Clinical Comparison of Placental Membrane versus Platelet-Rich Fibrin Membrane for Treatment of Gingival Recession: A 2-Year Follow-up Case Report

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Abstract

An amnion membrane is a placenta-derived tissue that has been introduced recently as a guided tissue regeneration membrane in dentistry. Numerous growth factors, proteins, and stem cell reserves in amnion could help in accelerated wound healing and regeneration. In addition, growth factors released after activation from the platelets in platelet-rich fibrin (PRF) gets trapped within fibrin matrix and also been shown to stimulate the mitogenic response in the periostium for bone repair during normal wound healing. In this case report, a healthy 22-year-old male patient with bilateral Miller’s Class I recession defects affecting canine were treated surgically with coronally advanced flap (CAF) along with amniotic membrane (AM) or PRF in a split-mouth design for coverage of the recession. Follow-up was done at baseline, 3 months, 6 months, and 18 months to evaluate the effectiveness of CAF with either PRF membrane or bioresorbable AM in the treatment of localized Miller’s Class I gingival recession defects. This case report demonstrated that CAF + PRF and CAF + AM are equally effective in providing clinically significant outcomes in respect to root coverage with AM showing the better percentage of root coverage as compared to PRF. Thus, both the treatment modalities can be used for the coverage of gingival recession depending on the choice of clinician.

Keywords: Amnion, platelet-rich fibrin, recession

Introduction

Periodontal plastic surgery procedures aimed at coverage of exposed root surfaces, have evolved into routine treatment modalities. Several techniques have been developed to cover the denuded roots which include laterally positioned flaps,[1] papilla flaps,[2] free gingival grafts (FGG),[3] semilunar coronally repositioned flap,[4] coronally advanced flap (CAF) and additive treatments including connective tissue,[5] root surface bio modification agents,[6] enamel matrix derivatives[7] and Guided tissue regeneration (GTR) membranes. In 1926, Norberg[8] introduced the coronally repositioned periosteal flap operation and the term Coronally Advanced Flap (CAF) was coined by Pini Prato G and Cortellini P.[9] CAF is the first choice surgical technique, when there is presence of adequate keratinized gingiva apical to the recession defect. However, selection of surgical technique depends on local anatomic characteristic of the site to be treated and patient’s esthetic demand. CAF does not increase the width of the keratinized gingiva and provides little or no periodontal regeneration. To overcome disadvantage of coronally advanced flap, concept of guided tissue regeneration was introduced for recession treatment along with coronally repositioned flap by Tinti C et al.[10]

Recently, clinical use of resorbable allograftic membranes allograft such as amnion is resulting in predictable root coverage. The amnion is a membrane lining the Amniotic sac that surrounds and protects human embryo. Cryopreserved...
Bioresorbable Amniotic Membrane (CAM) was found effective in wound healing and epithelialization as it helps in cellular adhesion of gingival cell, growth of fibroblast and angiogenesis. In periodontal plastic surgeries, the processed allograft amniotic membrane may provide an effective alternative to auto graft tissue in the treatment of recession defects.

CAF along with connective tissue graft is however gold standard for recession coverage but results in second donor site with associated morbidity and increase duration of surgery. To overcome this drawback, PRF as a membrane can be used for recession coverage, PRFs a concentrated suspension of the growth factors developed in France by Choukroun et al in 2001. This case report presents bilateral isolated gingival recession treated with a combined coronally advanced flap (CAF) with either PRF or amniotic membrane.

**Case Report**

A 22-year-old male patient reported to the Department of Periodontology with a complaint of hypersensitivity to cold and unesthetic appearance. He had no significant medical history. On clinical examination, isolated recessions were identified on the right and left maxillary canine teeth with 4 mm of Miller’s Class I on the right and left canine [Figure 1a and e]. Scaling and root planing was done followed by reinforcement of oral hygiene instructions. Informed consent was obtained after explaining the surgical procedure to the patient. The use of either platelet-rich fibrin (PRF) or amniotic membrane (AM) was assigned by toss of a coin.

**Surgical procedure**

The operative site, that is, 13 and 23, was anesthetized using 2% lignocaine with adrenaline (1:80,000). A coronally positioned flap technique was performed at the surgical site in relation to 13 and 23. This was performed by making two horizontal incisions in both mesial and distal interdental papillae, followed by a crevicular incision, two vertical releasing incisions at the mesial and distal aspects of 13 and 23. A full thickness flap followed by a partial thickness beyond mucogingival junction was reflected. A sharp dissection was done beyond the mucogingival junction, to facilitate planned coronal positioning. The exposed root surfaces were scaled and root planed.

**Preparation of platelet-rich fibrin membrane**

After preparing the recipient site, 5 ml of venous blood was placed in a test tube without anticoagulant and centrifuged immediately. It was centrifuged for 10 min at 2700 rpm. The resultant product consisted of the following three layers: The topmost layer consisted of acellular Platelet-Poor Plasma, a PRF clot in the middle, and red blood cells at the bottom. The membrane was prepared by squeezing the clot between two gauze pieces on sterilized glass slabs [Figure 1f]. The recession defect was either covered with a PRF membrane or AM obtained from Tata Memorial Hospital, Mumbai [Figure 1b, c and g]. A tin foil and periodontal dressing were placed over the surgical area. The patient was advised to use 0.2% chlorhexidine digluconate mouth rinse, twice daily. Systemic analgesics were prescribed and were advised to follow the routine postoperative instructions. The dressing and sutures were removed 10 days after surgery. Follow-up was done for 18 months. Postoperative examination was done for one, 3, 6, and 18 months. At the end of the 18 months, both the treatment procedures showed 100% root coverage and increased gingival biotype [Figure 1d and h].

