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Case Report

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Use of Platelet Rich Fibrin and Bovine Derived Xenograft in the Treatment of Intrabony Periodontal Defects

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Abstract

The main objective of periodontal regeneration is to allow reconstitution of lost periodontal tissues. In this case report, periodontal treatment of intrabony defects of a 40-year-old systemically healthy female patient with chronic periodontitis, who is on a supportive periodontal treatment program, was presented. The defects were treated by the use of Platelet Rich Fibrin (PRF) combined with Bovine Derived Xenograft (BDX) with the aim of periodontal regeneration. Before and 9 months after periodontal flap surgery, periapical radiographs were taken, Probing Depth (PD), clinical attachment level and gingival recession parameters were recorded at the deepest site of the periodontal defects. Significant clinical and radiographic improvements were achieved 9 months after surgery. A 3 mm decrease in PD and 3 mm Attachment Gain (AG) at the mesial site of tooth 43; 3 mm PD decrease and 2 mm AG at the distal site of tooth 42; 7 mm PD decrease and 5 mm AG at the mesial site of tooth 42; and 9 mm PD decrease and 8 mm AG at the distal site of tooth 41 were observed. It can be concluded that regenerative treatment of intrabony periodontal defects by the use of PRF and BDX combination may provide favorable healing with the suggestion of clinical and radio graphical findings in chronic periodontitis patients.

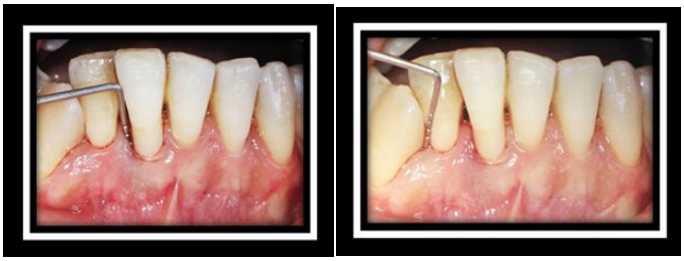
Keywords: Bovine Derived Xenograft; Intrabony Periodontal Defect; Periodontal Flap Operation; Platelet Rich Fibrin

Introduction

Periodontitis is characterized by clinical attachment loss and formation of osseous deformities around teeth [1]. The ultimate goal of periodontal therapy is the reconstitution of lost periodontal tissues and function through regeneration of the attachment apparatus [2]. There are several different materials and approaches used for the periodontal regeneration of intrabony defects. Platelet Rich Fibrin (PRF) which is a composition of various growth factors such as platelet-derived growth factor, basic fibroblast growth factor, transforming growth factor, vascular endothelial growth factor, insulin-like growth factor, and epidermal growth factor has a potential to regenerate periodontal tissues as a healing matrix [3]. It has been demonstrated that PRF in combination with Bovine Derived Xenograft (BDX) has ability to increase the regenerative effects in intrabony defects [4]. The aim of this report is to present the effect of PRF+BDX combination in the treatment of human intrabony periodontal defects.

Description of the Case

Periodontal treatment of a 40-year-old systemically healthy non-smoker female chronic periodontitis patient who is on a supportive periodontal treatment program at Marmara University Department of Periodontology Clinic was presented. Initial clinical measurements are 5 mm Probing Depth (PD) at the mesial site of tooth 43; 5 mm PD at the distal site and 9 mm PD at the mesial site of tooth 42; and 10 mm PD at the distal site of tooth 41 (Figure 1a, b) with the radiographic evidence of bone loss (Figure 1c). Regenerative periodontal surgery was planned for the treatment of these sites by using of PRF+BDX.



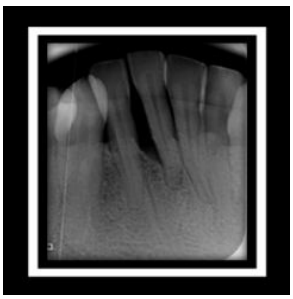
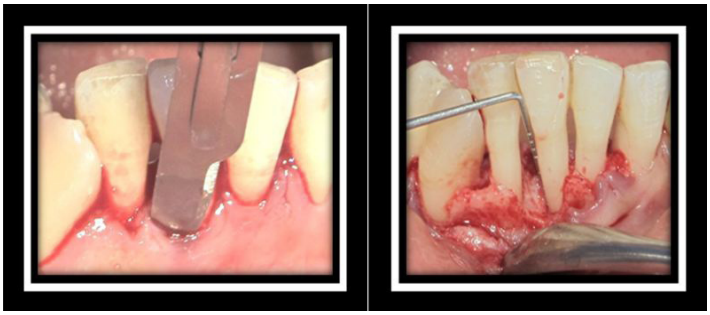


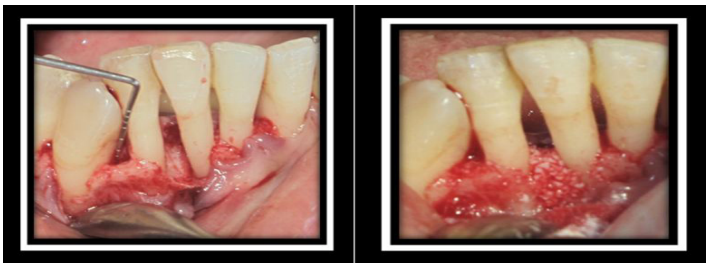
Figure 1(a-c): Clinical (a,b) and radiographic (c) view at the baseline.

