Hiroshi Muraoka
translated by Thomas R. Ward

A Color Atlas of

Complete Denture Fabrication

A Clinical Technique Using Interim Dentures

A Color Atlas of

Complete Denture Fabrication

A Clinical Technique Using Interim Dentures

Hiroshi Muraoka

translated by
Thomas R. Ward

Quintessence Publishing Company 1989
Tokyo, Berlin, Chicago, London, São Paulo, Hong Kong

A Color Atlas of
Complete Denture Fabrication

May 1988 First Edition
Author: Hiroshi Muraoka
Translator: Thomas R. Ward
Publisher: Ikko Sasaki

Publication Site : Quintessence Publishing Company
Hirose Ochanomizu Building 4F
2-1 Kanda Surugadai
Chiyoda-Ku
Tokyo
Telephone (03) 292-3691

Printing and Binding : Sun Art Printing Co., Ltd.
Osaka Japan

ISBN 4-87417-248-2 C3047

Contents

Introduction 7

Chapter 1

Initial Examination
"Why do you want new dentures?"

9

Chapter 2

Radiographic Diagnosis of Edentulous Arches

25

Chapter 3

The Interim Maxillary Denture

33

Chapter 4

The Interim Mandibular Denture

41

Chapter 5

The First Tissue Conditioning

53

Chapter 6

The Second Tissue Conditioning

63

Chapter 7

Modification of Esthetics and Occlusion

83

Chapter 8

The Final Impression

101

Chapter 9

Boxing

115

Chapter 10

Posterior Palatal Seal

125

Chapter 11

Preparation for Interocclusal Registration

129

Chapter 12

Interocclusal Registration

139

Chapter 13

Laboratory Procedures
(Tooth Arrangement, Processing, Occlusal Adjustment)

153

Chapter 14

Denture Insertion

181

Supplement

I. The Double Alginate Impression
II. The Essentials of Using Tissue Conditioner

189

Introduction

"Is there any way complete denture treatment can be easily understood and mastered?" "I would like to understand your technique, but....." I hear these words all the time.

I have devoted myself to absorbing knowledge and techniques associated with the oral cavity. I have always tried to make complete dentures which are satisfying for the patient and have a strong desire to make some type of contribution to this area of dentistry. Although my views sometimes differ fundamentally from other doctors' views, I have always tried to listen to their concepts and treatment procedures. They often state: "Patients will not wear dentures which have been made following what was taught in school. Dentures which are made using alginate impressions are preferable."

Even I am taken aback when hearing the true feelings of doctors asking these questions who have to some extent or other, lost their bearings. Why cannot the theoretical principles taught at a university be applied in a clinical setting? Is there some special aspect relating to complete denture procedures which should be considered? There is serious doubt whether complete dentures made from alginate impressions are really providing the patient with good treatment. When a survey was taken of dentists wearing complete dentures, the majority reported that the fit was better with smaller dentures made from alginate impressions. What could this possibly mean when a method not supported in the literature has been accepted by the dentists themselves?

First of all, we must consider whether the complete denture functions naturally as part of the body. If not, the fewer problems with the dentures, the better. Secondly, there are a large number of dynamic factors in the mouth such as the muscles associated with mandibular movement, the cheeks, and the tongue, which are essential to function. If the denture is made as small as possible, the functioning oral tissues will not be affected adversely so the feeling of a foreign object intraorally is reduced. This is like killing two birds with one stone.

This is the reason that smaller dentures are considered superior to larger ones. However, if we seek theoretical principles and scientific knowledge as a basis for the fabrication of complete dentures, there is doubt whether or not dentures can be made that are smaller yet meet functional needs. Smaller dentures can never meet the three essential requirements of complete dentures which are retention, stability, and suport.

Retention means a maxillary denture does not fall down and a mandibular denture does not ride up, both depend on the border seal. Stability depends on the intimate adaptation between the denture and mucosa. If there is not a close adaptation with the tissue-bearing surface of the denture, it will not be stable, regardless of the border seal.

Lastly in terms of support, the larger the area covered, the better. When the denture has maximum tissue coverage the forces incurred can be dispersed decreasing the pain due to a pressure spot, so we should try to achieve border extensions as far as possible. For my patients, I ultimately use a denture with maximum coverage when I seek the most appropriate form.

Although it is often said that science has no place in complete dentures, I have sought methods which can be understood by everyone and feel that I have perfected the techniques for this book.

Finally, I have received considerable assistance from my staff of doctors in completing this book. Mr. Yoshikazu Ishikawa helped in the arrangement and editing of the slides, Dr. Hideaki Muraoka in the overall composition of the book, as well as Drs. Masaru Kobayashi, Kazuhiko Irie, Harunori Ohno, Hajime Torii, Takao Shimizu, and Kiyomi Uematsu. I would like to express my sincere gratitude to all of them.

Also, I would like to thank Mr. Ikko Sasaki, President of Quintessence Publishing Company who so kindly assisted me throughout the creation of this book.

May 1988

Hiroshi Muraoka

Chapter 1

Initial Examination

"Why do you want new dentures?"

During the initial examination, try to elicit reasons that explain why the patient is dissatisfied with the present dentures. Listen carefully since resolving current problems promotes patient confidence which in turn, can be a significant advantage for future clinical treatment. Try to understand the patient's chief complaint and to correct the problem in the new prosthesis.

A summary of chief complaints can be divided into the following categories:

Esthetics, "The dentures look bad"

Fit, "They hurt" or "They are loose"

Function, "I can't eat".

Patient History

When taking the history during the initial examination, it is very important to listen to the patient's experiences with the present dentures. The patient is a valuable source of diagnostic information. The operator must try to ask the appropriate questions which may prove invaluable for diagnosing potential problems. With careful analysis, the patient history can be very useful for analyzing difficult clinical situations. Have the patient review the initial fit and function of the present dentures, condition after the initial adjustment period, and more recent problems.

Visual Examination

Observe the patient's facial features during the clinical examination, both with and without the dentures in the mouth. Also evaluate the dentures even if the patient has not been using them currently. It is necessary to perform an intraoral examination to evaluate the shape of the alveolar ridges and degree of bone resorption. The visual intraoral assessment includes diagnostic findings such as the maxillomandibular jaw relation.

Fig. 1-1

Fig. 1-2

Fig. 1-3

1. Review the patient history in a relaxed atmosphere.

Fig. 1-1 It is important to collect the necessary information before any direct patient treatment. The patient is a valuable resource and the operator must know just how to elicit the appropriate information. A key element to this setting is to have a structured conversation with a relaxed patient. When the patient is relaxed, the operator can elicit candid remarks regarding legitimate complaints, rather than exaggerated comments. The operator can observe the extraoral appearance with facial and perioral musculature in a relaxed tone. If the patient is experiencing stress, the operator will not get an accurate representation of the current problems.

Fig. 1-2 Evaluate the general facial appearance during the conversation while the patient is wearing the present prosthesis. Observe the patient's profile to check the shape of the mouth and evaluate the effects of severe alveolar ridge resorption on the maxillomandibular relationship.

Fig. 1-3 From a low-angle, frontal view, check the shape of the mouth. This patient shows prominent wrinkles possible due to an inadequate vertical dimension of occlusion in the present dentures. By observing a relaxed patient from different directions, the operator can see needs for changes in the new dentures.

2. Evaluate the prosthesis.

Fig. 1-4 The patient's current dentures can provide useful information in the clinical examination. Despite the condition of the dentures, the problems can influence the subsequent treatment plan. If there are no problems, new dentures may not be indicated.

Check the maxillary and mandibular dentures in maximum intercuspation. From the right-side view, note that the border of the mandibular denture base does not extend over the retromolar pad area. This patient's mandibular denture may be unstable during mastication.

Fig. 1-4

Fig. 1-5 In the frontal view, the area in the maxillary denture that corresponds to the labial frenum in the anterior region appears too wide. This may lead the operator to anticipate a problem with maxillary denture retention.

The teeth appear to follow interalveolar crestal lines in each arch. When observing the artificial tooth arrangement bilaterally, there appears to be an imbalance between both sides. There is adequate overlap between premolars on the right side but the left side does not have the necessary overlap; this could contribute to poor denture stability.

Fig. 1-5

Fig. 1-6 From the left-side view, the border of the mandibular denture base does not extend over the retromolar pad area, similar to the right-side, nor does the border of the maxillary denture extend into the hamular notch areas. The area corresponding to the zygomatic process behind the maxillary second molar has not been reproduced and is important to retention. From these observations, we can suspect poor mandibular denture stability and weak maxillary retention.

Note problems with the occlusal plane. The premolars appear to be lower than the occlusal plane which could create a curve of Spee. (Although the author is not opposed to a curve of Spee, he feels that it is important to make a flat occlusal plane.)

Fig. 1-6

Fig. 1-7

Fig. 1-8

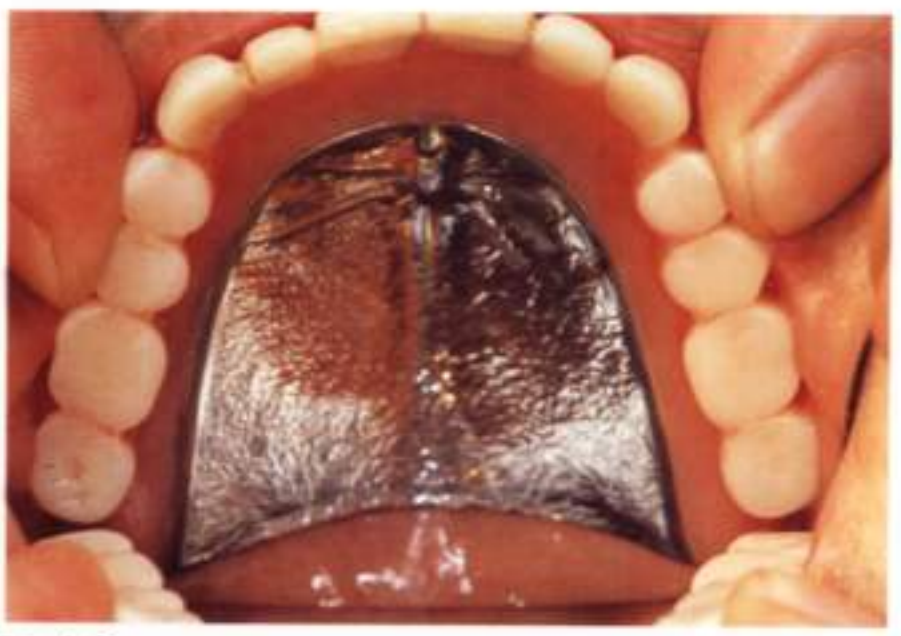

Fig. 1-9

3. Evaluate the prosthesis intraorally.

Fig. 1-7 Place the dentures intraorally and observe the tissue adaptation. Check the maxillary frenum attachment which corresponds with the wide anterior area in the maxillary denture; no border seal is present in this area. The denture base borders appear overextended in the lateral incisor and canine regions.

Fig. 1-8 When the patient occludes, there is considerable "foaming" under the mandibular denture which indicates poor denture base adaptation. The border between attached and free mucosa is visible in the mandibular anterior region.

Fig. 1-9 Intraorally, check the maxillary occlusal surfaces with a mirror. The palatal surface does not extend over the fovea palatinae. The posterior border of the denture is short of the "Ah" or vibrating line and accounts for the lack of a posterior border seal.

The patient might be able to chew even though the posterior teeth lack grooves. However, using the example of a file, distinct grooves improve abrasion. It is doubtful that these flat occlusal surfaces contribute to efficient mastication.

Fig. 1-10 Check the mandibular occlusal surfaces intraorally; the posterior teeth lack grooves. Note the decubital ulcer present near the lingual frenum. This may have resulted from poor denture positioning or metal base pressure on this area.

4. Visually examine the mucosal surfaces.

Fig. 1-11 Visually examine the oral tissues after removing the patient's dentures. Look at the maxillary vestibular areas and check for undercuts. Although there may not be a problem with the denture rubbing along these areas, the undercuts should be identified. The condition of the vestibule appears to be adequate based on the tissue color, but this one observation is not sufficient to determine the appropriate extent and thickness of the denture border in this area.

Fig. 1-12 Remove the dentures and check the palatal tissues intraorally. The small cuts around the incisive papilla area result from a poor fit, often seen in patients wearing dentures. The palatal surface has good tissue color and appears to have a certain degree of tissue thickness. The clinical appearance of the alveolar ridge can predict the tissue-bearing surfaces for the denture. For example, the flat portions of this alveolar ridge can support a denture base.

When a patient has tissue color appearing anemic with inadequate mucosal tissue thickness, it is difficult to obtain a retentive, stable maxillary denture due to the lack of a mucosal cushion. When palatal rugae are indistinct, this may be due to pressure from the previous denture.

Fig. 1-10

Fig. 1-11

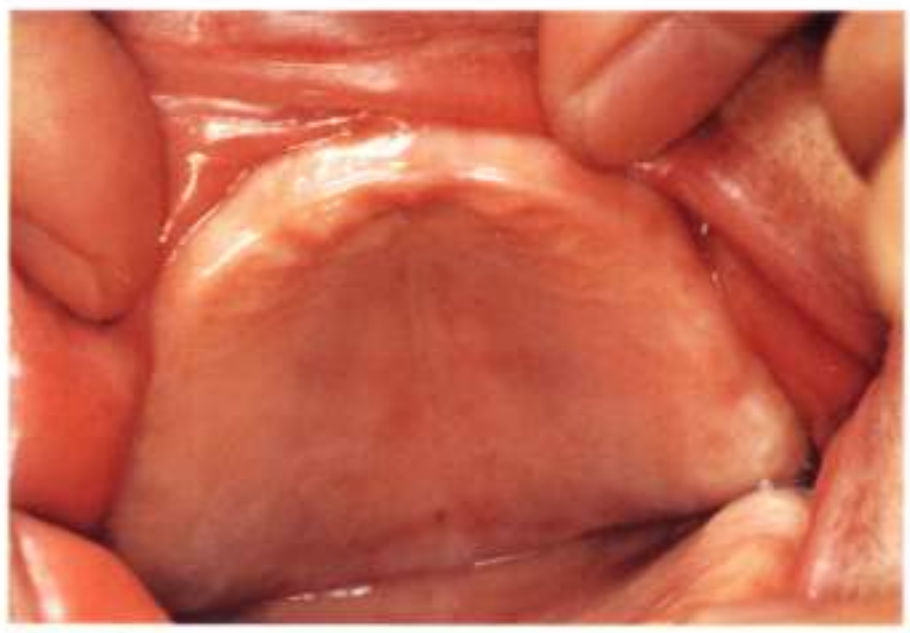

Fig. 1-12

Fig. 1-13a

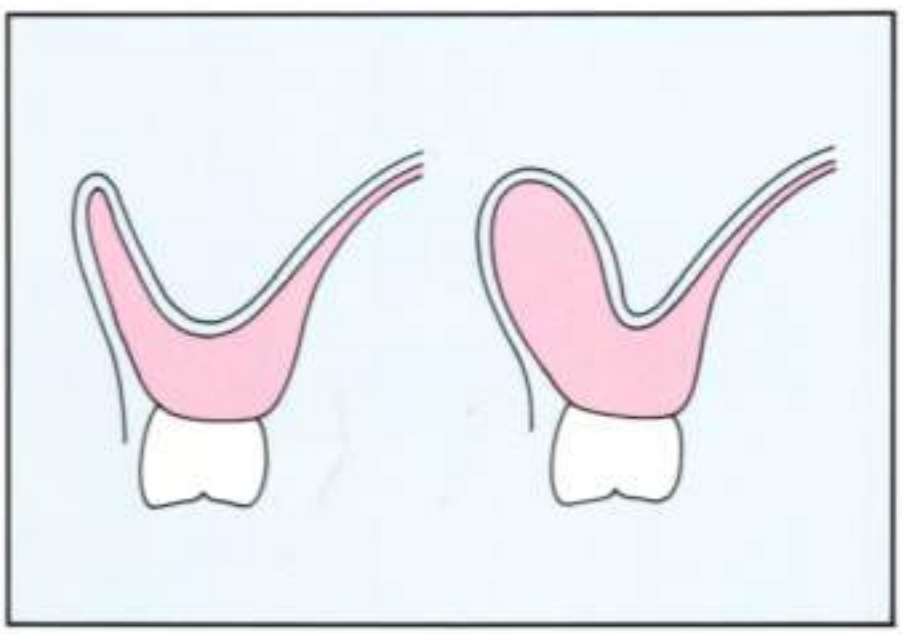

Fig. 1-13b

Fig. 1-14

Fig. 1-13 a&b Closely check the mucosa in the molar region of the maxillary alveolar ridge. Figure 1-13a shows the patient's left side. This region is important for creating a seal along the posterior buccal shelf. Maxillary denture stability is affected by both this area and the shape of the posterior buccal region. Generally, a slight undercut with a small space adjacent to the buccinator muscle is ideal.

In Figure 1-13b, the space by the buccinator muscle is larger when the alveolar ridge is "V"-shaped and requires more denture base material to fill the space.

Fig 1-14 Check the mandibular anterior alveolar ridge area. The tissues have several red spots, lack a uniform appearance, and the ridge has marked irregularities. The denture appears to be creating sore spots in this region.

Fig. 1-15 Check the occlusal surfaces of the mandibular alveolar ridge. There is a decubital ulcer present in the lingual frenum area. This sore spot results from pressure along the denture base, as previously mentioned in Figure 1-10. Another decubital ulcer is seen on the labial mucosal surface, possibly due to an overextended denture border which rubs as the patient elevates the lower lip or closes the mouth.

Fig. 1-15

5. Manual palpation of intraoral tissues.

Fig. 1-16 After a visual clinical exam, palpate the intraoral tissues. Begin with the maxilla and identify the extent of undercuts on either side of the maxillary labial frenum. Create tension in the frenum by pulling the upper lip. The deviation of the frenum may have resulted from the wide area left in the previous denture.

Fig. 1-16

Fig. 1-17 Use finger pressure to palpate the buccal surface of the maxillary alveolar ridge. Any sore areas must be relieved within the denture prior to insertion.

Fig. 1-17

Fig. 1-18

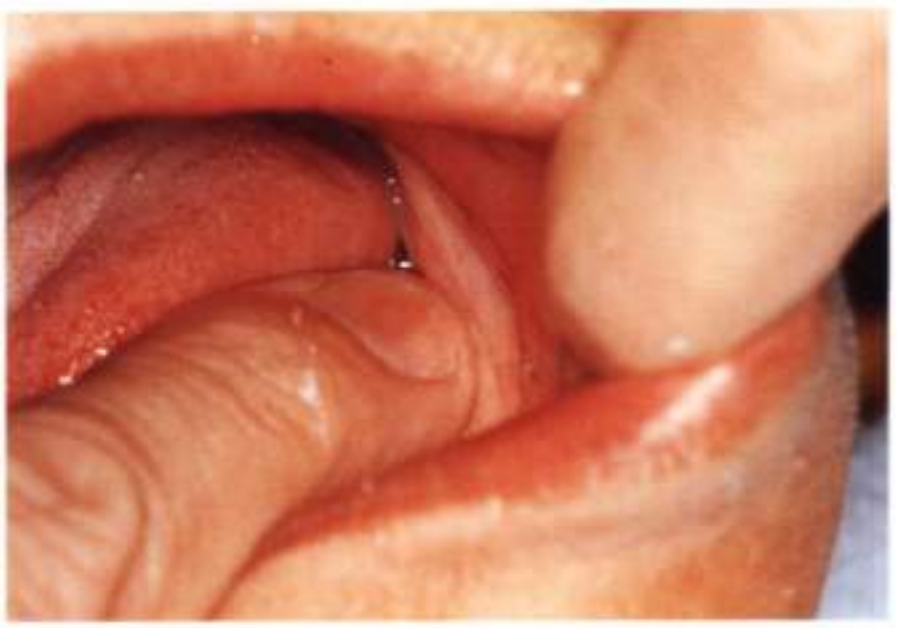

Fig. 1-19

Fig. 1-20

Fig. 1-18 Check the posterior maxillary alveolar region by pressing along the buccal surface in the molar area. The external pterygoid muscle can be palpated and patients may often feel pain in this region associated with denture occlusion problems. Continue palpating by moving the finger from the distal towards the mesial. When the patient complains of pain in an area, this corresponds to a pressure spot in the denture. One example is visible in the canine area as a white discoloration.

Thorough palpation is important since a decubital ulcer can result from a pressure spot in the denture or from the bone configuration. If the bone is protruding, the denture rotates and rubs the mucosa over the bone. If the problem is due to the denture, check for occlusal problems.

Fig. 1-19 Palpate the mandibular alveolar ridges. There is a decubital ulcer adjacent to the retromolar pad even though the denture border is underextended in this patient. The ulcer may be due to poor mandibular denture adaptation.

Fig. 1-20 Palpate the lingual surfaces of the alveolar ridge. Move the finger from the buccal shelf to the mylohyoid line on the lingual surface. The manual examination helps check for pain due to pressure, the amount of tissue elasticity, and relative displacibility of the free mucosa. The sublingual glands are above the mylohyoid line and can be displaced from their normal positions. Identify these anatomical factors to determine posterior extensions for the denture borders.

Fig. 1-21 When palpating the anterior mandibular alveolar ridge, the bone may protrude near the alveolar crest and mandibular labial frenum. The mental spine is under the bony protuberance and may make it more difficult to closely adapt a denture base. Use two fingers to examine both the buccal and lingual surfaces simultaneously.

Fig. 1-22 Palpation can help determine the thickness of the mucosa. Since the mucosa is thin in the anterior region, slight pressure can blanch the tissue.

Fig. 1-23 The clinical information obtained from the manual examination is transferred to a diagram. The graphical record provides locations of certain bone configurations and areas sensitive to pressure palpations. This record can be used to improve the current denture by indicating possible areas requiring relief in the prosthesis.

The red areas near the hamular notches in the maxilla indicate thin mucosa. Also make a record of the flat configuration or lack of indentation near the hamular notch. Since the areas are flat, the maxillary denture is unstable and moves easily instead of having some anatomical-mechanical stability.

