

Research Article

Clinical Evaluation of Semilunar Coronally Positioned Flap in Conjunction with Free Gingival Graft for Root Coverage (A Case Series)

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Abstract

Background and aim. Gingival recession as the apical migration of the gingival margin that results in exposure of the cemento-enamel junction (CEJ) and the root surface. In this case series we aimed to demonstrate a combination technique using semilunar coronally positioned flap with free gingival graft for root coverage.

Materials and methods. A total of 12 healthy subjects, 25-45 years of age, with gingival Miller's Class I gingival recessions in maxillary incisor or premolar area were recruited for study. A semilunar incision was made in mucogingival junction following the curvature of the receded gingival margin. A sulcular split-thickness incision was made in a coronal direction so that it reached the semilunar incision and advanced as coronally. The denuded area was covered by a free gingival graft (FGG). Longitudinal alterations during a follow-up period of 1, 3 and six months in terms of pocket depth (PD), Recession width (RW), Recession height (RH), Width of keratinized tissue (KT) and Clinical attachment level (CAL) were tested by repeated measures analysis of variance

Results. A comparison between baseline and the 1, 3 and 6 months clinical outcomes of patients revealed statistically significant changes from baseline were found for pocket probing depth ($p < 0.0001$). Six months evaluation revealed that recession width and height decreased significantly compared to baseline levels ($p < 0.0001$). A significant increase in width of keratinized gingiva and clinical attachment level gain at the sixth month evaluation ($p < 0.0001$).

Conclusion. Combination of semilunar coronally positioned flap with free gingival graft met a significant clinical outcomes for root coverage.

Key words: Gingival Recession, graft, semilunar flap.

Introduction

Gingival recession accounts for apical migration of the gingival margin that results in exposure of the cemento-enamel junction (CEJ) and the root surface¹ and is considered a mucogingival condition² that can constitute important aesthetic problems, root caries and hypersensitivity.^{3,4,5} Gingival recession is one of the most common findings in periodontal treatments and affects almost all of the people to various degrees.⁶

Various surgical and nonsurgical techniques have been used to correct labial gingival recession defects including periodontal plastic surgery, the goal of which is to remove or control the etiologic factors that result in mucogingival problems.¹

Increased interest in solving common patient complaints associated with root exposure such as esthetic complaints, root hypersensitivity and shallow root caries lesions, led to improvements in surgical procedures^{7,8} including free gingival grafts,⁹ laterally and coronally positioned flap,¹⁰ semilunar flap,¹¹ guided tissue regeneration (GTR)¹² and subepithelial connective tissue graft (SCTG)¹³ among which the latter has been reported as the most predictable one⁷ and currently serves as the standard for experiments related to root coverage techniques.¹⁴ However, this technique has some disadvantages, such as increased technical difficulty and the involvement of two surgical areas, one being the palatal wound donor area and may result in decreased vestibular depth and suboptimal keratinization.^{14,15} The semilunar coronally positioned flap (SCPF) procedure was introduced by Tarnow in 1986 for treatment of gingival recessions of about 2 or 3mm and is confined to the maxillary arch.^{15,16} This technique causes no disturbance of the adjacent papillae,¹¹ no shortening of the vestibule, and no tension on the flap.¹⁷ Besides these advantages, no sutures are needed.¹⁷ Despite of these advantages, no attempt is made to increase the width or thickness of gingival in this technique and there are reports of less success rates in complete root coverage.^{7,15} On the other hand, free gingival autograft may result in compromised color match due to lighter color of the graft.¹⁶

Because of the existing controversies about using different techniques of root coverage and their disadvantages and as there are no documented reports about simultaneous use of SCPF and gingival graft for covering the exposed root surface, the present study was performed to evaluate the results of using SCPF along with free gingival graft to cover the exposed root surface in patients admitted to department of

periodontology and implantology of Babol university of medical sciences.

Materials and Methods

Study population

A total of 12 healthy subjects, 25-45 years of age, were consecutively recruited for this study. The patients all desired treatment of gingival recession in maxillary incisor or premolar area and admitted to department of periodontology and implantology, Babol University of medical sciences. The following inclusion criteria was used: presence of Miller Class I gingival recessions in maxillary incisors or premolars, absence of caries, restorations or pathologic mobility in the areas to be treated and patients with single area of recession who needed root coverage and the palatal tissue was not suitable to be used as a donor site. All patients were healthy non-smokers. patients with systemic conditions known to interfere with periodontal healing such as uncontrolled diabetes, immune deficiency diseases, history of addiction or drinking alcohol, systemic or local bone diseases, pregnancy, using anticoagulant or immune suppressor drugs and those who were not able or compliant to maintain oral hygiene were excluded. Informed consent was signed by each of the subjects after thorough explanation of the nature, risks, and benefits of the clinical investigation and associated procedures. The University's Ethical Committee approved the consent form and experimental protocol.

