

Effects of Free Gingival Graft Alone or Combination of Free Gingival Graft in Combination with Injectable PRF in The Treatment of Periodontal Defects- An Original Study

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ABSTRACT:

Background: The present study investigated and compared between the potential effects of free gingival graft alone or in combination with Injectable Platelet-Rich Fibrin (I-PRF) on root coverage surgery.

Material & Method: Total of 40 subjects with Miller class I or II gingival recession were included. The subjects participated in the present study were randomly divided into 2 groups, i.e., control and experiment groups. The subjects in the control group were treated only with the free gingival graft (FGG), whereas the subjects in the experiment group were treated with the combination of free gingival graft and injected with I-PRF as a root surface biomodification agent (FGG+I-PRF). The subjects were reviewed again after 3 months, and amount of exposed root surface was determined and compared to that of the preoperative findings.

Results: The mean initial exposed root surface was 4.7 ± 1.50 mm for experiment (FGG +I-PRF) group and that of the control (FGG) group was 4.1 ± 1.09 mm and 4.5 ± 1.32 mm for all subjects. The mean root surface coverage values of the 2 groups three months after the operation were 3.5 ± 1.05 in the control and 3.9 ± 0.78 mm in the experiment group.

Conclusions: The findings in the present study showed that Injectable Platelet-Rich Fibrin (I-PRF) had a positive effect on the root coverage as compared to only free gingival graft in free gingival graft surgery.

KEYWORDS: Free gingival graft, gingival recession, platelet rich plasma

INTRODUCTION: Gingival recession can be defined as the retraction of gingival margin in the enamel-cement border towards the apex and thereby subsequent exposure of the root surface. The prevalence of gingival recession increases with old age, poor oral hygiene and various periodontal diseases.¹In adults, the incidence of gingival recession ranges from 50% to 100%. The first mechanism of the gingival recession responsible for causing the apical

migration of gingiva is the loss of bone support provided by the alveolar bone crest.² Accumulation of the dental plaque is the main causative factor for gingival recession. The other risk factors comprise of developmental defects like chronic trauma, bone dehiscence, frictional injury (due to tooth brush), malposition of teeth, aging, smoking, abnormal frenum attachment and iatrogenic injury. Several periodontal surgical methods have been emerged in order to close the exposed root surface that arises from gingival recession, such as free gingival graft (FGG) , subepithelial connective tissue graft, coronary positioned flap, semilunar coronally positioned flap, acellular dermal matrix, pediculated soft tissue grafts and thrombocyte-rich fibrin.^{3, 4} These procedures aim to enhance the amount of attached gingiva, thereby stop the gingival recession and subsequently decreasing the sensitivity of root, improve the plaque control and thereby aesthetic appearance. Free gingival graft (FGG) method is a simple surgical treatment that has been used in order to increase the amount of attached gingiva. Four classes of marginal tissue recessions were proposed in 1985 by Miller which has been based on the level of gingival margin with respect to the mucogingival junction (MGJ) and the underlying alveolar bone.⁵ Choukroun et al. in 2001 introduced Platelet-Rich Fibrin (PRF), which is a second-generation platelet concentrate. PRF can improve the tissue regeneration because of its effects on the vascularization, immune control, capturing the circulating stem cells and closure of epithelium.^{6,7} PRF has the ability to conserve the open wounds and improve the healing because of its ability to attract epithelial cells and also facilitate micro-vascularization.^{7,8} Therefore, the application of PRF by itself or in the combination with the connective tissue or free gingival graft for the root coverage has become an increasingly popular for gingival recession treatments.^{9,10} Injectable PRF (I-PRF) is the liquid form of PRF and is a bioactive agent which is obtained by the low-speed centrifugation, and also it has the capacity to stimulate the tissue regeneration. PRF at high concentrations may stimulate the secretion of several growth factors and also trigger the fibroblast migration.¹¹ I-PRF is generally used for the regenerative treatments with good results.¹² Fibronectin is one of the components which make up I-PRF.¹³ Fibronectin is an extracellular glycoprotein and its application to the root surfaces improves the cellular proliferation from the periodontal ligament towards the supracrestal parts.¹⁴ In the present study, comparison was done between free gingival graft (FGG) alone and I-PRF together with FGG placed to the exposed root surfaces of patients with Miller class I or II gingival recession.¹⁵ Root coverage with a modified laterally positioned flap combined with a subepithelial connective tissue graft in advanced recession.¹⁶

MATERIALS AND METHODS: 40 subjects (24 males and 16 females) were included in the study who were the patients with gingival recession complaints and had Miller class I or II gingival recession. All the subjects were in age group 24 to 36 years. In the present study, the exclusion criteria were: a) presence of any systemic disease affecting the wound healing (e.g., uncontrolled diabetes mellitus), b) smoking, c) pregnancy, d) poor oral hygiene. Scaling and root planning operations were performed in order to create healthy gingival tissues as needed before the operation. After the scaling and root planning, the patients were under observation for approximately 2 months so that the optimal gingival health necessary for the periodontal surgery can be obtained. The depth of gingival pocket was not deeper than 3 mm and also there was no interdental bone or soft tissue degeneration. The consent was signed by all the subjects to participate in the study and they were randomly divided into 2 groups of equal sizes (20 each). The patients in the control group were treated only with free gingival graft, while the patients in experiment group were treated with free gingival graft + I-PRF was applied to the exposed root surfaces. Aseptic techniques were used for every subject. The surgical site was locally anesthetized. Exposed root surfaces were smoothed with the currettes. In the control group, no material was applied to the exposed root surfaces of the

