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Root coverage stability of the subepithelial connective tissue graft and guided tissue regeneration: A 30-month follow-up clinical trial

Elizabeth P. Rosetti [a,b], Elcio Marcantonio Jr. [a], Elizangela P. Zuza [a,c], Rosemary A.C. Marcantonio [a,*]

[a] Department of Diagnosis and Surgery, São Paulo State University (UNESP), School of Dentistry, Araraquara, SP, Brazil
[b] Department of Master of Dental Clinics, University Vila Velha (UVV), School of Dentistry, Vila Velha, ES, Brazil
[c] Department of Master of Dental Science Course, Educational Foundation of Barretos (UNIFEB), School of Dentistry, Barretos, SP, Brazil

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ABSTRACT

Objectives: The aim of this study was to compare the long-term clinical effects produced by subepithelial connective tissue graft (SCTG) and guided tissue regeneration combined with demineralized freeze-dried bone allograft (GTR-DFDBA) in the treatment of gingival recessions in a 30-month follow-up clinical trial.

Methods: Twenty-four defects were treated in 12 patients who presented canine or premolar Miller class I and/or II bilateral gingival recessions. GTR-DFDBA and SCTG treatments were performed in a randomized selection in a split-mouth design. The clinical measurements included root coverage (RC), gingival recession (GR), probing depth (PD), clinical attachment level (CAL) and keratinized tissue width (KTW). These clinical parameters were evaluated at baseline and after 6, 18 and 30 months post-surgery.

Results: The changes in RC, GR, PD and CAL did not show significant differences between groups ($p > 0.05$). Both procedures promoted similar RC (GTR-DFDBA: 87% and SCTG: 95.5%) and similar reduction in GR (GTR-DFDBA: 3.25 mm and SCTG: 3.9 mm), PD (GTR-DFDBA: 1.6 mm and SCTG: 1.2 mm) and CAL (GTR-DFDBA: 4.9 mm and SCTG: 5.0 mm). The increase in KTW was significantly higher ($p = 0.02$) in the SCTG group (3.5 mm) than in the GTR-DFDBA group (2.4 mm).

Conclusions: Both techniques for treatment of gingival recession (SCTG and GTR-DFDBA) lead to favourable and long-term stable results, but SCTG promoted a more favourable increase in keratinized tissue.

1. Introduction

Different treatment modalities have been described to obtain root coverage in gingival recessions. Among them, subepithelial connective tissue graft (SCTG) is the surgical procedure that promotes the most predictable and satisfactory results for root coverage and aesthetics. [1–17] However, the SCTG technique requires a second surgical site for a donor area of connective tissue, which may cause more discomfort to the patient. [3,18] Hence, the guided tissue regeneration (GTR) technique with the use of barriers was proposed by Tinti and Vincenzi [19] in an attempt to promote stable root coverage and the formation of new cementum (the periodontal ligament and alveolar bone covering the exposed root surface). There are nonresorbable and resorbable membranes for GTR

* *Corresponding author at*: Rua Humaitá, 1680, Cep: 14801-903, Araraquara, São Paulo, Brazil. Fax: +55 16 3301 6369.
E-mail address: adriana@foar.unesp.br (Rosemary A.C. Marcantonio).
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procedures[19,20]; however, the use of nonresorbable barriers requires a second intervention for membrane removal, whereas the resorbable barrier does not need a second surgical intervention for that purpose. Thus, the resorbable membranes seem to be more comfortable for patients during the healing phase.[20]

Several comparative studies have been performed between SCTG and GTR techniques[2,4–11,21]; however, few studies have compared the procedures of GTR and SCTG to each other over a longer period of time. Some authors have demonstrated that the amount of root coverage presents no significantly difference between GTR and SCTG procedures, [2,4,5,7,8,10,11,21] whereas other studies have shown that SCTG yields significantly better results than GTR.[6,9] A recent systematic review showed that SCTG, coronally advanced flaps alone or combined with biomaterials and also GTR may be used as root-coverage procedures for the treatment of localized recession-type defects, but the authors highlighted that the use of SCTG seemed to be more adequate where root coverage and gain in keratinized tissue were expected.[22] The aim of this study was to clinically evaluate the long-term (30-month) results of 2 therapeutic modalities for the treatment of gingival recessions: GTR with a bioabsorbable barrier membrane and SCTG.

