Comparison of Free Gingival Graft and Gingival Unit Graft for Treatment of Gingival Recession: A Randomized Controlled Trial

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The aim of this study was to compare the use of gingival unit graft (GUG) with free gingival graft (FGG) for treating wide gingival recession and increasing keratinized tissue. This randomized controlled trial with a split-mouth design included 30 localized bilateral recessions (Miller Classes I and II) that were randomly treated with GUG or FGG. Both grafts were fixed by cyanoacrylate glue. Probing depth, clinical attachment level, vertical recession depth, and keratinized tissue width were recorded at baseline and 1 and 6 months after surgery. The postoperative mean percentage of root coverage at 1 and 6 months was better on GUG side, and KTW significantly increased on the same side 1 month after surgery (P < .05). GUG might be an acceptable modality for increasing keratinized tissue and treating recession.


Keratinized tissue width (KTW) measures the distance between the coronal margin of the gingival sulcus and the mucogingival junction and is considered a pivotal factor for the prevention and the management of healthy tissues around natural teeth.1 Gingival recession is defined as “displacement of the soft tissue margin apical to the cementoenamel junction” (CEJ).2 It may increase tooth hypersensitivity3 and cause root caries, unesthetic appearance of the gums, as well as loss of periodontal attachment and teeth,4 not to mention that it also makes plaque control and oral hygiene more difficult.5 Several techniques of gingival-recession management exist: subepithelial connective tissue graft, pedicled grafts (lateral and coronal), and free gingival graft (FGG).6 Although studies have shown that almost all of these techniques produce statistically significant clinical improvements, different rates of success have been documented both among and within them.7 The term FGG was first suggested by Nabers,8 and the approach has since been used not only for root coverage but also to increase width and thickness of the attached gingiva. Still, conventional FGG has several limitations, such as bulky appearance and esthetic mismatch.9

The vascular characteristics of the graft are probably important for
rapid anastomosis of the capillaries of the recipient site with injured graft vessels. The gingival sulcus is where fine blood vessels form a network and capillaries show numerous anastomoses. As the vascular plexus of the gingiva is rich in horizontal anastomoses, which perfuse the marginal zone, marginal and interdental gingival tissues could be used to benefit from better blood perfusion of the recipient site, therefore improving the chances of graft survival.

Therefore, the supracrestal part of the healthy gingiva involving marginal and papillary tissues is considered the only soft tissue with a free marginal portion naturally created to survive and function facially and interproximally over a vascular root surface. Other studies have shown that in healthy gingiva, there are significantly different vascular distributions in marginal, attached, and interdental gingiva.

For instance, Allen and Cohen used a palatal graft including marginal gingiva as an FGG without increasing its thickness—a technique based on data from a case report.

It should be mentioned, however, that a gingival unit graft (GUG) should be harvested from an area that is not esthetically important. Furthermore, there are only a few case studies and just two clinical trials in this respect.

The first randomized controlled trial dates back to 2013 and was conducted by Kuru and Yıldırım, who compared GUG and conventional FGG for treatment of Miller Classes I and II gingival recessions. They found that vertical recession reduction and keratinized tissue gain were significantly higher in the GUG group.

The aim of this study is to compare the effectiveness of FGG in the treatment of wide recessions and compare the use of GUG with FGG for treating wide gingival recessions and increasing KTW.

Materials and Methods

This randomized controlled clinical trial with split-mouth design was performed at the Department of Periodontology at Damascus University in Damascus, Syria, from November 2016 to February 2018.

Thirty localized Miller Classes I and II recessions were treated in 15 systemically healthy patients (6 men, 9 women), and each had bilateral recessions on canines (Fig 1). Recessions with a vertical depth of 2 mm on the buccal aspects of canines were selected. The participants had a low thickness of the palatal tissue that prevented harvesting of any connective tissue graft. Exclusion criteria included poor oral hygiene, smoking, endodontic treatment, and root surface restorations.

The two treatment modalities were explained in detail to the participants, and written informed consent forms were similarly obtained from each. Patient demographics are shown in Table 1.

