

# Treatment for Isolated Miller's Class I or II Gingival Recession with Platelet Rich Fibrin Membrane- A Clinical Study

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## ABSTRACT

**Introduction:** Gingival recession is defined as displacement of marginal tissue apical to cemento-enamel junction (CEJ). This prospective clinical study was designed to evaluate clinically the effect of lateral pedicle flap (LPF) with platelet-rich fibrin (PRF) graft for the treatment of denuded root surfaces.

**Material and Methods:** 20 isolated Miller's Class I and II gingival recession of single-rooted teeth were selected for the study. Ist we started with caling and root planing, followed by oral hygiene instructions. Plaque index, gingival index, and recession level (probing depth and clinical attachment level [CAL], were assessed at baseline. Following this, LPF with PRF was done at the recession sites, and parameters were assessed at 3 and 6 months.

**Results:** The mean level percentage of RC attained was 72.1% at 3 months and 73.4% at 6 months.

**Conclusion:** LPF with PRF produced statistically significant reduction in recession depth and gain in CAL by the end of 6 months.

**Keywords:** Isolated Denuded Root Surfaces, Lateral Positioned Flap, Platelet-Rich Fibrin Graft

hard tissue healing. The addition of thrombin to promote conversion of fibrinogen to fibrin is eliminated in PRF as in PRP.<sup>7</sup> PRF accumulates platelets and released cytokines in a fibrin clot. It contains concentrated growth factors found in platelets. These growth factors help in wound healing and tissue regeneration.<sup>7</sup> Platelet concentrate contains platelet-derived growth factor (PDGF), transforming growth factor  $\beta$  (TGF- $\beta$ ), and many other growth factors that modulate and upregulate function of other growth factors. Hence, the aim of this clinical study was to evaluate the effect of PRF along with LPF for the treatment of denuded root surfaces.

## MATERIAL AND METHODS

Twenty systemically healthy patients with Miller's Class I or Class II facial gingival recession of single-rooted teeth (20 sites) were selected in the department of periodontics Govt Dental College Srinagar. The inclusion criteria were the presence of adequate band of keratinized gingival of adjacent teeth, adequate depth of vestibule, patients having a good level of oral hygiene apart from absence of palpal pathology. Excluding criteria were same as for other periodontal surgeries. Informed consent of all the participants of the study was obtained, after making them understand the nature of the procedure and possible discomfort and risks.

**Pre-study patient preparation:** History including medical and complete dental history then periodontal evaluation and the necessary laboratory investigations were done in all participants. Followed by a session of prophylaxis including instructions on proper oral hygiene. A proper brushing technique was prescribed. University of North Carolina Probe was used to measure the different clinical parameters which were recorded to the nearest millimeter.

## INTRODUCTION

Labial gingival recession in the anterior region is the most important challenges for periodontal patients. There are different factors responsible for contributing to the condition apart from periodontal diseases are; traumatic tooth brushing, thin gingival tissue, tooth malposition, and high frenel attachment.<sup>1,2</sup> The main indications for root coverage (RC) procedures are esthetic concern, root hypersensitivity, management of root caries and cervical abrasion, plaque control.

Different surgical techniques have been proposed to achieve successful and predictable root coverage. They include coronally positioned flap, lateral positioned flap (LPF), free gingival graft, free gingival graft with coronally positioned flap, free connective tissue autograft, subepithelial connective tissue graft, guided tissue regeneration, and allograft matrix.<sup>3</sup> The average amount of 63%–86% RC may be expected for Miller Class I–II recession defects following treatments.<sup>4</sup> lateral pedicle flap technique which was originally described by Grupe and Warren in 1956, was considered as standard technique for many years and is still indicated in some cases.<sup>5</sup> The outcome of the lateral pedicle graft can be increased using a newer material such as platelet-rich fibrin (PRF).<sup>6</sup> It hastens healing as well as increases the chances of complete RC. PRF developed by Choukroun et al. (2001), is a second generation platelet concentrate used to accelerate soft and

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**How to cite this article:** Muzafar Ahmad Bhat, Huda Hussian, Suhail Majid Jan. Treatment for isolated Miller's class I or II gingival recession with platelet rich fibrin membrane - a clinical study. International Journal of Contemporary Medical Research 2019;6(4):D1-D4.

