Surgical Treatment of Gingival Recessions Using Emdogain Gel: Clinical Procedure and Case Reports

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This article describes the clinical procedure and outcome of surgical treatment of gingival recessions with the adjunctive use of Emdogain gel, an enamel matrix derivative bioactive material for periodontal reconstructive surgery. Six cases with gingival recession on maxillary canines are presented with 12 months of follow-up. Initial gingival recession averaged 4.8 mm, with a mean probing pocket depth of 2.2 mm. At the 12-month follow-up, a mean of 3.5 mm of root coverage was observed (ie, 73% root coverage, range 60% to 100%). Probing pocket depth averaged 1.7 mm, indicating a 4-mm gain of clinical attachment (range 3 to 5 mm). On a clinical level, mucogingival surgery in combination with the application of Emdogain gel results in predictable root coverage and gain of clinical attachment while maintaining shallow pockets. (Int J Periodontics Restorative Dent 2003;23:607–613.)

Gingival recession is defined as the location of marginal periodontal tissues apical to the cementoenamel junction (CEJ). The primary causes of gingival recessions in general are improper oral hygiene measures and periodontitis. For the patient, recession of the gingival margin may result in impaired esthetics and root sensitivity. The treatment of gingival recessions primarily aims at arresting the progression of tissue loss by adjusting oral home care measures, but in case of subjective problems coronal repositioning of the soft tissue margin should also be the goal of the treatment.

To cover exposed root surfaces, various mucogingival procedures have been used successfully, including pedicle flaps, free soft tissue grafts, and guided tissue regeneration (GTR) procedures using both nonresorbable and resorbable membranes. A review of the literature shows that these procedures may result in mean root coverage varying between 62% and 89% of the original defect. From a histologic viewpoint, healing against the root surface following treatment with
pedicle flaps is characterized by partly epithelial and partly connective tissue attachment, while cementum formation with functionally oriented collagen fibers may be observed only in the most apical portion of the recession defect. A significant enhancement of periodontal regeneration in recession defects may be achieved by the use of GTR procedures.

Recently, a new biologic approach in periodontal regeneration was introduced using enamel matrix proteins (Emdogain gel, Biora) applied during periodontal surgery, by which significant gain in periodontal attachment was demonstrated in animal and human studies on both clinical and histologic levels. Based on this approach of tissue engineering, a series of cases is presented describing the surgical technique and posttreatment results of soft tissue root coverage using enamel matrix proteins.

**Method and materials**

Six patients with localized gingival recessions, referred to the department of periodontology, ACTA, Amsterdam, were selected for mucogingival surgery for esthetic purposes (Figs 1 to 3). All subjects were in good physical health. Entry criteria included the presence of a Miller Class I recession of at least 4 mm in depth, presence of keratinized tissue apical to the recession, and absence of clinical signs of inflammation. The selected teeth were maxillary canines with vital pulp and no Class V restorations (Fig 1a).

At baseline and 12 months after treatment, the following parameters were measured: recession depth, probing pocket depth, clinical attachment level, and amount of keratinized tissue. All measurements were performed by the same investigator using a force-controlled periodontal probe (Brodontic) set at a force of 25 g. Measurements were rounded to the nearest lower millimeter. The patient’s satisfaction with respect to the esthetic result of the treatment was evaluated after 12 months on a 10-cm visual analogue scale (VAS) without grades and labeled with “disappointed” at the left end and “fully satisfied” at the right end. Data from the VAS were recorded by measuring in millimeters the distance between the zero point and the mark made by the patient.

**Operative technique**

The surgical technique used to achieve soft tissue root coverage was a coronally advanced flap, as described by Wennström and Pini Prato. Following local anesthesia, the exposed portion of the root was cleaned with a polishing paste and rubber cup. An intracrevicular incision was made with a scalpel at the site of the recession, and vertical releasing incisions extending from the papilla into the lining mucosa were placed at the mesial and distal line axes of the tooth. A split-thickness flap was dissected mesial and distal to the recession, followed by the elevation of a full-thickness flap apical to the recession until the level of the buccal fold was reached. The periosteum was then incised, and a blunt dissection into the vestibular lining mucosa was carried out to eliminate muscle tension to facilitate the repositioning of the mucosal flap coronally over the exposed root surface (Fig 1b). The pocket epithelium was removed mesial and distal of the recession defect, and the facial portion of the interdental papilla was deepithelialized to create a connective tissue bed onto which the coronally advanced flap could later be sutured. No instrumentation of the root surface was carried out. The exposed root surface was conditioned with PrefGel (Biora), a sterile 24% ethylenediaminetetraacetic acid (EDTA) gel, pH 6.7, for 2 minutes (Fig 1c) to remove the smear layer without damage to the surrounding tissues. Following thorough rinsing with sterile saline, Emdogain gel was applied on the exposed root surface (Fig 1d). The pedicle graft was coronally advanced and secured at the level of the CEJ by suturing the flap to the deepithelialized papilla regions using nonirritating sutures (Fig 1e). The vertical incisions were closed with two to three sutures. A periodontal dressing (Barricaid, Dentsply) was applied to protect the surgical area from mechanical injury during the initial phase of healing.
Fig 1a  Presurgical view demonstrates 4 mm of recession on maxillary left canine and first premolar scheduled for mucogingival surgery.

