ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at:www.ijdsir.com

Volume – 7, Issue – 1, January- 2024, Page No. :61- 65

Periosteal Pedicle Graft: A Novel Root Coverage Technique

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Citation of this Article: Dr. Hira Ismail, Dr. Mohd. Aamir Khan, "Periosteal Pedicle Graft: A Novel Root Coverage Technique", IJDSIR- January - 2024, Volume –7, Issue - 1, P. No.61 – 65.

Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Gingival recession is defined as the displacement of the marginal tissue apical to the cementoenamel junction (CEJ). It can lead to tooth hypersensitivity, poor aesthetics, or difficulty executing basic oral hygiene routines. If left untreated, it might result in further tooth-related complications such as chemical erosions, cervical abrasions, and root caries. Therefore, it needs to be corrected by root coverage procedures. The purpose of developing newer methods for root coverage is to increase predictability, reduce the number of surgical sites, and improve patient comfort, along with the need to reconstruct the lost periodontal tissues. One such new procedure is Periosteal Pedicle Graft, developed by Mahajan in 2009. The present case report describes this technique and evaluates the results obtained thereafter.

Keywords: Periosteal pedicle graft, Gingival recession, Root coverage, Root coverage esthetic score

Introduction

Periodontal plastic surgery procedures are performed to prevent or correct anatomical, developmental, traumatic, or plaque-induced defects of the gingiva, alveolar mucosa, and bone. [1] Root coverage technique is one of the periodontal plastic surgery procedures that is performed to cover the denuded root surface by gingival regeneration or grafting procedures to correct gingival recession.

Attached gingiva plays a promising role in maintaining periodontal health."Inadequate" width of gingiva would lead to less tissue resistance to the apical spread of plaque-associated gingival lesions, which would furtherfavor attachment loss and soft tissue recession.[2]As a consequence, the gingival margin eventually shifts apically, reducing the vestibular depth and exacerbating the disease.A patient experiencing recession may struggle with tooth hypersensitivity, poor aesthetics, or difficulty executing basic oral hygiene routines. If left

untreated, it might result in further tooth-related complications such as chemical erosions, cervical abrasions, and root caries.

With the necessity to restore the lost periodontal tissues, the goal of creating more advanced techniques for root coverage is to boost predictability, decrease the number of surgical sites, and enhance patient comfort. Mahajan (2009) has described one such novel procedure for recession coverage by utilizing the autogenous periosteal pedicle graft.[3] In addition to having the ability to encourage the regeneration of lost periodontal tissue, this graft, which has its blood supply, may be harvested sufficiently close to the recession defect without the need for a second surgical site.

The present case report describes a technique where vestibular extension by fenestration technique was performed and the layer of periosteum reflected after fenestration was used as a pedicle graft for root coverage.

Case Report

Pre-surgical management

A 24-year-old female patient reported the chief complaint of receding gums in the lower front tooth region. On intra-oral examination, a 3 mm wide and 4 mm deep Miller Class III gingival recession in left mandibular central incisor was evident. (Figure 1). The patient had a malpositioned left mandibular central incisor with a deep bite. The tooth was non-mobile and the patient also gave a history of toothbrush trauma. The vestibular depth and the width of the attached gingiva were also inadequate in the region.

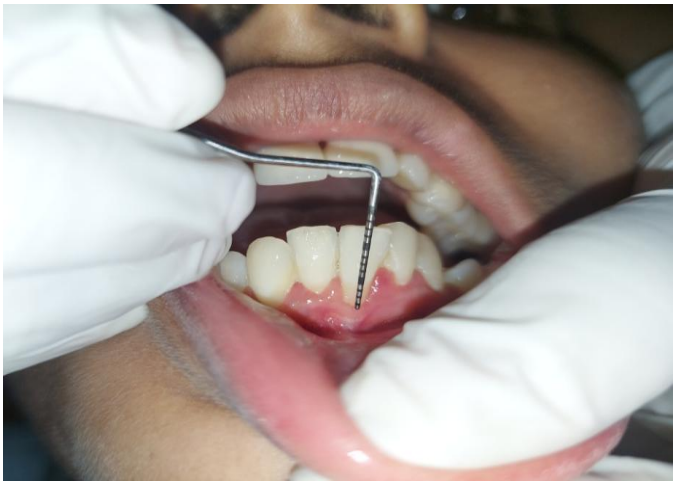

Figure 1: Pre-operative

A thorough general assessment of the patient was made by case history recording, clinical examination, and routine laboratory blood investigations. The patient was in good systemic health with no contraindications for periodontal surgery. The patient received phase I therapy with correction of traumatic occlusion and the surgery was planned after four weeks of follow-up. The patient was also advised for orthodontic correction before surgery which she denied.

