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Case Report

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Guided Bone Regeneration in Post-Extraction Socket with Partial Absence of Vestibular Table and the Use of L-PRF

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Abstract

The use of autologous blood components, specifically fibrin fragment, which is found polymerized in the form of a clot and in liquid state-monomeric when combined with granulated biomaterials, creates a mineralized compound through agglutination in a fibrin matrix. This combination has a beneficial effect by providing multiple advantages, such as improving predictability of results and reducing complications.

Objective: *Promote regeneration of bone and soft tissues through the application of L-PRF (Platelet-Rich Fibrin) with the aim of preparing the site for future implant placement. The case of a 20-year-old female patient with an extensive periapical lesion and partial absence of the vestibular table in the upper left lateral incisor is presented. Extraction and regeneration with sticky bone and L- PRF were performed.*

Result: *Optimal soft tissue healing, and regeneration developed.*

Keywords: Guided Bone Regeneration, L-PRF, Sticky Bone, Tooth Extraction, Implant, Bovine Bone.

Introduction

Tooth extraction can lead to resorption of the bone crest, which causes notable changes in the soft tissues and alveolar bone. This can compromise aesthetics and hinder subsequent dental rehabilitation. The buccal bone morphology-based classification of extraction socket and related treatment decision tree proposes three types of socket based on buccal bone morphology (intact, dehiscence, and fenestration) [1]. In this way, the surgeon can be guided towards a more conservative and predictable treatment. By understanding the quantity and quality of the remaining alveolar bone, the surgeon can determine if bone-sparing techniques are necessary or if immediate implant placement is possible. This classification helps to personalize the surgical approach and increases the predictability of results, thus optimizing esthetics and facilitating future dental rehabilitation (Fig 1). Reconstructive processes through bone grafts have become very common procedures in dental practice because they provide a rigid, mineralized and slowly reabsorbed framework that, together with blood elements, creates an ideal microenvironment for neovasculogenic and the accommodation of undifferentiated cells that direct new bone formation. In the evolution of the methods for obtaining platelet aggregates, new authorial methodological concepts were consolidated from the PRF Choukroun Process™. The Intraspin L-PRF™ method "Leukocyte – platelet rich fibrin" due to its composition of leukocytes [2]. This new generation of platelet and immunological concentrates with simplified processing and without biochemical manipulation of the blood represents an important advance in regenerative medicine [2]. As the addition of anticoagulant in the samples is not necessary, the obtained autologous leukoplatelet fibrin membrane results from a natural and progressive polymerization that occurs during centrifugation and provides an equilateral organization of the fibrin network, giving the biomaterial greater resistance and potential to promote efficient cell migration [2]. The migration and attachment of important cells at the surgical site, together with the long-term release of platelet growth factors that adhere to the fibrin fibrils during membrane harvesting, provide an enhanced local repair effect. These cells and growth factors play a crucial role in the healing process and tissue regeneration. By promoting the migration and attachment of these cells and the controlled release of growth factors, more effective repair is promoted in the surgical area, which may improve clinical outcomes [2].

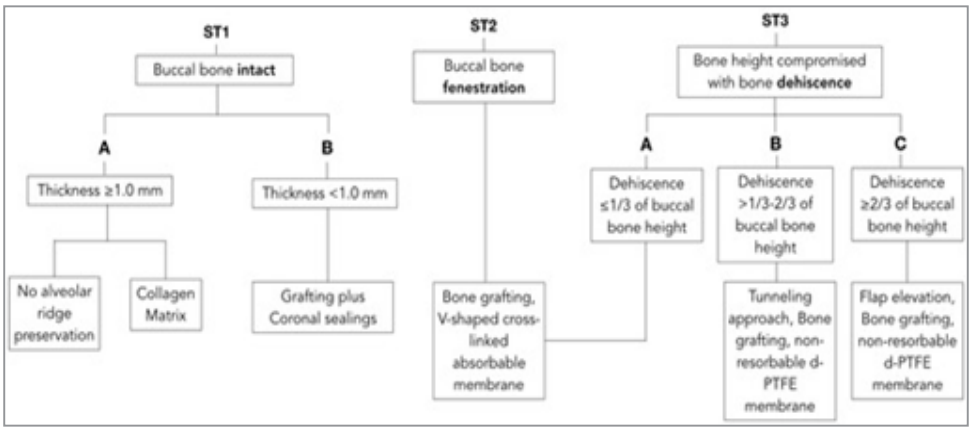

Figure 1: Decision tree matching anatomical features with suggested treatment options. Unassisted healing and most documented techniques for alveolar ridge preservation have been related with the ST Classification. Each clinical scenario is correlated with the most suitable treatment approach to allow maximum regenerative potentials with the most conservative intervention [1].

Clinical Case

A 20-year-old female patient presented with a dental history of dens in dens and retreatment of the upper left lateral incisor Fig. 2. The clinical history reveals a good state of health with no systemic history or smoking. The tomographic examination reveals great bone loss around the piece and partial absence of the vestibular table. Clinical procedure was initiated with the debridement of the lesion of the piece 2.2. Four tubes of blood were collected from the patient to place them in the centrifuge and obtain the L- PRF [2]. The lesion was cured with the Lucas curette in order to remove all the granulomatous tissue (Fig. 2a). The defect was classified as ST3-A, being a dehiscence that extended less than 1/3 of the length of the buccal bone wall [2]. Vertical incisions were avoided in order not to extend the flap too much towards the coronal area and cause an aesthetic defect when moving the mucogingival line. A full thickness crestal incision was made into the grooves of the neighboring teeth using a #15 scalpel blade. The mucoperiosteal flap was separated. Bovine bone graft (Miner Oss - cortical) 0.5 gr particulate material was placed to fill the alveolus by mixing with a polymerizable matrix of autologous fibrin still in liquid phase, resulting in "sticky bone" or "sticky bone". A 25x25 bilaminar collagen membrane (Geistlich Bio-Guide ®) was adapted, cut and then placed over the dehiscence while it was still protruding from the alveolus, covered with PRF membrane. 5-0 Nylon (Monofilament Nylon-Vital) sutures were placed from the buccal to the palatal flap to secure the membrane Fig.3. Postoperatively, Amoxicillin 500mg every 8h for 7 days and Eterocoxib 120mg every 24h for 3 days, and mouthwashes with chlorhexidine were prescribed. Maryland-type provisional were place 1 week later.

