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Case Report

Minimally invasive modified tunnel approach for the treatment of gingival recession: A case report

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ABSTRACT

Gingival recession is a common incidence and its occurrence will increase with age. It can lead to clinical problems, reduced cosmetic appeal and therefore esthetic concern. There are numerous strategies for root coverage. The preference for improved esthetics has elevated distinctly over the years. The idea of minimal invasive approach has received significance within the latest years and is changing the open surgical approaches. The treatment of gingival recession has continually been technique sensitive along with the related patient morbidity due to the invasive nature. This article presents a report of a case treated with a minimally invasive modified tunnel approach.

1. Introduction

Gingival recession is defined as the displacement of the gingival margin apical to the cemento-enamel junction (CEJ) with the loss of periodontal connective tissue fibers along with root cementum and alveolar bone.[1] Patients presenting gingival recession usually complain of hypersensitivity or unaesthetic appearance. The etiological factors include:

1. Periodontitis
2. Faulty toothbrushing
3. Malpositioning
4. Buccal prominence
5. Gingival biotype
6. Carious and noncarious cervical lesions.[2]

The amount of recession is assessed clinically by measuring in millimeters the distance from the CEJ and the soft tissue margin. The recession of gingiva, either localized or generalized, may be associated with one or more surfaces, resulting in attachment loss and root exposure. Marginal gingival recession, therefore should not be viewed as merely a soft tissue defect, but as the destruction of both the soft and hard tissue.[3]

The main indications for root coverage procedure are esthetic demands, root hypersensitivity, root caries lesions and cervical abrasions. Thus, it is essential to carry out root coverage surgery for the aforementioned conditions.[4] If untreated, gingival recession may progress to the point that it can compromise the prognosis of the tooth in question.

Various periodontal plastic surgeries are advocated for the treatment of gingival recession including free gingival grafts, laterally repositioned flap, and coronally advanced flap (CM) with their various modifications. Since the last decades, patients' esthetic expectations and perception of the use of least traumatic surgeries have led to the development of minimally invasive techniques which not only obtain root coverage but also have a color match and tissue blending with adjacent tissues of the defect site.[5]

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Tunnel or supraperiosteal envelope technique presented by Allen (1994) is one of the common approaches to complete root coverage. Tunnel technique was performed initially by an internal beveled incision from the top of the gingival margin on the areas of recession. Afterward, partial-thickness supraperiosteal envelope by sharp dissection is extended 3–5mm laterally and apically to areas of recession, undermining interdental papilla.[6,7] Santarelli et al.[8] adapted the tunnel technique using a single vertical incision. Mahn adapted the tunnel approach for acellular dermal connective tissue grafting by using full thickness procedure with vertical incisions.[9]

The minimally invasive modified tunnel approach adopted in this case study is a modification of the tunnel technique, which is designed to minimize the risk of laceration of the gingival margin. Laceration of the gingival margin results in unfavourable healing outcomes. In the minimally invasive modified tunnel approach, the initial incision was performed from the vestibule area apically to the recession. This study uses PRF as an adjunctive agent. PRF is required to accelerate the recovery after surgery so that it enhances the successful clinical outcomes.

2. Case Report

A 45-year-old female patient reported to the Department of Periodontology, Azeezia college of dental science and research, with a chief complaint of sensitivity in teeth on the lower front tooth region. The Patient was systemically healthy and had no contraindications for periodontal surgery. Clinical parameters assessed were keratinised width, recession depth, recession width and esthetic score (according to Cairo et al, 2009).[10] A Class I gingival recession defect (Miller, 1985) was diagnosed on examination in the mandibular right canine., with a recession depth of 3mm, recession width of 2mm, keratinized gingival width of 2 mm and esthetic score of 6. A modified tunnel technique utilizing platelet rich fibrin for root coverage was planned.

2.1. Procedure

2.1.1. Presurgical protocol

The treatment protocol was explained to the patient and an informed consent was obtained. Routine periodontal therapy, including scaling and root planning was done. Oral hygiene instructions were given. Patients recalled after 4 weeks for the surgical procedure.

2.2. Surgical site preparation

2.2.1. Incision

The surgical protocol employed was similar to Pinhole Surgical Technique (Chao, 2012) except for the use of the patented instrument. Following administration of local anesthesia, i.e., local infiltration of 2% lidocaine with a concentration of 1:200000 epinephrine, a vertical incision of 2 mm was made from the mucogingival junction (MCJ) to the alveolar mucosa, at the mesial aspect of tooth 42, using a # 15c blade (Figure 2). A periosteal elevator (molt-9, small elevator) was inserted through the incision, undermining mucosa to get a split thickness flap. The dissection was extended coronally and apically without disrupting the stability of interdental papilla and until the gingival margin could passively reach the CEJ. PRF membrane was then introduced until there was sufficient fullness in the papillary tissues for self-holding the mucogingival tissue complex.

2.2.2. Platelet rich fibrin preparation

With the help of a sterile syringe, 10 ml of blood was drawn from the patient's antecubital vein and collected in a sterile glass test tube. The tube was carefully transferred to a centrifugation machine and immediately centrifuged at 3,000 rpm for 12 minutes at room temperature. After 12 minutes, the blood was divided into three fractions: acellular plasma on the surface, a PRF clot formed in the middle part of the tube, and red blood cells at the bottom. Using a sterile tweezer, the PRF clot was removed carefully from the tube. A sterilized scissor was used to gently detach the RBC layer from the PRF clot and the clot was placed on woven gauze, compressed between other pieces of gauze to form a PRF membrane. Later, the membrane was inserted into the tunnel from the sulcus, with the help of a sterile tweezer, and finger pressure was applied to compress the membranes and also to mobilize the flap coronally.

