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DENTAL TECHNIQUE

Passively fitting implant-supported complete-arch interim restoration

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ABSTRACT

This article presents a technique for fabricating a passively fitting implant-supported screw-retained complete-arch interim restoration with resistance to early fracture. Two gypsum casts were obtained from an implant impression using the splinting technique. The complete-arch interim restoration with abutment access holes, which was reinforced with a glass fiber splint, was fabricated on one cast and connected to restorative abutments on the other cast extraorally to eliminate stresses from the polymerization shrinkage of resin. (J Prosthet Dent 2019;121:733-6)

Implant-supported, screw-retained restorations have been successfully used for edentulous patients,[1] with a fixed immediate interim restoration often provided. Different techniques for fabricating the interim restoration have been proposed. An existing complete denture can be converted into an implant-supported screw-retained interim restoration.[2] Computer-aided design and computer-aided manufacturing (CAD-CAM) has also been used to fabricate the interim restoration.[3,4] The key steps in these techniques include the creation of appropriate abutment access holes in the restoration and connecting the modified prosthesis to the implant abutments intraorally. These procedures should allow the restoration to be placed passively into the appropriate position. However, the intraoral connection processes are time consuming and skill dependent. In addition, the acrylic resin used for connection may contaminate the operating area during immediate restoration. Alternatively, a heat-polymerized or autopolymerized acrylic resin denture can be fabricated in the dental laboratory after an implant impression is obtained. Nevertheless, shrinkage occurs after polymerizing[5] that might lead to an inaccurate fit. A misfit can result in the accumulation of stress in the restoration, causing problems ranging from screw loosening to the loss of osseointegration.[6,7] This article presents a technique for fabricating a passively fitting complete-arch implant-supported fixed interim restoration for edentulous patients in a straightforward manner.

TECHNIQUE

The treatment plan involved a 4 implant-supported fixed restoration for a patient with maxillary complete edentulism (Fig. 1).

1. After placing the implants into the patient's mouth with a primary stability of 35 Ncm at placement, screw the impression copings into the implants and connect all the coping using an autopolymerizing acrylic resin (Luxatemp Star; DMG) (Fig. 2). Make an impression using polyether impression material (Impregum; 3M). Place the healing abutments in the mouth.

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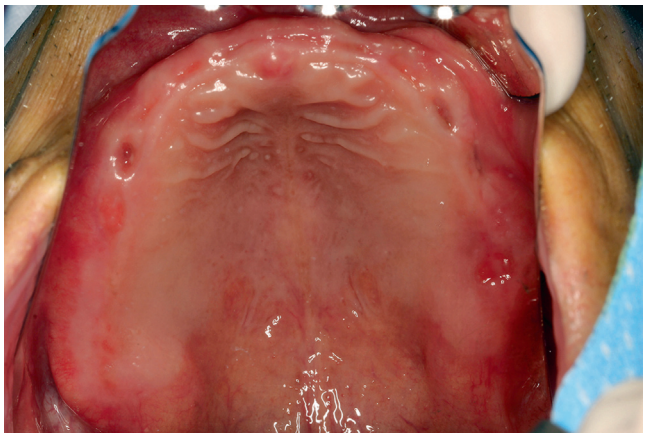

Figure 1. Patient with complete maxillary edentulism.

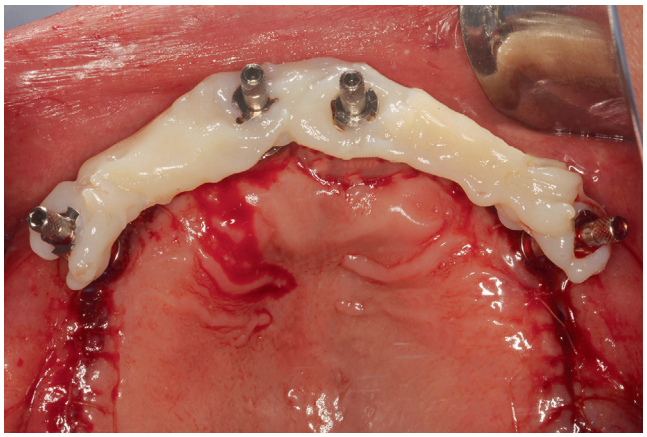

Figure 2. Splinted impression copings in mouth.

