Immediate Complete Denture Impressions

Case Report and Modern Clinical Technique

Authored by Joseph J. Massad, DDS and David R. Cagna, DMD, MS

Upon successful completion of this CE activity 1 CE credit hour may be awarded

Opinions expressed by CE authors are their own and may not reflect those of Dentistry Today. Mention of specific product names does not infer endorsement by Dentistry Today. Information contained in CE articles and courses is not a substitute for sound clinical judgment and accepted standards of care. Participants are urged to contact their state dental boards for continuing education requirements.
Immediate Complete Denture Impressions
Case Report and Modern Clinical Technique

LEARNING OBJECTIVES:
After reading this article, the individual will learn:

• historic techniques for taking impressions for immediate complete dentures, and
• a new technique for taking accurate impressions for immediate complete dentures.

ABOUT THE AUTHOR

Dr. Massad is director of removable prosthodontics at the The Scottsdale Center for Dentistry in Scottsdale, Ariz. He is an associate faculty member of Tufts University School of Dental Medicine in Boston, and is an adjunct associate faculty member of the Department of Prosthodontics at the University of Texas Health Science Center Dental School in San Antonio, Tex. He can be reached at (918) 749-5600 or joe@joemassad.com.

Disclosure: Dr. Massad is the developer and holds the patent for the Strong-Massad Dentate & Implant Trays.

Dr. Cagna is a professor and director of the Department of Restorative Dentistry, Advanced Prosthodontic Program, at the University of Tennessee Health Science Center College of Dentistry in Memphis, Tenn. He may be contacted via e-mail at the address dcagna@utmem.edu.

Disclosure: Dr. Cagna is a stockholder in Global Dental Impression Trays, which is the company that manufactures the impression trays used in this article.

INTRODUCTION

For patients confronted with the extraction of their remaining natural teeth and the need for complete prosthodontic rehabilitation, the transition is generally psychologically challenging for the patient and demanding of the clinician. This dramatic treatment is often necessitated by generalized caries, extensive periodontal disease, or a malocclusion that is not amenable to treatment. Of considerable significance to many patients facing this course of treatment is their desire to specifically improve the appearance of their anterior teeth, contributing to an attractive smile. In order to optimize immediate denture therapy, thoughtful consideration must be given to the treatment planning, definitive impression making, and denture tooth set-up phases of therapy.

The primary advantage of an immediate denture is the absence of an edentulous period where prosthetic tooth replacement is not available. Specifically, advantages of immediate complete dentures include the maintenance or improvement of: 1. dental aesthetics, 2. perioral and facial tissue support, 3. masticatory function, and 4. phonetic ability. If the patient's natural anterior teeth remain but are scheduled for extraction, the selection and arrangement of anterior denture teeth, from an aesthetic perspective, may be easier.

From the patient's viewpoint, immediate complete dentures provide the psycho-social advantage of continuous tooth display to allow personal and public interactions. Though abrupt, the transition from the dentulous state to edentulism may be made less difficult by incorporating immediate complete dentures in the treatment plan.

Major disadvantages of immediate denture therapy relate to the technical difficulties associated with denture fabrication. Because immediate complete dentures are constructed prior to extraction of the remaining teeth, 4 significant challenges arise: 1. the making of anatomically and physiologically accurate definitive impressions in the presence of remaining teeth and associated soft and hard tissue undercuts is often difficult and occasionally impossible, 2. if the residual teeth are mobile, recording accurate interocclusal jaw registrations may be difficult, 3. creating edentulous contours on dentate master casts utilizing clinically valid and reliable estimation techniques is often associated with unavoidable errors, and 4. the
inability to accomplish a full wax try-in of the proposed denture tooth arrangement makes the aesthetic outcome unpredictable. It is due to these technical difficulties that immediate complete dentures are often considered “interim” prostheses requiring replacement upon healing of the edentulous ridges.

Optimal retention, support, and stability for removable prosthodontic restorations are important factors in treatment success and patient comfort. When considering immediate complete dentures, certain clinical conditions often prohibit achieving ideal retention, support, and stability in the planned prostheses. As mentioned, the presence of residual natural teeth and associated unfavorable osseous and soft tissue contours require that the clinician: 1. modify existing techniques to generate physiologically and anatomically accurate impressions and master casts, 2. evaluate existing dentate or partially edentulous clinical conditions and predict expected edentulous ridge contours following tooth extractions, 3. develop these edentulous contours on the master casts, and finally 4. construct the immediate complete dentures.

