A Technique for Duplicating the Contours of an Interim Implant Supported Crown to Fabricate a Custom Impression Coping and the Definitive Prosthesis

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Dental implants have become a predictable treatment modality for the completely or partially edentulous patient. The initial protocol for dental implant surgery indicated that a 6- to 8-month healing time should be allowed after a tooth is extracted before placing dental implants. In addition, a 3- to 6-month healing time should be allowed for dental implants to become osseointegrated before applying any type of loading. The quest for a reduced period of treatment introduced the concept of immediate implant placement after tooth extraction. In addition to immediate implant placement, immediate loading is a technique that has been introduced in the literature to eliminate the 3- to 6-month healing period.

In recent years, a combination of immediate implant placement and immediate loading has been proposed on single dental implants for the esthetic zone to provide immediate esthetic results and reduce the period of treatment. With this protocol, an interim prosthesis is placed the day the tooth is extracted and an implant is being placed. Placement of an interim prosthesis provides immediate esthetic results and helps confirm the diagnostic design, esthetics, and contours, which can then be replicated in the definitive prosthesis. In addition, placement of an interim prosthesis provides soft tissue anatomy around the implant compatible with the anatomy of the prospective definitive prosthesis.

**Purpose:** The purpose of the presented technique is to enable the clinician to replicate the contours of the interim prosthesis.

**Materials and Methods:** A clinical case report is presented where this novel technique was implemented. A stone base and a silicone index were used to duplicate the contours of an interim prosthesis, so that the definitive restoration can have similar contours.

**Results:** The definitive prosthesis was fabricated based on the acquired soft tissue architecture and the contours of the interim restoration.

**Conclusion:** The presented technique may assist clinicians in replicating the contours of interim restorations into the definitive prosthesis.

**Key Words:** soft tissue engineering, custom impression coping, interim implant crown, provisional implant crown

**Technique**

1. Evaluate the tissue around the tooth that needs to be extracted for signs or symptoms of pathology. Make complete arch preliminary impressions progressively from the patient’s maxillary and mandibular arches with polyvinyl siloxane impression...
material (Silgimix; Sultan Healthcare, New York, NY). Make interocclusal record with polyvinyl siloxane occlusal registration material (Exabite II NSD; GC America Inc., Alsip, IL) at the maximum intercuspation position. After fabricating diagnostic stone casts from the preliminary impressions, proceed with fabricating the diagnostic wax-up and surgical stent as necessary for dental implant placement in the edentulous area.

2. Utilize the surgical template of the surgeon’s preference and perform regular dental implant surgery under local anesthesia and under copious saline irrigation (Fig. 2). The tooth extraction needs to be performed with the least possible trauma to avoid fracture of the buccal plate.9,11 Additional bone22 or soft tissue graft23 might be placed on the facial aspect of the dental implant or the facial aspect of the buccal osseous plate to enhance bone support and soft tissue contours. In the illustrated clinical situation, demineralized freeze-dried bone allograft (Alobone Poros; Osseocon, Cuyahoga Falls, OH) was placed on the facial aspect of the implant between the dental implant and the buccal osseous plate (Fig. 3).

3. After implant insertion is completed, use a vacuum clear stent based on the diagnostic wax-up to fabricate an interim screwretentive prosthesis. Use an interim metal abutment and autopolymerized acrylic resin (Structur 2; Voco, Indian Land, SC). Modify the contours of the interim prosthesis and seal the occlusal access hole with a cotton pellet and composite resin (Kerr Point 4; Kerr Co., Orange, FL). Then allow the implant to osseointegrate.

4. After osseointegration has been confirmed, form an index from the preliminary impressions, proceed with fabricating the diagnostic wax-up and surgical stent as necessary for dental implant placement in the edentulous area.
condensation silicone (Speedex; Coltene, Cuyahoga Falls, OH) (Fig. 4, A). Place a hole in the middle of the silicone index. Pour type IV dental stone (Durone; Dentsply, New York, NY) and place an implant analogue in the middle of the index through the hole. This will create a stone base with an implant analogue in the middle.

5. Remove the interim prosthesis from the patient’s mouth. Secure the interim prosthesis on the analogue through the occlusal abutment screw. Utilize condensation silicone to fabricate an index around the interim prosthesis (Fig. 4, B). Allow an opening at the occlusal area of the index, so autopolymerized acrylic resin can be poured later.

