TREATING THE COMPLETE DENTURE PATIENT

EDITED BY

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WILEY Blackwell

Treating the Complete Denture Patient

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This edition first published 2020

Registered Office
John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, USA

Editorial Office
111 River Street, Hoboken, NJ 07030, USA

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Library of Congress Cataloging-in-Publication Data

Names: Driscoll, Carl F., editor. | Golden, William Glen, 1947- editor.
Title: Treating the complete denture patient / edited by Carl F. Driscoll, William Glen Golden.
Description: Hoboken, NJ : Wiley-Blackwell, 2020. | Includes bibliographical references and index.
Identifiers: LCCN 2019039403 (print) | LCCN 2019039404 (ebook) | ISBN 9781119569589 (hardback) | ISBN 9781119569572 (adobe pdf) | ISBN 9781119569565 (epub)
Subjects: MESH: Denture, Complete
Classification: LCC RK656 (print) | LCC RK656 (ebook) | NLM WU 530 | DDC 617.6/92–dc23
LC record available at https://lccn.loc.gov/2019039403
LC ebook record available at https://lccn.loc.gov/2019039404

Cover Design: Wiley
Cover Image: © hoozone/Getty Images

Set in 9.5/12.5pt STIXTwoText by SPi Global, Pondicherry, India

10 9 8 7 6 5 4 3 2 1

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Foreword

William Glen Golden began his dental training with nine years enlisted service as a dental prosthetic laboratory technician in the US Navy, achieving the rank of Dental Technician Chief.

He completed dental technician A&C schools in San Diego and Field Medical Service School at Camp Pendleton, California. He served as a dental prosthetic technician and dental clinic supervisor before entering dental school in 1976 at West Virginia University on the Navy version of the Armed Forces Health Professions Scholarship. Graduating in 1980, he was sent to the Naval Dental Clinic in Yokosuka, Japan, where he served for four years, part of that time on the USS *Blue Ridge* (LCC-19), the flagship of the Seventh Fleet.

He completed a postdoctoral Fellowship in Prosthodontics at the Naval Dental Clinic, Great Lakes, Illinois, in 1985 and a Residency in Prosthodontics at the US Navy Dental Postgraduate School in Bethesda, Maryland, in 1988 with a certificate in Prosthodontics.

Following graduation, he served aboard the USS *Nimitz* (CVN 68), at the US Naval Academy in Annapolis, Maryland, as Head of the Prosthodontics Department, as a prosthodontist at the Washington Navy Yard, and as the Director of the Area Dental Prosthetic Laboratory at Naval Dental Clinic, Great Lakes, until his retirement in 1995.

After retiring from the US Navy, Dr Golden worked for two years as a restorative dentist and prosthodontist for a managed-care dental practice in Green Bay, Wisconsin, then as Clinical Assistant Professor and Prosthodontist at the Ohio State University (OSU) College of Dentistry in November 1997. He directed three undergraduate complete denture courses and was promoted to Clinical Associate Professor. He was serving as the Director of Removable Prosthodontics and Director of the Complete Denture Clinic at OSU when he retired at the end of December in 2010.

Following his retirement from OSU, Dr Golden accepted a part-time position as a Clinical Associate Professor at West Virginia University School of Dentistry in November 2011. He became Course Director of a six credit-hour predoctoral complete denture course and served for two years until he retired from actively practicing dentistry in June 2014.

Carl F. Driscoll is an acclaimed educator, researcher, and clinician. He currently serves as a Professor at the University of Maryland Dental School, where he previously served as Director of the Prosthodontic Residency for 21 years. That assignment followed a 20-year career with the US Army culminating with being the Prosthodontic Program Director at Walter Reed Army Medical Center for three years. Dr Driscoll has served as President of the American Academy of Fixed Prosthodontics, President of the American Board of Prosthodontics, and President of the American College of Prosthodontists. He has been awarded both the Garver-Staffanou Award (for outstanding service as a program director) and the Moulton Award (for outstanding contributions to fixed prosthodontics) from the American Academy of Fixed Prosthodontics. In addition, he recently was awarded the Educator of the Year Award from the American College of Prosthodontists. Dr Driscoll has given over 450 presentations nationally and internationally and has authored over 75 publications. Besides teaching in the PG Pros program at Maryland, he also maintains a private practice in Bethesda, Maryland, with his wife, Dr Sarit Kaplan.

Nadim Z. Baba received his DMD degree from the University of Montreal in 1996. He completed a Certificate in Advanced Graduate Studies in Prosthodontics and a Masters degree in Restorative Sciences in Prosthodontics from Boston University School of Dentistry in 1999. Dr Baba is a Professor in the Advanced Education program in Prosthodontics at Loma Linda University School of Dentistry, an Adjunct Professor at the University of Texas Health Science Center School of Dentistry in the Comprehensive Dentistry Department, and maintains a part-time private practice in Glendale, CA. He is currently the President of the American College of Prosthodontists and an active member of various professional organizations, a Diplomate of the American Board of Prosthodontics, and a Fellow of the American College of Prosthodontists and the Academy of Prosthodontics.

Acknowledgements

To Susan G. Kestner, who guided me in the right direction in organizing my thoughts and putting them down in print.

To Dr. Charles Goodacre, Dr. Timothy Saunders, and Dr. Alejandro Peregrina who encouraged me to write this book, reviewed its content, and made suggestions in how to improve it.

To Anthony Buffamonte, whose lab expertise, encouragement, and friendship I have treasured.

To Dr. Stephen Ancowitz, whose praise and support were always greatly appreciated.

To CAPT Robert Slater, DC, USN, CAPT Charles R. Linkenbach, DC, USN, RADM George A. Besbekos, DC, USN, and CAPT Alexander Sanderson, DC, USN who recognized my competence as a Dental Prosthetic Technician and greatly encouraged me to become a dentist, then supported me greatly to be selected for the Armed Forces Health Professions Scholarship Program.

To Dr. Carl F. Driscoll, who agreed to be co-author and advisor and help me get this book published.

To Dr. Nadim Z. Baba who agreed to write the chapter on digital complete dentures.

And finally, to my wife, Louise Teets Golden, who put up with the long hours it took me to complete this textbook and kept my schedule organized.

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1

The Diagnostic Appointment

Our goal is to teach students what to look for when diagnosing conditions that impact upon the use and prognosis of a complete denture, so that they may be better able to provide a complete denture service to their patients. First, certain anatomical features will be evaluated, and a judgment rendered as to their possible effects on the prognosis and success of a complete denture. We will identify typical landmarks that we should be able to find in all patients.

During a clinical examination, anatomical landmarks that are present in nearly every patient need to be evaluated to determine if there is any distortion, abnormality, or missing landmarks due to severe alveolar bone resorption, disease processes, previous surgical alterations, or natural physical variation that would indicate a problem area.

In the maxillary arch, we should be able to identify the incisive papilla, labial and buccal vestibules, rugae, residual ridge, maxillary tuberosity, hamular notch, palatine fovea, buccal and labial frenula, midpalatine suture, and glandular area. We should then be able to determine the vibrating line that is so important to maxillary complete denture retention.

In the mandibular arch, we should be able to identify the tongue, pterygomandibular raphe, residual ridge, buccal and labial vestibules, buccal, lingual, and labial frenula, buccal shelf, retromolar pad, retromylohyoid fossa, alveololingual sulcus, lingual tubercle, and submaxillary caruncles.

Once these landmarks have been identified, we must assess how their size, shape, location, presence or absence may affect treatment and prognosis. Patients must be informed of any situation that may affect their ability to comfortably wear their complete dentures.

The denture-bearing area is that part of the attached and unattached mucosa of the edentulous ridges upon which the dentures will rest. This area becomes progressively smaller as residual ridges resorb. Maximal biting forces in patients with complete dentures are about 5–6 times less than patients with natural or restored teeth.

Some conditions will require preprosthetic surgery and a healing period prior to the final impression being made for complete dentures.

Many complete dentures are made in mandibles with impacted wisdom teeth and the patient may experience no trouble; however, the patient needs to be informed about the risks involved with leaving an impacted tooth in place. As the ridges resorb, the bone overlying a tooth remnant or impacted tooth will resorb away, and this area will eventually only be protected from the denture by a thin layer of mucosa. When this happens, an infection or traumatic ulcer may develop. Retained mandibular third molars commonly dehisce. Have them removed!

A torus is a benign outgrowth of bony tissue covered by a thin layer of mucosa. Some maxillary tori can be left as they are, and a denture placed over them if they are not too large and do not adversely affect the retention or function of the maxillary complete denture. This may be possible because a maxillary complete denture has a broad denture-bearing area for support in the palate. Often this is managed by placing a palatal relief chamber over the torus as papillary hyperplasia will not form over these tissues, and if these areas become traumatized, they will be slow to heal due to the limited vascularity in that area.

