Root coverage using modified tunneling technique with acellular dermal matrix for treatment of gingival recession associated with orthodontic treatment: A case report

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ABSTRACT

Background: *Gingival recessions are known to affect a patient's appearance and health. Gingival recession has a number of causes, including orthodontic therapy. The degree and extent of gingival recession and orthodontic therapy are strongly correlated. Care must be taken in choosing the best soft tissue grafting technique. These past several decades have seen the development of a number of new and improved surgical techniques, including the modified tunneling technique.*

Case :*A-24-year-old female patient came to Periodontic Clinic Dental Hospital of Airlangga University with a chief complain of gingival recession in mandibular central incisors since 6 months ago. The patient complained about dental sensitivity. General health condition was good and no systemic diseases. Patient did not take any medication, had no allergies and was non smoker. The dental history revealed that she had undergone fixed orthodontic therapy for 7 years. She revealed the fixed orthodontic appliance was put off since 8 months ago. The patient concern about her appearance and aesthetic problem. She wanted to eliminate gingival recession. Gingival recession on buccal surface tooth 31 and 41 extending 1,5-2 mm apical of the incisors was found in clinical assessment. This case classified as Miller class III according to Miller classification. The doctor planned root coverage procedure using modified tunnel technique. Acellular dermal matrix (Surederm®) was chosen as a gingival graft.*

Conclusion: *In brief, root coverage using modified tunnel technique is effective and predictable treatment modality. Comparing with other root coverage method it give quite satisfying result. The use of Acellular Dermal Matrix (ADM) considered as an alternative to Connective Tissue Graft (CTG).*

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INTRODUCTION

Atrophic periodontal alterations called gingival recession are frequently linked to tooth discomfort. The health and look of a patient are both recognized to be impacted by gingival recessions. For dentists to successfully treat these disorders, they must be aware of the proper treatment order. Understanding the causes of gingival recession and the resulting tooth sensitivity is essential. Gingival inflammation, vigorous brushing, regular use of toothpaste with a high relative dentin abrasivity, periodontitis, oral piercings, and orthodontic treatment are some of the factors that contribute to gingival recession. Gingival recession can be treated and prevented using a variety of periodontal surgical techniques. To fully cover the roots, gingival recession should be surgically addressed. For purposes of aesthetics and/or cosmetics, root covering surgeries with suitably wide keratinized gingiva (2 mm) are the primary rationale. among the most difficult.[1]

Free soft tissue grafting, double papilla flap, coronally relocated flap, and pedicle soft tissue grafting (the laterally sliding flap) are all surgical procedures used to treat recession abnormalities.[2] Raetzke first described the "envelope technique" in 1985, a novel kind of connective tissue graft. In 1994, Allen described the tunnel or supraperiosteal envelope technique as a modification of Raetzke's method for treating numerous consecutive gingival recessions. Santorelli altered the tunnel technique by creating a single vertical cut. For usage with acellular dermal matrix (ADM), Mahn adapted the tunnel technique approach.3 Because the interdental papilla was left intact and there were no vertical incisions made during the tunnel technique, the aesthetics were improved. The tunnel procedure is intended to treat numerous and significant gingival recession, which is typically found in the jaws where obtaining root coverage is challenging. Additionally, the tunnel technique aids in maintaining a sufficient and continuous blood irrigation to guarantee a superior graft adaption in the receiving area.[1]

Since more than two decades ago, acellular dermal matrix (ADM) has been employed in place of connective grafts to treat gingival recession in conjunction with a range of flap designs. In most cases, free gingival or connective tissue grafts are used as the surgical procedure for gingival recession. Acellular dermal matrix (ADM) has recently been the subject of multiple studies evaluating its efficacy for mucogingival surgery. Avoiding the use of human donor tissue, having a higher availability, and being harvested in huge quantities are all benefits of adopting ADM. To maintain the graft close to the gingival border, modified coronally advanced tunneling (MCAT) offers the best attributes of mini-invasive, favourable flap relaxation, and opportunity. Allen and Winter (2011) used ADM and tunneling for the treatment gingival recession associated with cervical lesions.[3,4]

Treatment must be taken in choosing the best soft tissue grafting technique. These past several decades have seen the development of a number of new and improved surgical techniques, including the modified tunneling technique. This method avoids making a vertical releasing incision and maintains the crucial papillary integrity. In order to obtain root coverage, this article describes a modified tunneling approach using an acellular dermal matrix.

