1. Indication profile

<table>
<thead>
<tr>
<th>Region</th>
<th>Bony situation</th>
<th>Soft tissue situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>aesthetic region</td>
<td>maxilla</td>
<td>primary wound closure possible</td>
</tr>
<tr>
<td>non-aesthetic region</td>
<td>mandible</td>
<td>primary wound closure problematic</td>
</tr>
<tr>
<td>single tooth replacement</td>
<td>multiple teeth replacement</td>
<td>soft tissue grafting indicated</td>
</tr>
<tr>
<td></td>
<td>large bone defect</td>
<td>soft tissue grafting not indicated</td>
</tr>
<tr>
<td>immediately at time of implantation</td>
<td>prior to implantation (2-stage)</td>
<td></td>
</tr>
<tr>
<td>use of block grafts</td>
<td>use of particulated grafts</td>
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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“

Literature


Suppliers

Anti-inflammatory medication: 50 mg diclofenac, Cataflam®, Novartis Pharmaceuticals
Local anesthetic: Articain-hydrochloride with adrenaline 1/100,000
Suture material (ePTFE): GORE-TEX® CVS Suture, WL Gore & Associates, Inc.
Implant: Brånemark System®, Nobel Biocare
Fixation pins: Master-Pin System, Meisinger

Contact

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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

3.1. 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.

3.2. 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 vestibular side. This technique immobilises the graft material, allowing for the formation of the desired amount of bone.

3.3. Occlusal view of severely atrophied posterior mandibular ridge.

Fig. 1

3.4. Buccal 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 incisions.

Fig. 2

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

Fig. 7

3.6. 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 from the incision line and that single interrupted sutures are used to close the edges of the flap.

Fig. 6

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

Fig. 8

3.8. Occlusal 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. 4

3.9. Occlusal view of the thin posterior mandibular ridge.

Fig. 3

3.10. Fig. 11. Occlusal view of the newly formed ridge at implant placement.

Fig. 10

3.11. Fig. 11. Final outcome 2 years after implant loading.

Fig. 11

3.12. Occlusal view of a single Geistlich Bio-Gide® membrane, which is fixed with titanium pins. The pins are 2mm diameter, which are stable in the cortical bone of the mandible. Note that the fixed membrane completely immobilises the bone graft creating the sausage skin effect.

Fig. 5a