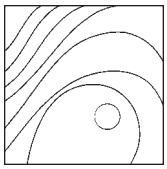
Efficacy of the Lateral Advanced Flap in Root-coverage Procedures for Mandibular Central Incisors: A 5-Year Clinical Study



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The aim of this study was to determine the efficacy of the lateral advanced flap in root-coverage procedures for mandibular incisors and to evaluate pain after treatment. A total of 15 patients who required treatment for gingival recessions were selected from the University of Genoa Laser and Restorative Dentistry Department. The inclusion criteria were the presence of at least one 3-mm gingival recession defect of a mandibular incisor and 3 mm or more of keratinized tissue width on the immediately adjacent tooth. One calibrated masked examiner performed the clinical measurements, including recession depth and width, probing depth, clinical attachment level, and keratinized tissue width. Patients were checked 7, 14, and 30 days after surgery and were included in supportive periodontal maintenance every 4 months. Further follow-ups were done at the first, third, and fifth year postsurgery when the same baseline assessment parameters were recorded according to the root-coverage esthetic score (RES). Numeric score recorded pain evaluations showed a mean of 3 at the day of the surgery, 2 in the first day after the surgery, and no significant scores were referred in the following days. Mean recession depth was 3.2 ± 1.3 mm at baseline; at 5 years, RES showed a positive increase of all scores. The laterally coronally advanced surgical technique was very effective in treating isolated gingival recessions. It combined the esthetic and root-coverage advantages of the coronally advanced flap with the increased gingival thickness and keratinized tissue associated with the lateral gingival flap.
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Gingival recession is defined as an apical shift of the gingival margin with respect to the cementoenamel junction (CEJ), which results in exposure of the root surface to the oral cavity.[1]

Miller[2] divided the recessions into four classes based on clinical data according to the prognosis of defect coverage. In Class I and II recession defects, there is no loss of interproximal periodontal attachment and complete root coverage can be achieved.

Root-coverage techniques are part of periodontal plastic surgery, and their principal indications are as follows: esthetic demand, dentin hypersensitivity, treatment of shallow root caries, cervical abrasion, and change of marginal soft tissue outline to facilitate plaque control.[3]

Many publications document the successful treatment of gingival recession and inadequate attached gingiva with various mucogingival surgical approaches, including coronally advanced lateral pedicle flaps (LPFs), free gingival grafts, and connective tissue grafts.

The LPF was presented in its original form by Grupe and Warren.[4]

It is necessary to have sufficiently wide and thick gingiva on the adjacent tooth and gingival recession with narrow mesiodistal dimensions.

The aim of this study was to determine the efficacy of the lateral advanced flap for the root coverage of the mandibular incisor as an alternative clinical choice, and, in addition to evaluating the long-term results, to assess the short-term pain experience with numeric score recorded (NSR) classification.

Method and materials

A total of 15 patients who signed a written consent form and required the treatment of gingival recessions were consecutively enrolled from the University of Genoa, Laser and Restorative Dentistry Department.

Case selection

The inclusion criteria were the presence of one or more 3-mm gingival recession defect(s) in the mandibular incisor area and 3 mm or more of keratinized tissue width on the immediately adjacent tooth. Gingival recession was measured as the distance between the CEJ (or other reference point in the middle of the buccal aspect of the crown) and the gingival margin. The assessment was made by a third blinded calibrated examiner using a Williams Periodontal probe (UNC-15, Hu-Friedy). Only teeth with Miller Class I and II recessions and no caries or restorations on the labial aspect were included.

The exclusion criteria were as follows: smoking habits, compromised systemic health, contraindications for periodontal surgery, clinical signs of active periodontal disease, periodontal surgical treatment during the previous 24 months on the involved sites, Full-Mouth Plaque Score > 20% and Full-Mouth Bleeding Score > 20% at the presurgical evaluation (on 6 sites per tooth), presence of plaque and bleeding on probing at the selected site, presence of malposition at the selected sites, and a recent history of orthodontic treatment.

After the inclusion criteria were met, a general baseline screening was performed for each participant, including a registry folder, a periodontal probing of the total dentition to exclude patients with a diagnosis of periodontitis, a full-mouth periapical radiograph, instruction of oral hygiene (roll brushing technique with soft or medium toothbrush) to eliminate the poor habits related to the etiology of the recession, and supragingival scaling and polishing.

Clinical measurements

A presurgical reevaluation of clinical photographs of the selected area and complete periodontal charting were done.

The following parameters were recorded on the midbuccal aspect of the involved teeth:

- Recession depth (REC), measured as the distance from the gingival margin to the CEJ or other reference point in the middle of the buccal aspect of the crown
- Recession width, measured as the mesiodistal distance of gingival margins just below or at the CEJ level
- Probing depth (PD), assessed as the distance from the gingival margin to the apical end of the gingival sulcus
- Clinical attachment level (CAL), calculated as PD + REC
- Keratinized tissue width (KTW), measured as the distance from the most apical point of the gingival margin to the mucogingival junction
- Stillmann cleft (yes or no) and the vertical extension

Surgical technique

All of the patients were instructed to take amoxicillin and clavulanic acid, 2 g, 1 hour before the surgery (in case of allergy, patients were prescribed claritromicine 500 mg).