Fig. 1-21

Fig. 1-22

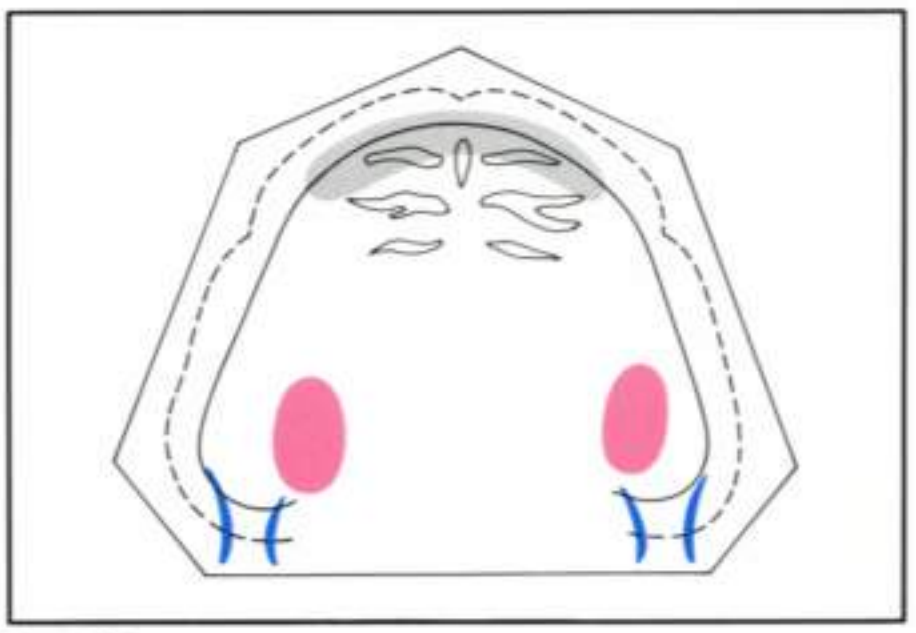

Fig. 1-23

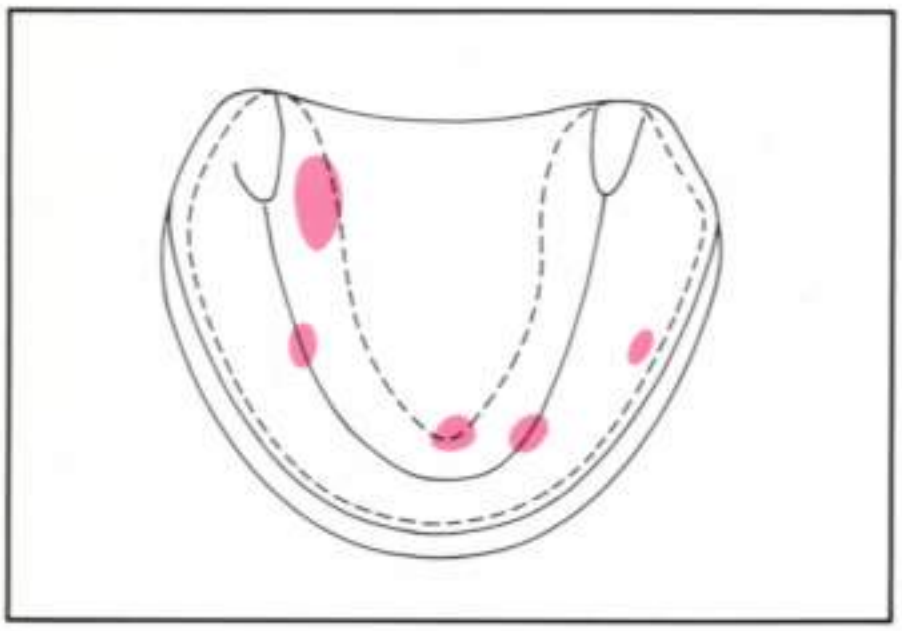

Fig. 1-24

Fig. 1-25

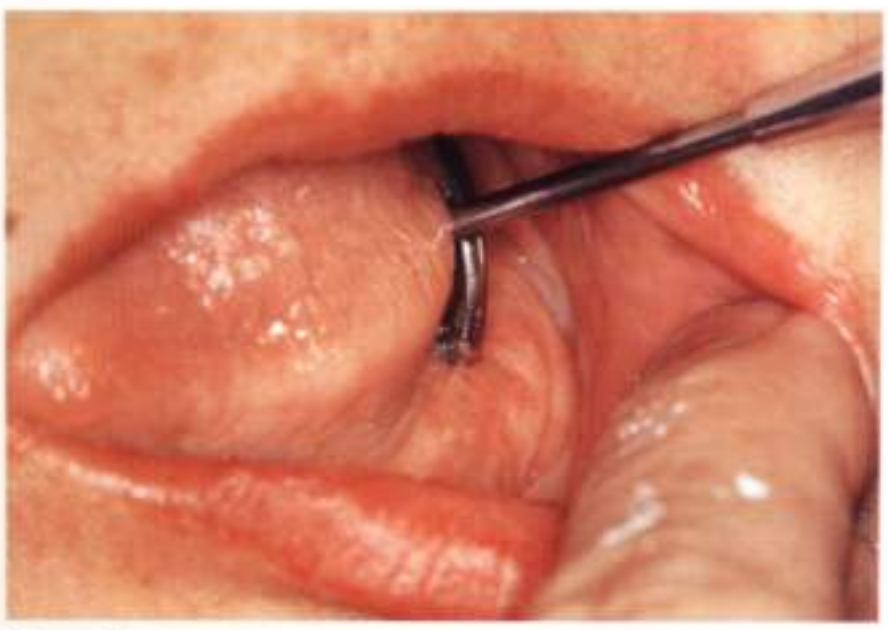

Fig. 1-26

Fig. 1-24 Be careful when the graphical record indicates many problem areas such as the example shown for the mandible. The spot near the mylohyoid line adjacent to the retromolar pad is a difficult location for denture adjustment. It is especially difficult to obtain an ideal denture border with a sharp anatomical configuration. A mark was placed here to indicate the presence of a decubital ulcer.

6. Examine the movement of the buccinator muscle.

Fig. 1-25 A denture contacts other intraoral structures besides the alveolar ridge. It is important to be familiar with the buccal mucosa and the buccinator muscles. The attachment of the buccinator muscle is external to the external oblique line of the mandible. The denture border should press lightly on this attachment area which is important for a buccal marginal seal.

It is helpful to retract the cheek as shown in the figure and to move the buccinator muscle upward while observing the external oblique line. By following this method, the cheek does not cover the area and the external oblique line can be seen easily. During the observation, place the thumb of the right hand outside the external oblique line to help determine the position of the buccinator muscle attachment.

Fig. 1-26 Examine the area medial to the external oblique line. There is a general tendency to extend the sublingual denture borders as far as possible. However, if the denture borders are overextended, tongue movements can displace the lingual borders and possibly create sore areas. To avoid overextensions, place a mirror in the sublingual space and have the patient protrude the tongue slightly; observe the tension of the musculature while holding the mirror. The thickness of the mirror simulates the denture border thickness.

Fig. 1-27 Use the mirror to determine the extent of the denture border in the premolar region. Place the mirror beneath the sublingual glands, slightly displacing them, to determine the appropriate depth of the denture border.

Fig. 1-27

7. Re-evaluate the extraoral appearance to check the vertical dimension of occlusion.

Fig. 1-28 Place the dentures intraorally and instruct the patient to occlude. Evaluate the appearance of alar and commissure lines; a downward turn in commissure lines gives the appearance of a declined lip line. Some patients may be concerned with a declined lip line that does not disappear when the dentures are placed intraorally, but this occurs naturally with age. The tension of wrinkles under the nose or the philtrum area should also be evaluated for proper lip support, possibly related to the size of the arch.

Fig. 1-28

Fig. 1-29 Many elderly patients state that angular cheilitis "is due to a bad stomach", although it is more often caused by an inadequate vertical dimension of occlusion. Normally saliva wets the lip up to the wet-dry line on the lip but with a decreased vertical dimension of occlusion, saliva collects at the commissures of the mouth. The area remains wet, irritated, and inflammed. In many patients, angular cheilitis resolves after approximately one week once the appropriate vertical dimension has been restored.

Fig. 1-29

Fig. 1-30

Fig. 1-31

Fig. 1-32

8. Evaluate facial tissue support.

Fig. 1-30 Use cotton gauze to evaluate changes in the vertical dimension of occlusion and tissue support in the philtrum region. The key to using the cotton is to keep it moist with water. Cut the gauze in half to reduce the size, soak it in water, then use several pieces to achieve the desired change. Place or remove pieces of gauze on the mucosal surface of the maxillary denture to obtain the best vertical dimension of occlusion.

Fig. 1-31 After improving the vertical dimension, add gauze to the labial surfaces of the teeth. Position gauze to obtain ideal tissue support in the philtrum region and areas supporting the lips, especially to determine the amount of protrusion for the maxillary anterior teeth.

Fig. 1-32 This method helps improve esthetics in the maxilla and upper lip. Depth of wrinkles has been decreased with increased lip support.

Fig. 1-33 The gauze pieces may slide more easily in the mandibular denture, so by applying a denture adhesive such as Fasteeth, the gauze stays in position.

Fig. 1-34 Although the mandibular denture is adjusted by adding and removing pieces of gauze, the adjustments to the maxillary denture are more important for facial tissue support. Some patients may use denture pads which are commercially available, or cotton under the dentures to compensate for pain or poor-fitting dentures.

Fig. 1-35 This photograph shows the changes in facial tissue support after adjusting maxillary and mandibular dentures with gauze. The anterior teeth appear natural, although a "natural" appearance at this stage of treatment is difficult since it also depends on age. The author established criteria for women as showing approximately 2mm of the anterior teeth and for men as 1mm or even with the level of the lip. These preparations are completed diagnostically without actually checking if the vertical dimension of occlusion is functional. This helps develop facial esthetic criteria for patient treatment.

Fig. 1-33

Fig. 1-34

Fig. 1-35

Fig. 1-36

Fig. 1-37

Fig. 1-38

9. Evaluate the vertical dimension of occlusion.

Fig. 1-36 Evaluate the vertical dimension of occlusion using cotton rolls. First soak the cotton rolls in water.

Fig. 1-37 Place cotton rolls on the posterior occlusal surfaces, in bilateral, symmetrical positions.

Fig. 1-38 Have the patient occlude on the cotton rolls. The dentures are stabilized with the cotton and if there is pain with occlusal pressure, there may be a problem with the tissue-bearing surface of the denture, not with the denture teeth. If adjustments are needed, cut, add, or remove cotton rolls while evaluating the patient's facial features.

Fig. 1-39 Have the patient occlude and close the mouth to evaluate the vertical dimension of occlusion. When the vertical dimension of satisfactory, place marks at the base of the nose and peak of the chin. Although the marks are not fixed, they should be stable points unaffected by changes in tissue support around the lips. The only true fixed point possible is the nose.

Fig. 1-40 Examine the patient when the mandible is in maximum open position. Check for difficulties with mandibular opening and check the amount of space available since this is the position of the mandible during the maxillary impression.

Fig. 1-41 Insert the dentures and evaluate the interarch space. The maximum open position should accomodate three fingers placed lengthwise, although there was space for only two and one-half fingers in this patient.

Fig. 1-39

Fig. 1-40

Fig. 1-41

Chapter 2

Radiographic Diagnosis of Edentulous Arches

In an edentulous patient, the remaining bone cannot be viewed directly nor accurately since it is covered by mucosa. To make an accurate diagnosis, it is necessary to take radiographs. Panoramic radiographs are very effective in diagnosis of an edentulous patient. By using this type of radiograph, it is possible to have one film that includes views of the maxilla, mandible, and condyles. Some general observations from the radiograph are possible, such as mental foramina positions and degree of bone resorption. We must rely on standard dental radiographs to complete a diagnosis.

The radiographs are also used to identify bone margins, foreign bodies, cysts, and pathology around retained roots. Further examination can help predict bone resorption along the alveolar margin following extractions, show healing tendencies, condition of bone defects, and thickness of cortical bone. The patient should be informed of the observations and/or pathologies.

The radiographic findings may be useful in fabrication of the dentures. Specific areas of denture relief may be needed depending on the position of mental foramina, inferior alveolar canals, maxillary sinuses, and thickness of mucosa. The radiographic evaluation is important in diagnosis and creates an atmosphere which can enhance cooperation between the patient and doctor.

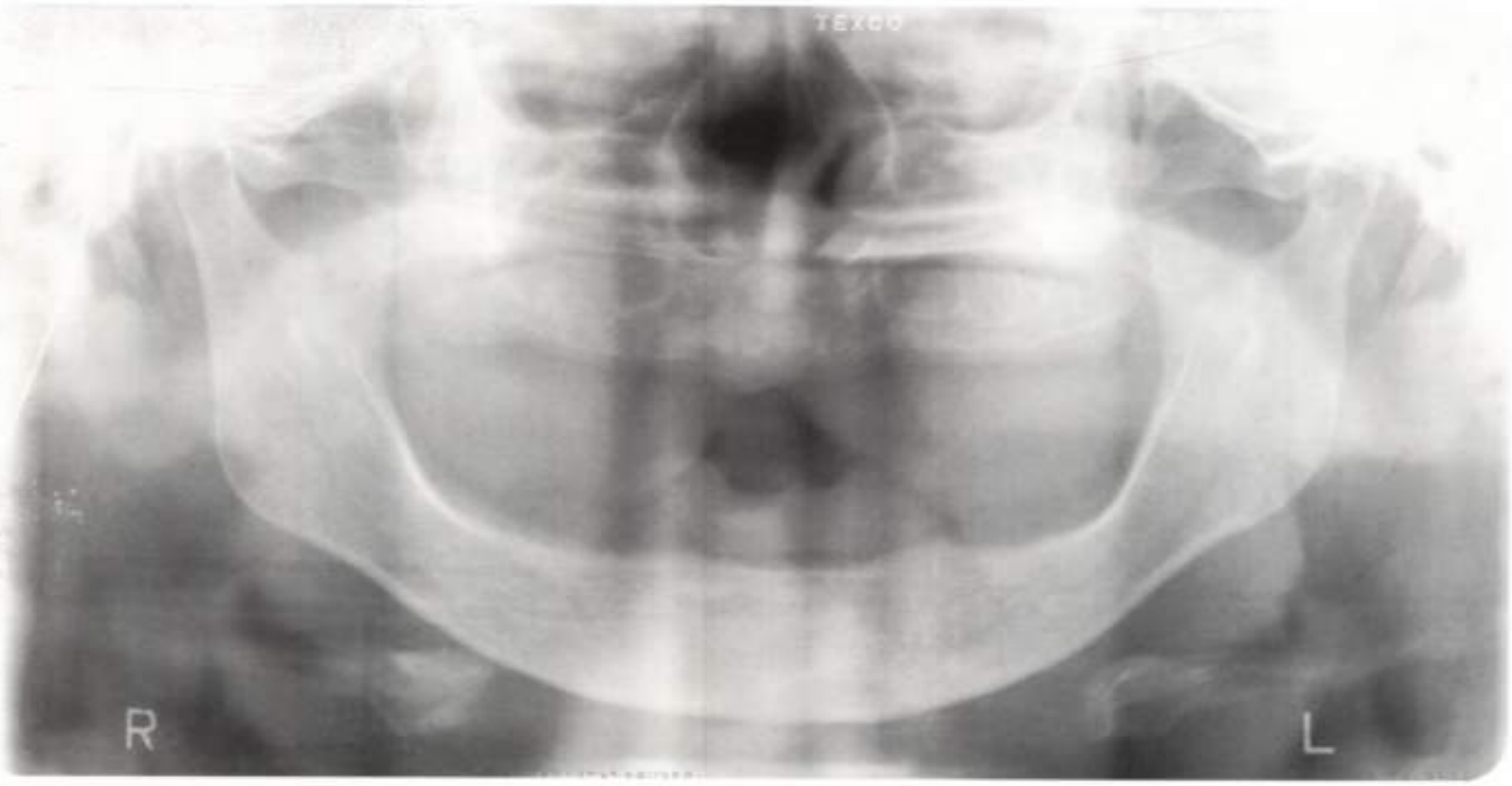

Fig. 2-1a

Fig. 2-1b

Fig. 2-1c

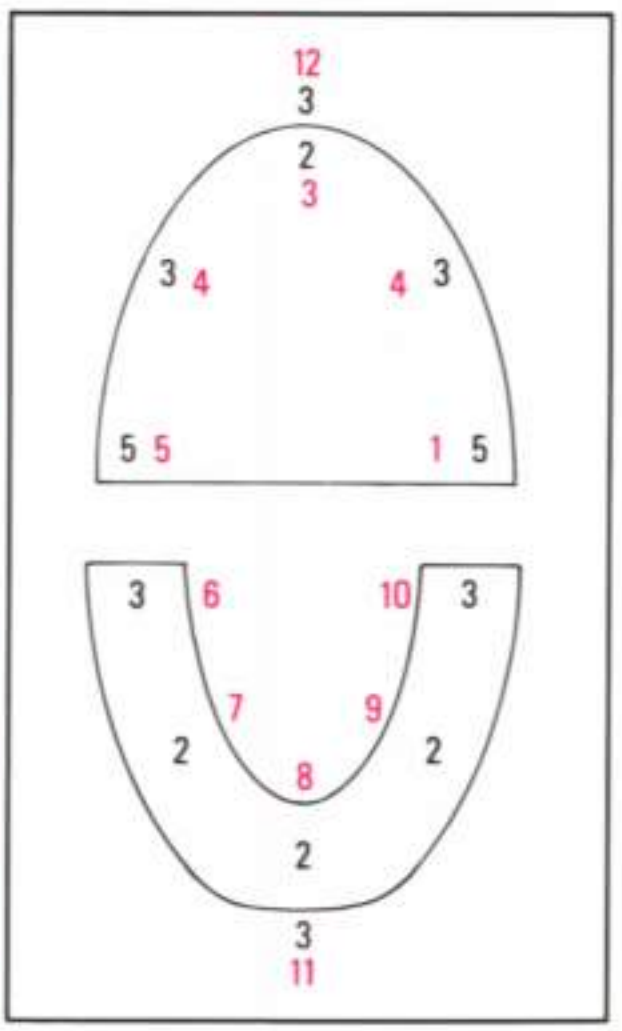

Fig. 2-2

Fig. 2-1a-c Although a panoramic radiograph is reliable for viewing general bony features of the maxilla and mandible, standard dental radiographs must be used to examine details of localized bone conditions.

Fig. 2-2 The diagram shows standard periapical radiographic film positions (red) and appropriate exposure times (black) for each region using the Yoshida X-60 at 60KVp, 10mA.

Fig. 2-3 Occlusal view of maxillary edentulous ridge.

Fig. 2-4 Close-up view of the maxillary left molar area.

Fig. 2-5 Initially take a radiograph of the maxillary left posterior region.

Fig. 2-6 Check the relative position of the collimator to the patient. For the maxillary left posterior region, direct the tube from above and behind with a slight forward inclination toward the posterior portion of the zygomatic arch.

Fig. 2-7 A radiograph of the maxillary tuberosity region appears clear with "white lines" representing compact bone or more dense bone. In this situation, there is little concern about bone resorption and a stable denture can be made with good adaptation. The projection seen below represents the coronoid process.

Fig. 2-8 For the next radiograph, direct the collimator from above, toward the anterior portion of the zygomatic arch. Check the relative position of the collimator and film to obtain a radiographic image of good diagnostic quality. Avoid positioning the collimator directly horizontal for maxillary radiographs.

Fig. 2-9 It is important to examine the relation between the bone margin and tissue margin. The thickness of mucosa over bone is important to denture stability. Problems can occur with a denture when the mucosa is very thin over supporting bone. Thick mucosa such as masticatory or attached gingiva can provide a stable denture base.

Fig. 2-10 Intraoral view of the maxillary anterior region.

Fig. 2-3

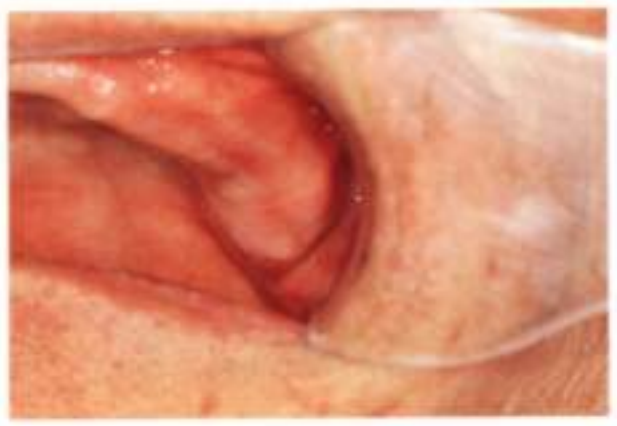

Fig. 2-4

Fig. 2-5

Fig. 2-6

Fig. 2-7

Fig. 2-8

Fig. 2-9

Fig. 2-10

Fig. 2-11

Fig. 2-12

Fig. 2-13

Fig. 2-14

Fig. 2-15

Fig. 2-16

Fig. 2-17

Fig. 2-18

Fig. 2-11 Note the position of the film in the maxillary anterior region.

Fig. 2-12 Move the collimator in front of the patient and position it over the tip of the nose.

Fig. 2-13 A radiograph of the maxillary anterior region shows irregularities in the bone. The irregularities may indicate a potential for further bone resorption.

Fig. 2-14 Intraoral view of the maxillary left molar area.

Fig. 2-15 Position the collimator to take a radiograph of the premolar area.

Fig. 2-16 The radiograph of the premolar area shows a different bone quality when compared to the anterior radiograph. Although the image produced is a result of the exposure direction, it is diagnostic for indicating the thickness of the mucosa.

Fig. 2-17 For the maxillary right molar area, the collimator is directed from above and behind with a slight forward inclination.

Fig. 2-18 The radiograph of the maxillary right posterior region shows good bone quality as seen with the left posterior region. The good quality is observed when there is adequate compact bone and also adequate alveolar bone height in the maxillary tuberosity region.

Fig. 2-19 Occlusal view of the mandibular alveolar ridge.

Fig. 2-20 Close-up view of the left mandibular molar area.

Fig. 2-21 Proceed with taking radiographs of the posterior mandibular edentulous ridge.

Fig. 2-22 For the right mandibular posterior region, position the collimator perpendicular to the face and film.

Fig. 2-23 The radiograph of the mandibular posterior region shows the anterior margin of the ramus. Mandibular bone is extremely dense.

Fig. 2-24 Move the collimator forward and direct the tube perpendicular to the face and film for the right mandibular premolar area.

Fig. 2-25 Although the bone surface may feel rough clinically, the radiograph may not show large irregularities; the stability of the denture is not compromised with these types of irregularities. There appears to have been minimal bone resorption when observing the height of alveolar bone relative to the position of the mental foramen, and the quality of bone is adequate.

Fig. 2-26 Intraoral, frontal view of the mandibular anterior region.

Fig. 2-19

Fig. 2-20

Fig. 2-21

Fig. 2-22

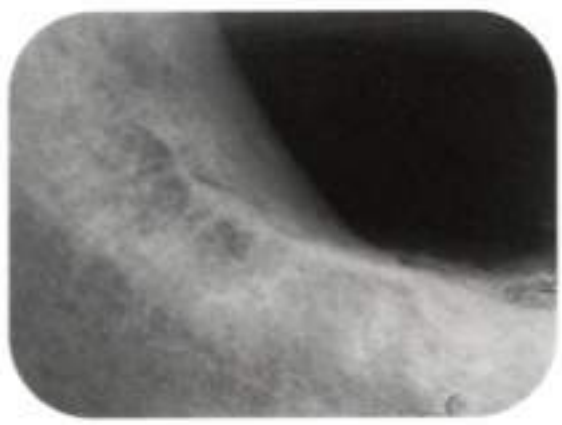

Fig. 2-23

Fig. 2-24

Fig. 2-25

Fig. 2-26

Fig. 2-27

Fig. 2-28

Fig. 2-29

Fig. 2-30

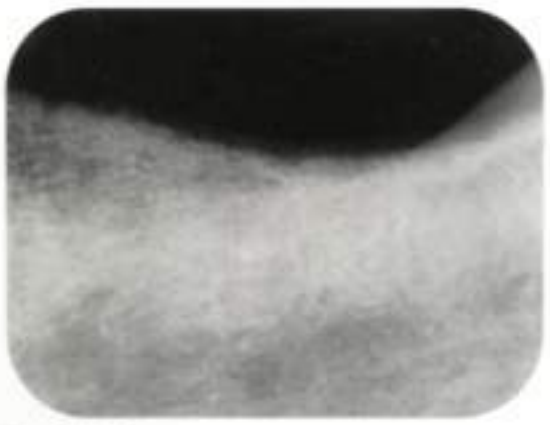

Fig. 2-31

Fig. 2-32

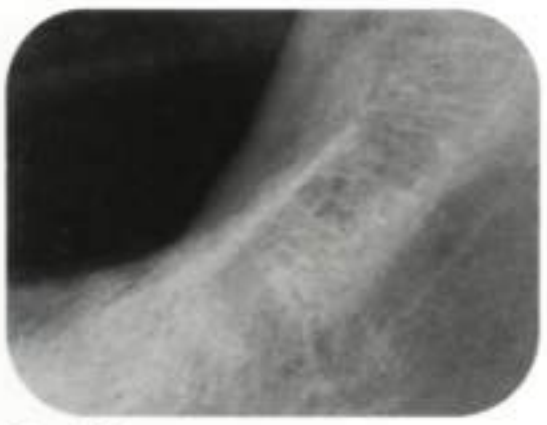

Fig. 2-33

Fig. 2-34

Fig. 2-27 For the mandibular anterior region, direct the collimator horizontally in front of the patient.

Fig. 2-28 The radiograph of the mandibular anterior region shows irregularities which can indicate future bone resorption.

Fig. 2-29 Close-up view of the mandibular left molar area.

Fig. 2-30 For the mandibular left premolar area, direct the collimator similar to the position used for the right premolar area.

Fig. 2-31 The radiograph shows dense compact bone similar to the radiograph of the right side (Fig. 2-23).

Fig. 2-32 Take the radiograph of the mandibular left molar area with the collimator in a horizontal position.

Fig. 2-33 The radiograph of the mandibular left molar area includes the anterior margin of the ramus.

Fig. 2-34 Intraoral, occlusal view of the mandibular anterior region.

Fig. 2-35 Take a radiograph of the mandibular anterior region with the collimator directed from below the chin.

Fig. 2-36 The radiograph shows adequate width of the alveolar ridge and adequate compact bone quality. Also, salivary stones or inclusions can be identified with this radiographic angle.

Fig. 2-37 Complete set of radiographs for maxillary and mandibular edentulous arches.

