

Efficacy of Injectable- Platelet Rich Fibrin (i-PRF) in Enhancing Gingival Biotype Quality: A Case Report

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Citation of this Article: Dr.Prashansa Sharma, Dr. Tarun Gaur, Dr.Shivam Agarwal, Dr. Balram Garg, “ Efficacy of Injectable- Platelet Rich Fibrin (i-PRF) in Enhancing Gingival Biotype Quality: A Case Report”, IJDSIR- April - 2020, Vol. – 3, Issue -2, P. No. 70 – 73.

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Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Most important requirement for biomaterial is presence of good amount of growth factors that can promote periodontal regeneration that to at fast rate. i-PRF (injectable platelet rich fibrin) that is autologous, rich in growth factors and stem cells with wide range of clinical benefits is believed to have additional benefit of improving the gingival biotype.

Keywords: Platelet concentrate, i-PRF, Root Coverage, Gingival biotype

Clinical Significance

First generation PRP, when used along with bone grafts, showed increased wetting of bone graft particles owing to its liquid consistency. Second generation PRF although having many advantages over PRP as discussed above and is prepared in clot form. Injectable- Platelet Rich Fibrin (i-

PRF) is a super PRF which combines the advantages of using PRP in liquid form with added advantages of second-generation PRF. Therefore, it is a feasible alternative in regenerative procedures.¹i-PRF improves the gingival biotype further increasing the defence resistance of gingival.

Introduction

The preparation and use of concentrated suspension of growth factors found in platelets is the latest innovation in regeneration that shows promising results. Marx et al in 1998² introduced platelet-rich plasma which is first generation platelet concentrate. For PRP preparation anticoagulant is required and it consists of two centrifugation cycles. Then, Platelet-rich fibrin (PRF) which is a second-generation platelet concentrate developed in France by Choukroun et al³ which contain

platelets and growth factors (PDGF, TGF- α) prepared from the patient's own blood (autologous) and require only one centrifugation cycle with no use of an anticoagulant.

Injectable- Platelet rich fibrin (i-PRF) that is the advanced form of Platelet rich fibrin (PRF) is not only a good source of white cells, platelets but also provides an abundant source of growth factors and cytokines.⁴ As it is autogenous, it decreases the chances of adverse reactions to the implanted material, especially immune-mediated ones which are seen with other types of grafting materials.⁵

Membranes play an important role in GBR because of their space maintaining properties and protecting the blood clot from ingress of epithelial and other cells, so that osteogenic cells can populate the clot. Both resorbable and non-resorbable membranes can be used.⁶ Resorbable membranes have the advantage of no second surgical intervention which disturbs the healed clot. PRF has a complex architecture of strong fibrin matrix with favourable mechanical properties and is slowly remodelled, similar to the blood clot. In surgical procedures, PRF could serve as a resorbable membrane for GBR, preventing the migration of non-desirable cells into bone defect and providing a space that allows the immigration of osteogenic and angiogenic cells and permits the underlying blood clot to mineralize. However, a normal PRF membrane has rapid degradability (1-2 weeks), but if fibres are cross-linked, it could provide resistance against enzymatic degradation and could be more stable during the healing period.⁷

AIM

To evaluate the effectiveness of Injectable-Platelet Rich Fibrin along with PRF Membrane in root coverage procedure in Enhancing Gingival Biotype Quality.

Case Report

Patient named Mr. Chandan Pal aged 40 years came to department of Periodontology with chief complain of food lodgement in upper right back tooth region since 5 months. On examination patient was diagnosed with generalized Periodontitis with furcation involvement in 16. After Initial therapy was given, flap surgery was planned with PRF membranes along with i-PRF. Significant amount of improvement in gingival biotype was seen postoperatively.

Surgical Procedure



Figure 1: Flap Reflection



Figure 2: i-PRF Saturation



Figure 3 : PRF Membrane placed



Figure 4: Suture Given



Figure 5 : Flap Reflection



Figure 6: i-PRF Saturation



Figure 7: Post operative 3 Months

Discussion

In this case report good improvement in gingival biotype is seen postoperatively after 3 months. The rationale behind use of platelet concentrate is to provide these growth factors in high concentrations in the healing area. The platelet concentrate had undergone many modifications from Pure platelet rich plasma and platelet rich fibrin to advanced platelet rich fibrin, titanium platelet rich fibrin and Injectable Platelet Rich Fibrin (i-PRF).

Research of i-PRF («i» as injectable) was directed towards obtaining a blood concentrate with very high leukocyte content but which coagulates few minutes after the end of spin. Use of platelet concentrates in «liquid» and not coagulated form remains an important indication in various medical and dental applications.⁵ Basically, it is a product which combined advantage of both properties of autologous PRF and act as alternative to liquid form of platelet rich plasma (PRP). High leukocyte count in i-PRF than conventional PRF is an additional advantage for periodontal regeneration. Moreover we are not only getting whole amount of cells from the blood, white cells, platelets but also other cells like circulating stem cell and endothelial cells both of which are essential fuel for any regenerative procedure. So, we should consider i-PRF as “Blood concentrate” and not platelet concentrates. These super PRFs are said to contribute for faster and effective handling characteristics and bonding with the biomaterials.⁸

On Comparison of growth factor release from PRP AND I-PRF. Growth factor release demonstrated that in general PRP had higher early release of growth factors whereas i-PRF showed significantly higher levels of total long-term release of PDGF-AA, PDGF-AB, EGF, and IGF-1 after 10 days. PRP showed higher levels of TGF- β 1 and VEGF at 10 days. While both formulations exhibited high

biocompatibility and higher fibroblast migration and proliferation when compared to control tissue-culture plastic, i-PRF induced significantly highest migration whereas PRP demonstrated significantly highest cellular proliferation. Furthermore, i-PRF showed significantly highest mRNA levels of TGF- β at 7 days, PDGF at 3 days, and collagen1 expression at both 3 and 7 days when compared to PRP. So, i-PRF demonstrated the ability to release higher concentrations of various growth factors and induced higher fibroblast migration and expression of PDGF, TGF- β , and collagen1.⁸

Conclusion

The recent advances in PRF technology are based on the concept which enables the scaffold of PRF to be tailored for specific clinical applications by changing the centrifugation protocol and time. These super PRFs are said to contribute for faster and effective handling characteristics and bonding with the biomaterials. However, as these studies on advanced PRFs are still in infancy, many more multi-centered, randomized clinical trials using different forms of PRF are required to assess the superiority of each of these super PRFs in effective and faster wound healing.

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