

Single-Tray Impression Technique for Implant-Supported Overdentures

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INTRODUCTION

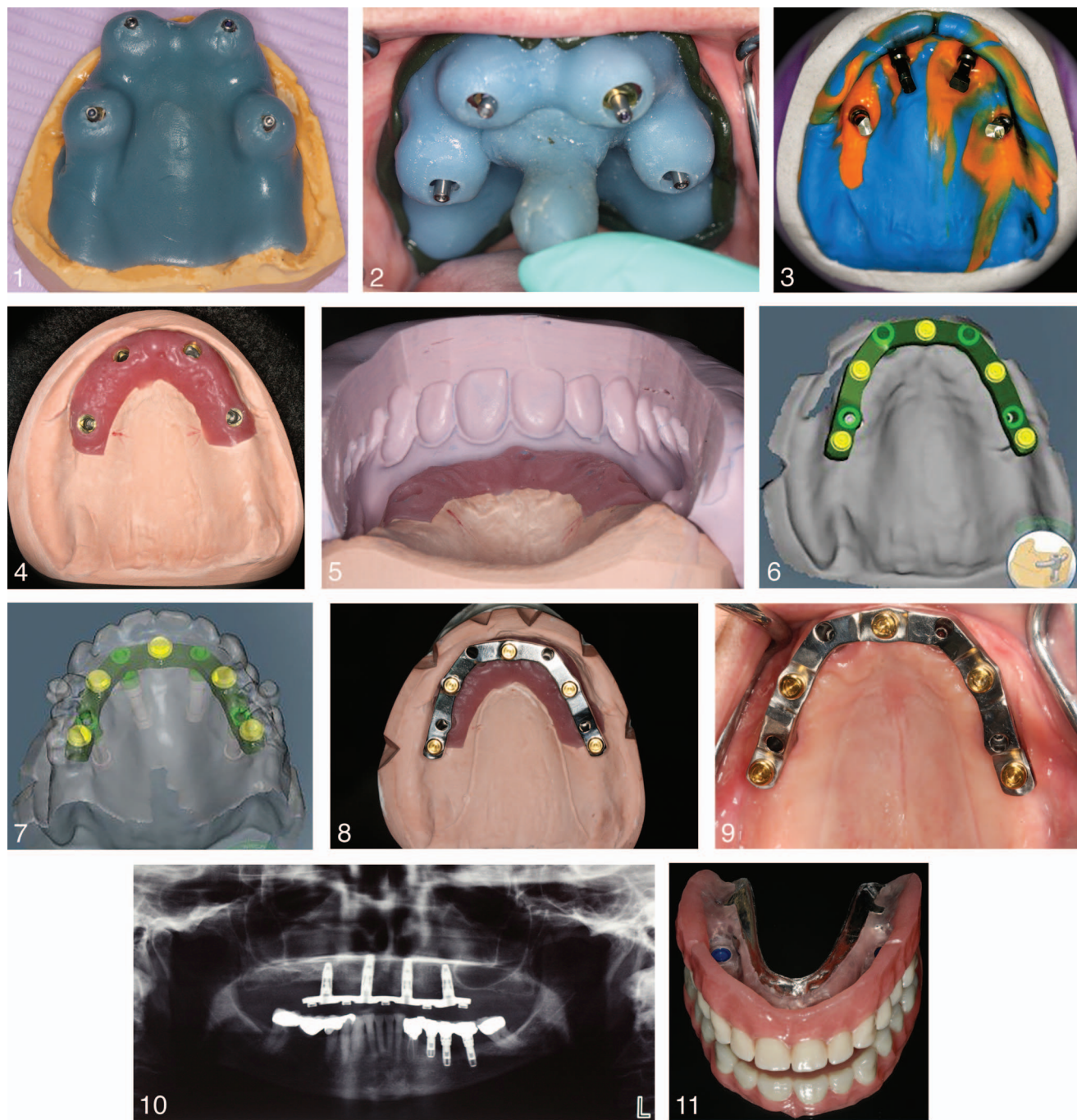
The final impression is a crucial step for the successful production of removable prostheses.¹⁻³ The aims of overdenture impressions are to ensure the retention, support, stability, and esthetics of the final prosthesis.² Various techniques and materials used to record denture-bearing areas have been debated in the literature.⁴⁻⁶ Implant overdentures are supported by either the implant only or both the implant and soft tissue. For implant and soft-tissue-supported overdentures, maximum denture extension is first required to satisfy the objectives of the final prosthesis because the support and stability of the dentures result mainly from the denture-bearing areas, but for implant-supported overdentures, the implants assume the full load.^{7,8} A border-molded impression for implant-supported overdentures ensures accuracy of the master cast to allow for fabrication of a stable record block to accommodate the jaw relation record, evaluate tooth setup, fabricate the implant connecting bar, and prevent food accumulation under the overdenture prosthesis by providing proper extension with an adequate seal.

