Case Series

Long-Term Outcome Following Treatment of Multiple Miller Class I and II Recession Defects in Esthetic Areas of the Mouth

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Background: *Multiple recession defects can be successfully treated using envelope-type coronally advanced flaps. The aim of the present study was to evaluate the long-term (5 years) stability of clinical outcomes achieved with the surgery and the association between patient variables and long-term stability.*

Methods: *Seventy-three Miller Class I and II gingival recessions affecting 22 young, systemically healthy subjects were treated with coronally advanced flaps with no releasing incisions. All patients were instructed to perform a coronally directed roll technique to minimize the toothbrushing trauma to the gingival margin. The clinical reevaluation was made 1 year after the surgery. At this point, 13 patients took part in a supportive periodontal care program consisting of oral hygiene instructions, control of toothbrushing technique, and professional tooth cleaning every 4 months. The remaining nine patients did not participate and received only sporadic care by general dentists. At 5 years postsurgery, all patients were reexamined.*

Results: *At the 5-year examination, 94% of the root surfaces initially exposed due to gingival recession were still covered with soft tissue, and 85% of the treated recession defects showed complete coverage. Complete root coverage in all recessions was maintained in 15 out of 22 patients (68%). The long-term stability of the soft-tissue margin in the treated sites was significantly influenced by the patient's regular participation in the recall program and the susceptibility to gingival recession in other areas of the mouth. A statistically significant increase of keratinized tissue (0.80 ± 0.64 mm) was observed between the 1- and 5-year observation visits, and the average increase of keratinized tissue between the baseline and the 5-year follow-up amounted to 1.38 ± 0.90 mm. This increase was significantly affected by the baseline keratinized tissue (KT) and recession (REC) depth: in particular, the 5-year increase in the amount of keratinized tissue was greater in sites with a greater recession depth and lower amount of keratinized tissue at baseline.*

Conclusions: *1) The successful root coverage results obtained with the coronally advanced flap for multiple recession defects were well maintained over the 4-year observation period. 2) Negative patient characteristics such as a lack of compliance with a supportive care program and individual susceptibility to gingival recession were significantly associated with the recurrence in gingival recession. 3) The increase in keratinized tissue height that followed the coronally advanced flap procedure may be attributed to the tendency of the mucogingival line to regain its genetically determined position.*
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KEY WORDS

Flap; gingival recession; root-coverage.

Primary goals of mucogingival surgery have changed with time. For many years, the free gingival graft was considered to be the most widely used, versatile, and predictable mucogingival surgical procedure.[1] Its main objective was to increase the apical-coronal dimension of keratinized tissue to extend the vestibular fornix,[2] to dissipate muscle pull,[3] and to produce an adequate zone of attached gingiva.[4] During the 1960s and 1970s, the rationale for increasing the band of attached gingiva was to maintain gingival health[5] and to prevent gingival recession to occur,[1-4] and grafts were positioned marginally when there was no more gingival tissue left and submarginally when a residual amount of marginal keratinized tissue was still present.[6] Once it was shown that periodontal health could be maintained even without gingiva, as long as good plaque control was maintained,[7,8] the use of a free graft to increase the amount of gingiva was no longer justified, and treatment of gingival recessions became the primary objective of mucogingival surgery. In addition, the goals of the treatment of gingival recession have changed with time, from preventing further progression of gingival recession by increasing the amount of gingival tissue (by means of a gingival graft) apical to the recession margin[9] to achieving predictable root coverage to solve patients' esthetic demands.[10-12]

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In the last few decades, several surgical procedures have been demonstrated to be successful in achieving root coverage and particularly complete root coverage, i.e., the coverage of the root exposure up to the cemento-enamel junction (CEJ).[12] This final outcome was frequently obtained irrespective of differences in the color and thickness between the treated area and the adjacent soft tissues.[13] Bilaminar procedures, for example, were highly effective and predictable in terms of root coverage but frequently resulted in excessive soft tissue thickness and poor color blending with respect to the neighboring gingival tissues.[14,15] The overall esthetic outcome of root coverage procedures has only recently become a concern, depending on the final color and tissue blend of the treated area. However, this result was not systematically evaluated but merely remarked upon, using general terms such as "aesthetically pleasing" and "good aesthetic results."[13] New concepts in terms of esthetic outcomes of a root coverage surgical procedure were introduced in a recent article:[16] 1) gingival recessions frequently affect adjacent teeth; 2) the surgical procedure should treat all gingival recessions at the same time; 3) vertical releasing incisions, which often result in unesthetic white scars, should be avoided; 4) gingival tissue still present apical to the root exposure should be preferred because it is histologically and clinically (and thus esthetically) identical to the one originally covering the exposed root; and 5) keratinized tissue may increase after coronally advanced flap surgery. The surgical procedure adopted in that study[16] was an envelope-type coronally advanced flap for the treatment of multiple gingival recessions in patients with esthetic demands. The 1-year clinical outcomes demonstrated that the surgical approach was effective in terms of esthetics, root coverage, and increase in keratinized tissue height.[16]

