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DENTAL TECHNIQUE

Esthetic tunnel exposure: A combination technique for peri-implant soft tissue development at second-stage surgery

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ABSTRACT

An esthetically pleasing result is the product of both prosthetic excellence and the health and quality of the soft tissue that frames the restoration. Management of the peri-implant coronal soft tissue is key to the ultimate success of treatment. This technique report describes an alternative, novel approach, combining established concepts and methods into a single technique to improve esthetic results. (J Prosthet Dent 2019;121:586-9)

Opting for staged surgery and later implant exposure is often necessary in scenarios that include guided bone regeneration (GBR) techniques, poor primary stability, and soft tissue defects that need to be subsequently corrected.[1] These procedures typically require release incisions to raise a flap, which may result in scarring at the incision lines and soft tissue defects.[2] Healing in the esthetic zone presents a particular challenge because visibility of the tissues makes patients acutely aware of irregular contours and asymmetries. Often after implant placement and GBR, recession occurs at the adjacent teeth, possibly with reduction or loss of the papillae.[3] These require management, ideally at the time of exposure. Modification of implant exposure techniques has been proposed to circumvent these undesirable outcomes, namely papilla-sparing flap incisions, Palacci flaps, to create papilla, and a midcrestal and intrasulcular flap approach, with or without a connective tissue graft.[4] A novel exposure and augmentation technique is described that combines known soft tissue management methods to improve the esthetic outcome.

TECHNIQUE

The selection criteria for treatment inclusion comprise delayed loading/2-staged approach of a bone level implant, specifically in the anterior esthetic zone to avoid scarring. As adequate mesiodistal space is required, narrow sites (lateral incisors typically <7 mm mesiodistally) are contraindicated for this technique. Suitable situations include recession at adjacent teeth resulting from flaps raised at implant placement and soft tissue defects at the facial ridge. In the patient presented here, after 90 days of osseointegration and healing of the GBR (Fig. 1), the implant was exposed according to the following technique.

Step 1: Exposure without vertical release incisions

After administration of local anesthesia on the working area (Ubistesin 4%; 3M), make a narrow U-shape incision above the implant, creating a miniflap with its free end positioned palatally (Fig. 1). A 2-mm space between the incision and the adjacent teeth is essential for the integrity of the soft tissue, and 3 to 4 mm is a minimum for accessing the implant. If less than 7 mm is available, then this technique is contraindicated. Use a microperiosteal elevator to raise the mucoperiosteum of the miniflap from the palatal to facial aspect. Then, create a tunnel and pouch by penetrating the tissue in split dissection by using a microblade.[5] Continue extending the tunnel from the palatal aspect over the facial ridge, over the implant, and distally to each adjacent tooth (or

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Figure 1. Presentation at day of second-stage/exposure surgery. Occlusal view.

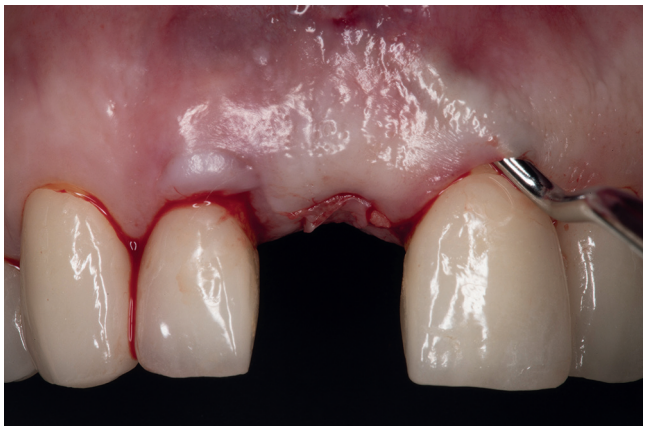

Figure 2. Miniflap created 2 mm from adjacent teeth. Tunneling instrument inserted through intrasulcuar incision to extend tunnel apically.

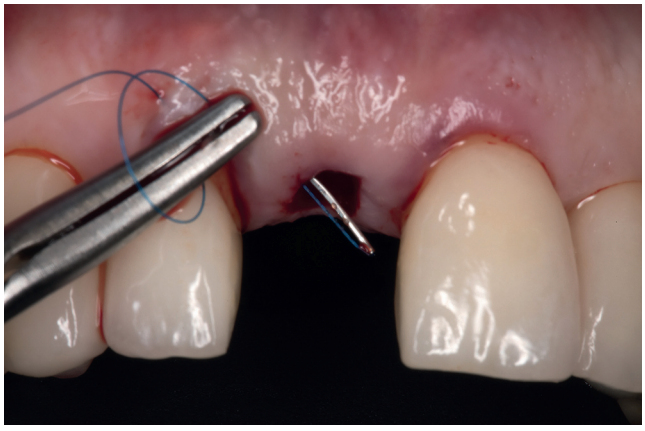

Figure 3. Suture first entry at labial gingiva, exit at tooth sulcus, backward entry at sulcus, exit through miniflap incision.

