Dentistry

Clinical Sheet

EARLY IMPLANT REHABILITATION USING EQUINE-DERIVED TISSUE SUBSTITUTES

Peri-implant GBR using resorbable membrane and equine bone substitutes.

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Alveolar bone, following extraction or loss of a tooth element, gradually resorbs, affecting the ability to perform implant rehabilitation[1]. Options available to counteract the resorption process include the use of biomaterials (bone grafts and barrier membranes to protect the graft) and surgical techniques for the purpose of promoting regeneration. The most common technique is the guided bone regeneration (GBR), in which a barrier membrane creates a bounded space between the soft tissues and the bone graft, thus allowing bone neoformation without the infiltration of epithelial and connective cells from adjacent soft tissues. Depending on the amount of bone present, 4 types of implant rehabilitation strategies can be adopted[2]: Type 1-immediate placement in a post-extraction socket without bone and soft tissue healing; Type 2-early placement with soft tissue but no bone healing (4 to 8 weeks of healing); Type 3-early placement with partial bone healing (12 to 16 weeks of healing); Type 4-late placement, with a fully healed socket (more than 16 weeks of healing). In particular, the main objective of type 2 implant rehabilitation is to guarantee the absence of pathology during implant placement and, at the same time, to improve the availability of soft tissue for primary healing and support lateral bone augmentation.

Bibliography:
1) Araujo, M. G., & Lindhe, J. et al., (2005) DOI: https://doi.org/10.1111/j.1600-051X.2005.00642.x
2) Graziani F et al. (2019) DOI: https://doi.org/10.1111/jcpe.13092

Materials

The guided bone regeneration (GBR) procedure was performed using a bone graft in syringe, consisting of cortical-cancellous granules in a 1:1 ratio, hydrated by an aqueous-based gel that allows adhesion and prevents dispersion (Bio-Gen® Mix Gel, Bioteck Spa, Italy). The cortical-cancellous granules are equine-derived, deantigenated through the Zymo-Teck® process (Bioteck Spa, Italy) based on the use of lytic enzymes at low temperatures, which allows the preservation of the mineral component and, in the case of the formats used in the present work, the bone collagen in hydrolyzed form.

This allows physiological recognition by osteoclasts, enabling total remodeling of the graft with new bone from the patient. The use of heterologous material also reduces the volumetric loss typically seen with the use of autologous bone alone.

The graft was protected with a collagen membrane (Biocollagen®, Bioteck Spa, Italy) obtained through advanced biochemical processing from type I collagen extracted from tendons of equine origin. It has a protection time of 4-6 weeks and is subsequently degraded by endogenous collagenases, leaving no residue.

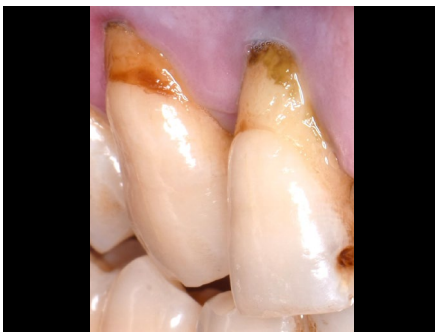

Fig. 1 *– Preoperative evaluation-occlusal view: note the edematous tissue around element 12 to be extracted.*

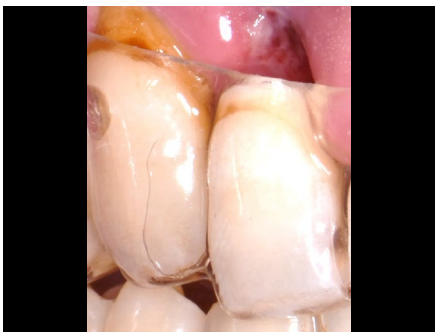

Fig. 2 *– Application of a transparent retainer containing the crown of the extracted tooth as a temporary aesthetic solution pending implant rehabilitation.*

