



CASE REPORT

Free Gingival Autograft and Subepithelial Connective Tissue Graft for the Treatment of Gingival Recession: A Brief Review and Report of Three Cases

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ABSTRACT

Gingival recession is the migration of the free gingival margin apical to the cemento-enamel junction. There are various factors contributing toward gingival recession apart from periodontal disease that include faulty tooth brushing, tooth position or malaligned teeth, high muscle or frenal attachment, alveolar bone dehiscence, orthodontic forces, and iatrogenic factors leading to problems of esthetics, hypersensitivity, and root caries.

Several periodontal plastic surgical techniques have been introduced in the previous literature aiming to correct marginal tissue recessions, the predictability of which depends upon careful evaluation of the defect type, presence of attached gingiva, keratinized tissue width, and presence of single or multiple gingival recessions. The use of free gingival graft (FGG) and subepithelial connective tissue graft (SCTG) in root coverage is indicated for the treatment of single or multiple gingival recessions. Although both FGGs and SCTGs provide significant reduction in recession depth and clinical attachment gain for Miller's Class I and II gingival recession defects, SCTG seems to offer root coverage with a better color match between donor and recipient site tissue rendering better esthetics. Considering the advantages and disadvantages of FGG and SCTG in root coverage procedures, the following case reports describe the clinical results using FGG by Miller's technique, and using SCTGs by technique of Langer and Langer, and Zabalegui tunnel technique for the treatment of gingival recession.

Keywords: Free gingival autograft, Gingival recession, Root coverage, Subepithelial connective tissue graft.

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INTRODUCTION

Gingival recession is the migration of the free gingival margin apical to the cemento-enamel junction.¹ There

are various factors contributing toward gingival recession apart from periodontal disease, including faulty toothbrushing, tooth position, or malaligned teeth,² high muscle or frenal attachment,³ alveolar bone dehiscence,⁴ orthodontic forces,⁵ and iatrogenic factors. The recession of the free gingival margin, i.e., marginal tissue recession, may lead to problems of esthetics, hypersensitivity, and root caries. Periodontal plastic surgical treatment results in an increase of the apico-coronal and buccolingual dimensions of the gingival tissues, forming attached gingiva having sufficient volume and integrity to ensure an adequate epithelial seal and biological attachment between the grafted tissue and the previously denuded root surface resulting in coverage of the root surface to the level of the cemento-enamel junction, thereby resulting in a shallow gingival sulcus.⁶

In 1963, Bjorn⁷ pioneered the free gingival graft (FGG) classical technique for root coverage. The choice of use of FGG is mainly to increase the width of keratinized mucosa.⁸ Agudio et al⁹ in 2008 conducted a retrospective study in 224 sites showing complete lack of attached gingiva that were treated using FGG with a follow-up period of 10 to 25 years and concluded that FGG in sites with an absence of attached gingiva associated with recessions provide an increased width of keratinized tissue associated with recession reduction over a period of time. The American Academy of Periodontology (AAP) consensus report in 2015 concluded that in areas of suboptimal plaque control, a minimal 2 mm of keratinized tissue is required for adequate maintenance and that the amount of keratinized tissue augmentation using FGG ranged from 3.1 to 5.6 mm.¹⁰ However, FGG being a free graft lacks blood supply and heals with less than adequate gingival color match between the donor tissue and the recipient sites.

Subepithelial connective tissue graft (SCTG) for root coverage was introduced by Langer and Langer in 1985, with modifications described subsequently by other authors. This technique combined a connective tissue graft with an overlying pedicle that provided the added blood supply needed to maintain the graft with better color match and predictable results. This was also concluded by Oates et al¹¹ in 2003 and Rocuzzo et al¹² in 2002 in a systematic review. Recent systematic review for predictability

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of root coverage for localized gingival recession given by Cairo et al¹³ in 2014 and multiple adjacent gingival recession given by Hofmänner et al¹⁴ in 2012 have concluded that coronally advanced flap plus connective tissue graft gives the best clinical result.

