Clinical Comparative Study of Collagen Membrane and Space maker Usage versus Sub epithelial Connective Tissue Graft (modified method) in Gingival Recession Treatment

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ABSTRACT
Background and Aim: Gingival recession is defined as exposure of tooth root surface due to apical movement of the gingival margin; different methods have been used for its treatment. This study was performed to clinically compare the changes observed in periodontal clinical indices between the two methods adopted in treatment of gingival recession, GRT and CTG.

Materials and Methods: In this experimental study, 24 cases of gingival recession were selected in 12 patients who had Miller’s class I and/or II gingival recession in their canines or premolars. Twelve areas were treated with CTG and 12 with GTR method. The studied indices including depth and width of recession, clinical attachment level, probing depth, and width of keratinized gingiva were measured before treatment and 1, 2, 3, and 6 months later. Data were analyzed using Wilcoxon, T-paired and ANOVA statistical tests.

Results: Both CTG and GTR methods led to significant decrease in depth of gingival recession (P=0.035), width of recession (p= 0.005), improvement in clinical attachment level (P=0.05) and width of keratinized tissue (P=0.0001). But no significant difference was noticed between two groups regarding probing depth (P=0.3).

Conclusion: Although both treatment methods considerably improved the treatment of gingival recession, CTG method was superior to GTR for increasing the width of keratinized tissue and increasing the clinical attachment level.

Key words: Gingival recession; Connective tissue; Guided tissue regeneration

INTRODUCTION
Gingival recession is defined as exposure of tooth root due to apical movement of gingival margin. In addition to aesthetic problems, it causes other problems such as root sensitivity, pulpititis signs and increased accumulation of plaque. Causative factors of gingival recession are gingivitis, trauma, and inappropriate position of the tooth in dental arch, as well as anatomical abnormalities. Prevalence and intensity of gingival recession is 8% in children and reaches 100% in 50 years of age 1. Wilson claims that gingival recession occurs in one or a number of alternative spans within intervals of several months or several years. 2 Covering the exposed root surface is among the most important aims of periodontal treatments. Using various types of grafts to cover the exposed roots has a long history; but much of the researches in this regard date back to the second half of
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19th century.
Some factors have been suggested that enhance the success of root coverage including, complete root planning and reducing the surface convexity, full adaptation of graft and the bed, coronal position of the inter-teeth bone compared with CEJ, and adequate thickness of the graft (at least 1mm) \(^3\), \(^4\). Miller (1987) reported the factors that would lead to failure of coverage of exposed roots as following: Miller’s class III and IV recessions, conditions in which root surface is not properly planed, improper preparation of the bed, inter-dental papillae with improper size, improper thickness of the graft and its dehydration. \(^5\)

Generally, the golden standard for coverage of the exposed root is using subepithelial connective tissue graft. \(^6\) This method is prescribed when there is not adequate tissue to perform the horizontal lateral flap, when there is single wide broad or multiple gingival recessions, when there are several recessed areas with the minimum level of gingival attachment, or when the recession is adjacent to edentulous area which requires correction of the ridge. This method has the advantages of both free gingival graft and gingival pedicel graft methods.

Today, new materials such as ADM (Acellular Dermal Matrix) are used for treatment of gingival recession; for coverage of root with coronally positioned flap \(^7\). This material can also be used in tunneling technique for treatment of multiple adjacent teeth with gingival recession in the aesthetic zone. \(^8\)

In this research, alteration has been made to the subepithelial CTG method and a new technique was introduced in using subepithelial CTG. In treating root recession, GTR method has been planned in such a way that a membrane would be placed underneath the coronal flap; or based on Melcher principles. \(^9\) Nowadays, the non-absorbable membranes have been replaced with absorbable ones, the most common of which is collagen membrane. This study compares “a modified method of using connective tissue” and “collagen membrane (BioGide) and space maker (Gingistat)” in treatment of Miller’s class I and II gingival recessions.

**Materials and Methods:**
This interventional clinical trial (registration no. IRCT 2014051912487N5) was performed on 24 cases of bilateral recession in 12 patients (8 men and 4 women) aged 23-54 with the mean age 39±7. The treatment type on the right and left side was decided randomly. Twelve areas in patients were treated using subepithelial connective tissue graft, the other 12 areas with use of collagen membrane and space maker.

considering the inclusion criteria, the patients must had class I recession (minimum depth 3mm) in anterior and premolars; they also had to be able to control the plaque, as well as having aesthetic problems or root sensitivity (to determine the sensitivity, air was blown on the root surface using air syringe for 3 seconds with 2cm distance from the considered tooth and the patient was asked about sensitivity).

The exclusion criteria were as following: having any systemic disease, smoking, presence of signs of gingival inflammation, allergic response to collagen compounds, and not being able to have regular visits. Prior to the surgery, full explanation was given to the patient on the method and conditions of treatment, and written consent was obtained. The patient was also fully trained on how to properly maintain hygiene.

Scaling and root planning was performed, and faulty restorations were corrected. During visits, O’Leary plaque index was recorded and when it reached below 20%, the patient was ready for surgery. Recession depth (RD) and recession width (RW), clinical attachment level (CAL), probing depth (PD), and width of keratinized gingiva were measured before, and 1, 2, 3 and 6 months after the operation. All measurements were done by the same operator with the help of Williams periodontal probe by 1mm accuracy.

