

Conversion of a complete denture to a provisional implant-supported, screw-retained fixed prosthesis for immediate loading of a completely edentulous arch

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This article describes the fabrication of a provisional implant-supported, screw-retained restoration for immediate loading of a completely edentulous arch. The technique can be applied to patients with partially edentulous arches as well. Until immediate loading of dental implants becomes a well-documented treatment modality, the described method should not be applied on a routine basis or without careful evaluation. (J Prosthet Dent 2002;87:473-6.)

Dental implants have become a predictable treatment option for the completely^{1,2} or partially^{3,4} edentulous patient. A 3- to 6-month healing period is usually recommended to achieve osseointegration before the implants are loaded with a prosthesis.⁵ The immediate loading of endosseous root-form implants has been introduced to eliminate the traditional healing period. This technique has been described mostly for the mandible in completely edentulous patients, with placement of a fixed implant-supported prosthesis on the same day of implant surgery⁶⁻¹¹ or a few weeks later.¹²

Schnitman et al,^{6,7} Balshi and Wolfinger,^{9,10} and Siirila et al¹¹ described a method for conversion of a provisional removable partial or complete denture into a provisional implant-support prosthesis. Acrylic resin is applied between provisional or gold abutments and the provisional prosthesis. The abutments are picked up intraorally with autopolymerized acrylic resin, and additional acrylic resin is added to fill the space between the abutments and the denture. The shrinkage of the acrylic resin¹³ may compromise the accuracy of this procedure. Moreover, the potential of heat transfer to the implants during the polymerization process is a concern,^{6,14} as is the toxicity of the monomer on the surgical field. Given the sensitivity of the bone to increased temperature,¹⁴ any heat transfer to the implants should be avoided. Balshi and Wolfinger¹⁰ suggested the use of a rubber dam to avoid the toxicity of monomer on underlying tissues.

It is hypothesized that cross-arch stabilization of implants through the prosthesis can provide the stability necessary for the implants to osseointegrate. It has been reported that early micromotion of implants can



Fig. 1. Preoperative view of mandibular arch.

prevent the osseointegration process from occurring,¹⁵⁻¹⁷ but controlled micromotion also has been shown to stimulate bone growth.^{18,19} Based on published clinical studies, the survival rate of immediately loaded implants is less than that obtained with the well-documented 2-stage approach.²⁰ Further research is required before definitive conclusions can be drawn.

This article describes a method for converting a mandibular complete denture into an implant-supported, screw-retained prosthesis for the immediate loading of root-form implants.

CLINICAL REPORT

A 72-year-old white female sought treatment at the Implant Dentistry Clinic at Loma Linda University for her partially edentulous mandible (Fig. 1). The patient expressed dissatisfaction with previously fabricated mandibular removable partial dentures and declined the fabrication of an immediate mandibular complete denture after extraction of the remaining hopeless mandibular teeth. After various treatment options were discussed, the decision was made to extract the remaining mandibular teeth, place 5 HA-coated root-form implants (Steri-Oss; Nobel Biocare USA, Yorba

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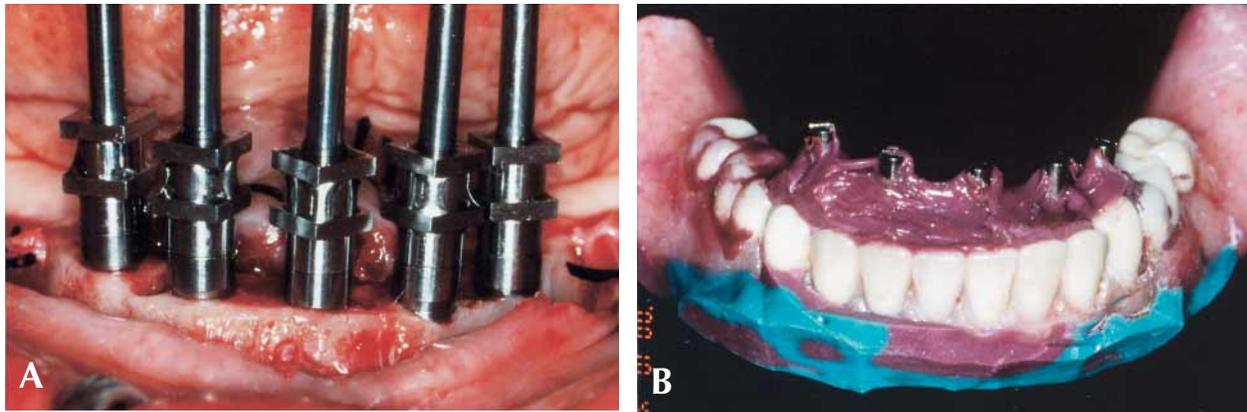


