Rescue Therapy for an Esthetically Compromised Maxillary Anterior Implant: a Case Report

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Often convoluted and strewn with unforeseeable snags, the treatment course the dentist and patient embark on to create an flawlessly esthetic anterior implant replacement for a tooth takes time, persistence, clinical acumen, a favorable tissue biotype, and plain luck. The archetypal crown, whether on natural dentition or an implant, assimilates well into its surrounding environment, and neither its contours, color, nor emergence profile from the soft tissue deviate from those of its contralateral counterpart. Thus, the ideal angulation of the crown and its soft tissue relationships becomes the ideal angulation of the implant and its soft tissue relationships, and if the original ridge form fails to support an implant driven by the prosthetic model, then the ridge morphology requires conversion to a more suitable shape. Establishing a base of tall and wide bone with overlying thick keratinized mucosa as early as possible exploits the body's ability to regenerate quickly and well after initial operative assault. The wound healing capacity dampens after multiple operations as repeated violation of the epithelium and blood vessels exposes the host to microbial challenges, interrupts oxygenation, and encourages fibrotic repair. Preferably, augmentation of the bone and/or gingiva occurs at the time of extraction; indeed, socket preservation with bone graft with or without membranes appears to maintain the vertical dimension post-extraction and decrease buccolingual resorption from the typical 3 mm to 6 mm down to 1 mm to 2 mm.[1-3] An already edentulous site that displays a non-space–making defect (one that extends beyond the envelope of bone) or a larger space-making defect benefits from grafting prior to implant placement. Relatively minor space-making defects, such as dehiscences or fenestrations, allow correction at implantation. Once the implant integrates, however, the predictability of soft-tissue augmentation progressively diminishes as time goes on. Alas, the patients who have the highest need for esthetics are frequently also those who require post-implant esthetic modification despite otherwise ideal treatment sequencing and early-as-possible intervention. These patients possess smile lines that show at least interproximal papilla (average) if not also a band of marginal mucosa (high).[4] Moreover, they often exhibit a thin/scalloped tissue biotype (thin bone, gingival thickness less than 1 mm, triangular tooth shape, coronally positioned contact point, tall and thin papilla, scalloped gingival contour), which is tremendously difficult to mimic.[5] Consequently for such a patient there is almost always an inevitable need for mucosal rejuvenation, especially at the papilla, after implant placement, whether at second-stage surgery, in the provisional stage, or even after final crown delivery.

Many techniques exist to preserve, sculpt, and stimulate peri-implant soft tissue. Expanding the mucosal volume and refining its shape calls for additive surgical approaches, including connective tissue grafting and guided soft tissue augmentation, as well as manipulation with adjustable interim restorations. This case report documents the amelioration of soft-tissue defects around a restored implant replacing a maxillary lateral incisor in a patient with high esthetic demand and a thin biotype.

Patient History

The patient was a non-smoking, 42-year-old female dental assistant who was unpleased with the soft-tissue esthetics around the existing tooth No. 10 implant restoration, which had been cemented for 5 months. The implant placed was a 3.25-mm x 13-mm parallel-walled fixture with external hex connection (NanoTite™ Parallel Walled implant, Biomet 3i, www.biomet3i.com). Her medical history revealed no contraindications to therapy. Clinical examination revealed a lack of papilla between tooth No. 9, implant No. 10 and tooth No. 11, causing a flat marginal contour and "black triangle" formation (Figure 1). The implant was non-mobile, non-suppurating and functioned without issue. Radiographically, there was bone at and apical to the first thread of the implant, and no peri-implant osseous defects were noted (Figure 2).

