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Root Coverage in Miller's Class 3 Gingival Recession Using a Laterally Positioned Flap with Advanced PRF: A Two-Year Follow-Up Case Report

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Abstract

Introduction: Gingival recession, marked by the apical migration of gingival tissue, presents aesthetic and functional challenges. The laterally positioned flap (LPF) technique, often used for localized root coverage, remains effective, particularly when combined with advanced platelet-rich fibrin (A-PRF).

Case Report: A 23-year-old male presented with Miller Class III gingival recession on tooth 41, with clinical attachment loss of 4.5 mm and high frenum attachment. A treatment plan involved the revised LPF technique, A-PRF membrane application, and frenectomy.

Surgical Procedure: Following patient consent and scaling, a sulcular incision was made, and flaps were elevated. A-PRF was prepared and placed over the exposed root, with the flap secured by sutures.

Post-operative Care: The patient received antibiotics and analgesics, with follow-up at 2 years showing a 4 mm gain in clinical attachment level and complete root coverage.

Results: The combination of the LPF technique and A-PRF effectively managed Miller Class III gingival recession, restoring both function and aesthetics.

Conclusion: This case underscores the efficacy of using A-PRF with the LPF technique for treating gingival recession, offering a reliable approach for restoring the keratinized gingival zone.

Keywords: Gingival recession, laterally positioned flap, advanced platelet-rich fibrin, clinical attachment level, periodontal surgery.

INTRODUCTION

Gingival recession refers to the downward movement of the gum tissue from its usual location on the tooth's crown to positions along the root surface, extending below the cemento-enamel junction.[1] Labial gingival recession in the anterior region represents one of the most important challenges for periodontal patients. There are different etiological factors responsible for contributing to the condition apart from periodontal diseases such as traumatic toothbrushing, thin gingival tissue, tooth-malposition, and frenum pull near gingival margin.[2] Gingival recession has been acknowledged as both an aesthetic and functional concern, leading to the development of various procedures aimed at preserving or improving the patient's

appearance. The main indications for root coverage (RC) procedures are esthetic concern, root hypersensitivity, prevention or management of root caries and cervical abrasion, enhancement of restorative outcomes, and facilitation of plaque control efforts.[2]

The laterally positioned flap(LPF) technique is frequently employed to cover localized, exposed root surfaces when there is sufficient donor tissue available on the side and enough vestibular depth.[3] LPF technique, originally described by Grupe and Warren in 1956, was the standard technique for many years and is still indicated in some cases.[4] The coronally advanced flap (CAF) is considered the standard technique when there is sufficient keratinized tissue located apical to the recession defect. However, if anatomical factors such as a shallow vestibule, lack of keratinized tissue below the defect, the presence of a gingival cleft, or the marginal attachment of frenula are present, a laterally positioned flap may be a more suitable option.[5]

The laterally positioned pedicle flap technique was revised by Ruben, Goldman, and Jonson as an enhancement of the lateral sliding flap first introduced by Harvey in 1970. This technique involves elevating a full-thickness flap in the mesial portion, adjacent to the recession, while the distal portion, further from the recession, is elevated as a split-thickness flap. The purpose of the full-thickness design in the mesial area is to cover the exposed root with periosteum, leveraging its potential for repair to achieve a stronger connective tissue-cementum attachment. Meanwhile, the split-thickness elevation in the distal section helps minimize post-operative complications related to bone resorption by preserving the periosteal layer and maintaining blood supply to the surrounding area.[6.7.8.]

