

# A comparative study of connective tissue graft and platelet rich-fibrin in the treatment of gingival recession using coronally advanced flap: a systematic review



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## Abstract

**Objective:** To compare the effects of platelet-rich fibrin (PRF) and connective tissue graft (CTG) in gingival recession treatment using coronally advanced flap (CAF)

**Methods:** Electronic Pubmed, Wiley, and EMBASE searches were conducted to identify articles published in dental journals without any restrictions of publication date. Gingival Recession Depth (RD), Keratinized Tissue Width (KTW), Probing Depth (PD), Clinical Attachment Level (CAL) and % Complete Root Coverage (CRC) were evaluated at baseline and 6 months. Patients with discomfort postsurgery was measured by comparing Visual Analog Scale (VAS) scores. Manual searches of human clinical trial and related articles were performed afterward. There are 31 studies explained about this, but only 6 studies met the inclusion criteria.

**Results:** The initial database search produced 221 titles. All articles were selected for full-text review. Six studies were selected for inclusion, with 88 patients as subjects. Most of the studies showed the decreased of RD, PD, CAL and the increased of KTW in both techniques at baseline and 6 months follow up. The percentage of CRC showed higher in CTG rather than PRF whereas VAS score showed lower in PRF group

**Conclusion:** Both PRF + CAF and CTG + CAF techniques are effective procedures in the treatment of gingival recession. The combination of CAF+CTG achieved a better result in root coverage however, PRF avoids a donor site, which means a major decrease in postoperative discomfort.

**Keywords:** Connective tissue, Gingival recession, Platelet rich fibrin

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## Introduction

There are various surgical techniques have been suggested to treat gingival recession defects such as laterally positioned flap, free gingival graft, the Coronally Advanced Flap (CAF), Connective Tissue Graft (CTG) and guided tissue regeneration with membranes, Enamel Matrix Derivative (EMD), or the application of an Acellular Dermal Matrix (ADM), Platelet-Rich Plasma (PRP) and Platelet-Rich Fibrin (PRF).<sup>1</sup>

Coronally Advanced Flap (CAF) procedure is one of the effective periodontal plastic surgical procedure for treatment of gingival recessions. This procedure is based on the coronal shift of the soft tissues on the exposed root surface. It has been documented as an effective and predictable surgical technique used to achieve root coverage in the treatment of millers class I and II gingival recessions. Most authors make use of different modifications of the Coronally Advanced Flap (CAF) in combination with Connective Tissue Graft (CTG) and consider it the "golden standard". However, these techniques create two postoperative wounds and this is considered to be

related with discomfort and post-surgical bleeding may be seen in the palatal area.<sup>2-4</sup>

The use of plasma that is rich in growth factors for tissue regeneration in periodontal plastic surgery has been proposed. Studies have demonstrated that the growth factors in the plasma concentrate stimulate the repair and regeneration of soft and hard tissues and that the plasma reduces inflammation and the subsequent pain and discomfort. A PRF membrane is a second-generation platelet concentrate. Using PRF requires very simple techniques because unlike other platelet concentrates, it does not require anticoagulants or bovine thrombin blood is collected in dry glass tubes or glass coated plastic tubes and centrifuged immediately, and the fibrin clot is formed in the middle of the tube. It contains leukocyte enriched fibrin biomaterial because, in this method platelets and leukocytes are collected with high efficiency such that the growth factors will able to release gradually during at least 1 week and up to 28 days, which means that PRF could stimulate its environment

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for significant time during wound healing.<sup>5,6</sup>

The purpose of this SR is to compare whether the use of CAF in combination with PRF or CTG may give the best clinical outcomes in treatment gingival recession of miller class I and II

**Methods**

This systematic review is written according to the guidelines of Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) for reporting studies evaluating healthcare interventions. population, intervention, control, outcome (PICO) question of the present systematic review was: in a patient with gingival recession class I and II miller treated with PRF and CTG using CAF.

**Information sources and Search**

A systematic search of the article was made to identify articles published in PubMed, Wiley, and EMBASE comparing technique PRF with CAF and CTG with CAF. The MeSH keywords used were “gingival recession” and “platelet-rich fibrin” and “connective tissue”. The search limits applied to the electronic search were the English language, clinical trial, and studies in human. The title and abstract were then reviewed to find the relevant

studies. There are 31 studies explained about this, with only 6 studies met the inclusion criteria.

The inclusion criteria in this systematic review were English language article, patient with single or multiple gingival recession miller class I or II which compared the effect of PRF with CAF and CTG with CAF, the studies included a clinical evaluation of the outcome with mean follow-up at baseline and 6 months after operation and VAS score at least 1 week after operation. While the exclusion criteria were the operation that using an implant or bone graft and studies in animal.

**Selections of Study**

The electronic searches were independently screened by authors (RM, AI) involved analysis of titles and abstracts of all studies using mesh keyword. When studies met the inclusion criteria or when insufficient data from abstracts for evaluating inclusion criteria were gained, the full article was obtained. The eligibility criteria were used to identify the articles that will be used for this systematic review.

