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Covering Miller Class I Anterior Mandibular Fracture: A Comparative Evaluation of Free Gingival Graft (FGG) Versus Langer's Connective Tissue Graft (L-CTG)

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Abstract

Background: Gingival recession occurs due to multiple etiological and predisposing factors. The objective of this study was to compare the root coverage achieved by two techniques—the Free Gingival Graft (FGG) and Langer's Connective Tissue Graft (L-CTG)—in patients presenting with Miller Class I recession affecting the mandibular anterior teeth.

Materials and Methods: This research utilized a retrospective case-control design and was conducted in Ilam Province in 2020. The study population comprised 20 patients referred to a private clinic who presented with Miller Class I gingival recession on their mandibular anterior teeth (with 1 to 2 mm of attached gingiva width). These patients were divided into two groups: Group I (10 subjects) treated using the conventional Free Gingival Graft (FGG) technique, and Group II (10 subjects) treated using the Langer's Connective Tissue Graft (L-CTG) technique, harvested from the palate using the Trape Door technique. Data analysis was performed using SPSS version 16.

Results: The findings of this study indicate that both FGG and SECTG are effective methods for root coverage. When comparing the degree of anatomical root exposure between the two groups, this parameter showed a greater reduction in the SECTG group; however, this difference was not statistically significant ($p = 0.30$). Furthermore, the reduction in Clinical Crown Length was greater in the SECTG group than in the FGG group ($p = 0.35$), though this difference was also non-significant. Comparing recession width, the reduction was greater in the SECTG group ($p = 0.034$), but this difference was not statistically significant. Similarly, the increase in the amount of attached gingiva was greater in the SECTG group than in the FGG group ($p = 0.30$), though this difference was also non-significant.

Conclusion: Given that both the FGG and SECTG techniques demonstrated similar efficacy in treating gingival recession and achieving root coverage, and considering that the tissue harvesting method in the Langer technique (SECTG) is inherently less invasive than the free harvesting required for the FGG technique, it is concluded that the use of the Langer technique (SECTG) is recommended as the preferred treatment modality.

Keywords: Root Coverage, Free Gingival Graft, Langer's Connective Tissue Graft, Miller Class I Recession, Mandible.

Introduction

Periodontitis is defined as the inflammation of the gingival tissues, loss of clinical attachment of periodontal ligaments, and reduction of alveolar bone support, which may ultimately lead to tooth loss. Periodontitis has been associated with numerous systemic and inflammatory conditions, including cardiovascular diseases, Diabetes Mellitus, respiratory diseases, Rheumatoid Arthritis, and the birth of preterm and low-birth-weight infants (1–3). In recent years, various forms of periodontal diseases leading to tooth loss have been managed using both surgical and non-surgical modalities. These surgical interventions are designed to correct issues related to the attached gingiva, in addition to other applications (4–6).

The World Health Organization (WHO) has identified oral diseases, specifically periodontitis and dental caries, as a major contributor to the high economic burden on the healthcare systems of developed nations (7, 8). The primary treatment for chronic periodontitis involves non-surgical intervention; however, patient compliance with oral hygiene recommendations and adherence to preventative maintenance appointments are often even more critical than the choice of treatment method itself. Therefore, identifying the individual, social, or behavioral factors influencing compliance, or adherence, is paramount (9–11).

Gingival recession is defined as the apical migration of the soft tissue relative to the cemento-enamel junction (CEJ). This clinical condition is prevalent in the population and, besides creating an unfavorable aesthetic status, can lead to an increased susceptibility to root surface caries and heightened dental dentin hypersensitivity (12, 13). The Keratinized Gingiva Width is considered one of the vital clinical indices in periodontal assessment and plays a crucial role in periodontal treatment planning, particularly when deciding on the necessity or choice of surgical procedure. Adequate keratinized gingiva provides a firm and stable foundation for restorative and aesthetic treatments. In areas lacking sufficient keratinized mucosa, the loss of attachment and subsequent bone loss occur more rapidly (14–16).

