

LETTER TO THE EDITOR

Clinical analysis on efficacy of root-surface conditioning by ethylenediaminetetraacetic acid on surgical treatment of gingival recessions with coronally advanced flap and enamel matrix derivative peptide: a retrospective studyC. Bertoldi¹, P. Cortellini², S. Spinato³ and D. Zaffe⁴

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To the Editor,

The treatment of gingival recession defects is successfully achieved by different methodologies of mucogingival plastic surgery. Therapy depends on the type of gingival recession, specifically on its width, depth, oral situation and interproximal involvement of the periodontal ligament as well as on the depth of vestibular fornix, the Miller class of the recession, and site-, oral- and patient-depending variables (1-4). Enamel matrix derivative peptide (EMP) is often used for periodontal regeneration, with the complementary treatment of exposed dental roots by ethylenediaminetetraacetic acid (EDTA) (2, 3). All current plastic mucogingival surgical techniques, allowing a less invasive approach to the patients, are particularly suited to the use of EMP often in association with root conditioning by EDTA (1-4). To treat gingival recession, the coronally advanced flap (CAF) therapy is a benchmark technique and it has been widely analyzed in association with EMP (2, 3). However, the role of the use of EDTA, citric acid and other root surface modifiers is debatable in periodontal regeneration (5, 6). The aim of the present study

is to compare the efficacy of EMP, with or without dental root conditioning by EDTA, in the treatment of gingival recessions by CAF surgical technique.

MATERIALS AND METHODS

This retrospective study was performed at the Periodontology Unit of Dentistry and Oral-Maxillofacial Surgery of Modena University Hospital. All the patients considered in this retrospective study signed the informed consent detailing all procedures of the treatment, as requested by Helsinki protocols. The considered patients had to be healthy and not suffering from periodontal disease (1, 5). Moreover, they had to satisfy the following systemic and local inclusion criteria: absence of relevant medical conditions (1, 5), to be of adult age, not pregnant or lactating, non-smokers, not undergoing antibiotic or anti-inflammatory therapy and not suffering recently from relevant affective symptoms (e.g. anxiety, depression, etc.) or psychotic disorders or personality disorders in lifetime medical history (4). The full-mouth plaque score (FMPS) and the full-mouth bleeding score (FMBS), had to be maintained $\leq 25\%$ (measured at 4 aspects per tooth).

Selected patients had at least a gingival recession of

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Miller class I or II, and needing surgical treatment by CAF. The teeth interested by recession defects had to be viable or endodontically treated correctly. Only defects with identifiable cemento-enamel junction (CEJ) were included in the study. Cases with conservative/prosthetic restoration involving the considered teeth and/or with presence of deep abrasion defects or caries that made CEJ undetectable were excluded. The considered defects did not include furcations. Patients suffering from parafunctions were excluded. Since the use of CAF technique is not expected to show advantages in patients with inadequate keratinized tissue, these patients were also excluded from the study. Additional exclusion criterion was the presence of detectable bleeding on probing (BoP) recorded at treated sites during the study.

Dental-periodontal procedures and clinical measurements

Subjects were included in the study after completion of cause-related therapy consisting of scaling and root-planing, motivation, and oral-hygiene instructions and ending with very high compliance and very low levels of plaque and BoP. When indicated, surgical periodontal therapy was performed on the remaining portions of the dentition of each patient. The CAF surgical procedure was always implemented (1-3).

Treatment of teeth was performed using the enamel matrix derivative peptide (EMP - Emdogain, Biora AB, Malmö, Sweden) close to dental roots in:

- Treatment group-1 (TG1) patients, having root surfaces not previously conditioned;
- Treatment group-2 (TG2) patients, having root surfaces conditioned by EDTA (PrepHgelA, Biora, AB, Malmö, Sweden) immediately before EMP application.

Probing depth (PD) and gingival recession depth (GR) were recorded at the experimental sites at baseline, immediately before surgical treatment (T0), and at the end of the follow-up period of 12 months (T1). In particular, mid-buccal PD, from the gingival margin to the base of the defect, and GR, from the cemento-enamel junctions (CEJ) to the free gingival margin, were evaluated by periodontal probe. The corresponding clinical attachment level (CAL) was calculated as the sum of PD and GR. Also, FMPS and FMBS were measured at the same time-points. BoP had never to be marked in relation to the treated sites during all the follow-up period.

Statistical analysis

The primary outcomes of this study were the PD, GR and CAL comparisons between TG1 and TG2. The secondary outcome was the evaluation of PD, GR and CAL changes during follow-up. The adjusted Fisher–Pearson standardized moment coefficient G was calculated, and skewness was refused if $-2 < G < +2$.

Statistical analysis was performed using the parametric t -test for the comparison of two groups of patients in the same phase (T0 or T1), and paired t -test for the clinical data taken before and after the surgical treatment. The χ^2 test (nominal data) was applied to compare the gender distribution between the two treated groups (5). For all measured variables, the null hypothesis (H_0) of no difference among groups was rejected for a critical significance level of $p < 0.05$ (1, 5).