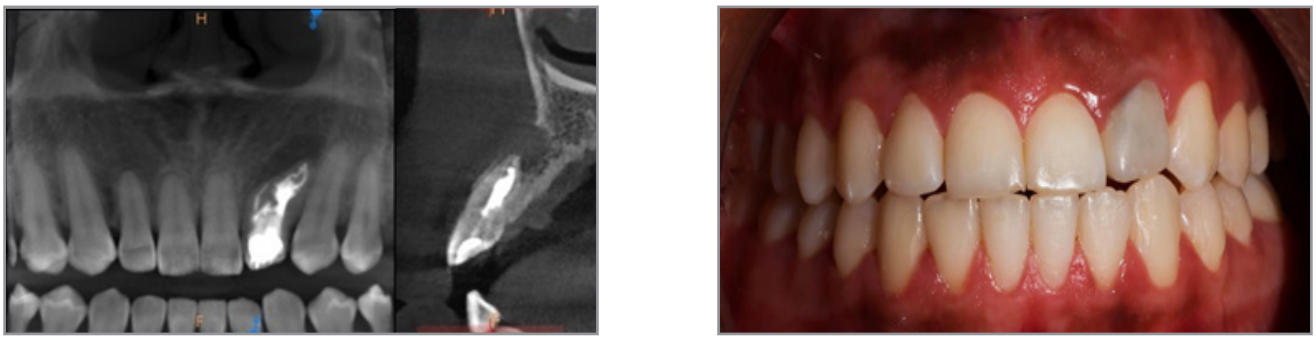

Figure 2: Preoperative photographs

Figure 3: a. Minimally traumatic extraction, the anatomy of the alveolus showed dehiscence of the vestibular bone. b. Placement of bone graft with autogenous fibrin. c, d, e. Placement of resorbable collagen membrane. f. Coating with PRF membrane. h. Suture.

Figure 4: Post-operative period and provisional placement Maryland type (1 week). Tomographic photography

Results

Optimal healing and regeneration of soft tissues was developed.

Discussion

The discontinuities of the buccal bone, such as fenestrations or dehiscence's, significantly increase the risk of complications, especially in cases of advanced rehabilitation. Guided bone regeneration represents a well-established procedure for bone augmentation, and it can be carried out using several kinds of membranes and grafts [2]. The purpose of these membranes is to prevent soft tissues from invaginating, which helps stabilize volume and provides cellular occlusion properties. Once the membrane is placed, the growth of local blood vessels allows for the recruitment of migratory mesenchymal stem cells to the surgical site and the surface of the membrane. These cells then multiply and differentiate into mature osteoblasts, which are responsible for bone matrix formation. This process is essential during the bone regeneration process. Tissue engineering is the use of a combination of multidisciplinary approaches with the goal of improving or replacing biological tissues and has a great application in reconstructive surgery procedures such as bone augmentation [6]. The essential elements required are osteoconductive scaffolds, osteoinductive growth factors, and progenitor cells [7]. In the case of ST2-A, the use of an absorbable collagen membrane in the lining of the alveolar bone to cover the bone graft is suggested as it shows slower resorption rates. Depending on their origin, bone graft materials have different properties that define their viability in bone formation. Xenogeneic bone graft is the material of choice for maintaining long-term crest dimensions [2]. Guided bone regeneration with particulate graft material and resorbable collagen membranes is an effective technique for ridge augmentation or simultaneous dental implant placement. [5]. Bovine bone (DBB) is among the most widely used bone substitutes in dentistry; DBB is osteoconductive, provides a scaffold for new bone formation and facilitates space provision. Successful outcomes after DBB use, also on the long term, have been reported in numerous studies and for various indications, e.g., one- or two-stage maxillary sinus floor elevation procedures, lateral and vertical bone augmentation, and post-extraction alveolar ridge preservation [8-11]. Moreover, the choice of bone graft to be used will depend greatly on the expected timing of implant surgery, the dentist's preference, and material availability. The association of liquid-phase fibrin with particulate biomaterials for grafting and obtaining a mineralized composite in a fibrin matrix is a reproducible method, favoring the reparative and angiogenic response.

Conclusions

Thanks to the use of PRF (fibrin-rich plasma) and advances in bone graft techniques, now we can access growth factors in a more accessible way, thus accelerating the natural processes of bone and tissue regeneration. This allows us to prepare the area for the subsequent placement of an implant more efficiently. It is important to consider the anatomy and select the best treatment option. During the postoperative period, accelerated soft tissue healing has been observed, which has allowed placement of a provisional prosthesis one week after surgery. No discomfort or pain has been reported in the patient. Similar results are expected in terms of guided bone regeneration and prompt implant placement. The application and handling of autologous leukoplatelet fibrin membranes has been shown to be a technique of low complexity.

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