

# A Novel Approach for Treatment of Two Adjacent Gingival Recession Defects using Modified Bilateral Pedicle Flap and Tunnel Technique combined with Titanium-Prepared Platelet Rich Fibrin

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## ABSTRACT

Gingival recession being the most common mucogingival problem among adult patients is often associated with root hypersensitivity, erosion, root caries, and compromised aesthetics. The primary goal of treating gingival recession include complete root coverage along with improving gingival biotype to facilitate proper plaque control, improve patient aesthetics, and to prevent further periodontal breakdown. Although numerous root coverage techniques and regenerative materials are available, a novel technique involving the bilateral pedicle flap with subperiosteal tunnel in interdental papilla along with use of Titanium Prepared Platelet-Rich Fibrin (T-PRF) has been described in the present case report. A 20-year-old male patient reported with the chief complaint of teeth sensitivity in lower front teeth. Intraoral examination revealed Recession Type 1 (RT-1) defects in mandibular central incisors which were treated using modified bilateral pedicle flap and tunnel technique combined with T-PRF. This technique allowed excellent blood supply at recipient site along with complete coverage of T-PRF membrane and root surfaces. The subperiosteal tunnel created in between the two affected teeth, allowed better stabilisation of membrane and inhibited apical retraction of flap during healing phase. Using this novel technique, complete root coverage was achieved along with gain in gingival thickness hence, it can be considered as a predictable approach for the treatment of RT-1 defects involving two adjacent teeth.

**Keywords:** Aesthetics, Gingiva, Interdental papilla, Mandibular central incisors

## CASE REPORT

A 20-year-old male patient reported to the Department of Periodontology with the chief complaint of sensitivity in lower front teeth since six months. Patient was apparently well six months back, since then he started experiencing sensitivity to cold food which was restricted to lower front teeth. He reported his concern to a local dentist who evaluated and referred him to the higher centre. The patient had no history of systemic illness, medication use, previous hospitalisations, or drug allergies. Dental history revealed that the patient used hard bristle toothbrush with horizontal scrub method of brushing technique.

On intraoral examination, two adjacent Recession Type-1 (RT-1) defects (Cairo F et al., 2011) were present in mandibular right and left central incisors [Table/Fig-1] [1]. There was presence of wide interdental papilla with intact proximal contacts and 1 mm of the attached gingiva was present with positive tension test. Mild

gingival inflammation was present in the teeth with minimal plaque deposit. Treatment plan was explained to the patient and written informed consent was obtained. Phase I therapy was performed which included scaling, root planing and demonstration of correct brushing technique.

Patient was recalled six weeks after phase 1 therapy and baseline parameters were measured using UNC15 probe (Hu-Friedy, USA) [Table/Fig-2]. Parameters recorded were: Probing Depth (PD) (distance between the gingival margin and the bottom of the pocket), Clinical Attachment Level (CAL) (distance between Cementoenamel Junction (CEJ) and bottom of the pocket), Keratinised Tissue Width (KTW) (distance between the most apical point of gingival margin and mucogingival junction) and Recession Height (RH) (measured from the CEJ to the most apical extension of the gingival margin at the mid-facial point of the teeth involved). Thickness of Keratinised Tissue (TKT) was measured 2 mm below the gingival margin of 31



[Table/Fig-1]: Preoperative photographs with RT-1 defect in 31 and 41.



[Table/Fig-2]: Preoperative recession depth of 3 mm in both 31 and 41.

and 41 using an endodontic spreader with a silicone disk stop. The mucosa was pierced and distance between the tip of the spreader and the inner border of the silicone stop was measured to the nearest 0.1 mm with Vernier callipers [Table/Fig-3]. Baseline plaque index score measured was 0.5 (Silness and Loe 1964) [2].



[Table/Fig-3]: Preoperative keratinised tissue thickness of 1.02 mm around 41.

