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RESEARCH ARTICLE

Root esthetic score (RES) comparisons of FGG and PE-FGG procedures in Miller class II and III recessions in mandibular anterior teeth

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Abstract

Objective: Free gingival graft (FGG) is frequently chosen for the treatment of recessions in mandible. Mandibular anterior teeth are the most affected teeth and major causes of the recession are lack of keratinized tissue, high frena attachments and shallow vestibular depth. However, free grafts frequently result in a poor aesthetic appearance due to unsatisfactory chromatic, texture, tissue integration and apical disalignment of alveolar mucosa. Therefore, partly epithelialized free gingival graft (PE-FGG), with an apical de-epithelialized portion designed to overcome some of the aesthetic problems associated with the conventional FGG. The aim of this study was to compare the RES score of the PE-FGG and conventional FGG in Miller class II and III recessions.

Material and Methods: 32 patients with 32 Miller class II and III recessions in mandibular anterior teeth were chosen. Sixteen mandibular central teeth were chosen for FGG procedure and sixteen mandibular central teeth were chosen for PE-FGG procedure. All patients were periodontally healthy women.

Results: All patients completed the study and attended all recall visits. The mean RES score of the FGG and PE-FGG groups were 5.25±0.85, 6.56±0.72 respectively. PE-FGG gave a better RES score and gingival color ($p<0.05$) than FGG but full root coverage was not achieved.

Conclusion: The PE-FGG procedure resulted in excellent gingival color and better mucogingival alignment and RES score than FGG and can be used instead.

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INTRODUCTION

Gingival recession is an intriguing and complex phenomenon. Recessions frequently disturb patients because of hypersensitivity and esthetics. Orthodontic treatment, inadequate plaque control, high frenulum attachment and shallow vestibular depths can be counted as the possible causes of mucogingival problems.[1-5]

Many surgical techniques have been introduced to treat gingival recession, including those involving autogenous tissue grafting, various flap designs, orthodontics and guided tissue regeneration (GTR). Since it was described by Björn[6] in 1963, the free gingival graft (FGG) procedure was widely utilized for increasing the width of keratinized tissue and root coverage in periodontal surgery. Its predictability was marked in several clinical studies, which demonstrated newly created keratinized tissue stability of up to 4 years.[7-10]

Coronally advanced flap (CAF) alone or combined with a graft (CAF+CTG) provide more successfull and predictable results regarding to complete root coverage and reduction of the recession.[11] But CAF is a tecnique mostly chosen for upper jaw. Its efficacy in lower jaw is less reported and FGG is frequently chosen for the treatment of the recessions in mandible.[12]

Mandibular anterior teeth are the most affected teeth and the major causes of the recession are lack of keratinized tissue, high frena attachments and shallow vestibular depth. Although there is no consensus on the minimally sufficient width and thickness of keratinized tissue, the presence of a thin gingival biotype is considered to be one of the most relevant anatomical factors associated with recession.[13-15]

The donor site for FGG is mostly palatal-gingival of the maxillary canin, premolar and molar region. The color and texture of the graft harvested from palatal gingiva is frequently different from the mandibular gingiva and this situation causes esthetic problems. In addition to the color and the texture, mucogingival alignment of the graft is generally incompatible with the recipient site. In order to avoid these problems and improve the esthetic outcomes of the FGG procedure, Cortellini et al. modified the technique and named as partly epithelialized free gingival graft (PE-FGG).[16] According to Cortellini's modified FGG technique, the FGG was epithelialized only in the coronal part. The apico-coronal extent of the epithelialized part was calculated as the amount of graft needed to cover the area from the cemento-enamel junction (CEJ) to the "ideal" position of the mucogingival junction (MGJ) at the recession site/s, calculated as an ideal line connecting the MGJ of the neighbouring teeth. The apical extent of the graft was de-epithelialized to expose the connective tissue. The graft thickness was about 1.5–2 mm in the epithelialized portion and 1–1.5 mm in the apical part.[16]

Although complete rootcoverage (CRC) is the main goal of the perioplastic surgery procedures, it may not provide optimal esthetic outcome. In addition to CRC, texture and color of the gingiva and the mucogingival alignment of the area must be considered.[17] Because the final target is the full esthetic success, the achievement of CRC along with soft tissue anatomy comparable and indistinguishable from adjacent tissue should be considered the treatment goal. Root esthetic score (RES) provides a comprehensive evaluation of the esthetics. There are six parameters evaluated in RES system. These are; CRC, level of the gingival margin, marginal tissue contour, MGJ alignment, soft tissue texture and gingival color. The perfect esthetic score is 10 points. RES ensures an objective evaluation and may be considered as a

good instrument to evaluate the esthetic outcomes of root coverage procedures.

