A Prospective, Randomized Controlled Pilot Trial to Compare Vestibular Incision Subperiosteal Access and Sulcular Tunnel Access Root Coverage Procedures to Treat Gingival Recession

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The aim of this randomized prospective study was to compare clinical and patient-centered outcomes of Miller Class I and II gingival recession defects treated with acellular dermal matrix (ADM) grafts and either vestibular incision subperiosteal tunneling access (VISTA) or sulcular tunnel access (STA) techniques. A total of 29 gingival recession defects in nine patients were assessed to determine clinical outcomes, including probing depth (PD), gingival recession (GR), width of keratinized tissue (KT), width of attached tissue (AT), tissue thickness at the gingival margin (TT1), and tissue thickness 4 mm apical to the gingival margin (TT2). Visual analog scale (VAS) assessment of patient-perceived pain, bleeding, swelling, and changes in activity were assessed postoperatively at 7 and 30 days, and professional assessment of postoperative esthetics using the Pink Esthetic Score (PES) was performed at 6 months. All sites demonstrated significant improvements in midfacial GR. No statistically significant differences were noted between the VISTA and STA groups for clinical or patient-centered outcomes, except for preferable midfacial AT in the VISTA sites at 6 months. These findings indicate that both surgical techniques can be used with ADM grafts to achieve improvements in root coverage, alterations in periodontal phenotype, and improved esthetics with high levels of patient satisfaction. Int J Periodontics Restorative Dent 2022;42:e91–e102. doi: 10.11607/prd.6135

Periodontal plastic surgical techniques are commonly employed to treat gingival recession defects around teeth and implants. The goals of such procedures include improving root coverage, achieving improved periodontal phenotype, enhancing esthetics, reducing the risk of progressive recession and attachment loss, decreasing dentinal hypersensitivity, and preventing tooth structure loss due to caries and/or noncarious cervical lesions (NCCLs). The outcomes of periodontal plastic surgical procedures have been assessed through measures such as root coverage, alterations in width of keratinized tissue (KT), and changes in soft tissue thickness. Furthermore, assessment of patient-centered outcomes has also been identified as an important factor in patient satisfaction with treatment and the patient’s willingness to accept additional treatment recommendations. Treatment outcomes may be influenced by the initial defect dimensions, the surgical treatment modality, the postsurgical position of the gingival margin, and patient characteristics, such as smoking.

It has been reported that previous negative patient experiences, particularly postoperative pain perception and incomplete root coverage, influence patient willingness to undergo future treatment.
While both autogenous and allogeneic grafts have been used to improve clinical parameters, the use of allograft materials has been proposed to reduce postoperative discomfort and improve esthetic outcomes.\textsuperscript{15,16} Multiple techniques have been developed to obtain predictable root coverage while optimizing patient acceptance, intraoperative time, and esthetic outcomes. The aims of these evolving techniques are to increase the predictability of treatment, reduce patient morbidity and discomfort, minimize surgical visits, and improve esthetic success, including color variability and continuity of the gingival margin.\textsuperscript{17,18} Both the use of sulcular tunnel access (STA) and vestibular incision techniques have been employed to improve surgical access and patient treatment acceptance for recession defects.\textsuperscript{19–22} This approach may allow for improved access with less risk of papillary displacement and better esthetic and patient-centered postoperative outcomes.\textsuperscript{13} However, current randomized controlled trials comparing the use of acellular dermal matrix (ADM; AlloDerm, BioHorizons) grafts and coronally advanced flaps, either via the vestibular incision subperiosteal tunnel access (VISTA) or STA technique, are not currently available. Therefore, this investigation sought to conduct a pilot study to evaluate the comparative clinical and patient-centered outcomes at Miller Class I and Class II gingival recession defects treated with ADM graft and either VISTA or STA surgical technique.

