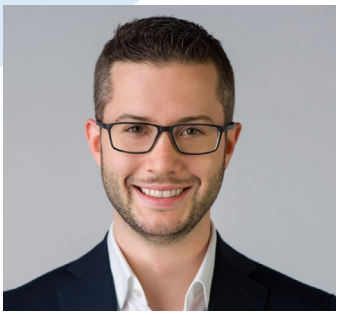
Dentistry

Clinical Sheet

GUIDED BONE REGENERATION USING BONE GRANULES AND FLEXIBLE CORTICAL LAMINA OF EQUINE ORIGIN

Bone augmentation using collagen-preserved bone granules and flexible cortical lamina.



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Following extraction of a tooth element, a reduction in the volume of the alveolar process occurs, leading to a narrower and shorter edentulous saddle than the original. Bone resorption continues over time, and the most significant vestibular contour loss occurs as early as the first 3 months after extraction. The latter is also accompanied by soft tissue contraction, leading to a significant cosmetic problem[1] . The most popular technique to avoid or limit the process of bone resorption and achieve a satisfactory esthetic result is guided bone regeneration (GBR). The use of collagen-preserved bone grafts is advantageous because they remodel with the patient's tissue and are physiologically recognized by cells deputed to bone remodeling. To ensure proper esthetic profile during the regeneration phase or in case of lack/damage of the vestibular cortical portion, reconstruction of a cortical bone layer with the use of flexible cortical bone laminae may be useful. These, once hydrated, remodel themselves by adapting to the patient's bone, acting as a support for new bone formation and providing long-lasting graft protection. In addition, the use of flexible cortical bone laminae is optimal not only for hard tissue but also as a support for soft tissue regeneration. Finally, the use of cortical bone laminae avoids the possible complications observed with the use of nonresorbable membranes.

1. Ten Heggeler et al. 2011 DOI: https://pubmed.ncbi.nlm.nih.gov/21091540/

Materials

Guided bone regeneration (GBR) surgery was performed using a cortical-cancellous granule bone graft of size 0.25-1mm (Osteoxenon® Cancellous Granules, Bioteck Spa, Italy), a flexible cortical bone sheet with a thickness of 0.5 mm (Osteoxenon® Flex Cortical Sheet, OSP-0X09, Bioteck Spa, Italy). The materials used are equine-derived, deantigenated through the ZymoTeck® process (Bioteck Spa) based on the use of lytic enzymes at low temperatures. In the case of bone grafts, this process preserves the mineral phase and bone collagen in native conformation. This promotes total remodeling of the graft with the patient's bone due to physiological recognition by cells deputed to bone regeneration. The Flex Cortical Sheet undergoes an additional partial demineralization treatment that makes it flexible once rehydrated. This makes it easily adaptable to the affected profile.

Fig. 1 *– Initial clinical situation with aesthetic defect of bridge 23-26.*

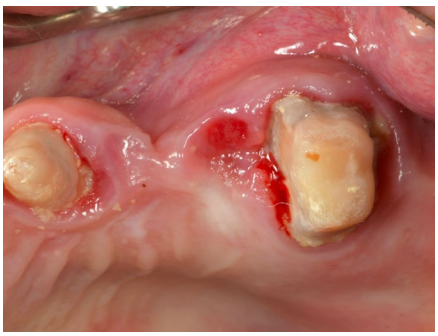

Fig. 2 *– Horizontal volumetric contraction of bone tissue at site 24-25 clinically visible following bridge removal.*

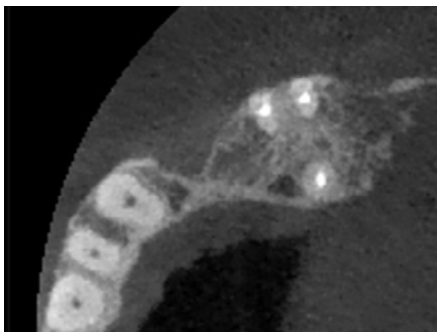

Fig. 3 *– CBCT examination showing horizontal bone loss.*

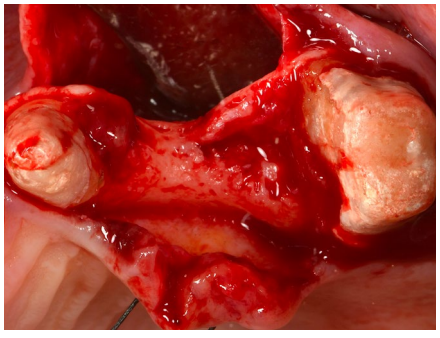

Fig. 4 *– Intra-operative image in which the extensive horizontal defect is appreciated.*

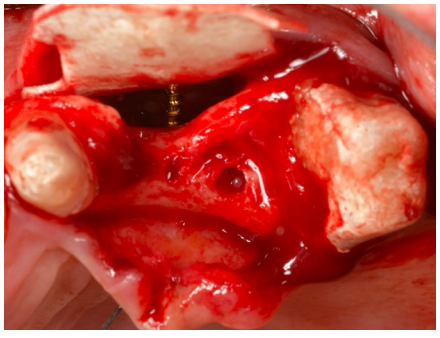

Fig. 5 *– Placement of the Flex Cortical Sheet, previously shaped and hydrated, fixed through the use of osteosynthesis screws.*

