Comparison of vestibular sulcus depth in vestibuloplasty using standard Clark’s technique with and without amnion as graft material

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Introduction: A number of materials are used as grafts in vestibuloplasty like mucosal and skin grafts with several advantages and disadvantages. To circumvent the disadvantages of these grafts, biological membranes such as amnion membranes are often recommended. Materials and Methods: The objective of this study was to clinically assess the vestibular sulcus depth in vestibuloplasty using Clark’s technique with and without amnion as graft material. Twenty edentulous patients underwent mandibular labial vestibuloplasty using Clark’s technique. Amnion was used as graft material in 10 patients (group I) and no grafts used in remaining 10 patients (group II). The vestibular depth was evaluated at time intervals of 1 week, 2 weeks, 1 month and 3 months, postoperatively. Results: Mean postoperative vestibular depth after 3 months in group I and II were 10.0 ± 3.13 mm and 7.8±0.63 mm, respectively. Mean of 2.2 ± 2.50 mm increase in depth was achieved after 3 months in Group I. Conclusion: Amnion graft is a viable and reliable option that promotes early healing and maintains postoperative vestibular depth.

Keywords: Amnion graft, clark’s technique, vestibular depth, vestibuloplasty

INTRODUCTION

The oral rehabilitation of patients after loss of teeth has made much progress in recent times. Vestibuloplasty, ridge augmentation and different types of implants were used to overcome the problems of flat alveolar ridge. Many different methods have been described for regenerating or replacing bone for secondary implant placement but until now no substantial progress has been made in soft tissue management. The most common procedure in vestibuloplasty are submucosal vestibuloplasty, secondary epithelial vestibuloplasty, soft tissue graft vestibuloplasty and Edlanplasty. The aim of all these techniques is to create adequate vestibular depth and limit the traction of fiber and muscle attachments.

In secondary epithelial vestibuloplasty, there is a need to cover the exposed periosteum because a nearly complete relapse could be proven during secondary healing with contraction and epithelialization of the vestibular periosteum. To date various autogenous soft tissue grafts from autogenous mucosal to allogeneic collagen membrane have been used for vestibular extension. All grafts have the disadvantages of increased morbidity, postoperative pain and risk of surgical complications in the donor site. This led to search for an alternate graft material.

Biological membrane obtained from placenta opens new perspectives. The human amnion membrane is a biological graft which has unique properties like antiadhesive effects, bacteriostatic properties, wound protection, pain reduction and epithelisation effects. Its easy availability, low cost makes it the best material.
The use of amnion in vestibuloplasty has been first reported by Guler et al.,[6] who concentrated on the blood flow to the graft. Lawson studied the use of amniotic membrane along with pectoralis major muscle for oral reconstruction.[7]

MATERIALS AND METHOD

Twenty patients who presented with insufficient vestibular depth but adequate mandibular bone heights were referred for the correction of vestibular depth. Bone height and mucosal quality and quantity were assessed using radiographic and clinical methods. The procedure to be performed was explained, followed by informed written consent. Ethical committee clearance was obtained and endorsed duly by the head of the institution.

Preoperative impression, cast and measurements were made [Figures 1 and 2]. The cast was arbitrarily scraped till the desired depth as per the clinical requirements. A splint was fabricated with clear acrylic, finished and polished [Figure 3]. Fresh amniotic membrane was obtained from healthy seronegative mothers who underwent Cesarean section. The amnion was separated from the chorion [Figure 4] and was cleansed of blood by flushing with copious amounts of tap water.

The membranes were placed in a large glass bottle containing 85% glycerol, made by taking 85 ml of glycerol and making up to 100 ml with normal saline and stored at room temperature for 24 hours. They were then transferred to another bottle of 85% glycerol and stored at 4°C for the time period till used.

Figure 1: Preoperative cast

Figure 2: Preoperative depth

Figure 3: Acrylic splint

Figure 4: Separation of amnion from chorion

Figure 5: Harvested amnion graft
Immediately prior to their use, small clean sections (6 x 10 cm²) of membrane were cut and kept in 400 ml of saline containing 10,00,000 IU penicillin at 48°C up to 24 hours. The obtained graft material was then properly cleaned in saline solution [Figure 5].

