

## Treatment of Gingival Recessions Using Coronally Advanced Flap and Connective Tissue Graft: A Retrospective Analysis

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### Abstract

**Aim:** The aim of this retrospective study was to evaluate the effectiveness of coronally advanced flap and connective tissue graft (CAF+CTG) in the treatment of gingival recessions (GR).

**Method:** Periodontal records of 32 single and multiple GR in 11 patients treated with CAF+CTG were selected for the study. According to Cairo's classification, recession type 1 defects were included. Recession depth (RD), probing depth (PD) and clinical attachment level (CAL) were assessed at baseline and follow-ups. Mean root coverage (MRC) and complete root coverage (CRC) were evaluated. Compliance with supportive periodontal therapy (SPT) was also determined.

**Results:** Mean age of 11 patients was 29.6±4.4 years. The mean observation time of 32 recessions was 37.6±24.2 months. All clinical parameters showed an improvement between baseline and the latest follow-up. After treatment with CAF+CTG, MRC was 92.6±13.1% and CRC was achieved in 75% of the recessions. Compliance to SPT was calculated at 83.3%.

**Conclusion:** The use of CAF+CTG yielded positive outcomes in terms of all clinical parameters and complete root coverage in Cairo recession type 1 defects with a mean observation period of >3 years. The results of the present study confirm the use of CAF+CTG as a gold standard for the treatment of gingival recessions.

**Keywords:** Connective tissue, root coverage, gingival recession.

### Kuronal Kaydırılan Flep ve Bağ Doku Grefti ile Tedavi Edilen Dişeti Çekilmelerinin Retrospektif Analizi

### Öz

**Amaç:** Bu retrospektif çalışmanın amacı dişeti çekilmelerinin tedavisinde kuronal kaydırılan flep ve bağ doku greftinin (KKF+BDG) etkinliğinin değerlendirilmesidir.

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**ETHICAL STATEMENT:** The study was approved by the local Ethics Committee of Istanbul Gelişim University (2022/11-29) on 24.06.2022.

**Yöntem:** Çalışmada KKF+BDG ile tedavi edilen tekli ve çoklu 32 dişetine çekilmesine sahip 11 hastanın periodontal kayıtları incelendi. Cairo sınıflamasına göre tip 1 dişeti çekilmeleri çalışmaya dahil edildi. Çekilme derinliği (ÇD), cep derinliği (CD) ve klinik ataşman seviyesi (KAS) ölçümleri başlangıç ve takip randevularında yapıldı. Ortalama kök yüzeyi kapanması (OKK) ve tam kök yüzeyi kapanması (TKK) değerlendirildi. Aynı zamanda hastaların destekleyici periodontal tedaviye (DPT) uyumluluğu da belirlendi.

**Bulgular:** On bir hastanın yaş ortalaması  $29.6 \pm 4.4$  yıl olarak saptandı. Otuz iki dişeti çekilmesinin ortalama gözlem süresi  $37.6 \pm 24.2$  ay olarak belirlendi. Son takip randevularında yapılan ölçümlerde tüm klinik parametrelerde başlangıç değerlere göre olumlu yönde değişiklik gözlemlendi. Kuronale kaydırılan flep ve bağ doku grefti ile tedavi edilen dişeti çekilmelerinde OKK  $\%92.6 \pm 13.1$  ve TKK  $\%75$  olarak saptandı. Destekleyici periodontal tedaviye uyumluluk oranı  $\%83.3$  hesaplandı.

**Sonuç:** Cairo tip 1 dişeti çekilmelerinin KKF+BDG ile tedavisinde ortalama üç yıldan fazla takibinde tüm klinik parametreler ve TKK açısından pozitif sonuçlar elde edildi. Bu çalışmanın bulguları KKF+BDG'nin dişeti çekilmelerinin tedavisinde altın standart olarak kullanılmasını destekler niteliktedir.

**Anahtar Sözcükler:** Bağ doku, kök yüzeyi kapama, diş eti çekilmesi.

## Introduction

Gingival recession (GR) is defined as an apical shift of gingival margin and it is associated with clinical attachment loss<sup>1</sup>. It occurs more than 50% of the population has both good and poor oral hygiene<sup>2-3</sup>. Among the possible consequences of GR; impaired esthetics, dentin hypersensitivity, caries/non-carious cervical lesions may be seen. Thin periodontal phenotype, which is determined by gingival phenotype (the thickness of gingiva and width of keratinized tissue) and bone thickness, is accepted to increase the risk for GR<sup>4-5</sup>. Restorations with margins invading gingival sulcus may also cause GR particularly in thin phenotypes<sup>1</sup>. Orthodontic tooth movements, mainly around mandibular incisors, and the thickness of gingiva may have an effect on changes in soft tissues resulting from recession<sup>6</sup>.

