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PLATELET RICH FIBRIN AS A SOLE GRAFTING MATERIAL FOR THE TREATMENT OF PERIODONTAL INTRABONY DEFECTS.

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ABSTRACT

Platelet-rich fibrin (PRF) is a second-generation platelet concentrate enriched with platelets and growth factors which found to be beneficial for periodontal regeneration. The purpose of this case report is to clinically and radiographically evaluate the efficacy of PRF for the treatment of periodontal intrabony defects (IBD). A 38- year old Indian female presented with periodontal IBD in relation to 21. The probing pocket depth (PPD), clinical attachment level (CAL) and Mean bone defect were found to be 13mm,14mm and 17.30 mm respectively in relation to 21. The affected lesion was treated surgically by placement of PRF which showed significant reduction in PPD, gain in CAL and radiographic bone formation after six months, thus supporting the role of various growth factors present in the PRF in accelerating the soft and hard tissue healing.

KEY WORDS: **Platelet concentrate, Intrabony defect, Platelet rich fibrin**.

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INTRODUCTION

One of the characteristic signs of destructive periodontal disease is loss of alveolar bone support. Bone grafts and their synthetic substitutes have been used in an attempt to gain this therapeutic endpoint. Complete regeneration of the periodontal attachment apparatus is possible, though not predictable[1]. Reconstructive dental surgeons are constantly looking for improving the soft and hard tissue healing and periodontal regeneration. It was found that autologous platelets contain large amount of growth factors, which are capable of enhancing wound healing and periodontal regeneration[2]. Platelet rich plasma (PRP) (first generation of platelet concentrate) was used in treatment of periodontal disease since 1998[2] with some controversial results and disadvantages. To overcome the disadvantages of PRP, Choukraun et al in 2001 developed PRF[3] which represents a new step in the platelet gel therapeutic concept with simplified processing minus artificial biochemical modification known as a second generation of platelet concentrate. PRF has a specific ability to slowly release growth factors like transforming growth factor-1β, platelet derived growth factor-αβ, and vascular endothelial growth factor as well as glycoproteins (e.g., thrombospondin-1) over ≥7 days[4], all of which is organized as a dense fibrin scaffold with a large number of leukocytes[5] which is beneficial in soft and hard tissue healing.

CASE PRESENTATION

A 38-year-old Indian female reported to the Department of Periodontics, Bharati Vidyapeeth Dental College, and hospital, Sangli with a chief complaint of food lodgment and pain in the upper right front region with no relevant medical and dental history. On intraoral clinical examination, generalized bleeding on probing was present. The PPD and CAL on the mesio-buccal aspect of the tooth 12 were 11 mm and 12 mm respectively with no signs of mobility and trauma from occlusion. (figure1). An introral periapical radiograph (IOPA) was taken. The radiographic parameters were recorded by utilizing Kodak RVG 5000 Digital Radiography System and grid[6] which revealed presence of interproximal IBD with 12. (Figure 2) Grid is superimposed on radiographic images and ruler was used to measure the radiographic parameters. To assess elongation or foreshortening of radiographs, a steel ball of 3mm in diameter was incorporated in stent. An alginate impression was made and plaster model was prepared on both the arches of patient. Custom made stent[7] with vertical grooves were fabricated using putty material to standardize the readings. Pre-surgical patient preparation consists of oral hygiene instructions and motivation of the patient to maintain oral hygiene, scaling and root planning. It was continued for 4 to 6 weeks till the patient showed satisfactory plaque control which was confirmed by plaque index. PPD and CAL were measured every week for six weeks after the non surgical periodontal therapy and they were still found to be 10 mm and 11 mm respectively. So we decided to proceed with regenerative surgical procedure using PRF. All necessary blood investigations were assessed and found to be within normal limits. Following the local anesthesia, intra-crevicular incisions were performed extending to the neighboring teeth in the selected area. The full thickness mucoperiosteal flap was raised on buccal and palatal side (figure 3). Degranulation of defect and root planning was done. PRF was prepared as follows- 10ml of blood was drawn from patient by venipuncture of the antecubital vein into 10ml test tube without an anticoagulant and was centrifuged immediately using a tabletop centrifuge for 10 min at 3000 rpm[8]. The resultant product consisted of three layers: top most layer consisting of acellular platelet poor plasma (PPP), PRF clot in the middle and RBCs at the bottom. The uppermost layer was discarded with pipette. Sterile tweezer was inserted into the tube to gently grab the fibrin clot with attached RBC's. Fibrin clots were transferred to dampen dish (figure 4) and RBCs were gently scraped away and discarded. The defect was filled with PRF (figure 5), the mucoperiosteal flap was repositioned and interrupted sutures were given (figure 6). Patient received antibiotics, analgesic and 0.2 % Chlorhexidine rinses. Sutures were removed one-week post-surgery. Patient was revaluated clinically as well as radiographically after 1 week,1 month,3 months and 6 months post surgery showing reduction in PPD (from 11mm to 3mm); gain in CAL (from 12mm to 5mm) and mean defect fill of 9.55 mm (bone defect from 17.3mm to 7.85mm) (figure 7).

