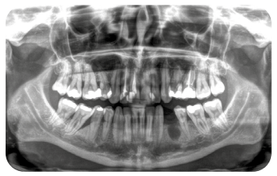
Prosthetic restoration six months after surgery with aesthetical outcome

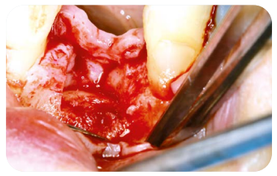
maxgraft® bonering in conjunction with Straumann® Emdogain®:

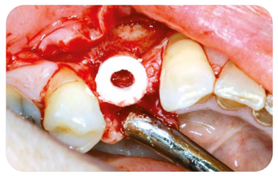
Straumann® Emdogain® can be used to support soft tissue wound healing in oral surgical procedures comprising implantations and peri-implant procedures. Straumann® Emdogain® is a gel containing enamel matrix proteins which stimulate various cell types that are important for the wound healing process. It can be pre-mixed with bone grafting materials and additionally applied on top of the graft before final wound closure. To promote the regeneration of the periodontium of adjacent natural teeth Straumann® Emdogain® can also be applied on the exposed root surfaces.[6]

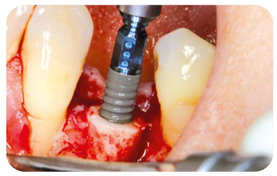
CLINICAL CASE BY
Dr. Bernhard Giesenhagen, Kassel, Germany

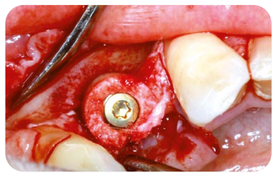
BONE AUGMENTATION AND IMPLANT PLACEMENT IN SINGLE-TOOTH GAPS
Restoration of buccal and lingual bone with maxgraft® bonering

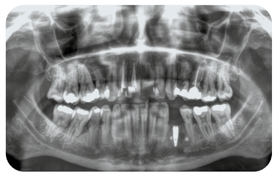

Initial situation: x-ray shows a two-wall bony defect with loss of buccal and lingual bone

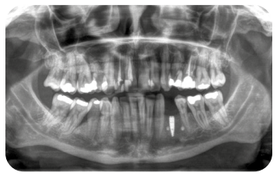

Clinical situation of the ring bed after preparation according to protocol (pilot drill, trephine, and planator)

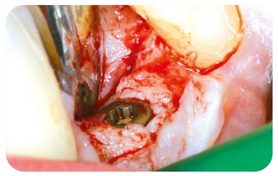

Placement of maxgraft® bonering after adjusting to desired length

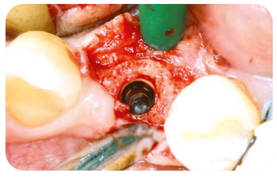

Fixation of maxgraft® bonering with an implant after implant bed preparation through the ring

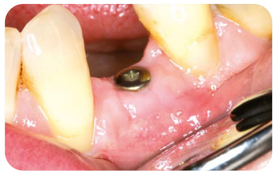

Fixed implant placed in the aesthetic window

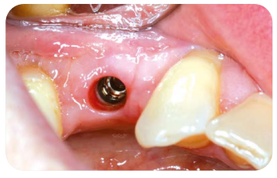

X-ray after surgery

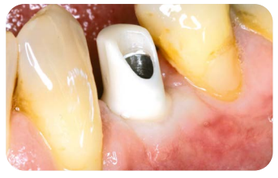

X-ray six months after surgery shows osseointegrated implant and bone ring with the same radiopacity as the native bone

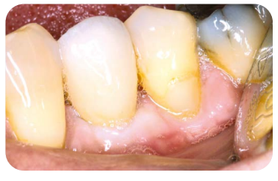

Clinical situation six months after surgery: vital bleeding bone on the shoulder of the implant

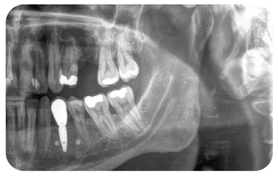

Crestal view after removing the cover screw


Clinical situation after placing a healing cap for several weeks


Healthy soft tissue situation after removal of the healing abutment

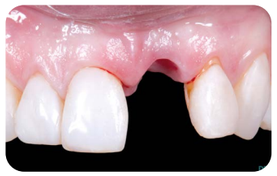

Abutment for final restoration

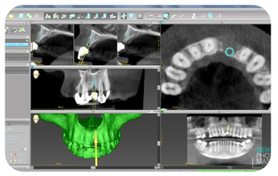

Final restoration


X-ray seven months after surgery shows bone with the same radiopacity as the native bone

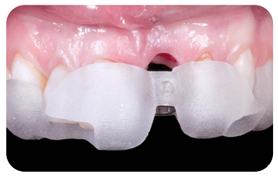
CLINICAL CASE BY
Dr. Orcan Yüksel and Dr. Krzysztof Chmielewski, Frankfurt, Germany

BONE AUGMENTATION AND IMPLANT PLACEMENT IN SINGLE-TOOTH GAPS
Guided bone ring surgery and implantation in aesthetic zone with maxgraft® bonering

