One-Stage Surgery and Immediate Provisionalization: Achieving Optimal Soft and Hard Tissue Form

Jin Y. Kim, DDS, MPH, MS*

Achieving ideal form of soft and hard tissue around a dental implant is critical for long-term functional and cosmetic success. Despite advances in surgical techniques, provisionalization at the time of tooth extraction and immediate implant placement has shown to be the most predictable method for preserving fragile gingival topography.1-7 Provisionalization using customized abutments that mimic the gingival embrasure form is arguably the most ideal way to preserve the natural form of periodontal tissues.8,9 One must carefully assess, however, the risks and benefits of immediate provisionalization against inadvertent or purposeful immediate loading of the implant.10 This article presents two cases where the tissue form of periodontal embrasure is preserved using a customized healing abutment, but immediate loading is prevented by a removable provisional denture that is aesthetically pleasing.

**Case 1**

A 73-year-old healthy male patient presented with a maxillary central incisor that was previously treated endodontically and with an all-ceramic restoration. The tooth was deemed non-restorable due to a clinically detectable root fracture and resulting fistula formation. The tooth was surgically removed without raising a flap (Figure 1). Upon debridement of the extraction socket, an internal connection implant (ie, BioHorizons Internal, BioHorizons, Birmingham, AL) was placed with the implant shoulder approximately 2.5 mm apical to the free gingival margin of adjacent central incisor (Figure 2). A circumferential socket defect of approximately 1.5 mm at the widest portion was filled with mineralized freeze-dried bone allograft chips (ie, MinerOss, BioHorizons, Birmingham, AL) (Figure 3). A polyetheretherketone (ie, PEEK, Victrex, Greenville, SC) temporary abutment, which allowed direct bonding to its surface, with light-cured flowable composite resin, was then used to pick up gingival architecture that represented the emergence profile of extracted natural tooth. A custom healing
abutment was therefore fabricated based on this embrasure form, which was torqued to 20 NCM (Figure 4). A flangeless removable partial denture was used where space was created under the pontic to ensure no occlusal load was applied to the dental implant.

At 4 months, the implant had integrated clinically. Upon removal of the customized healing abutment, a natural shaped soft tissue form was found to be preserved (Figure 5). A full-contoured screw-retained provisional restoration was fabricated out of bisacrylic material (ie, Protemp, 3M Espe, St. Paul, MN) (Figures 6 and 7). This provisional was used in a series of contour adjustments to achieve the most desired soft tissue profile.

Case 2

A 55-year-old healthy male patient presented with a fractured maxillary central incisor that was not restorable. The tooth was surgically removed via sectioning and without raising a flap (Figure 8). The extraction socket was debrided, and an external connection implant was placed with the implant shoulder approximately 3 mm apical to the free gingival margin of the adjacent central incisor (Figure 9). The resulting circumferential socket defect was filled with mineralized freeze-dried bone allograft chips. Quick-setting acrylic resin (ie, Alike, GC America, Alsip, IL) was applied to a titanium abutment (ie, Maestro, BioHorizons Implant Systems, Birmingham, AL), which was then used as a customized healing abutment, preserving the soft and hard tissue around the extraction site (Figure 10). The abutment was torqued to 20 NCM and a removable resin denture was placed to ensure that there was a gap at the pontic site during mastication (Figure 11). At approximately 4 months, the customized healing abutment was modified chairside to a full-contoured screw-retained provisional restoration (Figure 12). After 6 weeks of further tissue maturation, a definitive restoration was delivered (Figures 13 and 14).

Discussion

At 4 months, both cases were able to develop ideal soft tissue embrasure form around the respective central incisor implant. At this time, the screw-retained resin provisional restoration was fabricated chairside. The fixed restoration was subsequently adjusted over a period of 2 to 3 months for the final embrasure form to be established. A number of impression techniques have been discussed where the soft tissue profile can be transferred to the master cast.8-11 A pickup-type impression using a duplicated provisional to be used as a customized impression coping has been suggested to be the most accurate replication of the soft tissue morphology.

Figure 2. An internal connection implant was placed 2.5 mm apical to the free gingival margin.
Figure 3A. Occlusal view of the seated implant.
3B. A circumferential socket was filled with mineralized bone allograft.
Figure 4A. A customized healing abutment was fabricated to conform with the natural tooth embrasure.
4B. View of the customized healing abutment upon seating.
Figure 5. At 4 months, the implant had integrated clinically. The soft tissue complex was preserved to an ideal form.

Figure 6A. Preoperative radiograph of Case 1. 6B. Radiograph of the seated abutment.

Figure 7. An aesthetically pleasing provisional restoration was fabricated of bisacrylic material. Subsequently, the patient had porcelain veneers fabricated on the adjacent teeth, and the gingiva at the #8 site was contoured with a CO₂ laser.

Case 2. Figure 8A and 8B. A 55-year-old male presented with a non-restorable fractured maxillary central incisor.

Figure 9A. The extraction socket was debrided thoroughly. 9B. An external connection implant was placed into the extraction socket and grafted with mineralized allograft.

Figure 10A. Fabrication of anatomic, customized healing abutment. 10B. The customized healing abutment conformed to the extraction socket, ensuring preservation of the natural tooth embrasure.

Figure 11. The customized healing abutment was torqued and a removable resin denture was placed over the abutment and relined.

Figure 12. The soft tissue complex was preserved to an ideal form at 4 months.

Figure 13. Radiograph of the definitive implant restoration.

Figure 14. The patient was pleased with the definitive aesthetic restoration.
Conclusion

One-stage surgery of non-submerging allows the original form of periodontal tissue to be unaltered. A customized healing abutment is the key to supporting the soft tissue form. A quick-setting material is used to customize a prefabricated titanium or temporary abutment. Whether the provisional restoration is made to full contour and to conform to full load of occlusion has to be a clinical decision based on individual risk assessment. Although simple, the technique is reliable in achieving the ideal soft tissue embrasure form with minimal surgical intervention. The risk of inadvertent overloading of the implant is reduced by the use of a removable partial denture relieved at the pontic site, above the customized healing abutment.

The author mentions his gratitude to Dr. Katherine Ahn, Huntington Beach, CA, for her restorative work on Case 1 and Dr. Van Bui, Westmont, CA, for her restorative work on Case 2.

References