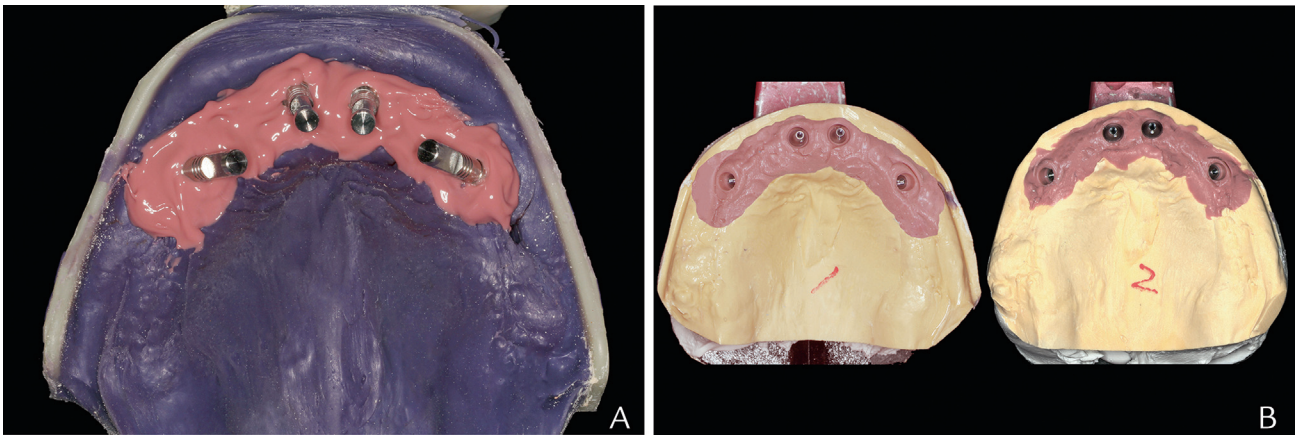

Figure 3. A, Impression with implant analogs inserted and gingival mask. B, Two gypsum casts.

2. Insert implant analogs into the impression using the splinting technique and syringe a gingival mask material (GumQuick; Dreve) around them (Fig. 3A). Pour 2 gypsum casts from the impression (Fig. 3B) and mount them on the articulator.
3. Place the preconditioned interim titanium abutment on the second cast. Place polytetrafluoroethylene (PTFE) tape into the screw access chamber and wrap 3 of the 4 abutments with PTFE. Connect the abutments to each other using a glass fiber splint material (Quartz Splint; RTD) to reinforce the restoration (Fig. 4).
4. Fabricate the restoration using the conventional acrylic resin processing technique. Remove the restoration from the second gypsum cast, which is destroyed. The restorative abutment without PTFE coverage is connected to the restoration (Fig. 5). Remove the other 3 abutments and connect them to the first cast. Place the PTFE tape into the screw access chamber.
5. Seat the interim restoration onto the first cast and fasten the screw in the attached abutment (Fig. 6). Spot attach the interim restoration to the other 3 interim abutments with an autopolymerizing composite resin (Nature; Nissin). Once the resin has polymerized, remove the screw-retained interim restoration from the first cast, fill in the remaining void areas, and reshape the submerged contour with the autopolymerizing composite resin (Nature; Nissin). Finish the interim restoration with fine diamond rotary instruments, polish it with cotton wheels, and steam clean (Fig. 7).
6. Insert the restoration intraorally and tighten it to 15 Ncm (Fig. 8). Seal the screw access hole with the PTFE tape and a light-polymerizing flowable composite resin (Beautifil Flow; Shofu).
7. Evaluate the occlusion and make occlusal adjustments when necessary.

