

# **The Complete Denture Prosthesis: Clinical and Laboratory Applications - Baseline Data and Prognostic Indicators**

**Kenneth Shay, DDS, MS; Joseph E. Grasso, DDS, MS;  
Kenneth S. Barrack, DDS**

*This course is no longer offered for Continuing Education credit.*

The first of a multi-part series, this course focuses on the range of data that must be compiled and assessed at the onset of treatment and presents the rationale and procedures for making preliminary impressions.

## **Overview**

Successful denture therapy is a complex process demanding technical and interpersonal expertise. As such, the dentist needs to know as much as possible about each patient's intraoral anatomy and function; expectations and experience; and likely range of physical and psychological responses to treatment and a new prosthesis. For this reason, thorough collection of relevant information needs to precede the initiation of fabrication of complete dentures. This course focuses on the range of data that must be compiled and assessed at the onset of treatment and presents the rationale and procedures for making preliminary impressions.

## **Learning Objectives**

Upon the completion of this course, the dental professional will be able to:

- Describe the factors that must interplay for successful denture therapy.
- Describe the different data that must be collected at the outset of treatment.
- List the essential elements of the intraoral examination of an edentulous patient.
- Describe the anatomic features of edentulous alveolar ridges that are ideal for complete dentures.
- Describe the ideal interarch ridge relationship.
- Detail aspects of the existing dentures that should be evaluated.

- Recount characteristics of patients that would suggest denture success may require adjunctive retention.
- List different materials suitable for preliminary impressions and describe the indications for each.
- Detail features of mandibular and maxillary impressions that must be present for the impressions to be judged acceptable.

## Course Contents

- Patient Assessment and Treatment Planning
- Extraoral/Oral Examinations
- The Radiographic Survey
- Maxillomandibular Relations
- Residual Ridge Form
- Examining the Old Prosthesis
- Challenges in Complete Denture Prosthodontics
- Preliminary Impressions
- Evaluating the Mandibular Impression Tray
- Evaluating the Maxillary Impression Tray
- Pouring the Preliminary Cast
- Summary
- Course Test
- Additional Resources
- About the Authors

## Patient Assessment and Treatment Planning

Treating the edentulous patient is both a complex and rewarding clinical challenge that demands skill and knowledge.

The homeostasis characterizing the healthy masticatory system depends on the dynamic relationship between dental occlusion, masticatory musculature, and the temporomandibular joints. In the edentulous patient, this balance can only be reestablished when the patient's anatomy, muscular capabilities, esthetics, and expectations are in harmony.

As with any dental treatment, the medical/health history provides information vital to planning appropriate treatment and completing successful therapy. Knowledge of disease states, medication, and previous dental therapies will provide insights indispensable for optimizing the course and enhancing the likelihood for successful treatment.

By tailoring his/her interpersonal approach according to each patient's characteristics, the

successful dentist can address each patient's needs appropriately. The focus of complete denture therapy may be more directed toward esthetic considerations for one patient and more on function for another. Some patients are not interested in knowing the exact techniques to be used, while others want to follow every detail of each procedure. The patient interview is essential for identifying the expectations, misconceptions, personality traits, and socioeconomic circumstances that will uniquely predict each patient's reaction to care.

The phrase, "Never treat a stranger," embodies an important concept in dental treatment, particularly for complete denture prosthodontics. Comprehensive patient care for the complete denture patient includes an assessment of the psychologic and physical conditions identified in the patient history as well as the oral and orofacial considerations on which the treatment efforts will be focused. Testing for functional disturbances is necessary to identify those patients likely to experience special needs. The patient should be instructed to perform the following movements:

- Extend the tongue
- Move the tongue from side to side while extended
- Lick the lips
- Swallow
- Open wide
- Protrude the mandible
- Move the mandible from side to side

Hesitation or incorrect action in following any of these directions can signal potential challenges in treatment and treatment outcomes. Often an inability to perform these normal oral functions may confirm a medical condition highlighted in the medical/health history (e.g., stroke).