For years, the approach to GR in the absence of dentin hypersensitivity and esthetic concern has been not to perform surgery but to observe as long as the patient is able to apply proper oral hygiene. However, in a systematic review by Chambrone and Tatakis<sup>5</sup>, out of 1647 untreated GR, 78.1% experienced increase in GR depth and 79.3% of patients had new GR during an observation time of at least two years. In another split-mouth study, treated and untreated GR were followed for 18 to 35 years, and 48% of untreated sites showed an increase in recession<sup>4</sup>. Thus, it is inevitable to treat a GR once it occurs.

There are overwhelming studies about the surgical treatment of GR with different techniques such as free gingival grafts, laterally or coronally advanced flaps with or without connective tissue grafts<sup>7-9</sup>. The texture and color of the soft tissue as well as the contour differ due to the healing

after several surgical interventions. The decision for the treatment mostly depends on the dentist's knowledge and clinical experience, in addition to financial considerations<sup>10</sup>. In a consensus of the European Federation of Periodontology, a patient-centered outcome determined by the contour and color of the gingiva was recommended for the assessment when selecting the appropriate surgical technique<sup>11</sup>. Therefore, coronally advanced flap with subepithelial connective tissue graft has been the gold standard as the biological rationale is to provide the graft with an increased blood supply above the avascular root surface<sup>8,12</sup>. However, anatomical factors such as keratinized tissue, gingival and buccal bone thickness, the position of the tooth, the presence of caries/non-carious lesions, and esthetic demands should also be considered.

In the last two decades, Miller's classification based on the level of gingival margin with respect to the muco-gingival junction and underlying alveolar bone has been widely used to classify gingival recessions<sup>13</sup>. The difficulty in differentiation between Class I and II and the identification of soft and hard tissue loss in the interdental area made the researchers propose a more reliable and applicable classification using the clinical attachment level at both buccal and interproximal sites<sup>14</sup>. The pre-determination of gingival margin after surgery is another important issue. Despite the earlier suggestion of the use interdental papilla to predict the recession reduction<sup>15</sup>, Cairo et al.<sup>14</sup> hypothesized that interproximal clinical attachment level is the coronal limit of the achievable amount of root coverage at buccal site after surgery.

The aim of the present study was to analyze the outcomes of the treatment of single and multiple gingival recessions by coronally advanced flap and subepithelial connective tissue graft (CAF+CTG) procedures.

## **Material and Method**

Patients who had received soft tissue augmentation procedures at private practice between January 2014 and January 2022 were included in this study. A further analysis was performed regarding patients who were treated for recession defects. Final data included patients who had single or multiple GR and treated by CAF+CTG. Patients with pre-operative and post-operative photographs taken at follow-up appointments for at least 6 months were included. Therefore, 11 patients 3 males and 8 females (age range, 22 to 35 years; mean age  $29.6 \pm 4.4$  years) were enrolled in this study. Informed consent was obtained from all patients. The study was approved by the local ethics committee of Gelişim University (2022/11-29) on 24.06.2022.

## **Study Design**

Patients with known systemic disease, those taking medication that may interfere with healing, smokers, and those with recession defects associated with caries or restoration were not included in this study. All patients had undergone initial periodontal therapy, including oral hygiene

instructions when needed, prior to soft tissue augmentation. Surgical treatment was not scheduled until the supragingival plaque control was adequate. According to Cairo's classification<sup>14</sup>, recession type 1 defects (Gingival recession with no loss of interproximal attachment) were included and treated by CAF+CTG. The flap design consisted of oblique incisions followed by split-full-split thickness flap elevation in the corona-apical direction<sup>16</sup>. After the de-epithelization of papillae, connective tissue graft harvested from the palate was sutured and flap was coronally positioned to cover the graft.

Post-surgically, patients were instructed to rinse with chlorhexidine (0.12%) and to avoid toothbrushing for 10 days. All patients were asked to perform oral hygiene with an ultra-soft toothbrush (TEPE® Special Care, Sweden) for 6 weeks after the removal of sutures. Preoperative and postoperative photographs were obtained. Patients were seen 2 to 3 times per year according to the individual needs. During the observation period, oral hygiene instructions were reinforced, and supragingival and subgingival tooth cleaning was performed when necessary. Recession depth (RD) and probing depth (PD) at both buccal and interproximal sites were recorded. A clinical attachment level (CAL) at both buccal and interproximal sites was then calculated. Compliance with supportive periodontal therapy (SPT) was also calculated by the ratio of recall visits to planned appointments and expressed in percentage<sup>17</sup>.

All patients were treated by the same operator (E.E.) in a private practice. On digital photographs, the amount of root coverage was also calculated as a percentage with the *Image J* program (Wayne Rasband, National Institute of Health, USA). The height of the premolar or molar tooth was used for the magnification between the photographs.

