

Surgical Microscope May Enhance Root Coverage With Subepithelial Connective Tissue Graft: A Randomized-Controlled Clinical Trial

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Background: Minimally invasive techniques have broadened the horizons of periodontal plastic surgery to improve treatment outcomes. Thus, the purpose of this clinical trial was to compare root coverage, postoperative morbidity, and esthetic outcomes of subepithelial connective tissue graft (SCTG) technique with or without the use of a surgical microscope in the treatment of gingival recessions.

Methods: In this split-mouth study, twenty-four patients with bilateral Miller's Class I or II buccal gingival recessions ≥ 2.0 mm in canines or premolars were selected. Gingival recessions were randomly designated to receive treatment with SCTG with or without the assistance of the surgical microscope (test and control groups, respectively). Clinical parameters evaluated included the following: depth (RH) and width (RW) of the gingival defect, width (WKT) and thickness (TKT) of keratinized tissue, probing depth (PD), and clinical attachment level (CAL). Postoperative morbidity was evaluated by means of an analog visual scale and questionnaire. Patient satisfaction was also evaluated with a questionnaire. Descriptive statistics were expressed as mean \pm SD. Repeated-measures analysis of variance was used for examination of differences regarding PD, CAL, and TKT. The Wilcoxon test was used to detect differences between groups and the Friedman test to detect differences within group regarding WKT, RH, and RW.

Results: The average percentages of root coverage for test and control treatments, after 12 months, were 98.0% and 88.3%, respectively ($P < 0.05$). Complete root coverage was achieved in 87.5% and 58.3% of teeth treated in test and control groups, respectively. For all parameters except recession height, there was an improvement in the final examination but without difference between treatments. For the RH, a lower value was found in the test group compared to the control group ($P < 0.05$). In the test group, all patients were satisfied with the esthetics obtained, and 19 patients (79.1%) were satisfied in the control group. For postoperative morbidity, 14 patients in each of the two treatment groups did not use analgesics for pain control.

Conclusion: Both approaches were capable of producing root coverage; however, use of the surgical microscope was associated with additional clinical benefits in the treatment of teeth with gingival recessions. *J Periodontol* 2012;83:721-730.

KEY WORDS

Clinical trial; connective tissue; gingival recession; microscopy; split-mouth design; surgical flap.

One of the objectives of periodontal plastic surgery is to obtain root coverage with techniques that ensure good predictability and esthetics. There are several reasons for the indication of a root coverage procedure, such as elimination of biofilm retention areas, control of dentin hypersensitivity, prevention of root caries, and enhancing esthetics.^{1,2}

The knowledge that subepithelial connective tissue graft (SCTG) is capable of inducing tissue keratinization, causing gain in the weight of keratinized tissue (WKT), has encouraged authors to develop techniques combining the SCTG with different tissue flap designs. The SCTG can be used in association with the coronally positioned flap,³ "envelope" flap,⁴ or double papilla flap.⁵ This group of techniques raised the predictability of root coverage with SCTG because it increased graft nutrition. Recent systematic reviews^{2,6-10} demonstrated

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that techniques using SCTG are predictable for treating teeth with gingival recessions and provide homogeneity of color between the grafted area and surrounding tissues.

In addition to acceptable results of root coverage based on clinical observations, the goal of periodontal plastic surgery is to develop less invasive techniques that favor rapid healing, less postoperative discomfort, and greater patient satisfaction. The surgical microscope has been used to attain these objectives because it offers good illumination and magnification of the operative field. These advances could lead to more precise and less traumatic tissue manipulation, enabling precise coaptation of wound edges and healing by first intention.^{11,12}

Results of case reports¹³⁻¹⁸ have stimulated the association of minimally invasive techniques with SCTG in periodontal plastic surgery, obtaining predictable root coverage, esthetics, and better patient acceptance.

