

LEADING REGENERATION

Geistlich
Biomaterials

Minor Bone Augmentation

Treatment Concepts





“The GBR technique with the combination of autologous bone chips, Geistlich Bio-Oss® and Geistlich Bio-Gide® offers predictable outcomes for contour augmentation. It’s important that the products are both clinically and scientifically well documented.”

Prof. Daniel Buser | Switzerland



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Minor bone defects: key factors for successful treatment

Minor Bone Augmentation: Bone defects around implants

Guided Bone Regeneration (GBR) is a well-documented and successful method for bone augmentation. The term Minor Bone Augmentation is used to describe GBR procedures around an implant when a bony defect leaves part of the implant surface exposed. Therefore Minor Bone Augmentation is defined as the treatment of a bone defect around an implant and amongst others includes dehiscences and apical fenestrations.¹

In the present treatment concepts we focus on minor bone augmentations and differentiate them from major bone augmentation and ridge preservation procedures. Major bone augmentation includes staged approaches for implant placement.

Ridge preservation may be accomplished by grafting of the extraction socket with biomaterial in order to avoid ridge resorption after tooth extraction. (Tab. 1)

Decision criteria for implant placement with a simultaneous GBR







Besides general factors like smoking behavior, age, disease, etc. local factors play an important role for a successful GBR procedure. General factors cannot be influenced by the clinician whereas local factors are influenced by the decision-making of the clinician. The first and most important local factor is the ratio between the surface area of the exposed bone and the defect volume to be regenerated. Whereas the bone regeneration depends on the number of bone walls available that can contribute

to new bone formation, a simple rule summarizes: the more bone walls are available in a defect area, the better the healing potential in a given defect site. One-wall defects are more demanding than two- or three-wall defects.

The 3 most important criteria for implant placement with simultaneous GBR are:²

- 1 Correct 3D-implant position**
(Fig. 1-3) The implant must be placed in a correct three-dimensional position in order to obtain an optimal functional and esthetic outcome.²
- 2 Primary stability**
Primary implant stability has to be achieved for a predictable osseointegration.²
- 3 Favorable morphology**
(Fig. 4-6) The peri-implant bone defect must have a favorable defect morphology to allow predictable bone regeneration of the defect area and successful implant placement.²

TAB. 1: Different Therapeutic Areas with various treatment solutions:

Extraction Socket Management	Minor Bone Augmentation	Major Bone Augmentation
Ridge Preservation procedures irrespective of the prosthetic restoration time point (implant/bridge).	Implant placement combined with GBR	GBR prior to implant placement / GBR with form stable components / sinus elevation
See "Treatment Concepts for Extraction Sockets"	See online version of the present "Treatment Concepts for Minor Bone Augmentations"	See "Innovative Treatment Concepts in Oral and Maxillofacial Surgery"
		
		

Correct 3D implant position

The placement of implants in a correct three-dimensional position is one of the keys to an esthetic and functional treatment outcome:

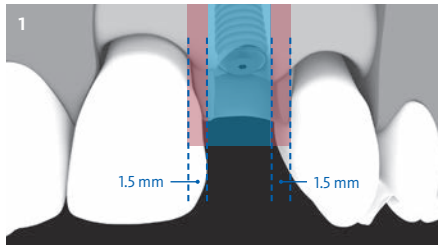


Fig. 1 Mesiodistal Dimension

Minimal distance to neighboring teeth or implants needs to be respected at implant placement to prevent vertical bone loss on adjacent teeth in the mesiodistal dimension. Correct implant position in the comfort zone (blue zone fig. 1) avoiding the danger zone (red zone fig. 1), which is dependent on the nature of adjacent structures.³

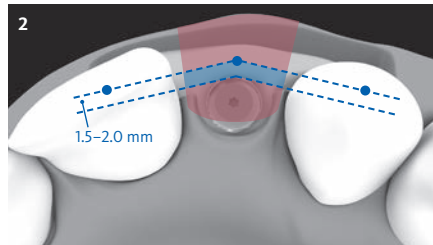


Fig. 2 Orofacial Dimension

In the orofacial dimension, the implant shoulder should be positioned in the comfort zone (blue zone fig. 2) which measures about 1.5–2.0 mm in width when measured from the ideal point of emergence. The danger zones (red zone fig. 2) are located both facially and palatally from the comfort zone.³

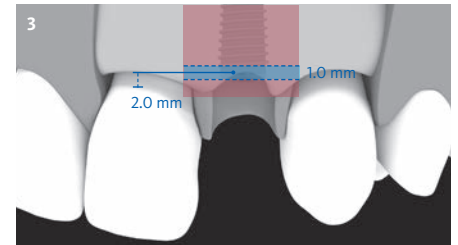


Fig. 3 Coronoapical Dimension

In the coronoapical dimension, the comfort zone (blue zone fig. 3) is a narrow band of about 1.0 mm and is dependent on implant systems and manufacturers recommendations. In general, the implant shoulder should be positioned approximately 2.0 mm apical to the mid-facial gingival margin of the implant restoration. Apical and coronal to this narrow band the danger zone (red zone fig. 3) is positioned.³

Favorable defect morphology¹ and treatment with Geistlich biomaterials

Successful Minor Bone Augmentation with Geistlich Bio-Oss® and Geistlich Bio-Gide® can be expected if the following defect morphology is prevalent:

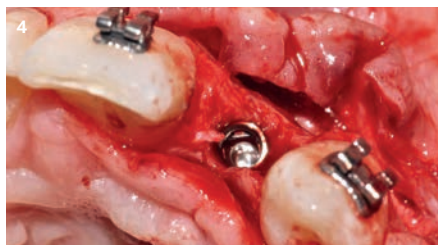


Fig. 4 Contour deficit: Class 0

Implant is placed in a bony envelope, but a contour augmentation is necessary for an esthetic outcome. GBR procedure with Geistlich Bio-Oss® and Geistlich Bio-Gide® is performed in these situations. (Picture by courtesy of Dr. Raffaele Cavalcanti)

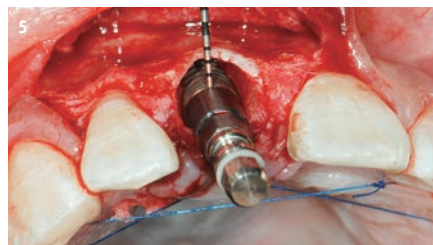


Fig. 5 Intra-alveolar defect: Class I

Implant is placed and an intra-alveolar gap defect is visible. A GBR procedure is performed with Geistlich Bio-Oss®¹⁷ and Geistlich Bio-Gide® to fill the gap between the implant surface and the intact bone walls. If necessary, combined GBR procedure is performed with Geistlich Bio-Oss® and Geistlich Bio-Gide® to also account for filling the gap as well as for contour augmentation. (Picture by courtesy of Dr. Su Yu Cheng)



Fig. 6 Dehiscence-type defect: Class II

After implant placement a peri-implant defect is visible with deficient bone wall. The GBR procedure is performed with Geistlich Bio-Oss® and Geistlich Bio-Gide® to fill the defect and adapt the contour augmentation.^{3,9} (Picture by courtesy of Dr. Teppei Tsukiyama)



“I have been practicing implant dentistry for more than 20 years. The majority of that time I have exclusively used Geistlich products for treatment involving bone regeneration. The results, year after year, are exceptionally predictable.”

Dr. Jay Beagle | USA

Long-term success with the dream-team

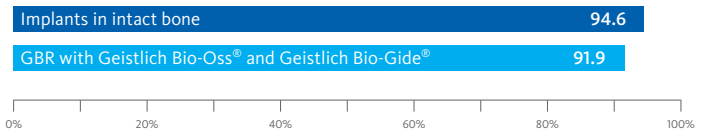
GBR with the dream-team: Geistlich Bio-Oss® and Geistlich Bio-Gide® for outstanding and predictable clinical outcomes.

Implant placement and simultaneous GBR with Geistlich Bio-Oss® and Geistlich Bio-Gide® perform as well as implant placement into native bone with respect to implant survival, marginal bone height and peri-implant soft tissue parameters (cross-sectional retrospective study).⁴ According to studies on simultaneous implantation and GBR with Geistlich Bio-Oss® and Geistlich Bio-Gide® results suggest:

- › Comparable implant survival rate after at least 5 years.⁴ The implant survival rate remains comparable after 12–14 years.⁶
- › Successful osseointegration of implants and high stability of simultaneous augmented peri-implant bone volume.⁵

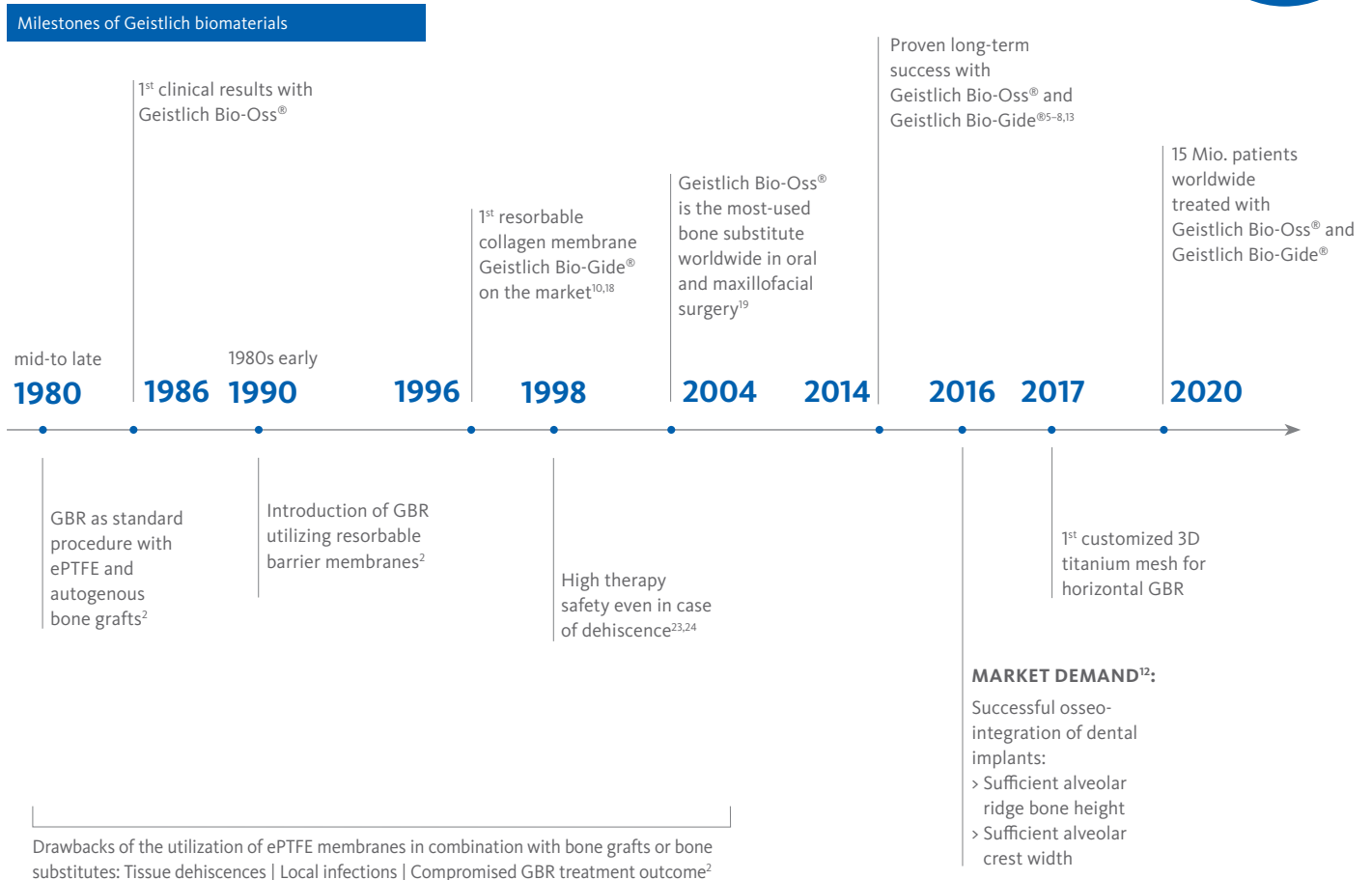
- › Maintained facial bone wall in 95 % of the patients for up to 5–9 years follow-up.⁷⁻⁹
- › Reliable bone regeneration and optimal tissue integration.²⁰⁻²²
- › High predictability for successful esthetic outcomes and good long-term stability of the established facial bone wall.⁹