Treatment Procedure

After local infiltrative anesthesia, a full thickness flap was raised with the sulcular incision (Figure 2a), and the granulation tissue was removed from the inner surface of the flap. Root surfaces were planed using hand instruments and ultrasonic scaler. Intrabony defects were detected at the distal site of #41, mesial and distal sites of the #42, mesial site of the #43 (Figure 2b,c). 10 ml venous blood was collected from the ante-cubital vein and placed in the centrifuge before surgery. After 12 min of centrifugation at 2700 rpm, the middle (platelet rich) layer of the concentrate was separated (Figure 3a,b,c). The PRF box, which separates serum from fibrin was used to obtain a stable form (Figure 3d). Intrabony defects were filled with BDX (BioOss®, Geistlich)+PRF combination (Figure 2d). Additionally, PRF was used for covering the graft material (Figure 3e,f). Only one PRF layer was used in the interdental area in order to cover the graft material and also added one more PRF layer each on the buccal and oral sides of the defects. Polyglycolide-co-lactide 4.0 braided, (Pagelak®, Dogsan, Trabzon, Turkey), synthetic, absorbable, multifilament surgical suture material was used for closuring the flap. Non-steroidal anti-inflammatory drugs and wide-spectrum antibiotics were administered twice a day postoperatively for 10 days. In addition, 0.2% chlorhexidine digluconate containing mouth rinse was prescribed for 15 days. Sutures were removed 15 days after the intervention (Figure 4). No complications were observed other than normal levels of postsurgical pain and swelling. Patient had regular recall controls with 3 months intervals.

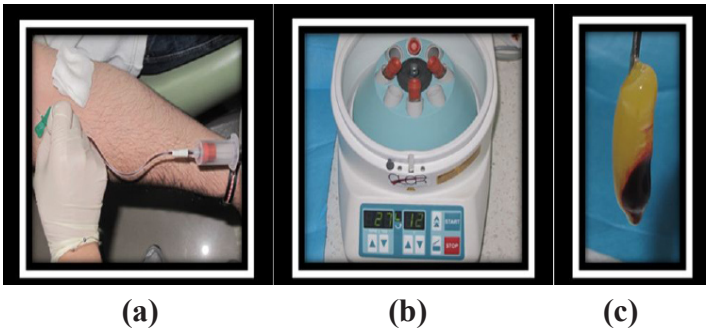


(a) (b)

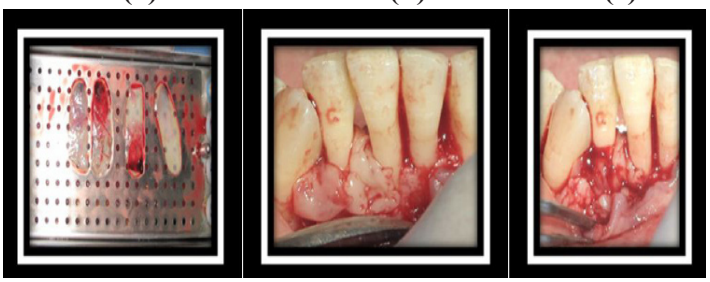


(c) (d)

Figure 2(a-d): Sulcular incision (a), clinical view of the intrabony defects (c,d), application of the graft material into the defects.

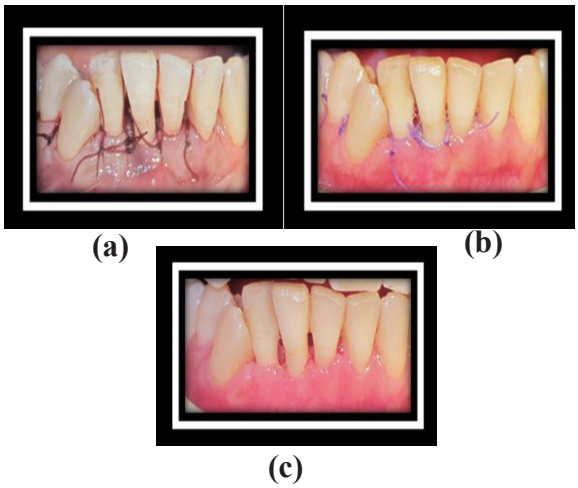


(a) (b) (c)



(d) (e) (f)

Figure 3(a-f): Preparation (a,b,c,d) and application (d,f) of PRF.