Clark’s technique of vestibuloplasty was done after reflection of flap [Figure 6] and suturing to desired depth [Figure 7] and the amniotic graft material so prepared is transferred over the surgical site with mesenchymal side against the wound and sutured in place with 5-0 absorbable sutures [Figure 8]. The surgical splint was placed after lining with soft liner[7] to prevent formation of dead space, and secured either with circum-mandibular suturing
or with bone screws of 1.5 x 6 mm [Figure 9]. Postoperative impression, cast and measurements were made [Figures 10 and 11].

Out of 20 patients, randomly 10 patients (Group I) had the raw surface covered with amnion graft followed by splint placement and remaining 10 patients (Group II) underwent secondary epithelisation without any graft under local anaesthesia. Splints were secured to bone through the transmucosal bone screws. The splint was removed after 7th day postoperatively and grafted site was thoroughly cleaned. Patients were followed up and their vestibular depths were measured at intervals of 1 week, 2 weeks, 1 month and 3 months, postoperatively [Tables 1 and 2].

Descriptive statistics were presented. Paired t test was performed to find the difference between the percentages of reduction in depth of the buccal vestibule. \( P \) value \( \leq 0.05 \) was taken as significant.

**RESULTS**

The reduction in the depth of the buccal vestibule in Group I was found to be 24.81% after 3 months follow-up and 42.22% reduction in the depth of the buccal vestibule was seen in group II [Table 3]. The difference in between the groups at various postoperative measurements was statistically significant.

Postoperatively there were no mental nerve paresthesias in both the groups. Vestibular depth was assessed in all patients. Group I patients had no postoperative edema, swelling and even pain was of bearable state which can effectively be controlled by using analgesics. No complications such as immunological rejection and infection occurred in study population, and the prosthetic treatment could be started as early as a month after the surgery. Although in one of our patient there was relapse of the vestibular depth to almost near to its preoperative value, mainly due to inability to maintain the oral hygiene. In Group II, one patient had postoperative edema and swelling which subsided on further course of antibiotics. Pain of higher scale chiefly on 1st and 2nd day were present in group II. The graft area could not be differentiated from nongrafted tissue after 3 months. Group I showed better results when compared to group II [Graph 1].

**DISCUSSION**

Lack of an adequate residual alveolar ridge and basal seat severely compromises the success of prosthodontic treatment. It has been suggested that expansion of the denture-bearing area by means of a vestibuloplasty would reduce denture load per square unit of supporting bone and thus reduce the bone resorption caused by transfer of occlusal forces.\(^8\) Numerous graft materials are available but all suffer from certain limitations. In order to overcome the same there is a search for more appropriate graft material. Skin graft,\(^8\) mucosal grafts,\(^8\) palatal graft,\(^9\) buccal graft,\(^10\) cultured mucosal grafts, allogenic collagen membrane,\(^14\) dural graft,\(^15\) placent graft\(^6,7\) were suggested.

Split skin graft is well-tolerated, but can be subjected to postoperative shrinkage,\(^12\) and when compared with the
In most patients, problem with lower denture are more than with upper denture, as the alveolar ridge resorption is four times greater in the mandible than in the maxilla. So we included mandibular anterior region as the site for our study.

The main potential issue that one could expect to raise with use of processed amnion is of cross infections, especially with prion diseases. Adequate care need to be exercised while collecting the same from voluntary donors. Proper screening and sterilization modalities need to be instituted. The next issue would be of voluntary, informed consent of the patients owing to the ethical issues involved in such treatment.

The result of the present study indicates that reduction in postoperative vestibular depth is less when human amniotic membrane is used as a graft material to cover the denuded periosteum when compared to standard Clark’s technique without amnion graft. The results of this study indicates that the amnion is an appropriate graft material for vestibuloplasty. The concept of using biodegradable amniotic membrane could lead to better results, shorter treatment time and less donor site morbidity. Also, the study proves the versatility of angiogenic biodegradable amniotic membrane as a favourable graft material for vestibuloplasty which promotes healing and prevent relapse.

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**Table 3: Reduction rate in group 1 and group 2 from intraoperative to 3 months by t-test**

| Time                  | % of Reduction in group 1 | % of Reduction in group 2 | P-value  |
|-----------------------|---------------------------|---------------------------|----------|
| Intraoperative to 1 week | 10.53                     | 23.7                      | 0.0000* |
| Intraoperative to 2 weeks | 16.54                     | 29.63                     | 0.0001* |
| Intraoperative to 1 month | 21.05                     | 36.3                      | 0.0005* |
| Intraoperative to 3 months | 24.81                     | 42.22                     | 0.0008* |

*P<0.05
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