CASE REPORT

A-24-year-old female patient came to Periodontic Clinic Dental Hospital of Airlangga University with a chief complain of gingival recession in mandibular central incisors since 6 months ago. The patient complained about dental

sensitivity. General health condition was good and no systemic diseases. Patient did not take any medication, had no allergies and was non smoker. The dental history revealed that she had undergone fixed orthodontic therapy for 7 years. She revealed the fixed orthodontic appliance was put off since 8 months ago. The patient concern about her appearance and aesthetic problem. She wanted eliminate gingival recession. Gingival recession on buccal surface tooth 31 and 41 extending 1,5-2 mm apical of the incisors was found in clinical assessment. This case classified as Miller class III according to Miller classification. The doctor planned root coverage procedure using modified tunnel technique. Acellular dermal matrix (Surederm®) was chosen as a gingival graft.

The patient first received phase I periodontal therapy, which included advice on dental care and scaling and root planing. After explaining the operation to the patient, their informed consent was obtained. A 10% povidone iodine solution was used in conjunction with strict aseptic measures.

A nerve block and/or infiltration with the anesthetic Scandonest® (2% Articaine with 1:100.000 adrenaline) took place. The blade number 15c was used to make a horizontal access incision (Fig. 1 (A)). To enable elevation of the subperiosteal tunnel and exposure of the face osseous plate, surgical incision was created through the periosteum. The subperiosteal tunnel was made using a microsurgical periosteal elevator (Fig. 1 (B)). To mobilize gingival tissue, the tunnel was extended one or two teeth beyond the tooth being treated.

The subperiosteal tunnel was further expanded across the gingival sulci and well beyond the mucogingival boundary to enable low tension coronal repositioning of the gingiva. Without making any surface incisions through the papilla, the tunnel elevation was extended interproximally under each papilla as far as the embrasure space would allow (Fig. 1(C)). To remove the smear layer, Tetracycline was then applied to the root surfaces for 4 minutes (Fig. 1(D)). ADM has been subperiosteally tunneled after 30 minutes of soaking in saline solution (Fig. 1(E)). By positioning a horizontal mattress about 2-3 mm apical to the gingival margin of each tooth, the membrane and mucogingival complex were then advanced coronally and fixed in the new position by a coronally anchored suturing. After placing the knot with the suture, each tooth's face aspect was fastened with composite at the mid-coronal point (Fig. 1(F)).

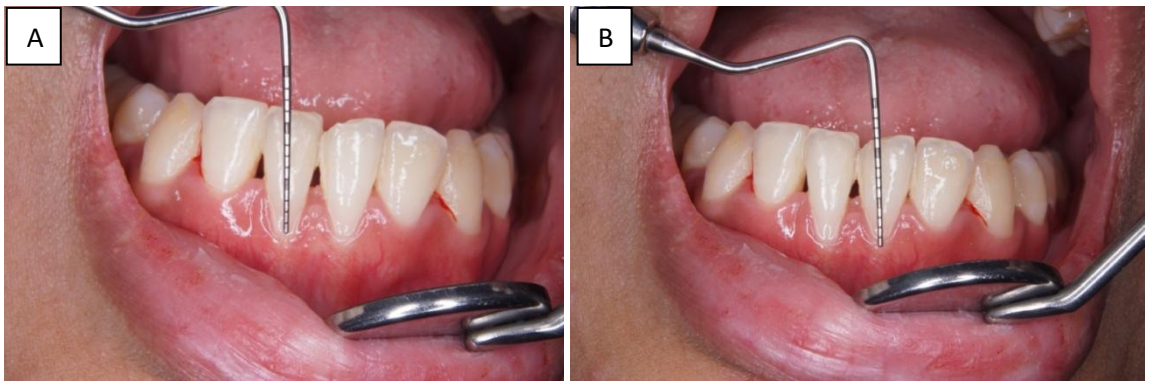

Figure 1. (A and B) depicts the intraoral situation prior to surgery on buccal teeth 31 and 41 with Miller's class III recession.