Since the true benefit for the patient is not only improved esthetics but also the stability of the result over time, it is relevant to evaluate whether or not these 1-year successful outcomes remain stable. The aim of the present study was to investigate the following: 1) the long-term (5 years) stability of clinical outcomes obtained with the coronally advanced flap for the treatment of multiple gingival recessions; and 2) the association between patient variables and long-term stability.

MATERIALS AND METHODS

Patient Population

The subject population of a previously published investigation[16] consisted of 22 young (age range, 18 to 34 years), systemically healthy subjects with esthetic problems due to the exposure, during smiling, of multiple recession-type defects. The participants were selected on a consecutive basis and treated between September 1997 and July 1998 in the Department of Periodontology, University of Bologna, Italy. All of them gave informed consent before being enrolled in the study. The study was conducted in accordance with the Helsinki Declaration of 1975, as revised in 2000. The 22 patients included in the study presented a total of 73 teeth with buccal recession-type defects. All recessions fell into Class I or II according to the definitions given by Miller (1985)[17] because no loss of interdental soft and hard tissue height was present. The mean number of gingival recessions treated in each subject was 3.3 (range 2 to 5). In 20 out of 22 subjects (91%), the mean number of treated recessions was ≥3 mm. All defects were located in the esthetic area of the maxilla (from tooth #15 to tooth #25).

Recession treatment consisted of a coronally advanced flap with no releasing incision and with a unique split-full-split thickness buccal flap elevation. Sling coronal sutures secured each surgical papilla to the corresponding disepithelized anatomic papilla in the most feasible coronal position.[16]

All patients were recalled for professional oral hygiene and prophylaxis 1, 3, and 5 weeks after suture removal and, subsequently, once every 3 months until the final examination (12 months). Furthermore, all patients were instructed to perform a coronally directed roll technique to minimize the toothbrushing trauma to the gingival margin. A soft toothbrush was recommended during the first year of observation and then patients started to use a toothbrush with a medium-type bristle.

After the 1-year reevaluation, all patients were given the opportunity to be enrolled in a supportive periodontal care program, performed at the University of Bologna, that included oral hygiene instructions, control of toothbrushing technique, and professional tooth cleaning every 4 months. Nine out of 22 patients did not participate and received only sporadic care by their general dentists. All patients were reexamined after 5 years.

Clinical Measurements

The full-mouth plaque score (FMPS) and local plaque score were recorded as the percentage of total surfaces (four aspects per tooth) that revealed the presence of plaque.[18] Bleeding on probing was assessed dichotomously at a force of 0.3 N with a manual pressure-sensitive probe.‡

The full-mouth bleeding score (FMBS) and local bleeding score were recorded as the percentage of total surfaces (four aspects per tooth) that revealed the presence of bleeding upon probing.

The same clinical measurements, taken 1 week before the surgery and 1 year later, were recorded at the 5-year follow-up visit: marginal gingival recession

‡ PCP-UNC 15 probe tip (Hu-Friedy, Chicago, IL) equipped with a Brodontic spring device (Dentramar, Waalwijk, The Netherlands).

(REC) depth, measured at the buccal tooth surface, as the distance between the cemento-enamel junction and the most apical extension of the gingival margin; probing depth (PD), measured from the gingival margin to the bottom of the gingival sulcus; probing attachment level (PAL), measured from the cemento-enamel junction to the bottom of the gingival sulcus; and keratinized tissue (KT) height, measured from the gingival margin to the mucogingival line.