This information has encouraged application of the periodontal microsurgery technique proposed by Tibbetts and Shanelec¹¹ and modified by de Campos et al.¹⁸ for root coverage. However, to the best of our knowledge, there is no information available on the role of the operative microscope in microsurgery technique used with SCTG on esthetic achievements, postoperative morbidity, or root coverage. Thus, the aim of the present controlled prospective clinical trial is to compare root coverage, postoperative morbidity, and esthetic outcomes of the SCTG technique with or without the use of a surgical microscope in the treatment of Miller Class I and II¹⁹ gingival recessions.

MATERIALS AND METHODS

Study Population

The participants were selected from among patients referred for dental treatment at the Piracicaba Dental School, University of Campinas, Piracicaba, Brazil. Informed consent was signed by each of the participants after thorough explanation of the nature, risks, and benefits of the clinical investigation and associated procedures. The University of Campinas Ethical Committee approved the consent form and experimental protocol (056/2006).

For this split-mouth study, twenty-four patients (13 males and 11 females, aged 18 to 55 years; mean age: 34 years) were recruited after a screening examination that included a full medical and dental history, intraoral examination, full-mouth periodontal probing, and radiographs. Participants were enrolled from March 2007 to December 2007. Power analysis indicated that, with 20 participants, the study would have >85% power to detect a 1-mm difference in recession depth between the two groups. All patients were non-smokers, periodontally and systemically healthy, with

no contraindications for periodontal surgery, and were not taking medications known to interfere with periodontal tissue health or healing. The following inclusion criteria were used: 1) presence of bilateral Miller Class I or II gingival recessions¹⁹ (≥ 2 mm) in maxillary canines or premolars; 2) probing depth (PD) of < 3 mm without bleeding on probing; and 3) tooth vitality and absence of caries or restorations in the areas to be treated.

Initial Therapy

The patients initially completed a plaque control program, including oral hygiene instructions to eliminate habits related to the etiology of the recession, scaling, root planing, and crown polishing. The patients were instructed to perform a non-traumatic brushing technique using a soft toothbrush. All the patients were provided with soft toothbrushes.[‡] Visible plaque index²⁰ and sulcus bleeding index²¹ were used to assess gingival health throughout the study.

Clinical Parameters

All measurements were recorded by a masked, trained, and calibrated examiner (EDPR) at baseline, and at 6 and 12 months post-surgery, and quantified with a caliper[§] of 0.01-mm resolution. The baseline measurements were recorded 28 days after the initial therapy.

Measurements were taken from the incisal border of the tooth to the cemento-enamel junction (ref CEJ), to the mucogingival junction (ref MGJ), and to the gingival margin (ref GM) using an endodontic finger spreader attached to a rubber stopper. The following clinical parameters were assessed: 1) recession height (RH), the distance from the CEJ to the GM calculated as ref GM – ref CEJ; 2) WKT, the distance between the most apical point of the GM and the MGJ, calculated as ref MGJ – ref GM; 3) recession width (RW), measured from one border of the recession to another, measured at the CEJ; 4) PD, measured as the distance from the GM to the bottom of the gingival sulcus; 5) clinical attachment level (CAL), calculated as RH + PD; and 6) thickness of the keratinized tissue (TKT).

TKT was assessed twice: TKT1, 2 mm apical to the GM before surgery; and TKT2, 2 mm apical to the GM after surgery. After carefully removing the spreader, penetration depth was measured with a caliper of 0.01-mm resolution. The tissues were stained with iodine solution^{||} to facilitate identification of the MGJ. The RW and PD were measured using a periodontal probe[¶] with a rubber stopper.

‡ Colgate-Palmolive, São Bernardo do Campo, SP, Brazil.

§ ABSOLÚTE, Mitutoyo South American, Suzano, SP, Brazil.

|| Schiller's iodine solution, Proderma Farmácia de Manipulação, Piracicaba, SP, Brazil.

¶ Mini-Grace curets, Hu-Friedy, Jacarepaguá, Rio de Janeiro, RJ, Brazil.

