Dentistry

Scheda Clinica

BONE REGENERATION SURGERY USING FLEXIBLE GRAFT OF EQUINE ORIGIN

Volumetric restoration by cortico-cancellous granules, flexible cortical lamina, and pericardium membrane.

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The use of osseointegrated dental implants for the treatment of partial or complete edentulousness caused by periodontal, endodontic disease or trauma is an essential solution for the improvement of patients' quality of life. However, the presence of adequate bone quantity and morphology at the implant site is necessary for a good long-term prognosis[1]. Guided bone regeneration (GBR) is a surgical technique involving the use of both resorbable and non-resorbable membranes associated or not with bone substitutes that allows restoration of proper bone volume. First, the membrane represents a protective barrier that prevents epithelial and connective tissues from interfering with the recruitment of mesenchymal cells that differentiate into osteoblasts, which are then responsible for the bone regeneration process[2]. Second, membranes have been shown to play an active role, promoting the recruitment of different cell types and leading to a significant local increase in growth factors related to tissue renewal and bone regeneration[1].
Among the biomaterials used for this purpose are flexible collagen-preserved cortical bone sheets, being of natural origin and totally biocompatible, suitable for providing proper protection and volumetric restoration of bone.

1. Elgali et al., 2017 https://pubmed.ncbi.nlm.nih.gov/28833567/

2. Wang et al., 2006 https://pubmed.ncbi.nlm.nih.gov/16569956/

Materials

Volumetric restoration surgery was performed by using a 0.25-1mm collagen-preserved cortical-cancellous granule bone graft (Osteoxenon®, OSP-OX31, Bioteck Spa, Italy), a 0.9 mm thick Flex Cortical Sheet (Osteoxenon® Flex Cortical Sheet, OSP-OX08, Bioteck Spa, Italy) and a pericardium membrane (Heart®, HRT-001, Bioteck Spa, Italy). All the biomaterials are tissue substitutes of equine origin treated with the innovative Zymo-Teck deantigenation process. The latter employs enzymes and low temperatures to remove all immunogenic components from equine tissues, while preserving the collagen and mineral component in native form. Specifically, Flex Cortical Sheet is further subjected to a partial demineralization treatment, which removes much of the mineral component and becomes flexible and elastic once rehydrated with saline or autologous derivatives.

Fig. 1 *– Evaluation of the initial clinical situation with significant horizontal volumetric contraction of the edentulous ridge at the tooth element 4.6.*

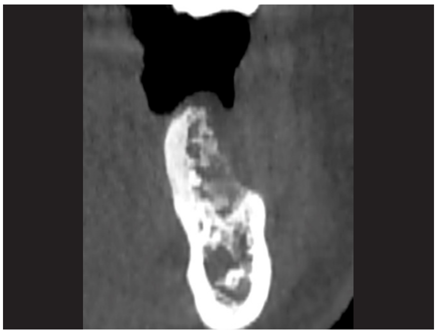

Fig. 2 *– CBCT analysis of area 4.6 where the horizontal bone defect is shown.*

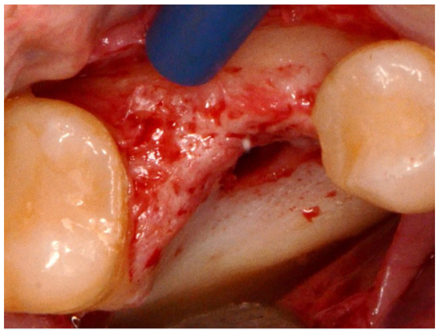

Fig. 3 *– Early intraoperative image showing the prominent horizontal defect.*

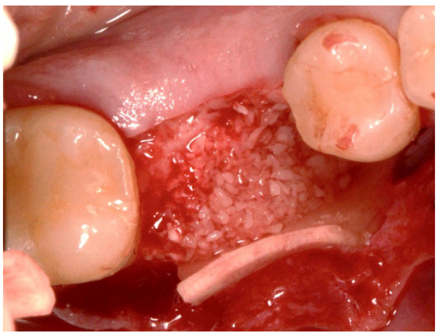

Fig. 4 *– Intraoperative image highlighting the grafting of the cortico-cancellous granules and placement of the Flex Cortical Sheet. Intraoperative image showing the Flex Cortical Sheet curved and positioned to cover the graft site.*

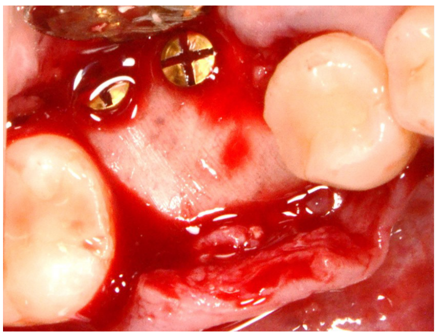

Fig. 5 *– Flex Cortical Sheet shaped and positioned to cover the graft site and stabilized by pins and fixing screws.*