The same investigator performed the clinical measurements at baseline and after 1 and 5 years. He did not perform the surgical procedures and was unaware of the precedent recordings. All measurements were performed with a manual probe and rounded up to the nearest millimeter.

Evaluation of Patient Characteristics

Each patient was further characterized with a series of descriptors known or supposed to be of importance in determining the prognosis. The following patient characteristics were evaluated: age, gender, smoking status, participation in the recall program, and tendency to gingival recession in multiple sites.

Smokers were defined as subjects who smoked ≥10 cigarettes per day.[19] Non-smokers did not smoke. Participating in the recall program (recall patients) was defined as compliance with recall appointments over the 4-year period (1 to 5 years). Patients who did not comply received sporadic care by their general dentists (non-recall patients).[20] A patient's tendency to gingival recession in multiple sites (a susceptible patient) was defined as an increase in gingival recession ≥1 mm in at least three sites from different teeth (other than those that were longitudinally monitored) over the 4-year observation period. Patients who were not susceptible were defined as unsusceptible.

Data Analysis

The statistical analysis was performed using statistical application software.§

Two statistical analyses including multivariate methods were performed: after fitting a general linear model, a multiple regression analysis of variance (ANOVA) for repeated measures was used to evaluate any time-dependent difference (baseline and 1 and 5 years) regarding FMPS, FMBS, REC, PD, clinical attachment level (CAL), and KT. The method used to discriminate between the means was Fisher's least significant difference (LSD) procedure. The same general linear model was fitted to relate the difference between baseline and 5-year KT to two categorical (smoking status and number of sites per patient) and two continuous (baseline REC and KT) factors as covariates (analysis of covariance [ANCOVA]).

The unpaired Student t test was used to evaluate any difference between recall and non-recall patients in terms of FMPS and FMBS.

The stability of the soft tissue margin was defined on the basis of the difference in REC depth between 1- and 5-year follow-up visits. A treated site was considered unstable in the case of a difference in REC depth ≥1 mm between the 1- and 5-year examinations, whereas a site was considered stable when no difference was demonstrated. Patients showing one or more unstable sites were defined as unstable patients, whereas those demonstrating stability at all treated sites were reported as stable.

Chi-square analysis was used to evaluate the influence of recall (regular or sporadic), susceptibility (susceptible versus unsusceptible), smoking habit, and number of treated teeth per patient on the patient's stability between 1 and 5 years.

RESULTS

Patient Characteristics

Thirteen out of the 22 (59%) patients included in the study complied with the recall system between 1 and 5 years. Five patients (23%) were smokers, and eight (36%) were susceptible to gingival recessions in other areas of the mouth.

Plaque and Bleeding Scores

The 5-year FMPS and FMBS of the experimental population were 10.4 ± 4.2 and 6.8 ± 3.4, respectively. The results of multiple regression ANOVA for repeated measures showed no significant relationship in the time-dependent variations of FMPS ($F = 1.78$) and FMBS ($F = 0.99$). In addition, the difference between recall and non-recall patients in terms of FMPS ($t = 0.78$) and FMBS ($t = 0.90$) was not statistically significant.

Clinical Measurements

The 1-year results have been previously reported.[16] The periodontal parameters at baseline and the 12-month visit together with the 5-year outcomes are summarized in Table 1.

At baseline, the average depth of the recession defects was 2.78 ± 1.13 mm with a mean clinical attachment loss amounting to 3.84 ± 1.20 mm. The depth of the recessions ranged from 1 to 6 mm. The height of the keratinized tissue apical to the recession was on average 1.80 ± 0.86 mm; 38% of the recession sites had ≤1 mm keratinized tissue height.

One and 5 years following the root coverage procedure, the mean recession depth was 0.12 ± 0.33 mm and 0.22 ± 0.56 mm, respectively. Hence, the average root coverage was 2.67 ± 1.03 mm (97% of the preoperative recession) at 1 year and 2.56 ± 1.00 mm (94%) at 5 years. The results of the multiple regression ANOVA for repeated measures show a significant ($F = 35.34$) relationship in the time-dependent variations of REC depth; in particular, both REC reductions

§ Statgraphics 5 Plus, Manugistic, Rockville, MD.

Table 1.

