

EMDOGAIN® OR SCTG – WHICH ONE’S BETTER FOR MANAGING CERVICAL ABRASIONS??

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Abstract:

Background: Gingival recessions induce root denudation with the risk of non-cariou and cariou cervical abrasions. Periodontal plastic surgery may be used as an alternative to restorative dentistry in order to cover the lesion. The aim of the study was to compare subepithelial connective tissue grafts (SCTG) and coronally advanced flap (CAF) procedure in conjunction with the application of Emdogain® to treat cervical abrasions.

Materials and methods: A total of 31 teeth of twelve non-smoking patients (7 females and 5 males), with an age range of 22 to 45 years displaying multiple gingival recessions were included in the randomized controlled clinical trial. Recession depth (RD), recession width (RW), probing depth (PD), clinical attachment level (CAL), and keratinized tissue (KT), were measured and recorded by a single blinded examiner at baseline and at 4, 12 and 24 weeks. Before surgery the samples were randomized to receive either a CAF with Emdogain® (test group) or a connective tissue graft (control group). Data were analyzed using independent t-test and univariate analysis of variance.

Results: Twenty-four weeks after therapy, the mean root coverage in the test and control cases was 50.13% and 65.71%, respectively. There was no significant difference between the two groups. Within the 24-week follow-up period both procedures resulted in statistically significant improvement in RD, RW and CAL, but not in PD.

Conclusion: The SCTG procedure provided better results in comparison to CAF with Emdogain. However the later method is easier and less technique-sensitive. Therefore it can be considered as a possible substitute for the treatment of gingival recessions, especially when increasing KT is not required.

Key words: Cervical abrasion; Enamel matrix derivative; Gingival recession; Sub-epithelial connective tissue graft.

Introduction

Root denudation following gingival recessions promotes cariou or non-cariou 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.¹⁻⁴ 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.⁵

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.⁶ Conventional periodontal plastic surgery using coronally advanced flap (CAF) and subepithelial connective tissue grafting (SCTG) for root coverage is clinically predictable but the nature of the attachment gained is still controversial.

The SCTG introduced by Langer and Langer in 1985, achieved a high success rate by combining the advantages of both free gingival and pedicle grafts^{7,8}. This technique has been proposed as “Gold standard”, as far as predictability and esthetics are concerned⁶. However harvesting the graft from a donor site results in an additional

wound site leading to post-surgical pain and discomfort for the patient^{9,10}.

Treatment of exposed roots with CAF is considered as a relatively easy method that can produce optimal results. In contrast to connective tissue grafts, CAF does not require a second surgical site, therefore is more acceptable for the patient. Mean root coverage of 55% to 99% has been reported for CAF¹¹.

Emdogain® (EMD), 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.¹² EMD has been successfully used to restore a fully functional periodontal ligament, cementum and alveolar bone in patients with advanced intrabony defects.¹³ Clinical studies have shown the possibility of combining EMD with root coverage procedures, especially CAF, to achieve root coverage and periodontal regeneration on previously exposed root surfaces¹⁴.

The aim of the current randomized control clinical trial was to assess the clinical efficacy of a coronally advanced flap procedure with the addition of EMD for the treatment of cervical abrasion and to compare it to the subepithelial connective tissue graft method.

Materials & method

A total of 31 teeth of twelve non-smoking patients (7 females and 5 males), with an age range of 22 to

45 years referred to the Department of Periodontology, Teerthankar Mahaveer Dental College & Research Centre were included in the study.

Systemically healthy patients with a modified O'Leary plaque index score of 15-20%, and at least 2mm keratinized gingiva on the buccal aspects of the involved teeth and no contraindications for periodontal surgery were included in the study. Pregnant women, caries or restoration on the test or control site or history of previous periodontal surgery on the sites were not included in the study. A written informed consent was obtained from the all patients.

Recordings of Recession width (RW); Recession depth (RD); Probing depth (PD); Keratinized tissue (KT) and Clinical attachment level (CAL) were taken by a single blinded examiner at baseline and at 4, 12 and 24 weeks after surgical treatment using Williams periodontal probe. The samples were randomly allocated into either test or control groups, before surgery.

Following local anesthesia, root planing was performed on the exposed root surfaces and then an intrasulcular incision was made on the buccal aspect of the involved tooth/teeth. A partial-thickness flap was raised following two oblique apically diverging incisions extending from the mesial and distal aspects of the intrasulcular buccal incision beyond the mucogingival junction. A horizontal dissection was performed at the base of the flap to allow tension-free coronal displacement. Interdental papillae were de-epithelialized to create a bleeding connective tissue bed.

