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Submission date: 25-Aug-2020 08:24AM (UTC+0800)

Submission ID: 1373656338

File name: 16._Modified_Tunneling_Technique.pdf (488.21K)

Word count: 2030

Character count: 11623

Modified Tunneling Technique With Acellular Dermal Matrix Combined With Platelet Rich Fibrin (PRF) For Treatment Of Gingival Recession: A Case Report

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Abstract: One of the most common aesthetic concerns associated with the periodontal tissues is gingival recession. Gingival recession is the exposure of root surfaces due to apical migration of the gingival tissue margins; gingival margin migrates apical to the cemento-enamel junction. Although it rarely results in tooth loss, marginal tissue recession is associated with thermal and tactile sensitivity, aesthetic complaints, and a tendency toward root caries. Selection of the most appropriate soft tissue grafting procedure must be done carefully. This search for predictable aesthetic outcome has led to the development of several new and modified surgical techniques in the past decades, such as modified tunneling technique. **Case:** A 33-year-old female visited Periodontics Clinic of Dental Hospital Airlangga University with the chief complaint of poor aesthetic and dental sensitivity resulting from exposed root surfaces in mandibular central incisors. Through clinical evaluation revealed, Miller's class III defect. The recession on buccal teeth 31 and 41 (FDI notation) were 3mm and 4mm. Modified tunnel technique with the use of an acellular dermal matrix (Surederm[®]) combined with PRF was planned. **Discussion:** The treatment of gingival recession through creating "tunnel" beneath the buccal mucosa allows coronal repositioning of the soft tissue with predictable root coverage and aesthetic. Horizontal incision enables placement of tissue graft. **Conclusion:** Based on this report, placement of an acellular dermal matrix with modified tunnel technique is an effective treatment modality with predictable and highly aesthetic result.

Keywords : Gingival recessions, Root coverage, Modified tunnel technique, Acellular Dermal Matrix (ADM), platelet rich fibrin (PRF).

1. Introduction

Gingival recessions are known to cause aesthetic and health problem for patient. The etiology of gingival recession is multifactorial, included periodontal disease, accumulations, inflammation, improper flossing, aggressive tooth brushing, incorrect occlusal relationships, and dominant roots. There is a strong correlation between the severity and extent of gingival recession and orthodontic treatment. The main indications for root coverage procedures are aesthetic and/or cosmetic demands. Coverage of denuded roots have become one of the most challenging procedures in periodontal surgery.^{1,2}

Surgical procedures used in the treatment of recession defects may be classified as pedicle soft tissue grafting procedures (the laterally sliding flap), double papilla flap, coronally repositioned flap or free soft tissue grafting procedures.³

In 1985, Raetzke described a different version of connective tissue graft called “envelope technique”. Allen in 1994, in a modification of Raetzke’s technique described the tunnel or supraperiosteal envelope technique for the treatment of multiple adjacent gingival recession. Santorelli adapted the tunnel technique using a single vertical incision. While, Mahn adapted the tunnel technique approach for acellular dermal matrix (ADM).⁴

Selection of the most appropriate soft tissue grafting procedure must be done carefully. This search for predictable aesthetic outcome has led to the development of several new and modified surgical techniques this past decades, such as modified tunneling technique. This procedure while maintaining the critical papillary integrity and avoiding vertical releasing incision. This article describes a modified tunneling technique with the use of an acellular dermal matrix to achieve root coverage.

2. Case

A-33-year-old female patient visited Periodontic Clinic Dental Hospital of Airlangga University for evaluation and treatment of gingival recession associated with the mandibular central incisors. The patient complained about dental sensitivity. Her general health condition was good. Patient did not take any medication, had no allergies and was non smoker. She was excited about attempting to eliminate aesthetic problem. Clinical evaluation revealed gingival recession on buccal surface tooth 31 and 41 (FDI notation) extending 3-4 mm apical of the incisors. According to Miller’s classification, this case classified as Miller class III. Modified tunnel technique with the use of an acellular dermal matrix (Surederm[®]) combined with platelet rich fibrin was planned.

3. Case Management

Patient initially underwent phase I periodontal therapy that comprised scaling and root planning and oral hygiene instructions. Informed consent was obtained from the patient after discussion of the procedure that will be carried out. Complete aseptic precautions were taken using 10% povidone iodine solution.