The predictability of the lateral pedicle graft can be increased using a newer material such as platelet-rich fibrin (PRF). It Fastens healing as well as increases the predictability to complete Root coverage. PRF, developed in France by Choukroun *et al*. (2001), is a second-generation platelet concentrate widely used to accelerate soft and hard tissue healing. Platelet rich fibrin (PRF), a concentrated suspension of the growth factors found in platelets. These growth factors are involved in wound healing and act as promoters of tissue regeneration. It represents a new step in the platelet gel therapeutic concept with simplified processing minus artificial biochemical modification as in PRP.[9]

Advanced platelet-rich fibrin (A-PRF), developed in 2014, improves tissue engineering by modifying centrifugation techniques—specifically, by lowering the centrifuge speed and extending the duration of centrifugation compared to standard PRF. This process results in a higher concentration of platelets in the upper layer, which significantly increases the release of growth factors.[9]

This study aimed to evaluate the efficacy of using platelet-rich fibrin (PRF) in conjunction with the revised laterally positioned flap technique for managing localized Miller class III gingival recession.

CASE REPORT

A 23-year-old male patient presented to the Department of Periodontics at Inderprastha Dental College & Hospital, Sahibabad, with concerns of gum recession and sensitivity in the lower teeth. Clinical examination revealed a Miller class III recession defect on the buccal aspect of tooth 41, accompanied by a high frenum attachment. The clinical attachment loss (CAL) measured 4.5 mm, and the width of the recession at the cemento-enamel junction (CEJ) was 3 mm. Additionally, a pocket depth of 1 mm was observed above the mucogingival junction, with 2 mm of keratinized tissue depth. (Figure -1).

Additionally, a prominent papillary buccal frenum was noted, which was one of the contributing factors to the recession. Radiographic evaluation revealed bone loss between teeth 31 and 41, further contributing to the Miller class III gingival recession. (Figure- 2 & Figure- 3)

TREATMENT PLAN

A single-stage treatment approach was planned, utilizing the revised laterally positioned flap technique combined with a platelet-rich fibrin (PRF) membrane and a frenectomy[10] to address the gingival recession.

PRESURGICAL THERAPY

A comprehensive assessment of the patient was conducted through medical history review and routine laboratory tests. The surgical procedure was thoroughly explained to the patient, and informed consent was obtained. Patient preparation included scaling and root planing, along with oral hygiene instructions. The modified Stillman brushing technique was recommended for the patient.

EVALUATED PARAMETERS

The parameters were evaluated using the UNC-15 periodontal probe. The following metrics were recorded at baseline and again 2-year post-surgery

Clinical Recession Depth (RD): The distance from the cemento-enamel junction to the lowest point of the gingival margin.

Pocket Depth (PD): The measurement from the gingival margin to the bottom of the gingival sulcus.

Clinical Attachment Level (CAL): Measured from the cemento-enamel junction to the base of the periodontal pocket.

SURGICAL PROCEDURE

After ensuring proper isolation of the surgical field, the operative sites were anesthetized using 2% xylocaine hydrochloride with adrenaline (1:200,000). Gracey curettes GR no. 1/2 and 3/4 were utilized to smooth the exposed root surface, achieving a glass-like finish to facilitate tissue attachment (Figure-2). Subsequently, 17% EDTA was applied to the exposed root to eliminate the smear layer, conditioning the surface for optimal healing. (Figure-4).

A sulcular incision was made around the central incisor, extending to the adjacent lateral incisor. A horizontal incision was then created at the distal aspect of the lateral incisor, continuing to the mucogingival junction (Figure – 5). Using a periosteal elevator, a split-thickness flap was raised, followed by the elevation of a full-thickness flap. The flap was ultimately released by performing an undermining incision through the periosteum at its apical base, allowing it to passively slide toward the central incisor. (Figure -6). The area surrounding the central incisor was de-epithelialized to expose the connective tissue bed for the lateral positioned flap. (Figure-7).

To address the frenum, a haemostat was inserted into the depth of the vestibule, and incisions were made on both the upper and undersurfaces of the haemostat until it was freed. The triangular portion of the frenum that was resected along with the haemostat was removed. A blunt dissection was performed on the bone to relieve any fibrous attachments. (Figure-7).

PREPARATION OF PRF.

