

# MULTIDISCIPLINARY APPROACH TO ACHIEVE EXCELLENCE IN AN ANTERIOR IMPLANT CASE

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## Abstract

Restoring a single tooth in the esthetic zone can be one of the most challenging procedures for a dentist. In this case, a multidisciplinary approach that included an orthodontist and periodontist allowed for optimal esthetics to retain the natural tooth while waiting for implant placement and provisionalization. Staged treatment allowed for seamless transitions from extraction to implant provisional and then collaboration with the laboratory technician for the final implant restoration.

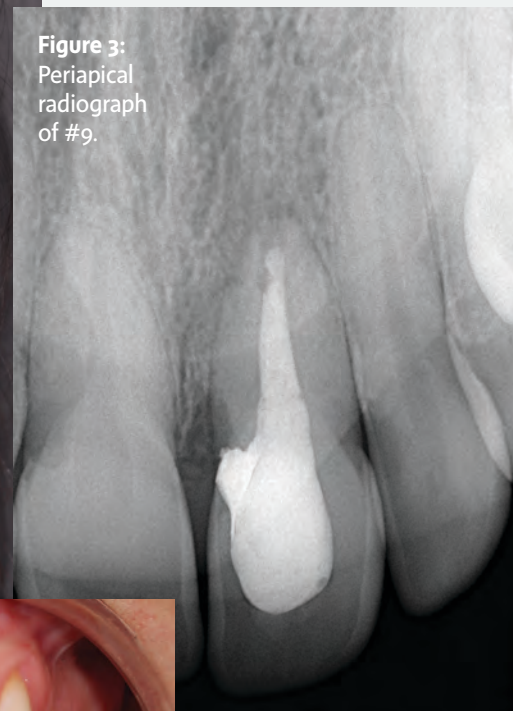
**Key Words:** implant restoration, delayed implant placement, implant provisionalization, emergence profile, custom shade matching, Case Type III

## Introduction

Restoring a single tooth in the anterior zone presents significant challenges, and many factors must be considered when the single tooth restoration is an implant. Preserving the shape of the gingival tissue is crucial for proper pink esthetics. It is essential to capture the intricacies and nuances of natural tooth structure for seamless integration of the new restoration. When implant placement and immediate provisionalization cannot be accomplished, a multidisciplinary approach involving the restorative dentist, laboratory technician, orthodontist, and periodontist allows for esthetic options during every phase of treatment.



**Figure 1:**  
Pretreatment  
full-face smile  
view (1:10).



**Figure 3:**  
Periapical  
radiograph  
of #9.



**Figure 2:**  
Preorthodontic  
retracted frontal  
view (1:2) displaying  
the high gingival  
scallop.

## Case Presentation

### Chief Complaint

A 43-year-old female presented with a fistula that was facial to the left central incisor (tooth #9). The tooth had undergone endodontic treatment, retreatment, and numerous internal bleaching procedures, but the patient was still unhappy with the tooth's color. She had been voted "best smile" in high school, and it was important to her that #9 be restored to match the adjacent right central incisor (#8) so it would be its mirror image in color and shape (**Fig 1**).

### History and Evaluation

The patient was categorized as "healthy" per the American Society of Anesthesiologists Classification System (ASA 1).<sup>1</sup> She was allergic to codeine. An examination revealed she was free of caries and had a few existing composite restorations. The high scallop of the gingival architecture increased the likelihood of gingival loss after extraction, which put this case at higher risk for failure<sup>2</sup> (**Fig 2**). A periapical radiograph showed a large area of radiolucency and bone loss, with a patched area on the mesial where internal resorption had previously been noted by her former dentist (**Fig 3**). A temporomandibular joint exam indicated an acceptable bite.

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**Figure 5:** Periapical radiograph of #9 on the archwire after extraction.



**Figure 4:** Retracted frontal view (1:2) of orthodontic treatment with the #9 pontic on the archwire.



**Figure 6:** 3D-printed study model with wax-up for provisional fabrication.



## Diagnosis and Treatment Plan

Consultation with a periodontist revealed bone loss around #9; it was recommended to extract the tooth, perform a bone graft, and allow the site to heal before implant placement. The patient did not want a removable provisional, so she went for an orthodontic consultation. The main orthodontic goal was the alignment of the central incisors with the retention of #9 on a bracket. This would allow for a nonremovable option while waiting for implant placement/integration and fabrication of an implant-retained provisional.