Considering the advantages and disadvantages of FGG and SCTG, the following three case reports describe the results using FGG to increase the width of attached gingiva using Miller's technique,¹⁵ Langer and Langer technique¹⁶ of SCTG, and Zabalegui tunnel technique¹⁷ of SCTG for root coverage.

CASE REPORTS

Case 1

A 22-year-old female patient reported with a chief complaint of receding gums in the lower anterior teeth. The patient was in good systemic health. On intraoral examination, there was Miller's class III gingival recession seen with mandibular central incisors 31 and 41 (Fig. 1).

Presurgical Patient Preparation

Following patient education and oral hygiene instructions, scaling and root planing was performed. The patient was recalled after 4 weeks to assess oral hygiene maintenance and reduction in gingival inflammation with respect to 31 and 41 [FDI Federation Dentaire Internationale system of tooth numbering]. A decision was arrived upon to treat the recessions using free gingival autograft by Miller's technique.¹⁵ Alginate impressions were made to fabricate a surgical acrylic stent to protect the donor site on the hard palate from which graft will be harvested.

Surgical Procedure

Following all aseptic precautions and under adequate local anesthesia, scaling and root planing was performed

on both supragingival and subgingival areas of the root surfaces of 31 and 41 using Gracey curettes. Root biomodification with tetracycline hydrochloride was done using cotton pellet by active burnishing method for 30 seconds. Horizontal incisions were made in the two interdental papillae adjacent to the area to be grafted. The incisions were made at right angles to the gingival surface, creating a well-defined butt joint design. Two vertical apically diverging incisions were then placed at each end of the horizontal incision and extended beyond the mucogingival junction. Using sharp dissection of the scalpel blade, a split thickness flap was elevated to the level of the apical end of the vertical incisions, taking care that alveolar bone should not be exposed (Fig. 2). The FGG of 1.5 mm thickness was then harvested from the hard palate from between the distal area of canine to the mid-palatal of first molar, with the dimension of the gingival graft being one and a half times the dimensions of the recipient area (Fig. 3). The graft was sutured firmly to the recipient site as given by Holbrook and Ochsenbein¹⁸ using nonresorbable 4-0 surgical black silk sutures (SUTURA[®], Futura Surgicare Pvt Ltd., Bengaluru, India). (Fig. 4). After suturing, a tin foil was placed on the grafted site and then a eugenol-free periodontal dressing (COE-PAK[™], GC India Dental Pvt Ltd., Telangana State, India) was placed.

Bleeding from the donor site was arrested by pressure application following which oxidized cellulose surgical dressing and the surgical acrylic stent were placed to protect the wound. Postoperative oral 500 mg amoxicillin trihydrate and 400 mg ibuprofen, each thrice daily for 7 days, and mouthrinse 0.2% chlorhexidine gluconate twice daily for 3 weeks were prescribed with toothbrushing at the surgical site being discontinued for that time period. The patient was recalled after 2 weeks for periodontal dressing and suture removal and to check for healing. The healing at the donor site was by secondary intention, and healing occurred uneventfully without scarring



Fig. 1: Case 1: Preoperative view showing Miller's class III gingival recession w.r.t 31 and 41



Fig. 2: Case 1: Horizontal and vertical incisions made. Split thickness flap elevated

