An accelerated clinical chairside technique for casting overdenture attachment copings

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An accelerated technique for casting a direct-pattern post and core restoration for use in fixed prosthodontics has been previously described. Similar techniques for use in removable prosthodontics show potential for clinical use, specifically for the fabrication of radicular stud overdenture attachments and their corresponding copings. The procedure uses a chairside technique and readily available components to fabricate a direct, acrylic resin pattern combining the elements of a cast coping with a fixed radicular attachment. This pattern can subsequently be invested, cast, finished and polished, luted, and attached to the removable prosthesis in a single clinical appointment. (J Prosthet Dent 2011;106:337-339)

The traditional treatment for edentulism has been the fabrication of complete, removable, tissue-supported dentures. One of the greatest challenges facing the clinician is to provide a removable prosthesis with adequate retention resulting in improved comfort and masticatory ability.[1-3] While the traditional treatment of edentulism remains appropriate, using a retentive feature on the roots of natural teeth can increase patient satisfaction.[4] Originally introduced in 1958,[5] the overdenture has long been recognized as a method of maintaining alveolar ridge integrity and periodontal ligament mechanoreception, increasing denture stability, and, potentially, increasing retention. Radicular stud attachments were developed to facilitate overdenture retention.[4]

Dental manufacturers fabricate stud attachments in many forms. The clinician has the option of directly fixing a readily available, manufactured, stud attachment or making an impression of the tooth root and having a dental laboratory fabricate a custom coping and attachment to fit the root. With the first technique, the clinician performs an endodontic procedure, reshapes the tooth, and sizes the root canal to a predetermined size according to the type of attachment to be used. The clinician lutes the manufactured attachment in the post space and attaches the retentive element to the denture. While this procedure is acceptable, many of the commercially manufactured components constitute a "one-size-fits-all" approach with limited ability to accommodate the varying sizes of canal morphology or limited restorative space. Furthermore, these standard attachments do not allow for a cast gold coping to be adapted to the root, as advocated in traditional overdenture prosthodontics.[6] To overcome these limitations, clinicians make an impression of the tooth and canal and have a dental laboratory fabricate a cast coping with a stud attachment. Some may choose not to use this approach because of the added expense and time, multiple appointments, and delay in treatment.

An accelerated technique for fabricating a direct-pattern post and core restoration for use in fixed prosthodontics was presented by Campagni and Majchrowiez.[7] This technique minimizes laboratory time and expense by manipulating acrylic resin to the desired shape directly in the tooth, spruing, investing, and casting the pattern while the patient remains in the office. An analysis of the technique shows it is an accurate and reliable method of fabricating [8] and producing castings comparable to those produced in a more conventional fashion.[9] By following the accelerated casting guidelines established by earlier studies,[7-9] a similar technique can be used for radicular attachments in overdenture prosthodontics. The purpose of this article is to illustrate a technique that uses readily available manufacturer-provided components to produce a custom-cast radicular coping with an attachment in a single clinical appointment.

PROCEDURE

1. Remove the provisional restoration. Reshape the coronal portion of the tooth to the desired shape. Flare the orifice of the canal to ensure that no undercuts are present. Prepare the canal with the Parapost XP-Lab system (Coltène/Whaledent Inc,

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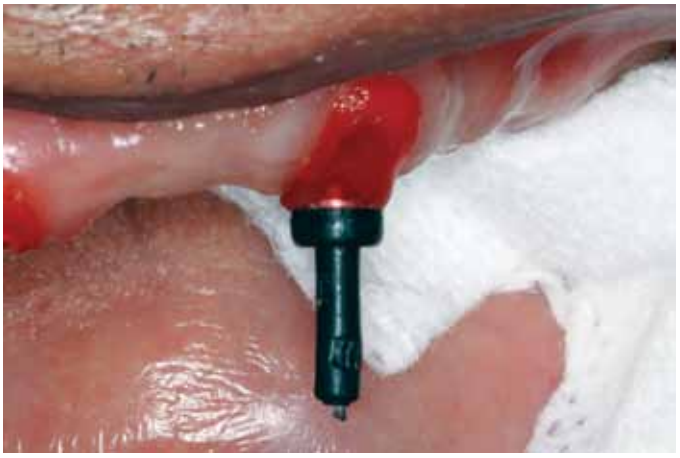
1 Size pilot drill and prepare root to ensure no undercuts are present and sufficient space exists between matrix threads and root dentin.