IMPLANT SURVIVAL RATE AT UP TO 13 YEARS⁶



Reliable
91.9%
Implant survival rate after 12–14 years⁶

Milestones in GBR & Geistlich Biomaterials history go hand in hand



Milestones of GBR

Contour Augmentation with L-shape technique



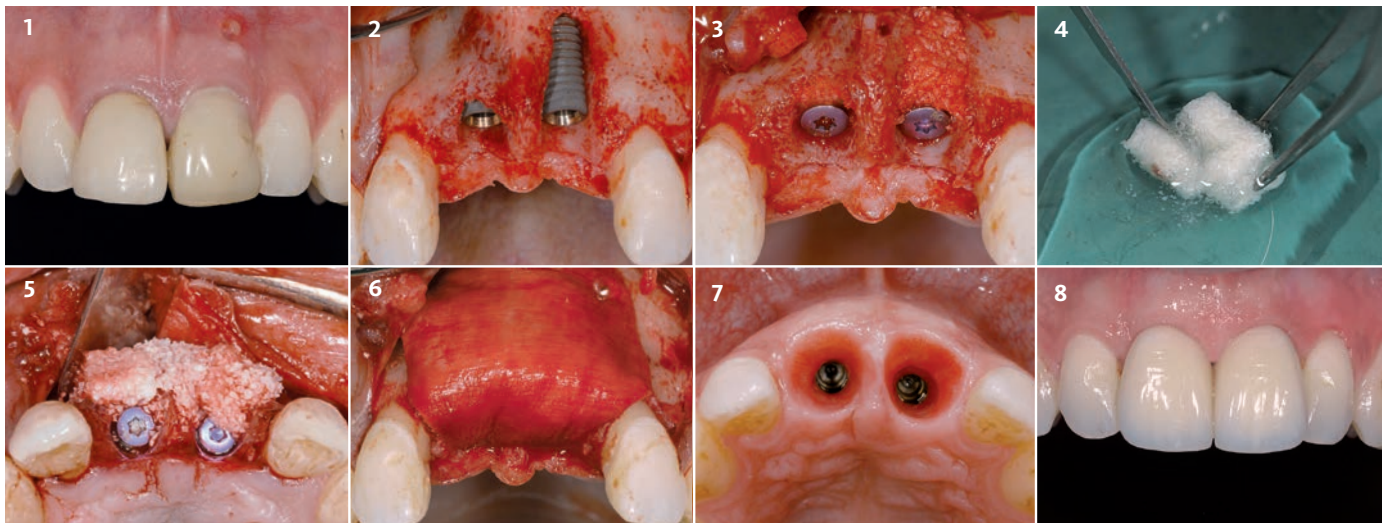
Prof. Ronald Jung, PhD | Switzerland

Clinical Challenge: For buccal, peri-implant defects in the esthetic region, Geistlich Combi-Kit Collagen offers the possibility of building up volume and of imitating the natural root prominence.

Conclusion: The 10% collagen component probably supports stabilization of the blood coagulum and keeps the Geistlich Bio-Oss® particles together.

Aim/Approach: Geistlich Bio-Oss® Collagen is cut into an L-shape and is adapted to the defect using Geistlich Bio-Gide® and resorbable pins. This supports the peri-implant soft tissue and mimics the natural root contour at the implant site.

Defect	Region	Treatment	Additional means
<input checked="" type="radio"/> Class 0 <input type="radio"/> Class I <input checked="" type="radio"/> Class II	<input checked="" type="radio"/> anterior <input type="radio"/> posterior	<input checked="" type="radio"/> maxilla <input type="radio"/> mandible	<input checked="" type="radio"/> Autologous bone chips <input checked="" type="radio"/> Resorbable pins
		<input checked="" type="radio"/> Geistlich Bio-Oss® <input checked="" type="radio"/> Geistlich Bio-Gide® <input checked="" type="radio"/> Geistlich Bio-Oss® Collagen	



1 Initial situation before extraction of teeth 11 and 21. A fistula apically of tooth 21 is visible.

2 After implant placement a small dehiscence defect was visible at the buccal aspect of implant site 11 and a large buccal bone dehiscence was present at the implant in region 21.

3 In order to cover the implant surfaces, a mixture of autologous bone chips from the surrounding area was combined with Geistlich Bio-Oss® particles.

4 Preparation of the Geistlich Bio-Oss® Collagen by cutting into an L-shape. The cutting process is easier when it is wet.

5 Occlusal view displaying how nicely Geistlich Bio-Oss® Collagen L-shape was used for contour augmentation in regions 11 and 21. Geistlich Bio-Oss® particles are used additionally to smooth the contour.

6 The defect is covered with a Geistlich Bio-Gide® membrane, which is tacked and stabilized with two resorbable pins made of polylactic acid placed at the apical part of the collagen membrane.

7 After abutment connection with subsequent soft tissue conditioning using screw retained temporary crowns an excellent emergence profile was achieved 4 months after implant placement.

8 A very natural appearance was achieved with two all-ceramic screw retained crowns 11 and 21. An optimal result for the ridge contour 8 years after crown insertion.

Contour Augmentation with ridge preservation



Dr. Benoit Brochery & Dr. Gary Finelle | France

Clinical Challenge: This case illustrates a proposition of implant protocol adapted to the initial tissue conditions and to the esthetic and functional requirements of previous restorations. Tooth 21 presents a root fracture causing a total loss of buccal cortical bone, while this tooth is the anterior abutment of a bridge replacing 22 and relying on 23. The clinical challenge to be overcome is the reconstruction of lost tissue and the choice of temporary restoration.

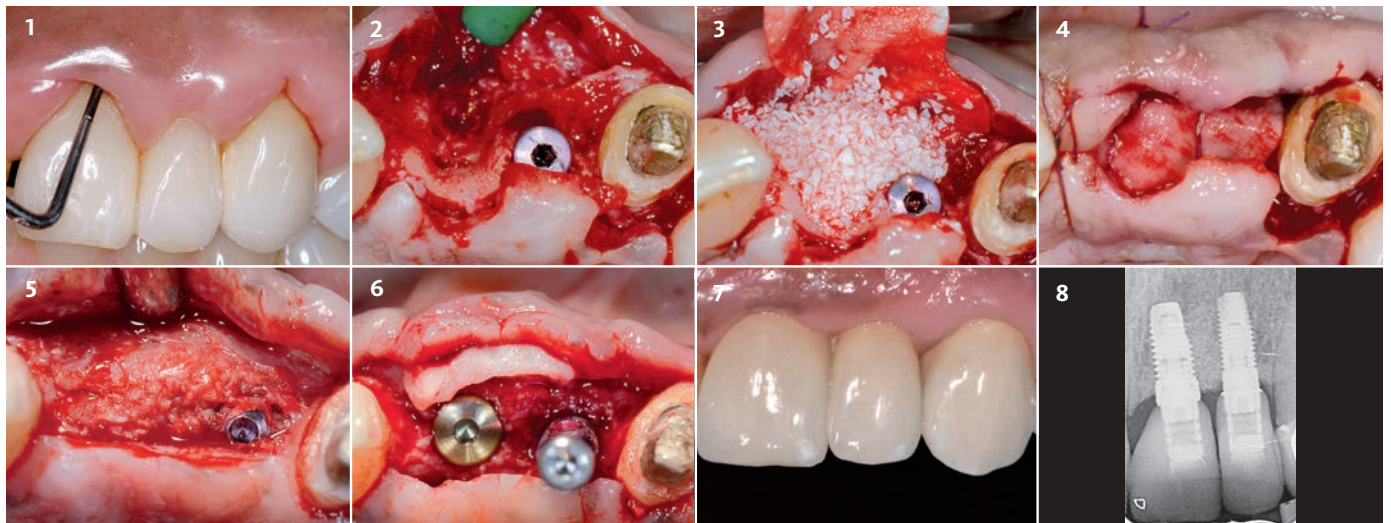
Aim/Approach: The loss of buccal cortical bone requires reconstruction by GBR. A 2-step surgical approach is performed in order to optimize the reconstruction of the missing bone and to keep a fixed temporary restoration, firstly tooth-sup-

ported and then implant-supported, used to shape the morphology of soft tissues.

Conclusion: The esthetic objective of anterior implant restorations is made possible by obtaining a thick bony and soft tissue environment in the long term.

Case source: "Anterior maxillary implant rehabilitation: tissue management and protocol of temporization; Réalités Cliniques – HS, June 2016, B. Brochery, G. Finelle"

Defect			Region		Treatment	Additional means
● Class 0	○ Class I	○ Class II	● anterior ○ posterior	● maxilla ○ mandible	● Geistlich Bio-Oss® ● Geistlich Bio-Gide®	● Connective Tissue Graft (CTG)



1 Buccal view of the bridge 21–23: the deep buccal probing on tooth 21 indicates the presence of a root fracture and absence of buccal cortical bone.

2 First stage: the surgery reveals a prominent horizontal bone defect after extraction of 21. Placement of implant at 22.

3 Buccal view of guided bone reconstruction with Geistlich Bio-Oss® and Geistlich Bio-Gide® of site 21 and of the buccal deficit of the implant 22.

4 Occlusal view of Geistlich Bio-Gide® covering the bone reconstruction of site 21–22.

5 Re-entry at 8 months showing the good results of reconstruction at site 21 and integration of implant 22.

6 Implant placement at 21, use of CTG for soft tissue augmentation and impression taking of implant 22 to change the temporary restoration.