An inspection of the patient's existing denture, in combination with patient comments about the appliance's fit, function, appearance, etc., provides critical information on patient expectations for the new dentures.

## Extraoral/Oral Examinations

### The Extraoral Examination

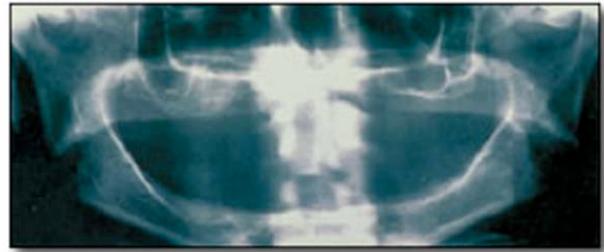
Observe the patient for the following:

- Abnormal facial features: prominent scars, facial asymmetry, etc.
- Temporomandibular joint and/or masticatory muscle dysfunction
- Upper cervical lymph nodes

### The Oral Examination

The oral evaluation of the edentulous patient must include assessment of the following features:

- Floor of the mouth (anterior, including size and position of the submandibular and sublingual gland complexes and ducts; posterior of the mylohyoid attachment with special attention to the depth and configuration of the retromylohyoid space)



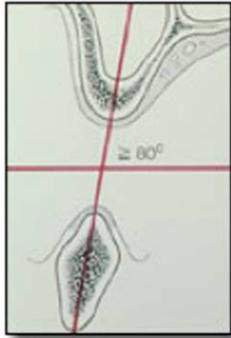
- Frenum attachments (number, position, and significance)
- Lips (herpetic lesions, angular cheilosis, fissuring, scars)
- Maxillomandibular relationships (anteroposterior, buccolingual, and inferior/superior)
- Oral mucosa (erythema, ulceration, hyperkeratosis, desquamation, edema, epulis, fibroma, tumor)
- Palate (hard and soft) and visible oropharynx
- Residual ridges (morphology, anatomic shape, consistency)
- Tongue (position, size, mobility, consistency, involuntary movement, neoplastic changes)
- Saliva quantity and quality

### The Radiographic Survey

Evaluation of a recent panoramic radiograph is recommended prior to initiating care of an edentulous patient. Conditions to look for include: residual root tips, impacted teeth, cysts, or other pathologic conditions.

Changes to alveolar bone occur following the extraction of teeth. The edentulous patient will likely display diminished alveolar bone volume and notable changes in ridge morphology. A consistent finding in the edentulous population is that the volume of residual ridge decreases over time. The decrease is most dramatic in the first weeks and months immediately following removal of teeth but continues at a variable but diminishing rate for the rest of the lifetime. The mandible is more severely affected than the maxilla.

Many factors affect ridge resorption including local and systemic biochemical factors and load or physical factors.



### Maxillomandibular Relations

In ideal maxillomandibular relations, the ridges are equivalent in size and anteroposterior position; and the ridge crests are parallel to one another. Commonly however, the anterior crest of the mandibular arch lies to the lingual or facial of the maxillary arch; and the posterior mandibular ridge is to the buccal of the maxillary arch. With residual ridge resorption, the maxillary arch narrows and its most anterior extent moves posteriorly; and the mandibular arch widens as its most anterior extent moves further anteriorly.

