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Demystifying the facts and the fallacies of using paletelet rich fibrin in root coverage.

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Abstract

Gingival recession can be treated by various periodontal plastic surgery procedures. Recently the use of biomaterials to achieve a better result has become a common practise. Amongst these, the platelet rich fibrin (PRF) membrane is one of the most common biomaterials that is in use. Due to the various advantages of PRF, its use has been popularised these days.

Here, a series of 5 cases have been selected, with Miller's class I gingival recession. After achieving the goals of the non-surgical periodontal therapy, the conventional coronally advanced flap was carried out and PRF membane was placed at the surgical site. The flap was stabilised in a coronally advanced position using sling suture. Post operative followups were taken at the interval of 1 month, 3 months and 6 months.

The result obtained had showed that the use of PRF had no added advantage in root coverage. However, its advantageous role in post-operative healing is further analysed, considering the biology of this biomaterial.

Keywords: Gingival Recession, Platelet Rich Fibrin, Coronally Advanced Flap.

Introduction

The increasing concern for aesthetics these days have led to awareness against conditions like gingival recession. Gingival recession is the displacement of the soft tissue margin apical to cemento-enamel junction with exposure of root in the oral cavity.[1] Usually gingival recession further leads to hypersensitivity and can also be associated with root caries. It is most commonly caused by mechanical trauma from tooth brushing and from periodontitis. However, other etiologic factors like malposition of tooth, high frenum, occlusal trauma, thin gingival biotype can also predispose to such condition.[2] Amongst the various classifications of gingival recession, Miller's classification is most commonly in use. Based on clinical experience, Miller had suggested that it was possible to achieve 100% root coverage in Class I and II cases, while only partial coverage was possible in class III.[3] A more recent classification by Cairo has emphasised the relationship between the interdental clinical

attachment loss and prognosis of the root coverage treatment.[4] Gingival recession can be treated by various periodontal plastic surgery procedures. The aim of these procedures is to improve the periodontal health by reconstruction of soft tissue. This can be achieved by free mucosal grafts or pedicle flaps like rotational flaps, advanced flaps, semilunar flaps. It has been seen that optimum root coverage and good colour matching can be achieved by coronally advanced flap technique.[5] However, there are several factors which influence the final outcome of this technique, such as, the width of the keratinised gingiva, height of the interdental papilla, vestibular depth and frenal attachment.[6] Since long term stability could not be achieved with conventional coronally advanced flap,various adjuncts have been used to improve the clinical results.[7] Amongst the various available biomaterials that can be used as an adjunct, the platelet rich fibrin (PRF) membrane is widely under research these days.

Platelet rich fibrin was developed in France by Choukroun *et al.* [8] This is a matrix of fibrin in which platelets, cytokines and leukocytes are trapped in the equilateral fibrin meshwork. The cytokines and the growth factors are released over a period of time and the membrane resolves in 7 days. This second-generation platelet concentrate has a lot of advantages which include an ease of preparation/application, minimum expenditure and lack of biochemical modification as no bovine thrombin or anticoagulant is required for its preparation unlike platelet rich plasma (PRP) . A natural human blood clot consists of 95% red blood cells (RBCs), 5% platelets, less than 1% white blood cells (WBCs), and a lot of of fibrin strands. While a platelet concentrate contains 4% RBCs, 95% platelets, and 1% WBCs.[9] The fibrin clot entraps the platelets and leucocytes, which are released slowly over time. The abundance of the numerous growth factors and its ease of preparation and handling has made this biomaterial quite popular.

Case Report

The study was conducted in the Department of Periodontics, Guru Nanak Institute of Dental Sciences and Research, Kolkata. Five systemically healthy patients with Miller's Class I or II gingival recession in maxillary anterior teeth region were chosen. Informed consent was taken from the patients. The adequacy of attached gingiva and reduction of the inflammatory condition was ensured before the treatment. The clinical parameters of recession depth, recession width, probing depth and the width of the attached gingiva were recorded at the baseline. Coronally advanced flap along with PRF membrane placement was planned. Complete hemogram checkup was advised before initiating the surgical procedures. Scaling and root planing was completed. Coronoplasty was performed where ever required. Proper oral hygiene instructions were given. Three weeks after achieving the goals of the phase I therapy, the gingival tissue response was evaluated. After re-evaluation surgical procedure was performed.

