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ORAL–SURGICAL TREATMENT OF PERIODONTAL POCKET WITH GUIDED BONE AND SOFT TISSUE REGENERATION

Biljana Evrosimovska[1], Ivana Pop Janeva [2], Bojana Pop Janeva [2], Bruno Nikolovski[1]
[1] Department of Oral Surgery and Implantology, University Dental Clinical Centre St. Pantelejmon, Faculty of Dentistry, Ss. Cyril and Methodius University in Skopje, R.North Macedonia
[2] Private practice Pop Janevi – Skopje, R. North Macedonia

Abstract

Periodontal disease is defined as a complex, multifactorial disease characterized by the loss of connective tissue attachment with destruction of periodontal tissues. The aim of periodontal therapy is to eliminate inflammatory process, prevent the progression of periodontal disease and also to regenerate the lost of periodontal tissues.

Loss of the bone support by creating a periodontal pocket is one of the most common cause of tooth extraction. Their treatment can be conservative and surgical.

The purpose of this paper is to demonstrate the treatment of infrabony periodontal defects with bone and soft tissue regeneration.

On periodontal examination and radiographic evaluation, the female 56-year-old patient presented with an infrabony defect extending up to apical third of the mesial side of the right maxillary second molar with a probing depth of 8 mm.

After conservative periodontal treatment, oral surgical intervention was performed including open flap debridement and filling the defect with xenograft and plasma rich fibrin.

The application of xenograft and Plasma rich fibrin resulted in bone regeneration of the defect and successful fixed prosthodontic solution.

Guided bone and soft tissue regeneration using xenograft and fibrin-rich plasma gives successful radiological and clinical signs of bone augmentation and consolidation of defects caused by loss of tooth attachment.

Keywords: periodontal pocket, xenograft, PRF.

Introduction

Periodontal disease is a chronic infection of the periodontium that affects the soft and mineralized tissues surrounding the teeth (Hajishengallis and Lambris, 2012).The extent and the severity of alveolar bone loss in the dentition are usually assessed by a combination of radiographic and clinical means and are important adjuncts to the clinician in the diagnosis, treatment planning, and assessment of prognosis of the periodontal patient [1].

Classically, periodontal defects have been differentiated based on bone resorption patterns into “supraosseous” (“suprabony”) and “infraosseous” (“infrabony”) (Goldman&Cohen, 1958) [1]. These authors defined suprabony defects as those where the base of the pocket is located coronal to the alveolar crest. On the other hand, infrabony defects are those with apical location of the base of the pocket relative to the bone crest.

New attachment of periodontal tissues can be obtained following surgical treatment of intrabony pockets. There are several available surgical treatments for infrabony defects, including: 1. open flap debridement in which the gum is lifted back surgically in order to clean the deep tartar; 2. bone graft in which a portion of natural or synthetic bone is placed in the area of bone loss; 3. guided tissue regeneration

in which a small piece of membrane-like material is placed between the bone and gum tissue in order to keep the gum tissue from growing into the area where the bone should be; and 4. the use of enamel matrix derivative, a gel-like material which is placed in the area where bone loss has occurred and promotes its regeneration [2] .

In order to accelerate the healing process, autologous platelet concentrates have been recently used. A large number of studies have evaluated the effect of periodontal regeneration for infrabony defects and shown positive clinical and radiographic outcomes, as well as histological evidence of new cementum, periodontal ligament and alveolar bone regeneration.

To day flap procedures with complete surgical opening to the defect and removal of all soft material from the intrabony lesion often followed by bone transplantation constitute the accepted approach to obtain a new connective tissue attachment [3].

Recent approaches for the treatment of infrabony defects, combine advanced surgical techniques with platelet-derived growth factors [3]. With the advancements made in platelet formulations over the past decade, PRF has recently been introduced and utilized as a supra-physiological concentration of autologous growth factors without necessitating the use of anticoagulants.

