Subperiosteal Tunnel Assisted Graft (STAG) Technique, a Novel Approach to Peri-Implant Phenotype Modification: A Case Report

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Aim

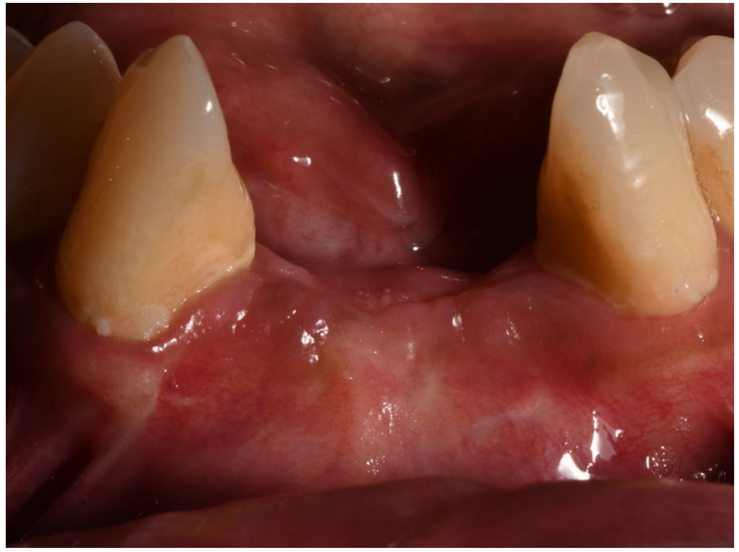
To present the **Subperiosteal Tunnel Assisted Graft (STAG)** technique as a predictable solution for peri-implant mucogingival deficiencies. This report demonstrates how utilizing a subperiosteal tunnel and lasso suture fixation overcomes traditional FGG limitations to simultaneously increase keratinized tissue width, vestibular depth, and soft tissue volume.

Background

An adequate zone of keratinized mucosa (KM) is vital for peri-implant health, yet traditional Free Gingival Grafts (FGG) often face challenges in shallow vestibules. The Subperiosteal Tunnel Assisted Graft (STAG) technique addresses these limitations by utilizing a subperiosteal tunnel for bilateral graft insertion. This novel approach minimizes surgical complexity and micromotion while simultaneously enhancing both the quality (KM) and thickness of the peri-implant soft tissue.

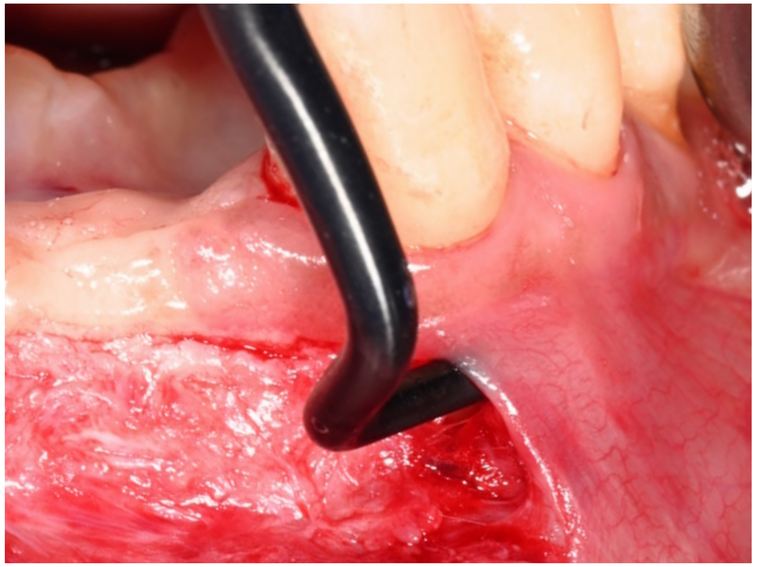
Material and Methods

A systemically healthy male patient presented with a Seibert Class III ridge deficiency and a lack of keratinized mucosa (KM) in the mandibular anterior region. Following implant placement, the recipient bed was prepared by performing a selective de-epithelialization of the existing mucosa to create a connective tissue base. Two vertical incisions were then made at the mesial and distal aspects of the surgical site. Using a tunneling instrument, a subperiosteal tunnel was developed, extending distally from each vertical incision. This tunnel was designed to provide a secure housing for the graft ends, ensuring maximum adaptation to the underlying bone and protecting the graft's vascular supply.



