



Minimally invasive free gingival graft technique prior-to orthodontic therapy: case report

Diana Cecilia Peniche-Palma,* Bertha Arely Carrillo-Ávila,* Eduardo Sauri-Esquivel,*
José Rubén Herrera-Atoche,§ Víctor Manuel Martínez-Aguilar*

* Department of Specialization in Periodontology.

§ Department of Specialization in Orthodontics.

Facultad de Odontología, Universidad Autónoma de Yucatán. Mérida, Yucatán, México.

ABSTRACT

Introduction: A gingival recession (GR) is an affection in which the gingiva displaces apical to the cement-enamel junction causing exposure of the root surface. A thin gingival phenotype can be associated to GR, especially when exposed to orthodontic movements. To solve this condition, several mucogingival techniques have been proposed. Free gingival grafts taken from the palate are the gold standard; however, they are related to poor esthetical results and postoperative complications. In order to reduce those disadvantages, a «Minimally Invasive Esthetic Free Gingival Graft» (MIEFGG) technique is proposed, which involves a donor site placed on the buccal aspect of upper molars to modify the phenotype or regain attachment in the recipient site. **Aim:** To describe a new graft technique, used in mucogingival surgery, which is both esthetic and minimally invasive. **Material and methods:** A 24-year-old female patient who requested a periodontal evaluation before orthodontic treatment. Diagnosis: Cairo's RT3 along with thin phenotype, type II mobility, and extrusion associated to teeth 4.1 and 4.2. Treatment plan: thicken the gingival phenotype surrounding teeth 4.1 and 4.2 before orthodontic therapy. Since the patient expressed esthetical concerns, the MIEFGG technique was selected. **Results:** Postsurgical follow-ups were performed 7, 14, 30, and 150 days. Both the width and the height of the keratinized gingiva around teeth 4.1 and 4.2 increased by 1 mm. The esthetic outcome was satisfactory, according to the patient. No complications or postoperative pain was reported. **Conclusion:** MIEFGG is a technique that presents good results in terms of gingival augmentation, little discomfort to the patient, and esthetic results. Concerning the clinical case presented here, those

advantages were achieved. However, more research is needed in order to prove its effectiveness.

Keywords: Gingival recession, oral surgical procedures, periodontics, minimally invasive esthetic free gingival graft.

INTRODUCTION

A gingival recession (GR) is a pathological condition in which the gingiva displaces apical to the cement-enamel junction (CEJ) causing exposure of the root surface.¹ The GR is not exclusively associated with inadequate standards of oral hygiene; it is a complex and multifactorial etiology in anatomical, iatrogenic and pathological matters² and it can decrease the quality of life of the patient due to poor esthetics, dental hypersensitivity and high risk of tooth decay.³

Cairo et al. (2011) classified GR into three types, according to the assessment of Clinical Attachment Loss (CAL) at both buccal and interproximal sites.⁴

A thin gingival phenotype can also represent a risk factor for the appearance of GR,⁵ especially when teeth associated with thin phenotype are or will be exposed to orthodontic movements. When this is the case, it becomes imperative to enhance the preoperative circumstances of the periodontium to avoid that the GR is accentuated.⁶ In this regard, mucogingival surgical techniques have been proposed, aiming to recover the clinical attachment loss or modifying the phenotype width, reducing the risk of GR appearance.⁷

Free gingival grafts using the palate as a donor site have been widely used to increase the width of the attached gingiva; however, this procedure usually tends to produce unsightly results and may be associated to postoperative complications, such

Received: May 2020. Accepted: June 2020.

How to cite: Peniche-Palma DC, Carrillo-Ávila BA, Sauri-Esquivel E, Herrera-Atoche JR, Martínez-Aguilar VM. Minimally invasive free gingival graft technique prior-to orthodontic therapy: case report. Rev Odont Mex. 2020; 24 (2): 152-156.

© 2020 Universidad Nacional Autónoma de México, [Facultad de Odontología]. Este es un artículo Open Access bajo la licencia CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

www.medigraphic.com/facultadodontologiaunam

as bleeding from the donor site and severe patient discomfort due to the grafted palate.⁸

To reduce these complications, a new minimally invasive technique, called «Minimally Invasive Esthetic Free Gingival Graft» (MIEFGG) has been proposed. This technique consists of a partial thickness flap made on the buccal aspect of the upper molars (donor site) in order to take the graft and place it at the recipient site to modify the phenotype or even to recover the periodontal attachment. MIEFGG requires that the donor site be on the buccal aspect of an upper molar, with a minimum width of 5 mm of keratinized gingiva; the graft's width should measure at least 1 mm. The technique involves the following indications:⁹

- The coronal incision at the donor site should be placed 2 mm apical to the free gingival margin.
- The apical incision at the donor site should be placed slightly coronal to the mucogingival junction.
- The graft should be sutured in the recipient site, associated, which needs to be de-epithelized in order to create a vascular bridge.
- If there is a frenum associated with the donor or recipient site, it should be removed to avoid tension.