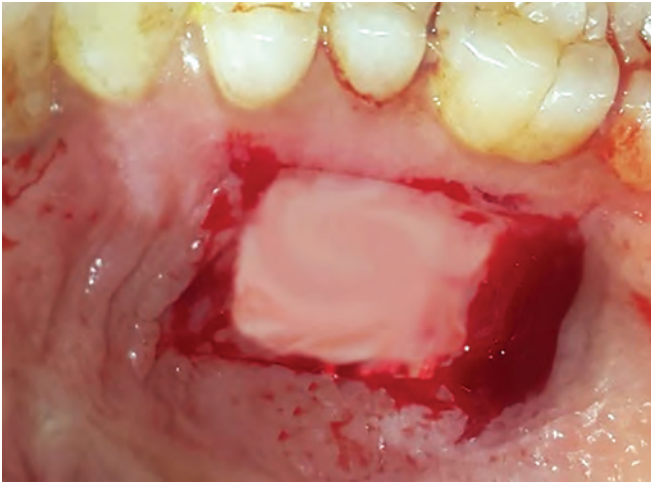


Fig. 3: Case 1: Free gingival graft harvested

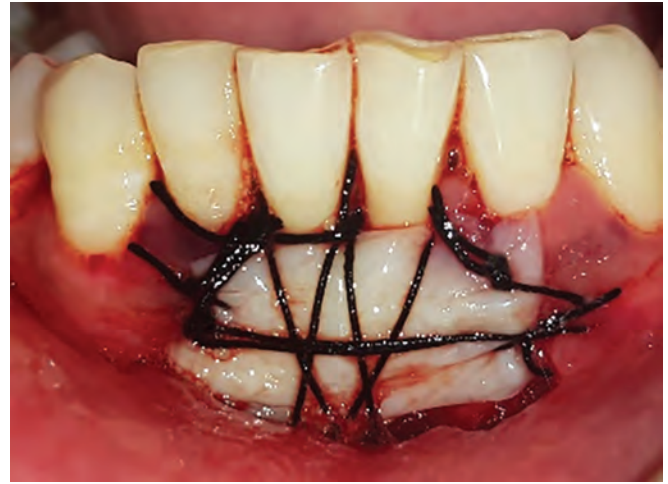


Fig. 4: Case 1: Free gingival graft sutured at the recipient site by Holbrook and Ochsenbein technique



Fig. 5: Case 1: Two weeks' postoperative healing



Fig. 6: Case 1: Three months' postoperative healing

(Fig. 5). The patient at 3 months was evaluated for healing and root coverage and increase in width of attached gingiva, and oral hygiene instructions were reinforced (Fig. 6). Results showed satisfactory increase in width of attached gingiva and increase in gingival thickness. Donor graft - recipient site color match, and root coverage was not entirely achieved

Case 2

A 26-year-old male patient reported with a chief complaint of hypersensitivity in the lower anterior region on having cold drinks. The patient was in good systemic health. On intraoral examination, there was Miller's class I gingival recession seen with respect to 31, 32, 41, 42 (FDI system of tooth numbering) (Fig. 7).

Presurgical Patient Preparation

Following patient education and oral hygiene instructions, scaling and root planing was performed. Recall at



Fig. 7: Case 2: Preoperative view showing Miller's class I gingival recession w.r.t 31, 32, 41, and 42

4 weeks was done to assess maintenance and reduction in gingival inflammation with respect to 31, 32, 41, and 42. A decision was arrived upon to treat the recessions using SCTG by Langer and Langer technique.



Fig. 8: Case 2: Split thickness horizontal and vertical incisions placed

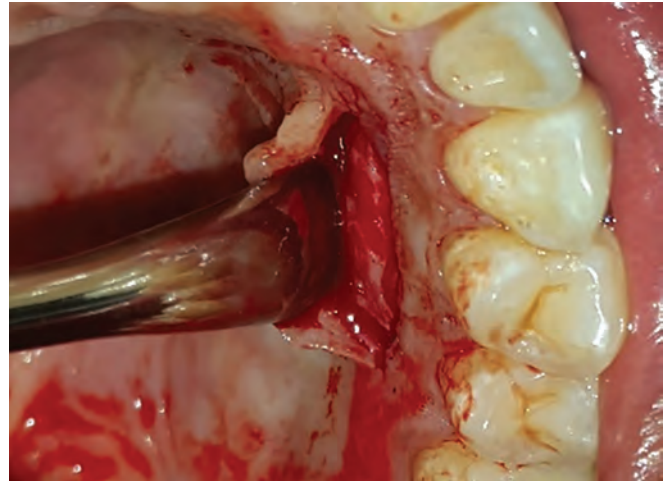


Fig. 9: Case 2: Donor site connective tissue graft procured using single incision technique

