

COMPARISON CLINICAL EFFECTS OF CONCENTRATED GROWTH FACTOR AND PLATELET-RICH FIBRIN IN THE TREATMENT OF LOCALIZED GINGIVAL RECESSIONS: A SPLIT-MOUTH RANDOMIZED CLINICAL TRIAL

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ABSTRACT

Background and Aims: The purpose of this study was to evaluate the clinical efficacy of concentrated-growth-factor (CGF) in combination with coronally-advanced-flap (CAF) compared with platelet-rich-fibrin (PRF)+CAF for the treatment of localized gingival-recessions (GRs)

Methods: 18 subjects with localized GRs were randomly treated according to a split-mouth design in the maxilla using CGF+CAF (test site), or PRF+CAF (control site). Clinical outcomes were assessed at baseline and at 6 months after surgery for the following terms: complete-root-coverage (CRC), mean-root-coverage (MRC) clinical-attachment-level (CAL), recession-depth (RD), keratinized-gingiva-width (KGW), gingival-thickness (GT), recession-width (RW).

Results: A statistically significant difference was observed in CAL, RD, KGW, GT and RW at 6 months compared to baseline values in both therapy sites. MRC was 85.18% and 82.40 %, CRC was 61.11% (11/18) and 50.00% (9/18) for the CGF site and PRF site, respectively at 6th month. No statistically significant difference was observed in these parameters between the two sites at 6 months.

Conclusions: The use of CGF and PRF membranes together with CAF may increase the success of GR therapy. However, the use of CGF+CAF was not superior to PRF+CAF in providing additional benefits in clinical parameters.

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INTRODUCTION

Gingival recession (GR) is a common mucogingival deformity. The root surface (RS) exposed by GR is treated with various surgical techniques.^{1,2} There are several factors in the success of these procedures. One of them is the gingival thickness (GT).¹ Studies suggested that GT > 1mm provides the optimal root coverage (RC).³ Traditionally, if GT and height of the keratinized gingiva (KG) are sufficient, the coronally advanced flap (CAF) technique is commonly used to close the exposed RS.⁴ In the absence of keratinized gingiva, the subepithelial connective tissue graft (CTG) combined with the different flap designs minimizes the apical movement of the gingival margin.⁵ However, CTG has several disadvantages, such as a secondary surgical site, obtaining limited grafts from the donor site, insufficient donor tissue thickness, and prolonged surgical time.^{5,6} Additionally, increased pain and bleeding discomforts have been reported postoperatively.^{5,6} Therefore, a variety of biomaterials in periodontal plastic surgery have been used to correct mucogingival deformities.⁷ The biomaterials produced using autogenous platelet concentrates have been suggested as promising biomaterials in tissue remodeling and regeneration, since the use of acellular dermal matrice, collagen membranes, and enamel matrix derivatives imposes a financial burden.⁸

Platelets contain various growth factors (GFs) to initiate the healing process or regeneration of tissue.⁹ Since GFs increase cell mitosis, proliferation, collagen production and extracellular matrix synthesis, the use of platelet-derived GFs for tissue regeneration in periodontal plastic surgery has been suggested.¹⁰ Platelet-rich plasma (PRP) was defined as the first generation autologous platelet biomaterial. Due to the use of PRP with anticoagulants or clot formation inhibitors, it has been reported to reduce the long-term release of growth factors. Therefore its use in periodontal surgery has gradually decreased.⁷ The second generation of platelet concentrates is platelet-rich fibrin (PRF) that is obtained from the centrifugation of blood (2700/3000rpm for 12 min) without anticoagulant or bovine thrombin.⁷ It has some advantages compared to PRP, such as including shorter time preparation, slow dissolution, and a more dense fibrin matrix.⁷ PRF has been widely used to facilitate soft and hard tissue healing, especially in periodontal procedures, including furcation defects,¹¹ sinus floor augmentation,¹² intrabony defects,¹³ and multiple and localized gingival recession.^{5,14} It can be used as membranes, when squeezed