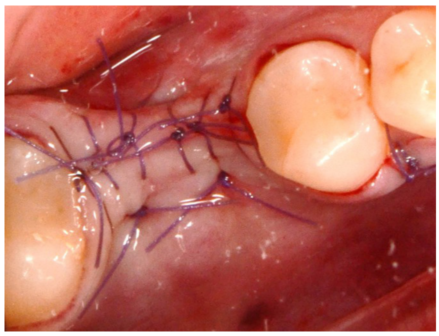

Fig. 6 *– Intraoperative image detailing surgical wound closure with 5/0 resorbable sutures.*

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Results

The clinical case involved a patient with significant horizontal volumetric contraction of the edentulous ridge in the area of element 4.6 following tooth element avulsion due to extensive periapical lesion.
Analysis of the initial clinical situation was performed by three-dimensional radiographic investigation using mandibular *Cone Beam* CT (CBCT). Both CBCT sections and three-dimensional volumetric reconstruction showed the major bone defect at tooth element 4.6.
Bone regeneration surgery using biomaterials was evaluated with the aim of restoring an ideal profile of the edentulous ridge to allow a subsequent implant rehabilitation.
The procedure began with making the primary incisions in area 4.6 to expose the horizontal bone defect, followed by grafting the site with collagen-preserved equine-derived cortical-cancellous mix granules.
The Flex Cortical Sheet was then properly placed at the graft site, curved to cover the area, stabilized by pins and fixation screws, and finally covered with a pericardium membrane. The flap was then closed with 5/0 resorbable sutures. A CBCT radiographic control was performed immediately after surgery showing proper placement of the graft and flexible cortical sheet to correct the initial volumetric contraction.
Suture removal at 14 days after surgery showed optimal tissue maintenance and proper healing of the site. Subsequent clinical follow-up at 30 days after the bone regeneration operation showed the excellent clinical appearance of the tissues and clear improvement of the horizontal bone defect at site 4.6.
At 6 months, implant placement was performed. Radiographically and clinically, the excellent quality of newly formed bone with complete remodeling of tissue substitutes used in the patient's bone was visible. At 5 months after implant placement, the excellent appearance of the soft tissue was noted and the final zirconia prosthesis was delivered. Endoral X-ray confirmed the excellent bone regeneration achieved.

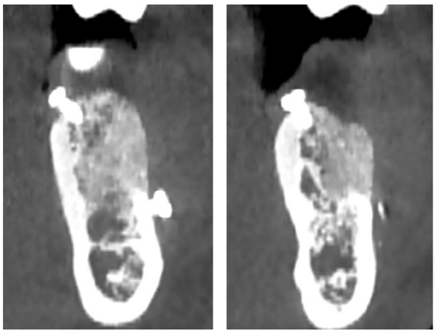

Fig. 7 *– Postoperative radiographic control. CBCT sections of area 4.6 show the correct placement of the grafts.*

Fig. 8 *– Control at 6 months after surgery. Note the excellent clinical appearance of the soft tissue at the graft site.*

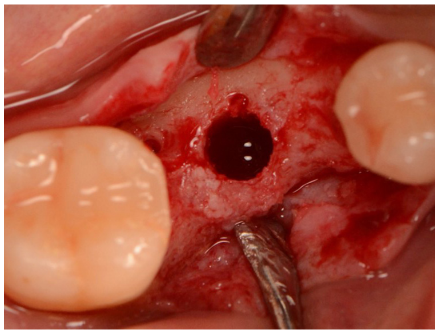

Fig. 9 *– Implant site preparation.*

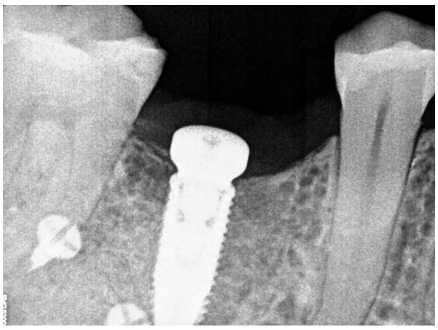

Fig. 10 *– Postoperative radiography of implant placement.*

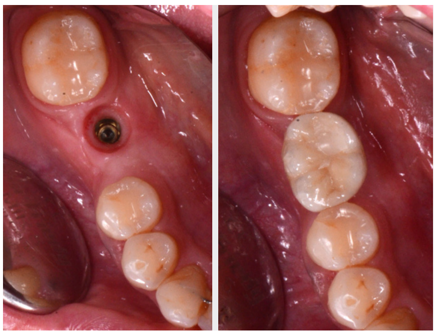

Fig. 11 *– Left, soft tissue appearance at 5 months after implant placement. Right, occlusal view of the final zirconia prosthesis.*

Fig. 12 *– Rx at 5 months after implant placement showing remodeling of the bone graft with patient bone and the excellent osseointegration of the implant.*