Platelet-Rich Fibrin a Second Generation Autologous Platelet Concentrate for the Treatment of Inadequate Width of Attached Gingiva

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Along with the better understanding of the pathogenesis of periodontal diseases, the treatment modalities for various periodontal diseases have also gone a step ahead. One of the most important and currently unsolved problems in clinical periodontics is the predictable successful treatment of inadequate width of attached gingiva. Recently, importance has been given to the use of platelet-rich fibrin (PRF) for predictably treating periodontal diseases. PRF is an intimate assembly of glycan chains, glycoproteins, and cytokines. These are enmeshed in a slowly polymerized fibrin network which has the potential to accelerate soft and hard tissue healing. This article presents the clinical results of treatment of inadequate width of attached gingiva with PRF.

Keywords: Inadequate width of attached gingiva, Mucoperiosteal flap, Platelet-rich fibrin, Vertical relieving incisions

INTRODUCTION

The width of attached gingiva is the distance between the mucogingival junction and the projection on the external surface of the bottom of the gingival sulcus or the periodontal pocket.¹ It is not synonymous with keratinized gingiva because the latter also includes the free gingival margin.¹

The inadequate width may lead to the exposure of an unacceptable amount of root surface causing potential root caries, esthetic problems, dentinal hypersensitivity, as well as mucogingival problems.²

To manage inadequate width of attached gingiva, it requires identification of etiological factors, patient assessment and monitoring of the extent and severity of the condition. One of the recent approaches to the treatment that is being researched is the use of the second-generation autologous platelet concentrate.³

The use of fibrin glue⁴ or platelet concentrate (often named platelet-rich plasma)⁵,⁶ during surgical procedures is a current treatment concept used to accelerate wound healing and tissue maturation.⁷

Choukroun’s second-generation platelet concentrate⁸ was defined as an autologous leukocyte and platelet-rich fibrin (PRF) biomaterial. PRF was developed by Choukroun et al. in 2001. Unlike other platelet concentrates, this technique does not require any anticoagulants or bovine thrombin or any other gelling agent.⁹

It is the assembly of glycoproteins, glycan chains, and cytokines, which are enmeshed in a slowly polymerized fibrin network having the potential to accelerate soft and hard tissue healing.¹⁰ Its beneficial effects have been studied in various surgical procedures for Grade II furcation,¹¹ and various other treatments.¹²-¹⁴ PRF has also shown to provide suitable scaffold for breeding human periosteal cells, which is suitable in bone tissue engineering.¹⁵

Preparation of PRF

PRF prepared in accordance with the method given by Dohan and Choukroun.⁶ After the preparation of the patient for surgery, 10 ml of intravenous blood (from the antecubital vein) was collected in a sterile tube without anticoagulant and centrifuged immediately at 2500 rpm for 10 min.

After centrifugation, three layers are formed which are a red blood cell (RBC) base at the bottom, acellular plasma (platelet-poor plasma) as a supernatant and a PRF clot in the middle.
Sterile tweezer was used to remove the PRF clot from the tube, separated from the RBC base using scissors, and placed in a sterile kidney tray.

This article presents two cases that were diagnosed with inadequate width of attached gingiva in the mandibular anterior region of the mouth. These cases were treated with placement of PRF membrane after reflecting a full thickness mucoperiosteal flap.

CASE REPORTS

Case 1
A 44-year-old male patient reported to the Department of Periodontics with a chief complaint of bleeding from gums while brushing since past 6 months. On complete history taking and intraoral examination, it was seen that in the mandibular anterior region of the mouth the patient had inadequate width of attached gingiva (Figure 1).

After the induction of local anesthesia, labial and lingual sulcular incisions were made, and mucoperiosteal flaps reflected. The patient’s venous blood was collected, and the PRF preparation was started. In the meantime, meticulous defect debridement and root planing were carried out using Gracey’s curettes followed by placement of PRF (Figure 2). The mucoperiosteal flap repositioned and sutured using simple loop technique with resorbable sutures (Vicryl sutures). Periodontal dressing placed over the surgical area. Post-operative instructions were given. Patient was advised amoxicillin 500 mg t.i.d and ibupara 500 mg t.i.d for 5 days. Patient was evaluated 24 h and 7 days postoperatively. Healing was reviewed in subsequent visits at 1, 3, and 6 months (Figure 3).

Case 2
A 22-year-old male reported to the Department of Periodontics with a chief complaint of gums moving downward in the lower front region of the mouth since past 6 months. On complete history taking and intraoral examination, it was seen that in the mandibular anterior region of the mouth the patient had inadequate width of attached gingiva (Figure 4).

After giving local anesthesia, labial and lingual sulcular incisions were made, and mucoperiosteal flaps reflected. The patient’s venous blood was collected, and the PRF preparation...
was started. In the meantime, meticulous defect debridement and root planing were carried out using Gracey’s curettes followed by placement of PRF (Figure 5). Flaps were repositioned and secured by simple loop technique using resorbable sutures (Vicryl sutures). Periodontal dressing placed over the surgical site. Post-operative instructions were given. Patient was advised amoxicillin 500 mg t.i.d and ibupara 500 mg t.i.d for 5 days. Patient was evaluated 24 h and 7 days postoperatively. Healing was reviewed in subsequent visits at 1, 3, and 6 months (Figure 6).

**DISCUSSION**

Over the past 20 years, dental research has begun to increasingly focus on biologically inert, synthetic and autologous materials. The present article evaluated the clinical efficacy of PRF in the treatment of inadequate width of attached gingiva.

The regenerative potential of platelets was introduced in 1974. Ross et al., were first to describe the release of growth factor from platelets. After the activation of the platelets that are present within fibrin matrix, growth factors are released. These stimulate the mitogenic response in the bone periosteum leading to the normal wound healing for repair of the bone. Better understanding of the properties of platelets in wound healing has led to frequent therapeutic application of platelet derivatives in its various forms showing varying results.

The uneventful healing in the patients was in agreement with the findings of previous studies, thus supporting the outstanding ability of PRF to enhance periodontal wound healing. Use of PRF presents a significant improvement in the soft tissue healing.

PRF is commonly used as a biological mediator to promote wound healing, graft stabilization, bone regeneration, wound sealing and hemostasis. Since the fibrin matrix is better organized, it more efficiently directs the stem cell migration and the healing process. The \textit{in-vitro} and \textit{in-vivo} studies have substantiated the release of growth factors from PRF. This has led to optimal clinical application of PRF.

In the recent times, application of biologic modifiers like growth factors has been investigated extensively for use in periodontal regeneration and healing. These growth factors augment the wound healing process by stimulating anabolic bone formation, cementogenesis, angiogenesis, osteoblast differentiation, chemotaxis, and various other processes that improve the healing.

There is, till date, no evidence of use of PRF to increase the width of attached gingiva. The results of this case series indicated toward the gain in the width of attached gingiva. This result is probably due to the fact that PRF progressively releases cytokines during fibrin matrix remodeling. This mechanism explains the clinically observed improved healing due to the properties of PRF. 

**CONCLUSION**

The concept of use of PRF for increasing the width of the attached gingiva opens another preview in periodontal therapy. It has shown promising results in the cases discussed earlier. However, further studies and long-term re-evaluation are required for this procedure to hold strong ground as a treatment modality.

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