### Residual Ridge Form

Ideal residual ridge characteristics include:

- Healthy attached keratinized mucosa of even thickness
- No bony spicules, sharp ridges or undercuts
- No muscle attachments or frena in critical areas; frena attach to the ridge closer to the base than to the crest
- No scars or mucosal hypertrophies
- Prominent residual bone
- Rounded ridge crest
- Slightly tapered labial, buccal and lingual sides
- Distinct vestibules buccal and facial of both ridges; distinct retromylohyoid vestibule for lower ridge

### Examining the Old Prosthesis

An examination of the old prostheses, both in and out of the patient's mouth, yields insights into a patient's biting, chewing, and hygiene habits as well as information necessary for identifying and incorporating improvements and changes into the new dentures. Assessment of the following factors is important for optimal treatment planning:

- Age and condition of prosthesis
- Denture position relative to facial landmarks
- Extensions
- Interocclusal distance
- Occlusal relationships
- Occlusal vertical dimension
- Retention
- Soft tissue support
- Stability
- Chewing stability

- Esthetics
- Evidence of self-adjustment
- Hard and soft microbial deposits and stain
- Phonation
- Patterns of tooth wear

### Challenges in Complete Denture Prosthodontics

An element vital to successful therapy is the accurate assessment and, as necessary, appropriate adjustment of patient expectations of the outcome of denture therapy. Patients presenting a particular challenge to the clinician include patients with one or more of the following:

- Strong need for stability and retention (wind instrument musicians, actors, public speakers)
- Compromised neuromuscular control (stroke survivors, patients with Parkinson's disease or tardive dyskinesia)
- Compromised intraoral anatomy (severe ridge resorption, scars from surgery)
- Modified salivary quality or quantity (pharmacological suppression, irradiation, connective tissue disease)

Patients presenting with significant clinical challenges are excellent candidates for the adjunctive use of a denture adhesive.

### Preliminary Impressions

#### Impressions

Various types of impressions are used in the fabrication of complete removable prosthetics. The preliminary impression is used to fabricate a diagnostic cast from which a custom tray is made. The final impression, made from the custom tray, allows for fabrication of the master cast: an

accurate replica of the particular tissue area against which the prosthesis will rest.

Care must be taken at every stage of denture fabrication because the success of each subsequent step depends on the accuracy of each prior step.

#### The Preliminary Impression

The preliminary impression, which records the conformation of that portion of the residual ridge supporting the denture, is typically made with alginate impression material and is used in the fabrication of a diagnostic cast from which a custom tray is made.

The alginate mix is placed into stock impression trays that have been designed for the edentulous ridge. Thermoplastic impression compound can also be used in stock metal trays. While this method yields poor tissue detail, it involves less clinical time and may be indicated for the patient who gags or is uncooperative. Additionally, a thermoplastic impression does not have to be poured immediately, which lends to its usefulness in dental care delivered outside the dental office (e.g., in a home, hospital, or convalescent facility).

#### Impression Armamentarium

The preliminary alginate impression requires:

- Alginate powder and measuring scoop
- Graduated water measuring cylinder
- Mixing bowl and spatula
- Impression tray

#### Evaluating the Mandibular Impression Tray

The impression tray should match the shape and size of the denture-bearing area of the mandible as closely as possible. The length of the tray can

Armamentarium



Mandibular



Tray should correspond to denture-bearing tissues

be increased with wax or compound to extend as necessary into the retromolar or sublingual (retromylohyoid) areas.

### The Mandibular Impression

Impression material is distributed into the tray in a manner that reflects the anticipated final form of the impression. Using the fingers or a disposable 50 cc syringe, some impression material is placed into areas likely to otherwise yield voids, such as deep vestibules or undercut areas. Next, the filled tray is positioned over the residual ridge. The patient is instructed to raise the tongue, and then the impression tray is slowly seated as the labial and buccal frena are gently manipulated and the patient relaxes the tongue.

The best access and visualization is provided by approaching the patient from the front.

### Check List for the Completed Mandibular Impression

The mandibular preliminary impression should be free of voids and provide detailed reproduction of all of the following:

- Retromolar pad
- Sublingual areas
- Vestibular areas
- Labial and buccal frena (if applicable)

No inner portion of the tray should be visible through the material.

