
The Treatment of Miller's Class I Gingival Recession Implementing the Modified Coronally Advanced Tunnel Technique (MCAT) and Acellular Dermal Matrix (ADM)

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ABSTRACT:

Background: Gingival recession can lead to root hypersensitivity, root caries, and impaired aesthetic concerns. Modified coronally advanced tunnel (MCAT) technique, which possesses various benefits that can be used to support the success in the treatment of gingival recession. Acellular dermal matrix (ADM) is used in the procedure, frequently documented indicating encouraging results in the treatment of gingival recession. The following case report is to indicate an evaluation on the treatment utilizing MCAT with ADM.

Case presentation: A male of 27 year-old arrived with main complaints of aesthetic concerns and dental hypersensitivity on the upper right teeth posterior caused by Miller's class I gingival recession. The aforementioned technique is chosen in treatment considering the rate of success to treat the defects as the impact of gingival recession.

Case management: The MCAT with ADM commenced with the fabrication of composite stops at the contact points. Later local anaesthesia (lidocaine HCl 2% with epinephrine 1:100,000) was given. Intrasulcular incision was then made and the mucoperiosteal flap was raised with tunneling knives. The tunnel was then extended over the mucogingival junction. ADM was pulled into the tunnel by means of mattress sutures. Finally the tunnel was positioned coronally to the CEJ by means of suspended sutures placed around the contact points.

Conclusion: The use of MCAT technique with ADM (Mucoderm) is able to show satisfying outcome with the improvement of root coverage in the case of Miller's class I gingival recession.

KEYWORDS: Gingival recession, Miller, modified coronally advanced tunnel, acellular dermal matrix, root coverage

INTRODUCTION

Gingival recession is considered as one of the most common problems affecting the periodontium.¹ It is defined as the exposition of the root surface caused by the migration of gingival margin to the apical of cemento-enamel junction (CEJ). As the result of the exposition of the surface root, aesthetic problems, root hypersensitivity, cervical abrasion as well as the difficulty in achieving optimal plaque control might arise. The causes of gingival recession can be attributed to the dental position being not in the proper dental arch, dental brush traumas, dehiscence on the alveolar bone, thin biotype gingival, periodontal diseases.² Gingival recession can be classified into four classes based on Miller's classification, i.e. (A) class I : gingival margin tissue not exceeding the mucogingival junction, no bone damage nor harm on the soft tissues in the interdental area (B) class II : gingival margin tissue widen to or over the mucogingival junction, no bone damage nor harm on the soft tissues in the interdental area (C) class III : gingival margin tissue widening to or over the mucogingival junction, the loss of bone or soft tissue in the interdental area, dental malposition might arise (D) class IV : gingival margin tissue widening to or over the mucogingival junction, the loss of bone or soft tissue in the interdental area, dental malposition might arise with more severe condition.³

Any treatment on the patient will not succeed if the causes are not treated accordingly. As soon as the causes are identified, measures can be taken to eliminate them. Non-surgical treatment can be conducted, e.g. using different kinds of sensitive toothpaste as well as desensitizing agents. If such treatments are proven not to work to alleviate the symptoms on the patients, invasive treatments, such periodontal plastic surgery, should be considered.⁴

Periodontal plastic surgery encompasses a broad range of procedures to maintain and prevent the periodontal recession. Periodontal recession should be treated surgically in order to obtain complete root coverage with adequately wide keratinized gingiva (2 mm) for an esthetic result and gingival physiology.⁴

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One of the recently developed surgical techniques to obtain root coverage in the gingival recession defect is modified coronally advanced tunnel (MCAT).⁵ MCAT technique offers some benefits, namely, wound healing and speedy revascularization in the surgical area by avoiding vertical incision and not performing any incision on the papilla tissue.⁶

The surgical technique for the gingival recession generally can be achieved with free gingival as well as connective tissue graft (CTG).⁴ In conducting CTG there is a main disadvantage of the patient morbidity related to the second surgical area and inefficient surgical time, the limited availability of the donor tissue, and the possibility of the post surgery complication. To overcome the aforementioned disadvantages there has been a new material developed to replace CTG, namely, acellular dermal matrix (ADM) to increase the proper acceptance in the patient as well as minimizing any morbidity.⁵ Some clinical studies have shown satisfying result in the use of MCAT employing CTG or other graft tissue replacements in the Miller's class I, II, III gingival recession.⁷

CASE PRESENTATION

A 27-year-old male patient came to the Department of Periodontology of the Dental and Oral Hospital at Airlangga University with a complaint of aesthetic nature and hypersensitivity in the upper right posterior. In the clinical examination Miller's class I recession was found in the teeth 14 and 15 (**Fig. 1**). The patient refused the procedure of harvesting connective tissue of the palatal area. Thereof, MCAT was employed to cover the recession with the acellular dermal matrix (ADM) insertion.