7 18-month follow-up: Situation with the final restorations.

8 Retroalveolar x-ray taken at 18-month follow-up.

Contour Augmentation in a demanding ESTHETIC situation



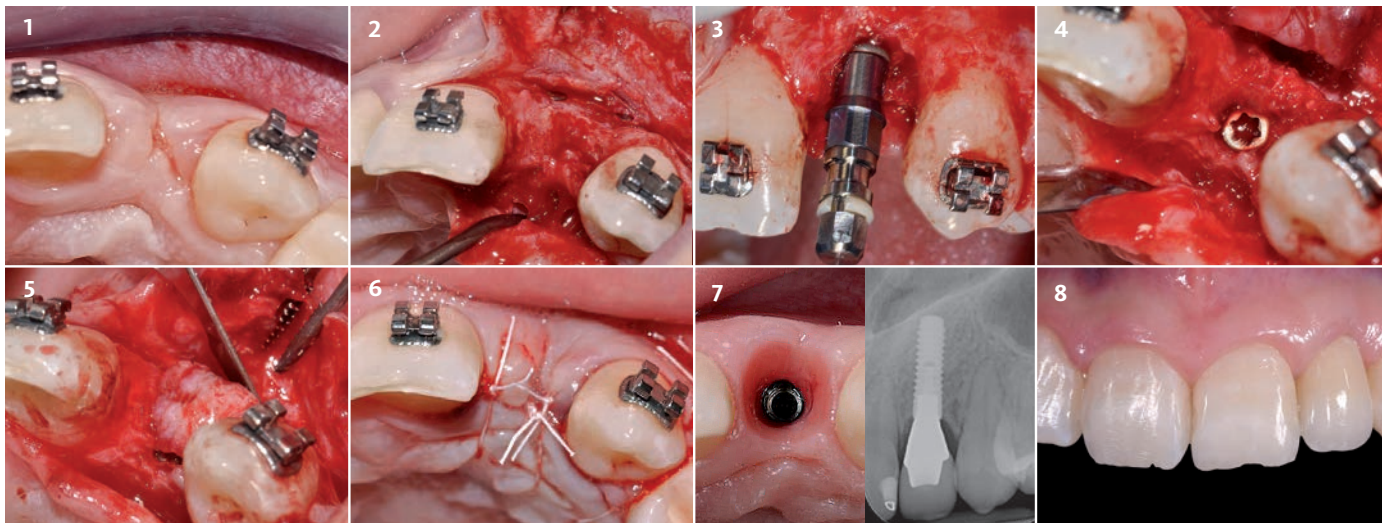
Dr. Raffaele Cavalcanti | Italy

Clinical Challenge: Replacement of a compromised upper lateral incisor (due to external root resorption) in a young woman with high expectations in an esthetically demanding area.

Conclusion: The 18-month follow-up shows a remarkable tissue stability which is very important in an esthetic area.

Aim/Approach: To achieve, after tooth extraction and residual major bone defect, regeneration of a sufficient amount of bone to place, after six months healing period, a dental implant with simultaneous bone recontouring and soft tissue graft, in order to optimize functional and esthetic result.

Defect			Region		Treatment	Additional means
● Class 0	○ Class I	○ Class II	● anterior ○ posterior	● maxilla ○ mandible	● Geistlich Bio-Oss® ○ Geistlich Bio-Gide®	● Connective Tissue Graft (CTG)



1 Three-month follow-up situation after major bone augmentation treatment with Geistlich Bio-Oss® and Geistlich Bio-Gide®.

2 Six-month follow-up situation showing the regenerated ridge in the intraoperative view.

3 The residual small bone defect after implant placement.

4 Contour augmentation using Geistlich Bio-Oss® in order to meet the high esthetic demand.

5 Simultaneous soft tissue augmentation using a connective tissue graft.

6 Immediate post-operative picture after suture placement.

7 A) Clinical picture after second surgical stage and tissue conditioning by mean of screw-retained provisional crown.

B) Radiographic picture after 18-month

8 Final clinical picture. Follow-up shows a very nice situation.

Ridge over-contour for improved anterior esthetics



Dr. Paul Rosen | USA

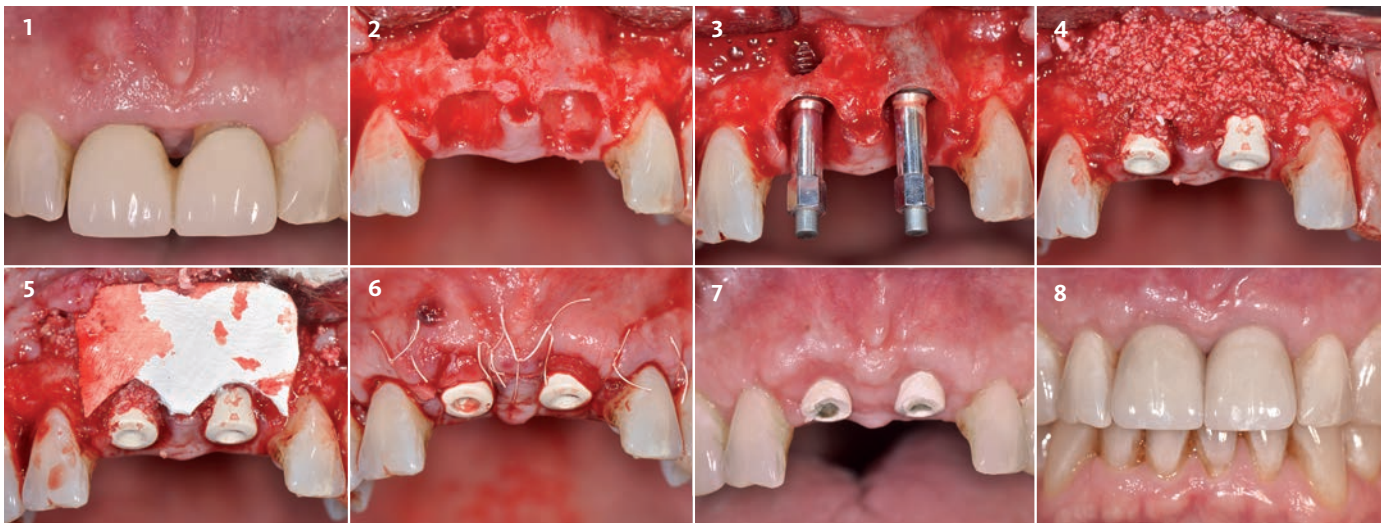
Clinical Challenge: A 49-year-old male with no contributory medical conditions presented with maxillary incisors that had undergone endodontics during his teenage years. Tooth 11 had mobility of ½ degree, no significant probing depths, but failed endodontics while tooth 21 presented with a 6 mm mesial pocket. Previous surgery to correct the apical lesion on tooth 11 and the infrabony defect on tooth 21 had failed, leaving a gingival, black triangle deformity.

Aim/Approach: Extraction and degranulation revealed fairly intact labial bony walls but a bony fenestration on tooth 11. Geistlich Bio-Oss® pen was mixed with sterile saline, and defects around the immediately placed dental implants were overfilled. Geistlich Bio-Gide® was trimmed to cover the graft-

ing area but to be slightly relieved from the implant/ healing abutment. Interrupted sutures (ePTFE) were used to coronally advance the labial gingiva from its preexisting height. The implants were stable, and radiographs revealed what appeared to be new interproximal and coronal bone.

Conclusion: A good example of how predominantly intact coronal extensions of extraction socket, buccal bony walls (despite bony dehiscences) provide an opportunity for immediate implant placement, grafting and good soft tissue healing, using Geistlich Biomaterials. Prosthetic planning and soft tissue contouring, on a solid graft foundation, can provide patients with a relatively quick solution, good function and improved anterior esthetics.

Defect	Region	Treatment	Additional means
<input checked="" type="radio"/> Class 0 <input type="radio"/> Class I <input checked="" type="radio"/> Class II	<input checked="" type="radio"/> anterior <input checked="" type="radio"/> maxilla <input type="radio"/> posterior <input type="radio"/> mandible	<input checked="" type="radio"/> Geistlich Bio-Oss® <input checked="" type="radio"/> Geistlich Bio-Gide®	<input checked="" type="radio"/> none



- 1 Preoperative view of maxillary incisors.
- 2 Degranulated extraction sockets.
- 3 Immediate implants in place. Resonance frequency analysis (RFA) was 69–70 for tooth 11 and 70–75 for tooth 21.
- 4 Geistlich Bio-Oss® Pen used to fill defects and over-contour the ridge.
- 5 Geistlich Bio-Gide® placed to cover the graft but also relieved from implant / healing abutment.
- 6 ePTFE interrupted suture used to pull gingiva labially from palate.
- 7 Good gingival healing and contouring around healing abutments.
- 8 Final crowns with good gingival contouring after 6-months postoperative. The GBR procedure provided a bone foundation for good soft tissue esthetics.

Contour Augmentation with Geistlich Bio-Oss® Collagen



Dr. Ueli Grunder | Switzerland

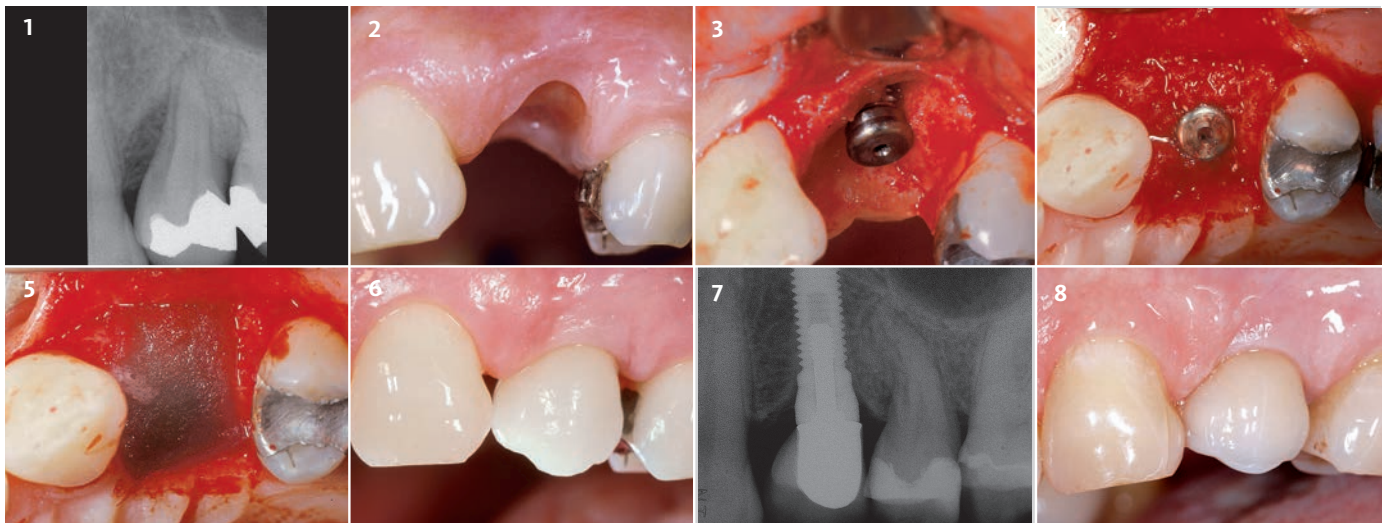
25 years follow up

Clinical Challenge: The upper premolar had to be removed due to an advanced periodontal disease and severe bone loss around the infected tooth. The bone defect was an intra-alveolar defect without dehiscence or fenestration.

