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Comparison of Coronally Advanced Flap Technique with Application of Free Connective Tissue or Platelet-Rich Fibrin

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Abstract

Introduction: the present study aimed to compare the amount of root coverage using connective tissue graft or platelet-rich fibrin with Coronally advanced flap.

Materials and Methods: The present clinical trial study was performed on 24 patients with Miller class I and II gingival recession who were randomly divided into 2 groups of 12 patients. In one group, connective tissue graft technique with coronally advanced flap (CAF) was used and in the other group, platelet-rich fibrin technique with coronally advanced flap (CAF) was used. In both groups, factors such as probing depth, recession height, recession width, keratinized tissue width, clinical attachment level, gingival biotype and root coverage percentage and gingival thickness in the time periods before the study, one month, three months and 6 months were evaluated and Next, the study findings will be analyzed using SPSS software and Chi-square, Mann-Whitney and Friedman statistical tests.

Results: The results of the present study showed that the percentage of root coverage in the CTG group was 74.68 29 29.31% and in the L-PRF group was 70.42 31 31.85%; Statistically, the coverage of the two groups is not significantly different from each other (P value = 0.579). Probe depth, recession height, recession width, clinical attachment level, biotype and gingival thickness were not significantly different in both techniques (P value> 0.05). Adhesive and keratinized gingival width in CTG group was significantly better than L-PRF group (P value <0.001).

Conclusion: Based on the results of this study, it seems that the use of L-PRF like CTG with coronally advanced flap is effective in the treatment of gingival recession.

Keywords: Root cover, Connective tissue graft, Coronally Advanced Flap, Platelet-rich fibrin.

Introduction

The development of a cement-enamel Junction (CEJ) and root surface in the oral medium is caused by gingival resorption, which seeks to shift the gingival border toward the apical (1). Gingival resorption

is one of the most prevalent periodontal findings, affecting persons of all ages and in different parts of the mouth [2]. Gingival resorption is one of the most frequent lesions in adults, and it has become more common as people have become older (3). In populations with high (4) and low (5) oral health standards, the incidence of resorption has been officially recorded. Periodontal disease, mechanical pressures such as inappropriate brushing (6), iatrogenic factors such as orthodontic control movements (7), and restoration of erroneous cases are all variables that contribute to gingival resorption and basil. In this example, veneer and laminate fillings were used. (8) Gingival resorption is made more likely by the form and kind of gingival tissue, which might have a hereditary component. Gingival resorption can be caused by bruxism and gingival tissue injury, among other things (9-11). However, several clinical features of gingival resorption have heightened its significance as a clinical issue (12-14).

In the oral environment, bare tooth-root surfaces increase the risk of dental decay and wear, which eventually leads to tooth sensitivity, which is also cosmetically unpleasant for most patients. Furthermore, it appears that following gingival resorption, the risk of sticky gingiva loss, pulp hyperemia, endodontic difficulties, and problems with restorative procedures increases, and root rot occurs faster, according to some research (15). According to certain research, 58 percent of persons over 30 years old in the United States had gingival resorption of 1 mm or greater (3,16). In an Iranian study of patients sent to Tabriz University of Medical Sciences School of Dentistry, 45.9% of patients showed signs of gingival resorption (17). Basic flaps, such as rotating flaps, progressive flaps, and the tunnel method (14,18), or free soft tissue grafting, can be used to treat gingival resorption (19). Gingival resorption treatments can be prescribed for a variety of reasons, including increasing beauty (20), preventing and treating dental allergies (16), preventing and controlling root surface caries (16), improving prosthetic results, and preventing disease progression due to plaque buildup in the area in question (16,21). In most cases, however, gingival resorption is treated with free connective tissue grafting using one of the progressive flaps. The outcomes of various treatment approaches for Miller class I and II gingival resorption lesions have been evaluated, with varying degrees of clinical effectiveness reported (22,23).

The scientific community and periodontists have developed numerous treatment strategies for gingival resorption lesions to get the greatest clinical results, greater attractiveness, and less invasiveness. One of these approaches, known as modified coronal progressive flaps or CAF Modified (24, 25), or the tunnel technique, is to try to advance the pedicle flaps without using vertical release incisions (18). When sub-epithelial connective tissue grafts are combined with CAF methods, however, the predictability of CAF techniques rises considerably (26). In root canal operations, connective tissue transplantation is regarded as the gold standard for gingival resorption therapies (27, 28). However, the technique's use is restricted by the donor's thickness, anatomical variables (29), the technique's intricacy, and the necessity for the donor (30). The use of platelets to treat gingival resorption has been recommended. L-PRF membranes are simple to employ since they are simple to prepare and manage and do not require anticoagulants. They can be incised, fitted to the region, and sutured, as well as the functional and structural properties of the gums reconstructed (31). As a result, there is disagreement among researchers on the optimum treatment outcome and surgical procedures' highest effectiveness in various trials; for example, the CAF method reported 55-99 percent root cover while CAF + CTG method reported 98-70 percent root cover (32-33). L-PRF has also been shown to have beneficial benefits on tissue thickness, keratinized gingival width, and average gingival coverage (34). As a consequence of the scarcity of studies and the discrepancy of the results gained in this sector, it appears that more research is required. As a result, the present study aimed to see how