Fig. 2. **A**, Impression copings placed on implants. **B**, Open tray technique used with immediate complete denture and vinyl polysiloxane impression material.

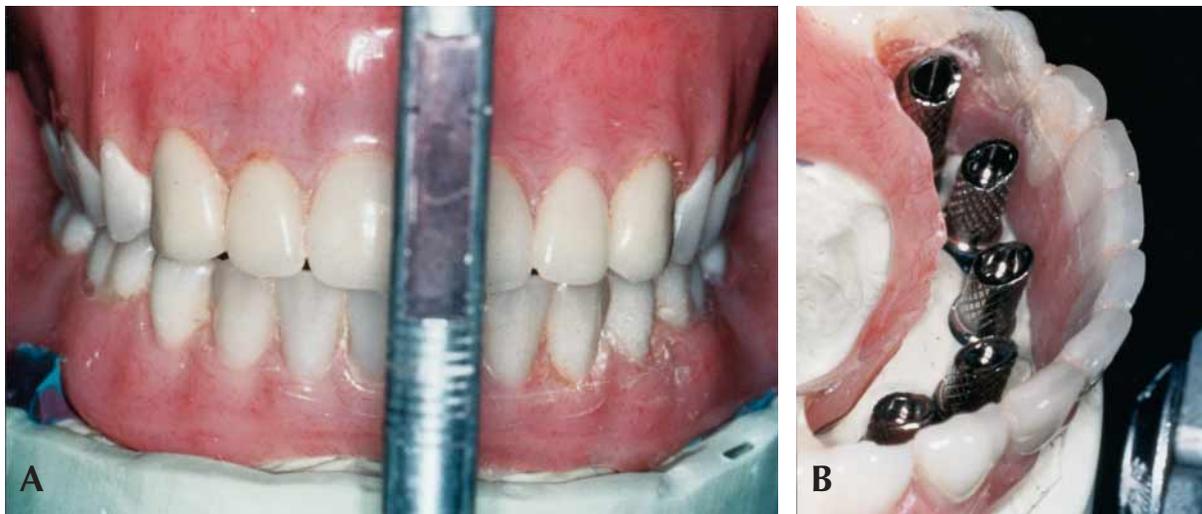


Fig. 3. **A**, Maxillary and mandibular complete dentures mounted in semi-adjustable articulator. **B**, Non-hexed temporary copings placed and height adjusted.

Linda, Calif.) in the anterior segment of the mandible, and transform an immediate complete denture into an implant-supported, screw-retained fixed prosthesis.

An immediate mandibular complete denture and a maxillary complete denture were fabricated in the laboratory according to standard procedures.²¹ The remaining mandibular teeth were extracted. With the guidance of a surgical template that had been fabricated based on the mandibular complete denture,²² 5 HA-coated root-form implants (Steri-Oss; Nobel Biocare) were placed at the anterior area of the mandible. Transmucosal abutments 3 mm in height (PME abutments; Nobel Biocare) were placed on each implant. Square impression copings were placed on the PME abutments (Fig 2, *A*). In some situations, copings may require modification for occlusal clearance, but that was not true for this patient.