Aim/Approach: An early implant placement approach – with a healing time of six weeks before implant placement – was chosen. The bone augmentation with Geistlich Bio-Oss® Collagen was conducted simultaneously with implant placement. As this patient was treated in 1991, the case is one of the very first clinical applications of Geistlich Bio-Oss® Collagen.

Conclusion: A premolar grafted with Geistlich Bio-Oss® Collagen during implant placement showed good long-term result after 25 years. Satisfactory hard and soft tissue contour are present 25 years after implantation.

Defect			Region		Treatment		Additional means
<input type="radio"/> Class 0	<input checked="" type="radio"/> Class I	<input type="radio"/> Class II	<input type="radio"/> anterior	<input checked="" type="radio"/> maxilla	<input checked="" type="radio"/> Geistlich Bio-Oss® Collagen	<input type="radio"/> Geistlich Bio-Gide®	<input checked="" type="radio"/> Collagen Fleece
			<input checked="" type="radio"/> posterior	<input type="radio"/> mandible			



- 1 Preoperative radiograph showing the severe bone defect around the tooth.
- 2 Six weeks after tooth extraction an uneventful soft-tissue healing in the post-operative phase is visible.
- 3 After flap preparation an implant was placed in a site with a severe bone defect.
- 4 In order to fill up the defect and provide volume stability Geistlich Bio-Oss® Collagen was applied.
- 5 After augmentation with Geistlich Bio-Oss® Collagen the site was covered with a collagen fleece.
- 6 Final crown restoration after 6 months post-operative.
- 7 The radiograph after 25 years shows a stable bone situation.
- 8 The clinical picture after 25 years follow-up presents a very nice and stable bone and soft tissue situation.

Contour Augmentation of an intrabony defect



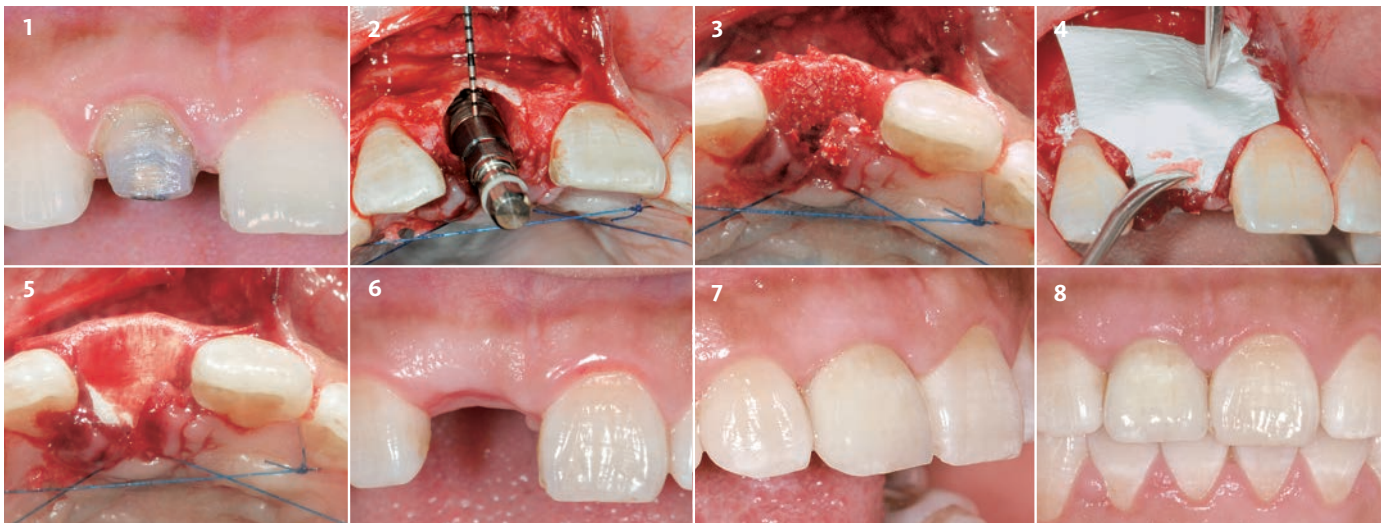
Dr. Su Yu Cheng | China

Clinical Challenge: The maxillary central incisor had to be extracted and was replaced with an implant immediately after tooth extraction. The clinical challenge in this situation is to maintain the ridge volume – which is crucial not only from a functional, but also from an esthetic point of view.

Conclusion: By using regenerative surgery, predictable esthetic outcomes were achieved for immediate implant placement in esthetic area.

Aim/Approach: The implant was placed immediately after extraction of tooth 11. To minimize bone resorption and volume loss, the space between the implant and the alveolar bone walls was filled with Geistlich Bio-Oss® and the area was covered with Geistlich Bio-Gide® membrane.

Defect	Region	Treatment	Additional means
<input type="radio"/> Class 0 <input checked="" type="radio"/> Class I <input type="radio"/> Class II	<input checked="" type="radio"/> anterior <input type="radio"/> posterior	<input checked="" type="radio"/> maxilla <input type="radio"/> mandible	<input checked="" type="radio"/> Geistlich Bio-Oss® <input checked="" type="radio"/> Geistlich Bio-Gide®

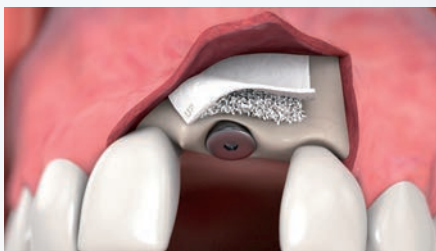


- 1 Preoperative situation, upper right central incisor, showing the soft tissue situation.
- 2 Status following implant placement. Probing at buccal alveolar wall is shown. Note the local bone defect between the implant and buccal wall.
- 3 Use of Geistlich Bio-Oss® granules in the local bone defect. Bone anatomy was improved at the same time.
- 4 Covering of the Geistlich Bio-Oss® granules with a Geistlich Bio-Gide® membrane in accordance with the GBR principle.
- 5 Occlusal view, the augmented site is protected by the membrane, extending its margins to the native bone. Flaps are prepared to obtain primary closure of the regenerated site.
- 6 Clinical situation after 6 months before restoration.
- 7 At 12 months: lateral view of the restoration. An optimal ridge contour is achieved.
- 8 Frontal view, successful esthetic outcome in the upper right central incisor site, status at the 12-month follow-up.

Treatment Decisions in Minor Bone Augmentation

Bony defect around implant

Minor Bone Augmentation is defined as a GBR at a bone defect around an implant, mainly dehiscences and apical fenestrations.



Is an implant placement TOGETHER with GBR possible?

Yes

Which class of defect exists?

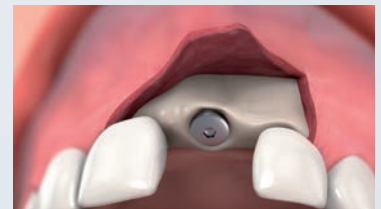
No

Was the implant placed Previously?

Defect morphology¹

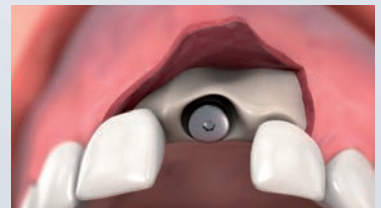
CLASS 0 DEFECT

Implant can be placed in a bony envelope, but to increase the contour of the ridge a contour augmentation is necessary. Side with a ridge contour deficit and sufficient bone volume for standard implant placement



CLASS I DEFECT

Intra-alveolar defect between the implant surface and intact bone walls (gap-grafting)



CLASS II DEFECT

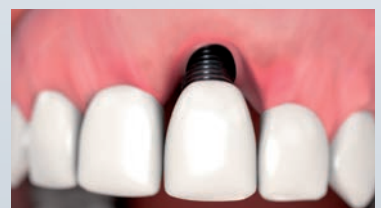
Peri-implant dehiscence, in which the volume stability of the area to be augmented is provided by the adjacent bone walls.



PERI-IMPLANT FAILURE

Yes

Peri-implant bone atrophy and soft tissue recession in the esthetic area.



No

Extraction Socket Management or Major Bone Augmentation (scan the QR-code on page 3)



Register now for THE BOX
<https://box.osteology.org/>

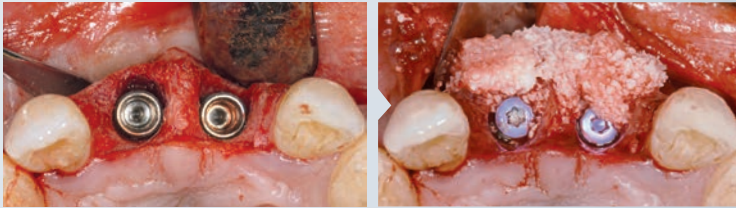


Online content: Treatment of Class 0 Defect with Geistlich Bio-Gide® Compressed and Geistlich Bio-Oss® as esthetic follow-up of a previous Major Bone Augmentation Procedure. (Dr. Luca De Stavola, Italy)