Mandibular tori are sometimes left in place for a tooth-borne removable partial denture (RPD). When the patient loses posterior teeth and a distal extension of the flange of the denture becomes necessary, they may fail to see the need for surgical reduction, but if these are left in place, the denture base will erode the overlying soft tissues severely, causing intense pain. A tissue conditioner may help temporarily, but it will not be a long-term fix. When immediate insertion dentures are placed over tori, patients often must suffer until the tissues heal. A second surgery may not be

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recommended while the tissue is thus inflamed or not completely intact.

Exostoses are bony outgrowths on the alveolar ridge. They also pose a considerable problem for a complete denture patient. The tissue is stretched tightly over them and the undercuts they have would prevent a peripheral seal for a denture from being evenly remotely possible. Food debris generally will collect in the overhangs they provide, and denture movements will denude the soft tissue overlying them.

Tori and exostoses often show signs of trauma because of their thin epithelium and prominent profile. This is particularly true after eating a hard-crusted food such as pizza. Healing will take place slowly in these areas because of the lack of adequate vascularization. Infection will have easy access to the underlying tissues.

Inflammatory fibrous hyperplasia begins as a traumatic ulcer secondary to an ill-fitting denture flange and develops into a callous-like fibroma called an epulis fissuratum. These need to be removed and the existing denture relined with tissue conditioner to promote healing. Healing must be completed before making a final impression for a complete denture.

Inflammatory papillary hyperplasia can also occur under a denture. It can arise with or without the presence of *Candida albicans* and is caused by an ill-fitting denture, wearing the denture at night, and/or poor oral hygiene. It appears as flattened or grape-like clusters, dependent upon the pressure of a denture over the area. This often occurs under a palatal relief chamber that was placed to increase suction under a maxillary complete denture.

As resorption progresses, the maxilla shrinks upward and inward, while the mandible shrinks downward and outward, leading to more and more of a posterior crossbite. As the bone resorbs, the area involved becomes less able to tolerate the presence of a denture overlying it, due to the decreased surface area and a resulting increased instability. In a severely resorbed mandible, the inferior alveolar nerve may lie on top of the residual ridge. Any pressure on this area will be painful.

A sharp mylohyoid ridge will press against the overlying tissue and make it very tender to any pressure of even a well-fitting denture. Trauma to this area can be minimized or prevented altogether if the patient inserts the mandibular complete denture in the posterior first, then slides the denture forward and down over the anterior ridge. This is an important area, as it provides an undercut that will improve retention of the mandibular complete denture.

A flabby residual ridge is simply soft tissue that becomes soft and flabby over the knife-edged bone of the alveolar residual ridges when an advanced residual ridge resorption occurs. It is not a good support area for a denture. This condition most often develops in the maxillary anterior region because the tongue protects the lower anterior teeth from decay. A mandibular RPD is much more stable than a mandibular complete denture (CD), so the lower anterior teeth are retained to provide retention for a mandibular RPD. This results in Kelly syndrome, otherwise known as combination syndrome.

Combination syndrome or Kelly syndrome defines a situation that develops when a steep anterior guidance angle allows minimal or no posterior contacts in working, balancing or protrusive relationships when the patient goes through the chewing cycle. This results from the denture tipping anteriorly during the chewing cycle, compressing the mucoperiosteum of the premaxilla, leading to resorption of the bone of the premaxillary area. The negative pressure in the posterior can lead to a maxillary tuberosity protuberance.

Resorption can be so severe as to require augmentation with bone grafts in order to prevent idiopathic fracture of the mandible. There are cases on record where a patient has suffered a fracture from simply falling asleep with their hand on their chin. A mandibular CD is very seldom made opposing the maxillary restored arch due to the almost impossible task of achieving bilateral balance of the denture teeth against the restored teeth and the increased forces that a patient can generate while chewing against the natural or restored teeth. This can lead to rapid resorption of the mandibular alveolar ridge.

The retromolar pad is a cushioned mass of tissue, frequently pear-shaped, located on the alveolar process of the mandible behind the area of the last natural molar tooth. It is composed of nonkeratinized loose alveolar tissue covering glandular tissue, fibers of the buccinator muscle, the superior constrictor muscles, and the pterygomandibular raphe, and the terminal part of the tendon of the temporalis muscle. Since there were no teeth beneath this area, it is usually the most stable area of the mandibular edentulous ridge and should be covered by the denture flange. Trauma from ill-fitting mandibular complete dentures or the patient failing to wear a lower complete denture when chewing can also lead to this area being soft and loose. The alveolar process, on the other hand, has had teeth which have been removed and although these areas have filled in with reparative bone, it is not as resistant to resorption.

Some severely resorbed ridges will manifest as knife-edged bone under a ridge of soft tissue that feels firm. The bone under these ridges is so small that it resembles a knife in a sheath. It is very susceptible to spontaneous fracture

and will require augmentation with a synthetic material, cadaver bone or autogenous bone graft.

House classified the posterior palate by the shape of the soft palate according to how it drapes down posteriorly, relevant to developing the posterior palatal seal in a maxillary complete denture. In his classification system, a patient with a Class I palate will be able to tolerate a complete denture easily because this palate offers the broadest range of area (5–10 mm) in which to place the posterior palatal seal, but it is also the hardest to locate the exact area because of its flat curvature. A Class II posterior palate is the most common in the Caucasian population, with a range of 3–5 mm. It falls between the limitations of the Class I and the Class III palate. A Class III posterior palate has a vibrating line that is easiest to locate as it drops down suddenly, but it offers only 1–3 mm of area to place the posterior palatal seal. A patient with a Class III palate will have the hardest time of the three in tolerating a maxillary complete denture.

Neil classified the lateral throat form by measuring the height of the lingual vestibule in the retromylohyoid region. A patient with a Neil Class I lateral throat form will have over ½ in. of depth provided and is very favorable for mandibular denture retention and stability. A Neil Class II lateral throat form falls between Class I and Class III and is less than ½ in. in depth. A Class III lateral throat form has no vestibular depth and would have an unfavorable prognosis. Generally, around three-quarters of patients will have Neil Class I lateral throat form, about one-fifth will be Class II, and only 5–6% will be Class III. The lateral throat form is bounded anteriorly by the mylohyoid muscle, laterally by the pear-shaped pad, posterolaterally by the superior constrictor, posteromedially by the palatoglossus, and medially by the tongue.

2

Preliminary Impressions

A preliminary impression is a negative likeness made for the purpose of diagnosis, treatment planning, or the fabrication of a tray. It is made in a stock tray that is selected from an assortment. These trays are made to fit the majority of patients, but really do not fit anyone well. They simply provide a vehicle to carry the impression material to the patient's mouth for that first impression as a starting point. This is the first impression of the patient's mouth that is made for diagnosis, treatment planning, and then for making the custom trays.

There are primarily two types of materials used for preliminary impressions: modeling compound and hydrocolloid. Modeling compound is used almost exclusively for edentulous patients. It is a thermoplastic material that is color coded for working temperature. *Thermoplastic* means that it is softened when heat is added and becomes firm when it cools. It comes in cake and stick forms, with the stick form most commonly used for border-molding a tray.

Green compound has a working temperature above 123 °F and red compound has a working temperature above 132 °F. Compound must be tempered in a water bath to obtain the correct temperature and not burn the patient. The hot water tempering bath is set at 140 °F for green compound to allow for enough plasticity to be transferred from the bath to the mouth and the compound be formed to the desired shape.

The second material used for preliminary impressions is an irreversible hydrocolloid (alginate). It is a hydrophilic gel made from seaweed, calcium sulfate, and water. *Hydrophilic* means that it mixes completely with water and it provides a very good impression in the moisture of the mouth. The setting time for alginate impressions is varied by the addition of sodium phosphate (a retarder). Fillers of diatomaceous earth and silicate powders determine the hardness of the alginate.

The dentist must hold the tray still the entire time until the alginate is set or distortion will result. A patient should never be asked to hold the tray themselves. The temperature and amount of water should be measured accurately, or the efficacy of the material will be greatly reduced. Room temperature water (70 °F) should be used for best results.

There are three types of impression trays used for containing the impression material: Styrofoam, plastic, and metal. A Styrofoam tray is not rigid, is bulky, and does not retain the impression material well. Some plastic trays are disposable and are not very rigid. They require adhesive to retain the impression material. Reusable plastic trays are rigid and retain the material by retention holes and rim locks. Metal trays are rigid. Some are perforated and retain the impression material with retention holes. Others are solid and very rigid and retain impression material with rim lock retention. Some metal trays can be minimally adapted by bending if the tray is not made of stainless steel. Stainless trays are not adaptable.

