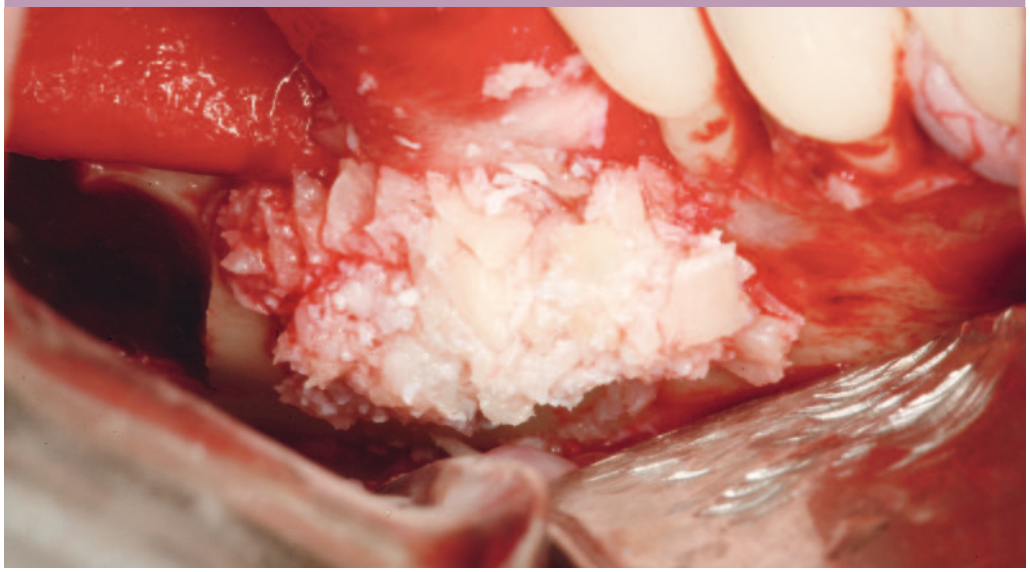
Horizontal Augmentation



Treatment concept of Dr. Istvan Urban, Loma Linda University, USA

- Horizontal ridge augmentation utilising the resorbable Geistlich Bio-Gide® membrane and a combination of particulated autogenous bone with Geistlich Bio-Oss®
- Demonstration and explanation of the „sausage technique“:
  The Geistlich Bio-Gide® membrane stabilises the bone graft particles and acts as an immovable „sausage skin“

1. Indication profile

Region	☐ aesthetic region	☒ non-aesthetic region
	☐ single tooth gap	☐ multiple tooth gap
Bony situation	☒ bone defect present	☐ no bone defect present
Soft tissue situation	☐ recession	☐ no recession
	☐ inflamed	☐ infected
	☐ thick biotype	☐ thin biotype
	☒ primary wound closure possible	☐ primary wound closure not possible
	☐ intact papillae	☐ impaired, missing papillae
	☐ adequate keratinised mucosa	☐ inadequate keratinised mucosa
	☒ uneventful	
Implantation	☐ simultaneously with bone augmentation (1 step)	☒ successively to bone augmentation (2 steps)

Background information

Dr. Istvan Urban:
Augmentation utilizing guided bone regeneration (GBR) has become a major treatment option to provide optimal bone support for osseointegrated dental implants.[1,2] The so called "knife-edge" ridges, or Cawood and Howell Class IV edentulous jaw present a unique problem for horizontal augmentation. The necessary height of the ridge is adequate, but the width is insufficient making implant placement often impossible without prior treatment. Clinical studies utilising GBR for the treatment of knife-edge ridges used both non-resorbable and resorbable membranes.[1, 3, 5] Resorbable membranes have shown better soft tissue compatibility, compared to non-resorbable membranes.[4] In a recent prospective case series of twenty-two patients, with twenty-five ridges, horizontal ridge augmentation was performed utilizing a slowly resorbable membrane and either autogenous particlulated bone alone, or autogenous particulated bone mixed with Geistlich Bio-Oss® (1:1 ratio). A mean 5.5mm bone width gain was achieved. Clinically, the Geistlich Bio-Oss® particles showed good incorporation within the newly formed ridge.[5] This was supported by the available histology of the augmentation area showing that the Geistlich Bio-Oss® was connected by a dense network of newly formed bone. In experimental studies, native collagen membranes showed excellent biocompatibility and demonstrated equivalent level of bone formation in dehiscence type defects when compared to non-resorbable and slowly resorbable membranes.[6,7] This may indicate that there is no need for the use of a slowly resorbable membrane in horizontal ridge augmentation. To examine this hypothesis, the slowly resorbable membrane study was recently repeated in a prospective study using the same grafting materials and a native collagen, resorbable, Geistlich Bio-Gide® membrane. The results of this case series were excellent and a representative case of this is shown here. The use of particulated bone grafting materials and resorbable membranes to treat knife-edge defects with horizontal augmentation may lead to less morbidity in the treatment of patients with these defects. In addition, the use of Geistlich Bio-Oss® in these procedures may lessen the need of harvested autogenous bone and may generally lead to decreased morbidity, increased patient comfort and satisfaction associated with these regenerative procedures. The absence of major complications in any of the harvest sites in the case series supports the potential benefit of Geistlich Bio-Oss® for use in these types of procedures.[5]

Sausage technique:
The sausage technique describes the membrane stabilization of the bone graft particles while acting as an immobilising „skin" in the early weeks of bone healing.
Non-resorbable, titanium reinforced e-PTFE membranes are still regarded as the gold standard in GBR, however frequently reported soft tissue problems, as well as the need to remove the membrane, have supported the development and use of resorbable membranes. The sausage technique utilises a native collagen, resorbable membrane to completely immobilise and protect a particulated bone graft for the initial weeks of graft maturation. The lack of a titanium reinforced resorbable membrane can be overcome by secure fixation of the membrane on both the lingual/palatal and the vestibular side. This technique immobilises the graft material, allowing for the formation of the desired amount of bone.