Although techniques have been developed to fabricate immediate complete dentures, significant obstacles are frequently encountered. The development of diastemata secondary to advanced periodontal disease may complicate impression procedures. Varying degrees of periodontal involvement of the residual dentition will result in an irregular contour of the edentulous alveolar ridges. Irregular osseous contours that protrude into the vestibular sulcus interfere with an accurate impression in this area, ultimately affecting the development of a peripheral seal in the final prostheses.

The accurate, physiologic replication of vestibular anatomy (including frenum attachments, the postpalatal zone, and the retromylohyoid space) is important to the development of peripheral denture seal and denture retention. When physiologic vestibular anatomy is represented accurately in the immediate denture flange contours, the denture may function effectively as suction is achieved. Under such conditions and in the presence of appropriate volume of saliva, optimal consistency of the saliva, accurate fit, and a favorable occlusal scheme, satisfactory denture retention is possible.

It is not uncommon to encounter problems with denture retention on the day of immediate denture insertion. As mentioned, this problem can often be traced back to inaccurate adaptation of the denture flanges to the physiologic limits of the vestibular sulci. Horizontal and/or vertical overextension of vestibular anatomy during impression making, as is common when using inappropriately contoured stock impression trays and irreversible hydrocolloid impression materials, does not allow physiologically accurate impressions. The result will be overextension of the immediate denture flange. Ultimately, extensive adjustments are necessary on the day of denture placement and during the post-operative adjustment period.

Although challenging in many ways, anatomic and functionally accurate impressions are critical to successful immediate denture therapy. A predictable immediate denture impression technique adaptable to a wide variety of dentate and partially edentulous conditions is available. The following case report discusses historical immediate denture impression techniques, and concerns in regard to the utility of the resultant casts. Also presented are step-by-step procedures for making immediate denture impressions using a new impression tray design and modern impression materials.

CASE REPORT

A 44-year-old white female presented on referral from her general dentist for evaluation and treatment of a severely compromised dentition. The patient was a professional makeup artist and expressed concern regarding the aesthetics of her smile and the appearance of her teeth during close, personal, daily interactions with her clients. The patient also reported that she smokes cigarettes (one half pack per day). This habit began 15 years ago.

Intraoral examination revealed multiple missing teeth, substantial accumulation of dental plaque and calculus, many teeth with 6 to 9 mm probing depths, generalized bleeding on probing, generalized moderate to severe mobility, and severe fremitus involving most teeth (Figures 1 and 2). Following scaling and root planing, many of the teeth previously demonstrating moderate mobility now displayed severe mobility.
The patient's remaining teeth were not salvageable. Treatment options, duration, and prognosis, as well as cost, were reviewed with the patient. The patient elected full mouth extractions and placement of immediate maxillary and mandibular complete dentures.

**IMMEDIATE DENTURE IMPRESSION TECHNIQUES**

A number of different impression techniques have been described for use in the fabrication of immediate complete dentures. These techniques include:

1. An irreversible hydrocolloid impression made in a stock impression tray.  
2. An elastomeric impression made in a border molded custom impression tray.  
3. A combination or double impression involving (a) a primary impression made in a border molded custom tray using an elastomeric impression material to capture only edentulous regions and associated vestibular areas, and (b) a secondary impression made in a stock impression tray using irreversible hydrocolloid to capture the remaining teeth and associated vestibular areas. The secondary impression is made with the primary impression in place in the patient's mouth.

4. A sectional impression involving (a) a posterior section impression made in a border molded custom tray using an elastomeric impression material to capture edentulous posterior regions, associated vestibular areas, and the lingual aspects of the residual dentition, and (b) an anterior section impression, or facial matrix, made by placing a bulk of impression material in the labial vestibular space associated with the residual dentition and allowing it to set. Alternatively, the impression material may be carried to the mouth in a second sectional tray that is indexed to the primary tray. In either case, the anterior section impression will capture the facial anatomy of the teeth, the vestibular anatomy, and indices on the primary impression/tray. Upon removal of the anterior and posterior sections separately, the 2 sections are reassembled outside the mouth (using the indices) and prepared for casting.

5. The “Campagna” combination impression involving (a) a primary impression made in a border molded custom tray using an elastomeric impression material to capture the posterior edentulous regions and all vestibular areas, and (b) a secondary impression, or over-impression, made in a stock impression tray using irreversible hydrocolloid to capture only the residual dentition and pick-up the primary dentition.