Examiner Calibration

The investigator (EDPR) responsible for clinical assessments was calibrated for intraexaminer repeatability before the trial began. Three patients were enrolled for this purpose. Duplicate measurements for ref CEJ were collected with an interval of 24 hours between the first and second recording. The intraclass correlation coefficient, used as a measure of intraexaminer reproducibility, was 0.99.

Surgical Procedures

All surgical procedures were performed by one clinician (SB). One gingival recession from each pair was randomly assigned (by coin toss) to one of the treatments: 1) test group, in which SCTG was performed with a microscope at $\times 8$ to $\times 12$ magnification;[#] or 2) control group, in which SCTG performed without a microscope or any type of magnification. Both procedures were performed with the technique proposed by Tibbetts and Shanelec¹¹ and modified by Campos et al.¹⁸ There was a 4-week interval between surgeries.

Before surgery, each patient was given a single dose of sodic dipyrone ** (500 mg) as an analgesic. Extraoral antiseptics was performed with a 2.0% chlorhexidine solution^{††} and intraoral antiseptics with 0.12% chlorhexidine rinse. Lidocaine^{‡‡} (2%) with 1:100,000 epinephrine^{§§} was used as anesthesia. The exposed root surface was planed with finishing burs^{|||} and mini curets^{¶¶} to remove edges, grooves, and dental plaque as well as to reduce the convexity of the most coronal portion of the root.

For both groups (Fig. 1), an initial horizontal incision was made slightly coronal to the CEJ from the distal to the mesial papilla of the tooth with the recession. A second incision, 1 to 2 mm apart and parallel to the first incision, was made apically. This second incision was made divergent in areas with recessions >3 mm. Both incisions were performed ≈ 1 -mm deep at a 90° angle to the tissue surface (Fig. 1B). A sulcular incision was made to link the second incisions using a microsurgical blade.^{###} The blade was progressively inserted (2 to 3 mm) extending beyond the MGJ, to create a uniform split-thickness flap. In addition, the deepest fibers of the flap were dissected to eliminate tension and to permit coronal displacement of the flap. The tissue between the two incisions was partially removed using scissors^{***} to obtain a uniform receptor site that permitted primary closure.

A periodontal probe was used to measure the size of the recipient site (i.e., from the center of the mesial papilla to the center of the distal papilla). These measurements were transferred to the donor site. A connective tissue graft was obtained from the palate by using a parallel blade as described by Harris,¹ yielding 1-mm-thick connective tissue grafts. The epithelial

band of the graft was removed and discarded. The tissue obtained was immediately placed on the root surface (Fig. 1C).

The sutures were performed in two stages: 1) approximation^{†††} (needle: one-half circle with a length of 1.6 cm) and 2) coaptation^{‡‡‡} (needle: three-eighths circle with a length of 0.65 cm) (Fig. 1D). The aim of the approximation suture was to place the edge of the flap at the base of the remaining papilla and secure the graft in position. The passive closure of the wound margins without tension was performed with two or three interrupted coaptation sutures, depending on the width of the papilla. The interrupted sutures were done without passing through the graft. The donor area was then closed with continuous sutures.¹⁸ Sutures were removed after 7 days.

The only difference between groups was the use of the operative microscope during surgery. The duration of surgery was measured with a chronometer from anesthesia to suturing.

Post-Surgical Care

Patients were instructed to take analgesic medication (sodic dipyrone; 500 mg) if they experienced pain. The patients were instructed to record when (date and hour) the analgesic medication was taken. Overall postoperative pain was also assessed using a 100-mm horizontal visual analog scale, with the left endpoint marking “no pain” and the right endpoint marking “extreme pain.”

All patients were instructed to discontinue toothbrushing around the surgical sites for 30 days after surgery. During this period, plaque control was provided by rinsing with a 0.12% chlorhexidine digluconate solution twice a day. After this period, gentle toothbrushing with a soft-bristle toothbrush was permitted.

Participants were enrolled in a periodontal maintenance program (professional plaque control), weekly for the first 4 weeks and then monthly until the end of the study period.

