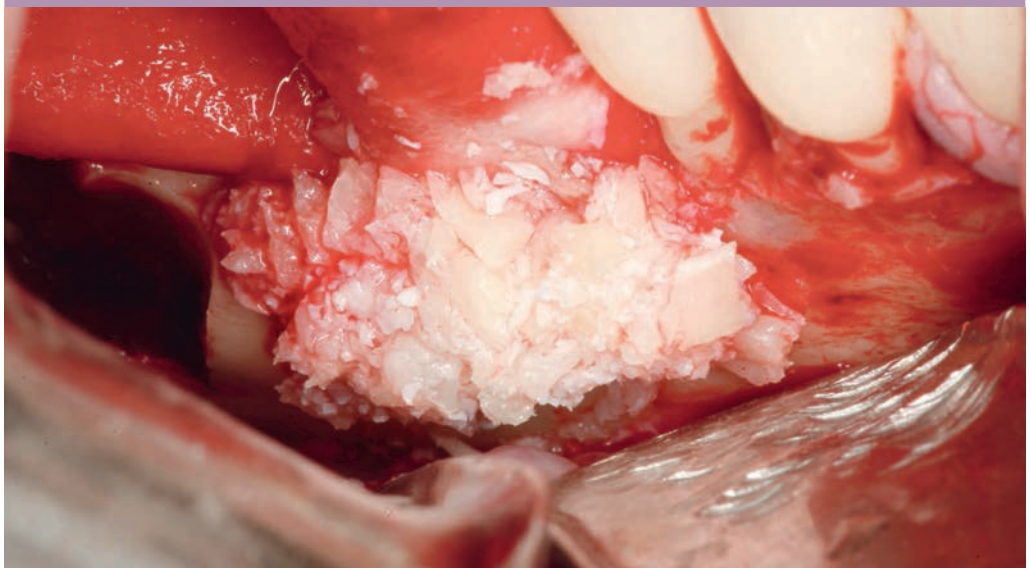
Horizontal Augmentation



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
	☐ maxilla	☒ mandible
	☐ single tooth replacement	☒ multiple teeth replacement
Bony situation	☐ small bone defect	☒ large bone defect
Bone augmentation indicated	☐ immediately at time of implantation	☒ prior to implantation (2-stage)
	☐ use of block grafts	☒ use of particulated grafts
Soft tissue situation	☒ primary wound closure possible	☐ primary wound closure problematic
	☐ soft tissue grafting indicated	☒ soft tissue grafting not indicated

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 particulated 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. Chirurgisches Verfahren

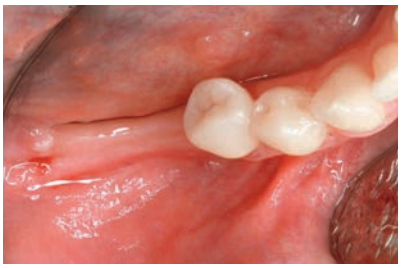


Abb. 1 Okklusale Ansicht des stark atrophierten unteren posterioren Kieferkamms.

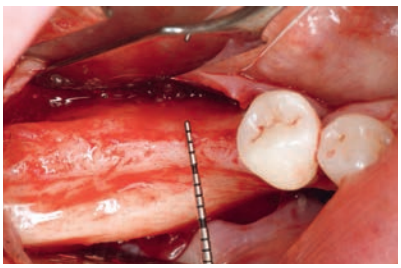


Abb. 2 Okklusalansicht des dünnen unteren posterioren Kieferkamms. Es wird eine Inzision in der keratinisierten Gingiva der Kieferkammmitte für die Präparation eines Mukoperiostlappens angelegt. Für den operativen Zugang erfolgen zwei weitere, divergierende vertikale Inzisionen, eine am mesiobukkalen Linienwinkel des ersten Prämolaren und eine zweite, schräg-vertikale an der distalsten Stelle der krestalen Inzision.

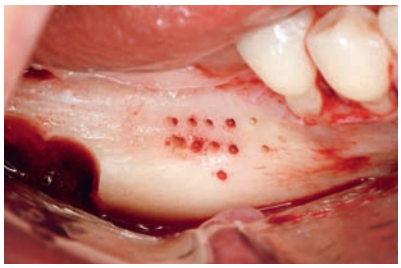


Abb. 3 Das Empfänger-Knochenbett wird mit zahlreichen Bohrlöchern durch die Kortikalis hindurch präpariert, und autogener Knochen wird in der Stärke eines halben 4 mm-Trepanbohrers von der Linea obliqua entnommen.

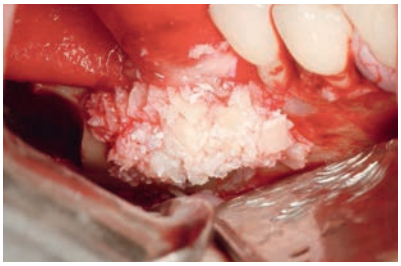


Abb. 4 Bukkale Ansicht nach Applikation einer 1:1-Mischung von autogenen Knochenpartikeln und Geistlich Bio-Oss® Granulat. Beachten Sie, dass die Geistlich Bio-Gide® Membran vor der Applikation des Ersatzmaterials am Kieferkamm fixiert wird.

