

FREE GINGIVAL AUTOGRAFT FOR AUGMENTATION OF KERATINIZED TISSUE AND STABILIZATION OF GINGIVAL RECESSIONS

Chr. Popova, Tsv. Boyarova
*Department of Periodontology
Faculty of Dental Medicine, Medical University - Sofia, Bulgaria*

SUMMARY:

Background: The presence of gingival recession associated with an insufficient amount of keratinized tissue may indicate gingival augmentation procedure. The most common technique for gingival augmentation procedure is the free gingival autograft.

The aim of this study was to evaluate the changes in the amount of keratinized tissue and in the position of gingival margin in sites treated with free gingival autograft apical to the area of Miller's class I, class II and class III gingival recessions.

Methods: Twenty three subjects with 56 gingival recessions associated with an insufficient amount of keratinized gingiva were treated with gingival augmentation procedure (free gingival graft). The grafts were positioned apical to the area of recession at the level of mucogingival junction. Clinical variables, including recession depth (Rec), amount of keratinized tissue (KT) and probing depth (PD) were measured at baseline and six months to one year after surgery and analyzed using statistics model of variation analysis.

Results: From baseline to one year after free gingival grafting KT increased with 4.28 ± 1.10 ($P < 0.001$) and recessions reduced with 0.90 ± 0.56 ($P < 0.001$). There was no significant change in probing depth after gingival augmentation procedure ($P > 0.05$).

Conclusion: In the limits of this study it may be concluded that free gingival graft augmentation procedure apical to the area of recession lead to predictable results providing an increased amount of keratinized tissue and may reduce the recession depth.

Key words: Gingival recession; free gingival graft; gingival augmentation procedure.

Gingival recessions are often associated with genetically determined anatomic situations like an insufficient amount of keratinized gingiva, frenal pull, tooth malposition, dehiscence and fenestration of facial osseous lamella but the most common cause of the recession defects is abrasive and traumatic toothbrushing (2, 7, 9, 10, 22). On the other hand improper oral hygiene, subgingival calculus

formation and periodontal disease can cause progressive loss of attachment and displacement of gingival margin apically reducing vestibular depth. Proper oral hygiene is impossible in such cases with minimal vestibular depth and lack of attached gingiva (2, 15).

There are several evidences that persons who practice optimal oral hygiene may maintain periodontal health with minimal amount of keratinized gingiva (18). However, a number of authors suggest that sufficient amount of keratinized tissue is considered essential to preserve the healthy periodontal status and to support the dentogingival unit more resistant during the masticatory function and oral hygiene procedure (9). Therefore the presence of gingival recession associated with a minimal amount or lack of keratinized gingiva may indicate need of gingival augmentation procedure to prevent additional apical displacement of the gingival margin (1, 3, 4, 5, 7, 8). A definitive indication for gingival augmentation procedure is the lack of attached gingiva in the areas of dentition considered for prosthetic restoration. The evaluation and the correction of the amount of the attached gingival tissue is a significant part of the orthodontic treatment when the buccal movement of the teeth is expected (26). Gingival augmentation therapy is often indicated in the cases of lack of attached gingiva to improve the effectiveness of the oral hygiene procedures.

Periodontal plastic surgery is the branch of periodontology that is focused mainly on the correction or elimination of mucogingival problems associated with lack of attached gingiva, a shallow vestibule and aberrant frenum (7, 13). Various mucogingival surgical procedures are used to halt progression of the gingival recession and to correct poor esthetic appearance (5). Free gingival autograft is one of the most common techniques used for gingival augmentation apical to the area of recession. This technique accomplishes the following objectives: enhances plaque removal around the gingival margin, reduces gingival inflammation and improves esthetics (22). Some studies reported stability of gingival margin and reduction of recession after free gingival augmentation procedure (1, 3, 4, 5, 6, 7, 14, 15, 18, 21, 25).

The aim of this study was to evaluate the changes in the amount of keratinized gingiva and in the position of gingival margin in sites with lack or inadequate attached gingiva in conjunction with gingival recession six months to one year after mucogingival treatment by free gingival autografts procedures.

MATERIALS AND METHODS

Study population

Twenty three subjects (aged 23 to 60 years) with 56 Miller's class I, class II and class III gingival recessions (16 underwent gingival augmentation procedure.

