



ORIGINAL RESEARCH PAPER

Periodontology

BONE REGENERATION WITH BIOMATERIALS AND COLLAGEN MEMBRANE: CASE REPORT

KEY WORDS: bone regeneration, xenografts, biomaterials, barriers. (MeSH DataBase)

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| ABSTRACT | Introduction: Bone regeneration represents an important alternative in the management of bone defects, however, the handling of the materials used is of care and represents a structured protocol. Animal origin materials are a viable alternative when sowing bone tissue; but this theory still need to be supported. |
| | Case report: 45-year-old male patient attends a dental consultation, the clinical examination shows dental calculus and periodontal affection, multiple recessions were found, in the Cone Beam tomography advanced bone loss in the anterior-inferior sector is detailed. The procedure consisted of a hygienic phase and a surgical phase where materials of bovine origin were used to correct bone defects. |
| | Results: After the intervention, was shown, achieving a much more acceptable bone volume that allows stability and resistance. |
| | Conclusions: Animal origin materials are effective in the process of bone regeneration, easily accessible in the market and they minimize the interventions in relation to autologous grafts. |

INTRODUCTION

Bone regeneration is widely used in the field of dentistry in cases where a considerable amount of bone has been lost and it is necessary to recover this tissue, either to prolong the time of the dental organs in the mouth, or to create a bone area much more stable that allows, subsequently, the placement of implants, having a much more dense cortical and less prone to fractures. Bone defects can have different etiologies, whether traumatic, infectious or induced by medications or systemic conditions like tumors, among others (1).

According to Goldman and Cohen in 1958, periodontal bone defects are classified as supra-osseous defects, infra-osseous defects and inter-radicular defects. Nowadays different surgical techniques are employed in order to increase bone volume and within them is guided bone regeneration (GBR), which is based on the use of barriers or membranes to prevent osteoinductive cells from invading other tissues that are not going to be treated (2), said membranes come from different origins, which can be natural, synthetic or animal; likewise, these are classified as resorbable, non-resorbable, with or without titanium reinforcement.

Despite the diversity of existing materials, autologous bone grafting is considered the gold standard since, with this, osteoinduction is achieved without triggering any undesired immune response (3), which makes the success of regeneration predictable. The objective of this procedure is that, when new bone is sown in an affected area, angiogenesis processes are triggered, where the activation of the matrix metalloproteinases and the endothelial growth factor allow the remodeling of the bone tissue and the stimulation of osteoblasts, respectively, achieving bone regeneration (4), however, it should be noted that this is a complex process that involves a variety of reactions, which together result in adequate bone remodeling.

Another alternative for regeneration is platelet-rich fibrin, formerly known as platelet-rich plasma; this procedure consists in extracting blood from the patient's antecubital vein with an immediate centrifugation without adding anticoagulants to obtain a solid fibrin biomaterial that helps in the repair and regeneration of the tissue (5,6), this alternative could suppose an

additional positive characteristic due to the nature of the material, remembering that platelets are rich in cell growth factors, thus favoring angiogenesis and tissue remodeling.

The importance of the present case is established from the perspective of the biological rationalization of xenografts in modern guided bone regeneration.

The objective of this clinical case is to present a clinical case in which GBR was used, to create an adequate thickness of the alveolar bone that would preserve the dental organs and prepare the area for future interventions.

Patient Information

A 45-year-old male patient attended a dental consultation for presenting discomfort in the lower anterior section of the jaw due to recessions and dental mobility, also referred sensitivity when eating cold food, did not report personal or family medical history of importance, denied suffering any pathologies such as hypertension, diabetes, arthritis, among others. He expressed to carry healthy lifestyle.

Clinical Findings

During the intraoral clinical examination, supra gingival dental calculus was observed in the lower anterior sector, gingival recession in multiple areas, and significant bone loss was observed mainly in the aforementioned sector. (Image 1)



Image 1.

Initial state of the patient is observed, bone loss in the lower anterior section, loss of interdental papillae, multiple recessions, exposure of 2/3 of the root in tooth #41 and a thin hard lamina.

Imaging

A Cone Beam Computed Tomography was performed, which showed bone loss with greater prevalence at the level of teeth #41, 31, 32, 33 with a thin alveolar table (Image 2). Laboratory tests were ordered, including complete blood count, fasting blood glucose, thromboplastin time, prothrombin time and partial urine, finding normal results.