between two hard surfaces, in the treatment of GRs.¹⁵ And, the third generation of platelet concentrates is concentrated growth factor (CGF) as a new approach to producing PRF.¹⁶ CGF is produced by a special centrifuge machine at varying speeds between 2400 to 3000 rpm. It is stated that the modified speed during centrifugation contributes to the dense fibrin matrix in which larger, more intensive, more GFs than PRP or PRF were included.¹⁶⁻¹⁸ Lee et al.¹⁹ reported that CGF has stronger tensile strength and higher potential to induce proliferation of osteoblast and gingival fibroblast compared with PRF. The high tensile strength and viscosity of CGF protect GFs from proteolysis and prolong the release times of GFs.¹⁶ Additionally, it was reported that CGF also contains a higher concentration of GFs and osteoblast number than PRF. Thus it exhibits superior regenerative capacity and biomaterial potential.^{19,20}

PRF has been used in the treatment of multiple or localized GRs.^{5,7,14} Recently, the use of CGF as a natural biomaterial in the treatment of GRs has been increasing.^{6,21,22} CGF is considered to be a biomaterial that is better than PRF in bone regeneration, but there is no study comparing the clinical effects of CGF and PRF in the treatment of localized GRs. Our study hypothesized that if CGF has a better regenerative capacity than PRF, the use of CGF in the treatment of GRs as a natural biomaterial may enhance the percentage of RC or healing of soft tissue compared with PRF. Therefore, the purpose of this study was to compare the clinical effects of CGF+CAF and PRF+CAF in the treatment of localized GRs.

MATERIALS and METHODS

Study Design

The ethics committee of Ankara University Faculty of Dentistry Clinical Research approved the study under the Helsinki Declaration of 1975, as revised in 2013 (Protocol ID: 36290600/39, 29/04/2015, Clinical Trials ID: NCT05188768). All subjects were informed about the study's purpose, and the study was performed after written informed consent was obtained. This study was planned as a randomized, split-mouth, controlled clinical study on 18 individuals who applied to Bülent Ecevit University, Faculty of Dentistry, Department of Periodontology for GR complaints, between July 2015 and November 2016.

Patient Selection

Periodontally and systemically healthy non-smoker subjects over 18 years enrolled in this study based on the following inclusion criteria: (1) similar bilateral Type 1 localized GRs

with no loss of interproximal attachment and interproximal cemento-enamel junction (CEJ) were not clinically detectable at both mesial and distal aspects of the teeth with ≥ 2 mm gingival recession depth (RD), probing depth (PD) < 3 mm, and gingival thickness (GT) ≥ 1 mm, located on incisors, canines or premolars tooth of the maxillary arch;²³ (2) the presence of identifiable CEJ; (3) full-mouth plaque score (FMPS) ≤ 20 ,²⁴ and gingival index=0;²⁵ (4) presence of tooth vitality and absence of restorations, caries, and furcation problems in the treated sites; (5) no periodontal surgical therapy in the previous 1 year on the treated sites. The exclusion criteria were as follows: (1) pregnant or lactation; (2) systemic diseases that would affect the periodontal surgical therapy; (3) use of medications (systemic antibiotics, corticosteroids, anticancer agents, non-steroid anti-inflammatory drugs, etc.) in the last 6 months; (4) presence of recession defects associated with caries, deep abrasion.

All the subjects received oral hygiene instructions, and full-mouth scaling and root planing (SRP) was performed four weeks before periodontal surgery. The subjects were instructed to perform a non-traumatic brushing technique

(roll) using an ultra-soft toothbrush. The location and distribution of the treated sites are depicted in Figure 1.

Clinical Measurements

FMPS and GI were evaluated before the surgery. A calibrated examiner (who did not perform the operations and who was unaware of the procedure, FÖD) recorded clinical measurements using the millimeter calibrated Goldman/Fox Williams probe (Nord Grove Manufacturing, Elk Grove Village, IL, USA) before the surgical procedure, and 6 months after. Guides were used to standardize clinical measurements. PD was measured as the distance between the bottom of the sulcus and the gingival margin on the midbuccal surface of the teeth. Clinical attachment level (CAL) was measured from the bottom of the sulcus to the CEJ on the midbuccal surface of the teeth. RD was measured from the gingival margin to the deepest point of recession and the CEJ. Keratinized gingiva width (KGW) was measured from the gingival margin to the mucogingival junction (MGJ). Recession width (RW) was recorded as a horizontal distance from the mesial to the distal margin of the recession at CEJ. Gingival thickness