Even with the PE-FGG, it is impossible to achieve full root coverage and full aesthetic score in Miller class 3 and 4 recessions and a perfect RES is hardly achievable in class 2 recessions in one surgery. Two-step surgery (firstly FGG and then CAF) is required in order to achieve CRC in Miller class II defects, however PE-FGG can reduce texture and color problems. Besides, there is a limitation of the PE-FGG technique. For a perfect aesthetic score mucogingival alignment of the relevant tooth/teeth must be similar to the adjacent teeth. In Miller II, III and IV recessions, the recession extends to the MGJ, sometimes goes beyond. In this case the mucogingival alignment of the graft would be below from the adjacent teeth and in the PE-FGG technique, it would be difficult to position the de-epithelialized part of the graft to fit to the mucogingival alignment.

Based on this, the aim of the present study was to evaluate the RES score of the PE-FGG and conventional FGG in Miller class II, III and IV recessions after one surgery.

MATERIAL METHODS

Patient sample

Thirty two mandibular central teeth in 32 patients with Miller II and III recessions were chosen. Sixteen teeth were chosen for FGG procedure and 5 of them were Miller class II and the others were Miller class III defects. Sixteen teeth were chosen for PE-FGG procedure and 5 of the teeth were Miller class II recessions while the others were Miller class III recessions. All patients were periodontally healthy women. All patients have been informed and signed informed consent. All patients have been informed and signed informed consent. The research protocol was approved by the Institutional Ethical Committee of Gaziosmanpaşa University.

The inclusion criteria were applied as following:

- Age ≥18
- No smoking
- No relevant systemic disease
- Good oral hygiene
- Presence of at least one Miller II or III recession at mandibular anterior teeth

Study design

All patients underwent scaling and polishing procedure and were given oral hygiene instructions. The FGG procedure group was chosen as control group and the other group was chosen as test group.

Recessions were measured by same specialist who is blind to the groups (O.K.) via Williams periodontal probe and recorded. Photographs were taken before surgery, during surgery and 1 month after the surgery. Measurements were repeated and RES evaluations were performed at 1. month.

Surgical procedure

A local anesthetic (Ultracain D-S forte, Hoechst Roussel, Frankfurt, Germany) was administered to the donor and recipient sites to achieve anesthesia. At the recipient site, a marginal horizontal linear incision was made in the mucogingival junction with a number 15 scalpel (Hu-Friedy Manufacturing, Chicago, IL, USA). Split-thickness incision was extended distally one to two teeth further than the planned graft area and deepened to the adequate depth, which would not cause movement of the transplanted tissue. The horizontal dimension of the recipient site was determined according to the area demonstrating mucogingival stress. After local anaesthesia, root planning of the exposed root surfaces was performed

by means of gracey curettes (Hu-Friedy, Chicago, IL, USA).

The surgical procedure was made by creation of a partial-thickness flap according to Miller's techniques. The gingival tissue graft was obtained from the palatal side. The autogenous graft was sutured on the receptor site with interrupted and compressive sutures (4-0 silk sutures). for an adequate graft adaptation. A non-eugenol periodontal dressing was applied to the donor and recipient sites.

Roots were planed using Gracey curettes. A no. 15 blade was used to make horizontal incisions in the interdental papilla at the level of the CEJ. The horizontal incision was made at the level where the root coverage is expected and extended at least 3 mm to the line angle of the adjacent teeth bilaterally. The vertical incision was made mesio-distally so that the outline of the recipient site was trapezoidal. A partial thickness flap was raised consisting of the epithelium and connective tissue and the recipient site was prepared 3mm apical to the most apical part of the exposed root. Scissors and no. 15 blade were used for preparing the recipient site. The reflected partial thickness flap was excised. A tin foil was placed on the recipient site and a template was prepared. The tin foil template was then placed overlie palatal area and an incision was made all round the template to a depth of 2 mm and 1mm larger than the outline of the tin foil to accommodate graft shrinkage. Small tissue pliers were used to lift the graft's edge and the graft was separated along the outline. The undersurface of the graft was trimmed to remove the overhanging tissues. The harvested graft was placed onto gauze soaked in normal saline solution. The graft was tried and adapted to the recipient site so that it extended 3-5mm apical to the margin of the exposed root. The graft was compressed and held in position for few minutes to reduce the dead space and immobilized with 4-0 black silk sutures. The donor and recipient sites were protected with periodontal pack.

Post-surgically, all patients were given analgesics (flurbiprofen) twice a day and instructed to rinse their mouth with a 0.12% chlorhexidine solution, two times a day for 1 min. for 3 weeks. Patients were instructed to avoid brushing in the operated area until suture removal at 10 days. Patients underwent manual supragingival tooth cleaning twice a week until suture removal. At suture removal, all patients were controlled and instructed in mechanical tooth cleaning of the operated areas using a soft tooth brush and a roll technique. All patients were recalled after 28 days.

RES evaluations were performed by three different clinicians (Altintepe S.S., Aydemir Turkal H. and Karatas O.) and mean score were recorded. The scoring is shown in the table 1.

