Predictable Edentulous Final Impressions in a Single Visit

A Peer-Reviewed Publication
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Educational Objectives
Upon completion of this course, the clinician will be able to do the following:
1. Understand the use of newly designed edentulous impression trays to capture the fine detail of the edentulous arches in a single appointment.
2. Understand in a step-by-step manner how to employ the use of different viscosities of polyvinyl siloxane impressions material to obtain excellent impressions of the edentulous arches.
3. Understand certain techniques to accurately size trays and deploy them for maximum patient comfort and accurate, detailed impressions of the edentulous arch.

Abstract
Traditionally in most practices, the fabrication process of new full dentures begins with the use of inaccurate stock impression trays with an alginate type material. These initial impressions are then poured and custom trays are created to begin the final phase of the impression procedure. This approach thus requires two appointments for final impressions along with auxiliary time in the fabrication of custom trays.

An innovative, newly designed type of edentulous impression tray is used to capture all the fine detail of the edentulous arches in a single appointment, eliminating the necessity and expense of two appointments and the fabrication of custom impression trays. This impression system employs the use of different viscosities of polyvinyl siloxane impression material to capture the fine anatomic details with the appropriate amount of pressure and optimal vestibular extension.

Introduction
Recently developed edentulous impression trays were used to accomplish final maxillary and mandibular (Figure 1) edentulous impressions in a single appointment using varying viscosities of polyvinyl siloxane impression material. The use of different viscosities of impression material helps to ensure that an excellent definitive master impression is achieved. Heavy viscosity material is used for tissue stops and border molding. Light or extra-light viscosity material is used for the wash. The different viscosities of materials must be compatible so that they bond together to avoid delamination at the time of impression removal or in the event of multiple pours.

Lower-viscosity wash material is used when the tissue is fragile and/or highly mobile, which is a situation that often occurs when replacing an old lower denture or when no teeth have been present for a long period of time. The light-bodied material, due to its lower-viscosity, will easily be displaced at the expense of minimizing tissue displacement upon seating of the tray. Fast-set material is desirable when creating tissue stops and border molding. Either regular or fast-set material can be used for the wash step, depending on the operator’s level of comfort and speed of placement. A material that exhibits a pleasant taste and smell is also desirable. This will help to ensure that the patient is more comfortable and better able to mimic natural movements during border molding and final impression steps. Impression materials with consistent set times and predictable colamination with various viscosities of materials are mandatory to ensure repeatable success when using this impression technique. Polyvinyl siloxane (PVS) is the only material that meets all the previously mentioned requirements. For the case presented in this manuscript, Aquasil Ultra was used due to its wettability and ability to capture soft-tissue detail and to displace inevitable moisture. It is available in multiple viscosities and multiple delivery configurations, and it is mint flavored and scented. It has favorable strain values and a desirable tear strength, as well as varying colors of viscosities to make final inspection of colamination simple and accurate (Figure 2).

Other polyvinyl siloxane impression materials that could be used for this technique include Flexitime (Heraeus Kulzer), Examix NDS (GC) and StandOut (Sds/Kerr).

The trays are available in five different sizes for the maxillary and mandibular arches. Their unique characteristics include an appropriately positioned handle to facilitate ease of removal and to eliminate unwanted lip pressure during impression-taking. The maxillary tray has low vestibular borders and relief areas for muscle attachments. The posterior aspect of the tray is contoured to allow for the capture
of the functional hard-tissue form. The mandibular tray has lingual flanges formed for precise capture of the mylohyoid space. The back side of the trays has an ergonomically designed ridge to facilitate optimal stabilization pressure by the clinician's fingers (Figure 3). The slots and grooves in the tray are designed to "lock in" the polyvinyl siloxane impression material, making the use of odorous and distasteful tray adhesive optional. The flanges are designed to capture the full extent of the edentulous ridge and surrounding architecture without exerting unwanted pressure.2,3

Figure 3

Tray Size Determination
A unique sizing caliper has been developed to measure the maxillary and mandibular arch sizes. The corresponding tray size number is displayed, and the appropriate tray is selected for initial try-in (Figure 4). The tray should fit comfortably over the edentulous ridge with a two to four millimeter clearance. The peripheral border should approach the mucobuccal fold without significant impingement (Figure 5). If the tray flanges are too close to the tissue, the tray may be too small, necessitating the use of the next-larger-size tray, or the tray flanges may need to be flared using the following technique.