**Surgical procedure:** Patient was asked to rinse with a 0.2% chlorhexidine solution prior to surgery. The perioral skin was scrubbed with 7.5% povidone iodine solution. To achieve profound anaesthesia at surgical site, right and left mental nerve block using 2% lignocaine hydrochloride with 1:80,000 adrenaline was administered. An internal bevel incision using 15 C blade was placed 0.5 mm away from the gingival margin to remove sulcular epithelium and infected gingival tissue. TKN-1 tunnelling knife (Hu-Friedy, USA) was inserted carefully through the gingival sulcus and subperiosteal dissection was performed without damaging the tip of interdental papilla to complete the tunnel preparation [Table/Fig-4a,b]. To elevate bilateral pedicle flaps, two paramarginal horizontal incisions were placed starting at the level of CEJ, 3 mm distal to 31 and 41 and 2 mm apical to the gingival margin of 32 and 42. At the end of the horizontal incisions, two vertical incisions were placed extending 4 mm beyond the mucogingival junction into the base of vestibule [Table/Fig-5]. Using sharp dissection, recipient bed was prepared, and split thickness lateral pedicle flap were elevated, both side of the affected teeth. Full thickness dissection was done beyond the mucogingival junction in order to preserve



[Table/Fig-4]: a) Subperiosteal tunnel preparation using TKN-1 tunnelling knife; b) tunnel preparation completed.



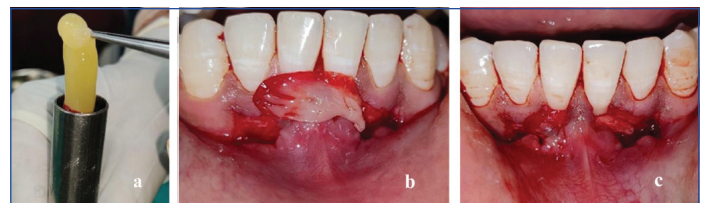
[Table/Fig-5]: Horizontal incision placed 3 mm distal to 31 and 41 and vertical incisions placed 4 mm beyond the mucogingival junction.

blood vessels of the flap and lateral pedicle flaps were rotated over denuded root surface to ensure passive placement of flaps without any tension [Table/Fig-6a,b].



[Table/Fig-6]: (a) Recipient site prepared; (b) Bilateral pedicle flap rotated on the root surfaces.

**Preparation of T-PRF:** The T-PRF was prepared according to protocol described by Tunali M et al., 2013 [3]. Specially designed Grade-IV titanium sterile tubes without any anticoagulant were taken into which, 20 mL of patient's blood which was drawn from the antecubital vein of patient's right arm was transferred. The tubes were immediately centrifuged at 2,800 rpm for 12 minutes at room temperature. After centrifugation, the T-PRF clot (in the middle part of the tube) was removed with sterile tweezers and separated from the red blood cell base. Clot was compressed between two sterile spatula to create a constant thickness of the T-PRF membrane. Root surfaces were mechanically treated with thorough root planning using curettes to remove infected cementum and bacterial toxins. The prepared T-PRF membrane [Table/Fig-7a] was placed over the recipient bed and below the prepared tunnel [Table/Fig-7b,c]. Bilateral pedicle flaps were rotated over the recession defect and sutured 1 mm coronal to CEJ using interrupted 5-0 vicryl sutures [Table/Fig-8].



[Table/Fig-7]: (a) T-PRF membrane prepared; (b,c) T-PRF membrane placed over the recipient bed and below the prepared tunnel.



[Table/Fig-8]: Bilateral pedicle flaps along with membrane sutured.

Finger pressure through a moist gauze piece was applied at the surgical site for about 10 minutes to ensure close adaptation of tissue and to reduce the incidence of bleeding, micro haematoma or dead space. Analgesics (Ibuprofen 400 mg twice daily for three days) and 0.2% chlorhexidine mouthrinse (twice daily for two weeks) were prescribed and patient was asked to discontinue toothbrushing on operated area for two weeks. Suture was removed after two weeks. Healing was uneventful and complete root coverage was achieved without any postoperative complications [Table/Fig-9]. Patient was followed-up at one, three and 12 months

and all the parameters were recorded at baseline and 12 month follow-up visit [Table/Fig-10].



**[Table/Fig-9]:** Postoperative frontal view at 12 month follow-up showing complete root coverage, thick gingival biotype and increase in keratinised tissue width.

