

Guided Tissue Regeneration Based Treatment of Root Coverage using Placental Membrane Allograft: A Case Report

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Gingival recession is defined as the apical migration of gingival margin to the cemento-enamel junction. It results in root exposure which leads to clinical problems such as root surface hypersensitivity, root caries, cervical root abrasions, difficult plaque control, and diminished aesthetic/cosmetic appeal. Guided tissue regeneration based root coverage has emerged as a promising treatment modality. A variety of non-resorbable and bioresorbable membranes have been successfully used. Among resorbable membranes, collagen has been extensively studied. Recently, amnion membrane, the third generation membrane which is a placental derived tissue has been introduced. On the basis of the findings of the present case report, it can be concluded that recently introduced amnion membrane (third generation membrane) are equally efficacious in the treatment of gingival recession and use of this resorbable membranes with coronally advanced flap is a versatile treatment modality for root coverage of isolated buccal gingival recessions. The more gingival tissue thickness (gingival biotype) enhancement was observed with this membrane. Amnion membrane has certain additive advantages over the collagen membrane such as better handling properties and a thin diameter enabling it to mold according to the defect anatomy and root surfaces easily.

Keywords: Amnion membrane, Creeping attachment, Gingival recession, Growth factors, Laminins

INTRODUCTION

Gingival recession is the apical displacement of the gingival margin thus exposing the root surface beyond cemento-enamel junction (CEJ). This condition is associated with a multitude of esthetic and functional problems, including poor esthetics, tooth hypersensitivity, pulp hyperemia, and root caries. Furthermore, it minimizes the zone of attached gingiva which can further make individuals difficult to maintain proper oral hygiene. Over the years, various treatments of gingival recession have evolved including soft tissue pedicle grafts,¹ coronally positioned grafts,²⁻⁴ free autogenous soft tissue grafts,⁵ and connective tissue autogenous grafts.⁶ Most of these autogenous grafts have the limitations of donor morbidity, the creation of the second surgical site and limited availability.

Guided tissue regeneration (GTR) for root coverage has been first employed by Tinti and Vincenzi.⁷ Since, the early used barrier membranes, i.e., non-resorbable like expanded polytetrafluoroethylene and titanium-reinforced membranes involves a need for the second surgical site to remove the membrane. Various authors have proposed the use of bioresorbable membrane⁸⁻¹⁰ for root coverage procedures.

Placental membrane allograft has been used in the field of medicine since 19th century in skin transplantation.¹¹ It is about 10-15 μm thick and constitutes of two fetal membranes, the inner amniotic membrane and the outer chorion.¹² Amnion membrane builds the amniotic sac that surrounds and protects an embryo composed of three major layers: A single epithelial layer, a thick basement membrane, and an avascular mesenchyme.¹³ It contains no nerves, muscles or lymphatics and can be easily separated from the underlying chorion. With improvements in the processing and storage technologies, amniotic membrane has found application in various fields of medicine, including management of burns; reconstruction of the oral cavity, bladder, and vagina; tympanoplasty; arthroplasty.¹⁴ In the field of periodontics, recently Velez

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and co-workers analyzed the effects of the cryopreserved amniotic membrane on periodontal soft tissue healing and observed that it was effective in helping cicatrization, wound healing, epithelization, facilitated migration, and reinforced adhesion.¹⁵ Gurinsky was the first person who reported processed allograft amnion as an effective alternative to autograft tissue in the treatment of gingival recession defects.¹⁶ Thus, in this case report, we present a case of gingival recession treated with GTR principle using amnion placental membrane (Figure 1).

CASE REPORT

A 32-year-old male patient reported with a chief complaint of tooth hypersensitivity in the lower right back tooth region since 3 months. His medical and family history was non-contributory.

On clinical examination, Miller's Class II recession was observed in relation to the tooth number #44 and #45. All measurements were performed by one examiner. The patient was evaluated for the following clinical parameters; gingival recession depth (RD), probing depth, clinical attachment level (CAL), width of attached gingiva and gingival biotype thickness, at baseline, 3, 6, and 12 months. A customized acrylic occlusal stent was fabricated with cold cure acrylic resin. Vertical groove was made on the mid buccal aspect. The graduated periodontal probe University of North Carolina-15 was placed in the stent groove to record clinical parameter.