Surgical management

Bilateral mental nerve block (Lignocaine 2% with 1:80,000 Adrenaline) was administered following extraoral (Betadine 10%) and intraoral (10 mL of 0.2% Chlorhexidine for 1 minute) mouth preparations. Using a Number 15c Bard Parker (BP) blade, a horizontal incision was performed from the left mandibular canine to the right mandibular canine at the mucogingival junction, preserving all of the attached gingiva. A split-thickness flap was reflected by sharply dissecting muscle fibers and tissue from the underlying periosteum up to the required vestibular depth. A tunnel was prepared at the recipient site by apical extension of the crevicular incision along the left mandibular central incisor with split-thickness dissection of the facially located tissues. (Figure2)

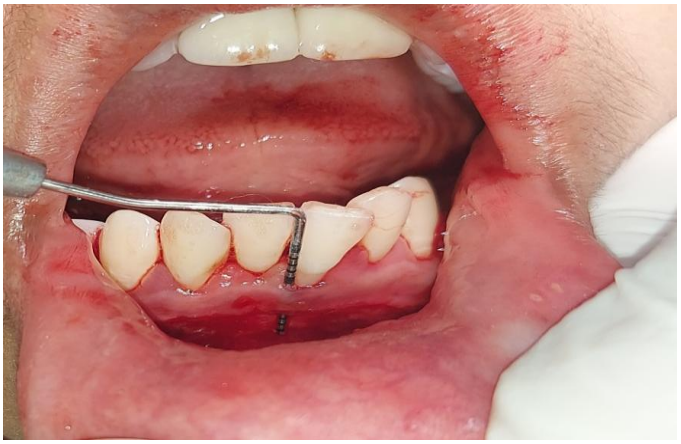

Figure 2: Tunnel preparation

Carefully a strip of periosteum was then reflected at the level of the mucogingival junction pedicled at the contralateral end, exposing the underlying bone creating a periosteal fenestration, and hence the name “Periosteal Pedicle Flap”.After root planning and root biomodification (Tetracycline HCl in a ratio of 100 mg/mL for 3 minutes), the Periosteal pedicle graft was then repositioned vertically towards the recession area, passing through the tunnel. The periosteal pedicle graft was sutured by an anchor suture using resorbable 5-0 sutures (Vicryl, Ethicon) (Figure-3). An aluminum foil was placed over the exposed bone (Figure-4) and a Periodontal dressing (Coe-Pak; GC America Inc.) was applied over the surgical area (Figure-5).

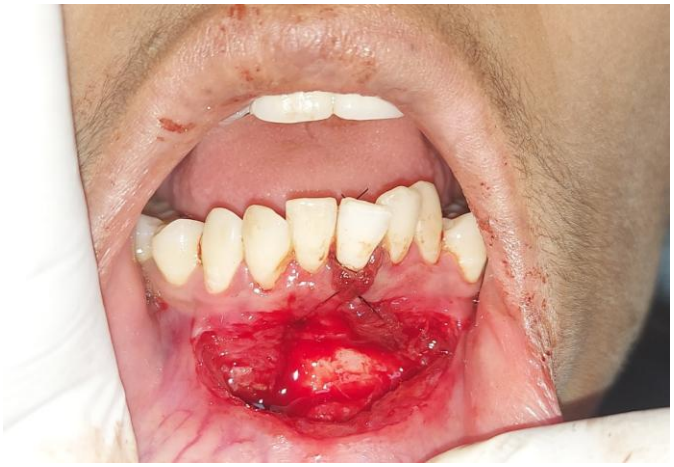

Figure 3: Periosteal fenestration done and Periosteal Pedicle Graft passed through the tunnel and sutured