Figure 4

Carefully pass the part of the tray requiring flaring through a flame, without allowing the flame to remain on the tray for an extended time. Use controlled finger pressure to flare the desired part of the tray (Figure 6). Cool the tray by passing it under cool running water or by immersing it in a bowl of cool water.

After flaring the tray, try it back in the mouth to assess for accurate and appropriate relationship to the tissue areas.

Figure 6

Creation of Tissue Stops
Four tissue stops should be placed in the maxillary tray (Figure 7), using a fast-set, heavy-viscosity polyvinyl siloxane impression material. The tray is placed over the maxillary arch and then centered. The tray should be seated utilizing light pressure until the tray itself is two to three millimeters from the tissue. The operator’s fingers should rest on the tray to allow for bilateral stabilization. The fast-set, heavy-bodied impression material should set for approximately two to three minutes. Proper tissue stops will ensure adequate space for impression material and stabilization of the tray (Figure 8). The tissue stops also provide a tactile sense for a repeatable insertion path and positive seating pressure.4,5

Figure 7

Border-Molding Procedure
A heavy-bodied polyvinyl siloxane material is used for the border-molding process. The material is placed along the entire tray border, including the posterior palatal border (Figure 9). The tray is fully seated using the positive tactile pressure of the previously placed tissue stops (Figure 10). The border-molding process is accomplished by detailing the functional movements of the anterior frenum, the anterior vestibular
sulcus, the post-zygomatic vestibular sulcus, the hamular frenum, and the post-palatal zone.

By grasping the filtrum close to the lip line and pulling downward, the anterior frenum is captured (Figure 11a). The patient should be asked to pout out the lips with a sucking action to form the anterior vestibular sulcus. By grasping the corners of the mouth with the forefinger and the thumb and pulling downward and forward, the buccal frenum and vestibular sulcus can be captured (Figure 11b). Dropping the mandible downward by opening the patient’s mouth wide will capture the post-zygomatic vestibular sulcus and the hamular frenum (Figure 11c). By occluding the patient’s nostrils and asking him or her to cough, the soft palate will be moved into its anterior functional position forming a post-palatal zone (Figure 11d).

After removal of the border-molded impression tray, it should be examined to determine if any areas of the tray are showing through the impression material (Figure 12). Areas of show-through should be trimmed away one to two millimeters prior to taking the final impression of the load-bearing areas (Figure 13).

**Final Maxillary Wash Procedure**

The final impression wash should be made using a light-viscosity impression material in the anterior area and either a light- or medium-viscosity material in the posterior area. The choice of viscosity in the posterior area is dependent upon the state of the tissue in different areas of the maxilla. If the tissue in the pre-maxilla is loose, a light- or extra-light-viscosity material should be used. This will reduce the possibility of displacing the loose tissue during final impression. If the tissue in the post-maxilla is normal, a medium-viscosity impression material may be used. This will serve to create an ideal impression as well as reduce gagging that may be caused by easily displaced light-bodied impression material.

With the maxillary impression tray fully seated into the mouth, all the steps previously accomplished for border molding should be reaccomplished. The impression should be thoroughly examined to ensure that all functional areas are captured (Figure 14) prior to boxing and casting the impression.

**Mandibular Impression Tray and Tissue Stops**

The size of the mandibular ridge should be measured just anterior to the retromolar pad at the crest of the ridge. The appropriate tray should be chosen. The tray may be adjusted, as necessary, by trimming or heating and then reshaping to ensure adequate fit.