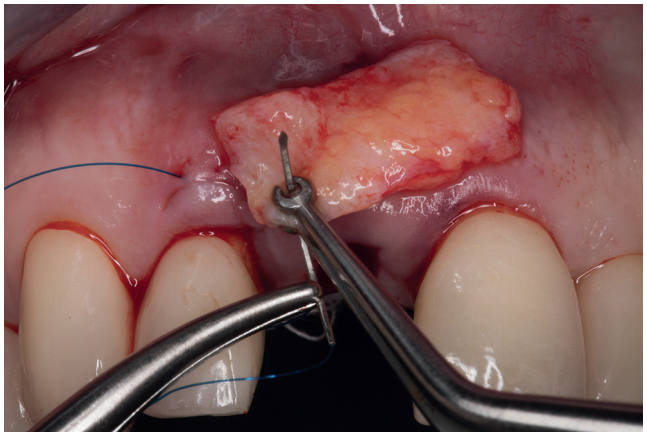

Figure 4. Connective tissue graft entered with suture needle retraces steps in Figure 3.

further if treatment of additional recession defects is required). Make intrasulcular incisions at the adjacent tooth crowns with the microblade to create one continuous tunnel using a tunneling instrument.[3] Then, extend the tunnel apically for additional release and later for coronal repositioning (Fig. 2).

Step 2: Subepithelial connective tissue graft

Harvest a connective tissue graft (CTG) the size of the recipient area from the palate immediately adjacent to the surgical area by using the Langer technique (if preferred, harvest a free graft and de-epithelialize outside the mouth).[6] Make the first suture needle entry point through the facial ridge gingiva, distal to the adjacent tooth (preferably with nylon 6/0, reverse-cutting 13-mm needle) and exit at the same tooth sulcus. From here pass the needle backwards through the sulcus to the microflap opening (Fig. 3). Then, pass the needle through the CTG and return backwards to the same adjacent tooth sulcus (Fig. 4). Enter the sulcus and exit adjacent to the initial suture entry point (ensuring at least 2 mm of tissue between the 2 thread ends to avoid tearing). Do not yet advance and tie off this first suture. Gently tug on the suture to guide the CTG into the tunnel so that its opposite end remains exposed for the same suturing method from the opposite side. Then, repeat the steps at the graft's opposite end, until both ends of the graft are positioned, stretched within the tunnel, and a suture at each end is tied off (Fig. 5).

Step 3: Modified roll flap

Remove the epithelium from the miniflap above the exposed implant (by scalpel or irrigated bur). Fold the flap inward toward the facial aspect and tuck into the tunnel (Fig. 3). A suture usually is not required to hold this flap in position as the abutment and laboratory-manufactured interim crown provide this support (Fig. 6).[2] An interim crown should be fabricated before or no more than 2 to 3 days after exposure. This crown develops the soft tissue contour before the definitive impression is made. The interim crown also provides anchorage if additional coronal repositioning of the tunnel flap is needed.

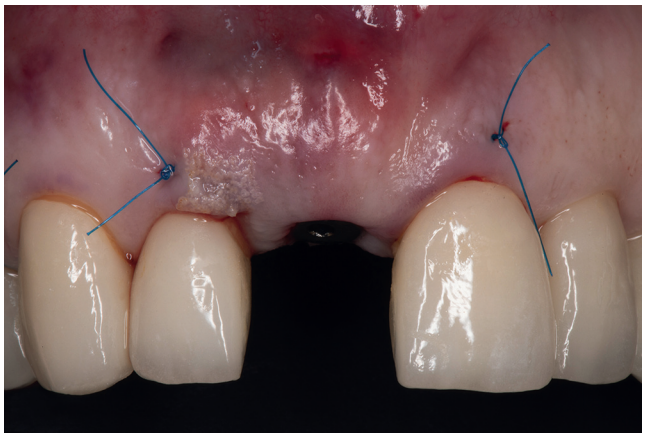

Figure 5. Steps repeated for opposite side, stretching connective tissue graft across, inside tunnel. Miniflap rolled inward, secured with healing abutment. Scar at lateral incisor removed by laser.

