Achieving the Optimal Peri-implant Soft Tissue Profile by the Selective Pressure Method via Provisional Restorations in the Esthetic Zone

JUNG NAM, D.M.D., M.S., M.S.D.*, PRASIT ARANYARACHKUL, D.D.S., M.S.†

ABSTRACT

For the successful single-tooth implant therapy in the esthetics zone, achieving an ideal peri-implant soft tissue profile is paramount. It can achieve by the manipulation of the provisional restorations. This clinical report demonstrate the selective pressure method and concave transmucosal profile of the provisional restorations to achieve the ideal and stable gingival profile in esthetic single tooth implant restorations.

CLINICAL SIGNIFICANCE

The selective pressure method and the concave transmucosal profile in implant provisional restorations facilitate stable and harmonized peri-implant gingival tissue in the esthetic zone. (J Esthet Restor Dent ••:••–••, 2015)

INTRODUCTION

In order to deliver a successful single-tooth implant therapy in the esthetics zone, one of the critical and challenging treatment objectives is achieving an ideal peri-implant soft tissue profile. The margin, color, contour, texture, and thickness of the peri-implant soft tissue, as well as the height of the interdental papillae, should be matched and harmonized with the existing adjacent dentition. In replacing a failing dentition with a dental implant in the esthetics zone, several important factors should be considered. These include: timing of the implant placement, timing of the provisional restoration placement, and the necessity of the hard and soft tissue grafts.9

Provisional restorations play a large role in creating and/or preserving the soft tissue architecture when achieving the ideal profile of the peri-implant gingival tissue.10 The timing of the provisional restoration placement is dictated by several factors, including the primary stability of implant, the size of defects and/or gaps between implant and buccal plate, and the amount of hard and/or soft tissue grafts. While the main goal of the immediate implant provisional restoration is to preserve the existing dento-gingival tissue, especially at the facial gingival level and at the interdental papilla,11,12 the utilization of the delayed restoration is to create peri-implant soft tissue architecture that harmonizes with the soft tissue of the adjacent teeth.10 In most cases, changing the emergence profile could be performed restoratively by adding or subtracting the restorative provisional materials, and/or surgically by the addition of the soft tissue graft, leading to thicker tissue that could hide the shadow effects of abutments and facilitate more stable peri-implant soft tissue.
The following three clinical cases demonstrate the successful harmonization of the peri-implant and adjacent soft tissue by utilizing the selective pressure method and a concave transmucosal profile via the immediate or delayed implant-supported provisional restorations in three different scenarios.

CASE REPORTS

Case I

A 31-year-old Asian male was referred to the office due to a failing maxillary right central incisor (Figure 1). The tooth was not restorable due to the compromised ferrule and the vertical root fracture. Upon clinical and radiographic examination, the tooth did not present any active infections, and a good buccal bony architecture was confirmed with a bone sounding (Figures 1 and 2). After the tooth was removed by a careful and minimally traumatizing extraction, the intact buccal cortical plate was reconfirmed. With the guidance of the surgical stent, the implant (Astra 4.5 × 15 mm; Dentsply Implants, MÖLNDAL, SWEDEN) was immediately placed at approximately 3 mm below the free gingival margin. After filling the gap between the buccal plate and the implant fixture with a bone graft (Endobon Zenograft Granules; Biomet 3i, Palm Beach Gardens, Florida, USA), the sub-epithelial connective graft was placed in the facial gingival pouch to thicken the soft tissue profile (Figure 3). Due to the stability of the implant, the nonfunctional screw-retained provisional restoration was immediately delivered (Figure 4).

To fabricate the provisional restoration, self-polymerized bis-acrylic material (Luxatemp; DMG, Hamburg, Germany) was injected around the temporary abutment, with the guidance of the putty index placing on the adjacent teeth. To finalize the shape of the provisional restoration, the abutment was carefully removed from the implant and added with the flowable composite resin (Filtek Supreme; 3M ESPE, St. Paul, MN, USA) (Figures 4 and 5). The provisional restoration was maintained with no function for 6 months. The customized impression coping was

FIGURE 1. Initial clinical photo for case I.

FIGURE 2. Initial periapical radiograph.

FIGURE 3. Implant placement surgery with connective tissue grafts and bone grafts.
fabricated to transfer the soft tissue contours from the provisional restoration to the definitive prosthesis (Figure 6).16,17

An immediate nonfunctional implant provisional restoration was fabricated to preserve most of the existing soft tissue architecture, except for the buccal gingival margin. With a selective pressure technique, a relatively lower pressure was applied through the under-contoured buccal marginal area, resulting in a buccal-free gingival margin located slightly more coronal than the free gingival margin of the maxillary left central incisor. In contrast, more pressure was applied through the ideally contoured interproximal areas, leading to the fully supported interproximal papillae.

The final zirconia customized abutment (Atlantis abutment; Dentsply Implants) was placed and torqued with 25 Ncm. The zirconia-based crown (Procera; Nobel Biocare, Zürich, Switzerland) was then cemented with the provisional cement (premier implant cement; Premier Dental, Plymouth Meeting, PA, USA). The existing crown of the maxillary left central incisor was replaced with the zirconia-based porcelain crown, and cemented with the resin cements (Rely-x ultimate; 3M ESPE) (Figures 7–11).
Case II

A 40-year-old Asian male presented to the office with a failing maxillary right central incisor with vertical root fracture (Figure 12). Due to an existing active infection, the treatment was planned according to the early implant placement protocol (6–8 weeks after the tooth extraction). The extraction socket was allowed to heal for 6 weeks (Figure 13). The dental implant (Astra 4.5 × 11 mm; Dentsply Implants) was placed in conjunction with the guided bone regeneration (Endobon Zenograft Granules; Biomet 3i) and the sub-epithelial connective tissue graft procedures. An Essix retainer was delivered as an interim prosthesis during the 5-month healing period.