Three tissue stops are recommended for the mandibular impression tray (Figure 15). Fast-set, heavy-bodied polyvinyl siloxane impression material should be used to create the stops. The tray should be centered over the mandibular ridges and stabilized with a finger on each side of the tray. Approximately two minutes should be allowed for the impression material to set.
Mandibular Border-Molding Procedure

Medium or heavy-bodied PVS may be used for the mandibular border-molding procedure. The material should be placed on all borders of the tray (Figure 16). The tray should be fully seated over the mandibular arch until the tissue stops are fully seated. The patient should be instructed to stick the tip of the tongue straight out (Figure 17a), move it from side to side and then pull it straight back to touch the roof of the mouth (Figure 17b). These movements will ensure that there is not an overextension of the lingual border and the proper creation of a mylohyoid zone. The lower lip should be grasped at the lip line and pulled upward. This movement helps to form the anterior frenum areas and the vestibular sulcus. With two fingers on the top of the tray and the thumb under the patient’s chin, have the patient pootch out and suck. This action helps form the anterior vestibular sulcus and the buccal vestibular sulcus. With the forefinger and thumb, pull the corners of the mouth upward and forward. This movement forms the buccal frenum and external oblique vestibular sulcus. The impression should be evaluated to ensure all detail has been captured during the border-molding procedure.

Final Mandibular Impression Wash Procedure

If the tray shows through the border-molding impression material, it should be reduced one to two millimeters prior to accomplishing the final wash procedure. A light- or extra-light-viscosity polyvinyl siloxane impression material is normally used for the mandibular impression because of loose tissue character and mobility normally found on the mandibular ridge. When accomplishing the final mandibular impression, the tray should be fully seated until the tissue stops meet the ridge. As with the maxillary technique, it is essential once the tray is seated to repeat all the border-molding steps in order to reconfirm full capture all of the anatomic details.

Conclusion

The use of these newly designed, innovative edentulous impression trays to accomplish maxillary and mandibular edentulous impressions in a single appointment was evaluated. The steps involved were simple, and the results were more predictable than those obtained using conventional custom trays. The trays’ configurations, coupled with the ability to lock impression material into the slots and grooves incorporated into the trays’ design, allow for a more predictable and efficient method of obtaining edentulous impressions.

References


Author Profiles

David A. Little, DDS

A graduate of the University of Texas Health Science Center Dental School in San Antonio (UTHSCSA), Dr. Little specializes in cosmetic and full-mouth restorations, including dental implants. In an effort to broaden his vision extensively, Dr. Little has spoken throughout the United States and in Canada, Hong Kong, Mexico, Puerto Rico, Asia, Germany, Malaysia and Grand Cayman. All of his programs unite current clinical advancements and technology, including practice management for implementation.

Dr. Little has written numerous articles and was recently featured on the cover of Dental Economics as “Office of the Month.” In addition to serving as an adjunct professor at UTHSCSA Dental School, he is a fellow in the International and American Colleges of Dentistry and a member in good standing of the ADA, TDA, AACD and AGD. Dr. Little is a consultant for numerous companies on product development and clinical testing. His passion for dentistry in general and his enthusiasm for the team
concept specifically enliven and motivate all who attend Dr. Little’s programs.

George T. Knight, DDS

Dr. Knight is a graduate of the University of Texas Health Science Center at San Antonio Dental School. He was a full-time member of the Dental School Faculty in San Antonio from 1989 through 2005. He held numerous positions during his tenure as an Associate Professor. These include, Director of the Division of Practice Dynamics in the Department of General Dentistry, Director of the Dental School Faculty Practice Clinic and Course Director of Operative Dentistry and Occlusion in the Department of Restorative Dentistry. He has published over forty manuscripts and abstracts and has presented his research findings at numerous national and international research meetings.