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FIG. 1

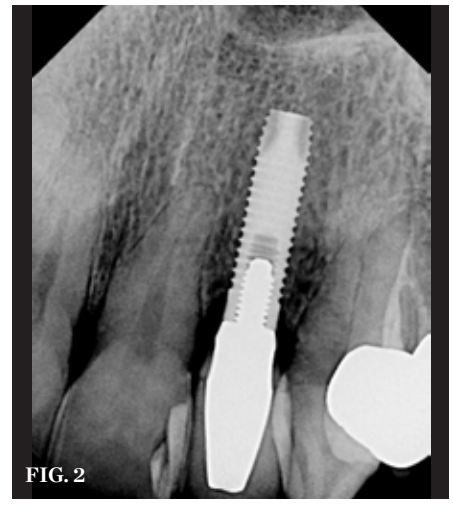
FIG. 2

(1.) ORIGINAL NO. 10 IMPLANT RESTORATION. NOTE THE FLATTENED GINGIVAL CONTOUR, LACK OF PAPILLA, AND RECESSION. **(2.)** Periapical radiograph of the original No. 10 implant. The bone is located at the first thread of implant and more coronal adjacent to teeth Nos. 9 and 11.

The patient had a relatively thin tissue biotype and high smile line.

Treatment Sequence

1. Crown removal.
2. 6-week healing period.
3. Connective-tissue grafting.
4. 8-week healing period.
5. Guided gingival growth.
6. 4-week healing period.
7. Temporization for 12 weeks prior to final restoration.

Crown Removal

The existing implant crown and abutment were removed and a cover screw placed. The soft tissue was allowed to granulate in over the cover screw in order to bury the implant body. After 6 weeks, complete soft-tissue closure occurred (Figure 3).

Connective Tissue Grafting

To gain buccal volume, a connective tissue graft (CTG) method was employed. After oral sedation with 0.25 mg triazolam and local anesthetic induction using 2% lidocaine with 1:100,000 epinephrine and 0.5% bupivacaine with 1:200,000 epinephrine, an envelope flap was created over the No. 10 site by creating a buccally oriented crestal incision and partially elevating the papilla (Figure 4). The envelope pouch was extended apically using a #15 scalpel and Orban knife, leaving the periosteum intact over the ridge. Following the design described by Langer and Langer, a connective tissue was harvested from the left side of the palate opposing teeth Nos. 11 through 14, and the donor site achieved primary closure via 4-0 expanded polytetrafluoroethylene (e-PTFE) (Figure 5).[6]

After trimming the connective tissue to conform to the defect morphology, the donor tissue was positioned over the labial pouch using a pure-string technique in which the suture was passed from the vestibule through the recipient site into the connective-tissue graft and back through the recipient site and out through the vestibule (Figure 6 and Figure 7). The CTG was secured to the ridge using 5-0 chromic gut suture. Healing occurred without incident.

Guided Gingival Growth

After a healing period of 8 weeks, some buccal ridge expansion was detected, but more soft tissue was desired (Figure 8). To enlarge the volume and allow for proper drape around the implant prosthesis, guided soft-tissue growth was performed. After local anesthetic induction using 2% lidocaine with 1:100,000 epinephrine and 0.5% bupivacaine with 1:200,000 epinephrine, a palatally oriented crestal incision was made over the No. 10 site connecting the distolingual line angle of tooth No. 9 and the mesiolingual line angle of tooth No. 10. A full-thickness flap was elevated. The implant cover screw was substituted by a one-piece 3.4-mm (platform) x 3.8-mm (emergence profile) x 3-mm (height) healing abutment and the flap was positioned over the abutment and secured with 4-0 e-PTFE suture in a simple interrupted pattern with cross-over modification (EP® One-Piece healing abutment, Biomet 3i). This effectively tented up the mucosa, allowing soft tissue to fill in the created void (Figure 9). Healing occurred without incident.