**Data Items**

The following information was collected from all the studies included: author(s), year, number of patients, Recession Depth (RD), Keratinized Tissue

**Table 1 Clinical Parameters (mean ± SD) of RD, KTW, PD, CAL (mm), and CRC (%) between PRF versus CTG**

Author (Year)	Patient	RD (mm) PRF vs CTG		KTW (mm) PRF vs CTG		PD (mm) PRF vs CTG		CAL (mm) PRF vs CTG		CRC PRF vs CTG (%)	Pain Intensity (VAS Score)
		Baseline	6 Months	Baseline	6 Months	Baseline	6 Months	Baseline	6 Months		
Eren and Atilla	22	2.67 ± 0.61	0.18 ± 0.32	2.58 ± 1.37	3.51 ± 1.28	1.07 ± 0.32	1.09 ± 0.29	3.75 ± 0.70	1.32 ± 0.55	72.7	NR*
		vs	vs	vs	vs	vs	vs	vs	vs	vs	
		2.61 ± 0.67	0.16 ± 0.33	2.41 ± 1.20	3.63 ± 1.43	1.05 ± 0.21	1.45 ± 0.60	3.68 ± 0.73	1.59 ± 0.65	77.3	
Jan kovic et al	15	3.51 ± 0.70	0.68 ± 0.45	1.32 ± 0.66	2.20 ± 0.54	0.74 ± 0.53	0.95 ± 0.41	4.35 ± 0.67	1.48 ± 0.40	75.85	0.2 ± 0.41
		vs	vs	vs	vs	vs	vs	vs	vs	vs	vs
		3.45 ± 0.84	0.38 ± 0.48	1.41 ± 0.58	2.85 ± 0.45	0.86 ± 0.47	0.92 ± 0.48	4.31 ± 0.61	1.35 ± 0.38	79.56	0.46 ± 0.51
Oncu	20	3.93 ± 0.91	0.90 ± 1.03	2.70 ± 0.70	3.80 ± 0.93	1.47 ± ±	1.17 ± 0.38	5.37 ± 1.07	2.07 ± 1.17	50	NR*
		vs	vs	vs	vs	0.51 vs	vs	vs	vs	vs	
		4.17 ± 0.83	0.68 ± 0.92	2.60 ± 0.77	4.33 ± 0.88	1.33 ± 0.66	1.17 ± 0.38	5.53 ± 1.07	1.77 ± 0.97	60	
Tunali et al	10	4.45	1.14	2.33 ± 0.56	2.93 ± 0.70	1.33 ± 0.59	1.24 ± 0.37	5.03 ± 1.94	2.27 ± 0.92	74.61	NR*
		vs	vs	vs	vs	vs	vs	vs	vs	vs	
		4.02	1.14	2.43 ± 0.52	2.93 ± 0.71	1.49 ± 0.50	1.13 ± 0.35	5.20 ± 1.49	2.24 ± 0.82	74.13	
Uraz et al	20	4.73 ± 1.30	1.17 ± 1.47	3.45 ± 1.05	4.63 ± 0.86	1.53 ± 0.17	1.31 ± 0.14	6.27 ± 1.27	2.48 ± 1.41	95	NR*
		vs	vs	vs	vs	vs	vs	vs	vs	vs	
		3.11 ± 0.80	0.11 ± 0.27	3.93 ± 0.72	5.11 ± 0.76	1.38 ± 0.58	1.13 ± 0.35	4.40 ± 0.86	1.18 ± 0.35	96.1	
Eren and Atilla	1	3.88	0.3	0.80	2.0	1.0	1.0				NR*
		vs	vs	vs	vs	vs	vs	NR	NR	NR	
		3.78	0	2.10	3.20	1.0	2.0				

\*NR: Not Reported

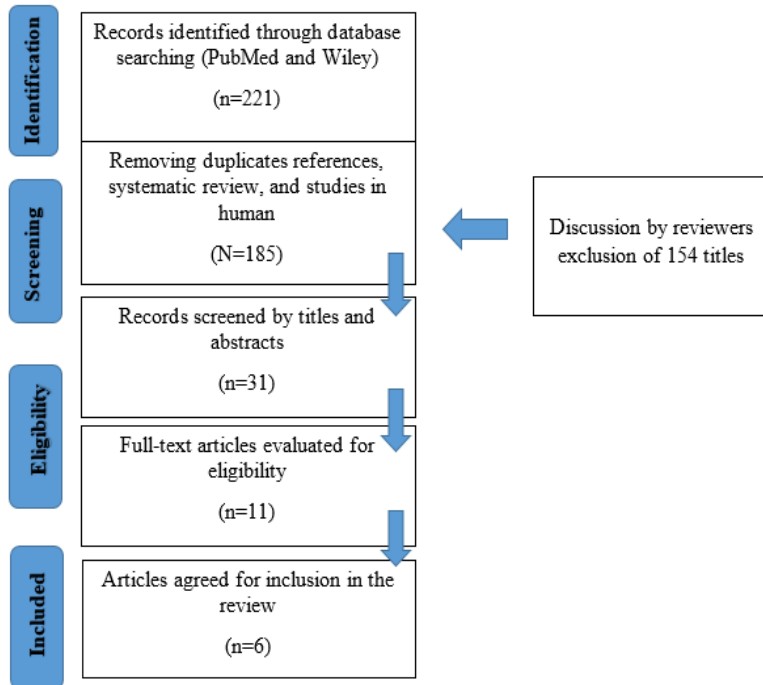


Figure 1 Article selection flow chart

KTW, CAL, PD, CRC, Visual Analogue Scale comparison technique (VAS) and percentage of root coverage CRC of each technique. All of the full-texts which met the inclusion criteria were read independently by reviewers and evaluated to formulate this systematic review.