**Materials and Methods**

Nine patients with 29 surgical sites were enrolled in this study between September 2018 and October 2019 following approval by the University of Alabama at Birmingham institutional review board (IRB-300001591). This study was registered with clinicaltrials.gov (NCT03566108). Patients were included in the study if they were systemically healthy or well-controlled, were at least 18 years of age, were able to provide consent, had stated their ability to comply with the protocol timeline, were not smokers (≤ 10 cigarettes/day), had no anticipated need for restorative and/or periodontal therapy during the study period, and presented with one or more adjacent teeth (up to four) with Miller Class I or II gingival recession (GR) defects\textsuperscript{23} with ≥ 2 mm GR depth at each site to be treated. Patients were excluded from the study if they had any health conditions, were taking any medication that could adversely affect bone healing, or had active caries or periodontal disease. A flowchart of subject visits is detailed in Fig 1.

**Clinical Measurements**

Clinical measurements were assessed at three sites per tooth (mesiofacial [MF], facial [F], and distofacial [DF]) on the buccal surfaces of all teeth included in the study. These measurements included: (1) probing depth (PD); (2) bleeding on probing (BOP); (3) Modified Gingival Index (GI)\textsuperscript{24,25}; (4) Gingival Index (GI)\textsuperscript{24,25}; (5) width of keratinized tissue (KT); and (6) attached tissue (AT). All clinical measurements were recorded at baseline and postoperatively at 3 and 6 months. Tissue thickness measurements (TT1 and TT2) were performed after administration of local anesthesia at baseline and after visits 6 and 7 (3 and 6 months postoperatively, respectively) and were measured by horizontal transmucosal probing using an endodontic reamer and stopper. TT1 and TT2 were measured at 0 mm and 4 mm from the mucosal margin, respectively.

**Surgical Procedures**

Surgical sites were randomized to receive either the VISTA or STA procedure using a random generator formula. All proposed surgical sites with recession were treated with ADM and coronal flap advancement. Images for each procedure are described in Fig 2 (VISTA) and Fig 3 (STA).\textsuperscript{21,26}

**VISTA Procedure**

The VISTA procedure utilized in this investigation was initially described by Zadeh.\textsuperscript{21} When multiple adjacent teeth were to be treated, a 2- to 3-mm buccal vertical vestibular incision was made apical to the mucogingival junction (MGJ) at the midline of the surgical sites, and for one-tooth sites, this incision was mesial/distal to the MGJ. A continuous split-thickness pouch was...
created with sharp dissection, starting at the vestibular incision and extending through the gingival sulcus and then laterally to include study sites and the adjacent teeth. Papillae were gently elevated to ensure they remained intact. After ADM placement through the vestibular incision, an OptraGate retractor (Ivoclar Vivadent) was inserted to retract the cheek and lips, and a small portion of the buccal surface of the enamel of the treated teeth (where the suspensory sutures were to be fixated), was prepared with 37% phosphoric acid etching for 40 seconds, followed by thorough rinsing with sterile water. The treated teeth were dried completely. Horizontal interrupted sutures slightly coronal to the MGJ at each site were placed with enough slack to allow for coronal advancement of the suture and the flap. The sutures were bonded with composite and light cured for 60 seconds. This secured the overlying flap in a position coronal to the CEJ and completely covered the recession defects. The total time and the total suturing intrasurgical time were recorded for all patients.

STA Procedure

The STA procedure utilized in this investigation was initially described by Modaressi and Wang.26 The surgical site(s) were prepared utilizing a papilla-sparing sulcular incision, and the tunnel was prepared using end-cutting knives, extending apically from the sulcus. For all surgical sites, the tunnel preparation was extended one tooth mesial and distal to the treated tooth/teeth. A continuous split-thickness flap was elevated at the buccal aspect of the flap. The papillae were gently elevated to ensure they remained intact. After ADM insertion through the sulcular incision, the ADM graft was secured in position, and an overlying flap was secured in a coronal position with individual vertical mattress sling sutures, with care not to allow tension of the sutures at the gingival margins or on the papilla. The total