2.2.3. Suturing

The vertical incision was sutured using a simple interrupted suture with 3-0 resorbable suture thread. To retain the coronally positioned gingival margin at CEJ, 2 sling sutures were placed for stabilization was given. The sutures were temporarily anchored using composite resin contact points. (Figure 5)

Fig. 1: Pre treatment photoraph showing gingival recession in 43

Fig. 2: Vertical incision in the vestibule region using a #15C blade

Fig. 3: Tunneling with periosteal elevator to get a mucosal flap

Fig. 4: PRF membrane inserted

Fig. 5: Sling suturing done

3. Results

The site healed uneventfully with no post-operative complications. Plaque index and Gingival index decreased significantly at 6 weeks. Width of keratinised gingiva increased from baseline to 6 weeks. Recession width, depth reduced after 6 weeks post surgically.

Table 1:

43 (canine) Clinical parameter	Baseline	6 weeks
Width of keratinized gingiva	2 mm	3 mm
Recession depth	3 mm	1 mm
Recession width	2 mm	1 mm
Esthetic score	6	10

Root coverage percentage = Preoperative recession depth - post-operative recession depth) * 100 / Preoperative recession depth

Table 2:

43 (canine)	% Root coverage obtained
	100%

Fig. 6: Pre and postsurgical photograph after 6 weeks.

4. Discussion

Ideal periodontal treatment should improve periodontal health and aesthetics. Gingival recession is one of the patient's complaints in aesthetics. Thus, the treatment of gingival recession is an important therapy for enhancing aesthetic outcome. Treatment of gingival recession is based on the etiological factor and the severity of the gingival defect. Eliminating the etiological factor is an initial treatment stage of gingival recession.[10,11] One of the treatment options for gingival recession is surgical using the tunnel technique.

In previous studies, the procedure to make the tunnel access is performed through gingival sulcus.[12,13] Access from gingival sulcus is very sensitive because the gingival sulcus is very narrow, and in addition, many patients have a thin gingival biotype. The gingival fibers play an important role. They brace and stabilize the gingival margin firmly against the tooth.[14–16] Tunneling access through gingival sulcus may cause damage to the gingival fibers integrity, especially laceration of circular and semicircular gingival fibers. Trauma to these gingival fibers leads to unfavorable healing outcomes.

This study introduces a new tunnel technique, namely the less invasive vestibule access tunneling. This technique is developed as a modification of the supraperiosteal envelope technique. Tunneling access in supraperiosteal envelope technique was performed through gingival sulcus. The less invasive access tunneling is performed through a narrow vertical incision in the vestibule. This new technique has several advantages: it can minimize the damage of gingival fibers complex on the gingival margin due to mechanical instrumentation; it is conducted without releasing interdental papilla, and therefore it is less bleeding and has a better interproximal esthetic outcome; and it ensures optimal vascularity at the surgical site, because there is only a narrow incision in the vestibule. The successful mucogingival surgery for gingival recession treatment is dependent on the excellent blood supply to the surgical site. Adequate blood supply is necessary to maintain the stability of the gingival attachment to the root surface.

In this study, 75%-80% root coverage was shown using minimally invasive surgical technique. A modification of the tunnel technique, which preserves the papillary height increase the thickness of keratinized gingiva, maintaining the blood supply to the underlying graft, provide better aesthetic results, and a decrease in clinical attachment loss was obtained. Mucosal tunnelling was done which gives better blood supply to the surgical site and it helps in healing faster.[17]

This study used PRF membrane to support adequate adaptation and better stabilization of the gingiva in the new position. Soft tissue augmentation with PRF membrane is recommended for patients who do not have adequate gingival thickness. Application of PRF membrane in mucogingival surgery for gingival recession can improve the gingival thickness and provide the long-term stability of gingival connective tissue attachment to the root surface. The study conducted by Garg et al. showed that reduction in gingival recession height after manipulation of the gingival margin with surgical alone was 40–50%, but in combination with PRF, its reduction increased up to 80%. Platelet-rich fibrin contains multiple growth factors that improve cellular functions in tissue healing. Platelet growth factor has several biological activities that promote and modulate cell proliferation and regeneration.[20] Application of PRF membrane in the surgical area will enhance the survival of gingival epithelial cell and fibroblast in the new position. Thus, for root coverage surgical procedures the addition of PRF in minimally invasive surgical technique in the presented case report, helped to obtain favourable results.

5. Conclusion

Treatment for gingival recession using the less invasive vestibule access tunneling demonstrates favourable root coverage. This technique results in a decreasing degree of gingival recession with the optimal healing outcomes without any adverse effect. Application of PRF membrane in this surgical technique improves the successful treatment of gingival recession. The gingival margin shows stable conditions. The healing was faster because of mucosal tunnelling and post-operative discomfort of patient is also less in this technique. Further studies are required to obtain statistically significant results.

6. Conflicts of Interest

There are no conflicts of interest in connection with this article.

7. Source of Funding

None.

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