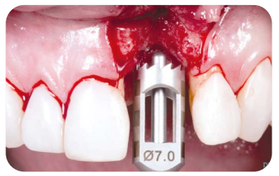

Initial situation: Bone loss due to a lack of physical load and inflammation of region 21 retained with a bridge


CBCT and clinical situation showed vertical and horizontal bone loss. Surgery planning with a digital implant planning software

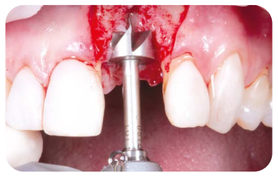

Drill guide


Situation three months after tooth 21 extraction and template in place

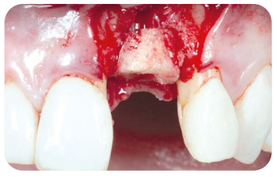

Guided pilot drill to determine the aesthetic implant position

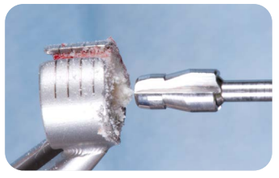


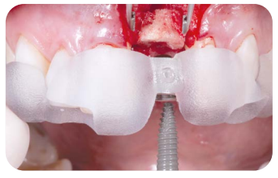
Trephine drilling; the guiding pin in the trephine follows the pilot drilling path; depth of drilling in this case: 4–5 mm

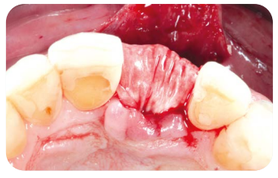

Ring bed preparation with a 7 mm planator; same size as the trephine

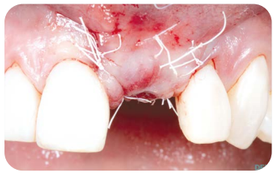

Implant bed preparation through the guide according to drilling protocol

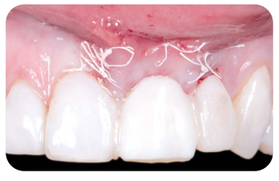

Implantation of maxgraft® bonering


Enlargement of maxgraft® bonering with profile drill, because a bigger implant diameter was used


Implantation through the drill guide


After smoothening sharp edges, the defect is covered with cerabone® and Jason® membrane


Single sutures close the flap and apical mattress sutures remove tension from the facial muscles


Adhesive temporary restoration in place

It is advisable to save the geometrical shapes of bone rings in your planning software to visualize the optimal position and size of maxgraft® bonering.
- Ø 7 mm and 10 mm length
- Ø 6 mm and 10 mm length

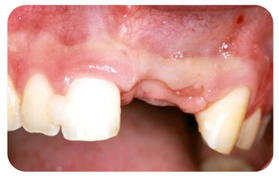
In areas where facial muscles, the tongue, or oral cavity might exert tensile stress to the augmentation site, it is recommended to place **apical mattress sutures** deep into the vestibulum. This **prevents micromovements** of the graft and reduces mechanical irritation of the incision line.

CLINICAL CASE BY

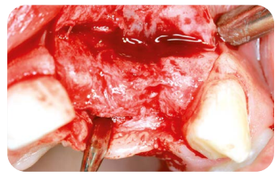
Drs. Orcan Yüksel, Bernhard Giesenhagen, and Andrea Seyfer, Frankfurt, Germany

BONE AUGMENTATION AND IMPLANT PLACEMENT IN EDENTULOUS SPACES

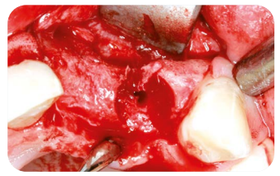
Restoration of incisors in aesthetic zone with two maxgraft® bonerings



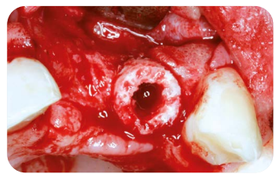
Initial situation: young patient with loss of teeth in region 21 and 22 after trauma



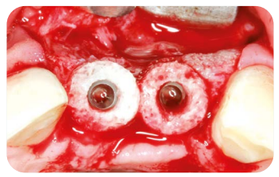
Clinical situation after lifting flap



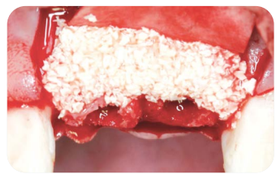
Prepared ring bed according to protocol



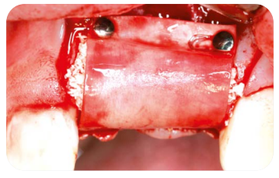
Implantation of maxgraft® bonering



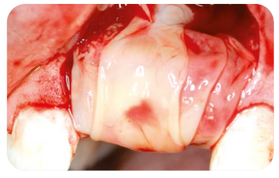
Two maxgraft® bonerings fixated with implants