### ***Statistical Analysis***

The statistical analysis was performed using SPSS (Statistical Package for Social Sciences) (SPSS Inc., Release 24.0 for Windows, Chicago, IL, USA). Descriptive statistics with a mean  $\pm$  standard deviation were performed.

### **Results**

The study consisted of 32 GR in 11 patients (mean age  $29.6 \pm 4.4$  years) treated by CAF+CTG. Furthermore, 8 defects were located at upper incisors, 9 upper canines and 15 premolars (13 upper, 2 lower). Thirty of the recessions were located in the maxilla, whereas two were in mandible. Wound healing was uneventful at recipient sites. Only one patient experienced bleeding in the donor area four days after the procedure and needed suturing. The other patients did not require any additional intervention. All patients included in the study were recalled within 4-6 months' time periods.

Patients achieved good plaque control during maintenance. Mean observation time was  $37.6 \pm 24.2$  months. Improvement in all clinical parameters were observed at follow-ups (Table 1). The small changes were observed in mean PD as it was  $1.5 \pm 0.5$  mm at baseline and  $1.4 \pm 0.4$  mm after a mean observation time of 37 months. Mean RD improved to  $0.3 \pm 0.6$  mm as it was  $2.5 \pm 0.8$  mm at baseline. There was a gain in CAL as well. The corresponding value increased from  $3.7 \pm 0.8$  mm to  $1.9 \pm 0.6$  mm. The comparisons between the clinical view of the teeth at baseline and follow-up appointments are shown in Figure 1 and 2. Mean root coverage was  $92.6 \pm 13.1\%$ , whereas complete root coverage was obtained in 75% of 32 recessions. Complete root coverage in maxilla was 73.3% and in the mandible 100% (Table 2). The percentage of root coverage for each individual patient is demonstrated in Figure 3. Compliance to SPT was calculated as 83.3%.

**Table 1.** Clinical measurements of 32 gingival recessions at baseline and the latest follow-up

	Baseline (Mean $\pm$ SD)	Follow-up (Mean $\pm$ SD)
PD (mm)	$1.5 \pm 0.5$	$1.4 \pm 0.4$
RD (mm)	$2.5 \pm 0.8$	$0.3 \pm 0.6$
CAL (mm)	$3.7 \pm 0.8$	$1.9 \pm 0.6$

PD: Probing depth, RD: Recession depth, CAL: Clinical attachment level, RC: Root coverage.

**Figure 1. A)** Lower premolars with gingival recession



**Figure 1. B)** 18-month follow-up. Complete root coverage in all treated gingival recessions and good color blending with the adjacent soft tissue



**Figure 2. A)** An upper premolar with gingival recession



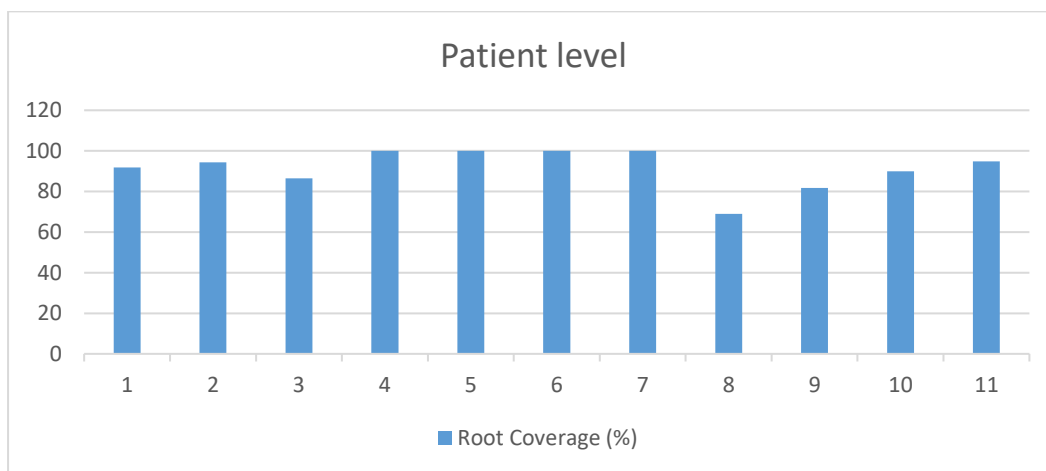
**Figure 2. B)** 42-month follow-up. Complete root coverage in treated area with good color blending and contour



**Table 2.** Root coverage in operated 32 sites with a mean observation of more than 3 years

	Mean root coverage (%)	Complete root coverage (%)
Maxilla (n=30)	92.6±13.1	73
Mandible (n=2)	100	100

**Figure 3.** Percentage of root coverage at the latest follow-up for each individual patient



## Discussion

Soft tissue grafting has been increasingly used in clinical practice for the correction of mucogingival deformities and to improve esthetics. Coronally advanced flap and subepithelial connective tissue graft is accepted as the most suitable surgical technique for the treatment of single or multiple gingival recessions<sup>18</sup>. This retrospective study evaluated the effectiveness of this technique in the treatment of Cairo recession type 1 defects. The results showed improved clinical outcomes and more than 90% root coverage after a mean observation period of 3 years.

