Use of implant-supported interim restorations to transfer periimplant soft tissue profiles to a milled polyurethane definitive cast

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A customized impression coping is often used in conjunction with conventional implant impression techniques to transfer a well-defined periimplant soft tissue profile resulting from an implant-supported interim restoration to the definitive cast with a removable gingival replica and achieve the desired esthetic outcome of the definitive restorations. However, a direct line of sight between the intraoral scanner and the periimplant soft tissue is needed during the data acquisition of the digital impression techniques, and it is not possible to use customized scannable impression copings to support periimplant soft tissue. This study describes a clinical technique with implant-supported interim restorations to transfer desired periimplant soft tissue profiles to the milled definitive polyurethane cast with a removable periimplant soft tissue replica to maximize the esthetic outcome of the definitive restorations. (J Prosthet Dent 2013;109:333-337)

Digital impressions at the implant level became possible with the development of intraoral digital scanner systems in which data can be acquired by using a scannable impression coping (Scan Body; Straumann AG, Basel, Switzerland)[1] with a compatible intraoral scanner (Cadent iTero; Cadent Inc, San Jose, Calif).[2] The scannable impression coping provides the 3-dimensional (3D) registration of the implant position, and the laboratory-based computer-aided design/computer-aided manufacture (CAD/CAM) software (Straumann Cares Visual 6.2; Straumann AG) can be used to place the virtual implant analog in the virtual definitive cast to design a customized anatomic abutment. Furthermore, the scanned data can be transmitted electronically to the modeling center (Cadent iTero; Cadent Inc), and an optional milled definitive polyurethane cast with a removable implant analog (Repositional Analog; Straumann AG) can be fabricated and returned to the dental laboratory for the fabrication of definitive restorations. Although a preliminary in vitro study[3] demonstrated that using a scannable impression coping to obtain a digital impression at the implant level is straightforward and effective, the authors believe its clinical application requires further validation.

Interim implant-supported restorations are often used to establish the desired periimplant soft tissue contour and emergence profile, stable and predictable overall esthetic outcome, and increased function.[4,5] After the periimplant tissue has matured, the customized impression coping can then be used to capture the emergence profile and transfer this information to the definitive cast with a removable periimplant soft tissue replica.[6-8] Without the customized impression coping, the soft tissue may collapse into the space above the implant immediately after the interim restoration is removed.[7] A removable periimplant soft tissue replica with a well-defined gingival margin and the desired emergence profile can be used by the dental laboratory technician to maximize the esthetic outcome of the definitive restorations.[9,10] A digital impression is limited by the line of sight during data acquisition, making the use of customized scannable impression copings to support periimplant soft tissue impossible. A direct line of sight between the intraoral scanner and the periimplant soft tissue is needed, and the use of any material to support the soft tissue during this process will result in an incomplete scan. A clinical technique with implant-supported interim restorations to transfer desired periimplant soft tissue profiles to the milled definitive polyurethane cast is described.

TECHNIQUE

First clinical appointment

1. Perform a thorough intraoral examination of the functions and esthetics of existing implant-supported interim restorations and the periimplant soft tissue profiles. Make clinical photographs to provide the dental laboratory technician with additional information for the fabrication of definitive restorations (Fig. 1).

2. Remove the implant-supported interim restorations (Fig. 2A) and secure scannable impression copings

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1 Existing implant-supported interim restorations in maxillary canine and premolar areas with satisfactory esthetics, function, and periimplant soft tissue profile.

2 A, Implant-supported interim restorations are removed and periimplant emergence profiles created by interim restorations can be observed. B, Scannable impression copings are secured to dental implants. Periimplant soft tissues collapse immediately after interim restorations are removed.

(Scan Body; Straumann AG) to the implants with a torque control device (Torque control device and Ratchet; Straumann AG) to 15 Ncm (Fig. 2B).

3. Make the definitive impression with an intraoral digital scanner (Cadent iTero; Cadent Inc) and evaluate the obtained data to ensure a complete scan of the scannable impression copings (Scan Body; Straumann AG) (Fig. 3). Approve the digital impression and forward the scan data to the manufacturer (Cadent iTero; Cadent Inc) and the selected dental laboratory for fabrication of the milled definitive polyurethane cast.

