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RESEARCH ARTICLE

PRF IN COMBINATION WITH DFDBA IN THE TREATMENT OF PERIODONTAL INFRABONY DEFECT-A CASE REPORT

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ABSTRACT

Periodontal regeneration is a specialized process which is very hard to achieve in routine clinical practise. New attachment apparatus should be formed to be considered for true regeneration like new cementum, bone and periodontal ligament. Various techniques and material have been used in the past to gain this therapeutic endpoint. In this case report we discussed the beneficial effects of platelet rich fibrin (PRF) with demineralised freezed dried bone allograft (DFDBA) in the treatment of infrabony defect mainly 2 and 3walled.

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INTRODUCTION

Periodontal regeneration is a multi-factorial process and requires an orchestrated sequence of biological events including cell adhesion, migration, multiplication and differentiation. (American Academy of Periodontology, 1992) To be considered a regenerative modality, a material or technique must histologically demonstrate that bone, cementum and a functional periodontal ligament (a new attachment apparatus) can be formed on a previously diseased root surface. Bone grafts and growth modulators have been used in an attempt to gain this therapeutic end point. (Rosen *et al*., 2000) Growth modulators include the use of growth factors, application of extracellular matrix proteins and attachment factors and use of bone morphogenetic proteins. (Cochran and Wozney, 1999) Growth factors are the proteins that may act locally or systemically to affect the growth and function of cells in several ways. Numerous growth factors, alone or in combination, have been tested for periodontal regeneration in animal experiments. (Graves *et al*., 1989; Lynch *et al*., 1987) Platelet rich fibrin (PRF) was introduced by "Choukroun" *et al*. in France in 2001. Platelet rich fibrin (PRF) is a second generation platelet concentrate. It is an immune and platelet concentrate collecting on a single fibrin membrane, containing growth factors like (PDGF, TGF, VEGF, and insulin-like growth factor-1), and tumor necrosis factor which are favourable for healing and regeneration. (Dohan *et al*., 2006) It can be used as a membrane or in conjunction with bone grafts which has several advantages such as promoting wound healing and haemostasis and providing better handling properties to the graft materials. (Sunitha and Munirathanam, 2008) DFDBA is among the most successful osseous graft used for bone regeneration for last three decades. It provides an osteoconductive surface and also acts as a source of osteoinductive factors. The purpose of this article is to understand and discuss the case of 40years old female patient with infrabony bone defect in lower molar reported to our OPD Deptt. Of perioodntology, MAIDS, New-Delhi, India treated with combination of PRF and DFDBA bone graft successfully.

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Case report

A 40 years old female patient reported to Department Of Periodontology & Oral Implantology (MAIDS, New-Delhi, India), with the chief complaint of bleeding from the gums since 7months. Extraoral examination showed bilateral facial

symmetry and overlying skin showed no signs of inflammation. The regional lymph nodes were also non palpable and non tender. Intraoral examination revealed generalized inflammation of gums with pockets.OPG showed infrabony defects mainly in lower molars, After analysing OPG for infrabony defects. (Fig no-1) Patients were taken up for phase-I therapy which included thorough supragingival and subgingival scaling and root planning. After phase-I evaluation, RVG was taken by using impression compound as an index which was being placed between the tooth and the film holder for standardisation. Depth of infrabony defects were measured both sides by using Kodak software. A 5mm infrabony 2wall defect was detected on the RVG in 35 tooth region. (Fig -2)

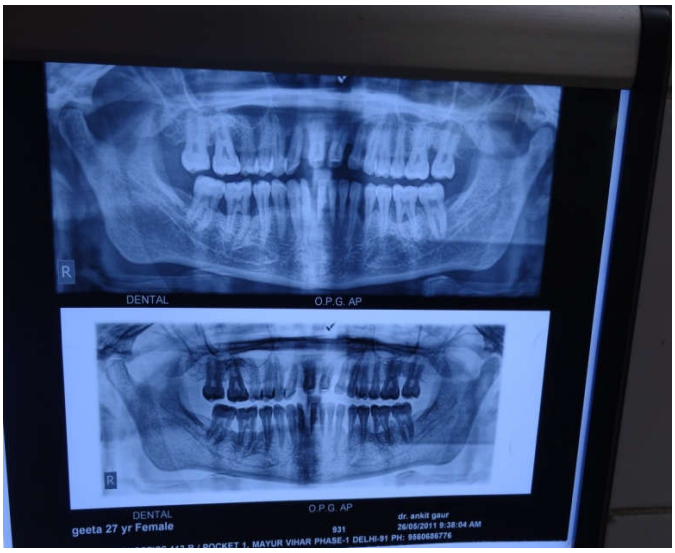

Fig.1.