Fig 1b  After intracrevicular incision, vertical releasing incisions are made extending from papillae into lining mucosa. Periosteum is cut to easily reposition mucosal flap coronally at level of CEJ.

Fig 1c  Facial portion of interdental papilla is deepithelialized, and sutures are applied loosely. Exposed roots are conditioned with PrefGel for 2 minutes.

Fig 1d  Surgical area is thoroughly rinsed with sterile saline, and Emdogain gel is applied to the conditioned root surfaces.

Fig 1e  Root surfaces are covered with a coronally advanced flap sutured to the deepithelialized papillae. Releasing incisions are closed by three sutures.

Fig 1f  Healing result at 6 months.

Fig 2a (left)  Localized 4-mm gingival recession on maxillary right canine in a 30-year-old smoking woman.

Fig 2b (right)  After application of PrefGel and Emdogain gel, coronally advanced flap is sutured into position.

Fig 2c (left)  Clinical appearance after 7 days.

Fig 2d (right)  Postoperative results after 12 months show a 0.5-mm residual gingival recession.
Maintenance care program

Patients were instructed not to brush the teeth in the treated area, but to use a 0.2% chlorhexidine solution, applied as a spray four times daily for 3 weeks. In addition, patients were instructed to avoid excessive muscle traction or trauma to the treated areas. Seven days following surgical treatment, the dressing and sutures were removed. After 3 weeks, toothbrushing was reinstituted using a technique creating minimal apically directed trauma to the soft tissue margin (rolling stroke method). All patients were recalled for prophylaxis after 1, 3, 6, and 12 weeks, and subsequently once every 3 months until the final examination at 12 months. No probing was performed in the surgically treated area until 6 months after surgery (Fig 1f).

Results

The six patients included four men and two women with a mean age of 43 years (range 24 to 51 years). Three subjects were nonsmokers, while the other three were light smokers (less than 10 cigarettes per day). Baseline measurements are shown in Table 1. The mean gingival recession was 4.8 mm, the mean probing attachment level was 7.0 mm, the mean probing pocket depth was 4.0 mm, and the mean keratinized tissue was 3.0 mm. Patient satisfaction with respect to esthetics (10-cm VAS) after treatment is shown in Table 1.

Table 1

<table>
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<tr>
<th>Case</th>
<th>Recession depth</th>
<th>Gain in root coverage (mm/%)</th>
<th>PAL Baseline</th>
<th>PAL gain Baseline</th>
<th>PPD Baseline</th>
<th>Keratinized tissue Baseline</th>
<th>1-y VAS score</th>
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PAL = probing attachment level; PPD = probing pocket depth.
depth was 2.2 mm, and the amount of keratinized gingiva averaged 2.5 mm.

The 12-month reexamination data are also presented in Table 1. A mean root coverage of 3.5 mm was observed, corresponding to a mean coverage of 73% of the initially exposed root surface. The mean gain of clinical attachment was 4.0 mm. Probing pocket depths averaged 1.7 mm, indicating a mean probing pocket depth reduction of 0.5 mm. The amount of keratinized tissue was slightly increased and showed a mean height of 2.7 mm. Patient satisfaction with respect to the outcome of the treatment, evaluated by 10-cm VAS, was as a mean value 8.5.

Discussion

The present case series study demonstrated that, using the coronally advanced flap and application of Emdogain gel, considerable root coverage and gain in clinical attachment can be achieved in combination with shallow probing pocket depth and a maintained amount of keratinized tissue. The average root coverage after 12 months amounted to 73%, an outcome that is in the range of the average result of other root coverage procedures and similar to the treatment outcome reported in a controlled clinical trial using a barrier membrane in combination with a coronally positioned flap or a two-step mucogingival procedure including free soft tissue grafting at recession sites of comparable depth. However, the latter techniques are surgically more demanding for both clinician and patient.

Interestingly, the gain of clinical attachment observed in the present study paralleled the reduction in recession. Several histologic studies, in animals as well as in humans, demonstrated the formation of newly formed acellular cementum, periodontal ligament fibers, and alveolar bone after application of Emdogain gel. A case report on the histologic healing following the treatment of a human experimental defect similar to a recession defect demonstrated that newly formed cementum with functionally oriented collagen fibers covered 75% of the original defect. Rasperini et al reported the histologic evaluation of the treatment of a 6-mm recession defect with Emdogain gel combined with a subepithelial connective tissue graft. Histologic evaluation evidenced the migration of junctional epithelium to a distance of 2 mm from the soft tissue margin and, apical to the junctional epithelium, the formation of new acellular cementum, bone, and connective tissue fibers inserted into the newly formed cementum. Based on the observations reported in the above studies, the gain in clinical attachment assessed following the use of Emdogain gel in the surgical treatment of recession defects in our patients was most likely established by the de novo formation of cementum and connective tissue fiber attachment rather than by a long
The observations made in the present series of cases indicate that the coronally repositioned flap in combination with the application of Emdogain gel is a predictable treatment procedure for the achievement of soft tissue root coverage and gain of clinical attachment in facial recession defects, while maintaining shallow pockets. However, until data from randomized controlled clinical trials become available, a proper judgment of the clinical benefit of the adjunctive use of enamel matrix derivative in the treatment of recession defects cannot be made.

Acknowledgment

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References