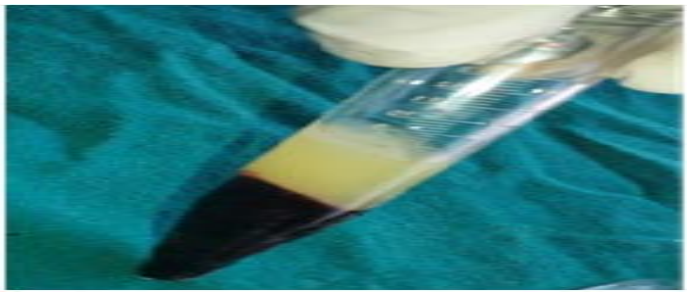

Fig 1: Centrifuged blood

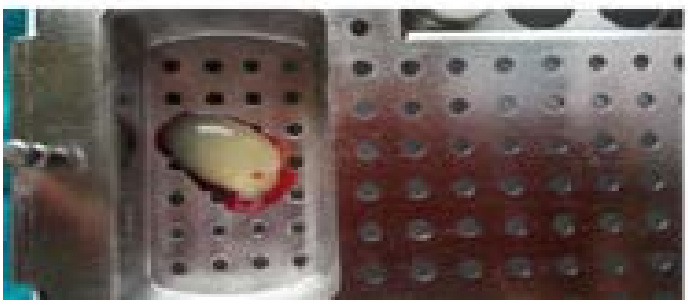

Fig 2: Fibrin clot placed in PRFbox

Fig 3: PRF membrane.

The PRF was prepared before preparing the surgical site. Following *Choukroun's protocol*, 10 ml of intravenous blood was collected (by venipuncture of the antecubital vein) in test tubes without anticoagulant and immediately centrifuged at 3000 revolutions/min for 10 minutes. After centrifugation, three layers were obtained, such that, the top layer contained supernatant serum, the fibrin clot at the middle layer, and the bottom layer contained the red blood corpuscles (RBC) (Figure 1). To separate the RBC base from the fibrin clot, scissors and tweezers were used. The clot hence obtained was placed in the PRF box and the lid was placed in position, exerting 66gm force (Figure 2 and 3) and left for three minutes to prepare the PRF membrane. The membrane hence obtained was of uniform thickness and easy to handle. After giving local anaesthesia at the surgical site, incisions were placed in the interdental areas, and intrasulcular incisions were placed around those teeth with recession defects. Split-full-split flap was raised in coronal–apical direction (Figure 4). The prepared PRF membrane was placed at the surgical site (Figure and stabilised with digital pressure. The flap was made freely mobile and advanced coronally such that its margin lies on the enamel to ensure overclosure to combat the shrinkage. Independent sling suturing was done using 4-0 non-resorbable sutures (Figure 6). Antibiotics and analgesics were advised as required. Post-operative instructions were given and patient was informed to report after 21 days for suture removal. The recession depth and recession width were measured at the interval of 1 month, 3 months and 6 months.

Fig 4: Split-full-split thickness flap raised.

Fig 5: PRF membrane placed

Fig 6: Coronally advanced flap stabilised within dependent sling sutures.

Discussion

Gingival recession manifests as clinical attachment loss alongwith underlying bone loss. The apical migration of

gingival margin usually occurs following the hard tissue defect. In patients with a residual amount of keratinized tissue apical to the recession defect, the coronally advanced flap may be recommended.[10] Various studies have been carried out in search of an ideal biomaterial for added advantage in root coverage procedures.The evolution of platelet concentrates have proven to be a boon in such a condition. In a comparative study of bilateral recession defects, where one side was treated with coronally advanced flap and the other side in adjunct with PRF membrane, it was seen that the resultant root coverage was comparable on 6 months followup.[1]

In this study, the five cases selected had similar recession depth pre-operatively. However, the result obtained in each case was different (Figure 7). It can be concluded from these post operative views that, the root coverage was dependent on a variety of factors. There was no appreciable difference in the residual recession depth at 3 months and 6 months post-operatively. The adjunctive use of PRF membrane had no extra benefit in root coverage. It was thought that the gingival tissue gained thickness due to growth factor induced increased proliferation of fibroblasts.[11] In contrary to this concept, no change in the tissue thickness could be appreciated in our study. The use of platelet concentrates was expected to result in long term stability of conventional root coverage procedures and beneficial effect on soft tissue wound healing. The microcirculation of the connective tissue post operatively, is dependent on the flap thickness and the kind of incision placed.

For all these days, the major focus was on the advantageous effect of the growth factors present in PRF. However, chances are there, that the interposition of the PRF membrane interferes with the collateral circulation and disrupts the healing of thin flaps.

The healing process is thought to be promoted by the efficient and sustained migration of cells and cytokines in a better organised fibrin meshwork like PRF. Due to the slower release of growth factors from PRF as compared to PRP, better healing could be appreciated with PRF.[12]

Fig 7: Comparison of the recession depth at baseline and at 6 month post-operatively.

The role PRF membrane as an adjunct to conventional coronally advanced flap procedure in achieving root coverage is questionable. Considering the biology of PRF, faster healing is expected. Other factors such as

PRF consistency, position of the membrane in relation to CEJ, PRF preparation protocol should further be considered for concluding the efficacy of the biomaterial.

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