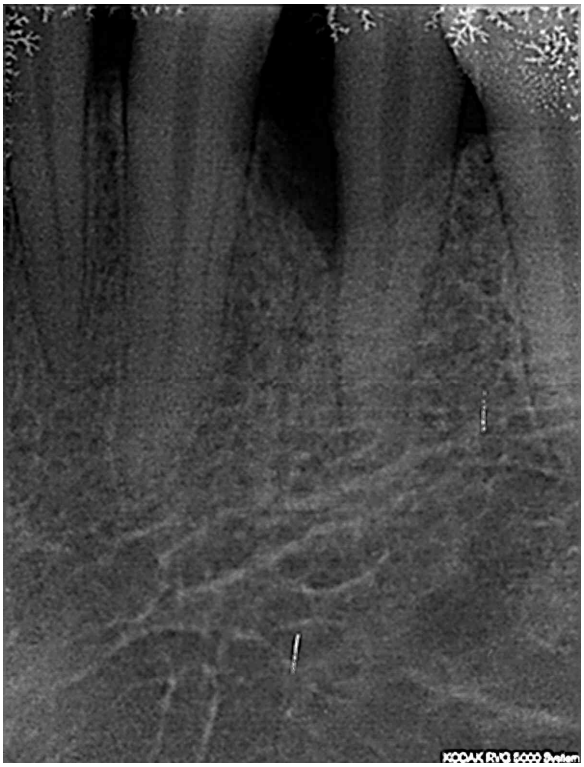

Fig.2. 5mm infrabony defect

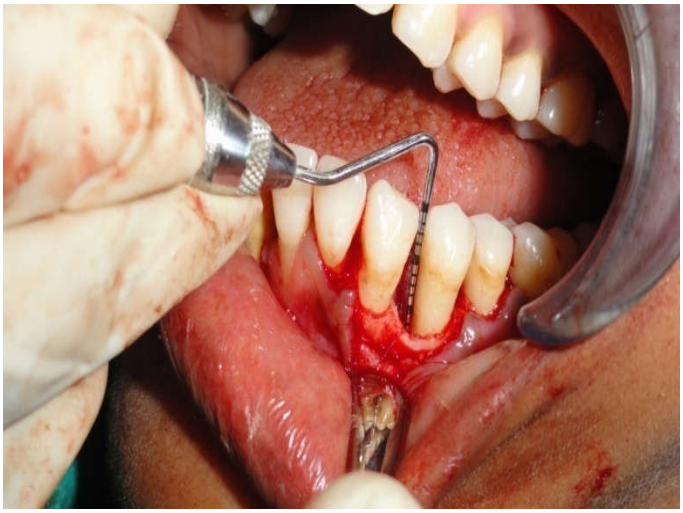

Fig.3. 5mm deep defect intraoperatively

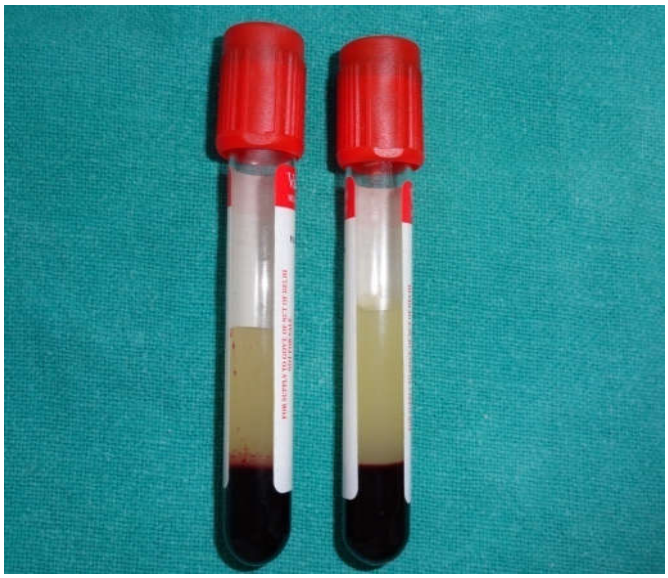

Fig.4. Vaccutainers with centrifuged blood showing 3layers

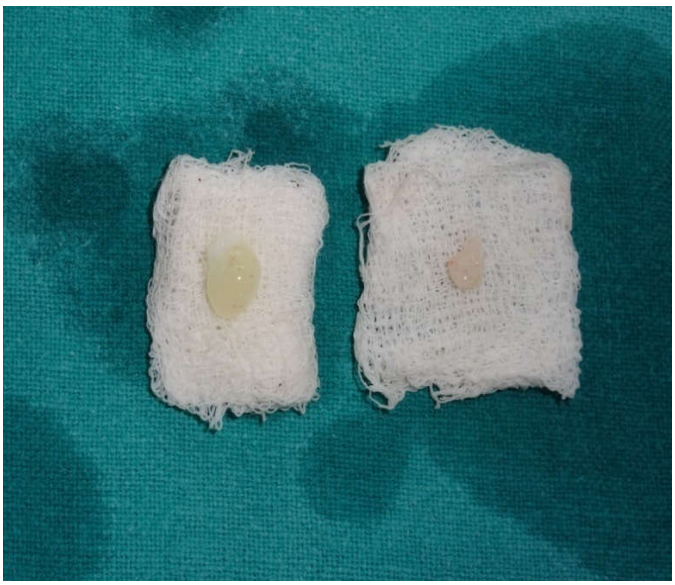

Fig. 5. PRF membrane

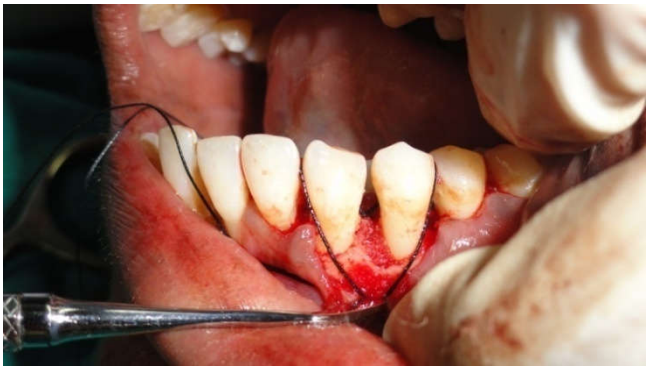

Fig.6. DFDBA bone graft placed in the defect

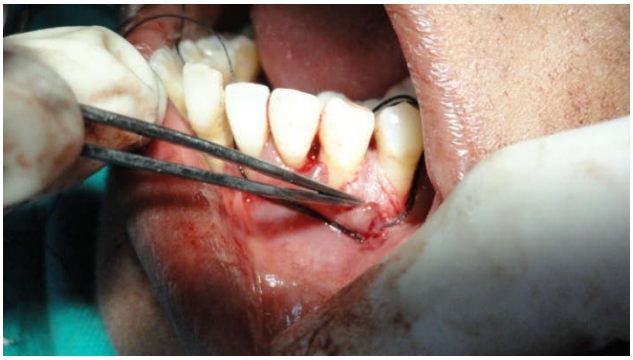

Fig.7. PRF membrane placed to cover the bone graft and defect

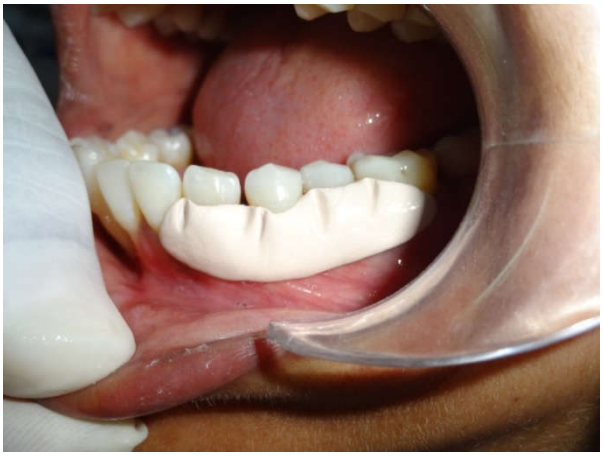

Fig.8. Coe-pak in place

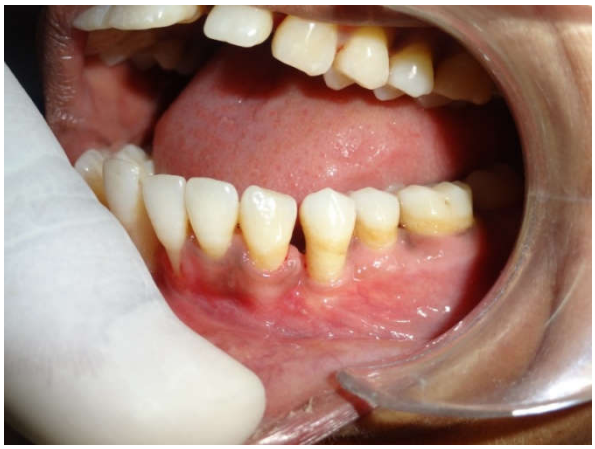

Fig.9. Post operative view after 14 days

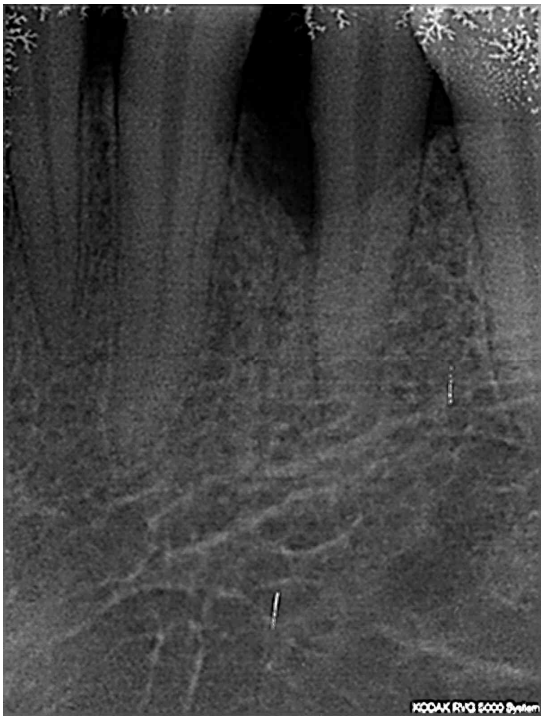

Fig. 10. Post-op-35 after 6 months

Routine blood investigations with random blood sugar and INR were also advised to the patient before the surgical intervention. After ensuring that the all routine