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Guided bone regeneration by porcine collagen membrane: A case report

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Abstract

Guided bone regeneration is the surgical technique developed to increase the volume of alveolar bone in the area where an implant will be placed, through the use of physical barriers that allow the proliferation of progenitor tissue cells in the defect excluding soft tissue cells. The objective of this case report is to report the surgical management of a female patient with a defect of the mandibular alveolar ridge class C (Misch & Judy) through guided bone regeneration with a resorbable porcine cross-linked collagen linked membrane and particulate porcine xenograft. Results: After 6 months of healing, an increase of 3.01mm in the horizontal direction was observed, being an adequate volume for the placement of implants.

Keywords: Guided bone regeneration, bone graft, particulate porcine collagen membrane

1. Introduction

Periodontal disease is a progressive chronic inflammatory process of bacterial origin, which destroys the supportive periodontal tissues [1]; being the main cause of tooth loss in the Mexican population with a prevalence of 78% in adults over 60 years [2].

The potential of the periodontium to regenerate itself is limited [3, 4]; however, nowadays surgical procedures are being carried out to achieve the increase of alveolar ridges that have been lost as a result of periodontal disease [5].

Currently there are therapeutically oriented classifications for the diagnosis of hard and soft tissue defects that guide us to choose the most predictable approach [6]. Guided bone regeneration (GBR) is the surgical technique developed to increase the volume of alveolar bone in the area where an implant will be placed or around previously placed implants [7], through the use of physical barriers that allow the proliferation of progenitor tissue cells in the defect excluding the soft tissue cells [8].

The aim of the present study is to report the surgical management of a patient with an alveolar ridge defect class C (Misch & Judy) by GBR with a resorbable porcine cross-linked collagen membrane and particulate porcine xenograft.

2. Case Report

A 73-year-old female patient attended the Graduate Periodontics Program, School of Dentistry, Universidad Autónoma de Nuevo León, with the chief complaint "I want to recover my teeth". In the medical history the patient does not report any systemic disease, as well as being under any medical treatment, therefore it was classified as an ASA I patient [9].

Within her dental history, the patient has a fixed partial denture from 1.7 to 2.7, 3.5 to 3.7 and an acrylic provisional from 3.3 to 4.3 due to dental extractions performed approximately 5 years ago due to periodontal disease.

The intraoral examination revealed clinical attachment level (CAL) loss, periodontal pocket depth > 5mm and grade I mobility in 3.1, as well as dentobacterial plaque, gingival inflammation and bleeding on probing (Fig. 1).

In the radiographic analysis, advanced localized bone loss in 3.1 and 4.5 was found, and a horizontal bone defect in the anterior inferior sextant, which was evaluated by a cone beam computed tomography (CBCT). A length of 16.67 mm in the horizontal direction and a ridge

of 5.82 mm were found in the coronal part of the edentulous zone and 10 mm in the base of the alveolar ridge (Fig. 2).

Due to the clinical and radiographic findings, it was diagnosed as localized advanced chronic periodontitis localized in 3.1 and the presence of mucogingival deformities in edentulous ridges class C of Misch & Judy^[10].

Due to the mucogingival deformity around edentulous ridges, GBR was performed in 3.3 to 4.3 with extraction of 3.1. A crestal incision was made and a full thickness flap was reflected, 3.1 was extracted and a resorbable membrane of cross-linked porcine collagen (Ossis®) of 25 x 30 mm was placed, to later place a particulate porcine xenograft (Inteross®). The membrane was fixed by periosteal and sling sutures with 5-0 chromic cat-gut and 5-0 polyglycolic acid (Fig. 3). 500 mg of amoxicillin was prescribed every 8 hours for 7 days and 400 mg ibuprofen every 6 hours for 5 days, as well as 0.12% chlorhexidine gluconate rinses twice a day for two weeks.

The sutures were removed at 14 days, a stable gingival tissue was found and without complications. The CBCT was indicated at six months, where a horizontal increase of 3.01 mm was found, with a good capacity of structural resistance of the membrane to the proliferation of soft tissue (Fig. 4).

3. Discussion

Bone, cement, gingiva and periodontal ligament are structures with an unique composition and architecture; together they maintain the function of the oral cavity. The balance of these tissues determines the state of health, destruction, repair or regeneration of the periodontium.

The etiology of periodontal disease works as a coordinated and metabolically integrated microbial community, together with the response of the host results in bone destruction patterns, with the greatest consequence is tooth loss^[6].

After the loss of dental organs, the alveolar process atrophies due to the lack of stimulation and a vertical and horizontal bone resorption occurs^[5]. The defects of the edentulous ridge can be classified according to the type of tissue that it affects, whether hard or soft tissues (Seibert, Allen *et al*, Lekholm & Zarb, Misch & Judy)^[11].

The placement of implants in a two-step technique is indicated when there is a combined ridge defect, which compromises the primary stability of the implant due to bone tissue deficiency^[11]. In this case, GBR was performed following the "PASS" principles^[12] to ensure the success of the surgical technique, emphasizing a full-thickness tension-free flap^[13]. A collagen membrane (Ossis®, Volumax) was used to promote the adhesion and proliferation of cells, thus excluding the epithelium. This membrane is degraded in 24 weeks, where Capri *et al*, demonstrated evidence of the membrane at 9 months. Neiva *et al*, reported in a series of cases the bone formation in the twelfth week of the placement of the membrane in an extraction site^[7].