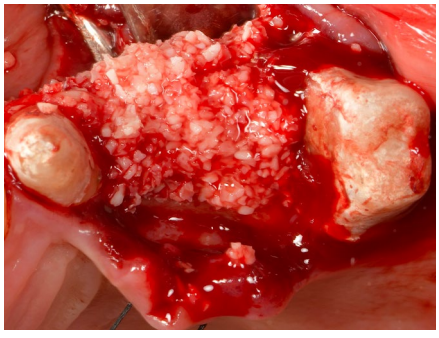

Fig. 6 *– Apposition of preserved collagen granules to fill the bone defect.*

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Results

The clinical case involves a 56-year-old patient who required a 23-26 bridge replacement for esthetic reasons. In order to ensure a proper esthetic profile and also to promote an easier cleaning of the prosthetic restoration, a solution with single elements, anchored to teeth and implants, was proposed. Clinical and radiographic examination by CBCT showed severe horizontal bone loss at sites 24-25, a condition that made it impossible to insert osseointegrated implants of standard diameter. Therefore, a treatment plan involving horizontal alveolar ridge augmentation using collagen-preserved bone grafts of equine origin was proposed to the patient. The primary focus was to restore the profiles lost as a result of extractions years earlier. The regenerative process was achieved with the use of a preserved collagen granular bone graft, protected by a 0.5-mm cortical lamina fixed with osteosynthesis screws. Post-operative Cone Beam CT (CBCT) showed filling of the defect and proper restoration of crestal volume by the use of equine bone granules and flexibility of the cortical lamina. A temporary bridge was fitted pending definitive implant rehabilitation.

Reopening, 6 months after regenerative surgery, showed the presence of mature bone, obtained by remodeling the granular graft and lamina in cortical bone with the patient's own bone. The regeneration time was found to be early given the large size of the defect. In addition, the use of the Flex Cortical Sheet avoided the possible complications related to the use of a non-resorbable membrane, and its remodeling allowed the correct crestal profile to be reestablished. The regenerated volume allowed the placement of two implants with diameters of 3.3 mm (element 24) and 4.1 mm (element 25).

Four months later, final zirconia prostheses were delivered, which went to meet the patient's initial request. The subsequent 2-years follow-up from the regenerative procedure confirmed the optimal recovered profile.

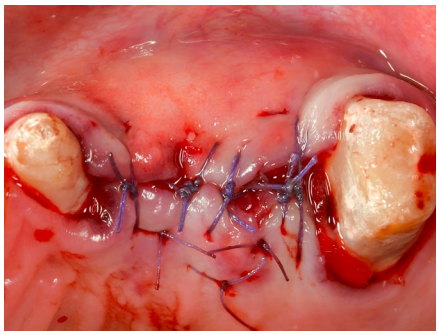

Fig. 7 *– Once the graft was protected with bone cortical lamina, the surgical wound was closed with resorbable PGA 5/0 sutures.*

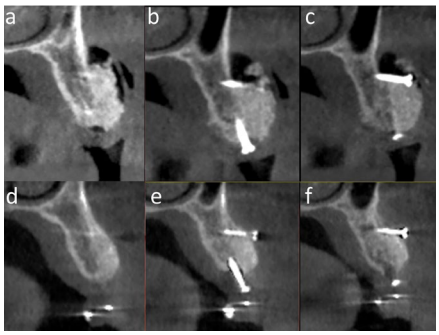

Fig. 8 *– Comparison of CBCT postoperatively (a,b,c) and 6 months after regeneration (d,e,f). It is possible to note the limited resorption of the graft and its perfect integration with the native bone.*

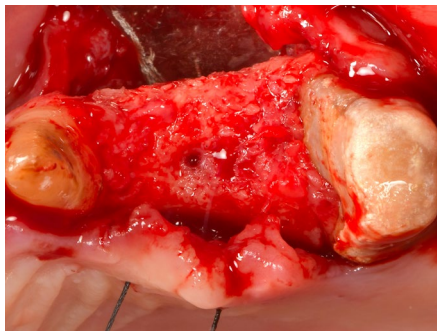

Fig. 9 *– Reopening 6 months after surgery showing the excellent bone regeneration achieved.*

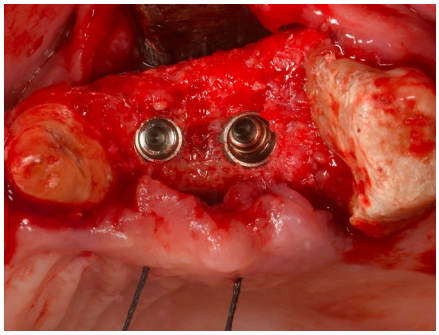

Fig. 10 *– Insertion of osseointegrated implants with a diameter of 3.3 mm (element 24) and 4.1 mm (element 25).*

Fig. 11 *– At 4 months after implant placement, the final prostheses, anchored to the teeth and implants, were delivered.*

Fig. 12 *– Final result of implant rehabilitation combined with GBR 2 years after surgery, highlighting the aesthetic improvement.*

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