DISCUSSION

The purpose of this article was to describe a technique for fabricating a passively fitting implant-supported screw-retained complete-arch interim restoration with resistance to early fracture for edentulous patients. The main advantage of the technique is that the restoration is

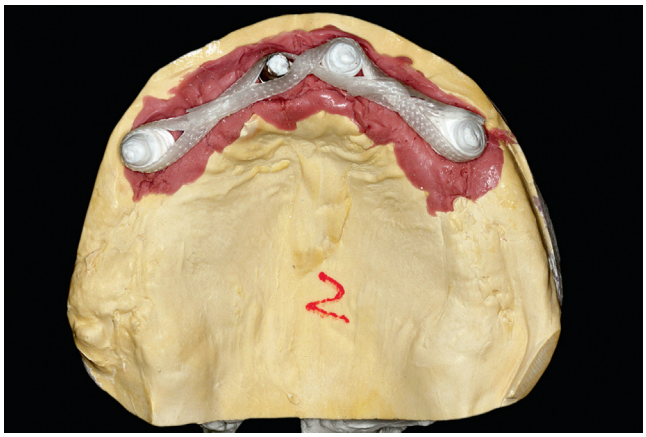

Figure 4. Interim abutment and glass fiber splint on second cast.

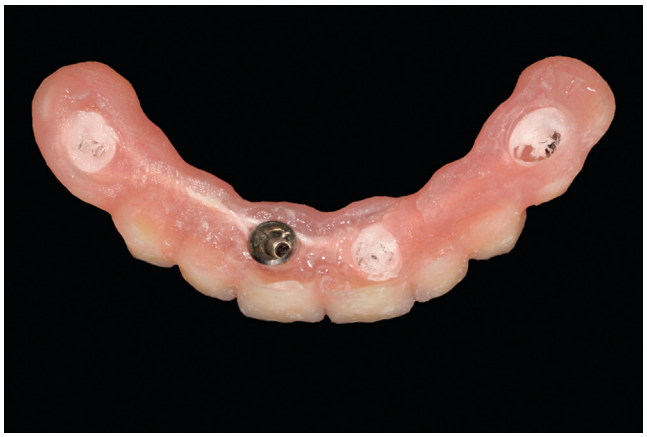

Figure 5. Interim restoration with one abutment connected.

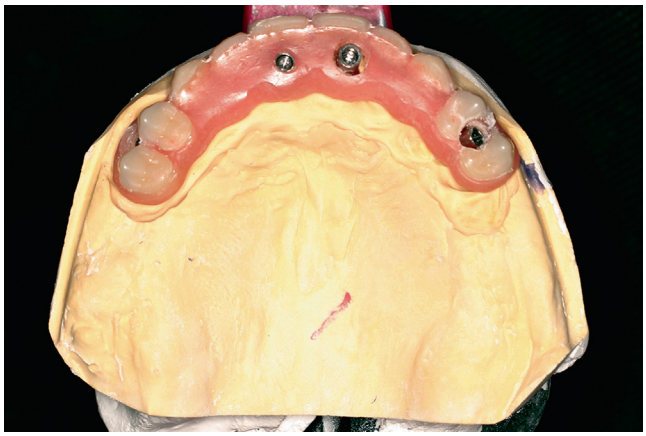

Figure 6. Interim restoration placed on first cast for connecting remaining abutments.

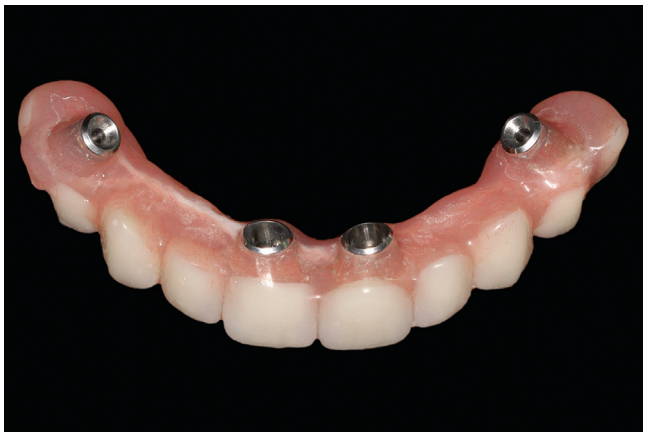

Figure 7. Interim restoration with 4 abutments connected.