Ferreira *et al*, mentions that a disadvantage of collagen membranes is their loss of structure in wet conditions, however in the results obtained according to the CBCT images at 6 months a horizontal increase of 3.01 mm is observed, with a good potential of structural resistance of the membrane to the proliferation of soft tissue^[5].

3.1 Figures



Fig 1: Initial Clinical Photographs.

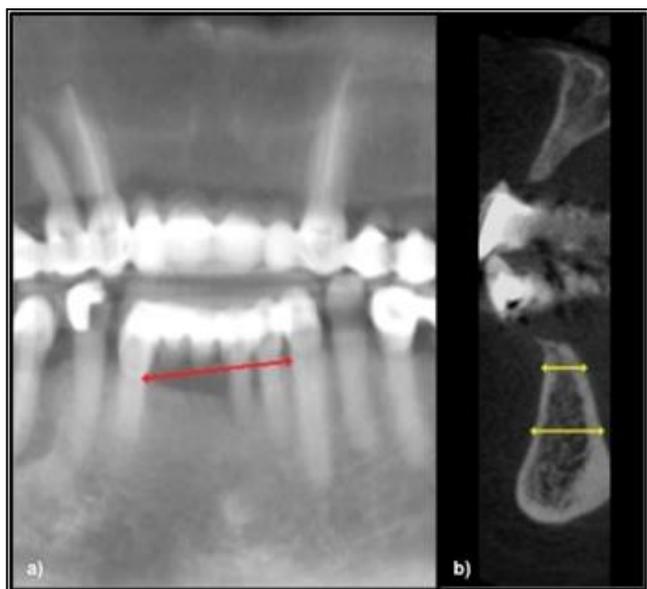


Fig 2: Initial CBCT. a) Measurement of 16.67 mm horizontally, b) Measurement of 5.82mm in the coronal part of the edentulous zone defect.

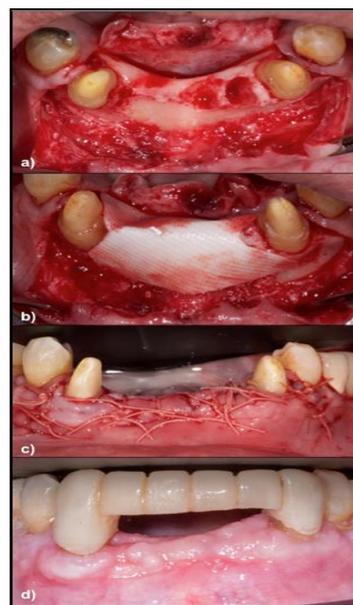


Fig 3: GBR. a Initial photograph, b Ossix Plus® membrane placement, c Suture, d Healing at 15 days with immediate provisional.

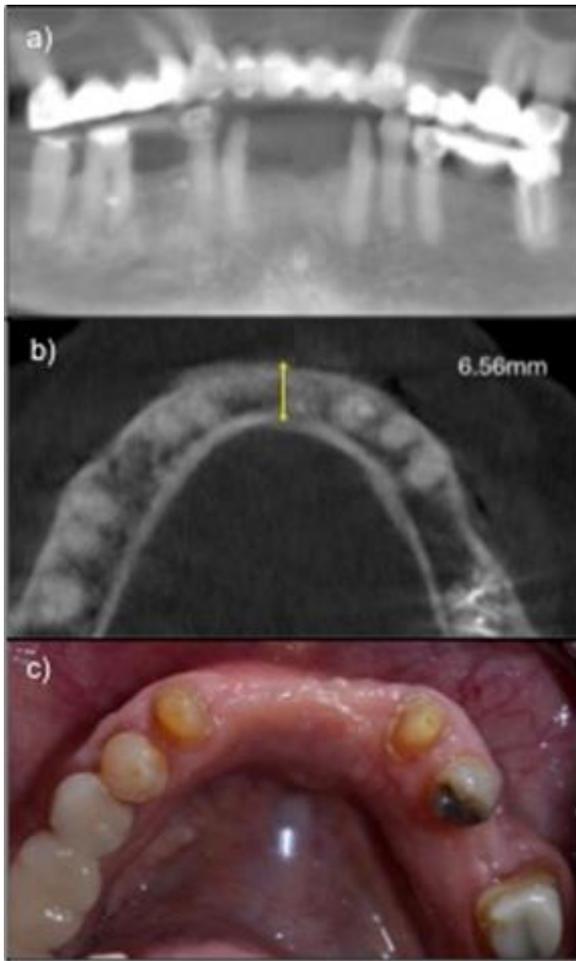


Fig 4: Clinical and imaging results at six months. a) and b) CBCT with a measurement of 6.56 mm in vestibulo-lingual direction. c) Clinical photograph showing an increase of the alveolar ridge with stability of the soft and hard tissues.

4. Conclusions

The correction of ridge defects by surgical procedures such as GBR is a predictable technique if the defect characteristics are met, with an appropriate selection of biomaterials and a positive host response. The use of a resorbable porcine cross-linked collagen linked membrane and particulate porcine xenograft together with a xenograft is an alternative for horizontal ridge reconstruction.

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