

CASE REPORT

Treatment of Intrabony Defects by Using Platelet Rich Plasma Combined With Bone Graft: A Case Report

ArunKumar.A¹,Deepa S², Anitha³

ABSTRACT

Background: Regeneration of periodontium using autologous materials have been attempted as it addresses safety issues and ensures easy availability. Among the autologous options available, use of platelet concentrates are promising due to ease of procurement, handling and low cost. Platelet-rich plasma (PRP) is an autologous product that is derived from whole blood through the process of gradient density centrifugation. We hereby report a case of chronic periodontitis with intra bony defects in relation 46 and 47 treated with PRP combined with bone grafts with a six month follow up. **Methodology:** 5ml of patient's venous blood was collected and PRP obtained after centrifugation. The platelet concentrate obtained was used in combination with bone graft in intra bony defect in relation to 46 and 47. **Results:** A reduction in the Probing pocket depth (PPD) from 7mm (Pre-operative) to 3mm and CAL (clinical attachment level) from 9 mm (Pre-operative) to 5 mm at 6 month recall was observed respectively. **Conclusion:** Significant improvement in clinical parameters such as PPD, CAL indicates success of regenerative therapy using PRP with bone grafts.

Keywords: Periodontitis, Periodontal regeneration, Intrabony defects, PRP, DBM.

Periodontitis is an inflammatory disease with differing levels of periodontal attachment loss and bone destruction.⁽¹⁾ The biologic mechanisms that provide a rationale for bone grafting are osteoconduction, osteoinduction and osteogenesis⁽²⁾.

Demineralized Bone Matrix (DBM) is an allograft with proven osteoinductive properties and biocompatibility.⁽³⁾ Demineralised bone matrix (DBM) Xenograft is a bone inductive sterile bio-resorbable Xenograft composed of Type I collagen. It is prepared from bovine cortical samples, resulting in non-immunogenic flowable particles of approximately 250µm that are completely replaced by host bone in 4-24

weeks⁽⁴⁾.

Platelet rich plasma (**PRP**), also termed autologous platelet gel, plasma rich in growth factors (PRGF) and platelet concentrate (PC), is essentially an increased concentration of autologous platelets suspended in a small amount of plasma after centrifugation. The proposed value of PRP in bone grafting lies in the ability to incorporate high concentrations of the growth

Scan the QR code with any smart phone scanner or PC scanner software to download/ share this publication



factors like Platelet derived growth factor (PDGF) , Transforming growth factor- β 1(TGF- β 1), TGF β 2, and Insulin like growth factor(IGF), as well as fibrin, into the graft mixture.⁽⁵⁾

CASE REPORT

One case of a patient treated with PRP combined with bone graft for osseous defects is reported here.

An apparently healthy 28 year old male patient reported to the Department of Periodontics, IGIDS, with the chief complaint of food impaction in the lower right back tooth region since 2 years. Periodontal examination revealed periodontal pockets in multiple areas measuring 6-8 mm in relation to first and second molars in all the quadrants.

Orthopantomograph and full mouth Intra-oral periapical radiographs taken showed vertical bony defects in relation to 26, 36, and 46. Routine hematological investigations – revealed normal blood picture. Probing Pocket depth (PPD) and

Clinical attachment level (CAL) measurements were using a Williams periodontal probe .

The treatment plan consisted of scaling and root planing followed by flap surgery with use of regenerative materials for intrabony defects. Patient was advised 0.2 % chlorhexidine mouth rinse twice daily.

Patient was recalled 6 weeks after phase-I therapy and the clinical parameters were re-evaluated. 46 had a PPD of 7mm & CAL of 9mm[Fig.1].IOPA revealed grade III furcation involvement [Fig.2]. PDL space widening present in relation to disto-buccal root of 46. Vitality test using electric pulp tester revealed 46 as vital.

Thereby surgical intervention was necessary and open flap debridement with regenerative therapy using a combination of PRP, Bone graft (BG)-Demineralized bone matrix was planned in relation to 46,47 tooth region.