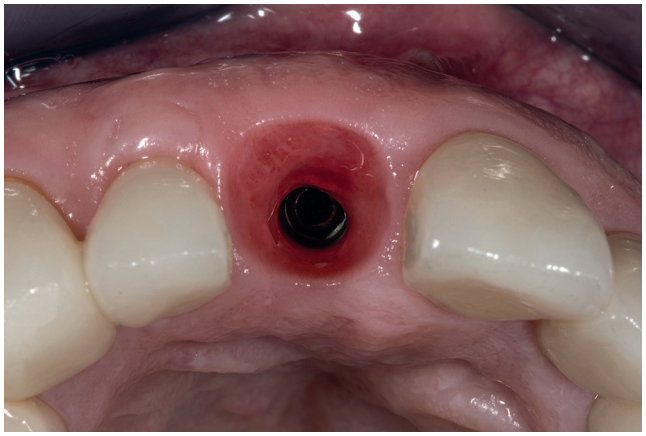

Figure 7. Healing at 3 months.

Figure 6. Suture removal at 2 weeks. Interim crown in position.

Figure 8. Definitive restoration, screw-retained right maxillary central incisor metal-ceramic crown.

These steps conclude the exposure technique while simultaneously augmenting the alveolar ridge contour at the implant site. Patients are given routine antiseptic oral rinse (chlorhexidine 0.2%) with analgesics only. Remove the sutures no earlier than 10 days of healing and evaluate the site for any signs of postoperative complications. Thereafter, allow a minimum of 3-month soft tissue healing and maturation, during which time the interim restoration may be adjusted as necessary to develop the site (Fig. 7). Finally, make a custom impression by duplicating the interim restoration emergence onto the impression abutment and restore definitively (Fig. 8). These authors always recommend a screw-retained option whenever possible.

In the patient presented here, the implant osseointegrated with favorable implant stability quotient readings. At exposure, no release incisions other than intrasulcular split-thickness at the adjacent teeth and full-thickness miniflap at the implant cover screw were made (Fig. 2). The modified roll flap provided adequate access to uncover the implant cover screw without undermining either of the adjacent papillae. The roll flap incision also provided access for tunneling instrumentation to create the tunnel facially to the implant. The tunnel adequately accommodated the insertion of the CTG, and the donor site was localized palatally to the adjacent teeth of the operative site, minimizing surgical invasion and morbidity. At 3 months of healing, the site demonstrated a notably augmented alveolar ridge contour facial to the implant (Fig. 7). Healing was uneventful, with a complete absence of infection or other complication. Most notable though was the near-complete absence of scarring of the facial tissues (except for gingival scarring from a previous mucogingival procedure at the right maxillary lateral incisor). The patient's functional and esthetic needs were satisfied, and positive treatment outcomes were maintained at the 1-year follow-up visit.

DISCUSSION

During a 2-staged approach, the only other opportunity for flapless exposure of the implant is a punch access to remove gingiva above the implant. The benefits of not

raising a flap that may result in recession and scarring are outweighed by the inability to augment the facial soft tissues to coronally advance the flap. The flapless approach has been associated with increased implant failure in a recent meta-analysis.[7] Punching also removes valuable soft tissues. The benefits of grafting the soft tissues facial to an implant have been unequivocally demonstrated for decades, and it is the authors' position that soft tissue grafting should be routine at implant sites.[8] Linkevicius et al[9] have also demonstrated that peri-implant coronal bone stability is reinforced by increased soft tissue thickness as a result of grafting. Typically, creating access for a soft tissue graft is achieved by raising a flap. A full-thickness flap has been demonstrated to result in slightly greater alveolar crestal bone loss, and recession may occur.[10] Moreover, the degree of scarring as well as papilla reduction may be unpredictable, resulting in less than ideal esthetic outcomes. By contrast, a tunnel access to the soft tissues circumvents the need for releasing incisions.

The technique was described by Raetzke[5] more than 3 decades ago. The split-thickness tunnel provides dual blood supply to the donor tissue from both the periodontal and periosteal vasculature deep to the graft, as well as from the overlying flap's supraperiosteal vessels.[11] The tunnel, if released sufficiently, may also be advanced coronally to treat recession defects and improve papillae volume. The limitations of the technique, however, may include operator skill, experience in mucogingival surgery, risk of perforating the flap in patients with thin gingival biotype, and the required microsurgical instrumentation. Nevertheless, the modified roll flap to expose the implant conserves tissue, allows the mobilization of additional soft tissue to the facial aspect of the implant, while also providing access for the tunneling instrumentation. These authors argue that combining the 3 techniques—modified roll flap, tunnel, and the CTG—is a suitable approach for the esthetic exposure of submerged implants during 2-staged implant treatment.

SUMMARY

Recent focus has been on soft and hard tissue augmentation, implant design, and biomaterials as predictors of esthetic treatment outcomes, and little has been reported on the attention required to manage the soft tissues at second-stage exposure. The technique described documents a suitable approach to esthetic implant exposure with soft tissue augmentation.

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