AJDS LAZHAR *Al-Azhar Journal of Dental Science* *Record 1110-2624 | the ISSN Portal*
Vol. 21- No. 4- 339:345- October 2018 *portal.issn.org*

COMPARING PRF MEMBRANE AND SUBEPITHELIAL CONNECTIVE TISSUE GRAFT IN THE TREATMENT OF GINGIVAL RECESSION

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ABSTRACT

Background: The present study was conducted to compare the clinical outcome of using SCTG combined with coronally advanced flap against using PRF membrane combined with coronally advanced flap in treatment of gingival recession. **Methods**: fifteen patients with 20 recession defects were included in the study, Patients were divided according to treatment modalities into two groups. **Group I:** Patients were treated using SCTG combined with coronally advanced flap. **Group II:** Patients were treated using PRF membrane combined with coronally advanced flap. Measurements of gingival index (GI), Plaque index (PI), Recession height (RH), Probing depth (PD), Clinical attachment level (CAL) and width of keratinized gingiva (WKG) were recorded for both groups at baseline, 3 and 6 months post-operatively. **Results**: there was no statistically significant difference between both groups regarding gingival index (GI), Plaque index (PI), Recession height (RH), Probing depth (PD), Clinical attachment level (CAL) and width of keratinized gingiva (WKG) after 3 and 6 months post-operatively. **Conclusion**: PRF membrane can be considered a safe and effective alternative treatment modality in treatment of gingival recession.

INTRODUCTION

Gingival recession is defined as the apical displacement of the gingival margin toward the cemento-enamel junction (CEJ) with the loss of periodontal tissue fibers, root cementum and alveolar bone[1]. The main indications for treatment of gingival recession procedure are esthetic demands, hypersensitivity, root caries lesions and cervical abrasions[2].

Different factors are considered to cause gingival recession. These factors include tooth malposition, aberrant frenal pull, minimal attached gingiva, Inflammation due to plaque and traumatic tooth brushing. Iatrogenic factors such as crown preparations extending sub gingivally, impression techniques involving gingival retraction and poor orthodontic treatment can also cause gingival recession[3].

There are three different types of procedures to achieve root coverage in gingival recession; the free gingival graft, the coronally advanced flap (CAF) and combined procedures[4]. These include the use of root biomodification agents, connective tissue grafts (CTG), barrier membranes, enamel matrix derivatives (EMD), acellular dermal matrix (ADM), platelet rich plasma (PRP), living tissue engineered human fibroblast-derived dermal substitute and platelet-rich fibrin (PRF) [5].

Among these procedures, the subepithelial connective tissue graft (SCTG) is considered as the gold standard. It has high predictability for root coverage, dual blood supply, and the resultant increase in the width of keratinized gingiva [6]. However, this procedure requires a second surgical site in order to harvest the tissue causing discomfort and the risk of bleeding. Moreover, the longer surgical

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time, technique sensitive results, presence of shallow palate with decreased connective tissue and limited amount of tissue that can be procured from the palate for treatment of multiple sites limit its application [7].

Platelet-rich fibrin is another adjunctive method for the treatment of gingival recession. It was developed in France by Choukroun et al [8]. It is a fibrin matrix in which platelet cytokines (growth factors) and cells are trapped and are released over time. Its advantages over the better known PRP include an ease of preparation/application, minimal expense and lack of biochemical modification as no bovine thrombin or anticoagulant is required for its preparation.

Due to the high morbidity rate and patients discomfort in SCTG, an alternative treatment for gingival recession with less disadvantages and comparable results may be a reasonable task in such kind of treatment. Platelet rich fibrin, being an autogenous material prepared from patient's blood, and acquiring potential of improving wound healing and enhancing tissue regeneration, might provide an alternative treatment modality in this regard.

PATIENTS AND METHODS

A total of 20 recession defects (Miller class I, II) in 15 patients Aging between 21 and 38 were diagnosed at the Department of Oral Medicine, Periodontology, Oral Diagnosis and Oral Radiology, Faculty of Dental Medicine, (Boys, Cairo) Al-Azhar University. The patients were divided according to the treatment modality into two groups and patients were assigned to each group by using coin toss.

Group I: included 10 recession defects treated with connective tissue graft combined with coronally advanced flap.

Group II: included 10 recession defects treated with PRF membrane combined with coronally advanced flap.

Surgeries were performed under local anesthesia; the exposed root was properly planned and the preoperative photos were taken for the recession site. Horizontal incisions were performed and extended mesial and distal to the recession site labially at the level of the cemento-enamel junction. Two vertical releasing incisions were made extending beyond the muco-gingival junction. A third crevicular incision was made and a full thickness trapezoidal flap was raised. De-epithelialization of the interdental papilla on both sides was performed and the flap was checked for moving coronally without any tension.

