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In the esthetic zone, remodeling of the peri-implant soft-tissue contours through the use of provisional restorations is one of the imperative key factors for optimizing outcomes. Several methods have been described to produce the desired peri-implant soft-tissue contours using customized impression copings or cement-retained provisional crowns. The aim of this article is to present an alternative method for obtaining the desired peri-implant soft-tissue contours by using screw-retained provisional restorations as impression copings, which facilitates the definitive prosthesis fabrication.

Key Words: peri-implant soft tissue, screw-retained provisional restorations, impression copings, emergence profile

INTRODUCTION

In the esthetic zone, osseointegration and function of a single implant are no longer the only criteria for determining success in state-of-the-art implant dentistry. There must not only be osseointegration of single implants but also harmonious soft- and hard-tissue architecture complementing natural-looking implant restorations.1

To achieve optimal esthetics, several issues have come under consideration recently, including immediate or early implant loading combined with provisional restorations fabrication to reduce healing time, CAD-CAM zirconia abutments, and all-ceramic crown fabrication to reach harmonious restorations.2–5

Optimal esthetics also includes the proper 3-dimensional implant placement,6 peri-implant soft-tissue sculping by the provisional restorations, the implant depth in relation to adjacent teeth or pontic area and gingival biotype.7–9

Previously, for most of the anterior aesthetic cases, the implant shoulder was located subgingivally, resulting in a deep interproximal margin. This shoulder location makes seating of the restoration and removal of cement difficult. Therefore, the screw-retained abutment and restoration interface was advisable to minimize these difficulties in the esthetic zone.10

Few articles describe how to use provisional restorations to remodel the peri-implant soft tissue for optimizing the esthetic result. The aim of this article is to present a

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DOI: 10.1563/AAID-JOI-D-10-00026.1

Journal of Oral Implantology 605
method for using provisional restorations as impression copings to reproduce the emergence profile of the peri-implant soft tissue contours in the definitive cast, therefore facilitating optimal esthetics for the definitive restoration. Detailed steps focus on procedures to make the definitive cast.

CASE REPORT
A 19-year-old woman was referred to our Department of Prosthodontics at Tzu Chi General Hospital Taipei Branch, Taipei, Taiwan, with a request for maxillary anterior implant restorations. The patient was a healthy nonsmoker. Previous dental treatment included orthodontic treatment to correct dental crowding and improve facial appearance. Clinical and radiographic examination revealed a retained maxillary right primary lateral incisor and a congenitally missing maxillary left lateral incisor. Each maxillary lateral incisor site presented with enough available space in the bone for the placement of 2 narrow-diameter implants (Figure 1). The treatment plan was to extract the maxillary right primary lateral incisor and place 2 implants in the bilateral maxillary lateral incisor positions.

Preoperatively, a diagnostic wax-up of lateral incisors was completed and used for the fabrication of a transparent acrylic resin surgical guide (hygienic orthodontic resin, Coltene Whaledent, Cuyahoga Falls, Ohio). Following the removal of the maxillary right primary lateral incisor, 2 narrow-diameter implants (Branemark system Mk III Groovy NP 3.3 × 13 mm, Nobel Biocare, Yorba Linda, Calif) were placed into an ideal position according to the procedures prescribed by the manufacturer and guided by the surgical template. Because of a bone concavity at the left lateral incisor apical third site, a guided bone regeneration procedure was performed using allograft (Oragraft, LifeNet Health, Virginia Beach, Va) and a bioresorbable membrane (Epi-Guide, Kensey Nash Corp, Exton, Pa). Healing abutments were placed and the surgical sites closed using synthetic absorbable suture (Vicryl, Ethicon, Somerville, NH; Figure 2). The orthodontic retainer was adjusted and relined with soft liner materials (Soft-Liner, GC Corp, Tokyo, Japan) so that it did not impinge upon the implant surgical region.

Three months postoperatively, an implant-level impression was obtained using vinyl polysiloxane impression material (Aquasil, Dentsply Caulk, Milford, Del) for fabrication of a screw-retained provisional crown (Figure 3). In the dental laboratory, a temporary abutment (Temporary Abutment Engaging Brånemark System NP, Nobel Biocare) was fabricated with autopolymerizing acrylic resin (Alike, GC America, Alsip, Ill). The contour of the provisional crowns was adjusted to provide the ideal emergence profile to model or remodel the peri-implant gingival architectures (Figure 4). Clinically, the occlusion scheme was such that the provisional crowns had light contact in centric occlusion and were free of contact during eccentric movements.

