

Treatment of an infected exposure of a dense polytetrafluoroethylene membrane in a vertical guided bone regeneration procedure: a protocol proposal.

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Background: Non resorbable membrane exposure has always been considered the main cause for guided bone regeneration (GBR) failure. Although the introduction of dense polytetrafluoroethylene (d-PTFE) membranes have significantly reduced the incidence of infection respect to expanded PTFE membranes, since the pore size does not allow bacteria penetration through their thickness, nevertheless infection can occur when bacteria contaminate the grafting material passing underneath the edge of the membrane. Soft tissue dehiscence, and the consequent membrane exposure, can be caused by poor flap coronal mobilization and suture with tension, sharp edges of the membrane, sharp food impaction, compressing removable prostheses, or the cusp of an extruded opposing tooth as in the clinical case reported. Removal of the membrane as well as the graft, the implants or the tenting screws inserted, is recommended to be done as soon as possible. Usually, the resulting clinical situation is worse than the starting one.

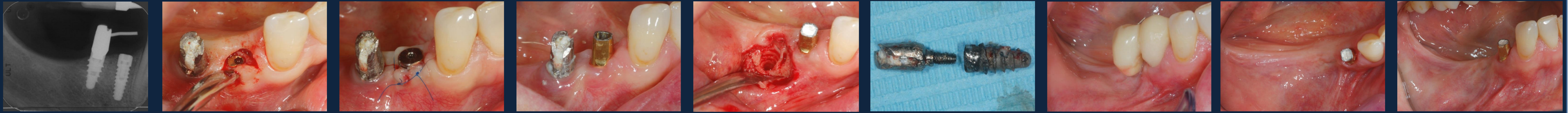
Aim: The aim of this report is to describe a protocol to treat the exposure of a d-PTFE membrane when infection has already occurred, without removing all the graft particles and coronally mobilizing the flaps for an unpredictable closure, because of inflammation and epithelization of the flaps.

Initial Clinical Situation



The patient presented mandibular right molars loss with vertical bone atrophy, and an implant with distal periimplantitis in second premolar position

The 1st premolar, with vertical fracture, was extracted and substituted with a BioHorizons Laser-Lok Tapered Implant. A simultaneous GBR procedure with collagen membrane and alloplast application was performed to correct the buccal dehiscence.



After a 2 month healing time, healing abutment connection, provisional abutment connection, for temporary fixed prosthesis with cantilever application, the implant in 2nd premolar position with periimplantitis was removed. After a 4 month healing time, soft tissues were ready for GBR procedure.

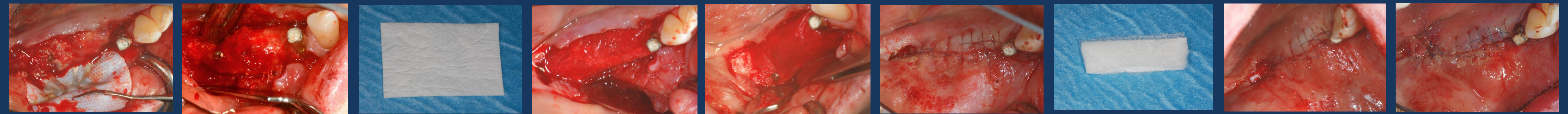
Materials & Methods: A staged approach GBR procedure was performed for the correction of a mandibular vertical ridge deficiency in the right premolar and molar region. Two tenting screws helped the titanium reinforced d-PTFE membrane (Cytoplast TI 250 PL, Osteogenics Biomedical, Lubbock, TX, USA) not to collapse over a graft composed by autogenous cortical bone, collected locally with a disposable bone collector (Safescraper, Meta, Reggio Emilia, Italy) mixed with a synthetic nano-crystalline hydroxyapatite (NanoBone, Artoss, Germany) in a 1:1 ratio. PTFE sutures were removed 2 weeks later, and after 2 more weeks the membrane exposure happened because of the cusp impaction of the opponent upper right second molar. The patient was instructed to clean softly and to rinse with 0.2 chlorhexidine every 8 hours. Nevertheless, the margins of the exposure were close to the distal edge of the membrane and two days later the pus presence suggested the membrane removal, that was performed few days later. The membrane, the distal tenting screw, part of the graft in the distal area with clear signs of infection were removed. The remaining graft was washed with chlorhexidine and covered by a cross-linked collagen membrane (Cytoplast RTM 2030, Osteogenics Biomedical) stabilized with titanium tacks. A collagen fleece (Medicipio® C, Medichema Germany) filled the gap of the mucosal dehiscence. No attempt of coronal flap advancement was done, but sutures just stabilized the collagen fleece that guided the mucosal repair.