Regardless of the tray selected, a suitable tray for a preliminary impression must conform to the general shape and size of the ridge. The flanges of the tray are contoured to follow the depth of the peripheral roll, best with a periphery wax made specifically for that purpose, although red rope wax is often substituted. The tray should allow for 3–5 mm of impression material thickness between tray and edentulous tissues. If a tray is not easily adaptable, use a smaller tray and use compound to extend and modify the tray.

With metal trays that can be adapted, use pliers or bend them with fingers. Shorten the border areas so that adaptation can start with the palate. Smooth and polish the modified areas with the pumice-impregnated rubber wheel.

A preliminary impression should have the following characteristics. It should show good borders and completely fill the peripheral roll. It should be centered in the tray and be of uniform thickness. It should show good tissue adaptation and be free of bubbles and voids. It should extend posteriorly to record the pterygomaxillary notch and the vibrating area in the maxilla. It should extend posteriorly to record the retromolar pads and the lateral throat form of the mandible.

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Impression materials for preliminary impressions should be economically priced. Prepackaged impression materials are always more expensive than bulk packaged materials. Bulk packaged materials should be kept in air-tight and moisture-tight containers in a cool area. They should be kept in a relatively small container so that the material can be used in a fairly short period of time.

When a preliminary impression is poured, a double-pour technique is used. An alginate impression should be separated from the cast about 45 minutes after pouring to prevent damage to the cast as leaving stone in alginate overnight will result in extreme shrinkage and binding of the impression material to stone models. When compound is used for the preliminary impression, remove all compound from the cast before proceeding. Use a boil out tank or a hot water bath to remove wax from the cast. You must temper the cast for five minutes in warm water before a boil out tank is used, or the hot water will fracture the cold cast.

Before using the model trimmer, trim the land area of the cast with the laboratory knife. Never use a red handle knife or a scalpel for this as the blade can break and severely cut your hand. Remove all foreign material (alginate, compound, impression material, and wax) before using the model trimmer. Always have the water turned on while operating the model trimmer. Light pressure should be used to push the cast against the model trimmer wheel, so you do not lug the motor down. Slowly move the cast back and forth to achieve maximum efficiency. Brace your fingers against the table and keep hand instruments away from the model trimmer to prevent damage from the rotating wheel. Moisten the cast under running water prior to grinding on the trimmer to prevent the gypsum/water spray from adhering to the cast like concrete.

Preliminary casts should be trimmed to certain dimensions. Trim the edentulous cast to an outline form that is flat in the posterior and arched on the facial. Always trim the surface of the land areas first to visualize the width of the land area. Establish the 2–3 mm depth to the land area. (You may find it helpful to use a pencil to outline the width of the land areas before going to the model trimmer.) Trim the base of the cast to make the residual ridge parallel to the base and the bench top. Also make the cast 12–13 mm thick to a flat plain occlusion table and a flat bench top. Make the posterior side of the cast flat. Finalize the sides of the cast and the land area width. Rinse the slurry water and debris off the cast immediately. Do not use a heavy scrub brush to clean the cast or it may be damaged.

All edentulous casts must meet the same criteria. The median foundation plane is horizontal and parallel to the base of the cast when the cast is on the bench top. The cast is 12–13 mm thick in its thinnest portion. The land area is 1 mm above the tissue surface between the pterygomaxillary notches and 3–4 mm in facial and 4–5 mm in posterior sections. The peripheral roll is 2–3 mm in depth from the land area. The facial outline form of the land area should follow the outline form of the peripheral roll. The sides of the cast are perpendicular to the base. The cast surface is free of voids and no nodules of stone are present. The cast is free of foreign material and debris.

2.1 Making the Preliminary Impression

Preliminary impressions are made in stock trays which are not capable of making an accurate impression of the vestibules. The vestibules will always be overextended on an impression made in a stock tray. The best you can do is to pick a tray that will fit over the arch and confine the impression material to that area.

An appropriate tray is selected to fit the patient as accurately as possible. Remember that a stock tray is not meant to be a perfect fit. A main concern is that the tray must be able to be placed in the mouth while loaded with alginate and removed easily as a unit without damaging the impression or the patient. The trays are made specifically for edentulous mouths. A tray made for patients with teeth should not be used to make impressions of an edentulous mouth.

If the patient has an existing denture, it can be used to determine the best size tray to be used for the impression. It is placed in an edentulous tray to determine the appropriate size tray to use for the impression (Figure 2.1). There should be adequate clearance between the denture and the tray to allow the tray to fully seat in the patient's mouth without impinging upon the tissue surfaces when it is loaded. If the patient does not have an existing denture, the dentist can spread the index finger and the second finger apart and use them to measure the width of the arches then place them in the tray to determine the best fit.

It is very important that the tray will support the alginate in the two most critical areas: the retromolar pad area of the mandible and the hamular notch (pterygomaxillary notch) of the maxillary. These areas must be captured in the impression because they are the most stable areas of the residual ridges. The tray should correspond to denture-bearing surfaces. Select a tray that is at least 3–4 mm larger than the residual ridge. The retromylohyoid space must also be captured, because these areas have such a profound effect on the retention and stability of the mandibular denture by providing a distal undercut that will resist the denture dislodging posteriorly when the patient bites on something anteriorly.

Flange areas and the palate can be modified for a more comfortable and uniform fit. Periphery wax is the best

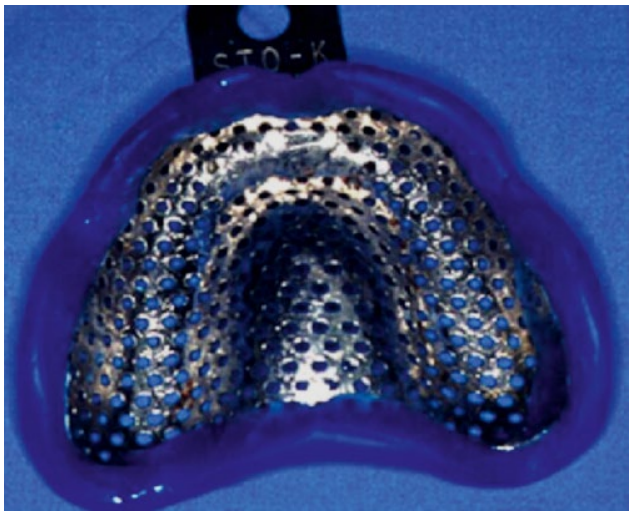
Figure 2.1 Place a denture in an edentulous tray to determine the appropriate size tray to use for the impression.

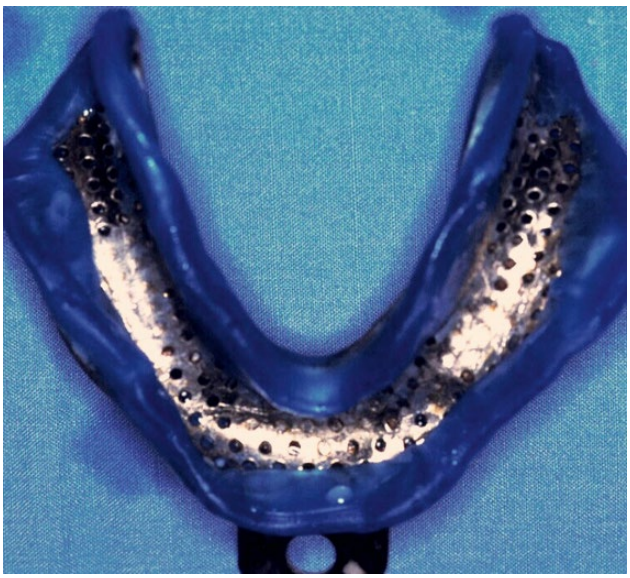
material used to modify and support the tray in these critical areas, but the main objective of placing the tray in the mouth and removing it without distorting the impression must not be compromised. This blue periphery wax is a mouth-temperature wax and will mold to fit the anatomy of the mouth. Red rope wax is often used instead of periphery wax but is a poor substitute as it does not have the same properties as utility wax. The impression tray is more comfortable for the patient when a strip of periphery wax is placed around the entire flange of the tray.

Border-molded trays should be comfortable and accurately cover the extensions of the arch. Blue periphery wax is applied to the complete circumference of the border of the tray (Figures 2.2 and 2.3). This wax can be modified to fit the mouth more accurately because it will become softer at mouth temperature and will allow a certain amount of border molding. The frenulum areas require special attention so that the metal of the tray does not show through.

