

Predictable Treatment of Gingival Recession Using Titanium Prepared Platelet-Rich Fibrin in Combination with Coronally Advanced Flap

Abstract

Treatment for receding gums is always a challenging task for a periodontist. To fulfill this, many surgical techniques such as free gingival grafts, connective tissue grafts, pedicle flaps, and lateral sliding flaps have been used. For better prevention of relapse of these procedures and to improve the gingival biotype, various biomaterials such as platelet-rich fibrin, collagen matrix, and amnion chorion membranes have been additionally utilized. Due to advancements in preparation of platelet concentrates titanium platelet-rich fibrin, a third-generation platelet concentrate was introduced. Unlike other biomaterials, it has thicker fibrin meshwork with greater cellular entrapment and thicker membrane. Present case reports depict the usage of titanium platelet-rich fibrin as a biomaterial along with coronally advanced flap in the treatment of millers Class-I gingival recessions. Patients were followed up to 6 months after performing recession coverage treatments.

Keywords: Biomaterial, coronally advanced flap, gingival recession, platelet-rich fibrin

Introduction

Gingival recession is the apical migration of marginal gingiva due to inflammation caused by poor oral hygiene and trauma resulting from faulty tooth brushing or abnormal alignment of teeth.^[1] This is one of the major problems experienced by patients and treating these gingival recessions is always a challenging task for a periodontist.^[2] Apart from trauma and inflammation patient also complains exposure of root surface to the oral environment leading to dentinal hypersensitivity and root caries.^[3] Various treatment modalities have been tried such as free gingival grafts, coronally advanced flaps (CAF) with or without connective tissue graft (CTG), leukocyte platelet-rich fibrin (L-PRF); laterally pedicle flap; vestibular incision subperiosteal tunnel access technique, etc.^[4] Although CAF + CTG is considered as a gold standard, it has a drawback of the second surgical site. Even L-PRF an autologous platelet concentrate was extensively used in the treatment of gingival recession because of sustained growth factor release, but due to possible silica contamination, researchers got attracted to titanium metal and used

titanium tubes in the preparation of titanium prepared platelet-rich fibrin (T-PRF) which has similar properties to that of L-PRF regarding the release of growth factors and activation of platelets in the formation of a fibrin clot.^[5]

Titanium is a novel metal which is already in use for orthopedic surgeries and replacement of dental implants. Moreover, titanium has better hemocompatibility, activates platelets in a similar pattern to silica. Within the tube, titanium passivates into a titanium dioxide layer, which activates the blood platelets and helps in T-PRF.^[6] T-PRF was introduced by Tunali *et al.*,^[7] in 2013. Present case reports depict the cases of miller's class I gingival recession treated with CAF along with the T-PRF membrane.

Case Reports

Case 1

A 32-year-old systemically healthy male patient came to the department of periodontics with a chief complaint of sensitivity in the right upper front tooth region for the past 3 months. On clinical examination, the patient had a moderate deposition of plaque cum calculus,

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and miller's class I gingival recession of 3 mm was reported on tooth number 13 [Figure 1]. After finalizing the treatment plan (CAF + T-PRF), the entire treatment protocol, surgical technique, and the pros and cons of the procedure were explained to the patient. Informed consent was obtained, and initial Phase-I therapy, including scaling and root planing, brushing techniques, desensitizing toothpaste prescription, and oral hygiene instructions were given. The patient was re-evaluated after 4 weeks and proceeded to further treatment when patient had maintained good oral hygiene, minimal plaque, and calculus deposits with no bleeding on probing.

Case 2

A 40-year-old systemically healthy male patient came to the department of periodontics with a chief complaint of sensitivity in the upper front teeth region for the past 6 months. On examination, there was the presence of mild plaque and calculus deposits, cervical abrasions along with miller's class-I gingival recessions of 3, 2, 4, 4, and 3 mm were reported on teeth 11, 12, 13, 21, and 22. Then, the patient was subjected to initial scaling and root planing along with desensitizing toothpaste application. The patient was kept on a follow-up for a period of 2 weeks regarding the reduction of dentinal hypersensitivity. There was only a limited satisfaction regarding the intensity of hypersensitivity. Finally, after getting the informed consent, the treatment plan was advised as CAF + T-PRF along with the filling of cervical abrasions with glass ionomer cement [Figure 2].