CONSORT 2010 Flow Diagram

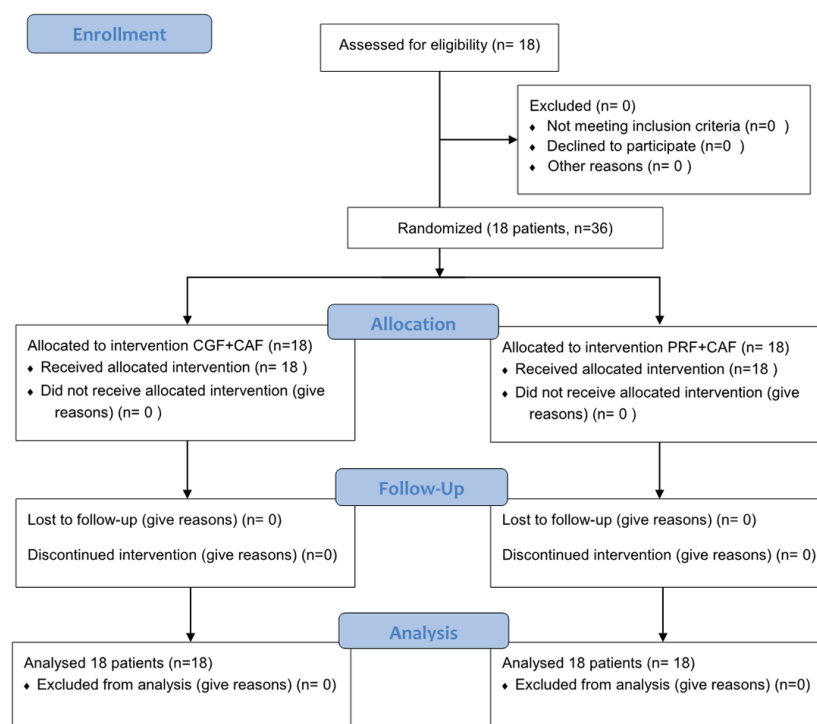


Figure 1. Consort flowchart of the study

(GT) was recorded midbuccally from the 2 mm apical of the gingival margin at the attached gingiva using a 15 H-File endodontic reamer (Bahadır Dis, Malz, Istanbul, Turkey) with a rubber stopper under local anesthesia and evaluated with a digital caliper with 0.05 resolution (Stainless Steel Digital Caliper 75 mm, Shan, China). Complete root coverage (CRC) and mean root coverage (MRC) were calculated using the same method as Naik et al's study.²⁶

An examiner (FÖD), who was completely blinded to the surgical procedures, evaluated all the clinical parameters. Calibration was assessed by measuring 10 defects in five patients twice at 72-h intervals. The calibration was accepted when the recession measurements (PD, CAL RD, KGW, and GT) were similar at the 90% level. Calibration was evaluated by measuring 10 defects twice in five participants at 72 hour intervals.²⁷

Surgical Therapy

All surgeries were performed by the same expert periodontitis (K.T) during a single surgical session. The recession sites were randomly assigned to one of the two treatments sites as either the test side or the control side by the flip of the coin. After local anesthesia with 2% lidocaine and epinephrine 1:100,000, sulcular incisions were performed on the recipient teeth and joined with horizontal incisions into the adjacent inter-dental areas. The horizontal incision was connected to two vertical incisions where those incisions were made extending 3–4 mm into the alveolar mucosa at the mesiofacial and distofacial line angles of the study teeth. After releasing the partial-thickness flap at the papilla, the keratinized tissue apical to the RD was elevated as a full-thickness flap. The second partial thickness flap was then released apically to the exposed bone to allow the flap to move coronally. The anatomical papilla was de-epithelialized to form a connective tissue bed. All incisions were performed using a 15-C blade (Swann-Morton LTD, Sheffield England). The exposed RSs were mechanically treated with curettes (Gracey curettes; Hu Friedy, Chicago, IL, USA) to remove the plaque, calculus, and soft tooth structure. Further root conditioning, mechanical or chemical was not performed. At each site, PRF and CGF membranes were extended apically beyond the apical base of recession defects ≥ 3 mm and placed over the defect (Figures 2 and 3). The flaps were coronally positioned and stabilized without tension over the membrane to completely cover the CEJ and sutured with Lactasorb 5/0, 16 mm, 3/8 resorbable sutures (Ankara, Turkey) in both groups. Gentle pressure was



Figure 2. PRF side: (A) pre-operative view, (B) intra-operative view, (C) immediate postoperative view, and (D) 6 months post-operative view.

