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# Modifications of the superstructure for the staple implant

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**P**opularized by Small,<sup>1-4</sup> the staple bone plate (Zimmer, Warsaw, Ind.) has found wide acceptance among dentists as a way to stabilize a mandibular complete denture. Helfrick et al.<sup>5</sup> reported a success rate greater than 95% in 250 patients. The staple implant is available in three configurations that include an inferior bone plate, three or five retentive pins, and two transosteal pins that extend into the oral cavity (Fig. 1). Included with each implant are four fasteners and two locknuts. The transosteal pins pass through the mandible and are joined together intraorally by a superstructure, thus forming a rigid rectangular configuration (Fig. 2). Ceka (CEKA, p.v.b.a., Deurine, Belgium) or Dalbo (Cendres et Metaux SA, Biel-Bienne, Switzerland) attachments

are added to the superstructure at the distal end of each transosseous pin to which a removable prosthesis is attached. The superstructure is usually cemented to the transosseous abutments when the removable prosthesis is inserted. The prosthesis must not direct loading forces to the staple implant.

Several techniques have been described to make dentures over a staple implant. Some techniques require the construction of duplicate casts, some require placement of the attachments clinically, and most require placement of the attachments after the denture has been processed. Various techniques propose the use of copings, connecting bars, or attachments in the superstructure.<sup>6</sup> Precious metals are often used for copings and connecting bars; attachments are expensive, and the procedures are time consuming.

Although we have used these techniques in approximately 50 patients in 7 years, economy has suggested the

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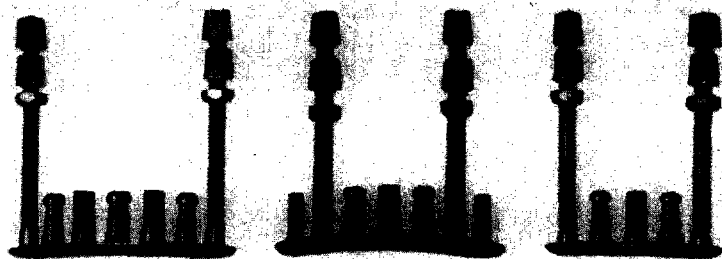


Fig. 1. Implant is manufactured in three configurations. Left to right: Seven pin, modified seven pin, and five pin.



Fig. 2. Transosteal pins joined with round bar.

need for technique changes that do not sacrifice the quality of the prosthodontic rehabilitation. This article describes two techniques in which the ULTRA M attachment (Attachments International, San Mateo, Calif.) is used. The male portion of the ULTRA M is plastic and the female portion is a nonprecious alloy. The ULTRA M attachment, like the Dalbo, has a spring within the female portion that must be removed to prevent vertical loading of the implant.

#### TECHNIQUE NO. 1

1. Fabricate acrylic resin transfer copings over the fasteners (Fig. 3).

2. Align the fasteners on each transosteal pin so that a flat surface of the fastener is perpendicular to a line that bisects the angle made by lines drawn parallel to the crest of the ridge and the midline of the cast (Fig. 4). There should be 1.5 mm between the base of the locknut and the crest of the ridge. If a locknut is not used because of vertical height restrictions, 1.5 mm must be maintained between the base of the fastener and the crest of the ridge.

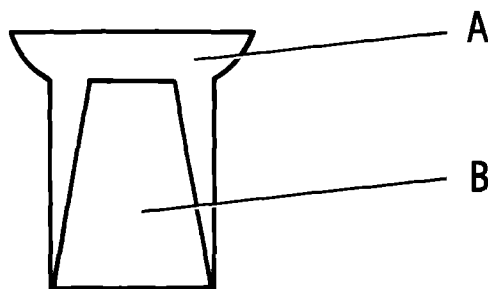


Fig. 3. Acrylic resin transfer coping (A) and fastener (B).

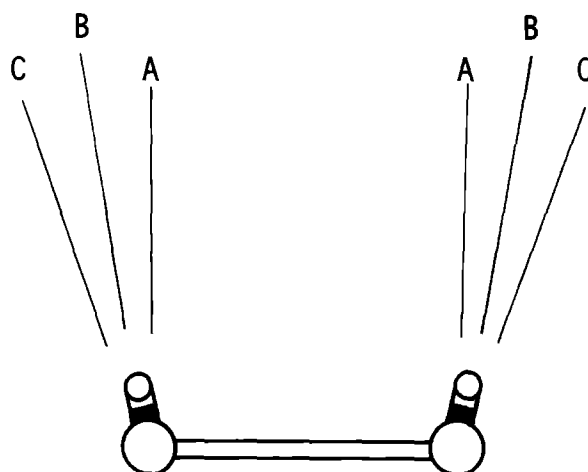


Fig. 4. Flat surface of fastener perpendicular directed to line B. Line C is parallel to residual alveolar ridge and line A is parallel to midline of cast.

3. Place the transfer copings over the aligned fasteners and make an irreversible hydrocolloid impression in a border-molded custom tray.

4. On removal of the impression, remove the fasteners from the transosteal pins and place them into the transfer copings in the impression.

5. Insert a roundhead steel machine screw (4-40 x 3/4 inch) into the fastener and place acrylic resin at the

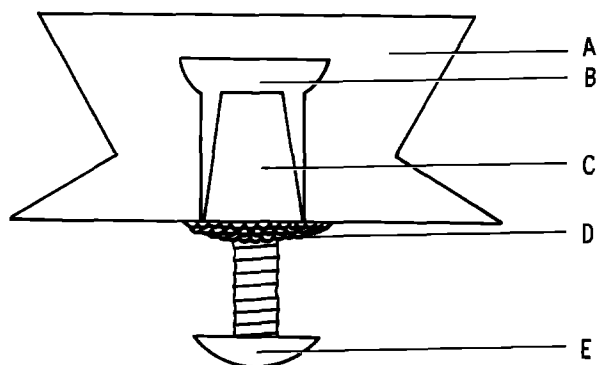


Fig. 5. Impression (A), transfer copings (B), fasteners (C), acrylic resin (D), roundhead machine screw (E).