This ensured accuracy and reproducibility of reading. Gingival RD measured as the distance between the most apical point of the CEJ and the gingival margin (Figure 2a and b). Probing depth was measured as the distance between gingival margin to the bottom of the sulcus and CAL was measured as the distance from CEJ to the base of the sulcus.

Prior to surgery, informed consent has been explained to the patient and signature was obtained. On the day of surgery, following a strict aseptic protocol adequate anesthesia was given using 2% lignocaine hydrochloride containing 1:2,00,000 adrenaline (Xylocaine)[®]. Two oblique beveled incisions, one on the mesial aspect and the other on the distal aspect of the recession site were given (Figure 3) to raise a trapezoidal flap followed by two vertical incisions extending into the alveolar mucosa were given. A trapezoidal flap was elevated (Figure 4), following which the exposed root surface was thoroughly planed. Tetracycline solution (50-150 mg/ml, Isik *et al.* 2000) was applied to the root surface for 2 min. The area was



Figure 1: Amnion membrane allograft

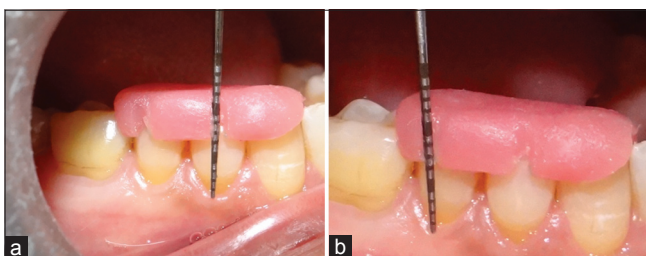


Figure 2: (a and b) Pre-operative measurement of recession depth using University of North Carolina-15 probe w.r.t. #44 and #45



Figure 3: Incision lines



Figure 4: Trapezoidal flap elevation

rinsed thoroughly with normal saline. Thereafter, amnion membrane (Figure 5) was trimmed and positioned over the root and 2-3 mm beyond the bony margin. Upon placement, the freeze-dried, irradiated amnion membrane gets dehydrated and becomes self-adherent to the exposed root and proximal bone, thus eliminating the need for suturing the membrane. The flap was then coronally positioned to cover the membrane. The surgical papillae were stabilized using 5-0 interrupted black braided silk suture (Trusilk) (Figure 6). The final position of the flap margins was positioned to be at least 3-4 mm coronal to the CEJ of all teeth at the end of the surgery. Periodontal dressing was applied to avoid any mechanical trauma or any discomfort to the patient. Post-operative instructions, diclofenac sodium (50 mg) twice daily for 3 days and a chlorhexidine mouthrinse 0.2% twice daily for 2 weeks were prescribed.

Thereafter, all the clinical parameters were recorded at 3 (Figure 7), 6 (Figure 8a) and 12 (Figure 8b-c) months. (Table 1) will be the part of Case Report itself.

DISCUSSION

Amnion contains a variety of specialized proteins such as fibronectin, laminin, proteoglycans, and collagen Types IV, V, and VII. It not only provides matrix for cellular migration and proliferation but also enhances the wound healing process. It has been reported to be non-immunogenic to

Table 1: Clinical parameter at baseline, 3, 6, and 12 months

Study intervals	Baseline		3 months		6 months		12 months	
Tooth number	34	35	34	35	34	35	34	35
Recession depth (mm)	2.5	2.5	0.5	0.5	0	0	0	0
Probing depth (mm)	1	1	0.5	0.5	0.5	0.5	0.5	0.5
Clinical attachment level (mm)	3	3	1	1	0.5	0.5	0.5	0.5
Width of attached gingiva (mm)	3	3	5	5	5.5	5.5	5.5	5.5
% Root coverage	-		80	80	100	100	100	100
Gingival biotype thickness (mm)	0.6	0.6	1.2	1.2	2	2	2	2