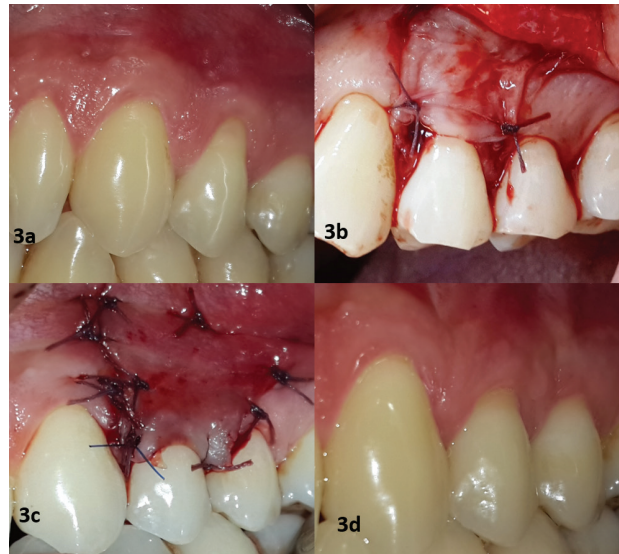


Figure 3. CGF side: (A) pre-operative view, (B) intra-operative view, and (C) immediate postoperative view, and (D) 6 months post-operative view.

performed for 3 min to stabilization of the blood clot.^{5,21,27}

A nonsteroidal anti-inflammatory drug (Apranax Forte 550 mg; Abdi Ibrahim, Turkey) was prescribed every 8 hours to reduce postoperative pain and edema. The participants were advised not to eat solid food using the treatment area and not to brush that area. The chlorhexidine digluconate (0.2%, CHX) twice a day for 1 min was recommended to rinse their mouth. The sutures were removed after 10 days and plaque

control was maintained with CHX for another 2 weeks. After 3 weeks, the participants started brushing their surgical sites gently using the roll-technique with an ultra-soft brush. Oral hygiene training was repeated at each visit.

Preparation of CGF and PRF membranes

Before the surgery in the test site, intravenous blood was collected into two tubes from forearm of each subject and placed into 10 mL glass test tubes without anticoagulant, and immediately centrifuged in a CGF centrifuge machine (Medifuge, Silfradent, S. Sofia, Italy). After approximately 12 min of rotation (centrifuged at 2700 rpm × 2 min, 2400 rpm × 4 min, 2700 rpm × 4 min, and 3000 rpm × 3 min) CGF was obtained.¹⁸ CGF was formed by 4 layers: serum in the top layer, a buffy coat in the second layer, GF and CGF in the third layer, and red blood cells (RBCs) in the bottom layer. The obtained CGF was removed from the tube and separated from the RBCs using microsurgical scissors. The CGF was squeezed in a special box that produces membranes at a constant thickness of 1 mm (Fig. 3 a, b, c, d). The CGF membrane was immediately placed over the recession area. The collection of blood was the same in the obtaining procedure of PRF as in the CGF. After collection of venous blood, were quickly inserted into the Electro-Mag centrifuge (M 815 P, İstanbul, Turkey) without shaking. The device was operated at 2700 rpm for 12 min to obtain PRF. Consequently, three layers were formed: cell-free plasma content in the top layer, PRF gel in the middle layer, and red blood cells in the bottom layer. A membrane was created from the obtained PRF content using the same special box of CGF that produces membranes at a constant thickness of 1 mm, and it was immediately placed on the control site to cover it (Fig. 2 a, b, c, d)

Statistical Analysis

The primary outcome variable was the evaluation of CRC. The MRC, RD, RW, PD, CAL, KGW, and GT were established as the secondary outcome variables. Beginning of the study, sample size calculations were determined according to the published study.⁵ According to detect the minimum level of clinically significant difference in RC of 1 ± 0.9 mm (%80 power, which is equal to a $\beta = 0.20$ type II error level with a 5% type I error level, which is equal to an $\alpha = 0.05$ probability level), 14 subjects were needed in every group. A total of 20 subjects were enrolled in each group to eliminate the effect of possible withdrawals.

