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Treatment of Gingival Recession in the Mandibular Anterior Region with an Amnion Chorion Membrane Using the Papilla Access Tunnel Technique – 2 Clinical Case Reports

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Case Report

History

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ABSTRACT

The tunnel technique for root coverage and soft tissue augmentation in the mandibular anterior area can pose several challenges, including shallow recession, thin soft tissue, pronounced roots, and alveolar undercuts. These factors can complicate the surgical procedure and lead to poor outcomes. In this context, a papilla access technique has been developed to facilitate the preparation of the tunnel site and the placement of grafts under challenging anatomical conditions. This surgical access method is particularly useful in patients with minimal recession of the mandibular central incisors, where extending the tunnel to include the lateral incisors and canines is necessary for augmentation purposes. This approach offers improved surgical maneuverability for both site preparation and graft placement while minimizing the risk of perforation or trauma to delicate tissues. Overall, the papilla access technique represents a useful addition to the armamentarium of periodontal surgeons for root coverage in the mandibular anterior region and soft tissue augmentation procedures.

Keywords: Papilla access tunnel technique, Amnion membrane, Chorion membrane, Root coverage, Gingival recession.

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Introduction

Gingival recession, also known as soft tissue recession, is defined as the displacement of the gingival margin apical to the cemento-enamel junction (CEJ) of a tooth or the platform of a dental implant. This condition has been associated with compromised aesthetics, noncarious cervical lesions (NCCLs) and dentinal hypersensitivity.[1,2] Clinical challenges arise, particularly in cases of recession defects located in the mandibular area, due to anatomical considerations such as vestibular depth, tooth position, muscle pull, frenulum, and the thickness of hard and soft tissues.

In order to address these challenges and enhance postsurgical outcomes for such defects, more complex treatments, such as soft tissue grafting, are considered the "gold standard".[3] A newer surgical technique, the papilla access tunnel technique, has emerged as a promising option for treating mandibular recessions.[4] Since its introduction by Allen in 1994, the tunnel technique has undergone several modifications [5] and has demonstrated more favorable results than alternate methods in terms of aesthetic outcomes and patient experience.[6,7] The advantages of this tunneling approach include an incision-free design and preservation of papilla integrity. Papillary access minimizes the risk of injury or perforation of thin tissue while improving surgical access for site preparation and graft insertion. However, in areas where recession is shallow, the intrasulcular approach might provide challenges, especially in the mandibular anterior region where roots are narrow and sulcus dimensions are small, rendering intrasulcular access insufficient.[8]

Gingival tissue shares similarities with fetal tissues in terms of structure, fibroblast phenotype, and scarless healing. Recently, placenta-derived tissues, such as the amnion and chorion, have gained popularity as guided tissue regeneration membranes in dentistry. These tissues contain stem cell reserves; various growth factors; and proteins, such as fibronectin, laminin, proteoglycans, and glycosaminoglycans, that accelerate healing and regeneration. The chorion is particularly rich in collagen proteins.[9] Placental allografts offer advantages due to their immune-privileged composition, antibacterial and antimicrobial properties, and provision of a protein-enriched matrix facilitating cell migration[10]. Both amnion and chorion membranes are now utilized in root coverage procedures. In particular, the amniotic membrane serves as a cost-effective, allogenic substitute for subepithelial connective tissue grafts for achieving root coverage. Based on the biological properties of placental membranes and their potential, it is theorized that they could be effective at managing gingival recession.[10]

Case Report

In the first case, a male patient aged 30 years reported sensitivity in the lower mandibular anterior teeth. Clinical examination revealed Miller's class II gingival recession affecting teeth #31 and #41. The recession depth was measured at 3 mm for tooth #31 and 2 mm for tooth #41, with a recession width of 2 mm. The patient exhibited a thin biotype (Figure 1). In the second case, a female patient aged 42 years presented with sensitivity in teeth #31 and #41. Clinical examination indicated Miller's class I gingival recession involving teeth #31 and #41, with a recession depth and width of 2 mm. Similar to the first patient, the patient also displayed a thin biotype (Figure 2).