Fig. 2-35

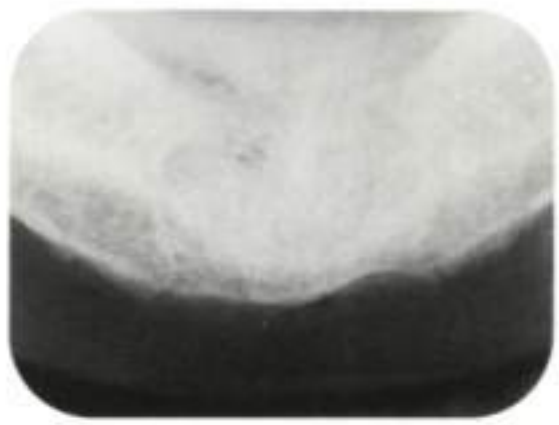

Fig. 2-36

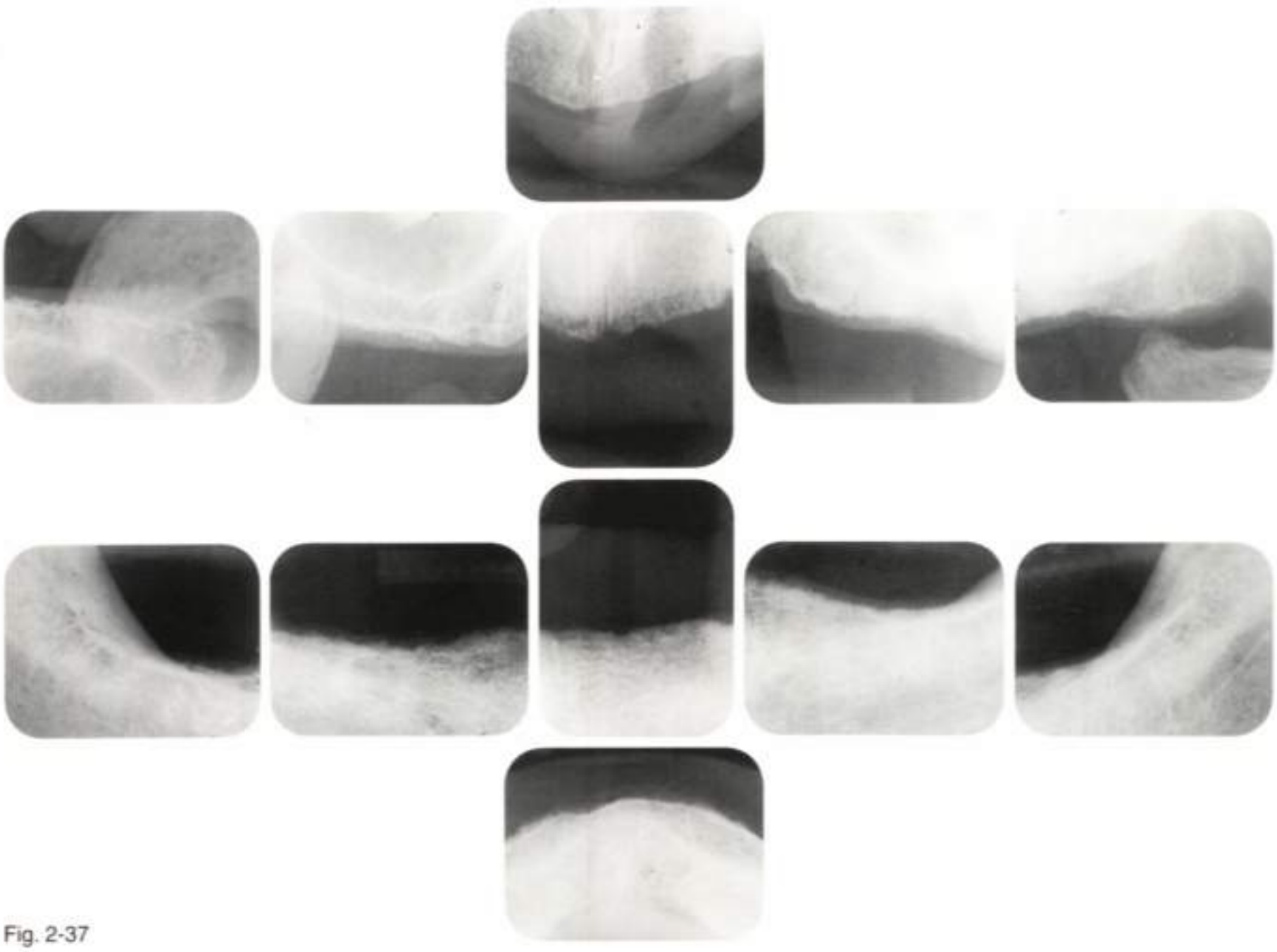

Fig. 2-37

Chapter 3

The Interim Maxillary Denture

When making interim dentures, begin with the maxillary denture. In this discussion, the current denture will be used as an interim prosthesis. By using a material such as Fit-Checker, the adaptation of the denture on the tissues can be evaluated. The material also helps indicate pressure areas that are potential problems even though the patient may not have a complaint at this time.

When using Fit-Checker, apply light finger pressure and instruct the patient to avoid occluding the teeth during the examination. With poor denture occlusion, the denture is moved as the patient occludes which creates false pressure areas. Gently push the denture toward the tissues while guiding it into position. The occlusion will be checked after evaluating the denture-to-tissue adaption and improving the centric relation position. After verifying the general occlusal relation, use a tissue conditioning material.

The denture fit, occlusion, and centric relation position affect the method for making the interim denture, although the initial treatment requires use of a tissue conditioner. Any errors in occlusion cannot be related directly to the thickness of tissue conditioning material in the denture. If a fulcrum exists in a certain position, rotational displacement will occur despite filling any voids with tissue conditioner. So lateral movements should be made harmoniously from a coincident centric occlusion-centric relation position to various eccentric positions.

Disregard any discrepancies in vertical dimension of occlusion, either high or low, and check the fit of the denture as if it were a custom impression tray. Check for pressure areas using Fit-Checker, since the denture may be used as an interim prosthesis. The two depressions on either side of the midline at the posterior border of the denture are commonly referred to as the fovea palatinae. The line connecting the hamular notches distal to the maxillary tuberosities and posterior to the fovea palatinae represents the approximate vibrating line, sometimes referred to as the "ah-line".

From the approximate position of the vibrating line, estimate the curvature of the transitional region between the throat and palate. There are differences in throat curvature which can be categorized according to three classifications developed by Dr. House. Type 1 has a flat form with a straight posterior extension, Type 2 is the intermediate form, and Type 3 has a sharp drop posterior to the vibrating line.

Fig. 3-1

Fig. 3-2

1. Tissue Conditioning

Fig. 3-1 Make the interim denture more stable by placing a tissue conditioning material on the tissue-bearing surface of the current denture. The material fills voids which have developed by displacement of the denture. Although spaces are filled, denture displacement can still occur with an interference that creates a fulcrum.

Making adjustments on the tissue-bearing surface either by visual inspection or following a patient's complaint does not solve problems at this time since a balanced occlusion has not been checked in centric relation position. So if pressure areas such as those shown in the figure are adjusted, the adjustments do not correct rotational displacement problems.

Fig. 3-2 When placing the tissue conditioning material, the posterior border of the denture is easily overlooked. The tissue conditioner can help identify the vibrating line as well as the posterior border of the denture. So the post-dam technique is important for adjusting the denture. The posterior border should adequately cover the posterior region as shown in the figure.

Fig. 3-3 In order to accurately form the posterior border of the denture, it is important to review classification of this anatomical region. A well-known system is Dr. House's classification referred to as Type 1 (a), Type 2 (b), and Type 3 (c). When the vibrating line appears to have a flat transition into the soft palate, it is called Type 1 (a), the intermediate form is Type 2 (b), and the form with a sharp transition posterior to the vibrating line is Type 3 (c).

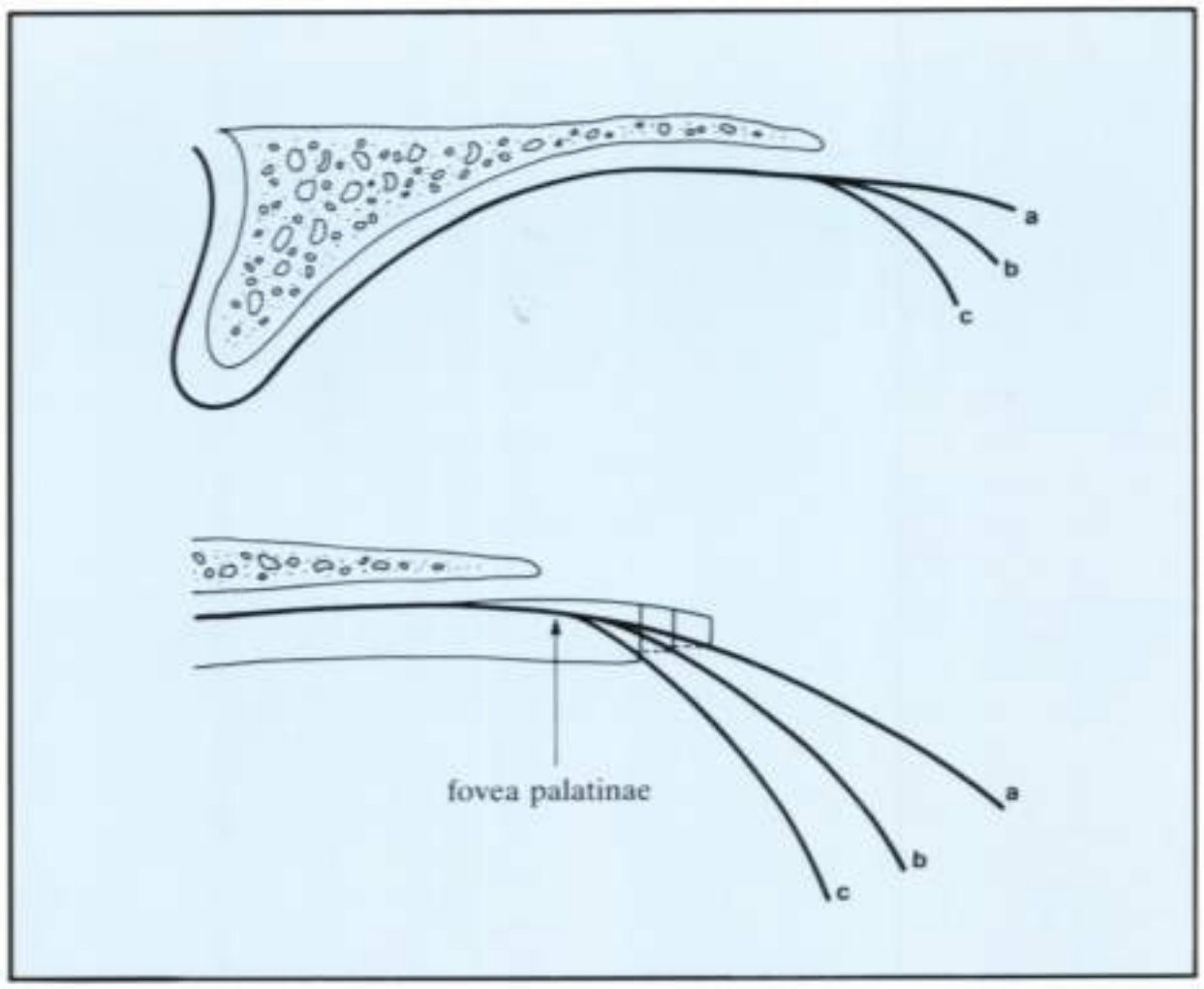

Fig. 3-3

2. Check for Pressure Areas.

Fig. 3-4 First check the fit of the denture intraorally using a silicone material designed for this purpose such as Fit-Checker. Apply the material on the tissue-bearing surface of the denture and position of the prosthesis intraorally. Poor adaptation is determined from a difference in color and thickness of material throughout the denture. Direct contact/pressure areas have only a thin layer of material, so the spot is marked using a pencil on the denture base through the material.

Fig. 3-4

Fig. 3-5 Check the various thicknesses of silicone material and make certain all pencil marks are completed.

Fig. 3-5

Fig. 3-6 There is a pressure spot near the buccal frenum, so it is necessary to reduce this region. Since the frenum is attached directly to the mucosa producing pulling forces, this may cause denture displacement or sore areas. Extensive flange reduction can be done since a tissue conditioner will be used.

The ideal thickness of tissue conditioner is 2mm since this covers the denture base completely; any less and the denture base is visible.

Fig. 3-6

Fig. 3-7 Too great a thickness of tissue conditioner reflects a large amount of space between the denture and tissue. Try to avoid a thickness greater than 2mm; if too large a space exists, reinforce the area with a reline resin rather than tissue conditioner. In this instance, remove more denture base material prior to using the reline material.

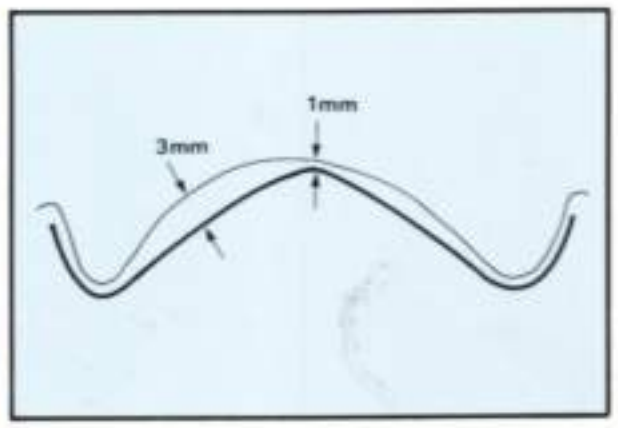

Fig. 3-7

Fig. 3-8

Fig. 3-9

Fig. 3-10

Fig. 3-11

Fig. 3-12

3. Metal Base Preparation

Fig. 3-8 The tissue-bearing surface of a metal base denture must be microblasted with alumina before adding tissue conditioner. The material will not stick to a metal surface microblasted with glass beads.

Fig. 3-9 After microblasting, the metal surface has a dull finish and resin will stick to this type of surface.

Fig. 3-10 The post-dam technique mentioned earlier requires posterior denture border extension to the vibrating line. If the posterior border does not extend adequately, form an extension with wax. Heat the wax and add it to the posterior border. Trim excess wax with a warm blade.

Fig. 3-11 Add sufficient wax so the region between metal and wax is firm. Excess thickness is bent slightly toward the occlusal surface. Be careful to avoid excess wax in the molar regions otherwise the wax may prevent maximum intercuspation between maxillary and mandibular dentures.

Fig. 3-12 Occlusal view of the existing denture with posterior border extension completed in wax. Smooth the transition between the denture and wax by heating it slightly.

Fig. 3-13 View of the tissue-bearing surface of the modified denture. The posterior border has been extended to the vibrating line and covers the fovea palatinae. Also, it is important to extend beyond the maxillary tuberosities and into the hamular notches.

Fig. 3-14 To adapt wax as shown in the figure, heat it with a small flame, insert the denture intraorally, and use pressure to adapt the wax on the mucosal surface. Do not push the posterior border region of the palate too firmly at this time. If too much pressure is used in the posterior region, there will not be adequate resin as it flows toward the posterior. Apply enough pressure to see some movement of the wax when it has been warmed before insertion.

Fig. 3-15 Remove a small layer of resin from the tissue-bearing surface of the denture. Apply the Kooliner, insert the denture, and allow it to set intraorally. It is not irritating nor has a bitter taste and its maximum temperature does not exceed body temperature. Other liners may cause irritation and in turn, cause the patient to move excessively in order to endure the discomfort, thus making it impossible to obtain an adequate tissue registration.

Fig. 3-16 Microblast the metal surface then apply the Kooliner over the entire tissue-bearing surface.

Fig. 3-17 Place the denture intraorally and have the patient occlude into centric relation. Since there is some resistance to seating due to the reline resin, hold the premolar regions bilaterally with the left index finger and thumb to avoid denture displacement. If there is a large discrepancy in the denture occlusion, it will be compensated for during this procedure.

Fig. 3-13

Fig. 3-14

Fig. 3-15

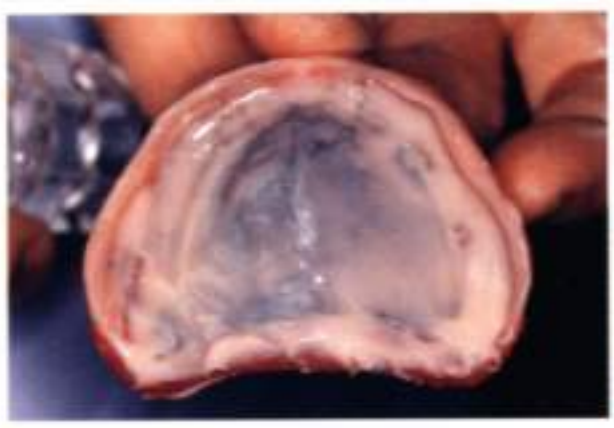

Fig. 3-16

Fig. 3-17

Fig. 3-18

Fig. 3-19

Fig. 3-20

Fig. 3-21

Fig. 3-22

Fig. 3-23

Fig. 3-24

Fig. 3-25

Fig. 3-18 Intraoral view of the adapted denture. Confirm if the Kooliner has adequately covered the posterior border; if not, additional material can be added to inadequate areas.

Fig. 3-19 Remove the denture and verify that the Kooliner has thoroughly covered the surfaces. Make certain that the surface is covered completely without voids.

Fig. 3-20 Once the liner has hardened, place the denture in warm water to soften the wax for easy removal. The warm water also promotes polymerization.

Fig. 3-21 After removing the wax, there is a groove left where the wax was placed at the posterior border. Fill this later to make a smooth transition and to reinforce the denture.

Fig. 3-22 Add a thin mix of Kooliner to the groove left after the wax has been removed.

Fig. 3-23 If the posterior border is still deficient, add more Kooliner to the area then insert the denture intraorally.

Fig. 3-24 After reinforcing the palatal and tissue-bearing surfaces, excess material flows over both sides. Make certain that there is no posterior tissue contact even if the vibrating line cannot be seen; check if the uvula moves upward when the patient inhales rapidly, takes a long, deep breath, or says "ah, ah" quickly.

Fig. 3-25 Reduce the thickness of the Kooliner at the posterior border of the denture to smooth the transition in this region.

Fig. 3-26 When necessary, add additional Kooliner over the posterior border. If the transition is extended further on the metal surface, microblast the metal surface where desired.

Fig. 3-27 The interim denture is completed. The tissue-bearing surface does not have the same shape as a denture completed from an impression but only serves as a matrix for placement of tissue conditioner. This finish is adequate since a tissue conditioner will be placed over the relined surface.

Fig. 3-28 Tissue conditioner (COE/Kooliner).

Fig. 3-26

Fig. 3-27

Fig. 3-28

Chapter 4

The Interim Mandibular Denture

Check the adaptation of the mandibular denture in a similar manner as done with the maxillary denture. Figure 4-1 shows the tissue adaptation of the mandibular denture using Fit-Checker. Disregard some of the inadequate extensions seen in the retromolar pad area. From this evaluation, an obvious pressure area appears at the lingual frenum region which caused a decubital ulcer. The denture metal border is over-extended. This and other areas visible on the labial surface should be adjusted or reduced. Other pressure areas are seen along the buccal shelf. The tissue-bearing surface on the lingual area of the metal base is not adapted well and appears to extend over the sublingual glands bilaterally. After adding resin, the lingual surface of the alveolar ridge can be reproduced along the tissue surface.

As described previously, the fitting procedures are initiated on the interim maxillary denture prior to fitting the mandibular denture. As a general assumption, the maxillary denture moves horizontally during mastication. Most dentists assume that the mandibular denture moves more easily when compared to the maxillary denture; this type of thinking can interfere with denture fabrication procedures.

When referring to movement or rotation of the maxillary denture, this implies a horizontal movement, anteriorly, posteriorly, and in a right or left direction. Since the maxillary denture moves easily, it is important to realize that the movement problem is based on poor tissue adaptation or a poor occlusion. The maxillary denture should have adequate retention and a firm foundation to achieve denture stability.

After achieving a dramatic effect such as improved denture stability, the patient believes the maxillary denture is more comfortable. This instills better patient cooperation and a desire to continue with treatment, an important aspect in any type of clinical treatment. If the patient subconsciously hesitates to return to the clinic, the practitioner has failed to instill confidence and an atmosphere where the patient can anticipate positive, progressive events. When initiating treatment on a patient, and to

enhance the patient's trust and confidence, improve maxillary denture stability first in the denture fabrication process, then make the mandibular denture fit the maxillary denture.

Fig. 4-1

Fig. 4-1 Evaluate the tissue-bearing surface using Fit-Checker. Note the lingual margin of the metal base shows a pressure contact, a cause for sore spots as seen in Figures 1-10 and 1-15.

Fig. 4-2 Since the pressure areas are visible through the Fit-Checker, mark the exposed areas using a pencil before removing the material. This is the same procedure followed for the maxillary denture.

Fig. 4-2

Fig. 4-3 The marked areas indicate exposed areas in the anterior region that require reduction.

Fig. 4-3

Fig. 4-4 Reduce the metal portion of the denture using a heatless stone. The heatless stone is more efficient than carborundum since it is made of hardened cement.

Fig. 4-4

Fig. 4-5 Reduce the labial area of the anterior region. Since resin will be added, remove a layer of resin throughout the surface in a similar manner done with the maxillary denture. Kooliner will not adhere to a contaminated surface and its use requires that exposed metal is microblasted using alumina. Prepare both the lingual and tissue-bearing surfaces since both contours will be modified.

Fig. 4-5

Fig. 4-6 Use Exa Dental or Masamune green points since they produce smooth surfaces. While making adjustments, keep the denture wet. The denture resin is susceptible to heat, so the water helps prevent heat generation and rinses debris from the surface. This process requires a towel under the denture for excess water and an additional person to provide the water spray.

Fig. 4-6

Fig. 4-7, 8 All pressure areas have been relieved and the metal base has been microblasted with alumina in order to prepare the denture for the Kooliner reline material.

Fig. 4-7

Fig. 4-8

Fig. 4-9

Fig. 4-10

Fig. 4-11

Fig. 4-12

Fig. 4-13

Fig. 4-14

Fig. 4-15

Fig. 4-16

Fig. 4-9 Initially apply resin to the lingual surface of the denture rather than the entire tissue-bearing surface. Use the resin to prepare the ideal shape for the denture. There is no need to adapt the tissue-bearing surface at this time.

Fig. 4-10 Next, build the tissue-bearing surface with the reline resin. Use a sufficient amount of resin to save time rather than applying a thin layer.

Fig. 4-11 Place the denture intraorally.

Fig. 4-12 Guide the mandible into centric relation position. This maxillomandibular relation is important in complete denture treatment.

Fig. 4-13 Note the improved lip support in the anterior area compared to the original appearance; the patient has a rejuvenated feeling with this change in esthetics. Also, the vertical dimension of occlusion has been improved considerably.

Fig. 4-14 View of the tissue-bearing surface of the mandibular denture; note the borders and area adjacent to the sublingual glands. The denture has been shaped by changing the denture borders, either reducing thick borders or adding material to other areas.

Fig. 4-15 Add material to the lingual surface even though the retromolar pads have not been reproduced.

Fig. 4-16 Next, add material to the buccal surfaces to obtain a balance between the denture and buccal mucosa. The neutral zone is established in the buccal regions using Kooliner to fill any deficient areas.

Fig. 4-17 Add Kooliner to the inner surface of the lingual flange throughout the denture.

Fig. 4-18 Build-up the borders with a stiff mix of material. The lingual border is short and thick, so add resin to extend the border.

Fig. 4-19 View of completed denture border additions. Originally the borders were too wide, but the additions in thickness do not bother the patient in these regions. Initially, the lingual regions were built-up followed by the buccal regions; both the lingual and buccal regions create the neutral zone.

Fig. 4-20 After the additions, the denture is placed intraorally and the patient is instructed to occlude into centric position. The tongue position after swallowing helps determine the lingual margin; the tongue should be on the lingual surface in the anterior region of the denture. Maintain this tongue position after swallowing, without displacing the mandible anteriorly. It is important to have the patient practice before determining the final position.

Fig. 4-21 The lingual border of the denture appears long and although unsymmetrical, the borders reflect the results of the resin build-up in the area. The extent of the lingual border is determined by contracting the mylohyoid muscles when the patient presses the tongue on the lingual surfaces of the anterior teeth.

Fig. 4-17

Fig. 4-18

Fig. 4-19

Fig. 4-20

Fig. 4-21

Fig. 4-22

Fig. 4-23

Fig. 4-24

Fig. 4-25

Fig. 4-26

Fig. 4-27

Fig. 4-28

Fig. 4-29

Fig. 4-22 The posterior borders are not complete even though some material has been added in the retromolar pad areas. Extend the border further than the "old" denture which may still be inadequate.

Fig. 4-23 The retromolar pad regions are shaped and built-up by hand. Prior to handling the resin material, wet the hands with Kooliner liquid which unlike other resins, is not very irritating. Paint additional Kooliner liquid on the denture base to make it more compatible with the resin.

Fig. 4-24 Form the approximate shape of the retromolar pad region using the fingers.

Fig. 4-25 Place the denture intraorally, and press and cover the retromolar pad region with the finger. The tip of the finger presses along the attachment of the masseter muscle to help form the retromolar pad region. The buccal shelf is anterior to this area and is not related to the shape of the retromolar pads.

Fig. 4-26 Note how the final shape of the denture is gradually completed.

Fig. 4-27 Additional material has been added to this area and the indentation created at the junction will be filled later.