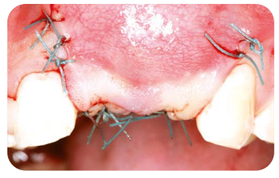
Defect covered with cerabone®



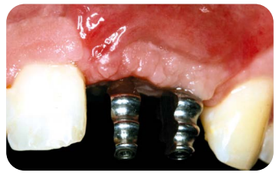
Jason® membrane tacked on the buccal aspect



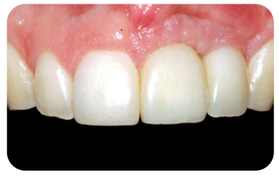
L-PRF matrix support wound healing



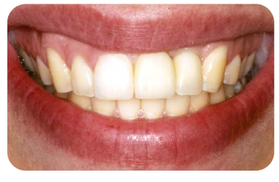
Single sutures free of tension



Abutments for prosthodontics



Final restoration



Aesthetic outcome one year after loading

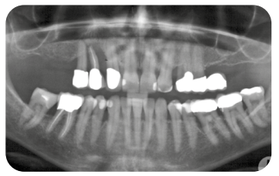
Platelet-rich fibrin (PRF) may be beneficial for soft tissue healing, maturation of bone grafts, and aesthetic results of soft tissue.[7,8] Its application can be considered in bone augmentation procedures.

CLINICAL CASE BY

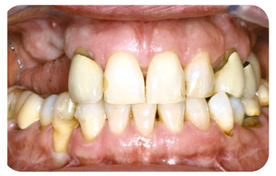
Dr. Anke Isser, Frankfurt, Germany

VERTICAL BONE AUGMENTATION AND IMPLANT PLACEMENT IN FREE-END SITUATION

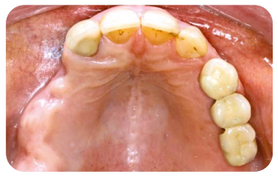
Advanced vertical augmentation in posterior maxilla with maxgraft® bonering

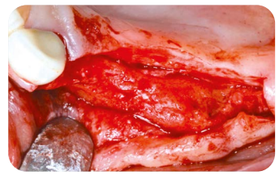


Severe bone loss #13–14; treatment plan: extraction and bone augmentation after healing

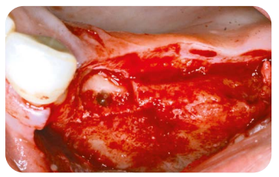


Situation after extraction and healing phase shows insufficient bone in posterior maxilla

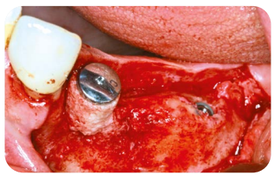




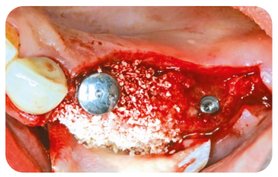
Vertical bone loss of 7 mm



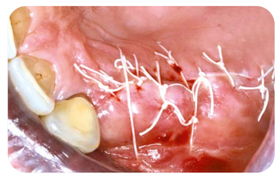
Implant and ring bed preparation



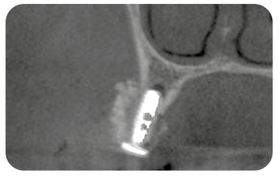
7 mm vertical augmentation with maxgraft® bonering and simultaneous implantation



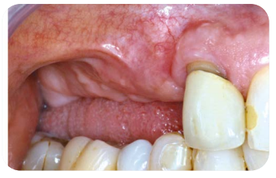
Defect covered with cerabone® and Jason® membrane



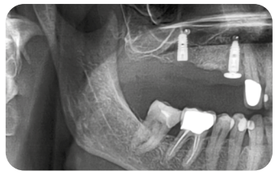
Sutures free of tension



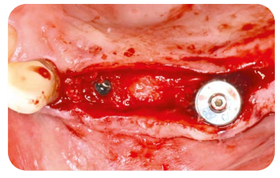
Post-op CBCT scan shows good seating of the implant



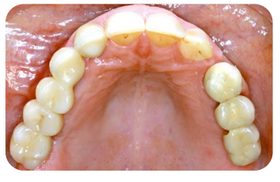
Clinical situation seven months post-op with uneventful healing



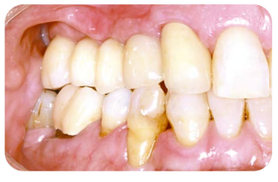
X-ray seven months post-op shows newly formed bone with almost the same radiopacity as the native bone



Clinical situation at re-entry shows healthy bleeding bone



Final restoration eight months after surgery



Aesthetic outcome eight months after surgery

Every vertical bone augmentation procedure has its limit. The **bone height of adjacent teeth** is the maximum level for augmentation. Mobilization of the periosteum is particularly important for achieving an optimal outcome.

In the mandible, soft tissue should be mobilized lingually; primarily, the periosteum should be detached up to the mylohyoid muscle with a dull elevator and the superficial fibrils mobilized in direction of the base of the mouth, as this can gain up to 10 mm of soft tissue.