Fig. 1. Patient indicating Miller's class I gingival recession in the teeth 14 and 15

CASE MANAGEMENT

Initial procedure was performed on the patient involving scaling and root planing. Surgery was performed after phase I periodontal therapy. The patient gave his approval on informed consent regarding the planned procedures. Modified coronally advanced tunnel (MCAT) was the second surgical technique employed with Mucoderm (Bottis) as the autograft soft tissue replacement and scaffold.

A moment prior to the surgery composite stop in the contact points were made to keep attached gingiva stay in the coronal position in relation to the gingival margin during the suturing process (**Fig. 2A**). Aseptic procedure in the planned surgical area was done with a cotton pellet and povidone iodine 10% (**Fig. 2A**). Local anesthetic (lidocaine HCl 2% with epinephrine 1:100,000) was the given in mucobuccal fold in tooth 14 and 15 (**Fig. 2B**). Intrasulcular incision was performed next and the mucoperiosteal flap was then removed with tunneling knives (**Fig. 2C**). The tunnel then was slowly loosened over mucogingival junction and under each of papilla of the split flaps to release any attached muscle and collagen fiber from the aspect of each flap paying attention not to damage any interdental papilla (**Fig. 2D**). Further investigation was later done to ascertain the adequacy of the tunneling prior to the mucoderm application (**Fig. 2E-2F**).

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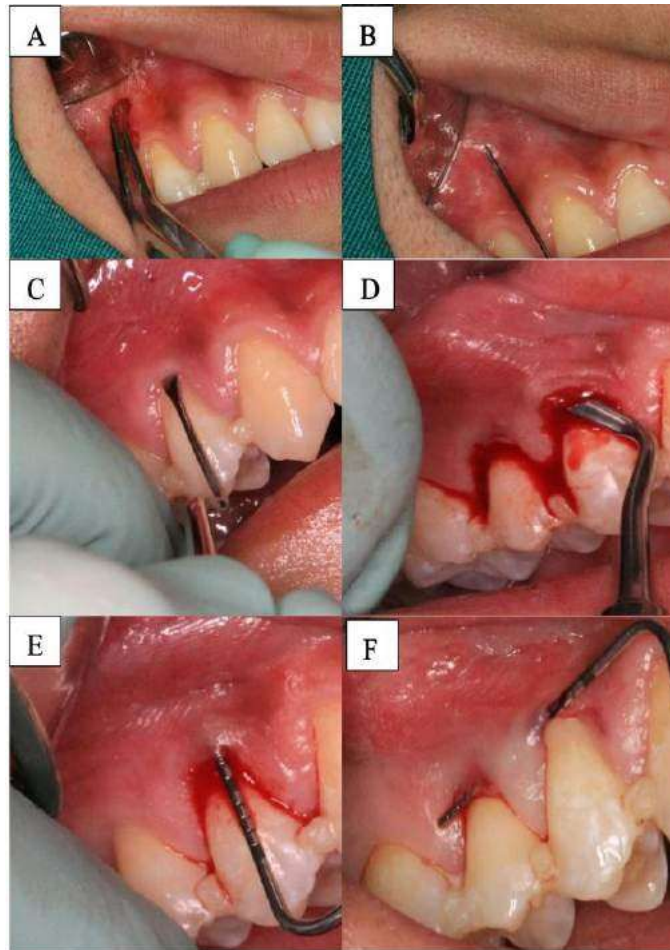


Fig. 2. Surgical procedures: (A) creating composite stops and surgical area aseptic procedure; (B) local anesthetics; (C) intrasulcular incisions; (D) slowly widening tunneling avoiding interdental damage; (E-F) investigating the tunnel area for the appropriate place for mucoderm application

Having done the investigation, granulation tissue curettage was conducted in tooth number 14 and 15 followed by the suturing the 4.0 nylon monofilament thread into the attached gingiva (**Fig. 3A**). This was done to observe whether the mucosa was able to cover the recession (**Fig. 3B**). Sodium chloride gel was then applied on cementum in order to obstruct the bacterial colonization (**Fig. 3C**). This also served as disinfectant for approximately 2 minutes prior to irrigation.