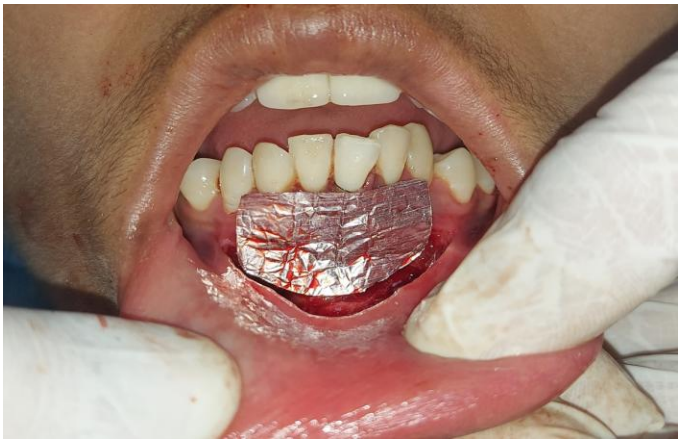

Figure 4: Placement of aluminium foil

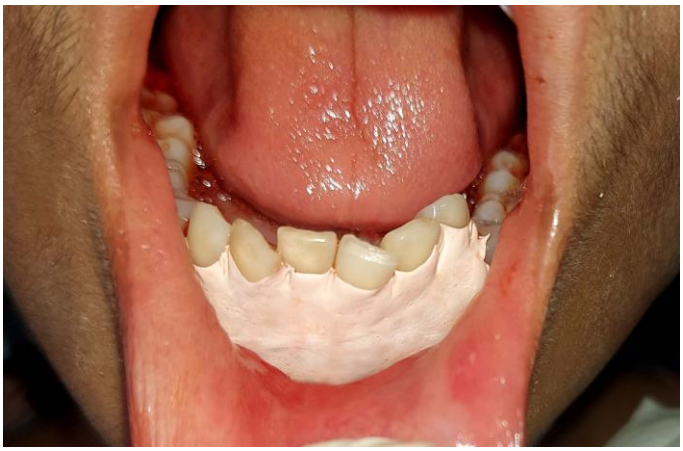

Figure 5: Placement of Coe pack

Post-operative medication was prescribed for 5 days that included Amoxicillin 500 mg, TDS, Paracetamol 500 mg + Aceclofenac 100 mg, BD, and Probiotics, OD.Following surgery, the patient was instructed to follow strict oral hygiene guidelines and Coe-Pak was removed 10 days later. At the surgical site, brushing teeth was forbidden for the first two weeks. Instead, patients were directed to rinse their mouths twice a day with 10 Ml of 0.2% chlorhexidine mouthwash for the next four weeks. After six months, the recipient site had good esthetic results, sufficient coverage with increased vestibular depth, and keratinized tissue. (Figure 6).

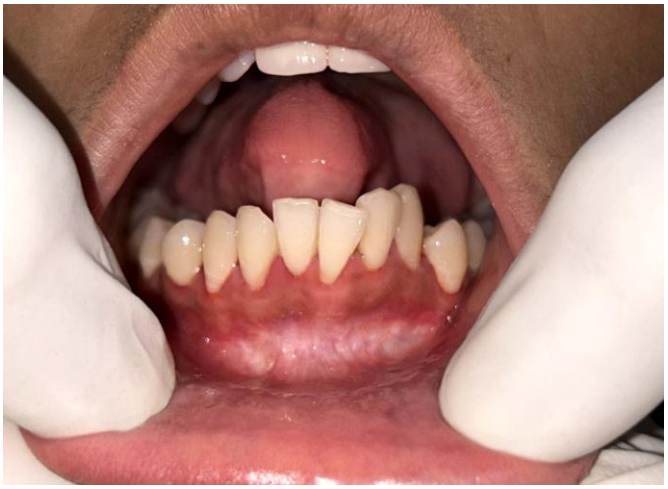

Figure 6: Post-operative view after 6 months

Discussion

The periosteum is a dense layer of vascular connective tissue that outlines all bones except sites of articulation and muscle attachment.[4] It comprises two layers: outer fibrous and inner cellular layer.[5] It has a high regenerative potential as its cellular layer has osteoblast and osteoprogenitor cells[6] and the fibrous layer has an immense number of collagen fibers and fibroblasts.[7] These cells can produce a variety of tissues, including bone and cementum with periodontal ligament fibers.[8]Vascularity is one of the factors that affect wound healing[9]. Adequately vascular graft is more likely to survive on an avascular root surface.Therefore periosteal pedicle graft which is a highly vascular graft that also releases vascular endothelial growth factors has a high chance of promoting regeneration on an avascular root surface[10].The advantage of being a pedicle flap is that it has adequate vascularity that prevents the necrosis of periosteal pedicle graft even if it is left uncovered by the overlying flap.

Similar cases where the periosteal pedicle graft reflected during vestibular extension was employed as a pedicle flap for root covering in a single tooth with Miller's Class II recession were described by Rajpal et al.[11] and Shah et al.[12] The outcome in each of these situations was comparable to the one we achieved. Mahajan[13] described the effective use of periosteal pedicle graft in the treatment of multiple gingival recession deformities.

Esthetic outcomes were assessed using the root coverage esthetic score (RES)[14] 6 months after surgery. This score evaluates five variables: level of the gingival margin, marginal tissue contour, soft tissue texture, mucogingival junction alignment, and gingival color.

- Level of the gingival margin – 3
- Marginal tissue contour – 1
- Soft tissue texture – 1
- Mucogingival junction alignment – 1
- Gingival color – 1.

The root coverage aesthetic score for the presented case was7.

The present case report demonstrated successful coverage of denuded roots with increased keratinized tissue and vestibular depth. Therefore, this technique shows predictable results and offers a successful and viable alternative for the coverage of localized gingival recessions with an inadequate width of attached gingiva.

Conclusion

In comparison to other techniques, this one has the following advantages: (A) it achieves vestibular deepening and root coverage in a single procedure; (B) has no associated donor site morbidity; (C) may be able to obtain enough tissue from the site adjacent to the defect; (D) has adequate vascularity of the flap with a low risk of necrosis, infection, and graft rejection; (E) has fewer postoperative complications; and (F) better patient satisfaction. As a result, this method provides a fruitful and feasible substitute for covering isolated gingival recessions that lack sufficient vestibular depth. Still, the technique's drawbacks remain, since it

necessitates high surgical skill and is limited to covering only one tooth at a time with mild to moderate recession.

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