Fig. 4-28 Add resin to the junctions to create a smooth transition.

Fig. 4-29 The left side of the denture is shaped in a similar manner.

Fig. 4-30 The inner surface is formed with the fingers prior to insertion.

Fig. 4-31 The retromolar pad area has been formed with the fingers and does not have to be accurate since a Kooliner wash will be done later.

Fig. 4-32 After completing the posterior borders, add material in the lingual frenum region. This is an important area since it relates to the tongue. This patient does not have a good relation since it appears to be deficient and restricted.

Fig. 4-33 Intraoral view of the patient's left side. The retromolar pad region is good but the masseter muscle area may be inadequate and require additional resin.

Fig. 4-34 Instruct the patient to occlude lightly into centric relation position. The operator can help guide the mandible although the patient may be familiar with the position, since the procedure has been rehearsed with opening and closing movements.

Fig. 4-30

Fig. 4-31

Fig. 4-32

Fig. 4-33

Fig. 4-34

Fig. 4-35

Fig. 4-35 All deficient regions of the denture base borders are built up near completion.

Fig. 4-36 After the build-up procedures have been accomplished, complete polymerization of the Kooliner under pressure in a Hydroflask. Fill the flask with hot water, 40-50 degrees Centigrade, and 50 pounds per square inch; this creates uniform density of resin without porosity. This procedure is effective when using other chemical-cure resins.

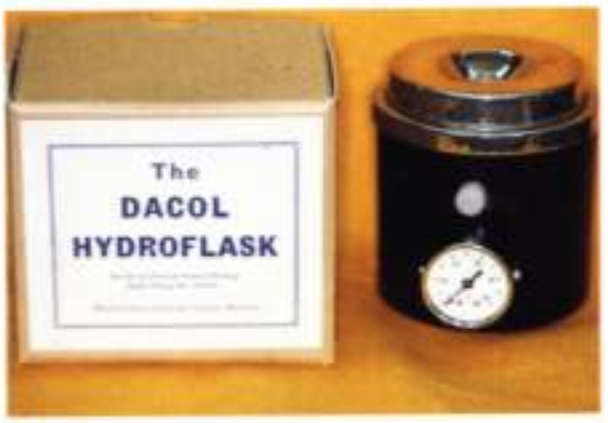

Fig. 4-36

Fig. 4-37 Use Fit-Checker to evaluate the tissue-bearing surface of the denture after processing the resin.

Fig. 4-37

Fig. 4-38 Place Fit-Checker in the denture, insert the denture intraorally, and instruct the patient to occlude.

Fig. 4-38

Fig. 4-39 Verify the mandibular position and instruct the patient to occlude into centric relation, then close their lips together. If necessary, guide the mandible into position.

Fig. 4-39

Fig. 4-40 After removing the denture, evaluate areas that are exposed, referred to as "show-through" areas. "Show-through" areas reveal over-extended areas of resin or metal base, such as the metal base visible in the ridge region. The lingual appears to be deficient since the thickness of Kooliner is greater than other areas.

The left lingual posterior region is over-extended since the denture resin is visible; this area should be reduced since it affects tongue movement. Check the tongue movements and positions as performed previously.

Fig. 4-41 Mark the pressure areas with a pencil on the exposed resin.

Fig. 4-42 Reduce and remove a small layer of resin.

Fig. 4-43 Create a wide space for the tongue by reducing the lingual of the denture base and tissue-bearing surfaces; both are important in relation to the tongue.

Fig. 4-44 Reduce unnecessary thickness on the lingual border regions, including metal. Polish exposed metal using a large point and water spray while holding the denture over a towel.

Fig 4-45 View of the border shape for the mandibular denture. The inner surface is well-defined with the correct form.

Fig. 4-46 Although the inner surface has wrinkles in the material, they are not important and will not be incorporated in the final denture.

Fig. 4-47 This denture base border is considered adequate and extends to the retromolar pad. Use Fit-Checker to examine any areas and determine if the thickness of Fit-Checker indicates either insufficient or excessive amounts of resin.

Fig. 4-40

Fig. 4-41

Fig. 4-42

Fig. 4-43

Fig. 4-44

Fig. 4-45

Fig. 4-46

Fig. 4-47

Fig. 4-48

Fig. 4-48 Frontal view of the interim dentures after modification procedures are completed on the "old" dentures.

Fig. 4-49

Fig. 4-49 Lateral (right) view of completed interim dentures. The shape of the borders has been completed using tissue conditioner which covers the junction between the different resins. The posterior borders of the mandibular denture has been extended over the retromolar area to create a foundation for tissue conditioning. The dentition has not been modified since the emphasis has been on improving the denture base-tissue adaptation.

Fig. 4-50 Lateral (left) view of completed interim dentures. Similar to the right side, the posterior border extends over the retromolar pad with additions on the buccal shelf region.

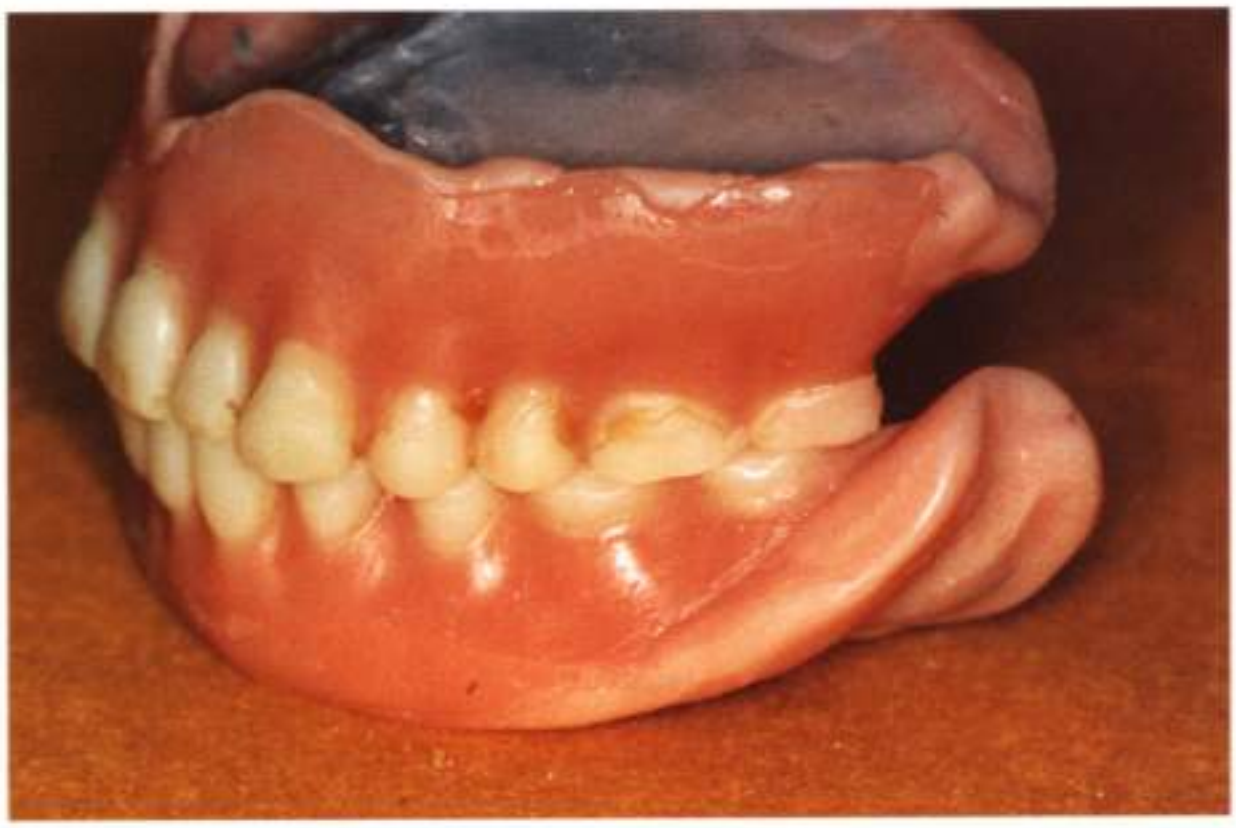

Fig. 4-50

Fig. 4-51 Posterior view of interim dentures in occlusion. Note the curvature of the inner surface. This denture form is necessary since too narrow a tongue space creates an uncomfortable situation for the patient.

Fig. 4-51

Chapter 5

The First Tissue Conditioning

Many types of materials are available for tissue conditioning and generally all are manufactured following ADA specifications. As a result, the different materials appear to be identical but special characteristics become apparent with their use. Materials such as Fit and COE-Comfort are opaque which makes them convenient to use when trying to judge the thickness of conditioner. The semi-transparent materials are difficult to use when trying to estimate the amount of conditioner used to build-up denture borders and the amounts are important when considering the high cost of these materials. Trimming the material is easier one week later, after the patient returns to the clinic.

The manufacturer's recommended powder-to-liquid ratio is 1:1, but with this technique, a slightly more viscous mixture with a ratio of 1:0.8 is necessary to build-up denture borders. Add the powder into the liquid and mix rapidly. The consistency shown in Figure 5-2 resulted from a 1:0.8 powder-to-liquid ratio. Immediately after mixing the material, place it in the maxillary denture since a certain degree of flow is needed to cover the surface area. If this consistency was used in the mandibular denture, the material would flow too easily from underneath the denture. The material is allowed to set longer for a higher viscosity for the mandibular denture. The only difference between the maxillary and mandibular dentures is a slight delay before using the conditioner for the mandibular denture, not a change in powder-to-liquid ratio.

Fig. 5-1

Fig. 5-2

Fig. 5-3

Fig. 5-4

Fig. 5-5

Fig. 5-1 Although the manufacturer's powder-to-liquid ratio is 1:1, a slightly higher viscosity is necessary for border molding, a 1:0.8 ratio.

Fig. 5-2 The material appears less viscous immediately after mixing and this consistency is used in the maxillary denture to cover the large tissue-surface area. This consistency would easily flow from beneath the mandibular denture so allow it to set to a higher viscosity. There is no change in powder-to-liquid ratio for use in the maxillary and mandibular dentures, only a slight time delay before using the material in the mandibular denture.

Fig. 5-3 The appropriate viscosity for the mandibular denture is shown in the figure. Once the material has reached this consistency, it can be used for tissue conditioning the mandibular denture.

Fig. 5-4 The correct consistency is not one where the conditioner can be poured but rather where a spatula can be used to place the material in the mandibular denture. This higher viscosity is necessary or the material will drip when the denture is inverted into position intraorally.

Fig. 5-5 The material is viscous but does flow slightly as shown in the figure.

Fig. 5-6 Instruct the patient to occlude in centric relation and the mandibular position can be maintained using a locator. After the material has set slightly, remove the locator and border mold the conditioner.

Fig. 5-7 Border molding or muscle trimming is done with the maxillary and mandibular dentures occluding lightly.

Fig. 5-8 By having the patient occlude lightly, there is no possibility that the mandibular denture is displaced during muscle trimming. Begin muscle trimming the facial borders in the anterior region after the conditioner does not stick to mucosal surfaces such as the inner surface of the lip.

Fig. 5-9 It is necessary to manipulate the lower lip by pulling and pushing it as though packing the material. Proceed with muscle trimming toward the molar regions.

Fig. 5-10 Muscle trim the buccal regions by pushing the material with the fingers.

Fig. 5-6

Fig. 5-7

Fig. 5-8

Fig. 5-9

Fig. 5-10

Fig. 5-11

Fig. 5-11 During final muscle trimming, instruct the patient to do a forceful, swallowing action as followed when finishing the resin. Instruct the patient to do different tongue movements after inserting the denture intraorally. Maintain the centric relation position with light support since the patient may protrude the mandible during tongue movements. Use finger support in the mental region to prevent the mandible from protruding.

The photo shows the patient swallowing. During the swallowing movement, the hyoid bone moves downward and the area below the chin appears to be pushed externally. The final tongue position is determined after a swallowing movement, so instruct the patient to relax for a natural position.

Fig. 5-12

Fig. 5-12 Note the difference in the thickness of conditioner, the lingual denture base border is thick and the buccal is thin. The thin regions have less than 1mm thickness of conditioner between the denture base and tissues. The excess thickness in the lingual borders indicates that the relation between the tongue and denture base border has not been established completely. As the tongue presses on the lingual surfaces of the anterior teeth, the movable mucosa stretches in this region. The stretched areas fill with conditioner resulting in considerable distance between the lingual mucosa and border of the denture.

Fig. 5-13 Occlusal view of mandibular denture after the first tissue conditioning.

Fig. 5-14 This denture border is well-adapted but a large amount of conditioner fills the area since the molar regions are positioned lingual to the neutral zone. This helps determine the molar positions in the final denture. Too much space buccally should be avoided since the neutral zone is important, as are adequate buccal tissue support and correct buccolingual positions of the posterior teeth.

Fig. 5-15 The other side of the denture also shows a large amount of conditioner between the molars and buccal tissues and helps determine the extent of the neutral zone.

Fig. 5-16 Excess material is trimmed with scissors.

Fig. 5-17 Remove the excess material after cutting.

Fig. 5-13

Fig. 5-14

Fig. 5-15

Fig. 5-16

Fig. 5-17

Fig. 5-18

Fig. 5-19

Fig. 5-20

Fig. 5-21

Fig. 5-22

Fig. 5-18 After removing cut portions of material, trim the borders using a heated spatula. Heat the spatula with a burner until it turns red.

Fig. 5-19 After applying the surface activator, the tackiness on the surface of the tissue conditioner is eliminated, subsequent procedures are made easier, and the dentures will feel better to the patient. Rinse the denture with water after using the activator.

Fig. 5-20 As shown in the figure, remove excess material with a hot spatula. The material is cut by the heat, so smoke is produced during this procedure.

Fig. 5-21 Next, smooth the surface using a Masamune Big Point under water spray. The material and transitional surface are polished at the same time.

Fig. 5-22 Finish the borders and use an Exa Dental point on exposed resin material.

Fig. 5-23 Tissue conditioning the maxillary denture requires a thin mix of material. The tissue conditioner is used immediately after mixing, so the low viscosity permits it to flow onto the maxillary denture as shown in the figure. If the material has a high viscosity and does not flow easily, it may change the occlusal relation since there are no vents for pressure relief. If this occurs with the maxillary denture, the procedure will fail and should be repeated with a low viscosity mix.

Fig. 5-23

Fig. 5-24 Place the conditioner evenly in the denture and immediately insert it into the patient's mouth.

Fig. 5-24

Fig. 5-25 Adapt the posterior border along the palate initially, then mold the anterior borders.

Fig. 5-25

Fig. 5-26 Prevent tissue conditioner from flowing down the throat by displacing excess material toward the anterior region. This technique helps prevent the gag reflex and can be followed when making maxillary impressions later.

Fig. 5-26

Fig. 5-27 Have the patient occlude into centric relation after seating the denture, similar to the procedure followed for the mandibular denture. If the tissue conditioner sticks to the mucosa on the inner surface of the lips, allow the material to set longer before muscle trimming.

Fig. 5-27

Fig. 5-28

Fig. 5-29

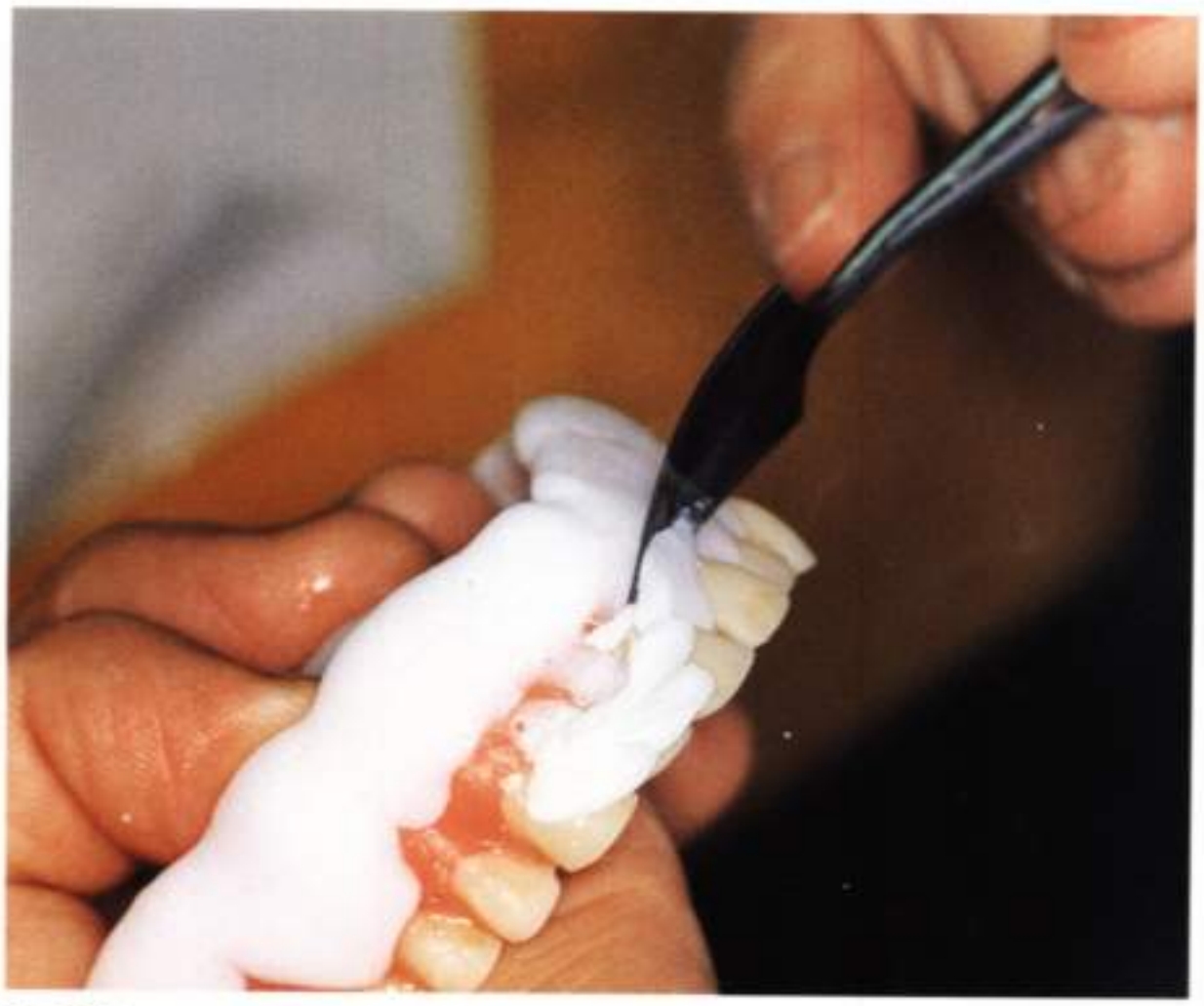

Fig. 5-30

Fig. 5-31

Fig. 5-32

Fig. 5-28 Seat the patient in the dental chair in an upright position when tissue conditioning the maxillary denture. If the conditioner flows toward the throat, quickly wipe the excess to the side with the index finger. To mold the area adjacent to the inner surface of the zygomatic bone, instruct the patient to open the mouth as far as possible then close.

Fig. 5-29 Remove the denture after the conditioner has set, then trim the excess in the posterior region with scissors.

Fig. 5-30 Remove excess material using a hot spatula, similar to removing excess from the mandibular denture.

Fig. 5-31 Sometimes a carbide bur can be used to remove excess but be certain to note the direction of bur rotation. The bur can tear the conditioner if it does not follow a cutting direction from conditioner towards resin.

Fig. 5-32 Other excess material can also be removed using a bur.

Fig. 5-33 Frontal view of completed maxillary and mandibular dentures after the first tissue conditioning.

Fig. 5-34 The right lateral view shows the position of the molars lower than the occlusal plane when using the retromolar pad as a reference. Also, the anterior teeth appear to be placed lingually when observing the gingival transition in the anterior region.

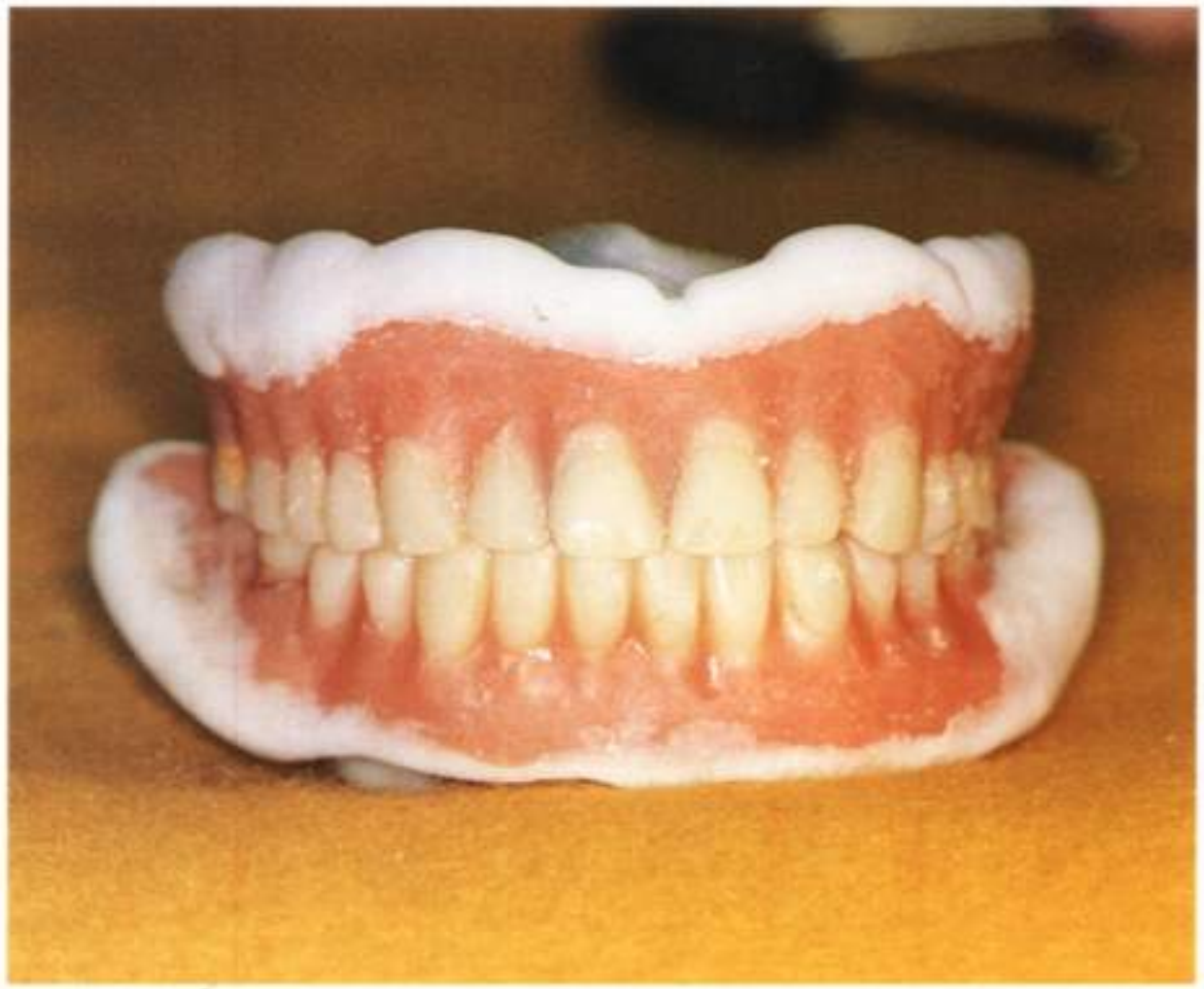

Fig. 5-33

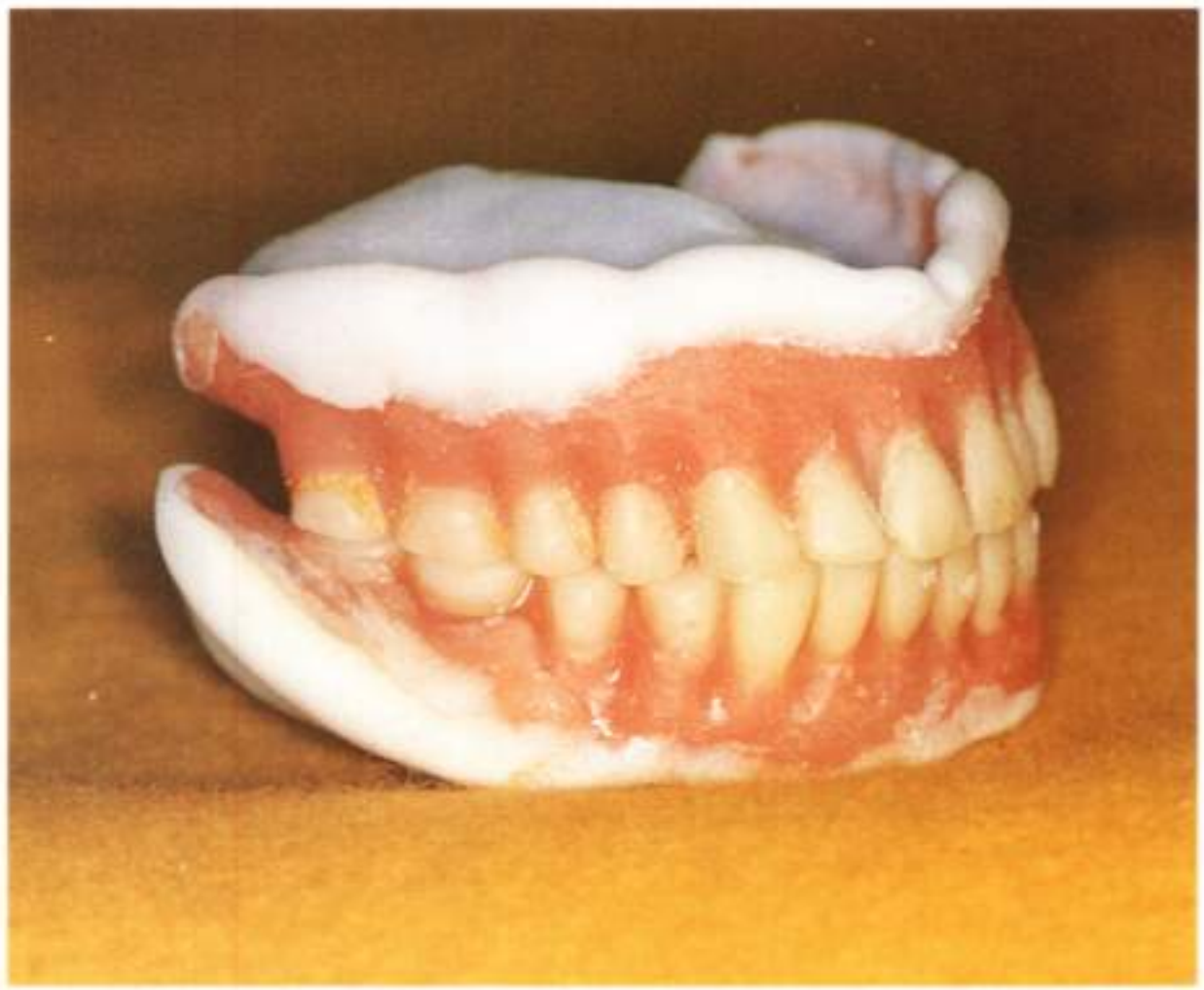

Fig. 5-34

Fig. 5-35

Fig. 5-35 The left lateral view also shows a low occlusal plane. The procedures followed have concentrated on tissue adaptation and border molding the dentures. Problems with the occlusal plane, buccolingual position of teeth, and anterior esthetics will be addressed at a later time.