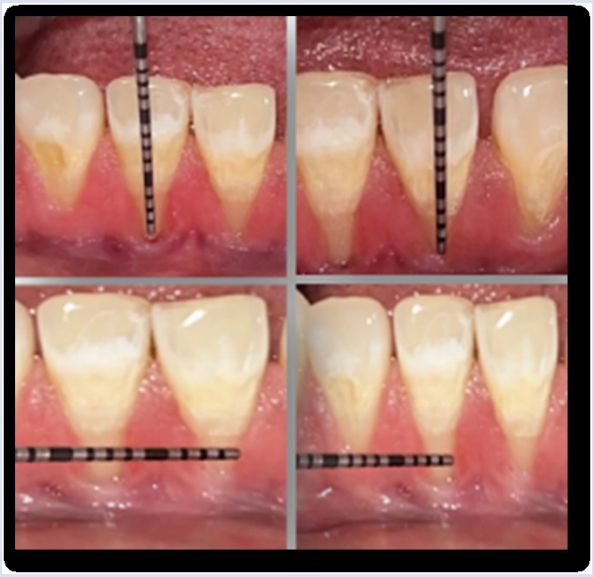

Figure 1: Baseline - Miller's class II gingival recession involving 31 and 41 with recession depth 3mm irt 31 and 2mm irt 41 and a recession width of 2mm.

Figure 2: Baseline - Miller's class I gingival recession involving 31 and 41 with a recession depth and width of 2 mm .

With the patient's signed informed consent, the treatment plan was discussed. Due to the presence of a thin biotype of the gingiva in both patients, the Papilla access tunnel technique with the amnion and chorion membrane was planned for both patients. Following local anesthesia administration (2% lidocaine with 1:80000 epinephrine), the papilla access tunnel was incised between the lateral incisors and canines on both the right and left sides. This incision separates the facial layer of the papilla on either side of the midline, effectively detaching the papilla from the tooth surface (Figure 3).

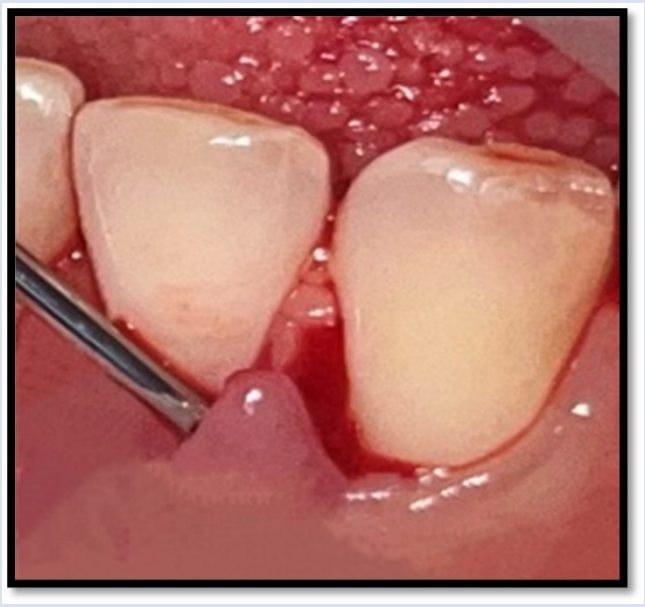

Figure 3: Papilla was incised between the lateral incisors and canines on both the right and left sides. The facial layer of the papilla was seperated on either side of the midline, effectively detaching the papilla from the tooth surface.

Using a #15 BP blade, an incision was initiated, commencing at the lateral incisor and progressing toward the canine to separate the facial layer of the papilla from its interdental papilla. Subsequently, an intrasulcular incision was extended in both the mesial and distal directions from the incised papilla, both on the mesial line angle of the lateral incisor and the distal line angle of the canine, traversing facially to the central incisors. The incision spanned from the base of the sulcus to the crest of the bone. Furthermore, it was extended proximally to ensure detachment of the papillae from the proximal surfaces of the adjacent teeth (Figure 4).

Figure 4: An intrasulcular incision was extended in both the mesial and distal directions from the incised papilla, both on the mesial line angle of the lateral incisor and the distal line angle of the canine, traversing facially to the central incisors. The incision spanned from the base of the sulcus to the crest of the bone. Furthermore, it was extended proximally to ensure detachment of the papillae from the proximal surfaces of the adjacent teeth.

