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Coronal Advanced Flap and Bilaminar Technique in the Treatment of Multiple Gingival Recessions: A Comparative Study with 6-Month Follow-Up

García Amador Braulio Andres[1]*, Cavazos Rivera Martin[1], Estrada Nevárez Omar[1] and Franco Ceniceros Luis Daniel[2]

[1]*Division of Graduate Studies, Faculty of Dentistry, UJED.*

[2]*Student specializing in Periodontics and Implantology, Faculty of Dentistry, UJED.*

***Correspondence:**

Durango, Durango, Mexico. Predio Canoas s/n, Col. Los Ángeles, USA, Tel: 6181874426.

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ABSTRACT

Introduction: *Gingival recession (GR) is the displacement of the gingival margin apically to the cementoenamel junction (CEJ). In clinical practice, multiple adjacent GRs associated with non-carious cervical lesions (NCCL) are common. Complete root coverage (RC) is the goal in the treatment of GR. Coronal advancement flap (CAF) with or without connective tissue graft (CTG) is a viable alternative in the treatment of GR. The objective of this clinical case was to compare the clinical results of CAF and CAF + CTG used in the treatment of multiple gingival recessions.*

Procedure: *The root coverage procedure for quadrant 1, with type 1 GR, was CAF. The flap was displaced coronally and sutured 2 mm coronal to the CEJ. In quadrant 2 with type 1 GR, a slight ameloplasty was performed, and a CAF + CTG was performed. The CTG was placed at the level of the CEJ and sutured at the base of the papillae. The flap was displaced and sutured 2 mm coronal to the CEJ. Some of the parameters evaluated before surgery and 6 months later: probing depth, GR dimension, apicocoronal width of keratinized tissue, presence of NCCL, and reduction in hypersensitivity.*

Results: *At 6 months, 100% root coverage was achieved with both techniques. Hypersensitivity was resolved with both treatment modalities. Only at sites treated with CAF + CTG was a "thin scalloped" to "thick flat" periodontal phenotype change observed.*

Conclusions: *Both techniques were effective in treating GR and dental hypersensitivity, but only CAF + CTG therapy showed a change in periodontal phenotype.*

Keywords

Coronal advancement flap, Connective tissue graft, Multiple gingival recessions.

Introduction

Gingival recession is defined as the displacement of the apical gingival margin to the CEJ [1].

Etiology

Etiology is multifactorial, the possible causes described in the literature can be: bone dehiscence, traumatic dental hygiene, periodontal disease, and NCCL[2].

Classification

Cairo et al. 2011 proposed a classification, taking the level of interproximal clinical insertion as a reference to determine the predictability of RC [2].

RT1 (Type 1 recession): No loss of interproximal attachment, attachment loss occurs only in the vestibular area. High predictability of complete RC.

RT2 (Type 2 recession): Loss of interproximal attachment equal to or less than the vestibular attachment. Complete RC may be limited, depending on symmetry and remaining interproximal support.

RT3 (Type 3 recession): Loss of interproximal attachment greater than the vestibular attachment. Complete RC is not predictable.

Pini Prato et al., [3] four classes of dental surface defects in areas of gingival recession were identified on the basis of the presence (Class A) or absence (Class B) of CEJ and of presence (Class+) or absence (Class-) of surface discrepancy (step).

Indications for Root Coverage

RC procedures are indicated when seeking to improve aesthetics, reduce tooth hypersensitivity, prevent root caries formation, improve personal plaque control, and improve gingival margin contours.

Coronal Advanced Flap

There are multiple surgical techniques for RC of exposed tooth roots, one of which is CAF. This is defined as a mucosal flap raised beyond the mucogingival junction that can be moved in the coronal direction to cover exposed root surfaces. It is used for one or multiple GR [4]. The surgical technique described by Zucchelli et al. [5] comprises the following steps:

1. A medium GR is taken, oblique incisions are made in interdental areas that connect with intrasulcular incisions, forming a surgical papilla and an anatomical papilla.
2. A partial-thickness flap is performed lateral to the GR, and a full-thickness flap is performed apical to the defect. A horizontal incision is made to the periosteum to eliminate muscle tension.
3. The flap is passively displaced in the coronal direction (2 mm to the CEJ).
4. The epithelium of the anatomical papilla is removed.
5. Finally, the flap is sutured (2 mm coronal to the CEJ) with a double horizontal mattress suture.