Patient Satisfaction

At 6 months, a questionnaire was given to each patient. The questionnaire recorded the results of the procedures relative to esthetics, root sensitivity (before and after surgery), and the postoperative period. The questionnaire results were reviewed by an individual (EDPR),

SM Plus, Opto Eletrônica, São Paulo, SP, Brazil.

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‡‡ Noplak, Odontis, Rio de Janeiro, RJ, Brazil.

§§ Alphacaine, DFL, Rio de Janeiro, RJ, Brazil.

||| KOMET, Besigheim, Germany.

¶¶ Hu-Friedy.

G. Hartzell & Son, Concord, CA.

*** Castroviejo scissors, G. Hartzell & Son.

††† 6-0 polyglactin 910 Vicryl, Ethicon, Johnson & Johnson, São José dos Campos, SP, Brazil.

‡‡‡ 8-0 polyglactin 910 Vicryl, Ethicon, Johnson & Johnson.



Figure 1.

SCTG. **A)** Preoperative view of recession on the maxillary canine. **B)** First and second incisions. **C)** Connective tissue graft placed. **D)** Approximation and microsuture coaptation.

independent of the surgeon (SB). In terms of esthetic outcome, patients expressed their opinion of each treated tooth by selecting one of the following choices: bad, sufficient, good, or excellent. Patients were also asked to indicate whether one technique was preferable to the other in terms of the postoperative period and esthetics.

Statistical Analyses

Descriptive statistics were expressed as mean \pm SD. Repeated-measures analysis of variance (ANOVA) was used to examine differences within and between treatments regarding PD, CAL, and TKT. The non-parametric Wilcoxon test was used to detect differences between groups, and the Friedman test was used to detect differences within each group regarding the percentage of root coverage, WKT, RH, and RW parameters. Pearson correlation coefficient was used to determine possible correlation between TKT at baseline and RH reduction. The Wilcoxon test was applied to compare the pain intensity and the number of pills taken in the postoperative period. The significance level of $P < 0.05$ was used in all statistical comparisons.

RESULTS

Healing was uneventful in all 24 patients (48 recessions, 26 in canines and 22 in premolars), and no patients were excluded from the analyses.

At baseline, no statistically significant differences were observed between groups for any of the clinical parameters. Intragroup and intergroup evaluation of the effect of root coverage, after 12 months, is presented in Table 1. Intragroup differences were found for all parameters in both groups ($P < 0.05$). There was an increase in WKT, TKT, and PD and a decrease in RW, RH, and CAL. After 12 months, the intergroup evaluation showed higher RH values in the control group than in the test group.

At 6 and 12 months, difference in mean root coverage between groups was also observed (Fig. 2). Twelve months after surgery, the percentage of root coverage was 98.0% and 88.3% for test and control groups, respectively ($P < 0.05$). After 12 months, complete root coverage was attained in 87.5% (21 of 24) of the treated cases in the test group and in 58.3% (14 of 24) in the control group. No patient in the test group had $< 77\%$ root coverage and in

Table 1.
Clinical Parameters (mm) at Baseline and 12 Months Postoperatively in Both Groups

