TREATMENT OF INTRABONY DEFECT WITH PLATELET RICH FIBRIN: A CASE REPORT

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ABSTRACT

Recently, importance has been given to the use of Platelet-Rich Fibrin (PRF) for predictably obtaining periodontal regeneration. The purpose of this case report is to present clinical and radiographic results of a wide intrabony periodontal defect treated with PRF. A 36 year old Indian female presented with a wide intrabony periodontal defect in relation to # 46. The probing pocket depth (PPD) on distobuccal aspect of # 46 was 9 mm and periodontal attachment level (PAL) was 8 mm. On surgical treatment with autologous PRF, six month follow up revealed a significant reduction in PPD and PAL gain as well as radiographic bone formation, supporting the role of various growth factors present in the PRF in accelerating the soft and hard tissue healing. From the presented case, it can be concluded that PRF is clinically and radiographically efficacious in the treatment of a periodontal intrabony defect. Thus, signifying its role as a regenerative material in the treatment of intrabony defects.


KEY WORDS: Fibrin; blood platelets; chronic periodontitis; wound healing.

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INTRODUCTION:

The primary goal of periodontal treatment is the maintenance of the natural dentition in health and comfortable function. Regeneration has been defined as the reproduction or reconstitution of a lost or injured part to restore the architecture and function of the periodontium. Conventional open flap debridement falls short of regenerating tissues destroyed by the disease, and current regenerative procedures offer a limited potential towards attaining complete periodontal restoration. Various biomaterials based on endogenous regenerative technology (ERT), have been in used for periodontal tissue regeneration in addition to autogenous and allogenic bone grafts but not a single graft material is considered as a gold standard in the treatment of intrabony defects.

Platelet rich fibrin (PRF) may be considered as a second-generation platelet concentrate, because the natural concentrate is produced without any anticoagulants or gelifying agents. First biochemical analysis of the PRF composition indicated that this biomaterial consists of an intimate assembly of cytokines, glycanic chains, and structural glycoproteins enmeshed within a slowly polymerized fibrin network. The biologic activity of the fibrin molecule is enough in itself to account for the significant cicatricial capacity of the PRF and the slow polymerization mode confers to the PRF membrane a particularly favourable physiologic architecture to support the healing process. In addition, the clinical effects of PRF with or without membrane in extraction sockets was determined in mongrel dogs and it was found that PRF enhances healing and osseous fill in extraction socket taken place within 3 weeks.

PRF in various surgical procedures like, degree II furcation, sinus floor augmentation during implant placement, with coronally displaced flap in multiple gingival recessions and in facial plastic surgery procedures have been shown to provide promising results.

Here, we present a six month follow-up report of an intrabony defect, treated by means of an autologous PRF by assessing clinical and radiological parameters.

CASE REPORT:

A 36-year-old Indian female complaining of food lodgement and pain in the lower right mandibular molar region reported to the Department of Periodontics, Government Dental College and Research Institute, Bangalore, Karnataka, India. Patient did not give any relevant medical history and there was no systemic condition that could interfere with physiological wound healing. There was no history of dental trauma or orthodontic treatment, and no injurious habit was reported by the patient. On intraoral examination, there was generalized bleeding on probing present but no swelling and no pus exudation was noticed. The probing pocket depth (PPD) on the distobuccal aspect of the tooth # 46 was 9 mm, periodontal attachment level (PAL) was 8 mm distobuccal, whereas no mobility was detected in relation to 46 and fremitus was found to be negative precluding the possibility of trauma from occlusion. (Figure 1)
A periapical radiograph was taken using the standardized techniques, which revealed presence of interproximal intrabony defects (IBD) with tooth #46. (Figure 2) Keeping all the findings in the mind, a thorough treatment plan was decided, including a series of therapeutic procedures,

1. Oral hygiene instructions and motivation of the patient in performing effective oral hygiene measures.
2. Non-surgical periodontal therapy after a period of 2 weeks by means of conventional scaling and root planing, using curettes\(^*\) and ultrasonic instruments.\(^†\)
3. Recall after every week and re-examination of the patient after the completion of healing after 6 weeks following non-surgical periodontal therapy. PPD and PAL were measured every week for six weeks after the non surgical periodontal therapy and they were still found to be 8 mm and 7 mm respectively.
4. Surgical periodontal therapy was done 2 weeks after the re-examination of the patient after completion of healing following non-surgical periodontal therapy.