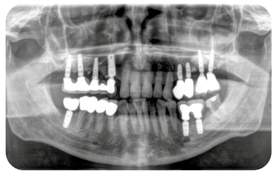
In free-end cases, apical mattress sutures are always recommended to avoid dehiscence.

CLINICAL CASE BY

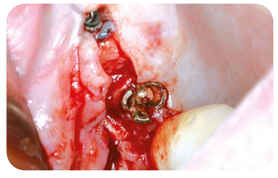
Dr. Bernhard Giesenhagen, Kassel, Germany

TREATMENT OF SEVERE PERIIMPLANTITIS

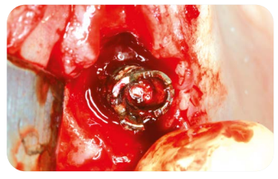
Single implant removal and immediate bone augmentation and implantation with maxgraft® bonering



Severe periimplantitis at tooth 15; bone loss up to 1/3 of the implant

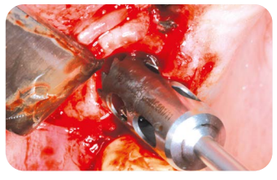


Crestal incision shows exposed implant shoulder

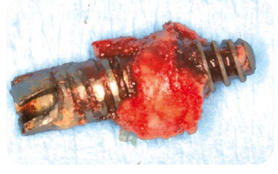


Infected and exposed implant

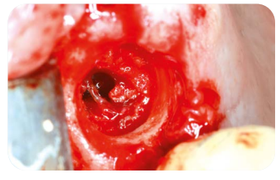
Defect is measured with either a 6 or 7 mm trephine



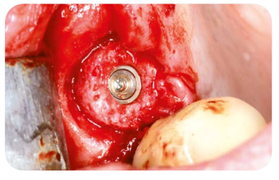
Infected bone and implant is removed with a trephine



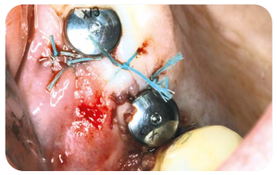
Explanted implant including the infected bone



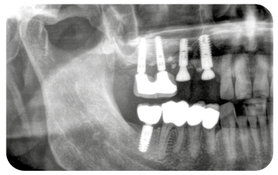
Disinfected augmentation site



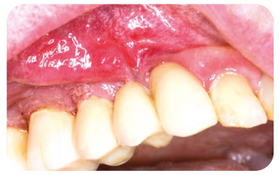
maxgraft® bonering fixated with an implant



Implants covered with healing abutments for transgingival healing



X-ray after surgery

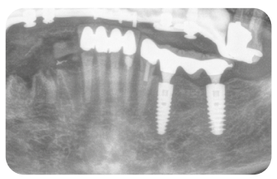


Clinical situation eight months after surgery

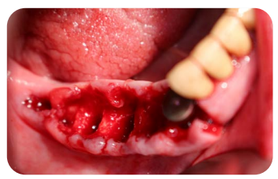
Conventional periimplantitis treatment prescribes surface decontamination of the implant using different means. However, as shown in most case studies, subgingival bacteria is not completely eradicated and surgical intervention is most effective in cases of progressed periimplantits.[9]

BONE AUGMENTATION AND IMPLANT PLACEMENT IN EXTRACTION SOCKET

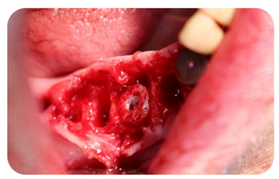
Immediate implant placement and bone augmentation after tooth extraction



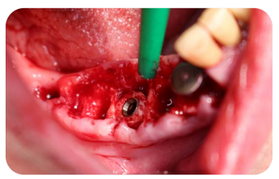
X-ray after extraction of teeth 44 to 47 due to mobility



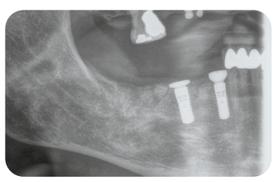
After extraction and immediate implant placement #44



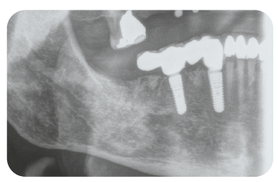
Placement of maxgraft® bonering after preparing the site with maxgraft® bonering surgical kit rotating instruments



Implant placement in order to fixate maxgraft bonering in the recipient site



X-ray six months post-op



X-ray five years post-op

Sinus floor elevation with maxgraft® bonering

This chapter describes the maxgraft® bonering technique with **simultaneous sinus floor elevation** (SFE) and implant placement. This method combines the lateral window approach with crestal implant insertion.[10]

Allogenic bone blocks are known to be a successful alternative to autogenous blocks in sinus augmentation procedure with both immediate and late implantation.[11,12]

If the residual bone height of the maxilla is less than 3 mm, or in cases with a subantral bone height of 3–6 mm where primary stability cannot be obtained, SFE procedures require a two-stage surgical protocol. The final prosthetic treatment may take place as late as 15 months after the surgery.[13]