After the periphery wax is placed on the tray, it is warmed in a warm water bath (Figure 2.4). This will soften it so that it easily molds to record the vestibular extensions in the patient's mouth. The warmed periphery wax is muscle-trimmed in the mouth to border mold the tray. When the border molding is complete, the tray is soaked in cool water to set (harden) the wax. A tray must be cool when loaded with alginate impression material before it is inserted in the mouth because the alginate will set quicker in a warm tray, which will prevent it from making a good impression.

A mouth mirror is used to pull the cheek away from the tray (Figure 2.5) to allow it to be eased into the mouth. This can sometimes be very difficult to do because some





Figures 2.2 and 2.3 Apply blue periphery wax to the tray border for patient comfort.

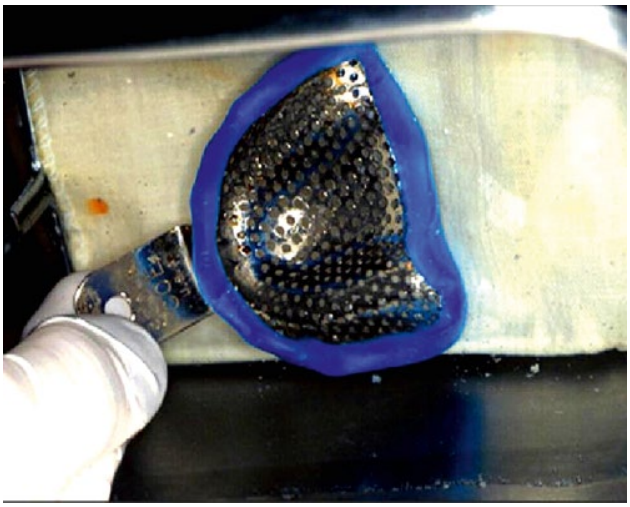


Figure 2.4 Warm the tray in a warm water bath.

Figure 2.5 Use a mouth mirror to pull the cheek away from the tray.

Figure 2.6 Materials used to make a preliminary alginate impression.

patients' lips may have become stiff with old age. The side of the tray that is away from the mirror is inserted first, and used to push the cheek over to that side of the mouth while the fingers or a mouth mirror pull the cheek away from the other side of the tray as that side is rotated in.

Sodium alginate is by far the most popular material used to make preliminary impressions. Alginate impression material is also called irreversible hydrocolloid because it is a one-time use item. It is a very suitable impression material for this purpose, because it has enough body when it is placed in the mouth to not run excessively from the tray and sets rather quickly. It is also capable of making accurate impressions in various thicknesses of material in ill-fitting trays. Alginate impressions will pull from undercuts with a lower risk of tearing and have a very good elastic

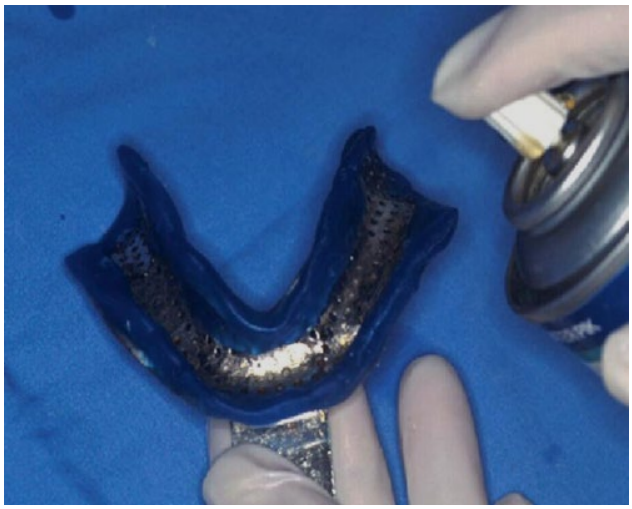


Figure 2.7 Coat a stock tray with an alginate adhesive aerosol spray.

memory to return to the arch form relatively quickly. Alginate is inexpensive when compared to most other impression materials. Major drawbacks are that the impression must be poured within 30 minutes to be accurate and the impression tray must be supported by its handle while the stone is setting.

Figure 2.6 shows a typical set-up of the materials used to make a preliminary alginate impression.

An alginate tray adhesive is applied to the inside of the border-molded tray. A thin layer of adhesive is sprayed or painted over the tissue surface of a tray. An aerosol spray can be used to coat the stock tray with alginate adhesive (Figure 2.7). The key to applying the spray adhesive is to use a thin coat. If too thick a coat is applied, it will take too long to get tacky. If alginate is placed in a tray that has wet adhesive, the alginate impression will separate from the tray when the impression is removed from the mouth. An impression will be distorted if it separates from the tray and is pressed back into place.

The correct amount of room temperature (70 °F) water is poured into a vial supplied by the manufacturer of the alginate and filled to the designated line marked on the vial. The measured water is poured into a rubber mixing bowl. The powder is poured into the water for the best results and stirred to incorporate it into a homogenous mixture using a round-edged flexible spatula in a vigorous manner (Figure 2.8). Sweeping strokes are used to press the mixture against the walls of the mixing bowl to force out any air bubbles and form a thicker mix. The mix will appear dry at first but do not add additional water. After several strokes, the mix will become smooth and creamy (Figure 2.9). It is recommended to use slightly less water to achieve a thicker mix when making the maxillary impression on a gagging

Figure 2.8 Use a round-edged flexible spatula to vigorously mix gypsum powder with water to incorporate it into a homogenous mixture.

Figure 2.9 Use sweeping strokes make a smooth and creamy mix.

patient. This is done rather than using warmer water as the warmer mix will set before the tray is inserted. Vacuum spatulas and other mechanical mixers are very useful and do the job very well but are not necessary once a person becomes skilled at mixing the material in a rubber bowl.

As you hold the mandibular tray by the handle in one hand, load the alginate from the back on one side of the tray and distribute it around the tray, pushing all air ahead of the mix. Make sure that the tray is filled completely (Figure 2.10).

Mandibular impressions are made by placing the loaded tray in the mouth while standing in front and to one side of the patient. The fingers of both hands are used to spread the lips and the tray is centered in the mouth with the

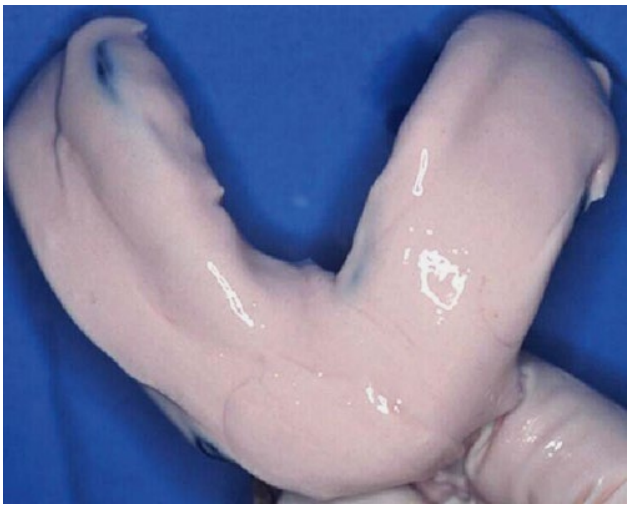


Figure 2.10 Make sure that the impression material fills the tray completely.

Figure 2.11 Use fingers to spread the lips and center the tray in the mouth.

handle straight out from the midline (Figure 2.11). The frenula and lips are manipulated in a procedure called muscle trimming while the tray is gently pressed down (Figure 2.12).

Have the patient raise the tongue as the tray is inserted and push it out over the handle while you press down gently, then move it to the right and left. This must be done several times while the alginate is setting, or the patient will relax and place their tongue fully back into the mouth and under the tray. The patient may worry that they will drool over themselves during this procedure, so be prepared to use a small suction tip and have paper towels

Figure 2.12 Manipulate the frenula and lips by muscle trimming.

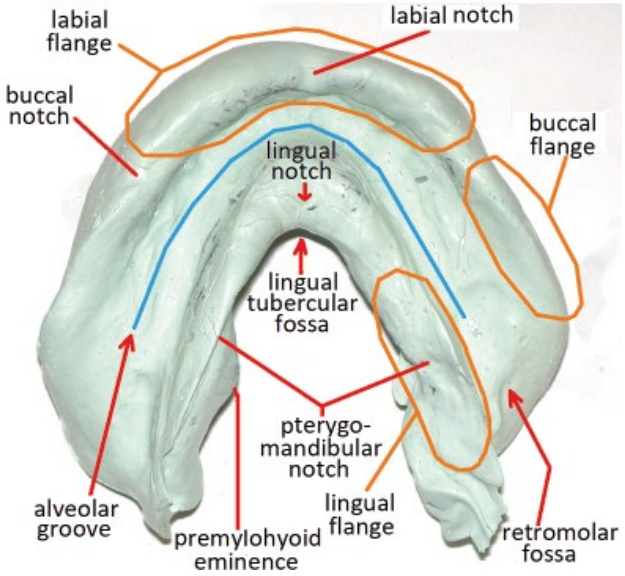


Figure 2.13 Landmarks of a mandibular impression.

available close by. The lower impression should be done first because it is less likely to cause the patient to gag and they may be less anxious about making the maxillary impression.

