



Use of 'The Prf Membrane' for Root Coverage Rescue

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Authors' contributions

This work was carried out in collaboration among all authors. Author NC designed the methodology, wrote the protocol and wrote the first draft of the manuscript. Author SA and Author FF assisted while conducting the study and did the follow up recordings. Author SA and Author FF managed the literature searches. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Gingival recession is a complex undesirable condition that poses numerous therapeutic challenges to a clinician. The laterally repositioned flap is commonly used to cover isolated, denuded roots that have adequate donor tissue laterally and vestibular depth. A recent advancement in the periodontal regeneration has been the application of platelet concentrates. This report uses a laterally repositioned pedicle flap along with autologous suspension of growth factors, the platelet rich fibrin membrane (PRF) for the management of localized Miller's class-II gingival recession. Growth factors promote better soft tissue healing and regeneration. A satisfactory esthetic outcome was achieved.

Keywords: Repositioned flap; platelet rich fibrin; recession; regeneration.

1. INTRODUCTION

Gingival recession (GR) is defined as the displacement of marginal gingiva apical to CEJ

with the exposure of root surface to oral environment. Having a multifactorial etiology, GR has been recognized as a prevalent esthetic and functional concern since many years. Among

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them, malalignment of teeth and deleterious tooth brushing habits are often related to GR [1].

Since mid 20th century, different techniques have been developed to cover denuded roots with the aim of providing optimal comfort, function and esthetics to the patient for his/her lifetime. Free autogenous grafts and pedicle grafts including rotational flaps, advanced flaps, and semilunar flaps have been advocated. Combination grafts with either autogenous grafts like connective tissue grafts (CTGs) or allografts and with GTR membranes were developed later to correct mucogingival defects [2]. Coronally Advanced Flap (CAF) shows excellent predictability due its proven root coverage results, excellent color blending and recuperation of original soft tissue morphology [3]. The laterally repositioned flap originally described by Grupe and Warren in 1956, is commonly used to cover isolated, denuded roots that have adequate donor tissue laterally and vestibular depth. It was called as the 'sliding flap operation' that involved the reflection of a full thickness flap in a donor area adjacent to the defect and subsequent lateral displacement of the flap to cover the denuded area. Later it was advised to avoid including marginal soft tissue in the flap to reduce the risk of recession and use of a split thickness flap was advocated to reduce the risk of dehiscence development at the donor tooth [4]. The predictability of the lateral pedicle flap was shown to be enhanced when a newer material such as PRF was used adjunctively.

PRF is a type of platelet gel; a matrix of autologous fibrin that provides a rich source of growth factors (GFs) enhancing the healing potential of soft tissues and are postulated as promoters of tissue regeneration [5]. It enhances healing by slow release of GFs, angiogenesis, induction of collagen synthesis, trapping stem cells, promoting fibroblast and osteoblast proliferation and immune modulation [6]. It has shown promising results when used adjunctively with various root coverage procedures, as the GF release takes place over a period of 10 days which is the time needed for revascularization and connective tissue formation in any soft tissue regeneration procedure. Their effectiveness lies on the continuous release of transforming growth factor-1 β (TGF-1 β), vascular endothelial growth factor (VEGF), insulin like growth factor (IGF), platelet-derived growth factor-AB (PDGF-AB) and many other unidentified growth factors that modulate and up regulate one growth factor's

function in the presence of second or third growth factor [7].

In the most recent systematic review by Miron RJ et al (2020), he observed that in general, the use of PRF in combination with various CAF procedures led to statistically significant improvements in relative root coverage (rRC) and CAL gains compared to the use of CAF alone. Additionally, being entirely autologous in nature, PRF proves to be an alternative to the commonly utilized synthetic or xenogenic biomaterials available in the market favoring greater rRC when compared with CAF alone. The use of PRF appeared to improve patient-related outcomes such as postsurgical discomfort and pain as well [8]. Also Mancini L et al in his systematic review in 2021 emphasized on the potential biological benefits of PRF and reduced patient morbidity in terms of pain perception and discomfort PROs [9]. In the case described in this report, PRF membrane was combined with laterally repositioned flap technique [4] in the management of localized Miller's class II gingival recession.

2. CASE PRESENTATION

A 30-year-old male patient reported to the Department of Periodontology, with the chief complaint of receding gums and sensitivity of his lower anterior tooth. He desired treatment of this particular concern alone. On clinical examination a Miller's class-II recession defect was observed on the facial aspect of 41 (Fig. 1) [10]. Mild crowding was present in relation to the lower anterior teeth and 41 was distally tilted. Patient was not willing for an orthodontic correction. At the time of presentation, clinical examination revealed 6 mm of clinical attachment loss (CAL). The distance between the CEJ and gingival margin was 4 mm and the distance between the gingival margin and the base of the pocket was 2 mm (Fig. 2). There was optimal amount of vestibular depth and keratinized tissue available adjacent to defect. The tooth was not mobile. Probing depth of the affected tooth was 2 mm mid buccally. The medical history of the patient was non-significant.

