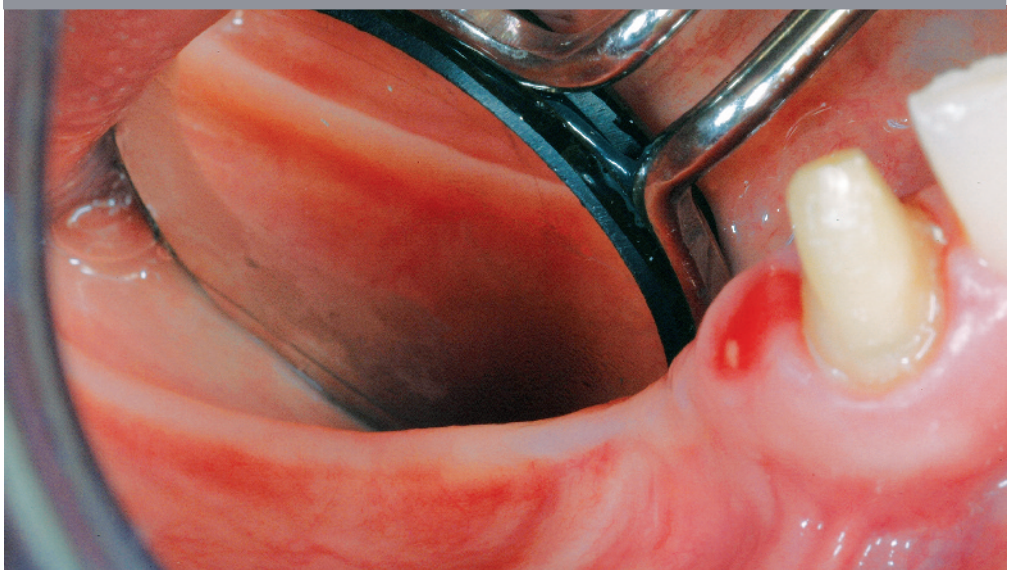
Vertical Augmentation



Treatment concept of Prof. Massimo Simion and Dr. Isabella Rocchietta, Institute for Dental Research and Education, University of Milan, Italy

› Vertical ridge augmentation with autogenous bone, Geistlich Bio-Oss® and a non-resorbable reinforced membrane

1. Indication profile

Region

- ☐ aesthetic region
- ☒ non-aesthetic region
- ☐ single tooth loss
- ☒ partially edentulous ridge:
  - ☐ gap situation
  - ☒ free end situation
- ☐ completely edentulous ridge

Remark: The shown procedure is also applicable in the aesthetic region, for single tooth loss and in gap situations.

Bony situation

- ☐ vertical bone defect
- ☐ horizontal bone defect
- ☒ combined vertical and horizontal bone defect
- ☒ use of autogenous bone chips + Geistlich Bio-Oss®
- ☐ use of autologous bone blocks + Geistlich Bio-Oss®

Remark: The shown procedure is applicable for both vertical and horizontal defects.

Soft tissue situation

- ☐ no soft tissue augmentation necesary
- ☒ soft tissue augmentation necessary:
  - ☐ prior to bone augmentation
  - ☒ during implantation
  - ☐ simultaneously with augmentation
  - ☐ in an additional stage surgery

Remark: It depends on the individual soft tissue situation.

Implantation

- ☐ yes, simultaneously with bone augmentation
- ☒ yes, in a second stage surgery after 6 months
- ☐ no

prosthetic treatment: maxilla: 4 months after implantation
mandible: 0 – 4 months after implantation

Remark: When the implant can be placed with primary stability, a simultaneous approach is possible.

Background information

Prof. Massimo Simion and Dr. Isabella Rocchietta:
«Vertical augmentation of severe localized edentulous atrophic alveolar ridges is still challenging. The membrane technique (guided bone regeneration) has been shown to be a valuable and predictable treatment method[1,2,3]. While resorbable membranes, especially native collagen membranes (Geistlich Bio-Gide®), have been used widely and successfully for bone regeneration in small to medium sized defects, in vertical ridge augmentation greater membrane stability is currently required. Therefore, we prefer to use the titanium-reinforced ePTFE-membrane. However, the surgical technique with this membrane is technically complex and involves a high risk of premature membrane exposure resulting in bacterial contamination.

