

Evaluation of Increase in Width of Keratinized Gingiva Using Functional Method and Chemical Staining Method Post Lateral Pedicle Graft Combined With Connective Tissue Graft in Treatment of Gingival Recession.

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Abstract: Gingival recession has been defined as the apical shift of gingival margin from its physiologic level causing exposure of root surfaces. Patient with gingival recession frequently report to dental clinics with complaint of preceding gums, pain or hypersensitivity, esthetic problem, retention of plaque, inflamed gingiva. This apical shift in gingiva causes reduction in width of attached gingiva and vestibular depth which may lead to sub gingival plaque accumulation and difficulty in oral hygiene maintenance. There are various techniques to treat gingival recession and to increase width of keratinized gingiva. This article puts emphasis on case report in which evaluation of increase in width of keratinized gingiva is done using functional method and chemical staining method post lateral pedicle graft combined with connective tissue graft in treatment of gingival recession.

Keywords: Lateral pedicle graft, Keratinized gingiva, Lugols iodine, gingival recession.

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I. Introduction:

Gingiva, with its unique texture and coral pink color, is the most delicate tissue in the oral cavity and the first essential component of the periodontium. Nowadays, the importance of gingiva is increasing because of its interrelationship with the general health and the direct esthetic effect on most dental treatment. Gingiva is a part of oral mucosa that covers the alveolar processes of the jaws and surrounds the necks of the teeth¹. Normally gingiva covers the alveolar bone and tooth root to a level just coronal to cement enamel junction (CEJ). Macroscopically gingiva is divided into Marginal, Attached, and Interdental area¹. However, the apical migration of the gingival margin to the cemento enamel junction is a mucogingival deformity which is multifactorial in origin and termed as gingival recession.² The distance between the CEJ and gingival margin gives the level of recession. The etiology of gingival recession has been principally associated to plaque accumulation, and/or mechanical trauma³, periodontal disease, alveolar bone dehiscence, improper flossing, aggressive tooth brushing, and dominant roots. Several other predisposing factors have been suggested such as high frenum attachment, dental malposition, and thin periodontal biotype⁴. Gingival recession can appear as localized or generalized with or without loss of attached gingiva which may promote the occurrence of dentinal hypersensitivity or may present an esthetic concern for the patient. Gingival recession results in the displacement of the gingival margin apically⁵, thus reducing the attached gingiva and vestibular depth.

Orban first described the term attached gingiva as the part of the gingiva that is firmly attached to the underlying tooth and bone⁶. The width of attached gingiva is the distance between the mucogingival junction to projection of the external surface of the bottom of the sulcus or the periodontal pocket¹. Attached gingiva together with marginal gingiva forms keratinized gingiva. Despite various opinions regarding the adequate amount of keratinized tissue for maintenance of periodontal health, the mucogingival junction serves as an important clinical landmark in periodontal evaluation. The mucogingival junction is a discrete line distinguishing the movable and immovable mucosa during passive motions of lips and cheeks⁷. The method employed for locating the keratinized gingiva/mucogingival junction are the visual method (VM), Functional method (FM), Visual method after histochemical staining method.⁸

In the FM, keratinized gingiva and mucogingival junction are assessed as a borderline between the movable and immovable tissue where in tissue mobility is determined by running a periodontal probe positioned horizontally from the vestibule toward the gingival margin with light pressure.⁷ In chemical staining method the

mucogingival junction can be assessed visually after staining the mucogingival complex with Lugol's iodine solution based on the difference in the glycogen content. The attached gingiva, which is keratinized, has no glycogen in the most superficial layer and gives an iodo-negative reaction. Thus, Lugol's iodine solution stains only the alveolar mucosa and clearly demarcates the mucogingival junction^{9, 10}. Friedman stated that inadequate zone of gingiva would facilitate subgingival plaque formation because of improper pocket closure resulting from the movability of the marginal tissue.¹¹

Methods for increasing the width of attached gingiva include 'Vestibular deepening' and 'Mucogingival surgeries'. Several surgical approaches have been proposed to address buccal recessions including coronally advanced flap (CAF), laterally positioned flap (LPF), double pedicle flap (DPF), tunnelling (TUN), subepithelial connective tissue graft (CTG), and guided tissue regeneration (GTR)¹². The surgical challenge for mucogingival procedure in the mandibular anterior region is often related to the predisposing factors mentioned above. A laterally positioned flap combined with a subepithelial connective tissue graft is one of the conventional approaches for solving problems associated with gingival recession defects, with the advantages of flap flexibility and extended coverage of the tissue graft.

