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Micro and Macrosurgical Treatment of Gingival Recessions: A Randomized Clinical Trial

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ABSTRACT

The purpose of this single-center, parallel armed, an assessor and statistician blinded, 6-month randomized clinical trial was to compare the clinical results of micro and macrosurgical techniques in the treatment of localized gingival recession defects.

Miller Class I and II gingival recession defects, at least 3.0 mm deep, were selected and randomly assigned to receive micro or macrosurgical techniques. Both techniques were performed using a coronally positioned flap with a subepithelial connective tissue graft. Plaque and gingival indices, gingival recession depth and width, pocket depth, bleeding on probing, clinical attachment level, width of keratinized gingiva, aesthetic score and percentage of root coverage, postoperative complaints, and satisfaction of the participants completing the study were evaluated at follow-up 1st, 3rd and 6th months.

A total of 20 defects at 17 individuals, aged 19-53 years, were evaluated. Defects were randomized to microsurgery (n=10) and macrosurgery (n=10) groups. The microsurgery was superior to the macrosurgery technique concerning a more significant amount of keratinized tissue at 6 months follow up ($p<0.05$). In contrast, no significant differences were observed between the groups in terms of the other clinical periodontal parameters, postoperative complaints, or self-reported aesthetic satisfaction at any of the follow-up periods ($p>0.05$). The percentage of the root coverage for the micro and macrosurgical techniques after 6 months were 92.0% and 71.0%, respectively ($p>0.05$).

The clinical results of microsurgery do not show superiority over conventional surgical techniques in the treatment of localized gingival recession defects using a coronally positioned flap with a subepithelial connective tissue graft.

Keywords: Clinical trial; connective tissue; gingival recession; microsurgery; pedicled flap

Introduction

Gingival recession is defined as the relocation of the gingiva from the cementoenamel junction (CEJ) to a more apical point (1). It is characterized by an open root surface and is often observed with dentin sensitivity, impaired aesthetics, cervical caries, and non-carious cervical defects (2). Periodontal plastic surgery is indicated to correct the condition.

Periodontal plastic surgery encompasses a range of procedures performed to reshape the tissues around the teeth to cure anatomical and developmental defects of the periodontal tissue (1). Various surgical approaches have been used for root-surface closure treatment (3). The first operation of a subepithelial connective tissue graft (SCTG) to close an exposed root surface was instituted by Langer and Langer (4), and a shifted semilunar flap to the coronal position was published by Tarnow (5). In 2007, Sanctis and Zuchelli (6) introduced the trapezoidal-shaped, coronally positioned flap (CPF) technique, characterized by papilla de-epithelization and abundant blood supply to the recipient area, an approach that is prevalent today. In a systematic review assessing the efficacy of a CPF alone or in combination with enamel matrix derivates, connective tissue grafts, barrier membranes, human fibroblast-derived dermal substitutes, acellular dermal matrices, or platelet-rich plasma revealed that enamel matrix products and connective tissue grafts in conjunction with a CPF enhanced the chance of acquired full root coverage in Miller Class I and II localized defects (7).

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Periodontal microsurgery refers to a surgical procedure performed under a microscope or magnifying loop using fine microsurgical instruments. It is undertaken to diminish surgical disturbance, produce minimal wounds, enable a safe primary closure of the wound, and minimize postoperative patient discomfort (8,9). In a systematic review comparing microsurgery and conventional surgical techniques, it was shown that, even though the clinical superiority of microsurgery had not been demonstrated in all randomized clinical trials compared to macrosurgery, using a microsurgical technique with an SCTG for the therapy of recession defects might increase the probability of fully covering the exposed root surface (10,11).

Therefore, this research purposed to compare the efficacy of microsurgical and macrosurgical techniques on CPFs plus SCTGs for the therapy of localized recession defects (Miller class I or II) over the course of 6 months based on clinical periodontal parameters, postoperative complaints, and satisfaction levels of the participants. We hypothesized that root coverage obtained by microsurgery in Miller I or II defects would improve clinical periodontal outcomes with greater postoperative comfort and aesthetic satisfaction in comparison with conventional macrosurgical techniques.

Materials and Methods

This research was managed with an ethical guideline named the Declaration of Helsinki, as revised in 2013. The Ethics Committee of a State University reviewed and approved this study (Number: 2016/292, Date: 02 Nov 2016).

Trial Design: The randomized clinical trial was conducted as a single-center, prospective, parallel-armed, active-controlled, assessor and statistician blinded. No changes were made to the study methods after the trial commenced.