In group I (Fig 1) the connective tissue graft was harvested from the patient's palate. The harvested amount was determined by measuring the recession defect height and width by using a periodontal probe. A partial thickness envelope flap was raised starting mesial to the canine 2 mm from the gingival margins and not extending beyond the distal aspect of the first molar to avoid injury of the greater palatine artery. After raising the flap, the connective tissue underneath was harvested. Later on, the flap was then repositioned and sutured back in place. While in group II (Fig 2) 10 ml of the patient's blood were obtained and centrifuged according to Choukroun et al [9]. The resulting product consists of three layers: the top layer which is platelet poor plasma (PPP), the PRF clot in the middle and the RBCs in the bottom layer. The PRF clot was then separated from the RBCs by a sterile scissors and then squeezed between two moist gauzes to form a membrane.

After that the graft was placed over the recipient site with its coronal edge resting slightly above the cemento-enamel junction. The graft was sutured in place with interrupted resorbable (vicryl) sutures and the flap was sutured coronally by performing sling sutures using non-resorbable 3-0 silk sutures. The vertical releasing incisions were sutured by interrupted sutures. Finally, the sutures were removed after 10 days and follow up of the patient was continued up to 6 months.

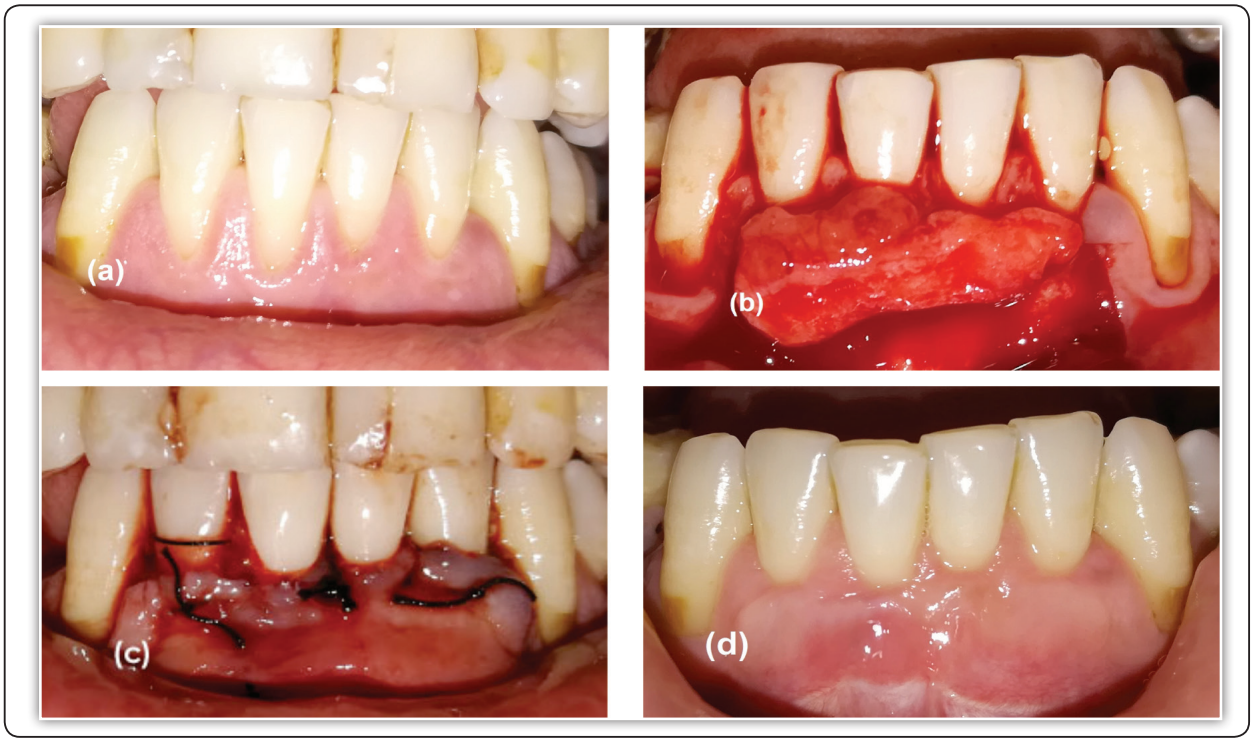

Fig. (1) (a) pre-operative photo of miller class I gingival recession in lower anterior teeth, (b) connective tissue graft placement over recipient site, (c) coronal repositioning and suturing of the flap over the CTG, (d) 6 months follow up showing complete root coverage.

