Histological comparison of two different GBR procedures: dPTFE membrane vs customized titanium mesh combined with natural pericardium collagen membrane.

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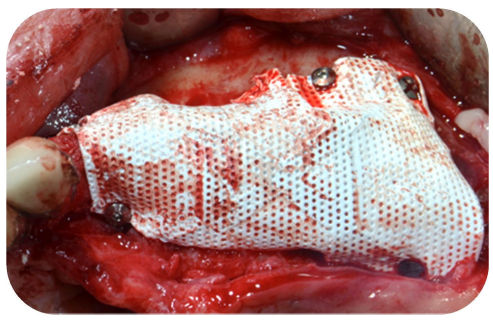
Introduction and Purpose

Guided Bone Regeneration (GBR) requires the employment of a barrier to exclude surrounding soft tissues from the regenerating site. Especially for what concerns vertical ridge augmentation procedures, the barrier should provide a long-lasting space maintaining capability. Both dPTFE titanium-reinforced membranes and titanium meshes show this ability, being the recommended ones for vertical GBR interventions[1]. Good clinical results were proved for both barriers[2]. Customized titanium meshes, shaped on patient's CBCT examination prior to surgery, have been recently introduced to clinical practice, leading to a reduced surgical time and perfect fit of the mesh to patient's osseous defect.
Aim of this study is to compare histological results of two cases treated via different GBR procedures.

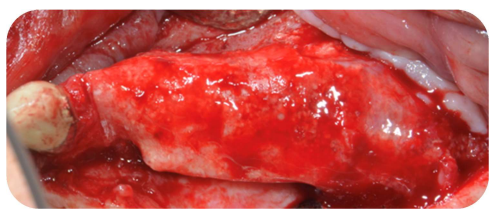
Materials & Methods

Two patients, aged 53 and 56, affected by severe posterior atrophy (Class V in accordance with Cawood and Howell classification[3]), underwent vertical GBR interventions. Preoperative analysis was carried out in terms of clinical and radiographic (OPG and cone beam) examinations.
Surgical protocols involved either a GBR intervention by means of a non-resorbable titanium reinforced membrane (Cytoplast® Ti-250 dPTFE membrane[§]) or the employment of a customized titanium mesh (Yxoss CBR®[§§]) covered by a natural pericardium collagen membrane (Heart® pericardium membrane[§§§]).
Bone grafting was made by a mixture of half autogenous bone and half bone substitute (EQUIMATRIX® natural bone mineral matrix[§§§§]).
After 7 months of healing a second surgery was performed in order to remove non-resorbable materials and implants positioning. Implant surgery was successfully carried out in both cases in the way it was originally planned.
At this time a bone specimen was withdrawn using a trephine (3 mm Ø) and stored in formaline due to histological analysis through Hematoxylin and Eosin staining protocol.