Mucoperiosteal flaps were raised and coronally moved either buccally and lingually. A cortical bone autograft was mixed with NanoBone particles. Two tenting screws helped the d-PTFE membrane not to collapse over the defect



Composite graft application and membrane stabilization with Pro-Fix microscrews. Tension-free Cytoplast PTFE sutures were removed after 2 weeks. The cusp of the opposite 2nd upper molar caused the membrane exposure. Few days later an infection occurred (arrow).



After d-PTFE membrane, partial bone graft and distal tenting screw removal, a Cytoplast RTM 2030 collagen membrane was applied and stabilized with tacks. Flaps were not moved coronally and the soft tissue dehiscence was filled with Medicipio C stabilized with sutures.

Upper Molars Intrusion

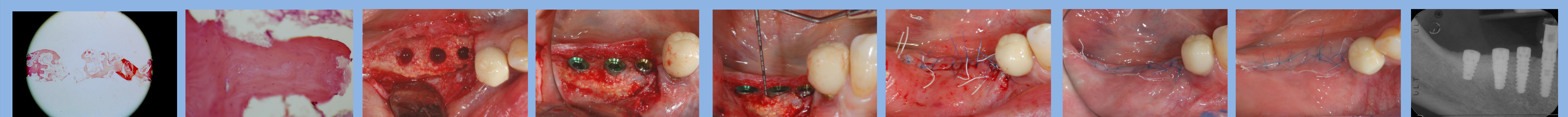


During the bone graft healing time, two orthodontic implants (Osstem, Korea) were inserted palatally for upper right molars intrusion with an implant-supported orthodontic device. Orthodontic treatment was performed by Dr. Matteo Colosimo, DDS, private practice, Rome, Italy.

Results: Healing was uneventful. Eight months and a half after d-PTFE membrane removal the site was re-opened. The bulk of regenerated bone, as shown by the post-operative computed tomography allowed the insertion of 3 Laser-Lok Tapered implants (BioHorizons, Birmingham, AL, USA) in the region of the second premolar and the first and second molar. A biopsy of the regenerated area was harvested during implant site preparation of the first molar. Histologic examination revealed new bone formation, almost totally lamellar mature bone, in direct contact with the graft remnants. No sign of inflammation was observed. The patient received a free gingival graft for keratinized tissue band augmentation, before she was restored with fixed crowns. Upper molar intrusion allowed normal dimension of the restorations.



Post-operative CBCT showed a good vertical bone gain. After buccal and lingual mucoperiosteal flap elevation, tacks and screws were removed and implant sites preparation were performed with a trephine bur, to harvest a bone biopsy for histologic examination.



New bone formation inside the interconnected cavities of NanoBone particle. BioHorizons implants were inserted leaving their Laser-Lok treated collars positioned 1 mm above the bone crest for soft tissue integration within the their micro-grooves. Submerged healing.

Keratinized Tissue Augmentation



During the healing abutment stage, a split-thickness flap was raised to create a blood supply to a free gingival graft harvested from the palate, in order to increase the thin band of keratinized tissue. After a 3 month healing time, tissues were ready for prosthesis application.



Titanium custom-abutments, and single zirconia crowns were delivered to the patient. Upper molar intrusion allowed normal dimension of the restorations. Six month clinical and radiographic follow-up.

Conclusions & Clinical Application: D-PTFE membrane substitution, with a collagen membrane and a collagen fleece, allowed an almost complete vertical bone regeneration and the mucosal repair, without any coronal flap advancement. The little bone volume removed in the distal area did not jeopardize implant insertion. The staged approach helped the clinical management and has to be suggested: simultaneous approach, with implant insertion during GBR procedure, would have led to the implant surface contamination and the removal of the implant, a bigger bone volume loss, and a difficult soft tissue management.