The mandibular immediate complete denture was seated after acrylic resin material was removed from

the lingual area of the denture to provide space for the impression copings. Tray adhesive (Dentsply International Inc, Milford, Del.) and vinyl polysiloxane impression material (Aquasil HV; Dentsply International Inc) were used to make a direct transfer impression of the implant position; the immediate complete denture was used as a tray. While the material polymerized, the patient was guided into the centric relation position, and an interocclusal record was made with vinyl polysiloxane (Exabite II NDS; GC America Inc, Alsip, Ill.). The screws of the impression copings were unscrewed, and the immediate complete denture was removed from the patient's mouth (Fig 2, *B*). Healing abutments were placed on the PME abutments, and implant analogs were placed at the intaglio area of the denture.

A mandibular master cast was fabricated with type IV dental stone (Die-Keen; Heraeus Kulzer Inc, South Bend, Ind.). Pink-colored condensation silicone (Gi-

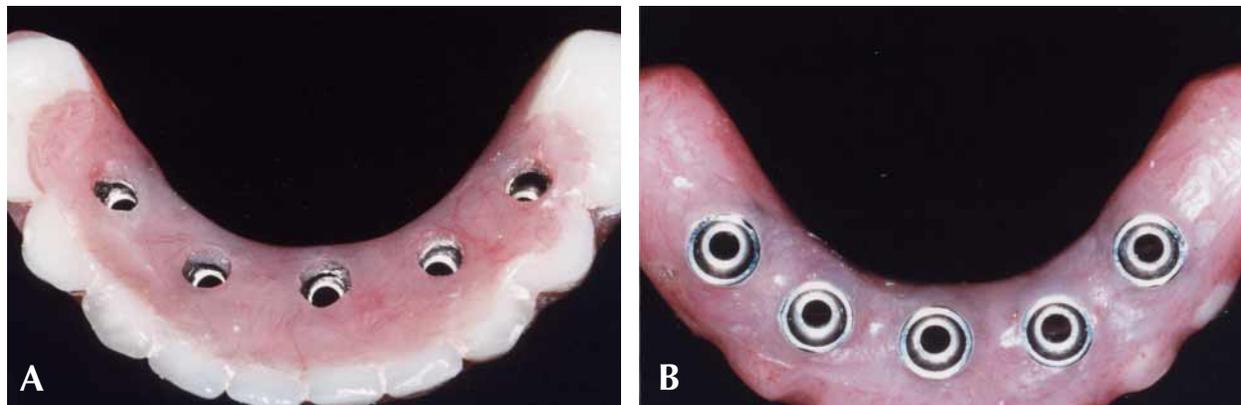


Fig. 4. **A**, Provisional implant-supported, screw-retained mandibular prosthesis. **B**, Intaglio surface.

