



# Platelet Rich Fibrin- A New Hope for Regeneration of Osseous Defects in Aggressive Periodontitis Patients: A Case Report

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Date of Receipt- 11/01/2014  
Date of Revision- 13/01/2014  
Date of Acceptance- 15/01/2014

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## ABSTRACT

Aggressive periodontitis causes rapid destruction of the periodontal attachment apparatus & the supporting alveolar bone. Early detection is critically important in the treatment of aggressive periodontitis because preventing further destruction is often more predictable than attempting to regenerate lost supporting tissues. Thus, the treatment of aggressive periodontitis must be pursued with a logical & regimented approach. A critical aspect of periodontal regeneration is the stimulation of the series of events & cascades at some point, which can result in the coordination & completion of integrated tissue formation.

In general, a recent innovation in dentistry has been the preparation & use of platelet-rich fibrin (PRF), a concentrated suspension of growth factors found in platelets. These growth factors are involved in wound healing & postulated as promoters of tissue regeneration. It is both nontoxic & non immune-reactive.

The use of PRF membrane in our case report to attain regeneration may alleviate the need for donor site procurement of bone graft.

**Keywords:** Aggressive periodontitis, platelet-rich fibrin, tissue regeneration

## INTRODUCTION

Aggressive periodontitis: It has been defined based on the following primary features<sup>1</sup>

1. Non- contributory medical history.

2. Rapid attachment loss & bone destruction.

3. Familial aggregation of cases.

The effectiveness of periodontal therapy is made possible by the remarkable healing capacity of the periodontal tissues. Periodontal therapy can restore chronically inflamed gingiva so that it is almost identical with gingiva that has never been exposed to excessive plaque accumulation.<sup>2</sup> The ultimate goal of periodontal therapy is the regeneration of tissues destroyed as a result of periodontal disease. Periodontal regeneration can be defined as the complete restoration of lost tissues to their original architecture and function by recapitulating the crucial wound-healing events associated with their development.<sup>3</sup> Conventional open flap debridement (OFD) falls short of regenerating tissues destroyed by the disease, and current regenerative procedures offer a limited potential toward attaining a complete periodontal restoration.<sup>4</sup> Various biomaterials based on endogenous regenerative technology (ERT) have been used for periodontal tissue regeneration in addition to autogenous<sup>5</sup> and allogenic bone grafts,<sup>6</sup> but there is not a single graft material that is considered a gold standard in the treatment of intra-bony defects (IBDs).

## CASE DESCRIPTION

Patient of age 30 years reported to the department of Periodontics, with the chief complaint of pain and mobility in teeth. Patient has no relevant medical history and no other abnormalities.

### Pre-surgical Therapy

Prior to the surgery, full-mouth supra- and subgingival SRP procedure was performed under local anesthesia. Six to eight weeks following phase I therapy, periodontal evaluation was performed to confirm the desired site for regeneration. (Fig. 1)

### Surgical Procedure

Intra-oral antisepsis was performed with 0.12% chlorhexidine digluconate rinse

and iodine solution was used to carry out extra oral antisepsis. Following administration of local anaesthesia, buccal and lingual sulcular incisions were made and mucoperiosteal flaps were reflected. (Fig. 2) Care was taken to preserve as much interproximal soft tissue as possible. Meticulous defect debridement and root planing were carried out using ultrasonic instruments and area specific curettes. No osseous recontouring was carried out.

At surgical site, HA granules with particle sizes of 600-700 microns were mixed with PRF at a proportion of 1:1 (v/v). The PRF- HA mixture was delivered to the defect. (Fig. 3) Care was taken not to overfill defect. A membrane of compressed PRF was trimmed and adapted over the grafted defect. (Fig. 4)

### Post-Surgical Measurements

Soft and hard tissue evaluation was performed 6 months after surgery. Second IOPA of the same study site was carried out at 6 months.

### Primary and Secondary Outcome Measures

The primary outcome of the study was bone defect fill (evaluated radio graphically). (Fig. 5 & 6) The secondary outcomes included PD, CAL.

## DISCUSSION

A recent innovation in dentistry is the preparation & use of platelet rich fibrin (PRF), a concentrated suspension of growth factors found in platelets. These growth factors are involved in wound healing & are postulated as promoters of tissue regeneration. Platelet concentrate contains platelet derived growth factor, transforming growth factor & many other unidentified growth factors that modulate & up regulate one growth factor function in the presence of second or third growth factor. This specific feature influenced the decision to use platelet

concentrates as the test material of choice in this case report. Thus, in the case described in this article, PRF membrane was combined with hydroxyapatite. The use of platelet concentrate (often named platelet-rich plasma [PRP]) during surgical procedures is a current treatment concept used to accelerate wound healing and tissue maturation. Choukroun's platelet-rich fibrin (PRF), a second generation platelet concentrate,<sup>7</sup> was defined as an autologous leukocyte and platelet-rich fibrin biomaterial.

PRF was developed in France by Choukroun *et al.*<sup>8</sup> in 2001. Unlike other platelet concentrates, this technique does not require any anticoagulants or bovine thrombin or any other gelling agent. This protocol is very simple and inexpensive: blood is collected in dry glass tubes or glass-coated plastic tubes and immediately centrifuged. Three layers are formed: a red blood cell (RBC) base at the bottom, acellular plasma (platelet-poor plasma [PPP] as a supernatant, and a PRF clot in the middle. This clot combines many healing and immunity promoters present in the initial blood harvest. It can be used directly as a clot or after compression as a strong membrane.