Results of Multiple Regression ANOVA for Repeated Measures Relating to Clinical Parameters (mean ± SD in mm)

	Baseline	1 Year	5 Years
REC	2.78 ± 1.13 (a)	0.12 ± 0.33 (b)	0.22 ± 0.56 (b)
PD	1.06 ± 0.26 (a)	1.06 ± 0.25 (a)	1.07 ± 0.26 (a)
CAL	3.84 ± 1.20 (a)	1.19 ± 0.40 (b)	1.29 ± 0.59 (b)
KT	1.80 ± 0.86 (a)	2.36 ± 0.75 (b)	3.18 ± 0.53 (c)

Different letters (a, b, and c) indicate a statistically significant difference between groups for each parameter.

(difference between baseline and 1-year REC and between baseline and 5-year REC) were statistically significant, whereas the increase in gingival recession that occurred between the 1-and 5-year follow-up visits (0.10 ± 0.53 mm) was not statistically significant.

Probing depth remained almost unchanged (mean value ~1 mm) in the three (baseline and 1- and 5-year) observation periods. The results of the multiple regression ANOVA for repeated measures showed no significant (F = 2.45) relationship in the time-dependent variations of PD.

The gain in probing attachment amounted to 2.65 ± 1.10 mm at 1 year and 2.55 ± 1.09 mm at 5 years. The results of the multiple regression ANOVA for repeated measures showed a significant (F = 30.70) relationship in the time-dependent variations of CAL; in particular, a significant difference was found between 1- and 5-year values compared to the baseline value, whereas the loss of clinical attachment that occurred during the 4-year observation period (0.10 ± 0.60 mm) was not statistically significant.

Compared with the conditions before surgical treatment, the keratinized tissue height showed an increase of 0.58 ± 0.82 mm at 1 year and a further increment of 0.80 ± 0.64 mm during the 4-year observation period and amounted to, on average, 3.18 ± 0.53 mm at 5 years post-treatment. The average increase of keratinized tissue between the baseline and 5-year follow-up amounted to 1.38 ± 0.90 mm. The results of the multiple regression ANOVA for repeated measures showed a significant (F = 11.79) relationship in the time-dependent variations of KT. All changes of keratinized tissue (difference between baseline and 1 year, baseline and 5 years, and 1 and 5 years) were statistically significant.

The results from the ANCOVA showed that the difference between the baseline and 5-year keratinized tissue height was significantly affected by KT (F = 135.76; $P<0.01$) and REC (F = 4.29; $P<0.05$) at baseline: in particular, the 5-year increase in the amount of keratinized tissue was greater in sites with a greater recession depth and lower amount of keratinized tissue at baseline.

Additional information regarding the effectiveness of the surgical technique used for soft tissue root coverage is shown in Table 2. On average, 94.6% of the root surfaces initially exposed due to recession were still covered with soft tissue at the 5-year examination. At this time point, 62 of the 73 treated recession defects (85.1%) showed complete coverage. None of the treated sites showed a remaining recession depth >2.0 mm. Table 2 also indicates the effectiveness of the surgical technique for the treatment of multiple recession-type defects. Complete root coverage in all recessions was obtained in 16 out of 22 patients (73%) at 1 year post-surgery and was maintained for the observation period (4 years) in 15 patients. Thus, 68% of treated patients had the soft tissue margin at the level of the CEJ at every single tooth treated for gingival recession 5 years before. Of the remaining seven patients, two still showed 1 mm recession in one of the treated recessions, one had 1 mm recession in two of the surgically treated defects, two had 2 mm recession in one of the surgically treated defects, one had 2 mm recession in two of the treated recessions, and the worst results were obtained in one patient still having 1 mm recession in two and 2 mm recession in one of the treated defects.

Influence of Patient Characteristics on the Stability of the Soft Tissue Margin

Instability of the soft tissue margin, as previously defined (see Data Analysis), was observed in eight out of the 73 (11%) treated defects. This increase in recession depth occurred in five patients (unstable patients; three males and two females); all of them were susceptible for gingival recession in other areas of the mouth, four did not participate in the recall program (non-recall), and three were classified as smokers. Patient stability was significantly influenced by the patient's regular participation in the recall program ($\chi^2 = 6.03$; $P<0.05$) and by the susceptibility to gingival recession ($\chi^2 = 10.35$; $P<0.01$), whereas it was not significantly influenced by patient smoking habit and number of treated teeth per patient.