Three months after implant placement

De-epithelialization of the recipient bed

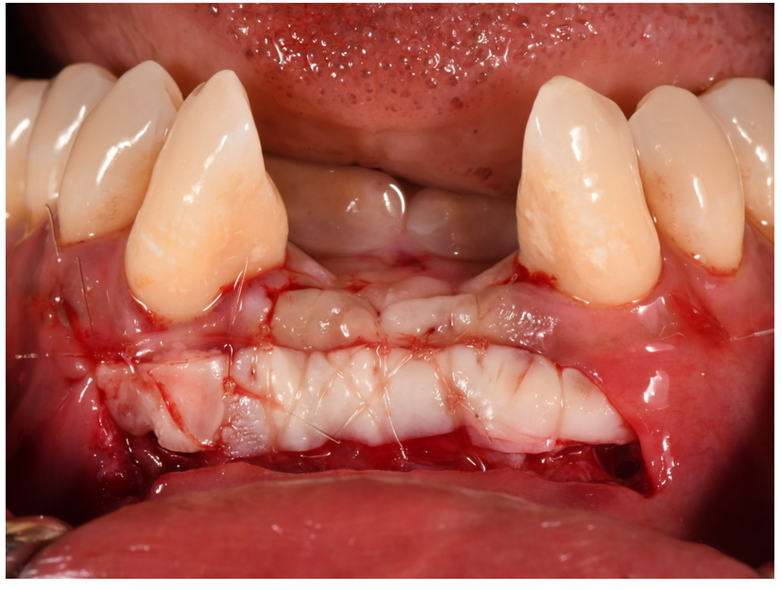


Subperiosteal tunneling

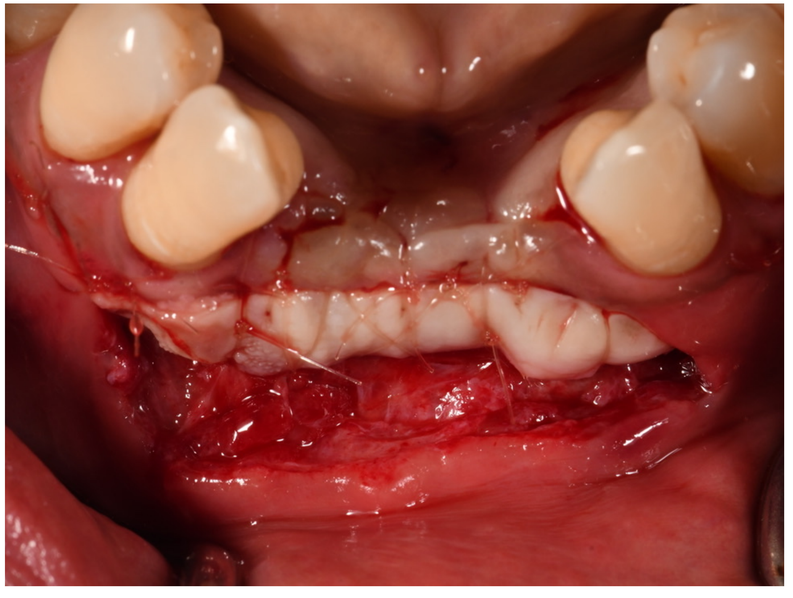
Material and Methods

A Free Gingival Graft (FGG) was harvested from the palate, specifically designed with a thickness appropriate for the recipient site. The portions of the graft intended for insertion into the tunnels were selectively de-epithelialized to transform them into a "de-epithelialized free gingival graft" (DFGG) segment, while the central portion remained epithelialized to form the new keratinized zone. The graft ends were then tucked into the previously prepared subperiosteal tunnels. Stability was achieved using a specialized "Lasso Suture" technique: a single suture at each end of the graft was looped to pull the graft into the tunnel and secure it firmly against the bone. This method ensures maximum adaptation, minimizes micromotion, and eliminates the need for multiple traditional interrupted sutures, significantly reducing surgical time.

Free gingival graft harvested from palate



Bilateral insertion and stabilization of the FGG



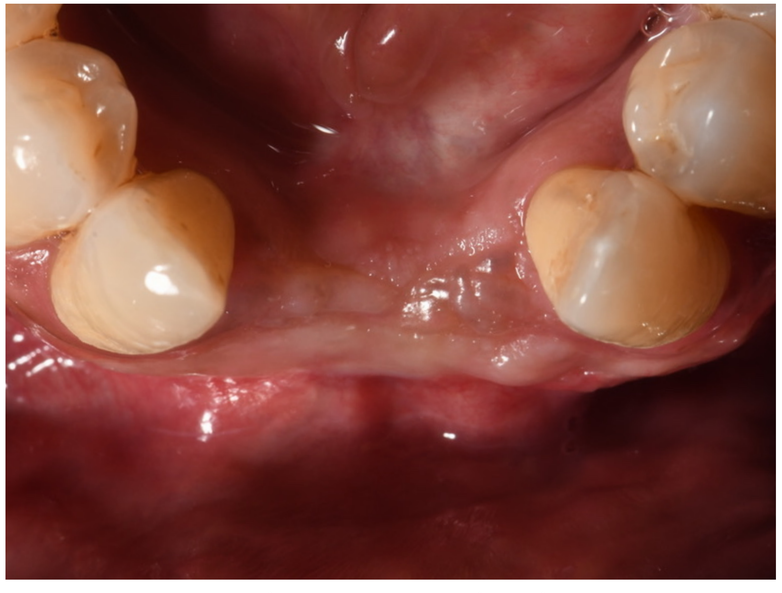
Occlusal view of graft positioning and adaptation