Local anesthesia with articaine 1:100,000 epinephrine was administered. A 45-degree bevel incision was created with a 15C Martin blade mesially or distally to the donor tooth and extended for 3 mm in a mesial or distal direction.[5] Then, the incision to design the flap was continued to the donor tooth, reproducing the same shape of the gingival contour of the adjacent teeth, precisely according to the width of the CEJ and extended again for 3 mm. From the mesial and distal angle of the donor site, two vertical parallel incisions were created with partial thickness elevation (Fig 1).

Fig 1 *From the mesial and distal angle of the donor site, two vertical parallel incisions were created with partial-thickness elevation.*

Fig 2 (left) *Another parallel incision on the mesial side of the tooth with the recession was made to deepithelize the gingiva before sliding the flap.*

Fig 3 (right) *Simple 5-0 sutures were used to complete the surgery.*

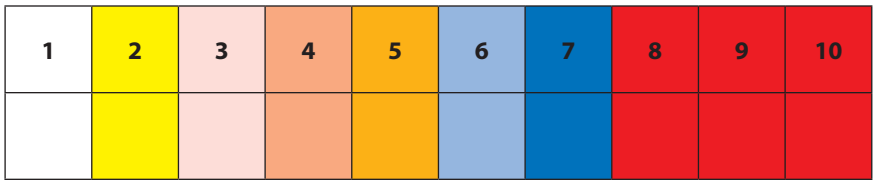

Fig 4 *Numeric score recorded chart for patients: 1 = absence of pain and 10 = strong pain.*

To finalize the recipient area, another parallel incision on the mesial side of the tooth with the recession was conducted to deepithelize the gingiva before sliding the flap (Fig 2).

The exposed root was root planed and the root surface treated with ethylenediaminetetraacetic acid (EDTA) 24% (PrefGel, Straumann) for 2 minutes then washed with saline solution for another 2 minutes.

Simple 5-0 sutures were used to complete the surgery (Vicryl Rapid, Ethicon), and an apical mattress suture was applied, if needed. No periodontal dressing was used (Fig 3).

The patients were instructed to avoid brushing the area for 1 month, continue the antibiotic therapy for the following 5 days, and take a pain reliever only if needed, tracking the type of medicine and the time of consumption.

All of the patients were provided with an NSR to be filled out within the first 3 days after surgery (day of surgery was considered day 1; Fig 4).

Patients were checked 7, 14, and 30 days postsurgery and were included in supportive periodontal maintenance every 4 months. Further follow-ups were done at the first, third, and fifth year postsurgery when the same parameters of the baseline assessment were recorded. The root-coverage esthetic score (RES) system is a reliable method for assessing the esthetic outcomes of root-coverage procedures[6] (Fig 5).

A periodontist, who did not perform the surgeries, evaluated the following five variables of the RES system after the surgery[7]:

1. Gingival margin level (GM):
   0 = failure of root coverage (gingival margin apical or equal to the baseline recession);

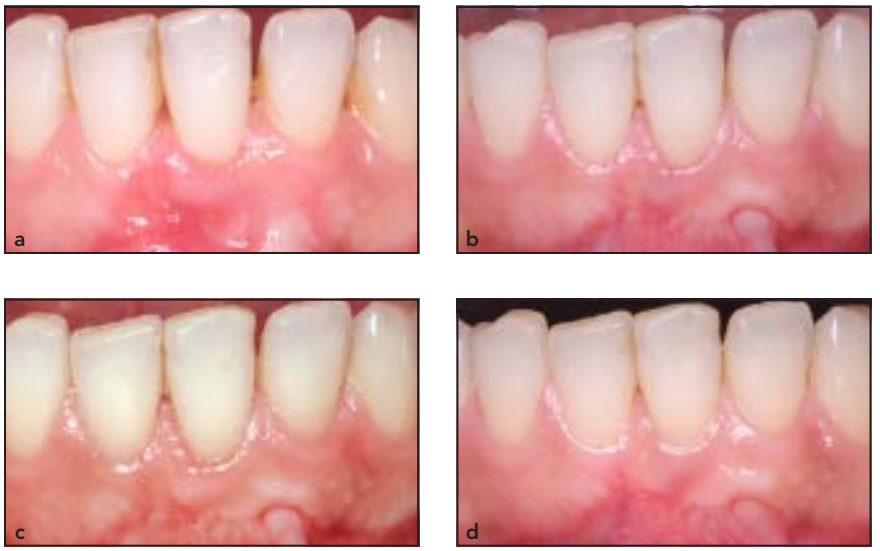

Fig 5 *Root-coverage surgery results after* (a) *6 months,* (b) *1 year,* (c) *3 years, and* (d) *5 years.*

Table 1 **Baseline (T0) assessments (mm), repeated at 6 months (T1), 1 year (T2), 3 years (T3), and 5 years (T4) (mean ± SD)**

	T0	T1	T2	T3	T4
Rec depth	3.2 ± 0.3	0	0	0.5 ± 0.2	0.5 ± 0.3
Rec width	2.1 ± 0.2	0	0	0.3 ± 0.2	0.4 ± 0.3
PD	2 ± 1	Not assessed	3 ± 1	3 ± 1	3 ± 1
CAL	5.2 ± 2.3	0	3 ± 1	3.5 ± 1.2	3.5 ± 1.3
KTW	1.3 ± 0.4	2.1 ± 1	2.7 ± 1	2.6 ± 1	2.5 ± 1.1

Rec depth = recession depth; Rec width = recession width; PD = probing depth; CAL = clinical attachment level; KTW = keratinized tissue width.