Subjects for this study were selected among the patients referred to Department of Periodontology - Sofia, Bulgaria according to the following criteria: full-mouth plaque and bleeding scores <20% (HI - O'Leary et al. 1972; Lindhe 1983, PBI Saxer & Muhlemann 1975), presence of at least one site with complete lack of attached gingiva related to gingival recession. All subjects signed a consent form for the surgical treatment.

Measurements

The following measurements are recorded at baseline and 6 months to 1 year after surgery:

- **Rec** - gingival recession depth (the distance between the gingival margin and the cemento-enamel junction at the mid-buccal point);
- **KT** – width of the keratinized gingiva (the distance from the gingival margin to the mucogingival junction at the mid-buccal point);
- **PD** - probing depth at the experimental site (the distance from the gingival margin to the bottom of the gingival sulcus).

The measurements were taken using Williams probe (Hu-Friedy, Chicago, IL, USA).

Surgical procedure

Before surgery all patients were motivated and instructed to use vertical brushing technique and interdental cleaning aids according to interdental architecture.

Free gingival graft procedure was initially introduced by Bjorn in 1963 (4). Later Nabers 1966 (20) and Sullivan and Atkins 1968 described the indications, techniques and the principles of the free gingival grafts (25, 26):

In this study the surgical procedure was performed according to the following steps:

Step 1. Preparing the recipient site. The recipient site was prepared with initial incision at the existing mucogingival junction with a #15 blade to the periosteum. Incisions were extended approximately twice the desired width of the keratinized tissue. The blade was inserted along the cut gingival margin and separated a flap without disturbing the periosteum. The flap was sutured to the periosteum apically where the apical portion of the gingival graft will be located.

Step 2. Harvesting the free gingival graft from

palate. The partial thickness graft was harvested from the palate. The graft consisted of epithelium and a thin layer of underlying connective tissue. Proper thickness between 1.0 and 1.5 mm is important factor for survival of the graft.

Step 3. Transferring and immobilizing the graft. The gingival graft was adapted to the recipient site and sutured at the lateral and coronal borders to the periosteum to secure it in position. Periodontal dressing was applied over the surgical area for ten days.

Step 4. Protecting the donor site. The donor site was compressed and covered with periodontal dressing for ten days too.

Sutures were removed 10 days after surgery. After initial healing the subjects were recalled every 3 months for supportive periodontal treatment (21).

Statistical analysis

Statistical analysis was performed by using one-way analysis of variance. A t-test was used for comparison between the means when analysis of variance test was significant. The significance level was set at $p < 0.05$. Statistical analysis was performed with SPSS v15.0 (SPSS Inc, Chicago, IL) for Windows (Microsoft, Redmont, WA).

RESULTS

A total of 23 subjects (aged 23 to 60 years) provided 56 sites for gingival augmentation procedures. All sites in this study were treated with free gingival graft positioned apical to the area of recession.

The results of statistical analysis of the measurements at baseline and 1 year after surgery are presented in Tables 1 and 2 and clinically on the figures 1-10.

At six months to one year after surgery the amount of KT was increased with mean value 4.28 ± 1.10 mm. In the recession sites associated with lack of KT vertical measurements were reduced with 0.9 ± 0.56 mm and mean values of PD remained stable without significant changes.



Figure 1. V.S. – Miller's class II gingival recession of #44 and lack of attached gingiva.



Figure 2. V.S. – 6 months after gingival grafting. Augmentation of the keratinized gingival tissue is achieved; the reduction of the recession is evident.



Figure 5. D.R. – Miller's class III gingival recessions of the lower incisors and lack of attached gingiva.



Figure 3. V.S. – Miller's class II gingival recession of #34 and complete lack of attached gingival tissue.



Figure 6. D.R. - 6 months after surgery the creation of the attached gingival tissue is evident. The reduction of the recession depth is observed.



Figure 4. V.S. – 6 months after free gingival grafting. The creation of keratinized gingival tissue and reduction in the recession depth is seen.



Figure 7. A.I. - Miller's Class I gingival recessions of the mandibular incisors in lack of attached gingiva.