Study Design

All patients underwent scaling and root planing and were also given oral hygiene instructions. Occlusal adjustment was performed when necessary.

Table 1 Patient Demographics

<table>
<thead>
<tr>
<th>Patients, n</th>
<th>13</th>
</tr>
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<tbody>
<tr>
<td>Age, y</td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>27.6 ± 3.9</td>
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<tr>
<td>Range</td>
<td>22–34</td>
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<tr>
<td>Sex, n (%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>8 (61.5%)</td>
</tr>
<tr>
<td>Male</td>
<td>5 (38.5%)</td>
</tr>
</tbody>
</table>

SD = standard deviation.
Using the cone randomization method, the right or left side was then randomly selected for treatment with either GUG or conventional FGG by supraperiosteal placement on recipient sites.

Clinical Assessments

Using a periodontal probe (UNC15, Medesy), the following clinical parameters were measured at baseline and 1 and 6 months after the surgical procedures:

- Probing depth (PD): Distance between the most apical point of the gingival margin and bottom of the pocket at three points: mesial, midbuccal, and distal.
- Clinical attachment level (CAL): Distance between the CEJ and the bottom of the pocket.
- Vertical recession depth (VRD): Distance between the CEJ and the most apical part of the gingival margin.
- KTW: Distance between the most apical part of the gingival margin and the mucogingival junction.

Surgical Procedures

After performing local anesthesia, the recipient sites of both treatment sides were prepared by two vertical bevel incisions extending apically to the adjacent teeth, 3 to 4 mm across to the mucogingival line. Surfaces of the interdental papillae were removed only at the GUG side, whereas at the conventional FGG side, butt-joint incisions were made on the papillary tissue at the CEJ level. A partial-thickness dissection was performed apical to the alveolar mucosa, and the surfaces between these incisions were deepithelialized. The base of the recipient site was 5 mm apical to the apical part of the recession (Fig 2). Root planing of the exposed portion of the root surface was done with hand instruments and was then rinsed with saline. A sterile aluminum foil was used for standardizing graft sizes for each patient (Fig 3). Local anesthetic was applied to the palatal area. In the GUG group, the donor palatal graft was selected from the palatal aspect of maxillary premolars. Incisions were made on the external edges of the aluminum foil, and another incision was made in the gingival sulcus of the first premolar. The palatal tissue, including marginal and interdental gingiva, was removed with...
gingivectomy blades and thinned to approximately 1.5 mm (Figs 4 to 6). In the conventional FGG group, the donor graft was harvested from the same area on the opposite side but ≥ 2 mm away from the gingival margin. The donor site was covered with a periodontal dressing (Fig 7) that was removed after seven days.

The grafts were about 1.5 mm thick, and each was stabilized with 2-octyl cyanoacrylate (PeriAcryl90, Glustitch) coronal to or at level with the CEJ. Moderate pressure was applied to the graft for 2 minutes, and afterward cyanoacrylate was applied using its pipette on the four graft angles (Fig 8). Graft adhesion in the recipient site needed 1 to 2 minutes (Fig 9).

Postsurgical care included avoiding chewing hard food; refraining from brushing teeth at the surgery site; rinsing with 0.2% solution of chlorhexidine digluconate once daily for 3 weeks; and taking a systemic antibiotic (500 mg amoxicillin, tid) for 1 week. Postsurgical appointments were scheduled for 1 and 6 months following the surgery (Figs 10 to 12).

Statistical Analyses

Statistical analyses were performed using SPSS, version 18 (IBM). Quantitative data of midbuccal and mid-surface measurements of recessions were recorded as mean ± standard deviation. For intergroup and intra-group comparisons, t test was used. Power calculation was performed at P < .05.
Results

This study included 15 patients who were treated in a split-mouth design. However, 2 patients (1 in the GUG group and 1 in the FGG group) were excluded during the experimental period because they failed to complete the two postoperative follow-ups. Healing in all patients was uneventful. No significant differences in the presurgical parameters were found between the two groups.

