Case Report

Mucograft® as an Alternative Treatment in the Management of Multiple Gingival Recessions: Case Report

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Abstract:
A variety of surgical procedures can be performed for the treatment of gingival recession, including the subepithelial connective tissue graft. Due to the morbidity reported by patients, alternative techniques using biomaterials has been frequently discussed. The objective of this study was to report the clinical follow-up of root coverage with coronally positioned flap associated with Mucograft® (collagen matrix) for 24 months. The fine gingival biotype tends to be delicate, possessing a small zone of keratinized mucosa. This type of thickness should be taken into special consideration since it directly influences in the aesthetics and the emergence profile. The gingival recession heights and the thickness of the tissue were measured initially and after 4, 9, and 24 months. 1 year post-operative, partial root coverage (22.5%) and gain in the thickness (100%) of the gingival tissue was observed. Although the root coverage with a coronally positioned flap associated with Mucograft® for this clinical case was not effective, a significant increase in thickness of the gingival tissue that received the collagen matrix was observed; thus, it was considered a viable treatment option and suitable for soft tissue augmentation. This clinical case, the Mucograft® was effective for the thickness of the gingival tissue; thus it is considered a viable treatment option and suitable for periodontal tissue augmentation.

Key Words: Dental materials, esthetics, gingival recession, periodontal grafts

Introduction

Patients search for dental practice for esthetic reasons, decay, sensitivity, or fear of losing a tooth.[1] Gingival recession is defined as the apical displacement of the gingival margin from the cement-enamel junction with root exposure, which can be localized or generalized and can include one or more surfaces of the tooth.[2]

Etiological factors may be associated with non-pathological bone loss, such as anatomy and tooth position, gingival phenotype, orthodontic movement, chemical, and/or mechanical trauma associated with parafunction, heavy muscle insertion or frenulum traction, restorations and dental calculus; or yet associated with pathological bone loss, where possible causes of gingival recession are periodontal disease, smoking, cervical and root caries, and abrasion.[3]

A variety of surgical procedures may be performed for the treatment of gingival recessions; however, it is necessary to determine the classification of the recession according to Miller,[4] and then establish the appropriate surgical treatment and prognosis for each specific case.[2] The surgical treatments of root coverage include free gingival graft; subepithelial connective tissue graft with coronal repositioning; tunnel subepithelial connective tissue graft technique; coronally positioned flap; laterally positioned flap; double papilla technique; and a combination of two or more techniques.[2,3,5]

Root coverage procedures, just like any other, should only be performed if the patient presents healthy gingiva and a good level of oral hygiene. Favorable results with full coverage are possible in Miller Class I and II recessions. Miller Class III has a dubious prognosis, generally allowing partial coverage of the recession.[3]

The most predictable treatment, considered the "gold standard" for root coverage, is the subepithelial connective tissue graft. However, this technique offers a disadvantage related to the morbidity to the patient, where it is necessary to remove the connective tissue from the palate area. Adverse effects reported by individuals who have undergone this technique are discomfort and postoperative pain in the palate wound.[6]

An alternative treatment to eliminate the need for a second surgical area-usually the palate is to use a graft material, such as the porcine collagen matrix. Recently, Geistlich Pharma AG (Wolhusen, Switzerland) produced an absorbable collagen

matrix of porcine origin, namely Mucograft®.[7] According to Herford *et al.* (2012), the matrix is indicated for soft tissue augmentation and consists of a bilayer structure: A dense layer of compact collagen and a spongy layer of porous collagen.[8] The objective of this study was to report the clinical follow-up of root coverage procedure with coronally positioned flap associated with Mucograft® (collagen matrix) for 24 months.

Case Report

A 35 years-old man seek for periodontal treatment due to root exposure in the upper right canine and first molar. At the clinical examination, gingival recessions Miller Class III (Figure 1) was observed. The patient reported no systemic diseases. Radiographically, there were no suggestive images of caries or periapical alterations.

Initially, the patient was treated with basic periodontal procedures of supragingival scaling and root planing, and oral hygiene instruction were given. The tissue thickness was measured using a sterile gingival needle between the apical margin of the recession and the mucogingival line. A sterile 1 mm silicone barrier was introduced in the gingival needle to copy the tissue thickness. The portion of the needle that was copied was then measured with a digital instrument (Starrett®, Athol, Massachussetts, EUA), converting each 1000 μm in 1 mm. Likewise, the silicone barrier was introduced in a periodontal probe to copy the distance between the cementoenamel juntion and the apical margin of the gingival recession, using the same digital instrument.

The upper right canine tooth showed 2.5 mm gingival recession and 0.3 mm tissue thickness, while the upper right first molar tooth presented 2.0 mm recession and 0.4 mm thickness. The planning included root coverage surgery with a 15 × 20 mm Mucograft® collagen matrix (Geistlich Pharma AG, Wolhusen, Switzerland) associated with coronally positioned flap.