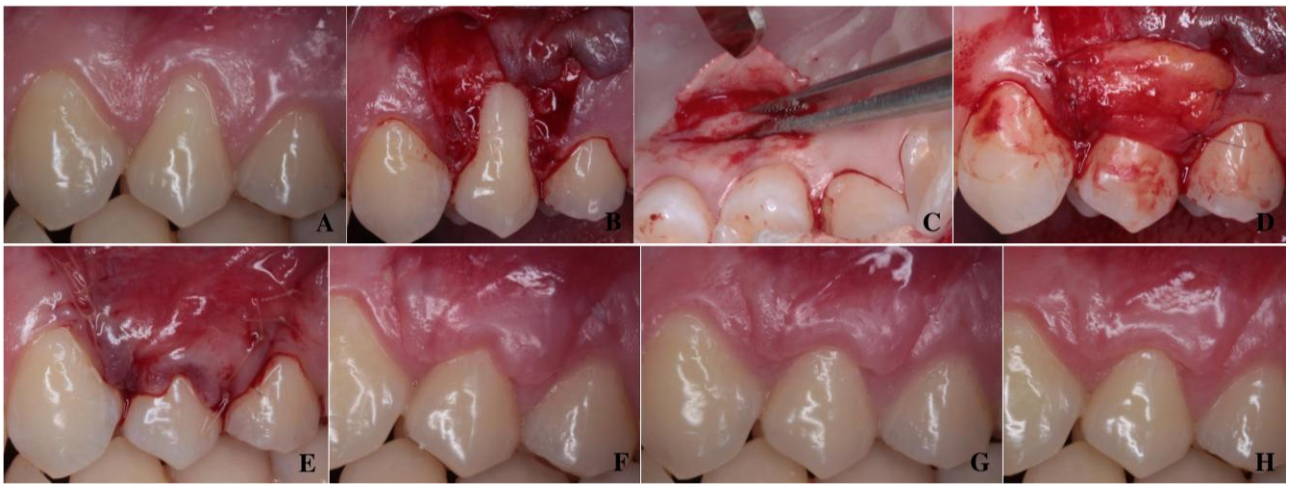
Participants: All subjects were adults aged 18 years or over who were systemically and periodontally healthy and met the eligibility criteria for localized recession defects of the canine or premolar teeth according to the Miller classification scheme (12) (i.e., Class I defect did not go beyond the mucogingival junction, no bone or soft tissue loss was seen in the adjacent tooth; and Class II defect exceeded the mucogingival junction, no bone or soft tissue loss was seen in the adjacent tooth. Exclusion criteria included the following: a) a history of chronic systemic or infectious disease; b) a history of chemotherapy or radiotherapy; c) a history of alcoholism or drug abuse; d) a history of former surgery at the defect area; e) multiple adjacent gingival recession defects; f) teeth without a visible CEJ; g) teeth with signs of endodontic problems; h) defects related with decays or restorations; i) medicines known to alter periodontium; j) antibiotic use in the last 6 months; k) smoking more than 10 cigarettes a day, and; l) current pregnancy or lactation.

The study took place at a state university in Turkey, from December 2016 to December 2017. The research procedure was described, and informed consent was given from each participant before data collection.

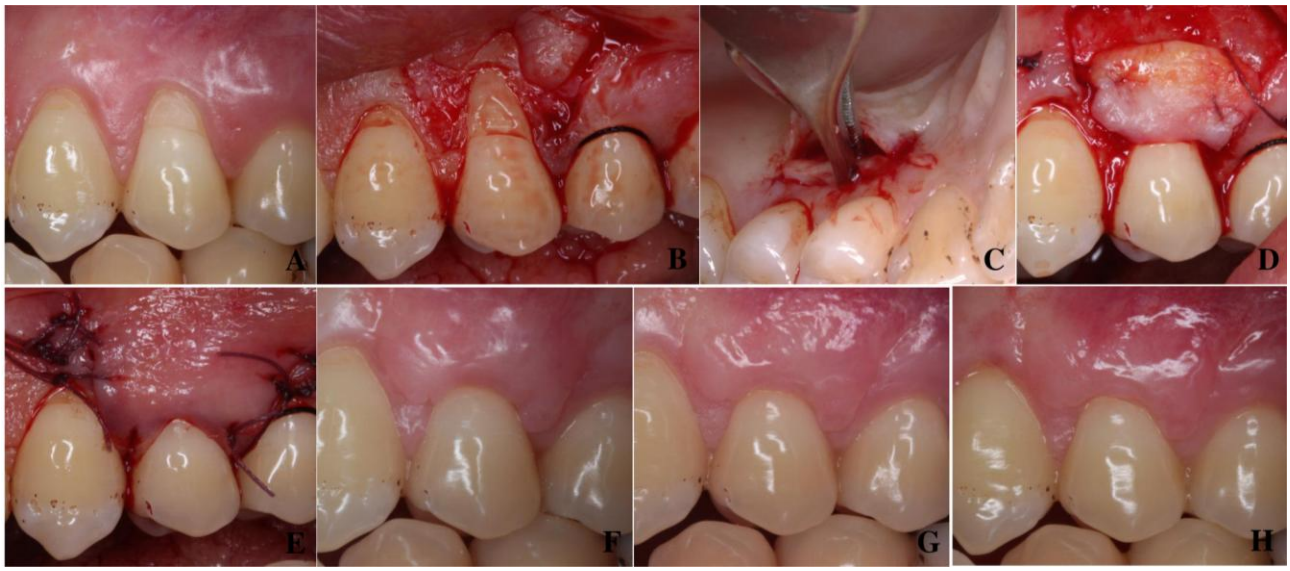
Interventions: Age, gender, cigarette consumption, systemic, and dental anamnesis data of each study participant were recorded. Each participant completed the beginning periodontal therapy consisting of oral hygiene directives before the intervention. Intra-oral photographs were taken of all targeted gingival recession defects.