Figure 8. A.I – 6 months after free gingival graft gingival tissue augmentation and reduction of gingival recession depth is observed.



Figure 9. M.A. – Miller's class II gingival recession with lack of attached gingiva apical to the recession.



Figure 10. M.A. – 6 months after free gingival grafting the attached gingiva augmentation and gingival recession reduction is achieved.

Table 1. Clinical variables before and after gingival augmentation procedure measured in mm: Rec, KT, PD, KT gain, Rec reduction.

Teeth	Rec mm		KTmm		PDmm		KT gain	Rec reduction
	before	after	before	after	before	after		
n=56	3.12±1.35	2.17±1.18	1.85±0.86	3.90±2.40	0.86±0.63	0.77±0.67	4.28±1.10	0.90±0.56
	t=4.32P<0.001		t=6.21P<0.001		t=0.73P>0.05			

Table 2. Gain of the keratinized gingival tissue and recession reduction in the areas of the different teeth. The highest values of gingival tissue augmentation and recession reduction are recorded in the premolars.

Teeth	KT gain	Rec reduction
Incisors – 38	4.21±1.1	0.84±0.47
Canines – 2	3.75±0.75	1±0.0
Premolars – 13	4.65±1.03	1.12±0.79
Molars – 3	4±1.14	0.66±0.24

Diagram 1. Here are presented all the vertical measurements of the investigated gingival recessions before and after free gingival grafting. It is obvious that in all of the cases the reduction of the recession is achieved.

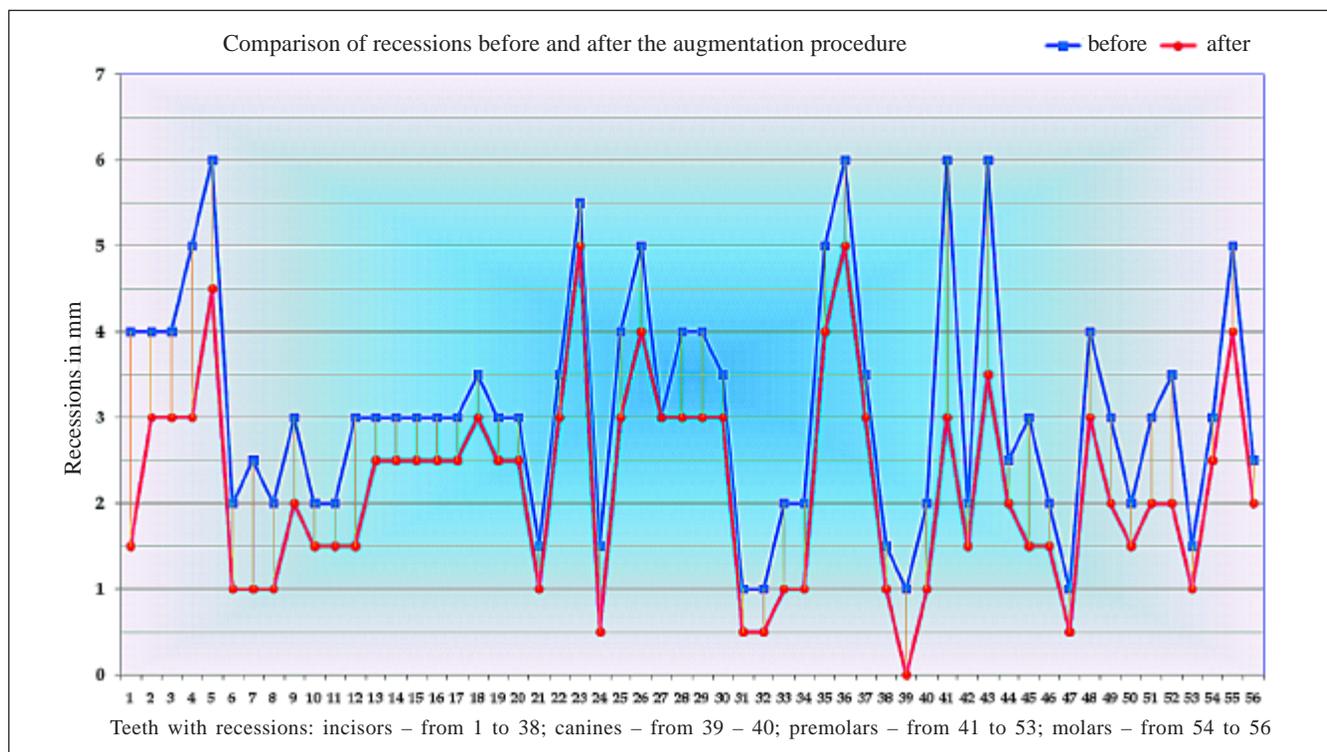


Diagram 2. All treated sites are presented with the initial and final values of the keratinized gingiva.