DISCUSSION

Results from the study demonstrated that the successful outcomes (achieved 1 year after the surgery) of the coronally advanced flap procedure for the treatment of multiple recession-type defects were well maintained over the 4-year observation period; in fact, 5 years after the surgery, 94% of the root surfaces initially exposed due to gingival recession were still covered with soft tissue, and 85% of the treated recession defects showed complete coverage. Furthermore, 68% of the patients enrolled in the study had the soft tissue margin at the level of the CEJ of all teeth

Table 2.

Number of Treated Recessions and 5-Year Root Coverage Results

Patient	N Recessions per Patient	Mean % Root Coverage	% Teeth With Complete Root Coverage
1	3	100	100
2	5	100	100
3	3	100	100
4†	4	100	100
5	3	88.7	66 (2/3)
6*†‡	5	80	60 (3/5)
7*	2	100	100
8	3	100	100
9*†‡	3	83.3	66 (2/3)
10	4	100	100
11	3	100	100
12*†‡	4	70	25 (1/4)
13	3	100	100
14*†	2	100	100
15*†‡	3	80.3	33 (1/3)
16	3	100	100
17*	3	100	100
18†	4	90	57 (3/4)
19	3	100	100
20*	4	100	100
21†‡	3	88.7	66 (2/3)
22*	3	100	100
Mean ± SD	3.3 ± 0.8	94.6 ± 8.9	85.1 ± 24.1

* Non-recall patients.
† Susceptible patients.
‡ Unstable patients.

treated for gingival recession 5 years before. The long-term maintenance of these root coverage results most likely was dependent on the emphasis placed on the control of the toothbrushing technique in the treated tooth areas. All patients, in fact, were instructed and motivated to perform a coronally directed roll technique to minimize the toothbrushing trauma to the gingival margin. The successful results in terms of root coverage achieved in the present study were associated with a clinically significant average increase in keratinized tissue height with no change in probing depth. Thus, the gain in clinical attachment was also well maintained during the observation period. This rate of long-term successful outcomes of the treatment is higher than that previously reported in the literature for other root coverage procedures.[11,12] Pini Prato et al.[21] in a comparative long-term (4 years) study, reported 73% and 72% root coverage in single gingival recessions treated with the coronally advanced flap associated with a non-resorbable membrane (guided tissue regeneration [GTR]) or a free gingival graft (two-step surgical techniques), respectively. One possible explanation for the improved results achieved in the present study is the modification in the surgical approach of the coronally advanced flap, namely the absence of vertical releasing incisions and the innovative split-full-split flap elevation.

One of the most remarkable results of the present study was the statistically and clinically significant increase in keratinized tissue height that followed the coronally advanced flap surgical procedure. Compared with the conditions before surgical treatment in which 38% of the recession sites had ≤l mm keratinized tissue height, 5 years after the surgery, 92% of the treated teeth had ≥3 mm gingival tissue, and none had <2 mm keratinized tissue. Furthermore, the present study data indicated a further increase in keratinized tissue height during the period comprised between the 1- and 5-year observation visits. This increment cannot be explained as a result of creeping attachment, since the level of gingival margin remained almost stable between the two (1-and 5-year) follow-up visits, but it should be attributed to the apical shift of the mucogingival line toward its original location. This assumption is validated by the results of the present study which demonstrated that the overall increase in keratinized tissue observed in the 5-year observation period was correlated negatively with the baseline amount of keratinized tissue and positively with recession depth. In other words, the increase in keratinized tissue was greater when, before surgery, there was a greater recession depth and narrower residual band of attached gingiva apical to the defects: these were the clinical situations in which a greater coronal displacement of the mucogingival line was performed during the surgery. Clinical examples of the results achieved 1 and 5 years after the surgery are shown in Figures 1 and 2. The results of the present study have shown that the mucogingival junction, displaced coronally during the surgery, continued its apical shift toward its original (presurgical) position for at least 5 years. This seems to confirm the hypothesis that the location of the mucogingival line is genetically determined.[22] The long-term increase in keratinized tissue height was already reported by Pini Prato et al.[21] for