The surgical procedure was explained to the patient and an informed consent was obtained. Initial non surgical periodontal therapy included scaling and root planing of the entire dentition and oral hygiene reinforcements. Clinical parameters namely probing pocket depth and

gingival recession [distance between the CEJ to the free gingival margin] was recorded before and after surgery.



Fig. 1. Preoperative view



Fig. 2. Preop clinical measurement

3. PRF PREPARATION

The 5 ml of blood was drawn in 10 ml test tube without adding any anticoagulant and centrifuged immediately. Blood was centrifuged in single step using a Bench top centrifuge (REMY Laboratories) for 12 minutes at 2,700 rpm. The resultant product consisted of the following three layers: Top layer consisting of acellular platelet poor plasma, PRF clot in the middle, RBC's at the bottom (Fig. 3.A). The PRF membrane was obtained by holding it in between two glass slides and squeezing out the fluids from the fibrin clot (Fig. 3.B) [11].



Fig. 3.A. Trilayered prf after centrifugation



Fig. 3.B. Platelet rich fibrin membrane prepared

4. SURGICAL PROCEDURE

After proper isolation of the surgical field, the operative sites were anaesthetized using 2% lignocaine hydrochloride with adrenaline (1:200000). A reverse bevel 'V' shape incision was made along the soft tissue margin of the recipient site in order to remove the epithelium around the root surface using a no.15 blade (Figure 4). Then the donor site was prepared by giving a vertical incision from the gingival margin to outline the flap adjacent to the recipient site and a full thickness flap was elevated (Figure 5). Root biomodification was performed using tetracycline (Figure 6). The PRF membrane was placed over the denuded roots, 2mm below the CEJ and stabilized horizontal mattress sutures (5-0 Ethicon Vicryl Absorbable sutures) in the intended position (Figure 7). The flap was then slid to completely cover the membrane and secured using sling sutures (Figure 8). Coe pak periodontal dressing was applied.



Fig. 4. De-epithelialized



Fig. 5. Flap elevated



Fig. 6. Root biomodification with tetracycline



Fig. 7. Platelet rich fibrin membrane placed



Fig. 8. Stabilized prf membrane completely covered and flap secured with sutures

4.1 Post Operative Care

Patient was placed on 0.12% chlorhexidine digluconate mouthrinse for four weeks. Systemic antibiotics and analgesics were prescribed and advised to follow routine post operative instructions. They were warned to avoid pulling on their lips to observe the surgical site. The surgical site was reevaluated and repacked after 1 week (Fig. 9). Both dressings and sutures were removed 14 days after surgery.

4.2 Patient Satisfaction Analysis

This was done based on visual analog scale (VAS) rating at baseline (24 hrs after treatment)

and at 2 weeks. Patient comfort score (PCS) was taken on a scale of 0–10, 0 being no discomfort and 10 being unbearable discomfort. Patient esthetic score (PES) was recorded with 0 being poor esthetics and 10 being excellent esthetics.

4.3 Healing

Post-operative follow up was done at 2 weeks (Figure 10). Patient did not turn up for further follow-up visits hence we were unable to document the stability of our result in further follow-ups. Healing was satisfactory and no post op complications were encountered. 50% coverage was achieved with excellent tissue contour and color blend at two weeks after the procedure. Hence with the passage of time we may anticipate a better increase in root coverage by creeping attachment. The average PCS was 1 and average PES was 8.5 (Table 1).



Fig. 9. 1 week postop view



Fig. 10. 2 weeks post op view

Table 1. Patient satisfaction analysis

	LPF WITH PRF	LPF WITH PRF
TIME PERIOD	PCS	PES
BASELINE	2	8
2 WEEKS	0	9

5. DISCUSSION

In this era of esthetic driven dentistry, an array of surgical techniques such as pedicle and free soft-tissue grafting have been put forth to aid in gingival reconstruction. The ultimate goal of any therapeutic intervention aimed at root coverage should be to restore the tissue margin at the CEJ and to achieve an attachment of the tissues to the root surface so that a normal healthy gingival sulcus with no bleeding on probing and a minimal probing depth is present [1,12]. Numerous pioneering studies have affirmed the clinical usefulness of the CAF and its many modifications to treat GR in presence of an adequate zone of existing keratinized tissue [13,14]. Currently, a CAF with subepithelial CTGs is considered as a 'gold standard' procedure in the treatment of GR [15]. However, their related donor site complications includes postoperative pain, bleeding and swelling along with histological studies showing unpredictable healing. As an alternative to CTGs, various biomaterials have been studied immensely which includes enamel matrix proteins, bioresorbable membranes, placental extracts like chorion membrane, etc which may add to the patient's treatment costs. In order to eliminate donor site morbidity as seen with CTGs and due to the unmatched regenerative potential, PRF was chosen as the material of choice for our case. Being autologous, it was indeed a boon to the lesser privileged patients.