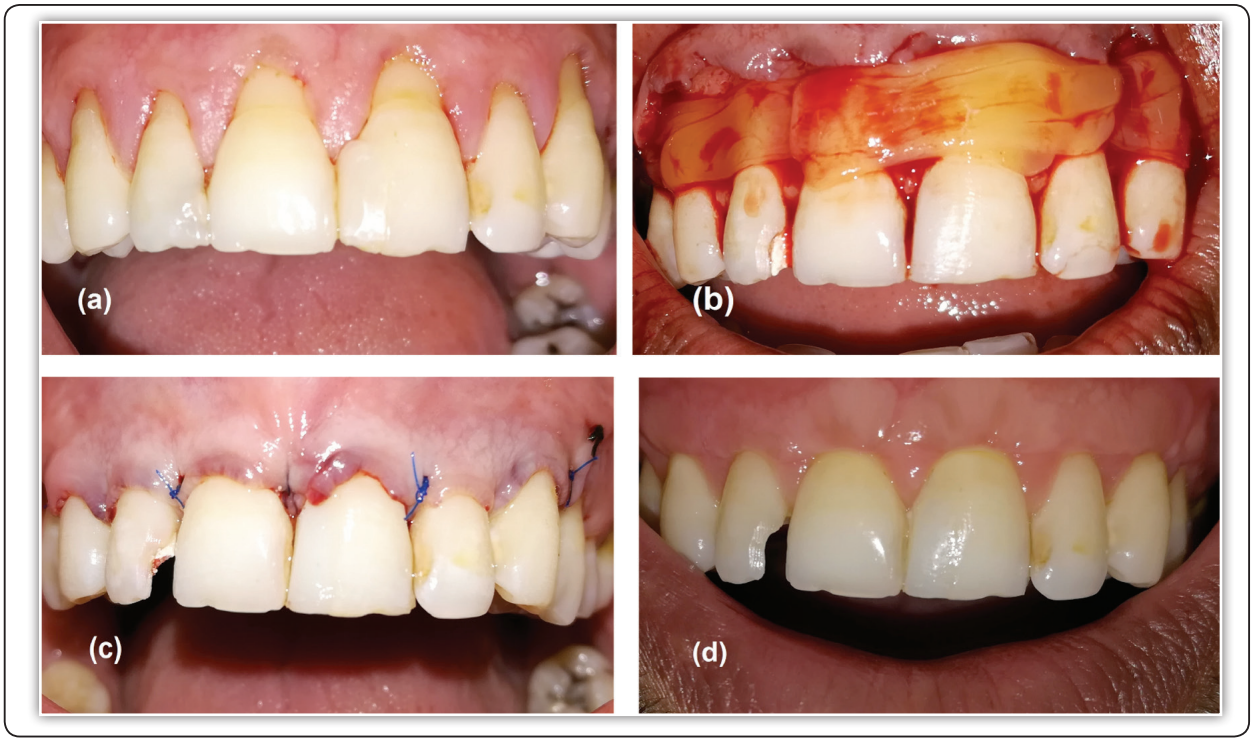

Fig. (2) (a) pre-operative photo of miller class I gingival recession in upper anterior teeth, (b) PRF membrane placement over recipient site, (c) coronal repositioning and suturing of the flap over the PRF, (d) 6 months follow up showing complete root coverage.

RESULTS

Comparing the measurement records of the two groups regarding gingival index (GI), Plaque index (PI), Recession height (RH), Probing depth (PD), Clinical attachment level (CAL) and width of keratinized gingiva (WKG) after 3 and 6 months follow up periods, there was no statistically significant difference between both groups at any point in the follow up intervals (table 1).

TABLE (1) Showing measurements records of (GI), (PI), (RH), (PD), (CAL) and (WKG) after 3 and 6 months follow up periods with was no statistically significant difference between both groups.