2 Trim plastic burnout post and place into canal. Lubricate, flow acrylic resin into canal, and seat attachment.



3 Add additional acrylic resin while manipulating into desired shape. Use parallel post to prevent acrylic resin from flowing into attachment matrix.

4 Evaluate casting intraorally and lute with resin cement.

Cuyahoga Falls, Ohio) to a size and length compatible with the anatomy of the canal.

2. Shape the orifice with a pilot drill (Zest part # 8924) and a spot-face diamond drill (Zest part # 8922) slightly oversizing the orifice (Fig. 1). Place a Locator (Zest Anchors LLC, Escondido, Calif) cast-to matrix (Zest part #8528) with a parallel post (Zest part #8517) into the shaped orifice at the desired angulation. Ensure adequate clearance between the threads and dentin to provide for sufficient bulk of alloy.

3. Size a plastic laboratory burnout post to the corresponding size post drill. Trim the plastic post so the coronal portion is slightly below the attachment threads. Lubricate the tooth and canal with petrolatum, place the plastic post, and flow acrylic resin (GC Pattern Resin LS; GC America, Alsip, Ill) into the coronal one-third of the prepared canal. Immediately insert a cast-to matrix with a parallel post at the desired angulation and allow the acrylic resin to polymerize (Fig. 2).

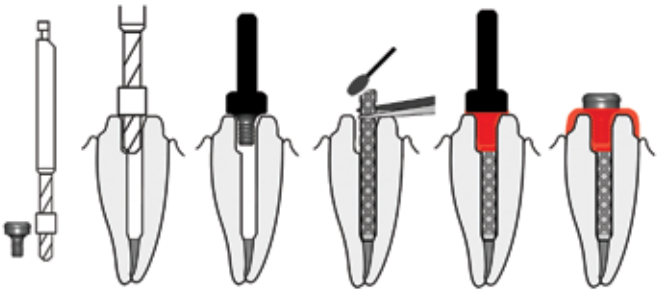
4. Remove the post, attachment, and acrylic resin assembly before finalizing the pattern to ensure the pattern draws upon removal. Add additional acrylic resin to form the final coronal shape (Fig. 3).

5. Sprue and invest the pattern with a phosphate-bonded investment (Jelenko Complete; Jelenko, Armonk, NY). Use a full ring liner and dilute the special liquid with distilled water at a 50/50 ratio.

6. Let the investment set until firm and, at its peak thermal temperature (12 to 15 minutes from mixing), place the ring in an oven preheated to 700°C (1300°F). Heat for 12 to 15 minutes, depending on the ring size and number of patterns.

7. Cast in a Type III or Type IV high-strength gold alloy (Laboratory 44 Casting Alloy; Argen Corporation, San Diego, Calif).

8. Cool, quench, divest, clean, and polish the casting. Use a fiberglass pencil (#1135: Preat Corp, Santa Ynez, Calif) to clean the investment and tarnish from the matrix portion of the attachment. Evaluate the coping intraorally and lute with resin cement (Panavia 21; Kuraray America, Inc) (Fig. 4).



5 Schematic diagram of technique. From left to right: size a pilot drill and prepare orifice so matrix is passive within post space; trim plastic post; lubricate canal; seat matrix with acrylic resin; add additional acrylic resin to obtain desired final shape.

9. Transfer the patrix portion of the attachment into the prosthesis according to conventional methods.[10]

10. Note that Figure 5 illustrates the technique showing a cross-sectional schematic diagram of the tooth and components.

SUMMARY

This article describes a technique in which a clinician can use original manufactured parts to directly fabricate a custom-cast radicular coping and attachment in a single clinical appointment. Advantages of this technique include expedited treatment, thus eliminating the need for a second appointment, laboratory fabrication time, and expense. Furthermore, this technique allows a clinician to establish the path of withdrawal of multiple attachments intraorally and to customize coping shape according to the prosthesis design. Disadvantages include the need for laboratory equipment, including a wax elimination furnace and casting machine, and the technical difficulty of direct intraoral fabrication.

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