**DOI:** <http://dx.doi.org/10.21276/ijcmr.2019.6.4.3>

**Clinical parameters** The clinical parameters: plaque index (PI), gingival index (GI), and recession parameters (assessed on the buccal aspects of all study teeth) at baseline, 3 months, and 6 months [Figure 1] were recorded. Recession parameters included: a. Probing depth (PD): Measured by probe at the defect from the crest of the marginal gingiva at the mid-buccal point of the involved tooth to the base of sulcus, b; Clinical attachment level (CAL): Calculated by adding recession depth (Measured from CEJ to the most apical point of the free gingival margin on the mid-facial region of the tooth by a probe) and the PD

The assessed recession parameters were used to obtain:

a. Recession reduction (RR): Calculated as: Preoperative CAL – Postoperative CAL

b. Percentage of RC: Calculated as: (RR/preoperative GRH) × 100.

### Study procedure

Platelet-rich fibrin: Ten milliliters of blood was drawn from patient and put into test tubes without an anticoagulant and centrifuged immediately using a centrifuge for 12 min at 2800 rpm. Three layers, topmost layer of acellular platelet-poor plasma, PRF clot in the middle, and red blood cells at the bottom [Figure 5] were formed. PRF membrane were obtained by squeezing out the fluids in the fibrin clot.<sup>6</sup>

**Surgical procedure** Local anesthesia was given in the area of surgery. The technique used in this procedure is: reflection of a partial- full-partial thickness flap at the donor area adjacent to the defect and then displacement of this flap to cover the exposed root surface.<sup>5</sup> A reverse bevel was made along the soft tissue margin of the recipient site to remove the epithelium around the root surface.<sup>8</sup> The root surface was cleaned by curettes. Then, the donor site was prepared by giving a crevicular incision using a #15 Bard-Parker blade and vertical incisions were made from the gingival margin to outline the flap and flap was raised [Figure 2]. Then, Ist partial thickness flap is reflected then full thickness flap was reflected till MGJ by bluntly using periosteal elevator. This was followed by partial thickness flap elevated by sharp dissection to release all the muscle attachments. Flap was then displaced laterally, and if tension was observed in the flap, a cutback incision was placed on lateral border of pedicle flap.<sup>9</sup> The prepared PRF membrane was then placed over the denuded roots as well as donor site to enhance healing [Figure 3]. The flap was then displaced to completely cover the membrane and secured using sling sutures.<sup>3</sup> Pedicle flap was also sutured by loop sutures [Figure 5].

### Postsurgical care and follow-up

Postoperative instructions were given to patients, and antibiotics (amoxicillin, 500 mg, TDS × 5 days) and analgesics (ibuprofen 400 mg, TDS × 5 days) were prescribed. Tooth brushing was discontinued at the site of surgery for 4 weeks. Chlorhexidine gluconate (0.2%) mouth rinse twice daily for 4 weeks [Figure 6] was prescribed. Sutures were removed after 2 weeks. Patients were instructed to resume mechanical tooth brushing, one month after surgery of the treated area.<sup>10</sup>

## RESULTS

All the parameters (viz., PI, GI, PD and CAL) were recorded at baseline, 3 months, and 6 months after surgery. To analyze the post treatment effect, paired *t*-test was performed at relevant degrees of freedom and 95% confidence level. The participants (*n* = 13) in the study were in the age group of 20–60 years. The mean age of the participants was 35 years of the study population; 46.15% were males and 53.85% were females. The differences for all parameters between baseline and 3 months and baseline and 6 months is outlined in table-1.

Indices	Baseline	3 months	6 months
PI	0.289±0.11	0.675±0.15*	0.662±0.10#
GI	0.345±0.08	0.622±0.15*	0.662±0.11#
PD	0	0.467±0.5*	0.333±0.47#
CAL	4.2±0.9	1.73±1.12*	1.53±0.88#

\*Significant difference between baseline and 3 months ( $P \leq 0.05$ ), #Significant difference between baseline and 6 months ( $P \leq 0.05$ ). Paired *t*-test was applied to assess results from 3 months and 6 months to baseline. PI=Plaque index, GI=Gingival index, PD=Pocket depth, CAL=Clinical attachment level,

**Table-1:** Comparison of mean±standard deviation of all the parameters at different intervals



**Figure-1:** Gingival Recession in canine, **Figure-2:** Flap reflection, **Figure-3:** PRF membrane placed, **Figure-4:** Postoperative view after 6 months



**Figure-5:** PRF membrane

CAL showed a mean gain of 2.47 mm at 3 months and 2.67 mm at 6 months.[Figure 7].