Initial therapy

Prior to surgery, all subjects received two sessions of prophylaxis, which included instructions in proper oral hygiene measures, scaling and root planning and crown polishing using rubber cup and mild abrasive paste. Only when the patient demonstrated the ability to maintain a good level of oral hygiene was the surgical phase initiated. Sillness and Loe plaque index was used to assess gingival health conditions prior and throughout the study. In addition, the following indices were assessed in the midbuccal area using William's probe prior and throughout the study: probing depth, measured as the distance from the gingival margin to the bottom of the gingival sulcus, recession width, measured from one border of the recession to another at the CEJ, recession height, measured as the distance from the CEJ to the gingival margin, width of keratinized tissue measured as the distance between the most apical point of the gingival margin and the mucogingival junction, clinical attachment level, calculated as probing depth + recession height.

Surgical procedures

The operation area was anaesthetized using local anesthesia (lidocaine with 1:80,000 epinephrine). A semilunar incision was made in mucogingival junction following the curvature of the receded gingival margin. The semilunar incision remained 2-3mm from the tips of the papillae to permit optimal perfusion of blood to the repositioned tissue. A sulcular split-thickness incision was made in a coronal direction so that it reached the semilunar incision. After complete flap freedom, the flap was easily advanced as coronally as possible without tension and then positioned properly. A moist gauze pad was lightly pressured perpendicular to the flap at its new level for 5 minutes. A 1-mm-thick free gingival graft obtained from the palatal area between molar and premolar teeth was immediately placed on the root surface. Closure of the wound margins was carried out using holding sutures (vicryl 5-0). The donor area was then closed with continuous sutures and a thin layer of periodontal dressing was applied to the recipient and donor areas. Patients were instructed to take analgesic medication (Ibuprofen 400mg, 4 times daily) and antibiotics (Amoxicillin 500mg, 3 times daily) for 7 days and to rinse with a 0.2% chlorhexidine digluconate solution twice a day for two weeks. Two weeks later, sutures were removed and the patients were instructed to gently brush around the surgical site with an ultra soft toothbrush using roll technique. Routine oral health care was used in other sites. Subjects were enrolled in a follow up program weekly for the first 4 weeks and then at third and sixth months after surgery. Complete plaque elimination was performed every 3 month.

Statistical analysis

Longitudinal alterations were tested by repeated measures analysis of variance and SPSS 16 was used for data analysis.

Results

Twelve patients (4 men and 8 women), 25 to 45 years of age (mean age, 32.5 years), with Miller's Class I gingival recessions in maxillary incisors and premolars were included in the present study. A comparison between baseline and the 1, 3 and 6 months clinical outcomes of patients treated by semilunar coronally positioned flap along with free gingival graft is shown in table 1. Statistically significant changes from baseline were found for pocket probing depth (p<0.0001). Rate of changes was increasing until the third month and then decreasing until the sixth month. Six months evaluation revealed that recession width

and height decreased significantly compared to baseline levels (p<0.0001) although an increasing rate was found between the first and six months postoperatively. Comparisons demonstrated statistically significant increase in width of keratinized gingiva and clinical attachment level gain at the sixth month evaluation (p<0.0001) although the rate of changes was decreasing from the first to sixth months.

Table 1. Clinical parameters (mm; mean – SD) at aseline and 6 and 30 months postoperatively

Clinical Parameter	Time			
	Baseline	4 Weeks	3 Months	6 Month
Pocket probing depth	1.5± 0.522	1.75±0.5	1.92± 0.557	1.625± 0.644
Recession width	2.83±0.444	0.33±0.492	0.42±0.634	0.63± 0.711
Recession height	2.875± 0.5276	0.33±0.492	0.42± 0.669	0.83±0.807
Width of keratinized tissue	3.04±0.811	5.42±0.793	5.33± 0.888	4.92±0.875
Clinical attachment level	4.375± 0.8823	2.08± 0.469	2.33± 0.685	2.458±0.6557

Discussion

The purpose of the study was to evaluate the results of simultaneous use of semilunar coronally positioned flap and free gingival graft for treatment of Miller class I gingival recession defects. The present data indicates that using this technique results in appropriate root coverage.

At the end of this study, reports revealed significant decreases in both recession width and recession height, and significant increase in keratinized tissue width. Various degrees of increase in keratinized tissue width in the range of 0.55mm to 3.54mm are reported in different studies and the results of our study meet this range.¹⁸⁻²⁴ Several factors such as the method used for detection of mucogingival junction, initial height of gingival recession, surgical technique and inclusion of Miller class II gingival recession can influence the degree of increase in keratinized tissue width.

Six months evaluation showed significant decrease in clinical attachment level by 43.81%. These results are the same as other studies using various flap and graft techniques.^{18,21-26} However, little difference exists in

the results of these studies probably due to difference in clinical parameter measurement techniques, magnification and illumination in surgical site which offers advantages such as enhanced visual acuity and more accurate and atraumatic manipulation of the soft tissue and using different kinds of blades. Deficiencies in Miller classification has been assumed as a causative factor for inconsistencies in different studies.^{27,28}

In current study, the covered root surface was not calculated but it can be determined in regard to recession width and height. As there were significant decrease in both recession width and height, it can be concluded that significant degree of root coverage was achieved using SCPF along with free gingival graft. Several factors such as the type of the lesions, amount and quality of adjacent gingival tissues, sample size, the inclusion criteria, research methodology, surgical technique, measurement tools and interoperator differences can affect the amount of root coverage following different techniques.