Porous hydroxyapatite (HA) bone grafting material has been used to fill periodontal defects, which has resulted in clinically acceptable responses.<sup>9</sup>

It has been shown that porous HA bone grafts have excellent bone conductive properties which permit outgrowth of osteogenic cells from existing bone surfaces into the adjacent bone material.<sup>10</sup>

Since there are no organic components contained in HA, this bone graft material does not induce any allergic reaction and is clinically very well tolerated.<sup>11</sup> However true periodontal regeneration is not achieved because healing occurs with a long junctional epithelium.<sup>12</sup> The use of PRF and HA in combination for periodontal regenerative therapy offers an interesting and

potentially clinically useful modality to the clinician in treating periodontal defects. However, it is yet unknown whether a combination of these materials may further enhance the outcome of periodontal regenerative therapy.

## CONCLUSION

In conclusion, the data from this case report suggests, firstly, that treatment of intrabony defects with PRF results in significant improvements of PD, CAL and bone fill compared with baseline and, secondly, that HA increases the clinical effects observed with PRF in the treatment of human three wall intrabony defects. However, long term, multi center and randomized, controlled clinical trial will be required to know clinical and radiographical effect over bone regeneration as well as the histological nature of newly formed tissues by either treatment, remains to be elucidated.

## REFERENCES

1. Lang et al. International classification workshop. Consensus report: Aggressive periodontitis. *Annals of Periodontology*. 1999; 4:53.
2. Lindhe et al. Clinical & structural alterations characterizing healing gingiva. *J Periodontol Res*. 1978; 13: 410.
3. Polimeni G, Xiropaidis AV, Wikesjo UM. Biology and principles of periodontal wound healing/regeneration. *Periodontol* 2000. 2006; 41:30-47.
4. Sander L, Karring T. Healing of periodontal lesions in monkeys following the guided tissue regeneration procedure. A histological study. *J Clin Periodontol* 1995; 22:332-337.
5. Orsini M, Orsini G, Benlloch D, Aranda JJ, Sanz M. Long-term clinical results on the use of bone-replacement grafts in the

- treatment of intrabony periodontal defects. Comparison of the use of auto genous bone graft plus calcium sulfate to auto genous bone graft covered with a bio-absorbable membrane. *J Periodontol* 2008; 79:1630-1637.
6. Nevins M, Hanratty J, Lynch SE. Clinical results using recombinant human platelet-derived growth factor and mineralized freeze-dried bone allograft in periodontal defects. *Int J Periodontics Restorative Dent* 2007; 27:421-427.
  7. Dori F, Kovacs V, Arweiler NB, et al. Effect of platelet rich plasma on the healing of intrabony defects treated with an an organic bovine bone mineral: A pilot study. *J Periodontol* 2009; 80:1599-1605.
  8. Choukroun J, Adda F, Schoeffler C, Vervelle A. An opportunity in perio-implantology: The PRF (in French). *Implantodontie* 2001; 42:55-62.
  9. Kenney EB, Lekovic V, Han T, Carranza Jr FA, Dimitrijevic B. The use of a porous hydroxyapatite implant in periodontal defects I. Clinical results after six months. *J Periodontol* 1985; 56:82-88.
  10. Bowen JA, Mellonig JT, Gray JL, Towle HT. Comparison of decalcified freeze-dried bone allograft and porous particulate hydroxyapatite in human periodontal osseous defects. *J Periodontol* 1989; 60:647-653.
  11. Meffert RM, Thomas JR, Hamilton KM, Brownstein CN. Hydroxylapatite as an alloplastic graft in the treatment of human periodontal osseous defects. *J Periodontol* 1985; 56:63-73.
  12. Stahl SS, Froum SJ. Histologic and clinical responses to porous hydroxyapatite implants in human periodontal defects. Three to twelve months post implantation. *J Periodontol* 1987; 58:689-695.



**Fig. 1.** Pre-operative buccal view



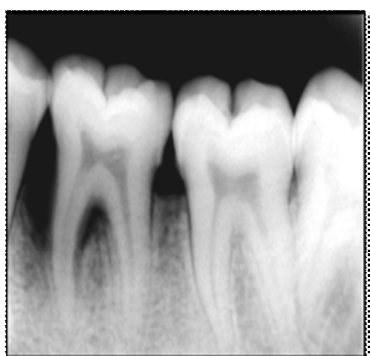
**Fig. 2.** Intra-operative buccal view



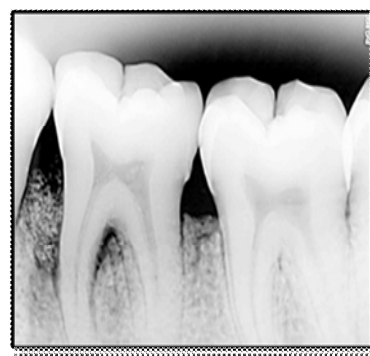
**Fig. 3.** PRF placement



**Fig. 4.** Suture placement



**Fig. 5.** Pre-operative



**Fig. 6.** Post-operative radiograph (6 months)