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Coronally advanced flap: a modified surgical approach for isolated recession-type defects

Three-year results

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Abstract

Background: Various modifications of the coronally displaced flap have been proposed in the literature with the attempt of treating gingival recession with uneven predictable results. The goal of the present study was to evaluate the effectiveness with respect to root coverage of a modification of the coronally advanced flap procedure for the treatment of isolated recession-type defects in the upper jaw.

Methods: Forty isolated gingival recessions with at least 1 mm of keratinized tissue apical to the defects were treated with a modified approach to the coronally advanced flap. The main change in the surgical procedure consisted in the modification of flap thickness and dimension of surgical papillae during flap elevation. All recessions fall into Miller class I or II. The clinical re-evaluation was performed 1 year and 3 years after the surgery.

Results: At the 1-year examination, the average root coverage was 3.72 ± 1.0 mm (98.6% of the pre-operative recession depth) and 3.64 ± 1.1 mm (96.7%) at 3 years. The gain in probing attachment amounted to 3.65 ± 1.10 mm at 1 year and to 3.70 ± 1.09 mm at 3 years. The average increase of keratinized tissue between the baseline and the 3-year follow-up amounted to 1.78 ± 0.90 mm. All changes of keratinized tissue (difference between baseline and 1 year, baseline and 3 years, and between 1 and 3 years) were statistically significant.

Conclusion: The modified coronally advanced surgical technique is effective in the treatment of isolated gingival recession in the upper jaw.

Key words: aesthetics; gingival recession; root coverage; surgery

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It has been assessed that gingival recession can be successfully treated irrespective of the technique utilized, provided that the biologic conditions for accomplishing root coverage are satisfied: no loss of inter-dental soft and hard tissue height (Miller 1985).

Conflict of interest and source of funding statement

The authors declare that they have no conflict of interest.

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The selection of the surgical technique in an attempt to cover a root recession depends mainly on the local anatomical characteristics and on the patient's demands. Local characteristics to be evaluated are as follows: the dimensions (depth and width) of root exposure, the height and width of the inter-dental soft tissue, the number of recession defects on neighbouring teeth, the presence of root caries or cervical abrasions. Also, the height, thickness and colour of the keratinized tissues apical and lateral to the root exposure and of the inter-dental papillae neighbouring the recession must be considered. Other soft-tissue characteristics to be evaluated in the selection of the surgical procedure are the depth of the vestibulum and the presence of marginal frenuli or muscle insertions (de Sanctis & Zucchelli 1996).

In patients with a residual amount of keratinized tissue apical to the recession defect, the coronal advanced flap may be recommended. Optimum root coverage results, good colour blending of the treated area with respect to adjacent soft tissues and complete recovery of the original (pre-surgical) soft tissue marginal morphology can be predictably accom-

plished by means of this surgical approach (Roccuzzo et al. 2002). Furthermore, the post-operative course is less troublesome for the patient as other surgical sites distant from the tooth with recession defect are not involved.

Recently, the coronally advanced flap has been demonstrated to be very effective in the treatment of multiple recession defects affecting adjacent teeth with obvious advantages for the patient in terms of aesthetics and morbidity (Zucchelli & de Sanctis 2000).

The coronal advanced flap was first introduced by Norberg (1926) as an aesthetic surgical procedure for root coverage. In a 1958 study, Patur and Glickman reported that the coronal advancement of a pedicle flap was not an effective means of covering exposed root. Hall, in the 1989 Proceeding of the World Workshop in Clinical Periodontology, stated that: ''these techniques never have achieved general acceptance and fail on a predictable basis; nevertheless, the goal of such a procedure elusive as it has been, remains the dream of periodontists''. The coronally advanced flap as a root coverage surgical technique has been evaluated more recently by other authors with uncertain results or limited data (Tenenbaum et al. 1980, Allen & Miller 1989, Wennstrom & Zucchelli 1996). Surgical recommendation (Allen & Miller 1989) was to utilize such a technique only in the presence of Miller's class I root recession defect and in the presence of residual keratinized tissue with the same height of the depth of the recession. This approach was thus limited to shallow recession depth, i.e. equal to or less than 3 mm.