Figure 1
Preoperative pocket probing depth.

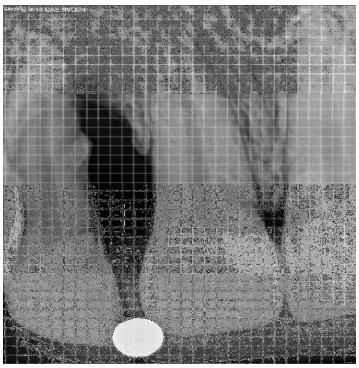

Figure 2
Preoperative IOPA showing intrabony defect.

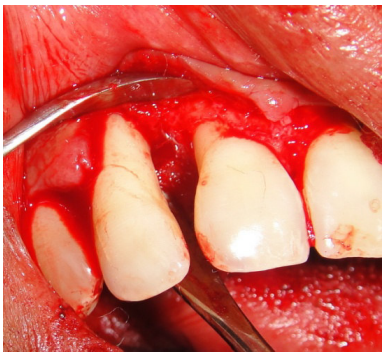

Figure 3
Intrabony defect after reflection of mucoperiosteal flap.

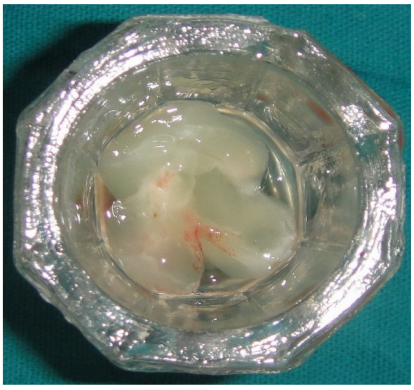

Figure 4
Platelet rich fibrin.

Figure 5
Platelet rich fibrin filled in the intrabony defect.

Figure 6
Interrupted sutures given.

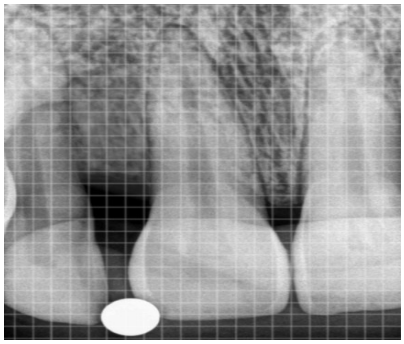

Figure 7
IOPA radiographic showing bone formation after 6 months

DISCUSSION

PRF, a second generation platelet concentrate is prepared naturally without addition of thrombin and anticoagulant, and it has a natural fibrin framework which can protect growth factors from proteolysis.[9] Thus, growth factors can perform their activity for a longer period and stimulate tissue regeneration. In the present case report, a significant reduction in PPD, gain in CAL and significant radiographic bone formation was seen, supporting the role of various growth factors present in the PRF in accelerating the soft and hard tissue healing[10] Furthermore, PRF has a specific ability to slowly release growth factors like transforming growth factor-1β, platelet derived growth factor-αβ, and vascular endothelial growth factor as well as glycoproteins (e.g., thrombospondin-1) over ≥7 days[4], all of which is organized as a dense fibrin scaffold with a large number of leukocytes[5]. Thus PRF could improve the healing of periodontal osseous defects. Yu-Chao Chang[11] conducted a study on PRF as a grafting material for periodontal regeneration and concluded that it is an effective regenerative treatment modality for periodontal intrabony defects. Recently various studies have been carried out showing effects of PRF on periodontal regeneration[12,13,14]. Limitations of the present study include absence of re-entry surgery, histological evidence and comparatively a short time period. This case report demonstrates that the use of PRF, as the sole grafting material in periodontal intrabony defects is an effective treatment modality for periodontal regeneration and in promoting soft and hard tissue healing. Results obtained from this study are encouraging and supports the clinical use of PRF in regenerative periodontal surgery.

CONCLUSION

PRF has a specific ability to slowly release growth factors over ≥7 days and it is organized as a dense fibrin scaffold with a large number of leukocytes. Thus it could improve the healing of periodontal osseous defects. Simplified, fast, easy and cost effective processing of PRF without use of any anticoagulant, along with ability of sustained release of growth factors, help to make PRF unique and unbeatable in fibrin technology.

CONFLICT OF INTEREST

Conflict of interest declared none.

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