TREATMENT OF INTRABONY DEFECT WITH PLATELET RICH FIBRIN AND HYDROYAPATITE BONE GRAFT: A 6 MONTHS FOLLOW -UP 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 and bone graft. A 36 year old female presented with a intra bony periodontal defect in relation to #36. The probing pocket depth (PPD) on distal aspect of # 36 was 9 mm and clinical attachment level (CAL) was 8 mm from CEJ. On surgical treatment with PRF and bone graft, six month follow up revealed a significant reduction in PPD and CAL 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. It can be concluded that PRF is clinically and radiographically efficacious in the treatment of periodontal intrabony defect.

Key words: Bony Defect, Platelet Rich Fibrin, Hydroxyapatite.

Introduction

Periodontal disease activity deals with the presence of inflammation, pocket formation, and connective tissue attachment and alveolar bone loss around a specific site of a tooth.[1] Periodontal therapy helps to protect and maintain the dentition over a long span of time. It provides comfort, functionality and esthetically sound appearance.[2] Periodontal surgical procedures have focused on the elimination of hard and soft tissue defects (i.e., probing depths and osseous defects) by facilitating new attachment[3]. Periodontal therapy helps to regenerate the supporting tissue which includes regeneration of cementum, periodontal ligament, and bone. The hydroxyapatite crystals have been used extensively in the treatment of bone defects, ridge preservation and periodontal bone defects. However it had no regenerative properties as regard to cementum and periodontal ligament. Periodontal regeneration is the complete restoration of the lost tissues to their original architecture and function by recapitulating the crucial wound healing events associated with their development[4].There has been tremendous interest in polypeptide growth factors (PGFs) in periodontal regeneration. PDGF and TGF-b have been shown to promote cell growth, differentiation, and periodontal regeneration.[5]

Platelet-rich fibrin (PRF) is a concentrated suspension of growth factors that has demonstrated to induce healing and regeneration of tissues, including those in the periodontal area[2]. The preparation of PRF involves the collection of blood and centrifugation at 3000 rpm for about 10- 12 minutes to obtain a gel like suspension of PRF.

PRF was first developed in France by Choukroun *et al*. for specific use in oral and maxillofacial surgery. PRF has the characteristic of polymerizing naturally and slowly during centrifugation. The slow polymerization mode confers to the PRF membrane a particularly favourable physiologic architecture to support the healing process.[6]

Combining bone graft material with PRF concentrate can enhance bone regeneration. Platelet concentrate in adjunction with bone graft material makes it possible to amplify the graft volume without injuring the maturation quality in new bone.[7] In various surgical procedures like, degree II furcation treatment[8] sinus floor augmentation during implant placement, [9] coronally displaced flap in multiple gingival recessions[10] and facial plastic surgery procedures,[11] PRF has shown promising results. This case report shows the treatment of an intrabony defect with Platelet-Rich-Fibrin and hydroxyapatite bone graft with a 6 months follow up.

Case Presentation

A 36-year-old Indian female complaining of food lodgement and pain in the lower left mandibular molar region reported to the Department of Periodontics, A.C.P.M Dental College and Research Institute, Dhule, Maharashtra, 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.

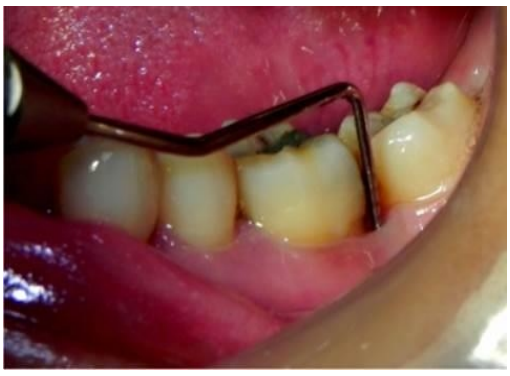

Figure 1: Pre-operative probing

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 disto-buccal aspect of the tooth # 36 was 9 mm, periodontal attachment level (PAL) was 8 mm distobuccal, whereas no

mobility was detected in relation to 36 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 defect (IBD) with tooth #36. (Figure 2)