Clinical parameters

Recession depth (RD), recession width (RW), keratinized tissue width (KTW), mean root coverage (MRC) were recorded at baseline, and 6 months postoperatively. Modified Still man brushing technique was advised to patients before surgical procedure. Before performing the surgery, routine blood investigations were performed in both cases such as clotting time, bleeding time, Hb%, hepatitis B virus surface antigen, and hepatitis C virus to avoid complications.

Surgical technique

Before surgery, 10 ml blood was drawn from the antecubital vein, transferred to medical-grade titanium tubes (Supra alloys, Camarillo USA), and subjected to centrifugation (REMI R8C, New Delhi, India) at 3500 rpm for 15 min (based on Tunali M protocol). It led to the formation of three layers within the titanium test tube. The top layer was a supernatant serum, middle layer T-PRF clot, and bottom layer of red blood cells. Then, the T-PRF clot was retrieved using sterile tweezers and compressed between sterile gauze for the preparation of the T-PRF membrane [Figure 3]. Extraoral and intraoral antiseptics were obtained with Povidone-iodine and 0.2% chlorhexidine gluconate solutions. After the achievement of profound anesthesia (2% Lignocaine Hydrochloride with 1:80,000 adrenaline) in relation to 13 tooth region (For case 1), horizontal incisions were given at mesial and distal line angles (both sides of recession) sparing the interdental papilla. Then these horizontal incisions were connected with sulcular incisions. The horizontal incisions

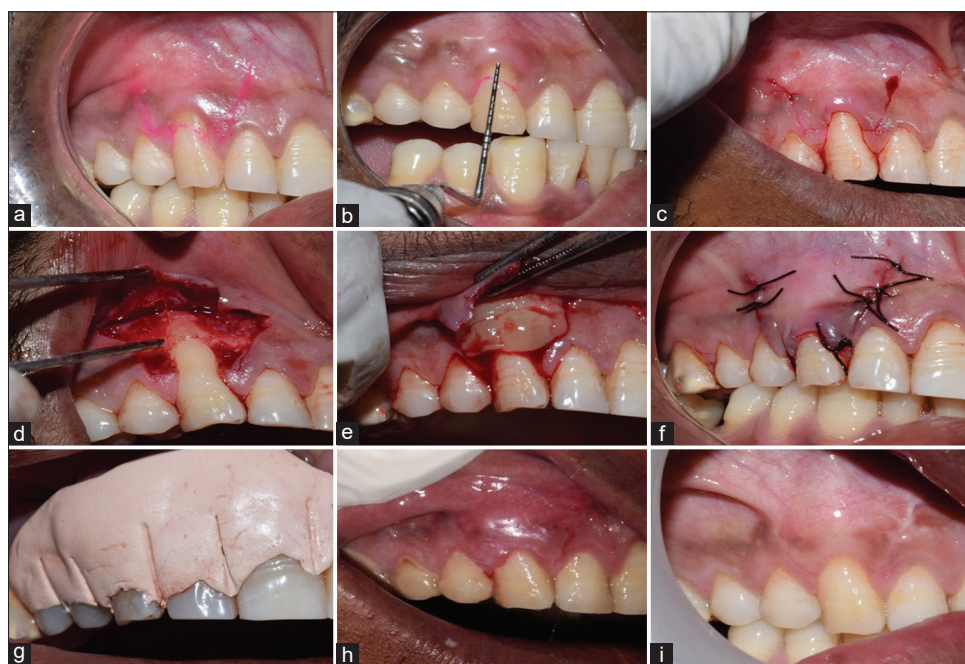


Figure 1: Depicts the surgical procedure of surgical incision design (a), Preoperative recession depth (b), after incision (c), flap reflection (d), titanium prepared platelet-rich fibrin membrane placement (e), flap coronally advanced and suturing done (f), Coe-Pak placed (g), 15 days postoperative (h), 6 months postoperative (i)