The technique as described by Allen & Miller (1989) consisted of two oblique incisions, starting from the mesial and distal line angle of the affected tooth and directed apically in the alveolar mucosa; the flap was then elevated with a split-thickness approach to protect the underlying bone. Following root debridement, the flap was then coronally advanced and secured with interrupted sutures.

Zucchelli & de Sanctis (2000) have recently introduced a modification of this procedure to treat multiple recession defects. A split–full–split approach was used to elevate the flap; this permitted to maintain the maximum soft tissue thickness above the root exposure. Coronal mobilization of the flap was achieved by means of a superficial incision eliminating lip muscle insertion residing in the thickness of the flap. The results reported from this study indicated that 64 of the 73 defects treated for recession showed complete coverage (88%); on average, 97% of previously exposed root surface was covered with soft tissue.

The aim of the present study was to evaluate the efficacy of a modified approach of the coronally advanced flap for treating single-type recession defects.

Material and Methods

Subject and site selection

Forty young subjects (age range 20–38 years), systemically and periodontally healthy with isolated recession-type defects in the upper jaw, were enrolled in the study. The participants were selected on a consecutive basis among patients consulting two private practices: one located in Florence and the other in Bologna. A screening examination revealed that all subjects showed an unremarkable medical history and none had loss of periodontal support at other tooth surfaces than those showing recession defects.

In order to be included in the study, patients should have at least one recession defect with the following characteristics: (1) isolated defect (no recessions in the neighbouring teeth), (2) class I or II according to the definitions given by Miller (no loss of inter-dental soft and hard tissue height), and (3) recession depth (RD) equal to or greater than 2 mm.

Following the screening examination, all subjects received a session of prophylaxis including instruction in proper oral hygiene measures, scaling and professional tooth cleaning with the use of a rubber cup and a low abrasive polishing paste. At teeth with recession-type defects, a coronally directed roll technique was prescribed, in order to minimize the tooth-brushing trauma to the gingival margin. Surgical treatment of the recession defects was not scheduled until the patient could demonstrate an adequate standard of supra-gingival plaque control.

Clinical characterization of patients and selected sites

Full-mouth plaque score (FMPS) and local plaque score was recorded as the percentage of total surfaces (four sides per tooth) that revealed the presence of plaque (O'Leary et al. 1972). Bleeding on probing was assessed dichotomously at a force of 0.3 N with a manual pressure-sensitive probe. Full-mouth bleeding score (FMBS) and local bleeding score was recorded as the percentage of total surfaces (four sides per tooth), that revealed the presence of bleeding upon probing.

The following clinical measurements were taken 1 week before the surgery and at the 1- and 3-year follow-up visits at all treated teeth:

- Recession depth, measured from the cemento-enamel junction (CEJ) to the most apical extension of the gingival margin.
- Probing pocket depth (PPD), measured from the gingival margin to the bottom of the gingival sulcus.
- Clinical attachment level (CAL), measured from the CEJ to the bottom of the gingival sulcus.
- Keratinized tissue height (KTH) measured from the most apical extension of gingival margin to the mucogingival line.

Surgeries and measurement were performed for all the locations by the same two operators.

The same single investigator performed the clinical measurements at baseline, at 1 year and at 3 years. He did not perform the surgery and was unaware of the goals of the study. All measurements were performed by means of a manual probe and were rounded up to the nearest millimetre.

Surgical technique

The design of the flap consisted of the following incisions:

- Two horizontal bevelled incisions (3 mm in length), mesial and distal to the recession defect located at a distance from the tip of the anatomical papillae equal to the depth of the recession plus 1 mm.
- Two bevelled oblique, slightly divergent, incisions starting at the end of the two horizontal incisions and extending to the alveolar mucosa.

The resulting trapezoidal-shaped flap was elevated with a split–full–split approach in the coronal–apical direction: the surgical papillae comprised between the horizontal incisions and the probeable sulcular area apical to the root exposure were elevated split thickness keeping the blade almost

parallel to the root, and the soft tissue apical to the root exposure was elevated full thickness inserting a small periostium elevator in to the probeable sulcus and proceeding in the apical direction up to exposing 3–4 mm of bone apical to the bone dehiscence. This was done in order to include the periostium in the thickness of that central portion of the flap covering the avascular root exposure. The releasing vertical incisions were elevated split thickness keeping the blade parallel to the bone plane, thus leaving the periostium to protect the underlying bone in the lateral areas of the flap. Apical to bone exposure flap elevation continued split thickness and finished when it was possible to move the flap passively in the coronal direction. In order to permit the coronal advancement of the flap, all muscle insertions present in the thickness of the flap were eliminated. This was done keeping the blade parallel to the external mucosal surface. Coronal mobilization of the flap was considered ''adequate'' when the marginal portion of the flap was able to passively reach a level coronal to the CEJ of the tooth with the recession defect. In fact, the flap should be stable in its final coronal position even without the sutures.