**Discussion**

PRF and AM have been used in various root coverage procedures as adjunct to release growth factors and pluripotent stem cells. The biological properties of these bioresorbable amniotic and chorion membrane such as antimicrobial, anti-inflammatory, in promoting rapid vasculogenesis, epithelialization and above all an abundant source of stem cells has made these...
fetal tissues a suitable choice in the field of reconstructive and regenerative medicine. In the field of dentistry, these tissues find an application especially in oral maxillofacial surgery and periodontology.[14]

Cryopreserved bioresorbable AM has been known to accelerate soft-tissue healing in periodontium and is also effective in helping epithelization facilitated migration and adhesion.[15] Gurinsky demonstrated that the allograft amnion when processed could be effectively used as an alternative to autografts used in the treatment of gingival recession.[16] Increase in gingival tissue biotype thickness and recession coverage has been reported by various studies with the use of amnion membrane. A recent case report compares the effectiveness of bioresorbable AM in comparison with PRF in bilaterally occurring multiple Miller’s Class I recession. The clinical outcome of the surgical procedure accounted for 100% root coverage, an enhanced gingival biotype, with both the membranes similar to the present case report.[17] Amnion cells help in synthesis of various molecules associated with innate immunity system, such as β-defensins, elastase-inhibitors, elafin, lactoferrin, or interleukin-1 receptor antagonist; which might affect antimicrobial capacities of human amniotic membrane.[18,19]

Fetal tissue is comparable to gingival and oral tissues in structure as the lesions of both heals without scarring and shares common fibroblast phenotypes.[20] Unique properties of amnion membrane as an allograft make it a new substitute for the treatment of gingival recession defects as it contains a variety of specialized proteins such as fibronectin, laminin, glycosaminoglycans, proteoglycans, laminin, and variety of collagen fibers. It accelerates the wound healing process and provides a scaffold for proliferation and migration of cellular elements as it contains large number of cytokines including transforming growth factor β, vascular endothelial growth factor, epidermal growth factor, platelet-derived growth factor β and fibroblast growth factor. It has been reported to be nonimmunogenic, to reduce inflammation, reduces scar tissue, has antibacterial properties, reduces pain at the site of application, and acts as a natural biological barrier. Thus, making it a new novel method of application to accelerate the healing of oral wounds.[20]

Thus, PRF can be considered as a natural fibrin-based biomaterial which can guide epithelial cells to migrate to its surface and leads to the formation of new vasculature. The three-dimensional meshwork of PRF has connected trimolecular or equilateral junctions that allow the formation of cytokines enmeshment and cellular migration supported by flexible fibrin meshwork.; it also provides elasticity and flexibility to the PRF membrane. PRF, as a physiologic fibrin matrix, serves as a net to stem cells, especially when accelerated angiogenesis develops in the fibrin membrane.[21] Furthermore, this matrix contains leukocytes and promotes their migration. After migration and degradation of fibrin, fibroblasts start the collagen synthesis.[22] Use of a connective tissue graft (CTG) is a highly effective method for root coverage. Advantages of PRF membrane as a graft material are no 2nd surgical site, accelerated tissue healing postsurgery, less patient discomfort during initial wound-healing period. A high level of observed clinical parameter equivalence between CTG and PRF groups powerfully supports the clinical value of PRF use. CTG or PRF membrane covered by a coronally positioned flap, are effective in the treatment of gingival recession defects with significant root coverage.

Shah et al.[23] in 2014 used Amnion allograft with coronally advanced flap (CAF) for the treatment of gingival recession and observed complete root coverage and excellent esthetics with increase in gingival biotype at 6 months postoperatively. Lafi et al.[24] in a recent split mouth randomized controlled clinical trial compared amnion membrane to subepithelial connective tissue graft for recession coverage and found that application of AM instead of connective tissue decreased surgical time discomfort of the patient considerably; however, root coverage between the two methods was not significantly different.

However, another randomized clinical trial in the same year reported an inferior root coverage of about 80.7% at the test site (CAF + PRF) as compared to about 91.5% achieved at the control site (CAF); however, it was an additional gain in gingival/mucosal thickness compared to conventional therapy.[25] Both the studies demonstrated a significant increase in keratinized tissue thickness, which can be attributed to long-term stability of results obtained and prevention of recession recurrence.[26]

The present case report demonstrated that both CAF + PRF and CAF + AM are equally effective in providing clinically significant outcomes in respect to root coverage with AM showing the better percentage of root coverage as compared to PRF. Thus, both the treatment modalities can be used for the coverage of gingival recession depending up the choice of the clinician.

Conclusion

Subepithelial connective tissue grafts have been a gold standard for root coverage. Use of palatal donor tissues for root coverage allows treating multiple sites at same surgical time.

Within the limitation of the case report, use of the AM or PRF seems to be an effective measure in ensuring root coverage and eliminating the need for 2nd surgical site intraorally. Long-term monitoring period and study with more number of patients are needed to reach the definitive conclusion.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that name and initial will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.
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Conflicts of interest
There are no conflicts of interest.

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