Laboratory procedure

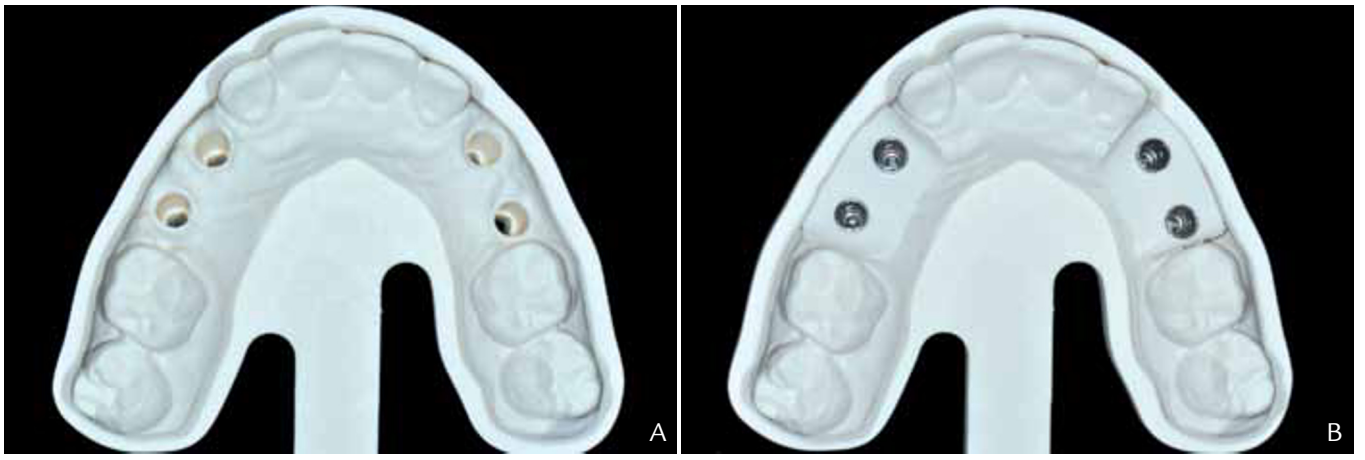
1. Articulate the milled polyurethane definitive cast and the opposing cast in a specifically designed hinge articulator (Itero Articulator; Cadent Inc). Select corresponding removable implant analogs (Reposition analog for Itero System, RC; Straumann AG) and insert the analogs completely into the milled polyurethane definitive cast.

2. Adjust the periimplant areas on the definitive cast with a tungsten carbide rotary cutting instrument (Coarse Staggered Toothing H79GE; Brasseler USA, Savannah, Ga) and scalpel (BD Bard-Parker; BD Medical, Franklin Lakes, NJ) to expose the top surfaces of the removable implant analogs (Reposition analog for Itero system, RC; Straumann AG) and to create sufficient space for further customization with vinyl polysiloxane material (Softissue Moulage; Kerr Dental Laboratory Products, Orange, Calif) (Fig. 4). Remove the analogs during the adjustment if necessary to avoid damage from the rotary cutting instrument.

