

## Platelet Rich Fibrin: The “Wonder Bio-Material” To Enhance Recession Coverage with Lateral Pedicle Flap

First Author: **Pranesh Sundaresan**

III MDS, Department of Periodontology  
Krishnadevaraya College of Dental Sciences and Hospital  
Email: writetopranchu@gmail.com

Second Author: **Dr Rashmi Paramashivaiah**

Reader, Department of Periodontology  
Krishnadevaraya College of Dental Sciences and Hospital

Third Author: **Dr Prabhuji MLV**

Professor and Head of Department, Department of Periodontology  
Krishnadevaraya College of Dental Sciences and Hospital

Fourth Author: **Dr Cherukuri Aswani**

III MDS, Department of Periodontology  
Krishnadevaraya College of Dental Sciences and Hospital

**Abstract** – *Labial gingival recession in the anterior region has been one of the most important treatment challenges for periodontists owing to their varied etiology. Among the procedures for treatment of isolated gingival recessions, it is ideal to perform a pedicle flap procedure. Thus this case report combines the lateral pedicle flap with the use of Platelet Rich Fibrin (PRF), an enriching bio-material for the treatment of isolated gingival recession. A 42 years old male patient reported to the outpatient department of Krishnadevaraya College of Dental Sciences and Hospital. On examination, Millers class III isolated recession was observed in relation to 41. Surgical procedure involved placement of a vertical incision 3 mm away from the gingival margin from the distal line angle of the adjacent tooth and upto the base of the recipient site to elevate a full-split thickness flap laterally rotated flap. Platelet Rich Fibrin was prepared in situ according to Choukroun's protocol and placed upon the defect prior to suturing for enhanced postoperative healing and was followed up for 1 month. Recession coverage obtained by this technique in the initial healing period showed that combining PRF with LPF was a promising alternative.*

**Keywords:** lateral pedicle, gingival recession, PRF, Miller's Class III, bio-material

## **Introduction**

In the recent years aesthetic concerns have led to an increasing importance towards seeking dental treatment, with the purpose of achieving the perfect smile. Gingival recession leading to exposure of tooth root surface is a rising concern among patients opting for surgical correction of the defect/defects. Treatment modalities have evolved by leaps and bounds over the years with the ultimate aim of achieving predictable and satisfactory outcomes from the clinician as well as the patient's perspective.

One of the earlier techniques put forth for treatment of localized gingival recessions is the pedicle flap characterized by their connection to the donor site even after placement at the recipient site. The first pedicle flap was attempted by Grupe and Warren (1956) and was called the lateral sliding flap operation. The lateral rotation of a flap from the adjacent tooth avoids a second surgical site and associated patient morbidity.<sup>1</sup>

Root coverage procedures have gained greater importance over the last two decades with the emergence of newer concepts and materials. Most of these materials, used in conjunction with the surgical procedure, enhance one or many aspects of the treatment modality thus optimizing treatment outcomes. Soft tissue healing has been shown to have an impact on the longevity of treatment as much as hard tissues and have also proven to be difficult to

manipulate owing to their delicate nature. Various materials attempted to enhance soft tissue quality and healing include gingival grafts, collagen membranes, acellular dermal matrix, growth factors and autologous platelet concentrates (APC).

Autologous platelet concentrates are a class of soft substitutes which capture a high amount of activated platelets in a fibrin meshwork leading to a steady release of growth factors which crucially aids in the initial phase of wound healing. The rationale is to capture the process at its final stage of clot formation and stabilization achieved by the centrifugation process.<sup>2</sup>

Platelet Rich Fibrin (PRF) is a second generation platelet concentrate which contains platelets and leukocytes in their highest concentrations entrapped in a three dimensional cross linked fibrin network.<sup>3</sup> This forms an ideal scaffold to capture, support and stimulate cytokines that induce cell migration and proliferation through the release of vital growth factors.<sup>4</sup> This case report describes the use of the lateral pedicle flap with the adjunctive use of PRF for the treatment of gingival recession.

### **Materials and Methods**

A 42 years old male patient presented to the Department of Periodontology, Krishnadevaraya College of Dental Sciences with a chief complaint of reducing gum level on his lower front tooth and wanted to get it treated. On intra-oral examination, Miller Class III gingival recession was present in tooth 41 which had gradually progressed over a period of 3-4 years. The tooth in question was fully functional with no sign of mobility as well. However, an aberrant frenulum was observed in the vestibular region in relation to tooth 42 which could

have caused the recession defect. Patient was in good systemic health with no relevant medical, family and personal history.

Understanding that the patient's main concern was aesthetics, root coverage procedure was explained to the patient as the appropriate treatment option. The lateral pedicle flap procedure was chosen after careful evaluation of the presence of keratinized tissue apical and adjacent to the defect. Internal frenectomy was also planned in order to remove muscle tension. To enhance soft tissue healing and clinical attachment, placement of PRF membrane was advised and the procedure was explained thoroughly to the patient. Patient agreed to the proposed treatment plan and non-surgical therapy was performed. An appointment was made 2 weeks after the initial therapy for re-evaluation. The healing at the proposed site was found to be satisfactory.