After local anesthesia, an intrasulcular incision was performed on the buccal aspect from the upper right central incisor tooth to the distal of the right second molar. A partial-thickness flap was then executed, except on the central and lateral incisors, where a total thickness flap was carried out (Figure 2). Root planing was performed with Gracey curettes and decontamination of the surfaces was executed using tetracycline hydrochloride and saline solutions for 30 seconds in each root surface. After preparation of the exposed root, the graft was adapted according to the size of each tooth root and positioned following the manufacturer's instructions. Two simple sutures were performed to stabilize the graft using Vicryl 6.0 suture material (Ethicon, São Paulo, Brazil) (Figure 3). Suspensory sutures in the coronally positioned flap were finally executed (Figure 4).

Anti-inflammatory (nimesulide 100 mg, every 12 h for 5 days), analgesic (Paracetamol 500 mg, every 6 h for 3 days) and

antibiotic (Amoxicillin 500 mg, every 8 h for 7 days) were prescribed postoperatively. In addition, mouthwashes of 0.12% chlorhexidine were prescribed twice a day for 7 days. The patient was advised to suspend brushing in the operated area. The sutures were removed 14 days after surgery.

The measurements were performed after 4 months. The upper right canine tooth presented 2.3 mm of gingival recession and 1 mm of tissue thickness, while the first molar presented 1.5 mm of recession and 1 mm of thickness. After 9 months, the measurements were carried out again. Regarding the gingival recession, the canine and the first molar teeth presented 2 mm and 1.2 mm, respectively, regarding the tissue thickness, 0.8 mm and 1.0 mm were recorded for canine and first molar teeth. After 24 months (Figure 5), the results were again

Figure 1: Initial aspect of the gingival recession corresponding to teeth 13 and 16.

Figure 2: Partial thickness flap performed on teeth 13 and 16.

Figure 3: Mucograft positioned and stabilized with two bilateral simple sutures.

measured, where 2 mm and 1.5 mm were recorded on the gingival recession, and 2.0 mm and 1.0 mm were presented for tissue thickness, on both canine and first molar (Table 1).

Results

According to the results in the evaluation of 4 months, the gingival recession of the canine decreased 0.2 mm and the tissue thickness increased by 0.7 mm. In relation to the first molar, the recession decreased 0.5 mm, and the gingival thickness increased 0.6 mm. When comparing the initial results with the 9 months postoperative, the recession of the canine decreased 0.5 mm, and the thickness increased 0.5 mm. In the first molar, the recession decreased 0.8 mm, and the gingival

thickness maintained an increase of 0.6 mm. Comparing the initial results with the 24 months postoperative, the recession of the canine reduced 0.5 mm, and the thickness increased 1.7 mm. In the first molar, the recession decreased 0.5 mm, and the tissue thickness maintained an increase of 0.6 mm. From 4 to 24 months, the gingival recession in the canine continued to decrease by 0.3 mm and the tissue thickness increased by 1 mm; while the recession and gingival thickness remained constant in the first molar. From 9 to 24 months, the gingival recession in the canine maintained on 2 mm and the tissue thickness increased by 1.2 mm; while the recession had an increase of 0.3 mm and the thickness remained stable on 1 mm in the first molar.

Table 1: Initial and postoperative measures.					
Tooth	Gingival tissue	Initial	4 months	9 months	24 months
13	Gingival recessions	2.5	2.3	2.0	2.0
	Thickness of gingival tissue	0.3	1.0	0.8	2.0
16	Gingival recessions	2.0	1.5	1.2	1.5
	Thickness of gingival tissue	0.4	1.0	1.0	1.0

Figure 4: Suspensory suture was performed to position the flap coronally.

Figure 5: Clinical aspect 24 months postoperatively.

Discussion

Several techniques have been presented as treatment for gingival recession, all of them aiming to achieve full coverage of the recession, improve the esthetic condition and decrease sensitivity, while maintaining periodontal health.[9] The subepithelial connective tissue graft associated with coronally positioned flap is a technique with high predictability, which has been presenting the best esthetic results among other procedures.[10,11] However, the morbidity of removing connective tissue from palate is a frailty of this technique; thus, there is an interest in searching for less invasive alternatives.[12]

To exclude the need for the connective tissue grafts, the Mucograft® was developed; it consists of a xenogenous collagen matrix originated from porcine and composed of collagen Type I and III. It has a bilayer structure, where the less porous surface is elastic, ensuring structural integrity of the material and allowing the suture stabilization in the surgical area that receive the matrix; and more porous surface that allows adherence, which promotes healing and cell integration. Thus, as performed in this case, the more porous surface of the collagen matrix contact the bone defect to facilitate tissue growth and stabilize the clot.[13]

This collagen matrix is specific to regenerate soft tissues and may be used alternatively to increase the volume of keratinized gingiva.[7] In the present case, the matrix was used to cover the multiple gingival recessions and increase the tissue thickness.

