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Evaluation Of Efficacy Of Autologous Platelet-Rich Fibrin With Bone Graft In The Treatment Of Infrabony Defects- A Case Report

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Abstract

Periodontal therapy aims to prevent periodontal tissue destruction while achieving regeneration of lost and damaged tissues. **Demineralized Freeze Decalcified Bone Allograft (DFDBA)** is an allograft with acceptable clinical responses in the field of periodontal regeneration. **Platelet Rich Fibrin (PRF)** is the latest advancement in fibrin technology and is a rich autologous source of various growth factors and leukocytes. PRF has a strong potential to influence the cellular mechanisms responsible for periodontal regeneration to be achieved. This article presents a case report of a patient with infrabony defect that was treated by combining PRF with allograft evaluating the clinical and radiographical outcomes at a 6 month follow-up.

Keywords: Regeneration, Infrabony Defect, PRF, Allograft

Introduction

The goal of periodontal therapy includes arrest of periodontal disease progression and the regeneration of structures lost due to pre-existing disease process[1]. Regeneration has been defined as "The reproduction or reconstitution of a lost or injured part to restore the architecture and function of the periodontium". The objectives of periodontal regenerative therapy are to reconstitute the bone, cementum and periodontal ligament on a previously diseased root surface[2]. Many of these procedures include the use of bone grafts and bone replacement materials. For the last few decades, demineralized freeze-dried bone allograft (DFDBA) has been used alone and in combination with other treatment modalities for periodontal regeneration. DFDBA has both osteoinductive and osteoconductive potential and the ability to create and maintain the space[3].

A different approach to periodontal regeneration is the use of polypeptide growth factors. Platelet rich plasma (PRP) is an autologous concentration of platelets in plasma. PRP has been used to enhance the clinical outcome obtained by using bone grafts with and without guided tissue regeneration in the treatment of infrabony defects.

The second generation of platelet concentrates is Platelet Rich Fibrin[4]. It is a promising, completely autologous leukocyte and platelet concentrate which is being successfully used in various fields of dentistry and medicine. The natural fibrin clot in PRF seems to be responsible for slow release of growth factors for an extended period[5].Because of its strict autologous nature, extended growth factor release, and cost-effectiveness,

PRF may be considered as a better treatment option compared to platelet rich plasma (PRP) - a first generation platelet concentrate[6].

Here, we present a 6-month follow-up report of an infrabony 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 34-year-old female patient reported to the Department of Periodontics and Oral Implantology,National Dental College and Hospital, Derabassi with a chief complaint of food lodgement and pain in the lower right mandibular molar region. On intraoral examination, the probing pocket depth (PD) on thedistobuccal aspect of tooth #46 (Federation DentaireInternationale FDI) was 9 mm with no sign and symptom of bleeding on probing, swelling, mobility and pus exudation [Figure 1].

Fig. 1 Pre-operative osseous defect depth

A periapical radiograph was taken which was standardized using paralleling technique and holder. The patient was explained about the treatment plan in detail and a written informed consent was taken from the patient. The radiograph revealed presence of interproximal angular bone loss [Figure 2]. This intraoral peri-apical radiograph (IOPA) was taken with the grid and the defect was measured 7 mm.

Fig.2 Pre-operative radiograph

Keeping all the findings in the mind, the periodontal therapy was planned.

1. Non-surgical periodontal therapy by means of conventional scaling and root planning using ultrasonic scalersand curettes.
2. Patient was recalled every week and re-examination was done for 4 weeks. Even after non-surgical periodontal therapy, pocket persisted after 4 weeks; hence, surgical periodontal therapy was planned.
3. Before that patient's 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. (2004)**just prior to surgery. Intravenous blood from antecubital vein was collected in the 10 ml of sterile tube without an anticoagulant and centrifuged immediately. Blood was centrifuged using a tabletop centrifuging machine for 12 min at 2,700 rpm [Figure 3].

The resultant product consisted of three layers

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

2. PRF clot in the middle.
3. Red blood cells (RBCs) at the bottom.

Fig. 3 PRF prepared

PRF was easily separated from RBCs using a sterile tweezer just after removal of PPP. It was then transferred on to the sterile dapen dish. The PRF was mixed with DFDBA bone graft **[Figure 4].**

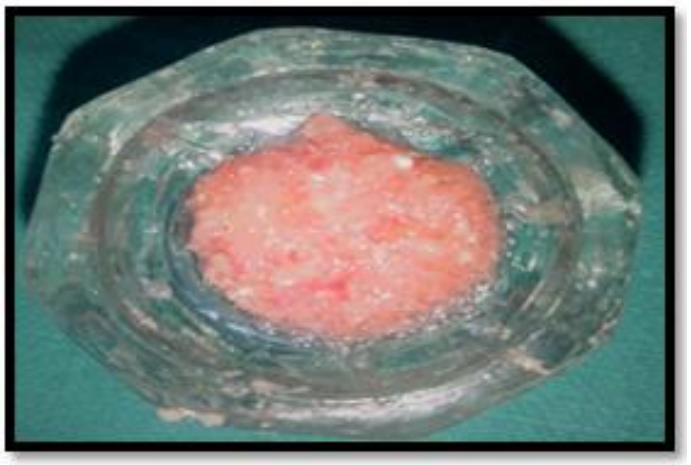

Fig.4 PRF + Bone graft

Surgical Management

The facial skin all around oral cavity was scrubbed with povidone-iodine solution and 0.2% chlorhexidinedi gluconate was used for intraoral antisepsis. Following local anesthesia, crevicular incisions were made on the facial and lingual/palatal surfaces, extending on tooth on each side of the defect tooth using the Bard Parker blade No.15. A full thickness mucoperiosteal flap was reflectedon the buccal side extending at least one tooth mesial and distal to the tooth with infrabony defect using the periosteal elevator. Care was taken to preserve maximum amount of interdental papillary tissue. After reflection of the flap and exposure of osseous defect, a thorough surgical debridement of soft and hard tissue was done using the area specific Gracey curettes. No osseous recontouring was performed. Debridement was followed by copious (0.9% normal saline) irrigation. After meticulous debridement of the defect and root planing, direct measurement of the osseous defect was done using a UNC-15 periodontal probe **[Figure 5].**

