Connective Tissue Graft Stabilization by Subperiosteal Sling Suture for Periodontal Plastic Surgery Using the VISTA Approach

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This report describes a minimally invasive surgical approach using the vestibular incision subperiosteal tunnel access and a suture called the subperiosteal sling (SPS) to stabilize the connective tissue graft (CTG) for periodontal plastic surgery. The SPS suture engages only the CTG and stabilizes the CTG against the tooth independent of the overlying tissue, which minimizes the risk of graft mobility caused by muscle movement. Int J Periodontics Restorative Dent 2019;39:253–258. doi: 10.11607/prd.3529

Although the coronally advanced flap (CAF) combined with a connective tissue graft (CTG) is well documented and considered the gold standard for root coverage of localized Miller Class I and II recession defects, it is susceptible to flap retraction, which can result in incomplete root coverage. Advance ment of a CAF alone 1 to 2 mm beyond the cementoenamel junction (CEJ) has been demonstrated to allow the gingival margin to settle apically at the CEJ during healing and increase the predictability of complete root coverage.7 Removal of the labial submucosal tissue has been demonstrated to reduce flap retraction and improve root coverage outcome of anterior mandibular labial recessions treated with CAF combined with CTG.6 However, not all recession sites, such as those located in the mandibular lingual anterior region, are amenable to coronal flap advancement. Furthermore, coronal advancement of sites with deep recession can potentially alter the mucogingival junction and compromise gingival esthetics.

The use of CTG with envelopes and tunnels maintains intact marginal and papillary tissue, which reduces the risk of tissue retraction during healing. With these approaches, the CTG can be stabilized to the overlying soft tissue by means of adhesive or sutures.9 Grafts

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stabilized to the overlying tissue are susceptible to mobility due to muscle movement at the recipient site. Sutures suspended over interdental contact points or anchored coronally on the midlabial surface of a tooth have been described to improve graft stability. These suturing techniques can be cumbersome and require the use of composite resin to suspend or anchor the sutures. Even with these suturing techniques, precise and controlled placement of the graft over the denuded root surface can be challenging.

This report describes a minimally invasive surgical approach using the vestibular incision subperiosteal tunnel access (VISTA) and a suture called the subperiosteal sling (SPS) to stabilize the CTG. Graft stabilization by SPS suture minimizes the risk of graft mobility caused by muscle movement and allows for the controlled placement and stabilization of the graft in the coronal-most position over the grafted site.

**Technique**

**Preoperative Care**

The patient is premedicated with 4 capsules of amoxicillin 500 mg (or clindamycin 150 mg), and 1 tablet of ibuprofen 800 mg.

**Tooth Surface Preparation**

The tooth to be treated and its adjacent teeth are thoroughly scaled and planed with Gracey curettes.

The denuded root surfaces are scrubbed and decontaminated for 1 minute with gauze soaked in doxycycline slurry (powder from doxycycline 100 mg capsule suspended in sterile saline). The teeth are then thoroughly rinsed with sterile saline.

**Recipient Site Preparation**

A 6-mm vertical incision is made with a no. 15 scalpel in the mucosa, starting at the mucogingival junction in the interdental area mesial or distal to the site to be augmented. If the interdental area adjacent to the recession is narrow, the incision is made in the interdental area one tooth away. From this incision, a full-thickness tunnel is created using a #1 Woodson periosteal elevator (PFIWDS16, Hu-Friedy) and a 4R/4L Columbia University curette (SC4R/4L9E2, Hu-Friedy). The tunnel extends at least one tooth mesial and distal to the tooth to be treated, and coronally under the papillae to provide mobility of the soft tissue.

**Donor Tissue Procurement**

A CTG with periosteum is procured from the palate using a single straight horizontal incision 3 mm apical to the gingival margin from the canine to the first molar. The CTG is placed between saline-moistened gauze while the donor site is sutured closed with vertical mattress sutures using 5-0 chromic gut (PSN687C, Hu-Friedy).