After the implant was uncovered, an implant-level impression was made. To fabricate the provisional restoration creating the natural-looking soft tissue and the emergence profile of the peri-implant tissue, the stone cast was carved according to the wax-up (Figure 14). The stone cast was under-carved at the buccal area, hence the provisional restoration with the slightly under-contoured buccal surface and the concave transmucosal profile. The provisional restoration was cemented with interim cements (temp bond NE; Kerr, Orange, CA, USA) (Figure 15). With the manipulation by the provisional restoration for 4 months, the buccal soft tissue margin locating slightly more coronal than the free gingival margin of the maxillary left central incisor, and the mature

FIGURE 8. Peri-apical soft tissue contour prior to final restoration insertion.


FIGURE 10. Final periapical radiograph.

FIGURE 11. Final clinical follow-up shows stable and harmonized soft tissue profile.
interproximal papillae was achieved. Then, the final impression was made utilizing customized impression coping. The zirconia abutment (Procera; Nobel Biocare) was torqued to 25 Ncm, and the alumina-based (Procera; Nobel Biocare) crown was delivered with the temporary cement (premier implant cement; Premier Dental) (Figures 16–18).

Case III

A 29-year-old Caucasian female patient was referred to the office with an unsatisfactory maxillary right canine implant supported crown (Figure 19). She expressed concern with the gingival level of the implant crown, which was significantly more coronal than that of the contralateral tooth.
The selective pressure method was utilized to manipulate and train the buccal soft tissue level around the implant (Tri-CAM 3.5 mm × 10 mm; ACE Surgical Supply Co., Brockton, MA, USA) with the provisional restoration. First, an impression was made, and the stone cast around the implant was carved to create an emergency profile according to the wax-up (Figure 20). The screw-retained provisional restoration was placed, and the buccal contour was modified by gradually adding flowable composites for several times. After reaching the satisfactory tissue level, the buccal peri-implant tissue locating more apical than the initial but slightly more coronal than the ideal level (Figures 21–23), it was maintained for 3 months. The zirconia customized abutment (Procura; Nobel Biocare) was torqued down with 30 Ncm, and the zirconia-based crown (Katana; Kuraray Noritake Dental Inc, Tokyo, Japan) was cemented with the temporary cement (Figures 24–25).

DISCUSSION

To achieve successful treatment outcomes of esthetic dental implants, both surgical and prosthetic management are of paramount significance. The prosthetic-driven surgical implant placement and the sub-epithelial connective graft facilitate esthetic implant restorations with pleasing peri-implant soft tissue architecture.20 Also, soft tissue management with provisional restorations is essential.
In cases of proper implant position and angulation, screw-retained provisional restorations are preferred to cement retained ones due to their multiple advantages: fewer possible residual cement issues, easier retrievability, and increased ease of controlling pressure when manipulating the soft tissue.

To utilize the selective pressure method via provisional restorations, a relatively lower pressure was applied through the under-contoured buccal marginal area, resulting in a buccal-free gingival margin located slightly more coronal than the prospective or ideal gingival margin. In contrast, more pressure was applied through the ideally contoured interproximal areas, leading to the fully supported interproximal papillae. After the removal of the provisional restorations during several treatment procedures, including impressions, try in, and delivery appointments, the abutment/implant interface could be interrupted, and the peri-implant tissue could be traumatized. One possible consequence would be buccal gingival margin recession, which could be offset by a low pressure applied through the under-contoured buccal area of the provisional restorations.

**FIGURE 21.** Emergency profile of a screw retained provisional restoration.

**FIGURE 22.** Screw retained provisional restoration in situ at the initial insertion.

**FIGURE 23.** Screw retained provisional restoration in situ after modification of the buccal contour by adding flowable composites. Note the gingival margin of maxillary right canine implant provisional restoration is more apical than in Figure 22.

**FIGURE 24.** Final clinical photo. Note the harmonized gingival margin of maxillary right canine compared to adjacent dentition.
The soft tissue response should be evaluated after placing the provisional restorations. After the pressure is applied, blanching of the tissue is expected, and should disappear within 15 minutes. In most cases, restorative provisional materials need to be added or subtracted depending on the tissue response, in order to give more pressure to, or room for, the soft tissue, respectively.

To achieve a thick and stable peri-implant soft tissue, the transmucosal portion of the provisional restorations and the final abutments should be concave. All provisional restorations must be highly polished to reduce plaque accumulation, and promote a healthy peri-implant soft tissue.

CONCLUSION

In the anterior areas, achieving an esthetically pleasing and healthy soft tissue profile is one of the crucial factors of the single tooth esthetic implant treatments. With the selective pressure technique and a concave transmucosal profile of the provisional restorations, esthetically and functionally successful implant-supported restorations of the presented clinical cases were delivered. The illustrated methods facilitate preserving and/or creating the optimal emergency profile and peri-implant soft tissue architecture for definitive restorations.

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REFERENCES


Reprint requests: Jung Nam, D.M.D., M.S., M.S.D., Department of Integrated Reconstructive Dental Sciences, Arthur A. Dugoni School of Dentistry, University of the Pacific, 1848 Saratoga Avenue, Suite 6B, Saratoga, CA 95070, USA. Tel: 408-871-1211; Fax: 408-871-1245; email: drjnam@gmail.com