RESULTS

All patients completed the study and attended all recall visits. Minimum and maximum RES scores of the FGG procedure were 4 and 8. Similarly, minimum and maximum RES scores were 5 and 8 in the PE-FGG results. The data are shown in the table 2. The mean RES score of the FGG and PE-FGG groups were 5.25±0.85 and 6.56±0.72 respectively. PE-FGG gave a better score than FGG but full root coverage was not achieved. The difference of root coverage, marginal tissue contour, MGJ alignment and soft tissue texture were not found significant ($p>0.05$). However, the difference in the gingival color of the groups was found to be significant ($p<0.05$).

Table 1. RES system developed by Cairo *et al.*[17]

Parameter		Scoring
Root coverage	Complete root coverage Partial root coverage None	6 3 0
Marginal tissue contour (scalloped form of the gingiva)	Similar to the adjacent teeth Dissimilar from adjacent teeth	1 0
Mucogingival junction alignment	Similar to the adjacent teeth Dissimilar from adjacent teeth	1 0
Soft tissue texture	Similar to the adjacent teeth Dissimilar from adjacent teeth	1 0
Gingival color	Similar to the adjacent teeth Dissimilar t from adjacent teeth	1 0

Table 2. RES Score results of FGG and PE-FGG procedures at sixth week

	FGG	PE-FGG
RES score	5,25±0,85	6,56±0,72*
Root coverage	3,0±0	3,18±0,75
Marginal tissue contour	1,0±0	1,0±0
Mucogingival junction alignment	0,1±0,31	0,5±0,51
Soft tissue texture	0,9±0,31	0,93±0,25
Gingival color	0,1±0,31	0,93±0,25*

*p<0.05 Statistically significant.

Figure 1. Images of the PE-FGG and FGG procedures. A: Representative preoperative image of FGG procedure, B: Representative postoperative image of FGG procedure, C: Representative preoperative image of PE-FGG procedure, D: Representative postoperative image of PE-FGG procedure.

DISCUSSION

The majority of patients applied for recession treatment were female. This situation might reflect an increased awareness for oral health and esthetic considerations in women. In developing countries the level of awareness for oral and dental health is lower than developed countries. Aesthetic problems are often ignored and patients do not seek any sort of treatment unless grade 3 or more mobility and/or Miller class II or more recessions are observed. Because of this fact we often are faced with the dilemma;

is it better to keep the teeth or is the extraction best treatment option? In these cases there is generally no keratinized tissue and the depth of the vestibular sulcus is too shallow. There are also accompanying some other issue we have to deal with. We have to eliminate secondary occlusal trauma, reduce the mobility and stabilize the teeth. In addition, recession usually extends beyond the MGJ. These situations might seem hopeless but it is not always impossible to achieve acceptable treatment outcomes when one reduces expectations and focuses on the optimal treatment option. In order to avoid the extraction and keep the teeth in mouth, firstly FGG procedure is performed to create a keratinized gingival margin. And then in order to cover root surfaces CAF, CTG or CAF+CTG procedure is performed. FGG frequently results in an unpleasant aesthetic appearance due to soft tissue differences in colour, texture, soft tissue thickness and misalignment of the MGJ. Connective tissue is the blood source of the epithelium and bonding of the two connective tissues such as in PE-FGG and the recipient area might increase the esthetic outcomes and might make the graft compatible with the recipient area and provide better color than FGG alone.[16]

In order to compare esthetic outcomes of the FGG and PE-FGG, three independent clinicians evaluated the photos taken at first month by using RES.[17] Depending on their evaluation we found that overall RES of FGG and PE-FGG procedures in Miller II and III recessions are similar. In this study we only evaluated the results of one surgery, FGG or PE-FGG. We questioned which of the mentioned procedures provide better results and found that regarding to contour and texture, the results were same in both procedures. But the mucogingival alignment is slightly, the color is much better in the PE-FGG grafts. The patients had additional CAF, CTG or CAF+CTG surgery but those results are not shown in this article.

The investigation evaluating the interrater agreement of the RES among expert periodontists shown that aesthetic evaluation by means of the RES may be useful for completing the overall esthetic assessment of root coverage procedures and RES seems to be a reliable method for assessing the esthetic outcomes.[18]

In our study PE-FGG gave better results than FGG. We expected a better root coverage in PE-FGG procedure assuming that the connective tissue part of the PE-FGG would improve blood supply of the graft but root coverage percentage was similar in both procedures. 31,25% of the recessions were class II defects and others were class III defects. It is hard to achieve compatible mucogingival alignment in recessions reaching MGJ. Because of this, in both procedures the alignments were not compatible with neighboring teeth. Yet the result is slightly better in PE-FGG procedure. Regarding the soft tissue texture, both procedures gave good results. On the other hand, gingival color was much better and almost indistinguishable from the neighboring teeth. The recessions in mandibular central teeth cause aesthetic issues and make patients uncomfortable. Better gingival color provides better aesthetics and ergo better patient satisfaction.

CONCLUSION

Regarding the gingival color, PE-FGG provided better outcomes, other than that the results were same in both procedures. On the other hand, when considering all, PE-FGG gave better RES score than FGG alone.

PE-FGG can be preferred instead of FGG.

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