The root surface was mechanically treated with the use of curettes. It must be considered that only the portion of the root exposure with loss of clinical attachment (gingival recession+probeable gingival sulcus/pocket) was instrumented. Exposed root surfaces belonging to the area of anatomic bone dehiscence were not instrumented not to damage connective tissue fibres still inserted in to the root cementum.

The facial soft tissue of the anatomic inter-dental papillae coronal to the horizontal incisions was disepithelized to create connective tissue beds to which the surgical papillae of the coronally advanced flap were sutured.

By moving the flap coronally to reach the tip of the disepitelized anatomical papillae, the vestibular soft tissue was positioned 1 mm coronal to the CEJ to account for soft tissue shrinkage. The location of gingival margin after suturing has been demonstrated to be positively correlated to recession reduction (Pini Prato et al. 2005)

The suture of the flap started with two interrupted periosteal sutures performed at the most apical extension of the vertical releasing incisions; then, it proceeded coronally with other interrupted sutures, each of them directed, from the flap to the adjacent buccal soft tissue, in the apical–coronal direction. This was done to facilitate the coronal displacement of the flap and to reduce the tension on the last coronal sling suture. The sling suture permitted to stabilize the surgical papillae over the inter-dental connective tissue bed and allowed for a precise adaptation of the flap margin over the underlying convexity of the crown (Fig. 1). In fact, in all treated cases, at the end of the surgery, the flap resided coronal to the cemento-enamel junction.

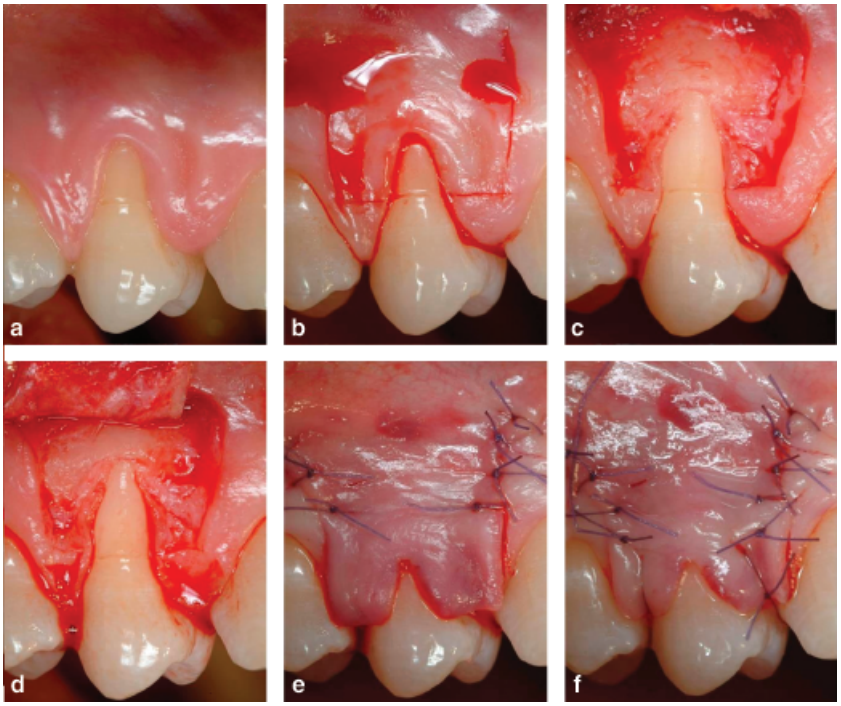

Fig. 1. (a) Upper right first pre-molar, pre-surgical. (b) Flap design; two horizontal bevelled incisions, mesial and distal to the recession defect, two bevelled oblique incisions coming from the two horizontal, extending to the alveolar mucosa are executed. (c) The flap is raised with a split–full–split thickness approach. (d) The anatomical papillae are disepithelized. (e) The flap is coronally advanced and the vertical incisions are sutured. (f) The surgical papillae are secured to the underlying bed with a suspended suture.

