A simple technique is presented to make a multipurpose duplicate of the patient’s complete denture to plan and fabricate a mandibular implant-retained overdenture. This duplicate serves 3 different functions. It can be used as a radiographic guide, surgical template, and custom tray adapted to the patient’s occlusion. Advantages of the technique described are twofold: it is cost effective and makes use of equipment and materials commonly found in dental practices. The use of a single guide allows the clinician to refer to the recorded prosthetic data at each step of implant treatment. (J Prosthet Dent 2010;103:53-57)
clinician to refer to recorded prosthetic data at each step of implant treatment.

**TECHNIQUE**

Fabrication and use of the radiographic guide

1. Ensure that the existing complete denture is adequate by evaluating it according to the method developed by Sato et al.²
2. Duplicate the mandibular complete denture using a box or duplicating flask (Dento-Box; Hager Worldwide, Inc, Odessa, Fla).³ Fill half of the box with vinyl polysiloxane (Express Penta H Putty; 3M ESPE, Seefeld, Germany) and place the denture in the impression material. After complete polymerization of the impression material (Express Penta H Putty; 3M ESPE), lubricate the denture-silicone surface with a separating agent (Vaseline; Unilever, Greenwich, Conn) before filling the second half of the box with the same impression material (Fig. 1). Remove the denture from the box. Use the impression as a mold for the radiographic guide. Mix barium sulfate powder (10% to 15% in weight) (barium sulfate; Unither, Paris, France) with acrylic resin powder before incorporating the monomer (Formatray; Kerr Corp, Orange, Calif). Pack the mixture in the mold and close the box until the acrylic resin polymerization is complete. Remove the mold from the plastic box, separate the 2 halves of the mold, and retrieve the duplicate denture. Remove acrylic resin sprues. Finish and polish the duplicate denture.

3. Index the desired emergence implant sites in the positions of the lateral incisors, canines, and first premolar areas on the intaglio surface of the duplicate prosthesis to create a guide (Fig. 2). Then index these sites on the denture polished surface, lingual to the location of the teeth. Select symmetrical sites for implant positions.

4. Drill 6 grooves with a 2-mm twist drill (Twist Drill, 2 mm, 25008; Nobel Biocare AB, Göteborg, Sweden), parallel to each other and perpendicular to the occlusal plane to optimize implant stress distribution (Fig. 3).¹⁴⁻¹⁷

5. Add autopolymerizing acrylic resin (Pattern Resin; GC America, Alsip, Ill) on the occlusal surface of the duplicate prosthesis to create an accurate record of the occlusion and to ensure correct placement of the radiographic guide. Have the patient occlude on the radiographic guide during the radiographic exam, to maintain it firmly on the mucosa of the denture-bearing area, as it is a mucosa-borne guide (Fig. 4).

6. Select optimal implant sites
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6. Select optimal implant sites from the radiographic images, and confirm or modify the implant axes, considering anatomic requirements (Fig. 5).

Fabrication and use of the surgical template
7. Drill the guide according to the planned implant position and orientation with a 3-mm twist drill (Twist Drill, 3 mm, 25013; Nobel Biocare AB). Incorporate steel tubes (215 610 002; Weber Métaux et Platiques, Ivry sur Seine, France) with an internal diameter of 2.1 mm in the selected positions (Fig. 6) to serve as drilling guides for the 2-mm twist drill during surgery.
8. Remove the buccal and lingual flanges in the anterior portion of the surgical template to allow use of surgical instrumentation and maintain visibility of the surgical site. Modify the acrylic resin at the occlusal level so as to avoid contact between the contra-angle head and the surgical template during drilling (Fig. 7). Disinfect the surgical template for 30 minutes in a chlorhexidine solution (Eludril; Pierre Fabre Medicament, Castres, France).
9. Raise the mucoperiosteal flaps to expose the bone. Place the surgical template on the denture-bearing area and maintain firmly by applying digital pressure on the first molar area. Use the template to guide the 2-mm twist drill through the cortical bone for each implant site. Remove the surgical guide and place a direction indicator (Branemark System Direction Indicator 28976; Nobel Biocare AB).
AB) in one of the drilled sites. Use this indicator as a reference to direct the drilling on a parallel axis to the opposite site. Follow the drilling sequence according to the implant system recommendations provided.

Fabrication of the custom tray

10. Add autopolymerizing acrylic resin (Unifast Trad; GC America, Inc) to the intaglio surface of the complete denture, across from implant sites, to recreate the initial intaglio surface of the duplicate denture and flanges using the previously fabricated mold. Allow the acrylic resin to polymerize. Remove the restored duplicate denture from the mold. Remove acrylic resin sprues. Finish and polish (Fig. 8).

11. Following implant osseointegration, use the prosthesis duplicate as an occlusally adapted custom tray during the impression phase for the implant-retained overdenture.

**SUMMARY**

There are numerous advantages to this complete denture duplicate. It is easy to fabricate from materials commonly available in dental offices. As a radiographic guide for highly resorbed mandibles, it allows selection of optimal implant sites while meeting prosthetic and anatomical requirements. As a surgical guide, it allows implant alignment along planned prosthetic axes during implant surgery and ensures good visual access for the surgeon. The guide can be converted into an occlusally adapted custom tray to make a complete mandibular implant-retained overdenture, as it benefits from the fact that the original denture has been worn and integrated by the patient. This procedure requires firmly maintaining the radiographic guide and surgical template on the mucosa of the denture-bearing area during the radiographic exam and surgery, as it is a mucosa-borne guide. The described protocol is particularly useful for highly resorbed mandibles.

**REFERENCES**

Self-adhesive resin cement versus zinc phosphate luting material: A prospective clinical trial begun 2003


Objectives: The literature demonstrates that conventional luting of metal-based restorations using zinc phosphate cements is clinically successful over 20 years. This study compared the clinical outcomes of metal-based fixed partial dentures luted conventionally with zinc phosphate and self-adhesive resin cement.

Methods: Forty-nine patients (mean age 54 ± 13 years) received 49 metal-based fixed partial dentures randomly luted using zinc phosphate (Richter & Hoffmann, Berlin, Germany) or self-adhesive resin cement (RelyX Unicem Aplicap, 3M ESPE, Germany) at the University Medical Center Regensburg. The core build-up material was highly viscous glass ionomer; the finishing line was in dentin. The study included 42 posterior, 5 anterior crowns and two onlays. Forty-seven restorations were made of precious alloys, 2 of non-precious alloys. The restorations were clinically examined every year. The clinical performance was checked for plaque (0-5; PI, Quigley-Hein), bleeding (0-4; PBI; Mühlemann) and attachment scores. The examination included pulp vitality and percussion tests.

Statistics: Means of scores, standard deviation, cumulative survival and complication rates were calculated using life tables.

Results: The mean observation time was 3.16 ± 0.6 years (min: 2.0; max: 4.5 years). During that time no restoration was lost, no recementation became necessary. One endodontic treatment was performed in the self-adhesive composite group after 2.9 years. At study end bleeding (1.44 RelyX Unicem vs. 1.25 zinc phosphate) and plaque (1.64 RelyX Unicem vs. 1.0 zinc phosphate) scores showed no statistically significant difference.

Significance: The self-adhesive resin cement performed clinically as well and can be used as easily as zinc phosphate cement to retain metal-based restorations over a 38-month observation period.