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

ХИРУРШКИ ТРЕТМАН НА ПАРОДОНТАЛЕН ЏЕБ СО ВОДЕНА КОСКЕНА И МЕКОТКИВНА РЕГЕНЕРАЦИЈА

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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 the inflammatory process, prevent the progression of periodontal disease and also to regenerate the lost periodontal tissues. Loss of bone support by creating a periodontal pocket is one of the most common causes 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, a female 56-year-old patient presented with an infrabony defect extending up to the 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. **Key words:** periodontal pocket, xenograft, PRF.

Апстракт

Пародонталната болест е дефинирана како комплексна мултифакторијална болест што се карактеризира со губиток на сврзно-ткивниот атачмент. Пародонтолната терапија има за цел да го елиминира инфламаторниот процес, да ја превенира прогресијата на периодонталната болест и да стимулира регенерација на изгубеното периодонтално ткиво. Губитокот на потпорниот апарат на забите со создавање на пародонтален џеб е една од најчестите причини за екстракција на забот. Терапијата на истите може да биде конзервативна и хируршка. Целта на овој труд е да се прикаже третман на инфракоскен пародонтален џеб на максиларниот втор десен молар со водена коскена и мекоткивна регенерација. Кај пациент од женски пол на 56-годишна возраст, после периодонтални и радилошки иследувања, детектирано е присуство на клинест коскен дефект од мезијалнатастрана на вториот максиларен молар. По конзервативниот третман (обработка на пародонтален џеб) спроведена е регенеративна -хируршка процедура , вклучувајќи open flap debridement исполнување на дефектот со ксенографт и втора генерација на тромбоцитно збогатен фибрин. По период на констатирана коскена регенерација на дефектот следуваше последователна успешна изработка на фиксно-протетски надоместок. Водената коскена и мекоткивна регенерација со употреба на ксенографт и плазма богата со фибрин дава успешни радиолошки и клинички знаци на коскена аугументација и консолидација на дефектите кои се предизвикани од губиток на припојот на забот. **Клучни зборови:** пародонтален џеб, ксенографт, 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. 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 used recently. A large number of studies have evaluated the effect of periodontal regeneration for infrabony defects and have shown positive clinical and radiographic outcomes, as well as histological evidence of new cementum, periodontal ligament and alveolar bone regeneration. Today, 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 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 have shown 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 good integration of soft tissues[6].

Case report

The female 56-year-old patient was admitted to the 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 anti-inflammatory medications or antibiotics.

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

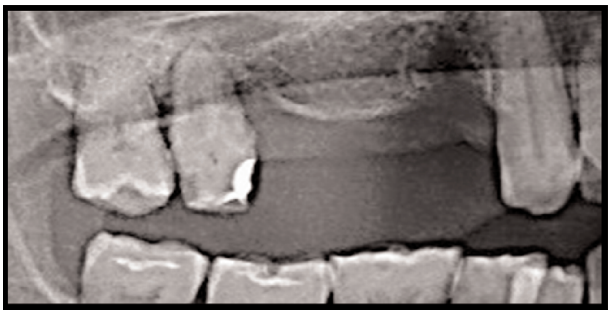

Figure 1. *X-ray of the infrabony defect*

This tooth was crucial because of the unique ability to make fixed prosthetic replacement with patient's natural teeth. Surgical treatment was performed including open flap debridement. Local infiltrative anesthesia using Scandonest 3% was applied.

The first incision was 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.

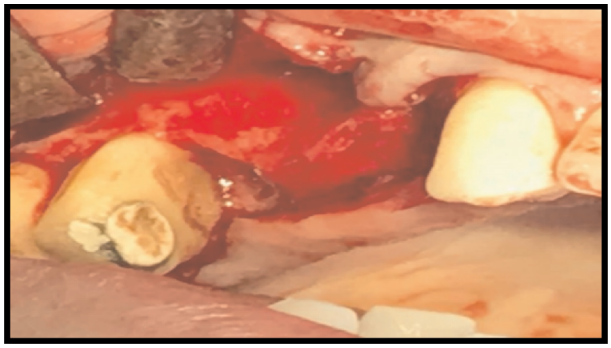

Figure 2. *Infrabony defect of 2nd maxillar molar*

The final incision was horizontal, to release the pocket tissues sharply and atraumatically. aAsmall elevator is used to reflect a full thickness flap, as atraumatically as possible. (Figure 2)

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 was 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.

