FREE GINGIVAL GRAFT IN THE TREATMENT OF CLASS II GINGIVAL RECESSION DEFECTS AND ITS EFFECTS ON DENTIN DESENSITIZATION

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ABSTRACT

Background and Aim: The aim of this study was to evaluate the effectiveness of free gingival grafts (FGG) in the coverage of Miller’s Class II gingival recession defects and dentin desensitization.

Subjects and Methods: FGGs were performed to treat recessions in a total of 14 teeth in 14 patients with Miller’s Class II gingival recession and clinically identifiable dentin hypersensitivity. Clinical parameters such as plaque index (PI), gingival index (GI), probing pocket depth (PPD), clinical attachment level (CAL), recession depth (RD), recession width (RW), and width of keratinized gingival (KG) were recorded at baseline and at 1 and 6 months after surgery. Dentin hypersensitivity was also measured at baseline, 1- and 6-months post-surgery by using a visual analogue scale (VAS). Kolmogorov-Smirnov test was performed to assess the normality of the distribution. PI, GI, KG and VAS were normally distributed, the repeated measures ANOVA was used. Since PPD, CAL, RW and RD were not normally distributed; statistical analysis was performed using the Friedman and post hoc Wilcoxon tests, with the significance level set at 0.05.

Results: Recession depth was reduced from 4.42±0.64 mm at baseline to 1.07±0.26 mm at 6-months post-surgery. A mean 75.7% reduction in recession depth was obtained. Keratinized tissue increased from 0.64±0.49 mm to 4.14±1.51 mm (84.5% increase in keratinized tissue). A mean 75.8% root coverage was obtained. A statistically significant improvement in VAS scores was also seen at 6-months post-surgery.

Conclusions: The FGG procedure can effectively treat Miller’s Class II gingival recession defects and relieve dentin hypersensitivity.

Key words: Dentin Hypersensitivity, Free Gingival Graft, Gingival Recession, Root Coverage
INTRODUCTION

Dentin hypersensitivity is defined as the short and transient painful response of exposed dentin, usually cervical, to thermal, tactile, osmotic, or chemical stimuli. With the exception of sensitivity associated with tooth bleaching or other tooth pathology, dentin hypersensitivity results from the exposure of dentinal tubules due to gingival recession and the subsequent loss of cementum on root surfaces. Treatment to relieve dentin hypersensitivity should always start by preventing dentin exposure and reducing predisposing factors and stimuli. Treatment options include over the counter (OTC) products such as fluoride- and/or potassium-enriched mouth washes and dentifrices and in-office treatments, such as high fluoride-content varnishes and gels, potassium-oxalate chelating agents, glutaraldehyde tissue-fixating agents, bonding materials and low-viscosity glass ionomers as well as nonconservative treatments such as root canal therapy and mucogingival surgical interventions.

This study examined the use of mucogingival surgical intervention in treating dentin hypersensitivity due to the ability of this treatment method to prevent further recession, correct aesthetic problems and aid in plaque control in addition to reducing dentine hypersensitivity. Most mucogingival treatment techniques involve the manipulation of dental tissue to augment the gingiva and cover the exposed root. Free gingival grafts (FGG), a coronally advanced or laterally positioned flap, guided tissue regeneration and subepithelial connective tissue grafts have all been used to successfully treat gingival recession. Though FGG is not an option for treatment of dentin hypersensitivity, it is effective to treat gingival recession, the most important predisposing factor associated with the occurrence of dentin hypersensitivity and to provide long term success. FGG was used in this study in preference to connective tissue grafts, because it is more successful in increasing apico coronal width of keratinized mucosa. Besides, while there are many studies about the effectiveness of connective tissue grafts in dentin desensitization, no information is available regarding the effectiveness of FGG. Therefore, this study aimed to assess the ability of FGG to improve root coverage in Miller’s II gingival recession defects and reduce dentin hypersensitivity. The hypothesis tested in this study is that FGG enhances clinical parameters and reduces dentin hypersensitivity.