This report converses one Millers class II case with wide and deep defect treated with combination procedure of lateralpedicle flap (LPF) and CTG and evaluating outcomes of increase in width of keratinized gingiva by functional probing method and chemical staining method as adequate keratinized gingiva provides a firm and stable base for maintaining good oral hygiene, restorative and aesthetic procedure

II. Case Report:

A 21 year old male reported to the outpatient department of Periodontics, MIDS dental college Latur with chief complaint of receding gums in lower front teeth region since 8-9 months. He also complained of dentinal hypersensitivity with the same. The patient was nonsmoker with a good general health and had received no antibiotics and periodontal therapy during previous six months. On intraoral examination there was Miller's class II gingival recession with mandibular right central incisor with a recession depth of 6mm, recession width at CEJ 3mm, probing depth of 1mm and clinical attachment loss of 7mm. The gingiva of the mandibular right central incisor was inflamed, with insufficient width of the keratinized gingiva and absence of attached gingiva. The tooth showed significant root prominence and was vital as determined by heat test. The tooth showed no mobility and no bone loss radiographically. Diagnosis was generalized chronic plaque induced gingivitis with localized periodontitis with 41 with mucogingival deformities and condition i.e. gingival recession with 41. All the treatment possibilities were discussed and the adjacent area was properly examined. In order to decide about lateral pedicle graft as a treatment option bone sounding was performed on adjacent healthy gingival tissue with 42. Soft tissue thickness was found to be more than 2mm. Also the palatal vault was examined for adequate thickness for procuring connective tissue graft. Considering the adequate thickness and width of attached gingiva a combination procedure of Lateral pedicle and sub epithelial connective graft (SECTG) was planned.

Presurgical protocol:

Patient was educated and motivated about oral hygiene and emphasis on tooth brushing technique(modified stillmans method) was given. A verbal and written informed consent was taken from the patient. Thorough scaling and root planning was performed and patient was asked to use Chlorhexidine mouthwash twice daily for 2weeks for rinsing.

Preoperative measurements:

Preoperative recession depth and width measurement were recorded using UNC 15 probe. Recession depth of 6mm, recession width at CEJ 3mm was found (Fig 1). Also width of attached gingiva was determined by using conventional (roll probe) technique and chemical staining (Lugol's iodine stain). The width of attached gingiva was found to be zero and there was no demarcation of mucogingival line seen with 41 on staining with Lugol's iodine solution. (Fig 2,3)

Surgical technique:

Preparation of recipient site:

The patient was recalled after 4 weeks and reevaluation was done for probing depth and gingival inflammation. The patient was scheduled for surgical procedure after gingival inflammation subsided. All the sterilization protocol was followed. After proper isolation, local anesthesia 1:80,000 was administered. A v shaped incision was made by giving reverse bevel incision on distal side of 41 for removing epithelium and connective tissue.(fig 4) An external bevel incision was given on mesial side to remove the epithelium. The gingival collar was removed. Odontoplasty was performed with no 2 polishing bur and root surface bio modification was done using EDTA(Ethylenediaminetetraacetic acid) for 3 minutes with 41

Preparation of donor Flap:

The Periodontium of donor site selected had adequate width of attached gingiva and thickness more than 2mm with no loss of alveolar bone, any dehiscence or fenestration clinically. With a 15 no Scalpel blade, a partial thickness flap was raised from the sub marginal gingiva upto 3mm depth, and full thickness was extended to the level of the base of the recipient site again a partial thickness flap was raised to relieve the attachment of pedicle for proper displacement. A vertical incision was given from gingival margin to outline a flap adjacent to the recipient site incision. A cut back incision was made into alveolar mucosa at the distal corner of flap pointing towards recipient site. Flap was positioned over recipient bed to ensure that flap margins are approximated without any tension. (fig 5)

Obtaining connective tissue graft:

A connective tissue graft was obtained from palate region by parallel incision technique. Anesthesia was given using lidocaine with epinephrine 1: 80,000. Two parallel incision was made from mesial aspect of 1st premolar to mid of 1st molar for procuring the required amount of SECTG. The parallel incision was made at least 2-3mm away from the gingival margin. A tissue forcep was used to retract the palatal tissue and provide access to the tissue in between the initial incisions. The tissue was then removed by incising the mesial, distal and medial edges between the parallel incisions. Pressure was applied with wet gauze to the donor area. The donor area was sutured using cross suspensory sutures.