Because of the residual teeth, associated osseous undercuts, and the use of hydrocolloid impression materials, these impression techniques fail to register anatomically and physiologically accurate vestibular anatomy. With the development of a new impression tray system (Strong-Massad Dentate & Implant Trays, Global Dental Impression Trays) and the use of vinyl polysiloxane many of the shortcomings associated with classic immediate denture impressions may be successfully avoided. The impression technique illustrated here employs vinyl polysiloxane (VPS) impression material to accomplish single appointment definitive immediate denture impressions.

**THE MAXILARY IMPRESSION**

**Tray Selection**

The first step is to determine the dimensions of the dental arch and select a stock impression tray of appropriate
size (Figure 3). The impression trays illustrated here are constructed from a clear polystyrene-based polymer and permit see-through visibility to assist when selecting and fitting the tray (Figure 4). Retention slots perforate the trays to maximize mechanical retention of the material. PVS adhesive should NOT be used in the trays. Rather, it is preferred that the impression material is wiped clean from the tray in areas where the tray impinges on border and peripheral tissues. The elimination of impression material from tray borders indicates the need to selectively adjust the tray prior to making the definitive impression.

**Tray Adaptation**

Customized tray adaptations can be made to accommodate existing anatomic contours. The trays illustrated here are thermoplastic. To effect subtle alteration of flange trajectory, pass the tray quickly through a laboratory flame until the resin begins to soften. Once softened, carefully manipulate the tray flange into the desired shape. Cool the tray in water. Border extensions of the tray may also be reduced by grinding with a conventional acrylic resin bur.

**Tray Stops**

The impression procedure described here requires repetitive placement of the impression tray in the patient’s mouth. In order to achieve consistently accurate tray placements, tray stops are used. Using high viscosity VPS, dispense quarter-size mounds in the molar, incisor, and mid-palate areas of the tray (Figure 5). Seat the tray in the patient’s mouth and center the tray over the residual teeth and ridge. Upon polymerization, remove the tray and inspect the stops to assure even thickness and that the teeth and ridge crest are centered within the tray. Trim the VPS with a sharp knife to eliminate all but the occlusal surface and incisal edge impressions and minimize any areas of soft tissue contact (Figure 5). Tray stops permit: 1. adequate and even space between the tray and residual tissues for impression material, 2. adequate and even space between the tray and vestibular reflections for impression material, and 3. consistently repeatable positioning during tray placement.

**Border Molding**

For maxillary impressions, it is recommended that a high or medium viscosity VPS material be used for border molding. Dispense a rope of VPS material along the peripheral tray borders, including the postpalatal seal area (Figure 6). Place the tray in the patient’s mouth and seat the tray onto the maxilla using the tray stops as guides. Use the following tissue manipulations to define peripheral borders:
• To define the labial notch, grasp the filtrum close to the vermilion border and pull downward (Figure 7).

• To form the labial vestibular borders, ask the patient to purse the lips using a sucking action (Figure 7).

• To define the buccal notches and buccal vestibular borders, grasp the cheek with the forefinger and thumb at the corner of the mouth and pull downward and forward (Figure 7). Repeat this process on the opposite side.

• To define the coronomaxillary vestibular border and hamular frenum area, ask the patient to open the mouth wide (Figure 8). This will cause the coronoid processes to translate through the coronomaxillary spaces, bringing associated muscles to their terminal positions. If the mandibular opening is restricted, instruct the patient to move the mandible from side to side.

• To functionally form the posterior border of the tray, instruct the patient in Valsalva’s maneuver. Manually occlude the patient’s nostrils and ask the patient to attempt to forcibly exhale through the nose only (Figure 8). This causes the soft palate to move downward, forming the VPS along the postpalatal seal aspect of the impression tray.

Following polymerization of the VPS, remove the impression tray and inspect all peripheral borders to assure that appropriate anatomic and functional detail is present. If the resin tray is apparent through the border molding material, adjust the tray by grinding. Finally, in preparation for the definitive impression, relieve one to 2 mm from all borders using a bur or scalpel blade and/or rotary instrument (Figure 9).

**Definitive Impression**

Dispense low-viscosity VPS impression materials into the maxillary impression tray (Figure 9). Inject extra-low-viscosity VPS material around all residual teeth using manual syringes (Figure 10). Extra-low-viscosity VPS material possesses relatively low tear strength, permitting easier recovery of the polymerized impression from the patient’s mouth without damaging periodontally involved teeth. The relatively low stiffness of low viscosity VPS also facilitates recovery of the definitive master cast from the impression without damage.

Following injection of low viscosity VPS around all teeth, place and center the impression tray on the maxilla (Figure 10) using the tray stops as guides. Repeat all border molding manipulations. Upon polymerization of the VPS, remove and inspect the impression for appropriate anatomic, functional, and surface details (Figure 11). Once satisfied with the quality of the definitive impression, bead,
box, and cast the impression using a suitable vacuum mixed dental stone (Figure 11).