(a) (b) (c)

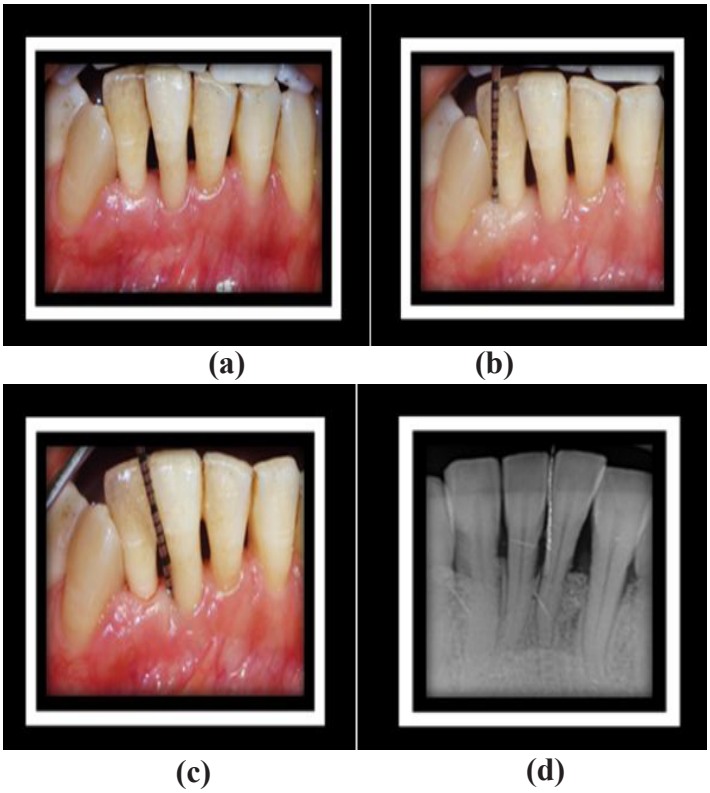
Figure 4(a-c): Suturing during surgery (a), postoperative 15 days (b), removing sutures i15 days after surgery (c).

Treatment outcomes

At 9 months, there were considerable clinical (Figure 5a,b,c) and radiographic (Figure 5d) improve ments in PD and clinical attachment level parameters. A 3 mm decrease in PD and 3 mm Attachment Gain (AG) at the mesial site of tooth 43; 3 mm PD decrease and 2 mm AG at the distal site of tooth 42; 7 mm PD decrease and 5 mm AG at the mesial site of tooth 42; and 9 mm PD decrease and 8 mm AG at the distal site of tooth 41 were observed (Table 1).

	#43 mesial 0.day	#43 mesial 9.month	#42 mesial 0.day	#42 mesial 9.month	#42 mesial 0.day	#42 mesial 9.month	#41 mesial 0.day	#41 mesial 9.month
PD (mm)	5	2	5	2	9	2	10	1
GR (mm)	0	0	0	1	1	3	3	4
CAL (mm)	5	2	5	3	10	5	13	5
PD: Pocket Depth, **GR:** Gingival Recession, **CAL:** Clinical Attachment Level								

Table 1: Changes in the periodontal parameters.



Discussion

This case demonstrates the positive effect of regenerative periodontal treatment approach in deep intrabony periodontal defects. Patient compliance is essential for short and long-term success of periodontal therapy [5,6]. In this case, good compliance and satisfactory oral hygiene maintenance were provided by the patient during the observation period. As a risk factor smoking modifies the periodontal response to the microbial activity and results in increase the amount of tissue lost in periodontal diseases [7,8]. Our patient was not a smoker so that this also enhanced the healing response. Similarly, occlusal trauma causes periodontal disease activity to reoccur and uncontrolled the inflammation [9] and it is not possible to regenerate bone under this active inflammation [10]. In this case occlusal contacts were eliminated in the related region before periodontal flap operation. As a regenerative biomaterial, PRF preparation does not require the use of any anti-clotting agent compared with other platelet concentrates, such as Platelet Rich Plasma (PRP) [11]. The naturally forming PRF containing platelet and leukocytes clot has a dense and complex structure. It can be thought that this dense framework provides protection of growth factors from proteolysis and slower/sustained release of growth factors into the wound area [12]. It is easier and cheaper to prepare PRF, and also less risky to the patients [13,14]. Also, it is shown that the use of PRF with bone mineral matrix has the ability to increase the regenerative capacity in intrabony periodontal defects [4]. Under the light of these evidences, we preferred the use of xenograft (BIO-OSS™; Geistlich, Switzerland), hypothesizing that it could enhance the space maintaining for tissue regeneration and also stimulate cells for bone filling. PRF was also used as a biological membrane onto xenograft as suggested by Panda et al. [15] who used minced PRF+ xenograft combination in intrabony defects. The reason of choosing minced PRF was reported as easy manipulation and delivery to the surgical sites. In this case report, the reduction in PD and gain CAL were evaluated after 6 months of follow-up period. At the end of 9 months promising clinical and radiographic results were obtained in our case report. AG scores of this case were similar with the case of Panda et al. [15]. Today with the help of various numbers of technologic systems, biological approaches and biomaterials facilitate and contribute patient outcomes in terms of function, ease of care, aesthetics and long-term maintenance. A recent review demonstrating results of different regenerative approaches conducted in the intrabony periodontal defects suggested similar results with our case [16]. Within the limits, following conclusions can be made: The use of PRF with bone graft materials is helpful for periodontal regenerative treatment. Positive clinical outcome is based on:

- Reduction in PD.
- Gain in CAL.
- Radiographic defect fill.
- Improved patient function and comfort.

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