## DISCUSSION

Gingival recession is associated with impaired esthetics and/or dentinal hypersensitivity. surgical procedures which are performed to cover denuded roots among which LPF is one of the most commonly performed RC techniques. Furthermore, there is a strong evidence that PRF, a second-generation platelet concentrate, accelerates soft and hard tissue healing.<sup>7</sup> Hence, in the our study, for coverage of localized recession we us combination of LPF with PRF graft so as to overcome the drawbacks associated with LPF technique such as incomplete RC and recession at the donor area. Grupe and Warren introduced 1st LPF, and which was later, modified by various authors. Staffileno (1964) and Pfeifer and Heller<sup>11</sup> used a split thickness flap to minimize risk of dehiscence at the donor tooth. In a clinical human study, Wood et al.<sup>12</sup> did reentry procedures to compare crestal radicular bone responses to full and partial thickness flaps. Pfeifer and Heller (1971)<sup>11</sup> reported that reattachment of periodontal tissues on the exposed root surface is more likely to occur with full thickness flaps. Therefore, full thickness flaps are more appropriate for RC, and partial thickness LP for increasing the width of the attached gingiva. Hence, in the present study, we reflected full thickness flap till MGJ and cut back incision was used to relieve tension in the pedicle flap (modified LPF).<sup>9</sup> PRF is a complex biomaterial with a specific biology. It is organized blood clot which has dense fibrin scaffold with a high number of leukocytes concentrated in one part of the clot,<sup>13</sup> with continuous slow release of growth factors (such as TGF- $\beta$  1, PDGF-AB, and vascular endothelial growth factor) and glycoproteins (such as thrombospondin-1) during the span of 7 days or more. Leukocytes have strong influence on release of growth factor, immune regulation and matrix remodeling during healing.<sup>14</sup> Another experimental study which was done used to investigate the influence of PRP and PRF on proliferation and differentiation of osteoblasts. In this study,it was found the affinity of osteoblasts to the PRF membrane appeared to be superior.<sup>15</sup> PRF can be used as unaltered mass, such as a clot or can be compressed into membrane without losing its properties. PRF membrane is prepared by compression and has to be used very quickly because it will dehydrate. An excessive waiting period on dry compresses influences the growth factor content in the membrane.<sup>16</sup> In the present study, PRF was kept ready in test tube till its application on prepared root surface. Hence, dehydration of PRF was avoided by quick utilization of this MRF membrane. In the present study, PI (Silness and Loe, 1964) was used to assess oral hygiene and for GI for gingival condition (Loe and Silness, 1963) during and after the procedure. Although there was an increase in values of both PI and GI score from baseline to 3 and 6 months, there was statistically no significant difference between 3 and 6 months, suggesting adequate maintenance of oral hygiene and lack of gingival inflammation at baseline, postsurgical, and recall visits. Treatment effectiveness in our study was

determined as relative RC and periodontal tissue health at 3 and 6 months. The percentage of coverage of a previously exposed root surface was the primary clinical outcome used to evaluate the effectiveness of the surgical procedure. In the present study, the mean percentage of RC attained was 72.4% at 3 months and 73.2% at 6 months (range: 50%–100%). Results in our study suggest that the mean RC of LPF + PRF was higher compared to mean RC mentioned for LPF alone.<sup>17,18</sup> The mean recession height at baseline was 4.2 mm which reduced to 1.7 mm at 3 months and 1.5 mm at 6 months, showing a mean reduction of 2.5 mm at 3 months and 2.7 mm at 6 months. In the Academy Report (2005), it was stated that mean initial recession height of 3.9 was reduced to 1.3 mm after LPF. Thus, mean reduction in recession height was 2.6 mm.<sup>17</sup> In our study LPF along with PRF results in more RC compared to LPF alone.<sup>18</sup> The present study is the first study of its kind which considered application of PRF along with LPF. Hence, results obtained in this study cannot be compared to ascertain the inference deduced from the study. One of the observations of the study was that the maximum change in parametric values for both the sites occurred at 3 months and these were maintained for 6 months postoperatively The change in values between 3 and 6 months were statistically not significant for all the parameters which were recorded that strongly indicates that healing must have been complete by the end of 3 months.<sup>19</sup>

## CONCLUSION

This study was designed to evaluate clinically, the treatment of denuded root surface with LPF with PRF graft. Results obtained indicated that LPF along with PRF resulted in significant improvement in all clinical parameters. LPF along with PRF (LPF + PRF) produced statistically gain in CAL by the end of 6 months. There was also statistically significant percentage of RC. The treatment produced an excellent in color matching and also restores esthetic contours of gingiva. Healing at experimental sites shows it is completed by 3 months, and results remained same till the end of the experimental period. The results of the present study are encouraging enough, to explore combined type of treatment procedures and to treat isolated denuded root surfaces successfully.

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**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 09-02-2019; **Accepted:** 25-03-2019; **Published:** 09-04-2019