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# Treatment of Infrabony Defects with Platelet-Rich Fibrin Along With Bone Graft: A Case Report

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#### ABSTRACT

Periodontitis is an infectious disease of periodontal tissues leading to bone loss and eventual tooth loss. So the ultimate aim of periodontal treatment is regeneration of the supporting structures of tooth. Although horizontal bone loss is most common, vertical bone loss is more responsive to regenerative periodontal therapy. Recently, importance has been given to use of platelet-rich fibrin (PRF) for predictably obtaining periodontal regeneration. PRF is a concentrated suspension of growth factors found in platelets. These growth factors moderate the wound healing and promote tissue regeneration. This article includes a case report of a patient who showed infrabony defects that were treated with combining PRF with allograft.

#### Keywords: Chronic periodontitis, PRF, Regeneration

### **INTRODUCTION**

The goal of periodontal regeneration is restoration of the periodontium to its original form and function. Conventional surgical approaches, such as Modified Widman flap, repair of lost periodontal attachment occurs primarily through formation of a long junctional epithelium between the gingival flap and the previously diseased cemental surface<sup>[1]</sup> Regeneration has been defined as "the reproduction or reconstitution of a lost or injured part to restore its original architecture and function of the periodontium"<sup>[2]</sup>. Periodontal regeneration requires biologic events such as cell migration, adherence, growth and differentiation, to undergo in a perfect sequence of events for success and predictability of periodontal regenerative procedures<sup>[3]</sup>. Periodontal regenerative procedures include soft tissue grafts, bone replacement grafts, root biomodifications, guided tissue regeneration (GTR), and combinations therapies of for osseous, furcation, and recession defects<sup>[4]</sup>. Platelet-rich fibrin (PRF) was first described by Choukroun et al. in 2004. It has been referred to as a second generation platelet concentrate <sup>[5]</sup> because the natural concentrate is produced without any anticoagulants or gelifying agents. PRF consists of cytokines, growth factors, glycanic chains, and structural glycoproteins enmeshed within a slowly polymerized fibrin network. These growth factors are involved in wound healing and are postulated as promoters of tissue regeneration. Platelet concentrate contains platelet-

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derived growth factor (PDGF), transforming growth factor (TGF), vascular endothelial growth factor (VEGF), etc. growth factors that modulate and upregulate growth factor function<sup>[6]</sup>. Here, we present a 6-month follow-up report of an intrabony defect treated with an autologous PRF by assessing clinical and radiological parameters. The bone graft used in this case is demineralized freeze-dried bone allografts (DFDBA), an allograft which has osteogenic potential.

## CASE REPORT

A 38 year-old Indian female reported to the Department of Periodontics of Guru Nanak Institute of Dental Sciences and Research, with the complain of food lodgement and bleeding in the right upper maxillary molar region. The probing PD on the mesiobuccal aspect of #16 was 8 mm, whereas no mobility was detected [Figure 1]. A periapical radiograph taken. Radiographs was were standardized by using paralleling technique and holder, which revealed presence of interproximal angular bone loss [Figure 2]. Keeping all the findings in the mind, the following periodontal therapy was planned.

1. Non-surgical periodontal therapy by means of conventional scaling and root planning using ultrasonic instrument and curettes.

2. Patients were recalled after every week and reexamination was done for 4 weeks, even after non surgical periodontal therapy pocket persist after 4 weeks.

3. So surgical periodontal therapy was planned.

Before that patients platelet count, hemoglobin, bleeding time, and clotting time were assessed and found to be within normal limits.

# PRF PREPARATION

The PRF was prepared in accordance with the protocol developed by Choukroun *et al.*<sup>[7]</sup> just prior to surgery, intravenous blood from antecubital vein was collected [Figure 3] in the 10 ml of sterile tube without an anticoagulant [Figure 4] and centrifuged immediately. Blood was centrifuged using a centrifuging machine for 10 min at 3000 rpm [Figure 5 and 6].

The resultant product consists of three layers: [Figure 7]

1. Topmost layer consist of acellular platelet poor plasma (PPP).

2. PRF clot in the middle.

3. Red blood cells (RBCs) at the bottom.

PRF was easily separated from RBCs using a sterile tweezer just after removal of PPP and then transferred on to the sterile dapen dish. The PRF was then mixed with DFDBA bone graft [Figure 8].

### SURGICAL PROCEDURE

Intraoral antisepsis were performed using 0.2% chlorhexidine gluconate rinse and iodine solution was used to carry out extra oral antisepsis. Following administration of local anesthesia, sulcular incisions were made along with vertical incision, and mucoperiosteal flap were reflected [Figure 9]. Meticulous defect debridement and root planning was carried out with the help of area specific curettes. The direct examination after debridement, confirmed the presence of two walled bony defect. PRF + DFDBA bone graft was filled into the infrabony defect [Figure 10]. The grafted material was covered with absorbable GTR membrane[figure] 111. The mucoperiosteal flap were repositioned and secured in place using 3-0 nonabsorbable black silk surgical suture [Figure 12] and Periodontal dressing was placed [Figure 13]. After that immediate postoperative IOPA radiograph were taken [Figure 14].