Transfer of the graft and SECTG graft:

The procured SECTG was placed at the recipient site and the pedicle Flap was shifted laterally to the adjacent denuded root making it adapted appropriately and without tension (fig 6). The lateral Flap and SECTG was fixed with interrupted sutures, horizontal mattress suture, and circumferential sutures to prevent slipping it apically (fig 7)

Postoperative Instructions:

Patient was informed about post-surgical necessary precautions and also patient was informed to report back in case of any bleeding, swelling and unbearable pain. To prevent postoperative infective complications, antibiotics were prescribed i.e. Amoxicillin 500 mg thrice a day for 7 days and Analgesics (Zerodol-sp) was prescribed twice a day for 5 days and 0.2% Chlorhexidine digluconate mouth wash was prescribed twice daily for four weeks and patient was advised to avoid vigorous brushing on the surgical site. The patient was recalled for follow-up and suture removal after 10 days.

Reevaluation after 10 days:

The suture was removed and irrigated using normal saline and betadine. Healing was satisfactory. Recall was scheduled for 1 and 3 months.

Reevaluation at 1 month and 3 months:

Reevaluation was done after 1 and 3 month which showed 3 mm gain in root coverage as well 3mm increase in the width of keratinized gingiva. Also a clear demarcation of mucogingival junction was seen when lugol's iodine solution was applied. (Fig 8,9,10). Formation of keratinized gingiva was evaluated with both the technique and no difference was found between them.

III. Discussion:

Several mucogingival techniques have been introduced in literature aiming to correct marginal tissue recessions and to increase the width of keratinized gingiva. The most used techniques were free gingival graft, sub epithelial connective tissue graft, coronally positioned flap, laterally displaced flap, and the combination of coronally positioned flap with free gingival graft. Advantage of this technique over other is morphologic and chromatic resemblance its simplicity, and good vascularity of pedicle. Disadvantages include probable recession, dehiscence or fenestration at donor site and its limitation to only one or two teeth. Grupe and Warren described sliding flap operation for repair of gingival defect comprising the use of a full-thickness pedicle flap moved horizontally to cover the denuded root¹³. Sugarman reported with human histologic evaluation that new connective tissue attachment occurred with lateral pedicle graft¹⁴. Common and McFall demonstrated with human histology that laterally positioned flap combined with citric acid conditioning resulted in new cementum and collagen fibers that were oriented parallel to root surface¹⁵. Nelson achieved 88% root coverage by subpedicle connective tissue graft in which connective tissue graft was placed over the exposed root surface covered by an overlying full-thickness laterally positioned flap¹⁶. Kritika et al. in 2018 performed similar case to cover root recession using LPG (lateral positioned graft) with sub marginal incision and obtained predictable results¹⁷. Wang et al obtained complete root coverage with laterally positioned flap and subepithelial connective

tissue grafton localized severely denuded root surface after surgicalorthodontic treatment in cleft lip and palate patient¹⁸.

In this case there was satisfactory increase in the width of keratinized gingiva and partial root overage was seen. Also no recession or dehiscence and fenestration on the donor site were found at 3 month follow up. For complete root coverage there may be need of second stage surgery requiring coronally advanced flap.

IV. Conclusion:

Based on the results obtained, it can be concluded that there was satisfactory increase in the amount of keratinized gingiva as determined by conventional probing method and chemical staining with lugol's iodine. Also predictable root coverage was achieved. The laterally positioned flap along with the sub epithelial connective tissue graft technique can be a better option for obtaining increase in width of keratinized gingiva provided that there should be adequate width and thickness of attached gingiva at donor site.

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Figure legends:

Figure 1: Preoperative recession depth.

Figure 2: Photograph showing absence of attached gingiva with 41 using functional method

Figure 3: Photograph showing no demarcation of mucogingival junction with 41.

Figure 4: Incision placement at recipient bed

Figure 5: Placement of incision for lateral pedicle graft.

Figure 6: Placement of SECTG on recipient bed

Figure 7: suturing of lateral pedicle and SECTG

Figure 8: follow up at 3 month showing 3mm gain in recession depth.

Figure 9: follow up at 3 month showing 3mm increase in width of keratinized gingiva with functional method

Figure 10: follow up at 3 month showing clear demarcation of mucogingival junction indicating increase in width of keratinized gingiva.



Figure 1: Preoperative recession depth.



Figure 2: Photograph showing absence of attached gingiva with 41.



Figure 3: Photograph showing no demarcation of mucogingival junction with 41.



Figure 4: Incision placement at recipient bed.



Figure 5: Placement of incision for lateral pedicle graft.



Figure 6: Placement of SECTG in between pedicle flap.



Figure 7: suturing of lateral pedicle and SECTG.



Figure 8: follow up at 3 month showing 3mm gain in recession depth.



Figure 9: follow up at 3month showing 3mm increase in width of keratinized gingiva.



Figure 10: follow up at 3 month showing clear demarcation of mucogingival junction indicating increase in width of keratinized gingiva.