### Evaluating the Maxillary Impression Tray

The properly selected stock maxillary impression tray approximates the shape and height of the ridge and adequately covers the tuberosities. To compensate for an extremely high palatal vault, deep vestibules, or wider tuberosities, the impression tray can be bent as necessary; or wax or compound can be added to extend the tray or to fill large voids between the tray and the anatomy (e.g., a very high palatal arch).

By standing slightly behind the dental chair, the clinician can readily seat the maxillary impression tray while retracting cheek tissue. When a patient presents with an exceptionally high vault, impression material should be placed gently into the vault area prior to taking the impression to avoid entrapping air. For the patient with a strong gag reflex, the patient should be seated upright

and be cautioned not to breathe through the mouth.

The impression tray is positioned beneath the ridge by centering in the anterior region. The posterior is seated first and the tray is rotated anteriorly. This technique will avoid trapping air and will minimize excess alginate flowing to the back of the throat.

### Check List for the Completed Maxillary Impression

The maxillary preliminary impression should be free of voids and provide detailed reproduction of all of the following:

- Maxillary tuberosities and pterygomaxillary notches
- Vestibules
- Hard palate including vibrating line
- Anterior soft palate
- Buccal and facial frena

No inner portion of the tray should be visible through the material.

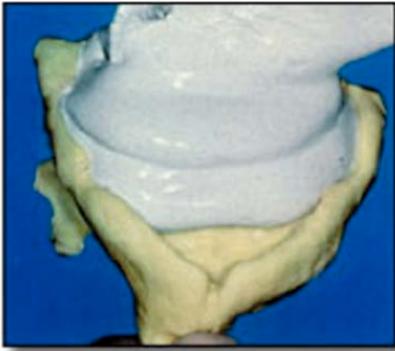
Maxillary Arch



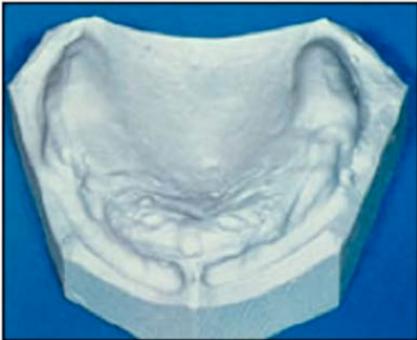
Tray must fit tuberosities and profile of ridge



Detailed and free of voids



Avoid trapping air bubbles in plaster



### Pouring the Preliminary Cast

Dental stone is mixed and flowed into the impression with the use of a vibrator, taking care not to incorporate air bubbles.

### The Impression Base

Just prior to the final set of the stone, the cast is inverted onto a base. Extra material is removed. The model can be trimmed after the material is completely set.

### Summary

Successful denture therapy is a complex process demanding technical and interpersonal expertise. As such, the dentist needs to know as much as possible about each patient's intraoral anatomy and function; expectations and experience; and likely range of physical and psychological responses to treatment and a new prosthesis. For this reason, thorough collection of relevant information needs to precede the initiation of fabrication of complete dentures. This course focuses on the range of data that must be compiled and assessed at the onset of treatment, as well as presenting the rationale and procedures for making preliminary impressions.

## Course Test Preview

To receive Continuing Education credit for this course, you must complete the online test. Please go to [www.dentalcare.com](http://www.dentalcare.com) and find this course in the Continuing Education section.

1. **Complete denture treatment involves the restoration of a homeostasis that is in harmony with certain patient factors. These factors include which of the following:**
  1. Anatomy
  2. Muscular capabilities
  3. Intellect
  4. Esthetics
  5. Expectations
  6. Previous denture experience
  - a. All of the above
  - b. None of the above
  - c. 1, 2, 4, 5
  - d. 1, 4, 5, 6
  
2. **Data to collect prior to undertaking treatment that will help the dentist deliver care include which of the following:**
  1. Medical history
  2. Oral examination
  3. Evaluation of existing prostheses
  4. Understand of patient expectations
  5. Medication list
  6. Patient misconceptions
  - a. All of the above
  - b. None of the above
  - c. 1, 2, 4, 5
  - d. 1, 4, 5, 6
  