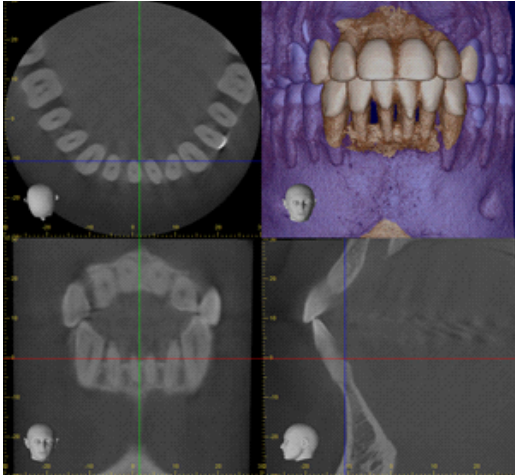


Image 2.

Cone Beam Computed Tomography showing bone loss, alveolar bone decreased in thickness and height, no adequate bone support is seen in the dental organs.

Once the treatment plan was explained, which consisted in carrying out a hygienic phase to subsequently start a surgical phase; the possible complications were indicated and after signing the consent, the proposed procedures were carried out.

Therapeutic Intervention

Root planing and scaling was performed using a Cavitron, recovery of gingival tissue was expected, after this, the surgical procedure of bone regeneration was programmed using bone of bovine origin plus a resorbable membrane of bovine origin; for this procedure, the patient was anesthetized with 2% Lidocaine using the Seldin incisive technique and infiltrative technique with a palatal reinforcement, then it was proceeded to lift a Newman flap with full thickness, detoxification of the roots was performed with cotton rolls previously embedded with tetracycline, when removing them the area was rinsed with water, then the bone graft was deposited in the area to be regenerated and the membrane was placed between the connective tissue of the flap and the bone graft, finally it was sutured with Vicryl 4.0 and surgical cement was placed. (Image 3 and 4)



Image 3



Image 4

For pain management, the patient was prescribed diclofenac sodium injected every 12 hours for pain, amoxicillin in tablets of 875 mg every 12 hours and the use of ice was recommended for 24 hours with 10-minute intervals, soft diet, no physical activity was allowed. The postoperative period was good, excessive bleeding was not generated, the gingiva was observed pink, without indications of infectious processes, a constant and increasing volume of the bone table has been maintained. (Image 5)



Image 5

DISCUSSION

Barrier membranes help to stabilize the graft materials and to maintain the blood clot, the first biological interaction with the tissue is the adsorption of plasma proteins at the membrane-tissue interface, which have the potential to attract specific growth factors and progenitor cells that play a fundamental role in regeneration (7). This is what is sought when using membrane in the present case, in addition to keeping the osteoconductive and osteoinductive process isolated in the specific area of the bone defect.

The use of a certain type of membrane or technique for bone regeneration depends on the specific case of each patient, emphasizing that xenografts or allografts are preferable before autologous grafts in those cases where the area to be treated is very extensive, which implies a very large intervention to extract the bone to be implanted or in situations where patients have a deficit in the healing process (8).

GBR is widely used in Dentistry to improve bone defects and increase the volume of alveolar bone; Gómez V et al., showed successful results in a case of regeneration of alveolar defects using an alloplastic graft of b-tricalcium phosphate as filling material, obtaining the required bone neoformation (9), agreeing with the authors of the present case where they obtained a positive result, where an increase in bone volume was observed.

On the other hand, the use of membranes, either as a coadjuvant or used individually for the improvement of bone defects, has a positive impact on regeneration, as shown by Majluf I et al., in their study, where they placed titanium implants in collapsed ridges using a non-biodegradable aluminum oxide membrane, which was removed at 14 weeks and found the presence of bone neoformation tissue, as well as the increase in the dimensions of the ridge (10), agreeing with the increase in the volume of alveolar bone in the present case; it is necessary to clarify that despite the type of membranes used were different, satisfactory results were obtained, which indicates that the biomaterials have good results in terms of bone regeneration.

CONCLUSION

Regeneration biomaterials of bovine origin were successful in the present case, generating bone formation, which allowed to gain thickness and height of alveolar bone, proving to be effective for bone repair and regeneration of the treated patient.

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