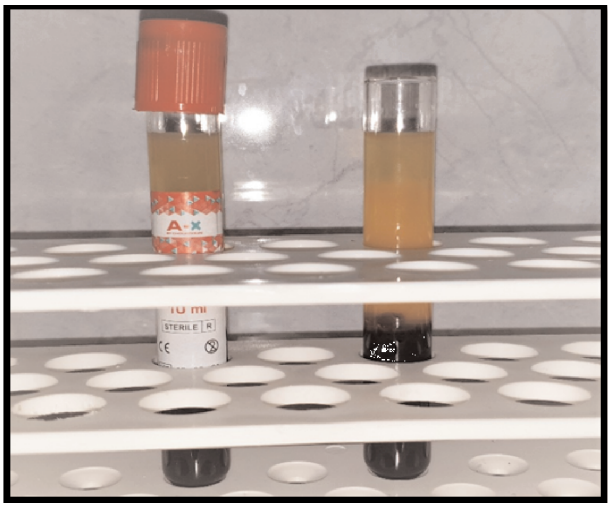

Figure 3. *Tubes containing plasma rich protein*

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)

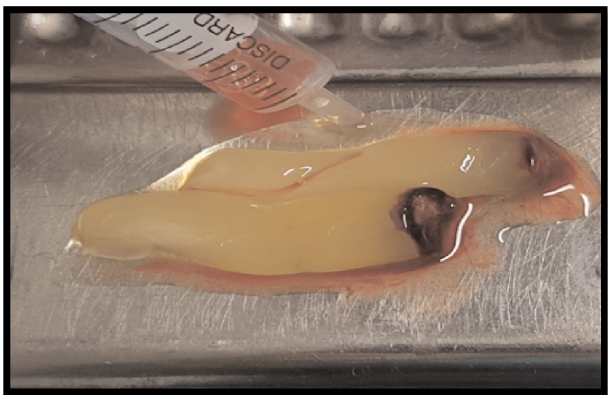

Figure 4. *PRF membranes*

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 level and sutured with atraumatic suture utilizing an interrupted technique.

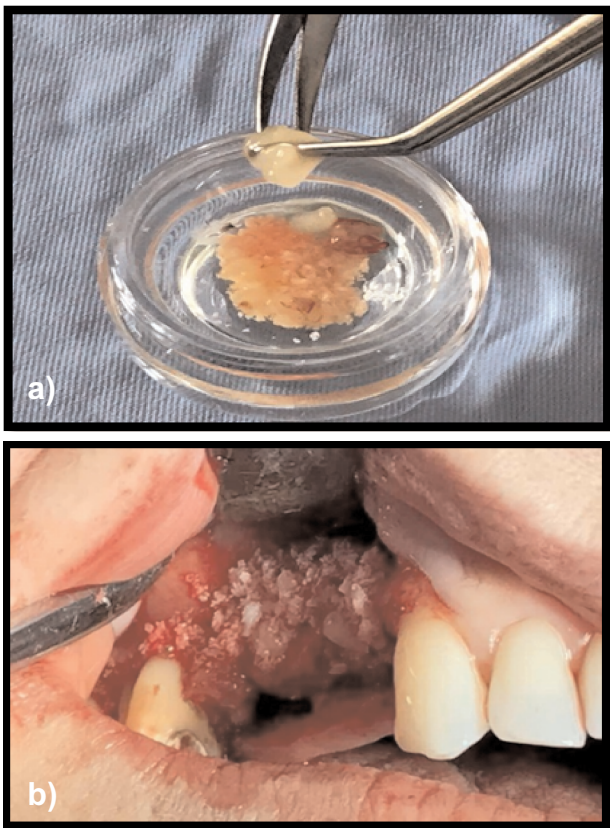

Figure 5. *a) "Sticky" bone, b) Applied xenograft with PRF in the infrabony defect*

Figure 7. *Follow up after one week*

After the operation, the patient was ordinated systemic antibiotics (Amoxicline with clavulanic acid for 7 days), Vitamin D (2000 I.E per day), Vitamin C (1000 mg per day) and natrium chloride solution for mouth wash (twice a day for 2 weeks).

The patient was examined the next day, and after 1 week, 2 weeks, 1 month, 3 and 6 months. (Figure 7)

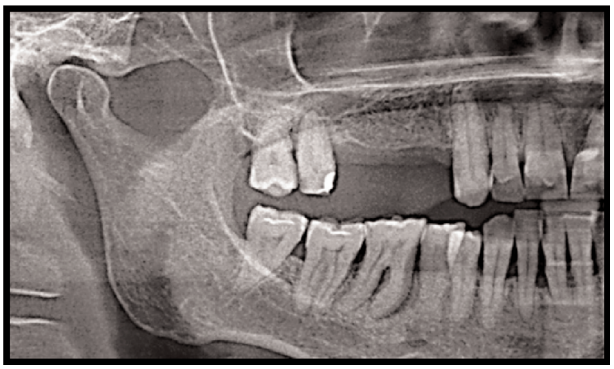

Figure 8. *X-Ray after two months*

Figure 9. *Fixed prosthodontic solution*

Panoramic radiography was performed. (Figure 8) In this case report, reduction of pocket depth and gain of clinical attachment were found after 6 months of follow-up which ended with successful prosthodontic solution. (Figure 9)

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 periodontal intraosseous defect[8]. The aim of periodontal and surgical therapy is to arrest and control 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, restoring the function of periodontal tissue, giving attention to gingival aesthetics, and eliminating the symptoms of infection and destruction on the basis of simple bone grafting has become a new direction for clinical treatment of 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, it 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 easy 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, non-rigid agent, such as EMD, significantly enhanced the clinical outcome of intrabony defects other than treated without the addition of bone mineral[11]. In another study, PRF in combination 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 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 platelet rich fibrin gives successful radiological and clinical signs of bone augmentation and consolidation of defects caused by loss of tooth attachment.

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