Dr. Knight’s practice emphasis is in cosmetic and restorative dentistry with a strong interest in removable prosthodontics. He has conducted extensive research in the area of bonded porcelain restorations as well as the resin/dentin bonding interface.

An effective lecturer and communicator, Dr. Knight has been invited to speak both nationally and internationally on the topics of esthetic dentistry and resin bonding. He has presented in Japan, Bolivia, Nicaragua and Mexico as well as numerous U.S. cities.

Lou Graham, DDS

Dr. Graham has always approached his practice of dentistry with a progressive yet conservative methodology.

Dr. Graham’s courses emphasize diagnosis, evidence-based treatment, dental materials, adhesion and cosmetic dentistry, customized approaches to periodontal care, implants and laser dentistry. He lectures nationally and internationally and is a published author in numerous leading dental journals. Dr. Graham is a graduate of Emory Dental School and is in private practice in Chicago, IL. He holds a part-time faculty position at the University of Chicago. He is a member of the ADA, AARD, AGD, AO, CDS and IDA.

Dr. Graham’s programs are filled with an undeniable passion for his trade, tons of practical information and great clinical stories and case presentations.

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1. The fabrication of custom impression trays usually involves:
   a. Multiple appointments
   b. Inaccurate stock impression trays
   c. Custom impression trays for improved accuracy
   d. all of the above

2. When different viscosities of polyvinyl siloxane impression material are used to capture fine edentulous details, heavy viscosity material is used for:
   a. Wash
   b. Tissue stops
   c. Border molding
   d. b and c

3. If these different viscosities of impression material are compatible, they will _______ delamination when the impression is removed.
   a. Avoid
   b. Promote
   c. Reduce
   d. none of the above

4. Edentulous tissue is often fragile and/or highly mobile under which of these circumstances?
   a. When no teeth have been present for a long period
   b. When replacing an older upper denture
   c. When replacing an older lower denture
   d. a and c

5. Fast-set material is desirable when creating:
   a. Molding stops and tissue borders
   b. Border stops and tissue molding
   c. Tissue stops and border-molding
   d. b and c

6. When choosing between regular or fast-set molding, the decision should be based upon the operator’s level of comfort and the speed of placement.
   a. True
   b. False

7. Which of the following statements is NOT true of polyvinyl siloxane?
   a. It can have a pleasant taste.
   b. False
   c. Three to four millimeters
   d. all of the above

8. Why are different colors of polyvinyl siloxane important?
   a. Variation in color makes final inspection easy to perform
   b. Generally-designed calipers
   c. The posterior vestibular sulcus
   d. all of the above

9. Appropriate tray size is determined by which of the following?
   a. Radiographic imagery
   b. Specially-designed calipers
   c. Trial and error; the tray should fit over the endentulous ridge with no clearance
   d. not determined; trays are one-size-fits-all

10. If the tray flanges need to be flared, which of the following is NOT recommended at the technique set out by the authors?
    a. Using controlled finger pressure to flare the part of the tray in question
    b. Holding the tray over open flame for at least a minute to ensure malleability
    c. Passing the tray quickly through a flame
    d. Immersing the tray in a bowl of water

11. How many tissue stops should be placed in the maxillary tray using heavy viscosity polyvinyl siloxane impression material?
    a. Two
    b. Three
    c. Four
    d. None; tissue stops are only used with mandibular trays

12. Once the tray is seated, which of these should be used to allow for bilateral stabilization?
    a. Weights
    b. The operator’s fingers
    c. Elastic tray bands
    d. The patient’s fingers

13. The heavy-bodied impression material should be allowed to set for:
    a. No longer than one minute
    b. At least five minutes
    c. Between four and five minutes
    d. Between two and three minutes

14. Proper tissue stops ensure:
    a. Adequate space for impression material
    b. Adequate space for positive seating pressure
    c. Adequate space for stabilization of the tray
    d. all of the above