Surgical Procedure

With all aseptic precautions and adequate local anesthesia, root planing of the exposed root surfaces was carried out to reduce the convexity of the root eminences in order to reduce the avascular surface underneath the planned SCTG. A partial thickness flap was reflected with two vertical incisions placed involving the line angle of the adjacent teeth of the recession defects to be treated. The coronal margin of the flap was started with a horizontal sulcular incision to preserve all existing facial gingiva, leaving the interproximal papillae intact. Care was taken to extend the flap beyond the mucogingival junction without perforations that could compromise the blood supply (Fig. 8). The area was irrigated with sterile saline solution.

A second surgical site was created on the hard palate, with incisions placed between the distal aspect of first premolar and the midpalatal region of the first molar area with a single incision technique (Fig. 9) as given by Hürzeler and Weng in 1999.¹⁹ A SCTG of 2 mm thickness was harvested, and pressure was applied to the donor area with gauze soaked in saline after the graft was harvested. The donor area was closed with primary closure by sling sutures using nonresorbable 4-0 surgical black silk sutures (SUTURA[®], Futura Surgicare Pvt Ltd., Bengaluru, India).

The harvested SCTG was trimmed with a sharp surgical blade, and placed to the recipient area, where the flap was coronally advanced over the SCTG to provide more blood supply to the graft. The recipient flap was then sutured directly over the graft with sling-anchored sutures using resorbable polyglactin suture 4-0 (VICRYL[®], ETHICON Inc, Johnson & Johnson India Pvt Ltd. Mumbai, India). The vertical incisions were also closed with simple loop interrupted sutures using resorbable polyglactin



Fig. 10: Case 2: Graft sutured at the recipient site and sutured

suture 4-0 (VICRYL[®], ETHICON Inc, Johnson & Johnson India Pvt Ltd. Mumbai, India) (Fig. 10). A mild compress with gauze soaked in saline was applied for 5 minutes to ensure better graft adaptation and early plasmatic circulation. A eugenol-free periodontal dressing was placed to protect the grafted area. Postoperative oral 500 mg amoxicillin trihydrate, 400 mg ibuprofen each thrice daily for 7 days, and mouthrinse 0.2% chlorhexidine gluconate for 3 weeks were prescribed, with toothbrushing being discontinued at surgical site for that duration. At 10 days post-surgery, dressing removal and suture removal at palatal donor site was performed. At 3 weeks postsurgery, healing was assessed, suture removal was done, and patient was advised Charter's technique of toothbrushing (Fig. 11). At 3 months postsurgery, the amount of root coverage was assessed and oral hygiene instructions were reinforced (Fig. 12). Results showed satisfactory root coverage, increase in width of attached gingiva, and donor graft-recipient site color match.



Fig. 11: Case 2: Two weeks' postoperative healing



Fig. 12: Case 2: Three months' postoperative healing

Case 3

A 56-year-old male patient reported with a chief complaint of hypersensitivity in the lower anterior region on having cold drinks. The patient was in good systemic health. On intraoral examination, there were Miller's class I gingival recession seen with respect to 41, 42, and 43 (FDI tooth numbering system) (Fig. 13).

Presurgical Patient Preparation

Following patient education and oral hygiene instructions, scaling and root planing was performed. Recall at 4 weeks was done to assess maintenance and reduction in gingival inflammation with respect to 41, 42, and 43. A decision was arrived upon to treat the recessions using Zabalegui tunnel technique¹⁷ for root coverage using SCTG procured by deepithelialization of free gingival autograft.