Parameters	Test Group		Control Group		p†
	Mean ± SD	Median (Range)	Mean ± SD	Median (Range)	
RH					
Baseline	2.51 ± 0.35	2.48 (2.02 to 3.22)	2.53 ± 0.55	2.40 (2.00 to 4.02)	
12 months	0.05 ± 0.14	0.00 (0.00 to 0.50)	0.29 ± 0.42	0.00 (0.00 to 1.37)	
Difference	2.46 ± 0.38	2.48 (0.00 to 3.22)*	2.24 ± 0.64	2.40 (0.00 to 4.02)*	≤0.05
RW					
Baseline	3.80 ± 0.79	3.88 (2.37 to 5.08)	3.87 ± 0.79	3.84 (2.22 to 5.32)	
12 months	0.13 ± 0.63	0.00 (0.00 to 3.15)	0.58 ± 1.32	0.00 (0.00 to 4.90)	
Difference	3.67 ± 0.99	3.88 (0.00 to 5.08)*	3.29 ± 1.49	3.84 (0.00 to 5.32)*	>0.05
WKT					
Baseline	2.45 ± 0.99	2.29 (0.78 to 4.50)	2.66 ± 1.20	2.86 (0.91 to 5.87)	
12 months	3.97 ± 1.06	4.04 (2.25 to 6.73)	4.03 ± 1.36	3.75 (2.02 to 8.37)	
Difference	-1.51 ± 1.01	-1.75 (0.78 to 6.73)*	-1.37 ± 1.18	-0.89 (0.91 to 8.37)*	>0.05
TKT					
Baseline	0.89 ± 0.23	0.90 (0.54 to 1.51)	0.97 ± 0.18	0.96 (0.59 to 1.32)	
12 months	1.19 ± 0.31	1.19 (0.64 to 2.05)	1.31 ± 0.41	1.19 (0.82 to 2.24)	
Difference	-0.30 ± 0.36*	-0.29 (0.54 to 2.05)	-0.34 ± 0.39*	-0.23 (0.59 to 2.24)	>0.05
PD					
Baseline	1.27 ± 0.49	1.00 (0.50 to 2.00)	1.40 ± 0.64	1.00 (0.50 to 3.00)	
12 months	1.77 ± 0.57	2.00 (1.00 to 3.00)	1.64 ± 0.56	2.00 (1.00 to 2.50)	
Difference	-0.50 ± 0.77*	-1.00 (0.50 to 3.00)	-0.24 ± 0.75*	-1.00 (0.50 to 3.00)	>0.05
CAL					
Baseline	3.78 ± 0.49	3.89 (2.94 to 4.62)	3.93 ± 0.93	3.92 (2.59 to 6.89)	
12 months	1.82 ± 0.61	2.00 (1.00 to 3.00)	1.94 ± 0.62	2.00 (1.00 to 4.33)	
Difference	1.96 ± 0.82*	1.89 (1.00 to 4.62)	1.99 ± 0.69*	1.92 (1.00 to 6.89)	>0.05

* Within-group comparison ($P < 0.05$).

† Between-group comparison.

the control group, no patient had <50% root coverage (Table 2).

The mean time spent in surgeries with the operative microscope was 60 minutes (range: 55 to 66 minutes); without the microscope, the mean duration of surgeries was 54 minutes (range: 49 to 63 minutes).

Regarding the postoperative period, 14 patients in each group did not experience pain. Thus, 10 patients in each group used medication for pain. When considering only the patients who experienced pain in the postoperative period, one pill was taken after each surgery, and the pain intensity mean was 4.7, for both groups. With reference to postoperative morbidity, no patient considered any one surgery more painful. Eight patients (33.3%) considered both surgeries uncomfortable.

The patients' evaluation of esthetics demonstrated that, at the end of the experimental period, 24 (100%) patients were satisfied with the results of the surgery performed with the microscope and 19 of 24 (79.1%) were

satisfied with the results without microscope. The subjective scores for the esthetic outcome are shown in Table 3. When asked about which of the surgeries they would prefer in case another intervention were needed, eight patients answered in favor of the test (microscope) procedure, and the other 16 patients responded that they would undergo either of the two surgeries.

At the beginning of the study, 11 patients in each group reported hypersensitivity; however, there was no evidence of residual or new sensitivity in the test group after 6 and 12 months. At these evaluation periods, three patients in the control group continued to complain about hypersensitivity.

DISCUSSION

Several case reports and clinical studies have shown the potential benefits of using the operative microscope in the surgical treatment of gingival recessions.^{12,14,15,17,18,22,23} However, no randomized controlled clinical trial has been conducted to evaluate the benefits of this equipment in the gingival recession

treatment. Systematic reviews and controlled clinical trials have shown optimal treatment outcomes in terms of percentage of root coverage and esthetics achieved with connective tissue grafts.^{2,6-8,10,24,25} Thus, the aim of the present randomized controlled clinical trial is to evaluate the benefits of using the surgical microscope in the treatment of Miller Class I and II gingival recessions¹⁹ with SCTGs.