Clinical example

Recommended material

CONTOUR AUGMENTATION BUCCAL BONE

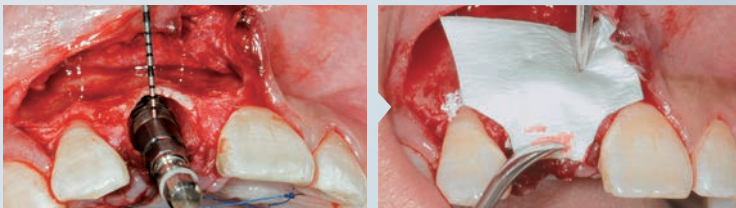


Geistlich Bio-Oss® or
Geistlich Bio-Oss® Collagen

Geistlich Bio-Gide® or
Geistlich Bio-Gide® Compressed

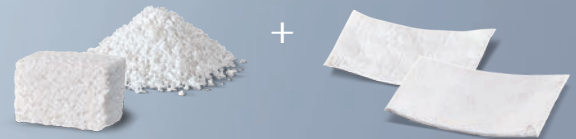


FILL-THE-GAP INTRA ALVEOLAR

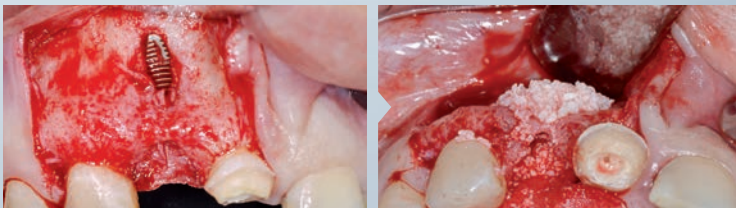


Geistlich Bio-Oss® or Geistlich
Bio-Oss® Collagen

Geistlich Bio-Gide® or
Geistlich Bio-Gide® Compressed

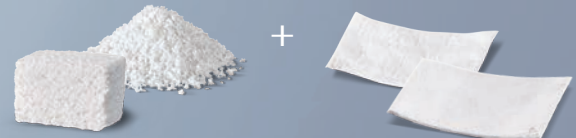


CONTOUR AUGMENTATION DEHISCENCE DEFECT / FENESTRATION DEFECT

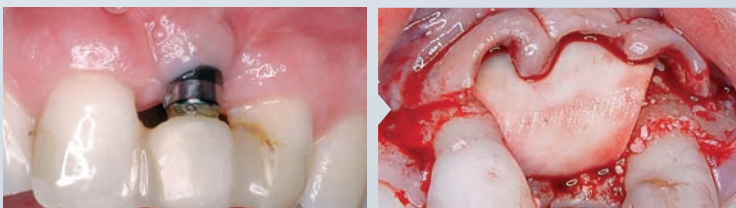


Geistlich Bio-Oss® or
Geistlich Bio-Oss® Collagen

Geistlich Bio-Gide® or
Geistlich Bio-Gide® Compressed



CONTOUR AUGMENTATION OF PERI-IMPLANT DEFECT AFTER PRIOR DECONTAMINATION OF THE IMPLANT SURFACE



Geistlich Bio-Oss® or
Geistlich Bio-Oss® Collagen

Geistlich Bio-Gide® or
Geistlich Bio-Gide® Compressed



Immediate implant placement involving thin buccal bone lamella



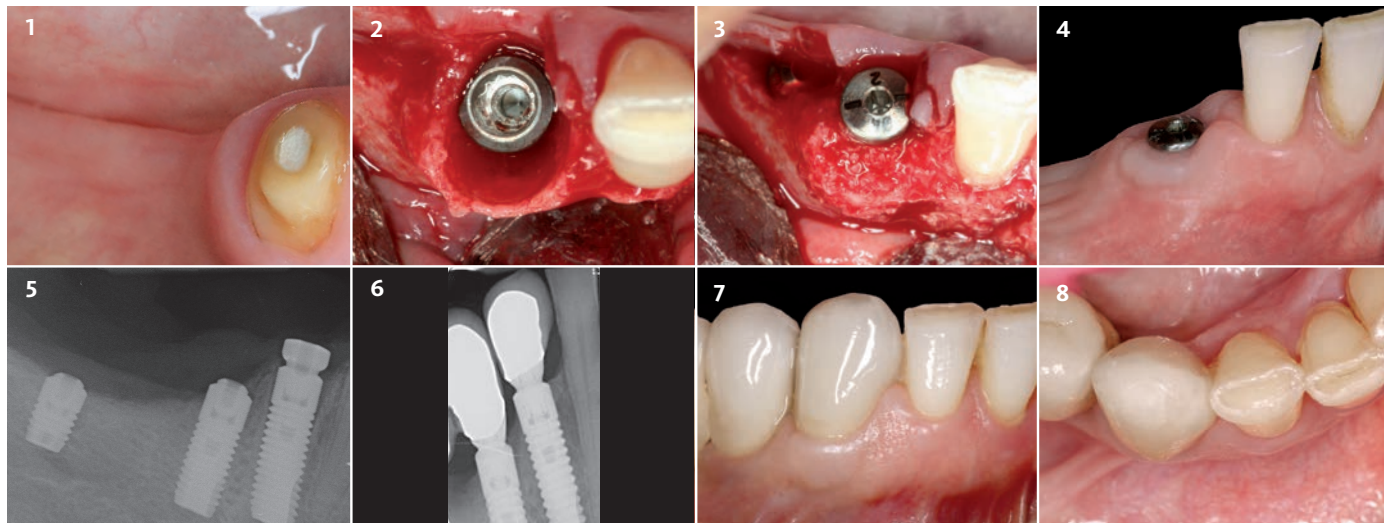
PD Dr. Dr. Markus Schlee | Germany

Clinical Challenge: The torn, perforated buccal bone lamella is very thin due to the horizontal absorption distally and the angulation of the tooth occurring as a result of the extraction.

Conclusion: Augmentation with Geistlich Bio-Oss® enabled the ridge volume and the esthetics to be preserved.

Aim/Approach: Preserving the extraction socket and alveolar ridge volume in immediate implant placement and simultaneous bone augmentation with Geistlich Bio-Oss®.

Defect	Region	Treatment	Additional means
<input type="radio"/> Class 0 <input checked="" type="radio"/> Class I <input type="radio"/> Class II	<input type="radio"/> anterior <input type="radio"/> maxilla <input checked="" type="radio"/> posterior <input checked="" type="radio"/> mandible	<input checked="" type="radio"/> Geistlich Bio-Oss® <input type="radio"/> Geistlich Bio-Gide®	<input checked="" type="radio"/> none



- | | | | |
|--|--|--|---|
| <p>1 Tooth needs to be extracted due to insufficient crown length.</p> | <p>2 The buccal bone wall is very thin due to the horizontal absorption distally and the angulation of the tooth; it is apically perforated and torn due to the extraction. The immediate implant in region 43 is aligned to the lingual bone wall.</p> | <p>3 Discongruences of shape between the socket and buccal bone lamella were augmented with Geistlich Bio-Oss®. The gingiva former tabilizes the graft.</p> | <p>4 Postoperative state following 2 weeks of healing.</p> |
| <p>5 X-ray of the implants in region 43, 44 and 46, 5 months postoperative.</p> | <p>6 X-ray picture 6 years postoperative.</p> | <p>7 Clinical situation 6 years after treatment.</p> | <p>8 The occlusal view shows the preservation of the buccal contour 6 years postoperative.</p> |

Contour Augmentation and double layer technique



Dr. Teppei Tsukiyama | Japan

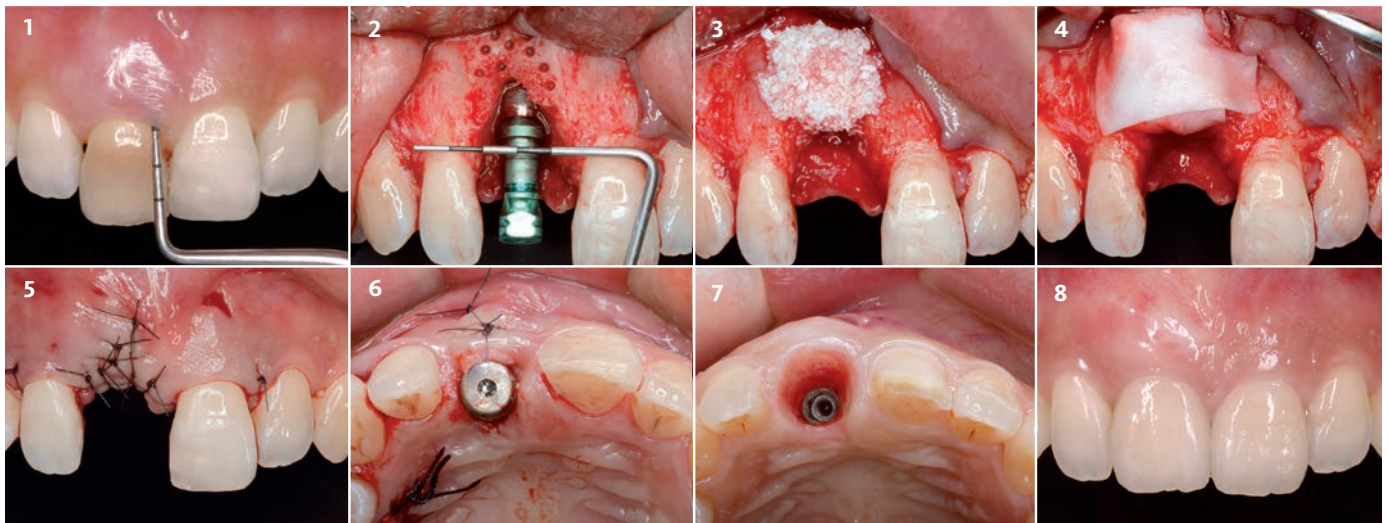
Clinical Challenge: 34 year old female complained about swollen gingiva and a loose tooth. After the atraumatic removal of tooth 11, the buccal bone was already lost due to the acute infection. A horizontal alveolar ridge reduction was observed. Soft tissue healing was uneventful 4 weeks after extraction; therefore, early implant placement together with guided bone regeneration was performed. The patients risk profile according to the ITI SAC classification is Moderate-High, which requires delicate tissue handling and meticulous restorative planning.

Aim/Approach: After correct 3D implant placement a decortication of the bone was performed. Geistlich Bio-Oss® granules were grafted over the exposed implant surface and covered with Geistlich Bio-Gide® double-layer technique. A periosteal incision was performed

to release the tension of the flaps and achieve adequate primary closure of the flaps. After 4-months uneventful healing, an incision for implant exposure was performed to uncover the implant. The patient was satisfied with the final restorations on teeth 11 and 21. The esthetic and functional result has been followed for 18 months.

Conclusion: Treatment planning for implant replacement in the esthetic zone, requires a comprehensive understanding of biology, basic biomaterial concepts, restorative concepts and delicate tissue management techniques. The surgical treatment phase has to be led by the final prosthetic desired results, proper implant positioning and hard and soft tissue management to obtain proper long-term and ideal soft tissue environment surrounding the implant restoration.

Defect	Region	Treatment	Additional means
<input type="radio"/> Class 0 <input type="radio"/> Class I <input checked="" type="radio"/> Class II	<input checked="" type="radio"/> anterior <input checked="" type="radio"/> maxilla <input type="radio"/> posterior <input type="radio"/> mandible	<input checked="" type="radio"/> Geistlich Bio-Oss® <input checked="" type="radio"/> Geistlich Bio-Gide®	<input checked="" type="radio"/> Connective Tissue Graft (CTG)



1 Preoperative frontal view. Extraction of tooth 11 due to the acute apical periodontitis and vertical root fracture. After 8 weeks of uneventfully soft tissue healing a significant horizontal volume reduction of the alveolar ridge is present.

2 Despite the ridge deficiency, it was possible to stabilize the implant in the apical bone. Implant fixture was placed on a correct 3D position based on the future restorative margin of tooth 11.

3 Geistlich Bio-Oss® was grafted over the implant to correct the horizontal bony defect.

4 Geistlich Bio-Gide® was placed using a double-layer technique to exclude the soft tissue invagination and allow for bone formation.