Fig. 5 Measurement of Osseous Defect

The direct examination after debridement, confirmed the presence of two walled bony defect[Figure 6]**.**

Fig. 6 Two walled defect

The required amount of DFDBA with a particle size of 250 microns (COLOCAST) was mixed with PRF which had been minced into small pieces. The mixture was made

into a workable consistency and delivered into the defect. PRF + DFDBA bone graft was filled into the infrabony defect [Figure 7]**.**The collagen membrane sheet (COLOGIDE) was placed [Figure 8]and mucoperiosteal flap was repositioned and secured in place using 5-0 resorbablevicryl suture[Figure 9]. The simple interrupted sutures were placed followed by periodontal dressing [Figure 10].

Fig. 7 Placement of mixture of PRF and Bone Graft

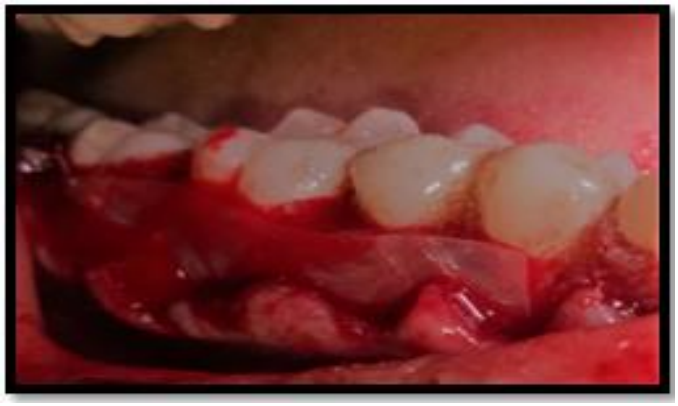

Fig. 8 Collagen membrane placed

Fig. 9 Rebsorbable Sutures placed

Fig. 10 Periodontal Pack placed

Post-operative care

The suitable antibiotics and analgesics (amoxicillin 500 mg three timesa day for 5 days and ketorolac tromethaminetwo 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 10 days postoperatively. Patient was instructed for oral hygiene maintenance and examined weekly for 1 month and then 3 and 6 months. Re-examination after 6 monthsrevealed reduction in pocket depth which was 4 mm, with bone fill of 5 mm[Figure 11]. There was no sign of bleeding on probing and significant radiographic bone fill was observed in the patient **[Figure 12].**

Fig. 11 Post-operative osseous defect depth

Fig. 12 Post-operative radiograph

Discussion

Periodontal therapy is performed with the primary objectives of gaining access to the diseased sites, achieving reduction in pocket depth, arresting further disease progression and finally restoring the periodontal tissues lost due to disease process[7]. The ultimate aim to achieve periodontal regeneration via new attachment formation has been approached by variety by regenerative modalities, but none has been established as a gold standard, given their own associated limitations. The recent trend of endogenous replacement therapy has shifted the focus to application of autologous mitogenic proteins to periodontal wound[8]. One such store house of autologous growth factors and leukocytes, recently made available to the field of periodontal therapy, is Platelet Rich Fibrin. Presently, researchers are in the process of exploring the vast benefits of PRF that can revolutionalize the field of periodontal regeneration.

When platelets in a concentrated form are added to graft materials, a more predictable outcome is derived[9].The growth factors present in PRF are PDGF and TGF-β. They help in the protein synthesis in 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, wound sealing and hemostasis, and improving the handling properties of graft material DFDBA has been used in periodontal therapy for years together. It has been successfully used to reconstruct intraosseous periodontal defects.

Thorat *et al.* (2011)[10]have conducted a study to explore the clinical and radiographic effectiveness of autologous PRF in the treatment of intrabony defects in patients with chronic periodontitis. 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.

Khattaret al. (2014)[11]in a study evaluated the efficacy of autologous PRF with the DFDBA; they concluded that a combination of PRF and DFDBA demonstrated significant improvement in the clinical probing depth, relative attachement level, and radiographical bone fill.

The present case-report highlights good results and additional benefits in clinical and radiographic parameters when PRF was used in combination with DMBM. Thus in future, PRF may prove to be a novel adjunct to conventional regenerative therapeutic modalities in management of periodontal osseous defects.

Conclusion

From the case report, it is concluded that treatment of infrabony defect with PRF appears to be associated with improvement in clinical and radiological parameters with uneventful healing. Addition of DBM enhances the clinical effects of PRF, with particular benefits, in terms of percentage in bone fill in infrabony defects. Considering the autologous nature, minimal cost and time, PRF can be incorporated as a regenerative material in infrabony defects. Further, long-term multicenter randomized, clinical trials with large sample size and histological evaluation of new bone formation are needed to confirm the results of this case-report.

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