Baseline measurements in the form of recession depth, recession width, probing depth and keratinized tissue width (KTW) were recorded prior to surgery (Figures 1 and 2). Local anesthesia (2% lidocaine with 1:80,000 epinephrine) in the form of mental nerve block and infiltration was administered. The surgical procedure started with the preparation of the recipient site where a reverse bevel incision 2 mm deep was given circumferentially around the recession defect. The epithelium was removed to create a connective tissue bed conducive for the attachment of the rotated flap and root surface was thoroughly curetted (Figure 3).<sup>5</sup> Root biomodification with 24% EDTA was carried out with a cotton pellet and the area was thoroughly rinsed out.

The donor site (tooth 42) preparation started with an incision in an apical direction parallel to the recession defect from the distal line angle of the adjacent tooth. This incision is connected to the recession defect by a horizontal incision given 2-3 mm away from the gingival margin

of 42 to prevent recession at the donor site. Full thickness elevation was done until the MGJ beyond which split thickness flap was raised to preserve the blood supply at the donor site and facilitate sufficient displacement of the flap (Figure 4).<sup>5</sup> A cut back oblique incision was given beyond the mucogingival junction (MGJ) to further increase the mobility and reduce the tension of the flap. During the surgery, 10 ml of blood was withdrawn and centrifuged immediately at 2100 rpm for 7 mins to form standard PRF membrane.<sup>6</sup> The membrane was placed between two glass slabs to expel residual fluid (Figures 5 and 6). The PRF membrane was then placed against the denuded root surface ensuring close adaptation (Figure 7). The flap was then rotated laterally to cover the PRF membrane and the root surface and held firmly in place by sling sutures (Figure 8). Pressure was applied with moist gauze to minimize the clot beneath the flap.

Postoperatively 0.2% chlorhexidine gluconate mouth rinse was advised 2 times daily for 1 minute for 2 weeks. Instructions were given to avoid brushing at the surgical site for 2 weeks and to use a soft bristle brush after that. Patient was asked to come for weekly follow ups during the 1<sup>st</sup> month, once at 3 months and 6 months to monitor the healing process and clinical attachment levels. Follow up at 1 month showed optimum healing and patient reported minimum pain and discomfort post-surgery (Figure 9).

## **Results**

The results of the present study show that gingival recession areas can be significantly covered by the lateral sliding flap technique. The soft tissue recession coverage observed was 4 mm one month after the surgical procedure which translates to 66% root coverage achieved. The stability of the result could be appreciated in the donor as well as the recipient

site. Keratinized tissue width increased from 4mm to 7mm and was maintained for the first month indicating minimum flap tension.

## **Discussion**

The pedicle graft is a predictable option for the treatment of localized gingival recessions as it offers acceptable root coverage with lesser morbidity. The biggest advantage could be the retained attachment to the donor site thereby maintaining an intact blood supply. Since the donor site is adjacent to the defect, a second surgical site and the associated trauma can be avoided. Placement of the horizontal incision away from the gingival margin was crucial to prevent the occurrence of gingival recession in the donor site.

<sup>7</sup>In a study by Harris et al (2005) coronally positioned flap, double pedicle flap and lateral pedicle flap with tunneling in association with connective tissue graft were compared in the treatment of isolated gingival recessions in the mandibular incisors. Among the three flap designs, the lateral pedicle with tunneling demonstrated a greater root coverage percentage and a greater increase in keratinized tissue width.<sup>8</sup>

In a recent study by Bharat et al (2017), Miller Class I and II gingival recession cases were treated with connective tissue graft and lateral pedicle flap and evaluated for 6 months. Although root coverage was superior with connective tissue graft, keratinized tissue width increase of 4.5 mm was seen following lateral pedicle flap which highlights the effectiveness of the procedure.<sup>9</sup> The use of lateral pedicle flap along with connective tissue graft for orthodontically induced gingival recession was reported by Panda et al. Following a similar

combination of full and partial thickness elevation, the authors were able to achieve 80% root coverage over a period of 1 year while obtaining optimum soft tissue health.<sup>10</sup>

Platelet rich fibrin is a complex biomaterial produced in the form of an optimized natural blood clot. It contains the highest concentration of platelets and leukocytes entrapped in a dense fibrin scaffold with a slow release of vital growth factors (such as TGF- $\beta$  1, PDGF-AB, and vascular endothelial growth factor) and glycoproteins over a period of 7 days or more.<sup>11</sup> Activated platelets release the contents of their granules which include adhesive proteins, chemokines and hemostatic factors. The rationale behind the use of platelet concentrates is to mimic the terminal stage of the natural coagulation cascade, which is, the formation of fibrin clot and release of growth factors that could then be utilized in a surgical site as natural scaffold and to promote local healing and lost tissue regeneration. Apart from their function as defence cells, leukocytes have a strong influence on growth factor release, immune regulation, anti-infectious activities, and matrix remodeling during healing.