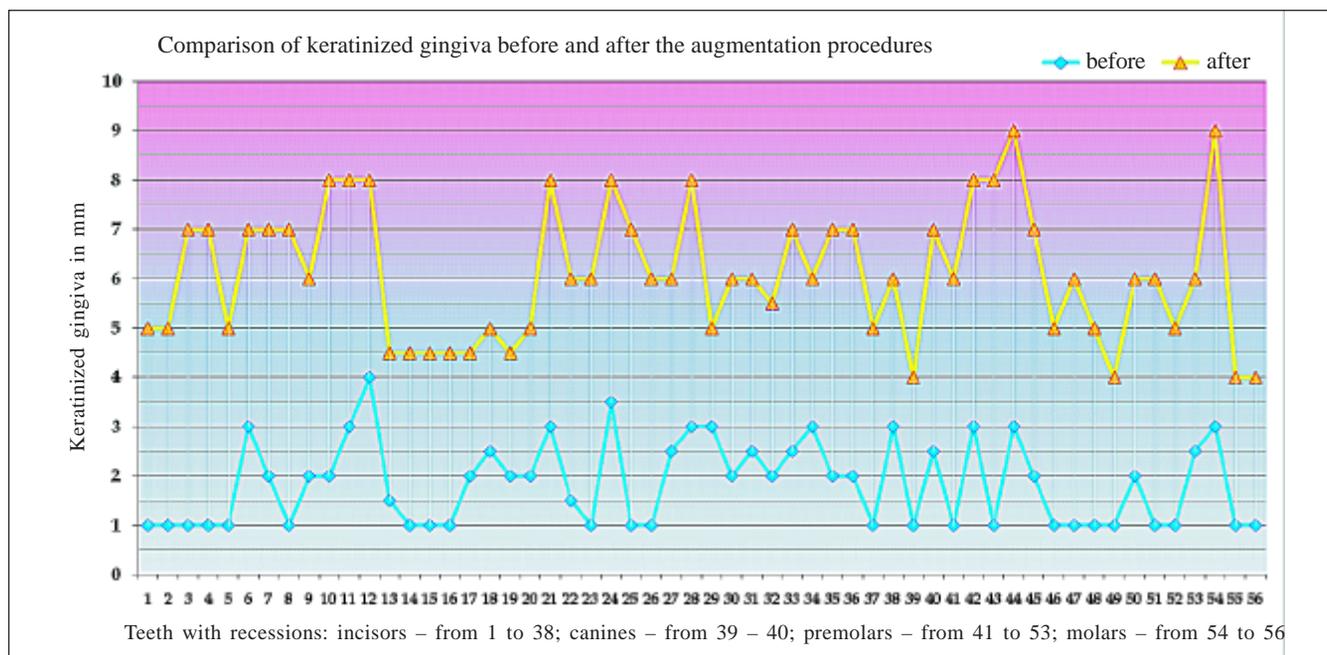
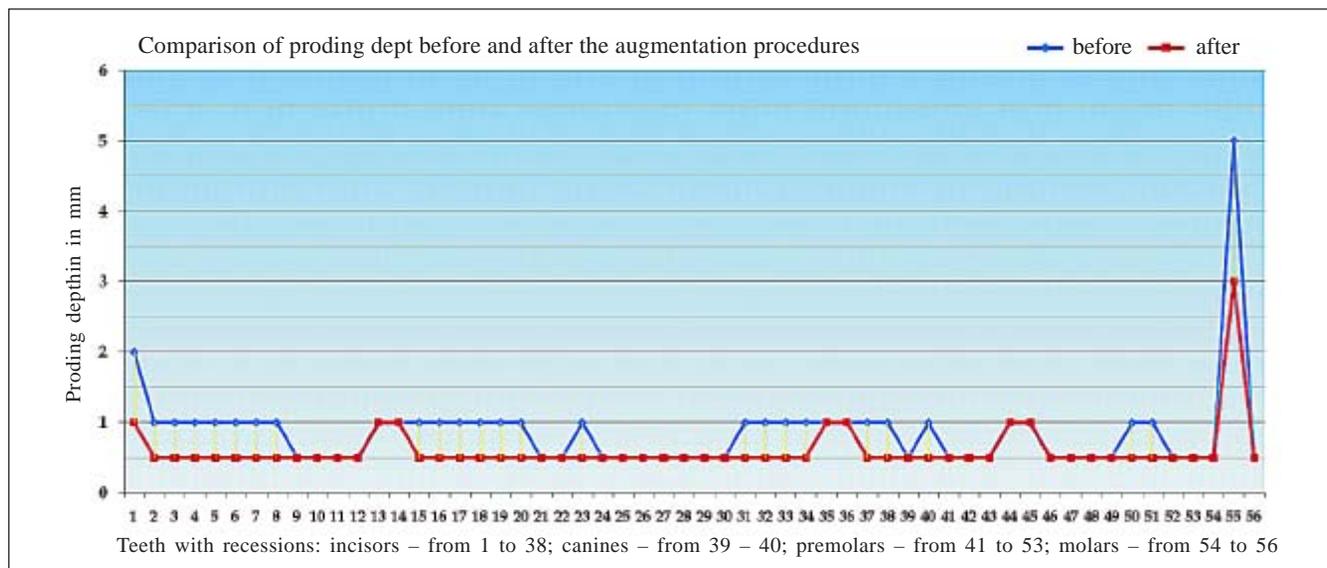