To guarantee reproducible measurements, individualized acrylic stents were used during the measurements. Clinical periodontal parameters including plaque index (PI) (13), gingival index (GI) (14), pocket depth (PD), bleeding after probing (BOP) (15) and, clinical attachment level (CAL) were measured at 4 areas (mesio-buccal, mid-buccal, disto-buccal, and mid-lingual/palatal). Gingival recession depth (GRD) was evaluated from the gingival margin to the CEJ, gingival recession width (GRW) was measured as the length between the distal and the mesial gingival margin, and keratinized gingival width (KGW) was measured using Lugol's Iodine solution (Norateks Chemical Industry, Istanbul, Turkey) from the mucogingival junction to the gingival margin of the target tooth and its adjacent teeth using a standard Williams' periodontal probe (Hu-Friedy, Chicago, IL, USA). The percentage of root coverage was calculated as: [(initial GRD – final GRD) / initial GRD × 100]. The aesthetic score of the root coverage (16), including the level of the gingival margin, mucogingival junction alignment, marginal tissue contour, soft tissue texture, and gingival tissue color, was also evaluated.

All defects were treated with a CPF plus an SCTG by the same researcher using either a microsurgery or macrosurgery approach. The microsurgical instruments consisted of a micro-scalpel handle (Hu-Friedy, Chicago, IL, USA), an inclined



Picture 1. The microsurgery technique for a Miller Class I gingival recession defect: A) view of the defect, B) release of the flap, C) obtaining a subepithelial connective tissue graft, D) the graft sutures, E) closing the flap with a coronally positioned flap, F) 1-month recovery image of the receiving area, G) 3-month recovery image of the receiving area, H) 6-month recovery image of the receiving area



Picture 2. Macrosurgery technique for a Miller Class I gingival recession defect: A) view of the defect, B) release of the flap, C) obtaining a subepithelial connective tissue graft, D) the graft sutures, E) closing the flap with a coronally positioned flap, F) 1-month recovery image of the receiving area, G) 3-month recovery image of the receiving area, H) 6-month recovery image of the receiving area.

microsurgical scissor (Hu-Friedy, Chicago, IL, USA), an atraumatic tissue forceps (Hu-Friedy Chicago, IL, USA) a microsurgical needle holder (Hu-Friedy, Chicago, IL, USA), a mini-five (#1/2, #3/4, #5/6) Gracey curette (Hu-Friedy, Chicago, IL, USA), 6-0/7-0 polyglactin sutures (Vicryl®, Ethicon, St-Stevens-Woluwe, Belgium), and a 2.5x magnification loop (Heine Binocular Loops, Herrsching, Germany). The macrosurgical instruments consisted of a scalpel handle, surgical scissors, straight tissue forceps, a needle holder (Schwert, Tuttlingen, Germany), 5-0 polyglactin sutures (Vicryl®, Ethicon, St-Stevens-Woluwe, Belgium), and a 15C scalpel blade (Swann-Morton, Sheffield, England).

Local anesthesia (Ultracain D-S; Sanofi Aventis, Istanbul, Turkey) was utilized to prepare the recipient and donor sites. The GRD was estimated to determine the onset position of the horizontal incision. This point was marked at the distance of the GRD plus 1 mm from the top of the interdental papilla. The horizontal incisions were extended to the defect's distal and mesial sites, approximately 3 mm. Horizontal incisions were merged with a sulcular incision, and oblique incisions were applied from the borders of the horizontal incisions, which extended to the mucogingival junction. A half-thickness flap was

started, followed by a full-thickness flap apical to the level of the defect. Another half-thickness flap beyond the mucogingival junction was dissected to enable passive coronal positioning of the trapezoidal-shaped flap. All muscle connections were eliminated to allow the flap to passively reach 2 mm beyond the CEJ of the target tooth. The anatomic interdental papillae were de-epithelialized to generate connective tissue where the papillae of the flap were sutured. Scaling and root planning were completed using periodontal curettes, and the tooth surface was rinsed with saline solution. After preparing the recipient site, free subepithelial connective tissue was harvested at the premolar region of the palatal area on the same side as the relevant tooth (17). Two parallel incisions were made in the palate. The length of these incisions was 3 mm longer than the GRW. Then, two vertical releasing incisions were done at the distal and mesial ends of the horizontal incisions. A connective tissue graft was obtained utilizing a 15C scalpel blade and the donor site was sutured. The epithelial border of the palatal graft was discarded, and graft thickness was measured just after harvesting using a periodontal probe (18). Average graft thickness was 2 mm (data not shown). Excess tissue removed to achieve the appropriate graft thickness; then, the graft was put on the denuded root surface and sutured. The flap was placed 2 mm higher than the CEJ of the target tooth and sutured. For the microsurgical technique (Picture 1), the connective tissue was sutured with 7-0 polyglactin sutures, and the flap was sutured using the 6-0 propylene. For the macrosurgery technique (Picture 2), both the tissue and flap were fixed with 5-0 propylene suture material. A gentle compression was applied to the flap with moistened gauze for 5 min to produce a clot, and no periodontal dressing was applied. The duration of each operation was recorded as the period between the first incision and the last suture. Following each operation, a systemic antibiotic (amoxicillin + clavulanic acid 1000 mg; Augmentin, Abdi-Ibrahim, Istanbul, Turkey) twice a day, an analgesic (flurbiprofen 100 mg; Majezik, Sanovel, Istanbul, Turkey) twice a day, and mouth rinses (0.12% chlorhexidine gluconate with 0.15% benzydamine hydrochloride; Kloroben, Drogsan, Ankara, Turkey) twice a day were prescribed for 7 days. After the first 24 hours have passed, patients were advised to rinse their mouths with the mouthwash for 1 minute. Participants were ordered to keep away mechanical trauma from the surgical area. The sutures were taken out on postsurgical 7th day.