The maintenance of early root coverage treatment outcomes (6 or 12 months) has been investigated and has not been determined yet<sup>19</sup>. In a study by Jepsen et al<sup>20</sup>, the 6-month and 3-year outcomes for root coverage by coronally advanced flap procedures were compared. The group indicated a high correlation between two different time periods and suggested that 6-month results may be useful to predict long-term outcomes. Although controversies may exist among different treatment modalities, the connective tissue graft based techniques display the greatest stability in maintaining the level of gingival margin<sup>21</sup>. Therefore, GR treated with CAF+CTG and observed for a mean period of 3 years (from 6 months to 96 months) were included in this study.

Several techniques have been proposed for the treatment of GR, such as coronally advanced flap, laterally rotated flap, or tunnel technique<sup>16,18</sup>. To improve treatment outcome, chemical preparation of the exposed root surfaces has also been worked. Korkmaz and Balli<sup>22</sup> assessed the effectiveness of the combination of tunnel technique and concentrated growth factor (CGF) for root coverage and compared it with CTG. They found no superiority of CGF as an alternative biomaterial to the gold standard CTG. Gorski and Szerszen<sup>23</sup> compared the additional influence of root biomodifications with 24% ethylenediaminetetraacetic acid (EDTA) alone or with enamel matrix derivative (EMD) for root coverage with CAF+CTG. All clinical parameters showed no significant difference except 0.5 mm more gain in CAL in EDTA+EMD group at 12 months, which was not clinically relevant. Stefanini et al<sup>24</sup> have concluded that complete root coverage was obtained by CAF+CTG at 3 years of follow-up in the treatment of multiple GR. Connective tissue graft is thought to enhance the adaptation of the flap to the root acting as a biologic filler<sup>25</sup>. Thus, gingival phenotype becomes thicker and a complete root coverage is achieved<sup>26</sup>. The stability of the gingival margin treated with CTG is obtained by the thick gingival phenotype, which may result in creeping attachment<sup>27</sup>. The findings of this study support the use of CAF+CTG as a gold standard for the treatment of GR with improvement in all clinical parameters and its stability up to 8 years.

Complete root coverage is accepted as the primary outcome of the treatment maintaining sulcus depth  $\leq 2$  mm, no bleeding on probing and gingival margin covering cemento-enamel junction<sup>28</sup>. Additionally, esthetics should also be considered as an important outcome, including the



appearance of soft tissue after treatment in terms of color and texture<sup>18</sup>. In a recent study, complete root coverage was achieved in 66.7% of the recessions treated with tunnel technique and CTG<sup>22</sup>. The corresponding values were 83% and 97% for the recessions treated with CAF+CTG<sup>29,30</sup>. Three out of four GR were covered completely in this study. Thus, the present findings corroborate the success of subepithelial connective tissue graft-based procedures in providing the best outcomes for clinical practice, having superior percentages of root coverage.

The definition of compliance varies between studies, however, the most common definition for compliers is the 100% participation in follow-ups after completion of active periodontal treatment. Conversely, irregular compliers are defined as patients who started SPT but discontinued or tended to attend irregularly<sup>31</sup>. In this study, all patients were accepted as irregular compliers. Despite the so-called definition, the compliance to SPT was found as 83.3%. In a systematic review, inadequate information/motivation was found as the main patient-reported reason for non-compliance and the percentage of fully compliers ranged between 3.3%-86.8%<sup>31</sup>. Despite being irregular compliers, the compliance rate was satisfactory in this study. This can be explained by the good motivation of patients prior to the treatment of gingival recessions.

The present study has several limitations. The retrospective design and limited sample size may have affected the outcomes. Secondly, the lack of control group did not yield to make a comparison between different techniques. The absence of another observer makes the results open to interpretation. For the expression of the overall satisfaction with the treatment outcomes, a visual analog scale (VAS) could also have been used. For that reason, the present data should be interpreted with caution.

## Conclusion

In this study, complete root coverage is obtained in 75% of the Cairo type 1 defects treated with CAF+CTG, which is known to be the gold standard. Studies evaluating the patients' esthetic satisfaction after recession treatment with a larger sample size would be desirable to confirm the results of the present study. Connective tissue graft is believed to increase the thickness of the gingiva. Therefore, the stability of the gingival margin after treatment with CAF+CTG can be validated by long term studies.

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