**Results**  
**Study Selection**

The electronic search strategy resulted in a total of 221 articles, including 22 from Pubmed and 1 from Embase, and 198 from Wiley. After excluding duplicates references, systematic review, and studies in human there were 185 studies remained. Then analyze the titles and abstract left 31 articles. The full-texts then be reviewed by the investigators and yielded 6 articles whereas the other 25 articles were excluded after careful reading because they did not meet the inclusion criteria. Studies were only included if there were using PRF with CAF compared to CTG with CAF. The flowchart of the selection of the studies is shown in figure 1.

**Study characteristics**

The six studies in this review were published between 2012 and 2017. The number of participants in the studies ranged from 1 to 22. Five of the six studies was a randomized clinical trials (RCTs) and one a case report. All of the studies dealt with

single or multiple miller class I or II recessions. Data from studies were combined in order to evaluate the treatment effect between CAF + PRF or CAF + CTG for root coverage. Each study provided the mean of RD, KTW, CAL, PD, CRC were measured at baseline and 6 months follow up. Patient VAS scores indicating discomfort during the first postoperative week. The clinical parameters showed in table 1.

**Discussion**

This systematic review aimed to compare the effects of PRF and CTG in treatment gingival recession Miller class I and II using CAF. All of the studies showed a reduction in RD and gain in KTW at baseline and 6 months follow up for both group. The KTW gain in the CTG group could be explained by the established concept that the information in the connective tissue determines the character of the surface epithelium. However, the increase of KTW in the PRF group may be explained by the biology of PRF, which contains several growth factors influencing tissue proliferation and manifestation.<sup>1,6,7</sup>

A significant decrease in CAL at 6 months after surgery, compared to the baseline value for both groups in all of the studies. Although the quality of the studies was considered generally good, the results among different studies demonstrated a substantial heterogeneity. Mean values of PD between PRF and CTG showed different result, three studies Oncu.<sup>7</sup> Tunali et al.<sup>8</sup> and Uraz et al.<sup>6</sup> showed decreased whereas the other studies Eren et al.<sup>1</sup> and Jankovic et al.<sup>9</sup> showed conversely but the values were not significant differences in both techniques at baseline and 6 months follow up.

Complete root coverage ensures recovery from hypersensitivity and esthetic factors associated with the recession, and therefore, it is associated with predictability. There are five studies (83%) showed higher of percentage complete root coverage in CTG than PRF whereas only one study (16.67%) showed conversely. Tengkawan et al.<sup>10</sup> reported the same result in 10 days after SCTG treatment, closing percentage of the gingival recession was 7 (77.8%) had completely closed; while the PRF, only 6 (66.7%). Whereas on day 30th, after SCTG treatment, all subjects had undergone a recession closing perfectly, while the PRF group only 66.7% recession that has closed completely.<sup>1,10</sup>

Jankovic et al.<sup>9</sup> reported mean value of VAS score whereas other studies just reported p-value and

number of the patient whose had postoperative complications such as pain, bleeding and edema. All of the studies showed significantly lower VAS score in the PRF group and that this could be explained by the absence of donor site. Eren et al.<sup>1</sup> reported that four patients of the CTG group had some postoperative complications, such as pain (four patients, 18.1 %), postoperative bleeding (one patient, 4.5 %) and edema (two patients, 9 %), were reported in the donor site.<sup>1,9</sup>

CTG technique is accepted as the gold standard for obtaining complete root coverage and shows a great degree of predictability. On the other hand, CTG requires a second surgical donor site in the palate and may lead to patient discomfort. PRF may be used as an alternative to the CTG in order to eliminate the need for a second surgical procedure in the palate. These studies demonstrated that the clinical efficacy of the PRF was comparable to the CTG over a period of 6 months. PRF would not only result in a similar clinical outcome but will also enhance the wound healing by regulated the vascular response of the grafted area.<sup>11</sup>

## Conclusion

The results of this study indicated that both PRF + CAF and CTG + CAF techniques are effective and predictable procedures in the treatment of gingival recession. The combination of CAF + CTG achieved a better result in root coverage however, these technique has some disadvantages. It is time-consuming and increases for the second surgery morbidity. PRF avoids a donor site, which means a major decrease in postoperative discomfort.

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## Conflict of Interest

The authors report no conflict of interest.

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