Indications for MIEFGG include thickening of the gingival phenotype and it is recommended for root coverage procedures too.

This paper presents the case of a female patient treated with MIEFGG who requested a periodontal evaluation before orthodontic treatment, and who expressed esthetical concerns.

CASE REPORT

A 24-year-old patient was referred to the periodontist by a general dentist; the main concern of the dentist was the periodontal health of the right mandibular incisors of the patient, since she requested an orthodontic treatment. During the periodontal examination, the lower-left incisors (4.1 and 4.2) were diagnosed with Cairo's RT3 gingival recession, with a thin phenotype, type II mobility, and dental extrusion (*Figure 1*). The patient was referred to the orthodontist for the latter to evaluate the occlusal trauma and extrusion of the incisors involved. At this point, it was decided to thicken the surrounding gingival phenotype of teeth 4.1 and 4.2 before starting orthodontic therapy.

After analyzing the diagnostic records, the patient was presented with the following treatment plan: a periodontal phase I that included plaque control and



Figure 1: Initial clinical examination. A remarkable thin phenotype and RT3 surrounding teeth 4.1 and 4.2 is shown. Both teeth were also associated to type II mobility and dental extrusion.

supragingival scaling, followed by a surgical phase that would involve a gingival graft whose objective was to increase the gingival thickness of the affected incisors.

Regarding the patient's concern for postoperative esthetical outcomes, the MIEFGG technique was chosen. The buccal aspect of the upper right first molar was selected as the donor site. Written informed consent was obtained from the patient before starting the treatment.

Surgical procedure and MIEFGG

The placement of a wire splint with composite in teeth 4.1 and 4.2 initiated the procedure. After infiltrating local anesthesia (2% lidocaine with epinephrine 1:80,000) the exposed surfaces of the affected incisor roots were planned with a «McCall 13-14S» curette. At the recipient site, a horizontal incision apical to the keratinized tissue was made with the help of a «Hu-Friedy MB64» micro scalpel (*Figure 2A*). The lower labial frenum was liberated to release tension and avoid graft from shifting.

Two horizontal incisions were made at the donor site (the buccal aspect of 1.6) using a «15C» scalpel blade. The first one was made 2 mm apical to the free gingival margin. This incision was then connected to a second one, which was located slightly coronal to the mucogingival junction (*Figure 2B*), thus giving the graft a rectangular shape (14 × 5 × 1 mm). The graft was then harvested from the donor site, trimmed (*Figure 2C*), placed on the recipient connective bed and sutured with nylon thread, 6-0 non-resorbable «Atramat»® suture (*Figures 2 D and 3A*).

The patient was instructed to clean the surgical areas using a 0.12% chlorhexidine mouthwash twice a day for two weeks, and it was remarked the

importance of avoiding any contact with both sites, the donor and the recipient, until suture was removed, which occurred 14 days later.

Postsurgical follow up

Postsurgical follow-ups were performed on days 7, 14 (*Figure 3B y C*), 30, and 150 (*Figures 3D and 4*). At each appointment, plaque removal at the donor and recipient sites was performed and both width and height of the keratinized gingiva around teeth 4.1 and 4.2 were measured.

It was determined that gaining was 1 mm for both, width and height; the esthetical outcome was assessed together with the patient, who reported being satisfied with the appearance of the graft and having had no postoperative complications or pain.

Only 14 days after surgery the donor site did appear to be completely healed (*Figure 3C*) and after five months the graft placed at the recipient site seemed to be well blended with the surrounding gingival tissue (*Figure 4*) maintaining the width and height gained.

DISCUSSION

Mucogingival therapy involves the augmentation (height and width) of the gingival tissues with the aim of controlling or preventing a gingival recession, facilitating dental hygiene (plaque control), improving esthetics and reducing hypersensitivity.⁷ This type of treatment includes free gingival grafts, connective tissue grafts, repositioned flaps, and

guided tissue regeneration. The use of any of these techniques can lead to significant clinical improvement; however, selecting the appropriate one depends on a variety of factors related to the defect, the patient's circumstances, and the technique itself.¹⁰

In dental practice, it is essential to improve patient outcomes. The use of a free gingival graft technique is well known for increasing keratinized tissue dimensions and creating a suitable area of attached gingiva. Nevertheless, changes in the graft, such as shrinkage, may occur during the healing period, which can interfere with both esthetics and the expected amount of keratinized tissue.¹¹ Some authors have proposed different techniques to improve both patient's comfort and outcome after mucogingival surgery, including palatal wound reduction or avoidance, using different harvesting procedures and locations.¹²