The clinical use of Mucograft® have presented satisfactory both clinical and histological results. The results using collagen matrix are similar to the results obtained for subepithelial connective tissue grafts, especially regarding the color. In addition, the matrix presents a standard of suitable healing and no signs of exacerbated inflammation.[7,14] Through histological studies, Carnio *et al.* (2012) concluded that the collagen matrix can be fully resorbed and replaced by connective tissue; on tissue evaluation, after 8 weeks postoperative, there were no signs of inflammation or collagen residues.[15]

McGuire and Scheyer (2010)[16] in a study that compared the use of Mucograft® to subepithelial connective tissue grafts, both associating coronally positioned flap technique, root coverage on a rate of 83.5% was obtained after 6 months with the use of Mucograft® against 97% with subepithelial connective tissue graft. After 12 months, 88.5% root coverage with Mucograft® and 99.3% in patients treated with connective tissue graft were recorded. However, regarding the keratinized tissue, the results were similar (1.34 mm for Mucograft® and 1.26 mm for connective tissue graft). According to the authors, the favorable clinical results when using the collagen matrix might be related to the role of the material to act as a scaffold, thus favoring the increase in thickness and providing a marginal stability of the gingiva. Despite the differences in the results, the membrane has similar effectiveness to the subepithelial connective tissue graft, which means high quality when considering the advantage of excluding the need of removing tissue from the palate.[15]

Cardaropoli *et al.* (2012),[17] in a similar study, achieved better results after 12 months. When using the Mucograft®, the root coverage was 94.32%, and when the connective tissue graft was used, it was about 96.97%. Regarding the tissue thickness, there was a gain of 1.23 mm when using collagen matrix and 1 mm using a connective tissue. Analyzing the results, it is suggested that the Mucograft® has a good stabilizing performance and ability to protect the clot until its total replacement by connective tissue.[18] In the present case report, there was an increase in tissue thickness, which is the main advantage of using the matrix once satisfactory root coverage was not observed.

Moreira *et al.* (2013)[19] reported a clinical case using Mucograft® for root coverage with coronally positioned flap in a 4 mm recession Miller Class I. The results were satisfactory and, after 3 and 6 months of follow-up, the recession was completely covered. After 12 months, the gingival margin remained stable, and there was a maturation of the gingival tissue. According to the authors, the use of membrane for covering Miller Class I gingival recessions can be successful, but more randomized clinical trials demonstrating the predictability and efficiency of the material are necessary.

The clinical case presented here measured the coverage of recessions and increased thickness of keratinized tissue of the upper right canine and first molar teeth. The technique used was the flap extended from the central incisor to the second molar, and it seems to be superior to the coronally positioned flap technique when using a biomaterial. A previous study compared the use of the coronally positioned flap to the extended flap technique when using an acellular dermal matrix for root coverage, and the results highlight the superiority of the extended flap. The authors believe that it avoids exposure of the material and improves its nutrition.[20]

The results in the present case were more significant regarding gingival thickness. After 4 months of follow-up, canine tooth presented 0.2 mm coverage and an increase of 0.7 mm in tissue thickness; while the first molar showed 0.5 mm root coverage and a gain of 0.6 mm in thickness. However, the outcomes may be considered satisfactory once the gingival recession, in this case, was a Miller Class III, where complete root coverage is not previsible. Although the tissue thickness presented a gain in the first 4 months, the 9th month evaluation showed that the canine had lost 0.2 mm in thickness while the first molar maintained thickness. In the 24th month evaluation, the canine continued with a 2 mm recession, but the tissue thickness increased 1.2 mm in relation to the 9th month; and the recession in the first molar increased 0.3 mm and the thickness remained the same as 1 mm.

According to Mehta and Lim (2010),[21] the thickness of gingival connective tissue has greater significance than the width of keratinized gingiva in determining susceptibility to gingival recession and health. However, the authors state that, clinically, the perception of gingival volume can be subjective; thus, evaluating the width of keratinized gingiva must be taken into consideration.

Conclusion
Although the root coverage with a coronally positioned flap associated with Mucograft® for this clinical case was not effective, a significant increase in thickness of the gingival tissue that received the collagen matrix was observed; thus, it was considered a viable treatment option and suitable for soft tissue augmentation.

Clinical Significance
The fine gingival biotype tends to be delicate, possessing a small zone of keratinized mucosa. This type of thickness should be taken into special consideration since it directly influences in the aesthetics and the emergence profile. This clinical case, the Mucograft® was effective for the thickness of the gingival tissue; thus, it is considered a viable treatment option and suitable for periodontal tissue augmentation.