investigations of the patient were within the normal limits, Open flap debridement (OFD) of the lesion was performed under local anesthesia (2% LIGNOCAINE HCL with ADR). A circumoral preparation with betadine was done first to prevent transfer of resident skin flora to the intraoral site. Mouth was disinfected by using 0.2% chlorhexidine mouthrinse prior to surgery for 60 seconds Bony defect was thouroughly debrided, root planned and scaled with gracey curettes (Fig-3). After debridement PRF membrane was prepared by centrifuging 10ml of venous blood at 2700rpm for 12minutes under strict septic conditions. Three different layers were obtained on centrifugation, middle layer of platelet rich fibrin was retrieved from the vacutainers with the help of sterile tweezer and pair of scissors. The platelet rich fibrin was placed between two saline wet gauze pieces and digital pressure was applied. Other two layers were discarded. (Fig-4,5).

DFDBA (size less than 500µm) was placed in the defect with the help of cumin scaler and condensed properly in the defect with parallogram condensers. (Fig-6) Prepared PRF membrane was carried to the defect with tweezer and placed over the graft covering grafted area completely (Fig-7). Horizontal mattress suturing was done and Surgical site was protected by applying a eugenol-free periodontal dressing (Coe-pak). (Fig-8) Antibiotics, analgesics with 2% cholorhexidine gluconate mouth were also prescribed for 5days.Patient was recalled after 14 days for follow up (Fig-09). Normal healing with no scarring and infection was noticed after 14days.after 6months post operative RVG was taken with the same technique used preoperatively to check the bone fill (Fig-10). A bone fill of 50-60%was appreciated on RVG with no side effects postoperatively after 6months.