We use autogenous bone chips underneath the membrane. Thereby we increase the potential for bone regeneration outside of the bony housing. The admixture of Geistlich Bio-Oss® granules to the autogenous bone helps to maintain the stability of the regenerated bone, due to the slow degradation process of Geistlich Bio-Oss®[4,5].»

2. Aims of the therapy

› Vertical bone regeneration in a (partially) edentulous jaw in order to provide sufficient long-term stability for implant-supported tooth restorations.

3. Surgical procedure

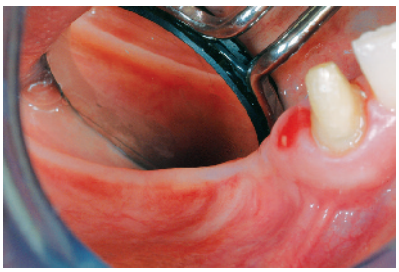


Fig. 1 Clinical view of the patient's edentulous right mandible. The severe atrophy can be appreciated and minimal keratinized gingiva is present.

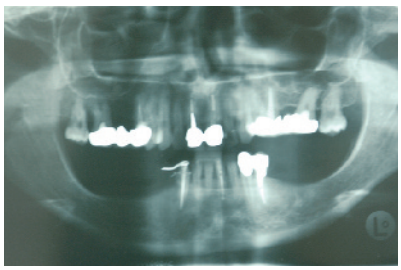


Fig. 2 Orthopantomography of the patient. A bilateral mandibular atrophy is present. The treatment of the right hand side will be presented.

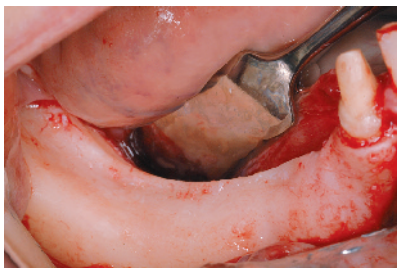


Fig. 3 The surgery is carried out after administering local anaesthesia combined with sedative premedication. A full thickness incision is made within the keratinized mucosa starting from the distal aspect of the cuspid. An intrasulcular incision is performed buccally around the cuspid and lingually extending to the lateral incisor. A vertical releasing incision is made at the mesiobuccal angle and at the distal aspect of the crestal incision. Buccal and lingual flaps are reflected with a periosteal elevator. Once exposed, the cortical bone is curetted with a back-action chisel to remove all residual connective tissue. Intraoperative view after flap elevation.

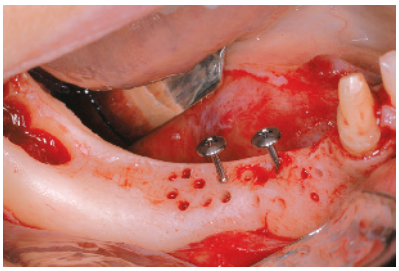


Fig. 4 Cortical perforations are made with a diamond round bur to enhance and promote bleeding. Two tenting screws are inserted to support the overlying membrane and the particulated graft. Autogenous bone chips are harvested in situ at the distal-lateral aspect of the mandibular ramus.

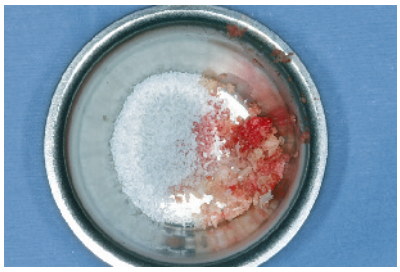


Fig. 5 Autogenous bone chips are mixed in a 1:1 ratio with Geistlich Bio-Oss®.

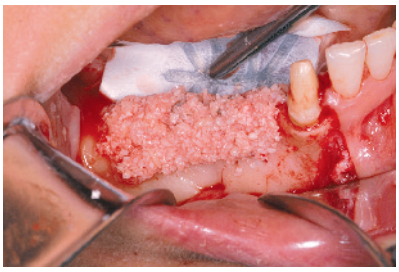


Fig. 6 The particulated graft is placed around the tenting screws and over the atrophic mandible. Prior to this, the membrane is fixed lingually by a mesial and a distal screw.