ADM (Mucoderm, Bottis) size was then appropriated in relation to the surgical area. A piece of the nylon monofilament thread was stitched into the tip of mucoderm to facilitate its placement in the surgical area (**Fig. 3D**). The mucoderm was next soaked in saline solution for approximately two minutes. ADM was inserted into the tunnel by way of mattress sutures, fixated into the mesial and distal (**Fig. 3E-3F**). Next the tunnel was positioned into the coronal by pulling the nylon monofilament, previously stitched in the attached gingiva, into the coronal and over the composite stops which had been placed in contact points (**Fig. 3G**). This was done to cover the ADM membrane and recession completely.

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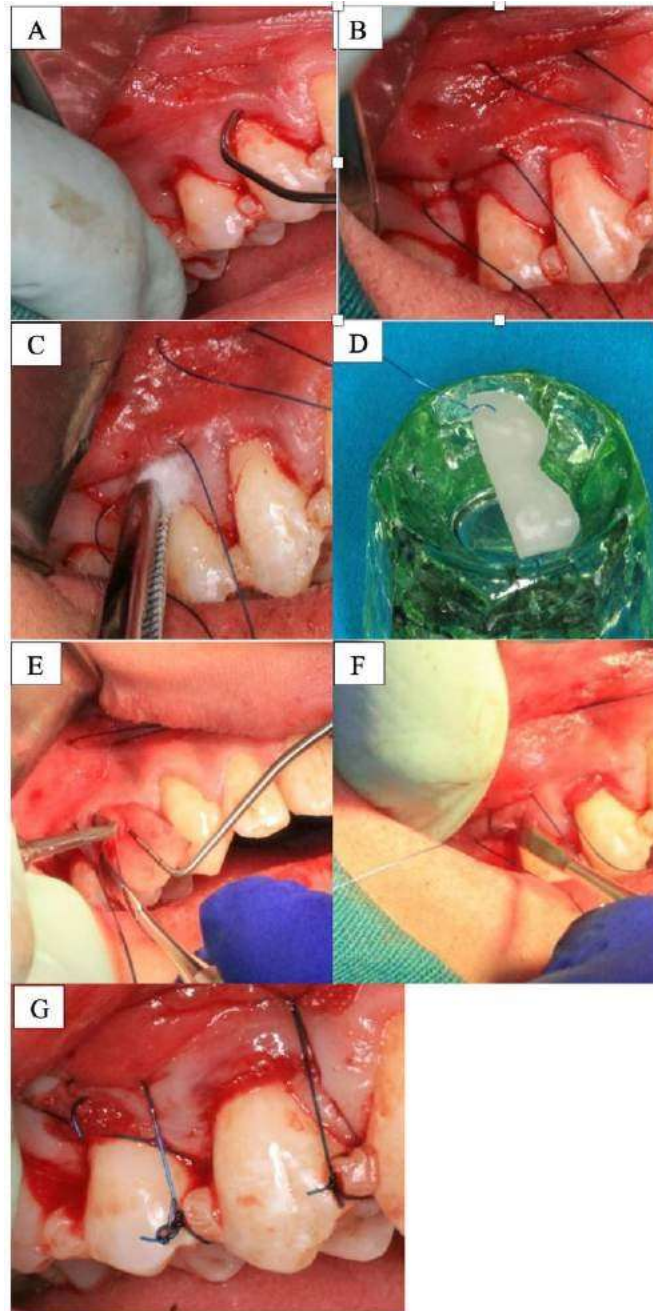


Fig. 3. Surgical procedures: (A) granulation tissue curettage; (B) pulling the nylon monofilament to observe if the mucosa was able to cover the recession area; (C) sodium chloride gel was then applied on cementum; (D) a piece of nylon monofilament was stitched into the tip of the mucoderm; (E) mucoderm was inserted into the tunnel; (F) final stitching was done as well as ascertaining that the mucoderm was not exposed; (G) the stitching was done from the attached gingiva and pulled to the coronal by way of composite stops.

Post surgical medication involved giving amoxicillin 500 mg for 5 days and mefenamic acid 500 mg for 3 days. The patient was informed to schedule following medical checkups on the 1st, 3rd, 5th, 6th day (Fig. 4A-4E). Root coverage improvement was visible in the recession of tooth 14 and 15.