RESULTS

Thirty patients, 17 women and 13 men, aged 20-60 years (mean \pm SD – median = 37.6 \pm 12.4 – 37 years) fulfilled the entry criteria of the retrospective study. Fifteen patients, 9 women and 6 men, aged 20-59 years (37.1 \pm 12.9 – 34 years) were enrolled in TG1 and fifteen patients, 8 women and 7 men, aged 22-60 years (mean \pm SD = 38.1 \pm 12.3 – 39 years) were enrolled in TG2 (Table I).

At baseline (T0), the adjusted Fisher–Pearson test, calculated from numerical data, resulted always $-2 < G < +2$, so skewness hypothesis was refused (14). At baseline (T0), the FMPS and FMBS were 12.8 \pm 2.5 – 16.7% and 7.7 \pm 2.8 – 7.1%, respectively, in TG1, and resulted 16.5 \pm 3.1 – 16.7% and 8.1 \pm 3 – 8.3%, respectively, in TG2. PD resulted 1.3 \pm 0.4 – 1 mm in TG1 and 1.3 \pm 0.5 – 1 mm in TG2. GR was 3 \pm 0.8 – 3 mm in TG1 and 2.7 \pm 0.7 – 3 mm in TG2. CAL resulted 4.2 \pm 1 – 4 mm in TG1 and 4 \pm 0.9 – 4mm in TG2 (Table I and Table II). The comparison between TG1 and TG2 at T0 (Tab. II) was not statistically significant for age, FMPS, FMBS, PD, GR, CAL and gender ($p > 0.05$, t -test analysis and χ^2 test for gender).

Twelve months afterward (T1), the adjusted Fisher–Pearson test resulted always $-2 < G < +2$, so the skewness hypothesis was again refused. FMPS and FMBS were 15.5 \pm 3 – 14.8% and 5.9 \pm 2.3 – 5.4% respectively in TG1 while resulted 15.4 \pm 3.1 – 14.8%

both TG1 and TG2 ($p < 0.05$ paired *t*-test). On the contrary, PD comparison between T0 and T1 was not significant in TG2 ($p \geq 0.05$) and significant in TG1 ($p < 0.05$ paired *t*-test). However, with the exception of PD in TG1, that resulted significantly greater at T1 compared with T0, all the recorded indices of TG1 decreased at T1 compared with T0.

DISCUSSION

Tissue regeneration depends on several variables, such as the materials used (7), and the devices used to apply them (8-10). Nevertheless, the defect properties and the surgical technique chosen to obtain the flap, as well as the stabilization of the clot beneath the flap, also play a fundamental role in periodontal regeneration (1-3). Furthermore, even the patients' lifestyles and psychological profile matter (4, 11). The study design required stringent criteria of inclusion in the retrospective study, to characterize as much as possible the periodontal defects and the patients to avoid disturbing variables. In particular, BoP is an inflammation index closely connected to periodontal disease and to periodontal CAL loss, so it had never to be recorded in the considered defects (5). The study was carried out on patients characterized by a good hygienic control and affected by gingival recession of Miller class I or II. The gingival recessions were treated only by CAF flap technique without subepithelial connective tissue graft (CTG). CAF + CTG might be considered the gold standard in root coverage procedures (12), however, it seems to be particularly established in cases of gingival recession with a relevant defect in gingival thickness and/or in those cases in which the increase in width of keratinized gingival tissue (wKT) is requested. Nevertheless, the combined use of CAF and EMP seems to guarantee a significant favorable clinical outcome for GR and CAL also at 10-year follow-up (3). Moreover, no differences in effectiveness were recorded among the use of CAF + EMP, CAF + CTG and CAF + CTG + EMP in root coverage in several studies (2, 3). Besides, McGuire et al. (3) even observed an increase of wKT using CAF + EMP in 10-year follow-up clinical results similar

to those achieved with CAF + CTG. So, both GR, CAL and also PD could significantly decrease within a year from surgery using CAF + EMP (2, 3).

In this study a significant clinical improvement of the measured periodontal indices at T1 compared with the values at T0 was always observed in both the TGs, with the exception of PD that significantly increased in TG1, but (not significantly) decreased in TG2. However, PD was always comprised between 1 and 3, so remaining in a physiological range.

Using CAF+EMD, a not significant decreasing trend of PD was observed also in other studies (2, 3), and EMP seemed helpful in wound healing by its potential in the PD reduction (12), but all these studies applied the TG2 protocol, using EDTA. In this study, TG1 protocol did not include the EDTA application. The PD significantly increased from T0 to T1. At T1, the comparison between TG1 and TG2 of PD and of CAL (greater in TG1) was significant, but not GR. GR resulted lower in TG2, but without statistical significance. Therefore, the significant CAL decrease of TG2, compared with the value of TG1, could be mostly due to PD behavior.

In conclusion, the primary clinical outcomes resulted mostly favorable for TG2, while the analysis of the secondary clinical outcomes showed a clinical advantage of GR and CAL in both the TGs. In addition, in comparison with T0, a FMPS and FMBS reduction was observed in both treatments at T1. This study considered a clinical setting in which the stabilization of the flap and of the clot beneath the flap is not guaranteed by the morphology and the biological properties of the defect to the same extent to which it could be in 2-3-wall intrabony defects, that have the self-ability to maintain the regeneration space (5, 6). The use of a dental root surface modifier such as the EDTA (5), improving the flap stability, could make all the difference to obtain significant clinical results in defects not predisposed to shunt the strain forces from the regeneration space.

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