Parameters recorded (mm) Tooth no: 31	Baseline	12 months post-treatment	Gain (mm)	Parameters recorded (in mm) Tooth no: 41	Baseline	12 months post-treatment	Gain (mm)
PD	2	1	1	PD	2	1	1
CAL	5	0	5	CAL	5	0	5
RH	3	0	3	RH	3	0	3
KTW	2	4	2	KTW	2	4	2
TKT	1.02	2.03	1.01	TKT	1.02	2.02	1

**[Table/Fig-10]:** The tabular column shows the baseline and re-evaluation data for tooth number 31, 41.

PD: Probing depth; CAL: Clinical attachment level; RH: Recession height; KTW: Keratinised tissue width; TKT: Thickness of keratinised tissue

## DISCUSSION

The ultimate goal of treating soft tissue marginal recession is to obtain complete root coverage of denuded root surface resulting in aesthetic and natural appearance of teeth. With higher overall prevalence of gingival recession reported in adult population, mandibular incisors are most frequently affected teeth (26-35%) [4]. Among all the surgical approaches available to address buccal recession defects, coronally advanced flap along with subepithelial Connective Tissue Graft (CTG) has been indicated as the gold-standard for root coverage procedures [5]. Owing to technique sensitivity and associated donor site morbidity, substitutes for CTG are being proposed. In light of the evolving techniques, platelet concentrates like PRF have emerged as a newer autologous graft material for root coverage surgeries [6].

The PRF is an autogenous source of growth factors, with platelets serving as the primary cells in charge of its biologic activity. The PRF membrane's flexible and dense fibrin structure allows for slow and long-term secretion of growth factors such as platelet-derived growth factor, transforming growth factor  $\beta$ , vascular endothelial growth factor, and insulin-like growth factor-1, which are responsible for accelerated wound healing [7]. A newer platelet concentrate introduced by Tunalı M et al., used titanium tubes instead of glass tubes for preparation of PRF membrane which resulted in more mature and denser fibrin network with longer intratissue resorption time leading to growth factors release for longer time period [3].

The novel surgical approach described in the present case report is a modification of technique developed by Blanes RJ and Allen EP in 1999 with a variation that involves the formation of a subperiosteal tunnel [8]. The subperiosteal tunnel created in interdental papilla between 31 and 41 resulted in minimal trauma to papillary blood vessels, along with better flap stability and prevented the apical retraction of flap once the membrane was placed over recipient bed. Another modification that was utilised in this surgical approach was

converting partial thickness dissection to full thickness dissection in coronal direction beyond the mucogingival junction [9]. This modification allowed preservation of major blood vessels inside the flap thus, providing uninterrupted supply of blood flow and nutrients leading to faster healing [9]. Similar incision design was described by Mörmann W and Ciancio SG, 1977 for periodontal flap surgery [10].

Uneventful and faster healing response seen in the present case may have been due to utilisation of T-PRF. This recent modification of platelet concentrate is superior to L-PRF (Choukroun, 2001) as it has a more compact and thicker fibrin network which plays an important role in prolonging intra-tissue fibrin resorption, promote release of growth factors gradually over a longer period of time and is free of any adverse effects associated with silica particles as it is prepared in biocompatible titanium tubes. Titanium coated surface resulted in better platelet activation as compared to glass tubes and histological studies revealed superior fibrin network [11].

In the present case, the KTW was increased by 2 mm and gingival thickness was increased by 1 mm. Sachdeva SV et al., reported an increase in width of keratinised tissue and significant decrease in root sensitivity when multiple mandibular sites were treated with

T-PRF [12]. Similar results were reported by Uzun BC et al., where statistically significant increase in KTW was reported with T-PRF as compared to CTG for treatment of multiple gingival recession [13]. Ustaoglu G et al., in their randomised control trial investigated the effectiveness of CTG and T-PRF for soft tissue augmentation around implants and found higher KTW and gingival thickness in both groups. Although, CTG group had higher gains, these were not statistically significant and thus, they concluded that T-PRF could be a minimally invasive alternative to the well-established CTG [14].

## CONCLUSION(S)

Complete root coverage along with reduction in root sensitivity was achieved utilising this novel surgical technique along with T-PRF. This technique offered advantage of better flap adaptation and stability of the membrane with improved blood supply over the recipient site from the apical portion as well as from the bilateral pedicle flap, resulting in accelerated wound healing and excellent clinical parameters at follow-up visits.

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