| Screening visit: Determine whether patient meets inclusion criteria, discuss and sign consent for study participation, determine study group assignment |
|---|---|
| Visit 1: Surgical care completed based on patient’s group assignment, intraoral photos taken |
| Visit 2: 1-week follow-up: Evaluation of surgical sites, patient satisfaction survey |
| Visit 3: 2-week follow-up: Suture removal, evaluation of healing |
| Visit 4: 1-month follow-up: Evaluation of healing, clinical measurements, patient satisfaction survey |
| Visit 5: 3-month follow-up: Clinical measurements |
| Visit 6: 6-month follow-up: Clinical examination, Pink Esthetic Score/practitioner and patient assessment of esthetic outcome and root coverage |
| Visit 7: 1-year follow-up: Clinical examination, Pink Esthetic Score/practitioner and patient assessment of esthetic outcome and root coverage, study participation and satisfaction survey |

**Fig 1** Study flowchart. At all visits, the patient’s health history was reviewed, healing was evaluated, patients were assessed for adverse events, and intraoral photos were obtained. Clinical measurements included probing depth, Plaque Index, bleeding on probing, Gingival Index, width of the keratinized tissue (KT; only visits 6 and 7), and position of the gingival margin related to the CEJ and tissue thickness (TT1 and TT2; only visits 6 and 7).
time and the total suturing intrasurgical time were recorded for all patients.

**ADM Placement**

ADM material was hydrated according to the manufacturer’s instructions. Mesiodistal and apico-coronal dimensions were measured at the recipient site, and the ADM material was trimmed to equal dimensions and uniform thickness. The ADM material was wetted with blood from the surgical site to determine the orientation of the graft material (ie, the basement membrane and connective tissue/dermal surfaces). The dermal surface was placed internally, and the basement membrane was placed externally. With this orientation, the ADM was inserted at the site and gently manipulated into place in a level plane and at the coronal extent of the pouch. The corners of the ADM were secured at the most mesial and distal extents with single-sling sutures. No tension was applied to the tissue because all sites were adequately released prior to bonding.

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**Fig 2** VISTA surgical technique utilized in this study. (a) Initial Miller Class I and II gingival recession defects at maxillary anterior teeth. (b) A vestibular incision was made and extended to include all involved teeth in the treated surgical site. (c) Simple interrupted sutures were placed horizontally at the mucogingival junction to allow for coronal fixation of the flap. (d) Acellular dermal matrix was inserted into the vestibular access, manipulated into position, and sutured at the mesial and distal ends of the overlying flap. (e) The vestibular incision sutures and suspensory sutures were bonded to the buccal aspects of the treated teeth to allow for coronal flap and graft advancement. (f) Clinical results after 6 months of healing.
Postsurgical Care

A presurgical antibiotic loading dose (2.0 g amoxicillin or 600 mg clindamycin) and analgesics (600 mg ibuprofen) were dispensed prior to the surgical procedures. Postoperative prescriptions for relief of postsurgical discomfort, a 5-day antibiotic course, postoperative 0.12% chlorhexidine gluconate mouthrinse, and written home care instructions were provided to all patients immediately after surgery.

Patients were assessed at 7, 14, and 30 days postoperatively. At all visits, changes to medical history relevant to the inclusion/exclusion criteria and any adverse events were assessed. At 14 days postoperatively, treated sites received supragingival scaling, and sutures without tension were removed. All other sutures were monitored and remained in place for a maximum of 30 days. For patients who received the VISTA therapy, the composite was removed from their teeth with a white stone bur when the sutures were removed. For patients in both groups, a prophylaxis cleaning with hand curettes and a rubber cup and pumice was...
completed after suture removal. Oral hygiene was reinforced, with emphasis on the roll technique\textsuperscript{25} using an extra-soft toothbrush. Standardized photos were obtained at all postoperative visits.

