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## RESEARCH ARTICLE

### RECESSION COVERAGE OF DENUDED ROOT SURFACES USING LATERAL PEDICLE FLAP AND PLATELET RICH FIBRIN - A CLINICAL STUDY

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#### ABSTRACT

**Aim:** The present clinical study was designed to evaluate clinically the effect of platelet rich fibrin (PRF) graft for the treatment of denuded root surfaces. **Materials and Methods:** 10 isolated Miller's Class I and II gingival recession of single rooted teeth were selected for the study. Scaling and root planing was done, and oral hygiene instructions were given to the patients. Recession parameters (probing depth, gingival recession height and width of keratinized tissue (WKT)) were assessed at baseline. Following this, LPF with PRF was done at the recession sites, and parameters were again assessed at 6 months. **Results:** The mean percentage of RC attained was 71.98% at 6 months. The WKT shows a mean gain of 1.2 mm at 6 months. **Conclusion:** LPF with PRF produced statistically significant reduction in recession depth and gain in WKT by the end of 6 months.

## INTRODUCTION

Gingival recession, defined as the location of the gingival margin apical to the cemento-enamel junction (CEJ) (The American Academy of Periodontology, 2001). It has multifactorial etiology with unclear mechanism of how it occurs leading to compromised esthetics, root hypersensitivity, increased incidence of root caries, pulp hyperemia and diminished plaque control, root abrasion, gingival bleeding, and/or a fear of tooth loss, thus necessitating treatment. A variety of periodontal plastic surgeries have been suggested for recession coverage that include coronally positioned flap, lateral positioned flap, free gingival graft, free gingival graft with coronally positioned flap, free connective tissue autograft, subepithelial connective tissue graft, guided tissue regeneration, and acellular freeze-dried dermal matrix allografts (Miller, 2000). The lateral positioned flap technique, described by Grupe and Warren in 1956, is a unique and standard technique commonly used to cover isolated, denuded roots that have adequate adjacent donor tissue and vestibular depth (Carranza, 2006). Various modifications in laterally sliding flap have been proposed in order to avoid the reported undesirable results on the donor site. At first it was described as the "lateral sliding flap."

The procedure was then modified and named as the "laterally positioned flap". The "oblique rotational flap", the "rotation flap", and the "transpositioned flap" are modifications in incision design (Rocuzzo *et al.*, 2002). A combination of treatment modalities involving use of surgical procedures along with growth factors has been suggested for root coverage in recent years. The predictability of the lateral pedicle graft can be increased using a newer material such as platelet-rich fibrin (PRF) (Anilkumar *et al.*, 2009) that hastens healing and acts as promoter of tissue regeneration (Tozum, 2003). Platelet rich fibrin (PRF), developed in France by Choukroun *et al.* (2001), is a second-generation platelet concentrate widely used to accelerate soft and hard tissue healing. It is a concentrated suspension of the growth factors found in platelets that has many advantages over platelet-rich plasma (PRP) include ease of preparation, application minimal expense and lack of biochemical modification (Toffler *et al.*, 2009). PRF production protocol attempts to accumulate platelets and released cytokines in a fibrin clot. Platelet concentrate contains platelet-derived growth factor, transforming growth factor, and many other unidentified growth factors that modulate and upregulate one growth factor function in the presence of second or third growth factor (Griffin, 2004). This specific feature influences the decision to use platelet concentrates as the test material of choice. The present study was carried out to

evaluate the effectiveness of PRF along with laterally positioned flap technique for the management of localized Miller class I and class II gingival recession.

## MATERIALS AND METHODS

A six month clinical study was conducted comprising of 10 systemically healthy patients with age range of 18-25yrs, with Miller's Class I or Class II facial gingival recession of single-rooted teeth (10 sites). Inclusion criteria included the presence of adequate band of keratinized gingiva of adjacent teeth, adequate depth of vestibule, patients with good oral hygiene, and absence of pulpal pathology. Exclusion criteria included subjects contraindicated for periodontal therapy, those on medication which affects the coagulation, those showing radiographic evidence of interdental bone loss, carious or noncarious cervical defect of tooth, malaligned teeth at a site of interest, current smokers, tooth mobility, and pregnant and lactating females. Informed consent of all the participants of the study was obtained and nature of the procedure and possible discomfort and risks were fully explained.