About 2 ml of anaesthetic solution Scandonest[®] (2% Articaine with 1:100.000 adrenaline) was administered as nerve block and/or infiltration. Horizontal access incision was made using blade no. 15c, (**Fig. 2 (A)**). The incision was made through the periosteum so as to facilitate elevation of subperiosteal tunnel and exposure of the facial osseous plate. A microsurgical periosteal elevator was used to create the subperiosteal tunnel (**Fig.2 (B)**). The tunnel was extended one or two teeth beyond the teeth being treated to mobilize gingival margin and facilitate coronal repositioning.

Additionally, the subperiosteal tunnel was extended well beyond the mucogingival margin, through the gingival sulci to allow low tension coronal repositioning of the gingiva. The tunnel elevation was extended interproximally under each papilla as far as the embrasure space permits, without making any surface incisions through papilla (**Fig. 2(C)**).

The root surfaces were then conditioned for 4 minutes with Tetracycline to eliminate the smear layer (**Fig. 2(D)**). ADM has been soaked in saline solution for 30 minutes before then inserted through subperiosteal tunnel(**Fig. 2(E)**).

The membrane and mucogingival complex were then advanced coronally and stabilized in the new positioned with a coronally anchored suturing, by placing horizontal mattress at approximately 2-3 mm apical to gingival margin of each tooth. The suture was then tied to positioned the knot at the mid coronal point of the facial aspect of each tooth, which was secured with composite (**Fig. 2(F)**).

Postoperatively patient was prescribed three times daily with NSAID (Mefinal 500 mg) for pain management and antibiotic (Amoxycilin 500 mg). Patient was instructed to use hyaluronic acid gel three times daily for post operative maintenance. Patient was recalled after one week post operative. Suture removal was done after two weeks post operative.

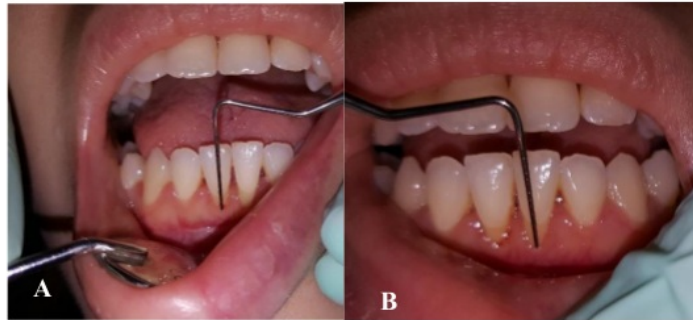


Figure 1. A and B showed intra oral condition pre operative showed Miller's class III recession on buccal teeth 31 and 41.

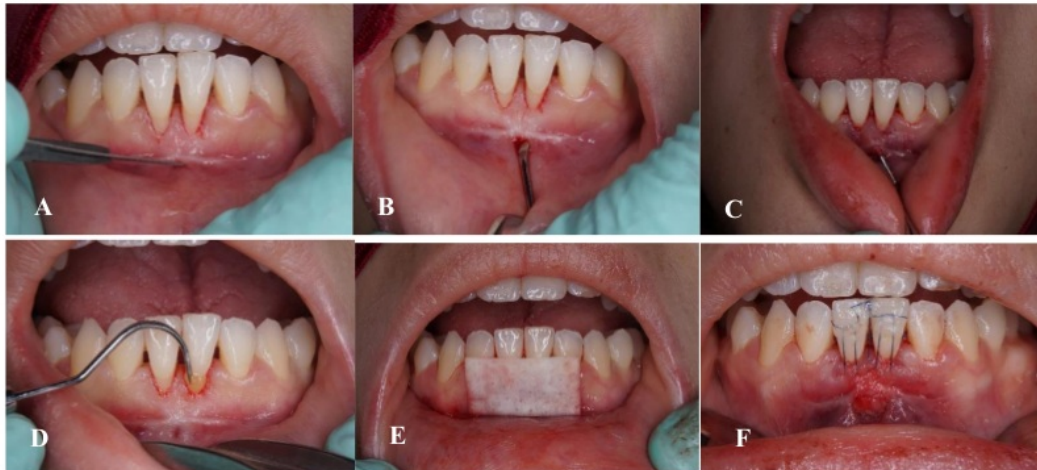


Figure 2. Modified tunneling technique procedures:(A) Horizontal incision using blade no.15C; (B) Periosteal tunnel preparation; (C) The tunnel elevation was extended interproximally under each papilla as far as the embrasure space permits; (D) The root surfaces were then conditioned for 4 minutes with Tetracycline to eliminate the smear layer; (E) Insertion of acellular dermal matrix (Surederm®); and (F)Coronally anchored suture with composite stop.

