

# Platelet Rich Plasma in Treatment of Periodontal Osseous Defect – A Case Report

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**Abstract:** Platelets play a crucial role in periodontal regeneration, as they are reservoirs of growth factors and cytokines, which are the key elements in formation of bone and healing of soft tissue. PRP is an autologous platelet concentrate, which is prepared from patient's own blood. This case report describes the effective use of PRP in restoration of periodontal osseous defect by PRP and its potential in periodontal regeneration.

**Keywords:** PRP, growth factors, periodontal regeneration, intra-bony defect, wound healing

## 1. Introduction

Polypeptide growth factors, because of their biologic activities such as their ability to regulate cell proliferation, chemotaxis and cell differentiation have attracted many periodontal researchers. Administration of these growth factors may be combined with tissue regeneration techniques in the repair of intrabony defects, furcations and cyst cavities. Autologous Platelet Rich Plasma [PRP] is a novel method for obtaining these polypeptide growth factors.

The objective of this case report is to highlight the procurement and usage of PRP in periodontal intra-osseous defect.

## 2. Platelet Rich Plasma [1]

It is a novel method of concentrating platelets from autologous blood so that high concentration of growth factors can be delivered to the site of the defect. As the blood is centrifuged, it is separated into three basic components:

From the least dense to the most dense – they are

1. Platelet poor plasma.
2. Platelet rich plasma-sometimes also called as "buffy coat"
  1. Second level of serum.
  2. The plasma with a concentrated number of platelets and white blood cells.
  3. Contains autologous fibrinogen.
  4. Accounts for 70ml of volume.
3. Dense red blood cells

How it is mixed...

1. The clinical application of PRP for grafts requires initiating the coagulation process by using a mixture of 10 ml of 10% calcium chloride mixed with 10,000 units of topical bovine thrombin. [Gentrac].<sup>[2]</sup>
2. The ratio of PRP to calcium chloride activator is 10: 1

Each mix draws, in order –<sup>[1]</sup>

- 6ml of PRP
- 1ml of calcium chloride – thrombin mixture.
- 1 ml of air to serve as mixing bubble.

The syringe is agitated for 6-10 seconds to initiate clotting

## 3. Case Report

A 36-year-old male patient reported to our department with the complaints of painful tooth and purulent discharge in relation to 36 and 37 region. (Fig 1 and Fig 2) Upon clinical examination there was a pocket depth of more than 8 mm between 36 and 37. radiographic examination revealed complete boss around the distal root of 36 upto the apex.



Figure 1: Preoperative view



Figure 2: Preoperative radiograph

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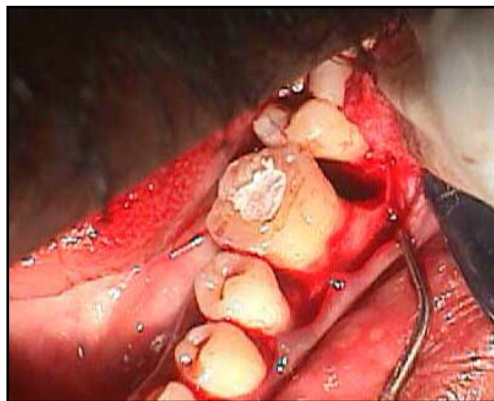
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**Figure 3:** After Root Canal Treatment



**Figure 4:** Pocket depth of 8mm before surgery



**Figure 5:** Flap reflected



**Figure 6:** Patient's blood centrifuged

Hence considering being an endodontic – periodontic lesion(Fig 2 and Fig 3), root canal treatment was done prior to periodontal therapy. After root canal treatment in relation to 36, the patient was planned for periodontal flap surgery with PRP in relation to the osseous defect(Fig 5 Fig 9 and

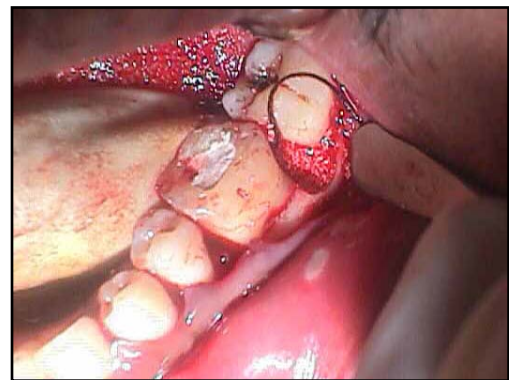
**Fig 10**) Upon flap reflection the root surface and the bony defect was debrided thoroughly. Then PRP was procured and mixed with the bone graft and placed into the osseous defect.(Fig 6 Fig 7 and Fig 8) Flaps were sutured and patient was advised antibiotics and analgesics. Sutures were removed after 10 days. Radiographs were taken immediately after placement of graft and after 3 months post operatively.