All tests were performed using statistical software (SPSS Inc., version 19.0, Chicago, IL, USA). The data were tested in

terms of normality distribution using the Shapiro-Wilk test. The Wilcoxon signed-rank test (paired observations) was conducted to compare PD, CAL, RD, RW, KGW, GT, and MRC between the groups after the normality of the data had failed. The Wilcoxon signed-rank test (paired observations) was used to compare the baseline values with the values obtained after 6 months. A comparison between the test and control sites for CRC at 6 months was made by using Chi-square analysis. The results were calculated as median (25-75th percentile) for the parameters, using the patients as the statistical unit. $p < 0.05$ was considered to be statistically significant.

RESULTS

The study was completed with 36 defects in 18 participants (mean age 39.67 ± 10.25 age; 12 females, 6 males) one side of the jaw received PRF+CAF (18 defects), the opposite site received CGF+CAF (18 defects). None of the subjects was excluded from the study. In these patients, 36 Tip I recession defects were localized in 6 incisors, 5 canines, 7 premolars in each group. No complications were observed and wound healing was uneventful after the treatment in both groups. At baseline, the clinical parameters and characteristics of the defects showed no significant differences between the CGF and PRF sites. The participants achieved good plaque control with ≤ 20 FMPS and GI=0 scores at the baseline and 6 months evaluation. The comparisons of obtained clinical views at baseline and 6 months are shown in Figures 2 and 3. A statistically significant decrease was found in both therapy sites in term of RD at 6 months compared to baseline values ($p < 0.05$; Table 1) RD decreased by 1.50 mm, which represents MRC 85.18 % in the CGF site. RD decreased by 2.00 mm, which represents MRC 82.40 % in the PRF group. CRC was found in 61. 11% of the sites (11/18) in the CGF site, and in 50% of the sites (9/18) in the PRF site (Table 2). No statistically significant different was observed in terms of RD, MRC, and CRC between the two therapy sites at 6 months ($p > 0.05$).

There were no statistically different in terms of PD in both therapy sites during the study period ($P > 0.05$) CAL and RW values statistically decreased and KGW and GT values significantly increased from baseline to 6 months in both therapy sites ($p < 0.05$). There were no statistically different in the inter-group comparison at 6 months in terms of CAL, RW, KGW and GT ($p > 0.05$). (Table 1)

Table 1. Descriptive statistics of the clinical parameters measured at baseline and 6 months after surgery

	PRF	CGF	p-value
PD (mm)			
Baseline	2.00 (2.00-2.00)	2.00 (2.00-2.00)	0.705
6 months	2.00(2.00-3.00)	2.00 (2.00-2.25)	0.317
<i>p-valueⁱ</i>	0.655	0.059	
CAL (mm)			
Baseline	5.00 (4.37-6.00)	4.75 (4.00-5.12)	0.248
6 months	3.00(2.00-4.25)	3.00 (3.00-3.62)	0.284
<i>p-valueⁱ</i>	.000*	.000*	
RD (mm)			
Baseline	3.00 (2.37-3.25)	2.50 (2.00-3.00)	0.257
6 months	1.00(1.00-1.00)	1.00 (0.00-2.25)	0.480
<i>p-valueⁱ</i>	.000*	.000*	
RW (mm)			
Baseline	3.25(3.00-4.00)	3.00 (3.00-4.00)	0.482
6 months	2.50 (0.00-300)	3.00 (2.00-3.00)	0.564
KGW(mm)	.000*	.000*	
Baseline	3.00(2.00-3.00)	3.00 (2.00-3.00)	0.585
6 months	3.50 (3.00-4.00)	4.00 (3.00-4.00)	0.593
<i>p-value</i>	0.007*	0.003*	
GT (mm)			
Baseline	1.40 (1.27-1.60)	1.40 (1.30-1.50)	0.867
6 months	1.60 (1.50-2.00)	1.70 (1.47-1.90)	0.776
<i>p-valueⁱ</i>	0.033*	0.016*	

PD: Probing pocket depth, CAL: Clinical attachment level, RD: Gingival recession depth, RW: Gingival recession width, KGW: Keratinized gingiva width, GT: Gingival thickness

Data are expressed as the median (25-75th percentile). Wilcoxon signed-rank test.