The results of the present study demonstrate that both treatments produced satisfactory percentages of root coverage (Figs. 3 and 4). However, better results were observed in the test group (Table 2). The percentages of root coverage observed in the control group are in agreement with previous studies that showed root coverage with SCTG ranging from 64.4%²⁶ to 97.3%.²⁷ The results of the test group were also similar to those reported by Burkhardt and Lang²² and Francetti et al.,¹⁷ who used an operative microscope to perform gingival recession treatment. In these studies, the mean root coverage ranged from 86% to 98%.

Comparison between studies, however, is impaired because there are important differences between them regarding the methods used to measure clinical parameters. This could explain the variability of the data. For example, methods that have a resolution of 1.0 or 0.5 mm tended to provide more favorable results, because residual recessions of ≤ 0.4 mm were not considered. These methods should therefore be replaced by methods with a resolution of 0.1 mm, as shown in

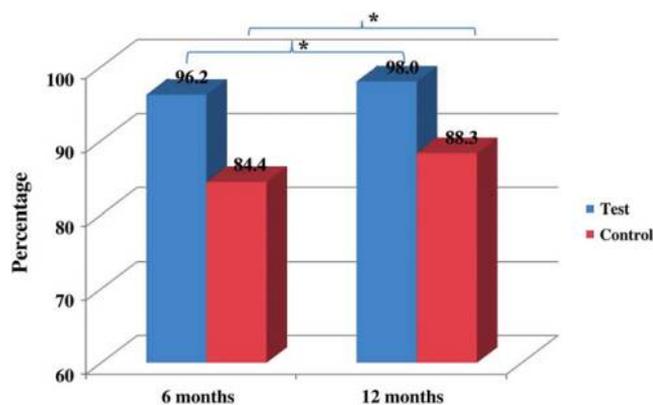


Figure 2. Percentage of root coverage at 6 and 12 months. Significant difference between groups * $P < 0.05$.

the present study. Another explanation for differences between studies could be plaque control and toothbrushing habits. In the present study, the importance of the patient's toothbrushing technique for the long-term success of root coverage was not ignored, and patients were instructed to use a non-traumatic brushing technique with a soft toothbrush.

To be successful, complete root coverage should be considered fundamental because it ensures recovery from hypersensitivity and esthetic defects associated with recessions, and therefore, is associated with predictability.^{2,6,8} The results of the present study at 12 months demonstrate that SCTG performed with a surgical microscope is more predictable than SCTG done without the microscope. A possible explanation for the higher means of root coverage and frequency of complete root coverage in the test group is the enhanced visual acuity resulting from the magnification and improved illumination of the field.²⁸ These advantages are associated with the use of specially designed microsurgical instruments and allow a more accurate, atraumatic manipulation of the soft tissue, which may result in rapid healing.²⁹

Twelve months after surgeries, an increment of 1.5 mm in WKT was observed in the test group and 1.4 mm in the control group ($P > 0.05$). This can be explained by the fact that both groups received SCTG and the established concept that the information in the connective tissue ultimately determines the character of the surface epithelium.^{30,31} The values found in the present study are similar to the one reported by Oates et al.⁷: 1.5 mm.

An increase in TKT is also expected after SCTG, and, in the present study, there was an increase of 0.3 mm in both groups. This result is less than those reported by Müller et al.³² (0.6 mm), da Silva et al.³³ (0.4 mm), and Martins et al.³⁴ (0.7 mm). However, these studies did not use a parallel blade scalpel; thus, the graft thickness was from 1.3 to 2.0 mm, rather than the 1-mm-thick SCTG used in the present study. Moreover, the importance of TKT has been raised, because a previous study³⁵ indicated TKT to be a predictive factor in root coverage outcomes. Flaps with a thickness of ≤ 0.8 mm were associated with partial root coverage after a flap was coronally positioned.³⁵ However, in both groups in the present study, no correlation could be established between TKT and root coverage. In the

Table 2.

