



The Laterally Closed Tunnel Technique: Redefining Root Coverage in Deep Mandibular Recessions

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Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

The etiology of gingival recession is multifactorial in nature and includes periodontal inflammation, traumatic tooth brushing, a thin periodontal phenotype, malpositioned teeth, and insufficient keratinized tissue. Gingival recession can lead to dentin hypersensitivity, root caries, non-carious cervical lesions, difficulty in maintaining effective plaque control, and significant aesthetic concerns, particularly in the mandibular anterior region. Management of isolated deep recession defects remains challenging because of the associated interproximal attachment loss and the limited predictability of achieving complete root coverage.

Case Presentation

The present case report describes management of a 6-mm apparent gingival recession associated with tooth #35 and 2mm with tooth #34 in a 28-year-old male patient using the Laterally Closed Coronally Advanced Flap (LCCAF) in combination with a de-epithelialized free gingival graft (de-fgg). The outcome at baseline, 2 weeks, 3 months, and 6 months demonstrated significant root coverage, increased soft-tissue volume, and improved gingival contour with progressive physiological remodeling.

Keywords: Gingival recession, tunnel technique, root coverage, mucogingival surgery.; Laterally Closed Tunnel; Connective Tissue Grafts; Deep Mandibular Recessions, de-epithelialized free gingival graft.

Introduction

Gingival recession (GR) refers to the apical migration of gingival margin beyond the cemento-enamel junction (CEJ), leading to exposure of root surface.¹ Its development is multifactorial and may be influenced by factors such as tooth position and anatomy within the dental arch, bony dehiscence, thin alveolar mucosa, traumatic or improper tooth brushing habits, muscle pull, and orthodontic treatment.^{2,3}

The primary goal in treating isolated mandibular gingival recessions is to increase soft tissue thickness and stability, thereby improving plaque control and reducing the risk of periodontal inflammation, attachment loss, and root caries.⁴ Various surgical techniques have been proposed, including fully or partially epithelialized free gingival grafts (FGG) and

subepithelial connective tissue grafts (SCTG) combined with envelope flaps, coronally or laterally positioned flaps, double pedicle flaps (DPF), and tunneling techniques (TUN), with or without laterally positioned pedicle flaps (LPPF).^{5,6}

Most of these procedures require a split-thickness flap, which can be technically challenging in the mandibular anterior region because of thin soft tissues and may increase the risk of flap perforation or graft necrosis. To address these limitations, the Laterally Closed Coronally Advanced Flap (LCCAF) was introduced, using a combined full- and partial-thickness pouch or tunnel followed by coronal flap advancement [Figure 1].⁷

This case report describes the management of multiple RT2 gingival recessions using the modified tunnel technique with de-FGG, demonstrating predictable root coverage, increased soft tissue volume, enhanced esthetics, and reduced postoperative morbidity.

Case Report:

Patient Information:

A 28-year-old man, systemically healthy reported to the department of periodontology.

Chief Complaint:

The patient presented with chief complaint of tooth sensitivity in the lower anterior tooth over the past 6 months.

Medical and Dental History:

The patient's medical, dental and family histories were non-contributory.

Clinical examination

Intraoral examination

Clinical examination revealed a thin gingival phenotype, multiple RT2 gingival recessions on teeth 35 and RT1 with 34, with 6-mm apparent gingival recession associated with tooth 35 and 2mm with tooth 34 [Figure 2]. Periodontal evaluation with a UNC-15 probe confirmed absence of active periodontal disease.

Investigations:

Routine haematological investigations ruled out any systemic involvement before surgical appointment.

Treatment Plan:

1. Patient was instructed to use a soft-bristled toothbrush with gentle pressure and circular brushing motions.
2. Following a comprehensive periodontal evaluation, it was determined that Laterally Closed Coronally Advanced Flap (LCCAF) technique in conjunction with de-fgg was the most predictable and least invasive alternative.⁷
3. Five days prior to surgery, the patient underwent a prophylactic oral hygiene session.

Informed consent was obtained from patient for surgical procedure.

Surgical Procedure:

Following administration of local anesthesia (Lignocaine HCl with 2 % epinephrine 1: 200,000), root surfaces were planed using Gracey curettes. Subsequently oblique intrasulcular incisions were made using microsurgical blades to de-epithelialize the recession area. The horizontal intrasulcular incisions extended from the mesial aspect of tooth 34 to the distal aspect of tooth 35. A mucoperiosteal pouch (tunnel) was prepared using specially designed tunneling instruments and extended apically beyond mucogingival junction and further mobilized mesially and distally around the recession defect by undermining the facial aspect of the interdental papillae [Figure 3].

Muscle attachments and collagen fibers on inner surface of pouch were gently released using Gracey curettes until tension-free movement of the pouch margins was achieved. Care was taken throughout the procedure to preserve the integrity of interdental papillae and avoid flap perforation. As a result of this mobilization, the pouch margins could be approximated mesially and distally without tension, allowing complete or near-complete coverage of the exposed root surface.