Check the finished impression for voids and look for areas where the tray may have pressed through the alginate. This may lock the tray onto the cast and make it very difficult to remove. Be aware that alginate impressions always overextend the vestibules unless the tongue relaxes and gets under the tray in the lingual vestibule. Remake the impression if this has happened or you will not be able to make a suitable custom tray on the cast.

There should be an S-shaped curve in the lingual vestibular area on both sides of the impression. Look for the mandibular landmarks in your impression. The labial notch, labial flange, buccal notch, buccal flange, alveolar groove, and retromolar fossa should all be very identifiable in the impression. Likewise, the pterygomandibular notch, retromylohyoid eminence, lingual flange, premylohyoid eminence, lingual notch, and lingual tubercular fossa should also be easy to see (Figure 2.13).

When you "border-mold" the tray with periphery wax for a maxillary alginate impression, simply push the lips and cheeks in as you massage them (Figure 2.14). This will result in overextended vestibules which will enable you to better make a custom tray. Since the wax is very soft at this point, the tray must be removed very carefully to avoid distorting the wax (Figure 2.15). The tray is then chilled in cold water to harden the wax and slow down the setting time of the alginate.

Mix the powder and water to a thick, creamy consistency according to the manufacturer's directions. The procedures for mixing alginate for the maxillary impression are the same as outlined for the mandibular impression. Load the

Figure 2.14 Massage the lips and cheeks to border mold the tray.

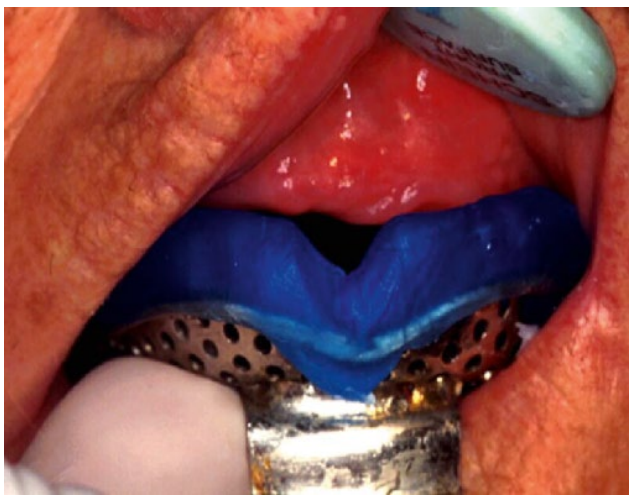


Figure 2.15 Remove the tray carefully to avoid distorting the periphery wax.

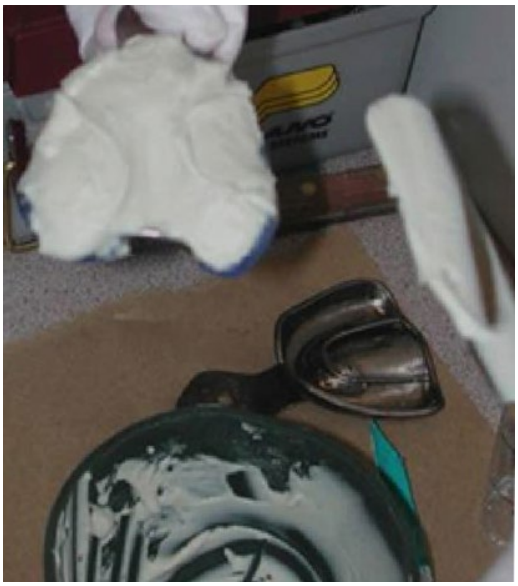


Figure 2.16 Load alginate mix into the tray and push air ahead of the mix.

Figure 2.17 Use moist fingers to distribute and smooth impression material in the tray.

alginate into the tray so that the air is pushed ahead of the mix, starting at one side in the back of the tray and loading the entire tray (Figure 2.16). Distribute and smooth the material in the tray using moist fingers (Figure 2.17).

The maxillary tray is seated by the dentist from behind the patient (11 o'clock position if the right hand is used). It is placed in the mouth with one hand holding the tray handle while using the fingers of both hands to spread the lips (Figure 2.18). The tray is rotated into position, making sure that the handle comes straight out from the midline and that the tray is situated evenly over the ridge (Figure 2.19).

The anterior portion is seated first so that the air is forced out the back as the tray is seated (Figure 2.20). Any excess impression material that is forced out the back is quickly

Figure 2.18 Seat maxillary trays while standing behind the patient.

Figure 2.19 Rotate the tray evenly into position over the ridge.

Figure 2.20 Seat the anterior portion of the tray first to force air out the back as the tray is seated.

Figures 12.7 and 12.8 Compare the shade of the teeth in the old dentures to the shade tabs in the shade guide.

according to the manufacturer's instructions. *Caution*: chloride or iodophors, e.g. bleaches or solutions containing iodine, will damage the color of the shade guide and should not be used to clean or disinfect it.

Compare the shade of the teeth in the old dentures to the shade tabs in the shade guide (Figures 12.7 and 12.8). Ask the patient if they like the color of the teeth in the old denture. Most will want a lighter shade. The current trend toward bleaching natural teeth has made unnaturally white teeth appealing to many patients.

Choose a mold of teeth that complements the patient's face form. Tooth shapes are generally based on four forms, square, triangular, tapering, and ovoid, and can be a combination of these forms as in square tapering, tapering ovoid, triangular ovoid or square ovoid. The molds we have available are limited, so we must choose the one that is the best match with the patient. Other variations of teeth may be available from another manufacturer, but the cost of the denture must be increased to reflect the difficulty of purchasing and resetting denture teeth to cover the increased cost of the teeth and the loss of chair time and the lab bill. Denture teeth manufacturers will supply you with pictographs (mold chart) and other helpful aids to make it easier for you and the patient to make the selection.

The Trubyte® Tooth Indicator (Figure 12.9) is a handy device to help determine the correct mold of tooth to fit the patient based on facial form and size. Simply place the indicator on the patient's face, allowing the nose to come through the center triangle. Center the pupils of the eye in the eye slots and hold the indicator with its center line coinciding with the median line. Slide the side indicator bar until it touches the face and read the width of the upper central incisor in millimeters. Slide the bottom indicator bar up until it touches the face immediately underneath the chin with the lips at rest and read the indicated length of the upper central incisor in millimeters.

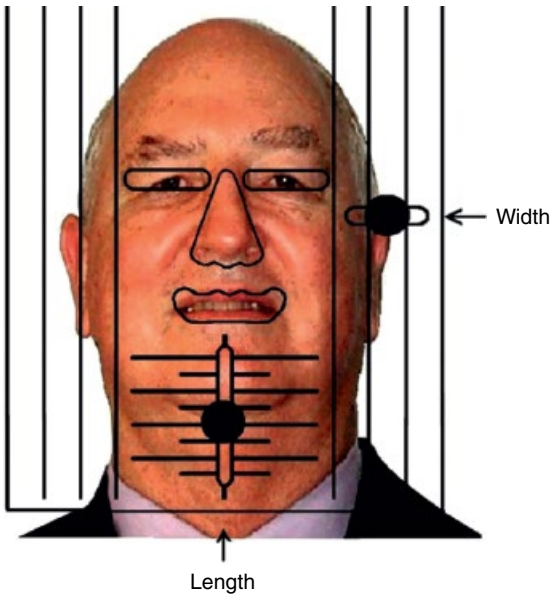


Figure 12.9 The Trubyte Tooth Indicator helps determine the correct mold of tooth based on facial form and size.

While the indicator is still on the face, observe the relative straightness or curvature of the profile. Check three points: the forehead, the base of the nose, and the point of the chin. If these points are in line, the profile is straight. If the point of the forehead and chin are recessive, the profile is curved.

You should have one complete set of teeth in an anterior mold guide and one complete set in a posterior mold guide available for use in the clinic. These should never leave the clinic and should be kept in the sterilization/issue area. Use the tooth selection chart and mold display to select the teeth for your patient. Begin with the maxillary anterior teeth.