With maxgraft® bonering, a **one-stage procedure** can be performed and **overall treatment time** drastically **reduced**. Furthermore, a second surgical procedure becomes unnecessary, offering an alternative treatment option for patients who have concerns regarding multiple surgeries and long treatment times.[10,16]

Guidelines for the application of maxgraft® bonering in the sinus:

- This technique requires a special screw to secure the implant in maxgraft® bonering. The screw head diameter needs to be larger than the shoulder of the implant. The screw must ensure close contact with the crestal bone to provide stability during the healing phase, as well as prevent the ring and the implant from moving into the sinus cavity
- The bone ring can be kept in place in the sinus cavity with special tweezers: ‘bonering tweezers sinus’, available from Ustomed® Instrumente (www.ustomed.de/Art. No. 10-824-165)
- Pre-op planning is mandatory for thoroughly reviewing the patient’s anatomy of the maxillary sinus, its adjacent structures, and residual bone height/quality
- Placement of the implant and maxgraft® bonering must be correctly planned and performed to achieve a successful prosthodontic rehabilitation
- Care must be taken to keep the Schneiderian membrane intact
- The sinus should be sufficiently wide, i.e. not too narrow at the base otherwise the ring cannot be placed flush with the bone
- If the implant lacks primary stability, the residual bone height is too thin or the bone is of poor quality, it is recommended to switch to a two-staged standard lateral window SFE procedure
- Healing time is approximately eight to nine months until final restoration

Indication

Maxillary bone height of 1–3 mm, or if no primary stability can be obtained with direct implantation.

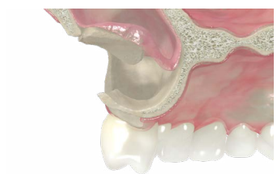
A residual bone height of less than 1 mm is contraindicated. Furthermore, the quality of the residual bone must always be evaluated when using this technique.

Sinus floor elevation

Surgical procedure and guidelines

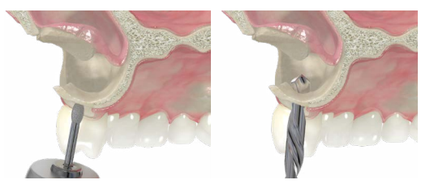
Step 1 Prepare the lateral window

After flap elevation, carefully prepare a lateral window with a burr or piezoelectric instrument.



Step 2 Elevate the Schneiderian membrane

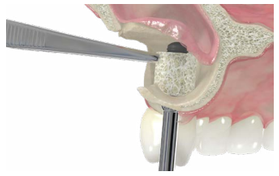
Gently detach the Schneiderian membrane from the inner aspect of the sinus cavity. The bony lid of the lateral wall of the sinus should be carefully reflected to allow visualization of the bony floor of the sinus and the area for bone ring implantation.



Step 3 Prepare the implant position

Mark the planned implantation site from the crestal side with a diamond tulip.

Use a pilot drill to access and prepare the planned implant bed and axis. Take care to keep the Schneiderian membrane intact.



Step 4 Place maxgraft® bonering

maxgraft® bonering is placed through the lateral window of the osteotomy. The height of maxgraft® bonering depends on the thickness and anatomy of the sinus floor and the length of the planned implant. Usually half of maxgraft® bonering (5 mm) is sufficient to stabilize the implant in the sinus cavity.

Note: It may be necessary to adjust the shape of the bone ring further to fit onto the floor of the sinus.

Step 5 Place the implant

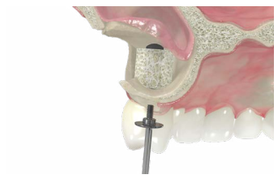
During the placement of the implant, hold maxgraft® bonering inside the sinus cavity through the lateral window using forceps to prevent rotation. The special tweezers from Ustomed® can help to apply gentle pressure while screwing in the implant.

Note: The implant should be placed 1 mm subcrestally. See case 2 from Dr. Chmielewski for an alternative treatment procedure in case of very thin sinus floors.

Step 6 Place a fixation screw

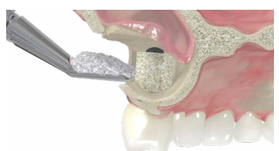
A special screw secures the implant within maxgraft® bonering. The screw head needs to be larger than the shoulder of the implant.

Ask botiss representatives which implant systems provide these screws: product-management@botiss.com



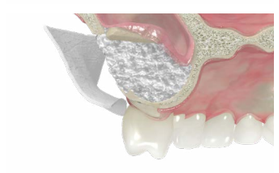
Step 7 Fill sinus with bone substitute material

The remaining space in the sinus cavity should be filled with particulate bone substitute material thanks to its volume stability, cerabone® is recommended.



Step 8 Cover the lateral window and close the wound

The lateral window should be covered with a resorbable collagen membrane (such as collprotect® or Jason® membrane). Closure of the flap for submerged healing should be carried out in a tension-free manner to facilitate healing.