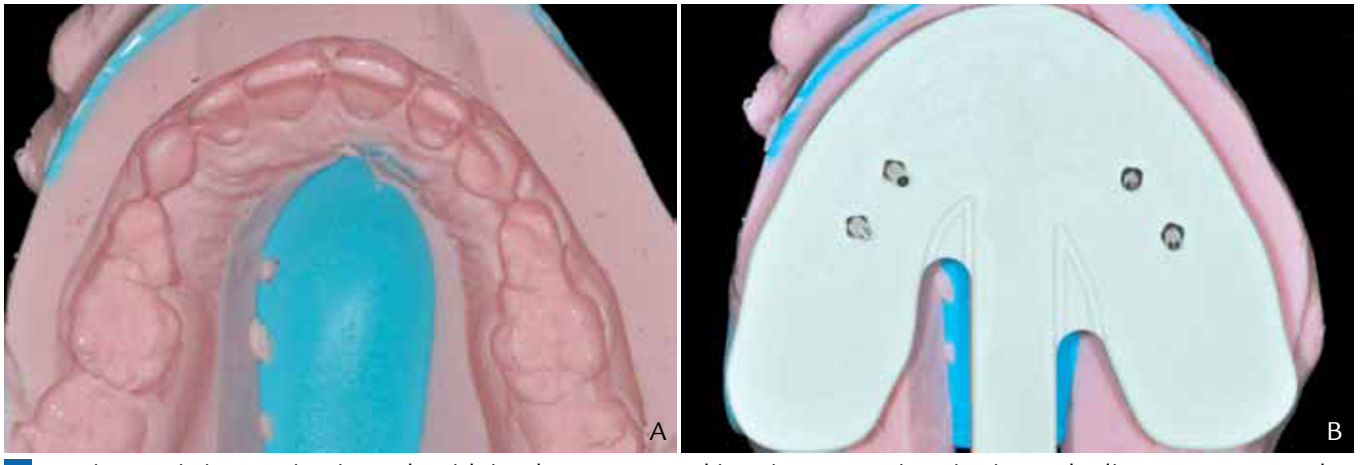
Second clinical appointment

1. Make a diagnostic impression (with the implant-supported interim restorations in situ) with irreversible hydrocolloid impression material (Jeltrate Alginate; Dentsply Caulk, Milford, Del) (Fig. 5A). Adjust the diagnostic impression with a scalpel (BD Bard-Parker; BD Medical) to remove the impression material extending beyond 6 to 7 mm from the soft tissue margins. Reposition the definitive cast into the adjusted diagnostic

3 Digital impression acquired with intraoral scanner.



4 A, Milled polyurethane definitive cast received from manufacturer's facility. Periimplant soft tissue profiles are not evident. B, Periimplant areas of cast adjusted for subsequent soft tissue replica fabrication. Areas above removable implant analogs should be completely removed.



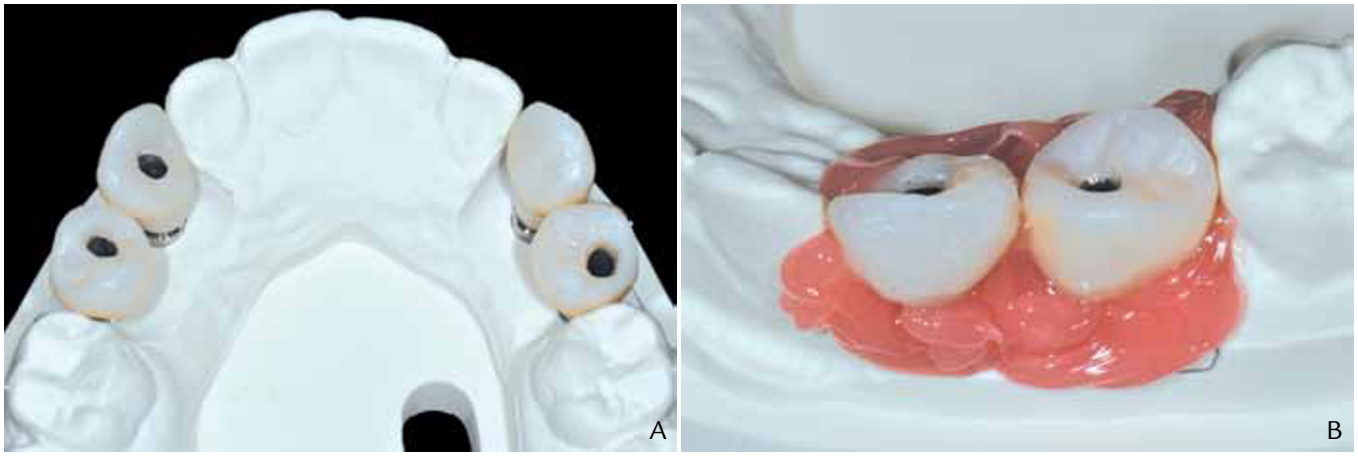
5 A, Diagnostic impression is made with implant-supported interim restorations in situ and adjustments are made to accommodate definitive cast. B, Definitive cast and diagnostic impression assembly.

impression and remove any excessive impression material that may interfere with the complete seating of the definitive cast (Fig. 5B).