Chapter 6

The Second Tissue Conditioning

ADA specifications state a five-day effectiveness for tissue conditioners but a one-week interval for the second tissue conditioning is easier in terms of appointment scheduling. If the first appointment is on a Monday, it is easier for the patient to make the next appointment on the following Monday. Another reason for using the one-week interval between appointments is related to the goal of building borders. Tissue conditioning alone is effective when using the five-day interval, but this method also includes building denture borders with the same material.

After one week, the material conforms well to the supporting mucosa and over-extended areas are eliminated during this time interval. If there is a pressure area present, seen as exposed resin or a thin layer of conditioner covering the resin, the pressure area should be relieved completely. Reduce the denture base resin be approximately 2mm to create space for a uniform layer of material during the second tissue conditioning procedure.

There are many factors that may create difficulties during the second tissue conditioning such as variable occlusal forces or occlusal interferences. This situation is difficult but does not create a problem if the vertical dimension of occlusion is increased slightly. With a large occlusal surface area, the load transferred between the maxillary and mandibular dentures affects the load on the tissue conditioner. This results in excess amounts of tissue conditioner flowing out along the borders from the tissue-bearing surfaces of the dentures. The excess material can be removed and adjusted easily. Any other exposed resin areas such as muscle or frenum attachments on the buccal or lingual surfaces, should be reduced by adjusting the resin.

Fig. 6-1

Fig. 6-2

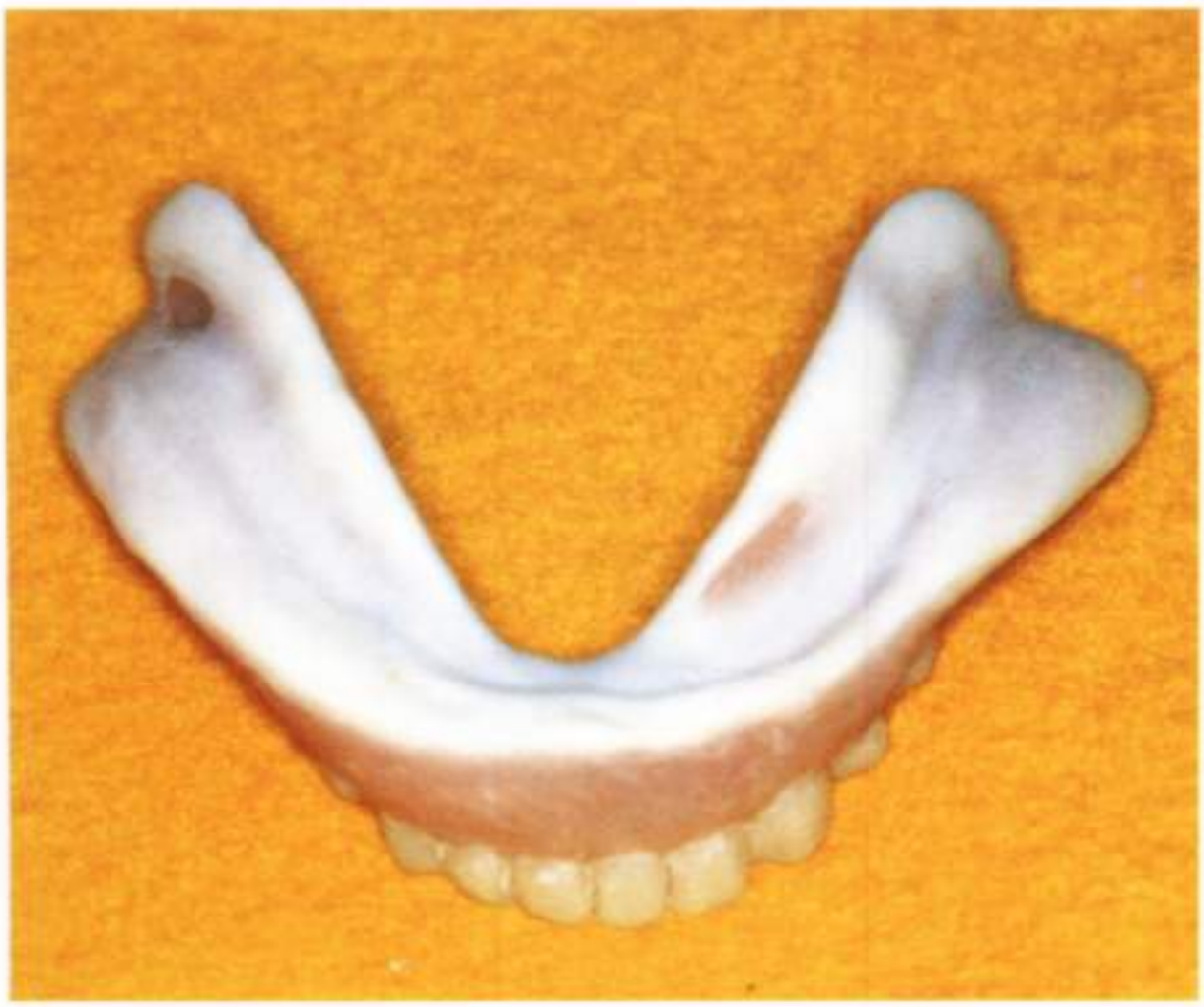

Fig. 6-3

Fig. 6-1 If the vertical dimension of occlusion is increased due to the thickness of the tissue conditioner, this is not a concern since there are various factors such as amounts of occlusal force or occlusal discrepancies which make the procedure difficult.

Fig. 6-2 Note the exposed resin in the figure; it is located on the mandibular left internal oblique line, below the second and third molars. Pressure areas are seen frequently along the sharp bone on the mylohyoid line. If the conditioner has been displaced exposing resin, the areas should be relieved. Although the alveolar ridge has resorbed, areas such as the internal oblique line, external oblique line, and mental spine do not resorb, so pressure areas in these regions should be relieved.

Fig. 6-3 There are pressure areas along the internal oblique line in the molar and premolar regions. These pressure spots are often located along the inner surface where bony protuberances are present. The protuberances are usually located bilaterally instead of unilaterally and are associated with pressure areas since there is only a thin layer of mucosa covering the bone.

Fig. 6-4 The maxillary denture has a pressure area along the inner surface of the anterior region. Few other pressure spots are seen especially in the less undercut areas. All borders are adapted well including borders adjacent to the maxillary labial frenum and buccal frena. No particular area appears to require special consideration.

Fig. 6-5 From another view, pressure areas are seen in the maxillary right rugae region where there is only a thin layer of tissue conditioner covering the resin. This and similar areas should be relieved.

Fig. 6-6 The pressure area in the right rugae region can be seen from an anterior view. The conditioner is thin on the buccal of the second molar area and maxillary tuberosity; this thickness in the border between hamular notch areas is important for the postpalatal seal. If not handled properly, the postpalatal seal can be lost easily.

Fig. 6-4

Fig. 6-5

Fig. 6-6

Fig. 6-7

Fig. 6-8

Fig. 6-7 The view of the tissue-bearing surface shows some exposed resin on the labial surface in the anterior region. The anterior maxillary region is undercut and can result in a pressure area in the final impression. The tissue is displaced in the pressure area and can lead to increased bone resorption, so adequate relief is necessary.

Fig. 6-8 The occlusal view shows an adequate extension along the posterior border. With a worn dentition, it is not possible to chew without applying excessive occlusal pressure.

Fig. 6-9 The lingual of the incisal edges on the anterior teeth show a difference in color. The esthetics have been restored by adding resin on the labial surfaces of the anterior teeth.

Fig. 6-9

Fig. 6-10 Use Coltene Pressure Spot Indicator material to check the adaptation of the tissue-bearing surfaces. This material has the same consistency as Fit-Checker, smooth when set like a silicone impression material, and adheres to the denture base resin. When reducing the resin at an exposed area, the material does not clog the point. It is used to check the borders since it has sufficient rigidity for an underextended border area rather than easily displaced onto the supporting resin. Use of this material depends on the clinical situation.

Fig. 6-10

Fig. 6-11 Mix the Pressure Spot Indicator and place it on the tissue conditioner. Since the standard base-to-catalyst ratio sets slowly, add twice the amount of catalyst to accelerate the setting time.

Fig. 6-11

Fig. 6-12 Check the consistency of the material in the anterior border region. If the material is sticky when the lips are retracted, allow more time for the material to set. After a few moments, begin muscle trimming.

Fig. 6-12

Fig. 6-13 Have the patient open with the denture in position.

Fig. 6-13

Fig. 6-14 When the material flows posteriorly, wipe the excess to the side with the index finger.

Fig. 6-14

Fig. 6-15 After the material begins to set, muscle trim the area below the zygomatic bone toward the philtrum by manipulating the lips with the thumbs. Do both sides at the same time when possible instead of one side at a time. Either hold the maxillary denture with the index fingers or use the mandibular denture to help stabilize the maxillary denture.

Fig. 6-15

Fig. 6-16 Double-check the posterior palatal area for excess material. Be careful when removing excess material since the patient may gag when material extends over the soft palate.

Fig. 6-16

Fig. 6-17

Fig. 6-18

Fig. 6-19

Fig. 6-20

Fig. 6-21

Fig. 6-22

Fig. 6-23

Fig. 6-24

Fig. 6-17 Evaluate the mandibular denture with the maxillary denture in position. Mix the pressure indicating paste.

Fig. 6-18 Although tissue paper has been placed intraorally, it is best to use gauze to absorb excess saliva.

Fig. 6-19 Place an adequate amount of material in the mandibular denture since it flows easily.

Fig. 6-20 Insert the mandibular denture with the maxillary denture in position.

Fig. 6-21 After the material has set slightly, elevate and press the lower lip. Remember that only elevating the lip, may shorten the border extensively.

Fig. 6-22 Repeat the procedure for the premolar regions.

Fig. 6-23 Retract the lips to check the tackiness of the material. Hold the lips in the canine regions to check the anterior border while the patient is instructed to occlude lightly.

Fig. 6-24 Verify centric relation position by using light chin-point guidance. If there is a discrepancy, instruct the patient to occlude into centric relation to prevent denture rotation or displacement while the thickness of the material changes under occlusal pressure. Follow careful procedures when checking centric relation for both the maxillary and mandibular dentures.

Fig. 6-25 Check the border extensions after the material sets. If the denture moves while the material sets, a space can be created at the border leading to an undesirable result.

Fig. 6-25

Fig. 6-26 After the material has set completely, use the air syringe to break the seal. Do not remove the dentures using force only.

Fig. 6-26

Fig. 6-27 The maxillary and mandibular dentures have been removed as a single unit.

Fig. 6-27

Fig. 6-28 Besides the pressure areas in the right palatal rugae region, the fovea palatinae are visible also.

Fig. 6-28

Fig. 6-29 All maxillary and mandibular borders are well-formed with the appropriate thickness.

Fig. 6-29

Fig. 6-30 The lingual tissue-bearing surface on the mandibular denture which had been adjusted previously, appears well-adapted.

Fig. 6-30

Fig. 6-31 Although the premolar region on the opposite side had been relieved previously, the pressure area is still present. If the material used to check adaptation has a very thin extension, too thick, or displaced over the denture, the interim denture has not been completed. If a border is unsupported and displaced easily, it is difficult to determine if it is correct. The material used to check adaptation is important for evaluating both tissue adaptation and border extensions.

Fig. 6-31

Fig. 6-32

Fig. 6-33

Fig. 6-32 The lingual border has the appropriate thickness and contours.

Fig. 6-33 The anterior view of the dentures reveals a considerable thickness of material in the neutral zone adjacent to the molars. This indicates that the molars were set lingually and should be positioned buccally. Vertical dimension of occlusion is important and if increased or decreased, could affect the shape of the neutral zone. When the vertical dimension is correct, the shape of the neutral zone is affected by posterior tooth arrangement.

Although the exact thickness on either the right or left side is difficult to discern, the neutral zone appears large. The length of the borders has little influence at this stage. If there was an inadequate vertical dimension of occlusion with over-extended borders, the dentures would not fit properly, creating a difficult situation. For this reason, the borders are made with a tissue conditioner and if over-extended, will adapt after one week of denture use.

Fig. 6-34 Place a red pencil mark on the inner surface of the denture.

Fig. 6-35 Place an additional mark on the labial where the material is transparent.

Fig. 6-36 The maxillary denture has good form.

Fig. 6-37 Material flow along the borders is good. The outer surface on the right side has been modified before completing the left side.

Fig. 6-38 Remove the material after the adjustment marks have been made.

Fig. 6-39 The material is removed easily in one piece from the maxillary denture since it is firm. Fit-Checker is soft and does not handle in the same manner as the Pressure Spot Indicator.

Fig. 6-40 Relieve all pressure spots indicated by red marks. After completing adjustments, proceed with tissue conditioning.

Fig. 6-41 Use the tissue conditioner following the same procedures used previously.

Fig. 6-34

Fig. 6-35

Fig. 6-36

Fig. 6-37

Fig. 6-38

Fig. 6-39

Fig. 6-40

Fig. 6-41

Fig. 6-42

Fig. 6-43

Fig. 6-44

Fig. 6-45

Fig. 6-46

Fig. 6-42 Begin with the maxillary denture. Normal use of a tissue conditioner requires removal of all previous material as stated in the ADA specifications. However, if this is followed strictly, the borders cannot be defined. Any areas needing relief are adjusted, then a tissue conditioner wash is done over the material present; use the same consistency mixed earlier.

Fig. 6-43 An increased vertical dimension of occlusion may be of concern when using a wash reline over the previous material, but since the patient will function with the dentures, the material continues to adapt during the first two days. Problems do occur when the tissue conditioner is mixed improperly or the material has set before insertion intraorally. If this occurs, repeat the conditioner-wash procedure.

The tissue conditioner should have a low viscosity to flow easily as demonstrated with the original reline for the maxillary denture. A highly viscous material will increase the vertical dimension of occlusion. The amount of material is not critical, but rather the elapsed time after mixing is important to get the correct consistency. Do not place a reline material in the denture if it is too viscous.

Fig. 6-44 Accelerate the rate for setting time of the material by placing the denture intraorally. Once the material does not stick to the tissues, muscle trim the borders on both sides simultaneously.

Fig. 6-45 Border mold both sides of the denture at the same time near the maxillary labial frenum and buccal frena in the premolar regions.

Fig. 6-46 Have the patient open to check for excess material along the posterior border. The coronoid process rotates anteriorly as the patient opens, so by having the patient position into maximum opening, this process border molds the buccal region distal to the second molars. The region below the zygomatic process cannot be molded using fingers, pulling tissues, or by trying to manipulate the buccinator muscle since the zygomatic bone hinders access.

Fig. 6-47 In maximum open position, stabilize the palatal area with the middle finger of the right hand and border mold the premolar regions, bilaterally. The opposing teeth do not occlude by muscle pulling actions alone or the denture could be displaced. So border molding buccal areas can be accomplished while maintaining light finger pressure in the palatal area.

Fig. 6-47

Fig. 6-48 Remove excess material along the posterior border as described previously.

Fig. 6-48

Fig. 6-49 Use scissors to cut the tentative posterior border along the fovea palatinae and slightly distal to the vibrating line.

Fig. 6-49

Fig. 6-50 Cut the regions along the buccal surface and neutral zone when extending beyond the height of contour.

Fig. 6-50

Fig. 6-51 While cutting the excess material, keep the tip of the scissors in contact with the denture base material.

Fig. 6-51

Fig. 6-52

Fig. 6-53

Fig. 6-54

Fig. 6-55

Fig. 6-56

Fig. 6-57

Fig. 6-58

Fig. 6-59

Fig. 6-52 Initially cut the material along the level shown in the figure.

Fig 6-53 Replace the denture intraorally and place gauze on the mandibular denture. Do not use tissue paper since it adheres to wet surfaces and tears easily which could disrupt the procedure.

Fig. 6-54 Mix the tissue conditioner.

Fig. 6-55 Place the material in the mandibular denture when it has sufficient viscosity so that it does not flow when the mixing cup is inverted.

Fig. 6-56 Use a spatula to place the material in the mandibular denture as opposed to flowing the material used for the maxillary denture.

Fig. 6-57 If the conditioner does not wrap around the spatula, wait a few moments before placing it in the denture.

Fig. 6-58 Time the intraoral placement of the denture when the material has set enough so it does not drip off the surface when inverted.

Fig. 6-59 The conditioner should maintain its shape, rather than flow easily.

Fig. 6-60 Verify the centric relation position when the patient occludes since the tissue-bearing surface adapts under occlusal pressure.

Fig. 6-61 Begin border molding when the material does not adhere to the tissues as the lip is retracted.

Fig. 6-62 Check the posterior regions.

Fig. 6-63 Right lateral view.

Fig. 6-64 Left lateral view.

Fig. 6-60

Fig. 6-61

Fig. 6-62

Fig. 6-63

Fig. 6-64

Fig. 6-65

Fig. 6-66

Fig. 6-67

Fig. 6-68

Fig. 6-69

Fig. 6-65 Left lateral view.

Fig. 6-66 Excess tissue conditioner flows over the denture teeth during border molding, unlike the first tissue conditioning.

Fig. 6-67 Only a small amount of conditioner from the mandibular denture has extruded onto the maxillary denture demonstrating a large neutral zone and good borders.

Fig. 6-68 The extent of the neutral zone regions present bilaterally is easily evaluated from a frontal view. The posterior teeth should be arranged buccal to the present positions.

Fig. 6-69 Left lateral view.

Fig. 6-70 The distal area and tissue-bearing surfaces are seen when the dentures are inverted.

Fig. 6-71 The lingual borders appear to have good contours which are important in a denture.

Fig. 6-72 The contour of the anterior lingual vestibule on the mandibular denture appears good.

Fig. 6-73 The anterior region and buccal surface have good contours and the neutral zone in the canine-premolar region is well-formed.

Fig. 6-74 The opposite side shows the final tissue-bearing surface which had a pressure area previously corrected.

Fig. 6-70

Fig. 6-71

Fig. 6-72

Fig. 6-73

Fig. 6-74

Fig. 6-75

Fig. 6-76

Fig. 6-77

Fig. 6-78

Fig. 6-79

Fig. 6-80

Fig. 6-81

Fig. 6-82

Fig. 6-75 View of the tissue-bearing surface of the mandibular denture. The result is acceptable although the tissues have created pressure areas revealing resin and the borders appear slightly longer.

Fig. 6-76 Cut the excess material with scissors in the neutral zone areas.

Fig. 6-77 Cut excess material on the opposite side also.

Fig. 6-78 Use a heated spatula to remove excess material from the anterior lingual surface.

Fig. 6-79 Use a heated spatula to remove material along bilateral, posterior lingual surfaces.

Fig. 6-80 Smoke is produced as the material is cut with the heated spatula.

Fig. 6-81 Smooth rough areas where the material has been cut with a hot spatula.

Fig. 6-82 A shelf is formed, the neutral zone, along the buccals of the molars due to the lingual arrangement of posterior teeth.

Fig. 6-83 Cut excess material on the opposite side.

Fig. 6-84 Use a carbide bur and water spray to remove remaining tissue conditioner over a towel-covered surface. The water spray prevents heat generation which could cause material to stick to the bur.

Fig. 6-85 Continue trimming excess material under water spray.

Fig. 6-83

Fig. 6-84

Fig. 6-85

Fig. 6-86

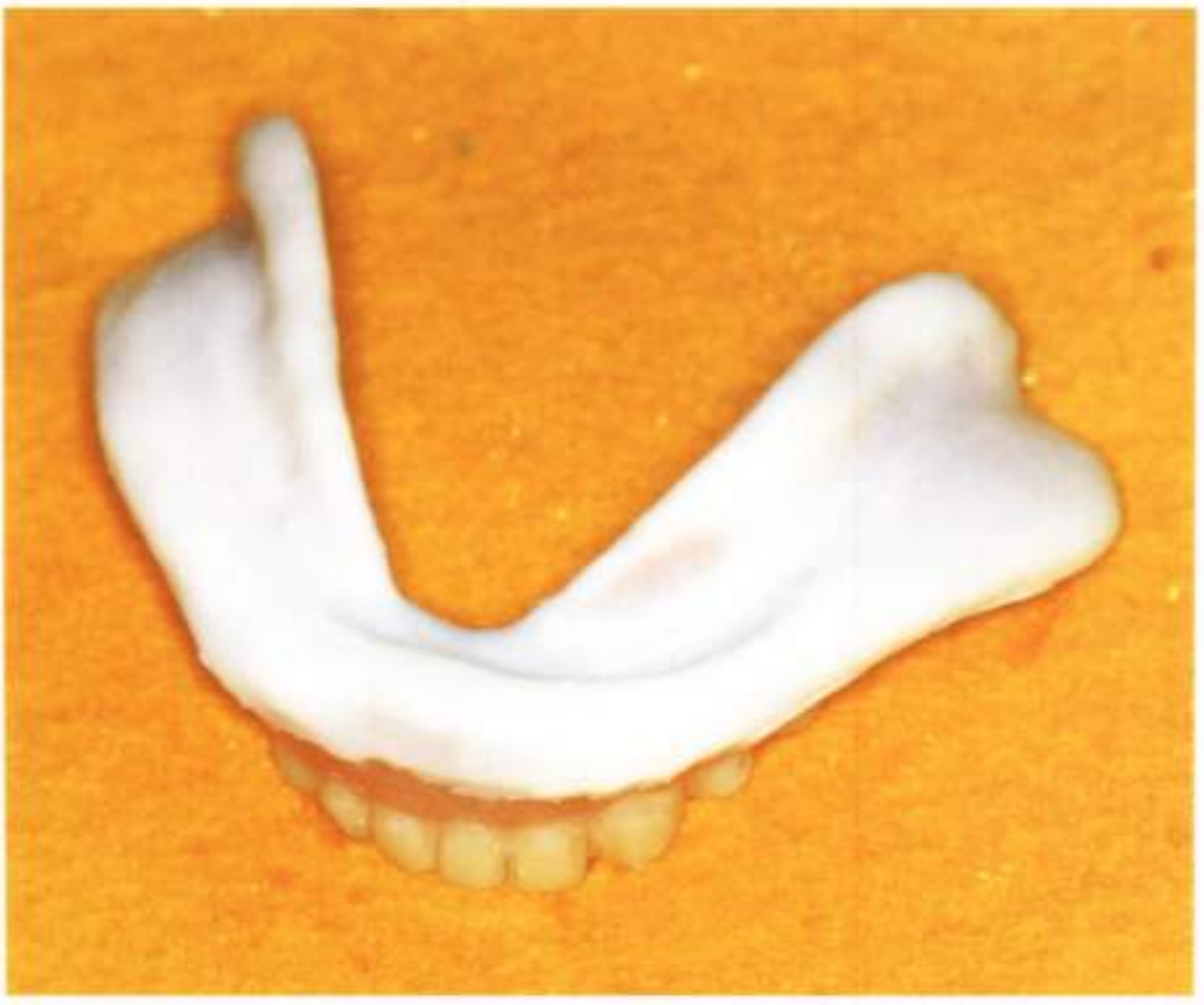

Fig. 6-87

Fig. 6-86 View of the tissue-bearing surface after most trimming has been completed.