Surgical Procedure

With all aseptic precautions and adequate local anesthesia, root planing of the exposed root surfaces was

carried out to reduce the convexity of the root eminences to reduce the avascular surface underneath the planned SCTG. In the recipient site, sulcular incision was given extending from 31 to 44 without involving the papillae, and tunnel was prepared extending beyond the mucogingival junction (Fig. 14). The donor tissue from the hard palate was demarcated like that of a free gingival autograft. The demarcated area was deepithelialized using a rotary diamond point in a micromotor handpiece until the epithelium was removed, which was clinically determined by appearance of pinpoint bleeding from the capillary loops of the connective tissue bed (Fig. 15). The predetermined connective tissue bed was harvested bearing a thickness of 1.5 mm, making it a subepithelial connective graft. The graft thus obtained was secured with the help of suture and then slid through the previously prepared tunnel in the recipient area (Fig. 16). The area was then sutured using horizontal cross-mattress technique by 4-0 nonresorbable surgical black silk sutures (Fig. 17). An eugenol-free periodontal dressing was placed to protect the grafted area. Bleeding from the donor site



Fig. 13: Case 3: Preoperative view showing Miller's class I gingival recession w.r.t 41, 42, and 43



Fig. 14: Case 3: Tunnel preparation extending beyond the mucogingival junction involving 31 to 44

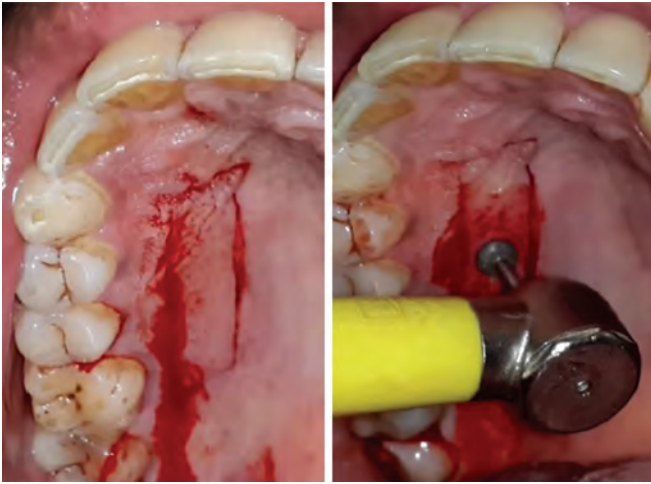


Fig. 15: Case 3: Deepithelialization of area demarcated for FGG



Fig. 16: Case 3: Sliding of the graft with the help of suture through the tunnel prepared



Fig. 17: Case 3: Stabilization of the graft with the help of suture



Fig. 18: Case 3: Three months' postoperative healing

was arrested by pressure application following which oxidized cellulose surgical dressing and the surgical acrylic stent was placed to protect the wound.

Postoperative oral 500 mg amoxicillin trihydrate, 400 mg ibuprofen each thrice daily for 7 days, and mouthrinse 0.2% chlorhexidine gluconate for 3 weeks were prescribed, with toothbrushing being discontinued at surgical site for that duration. At 2 weeks postsurgery, pack removal and suture removal were done and healing assessed and Charter's technique of toothbrushing was advised. The healing at the donor site was by secondary intention, and healing occurred uneventfully without scarring. At 3 months postsurgery, the amount of root coverage was assessed and the oral hygiene instructions were reinforced (Fig. 18). Results showed satisfactory increase in width of attached gingiva, good donor graft-recipient site color match, and root coverage.