A visual analog scale (VAS) was used to assess postoperative complaints regarding the recipient and donor sites according to graft size and postoperative satisfaction values (level of the gingival margin, gingival tissue color, dentin hypersensitivity, and root coverage). A 10 cm VAS, with "none" / "unhappy" at the left end and "intolerable" / "happy" at the right tail end was arranged for each patient. The VAS for postoperative complaints was recorded on intraoperative and postoperative days 1, 3, 5, 7, and 14. The VAS for postoperative satisfaction was recorded at baseline and the 6-month follow-up appointment.

All clinical periodontal parameters and intra-oral photographs were measured at baseline and 6 months following surgery. GRD, GRW, and KGW were also recorded at 1 and 3 months postsurgery.

Outcomes: The primary endpoint for the effectiveness of the recession defect was the percentage of root coverage at baseline and 6-months postsurgery, as assessed by GRD. Secondary outcome variables included changes in GRD, GRW, and KGW at the 6-month follow-up period. No alterations were made to the trial outcomes after the beginning of the trial.

Sample Size: A power calculation based on the data suggested that a sample size of 10 subjects per group would have 80% power at an effect size of 1.4 and an α level=0.05. These calculations were made using a software (G-Power, Heinrich-Heine Universität, Düsseldorf, Germany). There were no interim analyses.

Randomization: For each gingival recession defect, a referee flipping coin was tossed by the investigator to decide the allocation to 1 of 2 treatment groups. Ball's resulted in the defect being assigned to microsurgery, a logo result was allocated to macrosurgery. The coin was caught in the palm of the hand and allowed to land on a flat surface. Three patients had bilateral gingival recessions, which were also randomly assigned (by coin toss) to 1 of the 2 surgical groups. For these 3 patients, a single coin toss was used to allocate one defect while the other defect was allocated to the other group. Randomization took place on the day of surgery for each defect to determine which procedure would be performed.

Blinding: The surgeon allocated to the specific intervention group was aware of the allocated arm. Also, because the participants had read the informed consent form and had prior knowledge of surgical differences, they might have noticed

which group they were in due to the loop using during the surgical procedure. However, a statistician and an outcome assessor were blinded to the allocation, particularly as the similarity of the interventions could suggest that the same treatment approach was made with different instruments.

Statistical Methods: The power analysis indicated that for a power of 0.80 with a 1.4 effect size at an α level of 0.05 significance, 10 participants would be required for each group. The statistical program (MedCalc Software, Ostend, Belgium) analyzed all parameters measured at baseline and during follow-ups. Means ± standard deviations expressed as descriptive statistics. The primary and secondary endpoints were assessed using the Friedman test (with post hoc analyses). Student t-test was used if the data were independent and normally distributed, while the Mann-Whitney U test was used if the data were independent but not normally distributed. Wilcoxon signed ranks test was used to compare nonparametric data, whereas continuous variables of the groups were compared by Paired Samples T-test. Results with a value of $p<0.05$ were considered significant.

Results

A flow diagram of the study is shown in Figure 1. Seventeen participants with 20 Miller Class I or II defects were included in the study. A total of 20 defects, 3 of them located bilaterally, were randomized to the microsurgery (n=10) or macrosurgery (n=10) group. One female participant with 1 recession defect in the macrosurgery group was kept out from the analysis because she did not take part in 1 follow-up appointment. Sixteen participants with 19 defects completed the study.

Table 1 shows the distributions of the participants' age, gender, and smoking habits, and there were no significant differences between the groups (p>0.05). The location and class distribution of the defects in each group shown in Table 2. In the microsurgery group, 50% of the recessions were in the upper jaw, and 50% were in the lower jaw, whereas in the macrosurgery group, 33% were in the upper jaw, and 67% were in the lower jaw. There were no statistical differences between the locations of the defects (p>0.05). In the microsurgery group, 70% of the defects were Miller Class I, and 30% were Miller Class II, whereas in the macrosurgery group, 67% were Miller Class I and 33% were Miller Class II. No significant differences were observed (p>0.05). The mean minutes of operation time were 52 and 47 in the microsurgery and macrosurgery groups, respectively. There was no significant difference in the operation time between the 2 groups (p=0.21) (data not shown). The periodontal parameters at baseline and the follow-ups are shown in Table 3. At baseline, no significant differences were seen between the microsurgery and macrosurgery groups for PI, GI, PD, CAL, GRD, GRW, and KGW (p>0.05). BOP was not present in either the micro or macrosurgery group during any observation period, therefore, it is not specified in Table 3. No clinical periodontal parameters showed significant differences between the groups at any of the evaluation time points (p>0.05). Intergroup comparisons of GRD and GRW for both groups did not show statistical significance (p>0.05). Only KGW significantly increased at the 1, 3, and 6 months follow-up periods in comparison to baseline values in the microsurgery group ($p<0.05$).