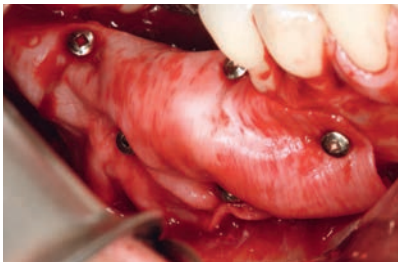


Abb. 5a Bukkale Ansicht einer einzelnen Geistlich Bio-Gide® Membran, die mit Titanstiften fixiert wird. Die Stifte haben einen Durchmessser von 1 mm und sind stabil in der Kortikalis des Unterkiefers verankert. Zu beachten ist, dass die fixierte Membran das Knochenersatzmaterial vollständig immobilisiert und so den Wursthauteffekt schafft.

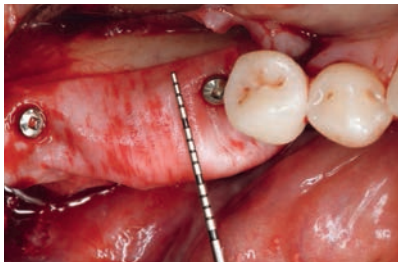


Abb. 5b Okklusale Ansicht.

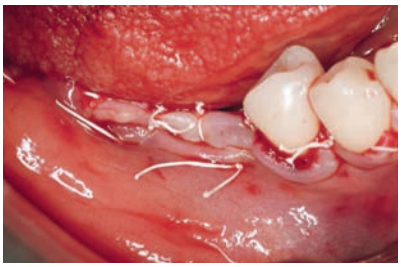


Abb. 6 Eine periostale Entlastungsinzision wird zur Verbindung der beiden vertikalen Inzisionen durchgeführt, bis ausreichende Elastizität erreicht ist. Der Lappen wird dann in zwei Schichten vernäht. Die erste Schicht wird mit horizontalen Matratzennähten in 4 mm Abstand von der Inzisionslinie verschlossen, und dann werden die Ränder des Lappens mit Einzelknopfnähten fixiert.

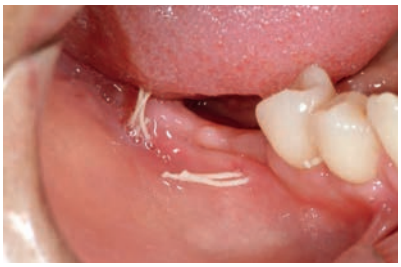


Abb. 7 Bukkale Ansicht der Weichgewebe nach drei Wochen unauffälliger Heilung.

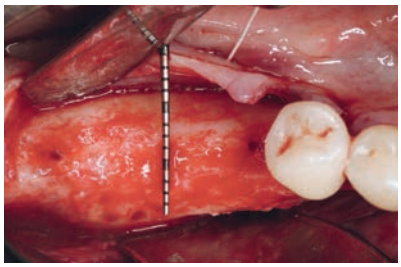


Abb. 8 Okklusale Ansicht des neu gebildeten Kieferkamms bei Wiedereröffnung nach 7 Monaten.

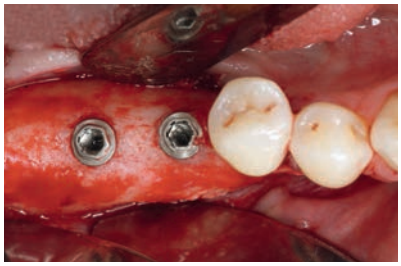


Abb. 9 Zwei Implantate wurden mit guter Primärstabilität gesetzt. Beachten Sie die hervorragende Integration des Geistlich Bio-Oss® in das Autotransplantat.

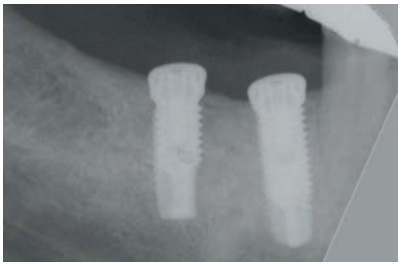


Abb. 10 Periapikale Röntgenaufnahme bei Implantatinsertion.

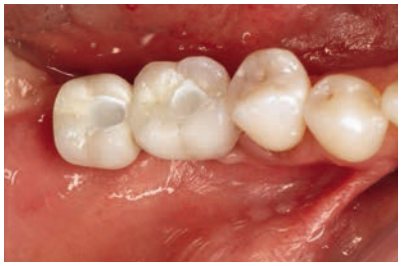


Abb. 11 Endergebnis 2 Jahre nach Implantatbelastung.

31511.1/1105/e

Literature

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6 Rothamel D, Schwarz F, Sculean A, Herten M, Scherbaum W, Becker J.Biocompatibility of various collagen membranes in cultures of human PDL fibroblasts and human osteoblast-like cells. Clin Oral Implants Res. 2004;15(4):443-9.

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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