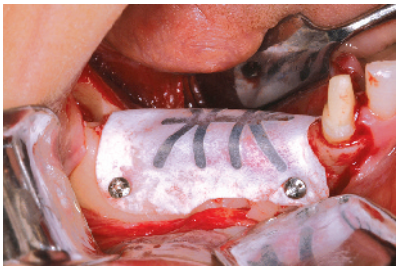


Fig. 7 The titanium-reinforced e-PTFE membrane is shaped to adapt to the defect without touching the distal margin of the adjacent tooth. The membrane is secured buccally by two fixation screws.

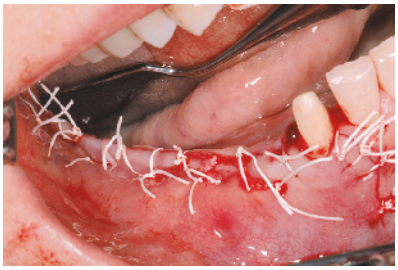


Fig. 8 A releasing incision in the periosteum is made at the base of the buccal flap to enhance the elasticity and to achieve tension-free approximation at closure. Primary wound closure is performed with alternating non-resorbable horizontal mattress sutures and interrupted sutures. The patient is given antibiotic prophylaxis and is advised to perform mouth rinses with 0.2 % chlorhexidine gluconate for 15 days. To minimize swelling and pain, the patient is given steroids (once post-op) and anti-inflammatory agents (for 4 days post-op).

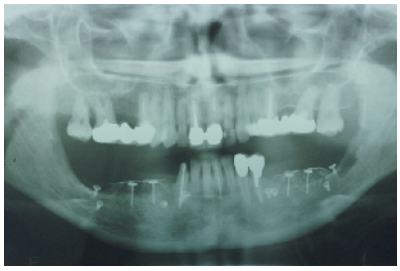


Fig. 9 Check x-ray of the titanium-reinforced e-PTFE membranes in place with the tenting and fixation screws. The sutures are removed after 12 days. Healing is uneventful. The patient is checked weekly during the first months and then once a month until the second stage surgery.

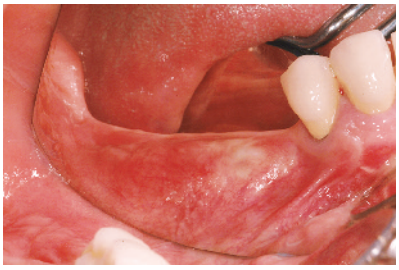


Fig. 10 Clinical appearance after 6 months. The augmented site appears healed correctly. The underlying hard tissue volume can be appreciated.

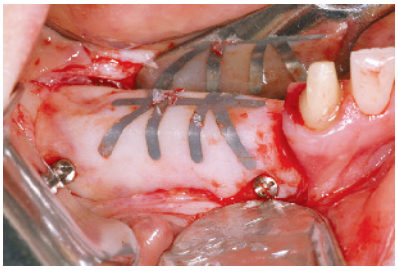


Fig. 11 Clinical view of the re-opening of the site. The titanium-reinforced membrane appears stable with the fixation screws in place.

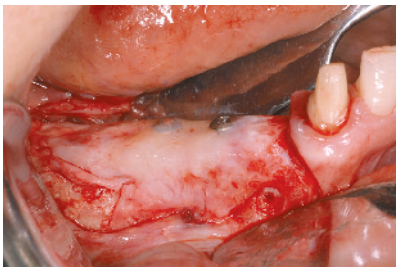


Fig. 12 All four screws (two buccal and two lingual) and the membrane are removed. A layer of connective soft tissue of variable thickness is always visible. The heads of the tenting screws are visible.

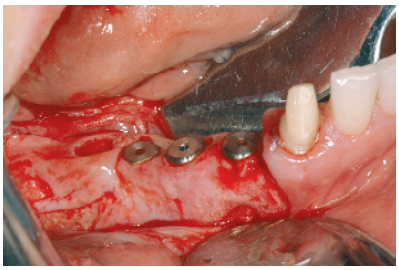


Fig. 13 The tenting screws are removed and three titanium dental implants are placed.

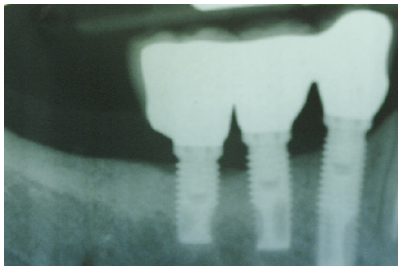


Fig. 14 An x-ray shows the three implants in place after 2 years.

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