2. Materials and methods

2.1. Subject population

Twelve patients (3 men and 9 women; mean age = 39 years) were selected for the study among those undergoing periodontal treatment at Araraquara Dental School of São Paulo State University (UNESP) from October 1996 to 2000. To be enrolled in the study, the patients had to fulfil the following inclusion criteria: age between 25 and 60 years, probing depth $\leq$4 mm in all teeth, and a minimum of 3 mm of gingival recession (Miller Class I and II) at mid-buccal surfaces of maxillary canines or pre-molars bilaterally. Patients were excluded from the study if they met any of the following exclusion criteria: diabetes mellitus status, pregnancy or lactation, physical or mental handicap that could interfere with adequate oral hygiene control, current smoker or former smoker (of five years or greater standing), use of systemic and/or topical steroidal and non-steroidal anti-inflammatory drugs during the last 3 months, antibiotic consumption during the last 6 months before the surgical procedures, a condition requiring prophylactic antibiotic coverage before invasive dental procedures or occlusal interferences. Gingival tissues with thinner phenotypes were excluded from the study, which showed features of translucency and prominent dental roots following the bone contour in the vestibular region.

Before entering surgery, patients were given oral and written information on the study design and purpose in order to obtain informed consent. The study design was approved by the local ethics committee of UNESP, and it conformed to the requirements of the World Medical Association Declaration of Helsinki. This study is a follow-up of a previously published paper with an 18-month follow-up period.[10]

2.2. Sample size and power

The sample size was based on earlier studies.[6,23,24] A posteriori power statistical test was performed based on our results for dependent means, considering root coverage data on the 30-month post-surgery for the GTR-DFDBA (87 $\pm$ 17.2) and SCTG (95.5 $\pm$ 10.1) groups. The power analysis was performed at the end of the study to ensure that the sample used was sufficient to uncover clinically and statistically significant differences. The power was calculated by a post hoc *t* test (G Power® 3.0.10., Faul F et al., Bonn, Germany), and it was estimated as 0.99 with error $\alpha = 0.01$.

2.3. Examiner calibration

A single examiner evaluated all periodontal clinical parameters (RACM). For calibration, clinical attachment level was randomly evaluated in two sextants per patient in four subjects on 2 different occasions, one week apart. The data were submitted to the Student's *t*-test, and calibration was approved, shown by the fact that there were no statistically significant differences in the evaluation between the two occasions ($p > 0.05$). Pearson's correlation between the two measurements revealed a very high correlation ($r = 0.92$). The calibration was repeated before each re-evaluation.

2.4. Experimental design

Six to eight weeks before entering the surgical procedures, the patients were enrolled in the study according to the inclusion criteria. Then, scaling and root planning by quadrants were performed and oral hygiene instruction was provided. After completion of the non-surgical periodontal treatment, the following periodontal parameters were assessed: gingival recession (GR), probing depth (PD), clinical attachment level (CAL) and keratinized tissue width (KTW).

The percentage of root coverage 30 months post-surgery was also calculated as described by Rosetti et al. [10] All measurements were obtained at the mid-buccal portion of each tooth by a single trained calibrated examiner (RACM) at baseline (0 week), 6, 18 and 30 months after the surgical procedures. The data of previous findings at baseline, 6 and 18-month follow-up were compared with the data obtained in the 30-month follow-up.

2.5. Surgical procedure and postoperative care

The surgical treatments were randomized by aleatory selection in a split-mouth design by an experienced clinician (EPR). A simple randomization was performed by flipping a coin, for example, heads as control and tails as treatment determined the assignment of each treatment group. The Guided Tissue Regeneration combined with demineralized freeze-dried bone allograft (DFDBA, Dembone, Pacific Coast Tissue Bank, Los Angeles, CA) was considered as the test group (GTR-DFDBA), and the subepithelial connective tissue graft (SCTG) procedure group was the control group (''gold standard''). The same surgical preparation was performed for SCTG and GTR-DFDBA at the recipient sites with an intrasulcular incision and 2 vertical incisions made in a trapezoidal formation with the

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