A mold chart will have several suggested teeth that will complement the maxillary anterior teeth you select. Once

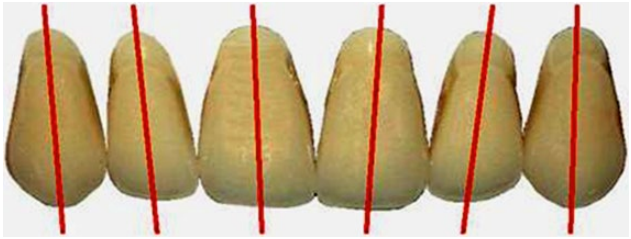


Figure 13.1 All maxillary anterior teeth are inclined mesially.

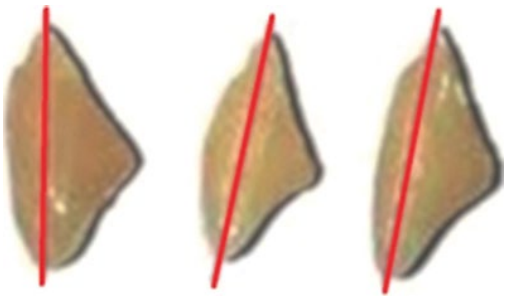


Figure 13.2 When viewed laterally, the maxillary incisors are depressed at the cervical, with the canine being straight with the long axis perpendicular to the occlusal plane.

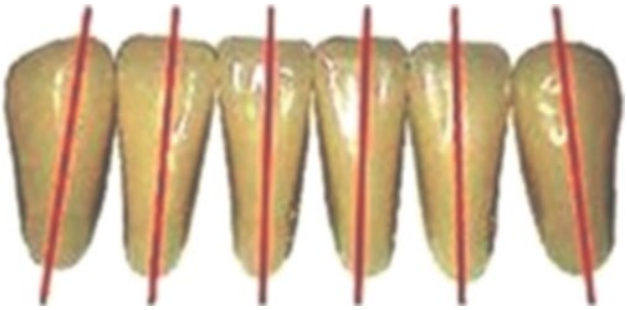


Figure 13.3 All the mandibular anterior teeth are inclined mesially except the central incisors.

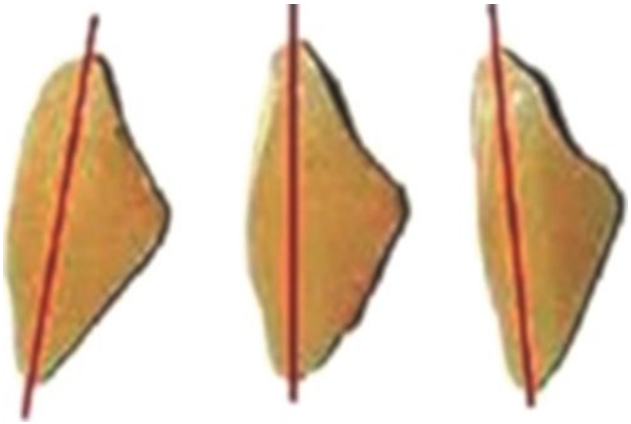
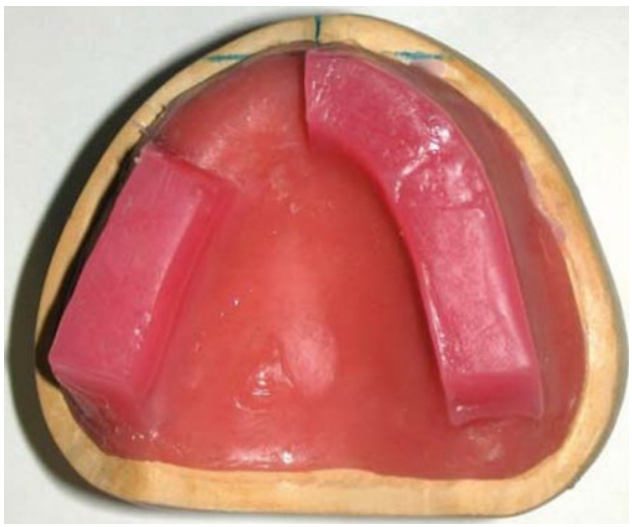


Figure 13.4 When viewed laterally, the mandibular central incisors are depressed at the cervical, the lateral incisor is straight, and the canine is inclined lingual to the long axis.

Figure 13.5 Do not position any anterior teeth further forward than the depth of the labial vestibule.

Figure 13.6 Mark the midline of the patient's face by placing a dot on the incisive papilla and marking this midline on the maxillary anterior land area.



Figures 13.7 and 13.8 Make a cut all the way to the base plate at the midline in the maxillary anterior wax rim and one distal to the canine point and remove this section entirely.

The sounds made when the patient's lower lip touches the maxillary incisors are the "f" and "v" sounds. A good way to assess this is to have the patient count from 50 to 60 and watch carefully as the patient says "fifty-five." If the "v" sound doesn't come out clearly (usually sounds like a "b" sound), then the lower lip is not touching the teeth correctly and a change must be made to correct this deficiency during the anterior wax try-in appointment.

If the maxillary anterior teeth are set in a position that is too low (Figure 21.9), the patient will struggle to position the lip correctly, but it will contact the teeth prematurely. This will create a "f" sound instead of a "v" sound when the patient says "fifty-five" and it will sound like "fifty-fife" and the "f" sounds will be somewhat "airy" as the air is forced unnaturally over the teeth. The patient will also generally spew saliva when speaking if the maxillary anterior teeth are too long.

Figure 21.8 Overextension of the labial flange of the lower denture will not allow the lower lip to touch the incisal edges of the maxillary anterior teeth without raising the lower denture.

Figure 21.9 If the maxillary anterior teeth are set too low, the patient will struggle to position the lip and it will contact the teeth prematurely.

If the VDO is increased, the teeth will contact prematurely and give a clicking sound. Instruct the patient to count from 60 to 70 to assess the vertical dimension, and carefully listen to the sounds that are made when the patient says "sixty-six." This may come out as a clicking sound if the increase is slight, sixty-six if the VDO is more open, or a "th" sound (sikthy-sikth) if the vertical dimension is decreased and the tongue is placed between the teeth to fill the gap. The CSS should be 1.5–3 mm at the second molar region. The patient will move the jaw 2–3 mm forward during speaking.

Sometimes a tooth must be left out to accommodate the patient's anatomic configuration or to allow the patient to move the lower jaw into eccentric positions. This can be due to a steep rise of the ramus or a severe Class II skeletal relationship. The posterior teeth should not be set on the slope of the ramus nor should the maxillary molar contact the lower denture base when the patient moves into protrusive or lateral positions. Also, there must be enough room to accommodate all the mandibular anterior teeth, without having to remove one of them. Either a molar (Figure 21.10) or a premolar (Figure 21.11) may be left out of the set-up, depending on the size of the area necessary to allow adequate movement or space to set the anterior teeth.

Figure 21.10 Consider leaving out a molar if the mesiodistal length of the mandibular residual ridge is too short to accommodate four teeth.

Figure 21.11 If the mesiodistal length of the residual ridge is too short for four teeth, consider leaving out a premolar.

Figures 21.22 and 21.23 Compare the noncontoured teeth in the picture in Figure 21.22 to the contoured teeth in the bottom picture. Teeth may need to be recontoured to permit a proper overlap or contact.

Figure 21.24 Stipple a denture to provide a surface texture that will break up the ambient light as it reflects from the mouth.

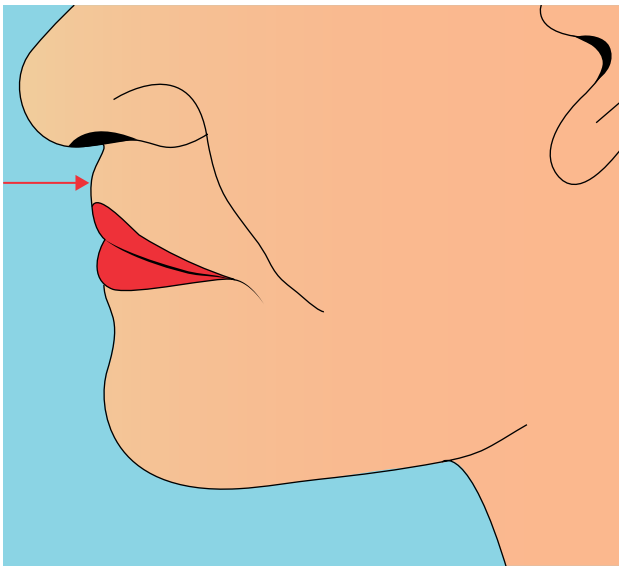


Figure 21.25 Provide lip support by contouring the gingiva appropriately.