**Patient-Centered Outcome Measurements**

A 10-point visual analog scale (VAS) was administered at 7 and 30 days postoperative and used to evaluate patient perception of pain, swelling, bleeding, and activity tolerance (using an activity tolerance scale [ATS]). All data were reported on a scale of 1 to 10, with 1 being no change in activity tolerance and 10 being unable to tolerate any activities.

**Esthetic Outcome Measurements**

The Pink Esthetic Score (PES) was assessed by calibrated, blinded examiners (M.L.G. and R.V.A.), for all sites and scored out of a total of 8.\textsuperscript{27}

**Intrasurgical Time**

Surgical and suturing times were recorded for each procedure and were combined to evaluate the total intrasurgical time. To account for the varying numbers of teeth included in different surgical sites, the times were divided by the number of teeth being treated at each site to provide an average time per tooth for both the total and suturing times.

**Statistical Analysis**

Descriptive statistics (mean ± SD for continuous variables; frequency and percentage for categorical variables) were used to summarize patient characteristics and dental indices. Linear regression analyses using a generalized estimating equations (GEEs) approach were performed to compare the dental indices, suture time, and surgery time between the VISTA and STA groups, while accounting for correlated observations due to multiple teeth in the same patients. Compound symmetry was chosen as an appropriate covariance structure for the models after assessing the covariance estimates and the fit criteria (QIC/QICu) of other models. A \( P \) value < .05 was considered statistically significant in two-tailed statistical tests. All analyses were conducted using SAS software version 9.4.

**Results**

**Overall Clinical Outcomes**

Nine patients completed all study visits, and a total of 29 surgical sites were treated. Thirteen sites were included in the VISTA group, and 16 sites were included in the STA group. One patient received surgery but was excluded from the study based on reported non-compliance with the postoperative instructions. For all participants, there were no statistically significant changes in PD from baseline to the 6-month visit. Mean midfacial GR was 2.48 ± 0.57 mm at baseline, was 0.52 ± 0.57 mm at 3 months, and was 0.43 ± 0.6 mm at 6 months. Mean TT1 and TT2 values at baseline were 0.54 ± 0.13 mm and 0.37 ± 0.1 mm, respectively. At 6 months, the mean TT1 and TT2 values were 1 ± 0.15 mm and 1.26 ± 0.37 mm, respectively. The mean KT for all participants was 2.48 ± 1.02 mm at baseline and was 2.82 ± 0.66 mm at 6 months. Mean AT was 0.79 ± 0.90 mm at baseline and 1.23 ± 0.32 mm at 6 months (Fig 2).

**Comparative Clinical Outcomes**

There were no differences between clinical parameters in the VISTA and STA groups at baseline (Table 1), and clinical parameters improved in both the VISTA and STA groups at 3 and 6 months. The midfacial AT measurements for the VISTA sites were statistically significantly greater than those for the STA sites at 6 months, but there were no other differences noted in clinical measurements at the 3- or 6-month visits. It should be noted that the overall mean root coverage was 74.4% and 75.2% for VISTA and STA, respectively, at 6 months (Tables 2 and 3).

**Patient-Centered Outcomes**

The patient-perceived postoperative pain, swelling, bleeding, and ATS were recorded on a 10-point VAS at 7 and 30 days after surgery. At 7 days, patients in the VISTA group reported an average pain of 2.14 ± 0.49, swelling of 3.87 ± 0.54, bleeding of 2.41 ± 1.25, and ATS of
### Table 1 Clinical Parameters for Surgical Sites at Baseline (Presurgery)