Sullivan and Atkins in 1968 proposed to remove a free gingival graft from the palate between the distal aspects of the canine and the medial aspect of the first molar. At that time, they recommended minimum thickness of 1.5-2 mm.¹³ The main disadvantage of this technique is the possibility of postoperative complications, which are considerably minimized when using the MIEFGG technique. Shah et al. (2019) analyzed edentulous ridges and retromolar areas (tuberosity or operculum area) as alternative donor sites for gingival grafts, which are comparable to the donor site recommended by the MIEFGG technique.

There are several advantages when it comes to using gingival operculum from an erupting molar as a free gingival graft. For instance, since it does not use



Figure 2:

A) Incision at the recipient site. A partial thickness flap was designed with a «Hu-Friedy MB64» micro scalpel in order to create a vascular bed. **B)** Donor site, located on the buccal aspect of tooth 1.6 after extraction of the partially thick tissue for grafting through a rectangular-shaped incision, chosen for this purpose. The integrity of the gingival margin was preserved; **C)** The graft was de-epithelialized after extraction, measuring 14 × 5 × 1 mm. **D)** Minimally invasive free gingival graft placed on the recipient site.

Figure 3:

- A)** The graft was sutured with nylon thread, 6-0 non-resorbable «Atramat» suture, using a suspensory technique.
- B)** Recipient site two weeks after surgery. Swelling still remains but a thickening of the phenotype and partial coverage of the GR can be noticed;
- C)** Donor site two weeks after surgery, complete recovery of the gingival tissues is shown;
- D)** Donor site five months after surgery. There are no scars or alterations of the surrounding gingival tissues.



the palate as a donor site, there is no risk of incising the greater palatine artery, which reduces the risk of both trans-operative and post-operative trauma; in addition, postoperative discomfort is significantly reduced. Another benefit is that the use of the operculum allows a faster healing process at the donor site and shows better blending with the recipient site.^{14,15} The MIEFGG technique shares these advantages.

Another commonly used donor site for free gingival graft is an edentulous ridge area. According to Windisch et al. (2019), this variation also reduces the risk of trans-operative complications and postsurgical discomfort but its major disadvantage is that it enables graft hyperplasia and scar formation after the healing period, which leads to lower esthetical outcomes when compared to the MIEFGG technique.¹⁶

Overall, it is important to highlight the significant reduction of postoperative discomfort when using an alternative donor site, instead of the palatal area. A study conducted by Wessel et al. (2008)¹² reported that grafts removed from the palate were associated with a higher incidence of pain at the donor site during the early postoperative period. Del Pizzo et al. (2002)¹⁷ reached similar conclusions, describing postsurgical complications at palatal donor site, during the first seven days after the procedure, in 100% of the subjects treated with free gingival grafts, which is consistent with a previous study proposed by Griffin et al. (2006).¹⁸

In addition to the lower postoperative complications of the MIEFGG technique, there is also the esthetical

result, since the main disadvantage of palatal free gingival grafts, is the lack of predictability in terms of esthetics. This situation has been explained in terms of the histological differences between the donor and recipient sites. Bertl et al. (2015)¹⁹ analyzed the palatal mucosa contains a greater amount of adipose tissue and a lesser amount of dense connective tissue, which creates difficulties to thoroughly blend with the attached gingiva, whereas this is not likely to happen when the donor site is almost identical to the recipient site.²⁰ Rocuzzo et al. (2002) reported that free gingival



Figure 4: Recipient site five months after surgery. The MIEFGG is completely blended, achieving an esthetical result. Although GR still remains the phenotype is thickened.

grafts from the palate have less chance of success and predictability²¹ which can be questionable when selecting the appropriate graft technique, especially if the esthetic factor is imperative for the patient.²²

CONCLUSION

Based on the described literature review, it can be concluded that when it comes to enhancing both the esthetical outcomes and reducing patients' discomfort during the healing period, the MIEFGG technique should be considered. However, since each patient is different, proper case selection and adequate tissue management must be considered critical points for the success of any surgical procedure. In this sense, some authors recommend that randomized controlled clinical trials with large samples should be carried out to prove the effectiveness and applicability of the MIEFGG.²³

