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An Analysis of Connective Tissue Graft and PRF in Comparison for Recession Coverage

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ABSTRACT:

Introduction: A common clinical disease known as gingival recession (GR) is when the gingival margin shows apical movement, which increases the risk of root cavities, causes cosmetic problems, and exposes the roots. Managemnt of multiple adjacent recession defects (MARD) requires efficient management techniques are essential.

Objectives: With an emphasis on root coverage, gingival biotype improvement, and postoperative healing, the study compares the clinical results of PRF membranes and CTG in the treatment of MARD.

Methods: Two male patients with multiple adjacent gingival recessions were treated with different techniques. Case 1 involved a 45-year-old male treated with PRF, while Case 2 involved a 40-year-old male treated with CTG. Both cases employed a coronally advanced flap procedure. Clinical indicators were assessed both at the initial 6-month follow-up and at baseline.

Results: The PRF-treated patient showed a 3 mm increase in root coverage and improved gingival biotype, with enhanced postoperative healing and minimal discomfort. The CTG-treated patient exhibited a 2 mm increase in root coverage and improved gingival biotype, but experienced more postoperative discomfort due to the secondary surgical site.

Conclusions: Both PRF and CTG are effective for treating MARD. PRF offers simpler preparation, better postoperative healing, and reduced patient morbidity, making it preferable for patients concerned about discomfort and recovery time. CTG provides predictable, aesthetically pleasing results. Further research is needed to validate these findings over longer periods and larger populations.

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Introduction

A frequent clinical disease called gingival recession (GR) occurs when the gum tissue margin surrounding the teeth erodes or pulls back, exposing more of the tooth or its root[1]. This condition can lead to increased sensitivity, higher susceptibility to root caries, and aesthetic concerns. It has multifactorial etiology that includes traumatic tooth brushing, periodontal disease, malocclusion, frenal pull, and improper dental procedures. Identifying and addressing the causative factors is crucial for effective management and prevention of further recession[2].

Various surgical processes have been developed to treat recession, aiming to cover the exposed root surfaces, enhance the aesthetic appearance, and improve the gingival health. Among these methods, the coronally advanced flap (CAF) in conjunction with the platelet-rich fibrin (PRF) membrane and connective tissue graft (CTG) is commonly utilized, particularly in the treatment of multiple adjacent recession defects (MARD)[3,4].

First described by Langer and Langer in 1985[5], the CTG, has been widely accepted as the gold standard for procedure to manage recession. Using this method, the patient's palate is used to remove a subepithelial connective tissue graft, which is then applied to the recipient site to cover the exposed roots[5,6]. The advantages of CTG include high predictability, excellent aesthetic outcomes, and long-term stability. However, this method requires a second surgical area for the harvesting of grafts, which can lead to additional discomfort, increased morbidity, and a longer recovery period for the patient[6,7].

On the other hand, introduced by Choukroun et al. in 2006, PRF is a second-generation platelet concentrate[8]. It is derived from blood from the patient itself, which is centrifuged to obtain a fibrin matrix rich in platelets and growth factors[9]. It is free from the use of bovine thrombin or anticoagulants, which is in oppositiont to other platelet concentrates, making it a simpler and more biocompatible option. PRF has been shown to release growth factors: TGF-β1 (transforming growth factor-beta), VEGF (vascular endothelial growth factor), and PDGF (platelet-derived growth factor), over an extended period, which promotes tissue regeneration and healing[10]. Its use in periodontal plastic surgery is popularity as a result of its capacity to promote wound healing, lessen discomfort following surgery, and boost clinical results[3,11].

Recent studies compared the efficiency of PRF membranes and CTGs in gingival recession treatment. A study by Uraz et al. (2015)[3] evaluated PRF membranes' efficacy and reliability in treating numerous contiguous recession defects and contrasted it with the conventional connective tissue transplant method. The study found that both techniques were effective in attaining significant coverage of root and improving clinical attachment levels, but PRF showed better postoperative healing and patient comfort.

This report aims to present a comparative evaluation of PRF and CTG while employing a coronally advanced flap to cure numerous tooth recessions. The cases of two male patients, one treated with PRF and the other with CTG, are detailed to illustrate the clinical outcomes and benefits of each technique.

Case 1: PRF

Patient Presentation

A 45-year-old individual complained of extreme sensitivity to cold beverages in the upper left front tooth region. Both the patient's prior dental and major medical histories were nonexistent.

Clinical Examination

Multiple adjacent recessions on the left canine and first premolar were found during the clinical examination. For the second premolar, the measurement of the recession defects' depth was 4 mm, which is the measurement between the gingival margin and the CEJ. These teeth did not show any signs of hard tissue abrasion defects. After phase-I therapy was finished, dental hygiene guidelines were reiterated. The patient was briefed about the surgical procedure and gave their consent.