Parameter	Time period	Group I	Group II	P value
PI	Baseline	1.26 ± 36	1.41 ± 0.42	0.06
	3 months	1.11 ± 0.28	1.09 ± 0.24	0.71
	6 months	1.24 ± 0.26	1.21 ± 0.27	0.85
GI	Baseline	1.28 ± 0.38	1.24 ± 0.32	0.250
	3 months	1.13 ± 0.41	1.03 ± 0.28	0.058
	6 months	1.20 ± 0.33	1.17 ± 0.41	0.154
RH	Baseline	2.35 ± 0.82	2.4 ± 1.17	0.913
	3 months	0.50 ± 0.33	0.5 ± 0.47	1.000
	6 months	0.55 ± 0.87	0.8 ± 0.79	0.381
PD	Baseline	1.6 ± 0.52	1.35 ± 0.47	0.274
	3 months	1.3 ± 0.42	1.45 ± 0.50	0.476
	6 months	1.05 ± 0.16	1.3 ± 0.42	0.106
CAL	Baseline	4 ± 1.13	3.75 ± 1.48	0.676
	3 months	1.8 ± 0.54	1.6 ± 0.66	0.467
	6 months	1.6 ± 0.39	1.95 ± 0.96	0.306
WKG	Baseline	3.56 ± 1.16	3.73 ± 1.15	0.83
	3 months	4.57 ± 1.44	4.80 ± 1.52	0.74
	6 months	4.73 ± 1.43	4.80 ± 1.52	0.92

DISCUSSION

Gingival recession is one of the most common esthetic concerns associated with the periodontal tissue. Many factors including periodontal disease, traumatic tooth brushing, frenal pull, and tooth malposition maybe associated with development of gingival recession, leading to clinical complications such as root caries, higher incidence of attachment loss and root hypersensitivity [10, 11].

Different surgical and non-surgical treatment modalities have been described for the treatment of gingival recession. Regarding the surgical procedures, the coronally advanced flap (CAF) procedure is a very common, effective and a predictable approach for root coverage of Millers Class I and II gingival recessions. This procedure is based on the coronal shift of the soft tissues over the exposed root surface [12].

Aiming to attain both regeneration of functional attachment apparatus and root coverage, CAF was frequently combined with various regenerative materials and biologic factors. Some of these materials were synthetic such as the A-cellular Dermal Matrix, Xenogeneic Collagen Matrix and Enamel Matrix Derivative, while others were natural such as autogenous sub-epithelial connective tissue graft and the Platelet Rich Fibrin. [13]. Among these grafting materials, the SCTG is accepted as the gold standard and shows a great degree of predictability [14]. As a main disadvantage, CTG requires a second surgical donor site in the palate leading to patient discomfort and increased patient's morbidity [15]. In order to avoid this disadvantage, PRF has been tested in other studies as an alternative to the CTG. However, only a few studies compared the clinical efficacy of the PRF with those of CTG over a period of 6 months [16, 17].

The current study was conducted to compare the effect of using coronally advanced flap combined with either PRF membrane or SCTG in treatment of miller class 1 & 2 gingival recession. The studied parameters were recession height, probing depth, clinical attachment level and width of keratinized gingiva. All patients maintained good oral hygiene as monitored and evidenced by the plaque index and gingival index scores recorded throughout the study period. The absence of statistical significance between both groups denoted that most of the patients satisfactorily followed the oral hygiene instruction.

The results of the current study showed significant decrease in recession height in CTG group from 2.35 ± 0.82 mm at baseline to 0.50 ± 0.33 mm after 3 months and 0.55 ± 0.43 mm after 6 months with mean percentage of 77% root coverage. Similar to the CTG group, PRF group also showed significant reduction in recession height from 2.4 ± 1.17 mm at baseline to 0.50 ± 0.47 mm after 3 months and 0.80 ± 0.79 mm after 6 months with mean percentage of 67% root coverage. There was no statistically significant difference in recession height between the two groups after 3 and 6 moths follow up periods. In a similar study by Mufti et al [18] the percentage of root coverage was about 51% in PRF group and 64% in CTG group with no statistically significant difference between the two groups. Jankovic et al [16] showed significant reduction in recession height in both CTG and PRF groups with mean percentage of root coverage of 91% and 88% respectively. In spite of this relatively higher percentage of root coverage encountered in that study, the results of the present study almost agree with those results. Similarly, the current results are parallel with those of Erin and Atilla [17] who also showed significant reduction in recession height with mean root coverage percentage of 94% in CTG group and 92% in PRF group without statistically significant difference between both groups. On the contrary, the results of Kumar et al [19] showed a significantly higher root coverage percentage in PRF group of about 74% root coverage compared with CTG group that showed only 58% root coverage.

In terms of probing depths, each group showed non-significant changes after 3 months follow up, while only the CTG group showed significant reduction in PD after 6 months. However, the difference between the two groups was still non-significant after 3 and 6 months follow up periods. Different studies showed controversial results regarding the probing depths. Kumar et al [19] showed significant decrease in the PD from baseline to 3 months and increased in PPD from 3 to 6 months in PRF group. However, there was no change in PPD in the CTG group at 3 and 6 months follow up. Jankovic [16] showed a non-significant increase in PPD in both PRF and CTG groups, while Eren and Atilla [17] showed no change in PPD in PRF group and 1 mm increase in PPD in CTG group.