The control group was treated with connective tissue grafts (CTG), which were taken from the palate in the bicuspid region on the same side as the recipient bed. After the palatal area was anesthetized, a horizontal incision was placed 4 mm from the free gingival margin and extended in correspondence with the dimensions of the recipient site. Two parallel internal vertical incisions, one superficial and one deep, were made and connected mesially and distally. The underlying connective tissue was released at its base and after removal it was shaped to fit the recipient site. After taking the graft the donor site was sutured.

In test group, all root surfaces were irrigated and then conditioned with 24% EDTA gel (Prefgel®, Biora) for 2 minutes to remove the smear layer and to obtain a surface free of organic debris. This was followed by rinsing with water and drying with a gauze sponge followed by pre-suture placement. EMD gel was then applied, starting from the most apical bone level and covering the entire root surface.

After placing the EMD and SCTG on the exposed root area, the graft was secured against the

tooth/teeth with sling sutures, at the CEJ level. The flaps were coronally positioned to cover the grafts using the sutures. Finally, the releasing incisions were closed with interrupted sutures and periodontal dressing was applied.

A 0.2 % chlorhexidine mouthwash was prescribed twice daily for 2 weeks, and analgesics were to be used as needed. The periodontal dressing and sutures were removed from the palate after 10 days. Patients were advised to avoid excessive tooth brushing or trauma to the treated area during the first 6 weeks. Afterwards, the subjects were instructed to perform the roll brushing technique with a soft toothbrush.

The participants were recalled every 2 weeks until 8 weeks and then once a month until 6 months. All measurements were repeated 4, 12 and 24 weeks after surgery.

Statistical analysis was performed using *t*-test, and univariate analysis of variance.

Results

A total of thirty-one teeth were included and the mean root coverage (RC) between 1 and 6 months was 56.3% in the test group and 64.86% in the control group. At the final recording (24 weeks), the mean RC in the EMD and SCTG groups were 50.13% and 65.71%, respectively. According to Levene's test for equality of variance no significant difference was found between the two groups at 12 or 24 weeks postoperative.

RD changes were significantly different between the two groups; and also among the measurements obtained at 4, 12 and 24 weeks postoperatively (Table I, Fig. 1).

Table I: Recession Depth (mm) before and after surgical intervention

Group	Teeth (n)	Baseline	Weeks		
			4	12	24
EMD	16	3.07 (0.95)	1.33 (1.09)	1.25 (1.03)	1.57 (1.06)
SCTG	15	3.3 (1.41)	1.3 (0.9)	1.11 (0.74)	1.03 (0.83)
P-value	-	-	0.006	0.008	0.009

Values in parentheses are standard deviation.

In the test group, RW decreased 1.37 (1.37) mm while a reduction of 2 (1.67) mm was seen in the control group at the final recording. The changes of RW were not statistically significant between the test and control groups. During the 24-week follow-up, KT increased in the control and

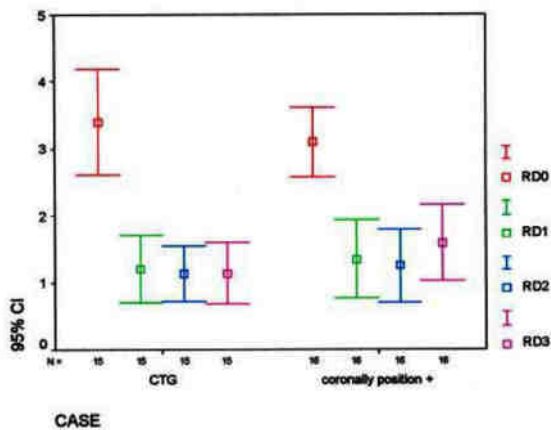


Figure 1- Error bar of mean and 95 % confidence intervals of Recession Depth in test and control groups in 4, 12, 24 weeks follow up.

decreased in the test sites, which showed a significant difference (Table II). A significant difference in KT was also observed between the two groups at all time periods.

Table II: Mean (SD) keratinized tissue (mm) before and after surgical intervention.

Group	Teeth (n)	Baseline	Weeks		
			4	12	24
EMD	16	4 (1.58)	3.84 (1.94)	3.4 (1.55)	3.5 (1.68)
SCTG	15	1.96 (1.27)	3.85 (1.06)	3.28 (1.27)	2.66 (1.07)
P-value	-	-	0.002	0.000	0.000

In the test group, CAL decreased a total of 2 (1.47) mm throughout the study period whereas a total reduction of 1.56 (1.49) mm was observed in the control sites. A statistically significant difference in reduction was found between the two groups (Table III).

Table III: Mean (SD) Clinical Attachment level (mm) before and after surgical intervention.