3. **The detection of functional disturbances can be accomplished by (choose one):**
  - a. Careful evaluation of the wear facets on maxillary buccal cusps
  - b. Careful appraisal of neurological elements of the medical history
  - c. Watching for hesitation or errors in performing tongue extension, tongue movements, swallowing, mouth opening, and mandibular protrusion
  - d. Questioning the patient carefully about their diet and oral hygiene
  
4. **Essential elements of oral examination prior to routine complete denture treatment include evaluation of all of the following EXCEPT:**
  - a. Salivary quality and quantity
  - b. Thickness of crestal alveolar mucosa
  - c. Palpation of the foramen ovale
  - d. Floor of mouth anatomy and position of sublingual and submandibular gland ducts
  
5. **The radiological survey is an important part of the pre-treatment evaluation, because through it the dentist may assess all of the following EXCEPT:**
  - a. Presence of root tips
  - b. Thickness of crestal alveolar mucosa
  - c. Presence of impacted or supernumerary teeth
  - d. Presence of cysts and/or other radiolucent pathoses

6. **Alveolar ridge resorption:**
  - a. Proceeds more rapidly in the mandible than in the maxilla
  - b. Occurs at a fixed rate throughout the life of the patient
  - c. Results in anterior movement of the maxillary ridge crest
  - d. Is unaffected by biochemical and physical factors
  
7. **The widths of the maxillary and mandibular arches change with alveolar bone resorption over time as follows:**
  - a. The maxillary arch widens and the mandibular arch is stable
  - b. The mandibular arch widens and the maxillary arch narrows
  - c. The mandibular arch narrows and the maxillary arch is stable
  - d. The maxillary arch widens and the mandibular arch narrows
  
8. **The ideal ridge form includes all of the following elements except:**
  - a. Prominent frenum attachments
  - b. Absence of undercut areas
  - c. A rounded ridge crest covered by a band of keratinized, attached tissue
  - d. Vestibules free of scars and mucosal hypertrophies
  
9. **Evaluation of existing dentures can reveal valuable information on all of the following EXCEPT:**
  - a. Esthetics
  - b. Oral hygiene
  - c. Recent weight gain or loss
  - d. Occlusal relationship
  
10. **Patients for whom need for denture retention may be particularly challenging include all of the following EXCEPT:**
  - a. Patients with surgically compromised intraoral anatomy
  - b. Patients with compromised oral hygiene
  - c. Patients with compromised neuromuscular control
  - d. Patients with compromised salivary flow and character
  
11. **Which of the following statements about preliminary impressions is CORRECT:**
  - a. "Because secondary impressions will be made, the accuracy and completeness of the preliminary impressions is not essential."
  - b. "Thermoplastic impression compound will provide a record that is as detailed as that obtained using alginate."
  - c. "Alginate impression material is less stable over time than is thermoplastic compound."
  - d. "The most important parts of the preliminary impressions are the vestibular extensions."
  
12. **Thermoplastic compound material for preliminary impressions is indicated:**
  - a. When the impression will be immediately poured
  - b. Unless the patient is a severe gagger
  - c. Only if the cooperation of the patient is assured
  - d. For care provided outside the dental office, such as in the home or hospital.