<table>
<thead>
<tr>
<th>Metric</th>
<th>VISTA</th>
<th>STA</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midfacial probing depth, mm</td>
<td>1.57 ± 0.76</td>
<td>1.85 ± 0.38</td>
<td>.337</td>
</tr>
<tr>
<td>Midfacial gingival recession, mm</td>
<td>2.54 ± 0.52</td>
<td>2.31 ± 0.48</td>
<td>.274</td>
</tr>
<tr>
<td>Midfacial width of keratinized tissue, mm</td>
<td>2.77 ± 0.93</td>
<td>2.46 ± 0.97</td>
<td>.472</td>
</tr>
<tr>
<td>Midfacial attached tissue, mm</td>
<td>0.92 ± 0.86</td>
<td>0.54 ± 1.05</td>
<td>.406</td>
</tr>
<tr>
<td>Tissue thickness at gingival margin, mm</td>
<td>0.57 ± 0.13</td>
<td>0.54 ± 0.12</td>
<td>.576</td>
</tr>
<tr>
<td>Tissue thickness 4 mm apical to the gingival margin, mm</td>
<td>0.36 ± 0.10</td>
<td>0.37 ± 0.103</td>
<td>.721</td>
</tr>
</tbody>
</table>

Values are presented as mean ± SD.

### Table 2 Clinical Parameters for Surgical Sites at 3 Months

<table>
<thead>
<tr>
<th>Metric</th>
<th>VISTA</th>
<th>STA</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midfacial probing depth, mm</td>
<td>1.63 ± 0.33</td>
<td>1.42 ± 0.29</td>
<td>.6278</td>
</tr>
<tr>
<td>Midfacial gingival recession, mm</td>
<td>0.4 ± 0.14</td>
<td>0.5 ± 0.15</td>
<td>.461</td>
</tr>
<tr>
<td>Midfacial width of keratinized tissue, mm</td>
<td>2.85 ± 0.80</td>
<td>2.23 ± 0.60</td>
<td>.055</td>
</tr>
<tr>
<td>Midfacial attached tissue, mm</td>
<td>1.31 ± 1.11</td>
<td>0.85 ± 0.69</td>
<td>.255</td>
</tr>
<tr>
<td>Tissue thickness at gingival margin, mm</td>
<td>1.27 ± 0.14</td>
<td>1.24 ± 0.16</td>
<td>.367</td>
</tr>
<tr>
<td>Tissue thickness 4 mm apical to the gingival margin, mm</td>
<td>1.39 ± 0.46</td>
<td>1.39 ± 0.51</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Values are presented as mean ± SD.

### Table 3 Clinical Parameters for Surgical Sites at 6 Months

<table>
<thead>
<tr>
<th>Metric</th>
<th>VISTA</th>
<th>STA</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midfacial probing depth, mm</td>
<td>1.22 ± 0.14</td>
<td>1.6 ± 0.22</td>
<td>.628</td>
</tr>
<tr>
<td>Midfacial gingival recession, mm</td>
<td>0.4 ± 0.20</td>
<td>0.47 ± 0.15</td>
<td>.811</td>
</tr>
<tr>
<td>Midfacial change in gingival recession from baseline, mm</td>
<td>−2.06 ± 0.36</td>
<td>−1.85 ± 0.14</td>
<td>.461</td>
</tr>
<tr>
<td>Mean root coverage, %</td>
<td>74.4</td>
<td>75.2</td>
<td>.935</td>
</tr>
<tr>
<td>Sites achieving complete root coverage, %</td>
<td>69.2</td>
<td>56.3</td>
<td>.245</td>
</tr>
<tr>
<td>Midfacial width of keratinized tissue, mm</td>
<td>3.00 ± 0.82</td>
<td>2.60 ± 0.52</td>
<td>.168</td>
</tr>
<tr>
<td>Midfacial attached tissue, mm</td>
<td>1.70 ± 1.16</td>
<td>0.60 ± 0.84</td>
<td>.017*</td>
</tr>
<tr>
<td>Tissue thickness at gingival margin, mm</td>
<td>1.04 ± 0.045</td>
<td>0.95 ± 0.031</td>
<td>.2331</td>
</tr>
<tr>
<td>Tissue thickness 4 mm apical to the gingival margin, mm</td>
<td>1.38 ± 0.14</td>
<td>1.12 ± 0.10</td>
<td>.228</td>
</tr>
</tbody>
</table>

All values except mean root coverage and the sites achieving complete root coverage are presented as mean ± SD. *Statistically significant.
1.9 ± 0.78. The STA group reported an average pain of 3.35 ± 0.08, swelling of 3.38 ± 0.59, bleeding of 0.86 ± 0.8, and ATS of 3.22 ± 0.93. There were no statistically significant differences in patient-perceived outcomes at 7 days after surgery (Table 4). At 30 days postoperative, all patients reported 0 for all categories of the patient-perceived VAS.