The patient returned to our department once per month during the healing stage, and the clinician adjusted the emergence profile of the provisional crowns to make certain there was sufficient support for interproximal papillae regeneration. The peri-implant soft tissue appeared to reach maturity about 6 to 8 weeks after provisional crowns were in place.

When taking the definitive impression, the guide pins were used as temporary implant screws for facilitating the open-tray impression procedure (Figure 5). The implant-level impression was made by directly using the screw-retained provisional crowns as impression copings with an open-tray technique. The impression was taken using a vinyl polysiloxane impression material (Aquasil, Dentsply Caulk; Figure 6). Then, the provisional crowns were assembled with
Implant analogues (implant replica Brånemark System NP, Nobel Biocare) and placed into the set impression. Soft-tissue model material (Gingifast Elastic, Zhermack, Eatontown, NJ) was placed in the peri-implant area. The impression was then poured with type IV dental stone (ResinRock, Whip Mix Corp, Louisville, Ky). Using this technique, the emergence profile could be accurately transferred to the definitive cast and facilitate the final restorations (Figure 7).

In the dental laboratory, the waxing was cut back to the desired form for fabrication of a castable abutment (Abutment Gold-Adapt Engaging Bränemark System NP, Nobel Biocare) using high-gold metal. Porcelain-fused-to-metal-screw-retained 1-piece definitive crowns were fabricated.

The bilateral screw-retained restorations were placed, and the screw hole was filled with composite resin (Filtek Z250, 3M ESPE, St Paul, Minn). The clinical pictures and radiographic examination demonstrated an optimal esthetic outcome. Adequate peri-implant marginal bone level has been maintained over 2 years of follow-up (Figures 8–10).

**DISCUSSION**

In the esthetic zone, the proper emergence profile of the provisional restorations provides the best approach to sculpting the peri-implant soft tissue. The final prosthesis must follow the ideal soft-tissue contours established with provisional restorations. Therefore, accurate transfer of the peri-implant soft-tissue architecture is an important key factor in achieving optimal esthetics.

Several techniques for transferring the peri-implant soft-tissue emergence profile from the provisional to the final prosthesis have been described.\(^3,11-17\) These techniques may allow for the peri-implant soft-tissue profile to collapse during the waiting...
period between provisional restoration removal and impression taking.

Ensuring correct 3-dimensional implant position and correct adjacent bone level to contact point positioning, screw-retained provisional restorations allow for a simple and predictable technique to remodel the peri-implant soft tissue.

The major advance of this technique that directly uses the provisional restorations as impression copings include saving clinical chair time by not having to modify the stock

Figures 5–8. Figure 5. Use guide pins as temporary screws for open-tray impression procedure. Figure 6. An implant-level impression was made with the open-tray technique by directly using provisional crowns as impression copings. Figure 7. The peri-implant soft-tissue contours were reproduced to the definitive cast. Figure 8. Facial view of the bilateral lateral incisor of screw-retained restorations at 2 years of follow-up. Note stable and good peri-implant soft tissue and interdental papillae between the adjacent teeth.

Figures 9–10. Figure 9. Periapical radiograph of the definitive restorations at 2 years of follow-up. Figure 10. Frontal view of full smile at 2 years of follow-up.
impression copings and facilitating accurate peri-implant soft-tissue contour transfer to the definitive cast.

The key determinant for naturally appearing implant restorations is the inability to predictably obtain and maintain ideal peri-implant gingival architectures and harmonious adjacent hard and soft tissue. To confirm the validity of this novel technique, long-term studies with multiple cases and several years of follow-up will be necessary.

CONCLUSION

This clinical article describes a novel method of directly using provisional restorations as impression copings to transfer the peri-implant gingival architecture to the definitive cast. The ideal established emergence profile by the provisional restorations is accurately reproduced and therefore facilitates the definitive prosthesis fabrication. Finally, screw-retained restorations were placed to achieve optimal esthetic outcomes at 2-year follow-up.

NOTE

The authors do not have any financial interest in any products or materials included in this article.

REFERENCES