Review Article

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Use of PRF for Recession Coverage

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ABSTRACT

Background: Periodontal therapy has historically been directed primarily at the elimination of disease and restoring healthy state of the supporting tissues. One of the most important aesthetic concerns associated with the periodontal tissues is gingival recession. There are various techniques developed to treat the exposed root surfaces. A recent innovation in periodontics is the use of second generation platelet concentrate which is an autologous platelet-rich fibrin gel (PRF) with growth factors for root coverage procedures which has shown predictable results. This article reviews the use of PRF for recession coverage, it's method of preparation and benefits over other techniques used for recession coverage.

Keywords: PRF, Root Coverage, Recession.

INTRODUCTION

"Gingival recession" is the exposure of root surface because of the displacement of the gingival margin apical to cemento-enamel junction[1]. Obtaining predictable & aesthetic root coverage has become an important goal of a Periodontal Plastic Surgeon. Advancement in technology and modifications are continuously taking place to achieve best end results for the patient. Over the years, numerous surgical techniques have been introduced to correct gingival recession defects. The selection of one rather than another surgical technique depends mainly on the local anatomical characteristics like dimensions of root exposure, the height and width of the interdental soft tissue, the number of recession defects, thickness and colour of the keratinized tissues, depth of the vestibule and on patient's esthetic demands. The sub epithelial connective tissue graft is considered the gold standard for the treatment of recession defects, in terms of the percentage of complete root coverage,[2,3] however there has always been a search for a material that provides an "edge" that jump starts the healing process to maximize predictability as well as achieves regeneration. Platelet rich fibrin (PRF) is one such material used for recession coverage which is a fibrin matrix in which platelet cytokines, growth factors and cells are trapped giving predictable long term results in recession coverage.

DISCUSSION

Over the years, numerous surgical techniques have been introduced to correct gingival recession defects. They include free gingival grafts, subepithelial connective tissue grafts pedicle flaps (Laterally repositioned flap, Double pedicle flap,

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Oblique rotated flap, Coronally advanced flaps and Semilunar flap). The Guided tissue regeneration technique, Enamel matrix Derivative, Acellular dermal matrix has also been utilized for root coverage procedures. Advancements in the field of periodontal plastic surgery led to the development of a new biologically active material called Platelet rich fibrin (PRF).

PRF was first developed in France by Choukroun et al. in 2001[4]. It is a second generation platelet concentrate widely used to accelerate soft and hard tissue healing. Preparation of PRF requires neither anticoagulants nor bovine thrombin (nor any other gelifying agent), making it no more than centrifuged natural blood without additives. PRF is a strictly autologous fibrin matrix containing a large quantity of platelet and leukocyte cytokines. These growth factors are involved in wound healing and are postulated as promoters of tissue regeneration. Platelet-rich fibrin (PRF) is an immune and platelet concentrate collecting on a single fibrin membrane all the constituents of a blood sample favorable to healing and immunity. Though platelet and leukocyte cytokines play an important part in the biology of this biomaterial, the fibrin matrix supporting them certainly constitutes the determining element responsible for the real therapeutic potential of PRF.[5]

Preparation of PRF follows the protocol developed by Choukroun. The protocol is very simple; however it has to be manufactured just prior to its application. The blood specimen is collected from the patient and centrifuged immediately for 10 minutes at 3000 rpm. Others have used 2700 rpm for 12 minutes with similar findings. Following this the blood sample settles into various layers. The absence of any anticoagulant grants the activation of platelets to set off a coagulation cascade. Due to the absence of the anticoagulant, the blood coagulates immediately upon contact with the glass tube.

The layers that are formed are as follows:

(a) the lower fraction contains the RBCs,
(b) the middle fraction contains the fibrin clot,
(c) the upper fraction contains the straw-colored acellular plasma.

The upper portion of the test tube containing the acellular plasma is removed. The middle portion containing the fibrin clot is then removed and is scrapped off from the lower part containing the red blood cells. The natural and progressive polymerization results in a fibrin clot formation with substantial embedding of platelets and leukocyte growth factors into the fibrin matrix. The clot can be squeezed between two gauge pieces to obtain an inexpensive autologous fibrin membrane. The main advantage in PRF preparation is the single stage centrifugation and absence of bovine thrombin. The natural polymerized fibrin architecture of PRF seems responsible for releasing high amounts of growth factors and other matrix glycoproteins for approximately 7 days [6]. These biochemical components and fibrin formation of PRF support cell migration, wound healing and tissue regeneration.[7] The autologous platelet-rich fibrin clot (PRF) was used initially in implant surgery to improve bone healing. It is now considered to be a healing biomaterial and is commonly used in implant and plastic periodontal surgery procedures to enhance bone regeneration and soft tissue wound healing.[8]

The ultimate goal of any therapeutic intervention aimed at root coverage should be to restore the tissue margin at the cementoenamel junction (CEJ) and to achieve an attachment of the tissues to the root surface so that a normal healthy gingival sulcus with no bleeding on probing and a minimal probing depth. Patients have, recently, become more conscious of dental esthetics and accordingly have been demanding precision treatment for exposed root surfaces.

