

# EMDOGAIN® IN THE MANAGEMENT OF CERVICAL LESIONS

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## ABSTRACT

**Background:** Gingival recessions induce root denudation with the risk of non-carious and carious cervical lesions. Periodontal plastic surgery may be used as an alternative to restorative dentistry in order to cover the lesion. Coronally advanced flap procedures produce statically significant improvements in root coverage with good esthetic results and hypersensitivity reduction. However, the nature of the attachment gain is still controversial. In the present study, we suggest the use of a coronally advanced flap procedure in conjunction with the application of Emdogain® to treat a cervical lesion that had been covered previously by a bonded restoration.

**Materials and methods:** Thirty healthy patients displaying multiple gingival recessions on the maxillary canine and premolars, which were previously restored with bonded restorations were included in the study. The bonded restoration was removed and a coronally advanced flap procedure associated with the application of Emdogain® was performed to treat the gingival recessions.

**Results:** The application of the Emdogain® tooth showed complete root coverage with an average attachment gain of 5.0 – 1.2 mm. The result is statically significant.

## Conclusion:

The study demonstrates good clinical results after 1 year of healing, and it can be concluded that Emdogain® may represent a very promising tool and offer a good alternative to restorative dentistry for the treatment of cervical lesions associated with gingival recession

**Key words:** Cervical abrasion, Enamel matrix derivative, Gingival recession.

## INTRODUCTION

Root denudation following gingival recessions promotes carious or non-carious cervical lesions with hypersensitivity and esthetic discomfort. Cervical dentin hypersensitivity (CDH) is a common clinical condition reported to affect 15% to 74% of the adult population.<sup>1-4</sup> It is characterized by tooth pain arising from

exposed dentin in response to chemical, thermal, tactile, evaporative, or osmotic stimuli that cannot be ascribed to any other form of dental defect or pathology.<sup>5</sup>

To satisfy the immediate demand of the patients, general practitioners used to perform restorative procedures including cervical fillings or bonding techniques

(resin-modified restorative glass ionomer, microfin resin composite) to cover the lesion. This approach shows poor long-term results and leads to progression of the recession.

Periodontal plastic surgery represents an efficient solution in the treatment of gingival recessions even if the lesion has been previously covered with a bonded restoration.<sup>6</sup> Conventional periodontal plastic surgery using coronally advanced flap and subepithelial connective tissue grafting for root coverage is clinically predictable but the nature of the attachment gained is still controversial.

Pini Prato et al suggested the use of the technique of guided tissue regeneration in the treatment of cervical lesions associated with gingival recessions to obtain a new connective tissue attachment. In the clinical procedures, the removal of the cervical restoration created a concavity which was covered by the membrane.<sup>7</sup> In this report, the authors present two cases with complete root coverage at 18 months. Nonetheless, inherent in the development of new techniques, the authors accept the technical difficulties in optimally placing the barriers, the lack of predictability, and the high risk of exposure leading to infection.<sup>7</sup>

Emdogain®, which is an enamel matrix derivative prepared from developing porcine tooth buds (Biora AB, Malmö), pretends to promote periodontal regeneration by mimicking the process that takes place during the development of the nascent tooth and periodontal tissue.<sup>8</sup> Emdogain® has been successfully used to restore a fully functional periodontal ligament, cementum and alveolar bone in patients with advanced intrabony defects.<sup>9</sup> In the present study, we suggest the use of a coronally advanced flap procedure in

conjunction with the application of Emdogain® to treat a cervical lesion that had been covered previously by a bonded restoration, in order to promote a remineralization of the lesion and a regeneration of connective tissue attachment with cementum formation.

#### **MATERIALS & METHOD**

Thirty non-smoking patients (17 males and 13 females), aged 30-45 years were enrolled in the study. All patients were systemically healthy and presented with multiple gingival recessions on the maxillary canine and premolars, which were previously restored with bonded restorations but there was persistent hypersensitivity and esthetic discomfort. Written informed consent was obtained from all patients who were included in the study.

Under local anesthesia, an intrasulcular incision was performed on the buccal aspect of the concerned teeth and completed with vertical releasing incisions beyond the mucogingival junction in order to get the required mobility. A full-thickness trapezoidal flap was elevated beyond the mucogingival junction without involving the adjacent papillae in order to preserve the blood supply.

In the apical portion, a partial-thickness flap completed the procedure to get a tension-free coronal displacement of the flap. The bonding restoration was removed with a diamond bur and the exposed portion of the root was gently planed with a Gracey curette. The surface epithelium was eliminated in order to create a connective tissue bed.

The exposed root surface was then rinsed with sterile saline and conditioned with EDTA 24% (Prefgel®, Biora) for 2 minutes, according to the manufacturer's instructions in order to remove the smear

layer and to selectively expose the collagen fibers of the root. The surface was thoroughly rinsed with sterile saline and pre-sutures were placed. Emdogain® gel was applied, starting from the most apical bone level and covering the entire root surface. The flap was slightly repositioned above the CEJ and sutures were placed. No periodontal dressing was used.

The patients were advised to rinse with 0.12% chlorhexidine digluconate for 1 minute 3 times a day over 2 weeks and to avoid toothbrushing at the surgical site. Sutures were removed at day 4. Brushing was reinstated at 3 weeks with a soft toothbrush. Recall appointments for prophylaxis were scheduled at 1, 3 and 6 weeks and every 3 months.

