Periimplant Regeneration

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› Single Implant placement with concomitant ridge augmentation with Geistlich Bio-Gide® and Geistlich Bio-Oss® Collagen for a double-tooth gap in the lower front region

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)	

Literature references

1 Benic GI, Jung RE, Siegenthaler DW, Hämmerle CHF. Clinical and radiographic comparison of implants in regenerated or native bone: 5-year results. Clin Oral Implants Res 2009; 20: 507-513.

2 Jung RE, Fenner N, Hammerle CHF, Zitzmann NU. Long-term outcome of impants placed with guided bone regeneration (GBR) using resorbable and non-resorbable membranes after 12-14 years. Clin Oral Implants Res 2012: 1-9.

3 Tal H et al., Long-term bio-degradation of cross-linked and non-cross-linked collagen barriers in human guided bone regeneration. Clin Oral Implants Res 2008;19:295-302

4 Becker J et al., Use of a new cross-linked collagen membrane for the treatment of dehiscence-tpye defects at titanium implants: a prospective, randomized-controlled double-blinded clinical multicenter study. Clin Oral Implants Res 2009;20:742-749

Suppliers

› Anti-inflammatory medication: 500 mg Méfénacid, Streuli Pharma AG, Switzerland
› Anti-septic medication: 750 mg Amoxicillin, Streuli Pharma AG, Switzerland, Chlorhexidin 0.2% Kantonsapotheke Zürich, Switzerland
› Suture material (ePTFE): GORE-TEX® CV-5 Suture, W.L. Gore & Associates, Inc., USA
› Implant system: Straumann® Bone Level Implant System, Institut Straumann AG, Switzerland
› Biomaterials: Geistlich Bio-Gide® 25x25 mm, 2 Geistlich Bio-Oss® Collagen 100 mg, Geistlich Pharma AG, Switzerland

Contact

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Background information

Dr. Christian Ramel:
Hard tissue augmentation utilizing guided bone regeneration (GBR) has become the treatment option to provide optimal bone support for osseointegrated dental implants in case of bony defects. Implants placed in demineralized bovine bone mineral (DBBM) and collagen membranes regenerated bone do not perform differently from implants placed in native bone with respect to implant survival, marginal bone height and peri-implant soft-tissue parameters[1]. For years though, non-resorbable membranes made of expanded PTFE have been considered as gold standard, especially in larger defect situations like the one presented below. This is no longer true, since resorbable membranes such as Geistlich Bio-Gide® have been used for over 15 years by now and they have proven their success in every day clinics and in literature. A recent study investigated the long-term outcome of implants with GBR using resorbable (collagen) and non-resorbable (ePTFE) membranes. The authors found no difference in implant survival after 12-14 years with respect to the type of membranes utilized[2]. The major advantages of resorbable membranes are a facilitated clinical handling during application, fewer wound dehicences[3,4] and no need for surgical membrane removal. On the other hand, stabilization of the augmentation material is limited, since this type of membrane is not rigid. Therefore, over-augmentation of the site is often indicated. In addition, reducing soft-tissue pressure by performing releasing incisions of the periosteum may be required.

2. Treatment objectives

› The aim of the therapy was to predictably restore the defect by means of a fixed implant after a long lasting orthodontic phase which left a two-tooth gap with a bony dehiscence in the lower front region.

3. Surgical procedure

Fig. 1 The photograph at the first examination shows strong muscular tongue activity, producing a major gap between the lower central incisors over the years.

Fig. 2 After retracting the tongue a gap situation with a pronounced distal inclination of the lower central incisors is demonstrated.

Fig. 3 The orthopantomogram (OPG) shows more than enough vertical bone for implant retained prosthodontics, but an unmanageable position of the adjacent roots because of their distal inclinement.

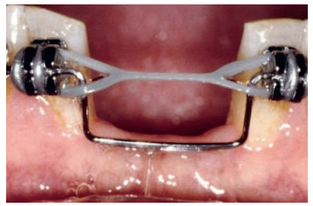

Fig. 4 The adjacent teeth were moved to an upright position by fixed orthodontic devices.

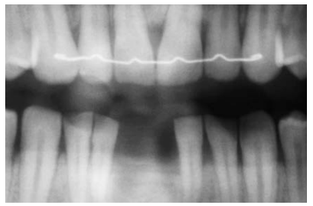

Fig. 5 After a treatment period of 1 year all teeth appear nicely aligned and positioned upright. Located centrally in the lower front region, a gap of the width of two front teeth was established.

Fig. 6 Bone supply still seems adequate, the bone crest is straight in between the neighboring teeth, although slightly lower as compared to the interdental bone level.

