Case Report

Treatment Of Gingival Recession With Platelet Concentrate Graft Using Indigenously Designed Compression Kit.

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ABSTRACT:

A variety of surgical techniques including displaced flaps, soft tissue grafts and combination procedures has been developed to attain root coverage in gingival recession. Recently, the preparation and use of platelet-rich fibrin (PRF), a second generation platelet concentrate constitutes a relatively new biotechnology that has been a breakthrough in the stimulation and acceleration of soft tissue and bone healing. In the cases described in this article, platelet rich derivative (PRF membrane) was combined with a coronally positioned flap for root coverage.

INTRODUCTION

Gingival recession is a matter of concern for both patients and dental professionals, especially when exposure of the root surface is linked to deterioration in esthetic appearance and increase in dental hypersensitivity. A variety of surgical techniques has been developed to attain root coverage, including free gingival graft (FGG), sliding flaps, double papilla grafts, connective tissue grafts (CTGs), coronally positioned flaps, coronal positioning of previously placed FGG and guided tissue regeneration. The predictability of these procedures has improved with modifications, such as the coronally advanced flap (CAF) combined with a soft tissue graft. The objective of these modifications is to enhance blood supply to the graft, thereby resulting in increased success rates.
A recent innovation in dentistry is the preparation and use of platelet-rich fibrin (PRF), a second generation platelet concentrate constitutes a relatively new biotechnology that has been a breakthrough in the stimulation and acceleration of soft tissue and bone healing. The efficiency of this process lies in the local and continuous delivery of a wide range of growth factors and proteins mimicking the needs of the physiological wound healing and reparative tissue process. Platelet concentrate contains PDGF, TGF and many other unidentified growth factors that modulate and upregulate one growth factors function in the presence of second or third growth factor. This specific feature influenced the decision to use platelet concentrates as the material of choice in this case series. In the cases described in this article, platelet rich derivative (PRF membrane) was combined with a coronally positioned flap for root coverage.

**Case Reports**

**Case 1**
A 19 year old male reported to the Department of Periodontics, Mamata dental college with a chief complaint of hypersensitivity in the lower front tooth region. On intraoral examination, a class I gingival recession is seen in relation to right lower central incisor with a probing depth of 2 mm and clinical attachment loss of 5 mm (Fig 1).

**Case 2**
A 25-year old man reported to the Department of Periodontics, Mamata dental college with the chief complaint of gingival recession in the upper front tooth region. Intra oral examination revealed 3 mm of recession on the buccal aspect of the right maxillary canine. In both the cases, taking into consideration the amount of vestibular depth and the presence of optimal quantity of keratinized tissue available, PRF membrane combined with coronally advanced flap was considered as the treatment option.

**Surgical technique**

*Presurgical therapy*: The surgical procedure was explained to the patient and the informed consent was obtained. Preparation of the patient included scaling and root planing of the entire dentition and oral hygiene instructions. The following parameters were recorded before and after surgery.

- Probing pocket depth (PPD), Gingival recession (GR), by measuring the distance between the cementoenamel junction (CEJ) to the free gingival margin.

**PRF Preparation**
PRF preparation requires an adequate table centrifuge, and collection kit including a 24 gauge butterfly needle and 9 ml blood collection tubes.

**The protocol for PRF preparation:**
Whole blood is drawn into the tubes without anticoagulant and is immediately centrifuged for 12 min at 2,700 rpm. Within a few minutes, the absence of anticoagulant allows activation of the majority of platelets contained in the sample to trigger a coagulation cascade. Fibrinogen is at first concentrated in the upper part of the tube, until the effect of the circulating thrombin transforms it into a fibrin network. The result is a fibrin clot containing the platelets located in the middle of the tube, just between the red blood cell layer at the bottom and acellular plasma at the top. This clot is removed from the tube and the attached red blood cells are scraped off and discarded. The PRF clot is then placed on the grid in the indigenously made PRF Box (Fig 2) which mimics the original PRF box and covered with the lid. This produces an inexpensive...
autologous fibrin membrane in approximately one minute (Fig 3). The PRF Box has an advantage to produce membranes of constant thickness that remain hydrated for several hours and to recover the serum exudate expressed from the fibrin clots which is rich in the proteins vitronectin and fibronectin. The exudate collected at the bottom of the box may be used to hydrate graft materials, rinse the surgical site, and store autologous grafts. The obtained PRF membrane is used to cover the recession.

**Surgical procedure:**

After proper isolation of the surgical field, the operative sites were anaesthetized with 2% lidocaine with 1:80,000. The CAF procedure in these cases was according to that given Sanctis & Zucchelli (2007). Two horizontal bevelled incisions mesial and distal to the recession defect located at a distance from the tip of the anatomical papillae equal to the depth of the recession plus 1mm. Two beveled oblique, slightly divergent, incisions starting at the end of the two horizontal incisions and extending to the alveolar mucosa. The resulting trapezoidal-shaped flap was elevated with a split-full-split approach in the coronal-apical direction: the surgical papillae comprised between the horizontal incisions and probeable sulcular area apical to the root exposure were elevated split thickness, and the soft tissue apical to the root exposure was elevated full thickness. This was done in order to include the periosteum in the thickness of that central portion of the flap covering the avascular root exposure. The releasing vertical incisions were given elevated split thickness. Apical to bone exposure flap elevation continued split thickness. Coronal mobilization of the flap was considered adequate when the marginal portion of the flap was able to passively reach a level coronal to the CEJ of the tooth. The root surfaces were mechanically treated with the use of curettes. The facial soft tissue of the anatomic interdental papillae coronal to the horizontal incisions was de-epithelized to create connective tissue beds (Fig 4). The PRF membrane was placed over the denuded roots and stabilized (Fig 5). The flap was then slid to completely cover the membrane and secured using sling sutures.
DISCUSSION