## Treatment

**Phase I—bone graft and implant placement:** Conventional orthodontic brackets and wires were placed. The periodontist removed the archwire and extracted #9. A bone graft was placed, and #9 was cut and shaped so the root would resemble an ovate pontic. The tooth was placed back on the archwire. After a few months of healing, the periodontist removed the archwire and placed the implant (Roxolid BLT, RC 4.1 mm, SLA 12mm, Straumann; Andover, MD). Orthodontic treatment continued while waiting for implant integration (Figs 4 & 5).

**Phase II—healing abutment, wax-up, and provisional:** The implant was uncovered, and the periodontist placed a customizable healing abutment (Peek RC, 7 mm height, 4.1 platform, Straumann). A scan of the maxillary arch was done one week before bracket removal (Medit i500; Newport Beach, CA). The model was 3D-printed (Asiga; Ann Arbor, MI), and the brackets were removed from the model with a flat-sided carbide bur (MX-3, Miltex; York, PA) in a lab drill (Volvere GX, NSK; Franklin, IN). The model was mounted on an articulator (Panadent; Colton, CA) using an index tray from the Kois Dento-Facial Analyzer (Panadent). Tooth #9 was then waxed up, and lingual seating wings were added to the adjacent teeth to help position the provisional in the mouth when it was inserted (Fig 6).

A putty impression of the wax-up was made (Platinum 85, Zhermack; Eatontown, NJ). An alginate impression of the wax-up was taken and then poured up in plaster. The model was prepared to replicate a crown preparation on #9 and then coated in a separating medium (Al-Cote, Dentsply Sirona; Charlotte, NC). A shell provisional was fabricated with poly(methyl methacrylate) (PMMA) material (B1, New Outline, Anax; Ardmore, OK). The shell was hollowed out in the middle to make room for the temporary abutment (RC, 4.5-mm diameter, 11-mm height, Straumann). The abutment was coated with a bonding agent (Optibond FL, Kerr; Orange, CA), light-cured, and coated with an opaque flowable nanohybrid composite (Effect Shade Ice, Inspiro, Edelweiss; Zug, Switzerland) to block out the metal color.<sup>3</sup>

The orthodontist removed all brackets, and the patient returned immediately to the author's office for provisional fabrication. Local anesthetic (4% Septocaine, Septodont USA; Lancaster, PA) was infiltrated to ensure patient comfort during the provisional process. The custom healing abutment was removed and replaced with the temporary abutment. It was marked with permanent ink, then cut extraorally to allow clearance when the patient closed her mouth. The shell provisional was placed in the mouth using the seating wings and attached to the abutment with flowable composite (shade Bi1, Inspiro) and light-cured (Valo Ortho Cordless, Ultradent; South Jordan, UT). The temporary abutment was removed and filled in with composite extraorally to form the proper contours. The temporary abutment was then tried back in the mouth and adjusted until the tissue level was symmetrical with #8. The abutment was tightened and monitored for 10 minutes to ensure the tissue blanching disappeared.<sup>4</sup>

The lingual access was covered with plumber's tape and a light-cured temporary material (Clip, Voco America; Indian Land, SC). The implant provisional was left alone for four weeks to sculpt and prepare the tissue for the final restoration.<sup>5</sup> This time would enable us to evaluate the provisional restoration's function, hygiene, esthetics, and phonetics (Figs 7-9).