Regarding the CAL, The SCTG group showed significant gains in CAL from 4 ± 1.13 mm at baseline to 1.8 ± 0.54 mm and 1.6 ± 0.39 mm after 3 and 6 months respectively with mean gain of 2.4 mm. Similarly, the PRF group also showed

significant gains in CAL changing from 3.75 ± 1.48 mm at baseline to 1.6 ± 0.66 mm and 1.95 ± 0.96 mm after 3 and 6 months with mean gain of 1.8 mm with no statistically significance difference between the two groups after 3 and 6 months follow up. These results agree with the results of Jankovic et al [16] who expressed higher gains in CAL with overall mean of 2.96 mm in CTG group and 2.87 mm in PRF group, with no statistically significant difference between both groups. Similarly, Eren and Atilla [17] showed similar results with mean gain in CAL of 2.09 mm in CTG group and 2.42 mm in PRF group without statistically significant difference between the two groups. In contrast, Kumar et al [19] showed significantly higher gains in CAL in PRF group than that of the CTG group after 6 months follow up with mean gain of 1.73 mm and 1.20 mm respectively. The gains in CAL are generally attributed to the reduction in the vertical component of the gingival recession as a result of the performed procedures. However, it is difficult to determine the type of the attachment obtained in each group due to the lack of histologic evidence in human studies.

Concerning the width of keratinized gingiva, it increased in the SCTG group from 3.56 ± 1.16 mm at baseline to 4.57 ± 1.44 mm after 3 months and 4.73 ± 1.43 mm after 6 months with mean increase of 1.17 mm. The PRF showed almost similar results, changing from 3.73 ± 1.15 mm at baseline to 4.80 ± 1.52 mm after 3 months and 4.80 ± 1.52 mm after 6 months follow up with mean increase of 1.07 mm. There was no statistically significant difference between the two groups after 3 and 6 months follow up. The results from Kumar showed similar findings with mean increase in WKG of 1.13 mm and 1.20 mm in PRF and CTG group respectively. Similarly, Eren and Atilla findings revealed an increase of 0.93 mm in PRF group and 1.22 mm in CTG group with no statistically significant difference between the two groups [17, 19]. The increase in WKG may be explained by the fact that the mucogingival junction that demarcates the junction between the basal bone and the alveolar process has a tendency to re-establish itself to its original position, leading to gain in keratinized tissue height. Only Jankovic et al [16] showed significantly higher increase in WKG in CTG group with mean gain of 1.44 mm compared to PRF group with mean gain of 0.88 mm. The generally higher increase of WKG in CTG groups as compared to PRF groups, recorded in the present study as well as the reviewed ones, can be attributed to the ability of the connective tissue of the palatal graft to induce keratinization of the epithelium.

In a histologic human study performed by Eren and Gulnihall [20], a comparison was made between CTG and PRF in the treatment of gingival recession. Gingival tissue samples were harvested from fourteen patients with gingival recessions of at least > 2 mm at 1 or 6 months after the root coverage procedure. The one- and 6-months biopsies were harvested from 9 and 5 patients respectively by using a 2-mm punch biopsy pen under local anesthesia. The findings revealed good integration in the epithelial layer of the tissues with the recipient sites in both groups. The density of the collagen fibers was uniform in all sites of the tissues in both groups at 6 months. Both PRF and SCTG groups showed similar vascularization patterns in number of vessels and vessel area at 1 month follow up. However, Number of vessels and total vessel area were higher in the SCTG group than the PRF group at 6 months. This increased angiogenesis at 6 months possibly accounts for increased graft viability. PRF on the other hand showed significantly deeper retepegs compared to SCTG. Healing was faster in PRF group than in SCTG group. This might be related to the enhanced angiogenesis and neovascularization through the release of pro-angiogenetic factors in the early phases of wound healing, therefore showing faster healing than SCTG at 6 months. These results suggest that although, healing produced by both SCGT and PRF is histologically different, it might be almost at the same level of clinical success predictability. The results of such studies may offer a support for the findings encountered in the present study.

CONCLUSION

In view of the results of the current study, using the gold standard CTG for root coverage in conjunction with CAF brought about higher but statistically insignificantly clinical improvement compared to PRF after 6 months of follow up. Weighting the disadvantages of CTG against the obtained insignificant less improvement of using PRF, together with its advantages, lead to the assumption that PRF may represent a comparable alternative treatment modality.

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