Post-surgical infection control

Patients were instructed not to brush the teeth in the treated area but to rinse with chlorhexidine solution (0.12%) twice daily for 1 min.

Fourteen days after the surgical treatment, the sutures were removed. Plaque control in the surgically treated area was maintained by chlorhexidine rinsing for an additional 2 weeks. After this period, the patients were again instructed in mechanical tooth cleaning of the treated tooth region using a soft toothbrush and a roll technique. All patients were recalled for prophylaxis 1, 3 and 5 weeks after suture removal and, subsequently, once every 3 months until the 1-year examination. In the period comprised between the 1- and the 3-year examinations, patients undertook hygienic recall visits every 6 months.

Data analysis

Statistical analysis was performed using a statistical application software (Statgraphics 5 plus; Manugistic Inc., Rockville, MD, USA).

Two statistical analyses including multivariate methods were performed:

- After fitting a general linear model, a multiple regression ANOVA for repeated measures was used to evaluate any time-dependent difference (baseline, 1- and 3-year) regarding FMPS, FMBS, recession of the gingival margin (REC), PPD, CAL and KTH. 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 3-year KTH to two categorical (smoke, and number of sites/patient) and two continuous (baseline REC and KTH) factors as covariates (ANCOVA).

Results

Following the initially provided oral hygiene phase as well as at the post-treatment examinations, all subjects showed low frequencies of plaque harbouring tooth surfaces (<20%) and bleeding gingival units (<15%), indicating an acceptable standard of supragingival plaque control during the study period. Eight patients were identified as smokers (smoking more than 10 cigarettes/day); all other patients did not smoke.

Forty isolated recession-type defects (in 40 patients) were treated with the coronally advanced surgical technique. All gingival recessions were located in the upper jaw. The tooth population consisted of incisors (6), cuspids (24) and pre-molars (10).

Clinical measurements

Table 1 gives the baseline, the 1-year and 3-year mean data for the various clinical parameters assessed.

At baseline, the average depth of the recession defects was 3.82 ± 1.2 mm, with a mean clinical attachment loss amounting to 4.96 ± 1.3 mm. The depth of the recessions ranged from 2 to 6 mm. The height of the gingival keratinized tissue apical to the recession was on the average 1.34 ± 0.6 mm. Fourty-eight percent of the recession sites had 1 mm or less of KTH.

One year and 3 years following the root coverage procedure, the mean recession depth was 0.10 ± 0.3 and 0.18 ± 0.6 mm, respectively. Hence, the average root coverage was 3.72 ± 1.0 mm (98.6% of the pre-operative recession) at 1 year and 3.64 ± 1.1 mm (96.7%) at 3 years. The results of the multiple regression ANOVA for repeated measures show a significant ($F = 56.45$; $p < 0.01$) relationship in the time-dependent variations of REC depth; in particular, both REC reductions (difference between baseline REC and 1-year REC and between baseline REC and 3-year REC) were statistically significant, while the increase in gingival recession that occurred between the 1- and the 3-year follow-up visits (0.08 ± 0.53 mm) was not statistically significant.

Additional information regarding the long-term effectiveness of the surgical technique used for soft tissue root coverage comes from the following data: on the average, 96.7% of the root surface initially exposed due to recession was still covered with soft tissue at the 3-year examination. At this time point, 34 of the 40 treated recession defects (85%) showed complete coverage. None of the treated sites showed greater remaining recession depth than 1.0 mm.

PPD remained almost unchanged (mean value ~ 1 mm) in the three (baseline, 1 and 3 years) observation periods. The results of multiple regression ANOVA for repeated measures show no significant ($F = 2.45$) relationship in the time-dependent variations of PPD.

The gain in probing attachment amounted to 3.65 ± 1.1 mm at 1 year and to 3.60 ± 1.2 mm at 3 years. The results of the multiple regression ANOVA for repeated measures show a significant ($F = 30.70$; $p < 0.01$) relationship in the time-dependent variations of CAL; in particular, a significant difference was found between the 1- and 3-year values compared with the baseline value; while the loss of clinical attachment occurred during the 3-year observation period (0.05 ± 0.6 mm) was not statistically significant.