A significant proportion of patients visiting dentists, especially periodontists, suffer from the exposure of

their tooth roots. The current goal of root coverage surgeries is to eliminate or reduce root sensitivity, lower the probability of root caries, and achieve improved aesthetics (17). Knowledge of unusual root morphologies and normal variations within them is essential. In most cases, the number of root canals corresponds to the number of roots (18).

Given the importance of oral and dental diseases, particularly periodontal diseases, this study was conducted with the aim of comparing the effectiveness of the Free Gingival Graft (FGG) technique against the Langer's Connective Tissue Graft (L-CTG).

Methods:

This research was a Retrospective Case-Control Study conducted in Ilam Province in 2020. Participants included patients presenting to a private clinic who exhibited Miller Class I gingival recession affecting the mandibular anterior teeth. The sample size was determined to be 10 patients per group using the appropriate calculation formula.

Data Collection Instruments:

A questionnaire was utilized, comprising demographic information (age and gender), clinical findings, and periodontal measurements taken using a probe.

Inclusion and Exclusion Criteria:

- **Inclusion:** Complete gingival health, Miller Class I gingival recession, aesthetic dissatisfaction in the recession area, presence of functional impairment, or poor oral hygiene compliance.
- **Exclusion:** Presence of systemic diseases (e.g., diabetes, connective tissue disorders, mucocutaneous diseases), active gingival inflammation, tobacco use, obsessive oral hygiene disorders, and psychiatric disorders (e.g., self-harm behaviors).

Grouping and Treatment Modalities:

After screening 20 eligible patients, they were equally divided into two groups of 10 subjects each. In both groups, baseline measurements (Clinical Crown Length, Recession Width, Keratinized Gingiva Width, and Root Coverage) were recorded prior to surgery.

1. Group I (Free Gingival Graft - FGG):

- The Free Gingival Graft (FGG) technique was employed.
- The recipient bed was prepared by creating sulcular incisions and a releasing incision (3 mm away from the recession margin).
- The flap was reflected full-periosteally, and the papillae were de-epithelialized.
- A graft, 1 to 1.5 mm in thickness, was harvested from the palate using a foil template pattern.
- The graft was fixed in the recipient site and compressed with direct pressure for 5 minutes to eliminate any dead space.
- Follow-up: Six months post-surgery, the indices were re-measured and compared.

2. Group II (Subepithelial Connective Tissue Graft - SECTG):

- The Subepithelial Connective Tissue Graft (SECTG) technique was utilized.
- Similar to Group I, baseline measurements were initially performed.
- Incisions were made to reflect a full-periosteal flap adjacent to the Mucogingival Junction

(MGJ). Subsequently, at a point beyond the MGJ, the flap was separated to a split-thickness level.

- Muscle attachments and frenula were detached to ensure a tension-free environment.
- A connective tissue graft, 1 to 1.5 mm thick, was harvested from the palate.
- The graft was sutured to the papillae using resorbable sutures, followed by the coronal repositioning of the flap over the graft.
- Follow-up: Six months later, the indices were re-measured and documented.

Result:

In this study, two groups, FGG and SECTG, were examined regarding the Amount of Anatomic Root Exposure (ARE), Clinical Crown Length (CCL), Keratinized Gingiva (KG), and Recession Width (RW), both before and after treatment. Five females and five males participated in each group. The mean age in the FGG and SECTG groups was 55.4 ± 10.01 years and 50.7 ± 12.66 years, respectively. The Amount of Anatomic Root Exposure (ARE) in the FGG group significantly decreased after treatment. In the SECTG group, the Anatomic Root Exposure (ARE) also significantly decreased, and this reduction was reported to be greater compared to the FGG group.