SUBJECTS AND METHODS

Fourteen patients with Miller’s Class II gingival recession were included in the study (Figure 1). Patients ranged in age from 32-40 years, were in general good health and were observed during this study. None of the patients had received any periodontal or desensitizing treatment during the previous 3 months, none had used desensitizing toothpastes during the previous 6 weeks, and none were taking regular medication. The research protocol was approved by the Bioethical Committee of the Masraşal Çakmak Hospital. The patients agreed to the study protocol and informed consent was obtained prior to treatment. The inclusion criteria were: (1) Presence of Miller’s Class II gingival recession with a recession height of ≥ 2 mm in an anterior or premolar tooth (n= 14), (2) Absence of interdental bone loss, (3) Normal alignment of the teeth in the arch, (4) Absence of severe cervical abrasion/root caries that would require restoration, (5) Presence and maintenance of good oral hygiene, (6) Nonsmokers, (7) Noncompromised systemic health and no contraindications for periodontal surgery. Baseline measurements of clinical parameters (Plaque index (PI), gingival index (GI), probing pocket depth (PPD), clinical attachment level (CAL), recession depth (RD), recession width (RW), width of keratinized gingival (KG), visual analog scale score (VAS)) were obtained. All the patients were capable of maintaining good oral hygiene, so no initial periodontal treatment prior to surgery was carried out. Prior to surgery, patients were asked to rinse for 1 min with a 0.12% chlorhexidine digluconate antiseptic solution, and the treatment area was anesthetised with 1:200.000.
lidocaine HCl (2%) and epinephrine. Gracey curettes were used to gently scale and plane the root surface and reduce buccal prominence. A horizontal incision was made at a right angle to the papilla at the level of the CEJ (cemento-enamel junction), and two parallel vertical incisions were made from the gingival margin to the alveolar mucosa. A partial thickness flap of epithelial and connective tissue was raised, and the recipient site was prepared 3 mm apical to the most apical part of the exposed root. An aluminum foil template of the recipient site was made and placed over the donor site in the palate. Gingiva from the palate was harvested, placed over the recipient site and sutured at the lateral borders and the underlying periosteum. Periodontal packs were placed over the graft and the donor site and were firmly held in place using digital pressure for 5 min. Patients were prescribed analgesics and a chlorhexidine digluconate mouthwash (0.2%) for one week. Patients were recalled after 10 days for removal of periodontal dressing and sutures (Figure 2). Follow-up visits were conducted after 1 and 6 months, and clinical parameters were recorded (Figure 3). Dentin hypersensitivity was evaluated using a visual analog scale (VAS) at baseline and 1 and 6 months post-surgery. An air-blast was directed to the root surface of the treated tooth for 2 seconds, with the adjacent teeth shielded by the dentist’s fingers, and patients were asked to grade their sensitivity using the VAS scale from 0 (“no pain”) to 100 “unbearable pain”.

Data of the study were processed using SPSS 16.00 (Inc., IL., USA) software. Kolmogorov–Smirnov test was performed in order to assess the normality of the distribution. PI, GI, KG and VAS were normally distributed, the repeated measures ANOVA was used. Pair-wise multiple comparisons were performed using the post-hoc comparison test. Since PPD, CAL, Rw, and RD were not normally distributed; the Friedman test was used in the statistical assessment. Pair-wise comparisons were performed using the Wilcoxon test. In testing the significance of all the comparisons and correlations, P<0.05 was considered as statistically significant.

**RESULTS**

Pre- and post-operative measurements of clinical parameters and root coverage percentages are given in Table 1. Statistically significant improvements in plaque index, recession depth, width of keratinized gingiva and clinical attachment level were observed at 6-months post-surgery. Recession depth decreased from 4.42±0.64 mm at baseline to 1.07±0.26 mm at 6-months post-surgery. A mean 75.7% reduction in recession depth was obtained. No statistically significant reductions in recession depth between 1 and 6 months (p>0.05). Keratinized tissue increased from 0.64±0.49 mm to 4.14±1.51 mm (84.5% increase in keratinized tissue). No statistically significant improvements in gingival index, recession width and probing pocket depths were observed. Mean recession (root) coverage at 6 months post-surgery was 75.8%. Whereas no significant improvements were observed in VAS scores from baseline to 1-month post-surgery, significant improvements were observed from baseline to 6-months post-surgery (p<0.05).