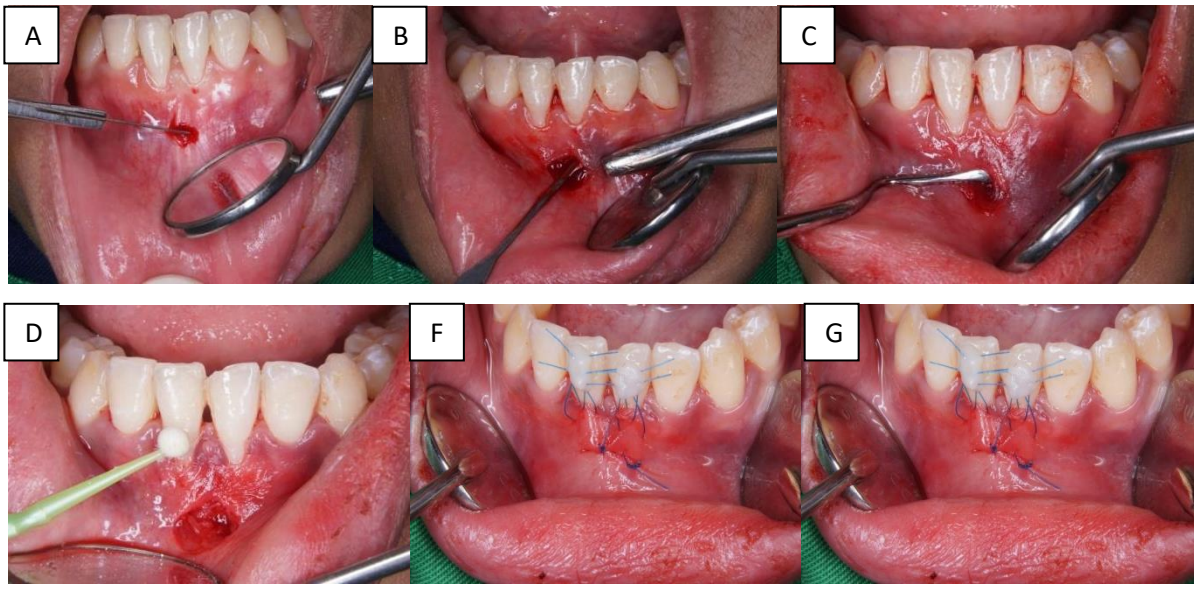

Figure 2. Procedures for modified tunneling techniques: Horizontal incision with blade no. 15C; preparation of the periosteal tunnel; extension of the tunnel elevation interproximally under each papilla as far as the embrasure space permitted; conditioning of the root surfaces with tetracycline for 4 minutes to remove the smear layer; insertion of acellular dermal matrix (Surederm®); and (F) coronally anchored suture with composite stop.

Following that, the horizontal incision access was roughly measured and interrupted sutured using 5.0 propylene suture. Following surgery, the patient was given NSAID (Mefinal 500 mg) and antibiotic (Amoxycilin 500 mg) prescriptions three times each day. For post-operative care, the patient was told to apply hyaluronic acid gel three times each day. After one week following surgery, the patient was summoned back. Suture removal was done after two weeks post operative.

Figure 3. (A) Pre operative condition; (B) 14 days post operative; (C) 1 month post operative; and (D) 2 months post operative.

Figure 4. Before and after surgery: (A) Gingival recession before surgery and (B) Gingival recession conditionafter surgery.