Results

The clinical application of the STAG technique resulted in a significant and stable increase in the width of keratinized mucosa and a successful deepening of the vestibule. By utilizing the subperiosteal tunnel for bilateral graft insertion, the procedure achieved excellent adaptation to the recipient bed with minimal postoperative graft shrinkage. The specialized "lasso suture" fixation effectively eliminated micromotion, ensuring high predictability even in the anatomically challenging mandibular anterior region. Furthermore, the technique provided simultaneous volumetric enhancement of the soft tissue thickness in adjacent areas, creating a smooth, aesthetic transition with the surrounding tissues. This approach significantly improved surgical efficiency by reducing the number of sutures required, while the patient experienced a comfortable healing process with no complications or graft displacement.

1 week post-op

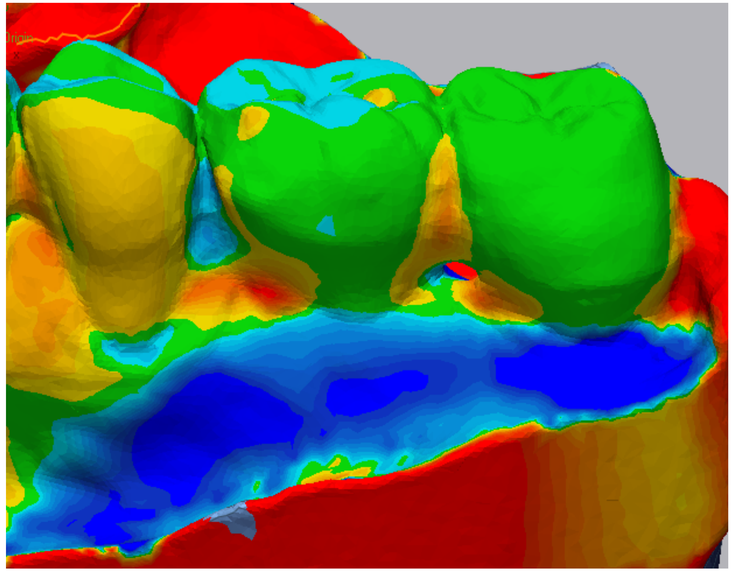
12 week post-op



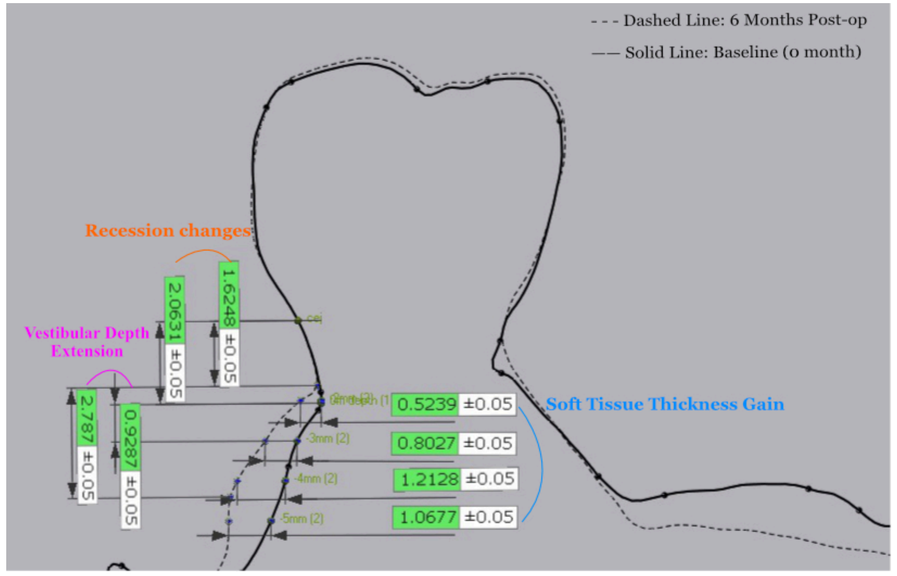
12 week post-op occlusal view

Results

The six-month follow-up confirms the long-term stability of the augmented keratinized mucosa and maintained vestibular depth following final Fixed Partial Denture (FPD) delivery. The STAG technique established a robust peri-implant environment with stable soft tissue thickness that effectively supports the prosthetic contours. To objectively quantify these outcomes, 3D digital analysis at site #19 revealed a soft tissue thickness gain of over **1.2 millimeters**, alongside approximately **0.4 millimeters** of recession coverage. Furthermore, a **2.7-millimeter** shift objectively confirms the successful extension of the vestibular depth.



3D volumetric analysis of soft tissue changes at #18.#19



2D cross-sectional profiles at site #19

six months post-FPD delivery

Conclusion

The STAG technique offers an effective approach to keratinized tissue augmentation for enhancing keratinized mucosa, soft tissue thickness, and vestibular depth around implants. This case demonstrated stable, esthetic, and functional outcomes, highlighting the technique's potential as a predictable alternative to conventional FGG.