Figure 1.
A) *Gingival recessions affecting the lateral incisor, canine, and first premolar. Note the small amount of keratinized tissue remaining apical to the canine.* ***B)*** *One-year outcome. Complete root coverage was achieved in all teeth.* ***C)*** *Five-year outcome. Complete root coverage was maintained in all teeth. Note that the increase in keratinized tissue height was greater in the tooth (canine) with the greatest recession depth and lowest amount of keratinized tissue at baseline.*

Figure 2.
A) *Gingival recessions affecting central and lateral incisors, canine, and both premolars.* ***B)*** *One-year outcome. Complete root coverage was achieved in all teeth. Note the increase in keratinized tissue height: this was particularly apparent at the central incisor and the canine, the two teeth with the deepest recession depth at baseline.* ***C)*** *Five-year outcome. Complete root coverage was maintained in all teeth. A further increase in keratinized tissue height was observed in all treated teeth when comparing the 1- and 5-year clinical images.*

GTR-treated gingival recession. Also, in this study, the 18-month growth in keratinized tissue height (0.56 mm) was followed by a further increase (1.28 mm) that occurred in the following 2.5 years. The similarity in the amount and trend of keratinized tissue changes obtained after a coronally advanced flap with and without the use of a barrier membrane seems to validate the importance of the mucogingival junction tendency to regain its genetically defined position rather than attributing a significant role to the granulation tissue deriving from the periodontal ligament tissue and migrating below the membrane to increase the dimension of the gingiva.[21]

The results of the present study showed an increase in the average recession depth between the 1- and 5-year follow-up visits. This increase, although not statistically significant, may be of clinical relevance especially when treating patients with esthetic requests. Very often, the most coronal millimeter(s) of the root exposure is the only visible part of the recession when patients smile. Therefore, the presence and/or the recurrence after surgery of even a shallow (1 mm) recession may be an esthetic problem for patients. For this reason, the present study was designed using a very strict criteria to define a treated site as unstable, i.e., a recession increase ≥1 mm between 1 and 5 years. The instability of the soft tissue margin was observed in eight out of the 73 (11%) treated defects: these unstable sites belonged to five patients (unstable patients). To evaluate the impact of patient characteristics on the stability of the root coverage outcomes, subjects who were enrolled in the study were evaluated according to the following: 1) smoking habit, 2) compliance with the supporting recall program, and 3) susceptibility to gingival recession in other areas of the mouth. A patient's long-term soft tissue margin stability was significantly influenced by regular participation in the recall program and the susceptibility to gingival recession in other areas of the mouth, whereas it was not significantly influenced by a patient's smoking habit. This might be due to the low number of smoking patients in the present study, which did not allow for the difference to reach the statistical power. The most interesting data was that all unstable patients were susceptible to gingival recession in other areas of the mouth, whereas three susceptible patients did not show a recurrence of gingival recession in the surgically treated teeth. It may be that the instability of the soft tissue margin observed in the treated sites was not related to the adopted surgical procedure but to the subject's individual tendency to develop gingival recession. Also, participation in the recall program was demonstrated to be of importance in maintaining stable root

coverage outcomes. Four out of the five patients with recurrence of gingival recession did not attend the proposed recall program. Because all patients enrolled in the present study performed an optimal plaque control, regardless of their involvement in the recall system, with no difference between recall and non-recall patients in terms of plaque and bleeding scores, it can be argued that the reinforced instruction of the correct (non-ntraumatic) toothbrushing technique was critical for the long-term success of the root coverage surgical procedure. The importance of the patient's toothbrushing technique for the long-term maintenance of the clinical outcomes achieved by a root coverage surgical procedure was previously demonstrated.[23] In this study, no major difference was observed with respect to the long-term stability (2 years) of the surgically established position of the gingival margin between sites subjected to an increase of the tissue thickness through the use of a free connective tissue graft and sites treated only with a coronally advanced flap. This data 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 (width and thickness).[23]

Some conclusions can be drawn from this investigation: 1) the coronally advanced flap technique for the treatment of multiple gingival recessions was effective in terms of root coverage and increase in keratinized tissue height, and these successful results were well maintained over the 4-year observation period; 2) the increase in keratinized tissue height that followed the coronally advanced flap procedure may be attributed to the tendency of the mucogingival line to regain its genetically determined position; and 3) negative patient characteristics such as a lack of compliance with a supportive care program and individual susceptibility to gingival recession were significantly associated with the recurrence in gingival recession.

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