The Papilla Access Tunnel Technique for the Treatment of Shallow Recession and Thin Tissue in the Mandibular Anterior Region

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It is often difficult to perform the tunnel technique for root coverage and soft tissue augmentation in the mandibular anterior region where there is shallow recession and thin soft tissue, particularly when accompanied by prominent roots and alveolar undercuts. The aim of this report is to present a papilla access technique that facilitates tunnel site preparation and graft placement in such sites. This surgical access method may also be applied to sites where there is moderate to severe recession of the mandibular central incisors, and extension of the tunnel to include both the lateral incisors and canines is desired for augmentation. The papillary access provides improved surgical access for both site preparation and graft placement with reduced risk of perforation or injury to thin tissue.


The tunnel technique has undergone a number of modifications since its introduction by Allen in 1994. Recently, the tunnel technique has been demonstrated to provide more favorable results than alternative methods in terms of patient experience and esthetic outcome. The intrasulcular approach for tunnel site preparation is easily accomplished when treating multiple tooth sites where some teeth have significant recession by using the access provided by an elongated sulcus associated with the recession defect. However, it is more difficult to apply the intrasulcular approach in sites with shallow recession due to limited sulcular access. This is especially a problem where roots are narrow and the sulcular dimensions are small. The most common site where intrasulcular access is insufficient is the mandibular anterior region. In this region, although the recession may be minimal and involve only one or two teeth, there often are prominent roots and thin tissue facial to all six anterior teeth, and all would benefit from soft tissue augmentation (Fig 1). Submarginal vertical incisions have been recommended for vestibular access to facilitate tunnel site preparation. This report presents the papilla access tunnel technique as an alternative to vestibular access incisions for soft tissue grafting of multiple teeth with minimal recession in the mandibular anterior region.
Technique

The papilla access tunnel is initiated by incising the papilla between the lateral incisor and the canine on both the right and left sides. Using a #15 surgical blade, an incision begins within the lateral incisor sulcus and courses between the lateral incisor and canine to separate the facial layer of the papilla from the interdental portion of the papilla (Figs 2a and 2b). The incision contacts the alveolar crest at the base of the papilla, creating a surgical papilla with a triangular shape and leaving a vascular papillary surface interdentally. The thickness of the separated papilla is approximately 1 mm. An intrasulcular incision is then extended from the incised papilla both mesially and distally to the mesial line angle of the lateral incisor and the distal line angle of the canine.

Next, an intrasulcular incision is made facial to the central incisors from the base of the sulcus to the crest of bone with the end-cutting intrasulcular knife (KPA, Hu-Friedy). The intrasulcular incision is extended proximally to the lingual line angle at the mesial and distal aspects of the central incisors, the mesial aspect of the lateral incisors, and the distal aspect of the canines to detach the papillae from the proximal tooth surfaces. Next, a full-thickness mucoperiosteal dissection is performed with a microsurgical elevator (PPA-ELA, Hu-Friedy), beginning in each sulcus and at the incised papillae and extending apically about 4 mm from the tissue margin and laterally under the facial aspect of the three anterior papillae (Figs 2c and 2d). Thus, a W-shaped mini-flap is created facial to the canine and lateral incisor on the right and left, and a tunnel is formed facial to the central incisors. The blunt subperiosteal dissection is continued to a position approximately 8 mm apical to the cementoenamel junctions (CEJs). The three non-incised midline papillae are gently detached from the interdental bone crest using the 7/8 Younger-Good curette (Hu-Friedy) as a curved elevator. The tunnel dissection is then extended approxi-mately another 7 mm apically with an Allen Arrowhead Knife (Hu-Friedy) while maintaining contact with the bony surface to create an immobile...
recipient surface for the graft while allowing tension-free coronal movement of the tunnel to the CEJs (Figs 2e and 2f). The Modified Orban Knife (Hu-Friedy) is passed through the tunnel to incise any remaining fibrous attachments that might prevent clear passage of the graft through the tunnel (Figs 2g and 2h).
The graft, whether autogenous, allograft (Fig 2i), or a suitable xenograft, can then be easily inserted through one of the W-flaps and aligned facial to the six anterior teeth (Fig 2j). The overlying tissue and graft are coronally positioned together to the CEJ and sutured using either interrupted sling sutures or a continuous sling suture (Figs 2k and 2l). Care is taken to maintain the coronal border of the graft at the base of the incised papilla so that the flap papilla can be positioned in direct contact with the papillary bed. Occasionally, an interrupted suture may be necessary to adapt and secure each incised papilla.