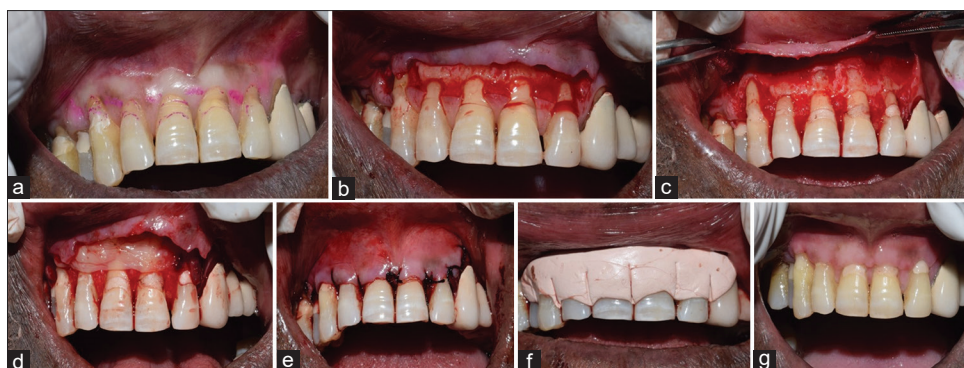


Figure 2: Depicts the surgical procedure of flap design (a), incision (b), glass ionomer cement restoration (c), titanium prepared platelet rich fibrin membrane placement (d), Flap coronally advanced and suturing (e), Coe-Pak placed (f), 6 months postoperative image (g)

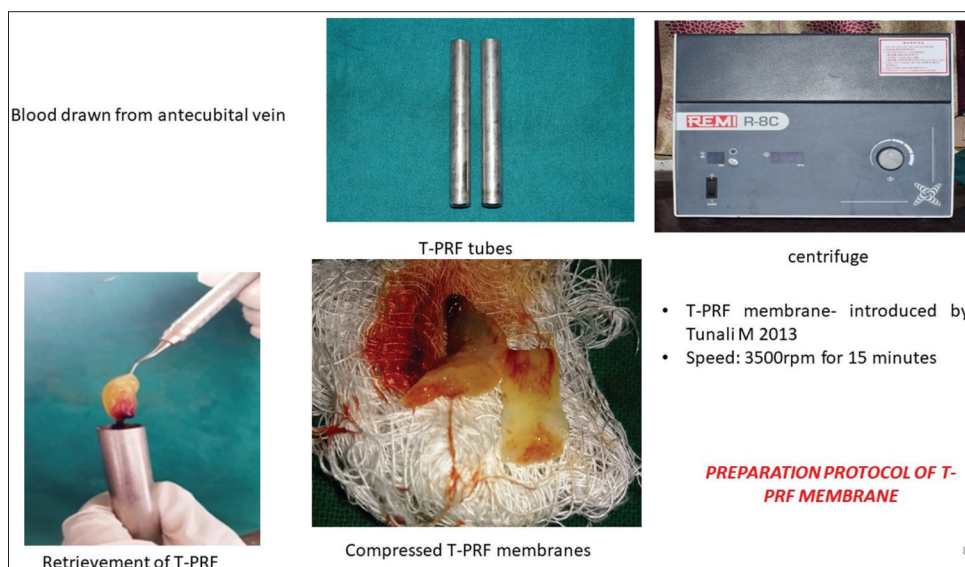


Figure 3: Depicts the titanium prepared platelet-rich fibrin preparation protocol

extension was based on the depth of the recession. Vertical releasing incisions were also given connecting the horizontal incisions before flap elevation, which were helpful in the advancement of the flap. Full-thickness flap was elevated using periosteal elevator up to mucogingival junction (MGJ), exposing the recession site. Then, a split-thickness flap was done by undermining the soft-tissue flap leaving periosteum intact beyond MGJ using 15 no blade. Further flap was advanced coronally and checked for passive mobilization. Further, a prepared T-PRF membrane was placed on the recession site, the flap was coronally advanced and compressed with moist gauze for passive adaptation.

For case two flap reflections and coronal advancement extend from 13 to 22 in the anterior region where horizontal incisions were extended from distal of 13 to distal of 22 and vertical releasing incisions were restricted to 13 and 22 tooth regions [Figure 2].