### Esthetic Outcomes

Esthetic outcomes were assessed by one calibrated examiner 6 months postoperatively using the PES, up to a potential total score of 8. Over-all PES was assessed to be 7.41 ± 0.28 for the VISTA group and 7.31 ± 0.29 for the STA group (P = .802). All treated sites received a transparency score of 2, which indicated no root surfaces or gray color gingival show-through of a periodontal probe was visible. Furthermore, all treated sites received a color score of 2, indicating that the color match with adjacent tissues was ideal 6 months after surgery. The position of the MGJ at 6 months postoperatively differed between groups, with the VISTA group demonstrating an average alignment score for MGJ position of 1.7 ± 0.15 and the STA demonstrating an average score of 1.88 ± 0.06 (P = .332). No sites in this category had a score of 0. The esthetic findings are summarized in Table 5.

### Intrasurgical Time

The average surgical procedure time per tooth for the VISTA group was 14:17 ± 1:24 minutes, and for the STA group was 15:30 ± 1:00 minutes (P = .094). The mean suturing time per tooth for sites treated with the VISTA procedure was 12:30 ± 0:36 minutes compared to a mean time of 8:07 ± 0:26 minutes for the STA group (P = .0001). The overall mean

### Table 4 VAS Scores for Patient-Perceived Outcomes at 7 Days

<table>
<thead>
<tr>
<th>VISTA</th>
<th>STA</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>2.14 ± 0.49</td>
<td>3.35 ± 0.083</td>
</tr>
<tr>
<td>Swelling</td>
<td>3.87 ± 0.543</td>
<td>3.38 ± 0.589</td>
</tr>
<tr>
<td>Bleeding</td>
<td>2.41 ± 1.25</td>
<td>0.86 ± 0.8</td>
</tr>
<tr>
<td>Activity tolerance score</td>
<td>1.9 ± 0.78</td>
<td>3.22 ± 0.93</td>
</tr>
</tbody>
</table>

VAS = visual analog scale.

VAS data were recorded on a scale of 1 to 10, with 1 being the least severe and 10 being the most severe. For activity tolerance, a score of 1 indicates no change in activity tolerance, and a score of 10 indicates an inability to tolerate any activities. Values are presented as mean ± SD.

### Table 5 VAS Changes from Baseline for PES Outcomes at 6 Months

<table>
<thead>
<tr>
<th>PES component</th>
<th>VISTA</th>
<th>STA</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gingival recession</td>
<td>1.74 ± 0.13</td>
<td>1.51 ± 0.16</td>
<td>.267</td>
</tr>
<tr>
<td>Gingival transparency</td>
<td>2 ± 0</td>
<td>2 ± 0</td>
<td>1.00</td>
</tr>
<tr>
<td>Gingival color</td>
<td>2 ± 0</td>
<td>2 ± 0</td>
<td>1.00</td>
</tr>
<tr>
<td>MGJ alignment</td>
<td>1.7 ± 0.15</td>
<td>1.88 ± 0.06</td>
<td>.332</td>
</tr>
<tr>
<td>Total PES</td>
<td>7.41 ± 0.28</td>
<td>7.31 ± 0.29</td>
<td>.802</td>
</tr>
</tbody>
</table>

MGJ = mucogingival junction; PES = Pink Esthetic Score; VAS = visual analog scale.