Table 1. Results of the multiple regression ANOVA for repeated measures relating to oral hygiene and clinical parameters (MV ± SD in mm)

	Baseline	1 year	3 years
FMPS	10.45 ± 2.1 (a)	10.28 ± 2.3 (a)	10.12 ± 1.8 (a)
FMBS	12.70 ± 2.2 (a)	10.48 ± 2.3 (a)	12.18 ± 1.8 (a)
REC	3.82 ± 1.2 (a)	0.10 ± 0.3 (b)	0.18 ± 0.6 (b)
PPD	1.14 ± 0.3 (a)	1.21 ± 0.2 (a)	1.18 ± 0.3 (a)
CAL	4.96 ± 1.3 (a)	1.31 ± 0.5 (b)	1.36 ± 0.6 (b)
KTH	1.34 ± 0.6 (a)	2.04 ± 0.8 (b)	3.12 ± 0.9 (c)

Different letters indicate a statistically significant difference between groups for each parameter.
FMPS, full-mouth plaque score; FMBS, full-mouth bleeding score; REC, recession of the gingival margin; PPD, probing pocket depth; CAL, clinical attachment level, KTH, keartinized tissue height.

Compared with the conditions before surgical treatment, the KTH showed an increase of 0.70 ± 0.8 mm at 1 year and a further increment of 1.08 ± 0.9 mm during the 2-year observation period and amounted to (on average) 3.12 ± 0.5 mm at 3-year post-treatment. The average increase of keratinized tissue between the baseline and the 3-year follow-up amounted to 1.78 ± 0.9 mm. The results of the multiple regression ANOVA for repeated measures show a significant ($F = 11.79$; $p < 0.01$) relationship in the time-dependent variations of KTH. All changes of keratinized tissue (difference between baseline and 1 year, baseline and 3 years and between 1 and 3 years) were statistically significant.

The results from the ANCOVA show that the difference between the baseline and 3-year KTH was significantly affected by KTH ($F = 137.01$; $p < 0.01$) and REC ($F = 3.71$; $p < 0.05$) at baseline: in particular, the 3-year increase in the amount of keratinized tissue was greater in sites with greater recession depth and lower amount of keratinized tissue at baseline.

The limited number of subjects smokers was not sufficient to perform any analysis on this variable.

Discussion

Treatment of gingival recession is becoming an important issue in clinical periodontology due to the increasing demand for cosmetic treatment. Problems relate particularly to the fact that very often, the patient exposes only the most coronal millimitres of the recession when smiling. Thus, only surgical procedures that provide the clinician with a very high percent of complete root coverage should be included in the mucogingival plastic surgical techniques. Moreover, excessive thickness or poor colour blending of the surgically treated areas, as those resulting from soft tissue graft, should be avoided.

The only limiting criteria in utilizing a coronally advanced flap is the need of a band of at least 1 mm of keratinized tissue; Wennstrom & Zucchelli (1996) have stated that the amount of root coverage utilizing coronally advanced flap with or without the presence of a connective tissue graft will not show any significante difference at the 2-year interval. More recently, the results from a systematic review on periodontal plastic surgery (Roccuzzo et al. 2002) stated that the use of a barrier membrane or

connective tissue, together with a coronally advanced flap, do not give better results than coronally advanced flap alone when root coverage is considered.

Moreover, patient-related aesthetic considerations would suggest the utilization of surgical techniques that can predictably obtain complete root coverage by using the soft tissue adjacent to the defect (de Sanctis & Zucchelli 1996).

The results of the present case-series study indicate that the modified coronally advanced surgical approach was highly effective in obtaining root coverage of isolated type of gingival recession defects and that this successful outcome was well maintained for a 3-year observation period (Fig. 2). This technique, in fact, resulted, at 1 year, in a very high mean percentage of root coverage (98.6%) and complete soft tissue root coverage (up to the CEJ) was obtained in the great majority (88%) of treated cases. No statistically and clinically significant changes in root coverage outcomes were demonstrated at the 3-year re-evaluation visit. At this time point, 96.7% of the root surface initially exposed due to gingival recession was still covered with soft tissue and 85% of the treated recession defects showed complete coverage. The successful results in terms of root coverage achieved in the present study were associated with a clinically significant average increase in KTH with no change in PPD; thus, the gain in clinical attachment was well maintained during the observation period.