The surgery method in CTG group was as follow: after performing the anesthesia, a horizontal incision was created with vertical angle at the level of CEJ on the mesial and distal papilla of
the considered tooth, followed by two vertical releasing incisions from the ending point of the first incision towards the alveolar mucosa and was continued to such a level that the muscle stretch on the flap would be eliminated and the flap would easily be positioned more coronal than the tooth CEJ. In the donor area (palate), after local anesthesia, two horizontal parallel incisions were created on the premolars area; the coronal incision was 2mm distant from the teeth margin and the apical incision was 2-3mm distant from the coronal one. The connective tissue was removed from its original site using forceps, placed on the papilla adjacent to the recession area, and was fixed to the periosteum in the recipient site using 0-5 absorbable Plane suture thread through Oscheubein suture. The flap was then placed on the connective tissue, coronalized using sling sutures and interrupted sutures, and was fully tighten on the vertical incision site.

Method of surgery in GTR group was similar to CTG group; the only difference was that in GTR method, there was no need to prepare the graft material; instead, a piece of the space maker material (Gingistat) was placed on the recession site in adequate amount or a bit more than the recessed site. In order to take the necessary care, dressing was not used after the operation was over.

The sutures were removed 10 days later. Amoxicillin capsules (500mg/8h) and ibuprofen (400mg/6h) were prescribed to be taken for a week. The patients were also recommended to rinse their mouth with 2% chlorhexidine mouthwash 2 times a day for 6 weeks. Wilcoxon and T-paired tests were used to analyze the data obtained within each therapeutic group and between the groups 1, 2, 3 and 6 months after the operation. In order to compare the results obtained from each therapeutic method, ANOVA and Mann-Whitney tests were used as appropriated.

Results:
Comparing the mean changes of the indices before and after treatment in GTR group revealed a significant decline within 1, 2, 3, and 6 months after surgery, in the mean value of recession depth (P=0.001), recession width (P=0.01), probing depth (P=0.04), clinical attachment level (P=0.001) and width of keratinized gingiva (P=0.001) (Diagram 1).

The same comparison in CTG group indicated a considerable decrease in mean value of recession depth (P=0.01), recession width (P=0.01), probing depth (P=0.04), clinical attachment level (P=0.001) and width of keratinized gingiva (P=0.001) within 1, 2, 3 and 6 months after the treatment (Diagram 2).

Diagram 1- Clinical variables before the operation and 6 months later in GTR group
When the two groups came to be compared, the changes in mean values of indices measured before and 6 month after the treatment showed that 6 months after the operation, both groups had significant decline in the mean value of recession depth (P=0.035), recession width (P=0.005), clinical attachment level (P=0.05) and the width of keratinized gingiva (P=0.0001). However, no considerable difference was detected between the two groups regarding the probing depth (P=0.3) (Diagram 1).

**Discussion:**
The current study clinically compared the method of subepithelial connective tissue graft with a modification in Langer & Langer method, i.e. omitting the epithelium of the connective tissue, and the modified method of guided tissue regeneration using collagen membrane and space maker (Gingistat) for treatment of Miller class I and II recessions.

Bouchard (1994) attempted to change the Langer & Langer method \(^{10}\); and could reach 69.2% coverage of the exposed root. His method was aesthetically superior, but regarding the relatively high volume of the connective tissue for coronally positioning the flap, the flap would undergo heavy stretch; the more intense the stretch, the less the gingival recession would reduce. \(^{11}\)

Regarding the mean changes following the treatment in the current study, both CTG and GTR groups were found to have significant changes in the indices of mean coverage of exposed root, width of keratinized tissue, probing depth, recession width and clinical attachment level.

The mean root coverage in this study obtained from CTG and GTR groups was 100% and 82%, respectively, indicating the mean exposed root coverage of CTG group to be higher than GTR. Majority of the researchers detected no difference between CTG and GTR groups regarding exposed root coverage \(^{12-17}\) which was in line with the results of the current study; nonetheless, it did not conform to the results obtained by Muller\(^{18}\) in this regard.

An increase was observed in the mean width of keratinized tissue in both groups, being 2.5 and
0.83mm in CTG and GTR, respectively; which was statistically significant (P<0.0001). These values were in line with the values obtained in other studies.19,20

The probing depth in this study was found to have declined in 7 cases treated by CTG method and 5 cases treated by GTR method; however the difference between the two group was not significant (P>0.05) and it was conforming to the results of other studies. 12, 14, 16But the probing depth was reported to have declined in GTR group in the study by Rossetti 22 which was different from the current study.

The mean recession width in CTG group was higher than GTR in this study. This difference might be due to the fact that in CTG group, the recession width reached zero in all 12 cases since the recession depth reached zero. While in GTR group this value declined to zero only in 6 cases and in others it only had a slight decrease; this makes mentioned study in accordance with this study and other studies 13-16, 22, 23

In the study by Tataki 24, the recession width did not show any changes in either group which did not match the current study and other researches. Both CTG and GTR groups revealed significant difference after treatment in terms of clinical attachment level; being higher in CTG group (P<0.005), and it was in consistency with other studies 16, 14, 12, 22.

Conclusion:
Although both therapeutic methods were highly effective on treatment of gingival recession, considering improved width of keratinized tissue and reduced attachment level, CTG method is superior to GTR.

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