**DISCUSSION**

Teeth exhibiting dentin hypersensitivity have been shown to have dentinal tubules open at the dentin surface, making the identification of those factors that lead to...
Dentin exposure and open tubules important for both prevention and management of dentin hypersensitivity. If the predisposing factors are not first removed or modified, treatment is likely to provide only short-term success. Gingival recession is considered to be the most important predisposing factor among the various factors that have been associated with dentin hypersensitivity. The present study assessed the use of FGG in treating Class II gingival recession and dentin hypersensitivity. At present, even though the FGG lost their race to subepithelial connective tissue grafts as far as root coverage is concerned; they still hold an edge in considerations like being less invasive, quick and easy tissue handling. Furthermore, to our knowledge, no previous study has evaluated the use of FGG to relieve pain due to dentinal hypersensitivity by providing root surface coverage.

Dentin hypersensitivity is a painful condition that is difficult to quantify. Wallace and Bissada have shown that air stimulus measures dentin hypersensitivity and not pulpal sensitivity; therefore, this study used air stimulus to measure dentin hypersensitivity. The present study also used a visual analog scale (VAS) to assess dentin hypersensitivity. The fact that the VAS is easily understood by patients and is able to discriminate among the effects of various types of treatments has made it a suitable tool for evaluating pain response in connection with dentin hypersensitivity that has been used in other clinical studies, including studies evaluating pain arising from periodontal therapies. The findings of the present study indicated the hypothesis that FGG enhances clinical parameters and reduces dentin hypersensitivity to be correct. Reduced sensitivity was still observable at 6 months post-treatment. The extent of keratinized gingival tissue was found to increase significantly following surgery, and significant coverage of denuded roots was obtained. The increase in keratinized gingival tissue was accompanied by better oral hygiene and a decrease in plaque index scores. Prati et al. have stated that tooth-brushing creates a new, thin smear layer and reduces dentin permeability, which may have contributed to the reduction of dentin hypersensitivity found in our study.

The literature reporting on free gingival autografts varies widely, reporting percentages of root coverage ranging from 11%-100%. These differences may be attributed...
to differences in the severity of gingival lesions, in the surgical techniques used and in the applied methodology used (that is inclusion criteria, variability between surgical procedures, examiner-blinding and follow-up period). The present study found 75.8% mean root coverage of denuded roots at the end of the study 6 months after FGG treatment. This coverage of denuded root is statistically significant. Although no significant improvements were observed in VAS scores from baseline to 1-month post-surgery, significant improvements were observed from baseline to 6-months post-surgery (p<0.05). While no previous study has used VAS scores to compare sensitivity to pain before and after root coverage, the findings of the present study are in line with a number of case reports that have evaluated the effectiveness of root coverage in dentin desensitization. For example, Martorelli et al.26 reported that a subepithelial connective tissue graft that completely covered recession defects was able to desensitize dentin in one patient. Similarly, Park27,28 found that the use of subepithelial connective tissue to treat a gingival recession defect had a pain-relieving effect. While root coverage is the most important factor in the desensitization of dentin observed following FGG, plaque accumulation and natural occlusion of tubules with time also play roles in lessening dentin sensitivity. In our study, the plaque index decreased significantly, and a great deal of root surface coverage was attained. It is also possible that tooth brushing produced a smear layer that resulted in the occlusion of dentin tubules, which may in turn have had an effect on dentin sensitivity. Dietary factors, saliva or other endogenous factors29 which might cause smear layer removal are eliminated in this study because VAS scores were recorded both preoperative and postoperative period.

Root preparation prior to surgery can be mechanical, chemical, or a combination of both. Mechanical preparation usually involves scaling and root planning, which removes cementum and softened dentin and smooths the root surface. In fact, there is some controversy as to whether or not mechanical preparation is necessary prior to surgery. Whereas some studies have found mechanical preparation to be a prerequisite for the formation of smear layer and the obliteration of dentin tubules,30-32 other studies have shown mechanical preparation to cause dentin hypersensitivity by removing the cementum and exposing dentin tubules.33,34 The present study found no significant improvement in VAS scores from baseline to 1-month post-surgery which may have been caused by scaling and root planning during surgery.

CONCLUSIONS

The results of this study indicate that nearly 75% of the denuded root surfaces could be covered with FGGs in class II recession, contributing to an overall improvement in the periodontal health. Also it suggests that in early period, after FGG, no changes were observed in severity of DH, in the progressive period, DH could decrease related with some factors such as plaque index, keratinized tissue, and time factor.

Conflict of interest

The authors declare that they have no conflict of interest.

REFERENCES


