

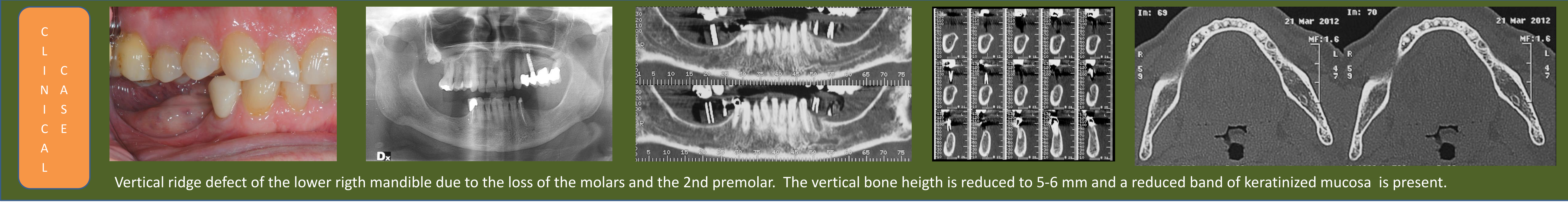
The pros of the staged approach in vertical guided bone and soft tissue reconstruction of the mandibular atrophy

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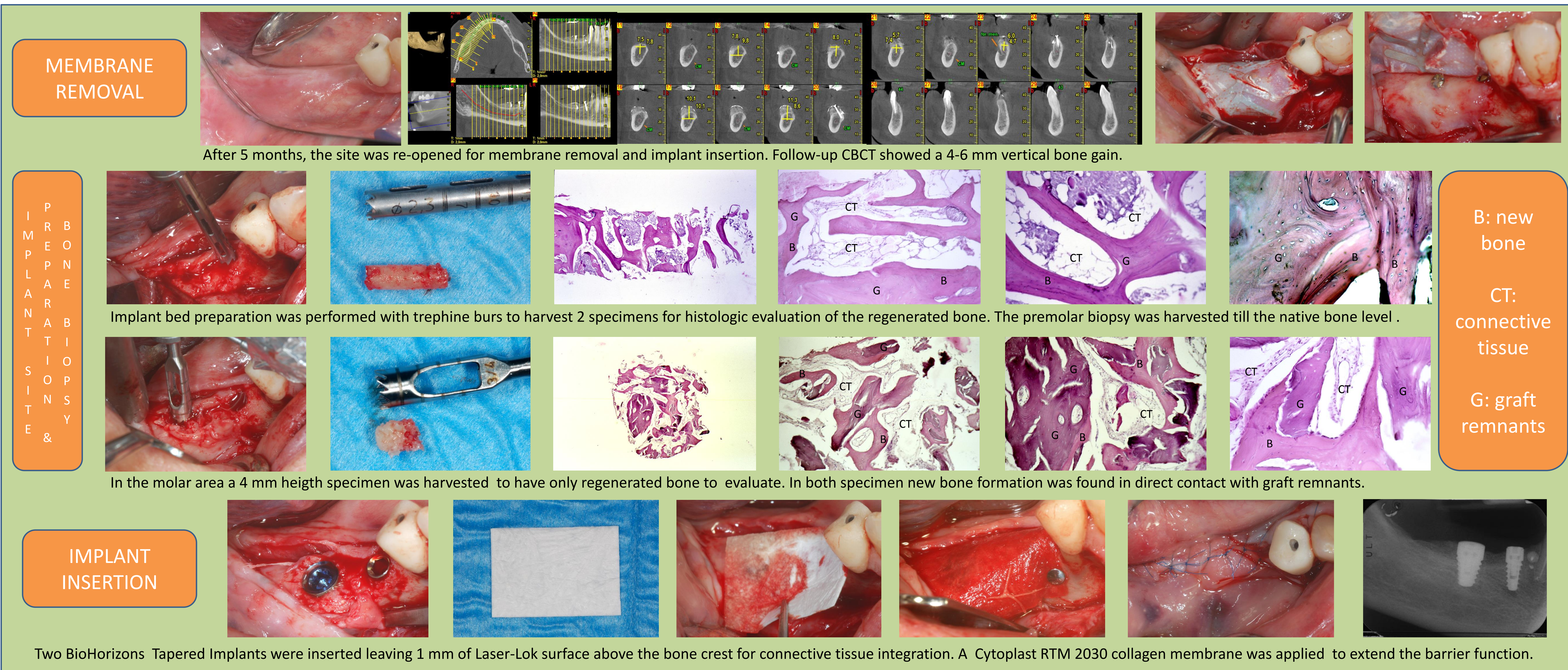
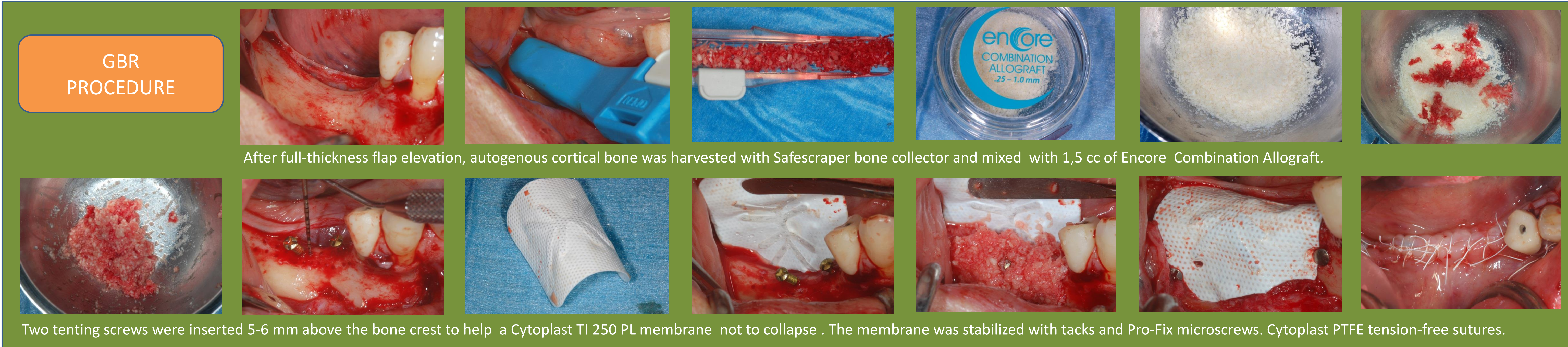


