

## Special Article – Periodontics

# Human Amniotic Membrane Graft used in Vestibuloplasty: A Case Report

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Various grafting materials have been used for vestibuloplasty but all have met with variable results. Skin and mucosal grafts have disadvantages of need of second surgical site, limited amount of mucosa available for grafting, postoperative pain and risk of surgical complications at donor site. In contrast, Human Amniotic Membrane (HAM) does not have limitations as conventional grafts. Its several unique properties forge it as a suitable substitute for conventional skin and mucosal grafts. Aim of this article is to present a case report on treatment for vestibuloplasty using an amniotic membrane graft. We concluded that amniotic membrane can be used successfully as a mucosal graft substitute.

**Keywords:** Amnion; Vestibuloplasty; Graft; Atrophic mandible

## Introduction

Facial and oral rehabilitation of patients with extreme mandibular atrophy has always remained a challenging task and been attempted with variety of treatment procedures such as ridge augmentation and vestibuloplasty. Vestibuloplasty is a mucogingival procedure designed to restore alveolar ridge height and to increase the amount of attached gingiva and vestibular depth by lowering muscles attached to the buccal, labial, and lingual aspects of the jaws [1]. One of the major challenges after a vestibuloplasty procedure is to reduce post operative discomfort, scar contracture and subsequent loss in sulcular depth. A raw bony surface, as is obtained after Clark's vestibuloplasty is vulnerable to infections, increased pain and scarring during the healing phase. Skin and mucosal grafts are most commonly used to cover the exposed periosteal surface; however they have drawbacks as limited amount of mucosa available for grafting, need of second surgical site, postoperative pain and risk of surgical complications at donor site [2]. There is a constant search for biocompatible membranes/materials which would satisfy most criteria required of a biological scaffold.

Human Amniotic Membrane (HAM) is the innermost layer of placenta and histologically resembles the skin. Guler et al. elaborated superiority of HAM as a graft over other graft materials [3]. The human amnion membrane is a biological graft which has unique properties like wound protection, healing promoter, bacteriostatic, pain reduction, antiscarring and epithelization effects. It may be a graft of choice due to its easy availability and low cost [4]. Here we present a case of human amniotic membrane used as a graft in Vestibuloplasty and discuss biological characteristics of amniotic membrane which most likely make it an ideal graft material.

## Case Presentation

### Clinical presentation

Sixty years old female patient was referred for treatment at Department of Periodontics and Implantology, Dr Z. A. Dental College, Aligarh with chief complains of instability of lower denture

during functions as speech and chewing. The patient's medical history was non-contributory. She informed of wearing full dentures for the last 10 years; dentures were ill adapted. Bone height and mucosal quality were assessed using radiographic and clinical methods. Patient was having Stage 4 atrophic mandible (Cawood & Howell) [5] with reduced bone height and obliteration of the buccal and the lingual sulcus. Mucosa was thin, healthy pink in color with reduced muscle tone. No bony prominence or undercut was noticed on palpation of ridge. Therefore, to increase the denture supporting area, we planned to go for vestibuloplasty along with amnion grafting followed by new denture fabrication. The procedure to be performed was explained to patient, followed by informed written consent & institutional ethical committee clearance.

Preoperative impression, cast and measurements were made (Figure 1a&1b). The cast was arbitrarily scraped till the desired depth. A splint was fabricated with clear acrylic (Figure 1c).

### Amniotic membrane harvesting

Fresh amniotic membrane was obtained from placenta of healthy seronegative mothers. Donor was screened for hepatitis B and C, syphilis and human immunodeficiency virus. Amniotic membrane was prepared a day before the procedure by separating it from chorion of placenta under sterile aseptic conditions. Separated amnion was flushed with copious amounts of saline to clean any blood. Amnion was processed under sterile conditions using an antibiotic mixture comprising 400 ml of saline containing 1,200,000 IU benzathine penicillin and 100 ml of metronidazole to cover Gram-negative bacteria, Gram-positive bacteria and fungi was used as a decontaminant and storage medium.

### Preservation

The membrane was then stored in a large bottle containing 400 ml of saline containing 1,200,000 IU benzathine penicillin at 4°C for 24 hr. On the day of application it was soaked in normal saline for 10 min.



**Figure 1: a)** Preoperative view showing atrophied mandible and decreased vestibular depth.



**Figure 2: a)** Incision given in mucogingival line and partial thickness dissection along with muscle attachment done.



**Figure 1: b)** Preoperative cast with markings representing decreased vestibular depth.



**Figure 2: b)** Separated mucosal flap was sutured to periosteum at desired depth.



**Figure 1: c)** Acrylic stent.



**Figure 2: c)** Amniotic membrane placed & secured in place by suturing.

**Vestibuloplasty**

Vestibular deepening was done using Clark’s technique (Figure 2a). After applying anesthesia, a horizontal mucogingival incision in the mucogingival line was carried out. Mucosal flap was dissected from the lip base. The submucosal connective tissue and muscle attachment were incised, separated with a periosteal elevator from the periosteum and pushed apically. The separated mucosal flap was sutured to periosteum at desired depth (Figure 2b). The prepared amniotic graft material was transferred over the exposed periosteal wound surface area with mesenchymal/chorionic side against the exposed periosteum and sutured in place with 5-0 sutures (Figure 2c). The surgical splint was placed after lining with Coe pack (GC, Japan) to prevent formation of dead space, and secured with sutures.