Connective Tissue Graft

Autogenous CTG are considered the gold standard in RC, as they increase the thickness and amount of keratinized gingival tissue [6].

The most preferred donor sites for keratinized gingival tissue in the oral cavity are the palatal vault and the maxillary tuberosity [7]. Peter N. Amin et al. [8] in 2018 found that CTG obtained from the maxillary tuberosity area differ from those obtained from the palate, with higher collagen fiber density, less postoperative pain, less friction on contact when chewing, scar tissue with a fibrous appearance, which can be unsightly, a smaller donor area, and higher quality CTG obtained as it is free of adipose and glandular tissue.

The CTG can be placed over the root, and the flap must be moved coronally and/or laterally to cover the graft [9]. Zuchelli et al. [10] described the bilaminar technique, adding the placement of a subepithelial CTG for RC of exposed root surfaces.

The objective of this study is to compare CAF and CAF + CTG (bilaminar technique) in the treatment of multiple GRs with a 6-month follow-up.

Clinical Case

A 40-year-old female patient attends an appointment at the periodontics and implantology clinic at the Faculty of Dentistry of the Universidad Juarez del Estado de Durango. Her reason for attending the appointment is that she reports having dental hypersensitivity in her maxillary teeth (Image 1). Clinical examination leads to a diagnosis of multiple GR. The patient reported no systemic history or routine medication use. After questioning, the following were identified as etiological agents of the GR and dental hypersensitivity: incorrect use of a toothbrush, a traumatic toothbrushing technique, and constant consumption of citrus fruits. No occlusal factors were observed that would impact the diagnosis of GR, so a periodontal diagnosis of gingival health in a reduced periodontium- non periodontitis patient. The mucogingival diagnosis is presented in Table 1.

Table 1: Baseline clinical parameters.

TOOTH	PROBING DEEP	GINGIVAL KERATINIZED TISSUE	PERIODONTAL PHENOTYPE [11]	DEPTH OF RECESSION	RECESSION TYPE [2]	RECESSION TYPE [3]	DENTAL HYPERSENSITIVITY
17	3 mm	4 mm	THICK FLAT PHENOTYPE	1 mm	RT1	A-	YES
16	3 mm	5 mm	THICK FLAT PHENOTYPE	3 mm	RT1	B-	YES
15	2 mm	5 mm	THICK FLAT PHENOTYPE	2 mm	RT1	A-	YES
22	2 mm	5 mm	THIN SCALLOPED	1 mm	RT1	A-	YES
23	2 mm	5 mm	THIN SCALLOPED	1 mm	RT1	A-	YES
25	3 mm	4 mm	THIN SCALLOPED	2 mm	RT1	A+	YES
26	3 mm	4 mm	THIN SCALLOPED	3 mm	RT1	B+	YES

Image 1: Initial conditions.

To prevent the progression of GR, the use of a soft brush with a modified Stillman technique was recommended. A periodontal phase 1 was proposed, followed by CAF for quadrant 1, and CAF + CTG for quadrant 2, with the presence of NCCL on teeth 2.5 and 2.6 being the main indication for the placement of an ITC.

Surgical Procedure

The patient underwent periodontal phase 1 one week prior to the surgical procedure.

For quadrant 1, the surgical field was cleaned and disinfected, then infiltrated with 2% lidocaine with epinephrine 1:100,000 in the posterior, middle, and anterior maxillary branches. Biofilm was removed from the exposed root surfaces with a Gracey® curette, and the exposed roots were then polished with a rubber cup (Image 2a, 2b, 2c, 2d). Subsequently, a split-thickness flap (partial, total, partial) was elevated as described by Zucchelli et al. [5], making oblique incisions connected to each other by intrasulcular incisions, extending from distal to tooth 1.7 to distal to tooth 1.3 (Image 3). The anatomical papillae of the teeth involved in the flap were de-epithelialized with a #12 scalpel blade (Image 4). Once de-epithelialized, the tension of the flap was verified, and the flap was repositioned 2 mm coronal to the CEJ. To achieve this, a horizontal incision was made on the apical periosteum at the mucogingival junction. Once the flap was passive, a suspensory matress was performed using 5-0 polyglycolic acid suture (Image 5).

Image 2: Sequence of biofilm removal.