References
1. Cairo F, Pagliaro U, Nieri M. Treatment of gingival recession with coronally advanced flap procedures: A systematic review. J Clin Periodontol 2008;35 8 Suppl:136-62.
2. Kassab MM, Badawi H, Dentino AR. Treatment of gingival recession. Dent Clin North Am 2010;54:129-40.
3. Tugnait A, Clerehugh V. Gingival recession-its significance and management. J Dent 2001;29(6):381-94.
4. Miller PD Jr. A classification of marginal tissue recession. Int J Periodontics Restorative Dent 1985;5(2):8-13.
5. Dembowska E, Drozdzik A. Subepithelial connective tissue graft in the treatment of multiple gingival recession. Oral Surg Oral Med Oral Pathol Oral Radiol Endod

2007;104(3):e1-7.

6. Chambrone L, Chambrone D, Pustiglioni FE, Chambrone LA, Lima LA. Can subepithelial connective tissue grafts be considered the gold standard procedure in the treatment of Miller Class I and II recession-type defects? J Dent 2008;36(9):659-71.

7. Sanz M, Lorenzo R, Aranda JJ, Martin C, Orsini M. Clinical evaluation of a new collagen matrix (Mucograft prototype) to enhance the width of keratinized tissue in patients with fixed prosthetic restorations: A randomized prospective clinical trial. J Clin Periodontol 2009;36(10):868-76.

8. Herford AS, Lu M, Akin L, Cicciù M. Evaluation of a porcine matrix with and without platelet-derived growth factor for bone graft coverage in pigs. Int J Oral Maxillofac Implants 2012;27(6):1351-8.

9. Roccuzzo M, Bunino M, Needleman I, Sanz M. Periodontal plastic surgery for treatment of localized gingival recessions: A systematic review. J Clin Periodontol 2002;29 Suppl 3:178-94.

10. Rotundo R, Pini-Prato G. Use of a new collagen matrix (mucograft) for the treatment of multiple gingival recessions: Case reports. Int J Periodontics Restorative Dent 2012;32(4):413-9.

11. Wessel JR, Tatakis DN. Patient outcomes following subepithelial connective tissue graft and free gingival graft procedures. J Periodontol 2008;79(3):425-30.

12. Nevins M, Nevins ML, Kim SW, Schupbach P, Kim DM. The use of mucograft collagen matrix to augment the zone of keratinized tissue around teeth: A pilot study. Int J Periodontics Restorative Dent 2011;31(4):367-73.

13. Ghanaati S, Schlee M, Webber MJ, Willershausen I, Barbeck M, Balic E, *et al.* Evaluation of the tissue reaction to a new bilayered collagen matrix *in vivo* and its translation to the clinic. Biomed Mater 2011;6(1):015010.

14. Vignoletti F, Nuñez J, Discepoli N, De Sanctis F, Caffesse R, Muñoz F, *et al.* Clinical and histological healing of a new collagen matrix in combination with the coronally advanced flap for the treatment of Miller class-I recession defects: An experimental study in the minipig. J Clin Periodontol 2011;38(9):847-55.

15. Carnio J, Fuganti MR, Ferrari C. The porcine collagen matrix (mucograft) used to root coverage. A case report. Perionews 2012;6(5):485-91.

16. McGuire MK, Scheyer ET. Xenogeneic collagen matrix with coronally advanced flap compared to connective tissue with coronally advanced flap for the treatment of dehiscence-type recession defects. J Periodontol 2010;81(8):1108-17.

17. Cardaropoli D, Tamagnone L, Roffredo A, Gaveglio L. Treatment of gingival recession defects using coronally advanced flap with a porcine collagen matrix compared to coronally advanced flap with connective tissue graft: A randomized controlled clinical trial. J Periodontol 2012;83(3):321-8.

18. Kimble KM, Eber RM, Soehren S, Shyr Y, Wang HL. Treatment of gingival recession using a collagen membrane with or without the use of demineralized freeze-dried bone allograft for space maintenance. J Periodontol 2004;75(2):210-20.

19. Moreira AR, Santamaria MP, Casati MZ, Sallum EA. Coronally advanced flap associated with collagen matrix graft in the tratamento of gingival recession. Perionews 2013;7:31-5.

20. Barros RR, Novaes AB, Grisi MF, Souza SL, Taba MJ, Palioto DB. A 6-month comparative clinical study of a conventional and a new surgical approach for root coverage with acellular dermal matrix. J Periodontol 2004;75(10):1350-6.

21. Mehta P, Lim LP. The width of the attached gingiva – Much ado about nothing? J Dent 2010;38(7):517-25.