FIG. 3


FIG. 4


FIG. 5

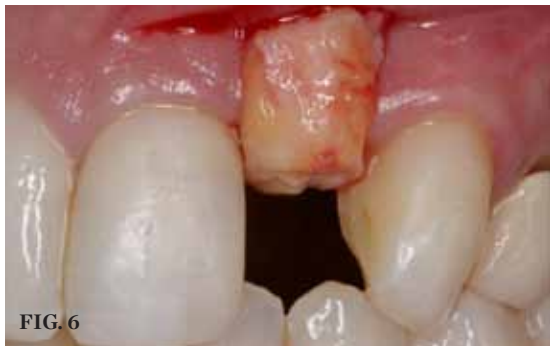
FIG. 6


FIG. 7

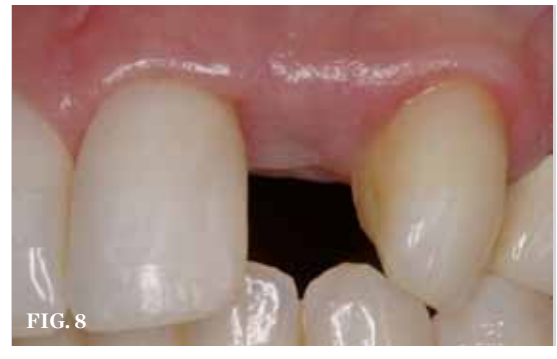
FIG. 8


FIG. 9

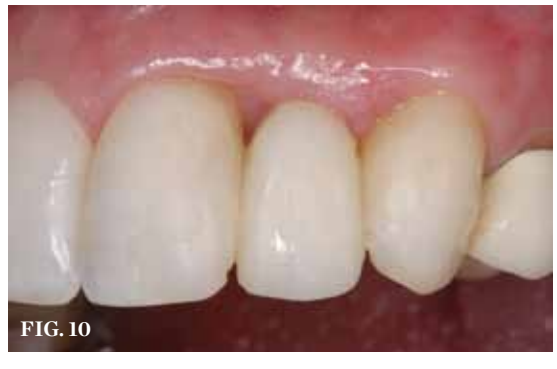
FIG. 10

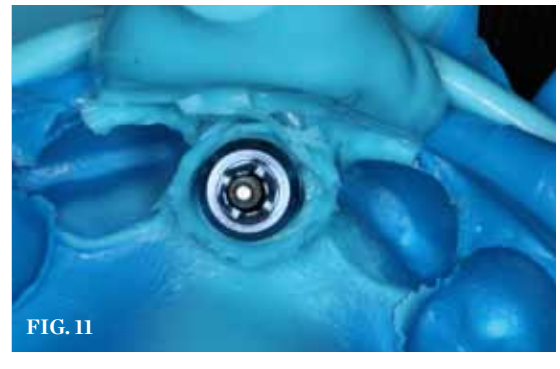
FIG. 11

(3.) Healing 6 weeks after removal of the implant crown and abutment and replacement with a cover screw. There is complete soft-tissue closure over the fixture. **(4.)** Connective tissue grafting of the buccal aspect of the ridge. An envelope pouch was created at the labial aspect of site No. 10. **(5.)** Connective tissue was harvested from the palate near teeth Nos. 11 to 14, and the wound was primarily closed with e-PTFE. **(6.)** Trimmed connective tissue graft was placed over the recipient site. **(7.)** The CTG was placed into the prepared labial pouch using a purse-string technique. **(8.)** The site 8 weeks after connective tissue grafting. There is some improvement in buccal volume. **(9.)** Guided gingival grafting at stage two. The crestal tissue is flapped and positioned labial to the healing abutment to maximize soft-tissue expansion. **(10.)** Provisional restoration in place 12 weeks after guided gingival grafting. There is papilla maturation and increased buccal volume. **(11.)** The direct implant-level impression taken using highly dimensionally stable vinylpolysiloxane (VPS) (Take 1® Advanced™ VPS Impression Material, Kerr Corporation) accurately registered the soft-tissue architecture, which was essential to recreating a final restoration with the same idealized contours as the provisional.

Provisionalization and Final Restoration

Adequate soft tissue was observed 4 weeks after guided gingival growth. A temporary abutment (PreFormance® Post, Biomet 3i) was attached to the implant, and an interim crown was cemented on. The contours of the provisional were amended periodically to further mold the marginal soft tissue and papillary tissue (Figure 10). After 12 weeks with the provisional, final restorative work was initiated. A direct implant-level impression was taken using highly dimensionally stable vinylpolysiloxane (VPS) (Take 1® Advanced™ VPS Impression Material, Kerr Corporation, www.kerrdental.com) (Figure 11). An accurate representation of the soft tissue position was registered, which was essential to recreating a final restoration with the same idealized gingival architecture as the provisional. The patient received the final crown on implant No. 10 and was satisfied with the esthetic result. Two years after final restoration, the implant prosthesis remains functional and cosmetically acceptable, and the bone level appears stable (Figure 12 and Figure 13). The facial mucosa of the No. 10 implant is roughly 2 mm apical to the free gingival margins of adjacent teeth Nos. 9 and 11. The mesial and distal papillae fill the interproximal spaces, and an appropriate level of scalloping exists.