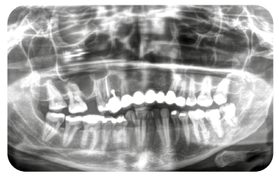


Note: botiss offers a 3D printed model based on CT/CBCT sinus scans of the patient. This helps to visualize the sinus cavity, the necessary positioning of the ring and the lateral window and enables to train the hard-tissue procedure on the actual anatomical situation.
Customized 3D printed jaw model: Art. No. 32100
maxgraft® bonering sample: Art. No. BOC-33SAM

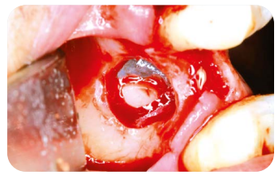
Please contact botiss for further information.
Data upload: www.botiss-bonebuilder.com

CLINICAL CASE BY
Dr. Bernhard Giesenhagen, Kassel, Germany

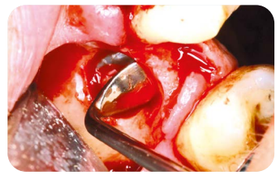
SINUS FLOOR ELEVATION AND IMPLANT PLACEMENT
Single-tooth restoration of maxillary bone height of 1.5 mm with maxgraft® bonering



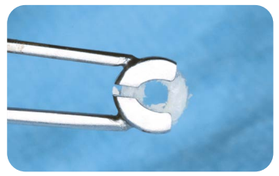
Initial situation: x-ray shows maxillary bone height of 1.5 mm in region 15



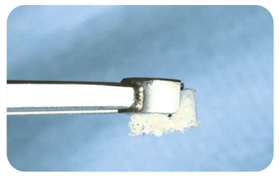
Preparation of a lateral window for external sinus floor elevation

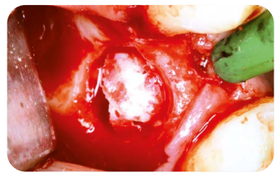


Gentle detachment of the Schneiderian membrane

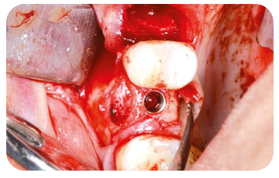


Ustomed® bonering tweezers sinus secure the ring in the sinus cavity; they apply gentle pressure from the top while drilling the implant through maxgraft® bonering

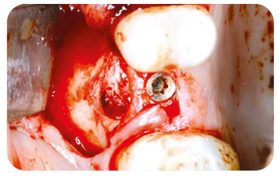




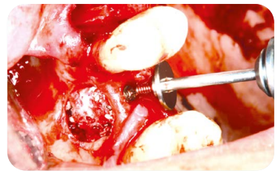
Insertion of maxgraft® bonering through the lateral window after preparing the implant position crestally



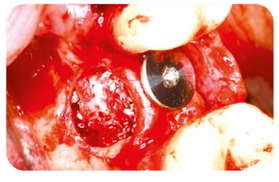
The sinus cavity filled up with cerabone® and implant in place



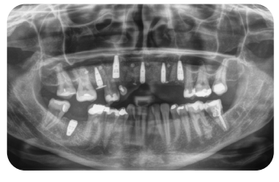
Cover screw with threads to fit the fixation cap



Fixation cap secures the implant in place and prevents the ring and implant from moving into the sinus cavity



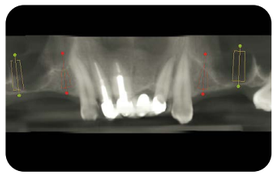
Closure and fixation cap to provide stability during the healing phase



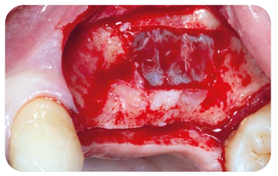
X-ray eight months after surgery shows a stable bone situation and sufficient maxillary bone height

CLINICAL CASE BY
Dr. Krzysztof Chmielewski, Gdansk, Poland

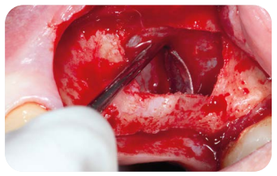
SINUS FLOOR ELEVATION ON BOTH SITES OF THE MAXILLA
Alternative treatment option to place an implant subcrestally in an eggshell thin sinus floor with maxgraft® bonering



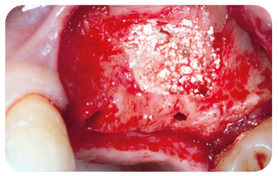
Initial situation: x-ray shows eggshell thin sinus floor (~1 mm) and planned maxgraft® bonering on both sites of the maxilla



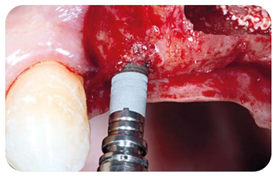
Lateral window prepared with a piezoelectric instrument