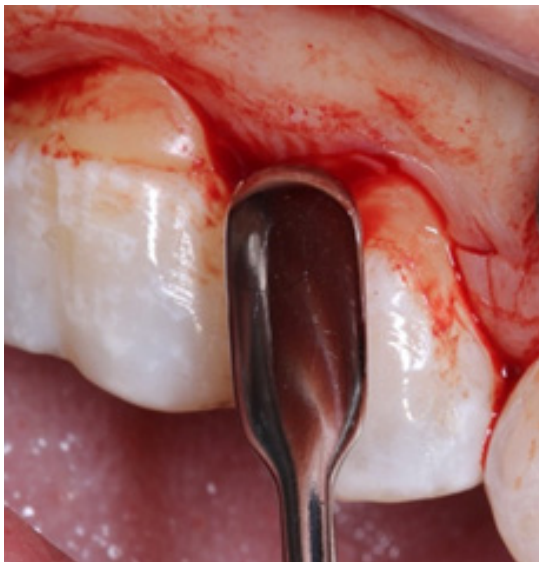

Image 3: Coronal advancement flap dissection.

Image 4: Des epithelialization of anatomical papillae.

Image 5: Coronal advancement and suspensory matress.

Image 6: Postoperative at 14 days.

Image 7: Postoperative at 21 days.

Image 8: Postoperative at 6 months.

For quadrant 2 (Images 9, 10), 2% lidocaine with epinephrine 1:100,000 was infiltrated into the posterior, middle, and anterior maxillary branches. Biofilm was removed from the exposed root surfaces with a Gracey® curette, and the exposed roots were then polished with a rubber cup. Subsequently, a split-thickness flap (partial, total, partial) by making oblique incisions connected to each other by intrasulcular incisions, extending from distal to tooth 2.7 to mesial to tooth 2.2 (Image 11). Ameloplasty was then performed with a fine-grain diamond bur to reduce the angle of the NCCL present in teeth 2.5 and 2.6 (Image 12). The teeth were de-epithelialized. The anatomical papillae of the teeth involved in the flap were removed with a #12 scalpel blade. Once the epithelium had been removed, the tension of the flap was checked, and the flap was repositioned 2 mm coronal to the CEJ. A CTG was obtained from the maxillary tuberosity area using a distal wedge technique with a #12 scalpel blade (Image 13). Once the CTG was collected, it was de-epithelialized extraorally with a #15 scalpel blade (Image 14). Given the thickness of the CTG (4 mm), a partial incision was made across the length of the graft to obtain a CTG with a larger diameter (17 mm). The CTG was placed in the recipient site at the level of the CEJ of teeth 1.5 and 1.6 (Image 15) and secured with sling suture to the anatomical papillae of the teeth involved, using 5-0 polyglycolic acid.

Image 9: Preoperative left side of maxillary.

Image 10: Cervical step assessment.

Image 11: Coronal advancement flap dissection.

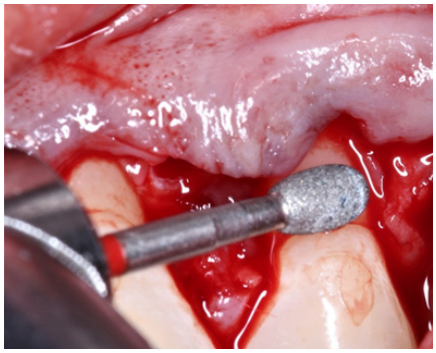

Image 12: Root step removal.

Image 13: Connective tissue graft harvested from the maxillary tuberosity area.

Image 14: Extraoral de-epithelialization of connective tissue graft.

Image 15: Adaptation of connective tissue graft in the roots surface.

Once the CTG was stabilized, the flap was replaced with a 2 mm coronal to the CEJ, and the position was secured with 5-0 nylon sutures, with a suspensory mattress (Image 16).

The patient was instructed to take nonsteroidal anti-inflammatory drugs (ketorolac 30 mg) three times a day for five days and to rinse with 0.12% chlorhexidine mouthwash twice a day for 14 days. The sutures were removed after 14 days, and follow-up was performed for six months.