*P<0.05

DISCUSSION

Various studies have shown that GFs supports cell migration, wound healing, and tissue regeneration.^{9,16,18} The use of GFs can achieve the improved clinical outcomes

of GRs therapy.²² A systematic review reported that PCs did not have significant benefits for the treatment of GRs.²⁸ Another hand, Luo et al.²⁹ reported that the use of PCs can exert a positive effect on the treatment of

Table 2. Mean and complete root coverage percentages in the operated patients at 6 months post-operatively

	Mean Root coverage	Complete root coverage
PRF	82.40 %	9/18 (50%)
CGF	85.18 %	11/18 (61.11%)
p-value	0.810*	0.737†

* Wilcoxon signed-rank test

† Chi-square test

GRs. Recently, there is an increase in the use of PRF membrane^{5,14} and CGF membrane^{6,21} in the GRs therapy. Especially, these membranes have been compared with a subepithelial connective tissue graft, which is known as a gold standard in the GRs therapy.³⁰ Our recently published article³¹ compared these membranes with each other in the multiple GRs therapy. Since therapy of multiple GRs are more challenging defect, as the surgical site is larger and more anatomic variations may be present²⁷, we thought that our present study in the treatment of localized GRs could obtain different results from our previous study.³¹ Therefore, the present study aimed to compare the clinical effects of CGF and PRF membranes together with the CAF surgery technique in the localized GRs treatment, and to the best of our knowledge, no study reported on whether a PRF membrane or a CGF membrane is the best option for the treatment of localized GRs.

The purpose of periodontal plastic surgery procedures in the treatment of marginal tissue recession is complete regeneration of all supporting components of the periodontium, resulting in complete coverage of the peeled RS.³² CRC ensures recovery from hypersensitivity and aesthetic factors associated with recession.³³ Therefore, evaluation of CRC in treatment of GRs is important for the predictability of therapy effects.⁵ Thamaraiselvan et al.³⁴ reported that the percentage of MRC was 74% in the PRF+CAF group and 65% in the CAF group, and CRC was 50% in both groups. Gupta et al.³⁵ showed that MRC was 91.00% and 86.60% and CRC was 80% and 73.3% for CAF+PRF and CAF alone, respectively, and no significant differences were reported in the intergroup comparison in terms of CRC and MRC in their study. Eren and Atilla⁵ reported that the percentage of CRC was 72.7% and 77.3% and the percentage of MRC was 92.7% and 94.2% in the PRF+CAF group and the CTG+CAF group, respectively. They reported no statistical differences in the percentages of CRC and MRC at 6 months between the test and control

groups. However, Aldana et al.³⁶ found statistically better RC results in the CTG+CAF group than in the leukocyte-PRF group in the treatment of localized GRs. Similarly, Joshi et al.³⁷ reported better RC in the CTG+CAF group than in the PRF+CAF group. The present study design was different because we evaluated the performance of CGF+CAF compared with PRF+CAF. We did not compare CTG grafts with GF membranes. Additionally, no study evaluated the effect of CGF membrane in localized GRs therapy for comparison. The present study found that MRC was 85% and 82%, and CRC was 61.11% and 50% in the CGF+CAF and PRF+CAF sites, respectively. The present study showed similar a RC percentage in both therapy sites and differences were not significant in the intergroup comparisons, which is similar to the results observed in the above studies.^{34,35} Also, the present study found similar findings to our recent study on RC percentage in the treatment of multiple GRs.³¹ Some studies have shown that GT and KGW values increase with the application of PRF and CGF membranes in the treatment of GRs.^{21,22,27,31} Öncü et al.³⁸ found that increase of KGW was higher in the CTG+CAF group than the PRF+CAF group. However, increase of GT was higher in the PRF+CAF group than in the CTG+CAF at 6 months. Thamaraiselvan et al.³⁴ showed an increase in GT the PRF+CAF group, and no differences were reported in terms of KGW between the PRF+CAF and the CAF alone group in the isolated GR. Gupta et al.³⁵ found an increase in the terms of GT and KGW in both PRF+CAF and CAF alone groups, but this increase was not significant in the intergroup comparisons. On the other hand, Aroca et al.²⁷ reported a significant decrease in terms of KGW in the PRF group compared to modified coronally advanced flap alone. In the present study, GT and KGW values statistically increased in both therapy sites at 6 months, but this increase was not significant in the intergroup comparisons. The increase in GT and KGW should be considered clinically significant as thick tissue resists trauma and subsequent recession enables tissue manipulation, promotes creeping attachment and exhibits less