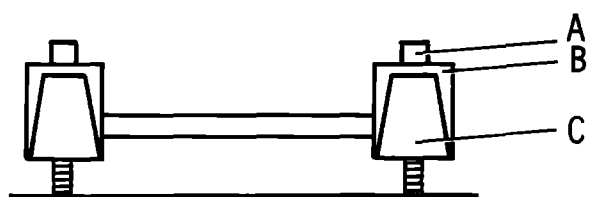


Fig. 6. Wax copings (B) and attachments (A) on fasteners (C).

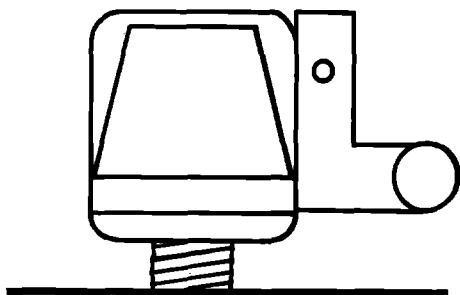


Fig. 7. Lateral view of coping and attachment over fastener.

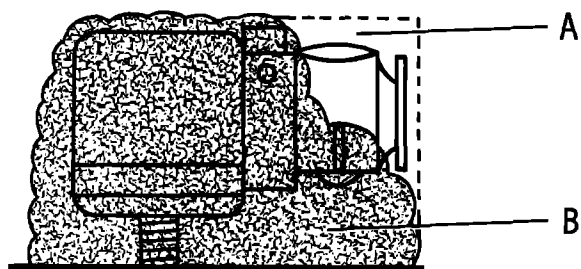


Fig. 8. Stone (B) eliminates undercuts beneath attachments and bar. Retentive portion of attachment is covered with wax (A).

fastener-screw junction (Fig. 5). If the locknut is to be placed on the master cast, do not place acrylic resin at the fastener-screw junction.

6. Pour the impression in dental stone and verify the alignment of the fasteners on the master cast.

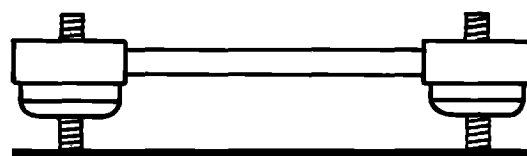


Fig. 9. Acrylic resin or wax over locknuts is connected by bar.

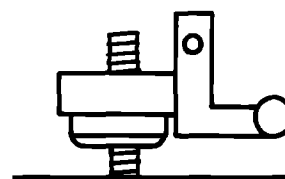


Fig. 10. Lateral view of washer and male portion of ULTRA M attachment.

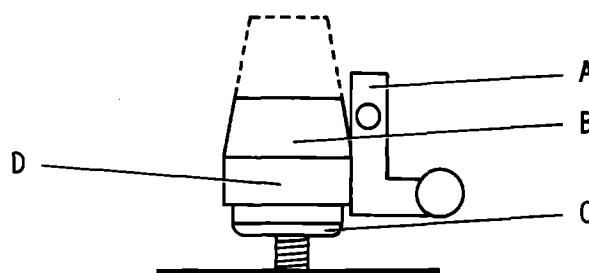


Fig. 11. Male portion of attachment (A), fastener (B) (lower half), locknut (C), and washer (D).



Fig. 12. Attachment, coping, and bar assembly cemented in place.

7. Wax the copings and bar, and assemble the attachments (Figs. 4, 6, and 7). The bar should be 10-gauge round.

8. Cast the attachments, copings, and bar in one piece in nonprecious metal.

9. Verify the assembly on the master cast and in the mouth.

10. Place the female portion of the attachment on the superstructure on the master cast.



Fig. 13. Attachment, washer, and bar assembly locked in place.

11. With stone, block out below the attachments and around the bar. Cover the retentive portion of the attachment with wax (Fig. 8).

12. Continue usual fabrication of the dentures.

#### TECHNIQUE NO. 2

1. Follow step Nos. 1 through 6 as in technique No. 1.

2. Remove the transfer copings and the fasteners from the screw.

3. Place an acrylic resin or wax washer over the locknuts and wax a 10-gauge round bar between them (Fig. 9).

4. Align and attach the plastic portion of the ULTRA M attachment to the washer (Figs. 4 and 10).

5. Cast the entire assembly in one piece.

6. Verify attachment alignment on the cast (Fig. 4) and in the mouth.

7. Place the assembly on the master cast with a locknut below and the lower half of a fastener above (Fig. 11). Another locknut can be used in place of the half fastener.

8. Continue as in step Nos. 11 and 12 of technique No. 1.

#### SUMMARY

Two techniques have been described to expedite fabrication and reduce the cost of prostheses made for staple implants. The techniques permit placement of a simulated transosseous pin within the master cast. At the time of denture placement in technique No. 1, the coping-bar attachment assembly is cemented (Fig. 12). In technique No. 2 the superstructure is placed over the transosteal pins and secured between the locknuts to maintain the base of the lower locknut 1.5 mm from the crest of the alveolar ridge (Fig. 13). Technique No. 2 permits removal of the superstructure as desired. Patients should be instructed in proper oral hygiene and denture care.

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