**Non surgical periodontal therapy:** At the baseline all the patients received oral hygiene instructions and non surgical periodontal therapy.

**Clinical Measurements:** Clinical parameters recorded during the course of the study were gingival recession height (Measured with a probe from the CEJ to the most apical point of the free gingival margin on the mid-facial region of the tooth), pocket depth, width of keratinized gingiva (KGW), and percentage of root coverage. William's graduated probe was used to measure the readings and were recorded at baseline and at 6 months.

**Surgical procedure:** After proper isolation of the surgical field, the operative site was anesthetized using 2% xylocaine hydrochloride with adrenaline (1:80,000). A collar of tissue was removed by reverse bevel 'V'-shape incision made along the soft tissue margin of the recipient site to remove the epithelium around the root surface with #15 blade. This was followed by thorough scaling and root planning by gracey currettes till hard and clear site was obtained. 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 adjacent to the donor site (Figure 2). Then, a partial thickness flap was reflected from the gingival margin to outline the flap (Figure 3). Flap was then displaced laterally, and if tension was observed in the flap after displacement, a cutback incision was placed on lateral border of pedicle flap (Corn, 1964).

**Preparation of platelet-rich fibrin:** Ten milliliters of blood was drawn into 2 test tubes without an anticoagulant and centrifuged immediately using a tabletop centrifuge for 12 min at 2800 rpm. The resultant product consisted of three layers, topmost layer of acellular platelet-poor plasma, PRF clot in the middle, and red blood cells at the bottom (figure 4). PRF membrane was obtained by squeezing out the fluids from the fibrin clot (Anil kumar *et al.*, 2009). The prepared PRF membrane was placed over the denuded roots and stabilized (Figure 5). The flap was then slid/displaced to completely cover the membrane and secured using sling sutures (Figure 6)

**Post-Operative care:** Postoperative instructions were given, suitable antibiotics and analgesics (Augmentin 625mg mg, thrice per day; and Diclofenac ( Exudase DP ) three times a day, for 5 days) were prescribed. Toothbrushing was discontinued at the site of surgery for 4 weeks. Patient was asked to rinse the oral cavity with 0.12% chlorhexidine digluconate mouth rinse for 4 weeks.

Patient was advised to avoid pulling on their lips to observe the surgical site. Sutures were removed after 2 weeks. One month after surgery, the patients were instructed to resume mechanical toothbrushing of the treated area using brushing technique that minimized apically directed trauma to the soft tissue of the treated teeth.<sup>11</sup> Post-operative follow-up was done for 6 months (Figure 7).

## Statistical analysis

The data were analyzed using statistical software IBM SPSS and Microsoft Excel (version 5.00). The results were averaged (mean standard deviation) for each parameter at baseline and 6 months. Inter group analysis of data was done by applying Student's independent t-test (also known as unpaired t-test) and for intra group analysis, Paired t-test was employed. A p-value of less than 0.05 was considered statistically significant.

## RESULTS

Present study included 10 patients, 5 females and 5 males to evaluate the application of platelet rich fibrin in treatment of class i and class ii recession defects (10) in single rooted teeth. All the patients completed the study. Post operative healing was uneventful. The periodontal parameters at baseline together with the 6-month outcomes are summarized in Table 1. Table 1 and 2 demonstrate the measurement of recession defects pre and post operatively and gain in keratinized gingival epithelium. Gingival recession height decreased from  $4.3 \pm 0.94868$  to  $1.2 \pm 0.42164$  which was statistically significant ( $p < 0.05$ ). Average gain in keratinized epithelium was 1.2 mm which was statistically significant ( $p < 0.05$ ). %age of root coverage was calculated and mean of root coverage was 71.98% at the end of 6 months.