Before planning for the periodontal surgical procedure, patient’s platelet count (3.5 lac/mm\(^3\)), Haemaglobin (13.5 gm/dl), Bleeding time (2.5 min) and Clotting time (4.5 min) 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\(^{19}\) and used in our previous study.\(^{15}\) Just prior to surgery, intravenous blood (by venipuncturing of the antecubital vein) was collected in a 10-ml sterile tube without anticoagulant and immediately centrifuged in centrifugation machine\(^‡\) at 3,000 revolutions (Approximately 400 g) per minute for 10 minutes. Blood centrifugation immediately after collection allows the composition of a structured fibrin clot in the middle of the tube, just between the red corpuscles at the bottom and acellular plasma (Platelet-poor plasma) at the top.\(^{20}\) PRF was easily separated from red corpuscles base [preserving a small red blood cell (RBC) layer] using a sterile tweezers and scissors just after removal of PPP and then transferred onto a sterile dapen dish. (Figure 3)

\(^*\) Gracey, Hu-Friedy, Chicago, IL, USA.
\(^†\) EMS V-Dent, China.
\(^‡\) R-4C, REMI, Mumbai, INDIA.
Surgical Procedure:
Intra-oral antisepsis was performed with 0.2% chlorhexidine digluconate rinse and Iodine solution was used to carry out extraoral antisepsis. Following administration of local anaesthesia, buccal and lingual sulcular incisions were made and mucoperiosteal flaps were reflected. (Figure 4) Care was taken to preserve as much inter-proximal soft tissue as possible. Meticulous defect debridement and root planing were carried out using ultrasonic instruments† and area specific curettes. No osseous recontouring was carried out. PRF of the required size was filled into the intrabony defect was used to cover the defect. (Fig 5) The mucoperiosteal flaps were repositioned and secured in place using 3-0 non-absorbable black silk surgical suture.§ The simple interrupted sutures were placed. The surgical area was protected and covered with periodontal dressing.¶

Postoperative Care:
The Suitable antibiotics and analgesics (amoxicillin 500 mg four times per day for 5 days and ibuprofen 800 mg three times per day) were prescribed, along with chlorhexidine digluconate rinses (0.2%) twice daily for 2 weeks. Periodontal dressing and sutures were removed 2 weeks post-operatively. Surgical wounds were gently cleansed with 0.2% of chlorhexidine digluconate and patient was instructed for gentle brushing with a soft toothbrush. Patient was re-instructed for proper oral hygiene measures postoperatively and examined weekly up to 1 month after surgery and then 3 and 6 months. No subgingival instrumentation was attempted at any of these appointments.

Re-examination at 6 months after the periodontal surgery revealed reduction in PPD (from 9 mm to 5 mm) and PAL (from 8 mm to 4 mm) with no sign of bleeding on probing (Figure 6) and significant radiographic bone formation in the periodontal intrabony defect. (Figure 7)

DISCUSSION:
The present case report evaluated the clinical efficacy of PRF in the treatment of IBD. Reduction in PPD, IBD and gain in PAL are the major clinical outcomes measured to determine the success of any periodontal treatment. In the present case report, a significant reduction in PPD and PAL gain was found. The present case report also reflected the significant radiographic bone formation in the periodontal intrabony defect, supporting the role of various growth factors present in the PRF in accelerating the soft and hard tissue healing.21 Also as it was a 3-wall IBD, it provided the best spatial relationship for defect bridging by vascular and cellular elements from the periodontal ligament and adjacent osseous wall.22 Space maintenance is provided by the defect walls to minimize membrane collapse and/ or provides protection and retention of the grafts.22 Osteoblasts cultured with PRF showed a initiation in mineralization process by using light and scanning electron microscopy and PRF leucocytes shown proliferation and interaction with osteoblasts.18 A in-vitro study showed that PRF is superior to PRP, considering the expression of alkaline phosphatase and induction of mineralization, caused markedly by released of TGF-β1 and PDGF-AB.23 Additionally there are many advantages of using PRF over the PRP. Preparation of PRF is quite easy and fast and simplified processing minus artificial biochemical modification than PRP, which takes more time.24 The PRF preparation process creates a gel like fibrin matrix polymerized in a tetramolecular structure, that incorporates platelets, leukocyte, and cytokines, and circulating stem cells.25 PRF would be able to progressively release cytokines during fibrin matrix remodeling; such a mechanism might explain the clinically observed healing properties of PRF.26 It is also found that PRF organized as a dense fibrin scaffold with a high number of leukocytes concentrated in one part of the clot,27 with a specific slow release of growth factors (such as transforming growth factor-1β, PDGF-AB, and vascular endothelial growth factor) and glycoproteins (such as thrombospondin-1) during ≥7 days.28

Figure 6: Re-examination after 6 months

Figure 7: Radiographic bone formation in the periodontal intrabony defect after 6 months.

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1 Gracey, Hu-Friedy, Chicago, IL, USA.
2 EMS V-Dent, China.
3 Ethicon, Johnson and Johnson Ltd., Somerville, NJ, USA.
4 Coe-Pak, GC America Inc., Chicago, IL, USA.
Simplified, easy, fast and cost effective processing of PRF preparation without use of any anticoagulant, along with functional, intact platelet in fibrin matrix and sustained release of growth factors, all these help to make PRF first in fibrin technology.\textsuperscript{36}

**CONCLUSIONS:**

From the presented case, it can be concluded that PRF is efficacious clinically and radiographically in the treatment of a periodontal intrabony defect. PRF is an autologous preparation and found to be clinically effective and economical than any other available regenerative materials including PRP. However, long term, multicenter randomized, controlled clinical trial will be required to know its clinical and radiographic effect over bone regeneration.

**REFERENCES:**


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