15. When using a heavy-bodied polyvinyl siloxane material for the border-molding process, the material is placed along the entire tray border except for the posterior palatal region.
    a. True
    b. False

16. In a detailed analysis of the functional movements, which of the following does NOT contribute to the border-molding process?
    a. The anterior frenum
    b. The anterior vestibular sulcus
    c. The post-mandibular zone
    d. The post-zygomatic vestibular hamular frenum

17. What method do the authors recommend to form the anterior vestibular sulcus?
    a. Pooching out the lips
    b. Grasping the filum close to the lip line and pulling downward
    c. Grasping the corners of the mouth with forefinger and thumb
    d. Dropping the mandible downward by opening the mouth wide

18. What method do the authors recommend to capture the anterior frenum?
    a. Pooching out the lips
    b. Grasping the filum close to the lip line and pulling downward
    c. Grasping the corners of the mouth with forefinger and thumb
    d. Occluding the patient’s nostrils and asking them to cough

19. After removal of the border-molded impression tray, areas of show-through should be trimmed:
    a. One to two millimeters
    b. Three to four millimeters
    c. Five to six millimeters
    d. No trimming should occur

20. A final light-viscosity impression wash is recommended for:
    a. The anterior area
    b. The posterior area
    c. a and b
    d. A light-viscosity impression should never be used

21. A medium-viscosity impression wash may be used in the posterior area under which of the following conditions?
    a. The tissue in the pre-maxilla is loose.
    b. The tissue in the post-maxilla is normal.
    c. The tissue in the post-maxilla is loose.
    d. none of the above

22. The size of the mandibular ridge should be measured:
    a. Just posterior to the retromolar pad at the base of the ridge
    b. Anterior to the retromolar pad at the base of the ridge within two to three millimeters
    c. Just anterior to the retromolar pad at the crest of the ridge
    d. As far from the retromolar pad as possible

23. How many tissue stops do the authors recommend for the mandibular impression tray?
    a. Two
    b. Three
    c. Four
    d. Five

24. Tissue stops in the mandibular impression tray should be created from:
    a. Light-bodied PVS
    b. Medium-bodied polyvinyl siloxane
    c. Heavy-bodied PVS
    d. Medium-bodied PVS

25. How long should the impression material in the mandibular tray be allowed to set?
    a. One minute
    b. Two minutes
    c. Three minutes
    d. Between twenty and thirty seconds

26. Which of the following may be used for the mandibular border-molding procedure?
    a. Light-bodied polyvinyl siloxane
    b. Medium-bodied polyvinyl siloxane
    c. Heavy-bodied polyvinyl siloxane
    d. b and c

27. To properly mold the mandibular border, the patient should be instructed to:
    a. Stick the tip of the tongue straight out
    b. Move the tongue from side to side
    c. Touch the tongue to the roof of the mouth
    d. all of the above

28. By grasping the lower lip at the lip line and pulling it upward, the operator helps to form:
    a. The mylohyoid zone
    b. The anterior frenum
    c. The anterior vestibular sulcus
    d. The buccal frenum

29. By pulling the corners of the mouth upward and forward with forefinger and thumb, the operator helps to form:
    a. The mylohyoid zone
    b. The anterior frenum
    c. The buccal vestibular sulcus
    d. The external oblique vestibular sulcus

30. When accomplishing the final mandibular tray impression, the tray should be:
    a. Fully seated until the tissue stops meet the ridge
    b. Fully seated with a one to two millimeter clearance between tray and ridge
    c. Carefully molded with controlled finger pressure
    d. none of the above
Educational Objectives

1. Understand the use of newly designed edentulous impression trays to capture the fine detail of the edentulous arches in a single appointment.
2. Understand in a step-by-step manner how to employ the use of different viscosities of polyvinyl siloxane impression material to obtain excellent impressions of the edentulous arches.
3. Understand certain techniques to accurately size trays and deploy them for maximum patient comfort and accurate, detailed impressions of the edentulous arch.

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