Case Report

Platelet Rich Fibrin Membrane for Root Recession Coverage

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ABSTRACT:

Treatment of gingival recession has become an important therapeutic issue due to increasing cosmetic demand. Multiple surgical procedures have been developed to obtain predictable esthetic root coverage. A recent innovation in dentistry is the preparation and use of platelet-rich fibrin (PRF), a concentrated suspension of the growth factors, found in platelets. These growth factors are involved in wound healing and postulated as promoters of tissue regeneration. The present case report shows the use of PRF membrane for root coverage on the labial surface of maxillary anterior teeth. This was accomplished using coronally advanced flap technique with platelet rich fibrin (PRF) membrane at the recipient site.

KEY WORDS : Recession, Plasma rich fibrin (PRF), Coronally advanced flap (CAF).

Introduction:

Aesthetics in dentistry is now the ultimate challenge for any dentist along with treating the disease of the patient. One of the most common aesthetic problems encountered is gingival recession which is perceived by the patient as the increase in length of the teeth. Gingival recession is the displacement of the soft tissue margin apical to cemento-enamel junction with exposure of root in the oral cavity.1

Root hypersensitivity is a common complaint associated with gingival recession, resulting because of root exposure and subsequent exposure of dentinal tubules in the oral cavity. It also results in attachment loss and root caries.2 One or more etiologic factors are responsible for gingival recession which includes inflammatory periodontal disease; mechanical trauma from tooth brushing; occlusal trauma; high frenal attachment; tooth malposition or root prominence leading to the thinning of bony plate; orthodontic tooth movement in unusual direction; underlying alveolar dehiscence; thin gingival biotype; and other periodontal treatment-related factors.3

Various periodontal plastic surgical procedures are offered to treat gingival recession. Most commonly used techniques are free grafts which includes free gingival graft and subepithelial connective tissue graft and pedicle flap which includes lateral pedicle flap and coronally advanced flap (CAF). With the use of free gingival grafts, gingival tissue color matching is always a problem which results in an unsatisfactory aesthetic. Though subepithelial connective tissue graft is satisfactory in terms of aesthetic and recession coverage, it requires a second surgical site. CAF technique have also shown more predictable recession coverage with apparently acceptable aesthetic results.2 CAF when used alone is unstable on long-term, in spite of having many advantages.4

CAF is often combined with various regenerative materials like guided tissue regeneration membranes, enamel matrix proteins derivatives, alloderm, living tissue-engineered human fibroblast derived dermal substitute which helps to regenerate functional attachment apparatus as well as enhances root coverage.2

Various new regenerative materials have been tried with CAF. One of such material is autologous platelet concentrates.2 PRF was first developed in France by Choukroun et al5 for specific use in oral and maxillofacial surgery. This technique neither requires anticoagulant nor bovine thrombin nor any other gelling agent for preparation. The method of production of PRF is simple and inexpensive. Second surgical site morbidity can be avoided. PRF affects cell biology activities on cellular levels. The main angiogenesis soluble factors such as fibroblast growth factor basic (FGFB), vascular endothelial growth factor (VEGF) and platelet derived growth factor (PDGF) are included in fibrin gel. The clinical experience of Choukroun et al confirmed that PRF can be considered as healing bio material.5 Various growth factors present in PRF may give an added advantage during root coverage procedure for gaining better outcomes in terms of root coverage and amount of attached gingival gain. This report presents a case of localized gingival recession treated by combined CAF-PRF novel technique.

Case Report:

A 38 year old female patient reported to a private clinic in Ahmedabad with the complaint of sensitivity to cold water in the upper right front tooth region. No relevant medical and dental history was reported. On clinical examination, localized gingival recession was identified on the right maxillary lateral incisor (Figure1). The recession defect, Miller's Class I type, was measured by calculating the distance between the cementoenamel junction and the gingival margin. It was recorded as 3 mm vertical and horizontal.

Figure 1: Preoperative view

Preparation of the patient included scaling and root planing of the entire dentition and oral hygiene instructions. The surgical procedure was explained to the patient and the informed consent obtained.

Surgical procedure:

The operative site was anaesthetized using 2% xylocaine with adrenaline (1:200000). A horizontal incision was made at the level of the CEJ on both the sides of the tooth involved.

Incisions were given in such a way that they preserved the adjoining interdental papilla. Two vertical incisions, extending apically were given from the horizontal incisions, which were made slightly divergent to allow a broader base for better blood supply. Two horizontal incisions were connected by an intrasulcular incision. A full thickness flap was raised from both horizontal

incisions. Apical to the mucogingival junction, it was split, keeping the periosteum intact. The split thickness flap was extended into the vestibule, till the flap was pulled coronally to completely cover the gingival recession, without any tension. The adjacent inter dental papillae were deepithelized to expose the connective tissue bed. The exposed root surfaces were scaled and root planed. (Figure 2)

Figure 2: Flap reflection

PRF Protocol:

The required quantity of blood was drawn quickly into 10 ml test tubes without anticoagulant and centrifuged immediately. Blood was centrifuged for atleast 10 min at 3000 rpm.