much root cover could be achieved using a connective tissue graft or platelet-rich fibrin with a coronally artery flap (CAF).

Materials and methods

This is a randomized clinical trial. The study included 24 patients (12 in the CTG group and 12 in the L-PRF group) from all patients referred to the periodontology Department of Isfahan University of Medical Sciences with class I or II Miller gingival resuscitation. The samples were initially treated with scaling/root planning and full brushing using a rubber cup and mild abrasive pastes following a comprehensive assessment of the patients and oral health education. None of the patients had surgery until they were confident in their ability to maintain adequate oral hygiene and remove microbial plaque on their own. Specific systemic diseases influencing recoveries, such as uncontrolled diabetes, immunodeficiency illness, systemic or localized bone disease, history of alcohol use, addiction, smoking, and pregnancy, were excluded from the research. The patients were informed about the type of therapy, its advantages, and any potential adverse effects before giving their signed consent to participate in the study. A probe was also used to determine the quantity of analysis. In addition, before treatment and in the third follow-up months, envelope probing depth, analysis height, keratinized tissue width, clinical adhesion limit, analysis width, Miller analysis type (Class I and II), gingival biotype type (thin, thick) before treatment and throughout the third month of follow-up sixth, patients were measured and documented using the Williams probe following surgery in the mid-buccal region. Before surgery, the nurse draws 20 mL of blood from the patient and stores it in two 9 mL laboratory tubes in the L-PRF group. It is then centrifuged at 2700 rpm for 12 minutes. To produce a 1 mm thick membrane, the mixture is put on the metal surface of the kit for 5 minutes under mild pressure on a metal plate. Submarginal incisions are produced using the C15 method using a c15 razor blade, and surgical papillae are created between the teeth to be operated on in the CAF procedure. To ensure sub-marginal inclined incisions, the depth of the defect analysis must be measured, and this measurement must begin at the tooth situated in the flap's rotation axis. The apico-coronal depth of analysis must be measured to establish the endpoint of the oblique submarginal incision, which begins at the gingival edge of the neighboring tooth. The incisions are then created in the buccal area of the teeth by intracellular incisions, and the incisions are extended to accommodate an additional tooth on either side of the surgical site. The dental papilla is diepithelialized to provide a connective tissue bed, and root debridement is done using sharp incisions up to 1 mm from the bone crest.

A 3 mm periosteum alveolar is used to cut the surgical papilla as a split-thickness (razor tip parallel to the bone) and expose it to the bone in the apical portion of the analysis region in full-thickness. The tissue is also sliced in partial-thickness in the apical area of the exposed bone so that the muscles may be detached from the flap's end and the envelope flap can become passively coronal. All of the muscles are removed from the inside of the flap with a razor held parallel to the mucosal surface. It should be noted that when the tissue is passively colonized and decomposes without stress in the top part of the cementoenamel of the tooth, the degree of coronalization of the flap is sufficient. In half of the patients, connective tissue transplantation is obtained from the palate using an incision in the donor area. The dimensions of the graft are determined based on the width and length of the analysis area. In the other half of the patients, platelet-rich fibrin was applied to the interdental papillae using 5-0 absorbable sutures. Vertical cross sutures are used to seal the flap properly. After that, the flap is coronalized and secured with a sling suture.

Using an independent t-test, the age of patients in the CTG group, with a mean of 42.67 12 12.05 years, was not statistically significant when compared to the L-PRF group, with a mean of 41.83±11.17 years (P-value = 0.862) (See Table 1).

Table (1). The mean age of patients in the two groups

	group CTG		group L-PRF		P-value
Age	Mean	SD	Mean	SD	
	42.67	12.05	41.83	11.17	0862

Out of the 12 patients in the research, 7 (58.3%) were female and 5 (41.7%) were male, indicating that there was no statistically significant difference between the two groups when Fisher's exact test was used. In reality, the two groups had the same gender (P-value = 1.00). (Table 2).