The baseline values of gingival recession defects were not significantly different between the groups ($p>0.05$) (Table 3). The mean root coverage was 92% and 71% in the microsurgery and macrosurgery groups, respectively. The percent root coverage was not significantly different among the groups ($p>0.05$) even though there was an approximately 20% difference between these results (Table 4). Similarly, the root coverage aesthetic score was not significantly different between the groups (p>0.05) (Table 4). The complete root coverage was reached in seven and three defects in the microsurgery and macrosurgery groups. No statistically significant difference was observed between the two groups in terms of complete root coverage (p>0.05) (data not shown).

The microsurgery and macrosurgery groups had similar VAS values in regards to postoperative complaints for the recipient side (Table 5) and the donor side (Table 6), and postoperative satisfaction (Table 7) at all of the evaluation time points ($p>0.05$).

No subgroup analyses were performed due to the limited number of participants, and no complications were seen during the surgery. Moreover, no remarkable side effects such as postoperative infection, significant inflammation, or graft necrosis were detected during the entirety of the study period.

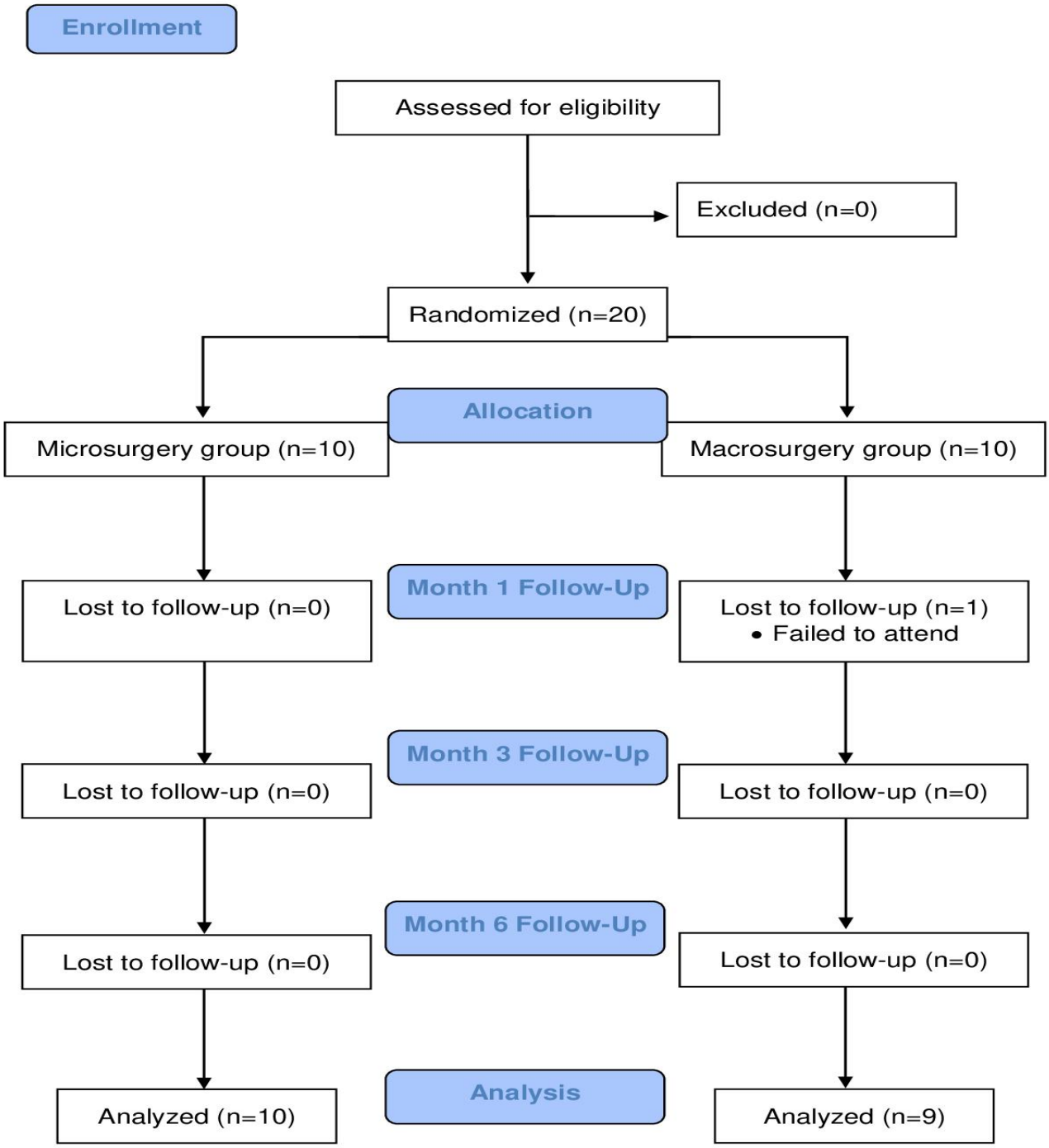


Fig. 1. Flow Diagram of the Study

Discussion

This 6-month, randomized clinical trial aimed to compare the clinical results of microsurgery and conventional macrosurgical approaches for the therapy of localized recession defects using a CPF plus SCTG. We hypothesized that root coverage performed using microsurgery for Miller class I or II defects would improve clinical periodontal outcomes and provide greater postoperative comfort and aesthetic satisfaction in comparison with macrosurgery. Our results indicate that using a CPF plus SCTG was not significantly different between the two techniques.

There were no significant differences between the micro and macrosurgery groups at any of the follow-up time points ($p>0.05$) in regards to periodontal parameters, percentages, aesthetic scores for root coverage, VAS values for postoperative complaints from the recipient and

Table 1: Distribution of age, Gender, and Smoking Habits of the Study Participants

	Microsurgery (n=10)	Macrosurgery (n=9)	P-value (Intragroup)
Age (years)[a]	35.1 ± 11.6 (21−50)	37.1 ± 11.3 (19−53)	0.758
Gender (Female/Male)	3 / 7	5 / 4	0.358
Smoking	0	1	0.267

Fisher's Exact Test
P-value > 0.05, the difference is not statistically significant.
[a] Mean ± Standard deviation values (Min-Max)

Table 2: Features Related To Gingival Recession Defects In The Study Participants

	Microsurgery (n=10)	Macrosurgery (n=9)	P-value (Intragroup)
Classification			
Miller I	7	6	1.00
Miller II	3	3	1.00
Location			
Maxilla	5	3	0.787
Mandible	5	6	0.549

Fisher's Exact Test
P-value > 0.05, the Difference Is Not Statistically Significant