5 Horizontal mattress suture and simple interrupted sutures were performed after releasing incision allowing tension free primary closure.

6 After a punch incision to uncover the implant, a pouch technique was utilized to create the space for connective tissue insertion. A healing abutment was placed into the fixture.

7 Tooth 21 was prepared for a ceramic veneer in order to match the symmetry with tooth 11. A customized Impression was placed on implant 11. Adequate amount of peri-implant tissue can be observed.

8 A natural esthetic outcome was achieved as shown after months following the insertion of the final restorations. The horizontal defect was corrected with the use of Geistlich Bio-Oss® and Geistlich Bio-Gide®.

Contour Augmentation AFTER soft tissue punch



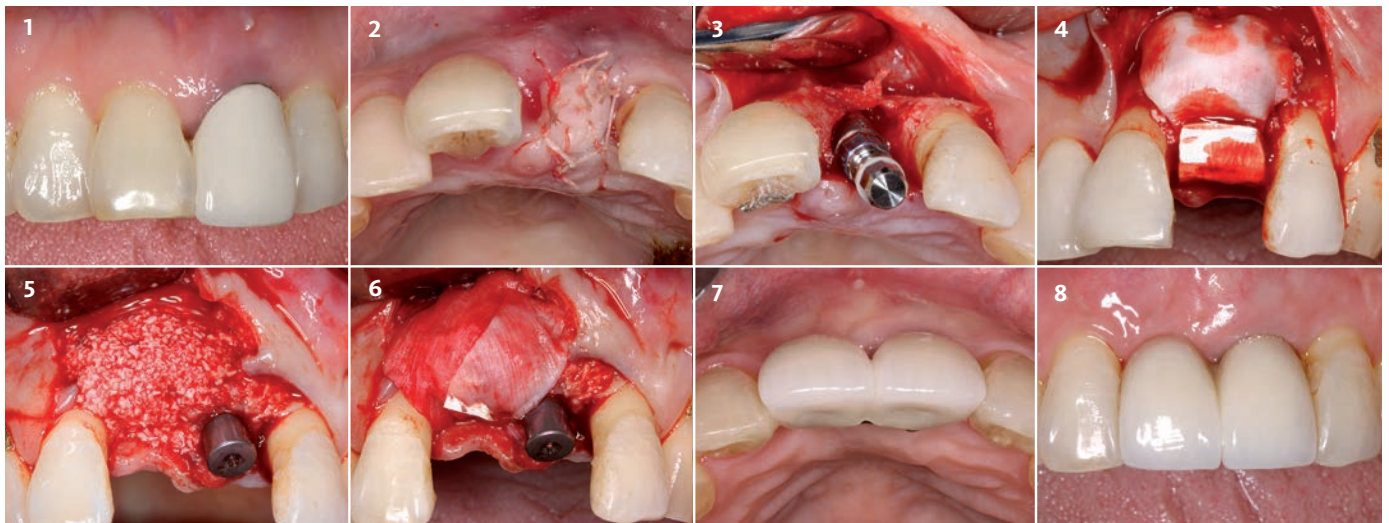
Prof. Ui-Won Jung | South Korea

Clinical Challenge: Restoration of anterior area is intimately concerned with esthetic aspect as well as functional aspects. When incisors are extracted due to periodontal or endodontic problems, the labial wall of the sockets frequently partially or completely resorb. This results in loss of bone tissue volume, also negatively affecting soft tissue contour. Moreover, following extraction, often thin mucosa can be observed in the extraction site.

Conclusion: Successful and esthetic outcome has been obtained showing augmentation of edentulous ridge volume on the maxillary incisor area.

Aim/Approach: The soft tissue punch technique was used immediately following maxillary incisor extraction. After 3 months, the implant was placed with the GBR using a Geistlich Bio-Oss® and Geistlich Bio-Gide®.

Defect		Region		Treatment	Additional means
<input type="radio"/> Class 0	<input type="radio"/> Class I	<input checked="" type="radio"/> Class II	<input checked="" type="radio"/> anterior <input type="radio"/> posterior	<input checked="" type="radio"/> maxilla <input type="radio"/> mandible	<input checked="" type="radio"/> Geistlich Bio-Oss® <input checked="" type="radio"/> Geistlich Bio-Gide®



- 1 Inflamed labial gingiva due to root fracture of the left maxillary central incisor.
- 2 Soft tissue punch technique from palatal donor site (diameter 6 mm).
- 3 Implant placement 3 months after healing.
- 4 Placing Geistlich Bio-Oss® on labial bone defect and covering Geistlich Bio-Gide® over bone graft material.
- 5 6 month after implantation and GBR on the left maxillary central incisor area. The right maxillary central incisor was extracted due to trauma. The defect was augmented with Geistlich Bio-Oss®.
- 6 Placing Geistlich Bio-Gide® over Geistlich Bio-Oss®.
- 7 1.5-year follow-up (occlusal view).
- 8 3-year follow-up (facial view).

Treatment of a fenestration defect with GBR and CT Graft



Dr. João Batista César Neto, Dr. Roberto Zangirolami*, Dr. Ricardo Takiy Sekiguchi* | Brazil

Clinical Challenge: Replacement of tooth 12 with predictable procedures, comfortable to the patient and, achieving good esthetic results.

Aim/Approach: Implant placement simultaneously to GBR was adopted due to the possibility of placing an implant in a prosthetic driven position with primary stability.

Conclusion: A careful clinical and CBCT examination may identify situations in which the simultaneous approach is favorable. Such an approach may reduce the treatment time and number of surgical procedures.

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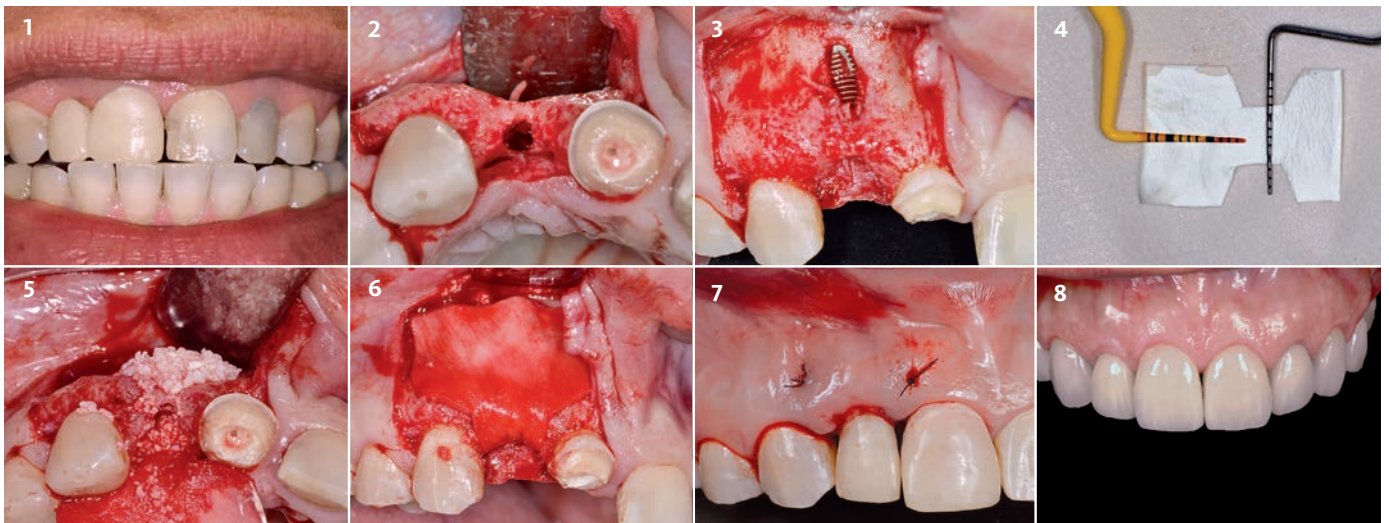


Movie to the present case



Another example of treatment

Defect	Region	Treatment	Additional means
<input type="radio"/> Class 0 <input type="radio"/> Class I <input checked="" type="radio"/> Class II	<input checked="" type="radio"/> anterior <input type="radio"/> posterior <input checked="" type="radio"/> maxilla <input type="radio"/> mandible	<input checked="" type="radio"/> Geistlich Bio-Oss® <input checked="" type="radio"/> Geistlich Bio-Gide®	<input checked="" type="radio"/> Connective Tissue Graft (CTG)



1 Preoperative buccal view of the intended treatment area. The right lateral incisor is absent and a provisional restoration is replacing it.

2 Implant site preparation: occlusal view of the perforation showing a favorable prosthetic position.

3 Implant in place showing a fenestration with apical implant threads exposed.

4 Geistlich Bio-Gide® trimmed according to the anatomy of bone defect.

5 Note that the palatal bone was thin. Then, Geistlich Bio-Oss® was placed both on top of buccal exposed threads and on palatal region. Geistlich Bio-Gide® was initially placed in palatal region and prepared to cover buccal defect.

6 Geistlich Bio-Gide® positioned on buccal defect to act as a barrier and favor bone formation on the exposed threads.

7 Nine-months after implant placement: a connective tissue graft was used to improve soft tissue volume.

8 Final restoration 21 months after implant placement associated with GBR.

*In collaboration with Dr. Roberto Zangirolami (Restorative Dentistry) and Dr. Ricardo Takiy Sekiguchi (Crown Lengthening Procedure)

Single implant placement with GBR



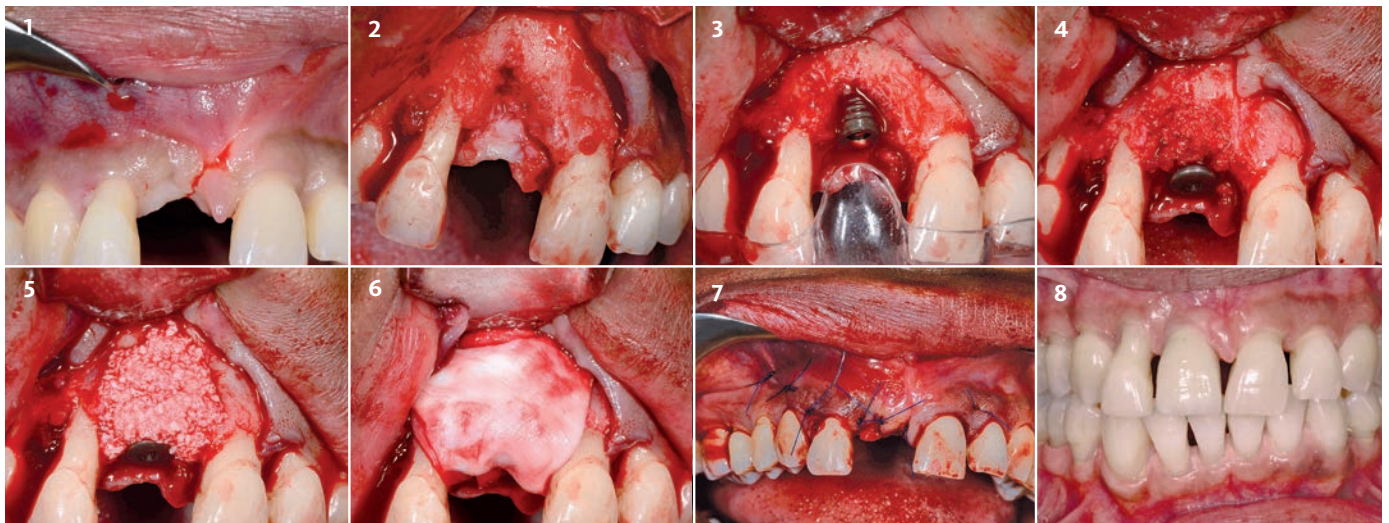
Dr. Colin Campbell | UK

Clinical Challenge: Patient presented following extensive periodontal treatment within our practice. Periodontist seeking to replace tooth 11 with fixed restoration. The patient was keen to retain as many teeth as possible and although prognosis of tooth 12 was questionable, it was agreed to provide a single implant replacement with GBR and attempt long term maintenance of tooth 21.