**Figure 7:** PRP collected in dappen dish



**Figure 8:** PRP mixed with Bone graft



**Figure 9:** Bone graft mixed with PRP in the defect



**Figure 10:** Flap sutured

#### 4. Discussion

Periodontics has come a long way from the era of Schallhorn who described the use of an iliac crest autograft to treat periodontal defects. Today, there are various options available to treat periodontal defects. However, autologous platelet concentrate is a very novel technique which has proved to be successful in the management of infrabony defects. The effects of platelet concentrate have been examined *in vitro* and *in vivo*. In 1995, Slater *et al.*[4] added human platelet concentrate to fetal calf serum medium containing human fetal osteoblasts. They demonstrated stimulated proliferation and maintained the differentiated function of the cells in tissue culture. Marx *et al.* added autologous platelet-rich plasma to cancellous cellular marrow bone grafts to repair mandibular discontinuity defects.[5]

Wound healing commences with hemostasis, which includes the formation of a fibrin clot, platelet adhesion, and aggregation. In the process of aggregation, alpha granules of platelets release many mediators, including platelet-derived growth factor (PDGF) and transforming growth factor (TGF)- $\alpha$  and - $\beta$ . These growth factors promote fibroblast chemotaxis (PDGF and TGF- $\beta$ ), proliferation (PDGF), contraction (PDGF), extracellular matrix deposition (TGF- $\beta$ ), and reepithelialization (TGF- $\alpha$ ) in the healing wound.[3] Periodontal ligament fibroblasts, cementoblasts, and osteoblasts are affected similarly by these growth factors.[6]

The present case report evaluated the efficacy of PRP in the treatment of intrabony defect, which led to an endodontic and periodontic lesion. Post operative radiographs taken immediately and after 3 months (**Fig 11**) showed promising results by filling of the osseous defect. This supports the various growth factors present in the PRP in accelerating the soft and hard tissue healing.



**Figure 11:** Post-operative radiograph after 3 months

Various growth factors mentioned above such as Platelet derived growth factor- PDGF-AA, BB, AB., Transforming growth factors-TGF-alpha, beta., Epithelial growth factor – EGF-acidic, basic, Fibroblast growth factor FGF, Insulin like growth factor – IGF-I are present in PRP.[1]. Even though these growth factors are present in PRP, which helps in osteogenesis and angiogenesis, it is not without limitations. Since bovine thrombin is used for clot activating it may lead to development of antibodies to factors V & XI.

Hence should be used in caution in patients with blood coagulopathies.[1]

#### 5. Conclusion

Even though with its limitations, it is safe to say that, it is a technology in its infancy. Further research is necessary to identify all the remaining growth factors in platelets, and explore the interactions of these growth factors with one another and with their target cells. Although the clinical parameters i.e., probing pocket depth reduction, clinical attachment level gain and radiographic evidence of bone fill are proved to be consistent with the successful regenerative therapy, but these findings cannot be directly extrapolated as an outcome of periodontal regeneration, as these are not supported by histologic evidence. So future studies with more critically designed protocols, larger sample size and inclusion of histologic evidence as criteria for periodontal regeneration are warranted to further explore the potential of the PRP as a periodontal regenerative tool.

#### References

- [1] Samuel E. Lynch, Robert J Genco, Robert E. Marx; Quinte; Tissue engineering: applications in Maxillofacial surgery and Periodontics. Quintessence publishing co, inc; 1999; 71 – 82.
- [2] Marx RE; Platelet rich plasma [PRP]; what is PRP and what are not PRP? Implant dent 2001; 10 (4); 225-228.
- [3] Simring M, Goldberg M. The pulpal pocket approach: Retrograde periodontitis. J Periodontol 1964; 35:22-48.
- [4] Slater M, Patavia J, Kingham K, Mason R. Involvement of platelets in stimulating osteogenic activity. J Orthop Res 1995; 13:655-63.
- [5] Marx RE, Carlson ER, Eichstaedt RM, Schimmele SR, Straus JE, Georgeff KR, *et al.* Platelet-rich plasma growth factor enhancement for bone grafts. Oral Surg oral Med oral pathol oral radiol endod 1998; 85:638-46.
- [6] American Academy of Periodontology. The potential role of growth and differentiation factors in periodontal regeneration (position paper). J Periodontol 1996; 67:545-53.

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