Table (2). Gender frequency distribution of patients in the two groups

Gender	group CTG		group L-PRF		P-value
	Frequency	Percentage	Frequency	Percentage	
Female	7	58.3%	7	58.3%	1.00
Male	5	41.7%	5	41.7%	

The probing depth in the CTG group with a mean of 1.09 29 0.29 mm was significantly different from the L-PRF group with an average of 03 0 0.67 Did not have / 1 mm (P value> 0.05) according to the Mann-Whitney test before the intervention and at 1, 3, and 6 months after the intervention (P value> 0.05). Additionally, the Friedman test's probing depth of the intervention in the CTG and L-PRF groups did not demonstrate it to be significant. (value 05 / 0P) (See Table 3).

Table (3). Mean probing depth of patients before and after the intervention in the two groups

Depth	group CTG		group L-PRF		P-value
	Mean	SD	Mean	SD	
Before intervention	1.09	0.29	1.03	0.67	0.455
One month after intervention	1.22	0.49	1.00	0.51	0.109
Three months after the intervention	1.13	0.34	0.94	0.43	0.061
Six months after the intervention	1.02	0.30	0.94	0.43	0.100
P-value	0.572		0.190		

The mean adhesive breadth and keratinization of the gums before the intervention did not differ significantly between the two groups (P value> 0.05) according to the Mann-Whitney test. The mean adhesive breadth and keratinization of the gums in the CTG group were substantially larger than the L-PRF group one month after the intervention (P-value 0.05). Friedman test findings revealed a substantial rise in gingival adhesive and keratinized tissue in both groups (P-value 0.001). (Table 4).

Table (4): Mean adhesive width and gingival keratinization of patients before and after the intervention in the two groups

Sticky gum width	group CTG	group L-PRF	P-value

	Mean	SD	Mean	SD	
Before intervention	1.62	1.14	1.72	137	0.994
One month after intervention	3.77	1.59	2.38	1.26	0.001
Three months after the intervention	3.90	1.37	2.31	1.35	<0.001
Six months after the intervention	3.93	1.53	2.34	1.38	<0.001
P-value	<0.001		<0.001		
Keratinized gingival width	group CTG		group L-PRF		P-value
	Mean	SD	Mean	SD	
Before intervention	2.58	1.33	2.69	1.40	0.899
One month after intervention	4.94	1.39	3.16	1.39	<0.001
Three months after the intervention	5.06	1.34	3.09	1.42	<0.001
Six months after the intervention	5.13	1.54	31.13	1.45	<0.001

The height of gingival resorption in the CTG group, with a mean of 3.36 44 1.44 mm before the intervention and at 1, 3, and 6 months after the intervention, was substantially different from the L-PRF group, with an average of 46 1.46 mm. 2.72 mm was not present (P-value = 0.084). CTG and L-PRF, on the other hand, revealed a substantial reduction after the intervention (P-value 0.001) in both groups when evaluated using the Friedman test (Table 5).

Table (5): Mean height of gingival resorption of patients before and after the intervention in the two groups

Height of gingival resorption	group CTG		group L-PRF		P-value
	Mean	SD	Mean	SD	
Before intervention	3.36	1.44	2.72	1.46	0.084
One month after intervention	1.09	0.96	1.09	0.97	0.966
Three months after the intervention	0.88	0.83	0.97	0.96	0.781
Six months after the intervention	0.75	0.71	0.88	0.84	0.730
P-value	<0.001		<0.001		

The breadth of gingival resorption in the CTG group with a mean of 2.75 88 0.88 mm was substantially different from the L-PRF group with a mean of 0.78 did not have 2.69 mm (P value> 0.05) according to the Mann-Whitney test before intervention and at 1, 3, and 6 months following surgery (P value> 0.05). CTG and L-PRF, on the other hand, revealed a substantial reduction after the intervention (P-value 0.001) in both groups when evaluated using the Friedman test (Table 6).

Table (6). Mean width of gingival resorption of patients before and after the intervention in the two groups

Wide gingival analysis	group CTG		group L-PRF		P-value
	Mean	SD	Mean	SD	
Before intervention	2.75	0.88	2.69	0.78	0.760
One month after intervention	1.41	1.32	1.72	1.25	0.322
Three months after the intervention	1.28	1.17	1.38	1.21	0.678
Six months after the intervention	1.16	1.19	1.25	1.16	0.707
P-value	<0.001		<0.001		

The clinical adhesion limit in the CTG group was not statistically different from the L-PRF group (P value> 0.05) according to the Mann-Whitney test before the intervention and at 1, 3, and 6 months following surgery. The Friedman test was used to evaluate the clinical adhesion status in each of the two groups, and it revealed that CTG and L-PRF levels in both groups decreased significantly after the intervention (P-value 0.001) (Table 7).