Conclusion: Even in an extremely difficult esthetic case including horizontal and vertical bone and tissue loss with associated recession (teeth 12 and 21), this procedure allows a predictable outcome which is acceptable for the patient and gives good long term chances of success.

Aim/Approach: Type 2 implant placement tooth 11 with autologous bone and Geistlich Geistlich Bio-Oss® and Geistlich Bio-Gide® GBR procedure to provide stable mucosal result around implant restoration for the long term.

Defect		Region		Treatment		Additional means	
<input type="radio"/> Class 0	<input type="radio"/> Class I	<input checked="" type="radio"/> Class II	<input checked="" type="radio"/> anterior <input type="radio"/> posterior	<input checked="" type="radio"/> maxilla <input type="radio"/> mandible	<input checked="" type="radio"/> Geistlich Bio-Oss® <input checked="" type="radio"/> Geistlich Bio-Gide®	<input checked="" type="radio"/> Autologous Bone Chips	



- Image of area to be treated immediately following local anaesthetic administration. Note pre-existing recession of tooth 12 and early recession of tooth 21.
- Retraction of flap shows considerable bone loss associated with tooth 12 and early bone loss associated with tooth 21. Vertical and horizontal defects associated with 11 implant site also clearly visible.
- Additional picture with surgical guide in position demonstrating correct vertical position of implant.
- Implant placed with cover screw in position. Autologous bone chips applied which were harvested locally.
- Geistlich Bio-Oss® granules applied over autologous bone to act as slow substituting filler to provide stability to graft volume.
- Double layer Geistlich Bio-Gide® application to protect graft during healing.
- View immediately postoperatively following application of sutures.
- Photograph of patient at 2-year follow-up with stable gingival position.

Treatment of fenestration and of periapical bone defect



Dr. Marlene Teo | Singapore

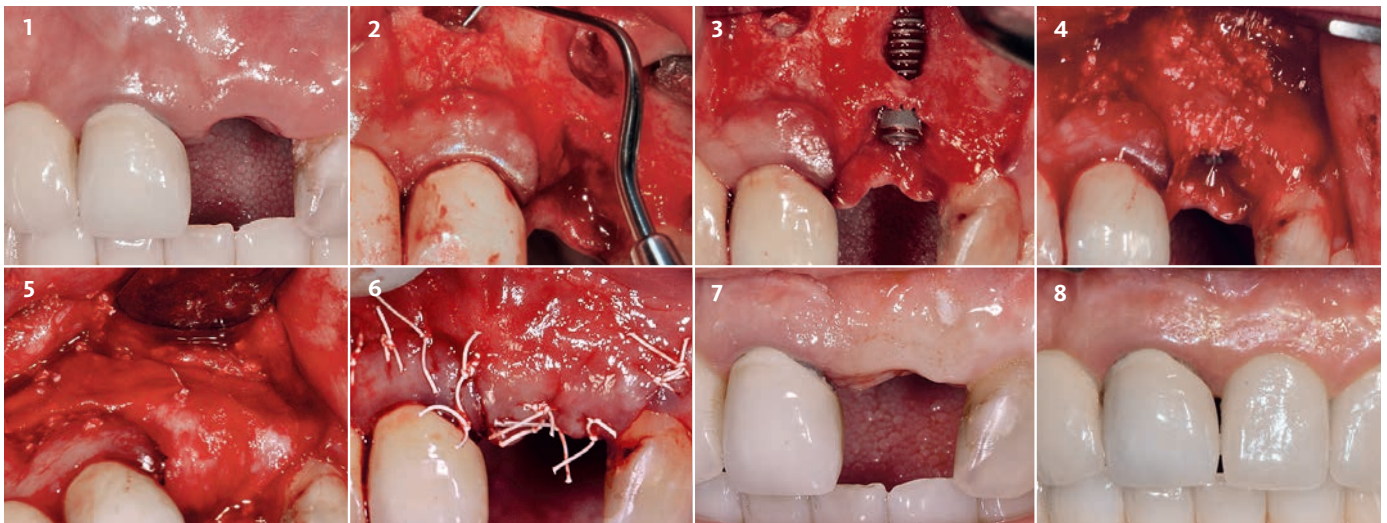
Clinical Challenge: The CT scan showed barely sufficient bone to achieve an implant stability. The patient was suggested a bridge spanning tooth 11 to tooth 22, but did not like the idea of having three frontal teeth linked together. Furthermore, there was a recurring abscess at tooth 11 due to an unresolved PA lesion. Root canal treatment on tooth 11 was done 3 years prior to the consultation at our clinic. Tooth 11 would not have served as a proper bridge abutment without treating the recurrent periodical abscess.

Aim/Approach: This case required a multidisciplinary approach. Our endodontist suggested an apisection procedure instead of retreatment for tooth 11 as the crown was intact

and the root canal fill looked dense. Hence, we decided to raise a flap to see if we could augment the bone at tooth 21 and place an implant on the day of the apisection surgery. If the implant could be stabilized at the time of surgery, the implant could be used as a tenting screw to support bone regeneration around the implant.

Conclusion: Treatment successfully cleared off the recurrent infection at tooth 11 with an apisection procedure. Stable implant placement at tooth 21 in a thin buccal piece of native bone. Regeneration of bone in both regions with good clinical results using Geistlich Bio-Oss® and Geistlich Bio-Gide®.

Defect		Region		Treatment	Additional means
<input type="radio"/> Class 0	<input type="radio"/> Class I	<input checked="" type="radio"/> Class II	<input checked="" type="radio"/> anterior <input type="radio"/> posterior	<input checked="" type="radio"/> maxilla <input type="radio"/> mandible	<input checked="" type="radio"/> Geistlich Bio-Oss® <input checked="" type="radio"/> Geistlich Bio-Gide®



1 Tooth 21 was extracted 2 months ago. Tooth 11 has recurrent periapical infections.

2 An apisection was done and the root tip was retro-filled with mineral trioxide aggregate (MTA).

3 The buccal view showing exposure of the implant threads with good primary stability.

4 The buccal defects in regions 11 and 21 were filled with Geistlich Bio-Oss® particles.

5 The augmentation was covered with Geistlich Bio-Gide®.

6 The site was sutured with non-resorbable sutures.

7 Follow-up picture 4 months postoperative.

8 Implant crown at region 21 and a crown at tooth 22 after 20-month follow-up situation.

Treatment of a dehiscence defect



Prof. Saso Ivanovski | Australia

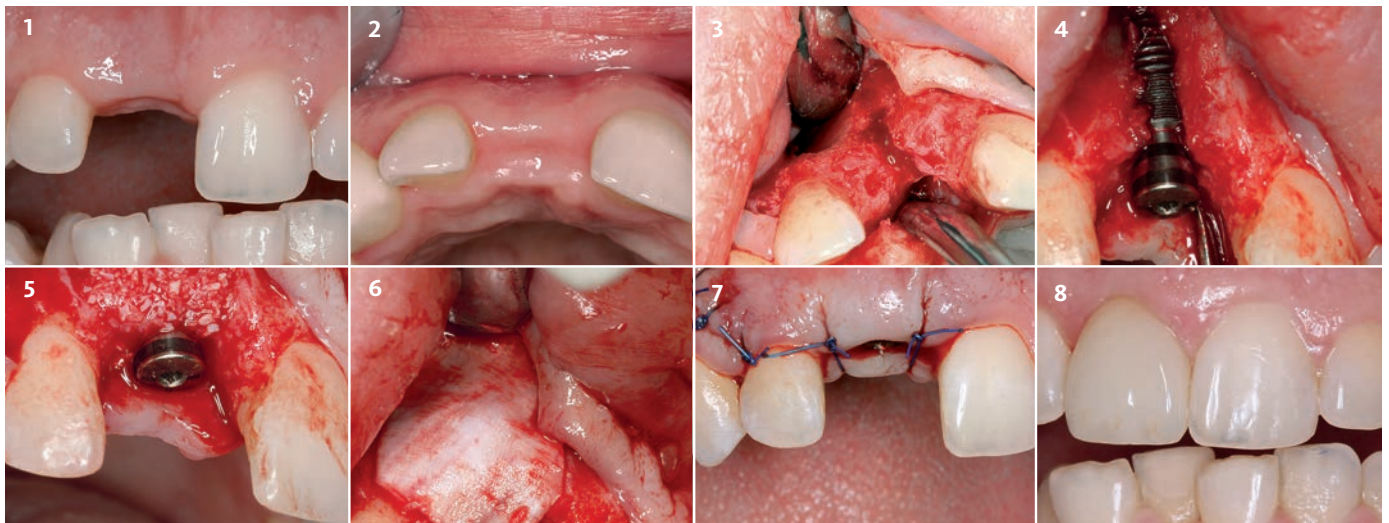
Clinical Challenge: Patient presented with a fractured maxillary right central incisor which had been restored with a post and core following endodontic treatment. Following the extraction of the tooth, implant placement was planned after a healing period of 8 weeks. A large buccal dehiscence was observed after accessing the site for implant placement.

Aim/Approach: A large dehiscence defect was seen in the buccal wall. After implant placement, most of the threads were exposed due to the dehiscence defect. Geistlich Bio-Oss® particles were used to cover the implant threads and augment the site to the original contour of the buccal bone.

The bone graft was then covered with a Geistlich Bio-Gide® membrane and flap closure was carried out with 4/0 non-resorbable sutures. A healing abutment was used and a semi-submerged protocol was employed.

Conclusion: Successful rehabilitation of a large buccal dehiscence defect in the anterior maxilla was carried out with simultaneous guided bone regeneration using Geistlich Bio-Oss® and Geistlich Bio-Gide®.