Recipient Site Preparation

Teeth 23 and 24 were chosen as the recipient site, and 2% Xylocaine with adrenaline (1:200,000) was used to anesthetize this surgical site. A coronally positioned flap was created using two vertical releasing incisions on either side of 23 and 24, a crevicular incision, and horizontal incisions. The procedure involved generating tension-free coronal displacement by means of a periosteum incision that releases horizontally, followed

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by a full-thickness flap and a partial thickness reflected back flap.

Figure 1. (A) Gingival recession of 4 mm is visible in the preoperative image (B) The mesial and distal parts of the recipient site underwent two vertical releasing incisions, a crevicular incision, and horizontal incisions as part of a coronally positioned flap procedure. The periosteum underwent a horizontal releasing incision and a full-thickness flap was reflected to allow for coronal displacement without any tension.

PRF Membrane Preparation

Preparation of the PRF membrane involved collecting 10 ml of intravenous blood in a glass test tube without anticoagulant and immediately centrifuging it at 3000 rpm for 10 minutes[12]. Separated from the remaining red blood cells (RBCs) was the fibrin clot that was obtained in the middle layer using Goldman-Fox scissors and placed on a perforated PRF box for membrane preparation. A lid was placed on the clot and left for 5 minutes to prepare the membrane. Following completion of recipient site preparation, the resulting PRF was isolated from the base. Subsequently, the produced PRF membrane was applied to the degraded root surfaces. Following membrane and defect coverage, the flap was advanced coronally and sutured. A dressing was then placed over the surgical site.

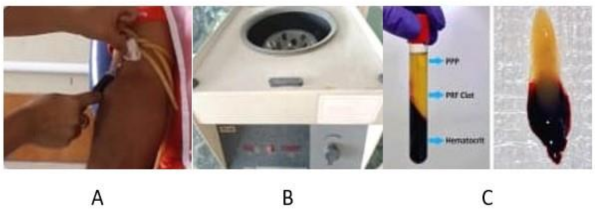

Figure 2. (A) Preparation of the PRF membrane began with the collection of 10 ml of intravenous blood in a glass test tube. (B) The drawn blood was centrifuged for ten minutes at 3000 rpm right away. (C) The red blood cells (RBCs) were extracted from the resulting PRF clot, which was situated in the intermediate layer. using Goldman-Fox scissors. The clot was then placed on a perforated PRF box with a lid applied for 5 minutes to form the membrane.

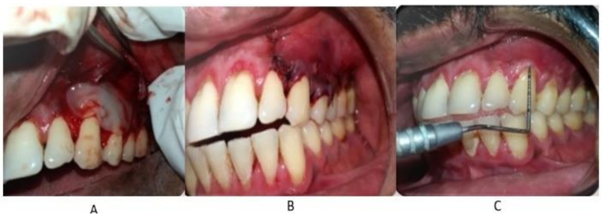

Figure 3. (A) PRF was isolated from RBC base. After that, the defective root was covered with the prepared PRF. (B) After being advanced coronally to encompass the denuded area and the membrane, the flap was sutured into position. The surgical site was covered with a periodontal dressing. (C) The patient had better gingival biotype and 3 mm more root coverage at the 6-month follow-up..

Postoperative Care

Systemic analgesics were advised and was prescribed usage of a mouthwash containing 0.2% chlorhexidine digluconate two times a day as part of the postoperative treatment. Ten days following the procedure, the patient was told to follow standard postoperative guidelines, and the dressing and sutures were taken out.

Follow-Up

At the 6-month follow-up, the patient showed better gingival biotype and a 3 mm increase in root coverage.

Case 2: CTG

Patient Presentation

A 40-year-old male patient complained of long teeth in the upper left front teeth region. He had no significant medical history and no previous dental history.

Clinical Examination

Multiple contiguous recessions on 12,11,21,22,and 23 were found during the clinical examination. The measurement of recession defects was done by estimating the distance of 4 mm between the gingival margin and the cementoenamel junction (CEJ). After phase 1 therapy was finished, dental hygiene guidelines were reiterated. The patient was briefed about the surgical procedure and gave their consent.

Recipient Site Preparation

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The operating site (teeth 12 to 23) was anesthetized with 2% Xylocaine mixed with adrenaline (1:200,000) as part of the recipient site preparation. A horizontal incision was made, followed by a crevicular incision, to execute a coronally positioned flap procedure. To enable tension-free coronal displacement, a full-thickness flap was reflected and a horizontal releasing incision was done in the periosteum.

Donor Site Preparation

Patient's palate served as the donor site for the CTG. Utilizing Zucchelli's (2010) method, a free gingival graft was obtained by joining two horizontal incisions with two vertical ones. After being de-epithelialized externally, the graft—which measured 30 mm by 5 mm—was submerged in serum to prevent dehydration. Black silk 4-0 was used to suture the palate's donor area utilizing cross threads in order to maintain hemostasis[6].