Frequency (n) of Gingival Recession Coverage, 12 Months After Surgery

Groups	100%	90% to 99%	80% to 89%	70% to 79%	60% to 69%	50% to 59%
Test	21	1	1	1	0	0
Control	14	0	5	1	0	4

Table 3.
Patient Evaluation of Esthetic Outcomes

Groups	Excellent	Good	Sufficient	Bad
Test	22	2	0	0
Control	13	4	3	4

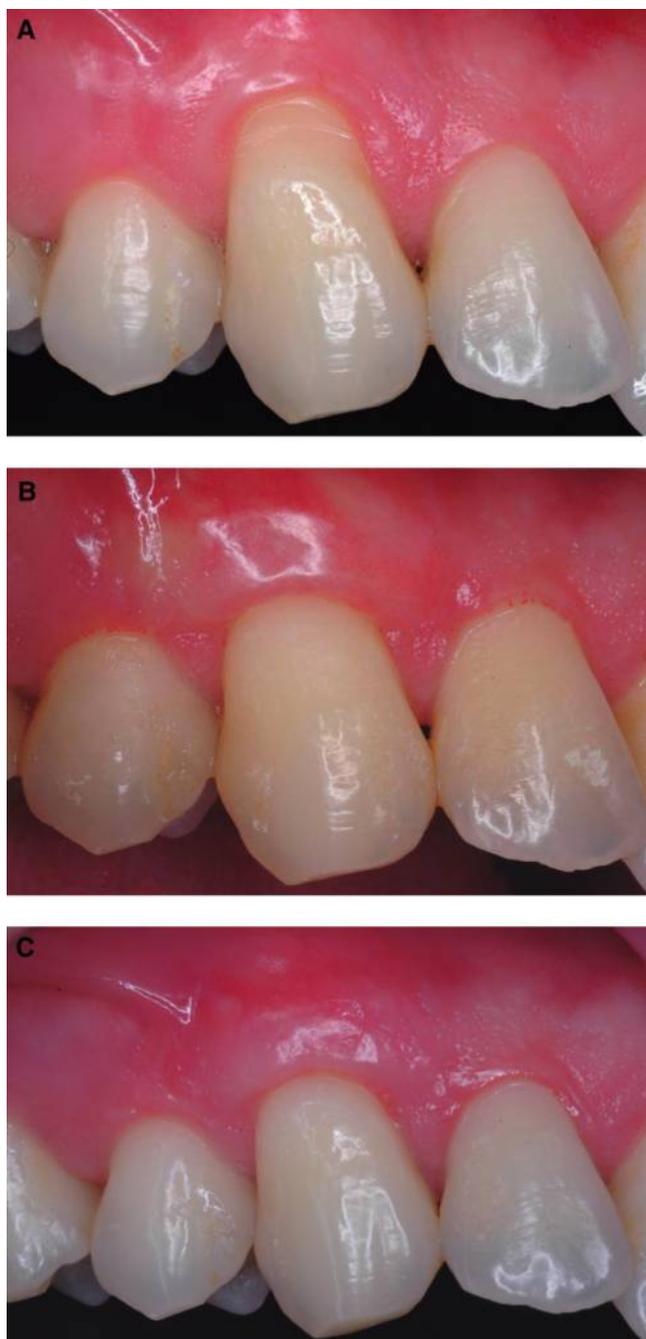


Figure 3.

Test group. **A)** Preoperative view of recession on the maxillary left canine. **B)** Postoperative view at 1 month. **C)** Postoperative view at 12 months.

beginning of the present study, 10 recessions in the test group and five in the control group presented TKT of ≤ 0.8 mm. Of these cases, only one in the test group and three in the control group were not completely covered.