The additional fibrin network has further been shown to serve as a space-making provisional matrix supporting angiogenesis and blood clot formation within periodontal pockets. Platelet-rich plasma (PRP) and platelet-rich fibrin (PRF) are autologous platelet concentrates prepared from patient's own blood. Platelet-rich fibrin (PRF) is a second-generation platelet concentrate which contains platelets and growth factors in the form of fibrin membranes prepared from the patient's own blood free of any anticoagulant or other artificial biochemical modifications [4].

The PRF clot forms a strong natural fibrin matrix, which concentrates almost all the platelets and growth factors of the blood harvest and shows a complex architecture as a healing matrix with unique mechanical properties which makes it distinct from other platelet concentrates [4].

PRF enhances wound healing and regeneration and several studies show rapid and accelerated woundhealing with the use of PRF than without it [5] It showed that the GTR combined with bone grafting was better than bone grafting alone in improving the aesthetics of the patients' gums, which might be related to its promotion of soft tissue healing and the good integration of soft tissues [6].

Case report

The female 56-year-old patient was admitted to "University dental clinical center St. Panteleimon", Skopje, at the Department of oral surgery and implantology, with no signs of acute infection and no luxation changes. On examination, the patient was systemically healthy and had not taken any long-term antiinflammatory medications or antibiotics.

On periodontal examination and radiographic evaluation, the patient presented with an infrabony defect extending up to apical third of the mesial side of the right maxillary second molar with a probing depth of 8 mm. (Figure 1).

Figure 1. X-ray of the infrabony defect

This tooth was crucial, because of the unique ability to make fixed prosthetic replacement with patient natural teeth. Surgical treatment was performed including open flap debridement. After applying local infiltrative anesthesia using Scandonest 3% the first incision performed both vestibular and oral. It was an inverse bevel incision, extending to the alveolar crest. The incision becomes intrasulcular in the interdental areas, than a small elevator is used to reflect a full thickness flap , as atraumatically as possible. (Figure 2)

Figure 2. Infrabony defect of 2nd maxillar mollar

This incision was a purely intrasulcular incision that is carried around each tooth, between the hard structure and the gingiva, beyond the base of the pocket and extending to the apical extent of the pocket epithelium.

The final incision was horizontal, to release the pocket tissues sharply and atraumatically. The soft tissue and all of the granulation tissue within the pocket are thereby removed using fine curettes and ultrasonic instruments. Systematic root cleaning and planing is performed with repeated rinsing (NaCl 0.9 %).

Blood sample was taken just before the surgery according to the Choukroun`s PRF protocol. With venipuncture the blood sample was taken from the patient in 10 ml glass tubes without an anti-coagulant and immediately centrifuged at 3000 rpm for 12 min.

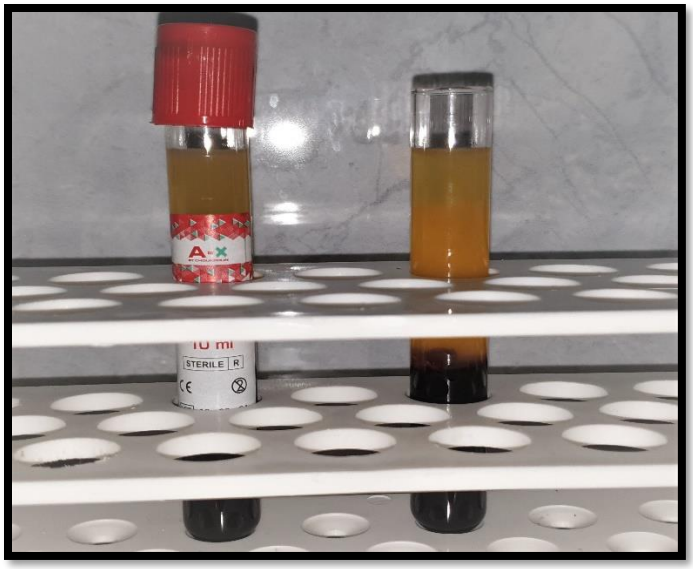

Figure 3. Tubes containing the plasma rich protein

A fibrin clot was formed in the middle of the tube, whereas the upper part contained cellular plasma, and the bottom part contained red corpuscles. (Figure 3) The fibrin clot was easily separated from the lower part of the centrifuged blood. (Figure 4).