Detaching the Schneiderian membrane

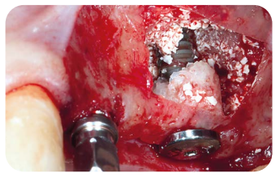


Defect filled with cerabone®

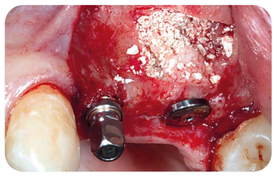


Direct implant placement in the area with sufficient maxillary bone height

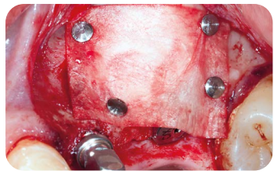
Preparing ring and implant extraorally; the implant should be placed below the margin of maxgraft® bonering



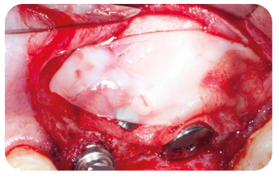
Bone ring and implant placed through the lateral window and secured with a membrane screw



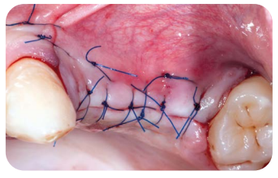
Sinus cavity filled with more cerabone®



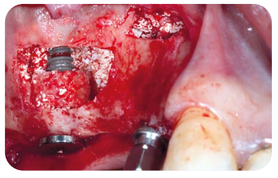
Jason® membrane secured with titanium pins



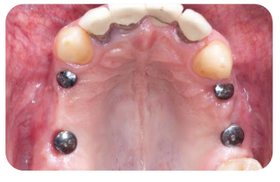
PRF matrix to support soft tissue healing



Wound closed with single stitches and apical mattress sutures



Second site treated in the same manner



Nine months after surgery: eventless healing and gingiva former in situ

Note: This procedure is only recommended if the sinus floor is very thin or of poor quality because the lateral window requires a larger surgical site than the crestal approach and may therefore be more traumatic for the patient.

Surgical precautions and post-op care

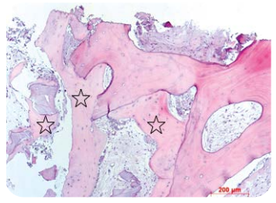
- Tension-free wound closure is the key to success for every augmentation; therefore, sufficient mobilization of the flap should be achieved; this is essential for vertical augmentations
- Mattress sutures are recommended to remove tension from the lip and the facial muscles to avoid micromovements within the augmentation site
- Sutures:
  - 4-0 Apical mattress sutures/single sutures
  - 5-0 Free gingival grafts
- The sutures are removed approximately ten days after surgery
- Mattress sutures are removed approximately three weeks after surgery
- No pressure should be exerted on the healing site from temporary prosthesis; in the first three weeks, it is recommendable to renounce on any temporary provision
- **Advise patients to:**
  - Avoid mechanical stress on the augmentation site; no solid food and excessive tooth brushing in the first days post-op
  - Abstain from physical exercise in the first week after surgery
  - Be examined immediately if inflammation or dehiscence is detected

Healing time

Healing times are approximately six months in standard bone ring procedures and eight months in sinus floor elevation procedures. The exact amount of time must be estimated individually by the surgeon depending on the location, type, and extent of the defect. The age of the patient should also be considered, as significant variations in patients of different age has been reported in terms of new bone formation.[14]

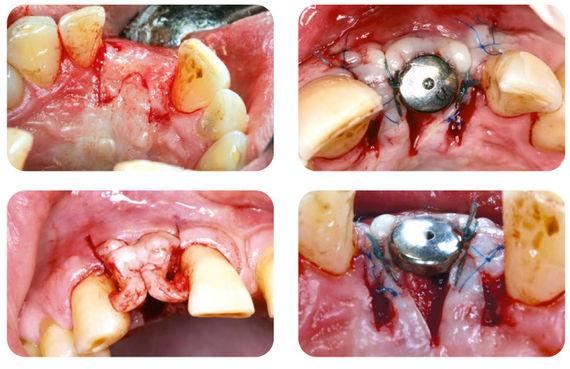
X-ray or CBCT scan follow-up is recommended

Representative histological image of the healing and integration behavior of maxgraft® allogenic bone blocks six months after surgery. The allograft becomes optimally integrated within new build bone (asterisks) (HE-staining, 10x magnification). Biopsy provided by Dr. Bernhard Giesenhagen.



Re-entry

For an optimal aesthetic outcome, it is advisable to perform a special incision technique to produce an ideal emergence profile. The meander, or split finger, technique consists of a circular incision line around the implant to relocate attached gingiva to the buccal side around the implant.[15]

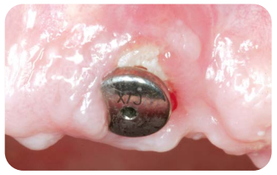


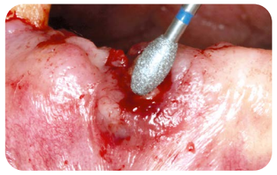
Courtesy of Dr. Bernhard Giesenhagen and Dr. Orcan Yüksel

Complication management

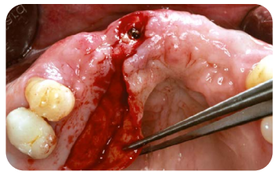
Thorough and regular follow-ups are essential to discover infection and dehiscence as soon as possible (three days, one, and two weeks after surgery).
In case of dehiscence, the exposed graft needs to be removed to an extent so that bleeding occurs.
The wound margins should be trimmed and mobilized again for wound closure. Additionally, a pedicled connected tissue graft (CTG) can help to close the augmentation area. If the flap keeps reopening, removal of the implant should be considered.
In all cases, patients should be treated with antibiotics systemically and the area should be rinsed with chlorhexidine locally.