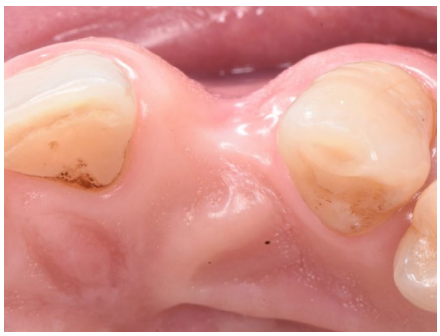

Fig. 3 *– Soft tissue healing at 4 weeks after extraction.*

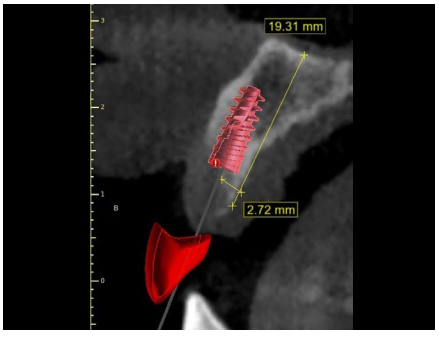

Fig. 4 *– Pre-surgical CBCT planning of implant insertion at 6 weeks after tooth extraction.*

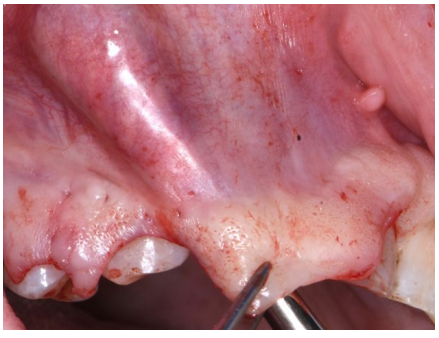

Fig. 5 *– Lip flap elevation: performing the Single Flap Approach on the incisal edge and occlusal surface with periosteal incision.*

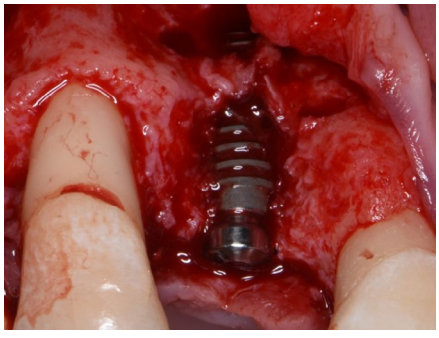

Fig. 6 *– Dental implant placement: the healing abutment was used instead of the screw to ensure vertical regeneration around the implant.*

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Results

The clinical case involved a male patient (52 aa) with no history of systemic disease and suffering from stage 4, grade B periodontal disease.
The right upper lateral incisor had severe type mobility (grade III). After initial periodontal therapy, it was decided to replace this tooth with a dental implant because the adjacent right upper canine had 3 mm gingival recession and 7 mm clinical attachment loss.
Due to the loss of buccal bone plaque and in order to obtain healthy soft tissue for the future flap, an early implant placement procedure was opted for (Type 2).
Following tooth extraction, the coronal portion was left in place with the help of a retainer to preserve the esthetic profile pending implant rehabilitation.
After about 4 weeks, excellent soft tissue healing was observed. The clinical and radiographic evaluations showed a three-dimensional bone defect compatible with implant placement. Implant rehabilitation (3.7 x 10mm) was then performed, and an *abutment* was placed to condition the soft tissue.
The exposed implant threads were covered with an initial layer of autologous bone and then with syringe granules of equine origin in order to preserve the bone volume.
The graft was protected by a collagen membrane, secured by periosteal sutures, and the flaps closed without tension. In addition, the recession at the canine level adjacent to element 12 was treated by the *Coronally Advanced Flap* technique.
Flap detachment was performed by periosteal release incision and thin partial-thickness dissection.
Meticulous cleaning of the root of the element was performed.
At 6 months after regeneration, repositioning of the flap on the palatal side was performed to promote soft tissue adhesion around the implant.
Final prosthesis was performed 6 weeks later. At 18-month follow-up, the soft tissues appeared stable around the implant with thick, healthy keratinized mucosa. Canine recession was found to be reduced to 1 mm with less than 3 mm of pocket depth.