A dual-tray impression technique has been used to fabricate one master cast for an immediate removable denture or a complete denture with hypermobile tissue.^{9,10} The first tray is used to record the maximum denture-bearing areas with a window over the remaining teeth or the hypermobile tissue, while the other tray is used to pick up the border-molded tray with an impression of the remaining teeth or hypermobile tissue. A modification of the dual-impression tray was adapted by Zouras et al⁵ to fabricate one master cast for implant-retained prostheses. The first tray is fabricated to allow for maximum access to the edentulous area extension with no concern for the implants. After border molding, an impression is made using the selected material. The second tray is fit into the mechanical interlocking grooves, ridges, and periphery of the first tray. Impression material is then injected between the trays and around the pick-up impression coping through the holes made on both trays. Repositioning of the first tray over the soft tissue and interlocking of the second tray over the first tray could induce some inaccuracy in the master cast. This article provides a detailed description of a single-tray impression technique used to fabricate an implant-supported overdenture.

TECHNIQUE

1. A prefabricated plastic impression tray providing maximum extension was selected. The healing screws were removed, and the pick-up impression copings were hand tightened after selecting the tray. Holes were opened on the tray. A preliminary impression was made with irreversible hydrocolloid impression material (Alginoplast, Heraeus Kulzer, South Bend, Ind; Figure 1).
2. Laboratory analogs were attached to the impression copings, and the primary impression was poured with type III dental stone (Microstone, Whip Mix Corporation, Louisville, Ky). A relief of the residual ridge was made with a thin layer of melted baseplate wax (Truwax, Base-plate Wax, Dentsply, York, Penn). Pick-up impression copings were hand-tightened in the laboratory analogs. Multiple layers of the baseplate wax were applied around the impression copings to maintain adequate space for the impression material and prevent contact with the custom tray. A full arch custom tray was fabricated with acrylic resin (Triad Tru Tray, Dentsply) with an access opening for the impression copings (Figure 1). The tray's handle was attached to the middle of the tray on the palate side to allow for proper border molding of the labial vestibule and to prevent interference with the impression copings access.
3. Try-in of the tray for proper extension was performed using disclosing wax (Disclosing Wax, KerrDental, Orange, Calif). A border molding was made with a low-fusing green modeling plastic impression compound (Impression Compound, KerrDental). Pick-up impression copings were placed in the implant fixtures, and a periapical radiograph was obtained to verify the seating of the impression copings. Ease of placement with no interference in the seating of the border-molded tray was tested before the impression was obtained (Figure 2). Vinyl polysiloxane (ExaMix NDS, GC America, Tulsa, Okla) impression material was used for the final impression. Clear access for the impression coping screws was maintained during the impression procedure. The screws for the pick-up impression copings were removed before taking the impression from the patient's mouth.
4. Laboratory analogs were attached to the impression copings, and a soft-tissue Moulage was injected around the junction of the coping-analog interface (Figure 3). The final impression was boxed and poured with type IV dental stone (SilkyRock, Whip Mix Corporation; Figure 4). A full-extended record block was fabricated.
5. The vertical dimension of the occlusion and the centric relation were recorded. The maxillary teeth were selected based on the anatomic landmarks. Pound's specification