Gingival recession is a matter of concern for both patients and dental professionals, especially when exposure of the root surface is linked to deterioration in esthetic appearance and increase in dental hypersensitivity. Traditionally, the primary goals of periodontal therapy are to eliminate any etiologic agents associated with inflammatory disease and to improve clinical parameters, such as clinical attachment level and probing depth. In treating gingival recession, attempts should be made to improve all clinical parameters, especially clinical attachment level and root sensitivity, if present. A variety of surgical techniques has been developed to attain root coverage, including free gingival graft (FGG), sliding flaps, double papilla grafts, connective tissue grafts (CTGs) coronally positioned flaps, coronal positioning of previously
placed FGG and guided tissue regeneration.³

Various surgical procedures have been described to treat gingival recessions, but these have been demonstrated to heal with a long junctional epithelium, and regeneration has been observed only in the most apical portion of the lesion. Although the bilaminar technique using subepithelial connective tissue grafts still holds the most promising results in root coverage, histological studies show unpredictable healing.¹⁰ The use of PRF membrane in our case report to attain root coverage may alleviate the need for donor site procurement of connective tissue. This has encouraged investigations of a more regenerative nature. The use of enamel matrix protein is one trend aiming at periodontal regeneration and root coverage.¹¹

Platelets contribute to haemostasis by preventing blood loss at sites of vascular injury, and they contain a large number of growth factors and cytokines that have a key role in bone regeneration and soft-tissue maturation. In the past two decades, an increased understanding of the physiological roles of platelets in wound healing and after tissue injury has led to the idea of using platelets as therapeutic tools.⁴

Fibrin, which is the activated form of a plasma molecule called fibrinogen is a soluble fibrillary molecule and is massively present not only in the plasma, but also in the platelet alpha granules. It plays a potential role in platelet aggregation during homeostasis and the fibrin matrix also has the property of angiogenesis.¹²

PRP is an autologous modification of fibrin glue, derived by methods that concentrate autologous platelets, and has been described and used in various applications with apparent clinical success. It is an easily available source of growth factors to support bone and soft tissue healing. The drawbacks of PRP include biochemical blood handling with addition of anticoagulants.¹² Platelet-rich fibrin (PRF) represents a new step in the platelet gel therapeutic concept with simplified processing minus artificial biochemical modification. Unlike other platelet concentrates, this technique requires neither anticoagulants nor bovine thrombin (nor any other gellifying agent), making it no more than centrifuged natural blood without additives. Developed in France by Choukroun et al in 2001, the PRF production protocol attempts to accumulate platelets and released cytokines in a fibrin clot.⁷

PRF membranes release high amounts of growth factors such as TGFβ1, PDGF-AB, VEGF and matrix glycoproteins (such as thrombospordin-1) during 7 days in vitro. The fibrin matrix with its intrinsic factors and leukocyte content contains the key ingredients for an enhanced healing of superficial and bone tissues, particularly through the stimulation of neoangiogenesis by producing large amounts of VEGF.¹³ It was recently demonstrated in vitro that PRF enhances proliferation of many different cell types such as fibroblasts, osteoblasts, adipocytes, and keratinocytes. PRF also stimulates osteoblastic differentiation.¹⁴ The PRF fibrin matrix as a filling biomaterial has produced consistently favorable clinical results. PRF, as an optimized blood clot, has also been shown to be a very efficient osteoconductive material in sinus-lifts.¹⁵ The PRF protocol is finally a way to transform a natural blood clot into a clinically usable bioactive
membrane. The synergetic effects of the fibrin matrix and its growth factor content lead to a natural and enhanced healing of soft and hard tissues. The platelet and leukocyte cytokines are gradually released during fibrin matrix physiological resorption, and matrix glycoproteins allow quick cell migration and proliferation within the PRF tissue-like architecture. This gradual release of cytokines appears to play a regulatory role in the inflammatory phenomena within the wounded tissues. However, the mechanical function of PRF must also be considered since the PRF membranes allow early wound protection and aid in primary soft tissue closure. This technique, which mimics the natural coagulation process, produces an inexpensive and simple bioactive membrane.

The above two cases demonstrated that complete root coverage was achieved in a less invasive way. The conventional subepithelial connective tissue graft requires harvesting of graft from a different site which requires precision and is time consuming. Platelet rich fibrin requires no second surgical site and the color, contour, and texture is enhanced and blends imperceptibly with the adjacent tissues.

CONCLUSION

The two cases presented here illustrate that the use of platelet concentrate may be an effective and less invasive way of treating gingival recession compared to the traditional autogenous graft. Optimal esthetic results with excellent soft tissue contour and texture were observed. Future clinical and histologic investigations should be conducted on this technique to assess its short and longterm effectiveness.

REFERENCES


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