Application of a concentrated suspension of supra-physiological doses of platelet derived growth factors, which is otherwise called PLATELET RICH FIBRIN, speeds up tissue regeneration. This second generation platelet concentrate eliminated the risk associated with the use of bovine thrombin. In dentistry, PRF has been utilized for the treatment of extraction sockets, gingival recessions, palatal wound closures, regeneration of periodontal defects and hyperplastic gingival tissues [12].

Several recent studies have claimed that platelet concentrates may improve soft tissue healing, stabilize the initial clot and induce flap

revascularization in root coverage procedures. The three-dimensional fibrin network will lead to more efficient cell migration and proliferation and can protect the growth factors from proteolysis, thus lengthening the release of growth factors, prolonging the duration of action and promoting tissue healing [16,17]. PRF generally showed a positive effect with treatment of Miller's class I and II gingival recession defects [18]. The recent systematic review by Panda S et al in 2020, showed that the therapeutic regenerative potential of PRF is harnessed when used in surgical treatment of GR along with CAF, as it positively influences cell proliferation, migration, adhesion, differentiation and inflammation [19]. Li R et al in his systematic review in 2019 mentioned that PRF could exert an additional effect to CAF and PRF could be preferred for the treatment of Miller's class I and class II GR [16]. Anil kumar et al in 2009 reported complete root coverage after 6 months of procedure using PRF with lateral pedicle flap [20]. Singh J et al in 2013 concluded that laterally positioned pedicle flap-revised technique along with placement of PRF membrane in localized recession defects can be used to restore the functional properties of labial gingiva of teeth by repairing gingival defect and re-establishing the continuity and integrity of zone of keratinized gingiva [21].

However, though autologous platelet concentrates have attracted the attention of many scholars in the treatment of gingival recessions, their additional effect remains controversial. A review by Del Fabbro et al. in 2011 evaluated the adjuvant role of platelet concentrates in the management of gingival recessions. The outcomes showed no significant improvement in RC and Keratinized Tissue Width (KTW) [22]. Another meta-analysis by Vittorio Moraschini et al. in 2016 evaluated the effects of PRF membranes on the outcomes of clinical treatment in patients with Classes I and II gingival recessions. Their results indicated there was no difference in improving RC, KTW, and CAL with or without PRF [23]. But in 2020, Miron RJ et al concluded that though the use of PRF in combination with CAF procedures have shown to provide significant improvement in relative root coverage and CAL gains, it is important to highlight that relatively no change in KTW or tissue thickness was observed when PRF was utilized. This in turn stresses on the fact that PRF alone is not sufficient to improve areas with minimal KTW, the utilization of CTGs is mandatory [8].

The outcome of our report is in accordance with these reviews wherein we observed limited additional benefit with the usage of PRF in achieving complete root coverage. Nevertheless we did observe excellent soft tissue healing which can be attributed to the growth factor reservoir of the PRF membrane. Patient based outcomes such as PCS and most predominantly PES are very relevant considerations in root coverage procedures. Patient was extremely satisfied with the esthetic result and no postoperative morbidity was reported which is quite evident from the PEC and PES scores.

Meticulous care during PRF membrane preparation and handling is absolutely essential which includes speedy blood collection and immediate centrifugation. One of the key elements to be noted is that PRF membrane should be completely covered to prevent early resorption [20].

6. CONCLUSION

Clinical implications and advantages of PRF membrane as a living tissue scaffold in GR treatments are related to the avoidance of morbidity of graft harvest, advanced tissue healing during the first 2 weeks post surgery, and a major decrease in patient discomfort during the early wound healing period. The case presented here illustrated that the use of PRF may be a promising and less invasive way of treating gingival recession compared to the traditional autogenous graft. Optimal esthetic results with excellent soft tissue contour and texture were observed. Further clinical and histologic investigations are needed in the future to provide a definitive clinical guidance for application of autologous platelet concentrates in field of root coverage procedures.

CONSENT

The surgical procedure was explained to the patient and an informed consent was obtained. Initial non surgical periodontal therapy included scaling and root planing of the entire dentition and oral hygiene reinforcements.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the ethical committee of M R Ambedkar dental college and Hospital and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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