This rate of long-term successful outcomes of the treatment was similar (Wennstrom & Zucchelli 1996, Zucchelli et al. 2004, Del Pizzo et al. 2005, Zucchelli & de Sanctis 2005) or even higher (Caffesse & Guinard 1980, Pini Prato et al. 1996, Al-Hamdan et al. 2003, Trombelli et al. 2005) than that previously reported in the literature for other root coverage procedures.

Some clinical and biological advantages of the technique adopted in the present study might be related to the split–full–split flap elevation as already suggested by Zucchelli & de Sanctis (2000): the split-thickness elevation at the level of the surgical papilla guarantees anchorage and blood supply in the inter-proximal areas mesial and distal to the root exposure; the full-thickness portion, by including the periostium, confers more thickness, and thus better opportunity to achieve root coverage, to that portion of the flap residing over the previously exposed avascular root surface; the more apical split-thickness flap elevation facilitates the coronal displacement of the flap. Although the technique comprises vertical releasing incisions, these did not result in unaesthetic scars. These incisions, in fact, were bevelled in such a way that the bone and periosteal tissues were not included in the superficial cut and thus did not participate to the healing process. On the contrary, the surgical papillae, outlined by the horizontal 3 mm incisions and by the vertical bevelled incision, were very wide and thus provided a larger area for anchoring the flap to the underlying vascular bed and more tissue to place the coronal sling suture. Furthermore, the partial thickness of the surgical papillae facilitated the nutritional exchanges between them and the underlying disepitelized anatomical papillae and improved the blending (in terms of colour and thickness) of the surgically treated area with respect to adjacent soft tissues.

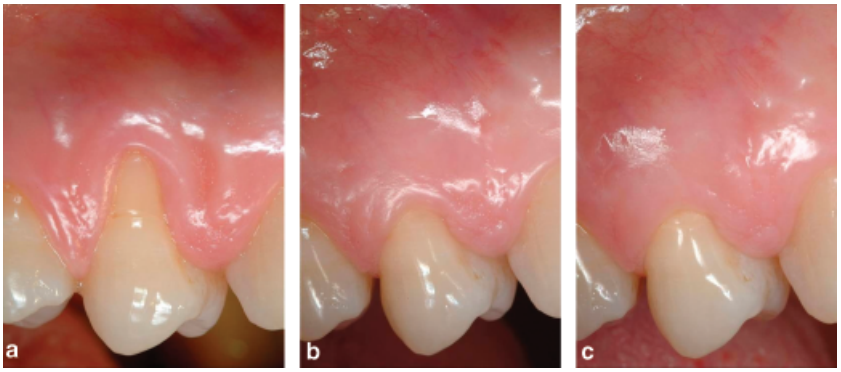

Fig. 2. (a) Upper right first pre-molar, pre-surgical. (b) Root coverage 1 year following surgery. (c) Clinical results 3 years after surgery: note the increase in keratinized tissue.

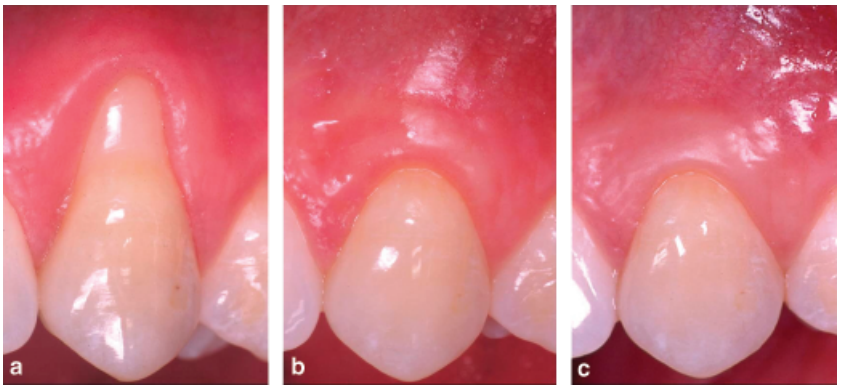

Fig. 3. (a) Upper left cuspid, pre-surgical: note the minimum amount of keratinized tissue. (b) Root coverage 1 year following surgery. (c) Clinical results 3 years after surgery: a dramatic increment in keratinized tissue is evident.