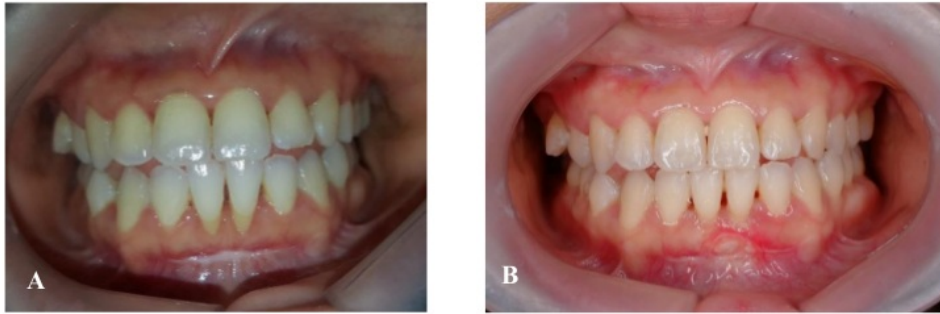


Figure 3. (A) Pre operative condition; (B) 1 month post operative

4. Discussion

The etiology of gingival recession is multifactorial like excessive or inadequate tooth brushing, destructive periodontal disease, tooth malpositioning, alveolar bone dehiscence, thin and delicate marginal tissue root surface, high muscle attachment and frenal pull, occlusal trauma and other iatrogenic factor.⁵

Classification of gingival recession according to Miller's divided into 4 class. (1) Class I: Marginal tissue recession that does not extend to the mucogingival junction. There is no bone loss or soft tissue in the interdental area; (2) Class II: Marginal tissue recession extends to or beyond mucogingival junction. There is no bone loss or soft tissue in the interdental area; (3) Class III: Marginal tissue recession extends to or beyond mucogingival junction. There is bone and soft tissue loss interdentally or malpositioning of the tooth; and Class IV: Marginal tissue recession extends to or beyond mucogingival junction. There is severe bone and soft tissue loss interdentally or severe malpositioning of the tooth.⁶

This classification is useful when deciding on treatment options. Nowadays, it is the most widely used. The key factors which determine the successful management of gingival recessions are the identification of its etiological agents and their elimination, the assessment of the degree or tissue involvement and selection of surgical procedure to achieve optimal root coverage.⁷

The choice of surgical modality and material is based on different factors such as degree of recession, location, width of keratinized tissue, gingival tissue biotype, the level of interdental papillae and the alveolar bone, the vestibular depth and positioned of labial frenulum, aesthetic demands and patient's preference.^{7,8}

Connective Tissue Graft (CTG) has been considered the gold standard for the treatment due to its significant outcomes in complete root coverage, attachment gain, keratinized tissue gain, and overall long-term stability. On the other hand, the need for second surgical site to harvest the CTG is main disadvantage due to increased risk of bleeding, pain, and swelling that leads to the need for other root coverage alternatives. As a result, Acellular Dermal Matrix (ADM) has been approved as a substitute for CTG.^{8,9}

ADM is an allograft that is chemically processed to remove all epidermal and dermal matrix. ADM works like an autogenous graft by providing a bioactive matrix consisting of collagens, elastin, blood vessel channels, and bioactive protein that support natural revascularization, cell repopulation, and tissue remodeling. ADM considered to be a safe alternative to autogenous grafts

and no cases of viral transmission have been reported in more than 10 years of use more than 900,000 grafts.¹⁰

In this case we used modified tunnel technique with material of acellular dermal matrix with PRF. Growth factors present in PRF plays crucial role in a hard and soft tissue repair. These growth factor include PDGF, EGF, TGF- β , VEGF, and IGF-1. These growth factors has been shown to accelerate and promote fibroblastic proliferation, and increase tissue vascularization.^{8,9,11} The treatment of gingival recession through creating “tunnel” beneath the buccal mucosa allows coronal repositioning of the soft tissue with predictable root coverage and aesthetic. Horizontal incision enable placement of ADM.

5. Conclusion

The modified tunnel technique with the use of acellular dermal matrix combines several technique that maximize their benefits. Based on this report, placement of an acellular dermal matrix and platelet rich fibrin with modified tunnel technique is an effective treatment modality with predictable and highly result.

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