A study by Kurdukar et al in which modified lateral positioned flap with PRF was used for Miller's Class I and II gingival recessions reported promising results in terms of significant clinical attachment level gain and increase in keratinized tissue width.<sup>12</sup> In our study we have extended the scope of this treatment option to Miller's Class III gingival recession and promising results have been obtained. The lateral pedicle flap provides good vascularity at the recipient site offering a better colour match and maintains adequate keratinized tissue as well.<sup>13</sup> PRF, characterized by its three dimensional fibrin scaffold, high concentration of activated platelets and the sustained release of growth factors, contributed to the superior and uneventful healing seen post surgically.<sup>14</sup>

The most challenging class for treatment is the Miller's Class III with its interdental soft tissue and bone loss. It is a veritable combination of a lateral pedicle flap with its native vascularity and the autologous platelet rich fibrin acting as a reservoir of the vital healing elements which could have contributed to the accentuated root coverage. Within the limits of the present case study it could be said that lateral pedicle flap along with PRF resulted in statistically significant root coverage, gain in clinical attachment levels and keratinized tissue width for the treatment of Miller's Class III gingival recession defect.

### **Conflict of Interest**

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

### **References**

1. Grupe, H. E. and Warren, Richard F.: Repair of gingival defects by a sliding flap operation. J. Periodont., 27:92, 1956.
2. Ezzatt OM. Autologous platelet concentrate preparations in dentistry. Biomed. J. Sci. Tech. Res. 2018;8:1-10.
3. Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J, Gogly B. Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part I: technological concepts and evolution. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2006 Mar 1;101(3):e37-44.



4. Newman MG, Takei H, Klokkevold PR, Carranza FA. Newman and Carranza's Clinical Periodontology E-Book. Elsevier Health Sciences; 2018 May 29.
5. Lang NP, Lindhe J, editors. Clinical periodontology and implant dentistry, 2 Volume Set. John Wiley & Sons; 2015 Mar 25.
6. Ehrenfest DM, Rasmusson L, Albrektsson T. Classification of platelet concentrates: from pure platelet-rich plasma (P-PRP) to leucocyte-and platelet-rich fibrin (L-PRF). Trends in biotechnology. 2009 Mar 1;27(3):158-67.
7. Grupe HE. Modified technique for the sliding flap operation. The Journal of Periodontology. 1966 Nov;37(6):491-5.
8. Harris RJ, Miller LH, Harris CR, Miller RJ. A comparison of three techniques to obtain root coverage on mandibular incisors. Journal of periodontology. 2005 Oct;76(10):1758-67.
9. BharatA A, GuptaB R, SinghC A, AggarwalA R. Comparison Of Two Root Coverage Procedures: Subcutaneous Connective Tissue Graft And Lateral Pedicle Flap: A Clinical Study.
10. Panda S, Panda S, Satpathy A, Das AC. Laterally Pedicled Flap and Connective Tissue Graft for Management of Orthodontically Inflicted Gingival Recession—. Indian Journal of Public Health. 2019 Sep;10(09):1613.
11. Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J, Gogly B. Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part II: platelet-related biologic features. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2006 Mar 1;101(3):e45-50.

12. Kurdukar AA, Kurdukar PA, Dani NH. Modified lateral positioned flap with platelet-rich fibrin graft for treatment of denuded root surfaces: A clinical study. Indian Journal of Dental Research. 2017 Sep 1;28(5):524.
13. Guinard EA, Caffesse RG. Treatment of localized gingival recessions: Part III. Comparison of results obtained with lateral sliding and coronally repositioned flaps. Journal of Periodontology. 1978 Sep;49(9):457-61.
14. Choukroun J, Diss A, Simonpieri A, Girard MO, Schoeffler C, Dohan SL, Dohan AJ, Mouhyi J, Dohan DM. Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part IV: clinical effects on tissue healing. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2006 Mar 1;101(3):e56-60.

### **Figure Legend**

Figure 1 – Pre-operative recession depth

Figure 2 – Pre-operative recession width

Figure 3 – Recipient site prepared

Figure 4 – Donor site preparation

Figure 5 – Post centrifugation of withdrawn blood

Figure 6 – Prepared PRF membrane placed on glass slab

Figure 7 – Placement of the PRF membrane in the recipient site

Figure 8 – Flap rotation and suturing

Figure 9 – Follow up at 1 month



**Figure 1.Pre-operative recession depth**



**Figure 2. Pre-operative recession width**



**Figure 3. Recipient site prepared**



**Figure 4.Donor site preparation**



**Figure 5. Post centrifugation of withdrawn blood**





**Figure 6. Prepared PRF membrane placed on glass slab**





**Figure 7.Placement of the PRF membrane in the recipient site**



**Figure 8. Flap rotation and suturing**



**Figure 9. Follow up at 1 month**