Fig. 6-87 View of the tissue-bearing surface, opposite side.

Fig. 6-88 Frontal view showing well-formed borders and smooth surfaces.

Fig. 6-89 Occlusal view showing sufficient material in the transition regions.

Fig. 6-88

Fig. 6-89

Fig. 6-90

Fig. 6-91

Fig. 6-92

Fig. 6-90 Additional demonstration of border molding procedures for the mandibular denture.

Fig. 6-91 Careful attention to detail is important, in particular for the anterior region. The orbicularis oris muscle is stronger than buccal muscles and affects both sides of the labial frena in the region from canine to canine. Do not over-extend the anterior border or the denture could be displaced occlusally.

Fig. 6-92 Push slightly to compensate for the buccal frena but do not pinch the lips.

Chapter 7

Modification of Esthetics and Occlusion

Esthetics is very important in complete dentures. This patient appeared older than her actual age due to the poor esthetics of her present denture. The denture teeth were too small, and the position of the labial gingiva and anterior teeth were arranged for inadequate soft tissue support. After certain problems are resolved, the patient will feel better and become cooperative throughout the various procedures.

The vertical dimension has been corrected by using tissue conditioner on the tissue-bearing surfaces of both dentures. Proceed by evaluating esthetics then consider adjustment of the occlusal surfaces. Before making any further changes, clean the denture well and use an acylic bur to remove a layer of resin from the labial surface.

Fig. 7-1 The vertical dimension relation has been corrected by using tissue conditioner on the tissue-bearing surfaces of both dentures.

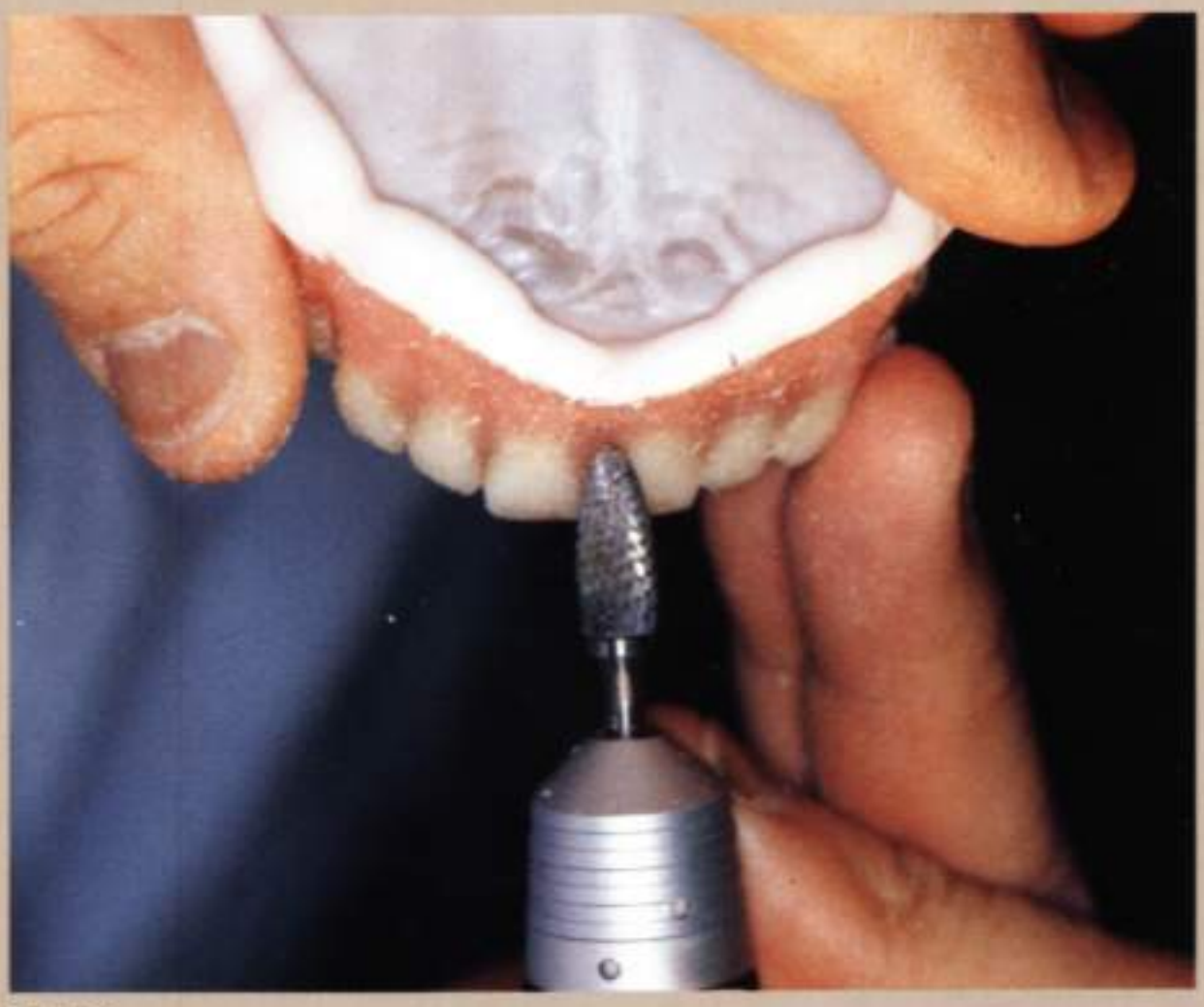

Fig. 7-1

Fig. 7-2

Fig. 7-3

Fig. 7-4

Fig. 7-5

Fig. 7-6

Fig. 7-7

Fig. 7-8

Fig. 7-9

Fig. 7-2 Remove a layer resin from the labial surface to facilitate resin adhesion.

Fig. 7-3 Various tooth-colored resins are available for the following procedure. Alike is an excellent material, available in the same shades as the Trubyte shade guide.

Fig. 7-4 Determine the shade using the Trubyte shade guide. Shade 77 is used for this patient.

Fig. 7-5 Place the monomer (liquid) in a dappen dish, then add the polymer (powder) into the liquid. Although this mixing sequence is best, additional monomer was needed for this mix shown in the figure.

Fig. 7-6 Place a thick layer of resin over the labial surfaces of the anterior teeth. The Alike resin has a fast polymerization time and requires quick skills.

Fig. 7-7 As the resin polymerizes, use a spatula to create the interproximal divisions between teeth.

Fig. 7-8 Place the denture intraorally and use the flat surface of an instrument to create the incisal morphology.

Fig. 7-9 The anterior tooth arrangement has been completed by adding resin to the labial surfaces. The resin addition gives the appearance that the anterior teeth are positioned more labially.

Fig. 7-10 The tissue conditioner has been displaced onto the labial surface of the denture which indicates that the present denture base needs additional resin.

Fig. 7-11 Note the amount and thickness of resin used to build the anterior teeth; this amount corresponds to a more labial tooth arrangement.

Fig. 7-12 Use a disk to finish the interproximal areas.

Fig. 7-14 Modify the shape of the tissue conditioner on the borders.

Fig. 7-15 After modifying the borders and anterior teeth, the denture base appears depressed considerably and requires additional resin.

Fig. 7-16 Add pink resin over the denture base resin; Kooliner was used in this case.

Fig. 7-17 Use a spatula to add the Kooliner. Fill in the area to make a smooth transition between the border and cervical areas of the teeth.

Fig. 7-10

Fig. 7-11

Fig. 7-12

Fig. 7-13

Fig. 7-14

Fig. 7-15

Fig. 7-16

Fig. 7-17

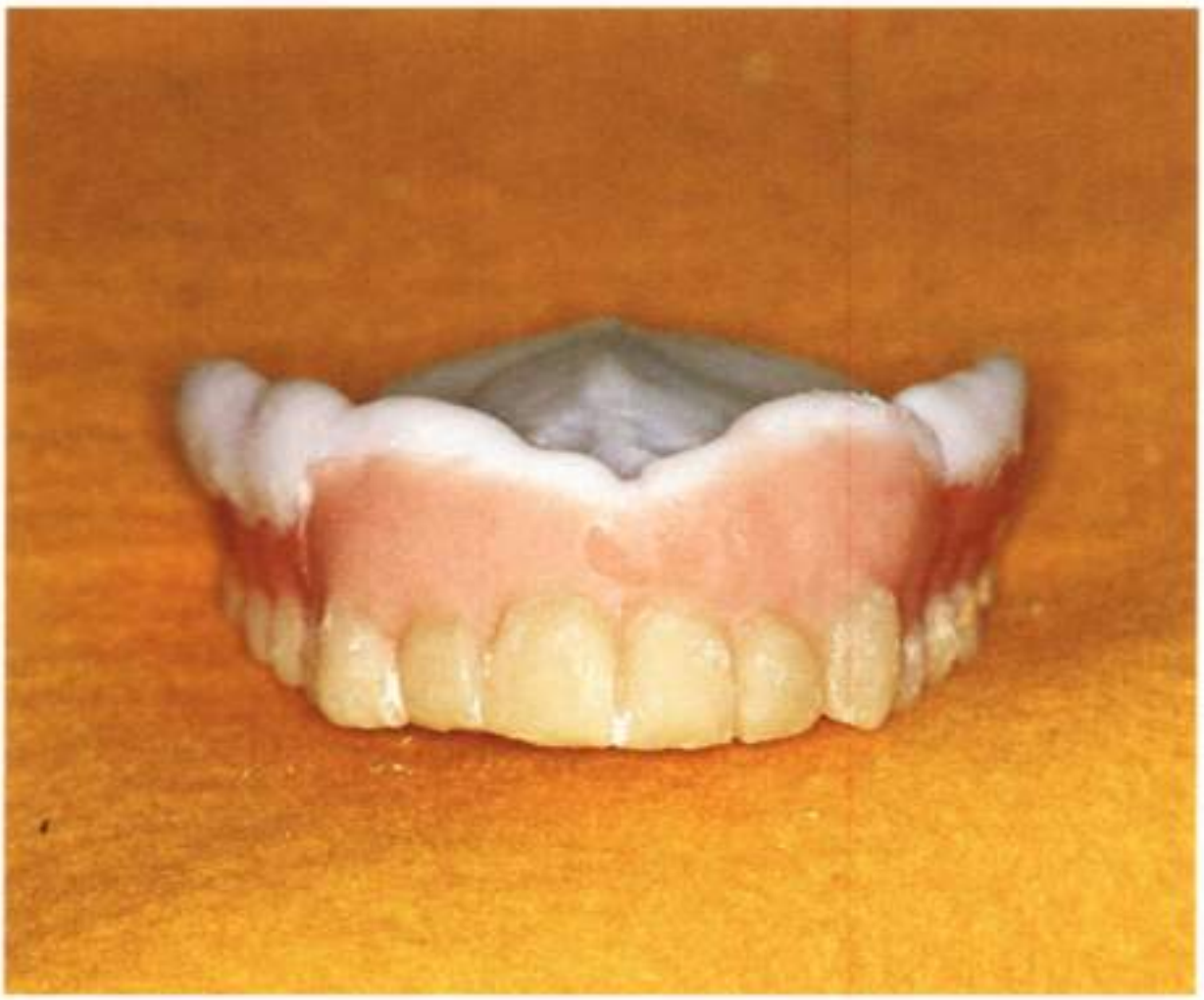

Fig. 7-18

Fig. 7-19

Fig. 7-20

Fig. 7-21

Fig. 7-22

Fig. 7-18 The labial surface has been corrected.

Fig. 7-19 The size of the teeth appears larger and the color has been changed to approximate the future denture. These gradual improvements enhance patient satisfaction with treatment.

Fig. 7-20 Prepare the anterior region of the denture as a temporary restoration to satisfy the patient.

Fig. 7-21 Inform the patient that the final denture will be better than the interim prosthesis.

Fig. 7-22 After the patient has become accustomed to the interim denture, adjust the vertical dimension of occlusion. Increase the vertical dimension of occlusion gradually instead of all at once. Determine the appropriate vertical dimension of occlusion by adding or removing small amounts of cotton gauze. No accurate method exists for measuring the vertical dimension of occlusion, although certain references can be used. There is some leeway and tolerance for differences, so physiological aspects are more important rather than the numerical values. This tentative denture method offers an excellent alternative.

Fig. 7-23 Measure the vertical dimension of rest and vertical dimension of occlusion using Willis calipers.

Fig. 7-24 Confirm the measured value.

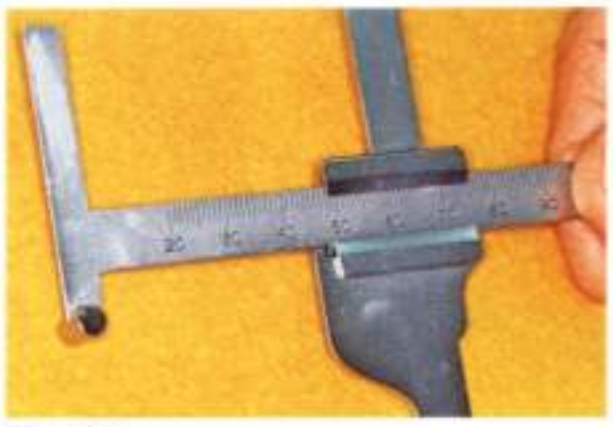

Fig. 7-25 Determine the interocclusal rest space using the criterion that the distance between the interpupillary line and corner of the mouth is equal to the distance from the subnasal point to the gnathion. A highly skilled dentist may still increase vertical dimension despite all efforts, but an unmotivated or unskilled dentist will create an inadequate vertical dimension that is too "low". An interocclusal rest space of 58mm is not exceptionally high.

Fig. 7-26 Since the vertical overlap was decreased slightly, the mandibular teeth require modification. The facial surfaces of the mandibular teeth should be adjusted to appear positioned labially and the incisal edges should be "elevated".

Fig. 7-27 It is not crucial whether the monomer or polymer is added initially since the modification requires only a small amount of resin.

Fig. 7-28 Add monomer to the polymer.

Fig. 7-29 Apply monomer to the facial surfaces before making additions.

Fig. 7-30 Add the mixed resin, Alike, to the labial surfaces.

Fig. 7-31

Fig. 7-32

Fig. 7-33

Fig. 7-34

Fig. 7-35

Fig. 7-36

Fig. 7-37

Fig. 7-38

Fig. 7-31 Since the maxillary teeth protrude slightly, make the mandibular teeth in similar manner.

Fig. 7-32 Apply monomer to smooth the surface of the resin.

Fig. 7-33 The incisal edges do not contact yet.

Fig. 7-34 Note that a considerable amount of resin is added to build the surface sufficiently.

Fig. 7-35 The height is increased as the thickness is increased. The mandibular anterior teeth are changed to follow the maxillary anterior teeth although the occlusal height in the molar regions is not changed.

Fig. 7-36 Use a spatula to add resin on the anterior teeth, including a small amount on the lingual of the incisal edges.

Fig. 7-37 Complete the additions gradually as shown in the photo.

Fig. 7-38 Use a spatula to create the interproximal divisions.

Fig. 7-39 Although near completion, the anterior teeth have an open occlusal relationship relative to the posterior teeth since the occlusal surfaces have not been changed.

Fig. 7-40 From an occlusal view, the mandibular anterior teeth appear positioned too far labially.

Fig. 7-41 Lingual view of the anterior region.

Fig. 7-42 Create individual tooth morphologies.

Fig. 7-43 After completing the anterior regions, it is important to reduce the lingual surfaces of the anterior teeth to create more intraoral space.

Fig. 7-44 Reduce the lingual surfaces on the anterior teeth.

Fig. 7-45 Modify the incisal edges.

Fig. 7-39

Fig. 7-40

Fig. 7-41

Fig. 7-42

Fig. 7-43

Fig. 7-44

Fig. 7-45

Fig. 7-46

Fig. 7-47

Fig. 7-46 Prepare the lingual morphology to enhance tongue movements.

Fig. 7-47 Complete recontouring the lingual surface in the anterior region.

Fig. 7-48 The anterior teeth appear to have been repositioned labially after adjusting the lingual surfaces.

Fig. 7-49 After making additions to the anterior teeth, the gingiva appears depressed, so add pink resin to the junction to improve esthetics.

Fig. 7-50 Adjust the molar region.

Fig. 7-48

Fig. 7-49

Fig. 7-50

Fig. 7-51 The "old" dentures have become the interim dentures. Check the occlusion after finishing the mandibular anterior region. Hold the dentures intraorally with fingers as shown in the photo, to stabilize centric relation position. The maxillary denture could rotate into centric occlusion if not stabilized, so hold the dentures to check centric relation.

Fig. 7-52 Check occlusion on the patient's right side.

Fig. 7-53 Smooth the lingual surfaces.

Fig. 7-54 Use a diamond disk to finish the interproximal areas for optimum esthetics.

Fig. 7-55 Use a diamond disk to create the interproximal separation from the incisal edges along the lingual surface. This improves esthetics since the area is visible when the mouth is open.

Fig. 7-51

Fig. 7-52

Fig. 7-53

Fig. 7-54

Fig. 7-55

Fig. 7-56

Fig. 7-57

Fig. 7-58

Fig. 7-59

Fig. 7-60

Fig. 7-61

Fig. 7-62

Fig. 7-63

Fig. 7-56 Recontour the gingival portions of the anterior teeth before adding resin.

Fig. 7-57 Place Kooliner in the depression below the anterior teeth. Be careful to avoid changing the shape of the conditioner.

Fig. 7-58 Use fingers to modify the shape near the mandibular border.

Fig. 7-59 Use the flat blade of an instrument to place temporary materials and finish the resin contours.

Fig. 7-60 Use monomer to smooth the resin surface. The labial contours should be in harmony with the denture borders prior to making the final impression. Since the interim denture is used for making the final impression, the contours and position of teeth are important and the impression could be compared to one made using a custom tray. The procedures used for interim dentures are essential for making the final impressions.

Fig. 7-61 Place the mandibular denture intraorally and check the shape of the resin.

Fig. 7-62 Use fingers to manipulate the lips and shape the resin.

Fig. 7-63 Use the tip of the fingernail to check if the resin has polymerized.

Fig. 7-64 The labial contours have been completed to create a smooth transition between the denture border and cervical areas of the anterior teeth.

Fig. 7-65 Although the molar region is still narrow, the tongue space is wider toward the anterior. Lengthening the lingual borders may cause the patient to feel uncomfortable since the arch width is the same. The arch should be made wider along the lingual surfaces in the molar regions, then the patient will not be concerned with extended borders. If the area is not widened, the patient may request shorter borders since it feels as though the throat is constricted and breathing is obstructed.

Fig. 7-64

Fig. 7-65

Fig. 7-66

Fig. 7-67

Fig. 7-66 Frontal view of the dentures.

Fig. 7-67 Observe the dentures with the lips retracted slightly and note a space located buccal to the premolars, behind the commissures; this indicates lingual placement of posterior teeth. The lingual placement of posterior teeth is not ideal and can compromise esthetic results. It is not recommended to place premolars buccally in a mandibular denture since there are buccal frena in the region. There should be a balance between the buccal, lingual, and occlusal surface factors when arranging teeth; a balance can be attained using lingualized occlusion.

Fig. 7-68 Add resin on the incisal edges of the mandibular anterior teeth to stabilize centric relation position with anterior support. Anterior teeth contacts are necessary for incising food.

Fig. 7-68

Fig. 7-69 Place resin on the mandibular anterior teeth and instruct the patient to occlude.

Fig. 7-69

Fig. 7-70 Incising food cannot occur without anterior tooth contacts and dentures lacking anterior contacts are only 50% effective. The frontal view of this denture shows lingually arranged molars. The tissue conditioner on the buccal has been reduced leaving a space between the teeth and buccal border. The patient complained of trapped food in this area since there was no self-cleansing action. The cheek cannot fill the gap created so food collects easily, therefore, the posterior teeth should be arranged buccally. Buccally arranged posterior teeth may cause the denture to rotate or dislodge thus justifying a more lingual arrangement. If the teeth are arranged toward the buccal, a lingualized occlusion should be used.

Fig. 7-70

Fig. 7-71 Coat the occlusal surfaces with monomer to enhance the bond between the new resin and artifical teeth. Add resin on the occlusal surfaces to modify the occlusal plane and vertical dimension of occlusion.

Fig. 7-71

Fig. 7-72 A tooth-colored resin is used to establish the occlusal plane.

Fig. 7-72

Fig. 7-73

Fig. 7-74

Fig. 7-75

Fig. 7-76

Fig. 7-77

Fig. 7-78

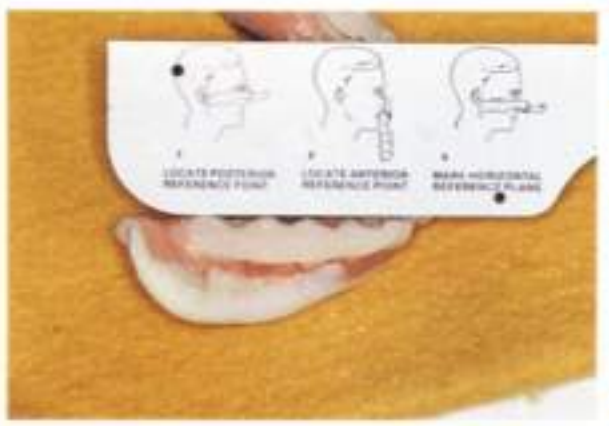

Fig. 7-79

Fig. 7-80

Fig. 7-73 Add resin bilaterally on the mandibular denture.

Fig. 7-74 After adding resin, insert the denture intraorally and instruct the patient to occlude in centric relation position.

Fig. 7-75 Remove the denture carefully to prevent distorting the resin.

Fig. 7-76 Remove excess resin along the lingual surfaces to enlarge the tongue space.

Fig. 7-77 After adjusting the lingual surfaces, the posterior teeth appear to be placed buccally when compared with the previous tooth positions and the tongue space is larger.

Fig. 7-78 The buccal surfaces have been extended considerably.

Fig. 7-79 Using the retromolar pad as a reference point, place a ruler on the right side. The lingual surfaces should contact a line drawn from the canine to the inner surface of the retromolar pad. The denture base must be extended over the retromolar pad or repeat the denture base modification procedures.

Fig. 7-80 Place the ruler on the left side between the inner surface of the retromolar pad and mesial of the canine, and check the lingual surface contacts.

Fig. 7-81 The cusp tip of the distalmost molar should be at a level between the center and uppermost part of the retromolar pad. Reduce the opposing maxillary molar contacts if the vertical dimension of occlusion is to remain the same.

Fig. 7-82 The occlusal plane is evaluated using the center of the retromolar pad as the posterior reference and the incisal edge of the maxillary anterior teeth as the anterior reference. In order to increase the vertical dimension, make additions to the maxillary molars, not the mandibular molars. To decrease the vertical dimension of occlusion, reduce the maxillary posterior teeth when opposing mandibular tooth contacts.

The maxillary anterior teeth form the reference for the maxillary denture esthetics and if not used as a reference, the occlusal plane will not be parallel with the ala-tragus line. The incisal edges of the maxillary central incisors should extend slightly beyond the occlusal plane but should not have a vertical overlap beyond 2mm. A deep vertical overlap is an absolute contraindication in complete denture treatment.

If a patient wants more of the anterior teeth showing, do not intrude the mandibular teeth nor have them obscured from view by the lips. Some vertical overlap is permissable due to canine and premolar guidance in protrusive movement resulting in a small incisal angle, but no anterior overlap or a zero degree incisal angle is best.

This principle should be followed: the incisive angle should never be larger than the anterior condylar inclination. If the incisive angle is zero degrees, the occlusion is easy since the angle of the distalmost molar is one-half the condylar inclination. Do not use a deep vertical overlap when using the bilateral balance occlusion concept in complete dentures. Achieve bilateral balance between the lingual cusps of the maxillary posteriors and the fossae of the mandibular posterior occlusal surfaces. The retromolar pad is an important reference used in setting teeth.