DISCUSSION

Several periodontal plastic surgical techniques have been introduced in the literature aiming to correct

marginal tissue recessions.²⁰ The choice of the technique and the long-term predictability of the procedure depend upon various factors, such as careful evaluation of the defect type, etiology of recession, presence of attached gingiva, tissue width, and single or multiple gingival recessions. The use of FGG as used in Case 1 to achieve root coverage and increase the width of attached gingiva in a one-step surgical technique was first described by Miller in 1985.¹⁵ The use of SCTG in root coverage as described by Langer and Langer in 1985¹⁶ in Case 2 is indicated for the treatment of single or multiple gingival recessions²¹ and can also be used for correction of the volume of papilla or deformities of the edentulous gingival border, creation and/or increasing of the amount of the keratinized mucosa, and perspective improvement of the root coverage associated with restorative procedures, abrasion, or dental caries.²² The success of SCTG is attributable to the double blood supply for the graft's nutrition, originating from the connective tissue of both the flap and the periosteum. The tunneling technique used in Case 3

as given by Zabalegui et al in 1999¹⁷ was first reported by Allen in 1994²³ by the name of supraperiosteal grafting. The tunneling method is reported to provide some advantages, such as good gingival blood supply from the papillae, avoiding horizontal and vertical incisions, less scarring, and excellent esthetic results as concluded by Nart and Valles in 2016.²⁴ Recent consensus on root coverage has concluded that all root coverage procedures can provide significant reduction in gingival recession depth and clinical attachment gain for Miller classes I and II recession-type defects. However, SCTG-based procedures provided the best clinical outcomes because of their superior percentages of mean root coverage as concluded by Chambrone and Tatakis²⁵ in a systematic review and Chambrone et al in 2012²⁶ in a meta-analysis. A mean root coverage of 89.3% was reported by the World Workshop in Periodontics in 1996 with the use of connective tissue grafts.²⁷ Additionally, this aforementioned technique is less invasive to the palatal area, causing a minimum postoperative discomfort to the patient and offering a great predictability of coverage with a better color match between donor and recipient site tissues.²⁸

CONCLUSION

The success of the three case reports may be attributed to the precise indication of the technique of FGG to increase the width of attached gingiva in Miller class III gingival recession and SCTG for root coverage in Miller class I gingival recession.