donor sides, or VAS values for postoperative satisfaction. Intergroup comparisons showed that the differences for GRD and GRW did not show statistical significance in either group ($p>0.05$); although, KGW increased significantly at the 1, 3, and 6-month follow-up periods in the microsurgery group compared to baseline ($p<0.05$).

The intra and intergroup results showed no differences for PD or CAL values at baseline or at 6-months follow-up. This result was expected and is supported in the literature (19,20).

The intra and intergroup results showed no differences for the GRD and GRW values at baseline or at 6 months. This is in contrast to the study by Burkhardt and Lang (19), which found a significant difference in GRD both within and between microsurgery and macrosurgery groups. This difference in results may be due to differences in the baseline GRD values, as the values in their study were higher than in ours. Furthermore, there was more root coverage success at shallow depths in our study which may have caused no difference to be found between the groups. Although Nizam *et al.* (20) found a significant difference in GRD within microsurgery and macrosurgery groups, no significant difference was found between the groups, which is similar to our study. Moreover, they did not observe a statistical difference in GRW values within or between their study groups at any time point.

An increase in KGW after the application of SCTG is known to occur (21). Accordingly, it appeared that both methods were similarly effective in increasing KGW. In our results, KGW increased significantly at the 1, 3, and 6-month follow-up evaluations in the microsurgery group compared to baseline, whereas the macrosurgery group did not exhibit significant differences. Nizam *et al.* (20) has stated that the increased KGW values in both microsurgery and macrosurgery groups in their study was statistically significant from baseline to 24 months. Akca *et al.* (22) has declared that KGW values increased statistically significantly at the sixth month after the macrosurgical operation compared to the baseline. This dissimilarity could be related to differences in local factors of defects and surgical approaches between the two studies.

Successful root coverage can be influenced by local variations around the target tooth. Therefore, to minimize anatomical variables, only canine and premolar teeth were included in the study. While smoking is a known predisposing component for periodontal diseases, full root coverage was achieved in the former smoker in our study. While the percentage of root coverage in the microsurgery group was higher than the macrosurgery group, this difference was not statistically significant. Similar to our study, Nizam *et al.* (20) found that, while root closure rates increased in the sixth month, there was no statistically significant difference within or between microsurgery and macrosurgery groups.