Total measured clinical parameters for the two sides are presented in Table 2. VRD significantly decreased on the GUG side after 1 and 6 months ($P = .017$ and $P = .002$, respectively). The mean percentage of root coverage (VRD) at 1 month was $55.06\% \pm 13.89\%$ and $36.73\% \pm 9.95\%$ on the GUG and FGG sides, respectively, and this difference was significant ($P = .001$). The postsurgical mean percentage of root coverage at 6 months was $92.74\% \pm 8.81\%$ and $66.94\% \pm 11.43\%$ on the GUG and FGG sides, respectively, and this difference was also significant ($P = .000$).

Complete defect coverage, defined as gingival margins at the CEJ level, was found in 2 of the 15 patients (13%) on the GUG side after 6 months, whereas none of the participants showed complete coverage on the FGG side. No significant difference existed between the PD in both sides after 1 and 6 months ($P = .887$ and $P = .591$, respectively). In both postsurgical evaluations, significant decline in CAL was seen more on the GUG than the FGG side ($P = .001$ and $P = .002$, respectively). KTW significantly increased on the GUG side from $2.44 \pm 0.78$ mm to $8.23 \pm 0.86$ mm at 1 month then decreased to $6.27 \pm 0.67$ mm at 6 months ($P = .028$); the FGG side showed a similar pattern, with a 1-month increase from $2.54 \pm 0.75$ mm to $7.38 \pm 0.62$ mm, then a fall to $5.62 \pm 0.74$ mm after 6 months ($P = .103$) (Tables 2 and 3).
No complications were observed at the gingival unit donor site, and healing was uneventful. There existed no significant differences in PD and CAL of the relevant maxillary premolar at the gingival unit donor site at 1 and 6 months after surgery (\(P > .05\)) (Table 4).

### Discussion

This randomized controlled clinical trial evaluated the use of GUG as an alternative technique to increase KTW and to treat localized gingival recessions of Miller Classes I and II. The new approach that this study incorporated was to include marginal gingiva and papillary tissue to use a vascular site-specific configuration.

Conventional FGG was initially used to expand the amount of attached gingiva and lengthen the vestibular depth, and was later applied to attempt coverage of exposed root surfaces.\(^2\) Areas with an absence or lack of attached gingiva and gingival recession can be effectively treated with FGG to create an adequate zone of keratinized tissue and recession coverage, especially when the patient has decreased vestibular depth.\(^2\) Camargo et al proposed that while traditional thin grafts and FGGs showed a high rate of success in root coverage of small to moderate gingival defects, wide and deep recessions had a smaller chance of success.\(^2\) In the present study, FGG increased KTW and root coverage (VRD) despite the latter’s incompletion in all patients due to the width of recessions on the canines. It has been demonstrated that predominant gingival vessels increase in number and decrease in size as they extend coronally.\(^1\) Marginal and interdental gingival tissues can be used to benefit from better blood perfusion of the recipient site, therefore improving the chances of graft survival.\(^1\)

In the current study, a split-mouth design was used in order to eliminate interindividual variability of the treatment effect. Two patients were excluded because they failed to complete the follow-up periods. At the final follow-up, both treatment sides showed statistically significant postoperative root coverage at 1 and 6 months,

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Difference from baseline</th>
<th>(P)</th>
<th>(P)</th>
<th>(P)</th>
</tr>
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<tbody>
<tr>
<td>PD</td>
<td>0.04</td>
<td>0.23</td>
<td>.887</td>
<td>.591</td>
</tr>
<tr>
<td>CAL</td>
<td>-0.94</td>
<td>-1.38</td>
<td>.001</td>
<td>.002</td>
</tr>
<tr>
<td>KTW</td>
<td>0.94</td>
<td>0.75</td>
<td>.028</td>
<td>.103</td>
</tr>
<tr>
<td>VRD</td>
<td>-0.58</td>
<td>-0.81</td>
<td>.017</td>
<td>.002</td>
</tr>
</tbody>
</table>

PD = probing depth; CAL = clinical attachment level; KTW = keratinized tissue width; VRD = vertical recession depth. Intergroup comparison. \(P\) values < .05 are considered statistically significant.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Difference from baseline</th>
<th>(P)</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD</td>
<td>0.03</td>
<td>0.07</td>
<td>.091</td>
</tr>
<tr>
<td>CAL</td>
<td>0.07</td>
<td>0.10</td>
<td>.604</td>
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</table>

PD = probing depth; CAL = clinical attachment level. Intergroup comparison. \(P\) values < .05 are considered statistically significant.