REFERENCES

1. American Academy of Periodontology 2001. Glossary of periodontal terms, 4th ed. Chicago: American Academy of Periodontology; 2001. p. 44.
2. Löe H, Anerud A, Boysen H. The natural history of periodontal disease in man: prevalence, severity, and extent of gingival recession. *J Periodontol* 1992 Jun;63(6):489-495.
3. Wennström, JL.; Zucchelli, G.; Pini Prato, GP. Mucogingival therapy periodontal plastic surgery. In: Lindhe, J.; Lang, NP.; Karring, T., editors. *Clinical periodontology and implant dentistry*. 4th ed. Munksgaard: Blackwell; 2003. p. 576-649.
4. Joshipura KJ, Kent RL, DePaola PF. Gingival recession: intra-oral distribution and associated factors. *J Periodontol* 1994 Sep;65(9):864-871.
5. Wennström JL, Lindhe J, Sinclair F, Thilander B. Some periodontal tissue response to orthodontic tooth movement in monkeys. *J Clin Periodontol* 1987 Mar;14(3):121-129.
6. Camargo PM, Melnick PR, Kenney EB. The use of free gingival grafts for aesthetic purposes. *Periodontol* 2000 2001;27:72-96.
7. Bjorn H. Free transplantation of gingiva propria. *Swed Dent J* 1963 Nov;22:684-689.
8. John V, Langer L, Rasperini G, Kim DM, Neiva R, Greenwell H, Dibart S, Sanz M, Scheyer ET. Periodontal soft tissue non-root coverage procedures: practical applications from the AAP Regeneration Workshop: enhancing periodontal health through regenerative approaches. *Clin Adv Periodont* 2015 Feb;5(1):11-20.
9. Agudio G, Nieri M, Rotundo R, Cortellini P, Pini Prato G. Free gingival grafts to increase keratinized tissue: a retrospective long-term evaluation (10 to 25 years) of outcomes. *J Periodontol* 2008 Apr;79(4):587-594.
10. Scheyer ET, Sanz M, Dibart S, Greenwell H, John V, Kim DM, Langer L, Neiva R, Rasperini G. Periodontal soft tissue non-root coverage procedures: a consensus report from the AAP Regeneration Workshop. *J Periodontol* 2015 Feb;86 (Suppl 2):S73-S76.
11. Oates TW, Robinson M, Gunsolley JC. Surgical therapies for the treatment of gingival recession. A systematic review. *Ann Periodontol* 2003 Dec;8(1):303-320.
12. 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 (Suppl 3):178-194.
13. Cairo F, Nieri M, Pagliaro U. Efficacy of periodontal plastic surgery procedures in the treatment of localized facial gingival recessions. A systematic review. *J Clin Periodontol* 2014 Apr;41 (Suppl 15):S44-S62.
14. Hofmänner P, Alessandri R, Laugisch O, Aroca S, Salvi GE, Stavropoulos A, Sculean A. Predictability of surgical techniques used for coverage of multiple adjacent gingival recessions – a systematic review. *Quintessence Int* 2012 Jul-Aug;43(7):545-554.
15. Miller PD Jr. Root coverage using the free soft tissue autograft following citric acid application. III. A successful and predictable procedure in areas of deep-wide recession. *Int J Periodontics Restorative Dent* 1985;5(2):15-37.
16. Langer B, Langer L. Subepithelial connective tissue graft technique for root coverage. *J Periodontol* 1985 Dec;56(12):715-720.
17. Zabalegui I, Sicilia A, Cambra J, Gil J, Sanz M. Treatment of multiple adjacent gingival recessions with the tunnel subepithelial connective tissue graft: a clinical report. *Int J Periodontics Restorative Dent* 1999 Apr;19(2):199-206.
18. Holbrook T, Ochsenbein C. Complete coverage of denuded root surface with a one-stage gingival graft. *Int J Periodontics Restorative Dent* 1983;3(3):8-27.
19. Hürzeler MB, Weng D. A single-incision technique to harvest subepithelial connective tissue grafts from the palate. *Int J Periodontics Restorative Dent* 1999 Jun;19(3):279-287.
20. Wennström JL. Mucogingival therapy. *Ann Periodontol* 1996 Nov;1(1):671-701.
21. Bernimoulin JP, Luscher B, Mühlemann HR. Coronally repositioned periodontal flap. Clinical evaluation after one year. *J Clin Periodontol* 1975 Feb;2(1):1-13.
22. Nevins, M.; Melloning, JT. *Periodontal therapy: clinical approaches and evidence of success*. Tokyo: Quintessence; 1998. p. 355-364.
23. Allen AL. Use of the supraperiosteal envelope in soft tissue grafting for root coverage. I. Rationale and technique. *Int J Periodontics Restorative Dent* 1994 Jun;14(3):216-227.
24. Nart J, Valles C. Subepithelial connective tissue graft in combination with a tunnel technique for the treatment of Miller class II and III gingival recessions in mandibular incisors:

- clinical and esthetic results. *Int J Periodontics Restorative Dent* 2016 Jul-Aug;36(4):591-598.
25. Chambrone L, Tatakis DN. Periodontal soft tissue root coverage procedures: a systematic review from the AAP Regeneration Workshop. *J Periodontol* 2015 Feb;86(Suppl 2): S8-S51.
26. Chambrone L, Pannuti CM, Tu YK, Chambrone LA. Evidence-based periodontal plastic surgery. II. An individual data meta-analysis for evaluating factors in achieving complete root coverage. *J Periodontol* 2012 Apr;83(4):477-490.
27. Wennström JL. Mucogingival therapy. *Ann Periodontol* 1996 Nov;1:667-701.
28. Bouchard P, Etienne D, Quhayoun JP, Nilveus R. Subepithelial connective tissue grafts in the treatment of gingival recessions. A comparative study of 2 procedures. *J Periodontol* 1994 Oct; 65(10):929-936.