**Subperiosteal Sling Suture for Connective Tissue Graft Stabilization**

The CTG is inserted into the tunnel and stabilized with a single SPS suture without engaging the soft tissue at the recipient site, using 6-0 polypropylene suture with a C-3 needle (PSN8695P, Hu-Friedy), as follows. The needle is inserted through the sulcus of the tooth to be augmented, and exits through the vertical incision (Fig 1a). The suture engages the CTG with a horizontal mattress suture (Fig 1b). The needle enters and exits the CTG from the side with periosteum. The needle is then inserted into the vertical incision and exits through the sulcus of the tooth to be augmented (Fig 1c). The CTG is then inserted into the tunnel through the vertical incision with a U17 Utility Pick-Up Dressing Plier (Hu-Friedy). The CTG is inserted such that the periosteum side faces the tooth and bone, the coronal margin of the graft aligns with the gingival margin, and the two ends of the horizontal mattress suture are positioned between the graft and the bone. The graft is then positioned as coronal as possible inside the tunnel and stabilized by slinging the polypropylene suture around the tooth and tying the suture (Fig 1d). The vertical incision is closed with simple loop sutures using 6-0 polypropylene without engaging the underlying CTG (Fig 1e). The vestibular simple loop sutures are removed at 1 week postoperative, and the SPS suture is removed at the 3-week postoperative visit.
Postoperative Care

Patients are prescribed amoxicillin 500 mg (or clindamycin 150 mg) tid for 7 days and ibuprofen 800 mg every 8 hours for 4 days and every 8 hours as needed thereafter. Patients are instructed to brush twice daily with an extra-soft Nimbus toothbrush with toothpaste of their choice, and to avoid brushing at the recipient site for the first week.

Case Report

A 66-year-old woman was referred by her general dentist for evaluation and treatment of gingival recession on the lingual surface of the mandibular left lateral incisor. The patient reported the recession occurred within the last 6 months since she completed traditional orthodontic treatment and began wearing a Hawley retainer. Clinical examination confirmed a 6-mm Miller Class III recession on the lingual side of the mandibular left lateral incisor (Fig 2a). Indentation of the Hawley retainer was visible in the lingual mucosa (Fig 2b).

The patient was sent to the orthodontist to replace the Hawley retainer with a fixed lingual retainer. The lingual recession on the mandibular left lateral incisor was treated with the technique described above (Figs 2c to 2e). No attempt was made to completely cover the denuded lingual root surface of the mandibular left lateral incisor, nor to completely submerge the CTG by coronally advancing the overlying gingival tissue.

Healing was uneventful. The two simple loop sutures that closed the vertical vestibular incision were removed at the 1-week postoperative visit, and the SPS suture was removed at the 2-week postoperative visit. At the 1-year follow-up (Figs 2f and 2g), the lingual gingival margin on the mandibular left lateral incisor remained at a position similar to the coronal margin of the CTG at the time of surgery—at the same level as the gingival margins of the two adjacent teeth—and the probing depth at the midlingual surface of the mandibular left lateral incisor was 1 mm. Additionally, 5 mm of root coverage was obtained, the amount of keratinized tissue was increased, and the biotype was thickened.

Discussion

The objectives of the technique presented here are to simplify the stabilization of the CTG at the recipient site, to have control of the coronal placement of the CTG inside a full-thickness tunnel, to minimize the effects of muscle and tissue movement at the recipient site, and to
have predictability in root coverage. The objectives are met with the use of a full-thickness tunnel through the VISTA approach, a thick and large CTG, and a SPS suture to stabilize the CTG at the recipient site. The VISTA approach facilitates the insertion of a large and thick CTG into the full-thickness tunnel. A large and thick CTG prevents the CTG from dislodging through the gingival sulcus if the recession is deep and wide; maximizes the ratio of submerged CTG to exposed CTG, which enhances the survival of the exposed portion of the CTG; and thickens the biotype. Success of the technique presented significantly depends on the size of the CTG. For CAF, envelope, and tunnel approaches, the CTG is typically 1.0 to 1.5 mm thick. For the technique presented here, a graft with a thickness of ≥ 3 mm that spans at least one tooth mesial and distal to the tooth with recession is desired.

CTG stabilization by SPS suture is unique in that graft stability for a single recession site can be obtained with only one SPS suture, and the SPS suture only engages the CTG and not the soft tissue at the recipient site. The SPS suture allows the graft to be anchored around the tooth in the most coronal position, while the overlying soft tissue passively drapes over the CTG. No attempt is made to coronally advance the overlying tissue to completely submerge the CTG to ensure passivity and minimize retraction. Any exposed portion of the CTG will epithelialize and increase the width of keratinized tissue, which is desirable. The author is not aware of any publication that specifically determines how much of the CTG can be left exposed with tunneling or envelope techniques. A study of 40 single recession sites treated with the CTG and envelope technique reported a change in keratinized tissue of 3.75 ± 0.95 mm at 1-year of follow-up. It is assumed that the gain in keratinized tissue is the amount of exposed CTG that survived and epithelialized.