Results

The healing process proceeded without incident, with inflammation, edema, and mild discomfort properly controlled with analgesics. After 14 days, the sutures were removed, observing stability of the gingival margin placed 2 mm coronal to the CEJ (Images 6, 7, 17, 18). No exposure or signs of necrosis were observed on the CTG. Six months after the procedure, the root surfaces showed complete RC, and the hypersensitivity reported by the patient improved in both quadrants, although hypersensitivity in teeth 2.2 and 2.3 persisted, as it was caused by the use of citrus fruits and not by the GR (Images 8, 19). A change in the periodontal phenotype of quadrant 2 was observed, changing from "thin scalloped" to "thick flat biotype" as a result of the placement of the CTG. The post-surgical fibrous gingival morphology of quadrant 2 associated with the use of CTG from maxillary tuberosity did not present a negative aspect for the patient (Image 20). There were no differences between the initial and final measurements in both quadrants in terms of the amount of keratinized gingival tissue. The results of the procedure are summarized in Table 2.

Image 16: Final Suture.

Image 17: Postoperative 14 days.

Image 18: Postoperative 21 days.

Image 19: Postoperative 6 months.

Image 20: Baseline vs. 6-month post-surgical follow-up.

Discussion

This clinical case study compares two techniques for RC of GR RT1 [2]. Both techniques achieved the main objective of RC.

A variety of surgical techniques have been described for treating multiple GR RT1. These include the tunnel technique [12], vestibular incision subperiosteal tunnel access [13], and laterally strached and coronally repositioned flap [14], all of which can be combined with CTG, mucosal substitute, or emdogain. Of all the techniques mentioned, the CAF and CAF + CTG techniques represent a viable, predictable option and do not pose a greater challenge for the operator.

Giovan Paolo Pini Prato et al. [15] conclude in their study that to obtain a 100% RC, the surgical margin must be repositioned at least 2 mm coronal to the CEJ, and that the presence of an NCCL is a factor that influences the final RC percentage. This is consistent with the findings of the present comparative study, where the final placement of the gingival margin was 2 mm coronal to the CEJ.

Zucchelli et al. [16] demonstrated that the CAF procedure is a reliable and predictable treatment modality for achieving RC in isolated or multiple cases. Later, Zucchelli et al. [17] mentioned that there are no significant differences between treatment with CTG and without CTG at 6 months and 1 year, but in a 5-year follow-up, there is greater apical migration in procedures without CTG. They emphasized that changes in habits, hygiene, and maintenance are important.

Mauro Pedrine Santamaria et al. [18] demonstrated that, in the presence of NCCL, or root convexities, the best results were achieved with CAF + CTG, compared to CAF + resin-modified glass ionomer. This is consistent with the results of our study, in which sites with NCCL were successfully treated with CAF + CTG.

Claudia Dellavia et al. [19] demonstrated that CTGs obtained from maxillary tuberosity presented less postoperative pain, a greater number of fibroblasts, and collagen fibers of higher density compared to those obtained from the palatal sites. These also showed greater long-term stability; however, there may be a fibrotic response, which can lead to an unsightly result. These are the reasons why the maxillary tuberosity area was chosen as the site for harvesting the CTG in the present comparative study. The discrepancy in gingival morphology observed in quadrant 2, where a CTG from the maxillary tuberosity was used, did not represent an aesthetic problem for the patient.

Conclusions

In this comparative study, where CAF and CAF + CTG were performed in the treatment of GR RT 1, both techniques achieved satisfactory results in terms of RC and improvement in dental hypersensitivity. The change in periodontal phenotype was only observed in the sites treated with CAF + CTG. Therefore, both techniques were satisfactory for the main objective of the comparative study.

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Table 2: Final clinical parameters (NGR = no gingival recession).

TOOTH	PROBING DEEP	GINGIVAL KERATINIZED TISSUE	PERIODONTAL PHENOTYPE [11]	DEPTH OF RECESSION	RECESSION TYPE [2]	RECESSION TYPE [3]	DENTAL HYPERSENSITIVITY
17	3 mm	4 mm	THICK FLAT PHENOTYPE	0 mm	NGR	NGR	NO
16	3 mm	5 mm	THICK FLAT PHENOTYPE	0 mm	NGR	NGR	NO
15	1 mm	5 mm	THICK FLAT PHENOTYPE	0 mm	NGR	NGR	NO
22	2 mm	5 mm	THIN SCALLOPED	0 mm	NGR	NGR	YES
23	2 mm	5 mm	THIN SCALLOPED	0 mm	NGR	NGR	YES
25	3 mm	4 mm	THICK FLAT PHENOTYPE	0 mm	NGR	NGR	NO
26	3 mm	4 mm	THICK FLAT PHENOTYPE	0 mm	NGR	NGR	NO

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