REFERENCES

- Jain S, Kaur H, Aggarwal R. Classification systems of gingival recession: an update. *Indian J Dent Sci.* 2017; 9 (1): 52-59.
- Pa H, Ritchie M, Asuni A, Gavillet E, Janne LS, Gingival NB et al. Gingival recession and root caries in the ageing population: a critical evaluation of treatments. *J Clin Periodontol.* 2017; 44 (18): 178-193.
- Morris JW, Campbell PM, Tadlock LP, Boley J, Buschang PH. Prevalence of gingival recession after orthodontic tooth movements. *Am J Orthod Dentofac Orthop.* 2017; 151 (5): 851-859.
- Cairo F, Nieri M, Cincinelli S, Mervelt J, Pagliaro U. The interproximal clinical attachment level to classify gingival recessions and predict root coverage outcomes: an explorative and reliability study. *J Clin Periodontol.* 2011; 38 (7): 661-666.
- Kim D, Bassir S, Nguyen T. Effect of gingival phenotype on the maintenance of periodontal health: an American Academy of Periodontology best evidence review. *J Periodontol.* 2020;91(3):311-38.
- Rodríguez YC, Pomarino SG. Orthodontic dental movement and its association with the presence of gingival recession. *Rev Odontológica Mex.* 2017; 21 (1): 8-11.
- Camargo PM, Melnick PR, Kenney EB. The use of free gingival grafts for aesthetic purposes. *Periodontol 2000.* 2001; 27: 72-96.
- Caffesse R, Guinard E. Treatment of localized gingival recessions part ii. coronally repositioned flap with a free gingival graft. *J Periodontol.* 1978; 49 (7): 357-361.
- Khanuja PK, Sharma RK, Tewari S, Narula SC. Clinical evaluation of the marginal gingiva as a donor tissue to augment the width of keratinized gingiva : Series of 2 cases with 3-year follow-up. *Contemp Clin Dent.* 2015; 6 (1): 1-9.
- Jenabian N, Bahabadi MY, Bijani A, Rad MR. Gingival unit graft versus free gingival graft for treatment of gingival recession: a randomized controlled clinical trial. *J Dent.* 2016; 13 (3).
- Yildiz MS, Gunpinar S. Free gingival graft adjunct with low-level laser therapy: a randomized placebo-controlled parallel group study. *Clin Oral Investig.* 2019; 23 (4): 1845-1854.
- Wessel J, DN T. Patient outcomes following subepithelial connective tissue graft and free gingival graft procedures. *J Periodontol.* 2008; 79 (3): 425-430.
- Sullivan H, Atkins J. Free autogenous gingival grafts. I. Principles of successful grafting. *Periodontics.* 1968; 6 (3): 121-129.
- Harrison JS, Conlan MJ, Deas DE. An alternative donor site for an epithelialized-free soft-tissue autograft. *Compend Contin Educ Dent.* 2011; 32 (2): e29-31.
- Shah HK, Shrestha S, Sharma S, Acharya P. Operculum from erupting third molar: an alternative donor site for an epithelialised-free soft-tissue autograft case report. *J Nepal Soc Periodontol Oral Implantol.* 2019; 3 (6): 75-77.
- Windisch P, Molnár B. Harvesting of autogenous grafts for gingival recession coverage. *Clin Dent Rev.* 2019; 3 (17): 1-9.
- Del Pizzo M, Modica F, Bethaz N, Priotto P, Romagnoli R. The connective tissue graft: a comparative clinical evaluation of wound healing at the palatal donor site. *J Clin Periodontol.* 2002; 29 (9): 848-854.
- Griffin T, Cheung W, Zavras A, Damoulis P. Postoperative complications following gingival augmentation procedures. *J Periodontol.* 2006; 77 (12): 2070-2079.
- Bertl K, Pifl M, Hirtler L, Rendl B, Nürnberger S, Stavropoulos A et al. Relative composition of fibrous connective and fatty/glandular tissue in connective tissue grafts depends on the harvesting technique but not the donor site of the hard palate. *J Periodontol.* 2015; 86 (12): 1331-1339.
- Azar E, Rojas M, Patricia M, Carranza N. Histologic and histomorphometric analyses of de-epithelialized free gingival graft in humans. *Int J Periodontics Restor Dent.* 2019; 39 (2): 221-226.
- Rocuzzo M, Bunino M, Needleman I, Sanz M. Periodontal plastic surgery for treatment of localized gingival recessions: a systematic review. *J Clin Periodontol.* 2002; 29 (3): 178-194.
- Goyal L, Gupta ND, Gupta N, Chawla K. Free gingival graft as a single step procedure for treatment of mandibular miller class I and II recession defects. *World J Plast Surg.* 2019; 8 (1): 12-17.
- Shah R, Thomas R, Mehta DS. Recent modifications of free gingival graft: a case series. *Contemp Clin Dent.* 2015; 6 (3): 425-427.

Mailing address:

Victor Manuel Martinez-Aguilar

E-mail: victor.martinez@correo.uady.mx