The values shown are scores, presented as mean ± SD. The PES components were scored according to Belser et al.27 as follows: Recession was scored from 0 to 2 (0 = no change or increase from baseline; 1 = decreased recession, with < 100% root coverage obtained; 2 = 100% root coverage obtained); gingival transparency was scored from 0 to 2 (0 = root evident beneath the underlying soft tissue; 1 = root visible through the soft tissue; 2 = no show-through of the root surface); gingival color was scored from 0 to 2 (0 = obvious difference from adjacent soft tissue; 1 = slight difference from adjacent soft tissue; 2 = no difference from adjacent soft tissue); and MGJ alignment was scored from 0 to 2 (0 = ≥ 1-mm difference from adjacent MGJ; 1 = ≤ 1-mm difference from adjacent MGJ; 2 = no difference from adjacent MGJ).
intrasurgical time was 26:07 ± 2:08 minutes and 23:07 ± 0:44 minutes for the VISTA and STA sites, respectively (P = .085).

**Discussion**

In the present study, both soft-tissue grafting techniques utilized for Miller Class I and II gingival recession defects resulted in significant improvements in clinical parameters, including midfacial gingival recession and tissue thickness at treated sites. This is consistent with previous investigations and reviews that have established the predictability of optimal root coverage at Miller Class I and II defects.1-5 Furthermore, alterations in soft tissue thickness have been associated with more stable grafting results at 12 months2,8 and in patients and/or sites planned for orthodontic or restorative therapy,6 and many graft types have been shown to significantly improve soft tissue thickness.29

Identifying treatments that provide acceptable and predictable outcomes to address areas of GR is critical to meeting patient needs, as GR defects are highly prevalent and can lead to other impactful and negative dental findings. When GR defects are present on teeth, treatment requires clinicians to rebuild the mucogingival complex, restore and preserve the esthetic relationship between the gingiva and the teeth, and establish an environment that is resistant to future progressive recession. Approximately 58% of the US adult population demonstrates at least one intraoral site with at least 1 mm of gingival recession, and the prevalence and severity of gingival recession defects increase with age.30 Further, the underlying causes of GR defects are multifactorial and include anatomical considerations such as buccal bone thickness, physiologic factors such as orthodontic tooth movement, and/or trauma from brushing or oral habits, oral hygiene habits, or aberrant frenal attachments.30-32 When developing treatment plans for such patients, addressing the underlying etiologic factors is critical to avoid recurrent GR after soft tissue grafting. Further, appropriate treatment of recession defects addresses other untoward conditions that have been associated with GR and exposed root surfaces, including dentinal hypersensitivity, increased risk of radicular caries, compromised esthetics, and the development of noncarious cervical lesions.1-5 It should be noted that while development and progression of GR are not associated with increased tooth mortality, the subsequent exposed root surfaces are frequently associated with esthetic concerns, dentinal hypersensitivity, and both carious and noncarious cervical lesions.3,7,9,31,32

Finally, without adequate treatment, most recession defects will progress over time, which can compromise the overall support of the teeth and lead to more severe secondary outcomes.31,32

The patient’s postoperative experience and their assessment of soft-tissue grafting outcomes have implications not only for the patient’s immediate well-being, but also on their attitudes toward future interventions.10 Postoperative pain has been negatively associated with the acceptance of future periodontal plastic surgery procedures, whereas complete root coverage was positively correlated with patient satisfaction and willingness to undergo additional procedures.10

Given these findings, it has become more common to investigate patient-centered outcomes and patient preferences in addition to clinical outcomes.33 This focus can ensure that patients are more willing to accept additional needed therapy if warranted. The present investigation compared patient-assessed postoperative outcomes and practitioner-assessed esthetic outcomes between two investigations. No statistically significant differences were noted between the STA and VISTA techniques in either the patient-centered outcomes or PES at 6 months postoperative. Notably, all patients stated at the end of the study period that they would be willing to receive another soft tissue graft if needed.