Figure 5: Placement of amnion membrane allograft



Figure 7: 3 months post-operative



Figure 6: After suturing

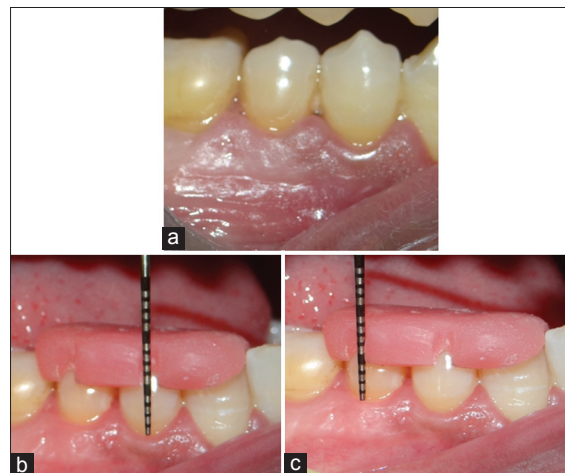


Figure 8: (a) 6 months post-operative. (b and c) 12 months post-operative

reduce inflammation, reduce scar tissue, has antibacterial properties, reduces pain at the site of application and act as a natural biological barrier.¹⁷ When amniotic membrane is preserved, it is regarded as an inert tissue with non-viable cells. The ability of this membrane to repair tissues occurs through the presence of growth factors and cytokines. Amnion membrane have revealed the presence of various growth factors in the membrane epithelium, such as epidermal growth factor; transforming growth factor- β 1; keratinocyte growth factor; beta-fibroblastic growth factor; and hepatocyte growth factor, which act in facilitating cellular migration.¹⁸ Amnion membrane is also readily obtainable in large amounts and its preparation and storage are relatively low in cost.

Complete and stable root coverage is the ultimate goal of any root coverage procedure. In the present case, we observed that amnion allograft resulted a complete (100%) root coverage and an excellent color match to the recipient site. The results were stable for 6 and 12 months post-treatment and no recurrence of recession was observed. Reduction in gingival recession was observed from 3 to 6 months in suggests an improved capacity of amnion membrane to induce creeping attachment.¹⁹ Induction of fibroblast proliferation and presence of vascular growth factor in amnion membrane could accelerate angiogenesis and tissue maturation; these may be responsible for preventing necrosis of the coronal portion of the flap, resulting in better healing and more creeping attachment.²⁰ Gain in the CAL can be attributed to the presence of laminins in the amnion membrane, which can promote regeneration, accelerate tissue adhesions and preserve tissue, all of which are key factors in improved healing and might resulted in CAL improvements. Furthermore, the antimicrobial agents that are present in amnion membrane, especially secretory leukocyte proteinase inhibitor I, lactoferrin, defensin, elafin might improve wound healing especially in patients with poor oral hygiene.²¹

Increase in the thickness (from thin to thick) of the gingival tissues observed as measured by endodontic spreader with stopper 3 mm from the gingival margin at various case report interval can be attributed to presence of Types I, III, IV, V, and VII collagen, in addition to laminins and fibronectin. Thick gingival tissue can withstand trauma and any resulting recession, promoting creeping attachment and a more predictable surgical result.²² Hence, all the optimum desired results as an allograft for root coverage were achieved by amnion allograft.

A few advantages of amnion membrane over other membrane observed during the surgical procedures were better handling properties and a thin diameter enabling it to mold according to the defect anatomy and root surfaces easily.

The results from the present report are encouraging and demonstrate that the amnion allograft is well tolerated by the gingival tissues and results in excellent healing. More studies exploring the potential of this allograft in periodontal therapies are required. This report paves a way for future studies that may investigate its application in other fields of periodontal and oral surgery.

CONCLUSION

The use of resorbable membranes with coronally advanced flap is a novel and versatile treatment modality for root coverage of isolated buccal gingival recessions. However, amnion membrane has certain additive advantages over other membranes and can be used as an alternative to collagen membrane. Rich source of stem cells, enhancement of healing and self-adhering property make these membranes an effective option for root coverage procedure.

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