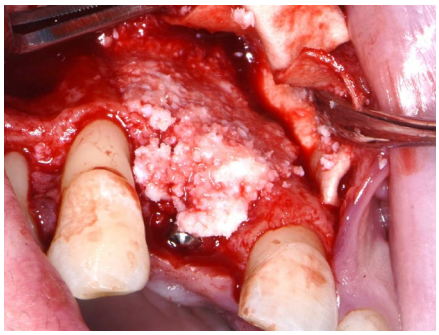

Fig. 7 *– Granules in syringe of equine origin are placed on top of the autologous bone layer in order to reduce graft resorption.*

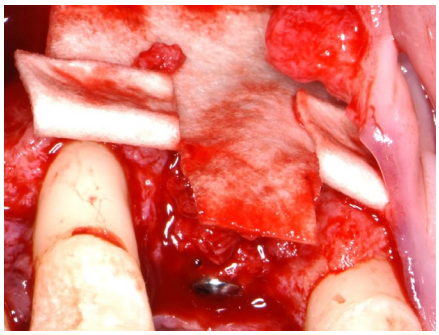

Fig. 8 *– Placement of the collagen membrane to protect the graft. The membrane was previously shaped to fit the geometry of the site.*

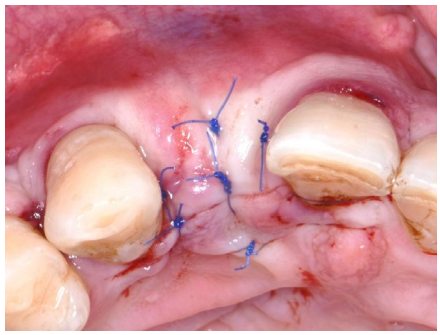

Fig. 9 *– Flap closure and healing by first intention.*

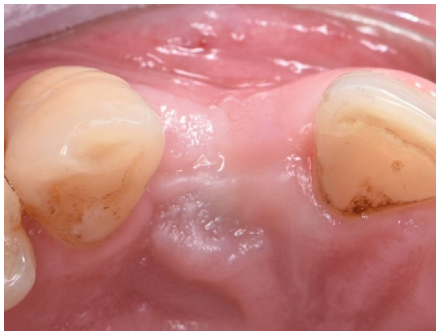

Fig. 10 *– Healing at 6 months after peri-implant regeneration. Excellent soft tissue thickening and increased bone volume is noted.*

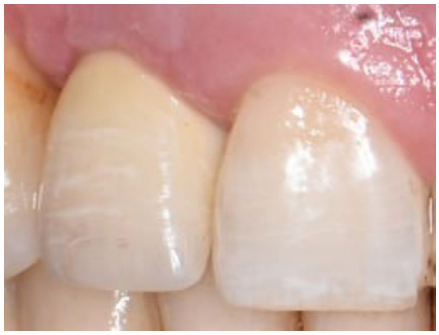

Fig. 11 *– Follow-up at 18 months after the regenerative procedure.*

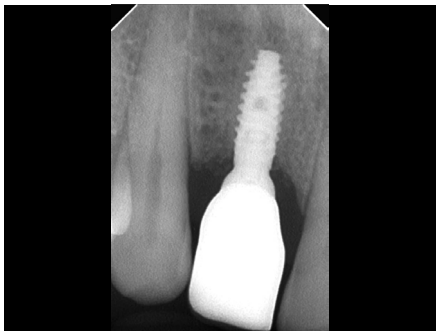

Fig. 12 *– Peri-apical radiograph at 18 months follow-up showing the complete regeneration of the bone graft, indistinguishable from the basal bone.*

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