# **POST-OPERATIVE CARE**

The suitable antibiotics and analgesics (Amoxicillin with clavulanic acid 625 mg three times a day for 5 days and paracetamol with ibuprofen two times a day for 5 days) were prescribed along with 0.2% chlorhexidine mouth wash twice daily, for 1week. Periodontal pack and sutures were removed after 1 week postoperatively. Surgical wound were cleaned with iodine and patients were instructed for gentle brushing with soft toothbrush. Patients were instructed for oral hygiene maintenance and examined weekly for 1 month and then 3 and 6 months.

Re-examination after 6 month revealed reduction in pocket depth was 5 mm and bone fill was 4 mm. There was no sign of bleeding on probing and significant radiographic bone fill was observed [Figure 15].

DISCUSSION

age 70

The ideal goal for periodontal therapy is regeneration of bone and connective tissue attachment that has been destroyed by the disease process<sup>[8]</sup>. The complete regeneration of the periodontium after periodontal treatment modalities has been difficult to achieve because of differences in the healing abilities among periodontal tissues. Consequently, scientists and researchers have been increasingly concerned over the past two decades with biologically inert, synthetic, and autologous materials for implantation into periodontal bony defect. The present case report evaluates the clinical efficacy of PRF + DFDBA allograft in the treatment of infrabony defects in patients with chronic periodontitis and showed a significant improvement in clinical and radiographic parameters. Although the 2-wall infrabony defect doesn't provide the best spatial relationship for defect bridging by vascular and cellular elements from the periodontal ligament and adjacent osseous wall<sup>[9]</sup>. PRF is in the form of a platelet gel and can be used in conjunction with bone graft, which offers several advantages including promoting wound healing, bone growth and maturation, graft stabilization and hemostasis, and improving the handling properties of graft material. When platelets in a concentrated form are added to graft materials, a more predictable outcome is derived<sup>[10]</sup>. The growth factors present in PRF are PDGF and TGF. They help in the protein synthesis in osseous tissues, stimulates angiogenesis, and enhance woven bone formation<sup>[10]</sup>. DFDBA is known to have an osteogenic potential that is manifested by exposing bone morphogenic protein (BMPs) which have the ability to induce host cells to differentiate into osteoblast. They have been used to reconstruct intraosseous successfully periodontal defects <sup>[11 and 12]</sup>. There was greater pocket depth reduction, clincal attachment level (CAL) gain, and bone fill at the sites treated with PRF with conventional open-flap debridement compared to conventional open-flap debridement alone. Mellonig et al. (1987)<sup>[13]</sup> carried out a study to evaluate DFDBA in human periodontal defects. Group 1 was treated with DFDBA and Group 2 was treated with only open-flap debridement. All defects were evaluated after 6 months postoperatively. Re-entry showed that there was 64.7% of bone fill in the sites which were treated with DFDBA. They concluded that DFDBA has definite potential as a graft material in periodontal regenerative therapy. Simonpieri et al.

(2009)<sup>[14]</sup> described the four advantages of the use of PRF during bone grafting. First, fibrin clot plays an important mechanical role in maintaining and protecting the graft and PRF fragments serve as biological connectors between bone particles. Second, fibrin network facilitates cellular migration, vascularization, and survival of the graft. Third, the growth factors (PDGF, TGF, IGF-1) are gradually released as the fibrin matrix is resorbed, thus creating a perpetual process of healing. Lastly, the presence of leukocytes and cytokines in the fibrin network can play a important role in the self-regulation of inflammatory and infectious phenomena within the grafted material. Bansal et al. (2013)[15] had done a study to evaluate the efficacy of autologous PRF with the DFDBA, in the treatment of periodontal intrabony defects. He concluded that a combination of PRF and DFDBA demonstrated significant improvement in the clinical probing depth, relative attachement level, and radiographical bone fill. Above studies show that when PRF is used alone or in combination with bone graft, demonstrate significant amount of pocket depth reduction, CAL gain, and radiographic bone fill.

# CONCLUSION

From the presented case, it can be concluded that PRF is efficacious clinically and radiographically in the periodontal infrabony defect. PRF is an autologous preparation and found to be clinically effective and economical than any other available regenerative material. However, long-term, multicenter randomized, controlled clinical trials will be required.

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#### FIGURES







Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9



Figure 10



Figure 11



Figure 12



Figure 13



Figure 14



Figure

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