Postoperative Instructions

After each surgical procedure, the patient was instructed to take ibuprofen 600 mg q 4-6 hours, hydrocodone 7.5 mg/acetaminophen 750 mg q 4-6 hours prn pain, and doxycycline 100 mg qd for 10 days. The patient was instructed not to brush at or near the surgical site but instead to rinse with 0.12% chlorhexidine or warm saline twice daily. The patient was also directed not to chew in the affected area for at least 2 weeks. Suture removal occurred at 10 to 14 days postsurgery.

Conclusion

It is possible to attain a satisfactory cosmetic result by manipulating soft tissue after placement of a final implant crown. The patient, however, must be willing to undergo replacement of the permanent prosthesis, experience at least one or two rounds of surgery, see the dentist for continual adjustments to his or her interim restoration and endure the long treatment process, all without a complete guarantee of success. If both patient and doctor understand the risks and potentially imperfect outcomes, then an attempt to correct post-implant restoration is warranted.

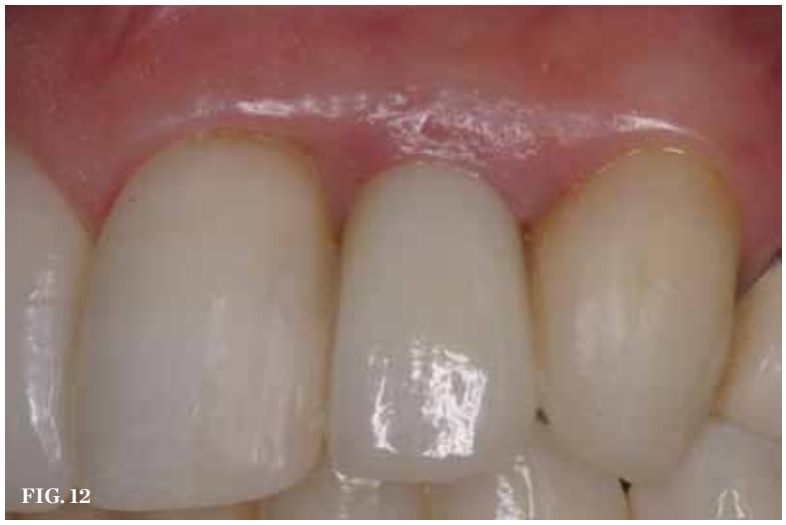
FIG. 12

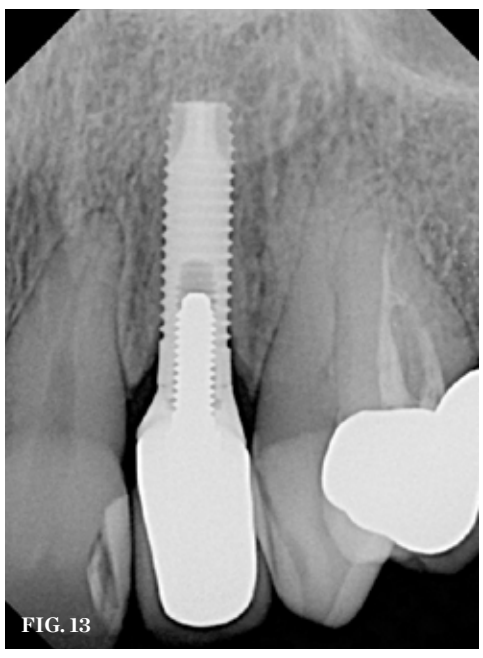
FIG. 13

(12.) Final restoration after 2 years of follow-up. Compared to the initial presentation, there is greater gingival scalloping, better formed papilla, and coronally placed marginal tissue. The patient is satisfied with the esthetic product. Restoration courtesy of Dr. Marilyn Geni. **(13.)** Periapical radiograph of final restored implant No. 10. The bone level is stable. restoration with the same idealized contours as the provisional.

Acknowledgments

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