The use of VISTA and STA surgical techniques to treat Miller Class I and II gingival recession defects resulted in similar clinical findings with regard to most clinical, esthetic, and patient-centered postoperative outcomes in the present investigation. The present study demonstrated improved midfacial attached tissue measurements for the VISTA sites compared to the STA sites. In this case, it is unclear whether this difference is clinically significant. The suturing technique utilized with the VISTA approach was more time-consuming per tooth than with STA,
but the total treatment time per tooth did not differ between techniques. No statistically significant differences were seen between the techniques tested for the surgical procedural or the total treatment time per tooth in the present study. All treated sites had a significant decrease in the degree of recession defects, with most sites gaining complete root coverage. All sites also had a significant increase in tissue thickness, and the tissue thickness at 6 months postoperative was greater than the 0.8-mm threshold for thick gingival phenotype categorization at all sites. This indicates that both surgical techniques may reduce the recurrence of gingival recession in the future by transforming the gingival phenotype from thin to thick at those sites.6,7 The decision to use one technique or the other should be made based on the characteristics of the proposed surgical site to be treated, the surgeon’s preference for and familiarity with a particular technique, and the patient’s individual characteristics and concerns.

The lack of other discernible differences between these surgical techniques with regard to clinical, esthetic, and patient-centered outcomes may be associated with several factors. First, all treated defects were Miller Class I (n = 18) or Class II (n = 11) recession defects, for which complete root coverage can be predictably achieved with appropriate surgical techniques. Because root coverage can be predictably achieved at these sites, this may have dampened the investigation’s ability to determine substantive differences between these techniques. Additionally, the present study included a relatively low number of participants (n = 9) and number of treated sites (n = 29), and thus the sample size may have been underpowered to fully assess differences between these treatment modalities. The outcomes seen herein may allow for more specific sample size calculations for future studies.

One significant difference between these techniques is the use of suspensory bonded sutures in the VISTA technique that are not employed in the STA technique. Had the same suturing technique been used in both cases, the differences in location and extent of the incision may have been elucidated. As such, this investigation cannot determine whether any of the differences seen were due to the suturing or incision design.

Furthermore, many soft tissue grafting techniques are both time-consuming and technique-sensitive. Both of these techniques may have a learning curve, and the level of experience that practitioners have with each technique may affect the outcomes of the procedure. It should be noted that procedural and suturing time decreased for both techniques over the course of the study, but this reduction was greater for the VISTA compared to the STA technique. While it is outside the scope of this investigation to determine the reasons for such changes, it is postulated that clinical hands-on training of the surgical team (surgeon and surgical assistant) may be critical for ensuring delivery of optimal care with both techniques. It is also possible that differences between the techniques may be more apparent when they are performed by a novice practitioner, and the performance of a threshold level of procedures may allow for more predictable outcomes with all techniques.24 It should also be noted that while all study sites achieved acceptable esthetic results after surgical treatment, baseline assessment of PES esthetic values were not performed, and there may have been unrecognized differences at baseline that may have been significant. Furthermore, in future investigations, the use of the Root Estheticic Score may be more informative and specific for soft tissue grafting rather than use of the PES.35

Future studies regarding these two techniques with larger sample sizes and additional follow-up time are recommended to determine the long-term stability of root coverage and esthetic outcomes achieved with each technique. It would also be of interest to determine if particular intraoral sites (eg, posterior or anterior, maxillary or mandibular) would benefit from one technique more than the other based on surgical access, anatomical limitations, and other factors that may vary throughout the mouth. It may also be beneficial to study both techniques with Miller Class III/IV defects with or without the use of adjunctive growth factors to determine if one surgical technique may be preferable when complete root coverage may not be anticipated and/or if adjunctive growth factors improve outcomes for these surgical interventions.
Conclusions
The use of VISTA and STA surgical techniques to treat Miller Class I and II gingival recession defects resulted in similar clinical findings with regard to clinical, esthetic, and patient-centered postoperative outcomes. Future research should include larger patient populations with more varied study sites, longer follow-up times, and the inclusion of more complex recession defects to compare the long-term outcomes between the techniques for optimal selection of the most appropriate technique in unique clinical situations.

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