PRP was prepared as follows: 5ml of patient's venous blood was collected [Fig.3], and



Fig 1: Pre operative



Fig 2: Pre op xray– Grade III furcation involvement



Fig 3: Collection of venous blood



Fig 4:Transferring blood to tube containing platelet activator

transferred to a test tube containing a platelet activator/agonist (topical bovine thrombin and 10% calcium chloride) [Fig.4]. The mixture was centrifuged at varying speeds until it separates into 3 layers: platelet poor plasma (PPP), PRP, and red blood cells. Usually 2 spins are used. The sample tube was then spun in a centrifugal machine for 10 minutes at 2400rpm to separate PRP and platelet poor plasma (PPP). PPP was then discarded, leaving just about 1ml of PPP present above the buffy coat. The test tubes were again centrifuged at 3600 rpm for 15 minutes to separate PRP and

PPP⁽⁶⁾. The material with the highest specific gravity (PRP) will be deposited at the bottom of the tube [Fig.5]. The whole process took approximately 12 minutes and produced a platelet concentration of 3–5x that of native plasma.⁽⁷⁾

SURGICAL PHASE

After administration of local anesthesia, sulcular and interdental incision were placed followed by elevation of full thickness flap in relation to 45,46,47 [Fig.6]. The area was debrided of subgingival calculus and granulation tissue. Horizontal and vertical component of the grade III

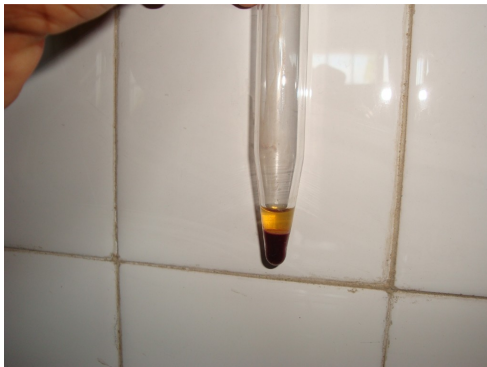


Fig 5: Separation of PRP layer at bottom after centrifuging



Fig 6: Full thickness flap elevated to expose the defect



Fig 7: Placement of PRP with graft in defect



Fig 8: Placement of PRP with graft in furcation area



Fig 9: Flap sutured



Fig 10: Periodontal dressing

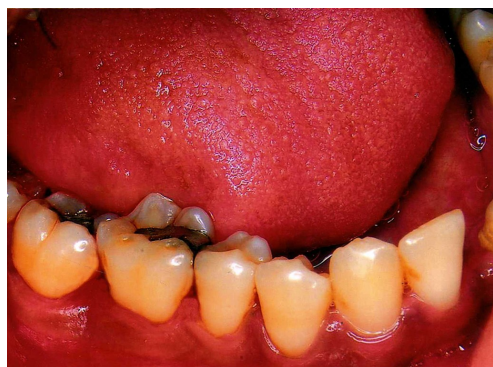


Fig 11: 6 month post operative



Fig 12: 6 months Post operative

furcation measured 4x3 mm. Width and depth of the intra bony defect was measured using Williams periodontal probe. Bone graft DBM (Demineralized bone matrix, osseomold™) was mixed with PRP [Fig.7] and placed at the defect area and at the furcation site[Fig.8]. This was followed by the approximation of facial and lingual flaps using simple interrupted sutures [Fig.9]. Periodontal dressing (Non-eugenol pack) was placed [Fig.10].

Postsurgical instructions were given. Amoxicillin 500 mg, tds for 5 days, Analgesic – Aceclofenac+ Paracetamol (100 + 500 mg), Chlorhexidine 0.2 % rinse thrice a day, were prescribed.

Following surgery, patient was re-evaluated for 6 subsequent months [Fig.11]. Radiographically a defect fill of approximately 60-70% was achieved [Fig.12]. There was a reduction in the PPD from 7mm (Pre-operative) to 3mm and CAL from 9 mm (Pre-operative) to 5 mm.

Discussion

The most favourable outcome for periodontal therapy is to regenerate the lost supporting tissues advocated, which include, open flap debridement; open flap debridement with bone grafts/bone substitutes, and guided tissue regeneration (GTR). In our case report, the patient was treated with PRP in combination with DBM to attempt regeneration in intrabony defects in relation to 46,47.

Studies have reported favourable clinical results with regard to clinical parameters like PPD and CAL with use of PRP in conjunction with bone grafts. Sachin S et al stated that combination of PRP and xenograft showed an improvement in the clinical and radiographic findings⁽⁸⁾. Wiltfang J et al stated that PRP results in accelerated new bone formation and it targeted cells such as osteoblasts and osteocytes⁽⁹⁾.

There are a many studies that have proved the efficacy of DBM as a successful regenerative material⁽¹⁰⁾. In a study by Mahantesha et al clinical and radiographic evaluation of DBM was done and the authors have achieved significant reduction in clinical parameters⁽¹¹⁾.