subjects, while that in the experiment group, 20 cc of blood was drawn from each subject, and the samples were centrifuged at 700 rpm for 3 min in order to obtain I-PRF which was applied onto the root surfaces for 5 min. The border of enamel-cement was horizontally incised in the mesial and distal directions followed by vertical incisions to form the trapezoidal flaps. The partial thickness flap was elevated and removed with surgical scissors. It was made ensured that the periosteum was intact and away from the apex of the exposed root surface by at least 3–5 mm. The area between the first and second premolars was chosen as the donor area as it did not contain rugae. The graft was placed on a gauze impregnated with isotonic solution and the fatty tissue was removed. Polytetrafluoroethylene (ePTFE) suture 5-0 was used for suturing. The subjects were discharged with the recommendations. The sutures were removed 10 days after the operation.

Statistical analysis and clinical assessment: the degree of gingival recession was measured using a William's probe and photographed. Ten days after the operation, the sutures and the post-operative changes were photographed. The subjects were reviewed after three months and degree of gingival recession was measured using a William's probe and photographed. Data were analysed using SPSS v.21 software. Shapiro Wilk test was used to assess the normal distribution of the data. The differences between the male and female groups were analysed by independent-samples *t* test. The differences in the root surface coverage values between the groups was determined by one-sample *t* test. $P < 0.05$ was accepted as the level of statistical significance

RESULTS: 40 subjects (24 male and 16 female patients) were included in the study. The mean age of the patients was 28.55 ± 6.04 . The mean root coverage value of all subjects was $87.66 \pm 16.10\%$. The mean root coverage was $83.16 \pm 18.48\%$ for the control group and $88.35 \pm 15.64\%$ for the experiment group. Complete root coverage was observed in 55% of the patients in the I-PRF group and 50% of the patients in the control group. Moreover, there was no statistically significant difference between male and female subjects in terms of their mean root surface coverage values. The mean initial exposed root surface value was 4.7 ± 1.49 mm for the free gingival graft +I-PRF group, 4.1 ± 1.07 mm for the free gingival group (FGG) group, and 4.4 ± 1.31 mm overall for all subjects. Three months after the operation, the root surface coverage values of the 2 groups were determined as 3.5 ± 1.05 and 3.9 ± 0.78 mm in the control and experiment groups, respectively. As per the statistical analysis, the mean values of 3.5 and 3.9 mm for gingival height in free gingival graft (FGG) and FGG I-PRF procedures, respectively. According to the results of this study, it was concluded that use of I-PRF with free gingival graft operations increases the amount of new gingival tissue as compared to free gingival graft alone.

DISCUSSION: Several methods and materials are used to treat gingival recession, among which free gingival graft method is the most commonly used method for the treatment. The reported root surface coverage ranges from 43% to 100%.¹⁷ In the present study, the mean root surface coverage was 87.76% (88.33% for the control group and 91.66% for the experiment group). Although the root surface coverage was higher in the experiment group, but the difference between 2 groups was not statistically significant. Various researchers reported various biomodification agents for the root surface coverage; however, effects of these agents on the root surface coverage are still unclear.¹⁸ Argument among some researchers still prevails that the application of chemical agents to smoothed root surface improves the outcome as these agents remove the smear layer and bring out the collagen fibres to the surface of the dentin matrix, followed by removal of the cytopathic material that inhibits the gingival fibroblast proliferation.¹⁹ Citric acid administered for biomodification on

the root surface reported that the coverage was 74% in the experiment (citric acid) group while 66% in the control group, but the difference between the 2 groups was found to be insignificant.²⁰ In free gingival graft procedures, immobilization of the graft is essential for success of operation.²¹ The development of autologous injectable platelet-rich fibrin (PRF) fulfils the requirements for clinically applicable cell-based tissue-engineering strategies. Hence, it was postulated that it might have an adhesive effect on the graft immobilization. However, our literature search failed to find any studies that applied I-PRF as root surface biomodification (RSB) agent. It was decided to use I-PRF (as RSB agent) as it contains fibronectin which is known to improve the healing process, and it also has an adhesive effect. Various studies have been conducted in order to improve the percentages of complete coverage with RSB.²² In the present study, a significant reduction was observed in recession height. Although the recession decreased in both groups, but the better coverage was seen in experiment (FGG+I-PRF) group. In free gingival graft (FGG) group, the gingival recession height before operation was 4.1 mm and it was 0.6 mm after operation. In experimental (FGG+I-PRF) group, 3 months after operation, the gingival recession height, which was initially 4.7 mm, was reduced to a mean value of 0.65 mm.

CONCLUSIONS: It was concluded in this study that the application of I-PRF to the root surface in the context of free gingival graft procedures may have a positive effect on the closure of root surface. Further studies with larger samples and various other mucogingival surgery methods, such as connective tissue grafts, should be done in order to support the valuable insights of the present study.

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