A 24-gauge needle will be used to venipuncture the patient's antecubital vein for blood collection. During surgery, 10 ml of whole blood will be drawn into sterile silica-coated A-PRF vacuum tubes. These tubes will then be placed in a Remi-R8C centrifuge, with a water-filled tube positioned diagonally for balance. Centrifugation will occur at 1500 rpm for 14 minutes, resulting in three distinct layers[11,12] (Figure – 8).

1. Platelet-poor plasma (top layer)

2. Fibrin buffy coat containing concentrated growth factors (middle layer)
3. Red blood cells (bottom layer) (Figure – 8).

The middle buffy coat layer, which constitutes A-PRF, will be collected after removing the upper and lower layers. The A-PRF will be transferred to a PRF box and compressed to form a PRF membrane. The PRF membrane was positioned over the exposed roots and stabilized (Figure-9). The flap was then slid to completely cover the membrane and secured in place with sling sutures. (Figure-10). A periodontal dressing (Coe-Pak) was applied over the surgical site."[11,12]

POST-OPERATIVE CARE

Amoxicillin 500 mg was prescribed to be taken three times a day for 5 days. Additionally, the patient received Ibuprofen 400 mg three times daily and one capsule of vitamin B complex daily for the same duration. The patient was instructed to adhere to standard post-operative oral hygiene practices and to rinse the mouth with 0.12% chlorhexidine Digluconate mouthwash for two weeks. They were also advised against pulling on their lips to avoid disturbing the surgical site. Dressings and sutures were removed 10 days post-surgery. (Figure-11). A follow-up was conducted for 2 years, during which no post-operative complications were observed, and healing was deemed satisfactory. The patient reported no post-operative morbidity."(Figure- 12).

RESULTS

The treated site demonstrated a 4 mm gain in clinical attachment level (CAL) and a 4 mm reduction in recession after 2 years [Table 1]. Complete coverage was achieved 24 months post-procedure, with excellent tissue contour and colour. Both the donor and recipient sites exhibited satisfactory healing, with no signs of inflammation noted during the final evaluation. (Figure-12).

DISCUSSION

Root coverage is a dependable and efficient approach for treating gingival recession in the field of periodontics. A range of surgical techniques has been established to achieve this goal. The laterally positioned flap (LPF) technique is commonly used to cover localized, exposed root surfaces, provided there is adequate donor tissue on the side and sufficient vestibular depth. Initially described by Grupe and Warren in 1956, this technique was the standard for many years and continues to be relevant in certain situations.[3,4.]

Staffileno (1964) and Pfeifer and Heller advocated for the use of a split-thickness flap to reduce the risk of dehiscence at the donor tooth. In a clinical study by Wood et al., procedures were employed to compare the bone responses at the crestal radicular level following the use of full and partial thickness flaps. Their findings indicated that the loss of crestal bone was primarily influenced by the thickness of the radicular bone, with thinner bone exhibiting greater postoperative loss.[13,14.]

Pfeifer and Heller (1971) also noted that reattachment to the exposed root surface is more likely with full-thickness flaps. Thus, full-thickness flaps are deemed suitable for root coverage (RC), while partial-thickness laterally positioned flaps are more effective for increasing the width of attached gingiva. Accordingly, in this study, a full-thickness flap was elevated up to the mucogingival junction, and a cut-back incision was utilized to relieve tension on the pedicle flap employed in this modified laterally positioned flap technique.[13,14.]

Platelet-rich fibrin (PRF) functions as an optimized natural blood clot and is a sophisticated biomaterial

with distinct biological properties. It forms a dense fibrin scaffold, enriched with leukocytes concentrated in specific areas of the clot. Over a period of 7 days or more, PRF facilitates the gradual release of growth factors—such as TGF-β1, PDGF-AB, and vascular endothelial growth factor—along with glycoproteins like thrombospondin-1. The presence of leukocytes plays a crucial role in regulating growth factor release, immune responses, anti-infectious activities, and matrix remodelling during the healing process.[15]