**Phase III—photographs and laboratory fabrication:** Custom shade photographs were taken with and without cross-polarization filters (polar\_eyes, Photo Med; Van Nuys, CA), with shade tabs incisal edge to incisal edge (Fig 10). The tooth retained on the orthodontic wire was also sent to the laboratory in a water-filled container along with the wax-up so the laboratory technician could see the natural surface texture. Local anesthetic (4% Septocaine) was infiltrated for patient comfort during the impression. The provisional was removed and placed on an implant analog that was sunk in plaster. The facial, lingual, mesial, and distal surfaces were marked clearly on the plaster. Clear polyvinyl siloxane (PVS) material (Memosil 2, Kulzer; South Bend, IN) was injected around the provisional and left to set. The provisional was removed and replaced with an impression abutment (RC BLT implant analog, 11 mm, Straumann). The Inspiro Bi1 flowable composite was injected into the clear putty and then light-cured (Valo) to mimic the emergence profile of the provisional.<sup>6</sup> The impression abutment was placed in the mouth, and a PVS impression was taken (Impressiv, Cosmedent; Chicago, IL).

The provisional was replaced and tightened and the lingual access was sealed with plumber's tape and Clip temporary material. The laboratory technician requested an internal structure try-in, and the case was sent back with the incisal half built without the enamel layer. Photos allow the lab to see how much more they need to add to replicate the incisal nuances of the

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**Figure 7:** Provisional shell try-in.



**Figure 8:** Provisional implant abutment and access hole.



**Figure 9:** Finished provisional in the patient's mouth, confirming proper gingival height.



**Figure 10:** Shade tab photos taken before the impression.



**Figure 11:** Internal structure try-in captured with a polarization filter.

contralateral central incisor. Multiple photos of the crown in the patient's mouth were taken with and without cross-polarization, with the shade tabs incisal edge to incisal edge. The lab technician requested that there be no reflection on the incisal half so they could see that area clearly (Fig 11).

**Phase IV—try-in and cementation:** The crown was tried in a few weeks later. A local anesthetic (4% Septocaine) was infiltrated for patient comfort. Wet gauze was placed over the adjacent teeth to keep them hydrated. The provisional was removed, and the titanium base zirconia custom abutment was placed using a seating jig composed of self-curing acrylic material (Pattern Resin, GC America; Alsip, IL). The abutment was torqued down, and the crown was tried in. Proximal contacts were checked with shimstock to ensure the crown was fully seated. The gauze was removed, and multiple photos were taken to evaluate shade. Once the patient approved the shade, length, and contour, the occlusion was checked and adjusted.

The abutment screw was retightened after its initial torque application.<sup>7</sup> Plumber's tape was packed into the screw access. The intaglio of the crown was etched for 30 seconds with 5% hydrofluoric acid (Ceramics Etch, VITA; Yorba Linda, CA) and rinsed with water. The crown was placed in an ultrasonic bath of distilled water for three minutes. Silane (Kerr) was applied to the intaglio and then heated in a 210°F oven for one minute.<sup>8</sup> The custom abutment was micro etched with 27-μm aluminum oxide at 40 psi (PrepStart, Danville; San Ramon, CA), after which silane was applied. A bonding agent was applied to both the abutment

and the intaglio. The crown was cemented with a neutral shade light-cured resin cement (Variolink Esthetic LC, Ivoclar; Amherst, NY). All surfaces were tack-cured for three seconds with the curing light. Excess cement was removed with a scaler and then fully cured. Glycerin (E-Z Lubricating Jelly, Athena Medical Products; Cincinnati, OH) was then applied to the margins for air blocking. A periapical radiograph was taken to make sure all subgingival cement had been removed (Figs 12-14).

## Summary

Although this was not an ideal case due to delayed implant placement, the addition of orthodontic treatment allowed for a non-removable provisional option that was more acceptable to the patient. Developing the gingival architecture and proper emergence profile with the provisional helped to set up the case for restorative success. The internal try-in and custom shade matching gave the laboratory technician added information to create a restoration that mimics the adjacent natural tooth and enhances the patient's smile (Fig 15). She was thrilled with the results.

## Acknowledgment

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**Figure 12:** Postoperative full-face smile view (1:10).



**Figure 13:** Postoperative retracted frontal view (1:2).



**Figure 14:** Postoperative view (1:1) showing the intricacies of the final restoration.

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**Figure 15:**  
Postoperative  
portrait view of an  
extremely satisfied  
patient.



Dr. Watson owns a practice in Bakersfield, California.

Disclosure: The author declares no conflicts of interest.