A full-thickness mucoperiosteal dissection was extended apically by approximately 4 mm from the tissue margin. This dissection also proceeded laterally beneath the facial aspect to create a tunnel for the placement of the membrane (Figure 5). To address any potential impediments to the unobstructed passage of the graft through the tunnel, a modified Orbans knife was used. This approach was utilized to traverse the prepared tunnel and incise any residual fibrous attachments that could hinder easy advancement of the graft.

Figure 5: A full-thickness mucoperiosteal dissection was extended apically by approximately 4 mm from the tissue margin. This dissection also proceeded laterally beneath the facial aspect to create a tunnel for the placement of the membrane..

A placental-derived, freeze-dried, irradiated chorion and amnion membrane (Tata Memorial Hospital Tissue Bank) (Figure 6) was inserted into the prepared tunnel after tunnel preparation, coronally advanced with the tunnel to cover the recession site (Figure 7), and sutured using interrupted sling sutures (Figure 8).

Figure 6: A placental-derived, freeze-dried, irradiated chorion and amnion membrane (Tata Memorial Hospital Tissue Bank)

Figure 7: A placental-derived, freeze-dried, irradiated chorion and amnion membrane (Tata Memorial Hospital Tissue Bank) was inserted into the prepared tunnel.

Figure 8: Coronally advancement done with the tunnel to cover the recession site and sutured using interrupted sling sutures

A periodontal pack was placed on both the labial and lingual aspects of the treated site (Figure 9). Postoperative instructions and care were given to the patient. Amoxicillin 500 mg TID was administered for five days, analgesics were prescribed, and the patients were advised to use a mouth rinse containing 0.2% chlorhexidine gluconate for up to 14 days for plaque control. Patients were advised to maintain oral hygiene and follow a soft diet. Tooth brushing was discontinued near the surgical site for 14 days following the surgical procedure.

Figure 9: A periodontal pack was placed on both the labial and lingual aspects of the treated site .

Patients were recalled after 2 weeks for suture removal, and follow-up was performed 3 months after root coverage. The clinical outcomes of the two patients who underwent surgery performed using this technique showed 100% gain in root coverage (Table 1) after baseline and after 3 months with an increase in biotype. (Figure 10), (Figure 11)

Table 1: Root coverage achieved at the end of 3 months follow-up

RECESSION DEPTH	AT BASELINE	AT 3 MONTHS
CASE I	3 mm	0 (complete root coverage)
CASE II	2 mm	0 (complete root coverage)

$$\text{Percentage of root coverage gain} = \frac{\text{Recession depth at baseline} - \text{Recession depth at 3 months}}{\text{Recession depth at baseline}}$$

$$= 100\%$$

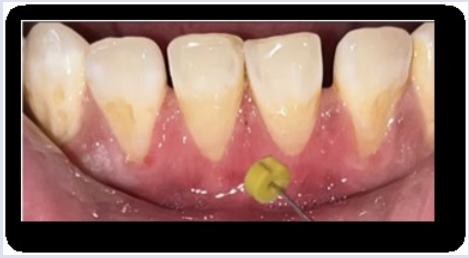

Figure 10: Follow up of Case 1 at 3 months post root coverage.

Figure 11: Follow up of Case 2 at 3 months post root coverage.

Discussion

Enhancing both periodontal health and appearance is the goal of ideal periodontal care. As esthetics is one of the main complaints in patients with gingival recession, a pivotal strategy to improve esthetic results involves addressing gingival recession through therapeutic measures. The initial step of therapy for gingival recession is contingent upon the severity of the gingival defect and the etiological cause.[11,12]

The PATT is a relatively new tunneling technique introduced by Allen.[9] The technique of papilla access presents an alternative method for preparing tunnel sites, specifically in the mandibular anterior region. As per earlier research, the gingival sulcus is used to facilitate the tunnel access technique.[13,14] The papilla access technique improves the efficiency of tunnel site preparation and reduces the risk of surgical trauma or perforation that can occur with intrasulcular dissection without additional access. Additionally, this approach allows for the inclusion of posterior teeth with lateral extension of the tunnel as needed and access for easier, less traumatic graft insertion.[15]