Fig. 7-81

Fig. 7-82

Fig. 7-83

Fig. 7-84

Fig. 7-85

Fig. 7-86

Fig. 7-87

Fig. 7-83 Since the patient expressed a desire for an increase in the vertical dimension of occlusion, more resin was placed in the molar regions which created an open anterior occlusion. Additional resin was placed on the incisals of the mandibular anterior teeth.

Fig. 7-84 Add resin on the mandibular anteriors.

Fig. 7-85 Instruct the patient to occlude with the dentures in position.

Fig. 7-86 The anterior teeth have been lengthened.

Fig. 7-87 Posterior view shows a wider denture than the original with teeth arranged more facially. With the tongue in a relaxed position, the tip of the tongue placed along the cervical regions of the anterior teeth, the tongue will be level with the occlusal plane. The tongue resting along the inner surface of the denture helps maintain the mandibular denture in position.

Fig. 7-88 Modify the lingual surfaces.

Fig. 7-89 Finish the additional resin surface.

Fig. 7-90 Lateral view of the patient.

Fig. 7-91 Use a compass to measure the vertical dimension of occlusion.

Fig. 7-92 Place the instrument at a subnasal point then adapt it to the chin. A 1 or 2mm difference occurs depending on the measurement method.

Fig. 7-93 The measurement revealed 60mm for the vertical dimension of occlusion.

Fig. 7-94 Always position the patient and chair in an upright position.

Fig. 7-95 It is important to maintain the maxillary denture occlusal surface approximately parallel with the ala-tragus line.

Fig. 7-88

Fig. 7-89

Fig. 7-90

Fig. 7-91

Fig. 7-92

Fig. 7-93

Fig. 7-94

Fig. 7-95

Fig. 7-96

Fig. 7-97

Fig. 7-96 The interpupillary line and occlusal plane should be parallel from a frontal view.

Fig. 7-97 Through these procedures, we have achieved the initial goals for the interim denture procedure.

Chapter 8

The Final Impression

The final impression can now be made since the shape of the denture has been determined by tissue conditioning procedures. The borders have been formed through the conditioning procedures and this interim denture makes an ideal custom tray.

Fig. 8-1

Fig. 8-1 Use a low viscosity, silicone impression material for the final impression. A silicone impression material has a characteristic flow when mixed, but is not well-suited for humid environments. The mixing time should be regulated strictly since the setting time is affected by humidity and temperature. The affects on the material prior to intraoral placement seem to be relatively small. The temperature difference in the mouth accelerates the setting time, a special characteristic of silicone impression material.

There is no need to wait up to 15 minutes before placing the material in the mouth, a time requirement used in the past. However, keep a card with the steps and times outlined for easy reference since it is important to follow the timing criteria strictly. Be certain to apply an adhesive on areas of exposed resin; the silicone material will adhere to dry tissue conditioner.

Fig. 8-2

Fig. 8-3

Fig. 8-4

Fig. 8-5

Fig. 8-2 The patient should wear the tissue conditioner-lined denture at least one week prior to making the final impression. Wash the tissue-bearing surface with a denture brush and soap to remove contaminants from the mucosal surface. Brush all undercut areas and do not worry about creating a rough surface since this will be used as a custom tray.

Fig. 8-3 Use a towel to absorb all moisture after washing the surface.

Fig. 8-4 Use a hair dryer to dry the inner surface with hot air before placing any impression material.

Fig. 8-5 Place gauze intraorally over the tissues before making the impression.

Fig. 8-6 Mix the material rapidly within the specified time. It is difficult to determine whether or not the material has been completely mixed so mix until the two distinct colors are not easily discerned. Mix as thoroughly as possible using this subjective criterion.

Fig. 8-7 Quickly place the impression material into the interim denture within the time limit.

Fig. 8-8 Initially spread the material on the inner surface, then spread it over the border areas with a painting motion. Spread the material evenly over the surfaces since excess material from inside the tray may not flow over all borders.

Fig. 8-9 Work quickly within the specified time period.

Fig. 8-10 Place the denture intraorally by seating the posterior border first, then seating the anterior area. The posterior to anterior seating motion helps insure that excess material flows toward the anterior. If the direction of placement were reversed, excess material may flow toward the posterior, induce the gag reflex, and result in a poor impression. Seat the patient in an upright position when making the maxillary impression to prevent material from flowing posteriorly. The patient can be seated in a reclined position for the mandibular impression.

Fig. 8-6

Fig. 8-7

Fig. 8-8

Fig. 8-9

Fig. 8-10

Fig. 8-11

Fig. 8-12

Fig. 8-13

Fig. 8-14

Fig. 8-15

Fig. 8-16

Fig. 8-17

Fig. 8-11 Apply pressure to the maxillary denture with the patient's mouth open and check for excess material in the posterior region. Use a finger to wipe excess material in the posterior region to the side. Instruct the patient to open widely to muscle trim the molar regions with the coronoid processes.

Fig. 8-12 Muscle trim the molar regions using the thumb along the zygomatic arches. Place the index fingers in the corners of the mouth to hold the tray and use the thumbs to trim the orbicularis oris and buccinator muscles simultaneously. Follow the shape of the denture tray to trim the upper lip, bringing the tips of the thumbs into close proximity.

Fig. 8-13 Use the fingers to hold the tray on the occlusal surfaces in the molar regions.

Fig. 8-14 Initially instruct the patient to open several times quickly before the material has set, then repeat this action as the material sets. This action helps muscle trim the bilateral areas distal to the second molar and buccal posterior regions.

Fig. 8-15 Retract the lip and check the borders.

Fig. 8-16 Use an air syringe to release the seal and remove the denture tray.

Fig. 8-17 View of the tissue-bearing surface of the final impression.

Fig. 8-18 The anterior region appears thick and can be adjusted at the time of delivery. The thickness is not important at this time if the border seal is adequate. The thickness of the anterior border is adjusted to meet esthetic demands by either reducing or adding to the border and does not affect denture function if the borders are not shortened. The impression also reproduced the fovea palatinae.

Fig. 8-18

Fig. 8-19 Left view of the final impression shows good reproduction from the buccal frenum to the posterior border. The impression material does not form the shape of the denture since the shape was created with tissue conditioner. The material is used as a wash impression over the interim denture.

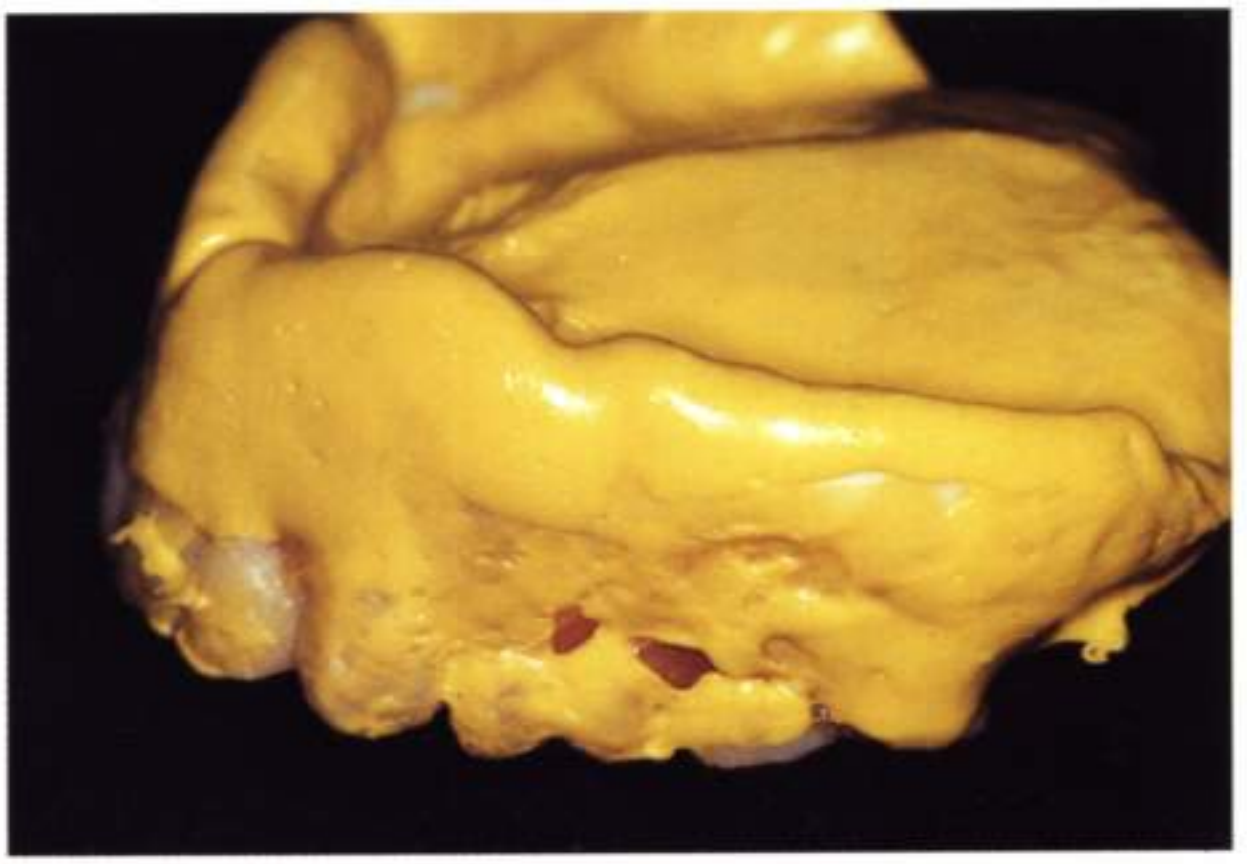

Fig. 8-19

Fig. 8-20

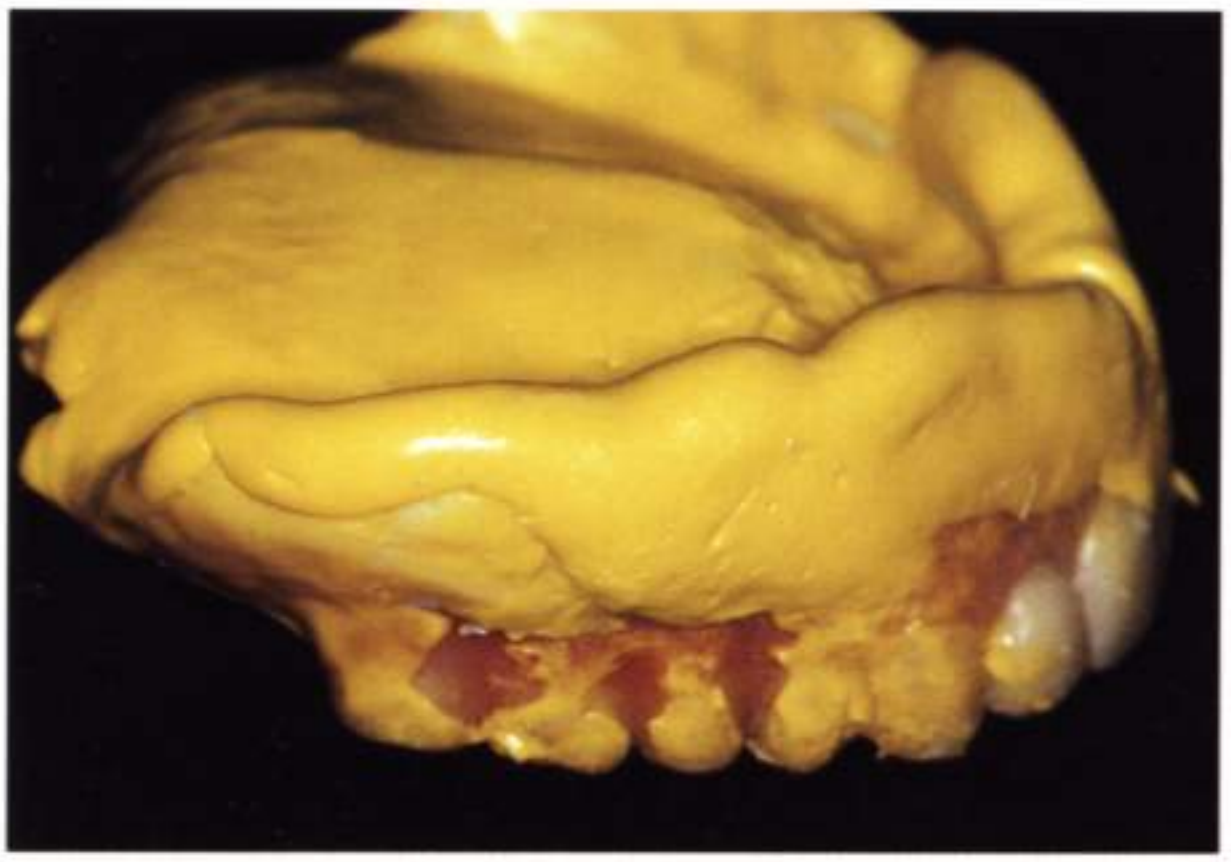

Fig. 8-21

Fig. 8-20 Frontal view of the final impression.

Fig. 8-21 Lateral view, right side.

Fig. 8-22 The impression of the anterior region has a distinct maxillary labial frenum, as well as left and right buccal frena.

Fig. 8-23 The impression has a good reproduction of the area between hamular notches and fovea palatinae in the posterior region.

Fig. 8-24 View of the inner surface on the left side.

Fig. 8-25 View of the inner surface on the right side shows a buccal frenum present (indicated by the arrow).

Fig. 8-26 The fovea palatinae are important for locating the vibrating line; the vibrating line is always located posterior to the fovea palatinae, never in an anterior position. The photo shows the vibrating line and fovea palatinae marked with a water soluble pencil.

Fig. 8-27 Place the impression intraorally to mark the vibrating line. Use sharp scissors to trim excess material slightly distal to the vibrating line.

Fig. 8-28 Photo shows the trimmed posterior border.

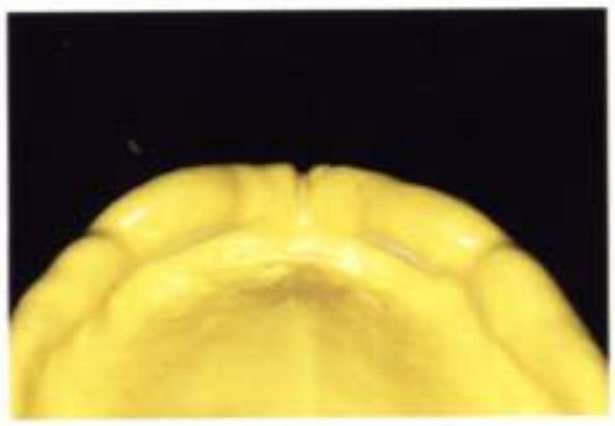

Fig. 8-22

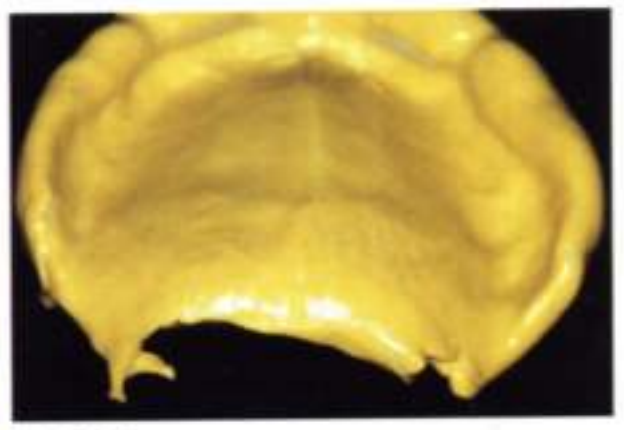

Fig. 8-23

Fig. 8-24

Fig. 8-25

Fig. 8-26

Fig. 8-27

Fig. 8-28

Fig. 8-29

Fig. 8-30

Fig. 8-31

Fig. 8-32

Fig. 8-33

Fig. 8-29 Making complete denture impressions using an impression paste does not allow repositioning the impression intraorally since the material is brittle and can break easily. With a silicone impression material, the maxillary final impression can be repositioned intraorally prior to making the mandibular impression. This allows an intraoral check of maxillary denture fit and retention.

Place gauze intraorally prior to making the final mandibular impression. Instruct the patient to occlude lightly when making the impression to immobilize the tray. The opposing teeth maintain the correct position in centric relation rather than if the operator uses hand-held pressure.

Fig. 8-30 It is essential to dry the inner surface of the mandibular denture using a hair dryer, following the same procedure done on the maxillary denture.

Fig. 8-31 Measure the appropriate lengths of impression material.

Fig. 8-32 Mix thoroughly within the specified time until all color streaks have disappeared.

Fig. 8-33 Place material in the tray and over the borders in the same manner followed with the maxillary impression.

Fig. 8-34 Wait for the material to reach a higher viscosity before placing it intraorally so the material does not flow or drip when the tray is inverted. Do not rush the initial placement. Although some time has elapsed, complete the remaining procedures quickly.

Fig. 8-34

Fig. 8-35 Reflect the facial tissues after positioning the tray to allow material to flow in the buccal vestibules.

Fig. 8-35

Fig. 8-36 Muscle trim the mental region by rotating the tips of the fingers.

Fig. 8-36

Fig. 8-37 Hold the buccal areas of the mandibular denture with the thumb and index finger. Instruct the patient to press the tip of the tongue along the anterior teeth firmly to trim the lingual borders and surfaces. Simultaneously use the middle finger to confirm tension in the mylohyoid muscle.

Fig. 8-37

Fig. 8-38 Follow the same procedures used in tissue conditioning for muscle trimming the final impression.

Fig. 8-38

Fig. 8-39 Retract the lower lip to check the border.

Fig. 8-39

Fig. 8-40 Remove the dentures as one unit by rotating the mandibular denture then removing the maxillary denture.

Fig. 8-40

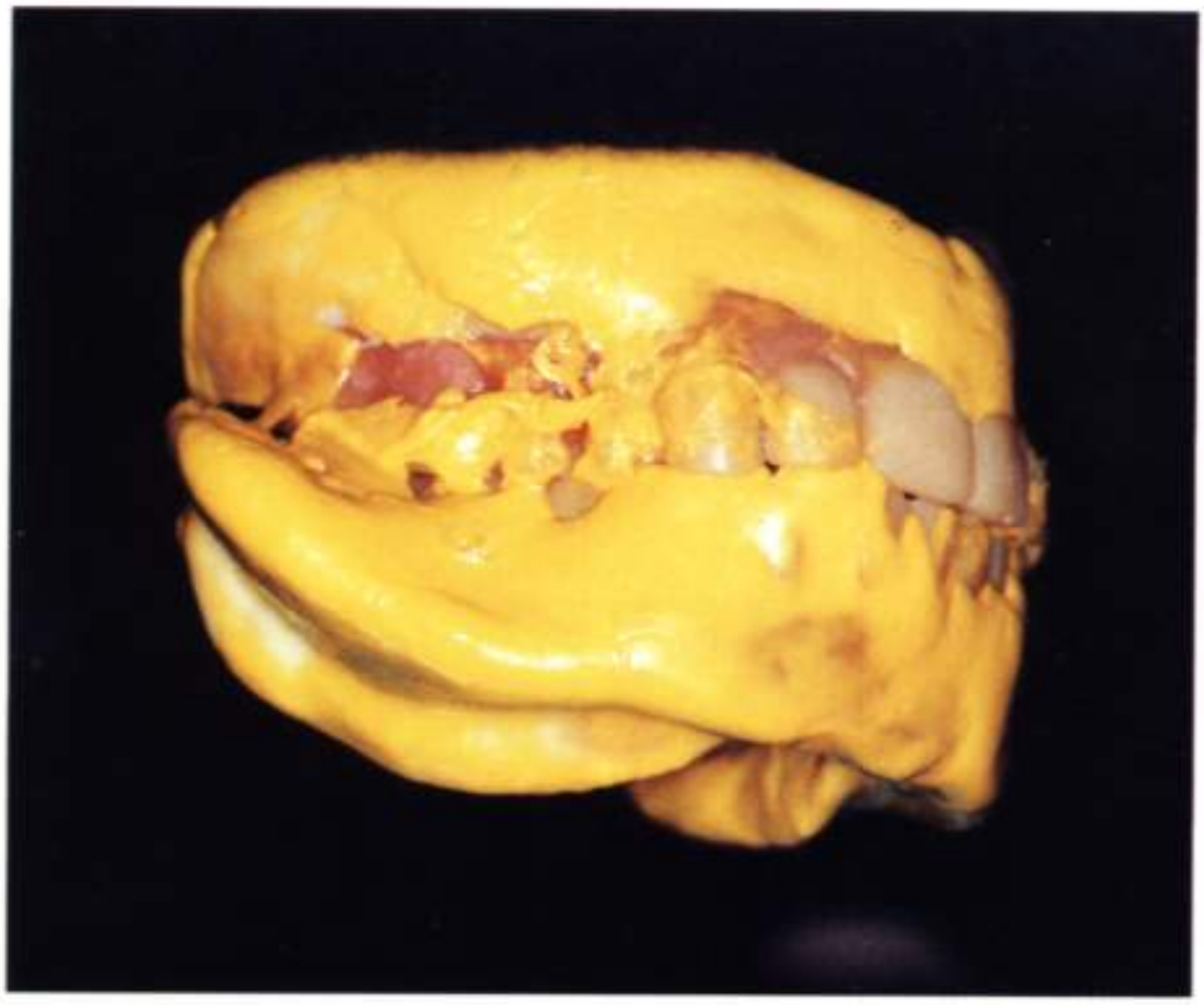

Fig. 8-41

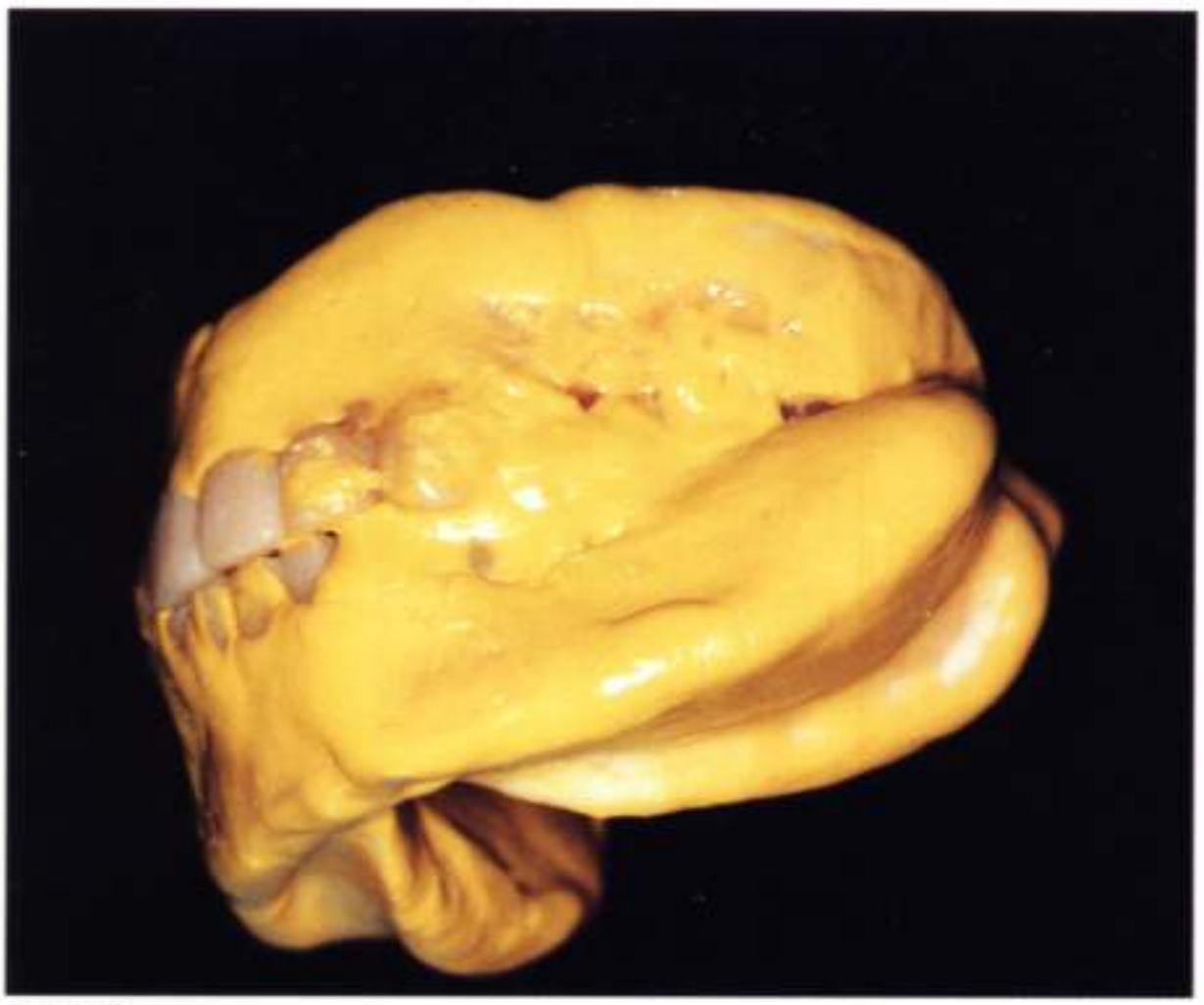

Fig. 8-42

Fig. 8-41 Right view of the final impressions.