Group	Teeth (n)	Baseline	Weeks		
			4	12	24
EMD	16	7.07 (1.57)	5.15 (1.63)	4.57 (1.41)	5.07 (1.31)
SCTG	15	5.32 (1.24)	5.01 (1.26)	4.3 (0.96)	3.75 (1.29)
P-VALUE	-	-	0.36	0.015	0.001

PD remained shallow and showed a small decrease from baseline to 24 weeks after surgery in both groups (P>0.05). The mean changes of PD did not

reveal significant differences between the two groups in any of the follow up intervals.

Discussion

Gingival recession is a common multifactorial condition associated with anatomical, physiological or pathological factors. This phenomenon is characterized by the apical migration of the gingival margin beyond the cemento-enamel junction (CEJ)¹⁵, and can involve a single tooth, a group of teeth or even the whole mouth¹⁶. Root exposure poses esthetic problems and may lead to root sensitivity, root caries and cervical abrasions^{17,18}. Several surgical procedures have been suggested for the treatment of gingival recession such as pedicle graft (PG), free gingival graft (FGG), connective tissue graft (CTG), and guided tissue regeneration (GTR)¹⁹.

The SCTG procedure was considered as the “gold standard” because of its predictability and acceptable esthetic results. The CAF procedure with the use of EMD is a relatively easy and effective technique, with the advantage of avoiding a second surgery at the donor site. Therefore patients experience less morbidity, especially compared to connective tissue graft surgeries.^{9,11,20}

This interventional randomized controlled clinical trial compared the clinical efficiency of a CAF method with the additional use of EMD (test), and SCTG (control) in patients with cervical abrasions. Data from the present study revealed a significant improvement in RD from baseline to 24 weeks postoperative. This corresponds to about 50.13% root coverage (RC) for EMD cases and 65.71% for patients receiving SCTG. The difference was not significant but RC was slightly superior in the control group. In fact the results from RD measurements in all the follow up intervals were better in the SCTG group.

In a similar study, McGuire and Nunn²¹ reported 95.1% RC for patients treated with EMD and 93.8% for subjects receiving SCTG. They also found no significant difference between the two procedures. Moses et al²² indicated a significant difference in RC between the EMD (76.9%) and SCTG (84.3%) groups. Nemcovsky et al¹⁵ reported a 71.7% and 87% RC for EMD and SCTG cases, respectively; and showed a statistically significant difference between the two groups. The two later studies showed a higher percentage of root coverage following application of the SCTGs. This was similar to the findings obtained in the current investigation but in contrast to those described by McGuire and Nunn²¹.

Moses et al²² and Nemcovsky et al¹⁵ conducted multicenter studies in which the patients were treated in several centers. However, it seems that the results obtained by a single operator are more reliable than those reported by more than one practitioner. Therefore the findings of the present investigation and those reported by McGuire and

Nunn ²¹, may be more accurate than the former multicenter studies.

Recently it has been shown that greater root coverage is associated with greater coronal displacement of the flap margins ²³. In the present investigation all flap margins were situated at the level of the CEJ, but in most other studies the flap margins were positioned “as coronally as possible”. EMD is a viscous gel and the operator has limited control during its application on the root surface. This may be a logical explanation for the fact that root coverage was superior in cases treated with the SCTG technique.

The capability of EMD to induce periodontal tissue regeneration has been previously demonstrated ^{14,24}. Throughout the study period, a 2mm and 1.56 mm decrease in CAL was observed in the test and control groups, respectively; which showed a significant difference.

Various studies have also shown an increase in KT following SCTGs ^{25,26}. According to Bouchard ⁸ and Cordioli ²⁷, the height of the grafted connective tissue (CT) that is exposed coronal to the flap margin at the end of the surgical procedure, can positively affect the resultant keratinized tissue width. They reported less than 1mm increase in KT width when CT was completely covered by the overlying flap ^{8,27}.

An increase in KT has been observed using the SCTG technique in studies similar to the current investigation ^{15,21,22}. In our study, in contrast to previous investigations, the CTG was completely covered with the recipient tissues. Incomplete coverage of CTG can induce a larger increase in the width of KT. During the 24 week follow-up period, KT increased in the control group but showed reduction in the test group. This may be related to the flap necrosis that occurs after surgery. SCTG is a vital graft that can be revascularized even when not completely covered, but EMD needs full coverage by a flap.

Conclusion

The utilization of enamel matrix derivative in the treatment of cervical abrasions 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.

It can be concluded that CTG can provide better root coverage (PCR), RW, RD and KT. However a coronally advanced flap with the addition of EMD is an easier and less technique-sensitive procedure. Therefore when increasing KT is not essential and there are no financial limitations, this method can be considered as a substitute for the treatment of cervical abrasions and gingival recessions.

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