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while the GUG side produced a higher root coverage percentage at 1 and 6 months but more KTW at 1 month alone. The GUG side created a significantly greater reduction in the CAL at 1 and 6 months. These results indicate that the GUG technique may improve these periodontal parameters.

Two previous comparative studies\textsuperscript{10,17} in the literature examined GUG and conventional FGG. One of them, a split-mouth design, included 18 bilateral localized recessions (Miller Classes I and II), which were treated in nine systemically healthy patients. The study found that GUG produced higher esthetic satisfaction at 1, 3, and 6 months, and higher root coverage at 1 month. Additionally, 11% of GUGs showed complete coverage at 6 months and a higher healing index and greater reduction in recession width 3 months after surgery; reduction in VRD on this side, however, was not significantly greater.\textsuperscript{17}

Kuru and Yıldırım’s study,\textsuperscript{10} on the other hand, included seventeen patients who were randomly divided into two groups. The authors found greater vertical recession reduction, attachment, and keratinized tissue gain in the GUG group than in the second group. Additionally, mean percentages of defect coverage were 91.62% in the GUG group and 68.97% in the FGG group ($P < .05$).

A case study by Allen and Cohen reported that using GUG was useful in treating localized recession defects at 3 months.\textsuperscript{14} A case report produced in 2015 showed that using modified GUG for treatment of Miller Class III recession defects provided better defect coverage than conventional FGGs did.\textsuperscript{16}

In the present study, 13% of the GUG sides showed complete coverage at six months while none of the conventional FGG sides did. Similar to another comparative study,\textsuperscript{19} Yıldırım and Kuru found that the mean coverage percentage at 6 months was 92.74% at the GUG side compared to 66.94% at the FGG side.\textsuperscript{16} Likewise, Jenabian et al\textsuperscript{17} found that mean coverage percentage at 6 months was 60.52% at the GUG side compared to 45.52% at the FGG side.\textsuperscript{17} The present study’s larger sample size may contribute to the greater coverage values found compared to Jenabian et al.\textsuperscript{17} PD did not change significantly, but the CAL and KTW gain were both significant in the present findings and were similar to those of previous studies.\textsuperscript{10,17} A significant reduction in VRD was observed after 1 month, with the greatest reduction at 6 months; this might have been due to gingival margin migration in the coronal direction as a likely result of creeping attachment, first described by Goldman and Cohen.\textsuperscript{23} This conflicted with Shah et al,\textsuperscript{6} where complete root coverage was not obtained because preoperative recession depth was large (6 mm) and the expectation of complete coverage was somewhat unrealistic.\textsuperscript{6}

In the present study, the authors did not notice any recession of the donor site, which occasionally happens in laterally positioned flaps,\textsuperscript{24} and there also were no significant differences in PD and CAL at 1 and 6 months in the donor site of gingival unit graft, which is similar to the findings of Shah et al.\textsuperscript{6} Additionally, no postoperative recession was noticed at the donor site. In Kuru and Yıldırım’s study,\textsuperscript{10} none of the patients of GUG group complained of any painful palate wound healing, and Jenabian et al\textsuperscript{17} found that clinical healing at the gingival unit donor site occurred without any complications. Similarly, none of the patients in the present study complained of excessive pain in the palate of the area of GUG, while participants reported complaints of discomfort in the two harvesting sides (both FGG and GUG groups). Overall, healing was free of problems in all study patients.

**Conclusions**

Within the limits of this study, it can be concluded that using GUG could be an acceptable treatment for Miller Classes I and II recession defects in light of the favorable results.

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**References**