Further sling suture was done with 4-0 silk suture for stabilizing the flap, and vertical releasing incisions were

sutured with a simple interrupted suturing technique. Periodontal pack (COE-PAK) was placed to protect the surgical site. Postoperatively, medications such as amoxicillin 500 mg thrice daily and diclofenac sodium and paracetamol combination tablet twice daily were prescribed for 5 days. Further patients were refrained from brushing at the surgical site and instructed to use 0.2% chlorhexidine gluconate mouth wash (Rexidin™) twice daily for 2 weeks. They were recalled after 14 days for suture removal. After suture removal, there was complete root coverage and patients were asked to clean that area with moist gauze for the prevention of inflammation postoperatively for an additional 15 days. Further they were kept under a strict maintenance program and followed up to 6 months.

Results

During the follow-up, the patient was completely satisfied, and sensitivity was also reduced. Both patients used pain killers for a period of 3 days, and postoperatively, surgical sites were healed without any complications. There was a mean RD of 3.1 mm at baseline that was reduced to 0.8 mm

Table 1: Depicts the case number, teeth number, and various clinical parameters such as recession depth, recession width, keratinized tissue width in millimeters, and mean root coverage percentage from baseline to 6 months

Case number/teeth number	Recession depth baseline (in mm)	Recession depth after 6 months follow-up (in mm)	Recession width baseline (in mm)	Recession width after 6 months follow-up (in mm)	Keratinized tissue width baseline (in mm)	Keratinized tissue width after 6 months follow-up (in mm)	Mean root coverage (%)
1/13	3	0	3	0	3	5	100
2/13	3	1	3	2	2	3	66.6
2/12	2	1	3	1	2	3	50
2/11	4	1	3	0	2	3	75
2/21	4	1	3	0	2	3	75
2/22	3	1	3	1	2	3	66.6
Total mean	3.1	0.8	3	0.6	2.16	3.3	72.2

during 6 months follow-up. Whereas mean RW was 3 mm at baseline and it reduced to 0.6 mm. Postoperatively, there was a gain in mean KTW, which improved from 2.16 mm at baseline to 3.3 mm at 6 months. In the present case reports, there was a MRC of 72.2% during 6 months follow-up period. In the first case, complete root coverage was achieved. While in the second case, 66.6% of root coverage was obtained [Table 1].

Discussion

The present case reports describe the entire procedure of CAF with T-PRF. The patient had proper healing of tissue without complications. T-PRF is a third-generation platelet concentrate. It is also autologous and does not require any anticoagulant. Histological studies conducted by Tunali *et al.*,^[7] and Chatterjee *et al.*,^[8] concluded that T-PRF membrane has better fibrin meshwork and cellular entrapment which is essential for the stimulation of periodontal cells leading to a proper wound healing. The usage of titanium tubes eliminates any possible silica contamination, is biocompatible, has a similar platelet activator when compared to silica, and better hemocompatible. Moreover, titanium passivates itself into titanium dioxide and helps in the formation of a T-PRF clot.

Due to a limited number of clinical trials or case reports performed using T-PRF, it was not possible to compare our results. The present study results regarding the RD and RW were comparable to the study conducted by Uzun *et al.*,^[9] 2018 where these parameters have reduced and showed improvement from baseline to 6 months postoperatively.

In the present study, there was an increase in KTW of 1.2 mm, which is almost equal to that of Uzun *et al.*,^[9] 2018 study where they have achieved a KTW of 1.97 mm during their 12 months follow-up. This might be due to the thicker fibrin membrane, which was formed is responsible for increase in KTW. The present study had a MRC of 72.2% which was lesser when compared to the study conducted by Uzun *et al.*,^[9] 2018 where they have achieved a MRC percentage of 93.2% while compared to CTG. This might be due to the larger sample size in their study.

Even though good results were obtained, every technique has its own limitations. Some of them are small sample size, short follow-up periods, usage of conventional CAF with vertical releasing incisions which hamper the blood supply and result in scar formation, better conservative minimally invasive techniques are available for recession coverage that might have improved the treatment outcomes. The higher cost of titanium tubes also limits their usage. Histological analysis of newly formed tissue was not done due to ethical constraints.

Conclusion

Thus within limitations, present case reports conclude that titanium platelet-rich fibrin can be a good option in the treatment of gingival recessions, as it eliminates the shortcomings of L-PRF and also reduces the second surgical site as for CTG harvesting.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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