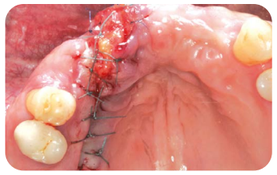
Pedicled palatal CTG in the upper jaw



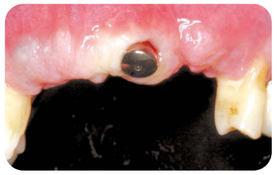


Small fenestrations should be immediately covered by connective tissue graft after decontamination of the surface. A diamond round drill can be used to reduce the infected and exposed bone ring.





Rotated CTG from the palate to cover the soft tissue defect and fixed with single sutures



Six weeks after CTG procedure

Courtesy of Dr. Bernhard Giesenhagen and Dr. Orcan Yüksel

Continuing EDUCATION

Like every new surgical procedure, the Bone Ring Technique has its learning curve. To achieve ideal clinical results, it is highly recommended to attend a course prior to your first surgery.

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References

1: Flanagan D. Cylindrical Ringbone Allograft to Restore Atrophic Implant Sites: A Pilot Study. Journal of Oral Implantology 2016. 42(2): 159-163.

2: Giesenhagen B. Vertical Augmentation with Bone Rings. EDI Journal 2006. Issue 3: 2-5.

3: Nissan J, Ghelfan O, Calderon S, Mardinger O & Chaushu G. Efficacy of Cancellous Block Allograft Augmentation prior to Implant Placement in the Posterior Atrophic Mandible. Clinical Implant Dentistry and Related Research 2011. 13 (4): 279–285.

4: Nissan J, Marilena V, Gross O, Mardinger O & Chaushu G. Histomorphometric analysis following augmentation of the anterior atrophic maxilla with cancellous bone block allograft. Int. J. Oral Maxillofac Implants 2012. 2: 84–89.

5: Motamedian SR, Khojaste M & Khojaste A. Success rate of implants placed in autogenous bone blocks versus allogenic bone blocks: A systematic literature review. Ann Maxillofac Surg 2016. 6(1):78-90.

6: Lyngstadaas SP, Wohlfahrt JC, Brookes SJ, Paine ML, Snead ML, Reseland JE. Enamel matrix proteins; old molecules for new applications, Orthod Craniofac Res. 2009 August; 12(3): 243–253.

7: Toffler M, Toscano N, Holtzclaw D, Corso D, Ehrenfest DD. Introducing Choukroun's Platelet Rich Fibrin (PRF) to the Reconstructive Surgery Milieu. The Journal of Implant & Advanced Clinical Dentistry 2009, 1 (6): 21-32.

8: Fernando AF, David JF. Combination of Autologous Platelet-Rich Fibrin and Bone Graft: An Invaluable Option for Reconstruction of Segmental Mandibular Defects. Philippine Journal of Otolaryngology-Head and Neck Surgery 2013. 28 (1): 38-42.

9: Smeets R, Henningsen A, Jung O, Heiland M, Hammächer C & Stein J. Definition, etiology, prevention and treatment of peri-implantitis – a review, Head & Face Medicine 2014, 10:34.

10: Yüksel O, Giesenhagen B, Chmielewski K, Single-surgery implant placement using maxillary sinus augmentation and allograft bone rings, July 7, 2014 by Implant Practice US.

11: Chaushu et al. 2010. Histomorphometric Analysis After Maxillary Sinus Floor Augmentation Using Cancellous Bone–Block Allograft. The Journal of Periodontology 2010, 81(8):1147-1152.

12: Sbordone C, Guidetti F, Califano L, Pannone G, Sbordone L. Volumetric changes after sinus augmentation using blocks of autogenous iliac bone or freeze-dried allogeneic bone. A non-randomized study. J Craniomaxillofac Surg 2014. 42(2): 113-118.

13: Katsuyama S, Jensen S. ITI Treatment Guide. Sinus Floor Elevation Procedures 2011. Quintessence Volume 5.

14: Nissan, J., Marilena, V., Gross, O., Mardinger, O. & Chaushu, G. Histomorphometric analysis following augmentation of the anterior atrophic maxilla with cancellous bone block allograft. Int. J. Oral Maxillofac. Implants 27, 84–9 (2012).

15: Misch, C. E., Al-Shammari, K. F., & Wang, H.-L. (2004). Creation of interimplant papillae through a split-finger technique. Implant Dentistry, 13(1), 20–7.

16: Nord et al. One-Stage Vertical Ridge Augmentation and Dental Implantation With Allograft Bonerings: Results 1 Year After Surgery. J Oral Implantol. 2019 Dec;45(6):457-463.

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