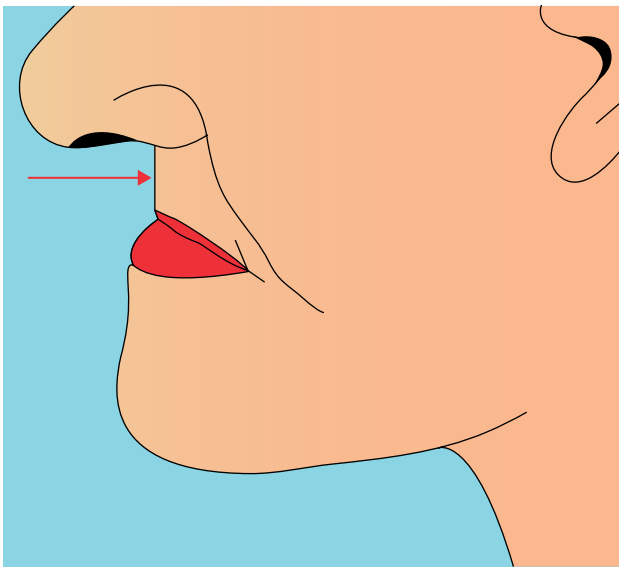


Figure 21.26 Note the unsupported upper lip in this picture, and the undercontouring in the lip that results from it.

A patient may want to have a diastema placed in the same location that their natural teeth had a diastema. One problem inherent to a diastema is that food debris tends to collect between the teeth so the patient must floss the dentures to get it out. This must be explained to the patient at the wax try-in appointment.

If we crowd or overlap the teeth, the problems of keeping the teeth cleaned are increased, as calculus will tend to form on dentures much as it does on natural teeth. Overlapping the teeth can also create problems in

Figure 27.7 Remove small bubbles easily from between the teeth with the point of a green-handled knife.

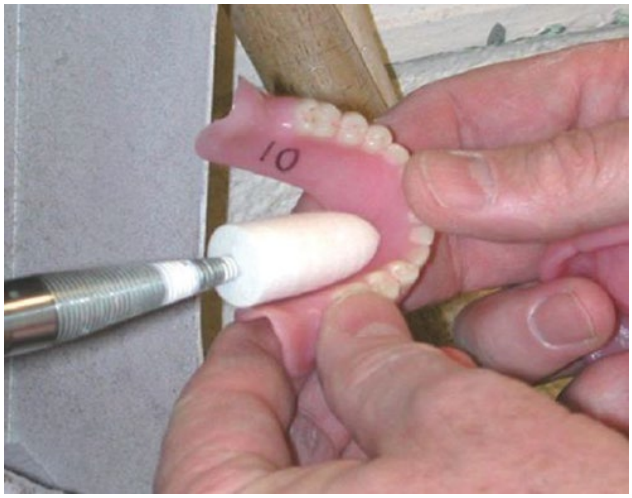
Figure 27.9 Rub a piece of 2 × 2 gauze lightly over the tissue surface, which will pull a thread if there are any small blebs.

Figure 27.8 Remove small blebs on the tissue side of the dentures with acrylic burs, rubber points, and/or a denture scraper.

Figure 27.10 Remove small blebs carefully with a discoid carver, other small instruments, and/or a mounted rubber point.

Figure 27.11 Use wet rag wheels mounted on a lathe to polish the external surfaces up to the peripheral fold.

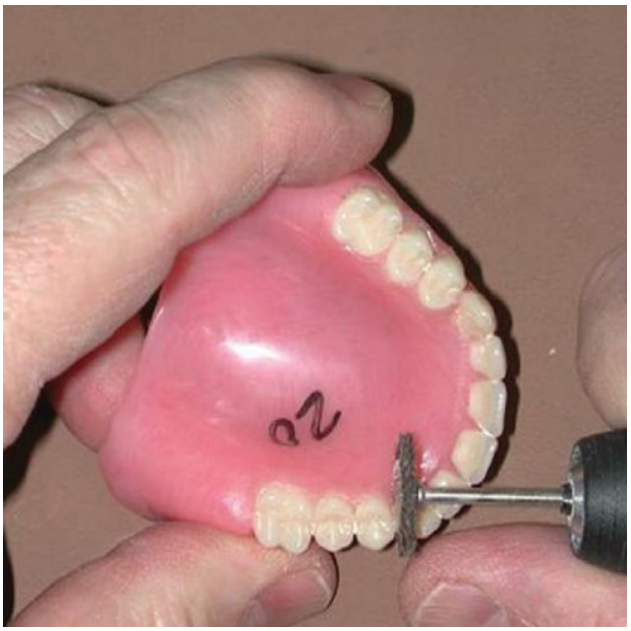
Figure 27.12 Use wet felt cones on a lathe to polish the external surfaces up to the peripheral fold.



Figures 27.13 and 27.14 Maneuver the denture so that depressed or concave areas are polished.

Figure 27.15 Use a felt wheel revolving at slow speed and Hi-Shine polishing agent to impart a high gloss on concave external surfaces of the denture.

Figure 27.16 Place a piece of masking tape over the teeth to prevent inadvertent abrading of their surfaces.



Figures 27.17 and 27.18 Finish gingival embrasures and other hard-to-reach areas at low speed with Hi-Shine and soft bristle brush wheels.

Figure 31.7 Use the black side of the articulating film to mark points of contact in centric relation.

Figure 31.10 Lock the condyle in centric relation on one side so that you get a purely rotational movement on that side and open the set-screw on the other side so that a purely translational movement is possible to equilibrate the dentures in lateral excursions.

Figure 31.8 The anterior teeth should contact simultaneously with the posterior teeth in protrusive movements.

Figure 31.11 Move the lower member of the articulator back and forth on the translational side and make adjustments, then repeat the process on the other side.

Figure 31.9 Use a piece of the paper that separates the AccuFilm in its pack to determine the strength of a contact between opposing teeth.

Figure 31.12 View the vectors of movement during lateral and protrusive movements which are represented on the teeth in red.

Figure 37.1 Make simple overdenture abutments with cast nonprecious metal dowel copings.

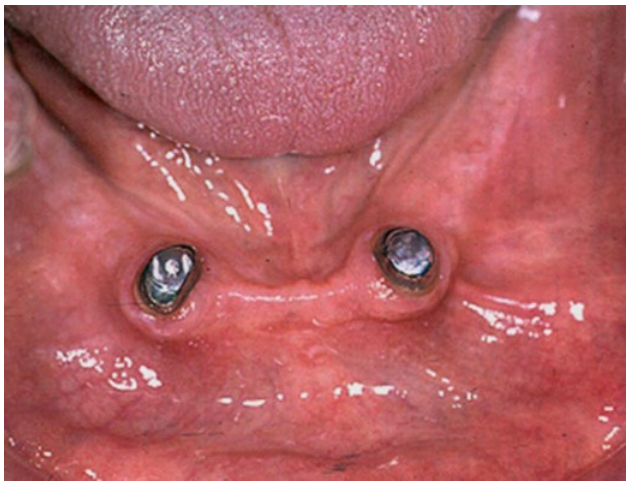


Figure 37.2 Amalgam also is sometimes used to make overdenture abutments.

Figure 37.3 Place a magnetic metal stud in the endodontically treated tooth abutment.

Figure 37.4 Magnets can be cast to a metal stud.

Figure 37.5 Ball or reverse cone-shaped abutments are the most popular overdenture abutments.

Figure 37.6 Snap yellow cap attachment transfers onto ball abutments.

abutment transfers are removed from the impression. Cap attachment transfers are press-fitted onto the ball abutment replicas (Figure 37.11), and cap attachment housings are placed onto the cap attachment transfers.

One system utilizes a simple ball abutment that a nylon retentive unit fits over. This is placed over the abutment in the mouth. This is contained in the denture by a soft nylon expansion bushing that is placed over the nylon bushing in the mouth and encapsulates it while it is in the denture. It will allow the first part to expand within a can-like metal container, which is pushed into place over the nylon bushing. This system allows for easy replacement of the first nylon bushing, which wears down before the other components of the system. The second part can also be replaced when it no longer will retain the first part, leaving the long-wearing metal canister unharmed.

After the implants are placed, they need to be covered to protect them during the augmentation process. This is done by relieving the existing denture and reconstructing it such that it does not place undue stress on the implants. A relief chamber is cut in a maxillary complete denture that has been modified to fit over newly placed implants (Figure 37.11). This chamber is filled with repair acrylic and cut back to provide relief and filled with tissue conditioner to protect the implants. It will be used for about six months, or until the implants are fully osseointegrated.

The rubber rings are retained by metal "keepers" that encircle the ring and protect it (Figure 37.12). The weak part of the system is the ring which will require frequent replacing.

