

Evaluation of Platelet-Rich Fibrin Membrane on Wound Healing Post-Gingivectomy Procedure

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ABSTRACT

Background: Gingival enlargement can be managed by scalpel gingivectomy. However, healing occurs by secondary intention. So, to promote healing Platelet rich fibrin (PRF) can be used as it is a rich source of growth factors. The present case series aims to evaluate the effect of PRF membrane on gingival wound healing by secondary intention. **Materials and Methods:** A total of 05 subjects, requiring gingivectomy, were selected. After gingivectomy, Platelet rich fibrin membrane was prepared in centrifugal machine then applied over the surgical site. Healing response was evaluated on 5th, 7th and 30th post-operative day. **Results:** On, 5th post-operative day, pain was mild in all the cases which completely subsided on 7th day post-operatively. Healing response was observed on 5th day post-operatively, showing almost complete epithelization with only few erythematous sites at gingival margin. However, on 30th post-operative day, all the sites were completely healed. **Conclusion:** It can be concluded that PRF may be safely used as a soft tissue dressing in open wound to achieve uneventful healing. However, future studies with larger sample size should be carried out to establish definitive result.

Key-Words: Gingival Enlargement, Gingivectomy, Platelet Rich Fibrin, Platelet Concentrates

INTRODUCTION

Gingival enlargement is one of the common gingival diseases that primarily affects the appearance and functionality of teeth.¹ A number of etiologic causes and pathogenic processes, such as dental plaque, mouth breathing, hormone imbalances, and drugs, are linked to hyperplasia and/or overgrowth of the gingiva.² Restoring the anatomical and physiological condition of the periodontium is necessary for the long-term health and function.³ Different gingivectomy methods can be used for the elimination of gingival overgrowth; of which the most common is scalpel.⁴ Scalpel has advantages of being easy to be used, precise incision with well-defined margins, the healing is fast, and there is no lateral tissue damage.⁴ While the disadvantage of scalpel are bleeding that result in inadequate visibility, post-operative discomfort to the patient and healing by secondary intention.⁵ Different platelet concentrates are used as a therapeutic tools to improve tissue repair particularly in periodontal wound healing.⁶ One of the platelet concentrate used nowadays is Platelet-rich fibrin (PRF) which was first.

developed in France for use in the field of oral and maxillofacial surgery by Choukroun et al. (2001).⁷ PRF can be used to promote healing because platelets are a rich source of growth factors, including vascular endothelial growth factor (VEGF), (IGF-1), (PF-4), platelet-derived growth factor (PDGF), connective tissue growth factor (CTGF), epidermal growth factor (EGF), and transforming growth factor (TGF- β , including β -1 and β -2-isomers).⁶ Based on background information, improved wound healing on PRF application following gingivectomy can be anticipated, leading to a more favorable outcome. Patients who reported to Department of Oral medicine and Radiology of age group between 20 years to 60 years of age were included in the study and was free of any pathology or deformities.

Case Series

Gingivectomy procedure was performed on 05 subjects with gingival enlargement grade ≥ 2 (Bokenkamp and Bohnhorst, 1994).⁸ Oral hygiene measures were given to the patients. Patients with good oral hygiene compliance were taken for the surgery (Figure 1). Profound anaesthesia with 2% lignocaine HCL containing 1:80,000 adrenaline was obtained at surgical sites. The pockets were marked with a pocket marker to outline their course on each surface (Figure 2). The gingivectomy incision was taken using scalpel having Bard Parker blade no. 11/15 at 45 degree beveled to the

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Fig 1: Pre-operative view



Fig 5: PRF membrane applied over surgical site



Fig 2: Pocket marking with pocket marker



Fig 6: Healing on 5th post-operative day



Fig 3: Post-gingivectomy and gingivoplasty



Fig 7: Healing on 30th post-operative day



Fig 4: PRF Clot

tooth surface, started apical to the points marking the course of the pockets and was directed coronally to a point between the base of the pocket and the crest of the bone. The excised tissue was removed by curettes, area was cleaned and closely examined for any remnants of calculus or granulation tissue to be removed (Figure 3). Gingivoplasty was performed as indicated to create the physiologic gingival contours.