Advanced platelet-rich fibrin (A-PRF), introduced in 2014, enhances tissue engineering by reducing centrifuge speed and increasing centrifugation time compared to standard PRF. This results in a higher concentration of platelets in the upper layer, leading to significantly greater growth factor release.[9]

The PRF membrane functions like a fibrin bandage, promoting the healing of wound edges and providing substantial postoperative protection for the surgical site.[15] Its preparation benefits from the lack of anticoagulants, allowing blood to coagulate upon contact with the glass surface. Rapid blood collection and immediate centrifugation are crucial for effective PRF preparation.[15] However, this is a preliminary report, and further longitudinal studies with larger sample sizes are needed to establish A- PRF's impact on soft tissue reconstruction in periodontal therapy alongside the laterally positioned pedicle flap technique.

CONCLUSION

Based on the findings of this study, it can be concluded that the laterally positioned flap, combined with the application of A-PRF membrane, effectively addresses localized recession defects. This approach can restore the functional characteristics of the labial gingiva in teeth by repairing gingival defects and reestablishing the continuity and integrity of the keratinized gingival zone.

Table 1		
BASELINE TWO YEAR		
PD (PROBING DEPTH)	1mm	1mm
RD (RECESSION DEPTH)	4mm	0mm
CAL (CLINICAL ATTACHMENT LEVEL)	5mm	0mm

Figure-1 Preoperative View with CAL -4.5MM

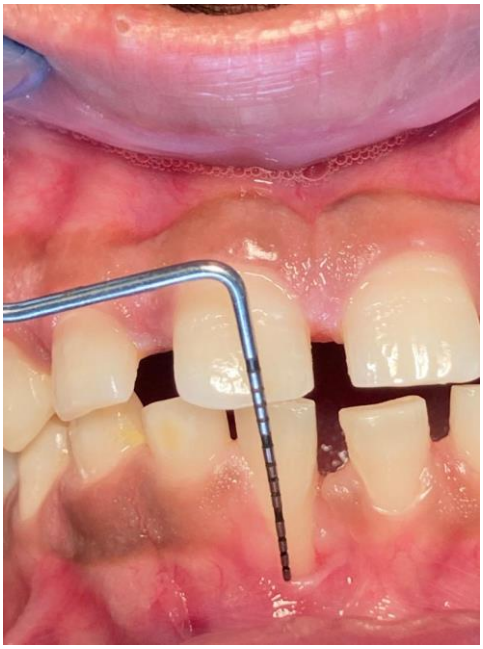

Figure-2 Root surface Planing with High Frenum Pull

Figure-3 Bone Loss b/w 31-41.

Figure-4 Root Conditioning with 17% EDTA gel.

Figure-5 Incision Design.

Figure-6 Full thickness Flap Raised Followed By Split Thickness Flap.

Figure-7 Frenectomy with Exposed Connective Tissue Bed.

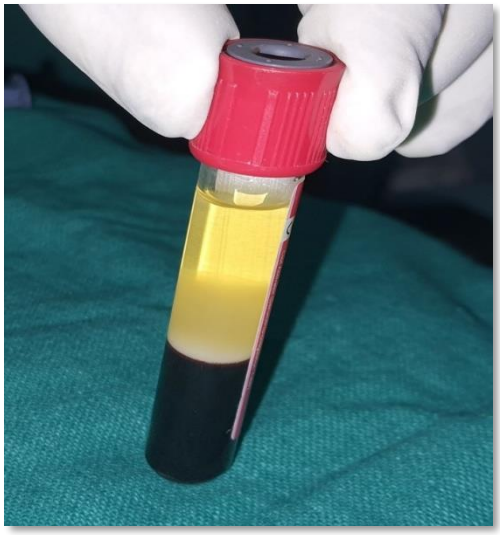

Figure-8 A-PRF.

Figure-9 A-PRF Membrane Placed

Figure-10 Suturing done.

Figure-11 Post Operative 10 days.

Figure-12 After 2 years.

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