The resultant product consists of the following three layers:

- Topmost layer consisting of platelet poor plasma (PPP)
- Platelet rich fibrin (PRF) clot in the middle
- RBCs at the bottom.

PRF was available as a fibrin clot. PRF clot was removed from the test tube using sterilized tweezers. After lifting, the RBC layer attached to the PRF clot was carefully removed using a sterilized scissors. PRF clot was then transferred onto sterile gauze soaked in saline. A stable fibrin membrane was obtained by squeezing serum out of the PRF clot by pressing it between the two layers of sterile gauze. PRF membrane was then placed under the CAF. (Figure 3) The flap and membrane were positioned over the recession coronal to the cementoenamel junction. Flap was then sutured using vicryl sutures followed by a non-eugenol periodontal dressing. (Figure 4)

Figure 3: PRF Membrane placement

Figure 4: Sutures in place

The patient was advised to use 0.2% chlorhexidine digluconate mouthrinse (0.2%). Systemic antibiotics were prescribed and advised to follow routine post-operative periodontal mucogingival instructions. The dressing and sutures were removed 10 days after surgery. (Figure 5)

Figure 5: 10 days postoperative

Discussion:

The main objective of treating buccal/labial gingival recession by surgery is to cover exposed root surface defects because of esthetic concerns. Coronally advanced flap technique for root coverage has been considered as a predictable surgical technique for correction of gingival recession, in terms of substantial root coverage, gain in clinical attachment level and increase in width of keratinized gingiva. Various clinical studies with this technique have shown mean root coverage ranging from 9% to 95%.6 The advantages of CAF include ability to treat multiple areas of root exposure, no need for involvement of adjacent teeth, high degree of success, and even if the procedure does not work, it does not increase the existing problem.

Figure 6: 6 months postoperative

The CAF technique used in the case for gingival recession defect was the flap design described first by Allen and Miller PD, in 1989. To improve the predictability of clinical outcomes of various periodontal surgeries as well as to enhance the soft and hard tissue healing, the use of platelet rich fibrin has been recently evolved by Choukroun J et al in 2000. PRF is a platelet concentrate releasing various growth factors critical in regulation and stimulation of the wound healing process.5 The technique of making PRF requires neither anticoagulant nor bovine thrombin (nor any other gelling agent), hence gives a material which is not biochemically altered.

Most of the studies support the hypothesis that therapy with CAF alone can be successfully applied when the residual gingiva is thick and wide.7 Accordingly the adjunctive use of a graft could be restricted to sites with thin residual gingiva. Therefore in the presented case report, PRF was used along with CAF.PRF also promotes more rapid attachment to the tooth with stable result. In addition, PRF slows down the blood activation process, which could induce an increased leukocyte degranulation and cytokine release from proinflammatory mediators, such as interleukin (IL)-1â, IL-6, and tumor necrosis factor-á, to anti-inflammatory cytokines, such as IL-4, different growth factors like transforming growth factor-1â, platelet derived growth factor-á â, and vascular endothelial growth factor, and glycoproteins (thrombospondin-1) over more than 7 days. Leukocytes seem to have a strong influence on growth factor release, immuneregulation, anti-infectious activities and matrix remodelling during healing. As a healing material, it stimulates the gingival connective tissue on its entire surface with growth factors and impregnates the root surface with key matrix proteins for cell migration (fibronectin, vitronectin, andthrombospondin-1). Moreover, the fibrin matrix itself shows mechanical adhesive properties and biologic functions like fibrin glues: it maintains the flap in a high and stable position; enhances neoangiogenesis; reduces necrosis and shrinkage of the flap; and guarantees maximal root coverage.8

It appears that the release of these growth factors is affected by a number of factors related to the preparation, handling and storage of the platelet preparation. Currently, the standard operating procedure promoted by Choukroun indicates that PRF clots should be squeezed between sheets of cotton gauze to obtain a fibrin membrane. Alternatively, the PRF Box can also be used to obtain compressed membranes. The effect of time lapse between PRF preparation and its subsequent growth factor and cytokine profile release has also been extensively evaluated. If the PRF is used within the first hour, it was reported there would be continuous release of the growth factors during the initial healing period after application of the membrane on the surgical site. The results of a study conducted by Su et al.9 supported preparing the PRF immediately before using it to allow for continuous release of growth factors over the subsequent 300 minutes. Moreover, the fibrin matrix itself shows mechanical adhesive properties and biologic functions like fibrin glues: it maintains the flap in a high and stable position, enhances neoangiogenesis, reduces necrosis and shrinkage of the flap, and, thus, guarantees maximal root covering.10 As interposition material, the PRF layer avoids the early invagination of the gingival epithelium, hence may also serve as a barrier to epithelial migration. Thus, in the presented case report, addition of PRF to CAF helped to obtain favorable clinical outcome in terms of root coverage

Conclusion:

The use of autologous platelet preparations like PRF allows the clinician to optimize tissue remodelling, wound healing and angiogenesis by the local delivery of growth factors and proteins. This case report reflects the success of this biomaterial for coverage of localized recession defects and the ability to increase the thickness of the keratinised gingival tissue. The novel technique described enables the clinician to gainfully harvest the full regenerative capacity of this autologous biologic material.

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