According to recent systematic reviews, chemical root surface biomodification provides neither detriment nor benefit to root coverage. The use of a doxycycline slurry on the root surface in the technique described is intended to help

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**Fig 2** (a) A Miller Class III lingual recession of the mandibular left lateral incisor. (b) The outline of the retainer is visible in the mucosa (arrows). (c) Recipient site following preparation. (d) CTG harvested from the left palate. (e) Recipient site following connective tissue stabilization and closure of the vertical incision. The connective tissue over the denuded root surface is left exposed. (f, g) Healing at 1-year: 5 mm of root coverage was obtained, the keratinized tissue was increased (f), and the biotype thickened (g).
decontaminate the root surface. Doxycycline is a tetracycline, and inexpensive in comparison to tetracycline hydrochloride. At high concentration, it can be effective at removing the smear layer on the root surface.18

The 6-0 polypropylene suture is preferred at the recipient site as it is hydrophobic and does not attract bacteria or induce an inflammatory response, which minimizes scarring.10 During healing, as the tissue swells, the polypropylene suture sinks into the tissue. As such, it is advisable to leave ≥ 6 mm of tails to facilitate removal of sutures and to remove the vestibular simple loop sutures at the 1-week postoperative visit. Although in the case report the SPS suture was removed at the 2-week postoperative visit, the author recommends removing the SPS suture at the 3-week postoperative visit to allow adequate stabilization of the CTG. Based on the author’s experience performing this technique, removal of the SPS suture at the 3-week postoperative visit minimizes the risk of tissue retraction, especially at sites with strong muscle movements.

Due to the stability of the CTG and the passivity of the overlying tissue at the recipient site, it appears that the coronal margin of the CTG at the time of surgery closely resembles the gingival margin following healing. The amount of root coverage obtained with this technique depends on the location of the CEJ at the mid-tooth surface with respect to the mesial and distal interdental bone. For labial recessions, if the CEJ at the midlabial surface is apical to the mesial and distal interdental bone, the coronal margin of the CTG will be coronal to the CEJ and complete root coverage is anticipated. If the CEJ at the midlabial surface is coronal to the mesial and distal interdental bone, the coronal margin of the CTG will most likely be apical to the CEJ and complete root coverage is not anticipated. For lingual recessions, the relationship is the CEJ at the midlingual surface with respect to the mesial and distal interdental bone.

The surgical approach presented is applicable for both teeth and dental implants, and for sites with multiple recessions (Fig 3). Up to four adjacent teeth can be treated through one vertical access incision. One SPS suture is required per tooth, and all the SPS sutures must engage the graft before it is inserted into the tunnel. When more than four SPS sutures are involved, management of all the SPS sutures becomes complicated. Furthermore, the size of the CTG will limit how many teeth can be treated. As such, sites involving more than four teeth should be treated more practically by using two vertical access incisions and two grafts, or a different technique.

While the main objective of root coverage is to obtain complete root coverage, this is not always possible due to loss of interdental tissue.19 In these instances, the goals of therapy should be to obtain the most root coverage possible and to thicken the biotype and increase the width of keratinized tissue to facilitate hygiene and to make the site more resistant to future recession.20 These goals were achieved for the Miller Class III lingual recession case presented here.

Although the number of reports21–26 on treatment of lingual recessions is limited in the literature, success of lingual root coverage procedures can be attained if the
surgical principles of blood supply and graft stabilization are respected. The mobility of the floor of the mouth and the tongue poses a major challenge to wound stabilization in the lingual mandible.\textsuperscript{16,18,19} The surgical approach presented here is a minimally invasive technique that stabilizes the CTG against the tooth and reduces the effects of muscle movement on graft stabilization, which can make root coverage of lingual recessions predictable.

Conclusions

The technique described here appears to be promising and suitable for the treatment of localized root recession. For single recessions, a single SPS suture appears to be adequate to stabilize the CTG inside a full-thickness tunnel. Clinical studies are required to understand the predictability and limitations of this technique and to determine long-term professional and patient-oriented outcomes.

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References