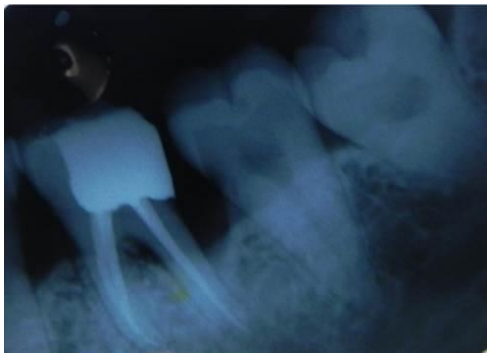

Figure 2: Preoperative radiograph

Keeping all the findings in the mind, a thorough treatment plan was decided, including a series of therapeutic procedures, following non-surgical periodontal therapy. PPD and CAL were measured after six weeks and they were still found to be 8 mm and 7 mm respectively. Before planning for the periodontal surgical procedure, patient's platelet count (3.5 lac/mm3), Haemoglobin (13.5 gm/dl), Bleeding time (2.5 min) and Clotting time (4.5 min) were assessed and found to be within normal limits.

Figure 3: PRP prepared

PRF Preparation:

The PRF was prepared in accordance with the protocol developed by Choukroun *et al*.[12] Just prior to surgery, intravenous blood (by vein puncturing 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. 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)

Surgical Procedure

Intra-oral antisepsis was performed with 0.2% chlorhexidine di-gluconate rinse. Following administration of local anaesthesia, buccal and lingual sulcular incisions were made and mucoperiosteal flaps were reflected. Meticulous defect debridement and root planing were carried out using ultrasonic instrument and curettes. PRF of the required size was filled into the intrabony defect with the hydroxyapatite bone graft granules. Also PRF membrane was used to cover the defect. (Figure 4)

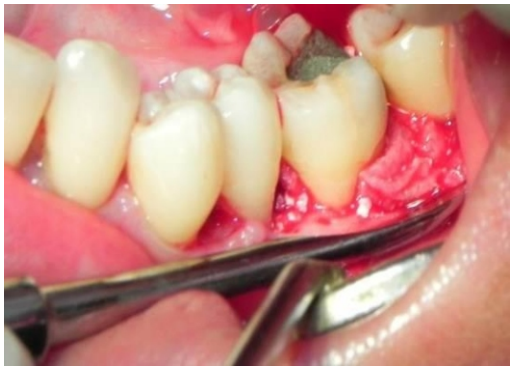

Figure 4: Surgical procedure

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. Patient was not given any postoperative antibiotic coverage. Periodontal pack was removed after a period of 7 days and on evaluation of the surgical site no craters were observed and uneventful healing.

Re-examination at 6 months after the periodontal surgery revealed reduction in PPD (from 9 mm to 3 mm) and PAL (from 8 mm to 3 mm) with no sign of bleeding on probing (Figure 5)

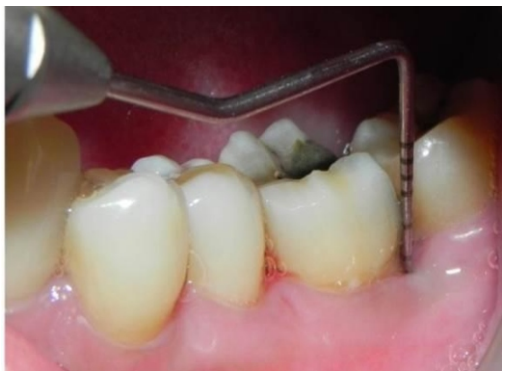

Figure 5: Post-operative probing

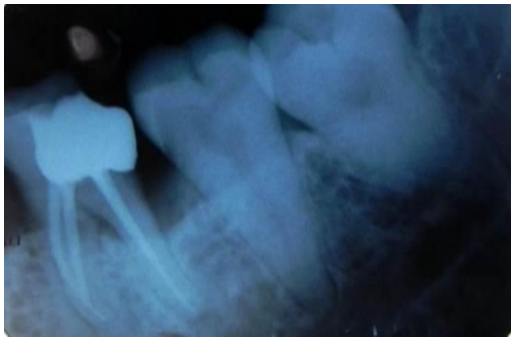

Figure 6: Post-operative radiograph showing bone formation in the periodontal intrabony defect

Investigations

Complete blood haemogram
Radiograph (intra oral periapical) pre- operative and post – operative.

Treatment
PRF with Hydroxyapatite Bone Graft

Discussion

Periodontitis is a disease of the periodontium characterized by irreversible loss of connective tissue attachment and supporting alveolar bone.[15] The ultimate goal of periodontal therapy is the regeneration of the tissues destroyed as a result of periodontal disease. Various biomaterials, based on endogenous regenerative technology (ERT), have been in use for periodontal tissue regeneration in addition to autogenous and allogenous bone grafts.