THE MANDIBULAR IMPRESSION

Examine the dimensions of the mandibular dental arch and select a stock impression tray of appropriate size (Figure 12).

Tray Adaptation

Customized tray adaptations may be made to accommodate existing anatomic contours. As with the maxillary impression procedure previously described, subtle thermoplastic tray reshaping and selective removal of tray material using an acrylic bur may be accomplished until an acceptable fit is achieved.

Tray Stops

Because the impression tray will be reseated in the patient's mouth a number of times during the impression making, and accurate tray placement is essential, a system of tray stops must be developed early in the impression procedure. Using high-viscosity VPS, dispense a ribbon of material along the occlusal wall of the impression tray (Figure 13). Seat the tray in the patient's mouth and center the tray over the residual teeth and ridge (Figure 13). Upon polymerization, remove the tray and inspect the stops to assure even thickness and that the teeth and ridge crest are centered within the tray. Trim the VPS with a sharp knife to eliminate all but the occlusal surface and incisal edge impressions (Figure 14).

Border Molding

For mandibular immediate denture impressions, it is recommended that a medium viscosity VPS material be used for border molding. Dispense a rope of medium viscosity VPS material along the peripheral tray borders (Figure 14). Place the tray in the patient's mouth and seat the tray onto the mandible using the tray stops as guides. Use the following tissue manipulations to define peripheral borders:

- To form the labial notch, grasp the lower lip at the vermilion border and pull outward and upward.
- To functionally form the labial and buccal borders, stabilize the tray with the index and middle fingers on the finger rest and the thumb beneath the chin. Ask the patient to purse the lips using a sucking action and then smile widely (Figure 15).
To form the buccal notches, grasp the cheek with the forefinger and thumb at the corner of the mouth and pull upward and forward. Repeat this process on the opposite side.

Following polymerization of the VPS, remove the impression tray and inspect all peripheral borders to assure that appropriate anatomic and functional detail is represented. If the resin tray is apparent through the border molding material, adjust the tray by grinding. Finally, relieve all borders approximately one to 2 mm using a scalpel blade and/or rotary instrument in preparation for the definitive impression (Figure 16).

**Definitive Impression**

Dispense low-viscosity VPS impression materials into the mandibular impression tray (Figure 16). Inject extra-low-viscosity VPS material around all residual teeth using manual syringes (Figure 17). As noted previously, extra-low-viscosity VPS material possesses relatively low tear strength permitting easier recovery of the polymerized impression from the patient’s mouth without damaging periodontally involved teeth. The relatively low stiffness of low-viscosity VPS also facilitates recovery of the definitive master cast from the impression without damage.

Following injection of low-viscosity VPS around all teeth, place and center the impression tray on the mandible (Figure 18) using the tray stops as guides. Repeat all border molding manipulations (Figure 18). Upon polymerization of the VPS, remove and inspect the impression for appropriate anatomic, functional, and surface details (Figure 19). Once satisfied with the quality of the definitive impression, bead, box and cast the impression using a suitable vacuum mixed dental stone (Figure 19).

**CONCLUSION**

The provision of prosthodontic restorations immediately following extraction of all remaining nonrestorable teeth is an important treatment option. Many patients in need of this therapy are eager to receive aesthetic replacement of their missing teeth, but express concern about edentulism. As new denture wearers, these patients will require time to accommodate to their situation. It is also expected that the post-extraction denture adjustment and maintenance phase of therapy will be challenging. Therefore, it is imperative that techniques be continuously developed to optimize the accuracy of immediate dentures in an effort to facilitate the difficult transition to edentulism.

As we improve conventional approaches to common
prosthodontic problems, the incorporation of new materials and techniques must also be considered. The immediate denture impression procedures presented here combine standard concepts of impression tray relief and physiologic border molding with modern concepts of improved impression tray design and vinyl polysiloxane materials to facilitate better clinical outcomes for patients. It is important to carefully evaluate impression border details, the replication of critical anatomy in the master cast, and the development of anatomic and physiologic accuracy in the definitive denture borders (Figure 20). Attention to detail when capturing the physiologic and anatomic characteristics of the denture foundation and peripheral sulci during impression making will facilitate retention, support, and stability of the definitive prostheses.

Following impression making and cast construction, care must also be given to: 1. accurate mounting of casts in a semiadjustable articulator, 2. extraction of the residual dentition from the casts, 3. recontouring of extraction sites to simulate expected soft and hard tissue changes, and 4. setting of denture teeth for acceptable denture function and aesthetics.
REFERENCES

**POST EXAMINATION INFORMATION**

To receive continuing education credit for participation in this educational activity you must complete the program post examination and receive a score of 70% or better.