Preparation of PRF

After the recipient site preparation was completed, PRF preparation was done based on Dohan et al. (3000 rpm for

10 minutes) protocol. 10 ml of venous blood was drawn and placed in sterile tube without an anticoagulant. Tube was placed in the centrifugal machine and centrifuged immediately. The resultant product consisted of three layers. a) Platelet poor plasma supernatant b) Platelet rich fibrin in the middle layer c) Red blood cells at the bottom (Figure 4). After centrifugation, the PRF clot was obtained, separated from the **PRF clot** RBC base using scissors, and placed in PRF box. The PRF membrane was prepared by placing the PRF clot on the grill in the PRF box and covered with the compressor cover for 1 minutes to squeeze out the fluid. Then the membrane was taken up from the PRF box using tweezers and placed on the exposed gingival wound (Figure 5). Following this non-eugenol periodontal dressing (Coe-Pak) was applied. Post-operative instructions were given and patients were asked to avoid brushing at the surgical sites for at least 7 days. Antibiotic (amoxicillin with clavulanic acid 625 mg, BD) for five days, analgesic (diclofenac sodium and paracetamol tablet, SOS and 0.2% chlorhexidine gluconate mouthwash twice daily for 14 days were prescribed. Healing response was evaluated on 5th, 7th and 30th day post-operatively (Figure 6 and 7 respectively).

DISCUSSION

In the present case series all the subjects stated that pain reduces progressively and on 5th post-operative day it was mild. As, after surgical gingivectomy, the gingival wound is large, having exposed raw connective tissue surface with exposed nerve endings that induce post-operative pain.⁹ Bradykinin, a major plasma protease present during inflammation, increases vessel permeability and stimulates nerve endings to cause pain.⁹ However, on telephonic communication, patient's pain was resolved completely in each subject at 7th post-operative day. Post-operative pain gradually decreases as the epithelization process begins over the connective tissue bed, which usually takes 5-14 days for complete epithelization.¹⁰ Evaluation of healing response on 5th post-operative day showed almost complete epithelization on each subject except few erythematous areas at margins. This could be possibly explained by the effect of PRF as it forms a dense fibrin network with leukocytes, cytokines, structural glycoproteins and also growth factors that are released from 1st day which favor matrix remodeling and early epithelization during wound healing.¹¹

On 30th post-operative day, complete healing was observed in each subject. The results were consistent with the case reported by Priyadarshini et al.¹² where PRF application was done after gingivectomy and uneventful healing was

found. Another study showed constant and steady release of six growth factors could be appreciated from PRF.¹³ The slower release of growth factors over time is due to the ability of the fibrin matrix to store the proteins within its fibrin mesh as well as the cells capability to further release the growth factors into their surrounding microenvironment.¹⁴ The dynamic VEGF is critical for neo-angiogenesis during the wound healing and also facilitate in maintaining the integrity of endothelial cell lining of the blood vessel.¹⁴ The FGF and EGF are known to play an important role in the regulation of ectodermal and mesenchymal derived cell along being a potent chemotactic and mitogenic actions.¹⁵ Thus, the diverse action of the growth factors forms a key player in wound healing and regeneration. The limitations of the present case series might be no histological analysis was done, which would have helped in more confirmatory results. For the future directions, larger sample size and use of more advanced form of platelet concentrate could enhance the soft tissue healing and less patient discomfort, for more accurate results,

CONCLUSION

The results from the present cases signifies that the growth factors released from PRF at the sites might have some additional role and it can be safely concluded that PRF may be used in soft tissue wound dressing where exposed connective tissue is present to achieve uneventful healing. Further studies with more sample size should be carried out to evaluate the clinical effectiveness of PRF on healing after gingivectomy.

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