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REGENERATIVE TREATMENT OF INTRABONY DEFECTS WITH PLATELET RICH FIBRIN - A CASE REPORT

Periodontology

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ABSTRACT

Aim: The purpose of this case report is to examine the clinical and radiographic (bone fill) efficacy of autologous PRF in the treatment of intrabony deficiencies. **Materials and Methodology:** 29 years old patient came with the chief complain of pain in lower right back tooth region. On clinical and radiographic examination there was an intrabony defect with 7mm of probing depth found in relation to 46 region. Regenerative procedure with platelet rich fibrin and Alloplast was done and 1, 3 and 6 months follow up was taken to evaluate bone fill radiographically and probing pocket depth clinically. **Conclusion:** Improvement in clinical and radiographic Indices with uneventful recovery appear to be linked to the treatment of intrabony defects with PRF. The clinical effects of PRF are improved by the addition of Alloplast. To further support the findings of this investigation, long-term, multicenter, randomized clinical trials with sizable sample sizes and histological examination of new bone growth are required.

KEYWORDS

Platelet rich fibrin, Regenerative bone grafts, Intrabony defects.

INTRODUCTION

In studies on intrabony defects, various regeneration material types have demonstrated variable results.[1] Recent studies have shown that biological modifiers can increase the growth and development of periodontal ligament cells by targeting cells found in periodontal deficiencies.[2] These growth factors, which are regarded as a natural source in platelets, are crucial for accelerating wound healing following periodontal therapy.[3] Choukroun et al. initially created platelet rich fibrin (PRF), a second generation platelet concentrate, in France.[4] Growth factors appear to be released slowly over a lengthy period of time in PRF due to the natural fibrin clot.[5] In comparison to platelet rich plasma (PRP), a first generation platelet concentrate, PRF may be thought of as a preferable therapeutic choice because of its stringent autologous origin, prolonged growth factor release, and cost-effectiveness.[6] Despite the fact that several studies have demonstrated the importance of PRF in bone regeneration, the outcome of PRF in combination with bone graft is yet unknown. Periodontal regeneration is a complex process that involves the recruitment of locally produced progenitor cells that later transform into osteoblasts, cementoblasts, or cells that form periodontal ligaments. Therefore, encouraging the progenitor cells to reoccupy the defects is essential for periodontal regeneration. Growth factors are essential mediators in this process because they can encourage periodontal progenitor cells to migrate, adhere, proliferate, and differentiate. Using a streamlined methodology, platelet rich fibrin (PRF), a newly developed growth factor delivery medium, may be viewed as a second generation platelet concentrate. In vitro research by Carroll et al. from 2008 showed that viable platelets released six growth factors over the course of their 7-day study, including insulin-like growth factor, platelet derived growth factor (PDGF), epidermal growth factor, vascular endothelial growth factor (VEGF), transforming growth factor (TGF),and fibroblast growth factor. Choukroun et al description of the PRF allows for the production of fibrin mesh that is enhanced with platelets and growth factors from an anticoagulant-free blood harvest without the need for artificial biochemical modification.[4,7] A robust natural fibrin matrix is formed by the PRF clot, which concentrates nearly all of the platelets and growth factors from the blood harvest and exhibits complex structures as a healing matrix, including mechanical qualities that no other platelet concentrate can provide.[7] Recent research has shown that it inhibits the growth of oral epithelial cells while stimulating the proliferation of osteoblasts, gingival fibroblasts, and periodontal ligament cells. In a 2011 study, Lekovic et al. showed that the regeneration effects in intrabony defects might be enhanced by PRF in conjunction with bovine porous bone mineral.[8] In this report, we discuss the clinical and radiographic changes of a patient treated for a periodontal intrabony defect with endodontic involvement using PRF and alloplast as grafting materials.