Although the increase in the mean PD after surgeries in both groups was statistically significant, it was not clinically important. There was an increase of 0.5 mm in the test group and 0.25 mm in the control group, but after 12 months in all cases, the PD never exceeded 3 mm (Fig. 4). Other studies also observed minimal increase in PD after SCTG for root coverage.^{22-24,26,32,36}

There is a need to investigate root coverage procedures as they relate to patient-oriented outcomes, such as esthetics, root sensitivity, and postoperative morbidities.^{2,7} Patient satisfaction with esthetic result reached 100% in the test group and 79.1% in the control group. The results of both groups are similar to those reported by Rosetti et al.,³⁷ Wang et al.,³⁸ and Aichelmann-Reidy et al.³⁹ in which patient satisfaction was 80%, 87.5%, and 90%, respectively. In both groups, the absence of scars and controlled increase in TKT after SCTG, without vertical incisions and a graft thickness of 1 mm, could justify the patients' satisfaction, while the frequency of complete root coverage could explain the difference in patient satisfaction between the groups.²⁷ The patient might not consider it satisfactory when incomplete root coverage occurs because the coronal millimeters of the still-uncovered root surface may show when the patient smiles.⁴⁰

In addition, the root area near the CEJ is the most susceptible to hypersensitivity.^{2,41} Thus, the difference between groups regarding the frequency of complete root coverage could explain why no patient in the test group reported residual hypersensitivity, whereas 27.3% in the control group still had this complaint 12 months after treatment.

Postoperative pain, considered of regular intensity by the only eight patients (33.3%) who took analgesic pills on the first day after surgery, originated in the donor area (palate). This result is similar to the one reported by Bittencourt et al.²³ in which 41.2% of patients used analgesic pills for pain control. These values are lower when compared to another study in which 91.7% of patients experienced pain in the first 3 days after SCTG, and 50% still complained of pain the third week after surgery.⁴² Differences in postoperative instructions, type of analgesic pill, methods used to remove the graft from the palate, and clinician experience can explain the differences between the studies.^{43,44} Also, the lower postoperative pain values observed in the present study could be attributable to the use of a minimally invasive technique in both groups.

In periodontal plastic surgery, the choice of procedure is based on the principles of success, reproducibility,



Figure 4.

Control group (same patient shown in Fig. 3). **A)** Preoperative view of recession on the maxillary left canine. **B)** Postoperative view at 1 month. **C)** Postoperative view at 12 months.

morbidity, and economy. To be reproducible, the technique has to be easily performed and not require the exceptional surgical or technical skills.² The technique used in the present study is not easy to perform. Intense clinical and laboratory training is required to use the surgical microscope. However, after this training, it can be used effectively to improve the results of root coverage procedures with less surgical trauma and post-

operative pain.^{15,29} It is important to note that the surgeries in both groups in the present study were performed by the same surgeon (SB) after 18 months of training. Thus, the control group could have benefited from this extensive training, allowing the sutures to be made with an 8.0 thread without using magnifying glasses.

Although the results demonstrate the benefits of using the operative microscope in SCTG for root coverage, a longer follow-up period is necessary to verify the stability of this approach. Other limitations of the present study are the randomization method and the impossibility of masking patients to the use of the microscope. The method of a coin toss was used in studies as a simple way of randomization for many years, although this method has potential defects, such as manipulations. The consequences of patients knowing which side was operated with the microscope were not measured. In addition, the observed difference between groups after 12 months regarding RH should be interpreted with the knowledge that RH was compared between groups by a non-parametric test, whereas PD and CAL were evaluated by the parametric test repeated-measures ANOVA. Moreover, there should be additional studies to compare the microsurgical technique with other surgical techniques, using SCTG, acellular dermal matrix graft, or only a coronally positioned flap.

CONCLUSION

Both approaches are capable of producing root coverage; however, the use of the surgical microscope is associated with additional clinical benefits in the treatment of teeth with gingival recessions.

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