To explore the clinical and radiographic effectiveness of autologous PRF in the treatment of intrabony defects in chronic periodontitis subjects, a clinical study was conducted in which 56 intrabony defects were treated either with autologous PRF with open flap debridement or open flap debridement alone. From the study it was concluded that, there was greater reduction in PD, greater CAL gain and greater bone fill at sites treated with PRF with conventional open flap debridement than conventional open flap debridement alone.[6] In a clinical case report, a 36 year old female had presented with a wide intrabony periodontal defect in relation to tooth 46. On surgical treatment with autologous PRF, six month follow up revealed a significant reduction in Periodontal pocket depth. There was a clinical attachment level 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.[13] In another study, using a split-mouth design, 18 subjects with 36 mandibular\ degree II furcation defects were randomly allotted and treated either with autologous PRF and OFD or OFD. All the clinical and radiographic parameters showed statistically significant improvement at the sites treated with PRF as compared with those with OFD.[14] 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 growthfactors, all these help to make PRF first in fibrin technology. 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

1. Hanna R, Trejo PM, Weltman RL. Treatment of intrabony defects with bovine derived xenografts alone and in combination with platelet-rich plasma: A randomized clinical trial. J Periodontol 2004;75(12):1668-1677
2. Tozum TF, Demiralp B. Platelet-rich plasma: A promising innovation in dentistry. J Can Dent Assoc 2003;69(10):664
3. Froum SJ, Weinberg MA, Tarnow D. Comparison of bioactive glass synthetic bone graft particles and open debridement in the treatment of human periodontal defects. A clinical study. J Periodontol 1998:69(6):698-709
4. Sharma A, Pradeep AR. Treatment of 3-wall intrabony defects in chronic periodontitis subjects with autologous platelet rich fibrin - a randomized controlled clinical trial. J Periodontol 2011;82(12):1705-12.
5. Yilmaz S, Kabadayi C, Ipci SD, Cakar G, Kuru B. Treatment of intrabony periodontal defects with platelet-rich plasma versus platelet-poor plasma combined with a bovine-derived xenograft:a controlled clinical trial. J Periodontol 2011;82(6):837-844
6. Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J *et al*. Platelet-rich fibrin (PRF): A second-generation platelet concentrate. Part I: Technological concepts and evolution. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;101(3):e37-44.
7. Choukroun J, Diss A, Simonpieri A, Girard MO, Schoeffler C, Dohan SL *et al*. Platelet-rich fibrin (PRF): A second-generation platelet concentrate. Part V: Histologic evaluations of PRF effects on bone allograft maturation in sinus lift. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;101(3):299-303
8. Sharma A, Pradeep AR. Autologous platelet rich fibrin in the treatment of mandibular Degree II furcation defects: a randomized clinical trial. J Periodontol 2011;82(10):1396-403.
9. Mazor Z, Horowitz RA, Del Corso M, Prasad HS, Rohrer MD, Dohan Ehrenfest DM. Sinus floor augmentation with simultaneous implant placement using Choukroun's platelet-rich fibrin as the sole grafting material: a radiologic and histologic study at 6 months. J Periodontol.2009;80(12):2056-64.

10. Aroca S, Keglevich T, Barbieri B, Gera I, Etienne D. Clinical evaluation of a modified coronally advanced flap alone or in combination with a platelet-rich fibrin membrane for the treatment of adjacent multiple gingival recessions: a 6-month study. J Periodontol. 2009;80(2):244-52.
11. Sclafani AP. Applications of platelet-rich fibrin matrix in facial plastic surgery. Facial Plast Surg 2009;25(4):270-6.
12. Choukroun J, Adda F, Schoeffler C, Vervelle A. A opportunite' in paro-implantology: the PRF. Implantodontie 2001;42:55-62. (French)
13. Pihlstrom BL, Michalowicz BS, Johnson NW. Periodontal diseases. Lancet 2005;366:1809–1820
14. Pradeep AR, Pai S, Garg G, Devi P, Shetty SK. A randomized clinical trial of autologous platelet-rich plasma in the treatment of mandibular degree II furcation defects. J Clin Periodontol 2009;36(7):581-8.

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