Table (7). Mean clinical adhesion of patients before and after the intervention in the two groups

Clinical adhesion limit	CTG group		L-PRF group		P-value
	Mean	SD	Mean	SD	
Before intervention	4.52	1.51	4.0	1.74	0.128
One month after intervention	2.06	1.62	1.97	1.09	0.679
Three months after the intervention	1.75	1.34	1.88	1.10	0.939
Six months after the intervention	1.56	1.19	1.81	1.12	0.627
P-value	<0.001		<0.001		

Gum biotypes range from thin to thick. Before, 1, 3, and 6 months after the intervention, the findings of this parameter evaluation did not differ substantially between the two groups (P-value = 0.435). Gingival resorption classes I and II are seen in the subjects in the research. The CTG group had 83.3 percent class I gingival resorption and 16.7% class II gingival resorption, while the L-PRF group had 91.7 percent class I and 8.3 percent class II gingival resorption. Using the Chi-square test, no significant difference between the two groups was discovered (P-value = 0.537).

The percentage of root cover in the CTG group was 74.68 29 29.31 percent, whereas it was 70.42 31 31.85 percent in the L-PRF group; statistically, the two groups' coverage was not substantially different (P-value = 0.579). (Table 8).

Table (8). Comparison of the average percentage of root cover between the two groups

Percentage of root cover	CTG group		L-PRF group		P-value
	Mean	SD	Mean	SD	
	74.68	29.31	70.42	31.85	0.579

Discussion

There was no statistically significant difference in PD probe depth or clinical CAL adhesion limit between the two groups, according to the findings. The mean clinical adhesion limit increased significantly in both groups, with 19.2 in the platelet-rich fibrin group and 96 in the free connective tissue transplant group. There were two of them. These findings are in line with the findings of Wang H et al. on the treatment of gingival resorption using free connective tissue transplantation and platelet-rich plasma (35). A statistically significant increase in the breadth of keratinized gums in the free connective tissue group compared to the platelet-rich fibrin group was reported in earlier research (36-37), which is consistent with the current study. The capacity of the palatal connective tissue to promote keratinization of its superficial epithelium is responsible for the increase in keratinized gingival width in the free connective tissue transplant group. The substantial increase in keratinized width in the platelet-rich fibrin group is most likely due to a tissue phenomenon and manifestation. In reality, the effect of growth factors on platelets trapped in the fibrin barrier is responsible for the proliferation of gingival fibroblasts, or pdl, confirming the necessity for more

detailed research into cellular processes. While the outcomes of keratinized width differ statistically, the ultimate width in both groups is adequate (38).

They compared the clinical characteristics in three CAF techniques alone with CTG and L-PRF in Archana Kumar's study and found that the L-PRF group had 74 percent higher root surface coverage than the two CTG and CAF groups combined. It contradicts the findings of our research. The results of changes in probe depth in their study after 3 months showed a decrease in all three groups, which is similar to the results of the current study, but loneliness increased in the L-PRF group from the third to the sixth month of follow-up, while it remained constant in the CTG and CAF groups (39).

To cover the roots, Sonam Mufti et al. used CTG and L-PRF in conjunction with a progressive coronal flap. From the beginning to the end of the six-month follow-up period, increasing the breadth of the keratinized gingiva, lowering the height of the analysis, and increasing the thickness of the tissue revealed a distinct difference in the experimental group (L-PRF). The CTG control group's results were not as significant as the experimental group's in their study. The only significant difference was in the decrease in analysis height and rise in tissue thickness, however, they observed that majority of the patients in the CTG group had thin gingival biotypes, which might be a reason for this difference. Only the two examples of clinical adhesion limit and tissue thickness exhibited significant intragroup outcomes in their investigation, which is consistent with our findings (40).

Conclusion

According to the findings, the CAF group had a greater average percentage of root cover than the L-PRF group. Even though there is no statistically significant difference in root coverage between the two, free connective tissue grafting is still a very successful procedure. The clinical implications and benefits of using the L-PRF membrane as a graft material include the elimination of the need for a secondary surgical donor site, faster tissue repair in the first two weeks after surgery, and a significant reduction in patient discomfort during the early wound healing period. Furthermore, except for the breadth of keratinized and sticky gums, none of the clinical indicators in the two groups were statistically significant, and the benefits of this membrane may be utilized in shallow to moderate and repeated analyses.

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