**Follow up**

The splint and sutures were removed 7<sup>th</sup> day postoperatively

and grafted site was thoroughly cleaned with betadine solution. A hyperaemic reddish white necrotic soft tissue layer could be seen with underlying hyperemic tissue. By the end of the 4<sup>th</sup> week, the necrotic layer had disappeared, leaving slightly hyperemic mucosal tissue. Amnion had completely degenerated and disappeared (Figure 3). The patient complained of very little discomfort and mild pain with no burning sensation. There was minimal scarring. No other complications such as infection or graft rejection were observed. After 6 weeks, the patient was referred to the department of Prosthodontics for prosthetic rehabilitation.

**Discussion**

An ideal scaffold/graft should be biocompatible, non toxic, non carcinogenic and non immunogenic. In addition the material should have adequate physical/mechanical properties like stability, elasticity, flexibility and appropriate resorbability at a rate congruent with tissue replacement. They should also allow for cellular adhesion and subsequent structural integrity [6].



**Figure 3:** Post-operatively (one month)- there has been gain in vestibular depth and increase in denture bearing area.

Amniotic membrane is the innermost layer of developing embryo lying next to chorion. It contains almost all the qualities of an ideal dressing and has been used extensively as graft or surgical wound dressing in cases of burns, ocular surgeries, surgical reconstruction of the bladder and vagina and in the prevention of surgical adhesions. Harvesting the HAM is a simple procedure and does not require any special arrangements. Different preservation methods has been used including cryopreservation, storage in antibiotic solution, preservation in silver nitrate, glycerol-preserved sheets, dried sheets and gamma irradiated sheets [7].

Its unique combination of properties makes it a suitable graft material. Gupta et al. [8] reviewed the properties and potential applications of amniotic membrane in periodontology. They described that amniotic membrane serves as a scaffold that easily integrates with host tissue and contains numerous angiogenic & growth factors which provide an excellent environment for cell migration and differentiation, promoting wound healing and rapid re-epithelialization. It contains thrombospondin 1 which promote neovascularization. It also contains epidermal growth factor, Transforming Growth Factor (TGF) beta, fibroblast growth factors, platelet-derived growth factors, metalloproteinases, and tissue inhibitors of matrix metalloproteins. These regenerative molecules impart wound healing properties to HAM. Unlike other synthetic materials, it provides sufficient oxygenation for epithelial and other cells because of its good permeability. It inhibits scarring by down regulating Transforming Growth Factor  $\beta$  (TGF) and its receptor expression by fibroblasts.

It has antimicrobial, antiviral and anti-inflammatory properties [9]. It acts as selective barrier membrane; reduces influx of inflammatory cells and mediators at the site of surgery. Kjaergaard et al. have shown *in vitro* antimicrobial effects of the amnion and chorion against certain microorganisms [10]. It secretes various antimicrobial peptides such as  $\beta$ -defensins and cystatin E. These molecules confer antibacterial and antiviral abilities to HAM respectively. There is still further need for studies to verify these properties of the amniotic membrane. The collagen fibers of amniotic basement membrane contribute to hemostatic attribute of HAM; this minimizes bleeding and hematoma formation. Also, HAM gets adhered to underlying wound surface and prevents dead space formation. This diminishes the accumulation of microbes and serous discharge.

One of important property of amniotic membrane is that it is

Non immunogenic. Amniotic cells do not express HLA-A and B class I MHC antigens making it 'immunologically privileged'; Hence HAM shows no graft rejection [11].

Amniotic membrane may be infected by normal vaginal flora, herpes, chlamydia or other contaminant bacteria. In addition there is risk of transmission of viruses like HIV, Hepatitis, syphilis and others. To prevent the chances of cross infection, donor mother should be properly screened and proper sterilization modalities need to be instituted [12]. The other issue of concern is ethical clearance involved in such procedure, so informed consent should be taken from patient.

Our results supports the findings of other studies showing that amniotic membrane can be successfully used as a graft in mucogingival surgeries [4,13-15].

## Conclusion

Based on clinical case described we can conclude that human amniotic membrane can be used as a successful and viable graft for covering of the raw periosteal surface, preventing secondary contraction after vestibuloplasty, and maintaining the postoperative vestibular depth. However, further studies are needed to confirm its advantages and usage in the future.

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