Fig. 7 Intraoral assessment shows a vertical defect of about 2 mm compared to the adjacent papillae. A rather small band of keratinized tissue is still present.

Fig. 8 On the other hand, a major horizontal defect mainly from the buccal but also from the lingual side is visible.

Fig. 9 At the time point of implant insertion the preoperative assessment is validated: the ridge shows no crater or saddle-like contour but a rather flat course between the adjacent teeth with an overall vertical recession of about 2 mm. The incision on the ridge was placed slightly palatal and one releasing incision was performed distally at the neighboring first incisor in order to elevate a triangular flap.

Fig. 10 In horizontal aspect, a major bony defect is visible. The ridge measures about 2 mm in width in the central region.

Fig. 11 To enable a perfectly prosthodontically driven implant position, the implant position was determined with a conventional splint. By not placing the implant in a central location, wider bucco-oral dimensions were found.

Fig. 12 The implant shoulder was positioned 2 mm apical of the future crown margin, leaving a periimplant defect of 3 mm.

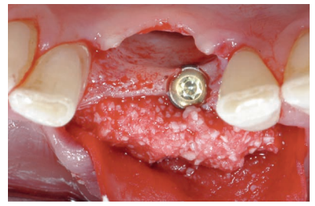

Fig. 13 Geistlich Bio-Gide® was adapted, apically positioned underneath the mucoperiosteal flap and deflected, then Geistlich Bio-Oss® Collagen was carefully put onto the defect region. The aim was to overaugment the site, since considerable soft-tissue pressure was to be expected.

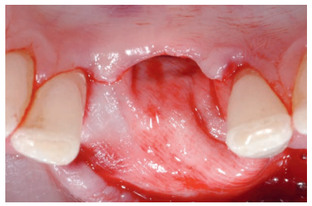

Fig. 14 The collagen membrane was then laid over the implant, and tucked underneath the lingual mucosa.

Fig. 15 To enable perfect wound margin adapation without tension, the periosteum was cut on the buccal side. Because of the rather large augmentation the implant was left to heal submucosally. Sutures were performed with single knots made out of ePTFE. Postoperatively the patient rinsed with chlohexidine twice a day for two weeks and received systemic antibiotics three times per day for one week. Suture removal was performed 10 days after the surgery.

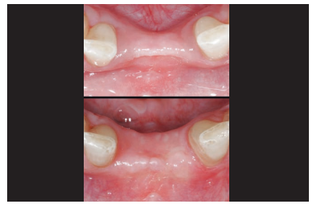

Fig. 16 Following uneventful healing, a remarkable broadening of the alveolar ridge is visible 14 weeks after the surgery (lower picture) when compared with the situation before treatment (upper picture).

Fig. 17 After two months of healing abutment connection was performed with a fine ridge incision slightly lingual to the implant center to create a 2 mm wide band of keratinized mucosa at the buccal side. At the same point of time, the adjacent teeth were built up to their original shape with direct composite fillings.

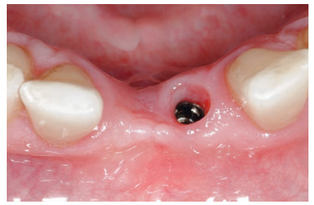

Fig. 18 The view into the internal implant connection at the time point of impression taking shows sufficient keratinized tissue all around and a perfectly healthy soft-tissue situation.

Fig. 19 A directly screw retained porcelain fused to metal (gold alloy) extension construction was chosen.

Fig. 20 The view from the back shows a screw access hole perfectly in the center of the lingual concavity.

Fig. 21 The situation shortly after the insertion of the reconstruction with stable, healthy periimplant mucosa.

Fig. 22 Before and after orthodontic tooth movements, external bleaching and implant retained prosthodontic rehabilitation.

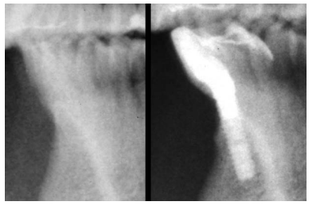

Fig. 23 Cephalometric radiographs taken before and after implant therapy show a clearly visible additional amount of bone that was created at the buccal aspect of the implant.

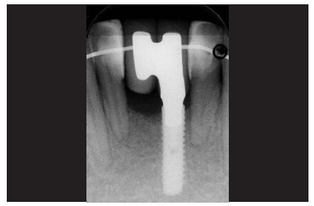

Fig. 24 The X-ray after one year in function shows healthy bony surrounding structures. A stable slight horizontal remodelling process is visible. The clinical appearance of the reconstruction one year after insertion was pleasant and satisfying.