Another important modification of the present surgical technique, with respect to the previously proposed ones (Patur & Glickman 1958, Allen & Miller 1989, Wennstrom & Zucchelli 1996), was that the coronal advancement of the flap was not obtained by means of periosteal incisions but through the elimination of muscle insertions included in the thickness of the flap. This permitted to eliminate lip tension on the flap, and to displace passively the soft tissue flap in the coronal position. The flap, in fact, was stable in a position coronal to the CEJ even without sutures, because of the absence of muscle pull.

The absence of a wide band of keratinized tissue apical to the recession defect was considered to be a limitation for the coronally advanced technique. On the contrary, the present study demonstrated an inverse relationship between the apico–coronal dimension of gingival tissue apical to the root exposure and the increase of keratinized tissue achieved with the surgery. Three years after the surgery, in fact, the

increase of keratinized tissue was greater in sites with greater recession depth and lower amount of keratinized tissue at baseline (Fig. 3). Very similar results were obtained in a previous study evaluating the 5-year outcomes of the coronally positioned flap for multiple gingival recession (Zucchelli & de Sanctis 2005).

Some hypothesis can be made in an attempt to explain the 1- and 3-year increase of keratinized tissue after coronally advanced flap: the tendency of the mucogingival line, coronally displaced by means of surgery, to regain its original, ''genetically determined'' position (Ainamo et al. 1992), or the capability of the connective tissue, deriving from the periodontal ligament, to participate in the healing processes taking place at the dento-gingival interface (Karring et al. 1971, Lundberg & Wennstrom 1988, Pasquinelli 1995).

The long-term increase in KTH was also reported by Pini Prato et al. (1996) for GTR-treated gingival recession. Also, in this study, the 18-month growth in KTH was followed by a further increase that occurred in the following two and half 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 tendency of the mucogingival junction to regain its genetically defined position rather then to attribute a significant role to the granulation tissue deriving from the periodontal ligament tissue to increase the dimension of the gingiva.

Regardless of the biologic principle capable of explaining the increase of keratinized tissue after coronally advanced flap, the present data indicate that a residual wide band of attached gingival apical to the root exposure is not required to perform successfully the coronally advanced flap as a root coverage surgical technique. On the contrary, once the stability of the soft tissue margin has been obtained at the level of the CEJ, the keratinized tissue is able to increase with time. However, a presurgical minimal amount of keratinized tissue is advocated to provide marginal stability for the surgical flap.

In conclusion, the results of the present study demonstrated that the modified approach of the coronally advanced flap technique was effective in treating isolated-type gingival recessions in the upper jaw. Successful results were achieved at 1 year, both in terms of aesthetics (root coverage and colour blending with adjacent soft tissues) and increase of keratinized tissue, and were well maintained or even improved (in terms of height of attached gingiva) during the subsequent 2-year observation period.

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Clinical Relevance

Scientific rationale for the study: It has been shown that a split–full–split approach in coronally advanced flap is a reliable surgical modality to obtain coverage of multiple recessions and to increase the amount of keratinized tissue. It is conceivable that similar results could be obtained with a single tooth approach. Also, long-term results of coronal advanced flap are lacking in the literature. This study reports the long-term clinical results following a modification of the coronally advanced flap on single tooth recession type defects utilizing a split–full–split surgical technique.

Principal findings: The average root coverage with the modified coronally advanced flap was 98.6% of the pre-operative recession at 1 year and 96.7% at 3 years. All changes of keratinized tissue (difference between baseline and 1 year, baseline and 3 years and between 1 and 3 years) were statistically significant. At 3 years, the increase in the amount of keratinized tissue was greater in sites with greater recession depth and lower amount of keratinized tissue at baseline.

Practical implications: This study supports the effectiveness of a new surgical approach in the coronal displacement of marginal tissue for root coverage. The described technique is highly effective in obtaining root coverage and maintaining the results over a 3-year time period. Also, during the time of observation, it was possible to evidence an increase in keratinized tissue that was inversely related to the pre-surgical amount. This finding tends to support the fact that the absence of a wide band of keratinized tissue apical to the recession defect is not a limiting factor in obtaining root coverage.