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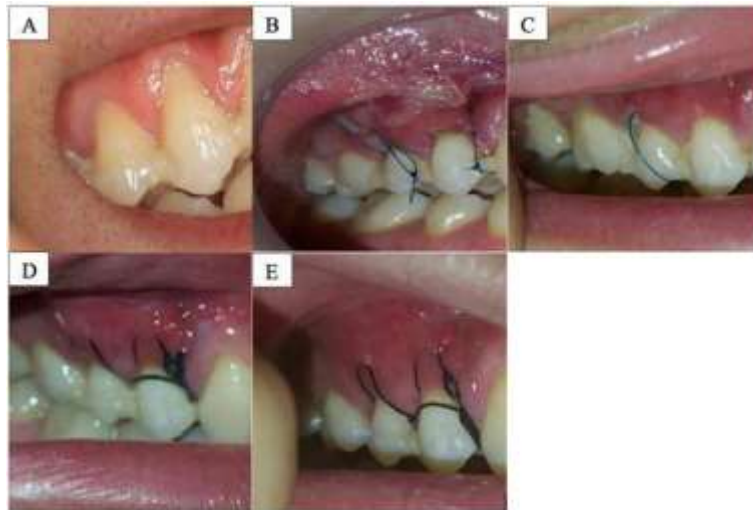


Fig. 4. (A) Pre-surgery photo; (B) 1st day post surgery; (C) 3rd day post surgery; (D) 5th day post surgery; (E) 6th day post surgery



Fig. 5 .7 years post surgery

7 years after surgery, MCAT, the tooth # 15 is indicative of a stable result. Whereas the tooth # 14 is indicative of returning of gingival recession (**Fig. 4F**). This is might be due to the ortho treatment that the patient went through 6 months prior to the documentation (patient went through the treatment in order to improve his occlusion) as well as the fact that the patient habitually clenched his teeth aggravating the recession occurring on the tooth # 14.

DISCUSSION

The treatment of gingival recession and repair of mucogingival integrity is a great challenge.⁸ Modified coronally advanced tunnel (MCAT) is one of the surgical techniques developed to obtain root coverage in the case of gingival recession defect.⁵ The technique has the advantage over other surgical methods by enabling the avoidance of the use of vertical incision as well as not incising any papilla, thus, minimizing the risk of vascularization. The technique also enables the placement of flap into the coronal so that the graft soft tissue can be covered entirely and in such condition the graft endurance can be improved.^{6,9} The modified coronally advanced flap or modified coronally advanced tunnel, which is combined with the use of soft tissue graft, one of them being connective tissue graft (CTG) has been reportedly indicating satisfying result in relation to full root coverage.² However, the use of CTG presents problems in the procedures, namely, the need for CTG which demands secondary surgical area, the availability of the tissue donor which is limited in number, the risk of post-surgery complications, morbidity in relation to the harvest of palatal mucosa of autogenous donor (which also presents the risk of post-surgery patient's discomfort in the surgical area due to any surgical wound). ADM is used to overcome these disadvantages.^{5,10}

ADM is a type allograft processed chemically to eliminate any epidermal as well as dermal cells but it has the ability to retain dermal bioactive matrix excess. ADM functions as autogenous graft by providing bioactive matrix consisting of collagen, elastin, blood vessels, bioactive protein which supports natural revascularization, cell repopulation, as well as tissue remodeling. ADM is considered as the safe alternative to autogenous graft. There has been no virus transmission case reported for over 10 years in the use of over 900,000 grafts.¹⁰ ADM eliminates the need for any palatal tissue harvest in the root coverage procedures. Its use presents very few complications and little discomfort post-surgery.⁸ ADM also has the benefit of not needing any tissue donor and is able to give similar satisfying result as CTG.¹⁰

Recession coverage resulted with the use of ADM has achieved the average of 84.4% root coverage. Another study has reported 78% root coverage when ADM is used in combination with tunneling technique.⁸ In the study done by Vincent et al 2017 the use of MCAT technique combined with ADM has succeeded in treating gingival recession of multiple Miller's class I and II, in the upper

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jaw with the average result of 84.35% root coverage in 12 months.⁵ Nevertheless, there is possibility that the initial condition might return as indicated in figure 4F.

CONCLUSION

The use of MCAT technique combined with ADM (Mucoderm) is able to show satisfying results, namely, the increase of root coverage in the gingival recession multiple Miller's class I.

Further studies with more samples and prolonged follow-up period are required for better understanding of this subject.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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