**Background:** Teeth loss leads to the atrophy of either the hard and soft tissues of the jaws. Guided bone regeneration (GBR) is an effective technique that can reconstruct hard tissues of the vertical bony defects with PTFE membranes. Nevertheless, since coronal flap mobilization is an indispensable requirement to cover the augmented site, it reduces the yet thin band of keratinized tissue. Based on current available evidence, a lack of adequate keratinized mucosa around implants is associated with more plaque accumulation, tissue inflammation, mucosal recession , loss of attachment. Simultaneous implant insertion seems to reduce the number of interventions and the overall treatment time. In reality, the implant reduces bone surface and its marrow space as a source of osteogenic cells, slowing down bone maturation and extending healing time to 9-12 months, while the mucoperiosteal full-thickness flap raised at reentry does not allow a vascular supply to a gingival graft in order to augment the keratinized tissue.

**Aim:** The aim of this report is to describe how a staged approach can reach predictable bone and soft tissues reconstruction without extending the overall treatment time in comparison with simultaneous application of implants and membranes. The staged approach provides a larger bone surface to contribute to new bone formation, that is activated twice by the local release of growth factors (1<sup>st</sup> during membrane surgery, 2<sup>nd</sup> during implant placement), and a better bone apposition to the titanium surface.



**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 dense-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 an allograft composed by 70% mineralized bone and 30% demineralized bone (Encore™, Osteogenics Biomedical), in a 1:1 ratio. After a 5 month healing time, the site was re-opened for membrane removal and implants insertion. The bulk of vertically regenerated bone (4-6 mm), as shown by the post-operative CBCT, allowed the insertion of 2 Laser-Lok Tapered Implants (BioHorizons, Birmingham, AL, USA) in the region of the second premolar and the first molar. A biopsy of the regenerated area was harvested for histologic examination. A cross-linked collagen membrane (Cytoplast RTM 2030, Osteogenics Biomedical) covered the implants in order to extend the barrier function. A submerged healing allowed a following split-thickness flap in order to give blood supply to a free gingival graft, harvested from the palate, to augment the width of the keratinized mucosa, reduced to about 1 mm after bone augmentation. Healing abutment were connected with a subsequent intervention, after a 3 month healing time and graft shrinkage.



**Results:** The overall treatment time was 10 months and a half, from membrane application to healing abutment connection, about the same time needed by a simultaneous implant insertion approach. Histologic examination revealed excellent new bone formation, almost totally lamellar mature bone, after a 5 month healing time. Free gingival graft allowed a keratinized tissue band augmentation of 12 mm, that were equally divided for the lingual and buccal flaps during the re-entry for healing abutment application. Porcelain fused to metal crowns were surrounded by sound, still and thick keratinized tissue, that helped the maintenance at 1-year clinical and radiographic follow-up.



**Conclusions and Cinical Application:** The staged approach offers several advantages compared with the simultaneous application of implants and barrier membrane: better bone formation and maturation, with double activation of growth factors, better bone-implant contacts, simplified implant positioning, with better implant stability and easier preparation of the recipient site, and better soft tissue management, since a split-thickness flap is necessary for the blood supply of a gingival graft, in order to reconstruct the soft tissues.