DISCUSSION

Gingival recession has a number of different causes, including over or under brushing, destructive periodontal disease, crooked teeth, alveolar bone dehiscence, thin and delicate root surfaces, high muscle attachment and frenal pull, trauma of occlusion, and other iatrogenic factors. Among them, a significant association between the degree and scope of gingival recession and previous or ongoing orthodontic treatment was discovered.[5]

Numerous anatomical and morphological characteristics were postulated to play a role in the development of gingival recession. When tooth roots travel through the alveolar cortical bone during orthodontic therapy, alveolar bone dehiscence may happen. Patients who have a narrow alveolar process, thin buccal or lingual bone plates, eccentrically positioned teeth, a basally expanded maxillary sinus, and progressive alveolar bone loss undergo this sort of movement. Recent studies revealed that keratinized tissue width decrease may be strongly correlated with pro-inclination orthodontic treatment. Labial tooth movement may cause a reduction in the height of the free gingiva and a thinned-out buccolingual tissue layer, which will encourage gingival recession. Gingival recession may also be significantly influenced by periodontal biotype, according to certain research. In terms of gingival recession depth and keratinized tissue width, a significant association between thin biotype and pro-inclination orthodontic movement was discovered.[6]

The patient had been using a fixed orthodontic appliance for 7 years, according to dental records. Gingival recession was created by a thin periodontal biotype, as revealed by a clinical evaluation. The degree of recession, location, width of keratinized tissue, gingival tissue biotype, level of interdental papila and alveolar bone, vestibular depth and labial frenulum positioning, aesthetic requirements, and patient preference all play a role in the surgical modality and material selection.[7,8]

The main benefits of the tunnel technique are as follows: (1) Fast early healing with no visible scars; (2) No papilla incision; (3) Immediate augmentation of keratinized mucosa; (4) Reduce morbidity; (5) No displacement of mucogingival line; (6) No changes in the depth of vestibule; and (7) Minor postoperative swelling. Due to its notable results in full root coverage, attachment gain, keratinized tissue gain, and general long-term stability, connective tissue graft (CTG) has been regarded as the gold standard material for the treatment. On the other hand, the requirement for a second surgical site in order to harvest the CTG is the main drawback because of the elevated risk of bleeding, discomfort, and edema, which necessitates the use of other root covering options.

Acellular Dermal Matrix (ADM) has therefore been authorized.[9,10]

An allograft called ADM has all of the epidermal and dermal matrix removed through chemical processing. By offering a bioactive matrix made up of collagen, elastin, blood vessel channels, and bioactive protein that supports natural revascularization, cell repopulation, and tissue remodeling, ADM functions similarly to an autogenous graft. In more than 10 years of use and more than 900.000 grafts, ADM is thought to be a secure alternative to autogenous grafts; no incidences of viral transmission have been documented.[10] In this case, we used an altered tunnel approach using acellular dermal matrix material. Creating a "tunnel" through the buccal mucosa to treat gingival recession enables coronal repositioning of the soft tissue with predictable root coverage and a pleasing appearance. ADM can be inserted through a horizontal incision.[11,12]

Connective tissue graft (CTG) has been regarded as the gold standard for the treatment due to its considerable outcomes, including incomplete root coverage, attachment gain, keratinized tissue gain, and general long-term stability. On the other hand, the requirement for a second surgical site to harvest the CTG is one of the key drawbacks because it necessitates the use of other root covering options due to the elevated risk of bleeding, discomfort, and swelling. Acellular Dermal Matrix (ADM) has been authorized to replace CTG as a result.[13]

In this case, we used ADM combined with Platelet Rich Fibrin (PRF). PRF is made up of a fibrin matrix that has been polymerized into a tetramolecular structure, along with platelets, leukocytes, cytokines, and any circulating stem cells. As a mitogen, PRF promotes the proliferation of periodontal ligament cells, gingival fibroblasts, and osteoblasts. Its chemical makeup and low thrombin concentration make it the ideal matrix for fibroblast and endothelial cell migration. It enables faster angiogenesis and simpler fibrin remodeling. Leukocytes and important immune cytokines like IL 1, IL 6, IL 4, and TNF that are trapped in PRF are what give it its anti-infectious properties and enable it to function as an immune regulation mode. PRF matrix can release various growth factors and cytokines locally at the wound site for a prolonged period of time which play important role in various stages of wound healing promoting periapical tissue generation.[14]

CONCLUSION

In brief, root coverage using modified tunnel technique is effective and predictable treatment modality. Comparing with other root coverage method it give quite satisfying result. The use of Acellular Dermal Matrix (ADM) considered as an alternative to Connective Tissue Graft (CTG).

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Not applicable.

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