**Traditional Completion Option:**
You may fax or mail your answers with payment to Dentistry Today (see Traditional Completion Information on following page). All information requested must be provided in order to process the program for credit. Be sure to complete your “Payment”, “Personal Certification Information”, “Answers” and “Evaluation” forms. Your exam will be graded within 72 hours of receipt. Upon successful completion of the post-exam (70% or higher), a “letter of completion” will be mailed to the address provided.

**Online Completion Option:**
Use this page to review the questions and mark your answers. Return to dentalCEtoday.com and sign in. If you have not previously purchased the program select it from the “Online Courses” listing and complete the online purchase process. Once purchased the program will be added to your User History page where a Take Exam link will be provided directly across from the program title. Select the Take Exam link, complete all the program questions and Submit your answers. An immediate grade report will be provided. Upon receiving a passing grade complete the online evaluation form. Upon submitting the form your Letter Of Completion will be provided immediately for printing.

**General Program Information:**
Online users may login to dentalCEtoday.com anytime in the future to access previously purchased programs and view or print “letters of completion” and results.

**POST EXAMINATION QUESTIONS**

3. Which of the following is/are necessary for complete denture retention?
   a. Peripheral denture seal.
   b. Appropriate volume and consistency of saliva.
   c. Accurate denture fit.
   d. ALL of the above.

4. Which is a concern when using irreversible hydrocolloid (alginate) impression material for definitive immediate denture impressions?
   a. Poor soft tissue detail.
   b. Hyper-allergenic patient response.
   c. Over extension of peripheral impression borders.
   d. Patient acceptance of the material’s taste.

5. Which is an alternative immediate denture impression technique described in the literature?
   a. Irreversible hydrocolloid impression material in a custom impression tray.
   b. Irreversible hydrocolloid impression material in a stock impression tray.
   c. Elastomeric impression material in a non-border-molded stock impression tray.
   d. Zinc oxide impression material in a stock impression tray.

6. In the impression technique described, which VPS material is preferred for border molding the impression tray?
   a. Extra-low viscosity material.
   b. Low viscosity material.
   c. Medium viscosity material.
   d. High viscosity material.

7. In the impression technique described, what advantage(s) is/are suggested for using extra low viscosity VPS material?
   a. Low tear strength permits easier recovery of the polymerized impression without damaging periodontally weakened teeth.
   b. The bright orange color is easily discernible when inspecting the final impression.
   c. Low stiffness facilitates recovery of the definitive master cast from the impression without damage.
   d. Both a and c are correct.

8. The purpose of Valsalva’s maneuver during border molding is:
   a. Functionally forms lingual flange extensions into the retromylohyoid space.
   b. Causes exaggerated physiologic movement of the mandibular buccal frenum.
   c. Permits reduced thickness of the maxillary labial flange during impression making for aesthetics.
   d. Helps form a physiologically accurate posterior border in the maxillary final impression.
Immediate Complete Denture Impressions: Case Report and Modern Clinical Technique

PROGRAM COMPLETION INFORMATION

If you wish to purchase and complete this activity traditionally (mail or fax) rather than Online, you must provide the information requested below. Please be sure to select your answers carefully and complete the evaluation information. To receive credit you must answer at least six of the eight questions correctly.

Complete online at: www.dentalcetoday.com

TRADITIONAL COMPLETION INFORMATION:

Mail or Fax this completed form with payment to:

Dentistry Today
Department of Continuing Education
100 Passaic Avenue
Fairfield, NJ 07004
Fax: 973-882-3662

PAYMENT & CREDIT INFORMATION:

Examination Fee: $20.00 Credit Hours: 1.0
Note: There is a $10 surcharge to process a check drawn on any bank other than a US bank. Should you have additional questions, please contact us at (973) 882-4700.

☐ I have enclosed a check or money order.
☐ I am using a credit card.

My Credit Card information is provided below.

☐ American Express ☐ Visa ☐ MC ☐ Discover

Please provide the following (please print clearly):

Program Evaluation Form

Please complete the following activity evaluation questions.

Rating Scale: Excellent = 5 and Poor = 0

Course objectives were achieved. __________

Content was useful and benefited your clinical practice. __________

Review questions were clear and relevant to the editorial. __________

Illustrations and photographs were clear and relevant. __________

Written presentation was informative and concise. __________

How much time did you spend reading the activity & completing the test? __________