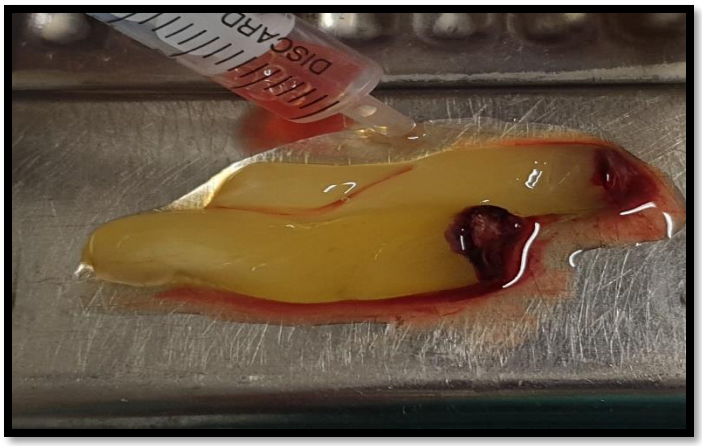

Figure 4. PRF membranes

One of the PRF membranes was cut in pieces and was mixed with xenograft (Bio-Oss™, 0,25mg). Also, PRF exudate which accumulated at the bottom of the box during the squeezing of the membrane was put in this mixture and "sticky" bone made from all this was applied to the defect walls and root surfaces. (Figure 5 a, b). With the other PRF membrane applied "sticky" bone was covered. The flap was repositioned to their presurgical levels and sutured with atraumatic suture utilizing an interrupted technique.

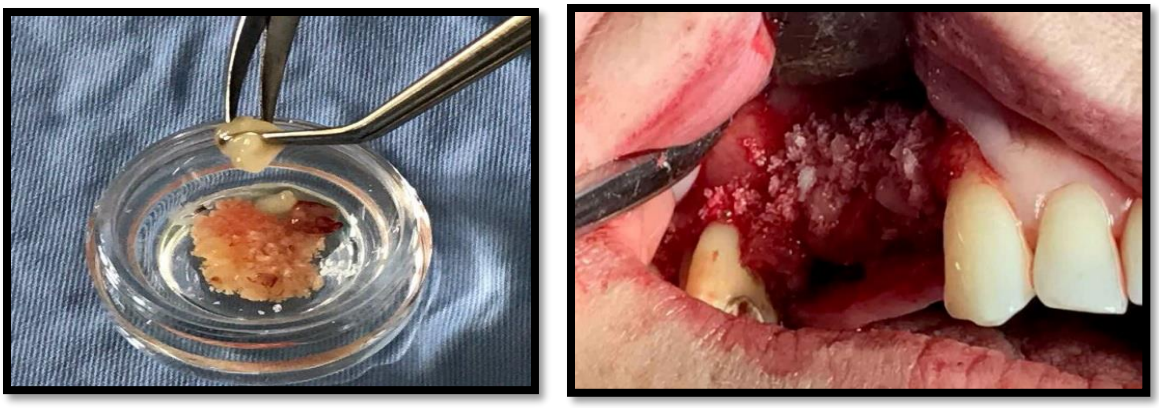

Figure 5. a) "Sticky" bone, b) Applied xenograft with PRF in the infrabony defect

After the operation, the patient was ordinated systemic antibiotics (Amoxicline with clavulanic acid for 7 days), Vitamin D, Vitamin C and natrium chloride solution for mouth wash (twice a day for 2 weeks).