Nevertheless, complete RC must be considered the true goal of treatment because it assures recovery from the hypersensitivity and esthetic defects associated with recessions.²⁹ Thus, root coverage that does not reach the CEJ may not be satisfactory for the patient because the coronal millimeter(s) of the still-uncovered root surface may show while smiling. In addition, the root area near the CEJ is the most susceptible to hypersensitivity and the frequency of complete root coverage is related to the technique predictability.^{8,30} The area to be treated is an effective factor in results of root coverage. The least amount of root coverage has been reported in canine and molar area.^{7,30} As the most treated teeth in current study were canines, it can be a determinant of the obtained results. Increase in the thickness of gingival tissue is a desired effect in decreasing the possibility of recurrence of gingival recession because chronic trauma from injuries during inadequate tooth brushing or inflammatory reactions in thin marginal tissue may result in gingival recession.^{19,31} In the present study, a statistically significant increase in mean thickness of keratinized tissue was detected after 6 months. This may have contributed to the higher frequency of complete root coverage in these patients. However in two controlled clinical studies performed using coronally positioned flap, significant attachment loss was encountered in long term evaluations.^{32,33}

The importance of the patient's tooth brushing technique was demonstrated for the long-term maintenance of clinical outcomes achieved by a root coverage surgical procedure.³³ Wennström and

Zucchelli indicated that an altered non-traumatic toothbrushing technique was of greater significance for a successful long-term outcome of the root coverage procedure than the gingival dimensions.³³ In the present study, all patients enrolled were instructed and motivated to perform a coronally directed roll technique to minimize the toothbrushing trauma while reaching an optimal plaque control; therefore, it is impossible to affirm which variable (gingival thickness or patient's toothbrushing technique) is more important for the maintenance of the position of the gingival margin or whether they have a synergic effect. The literature lacks studies that evaluated the results of combined SCPF and free gingival graft. To the best of our knowledge, the present study is the first to demonstrate the predictability and stability of this technique in a controlled clinical study. Bittencourt et al (2006) compared the long-term outcomes of subepithelial connective tissue graft and SCPF for the treatment of Miller class I gingival recession defects and indicated that the two surgical approaches were highly effective in obtaining root coverage and maintaining long-term stability.¹⁴ Jahangirnezhad (2006) evaluated the results of using SCPF with or without tissue adhesives and showed that using SCPF with Epigluie tissue adhesive is an effective method to cover the root surface of incisors and premolars especially in narrow gingival recessions.³⁵

However, the decision to use the SCPF technique is dependent on factors related to the height and class of gingival recession and the conditions of the keratinized tissue (width and thickness). This technique is not recommended for mandibular teeth.³⁶ There would remain an open wound and no attempt is made to increase the width of keratinized tissue. On the other hand, free gingival graft may result in suboptimal root coverage and compromised color match due to lighter color of the graft.^{7,15,16} The technique used in current study may be an effective tool in root coverage due to gathering the positive aspects of the two aforementioned techniques.

Along with the advantages of root coverage surgeries such as reduced root hypersensitivity and improved esthetics, it can serve as a prophylactic procedure especially in the cases of young patients with inadequate attached gingival and may reduce discomfort during daily plaque control procedures.³⁷ According to Allen and Miller, if one can stabilize the recessions by avoiding causative factors, and root sensitivity and esthetics are not of great concern, there is no indication for surgery but, if the surgical procedure is simple to perform, it can be assumed as a prophylactic treatment.³⁸

Due to the technique sensitive and operator sensitive nature of surgical procedures, careful case selection and diagnosis, precise performance of the surgical method and postoperative care are critical to favorable outcomes. Minute changes in these items can lead to diverse differences in predictability of results.³⁹ It appears that an ideal root coverage technique should be easy to perform by a periodontist without learning failure, less time-consuming and economically acceptable for the patient.³⁸ Despite of our attempt to do accurate and reproducible surgeries and using precise inclusion and exclusion criteria, limitations existed due to achieving adequate sample size, finding mirror images in paired teeth and obtaining patients compliance. However, the only solution was to prefer internal validity to external one.

Semilunar coronally positioned flap along with free gingival graft was effective in treatment of Miller class I gingival recessions. Significant improvements in clinical parameters such as recession height and width, clinical attachment level, width of keratinized tissue and pocket depth ensued using this technique. Further long-term clinical and histological investigations are needed to confirm these results. On the other hand, it is necessary to evaluate the outcomes of root coverage surgeries with regard to patient-related variables such as esthetics and intensity of postoperative pain, root hypersensitivity and complications.^{8,39}

Conclusion

semilunar coronally positioned flap along with free gingival graft is an effective method in treatment of Miller class I gingival recessions and due to favorable changes in clinical parameters such as pocket depth, recession width and height, clinical attachment level and width of keratinized tissue it can be successfully used in this kind of gingival recessions.

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