Figure 4. (A) The donor site for the CTG was prepared on patient's palate (Zucchelli (2010) Technique) (B) To prevent dehydration, the harvested graft—which measured 30 mm by 5 mm and was de-epithelialized outside the mouth—was submerged in serum. (C) To stop the bleeding, cross stitches made of black silk 4-0 were used to sew the palate's donor area. (D) Sling sutures placed to put the connective tissue graft at the recipient location using 6-0 Vycril. (E) Periodontal dressing was placed over the surgery site.

Graft Placement

After the graft was removed from palate, 6-0 Vycril sling sutures were used to place it. The surgical site was covered with a periodontal dressing to promote healing.

Postoperative Management

500 mg of amoxicillin thrice per day for seven days, 600 mg of ibuprofen twice per day for five days, and 0.2% chlorhexidine rinses two times a day for seven days were among the postoperative instructions prescribed. The patient was advised to eat soft, low-fat foods, and keep away from heat.

Follow-Up

At the 6-month follow-up, the patient demonstrated a 2 mm increment in root coverage and an increased gingival biotype.

Figure 5. (A) Preoperative image displaying MARD. The recession defects were measured as 4 mm. (B) Postoperative view at the 6-month follow-up demonstating a 2 mm increment in root coverage and an improved gingival biotype, demonstrating significant clinical improvement.

Results and Discussion with Literature Review

The results from our case studies, coupled with insights from existing literature, highlight the efficacy of both PRF and CTG in treating recession, yet also underscore some differences in outcomes and patient experiences. In the first case, a 45-year-old male patient treated with PRF showed a substantial improvement with a 3 mm increase in root coverage and a notable enhancement in the gingival biotype at the 6-month follow-up. This aligns with findings from Uraz et al. (2015)[3], who reported significant increase in keratinized tissue, lower clinical attachment loss, and better coverage of root when using PRF membranes in concurrence with CAF. The PRF technique, appears to promote accelerated and enhanced wound healing as there is sustained release of growth factors, which play critical roles in tissue regeneration and repair[3,8–11]. In contrast, the second case involving a 40-year-old male patient treated with a CTG from the palate resulted in a 2 mm increase in coverage of root and an improvement in the biotype of the gingiva. Although the coverage of root recession was slightly less than that achieved with PRF, the CTG remains a gold standard due to its predictability and excellent aesthetic outcomes[5–7]. The grafting technique, as demonstrated in studies by Zucchelli and De Sanctis (2000), has been shown to achieve high percentages of root coverage, often ranging from 69% to 97%[13]. However, requirement of a secondary surgical site can lead to increased patient morbidity, including pain, discomfort, and a longer

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recovery period. Studies by Dohan Ehrenfest et al. (2009)[14] have demonstrated that PRF not only facilitates quicker healing but also enhances the quality of the regenerated tissue. The PRF membrane serves as a biologically active barrier that supports cell migration and proliferation, critical for effective tissue regeneration. In addition, PRF has been shown to stimulate the osteoblasts and allow proliferation of gingival and periodontal ligament fibroblasts They therefore endorse its application in recession coverage and periodontal regeneration processes[8,11].

The literature review highlights several studies that compare the outcomes of PRF and CTG. A study by Aroca et al. (2009)[15] checked the usage of CAF in combination with PRF for treating multiple contiguous recessions. The study concluded that PRF, when used with CAF, provided certain advantages in terms of improved recession repair and gingival tissue thickness compared to CAF alone. Another study by Simon et al. (2009)[16] showed that PRF matrices could enhance the healing of extraction sockets and improve the quality of the regenerated soft tissue. In terms of postoperative healing, PRF offers significant advantages. The presence of a high concentration of leukocytes and platelets in the PRF matrix contributes to its anti-inflammatory and antimicrobial properties, reducing the risk of infection and promoting faster healing. This was evident in our first case, where the patient reported minimal postoperative discomfort and showed a significant improvement in gingival biotype within six months[17]. However, CTG, despite their invasive nature, provide robust and long-lasting results[5–7]. The harvested connective tissue graft is rich in collagen and other extracellular matrix components, which help in stabilising and integrating the graft with the existing gingival tissue. This technique has been refined over the years to improve patient outcomes, as demonstrated by Zucchelli and De Sanctis (2000)[13], who reported high success rates in achieving complete root coverage and aesthetic satisfaction. Comparative studies, such as the one by Uraz et al. (2015)[3], have shown that both CAF + CTG and CAF + PRF are efficient in achieving significant coverage of buccal gingival recessions and improving clinical attachment levels. They suggested that both approaches are effective in repairing multiple contiguous recession abnormalities. In conclusion, both PRF and CTG are efficient in correcting multiple contiguous recessions. PRF offers a less invasive procedure with enhanced postoperative healing and reduced patient morbidity, making it a preferable option for patients who are concerned about discomfort and recovery time. CTG, while more invasive, provide highly predictable and aesthetically pleasing results, making it a gold standard.

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