## DISCUSSION

The ultimate goal of any therapeutic intervention aimed at root coverage should be to restore the tissue margin at the cemento-enamel junction (CEJ) and to achieve an attachment of the tissues to the root surface so that a normal healthy gingival sulcus with no bleeding on probing and a minimal probing depth is present.<sup>12</sup> Various surgical procedures have been described to treat gingival recessions, but these have been demonstrated to heal with a long junctional epithelium, and regeneration has been observed only in the most apical portion of the lesion. Although the bilaminar technique using subepithelial connective tissue grafts still holds the most promising results in root coverage. Recent innovation in dentistry has been the preparation and use of platelet-rich fibrin (PRF), a concentrated suspension of the growth factors found in platelets. These growth factors are involved in wound healing and postulated as promoters of tissue regeneration. Combining the growth factors has been shown to accelerate bone repair and promote fibroblast proliferation, and increase

**Table 1. Measurement of clinical parameters**

Case no	Age /gender	Gingival recession height pre op	Gingival recession height Post op	% of root coverage	Mean%	Gain in keratinized epithelium
1	22/f	5mm	1mm	80%	71.98%	1mm
2	18/f	4mm	1mm	75%		1mm
3	21/m	4mm	1mm	75%		1mm
4	26/m	5mm	2mm	60%		2mm
5	22/m	4mm	1mm	75%		1mm
6	24/m	3mm	1mm	66.6%		1mm
7	22/f	5mm	1mm	80%		1mm
8	23/f	3mm	1mm	66.6%		1mm
9	20/f	4mm	1mm	75%		1mm
10	28/m	6mm	2mm	66.6%		2mm

**Table 2. Comparison of mean ± standard deviation of all the parameters in pre and post scores**

Measurements	Mean ± SD Pre score	Mean ± SD Post score	T value	P value
Gingival recession height	4.3±0.94868	1.2±0.42164	13.286	<0.000006
Pocket depth	1.9±0.0566	1.1±0.3159		<0.0001
Gain in keratinized epithelium	0.8±0.25	1.2±0.42164		



**Fig 1: Preoperative view**



**Fig 2: Vertical incision at donor site**



**Fig 3: Partial flap reflection**



**Fig 4: PRF preparation**



**Fig 5: Prf membrane placement**



**Fig 6: Post Operative View**



**Fig 7. 6 Month post operative view**

tissue vascularity, rate of collagen formation, mitosis of mesenchymal stem cells and endothelial cells, as well as osteoblasts, playing key roles in the rate and extent of bone formation. This activity, together with increased vessel ingrowth, is mediated by PDGF and TGF. Because of all of these powerful effects on tissue regeneration, a growing number of human clinical studies have detailed the use of growth factors in reconstructive oral and maxillofacial surgery, periodontal surgery, implants, and sinus grafting.<sup>13</sup> Thus Placement of PRF membrane in recession defects may alleviate the need for donor site procurement of connective tissue and can help to restore the functional properties of the labial gingiva of the mandibular anterior teeth by repairing gingival defects and re-establishing the continuity and integrity of the zone of keratinized gingiva. In present study mean percentage of root coverage is 71.98% at 6 months suggesting that the mean Root coverage of LPF + PRF was higher compared to mean RC mentioned for LPF alone supported by previous studies.<sup>14,15</sup> Mean recession height at baseline was  $4.3 \pm 0.94868$  which reduced to  $1.2 \pm .42164$  showing mean reduction of  $3.1 \pm 0.73786$  suggesting that LPF along with PRF results in more RC compared to LPF alone.<sup>15</sup> Jankovic *et al.*<sup>16</sup> has also concluded that the use of PRF membrane in gingival recession treatment provided acceptable clinical results, followed by enhanced wound healing and decreased patient discomfort compared to CTG. Martinez-Zapata *et al.*<sup>17</sup> has also conducted a systematic review and concluded the autologous plasma rich in platelets improved gingival recession.

## Conclusion

This study was designed to evaluate clinically, the treatment of denuded root surface with LPF with PRF graft. Results indicated that LPF along with PRF resulted in significant improvement in all clinical parameters. The results of the present study are encouraging enough, to further explore combined type of treatment procedures to treat isolated denuded root surfaces.

**Conflicts of Interest:** None

**Source of Support:** Nil

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