3 = partial root coverage; 6 = complete root coverage with no detectable CEJ

2. Marginal tissue contour (MTC): 0 = irregular gingival margin (it does not follow CEJ); 1 = proper marginal contour/scalloped gingival margin (following CEJ)
3. Soft tissue texture (STT): 0 = presence of scar formation and/or keloid-like appearance; 1 = absence of scar or keloid formation
4. Mucogingival junction (MGJ): 0 = MGJ not aligned with MGJ on adjacent teeth; 1 = MGJ aligned with MGJ on adjacent teeth
5. Gingival color: 0 = color of tissue differs from gingival color on adjacent teeth; 1 = normal color and integration with the adjacent soft tissues

Table 2 shows cumulative scores at four time periods.

Results

Fifteen patients underwent the surgery and continued in the study to its conclusion. No adverse events were reported after the surgery, such as infections, abscesses, or dehiscences of the wounds, except for one patient for whom a free gingival graft was requested to cover a preexisting bone dehiscence at the donor site.

NSR pain evaluation showed a mean of 3 on the day of surgery, 2 on the first day after surgery, and no significant scores were observed on the following days.

Mean recession depth was 3.2 ± 1.3 mm at baseline; mean recession width was 2.1 ± 0.2 mm. Mean PD was 2 ± 1 mm and CAL (calculated as PD + REC) was 5.2 ± 2.3 mm. Mean KTW was 1.3 ± 0.4 mm. All of the variations for each index are reported in Table 1.

Five years postsurgery, RES showed a positive increase of all scores (Table 2; Fig 6).

Discussion

The success of any mucogingival surgical procedure depends on the elimination of etiologic factors, evaluation of interdental bone, correction of brushing habits, and, most importantly, the choice of the most appropriate surgical technique. The advantages of the laterally repositioned flap are the presence of its own blood supply after the transfer of the pedicle and high survival rate of the roots versus graft.

All of the cases required adequate width of attached gingiva. The adjacent edentulous area along with the thick biotype gave the authors a good indication for an LPF.

Zucchelli et al[5] treated 120 isolated gingival recessions (Miller Class I or II with specific features of the keratinized tissue lateral to the defects) with the laterally moved flap. The main surgical modifications consisted of the coronal advancement of the laterally moved flap and the different thickness during flap elevation.

At the 1-year examination, the laterally repositioned flap demonstrated a 97% success rate. A statistical and clinically significant increase of keratinized tissue was observed. These favorable results were accomplished with no change in the position of the gingival margin or in the height of gingival tissue at the donor site.

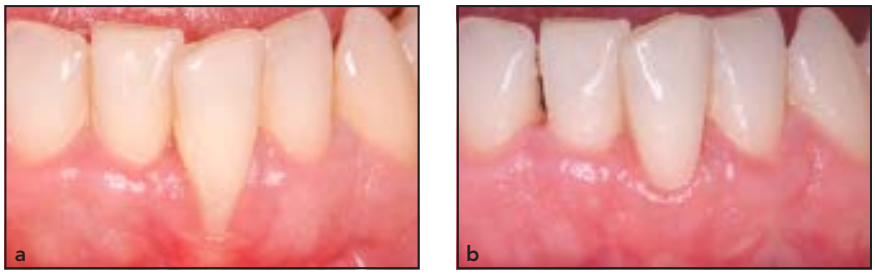

Fig 6 *Another case* (a) *before treatment and* (b) *after 5 years.*

Table 2 Cumulative root-coverage esthetic scores at 6 months (T1), 1 year (T2), 3 years (T3), and 5 years (T4)

	T1	T2	T3	T4
GM	6	6	6	6
MTC	1	1	1	1
STT	1	1	1	1
MGJ	1	1	1	1
Gingival color	1	1	1	1

GM = gingival margin level; MTC = marginal tissue contour; STT = soft tissue texture; MGJ = mucogingival junction.

Conclusions

The laterally repositioned flap was very effective in treating isolated gingival recessions. This approach is not different than described in the past, and the purpose of the present study was to confirm its clinical efficacy. It combined the esthetic and root-coverage advantages of the coronally advanced flap with the increase in gingival thickness and keratinized tissue associated with the laterally moved flap. The ideal gingival conditions must be present lateral to an isolated recession defect in order to render the proposed surgical technique effective and predictable for root coverage. This approach should be considered a valid alternative for the treatment of gingival recessions in mandibular incisor areas.

Acknowledgments

The authors reported no conflicts of interest related to this study.

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