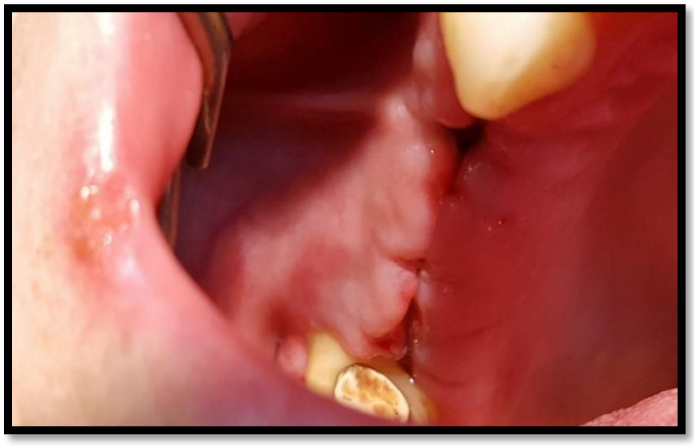

Figure 7. Follow up after one week

The patient was seen the next day and 1st week, 2nd week, 1st month, 3rd and 6th month. (Figure 7).
Panoramic radiographic was performed. (Figure 8).

In this case report, the reduction in pocket depth and gain in clinical attachment were found after 6 months of follow-up which ended with successful prosthodontic solution. (Figure 9).

Figure 8. X-Ray after two months

Figure 9. Fixed prosthodontic solution

Discussion

Gingival disease and chronic periodontitis are both periodontal diseases with a high incidence, which can be manifested as gingival swelling and bleeding, and are also one of the important reasons for the periodontal intraosseous defect [8].

The aim of periodontal and surgical therapy is to arrest and control the periodontal infection and ultimately regenerate lost periodontal structures. Newer approaches to periodontal therapy include regenerative procedures that aim to restore lost periodontal ligament, bone, cementum, and connective tissue.

With the development of new materials on how to promote the regeneration of periodontal tissue,to restore the function of periodontal tissue, give attention to gingival aesthetics, and eliminate the symptoms of infection and destruction on the basis of simple bone grafting has become a new direction for the clinical treatment of the periodontal intraosseous defect [7].

PRF is a second generation platelet concentrate which can enhance both soft and hard tissue healing. [4] . Its advantages over platelet-rich plasma include ease of preparation, ease of application, minimal expense, and lack of biochemical modification (no bovine thrombin or anticoagulant is required).

This considerably reduces the biochemical handling of blood as well as risks associated with the use of bovine-derived thrombin. PRF also contains physiologically available thrombin that results in slow polymerization of fibrinogen into fibrin which results in a physiologic architecture that is favorable to wound healing.

At the same time due to its material characteristics, weak mechanical strength is prone to collapse, which affects the space of the osteogenic area and leads to insufficient bone formation. [8] Combined with bone transplantation, the bone substitutes were implanted into bone defects to promote blood vessel regeneration and guide attachment of periodontal precursor cells [9,10].

In this case report, the decision to utilize PRF as defect fillers in combination with xenograft was made because of its ease of manipulation and delivery to the surgical site. The intended role of the PRF in the intrabony defect was to deliver the growth factors in the early phase of healing.

It has been reported that the combination of a mineralized, rigid bone mineral, with a semi fluid, nonrigid agent, such as EMD, significantly enhanced the clinical outcome of intrabony defects than treated without the addition of bone mineral [11].

In another study, PRF in combination in with bone mineral had ability in increasing the regenerative effects in intrabony defects. For that reason, we chose xenograft (Bio-Oss™), hypothesizing that it could enhance the effect of PRF by maintaining the space for tissue regeneration to occur. Amorphous PRF when used along with bio-oss for augmentation in maxillary atrophic cases showed reduced healing time and favorable bone regeneration [12].

In this case report, the reduction in pocket depth and gain in clinical attachment were found after 6 months of follow-up. These are the important clinical outcomes for any periodontal regenerative procedures. Radiographs revealed significant bone fill in the intrabony defect compared to measurements at baseline.

Conclusion

Guided bone and soft tissue regeneration using xenograft and fibrin-rich plasma gives successful radiological and clinical signs of bone augmentation and consolidation of defects caused by loss of tooth attachment.

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