Preoperatively a PPD and CAL value in our patient was recorded as 7mm and 9 mm respectively. At 6 th month ppost operatively the values reduced to 3 and 9 mm respectively.

PRP utilizes the patient own blood in a significantly small quantity and is therefore not harmful to the patient. Preparation of PRP takes about less than 30 minutes and is easily performed. This can be done simultaneously, while performing the surgery, and therefore does not significantly increase the chair time. PRP decreases the chances of intraoperative and postoperative bleeding at the donor and the

recipient sites, also facilitates more rapid soft-tissue wound healing. The use of PRP represents new concepts in part of tissue engineering and cell therapy today.⁽¹²⁾

CONCLUSION

Within the limits of this study we report that use

of PRP in combination with DBM resulted in significant reductions in clinical parameters such as in PPD and CAL.

Acknowledgments: We wish to acknowledge our distinguished teachers for their constant guidance and support.

REFERENCE:

1. Giannobile WV. The potential role of growth and differentiation factors in periodontal regeneration *J Periodontol* 1996; 67:545–553.
2. Klokkevold, PR, Jovanovic, SA: Advanced Implant Surgery and Bone Grafting Techniques. In Newman, Takei, Carranza, editors: Carranza's Clinical Periodontology, 9th Edition. Philadelphia: W.B.Saunders Co. 2002. Pg. 907-8.
3. Peterson B, MD, Peter G. Whang, MD et al; Osteoinductivity of Commercially Available Demineralized Bone Matrix; *J. Bone Joint Surg.Am* 2004;86: 2243-2250.
4. Blumenthal N, Sabet T, Barrington E. Healing responses to grafting of combined collagen. *J Periodontol* 1986; 57: 84-94.
5. Froum SJ, Wallace SS, Tarnow DP, Effect of Platelet-Rich Plasma on Bone Growth and Osseointegration in Human Maxillary Sinus Grafts: Three Bilateral Case Reports. *Int J Periodontics Restorative Dent* Vol 22. Number 1, 2002.45-55.
6. Kazuhiro Okuda, Hideaki Tai, Kiyoshi Tanabe, Hironbu Suzuki, Tadashi Sato, Tomoyuki Kawase et al. Platelet- rich plasma combined with a porous hydroxyapatite graft for the treatment of intrabony Periodontal Defects in Humans: A comparative Controlled Clinical Study. *J Periodontol* 2005; vol:76, 890-898.
7. Marx RE, Carlson ER, Eichstaedt RM et al. Platelet-rich plasma: Growth factor enhancement for bone grafts *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1998; vol:85, 638-646.
8. Sachin S shivanaikar, Mohammed faizuddin, Treatment of periodontal bony defect with bovine derived xenograft and in combination of platelet rich plasma – A Case report. *AOSR* 2012;vol:2 (2);98-102.
9. Wiltfang J, Kloss FR, Kessler P, Nkenke E, Schultze-Mosgau S, Zimmermann R, et al. Effects of platelet-rich plasma on bone healing in combination with autogenous bone and bone substitutes in critical-size defects. An animal experiment. *Clin Oral Implants Res.* 2004; vol:15: 187-193.
10. Mahantesha, KS Shobha, Clinical and radiographic evaluation of demineralised bone matrix as a bone graft material in the treatment of human periodontal intraosseous defects. *J Ind Soc Periodontol* ;2013, vol:17, issue:4, page495-502.
11. Garret.S, Periodontal regeneration around natural teeth. *Ann Periodontol* 1996;vol:1:638-9.
12. Palwinder Kaur, Puneet, Varun Dahiya. Platelet-Rich Plasma: A Novel Bioengineering Concept, *Trends Biomater. Artif. Organs*,2011, 25(2), 86-90.

Address for correspondence:

Arunkumar A,
Senior lecturer
Dept of Periodontology
Indira Gandhi Institute of Dental Sciences,
Sri Balaji Vidyapeeth, Puducherry
E mail:drarananbu@gmail.com

Authors:

¹Senior lecturer,
Dept of Periodontology
Indira Gandhi Institute of Dental Sciences,
Sri Balaji Vidyapeeth, Puducherry
^{2,3} Senior lecturer
Balaji Dental College and Hospital,
Chennai.

How to cite this article:

ArunKumar.A,Deepa S, Anitha. Treatment of Intrabony Defects by Using Platelet Rich Plasma Combined With Bone Graft: A Case Report . *Journal of Scientific Dentistry* 2014;4(2):25 -29

Source of Support: Nil, **Conflict of Interest:** None declared