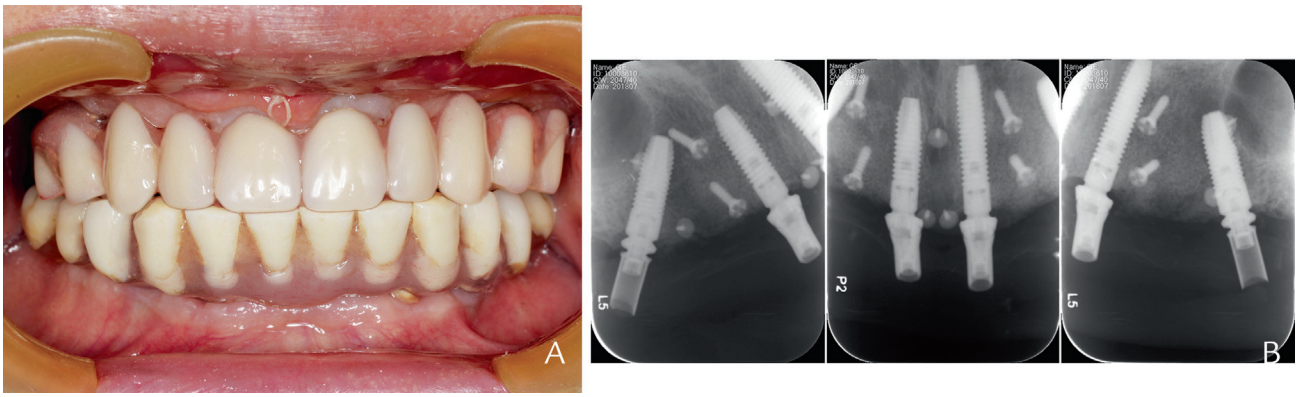

Figure 8. Interim restoration in place. A, Intraoral view. B, Periapical radiographs.

connected to the restorative abutments in a 2-step manner in the dental laboratory to eliminate stress in the restoration and save chairside time.

Polymerization shrinkage inevitably occurs when fabricating a heat-polymerized or autopolymerized acrylic resin denture. The key to solve this problem in the present technique is that the interim restoration is fabricated in the first step and connected to the restorative abutment on the gypsum cast in the second step. First, only 1 abutment is embedded in the restoration in conventional compression procedures. With a 1-point connection, the distorted resin restoration would not transmit stress to the implant. Furthermore, the 1 abutment is used to ensure an accurate fit and sealing of the

interim restoration on the gypsum cast extraorally. As the cast is destroyed when fabricating the restoration, another cast is needed to finish the extraoral connecting procedure. Then, the other 3 abutments are connected to the restoration on the gypsum cast in a second step to eliminate stresses in the restoration. Therefore, 2 gypsum casts should be poured from the implant impression using the splinting technique. As the first poured cast is more accurate than the second, the second cast is used for fabricating the restoration, and the first cast is used for connecting the restoration to the abutments.

As part of the restoration is removed for the abutment access holes, the strength of the denture declines, leading to a risk of fracture.[3] The technique presented in this article uses a glass fiber splint material to strengthen the restoration. In addition, the glass fiber splint material allows for better esthetics and is easier to use than a metal framework.

The main shortcoming of the technique is that the impression must be accurate, requiring an implant impression splinting technique. Clinical studies are necessary to validate this technique.

SUMMARY

This article describes a technique for fabricating a passively fitting implant-supported screw-retained complete-arch restoration with resistance to early fracture. This may eliminate stress and nonpassive fit attributed to the polymerization shrinkage of resin and save chairside time while placing a high-quality restoration for a patient with edentulism.

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