Diagram 3. It is demonstrated that in the time of the treatment the mean values of the probing tepth is retained in the limits of the normal gingival sulcus.



DISCUSSION

The purpose of this study was to evaluate the changes in the amount of KT and the position of the gingival margin after gingival augmentation procedure apical to area of recession with free gingival graft. Root coverage was not of primary goal of these procedures.

The results showed mean gain of KT 4.28 ± 1.10 . Analysis of the results depicted that canines and molars have a smaller amount of KT than incisors and premolars at first year. The mean recession reduction was 0.9 ± 0.56 probably due to the “creeping attachment” (9, 11, 12). This phenomenon is described as “post-operative migration of the gingival margin in a coronal direction of a previously denuded root”. Our clinical observations in this study supported the occurrence of creeping attachment because of the fact that periodontal depth remained stable in all treated sites in the time of the reduction of the recessions. It may be suggested that in cases of shallow recessions this phenomenon can lead to complete root coverage (Rec<3mm, Miller’s class I).

The results of this short-term study are comparable to those reported by Agudio et al., who treated a group of one hundred and three subjects with 224 sites by marginal and submarginal free gingival graft (1). In regard to the

amount of KT they noted in a retrospective long-term evaluation slight reduction of attached gingival tissue between 1 year and the end of the follow up period (10 to 25 years), whereas the gingival margin shifted coronally. These results they explained with the potential tendency of the mucogingival junction to regain its original position after gingival augmentation procedure.

Further investigations may reveal the influence of different circumstances on the amount of the keratinized gingival tissue gain and recession reduction after free gingival graft treatment.

CONCLUSIONS

In the limits of this study can be concluded: **1.** Free gingival graft augmentation procedure apical to the area of recession is effective in halting the progression of recession in cases associated with an insufficient amount of keratinized tissue and lead to reduction of the whole gingival recession. **2.** In cases of shallow recessions (Miller’s class I) this procedure can lead to complete root coverage because of the “creeping attachment”. **3.** This procedure increases significantly the keratinized tissue and improves esthetics and enhances plaque removal.

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Address for correspondence:

Assoc. prof. Christina Popova, PhD
Department of Periodontology, Faculty of Dental Medicine, Medical University of Sofia,
1, Georgi Sofiiski Str., Sofia, Bulgaria
Mobile: +359 88 875 90 49; E-mail: hrpopova@yahoo.com