dPTFE

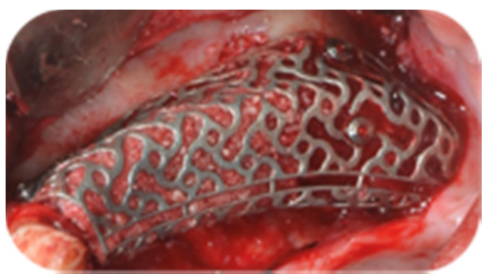


MEMBRANE POSITIONING

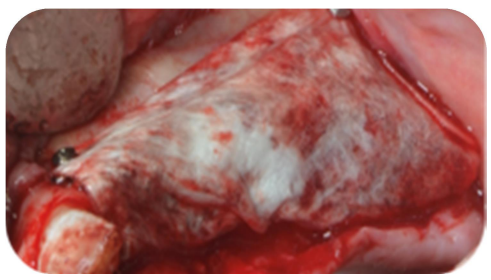


RE-ENTRY AT 7 MONTHS

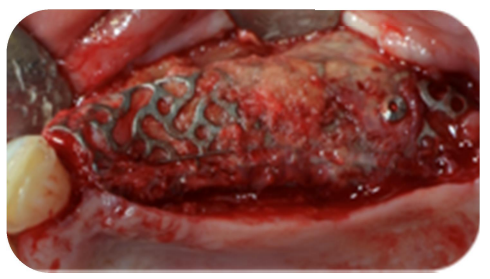
TITANIUM MESH + RESORBABLE MEMRBANE



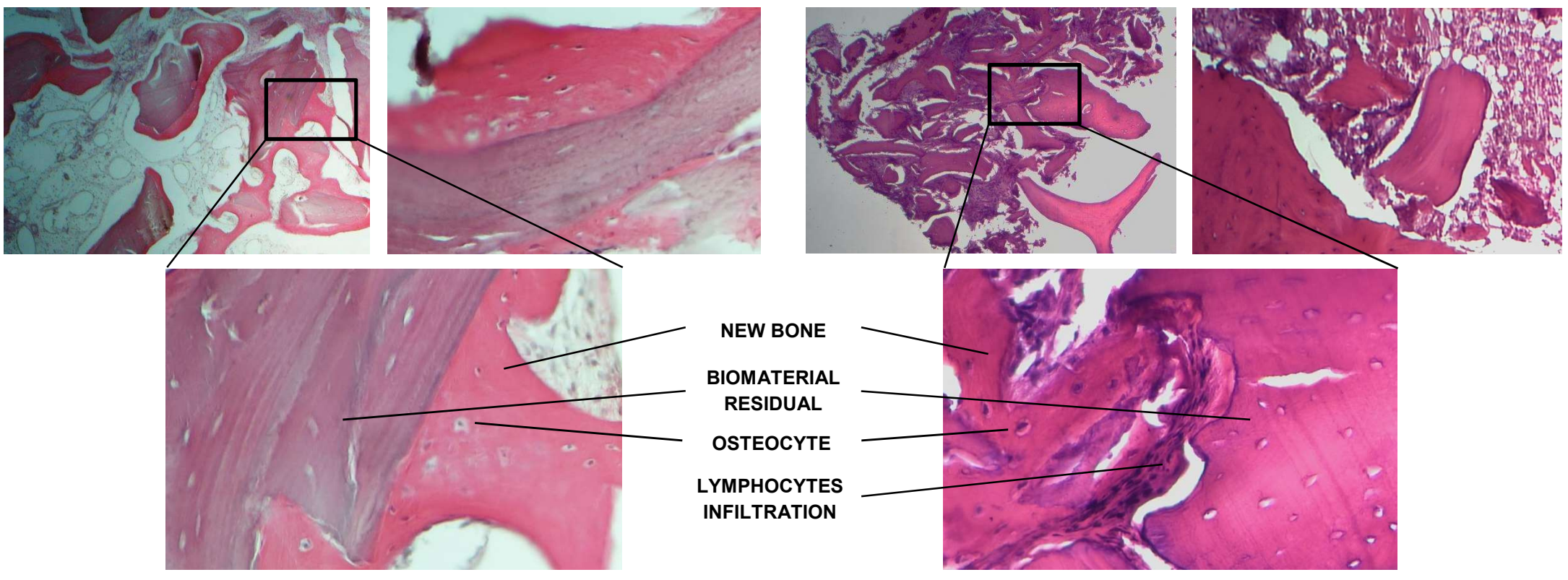
MESH POSITIONING



MEMBRANE POSITIONING



RE-ENTRY AT 7 MONTHS



HISTOLOGICAL ANALYSES OF TISSUES AT RE-ENTRY AFTER 7 MONTHS

Results and Conclusions

Histological images show better results when GBR was performed through the employment of dPTFE membrane: good relationship is shown between newly regenerated bone and biomaterial residuals, while a certain amount of lymphocytic infiltration can be observed between the two sides when ridge was treated by titanium mesh technique.

1. Tolstunov L, Hamrick JFE, Broumand V, Shilo D, Rachmiel A. Bone Augmentation Techniques for Horizontal and Vertical Alveolar Ridge Deficiency in Oral Implantology. Oral Maxillofac Surg Clin North Am 2019;31:163-191..**2.** Cucchi A, Vignudelli E, Napolitano A, Marchetti C, Corinaldesi G. Evaluation of complication rates and vertical bone gain after guided bone regeneration with non-resorbable membranes versus titanium meshes and resorbable membranes. A randomized clinical trial. Clin Implant Dent Relat Res 2017;19:821-832.**3.** Cawood JL, Howell RA. A classification of the edentulous jaws. Int J Oral Maxillofac Surg 1988;17:232-236.

[§]Osteogenics Biomedical, Lubbock, TX, USA; [§§] ReOss® Ltd., Filderstadt, Germany; [§§§] BiOTECK®, Vicenza, Italy; [§§§§]Osteohealth, Luitpold Pharmaceuticals Inc., New York, USA.