Medication:
The patient was premedicated with amoxicillin 2 g one hour before surgery and 500 mg penicillin three times a day for one week following the surgery.

2. Aims of the therapy

› The aim of this therapy is to predictably develop optimal bone width for dental implant placement with a technique which has minimal morbidity and more patient satisfaction.

3. Surgical procedure

Fig. 1 Occlusal view of severely atrophied posterior mandibular ridge.

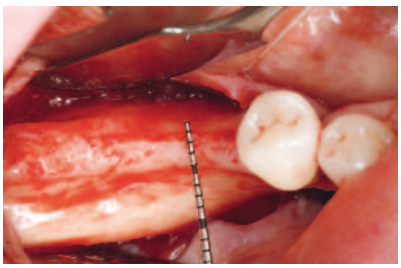


Fig. 2 Occlusal view of the thin posterior mandibular ridge. A full thickness, mid-crestal incision is used in the keratinised gingiva. For surgical access, the two divergent vertical incisions are placed, one at the mesio-buccal line angle of the first premolar and an oblique vertical incision was created at the most distal aspect of the crestal incision.

Fig. 3 The recipient bone bed is prepared with multiple decortication holes and autogenous bone is harvested from the external oblique ridge using half of a 4 mm trephine.

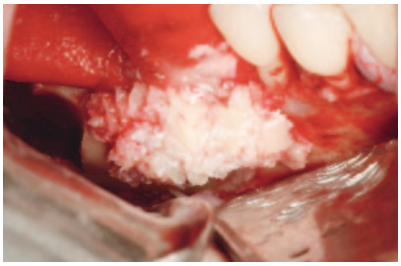


Fig. 4 Buccal view after application of a 1:1 mixture of autogenous particulated bone and Geistlich Bio-Oss® granules. Note that the Geistlich Bio-Gide® membrane is secured on the crest before the application of the graft.

Fig. 5a Buccal view of a single Geistlich Bio-Gide® membrane, which is fixed with titanium pins. The pins are 1mm diameter, which are stable in the cortical bone of the mandible. Note that the fixated membrane completely immobilises the bone graft creating the sausage skin effect.

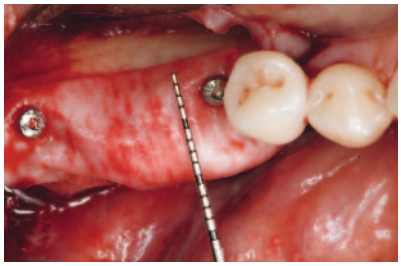


Fig. 5b Occlusal view.

Fig. 6 A periosteal releasing incision is made connecting the two vertical incisions until enough elasticity is achieved. The flap is then sutured in two layers. The first layer is closed with horizontal mattress sutures placed 4 mm from the incision line and than single interrupted sutures are used to close the edges of the flap.

Fig. 7 Buccal view of the soft tissues at three weeks of uneventful healing.

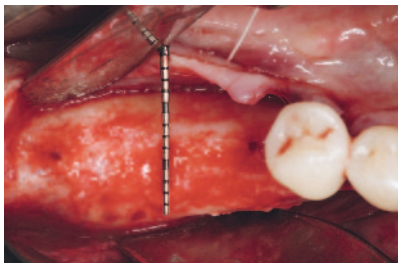


Fig. 8 Occlusal view of the newly formed ridge at re-entry after 7 months.

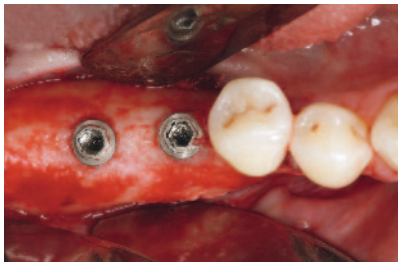


Fig. 9 Two implants were placed with good primary stability. Note the excellent incorporation of the Geistlich Bio-Oss® with the autograft.

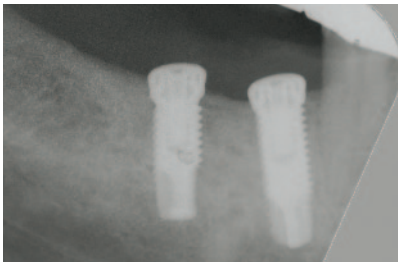


Fig. 10 Periapical radiograph at implant placement.

Fig. 11 Final outcome 2 years after implant loading.

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Literature

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7 Schwarz F, Rothamel D, Herten M, Wüstefeld M, Sager M, Ferrari D, Becker J. Immunohistochemical characterization of guided bone regeneration at a dehiscence-type defect using different barrier membranes: An experimental study in dogs. Clin Oral Implants Res. 2008;19(4):402-15.

Suppliers

Anti-inflammatory medication: 50 mg diclofenac, Cataflam®, Novartis Pharmaceuticals

Local anesthetic: Artican-hidrochloride with adrenaline 1/100,000

Suture material (ePTFE): GORE-TEX® CV-5 Suture, W.L. Gore & Associates, Inc.

Implant: Brånemark System®, Nobel Biocare

Fixation pins: Master-Pin System, Meisinger

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