Bovine collagen type 1 versus titanium reinforced PTFE membrane. Clinical and histological evaluation of GBR procedures in horizontal defects.

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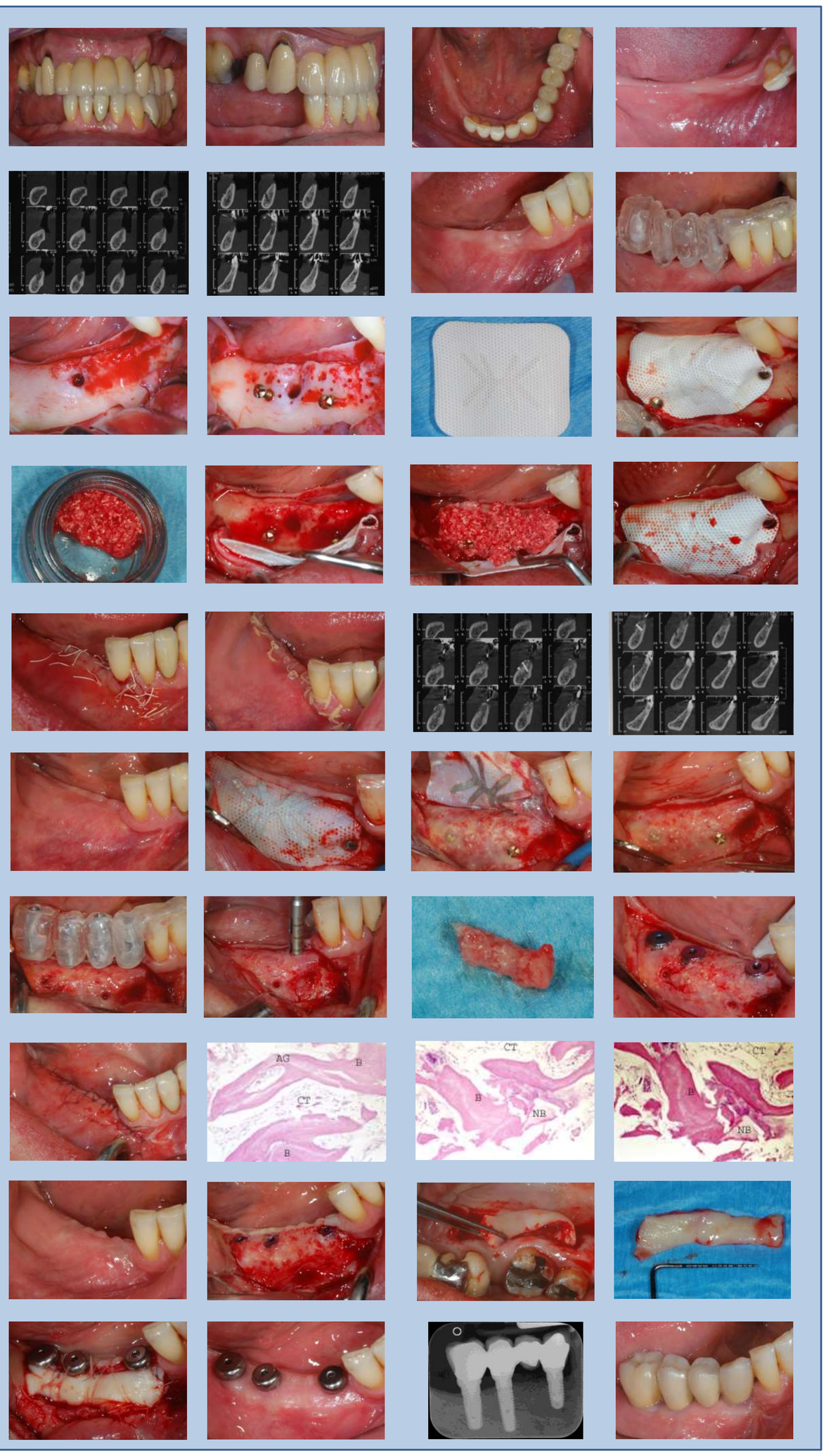
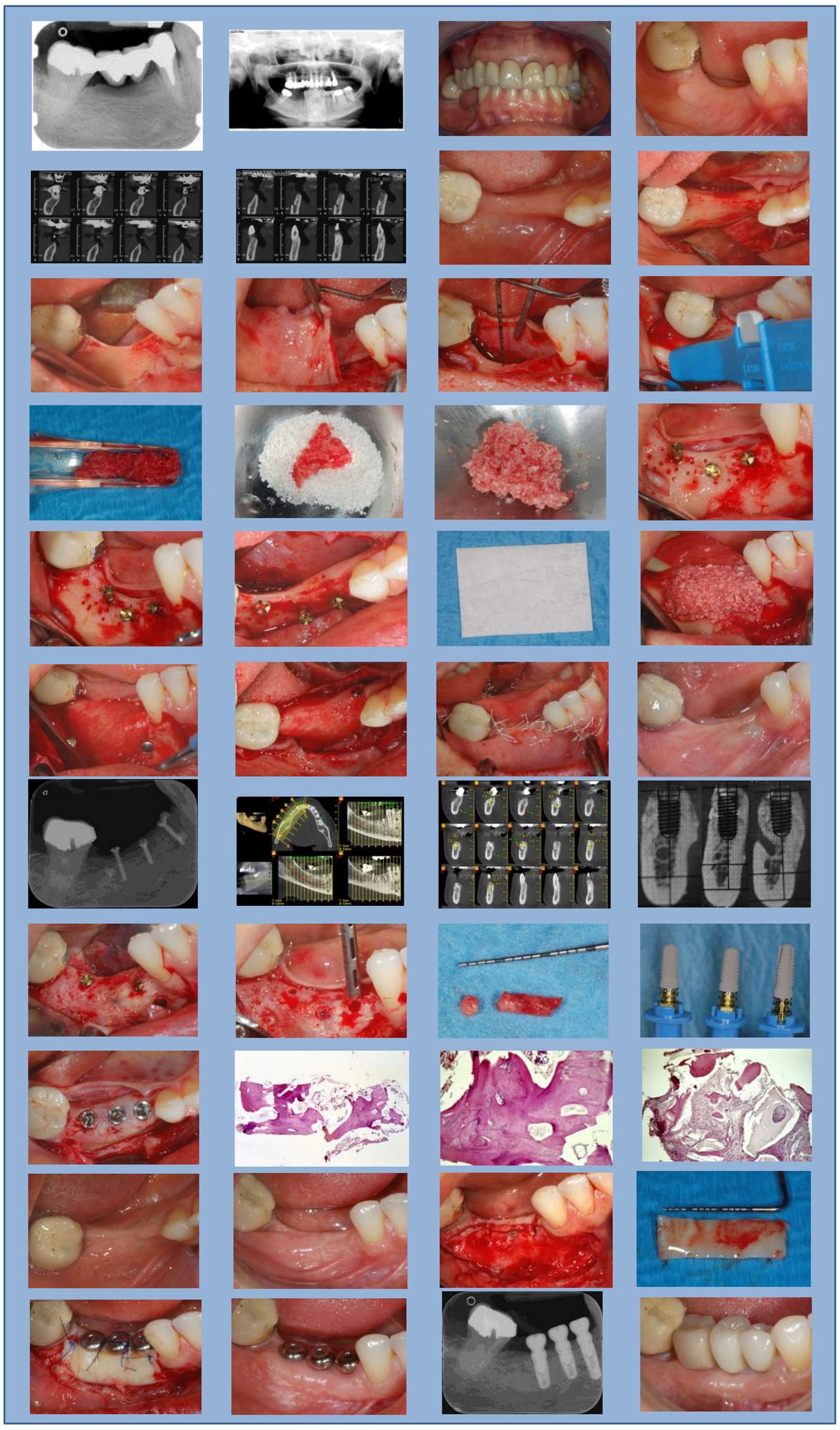
Objectives: The aim of this report was to determine if a resorbable collagen membrane with long resorption time (26-38 weeks) could produce an horizontal ridge augmentation similar to that achieved with a non-resorbable titanium reinforced dense polytetrafluoroethylene (d-PTFE) membrane in 1-wall mandibular defects.