Subsequently, a Free Gingival Graft (FGG) was harvested from hard palate. The harvested FGG was then De-epithelialized extra-orally with a sharp surgical blade. Immediate closure of donor site was performed using modified mattress sutures and collagen sponge [Figure 4].

Using mattress sutures (5-0 absorbable), the de-fgg was pulled and fixed mesially and distally at inner aspect of the pouch. Finally, the margins of the pouch were pulled together over the graft and sutured with interrupted sutures (5-0 absorbable) to accomplish tension-free complete or partial coverage of the graft as well as denuded root surface. Care was taken to position the gingival margin at least 1 mm coronally to the CEJ [Figure 5].

Postoperative Care:

1. Postoperatively, patients were prescribed analgesics (Ibuprofen 400 mg) twice daily for 2–3 days) and antibiotics (1,000 mg amoxicillin with clavulanic acid for 7 days) to control pain and prevent infection.
2. Patients were instructed to avoid brushing the surgical sites for the first 14 days after surgery and

were advised to rinse with 0.2% chlorhexidine digluconate mouthwash twice daily for 1 minute over a period of 21 days. Tooth brushing was resumed 14 days postoperatively using roll technique.

3. Palatal sutures were removed after 7 days, whereas sutures at the treated sites were removed after 14 days of surgery.
4. Follow-up visits, including professional supragingival cleaning and individualized oral hygiene reinforcement, were scheduled at 3 and 6 months postoperatively.

Results [Figure 6]

1. Fourteen days post-operatively: The horizontal incisions showed partial healing, along with recession coverage.
2. Three months post-operatively: The horizontal incisions showed complete healing with soft tissue maturation.
3. Six months follow up visit showed complete soft tissue coverage of gingival recession in both the premolars.

Discussion

Various periodontal plastic surgical procedures, such as coronally advanced flap (CAF), de-epithelialized free gingival graft (de-fgg), and laterally positioned flap (LPF), have been employed for root coverage procedures. However, success of these techniques largely depends on factors such as the amount of keratinized tissue present, flap tension, and adequate vascularization at the recipient site. For this scenario, Aroca et al. (2025) proposed a decision tree in which the CAF is indicated when there is free keratinized tissue (FKT) > 2 mm and wide papillae, while the tunnel technique is advantageous in the presence of FKT < 2 mm, narrow papillae and thin biotype, conditions present in the case presented.⁸

The Laterally Closed Coronally Advanced Flap (LCCAF) is a modified surgical technique designed to maintain an enhanced blood supply to the surgical site, contributing to more predictable healing and clinical results. Compared with conventional root coverage procedures, LCCAF offers several advantages, including reduced scar formation, lower postoperative morbidity, and improved esthetic outcomes.⁹

Previous studies have highlighted the advantages of combining connective tissue grafts (CTG) with

coronally advanced flap (CAF) procedures. Aroca et al. compared CAF performed with and without CTG and reported that the addition of soft tissue grafting resulted in improved root coverage and increased gingival thickness. However, their findings also suggested that the Laterally Closed Coronally Advanced Flap (LCCAF) alone was capable of achieving substantial root coverage, potentially minimizing donor site morbidity while still maintaining favorable clinical outcomes.¹⁰

The most important incisions were the initial split thickness incision in between recession defects and the intrasulcular beveled incision, which promoted a recipient bed for the de-fgg. The Laterally Closed Coronally Advanced Flap (LCCAF) has demonstrated biomechanical advantages, as it preserves interproximal blood supply, reduces surgical trauma, and offers improved esthetic results.

Conclusion

Although the Laterally Closed Coronally Advanced Flap (LCCAF) has demonstrated predictable root coverage and stable soft tissue outcomes, further long-term studies and comparative clinical trials are necessary to confirm its effectiveness. Future research should focus on refining surgical protocols and improving digital evaluation techniques to help establish LCCAF as a standardized and minimally invasive periodontal surgical procedure.

Acknowledgement: The authors would like to thank teachers, for all kind of support required for the case report and preparation of the manuscript, along with all the faculty members of the Department of Periodontics for their support and contributions.

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Figure 1

LATERALLY CLOSED CORONALLY ADVANCED FLAP (LCCAF)



Figure 2



PRE-OPERATIVE VIEW SHOWING GINGIVAL RECESSION WITH RESPECT TO #35 & #34 .

Figure 3



PER-OPERATIVE VIEW SHOWING OBLIQUE INTRASULCULAR INCISIONS AND
MUCOPERIOSTEAL POUCH (TUNNEL)

Figure 4



PER-OPERATIVE VIEW SHOWING PREPARATION OF DE-FGG & DONOR SITE MANAGEMENT

Figure 5



PER-OPERATIVE VIEW SHOWING MODIFIED SUTURE PLACEMENT

Figure 6



POST-OPERATIVE VIEW: 14 DAYS, 3 MONTHS & 6 MONTHS