The papilla access technique has several drawbacks, but its main downside is that suturing and positioning grafts on incised papillae require special care. To avoid crossing the papillary bed, it is crucial to place the graft at the level of the CEJs, which is crucial when allografts or xenografts are used. Additional limitations include the risk of tearing the delicate papillary tissue during manipulation, difficulty in achieving proper adaptation of the graft material in patients with thin biotypes, and challenges in ensuring adequate blood supply to the graft in cases of extensive recession or reduced interproximal tissue. Furthermore, the technique is technique-sensitive, requiring advanced surgical skills and experience, which may limit its applicability in routine clinical settings. Postoperative discomfort and prolonged healing times can also occur due to the manipulation of multiple papillae.[16]

In this case report, 100% root coverage was observed at every site treated with the pouch and tunnel technique. The initial recession height varied between 3 and 4 mm, with a width ranging from approximately 2 to 4 mm. After a one-year follow-up, all the sites displayed comprehensive root coverage. The tunnel technique, devised as a modification of the envelope technique, yielded positive outcomes in terms of root coverage. The application of the tunnel technique ensured superior graft adaptation to the recipient site, resulting in aesthetically pleasing outcomes and an increase in the thickness of the keratinized gingiva.[17]

The advantages of the tunneling technique over conventional flap techniques include the fact that the former is a miniamally invasive procedure that maintains blood supply to the gingiva, which results in a greater success rate in terms of esthetic outcomes and graft adaptability at the donor site.[18] The papilla access technique is a more efficient way of preparing the tunnel site, as it reduces the risk of surgical trauma or perforation to the tissue that may occur with intrasulcular dissection. Additionally, this approach allows less traumatic and easier graft insertion and enables the inclusion of additional posterior teeth by lateral extension of the tunnel when necessary.[9] Its disadvantages include that it is technique sensitive. The primary drawback is the need for special attention while placing the graft and suturing

the incised papillae, as it is crucial to align the graft level with the CEJs to prevent it from extending over the papillary bed, notably when using allografts.[19]

The envelope flap has been shown in several trials to offer more stability and better results when treating multiple teeth than a flap with vertical releasing incisions.[20] The papilla access approach facilitates more effective preparation of the tunnel site and reduces the risk of surgical trauma or perforation to the tissue that might arise from intrasulcular dissection without extra access. It also allows access for lateral tunnel expansion to accommodate more posterior teeth as necessary, making the insertion of grafts simpler and less painful. The graft material used in these two cases was the amnion chorion membrane, whereas the acellular dermal matrix was used in the original study [9] because it was unavailable in India and because a 100% improvement was achieved in terms of complete root coverage at recession site defects in both cases.

Gingival tissue has a similar structure to fetal tissues. In dentistry, placenta-derived tissues are becoming increasingly popular as guided tissue regeneration membranes. Stem cell reserves and various growth factors and proteins, such as fibronectin, laminin, proteoglycans, and glycosaminoglycans, present in the amnion accelerate healing and regeneration, whereas the chorion is rich in collagen proteins.[21] The amniotic epithelium, basement membrane, compact layer, fibroblast layer, and intermediate/spongy layer make up the amnion membrane. Chorion membrane consists of the reticular layer, basement membrane, and trophoblasts.[22]

Placental allografts have an advantage because they are composed of immune privileged tissue, possess antibacterial and antimicrobial properties, and provide a protein-enriched matrix to facilitate cell migration. Amnion and Chorion membranes are now being used in root coverage procedures and are utilized as cost-effective allogenic substitutes for subepithelial connective tissue grafts to achieve root coverage, thereby eliminating a second surgical site.[23]

Conclusions

This report outlines a surgical access approach that enables the use of a tunnelling technique in the mandibular anterior region, particularly in the presence of minimal to no recession or thin tissue that may pose a challenge in carrying out routine intrasulcular tunnel site preparation followed by graft placement without the risk of injury or perforation.

Informed Consent

Informed consent was obtained from the patient prior to the start of the treatment and for publication of this case report.

Ethical Statement

Approval was obtained from the institutional ethics committee (Manipal College of Dental Sciences, Mangalore, Manipal Academy of Higher Education) on the 10th of March, 2023 with protocol reference number: 23001.

Conflict of Interest

The authors declare that they have no conflict of interest.

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