Table 3: Mean ± Standard Deviation Values of The Clinical Periodontal Parameters of The Study Participants For Each Follow-Up Period

	Microsurgery (n=10)	Macrosurgery (n=9)	P-value (Intragroup)a
Plaque index			
Baseline	0.10 ± 0.17	0.22 ± 0.30	0.31
6 months	0.15 ± 0.20	0.19 ± 0.30	0.96
Gingival indexa			
Baseline	0.25 ± 0.30	0.36 ± 0.50	0.72
6 months	0.52 ± 0.40	0.47 ± 0.60	0.66
Probing depth (mm)a			
Baseline	1.60 ± 0.80	2.00 ± 1.00	0.49
6 months	2.30 ± 0.80	2.00 ± 0.90	0.54
Clinical attachment level (mm)a			
Baseline	4.80 ± 0.60	5.40 ± 1.70	0.66
6 months	2.40 ± 0.70	3.20 ± 1.40	0.14
Gingival recession depth (mm)a			
Baseline	3.20 ± 1.10	3.40 ± 1.10	0.6
1 month	0.30 ± 0.70	0.72 ± 0.70	0.24
3 months	0.30 ± 0.50	0.89 ± 0.80	0.11
6 months	0.30 ± 0.48	1.20 ± 1.11	0.09
P-value (Intergroup)b	1	0.247	□
Gingival recession width (mm)a			
Baseline	3.40 ± 0.80	3.90 ± 1.05	0.27
1 month	0.50 ± 1.10	2.00 ± 2.10	0.13
3 months	0.60 ± 1.10	2.20 ± 1.90	0.66
6 months	0.60 ± 0.90	2.28 ± 1.90	0.06
P-value (Intergroup)b	0.717	0.717	□
Keratinized gingival width (mm)a			
Baseline	2.00 ± 1.60	1.80 ± 0.70	0.13
1 month	2.30 ± 1.40	2.30 ± 1.10	1
3 months	2.30 ± 1.40	2.30 ± 0.09	0.66
6 months	3.00 ± 1.10	2.30 ± 0.70	0.11
P-value (Intergroup)b	0.006	0.846	□

[a]Mann-Whitney U Test
[b]Friedman Test (with post-hoc analysis)
P-value < 0.05, the difference is statistically significant

In our study, the aesthetic score of the microsurgery group was higher than the macrosurgery group, however, it was not significantly different. The aesthetic score from the macrosurgery group is similar to the results of a study by Cairo *et al.* (16); although, our study is the first to evaluate the aesthetic score following microsurgery.

An important goal of our study was to compare pain levels in the recipient and donor areas, and we found no significant differences within or between the 2 groups. In a study by Wessel and Tatakis (23), perceived pain levels in the recipient and donor areas were not evaluated separately, however, their results were similar to the macrosurgery group scores in our study at similar time points. In contrast, Nizam *et al.* (20) found a significant decrease on the third day in their microsurgery group, and on the fourth day in their macrosurgery group. The decreased pain level in the recipient site earlier in the microsurgery group suggests that there was less trauma in this group and the healing process was faster. As postoperative complications and pain may increase as the SCTG size increases, we examined the correlation between the two, but no statistically

Table 4: Percentage and Aesthetic Score of Root Coverage In Study Participants At 6 Months Follow Up

	Microsurgery (n=10)	Macrosurgery (n=9)	P-value (Intragroup)
Root coverage[a]	91.5 ± 14.4	70.7 ± 28.5	0.09
Aesthetic score[a]			
LGM	5.10 ± 1.49	4.00 ± 1.50	0.18
MJA	0.50 ± 0.50	0.56 ± 0.59	0.84
MTC	0.90 ± 0.30	0.78 ± 0.40	0.66
STT	0.60 ± 0.50	0.33 ± 0.50	0.35
GTC	1.00 ± 0.00	1.00 ± 0.00	1
Total	8.10 ± 1.70	6.67 ± 1.90	0.09

Mann-Whitney U Test
P-value > 0.05, the difference is not statistically significant
[a]Mean ± Standard deviation values
LGM; level of the gingival margin
MJA; mucogingival junction alignment
MTC; marginal tissue contour
STT; soft tissue texture
GTC; gingival tissue color

Table 5: Mean ± Standard Deviation Values From The Visual Analogue Scale For Recipient Side Postoperative Complaints By Study Participants

	Microsurgery (n=10)	Macrosurgery (n=9)	P-value (Intragroup)
Pain and swelling (%)			
Intraoperative	6.60 ± 7.90	3.60 ± 5.20	0.60
1 day	16.60 ± 29.90	19.30 ± 27.60	0.49
3 days	3.80 ± 9.60	6.70 ± 8.10	0.11
5 days	0.7 ± 1.70	1.10 ± 2.30	0.84
7 days	0.10 ± 0.50	0.00 ± 0.00	0.72
14 days	0.10 ± 0.50	0.00 ± 0.00	0.72

Mann-Whitney U Test
P-value > 0.05, the difference is not statistically significant

significant relationship was found. There are no other studies in the literature that examine the correlation between this pair.

In both the microsurgery and macrosurgery groups, high satisfaction scores were found at the follow-up evaluations. However, there was no significant difference within or between the groups. These findings suggest that the aesthetic results of both methods were satisfactory to the patients. Our results are supported other studies (4,24) that achieved high aesthetics by applying connective tissue grafts. In our study, participants whose root surface was not completely closed also gave high aesthetic scores. This suggests that when performing aesthetic evaluations, participants take into consideration factors other than the amount of root surface closure. In addition, the aesthetic criteria of physicians and patients may differ. Similarly to our results, Kerner *et al.* (25) demonstrated that root closure was not viewed as the most important criterion for patients when determining the aesthetic level.