DISCUSSION

Regenerative periodontal therapy aims at the reconstruction of the tooth supporting apparatus (i.e., root cementum, periodontal ligament, and alveolar bone), which has been lost because of periodontitis or trauma. The treatment of periodontal disease by traditional methods results in healing by the formation of a long junctional epithelium. Periodontal regeneration requires an orchestrated sequence of biologic events, such as cell migration, adherence, growth, and differentiation, to have the potential to increase the success and predictability of periodontal regenerative procedures. Several regenerative procedures have been described in the literature including open flap debridement with bone grafts or in combination with guided tissue regeneration and/or biological modulators. These procedures have had different rates of success. The key to tissue regeneration is to stimulate a cascade of healing events which, if coordinated, can result in completion of integrated tissue formation. Such modulators can include the use of growth factors, application of extracellular matrix proteins and attachment factors, and use of bone morphogenetic proteins. Growth factors are proteins that may act locally or systemically to affect the growth and function of cells in several ways. These factors may control the growth of cells and hence the number of cells available to produce a tissue. Platelet-derived growth factor (PDGF) has the primary effect of a mitogen, initiating cell division. It has been shown that osteoblasts proliferate in response to PDGF alone or with the addition of a progression factor to induce mitosis. A convenient technique to obtain a high concentration of PDGFs is by preparing autologous platelet rich plasma (PRP), but PRP has many disadvantages like biochemical handling of blood, limited potential to stimulate bone regeneration as it quickly releases growth factors, just before the cell outgrowth from the surroundings. To overcome all these drawbacks of PRP, a second generation platelet concentrate was introduced by Choukroun *et al*. (2006).

Choukroun platelet-rich fibrin (PRF), a second generation platelet concentrate, consists of an intimate assembly of cytokines, glycanic chains, and structural glycoproteins enmeshed within a slowly polymerized fibrin network containing growth factors like (PDGF, TGF, VEGF, and insulin-like growth factor-1), and tumor necrosis factor which are favourable for healing and regeneration. This new biomaterial looks like an autologous cicatrical matrix, which is neither like fibrin glue nor like a classical platelet concentrate. It is simply centrifuged blood without any addition. The PRF clot yielded by natural polymerization process during centrifugation and its natural fibrin architecture is responsible for slow release of growth factors like PDGF, TGF and matrix glycoproteins for more than 7 days. It can be used as a membrane or in conjunction with bone grafts which has several advantages such as promoting wound healing and haemostasis and providing better handling properties to the graft materials.

DFDBA is among the most successful osseous graft used for bone regeneration for last three decades. It provides an osteoconductive surface and also acts as a source of osteoinductive factors. It has more osteogenic potential as compare to FDBA (Melliong *et al*., 1981). Tissue banks providing DFDBA in various particle sizes and the range from 250 to 750 microns. Optimal particle size appears to be between 100 to 300 microns. This is due to a combination of surface area and packing density. Very small DFDBA particles may elicit a macrophage response and rapidly resorbed with little or new bone formation. In this case report we used dfdba of 450um particulate size. Bone levels were recorded using the Kodak software through which RVG images were taken both pre and postoperatively with the help of fixation device developed in the department. The surgical site was covered with periodontal dressing. According to NaSr *et al*. (2000) periodontal dressings prevented the impingement of foreign materials into the grafted site, prevented the flap displacement and loss of graft material which would jeopardize the success of the treatment. Antibiotics were prescribed to all the patients after the surgery. According to Kornman *et al*. (2000) antibiotics provide clinical benefits during the treatment of osseous defects as bacterial contamination adversely affects the clinical outcomes of regenerative procedures. Patients were instructed to use 0.2% chlorhexidine mouthwash twice daily for 4 weeks. In this cas report we achieved a linear bone fill of 3-4mm checked on RVG with gain in CAL and reduction in probing depth. So, PRF with DFDBA showed better result in regeneration and may be used for future studies. A limitation of the present study is the 6 month follow-up time, which could be regarded as rather short, especially for the evaluation of osseous changes. However, a longer follow up study with larger sample size could be carried out in the future to affirm the observations of our study. (Nikolas Markou *et al*., 2009)

Conclusion

As Platelet Rich Fibrin (PRF) is autologous, easy to prepare chair side technique rich in platelet derived growth factor used widely in the field of dentistry and cosmetic surgeries. So, it is recommended that future studies employing greater number of patients to be conducted to analyze the maximum potential of platelet rich fibrin (PRF) in regenerative periodontal therapy.

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