Discussion

Although the tunnel technique offers advantages over alternative grafting techniques, it can be difficult to perform in areas where there is minimal recession and thin tissue. Vestibular access incisions have been advocated as a means of simplifying the tunnel site preparation. While the vestibular incision subperiosteal tunnel access technique improves access for site preparation that is particularly beneficial for treating shallow recession in the maxillary arch, it is less desirable in the mandibular arch for anatomical reasons. The papilla access technique provides an alternative access method for tunnel site preparation, and is particularly indicated in the mandibular anterior region.

Compared to a flap with vertical releasing incisions, the envelope flap has been demonstrated to provide greater stability and improved outcomes when treating multiple teeth. An advantage of the tunnel technique over an envelope flap is the enhanced wound stability provided by tunneling rather than incising papillae. The greatest tension in the mandible occurs in the mandibular midline. Tunneling the mandibular midline papilla alone greatly reduces the tension on the surgical wound in this location, improving the postoperative course and outcome.

Tunneling the three mandibular midline papillae distributes the tension over three papillae for greater wound stability and reduced risk of separation of a single tunneled papilla. Incising the papilla between the lateral incisors and canines has the least impact on wound stability while also creating bilateral mini-flaps that provide access for easy dissection under the three midline papillae.

It is important to create an immobile recipient bed within the tunnel so that the dense collagenous connective tissue graft attaches to a rigid bed. This is accomplished by the initial subperiosteal dissection extending approximately 8 mm apical to the CEJs. Releasing tension of the overlying tissue for passive coronal positioning is also necessary. This is accomplished by extending the tunnel apically and laterally by sharp dissection while maintaining contact with the alveolar bone. This type of dissection also provides an internal release of the frenum, negating the need for a surface frenectomy. The dense connective tissue graft attached to the rigid bed also prevents reduction of—and can actually increase—vestibular depth.

Preparation of the tunnel site is more efficient with the papilla access technique, and it minimizes the potential for perforation or surgical trauma to the tissue that may occur with intrasulcular dissection without additional access. In addition, it provides access for easier and less-traumatic graft insertion as well as lateral extension of the tunnel to include additional posterior teeth when indicated.

The most significant disadvantage of the papilla access technique is that the incised papillae require special attention in graft positioning and suturing. It is important to align the graft level with the CEJs so that it does not extend over the papillary bed. This is particularly important when using allografts or xenografts. Since this technique is indicated for treating a shallow recession or augmentation grafting, coronally positioning the mini-flap may not be necessary. It is simply repositioned or only minimally coronally positioned. At sites with no recession, the suture may be placed under the midpoint of the papilla, allowing adaptation of an incised papilla precisely over the recipient papillary bed. In sites with root exposure, the suture must be placed at the root line angles to move the tissue margin coronally and proximally for more precise adaptation to the CEJ. This technique is not indicated or necessary for sites with generalized significant recession due to the access for site preparation and graft placement provided by the enlarged sulcus perimeter at deep recession sites. However, it is beneficial for treatment of sites with significant

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recession limited to the mandibular central incisors where extension of the tunnel laterally to include the lateral incisors and canines for adequate tension-free mobilization or where augmentation of the lateral incisors and canines is desired.

Conclusions

This report presents a surgical access technique that facilitates use of the tunnel technique in the mandibular anterior region where there is minimal to no recession and thin tissue that would make routine intrasulcular tunnel site preparation and graft placement difficult to perform without risking perforation or injury to the overlying tissue.

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References