This present study has some limitations. First, the effect size was large when determining the number of required participants in the power calculation. The power analysis, based on the data, suggested that a sample size of 10 patients per group would have an 80% power with an effect size of 1.4 at the α=0.05 level. As we had strict inclusion criteria and wanted to extend the follow-up visits to 6 months postoperatively, a small effect size would not have been realistic given the need to find the participants within the time allocated to the trial. However, several studies (11-13) related to root coverage surgeries began their trials with nearly 20 defects being investigated. Thus, the number of defects we investigated was similar to other studies, although this does not negate the large effect size. In addition, it has been shown that the creeping attachment of free gingival grafts

Table 6: Correlation of The Donor Side and The Visual Analogue Scale For Postoperative Complaints By Study Participants

	Microsurgery (n=10)		Macrosurgery (n=9)	
	r	p	r	p
1 day	-0.100	0.79	0.194	0.59
3 days	-0.303	0.42	0.225	0.53
5 days	-0.644	0.061	0.538	0.10

Spearman's Rho Test
P-value > 0.05, no correlation

Table 7: Mean ± Standard Deviation Values of The Visual Analogue Scale For Postoperative Satisfaction of Study Participants

	Microsurgery (n=10)	Macrosurgery (n=9)	P-value (Intragroup)
Level of the gingival margin (%)			
Baseline	41.10 ± 41.02	18.10 ± 25.20	0.21
6 months	97.10 ± 3.70	95.04 ± 8.30	1.0
Gingival tissue color (%)			
Baseline	62.50 ± 37.40	71.50 ± 27.10	0.84
6 months	98.10 ± 2.90	95.04 ± 8.30	0.72
Hypersensitivity (%)			
Baseline	25.50 ± 29.20	30.10 ± 32.50	0.54
6 months	5.80 ± 9.70	9.10 ± 12.20	0.60
Root coverage (%)			
Baseline	□	□	□
6 months	97.90 ± 3.10	95.50 ± 8.90	0.78

Mann-Whitney U Test
P-value > 0.05, the difference is not statistically significant

continue to occur during the first year following periodontal surgery (14). Therefore, the 6-month follow-up period may not have been enough time to observe significant differences in root coverage between the groups. It also should be considered that the surgical method (CPF plus SCTG) we applied known as the success of root coverage and of almost perfect aesthetic results (3, 6, 9-11, 13, 15, 16). So, it is perhaps unsurprising no difference between the 2 techniques was observed.

Second, we did not measure gingival thickness. However, methodological heterogeneity complicates comparisons between outcomes mentioned in the literature, as investigators may prefer to use different measurement sites, methods, or variables for analysis. Moreover, the definition of periodontal biotype varies among studies (17). Gingiva thickness is not measured in most studies or evaluated using uncertain methods.

Third, intraoral photographs were taken using a Canon 650D digital camera (Canon Inc, Tokyo, Japan) at baseline and during the follow-up visits. However, these photographs were not taken at fixed angles or at a standard magnification setting and could not be used to evaluate soft-tissue healing. Standardized digital photographs were used to evaluate the assessment of the pink aesthetic score of soft-tissue color. We focused on the root coverage aesthetic score (10), which also evaluated the gingival tissue color (0 point = color of tissue varied from the gingival color surrounding the adjacent teeth; 1 point = standard color and harmony with the adjacent soft tissues). In addition, we recorded the participants' self-reported satisfaction, including aesthetic determinants, via VAS. During the interview we did not show the before after photographs to patients, as we preferred aesthetic self-evaluations to be based on the individual's daily perceptions and not on photographic comparisons.

Fourth, post-operative analgesics were prescribed in all patients and a VAS scale was used for a subjective assessment of pain intensity. We did not include a group without analgesic in our study, because in clinical trials designed as periodontal

surgeries, establishing a group without analgesics is difficult owing to ethical reasons.

Strengths of the methodology include the minimization of bias (randomization and blinding), carefully determined inclusion and exclusion criteria (with a similar oral hygiene status among the participants), high-quality instruments for each surgical technique, and a standard surgical approach. In all cases, the same method was used for root coverage and harvesting the SCTGs. All defects were treated by the same investigator. The only variables between the groups were the use of the magnification system developed for microsurgery and more sensitive tools and fine suturing materials specially produced for the microsurgery procedures. In this study, the 2 different clinical approaches used the same method as is used in defects with similar features.

As the interventions in this study were implemented for all sexes and ages, our results suggest that patients with gingival recessions could benefit from using both of these surgical approaches to therapy of localized gingival recession defects. The surgical approach (CPF plus SCTG) was an effective method to cover Miller Class I and II defects. This indicates that both of these surgical techniques can be implemented in the treatment of these defects. For this trial, we chose a periodontal disease that is relevant to public health. The participants were also predominantly working-class with access to health insurance. There are signs that awareness of gingival recession will become more prevalent among young adults in the future.

The present findings suggest that root coverage in Miller Class I and II defects using a CPF plus SCTG has a high success rate in systemically healthy participants with good oral hygiene and clinically healthy periodontium, regardless of the surgical technique used. However, it is critical to note that to increase KGW, microsurgery is a better choice than a conventional surgical approach.

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