While implants are being augmented, the tissue surface of the denture is relieved and a tissue conditioner is added to the relieved area (Figure 37.13). The denture is then seated in the mouth and a tissue conditioner "impression" is made of the implants (Figure 37.14). Figure 37.15 shows another example of tissue conditioner being used to line a relief chamber cut into the base of the denture to prevent loading the implants until after fusion with the surrounding bone.

A bar system can be used as overdenture abutments. Plastic or metal clips can be used to hold the denture to the bar. If the bar extends anteriorly and posteriorly from the

Figure 37.11 Cut a relief chamber in a maxillary complete denture that has been modified to fit over newly placed implants.

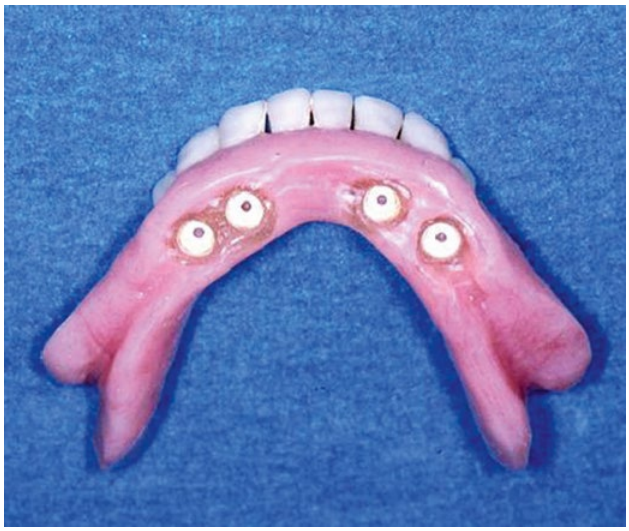


Figure 37.12 Retain rubber rings with metal "keepers" that encircle the ring and protect it.

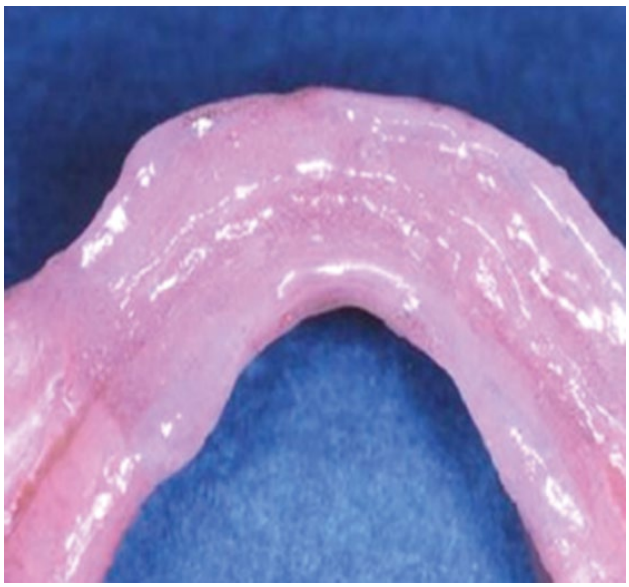


Figure 37.13 Add a tissue conditioner to the relieved area.

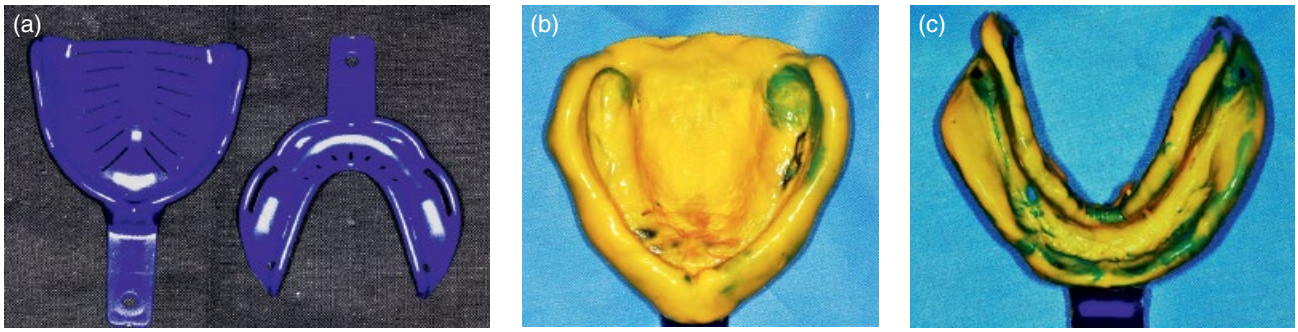


Figure 40.1 (a) Maxillary and mandibular AvaDent prefabricated trays. (b) Maxillary definitive impression. (c) Mandibular definitive impression.

Figure 40.2 Duplicates of patient's existing dentures used to make a definitive impression, establish Vertical dimension of occlusion (VDO), determine lip support, and make a CR record.

Figure 40.3 Conventional wax rims used to establish VDO, determine lip support, and make a CR record.

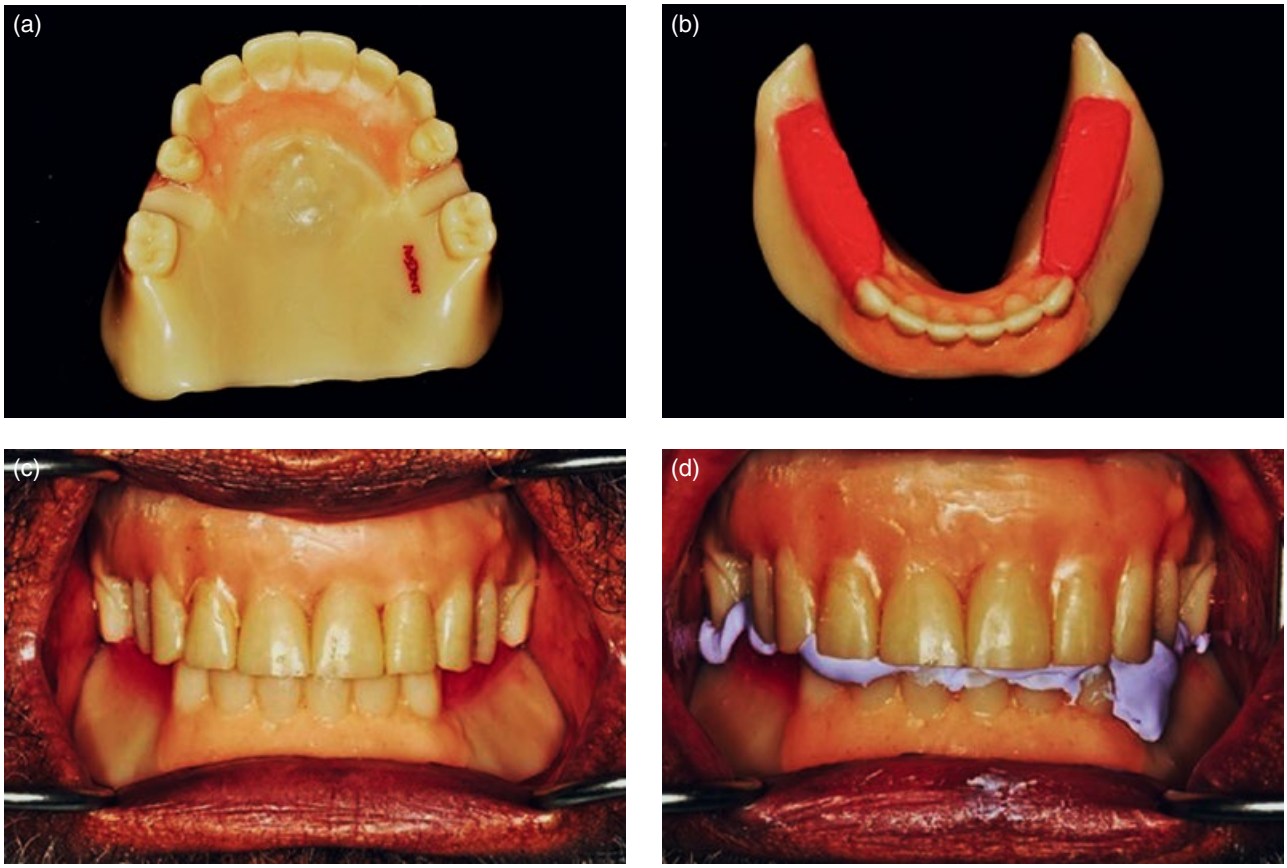


Figure 40.4 (a) Maxillary milled Wagner EZ guide tray. (b) Mandibular Wagner EZ guide tray. (c) Maxillary and mandibular Wagner EZ guide trays trial placed and adjusted as required. (d) Centric relation record made with the Wagner EZ guide trays.