## RESULTS

A good esthetic result, reduction of the hypersensitivity and a remarkable stability of the gingival margin at 1 year was seen. The application of the Emdogain® tooth showed complete root coverage with an average attachment gain of 5.0 – 1.2 mm. The result is statically significant.

## DISCUSSION

There are few histological studies on the nature of the attachment gained after surgical root covering. In most cases, periodontal plastic surgery leads to repair with the formation of a long epithelial attachment. However, in a human histological study, it was shown that recessions treated by the association of coronally advanced flap and connective tissue graft can partially heal with the formation of a new connective tissue attachment.<sup>10</sup> The technique of guided tissue regeneration using resorbable or non-resorbable membranes offers better results in terms of percentage of regeneration. In a case report, Cortellini et

al used guided tissue regeneration to treat a gingival recession on a mandibular canine and demonstrated histologically a gain of attachment with formation of new cementum, Sharpey's fiber attachment and new bone.<sup>11</sup>

However, in a comparative clinical study, it was demonstrated that the clinical outcome was significantly better following subpedicle connective tissue graft compared to guided tissue regeneration in terms of recession reduction, root coverage, and keratinized tissue augmentation.<sup>12</sup> Romagna-Genon found no difference in terms of root covering when comparing guided tissue regeneration and subepithelial connective tissue graft. The only significant difference between the two treatment modalities was the mean value of probing depth suggesting that guided tissue regeneration may create a more resistant attachment than does the graft.<sup>13</sup>

In order to gain a predictable connective tissue attachment, some authors suggested the use enamel matrix derivative (Emdogain®) in association with periodontal plastic surgery. In a split-mouth study design on 12 non-smoking patients, Modica et al compared the coronally advanced flap with or without Emdogain® in the treatment of gingival recessions of Miller Class I and II. Even though the Emdogain® group showed slightly better results in terms of root coverage and attachment gain, the clinical outcome was not significantly improved after 6 months of healing.<sup>14</sup>

In a 12-month prospective controlled study on 36 patients using the same procedure, Hägewald et al demonstrated that the only significant difference between the two treatment modalities was the augmentation of keratinized tissue, which was

significantly higher in the Emdogain® group.<sup>15</sup> Moreover, Berlucchi et al were not able to demonstrate any significant difference in terms of root coverage among the 2 techniques in a study of 26 gingival recessions treated by coronally advanced flap procedure or subepithelial connective tissue graft, both associated with the application of enamel matrix derivative.<sup>16</sup>

McGuire and Nunn found no significant difference in terms of root coverage in a recent clinical study that compared coronally advanced flap associated with the application of enamel matrix derivative and subepithelial connective tissue graft alone.<sup>17</sup> Rasperini et al placed a subepithelial connective tissue graft in combination with enamel matrix derivative on a mandibular canine with a 6 mm gingival recession that was scheduled for extraction. At 6 months, the tooth was extracted with the surrounding tissues and prepared for histological examination.<sup>18</sup> Histological and histometric measurements revealed the presence of new connective tissue attachment, extended 2.25 mm coronal to the new woven bone, new acellular cementum lining the notch and extending 1 mm coronally, and newly formed bone of 1.87 mm.<sup>18</sup> The results of this study are only partially confirmed by Carnio et al who implemented the same surgical procedure as Rasperini et al on 4 teeth with Miller Class II and III recessions and demonstrated limited regeneration on 1 specimen. However, the development of a long junctional epithelium was not observed in the 4 specimens using this combined therapy.<sup>19</sup> McGuire and Cochran undertook a histological evaluation of the healing following the treatment of human recession. Two hopeless teeth on the same

patient were treated either by coronally advanced flap procedure associated with the application of enamel matrix derivative or by subepithelial connective tissue graft.<sup>20</sup> Histological evaluation of the subepithelial connective tissue graft revealed a connective tissue attachment and some evidence of root resorption whereas a coronally advanced flap associated with enamel matrix derivative revealed new cementum, organizing periodontal ligament and islands of condensing bone.<sup>20</sup>

The utilization of enamel matrix derivative in the treatment of gingival recessions should not be aimed at increasing the root coverage but at stabilizing the results by enhancing the regenerative process. Moreover, the association of enamel matrix derivative with a surgical procedure may also enhance the re-mineralization of the cervical lesion, which is necessary when this lesion has been previously treated in restorative dentistry.

Analysis of the literature strongly supports the hypothesis that amelogenins are involved in differentiation and maturation of the odontoblastic cells and play a fundamental role during early dentine formation. This confirms the idea that enamel matrix derivative in association with periodontal plastic surgery could favor the re-mineralization of cervical lesions leading to the reduction of the hypersensitivity.

#### **CONCLUSION**

The concept of minimal invasive dentistry appears to offer a good alternative to restorative dentistry in the treatment of cervical lesions associated with gingival recessions. The association of enamel matrix derivative (Emdogain®) and coronally advanced flap procedures in the treatment of cervical lesions associated

with gingival recessions is aimed at stabilizing the results and not to increasing the root coverage. It may induce the remineralization of the cervical lesion and enhance the regenerative process.

This study demonstrates a good clinical result in terms of attachment gain, esthetic result and hypersensitivity reduction but should be followed by a histological analysis to demonstrate the nature of the attachment and by more clinical studies to confirm the predictability.

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