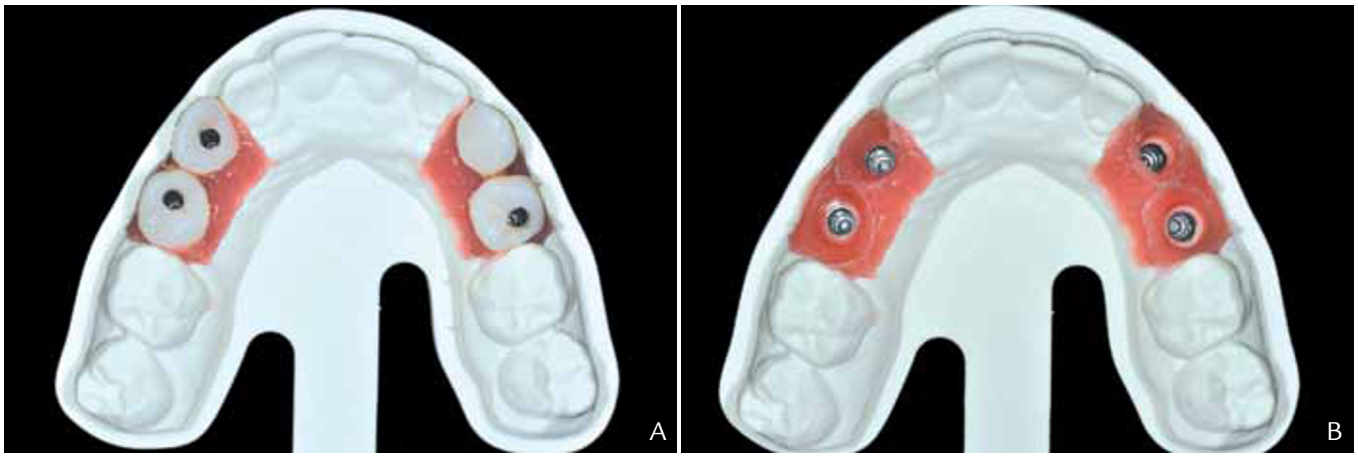
2. Remove the implant-supported interim restorations and secure them to the definitive cast with a torque control device (Torque control device and Ratchet; Straumann AG) to 15 Ncm torque (Fig. 6A).

3. Inject vinyl polysiloxane material (Softissue Moulage; Kerr Dental) with a disposable curved utility syringe (Henry Schein, Melville, NY) around the interim restorations on the definitive cast (Fig. 6B) and reposition the definitive cast into the adjusted diagnostic impression. Ensure the complete seating of the definitive cast.

4. Allow polymerization of the vinyl polysiloxane material (Softissue



6 A, Implant-supported interim restorations are secured to definitive cast. B, Vinyl polysiloxane material is injected around interim restorations and definitive cast is repositioned into diagnostic impression.



7 A, Excessive vinyl polysiloxane material is removed with scalpel after polymerization. B, Completed modified definitive casts with removable periimplant soft tissue replica.

Moulage; Kerr Dental) and separate the definitive cast from the diagnostic impression. Use a scalpel (BD Bard-Parker; BD Medical) to remove excessive vinyl polysiloxane material on the definitive cast (Fig. 7).

5. Pour the diagnostic impression with Type III dental stone (Buff Stone; Whip Mix Corp, Louisville, Ky). Send the digital clinical photographs, diagnostic cast, and modified definitive cast with removable periimplant soft tissue replica to the dental laboratory for the fabrication of customized anatomic abutment and restorations.

DISCUSSION

The technique described in this article allows the accurate reproduction of desired periimplant soft tissue profiles developed by the implant-supported interim restorations to be transferred to a milled polyurethane definitive cast resulting from a digital impression with a removable periimplant soft tissue replica. The diagnostic impression made with irreversible hydrocolloid impression material provides an economic option and serves as a template to facilitate the creation of a removable periimplant soft tissue replica. The diagnostic cast can then be poured from the same impression and provide information to the dental laboratory technician as to the desired restoration contours and size created by the interim restorations. Overall, this technique can maximize the esthetic outcome of the definitive restoration and is particularly indicated for the implant-supported restorations in the esthetic zone. Furthermore, the use of a removable resilient gingival replica can facilitate fabrication of the subgingival portion of the abutment and/or restoration in the dental laboratory.[10] However, additional clinical appointment and an existing satisfactory implant-supported interim restoration will be needed to modify the milled polyurethane definitive cast with this technique. The patient with limited availability for the clinical appointments and/or without satisfactory implant-supported interim restoration will be contraindicated.

SUMMARY

This article presents a technique for the precise transfer of the periimplant soft tissue profiles developed by the customized interim restorations to a milled polyurethane definitive cast resulting from a digital impression. The diagnostic cast of interim restorations and modified definitive cast with removable periimplant soft tis-

sue replica can be used by the dental laboratory technician to achieve a predictable esthetic outcome for implant-supported definitive restorations.

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Acknowledgements
The authors thank Stephanie Tinsley, CDT, and Roy Dental Laboratory, New Albany, IN for assistance in this study.