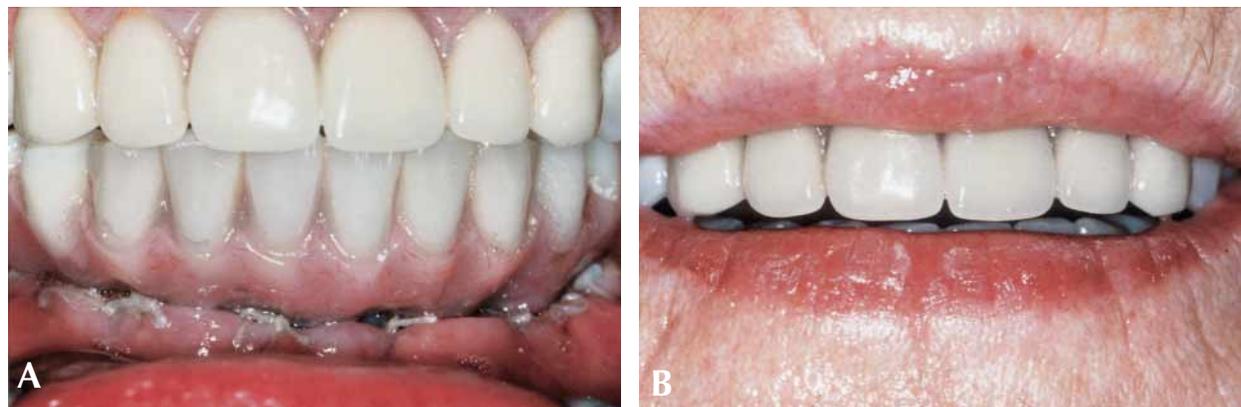


Fig. 5. **A**, Prosthesis seated intraorally. **B**, Definitive result.

mask; Coltene AG, Altstätten, Switzerland) was used to simulate the soft tissue.²³ Both maxillary and mandibular dentures were mounted in a semi-adjustable articulator (Hanau Model H2; Teledyne Waterpik Co, Fort Collins, Colo.) with the use of a face-bow and the interocclusal record (Fig. 3, *A*). The impression copings and impression material were removed from the anterior area of the denture, and provisional non-hexed abutments were placed on the implant analogs. The height of the abutments was adjusted to avoid occlusal interference and to develop the screw access position (Fig. 3, *B*).

Autopolymerizing acrylic resin (Permanent relin and repair resin; The Hygienic Co, Akron, Ohio) was bead-brushed and then poured around the provisional copings and along the intaglio area of the denture. The acrylic resin was allowed to polymerize in a pressure pot with warm water to increase the strength and reduce the porosity of the material.²⁴ After polymerization, excess acrylic resin material and the denture flanges were removed. A reduced distal cantilever was developed by limiting the occlusion to the second premolar area (a molar tooth had been placed). The

denture thus was converted into an implant-supported, screw-retained fixed prosthesis (Fig. 4, *A*). The acrylic resin material was removed from the intaglio area to allow access for oral hygiene (Fig. 4, *B*).⁶

The maxillary complete denture and the mandibular provisional implant-supported, screw-retained prosthesis were placed in the patient's mouth 2 days after implant surgery (Fig. 5). The fit of the mandibular prosthesis was evaluated through the alternate pressure technique²⁵ and the screw resistance test,²⁶ and the occlusion was adjusted. Cotton pellets and provisional cement (Cavit-G; ESPE-D, Seefeld, Germany) were placed into the occlusal access openings. Healing after the implant surgery was uneventful. The patient was followed for 5 months with no surgical or prosthetic complications.

DISCUSSION

The described technique is an economical and relatively easy way to immediately load a completely edentulous arch. Implant position was transferred with the direct transfer technique and addition-reaction silicone (vinyl polysiloxane) impression material, which

has been shown to provide accurate implant position reproduction^{27,28} and low cell toxicity.²⁹ Concerns about heat transfer during polymerization^{6,14} and monomer toxicity were thereby eliminated.

The provisional prosthesis allowed the patient to evaluate appearance and function and the dentist to evaluate oral hygiene before the definitive fixed-detachable restoration was fabricated. Tarnow et al⁸ described the fabrication of a fixed prosthesis for the immediate loading of completely edentulous patients. The provisional prosthesis was fabricated with use of a diagnostic wax pattern as a guide. If a fixed-detachable prosthesis is considered the final restoration, a cemented complete acrylic provisional prosthesis will not give the patient the opportunity to evaluate the design, cleansibility, esthetics, and function of the definitive restoration.

The technique described in this article can be used with the conventional 2-stage approach at second-stage surgery. It also can be applied to partially edentulous patients by transforming the provisional removable partial denture into an implant-supported, screw-retained fixed partial denture.

SUMMARY

The fabrication of a provisional implant-supported, screw-retained restoration for immediate loading of a completely edentulous arch has been described. Until immediate loading of dental implants becomes a well-documented treatment modality, this method should not be applied on a routine basis or without careful evaluation.

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