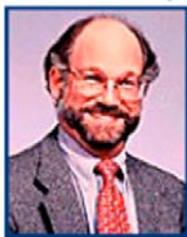
- 13. Alginate preliminary impressions of the mandibular arch can be improved by:**
- a. Instructing the patient to breathe through the mouth throughout the procedure working from behind the patient
  - b. Introducing impression material into the retromylohyoid and any undercut areas prior to insertion of the filled impression tray
  - c. The patient and the dentist remaining as motionless as possible once the filled impression tray has been seated
  - d. All of the above
- 14. Areas that must be undistorted and accurately reproduced in the preliminary mandibular impression include:**
- a. The retromolar pad
  - b. The sub- and paralingual areas
  - c. The vestibular extensions
  - d. All of the above
- 15. Alginate maxillary preliminary impressions can be improved by:**
- a. Seating the filled tray on one side of arch and then rotating the other side into position
  - b. Seating the filled tray posteriorly and then rotating up toward the anterior
  - c. Adding compound or rope wax to the palatal vault in a patient with a high vault
  - d. Removing the tray prior to final set; rinsing; and then reinserting
- 16. The preliminary impression of the maxillary ridge must include undistorted records of all of the following EXCEPT:**
- a. Both tuberosities and hamular notches
  - b. The entire hard palate
  - c. The anterior soft palate
  - d. The anterior nasal spine

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## About the Authors

### Kenneth Shay, DDS, MS



Dr. Shay is currently the Director of Geriatric Programs for the Office of Geriatrics and Extended Care, US Department of Veterans Affairs. In this capacity he oversees the VA's twenty Geriatric Research, Education and Clinical Centers ("GRECCs") and a variety of geriatric clinical programs nationally. He is also the section Chief for Dental Geriatrics at the Ann Arbor VA Medical Center and Adjunct Professor of Dentistry at the University of Michigan School of Dentistry. He is a Section Editor for the *Journal of the American Geriatrics Society* and is a Fellow of the American Society for Geriatric Dentistry, of the Gerontological Society of America, and of the American College of

Dentists. For over twenty years he has limited his practice of dentistry to caring for very old adults who have significantly debilitating physical and cognitive disorders.

e-mail: [kenneth.shay@va.gov](mailto:kenneth.shay@va.gov)

### **Joseph E. Grasso, DDS, MS**



Professor Department of Prosthodontics  
Associate Dean for Clinical Affairs  
University of Connecticut School of Dental Medicine

Upon completing graduate training in Prosthodontics at the University of Alabama Dr. Grasso pursued major research and clinical interests in removable Partial Denture Design and overdentures, attachments and denture adhesives. He is the architect of the Grasso clasp, which utilizes the curvilinear concept; a concept that is also applied to spherical overdenture attachments.

He is the co-author of a textbook Removable Partial Prosthodontics and author of more than 50 scientific articles and abstracts. Dr. Grasso is presently Associate Dean for Clinical Affairs at the University of Connecticut, School of Dental Medicine. Prior to his appointment to an administrative position, he was director of removable prosthodontics. In addition to his academic and administrative responsibilities, he also conducts a private practice limited to prosthodontics.

Phone: (860) 679-3752  
e-mail: [grasso@nso1.uchc.edu](mailto:grasso@nso1.uchc.edu)

### **Kenneth S. Barrack, DDS**



Dr. Kenneth Barrack is currently in private practice specializing in Prosthodontics in Mount Pleasant, SC. Dr. Barrack graduated from Emory College (1981) and Emory University School of Dentistry (1985) in Atlanta, Ga. He was a general dentist for three years in the U.S. Navy at Camp LeJeune, NC and then pursued post graduate education in Prosthodontics at New York University College of Dentistry (1990) with a U.S. Air Force sponsorship.

Dr. Barrack has earned a South Carolina dental technician license as well as having several articles published in various dental journals. He is an associate clinical professor at the Medical University of South Carolina, the lead clinical partner at the Carolina Center for Restorative Dentistry and owner of Dental Innovations Laboratory. Dr. Barrack is also the Secretary-Treasurer of the Southeastern Academy of Prosthodontics, a member of the American College of Prosthodontics, Academy of Osseointegration, Pierre Fauchard Academy, and National Association of Dental Laboratories.

Carolina Center for Restorative Dentistry  
966-I Houston Northcutt Blvd.  
Mt. Pleasant, SC 29464

Phone: 843-849-9044  
Fax: 843-849-7493  
e-mail: [kbarrack@aol.com](mailto:kbarrack@aol.com)