6. Secure an impression coping on the analogue. Place the silicone index around the impression coping. Pour autopolymerized acrylic resin (Duralay Temporary Crown & Bridge (C&B); Reliance Dental Mfg Co., Alsip, IL) around the impression coping while the silicone index is secured around the stone base (Fig. 4, C). This will result in a custom impression coping with gingival contours identical to the contours of the interim prosthesis.

7. Place the custom impression coping intraorally to make the final impression (Fig. 5, A). Pour with type IV dental stone. Apply tissue simulating material (Gi-Mask; Coltene) before pouring the stone (Fig. 5, B).

8. Place a hexed temporary metal abutment on the analogue that is embedded into the stone base. Secure the silicone index around the stone base and pour autopolymerized acrylic resin (Duralay, Reliance Dental Mfg Co.) to cover the incisal edge of the tooth (Fig. 6, A). This will create a replicated interim prosthesis (RIP). Remove the silicone index and inspect the RIP for any voids (Fig. 6, B). Place the RIP on the master stone model. Use a scanning abutment provided by the manufacturer of the implant system utilized to scan the implant position (D700, 3 Shape; Copenhagen, Denmark). Place the RIP on the stone model and scan the stone model again. This will record the contours of the interim prosthesis that have been confirmed intraorally.

9. The RIP can be considered as a custom scanning abutment. Design the CAD/CAM prosthesis of your choice by following the scanned contours of the interim prosthesis that have been verified intraorally. Utilization and replication of an interim restoration offer tissue contours similar to the contours of the definitive prosthesis.\(^\text{24}\) In the illustrated clinical situation, a CAD/CAM zirconia abutment was fabricated, which was bonded to a titanium insert (Panavia F 2.0; Kuraray America Inc., Irvine, CA).\(^\text{25}\) A zirconia crown layered with porcelain was made and cemented with resin-modified glass ionomer cement (3M ESPE 3505P Rely-X Luting cement; 3M Co., St. Paul, MN). Retraction cord was
placed to facilitate cement removal. After that a similar full coverage crown was made for tooth #9 (Fig. 7).

**DISCUSSION**

The significance of the described technique is that it offers a methodology for duplicating the modified interim prosthesis to fabricate a custom impression coping and the definitive restoration as well. In a recent publication, Proussaefs\(^1\) described a technique where the interim prosthesis, impression coping, and definitive restoration are designed and milled with identical contours before dental implant surgery. Although this technique offers the possibility to fabricate an interim restoration from a milled PMMA block, which has been associated with increased durability and minimal porosity, any intraoral modifications made in the interim prosthesis after insertion would not be replicated in the definitive restoration. With the described technique in the current paper, any and all modifications of the interim prosthesis will be replicated to the definitive restoration.

Some authors\(^1\) have utilized the interim restoration as an impression coping in an attempt to duplicate the acquired soft tissue profile on the master stone cast. Although to the author’s best knowledge there is no study to evaluate the accuracy and reproducibility of different techniques in transferring the soft tissue profile on the master stone cast, utilization of a custom impression coping might be advantageous because it can be designed with sufficient antirotational features for easy orientation within the impression, and the patient does not have to left without a provisional prosthesis for any period of time.

Some other authors\(^9\) to fabricate a custom impression coping have utilized autopolymerized acrylic resin intraorally around a temporary metal abutment or impression coping. One limitation of this technique is the difficulty to control moisture intraorally to ensure blood or saliva can be excluded from intervening at the space between the metal abutment and the autopolymerized acrylic resin. Most importantly, soft tissue might be unstable after removing the interim prosthesis. Applying autopolymerized acrylic resin intraorally and around a prefabricated impression coping does not preclude tissue collapsing, which may lead to incorrect soft tissue profile on the master cast.

An alternative to a custom impression coping could have been acquisition of the soft tissue profile and implant position through intraoral imaging from an intraoral scanner.\(^2\) The limitation of digitally acquiring soft tissue profile might be tissue instability and the tendency perimplant tissue has to collapse after removing the interim prosthesis, which might give inadequate information.

**SUMMARY**

The described technique offers an alternative methodology to duplicate hard and soft tissue profile of the interim implant prosthesis and perimplant soft tissue contours. A clinical study is needed to evaluate the accuracy and reproducibility of the described technique.

**DISCLOSURE**

The authors claim to have no financial interest, either directly or indirectly, in the products or information listed in the paper.

**APPROVAL**

The article described a clinical and laboratory technique; therefore, IRB was not involved.

**REFERENCES**