Case Report

The 29-year-old male in this case study complained of pain in his right lower back tooth and was sent to the periodontics department at Sharavathi Dental College and Hospital in Shimoga, India. The patient was found to be in good health overall and had not been on any antibiotics or long-term anti-inflammatory drugs. On periodontal examination and radiographic evaluation, the patient had an intrabony defect in the right mandibular first molar (#46) that extended to the apical third of the distal root and the middle third of the mesial root [Fig1, A] with a probing depth of 7 mm [Fig 1, B] using William's periodontal probe. The patient additionally underwent root canal treatment few months back in relation to tooth #46. Primary chronic periodontitis with subsequent furcation involvement in relation to the right mandibular first molar (#46) was determined to be the diagnosis. Once the patient had an O'Leary plaque score of 20 percent or lower, oral hygiene instructions were the only form of initial therapy.[9] The teeth underwent scaling and root planing. To establish that tooth #46 was suitable for this periodontal surgical technique, a periodontal reevaluation was carried out 4 weeks after phase 1 therapy. William's periodontal probe, which has graduations with a precision of 1 mm, was used to take clinical measurements. On the day of the procedure, blood was drawn using collection kits and centrifuge in accordance with the PRF protocol.[4] In a nutshell, a 6 ml blood sample from the patient who was not taking an anticoagulant was obtained and promptly centrifuged at 3000 rpm for 12 minutes in glass test tubes. The middle of the tube developed a fibrin clot, with red corpuscles and acellular plasma in the top and bottom, respectively. The lowest portion of the centrifuged blood was easily separated from the fibrin clot. To obtain a membrane, the PRF clot was gently pressed between two sterile dry gauges. The membrane was then chopped and put to the graft material. Right mandibular teeth (#45, 46, and 47) had an intrasulcular incision done on their buccal and lingual surfaces. To remove the granulation tissue, a full-thickness triangular flap was raised and its interior surface cured. Using hand tools and ultrasonic scalers, root surfaces were carefully prepared. First molar on the right side of the mouth showed mesial and distal intrabony imperfection. After thoroughly eliminating the granulation tissue, a mesial and distal intrabony defect that extended in the buccal and apical aspect was seen [Fig 1, C]. Briefly, root surfaces and defect walls were treated with alloplast (OSSEOGRAFT) [Fig 1, D, E]. After that, bone graft condensers were used to compress the alloplast with PRF [Fig 1, F]. Repositioning the flap to its pre-surgery levels was done while using an

interrupted silk suture technique [Fig 1, G]. Amoxicillin 500 mg twice daily for three days, Combiflam once daily for three days, and 0.12 percent chlorhexidine rinse were administered to the patient as systemic antibiotics following surgery (twice a day for 4 weeks). After seven days, stitches were removed. Without any infectious episodes or concerning clinical signs, the clinical healing was normal. The patient was seen at the first, third, and sixth weeks. At the beginning, three months, and six months following surgery, periapical intra-oral radiographs were taken at the site of the periodontal lesion [Fig 1, I]. After six months of follow-up, it was discovered in this case report that there had been a markable decrease in pocket depth and an increase in clinical attachment [Fig 1, H]. In comparison to measurements taken at baseline, radiographs of the intrabony defect showed considerable bone fill.

Figure 1: Pre and Post operative pictures of case report. (A) Pre- operative IOPA, (B) Pre- operative Probing Depth 7mm, (C) Intrabony defect After flap elevation, (D) Placement of Alloplast, (E) Placement of PRF, (F) Condensation of PRF with alloplast, (G) Flap approximated and sutured, (H) Post-operative 3mm Probing depth at six month follow up, (I) Post-operative IOPA

DISCUSSION

Due to PRF's simplicity of manipulation and distribution to the surgical site, it was decided to use it as defect fillers in conjunction with alloplast in this case report. Delivering growth factors during the initial stages of healing was the PRF's planned function in the intrabony defect. Even though PRF is a denser and stiffer material than other biological preparations like PRP and enamel matrix derivative (EMD), it is still not rigid enough to retain space as well as it could in periodontal abnormalities. In comparison to treatments without the inclusion of bone mineral, it has been observed that the combination of a mineralized, hard bone mineral and a semi-fluid, non-rigid agent, such as EMD, considerably improved the clinical outcome of intrabony defects.[10]

In a different investigation, PRF and bone mineral together have the capacity to enhance the regeneration effects in intrabony defects.[8] For this reason, we selected alloplast, with the hope that by preserving the area for tissue regeneration to take place, it could improve the effects of PRF. When used with bio-oss for augmentation in maxillary atrophic patients, amorphous PRF demonstrated accelerated bone regeneration and decreased healing time.[11] In this case report, 6 months of follow-up revealed a decrease in pocket depth and an increase in clinical attachment. Compared to measures at baseline, radiographs of the intrabony defect showed considerable bone fill. As PRF can increase the expression of phosphorylated extracellular signal, which regulated protein kinase and reduce osteoclastogenesis by encouraging the production of osteoprotegerin (OPG) in osteoblast cells, PRF may promote the healing of periodontal osseous defects.[12] By increasing the expression of OPG and alkaline phosphatase (ALP), PRF also shows to enhance osteogenic differentiation of human dental pulp cells.[13]

Furthermore, PRF promotes human osteoblasts' cell adhesion, proliferation, and expression of proteins associated to collagen.[14] Additionally, PRF boosts the production of extracellular signal-regulated kinases (phosphorylated), OPG, and ALP, which helps periodontal regeneration by affecting human periodontal ligament fibroblasts.[15]

CONCLUSION

Improvement in clinical and radiographic indices with uneventful recovery appear to be linked to the treatment of intrabony defects with PRF. The clinical effects of PRF are improved by the addition of Alloplast. PRF can be used as a regenerative material in intrabony defects due to its autologous nature, low cost, and speed. To further support the findings of this investigation, long-term, multicenter, randomized clinical trials with sizable sample sizes and histological examination of new bone growth are required.

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