Defect	Region	Treatment	Additional means
<input type="radio"/> Class 0 <input type="radio"/> Class I <input checked="" type="radio"/> Class II	<input checked="" type="radio"/> anterior <input type="radio"/> posterior <input checked="" type="radio"/> maxilla <input type="radio"/> mandible	<input checked="" type="radio"/> Geistlich Bio-Oss® <input checked="" type="radio"/> Geistlich Bio-Gide®	<input checked="" type="radio"/> none



- | | | | |
|--|---|---|--|
| <p>1 Frontal view of the right central incisor which had to be extracted after fracture and previous endodontic treatment. Extraction socket was left for spontaneous healing and implant placement was planned 8 weeks after extraction.</p> | <p>2 Occlusal view of the healed extraction socket 8 weeks after extraction.</p> | <p>3 Occlusal view of a full mucoperiosteal flap raised with a vertical releasing incision at the distal of the adjacent lateral incisor. A large dehiscence defect was apparent in the buccal wall.</p> | <p>4 Frontal view after implant placement according to the manufacturer's instructions. After placement, most of the implant threads were exposed due to the dehiscence defect.</p> |
| <p>5 Frontal view of the crest using Geistlich Bio-Oss® to cover the implant threads and augment the site to the original contour of the buccal bone.</p> | <p>6 The bone graft was then covered with a Geistlich Bio-Gide® membrane.</p> | <p>7 Frontal view of the flap closure carried out with 4/0 non-resorbable sutures. A healing abutment was used and a semi-submerged protocol was employed.</p> | <p>8 Postoperative, 1-year follow-up situation after implant placement.</p> |

Horizontal/Vertical defect (1-tooth-gap) in the anterior maxilla



Dr. Paolo Casentini | Italy

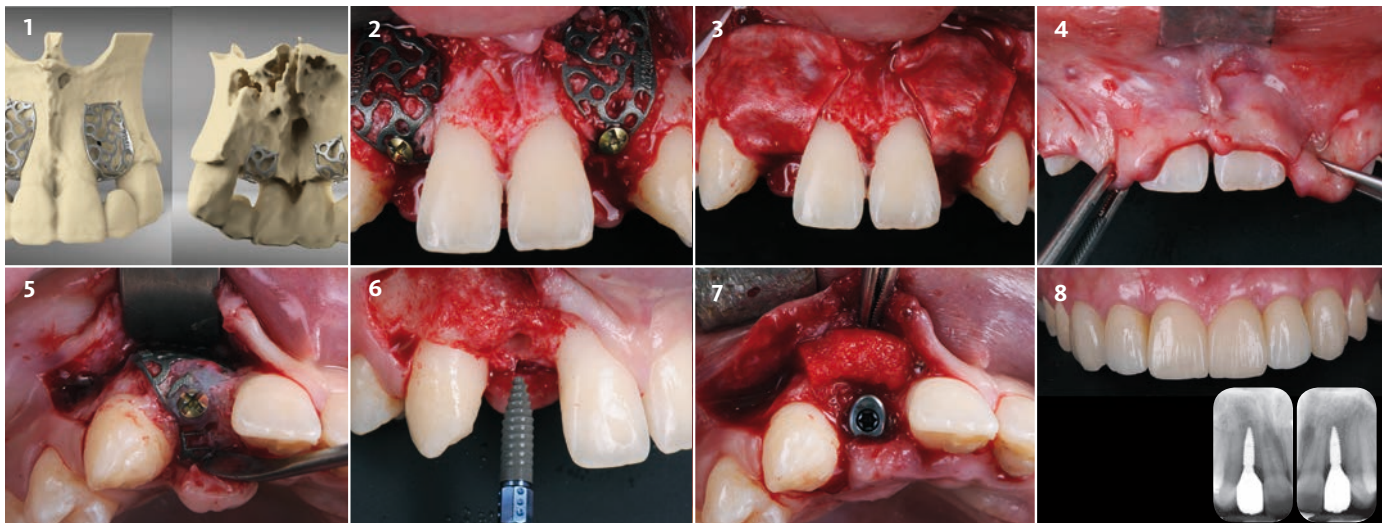
Clinical Challenge: The patient had initially a clinical situation with an adhesive Maryland prosthesis and vertical / horizontal bone defect. To perform a Prosthetically Guided Regeneration (PGR) concept, bone augmentation is required for a proper implant position. Non-resorbable membranes are challenging to adapt and increase the surgery time. That's why customized bone regeneration (CBR[®]) was considered as part of the digital planning.

The Yxoss CBR[®] was filled outside of the patient mouth with 50% of Geistlich Bio-Oss[®] and 50% of autologous bone chips (removed intra-orally with safescraper). Only 1 screw per site was necessary due to the perfect fitting of the Yxoss CBR[®]. Geistlich Bio-Gide[®] optimize the barrier effect and support better soft tissue healing. After 7 months, bone was regenerated and soft tissue thickness increased with Geistlich Fibro-Gide[®].

Aim/Approach: The digital plan using the prosthesis as the guidance for the bone volume was performed. Before the surgery it was possible to visualize the ideal bone regeneration volume required. During the surgery, proper soft tissue releasing is the key to create sufficient space for the entire regenerative biomaterials.

Conclusion: Customized bone regenerations leads to less surgery time due to lack of manual membrane adaptations during the surgery. PGR concept combined with predictable biomaterials completely restore the bone / soft tissue environment, increasing patient's quality of life.

Defect		Region		Treatment		Additional means	
<input type="radio"/> Class 0	<input type="radio"/> Class I	<input checked="" type="radio"/> Class II	<input checked="" type="radio"/> anterior <input type="radio"/> posterior	<input checked="" type="radio"/> maxilla <input type="radio"/> mandible	<input checked="" type="radio"/> Geistlich Bio-Oss [®] <input checked="" type="radio"/> Geistlich Bio-Gide [®]	<input checked="" type="radio"/> Autologous Bone Chips	



- Digital planning including customized bone regeneration – Yxoss CBR[®].
- Application of the 2 Yxoss CBR[®] and fixation with ostosynthesis screws. The defects were treated with autologous particulate bone grafting mixed with Geistlich Bio-Oss[®] in a 50% ratio.
- Positioning of two Geistlich Bio-Gide[®] on top of Yxoss CBR[®] to optimize the barrier effect.
- Flap mobilization is a fundamental element in any technique of bone volume augmentation.
- 7 months post-surgery, a favorable bone augmentation could be achieved...
- ...followed by implant a prosthetically guided implant placement (Straumann[®] BLT 2.9 x 10 mm)
- At time of implant placement, Geistlich Fibro-Gide[®] was used to augment the soft-tissue volume of the peri-implant soft-tissues.
- 1 year clinical and radiographic follow-up of the final prosthetic reconstruction demonstrates a successful integration of the restorations into the surrounding tissues.

Recommended material combinations

	Class 0 Defect	Class I Defect	Class II Defect	Peri-implant failure
BONE REPLACEMENT MATERIALS				
Geistlich Bio-Oss® Granules 0.25–1 mm 0.25 g ~ 0.5 cm ³				
Geistlich Bio-Oss® Granules 0.25–1 mm 0.5 g ~ 1.0 cm ³				
Geistlich Bio-Oss Pen® Granules 0.25–1 mm 0.25 g ~ 0.5 cm ³				
Geistlich Bio-Oss Pen® Granules 0.25–1 mm 0.5 g ~ 1.0 cm ³				
Geistlich Bio-Oss® Collagen 100 mg (5.0 × 5.0 × 7.0 mm)				
MEMBRANES				
Geistlich Bio-Gide® 13 × 25 mm 25 × 25 mm 30 × 40 mm				
Geistlich Bio-Gide® Compressed 13 × 25 mm 20 × 30 mm				
COMBI				
Geistlich Combi-Kit Collagen Geistlich Bio-Oss® Collagen 100 mg + Geistlich Bio-Gide® 16 × 22 mm				

* Product availability may vary from country to country

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- Schwarz F et al. Clin Oral Implants Res. 2014 Sept;25(9):1010–5. (Clinical study)
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- Data on File. Geistlich Pharma AG, Wolhusen, Switzerland. (Non-clinical)

Product Range

Geistlich Bio-Oss®



Small granules (0.25–1 mm) | Quantities: 0.25 g, 0.5 g, 1.0 g, 2.0 g (1 g ~ 2.05 cm³)
Large granules (1–2 mm) | Quantities: 0.5 g, 1.0 g, 2.0 g (1 g ~ 3.13 cm³)

The small Geistlich Bio-Oss® granules are recommended for smaller 1–2 socket defects and for contouring autologous block grafts. The large Geistlich Bio-Oss® granules enable improved regeneration over large distances and provide enough space for the in-growing bone.

Geistlich Bio-Oss® Collagen



Geistlich Bio-Oss® (small granules) + 10% collagen (porcine)
Sizes: 50 mg (2.5 x 5.0 x 7.5 mm), 100 mg (5.0 x 5.0 x 7.0 mm), 250 mg (7.0 x 7.0 x 7.0 mm), 500 mg (10.0 x 10.0 x 7.0 mm)

Geistlich Bio-Oss® Collagen is indicated for use in periodontal defects and extraction sockets. Through the addition of collagen, Geistlich Bio-Oss® Collagen can be tailored to the morphology of the defect and is particularly easy to apply.

Geistlich Bio-Oss Pen®



Small granules (0.25–1 mm) | Quantities: 0.25 g ~ 0.5 cm³, 0.5 g ~ 1.0 cm³
Large granules (1–2 mm) | Quantity: 0.5 g ~ 1.5 cm³

Geistlich Bio-Oss® granules are available in an applicator. It allows the bone substitute material to be applied more precisely to the surgical site. Geistlich Bio-Oss Pen® is available with either the small granules or the large granules.

Geistlich Bio-Gide®



Bilayer collagen membrane
Sizes: 13 x 25 mm, 25 x 25 mm, 30 x 40 mm

Geistlich Bio-Gide® stabilizes the grafted area and protects bone particles from dislocation for optimal bone regeneration.²⁶ The natural collagen structure allows homogeneous vascularization, supports tissue integration and wound stabilization.²¹ The combination of flexibility, good adhesion, and tear resistance contribute to easy handling, in turn saving time, and simplifying the surgical procedure.²⁷

Geistlich Bio-Gide® Compressed



Bilayer collagen membrane
Sizes: 13 x 25 mm, 20 x 30 mm

Geistlich Bio-Gide® Compressed is the product twin to Geistlich Bio-Gide® with firmer properties compared to its twin.²⁵ The natural collagen structure protects allows homogeneous vascularization, supports tissue integration and wound stabilization.²¹ Geistlich Bio-Gide® easier to cut and firmer in touch.²⁷

Geistlich Combi-Kit Collagen



Geistlich Bio-Oss® Collagen 100 mg
+ Geistlich Bio-Gide® 16 x 22 mm

When used in combination, the system has optimized properties for ridge preservation and minor bone augmentation according to the GBR principle.



More details about our
distribution partners:
www.geistlich-biomaterials.com

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