Materials and Methods: Two guided bone regeneration (GBR) procedures were performed in two consenting healthy patients (a 52 y.o. female, and a 56 y.o. male) for the treatment of similar 1-wall horizontal mandibular defects, requiring the positioning of 3 implants. A staged approach was chosen for both patients. One patient received a resorbable bovine collagen type 1 membrane (Cytoplast RTM 2030, Osteogenics Biomedical, Lubbock, TX, USA), with a resorption time of 26-38 weeks (test-case), while the other one (control case) received a titanium reinforced d-PTFE membrane (Cytoplast TI 250 PL, Osteogenics Biomedical, Lubbock, TX, USA). In both cases tenting screws were applied, to maintain the space beneath the membrane, that were fixed with titanium tacks. The test-case received a graft of autogenous cortical bone collected locally with a disposable bone collector (Safescraper®, Meta, Reggio Emilia, Italy) mixed to an equine-derived bone mineral (Equimatrix™, Osteohealth, Shirley, NY, USA), while the control case received a graft of autogenous cortical bone collected locally with a disposable bone collector (Safescraper®, Meta, Reggio Emilia, Italy) mixed to a nanocrystalline hydroxyapatite embedded in a silica gel matrix (NanoBone®, Artoss, Rostock, Germany). Periosteal incision allowed the flap to move coronally. Horizontal internal mattress and single interrupted PTFE sutures (Cytoplast, Osteogenics Biomedical, Lubbock, TX, USA) allowed a tension-free closure. Healing was uneventful and, after a period of 33 and 30 weeks for the test- and the control-case respectively, the sites were reopened, for titanium tacks and tenting screws remotion and implant application. Three Camlog Screw Line Promote Plus implants (Camlog Biotechnologies, Basel, Switzerland) were inserted in both cases . The test-case received one 3.8X11 mm, and two 3.8X9 mm implants, while the control-case received one 4.3X9 mm, one 4.3x13 mm, and one 5.0X11 mm implant in the mesial, central, and distal position respectively. The staged approach allowed to harvest a specimen for histologic evaluation of the regenerated tissue for both cases. A free gingival graft, harvested from the palate, increased the width of keratinized mucosa around implants in both cases.

CONTROL-CASE



TEST-CASE



Results: Bucco-lingual measurements of the ridge were obtained with a caliper, one millimeter below the most coronal part of the crest, in the zone were the implant had to be placed, guided by a surgical stent, at the moment of GBR procedure and at implant insertion. For the control-case, ridge width assessment was 3,5 mm, 3 mm, and 3 mm for the mesial, central, and distal implant respectively in the first stage, while at the moment of implant placement the measurements were 7,5 mm, 8 mm, and 10 mm respectively with a gain of 4 mm, 5 mm, and 7 mm respectively (mean 5,3 mm). For the test-case ridge width assessment was 3 mm, 1,5 mm, and 1,5 mm for the mesial, central, and distal implant respectively in the first stage, while at the moment of implant placement the measurements were 6 mm, 6 mm, and 6 mm respectively with a gain of 3 mm, 4,5 mm, and 4,5 mm respectively (mean 4 mm). Histologic evaluation revealed new bone formation, almost totally lamellar mature bone, in direct contact with the graft remnants. Both biomaterials used appeared to be very osteoconductive. No sign of inflammation was observed either in the test- and in the control-case.

Conclusion: The use of both collagen and d-PTFE membrane in horizontal GBR procedures resulted in similar ridge augmentation. Correction of 1-wall horizontal defect can be effectively achieved by means of a long-resorption-time collagen membrane, that has to be sustained by the graft and by the use of tenting screws and titanium tacks, helping the barrier membrane to be stable and not to collapse into the defect. The promising results of this pilot study have to be confirmed by further investigation with a wider number of treated cases.