Gingival recession associated with root surface exposure is a complex phenomenon that may present numerous therapeutic challenges to the clinician. Recession may be accompanied by root caries or abraded surfaces, and patients may complain of esthetic defects or root hypersensitivity. One goal of periodontal therapy is to regenerate the lost attachment apparatus of the teeth. Angiogenesis, immunity and epithelial cover are the three keys to healing and soft tissue maturation. The membranes of PRF are able to simultaneously support the development of these 3 phenomena and hence act as an excellent material for recession coverage.[9]Angiogenesis consists of the

formation of new blood vessels inside the wound. It requires an extracellular matrix to allow migration, division, and phenotype change of endothelial cells. It has been clearly demonstrated that fibrin matrix leads directly to angiogenesis[10]. The angiogenesis property of fibrin matrix is explained by the 3-dimentional structure of the fibrin gel and by the simultaneous action of cytokines trapped in the meshes.[11]Fibrin and fibrinogen degradation products (FDP) stimulate the migration of neutrophil and increase the membrane's expression of CD11c/CD18 receptor. This receptor permits adhesion of the neutrophil to endothelium and fibrinogen as well as the transmigration of neutrophils. Fibrin matrix guides the coverage of injured tissues, affecting the metabolism of epithelial cells and fibroblasts.[12]

There have been various studies done where they have used PRF to cover the recession areas. Anilkumar *et al*., has reported PRF as a potential novel root coverage approach for treating gingival recession in mandibular anterior teeth using combined laterally positioned flap technique and PRF membrane.[13] Aroca *et al*., in a 6 month randomized clinical trial, concluded that addition of a PRF membrane positioned under the MCAF (modified coronally advanced flap) provided inferior root coverage, but an additional gain in gingival/mucosal thickness (GTH) compared to conventional therapy. [14] Aleksić Z, Janković S et al (2010): evaluated clinical effectiveness of activated PRF membrane in treatment of gingival recession. The values of healing index recorded postoperatively were significantly enhanced in the PRF group.[15] Aravind Kumar P. et al (2011): highlighted the usage of PRF membrane and coronally advanced flap in 2 patients with class I gingival recession. 1 month follow up revealed good color match and a gain in clinical attachment levels with 96% of root coverage.[16],[17] Jankovic S. et al. (2012): aimed to compare the results achieved by the use of PRF membrane or CTG in the treatment of gingival recession and to evaluate the clinical impact of PRF on early wound healing and subjective patient discomfort in patients with bilateral isolated or multiple defects. Use of PRF membrane provided acceptable clinical results, followed by enhanced wound healing and decreased subjective patient discomfort compared to CTG group.[18] A split mouth randomized controlled study to evaluate the adjunctive effect of platelet-rich fibrin to coronally advanced flap in Miller's class-I and II recession defects, in 2013 showed that by Rajan Padma addition of PRF membrane with CAF provides superior root coverage with additional benefits of gain in CAL at 6 months postoperatively.[19] All these studies prove that PRF is a dependable biomaterial for achieving root coverage.

The intrinsic incorporation of cytokines within the slowly polymerized fibrin mesh allows for their progressive release over time (7-11 days), as the network of fibrin disintegrates, thus encouraging the healing process. PRF membrane eliminates the need of donor site procurement of the connective tissue, making this technique less invasive. This procedure lessens postoperative discomfort, promotes rapid soft tissue healing with less edema compared to connective tissue grafts and enamel matrix derivative techniques & has an advantage of elimination of risk factors associated with the use of bovine thrombin, one stage centrifugation.

CONCLUSION

Considering that PRF may enhance the healing potential of soft tissues as well as bone, it can be hypothesized as a potential grafting material for the treatment of gingival recessions. Potential applications of PRF are broad, but an accurate working knowledge of the biomaterial, its biology, efficiency and limits are necessary to optimise its daily use in dental clinics & its beneficial outcomes. Thus PRF definitely is a material that can be used in future with a good predictable outcome.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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