clinical inflammation.^{34,39} Additionally, the increase of KGW and GT in the present study can be likely due to the potential of the PRF and CGF membranes to regulate proinflammatory cytokines and to support migration of GFs, and cell adhesion, thus, they might lead to wound healing in the treatment of GRs.^{20,40,41} Also, this statement must be confirmed with further histological studies. Culhaoğlu et al.⁴² reported better findings in the application of 4 layers of PRF membrane than in the application of 2 layers of PRF membrane and suggested that effects of 4 layers of PRF membrane application and CTG were similar in the treatment of GRs. Additionally, Del Corso et al.⁴³ stated that PRF should be used in at least two layers, if possible in three layers so that the desired volume is reached. Briefly, an increase in applying membrane layers can improve the clinical outcomes, however, further studies are needed to confirm this. Another important point is that the preparation of GF membranes is done by the compression of PRF and CGF clot by a special box. Some investigators found that a considerable quantity of growth factors involved in the regeneration of tissues are eliminated by squeezing, and the compression has also shown to damage the platelets.^{44,45} This should also be taken into account when evaluating the results.

In this study, our findings showed that PD measurements were within normal limits at baseline and 6 months after surgery in both sites and no significant difference was reported between the inter and intra-groups comparisons. The change in the amount of PD should be evaluated together with CAL when evaluating clinical results. The significant CAL gain and a decrease in RW were observed in both therapy sites at 6 months after surgery and no difference was observed between the inter-group comparisons, which is compatible with the results reported in other studies.^{6,21,31,34} Another factor for evaluating the treatment of GRs is measuring the GR depth. The amounts of RD were similar between both therapy sites at baseline and the decrease in RD was statistically significant at 6 months in both sites and the difference was not significant in the inter-groups comparison, which is consistent with above mentioned studies.^{21,31,34,35} These findings demonstrated that the application of GFs membranes combined with CAF in both therapy sites was effective in the decrease of RD. However, it should be considered that several factors, including recession height and location, the design of incision affect the treatment of GRs.

This study was designed as a randomized, split-mouth, controlled clinical trial in the localized GRs. This study has some limitations. Firstly, histological examination was not performed

to demonstrate the potential regenerative capacity of CGF and PRF membranes. The second limitation, although a 6-months postoperative evaluation is sufficient to demonstrate the stability of gingival margin after a CAF,⁴⁶ short follow-up period (6 months) is not enough to observe clinically significant creeping attachment.⁴⁷ It may affect results. The third limitation, we did not evaluate the patient satisfaction or measure the RC esthetic score. The patients' subjective aesthetic evaluation of RC and the lack of color match which is suggested to be more important than RC for subjective aesthetic assessment in mucogingival surgery.³⁹ Therefore, future studies considering the above limitations and involving a greater number of participants, longer follow-up time, and applying different surgical techniques are needed.

CONCLUSIONS

From the results of present study, it can be concluded that the CGF+CAF application was not superior to the PRF+CAF application in the reduction of baseline recession of localized GRs. However, both therapy techniques were found effective to increase the clinical success of RC procedures. Additionally, clinical advantages of these autogenous biologic materials as a graft material are related to avoidance of donor site. Furthermore, application of GF membranes should be considered, if the therapy objective is to increase KGW and GT.

CONFLICT OF INTEREST

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The authors declare that they have no conflicts of interest related to this study.

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