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FIGURES 1–11. **FIGURE 1.** Custom tray was fabricated with acrylic resin and an access opening for the impression coping screws. **FIGURE 2.** Custom tray was used to verify that adequate space existed between the custom tray and the impression copings. **FIGURE 3.** Completed definitive impression with laboratory analogs fixed to the pick-up impression copings. **FIGURE 4.** Definitive cast created using the single-tray impression technique. **FIGURE 5.** Labial index shows the positional relation between the teeth and implants. **FIGURE 6.** Virtual design of computer-aided design/computer-aided manufacturing (CAD/CAM) bar with 5 locators. **FIGURE 7.** Final virtual design of the CAD/CAM bar in relation to the prosthesis. **FIGURE 8.** CAD/CAM milled bar made out of titanium alloy. **FIGURE 9.** Intraoral occlusal view of the milled bar supported by 4 implants. **FIGURE 10.** Panoramic radiograph confirming that the milled bar is completely seated. **FIGURE 11.** Palate-less implant-supported overdenture.

based on esthetics and phonetics was used to set up the maxillary anterior teeth.¹¹ The posterior tooth setup was harmonized with the opposing dental arch.

6. Labial and palatal putty index made of a condensation silicone (Exafast Putty, GC America) was used to record the

tooth positions with respect to the implant location (Figure 5). A computer-aided design/computer-aided manufacturing titanium bar with proper attachments milled out of titanium alloy (NobelProcera, Implant Bar Overdenture, Nobel Biocare, Kloten, Switzerland) was fabricated using software after

scanning the master cast and the trial denture (Figures 6 through 8).

7. A screw resistance test was used to verify the seating of the verification jig. The one-screw test is then used by loosening all of the abutment screws and then tightening one screw at either of the most posterior implants. Next, the other most posterior screw is tightened until contact between the metal components is felt. After this initial contact, the amount of circumferential rotation of the screwdriver is observed. The degree of screwdriver rotation is an index to the degree of passivity, and with this technique, there is virtually no rotation, validating the effectiveness of this technique (Figures 9 and 10).
8. A horseshoe titanium metal framework was casted based on the diagnostic putty index. Teeth were transferred to the metal framework using a stone index fabricated on the lower member of the articulator. The overdenture attachments were picked up in the lab using the black processing ring. The wax trial overdenture was evaluated intraorally. A heat-cured acrylic resin (SR Ivocap Injection System, Ivoclar Vivadent, Amherst, NY) was used to process the overdenture. The torque applied to the titanium bar was 35 Ncm based on the manufacturer's recommendation. Try-in of the overdenture prosthesis was performed before replacing the black processing locator clips with the final locator clips (Figure 11). The patient was placed on 24-hour, 1-week, and every 6 months recall. The patient was told that the locator attachments would need to be replaced in the future.

DISCUSSION

This single-tray impression technique offers several advantages over conventional or dual-tray impression techniques. The tray can first be border molded conventionally with no interference from the pick-up impression copings. The border-molded tray can then be evaluated for proper extension before obtaining the impression. The use of a custom tray minimizes the amount

of impression material used and will thus reduce the anticipated distortion. One master cast can be used to fabricate the prosthesis, which reduces both laboratory and clinical steps while at the same time ensuring accuracy.

CONCLUSION

The described technique allows for easy and efficient fabrication of a custom tray. The custom tray may be border molded and evaluated before transferring the intraoral position of the implants to the master cast. One master cast with the proper extension and accurate implant position can be used to fabricate an implant-supported prosthesis.

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