Table 1- Comparison of clinical crown length before and after surgery

Variable		Pre	Post	P-Value
Clinical crown length	Group I	14.1(7.56)	10(6.96)	0.000
	Group II	13.1(6.71)	20.9(10)	0.000
Gingival recession width	Group I	4.84(3.1)	2.63(0.0)	0.000
	Group II	3.15(1.1)	0	0.000
Keratinized gingiva	Group I	3.42(1.0)	9.48(3.1)	0.000
	Group II	45.97(1.0)	35.29(3.1)	0.000

In the FGG group, the Clinical Crown Length (CCL) significantly decreased from 7.14 to 6.10, and a significant correlation was observed between the changes in CCL before and after treatment. In the SECTG

group, a significant decrease in changes in CCL was reported, where the pre- and post-treatment CCL decreased from 6.13 to 10.20. In the FGG group, the Recession Width (RW) significantly decreased from 3.4 to

0.2, and a significant correlation was observed between the changes in RW before and after treatment. In the SECTG group, a significant decrease in Recession Width changes was reported, with the pre- and post-treatment RW reduction reported as 3 to 0.

In the FGG group, the Keratinized Gingiva (KG) significantly increased from 1.3 to 3.95, and a significant correlation was observed between the pre- and post-treatment KG. In the SECTG group, a significant increase in Keratinized Gingiva was reported, with the pre- and post-treatment KG changes reported as an increase from 1.45 to 1.35 (Table 1).

Discussion:

Various methods of surgery exist, including pedicled soft tissue grafts, free soft tissue grafts, the GTR technique, and a combination of the above, for root surface coverage. Applications of gingival grafting include covering the tooth root surface to reduce sensitivity, for aesthetic purposes, and to increase the width and thickness of the attached gingiva around implants and teeth prior to orthodontic treatment (19, 20). Given the importance of oral and dental diseases, especially periodontal diseases, this study was conducted with the aim of a comparative evaluation of Free Gingival Graft (FGG) versus Lingual Connective Tissue Graft (L-CTG).

In the study by Almeida et al., FGG and the free gingival technique in gingival augmentation were examined, and KTW was measured at 3, 6, and 12 months. Furthermore, postoperative pain and the amount of analgesic consumption in patients were recorded. Consistent with the findings, in both techniques used, the amount of KTW and KTT showed a significant increase (21). Liu et al. published a meta-analysis in 2025 that compared the effectiveness of FGG and CM. According to the findings, the FGG group had better performance in terms of KMW and gain in KMW compared to the CM group (22). The study conducted by AlJasser and his team focused on the anterior and premolar region of the mandible, comparing the effectiveness of Cyanoacrylate Adhesives (CAA) versus the FGG method. This split-mouth trial was performed on 22 participants: in the experimental group, FGG was stabilized using butyl cyanoacrylate, while in the control group, sutures were used. The results showed that although no statistically significant difference was observed in the mean Keratinized Tissue Width (KTW) and the amount of FGG graft shrinkage

between the two groups, there were significant differences in the parameter of graft thickness (GTT) (23).

The study by Wessel et al. demonstrated that for all participants in the study, the level of reported pain in the three-week assessment was correlated with parameters related to analgesic medication use during the recovery period; this included the number of days individuals used analgesics, the total number of pills consumed, as well as the number of pills consumed from day three until the end of the study. This correlation, while showing no difference between CTG and FGG in the first three days, indicates a close link between long-term pain severity and the need for its management by medication (24). Based on the findings of the 15-year study by Cevallos et al., both treatment methods were able to significantly increase Keratinized Tissue Width (KTW) and Gingival Thickness (TT); however, the results obtained for the group treated with FGG showed a clear long-term superiority over the other group (25).

Conclusion

Considering that both FGG and SECTG techniques showed similar effectiveness in treating gingival recession and root coverage, and taking into account that the tissue harvesting method in the Langer technique (SECTG) is inherently less invasive than the free harvesting in the FGG technique, it is concluded that the use of the Langer technique (SECTG) is recommended as the preferred treatment method.

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