Fig. 8-42 Left view.

Fig. 8-43 Frontal view of the final impressions.

Fig. 8-44 View from the posterior, lingual aspect.

Fig. 8-43

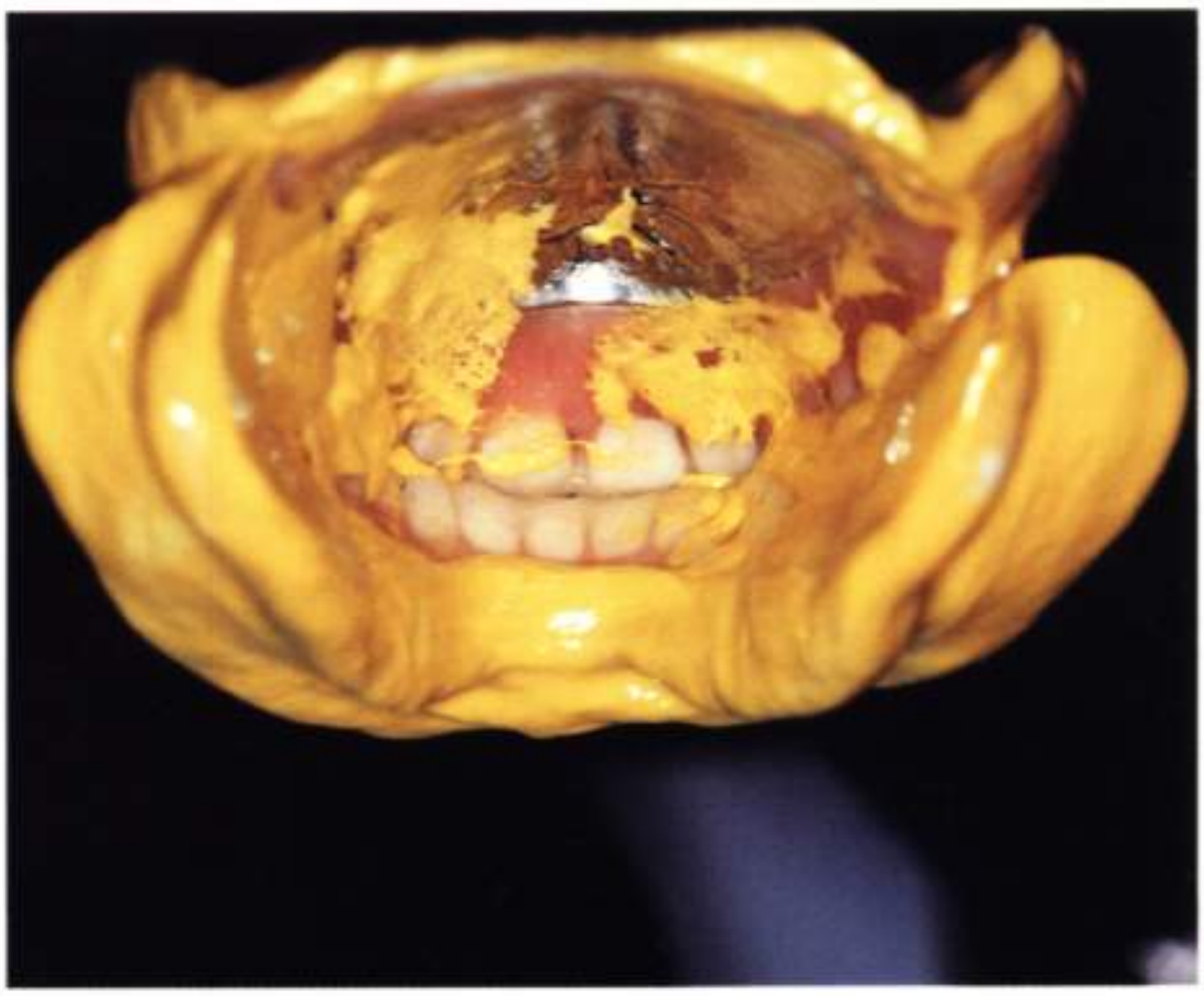

Fig. 8-44

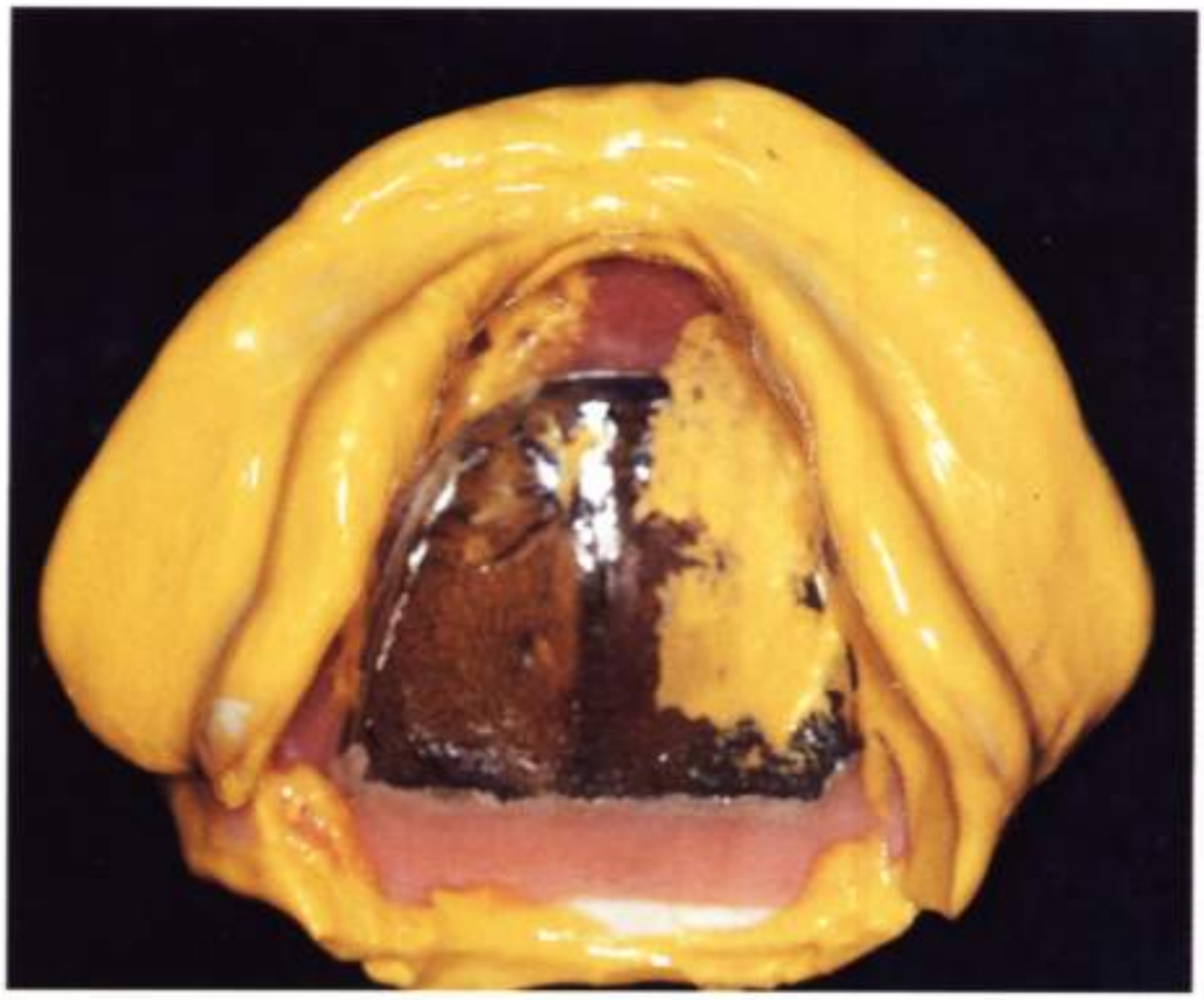

Fig. 8-45

Fig. 8-45 View of tissue-bearing surface of the mandibular denture.

Fig. 8-46 View showing the shape of the mental region.

Fig. 8-47 The border spreads over the sublingual glands approximately 1.5cm on either side of the lingual frenum. The length and width of these borders are important since if they are inadequate, the denture can be displaced. Pressure areas can easily occur due to the thin mucosa on the lingual, especially near the genial tubercle.

Fig. 8-48 Frontal view of the mandibular final impression.

Fig. 8-49 View of the neutral zone on the right buccal shelf region.

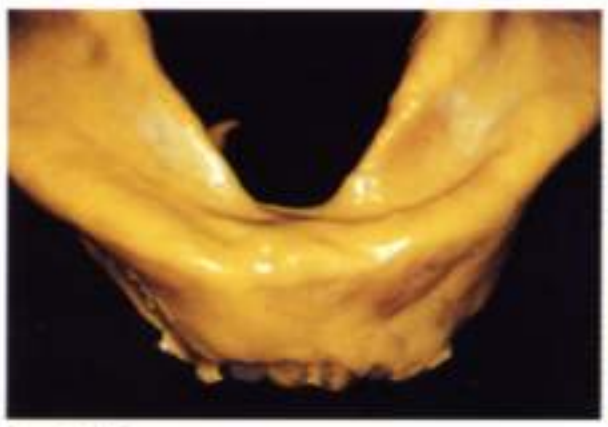

Fig. 8-46

Fig. 8-47

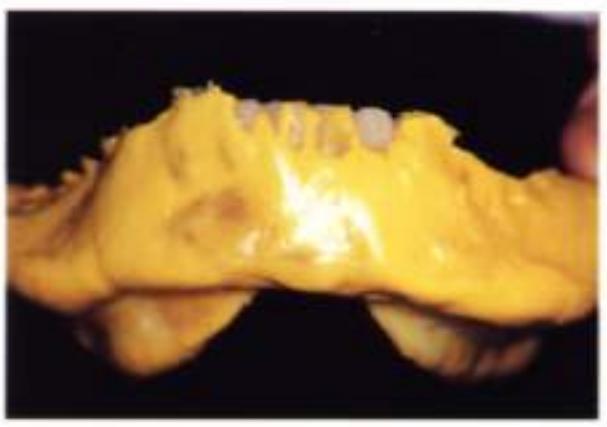

Fig. 8-48

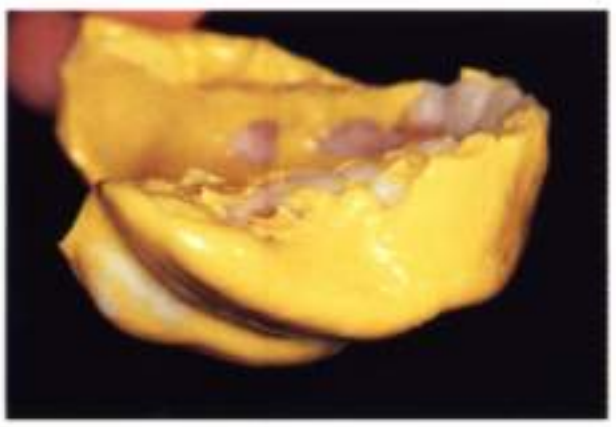

Fig. 8-49

Fig. 8-50 View of the neutral zone on the left buccal shelf region.

Fig. 8-51 View of the tissue-bearing surface on the left side. Since the buccinator muscle runs horizontally, there is considerable tissue tolerance when the buccal shelf region extends slightly over the external oblique line.

Fig. 8-52 View of the tissue-bearing surface on the right side. A pressure spot is seen below the right second molar; pressure spots occur often at the most posterior extent of the mylohyoid line.

Fig. 8-53 Right view of the final impressions.

Fig. 8-54 Frontal view of the final denture impression in occlusion.

Fig. 8-50

Fig. 8-51

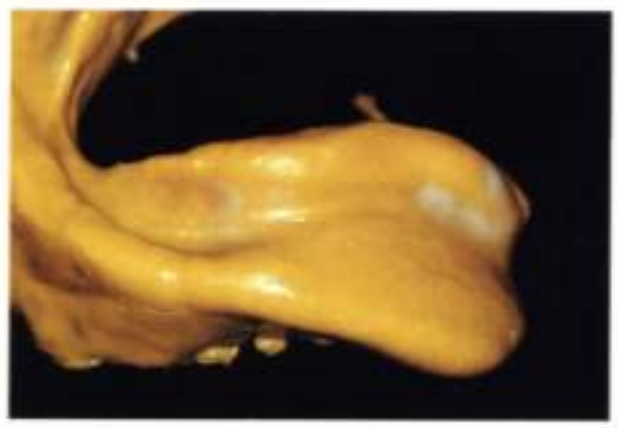

Fig. 8-52

Fig. 8-53

Fig. 8-54

Chapter 9

Boxing

Boxing procedures differ according to the impression material used. For example, although wax does not stick to alginate nor to silicone impression materials, it does stick to zinc oxide eugenol paste. Basic procedures for boxing impressions are discussed in this chapter.

Fig. 9-1 Different boxing waxes are available for use.
Above: Moyco Dental Boxing Wax.
Below: Kerr Boxing Wax Sticks.

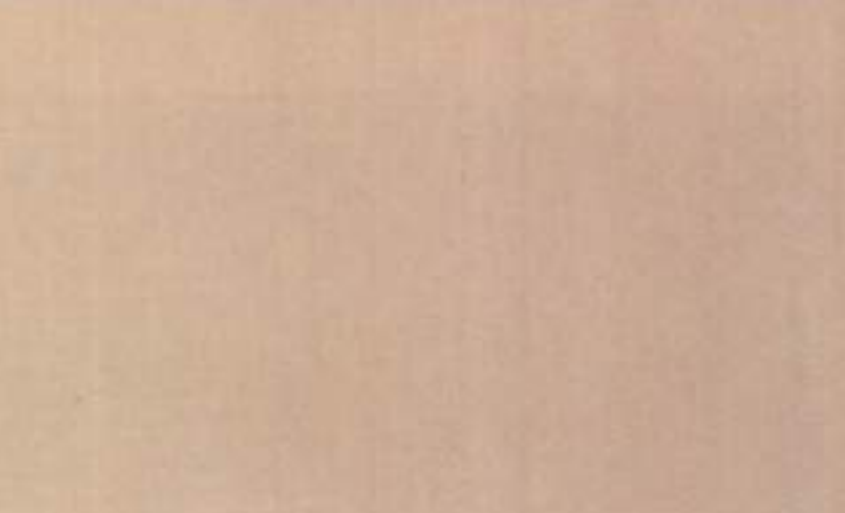

Fig. 9-1

Fig. 9-2 Photo shows boxing wax, beading wax, and maxillary and mandibular impressions made with an eugenol paste. All companies make the same width of beading wax.

Fig. 9-2

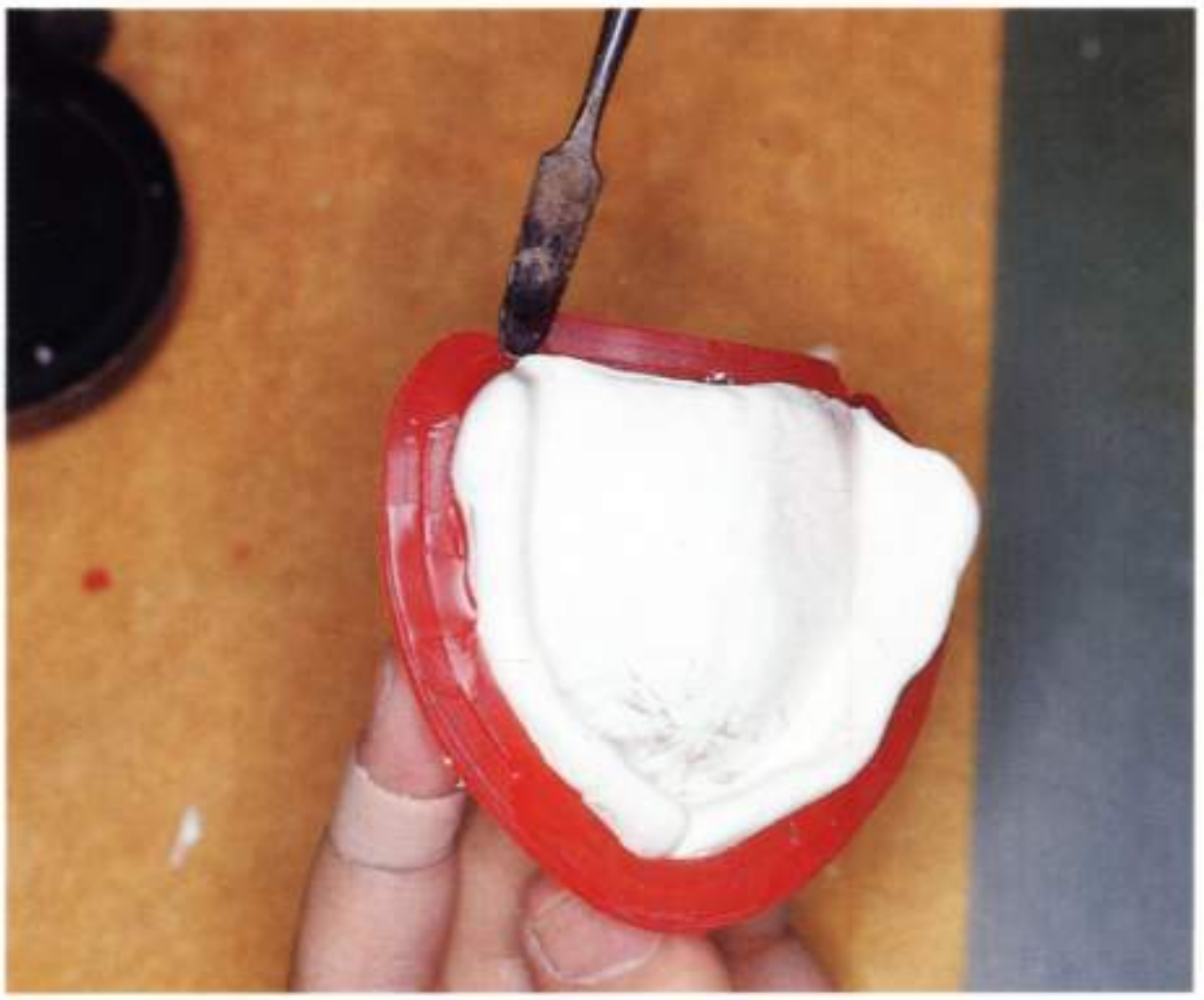

Fig. 9-3

Fig. 9-4

Fig. 9-5

Fig. 9-6

Fig. 9-7

Fig. 9-3 Wrap a strip of stick wax around the impression by following the outer surface height of contour. If the wax is not placed along the height of contour, the impression border will not be reproduced on the cast.

Fig. 9-4 Use a hot wax spatula to melt the wax to the impression material.

Fig. 9-5 The view of the left side shows a curve formed when the boxing wax follows the height of contour around the impression.

Fig. 9-6 The view of the right side shows the wax along the height of contour in the anterior region. The adjustments that will be made on the anterior border at completion do not affect boxing.

Fig. 9-7 Place the occlusal surface of the impression on the table and wrap a sheet of boxing wax around the impression.

Fig. 9-8 Wrap the sheet of boxing wax around the stick beading wax.

Fig. 9-9 Use a hot spatula and a piece of strip wax to drip wax and seal the junction between the beading and boxing waxes. Be careful to avoid making holes when trying to seal the junction directly with a hot spatula.

Fig. 9-10 As the wax contacts the hot spatula, the melted wax drips and flows into the gaps.

Fig. 9-11 Fill all the gaps between the sheet wax and stick wax. When the sheet wax does not overlap, seal the open margins. The previous figure shows overlapped sheet wax.

Fig. 9-12 After sealing the impression-side surface, seal the junctions on the occlusal-side. Follow the same procedure.

Fig. 9-13 View of the completed, boxed impression.

Fig. 9-14 When boxing an impression made of silicone impression material, mark the height of contour.

Fig. 9-15 Flow wax into air pockets or deficient areas in the impression.

Fig. 9-8

Fig. 9-9

Fig. 9-10

Fig. 9-11

Fig. 9-12

Fig. 9-13

Fig. 9-14

Fig. 9-15

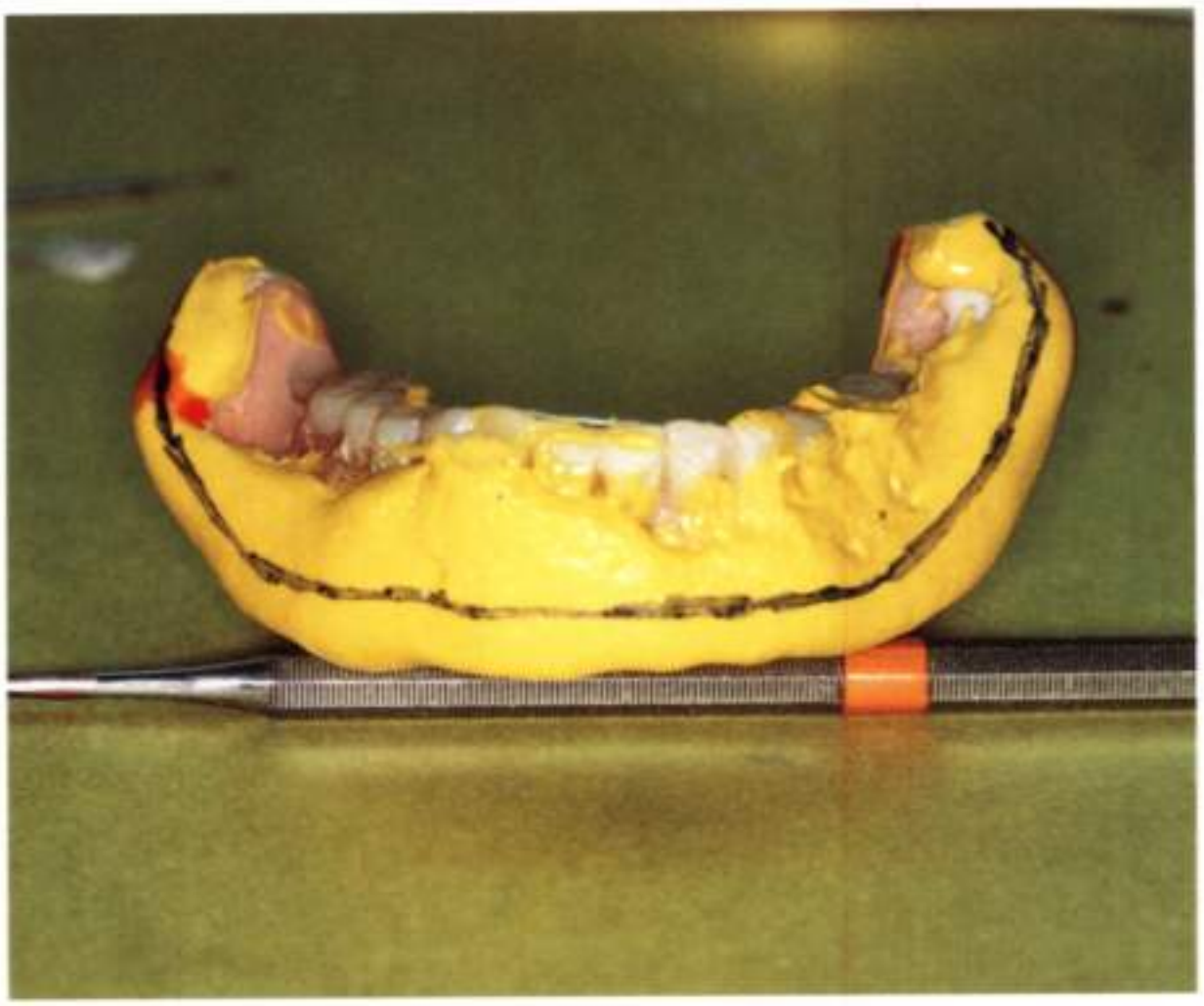

Fig. 9-16

Fig. 9-17

Fig. 9-16 Frontal view showing modified areas in the mandibular impression and a boxing line marked.

Fig. 9-17 Right side view.

Fig. 9-18 Left side view shows small areas filled with wax.

Fig. 9-19 Posterior lingual view shows the transition between the silicone impression material and interim denture filled with wax to make a smooth transition.

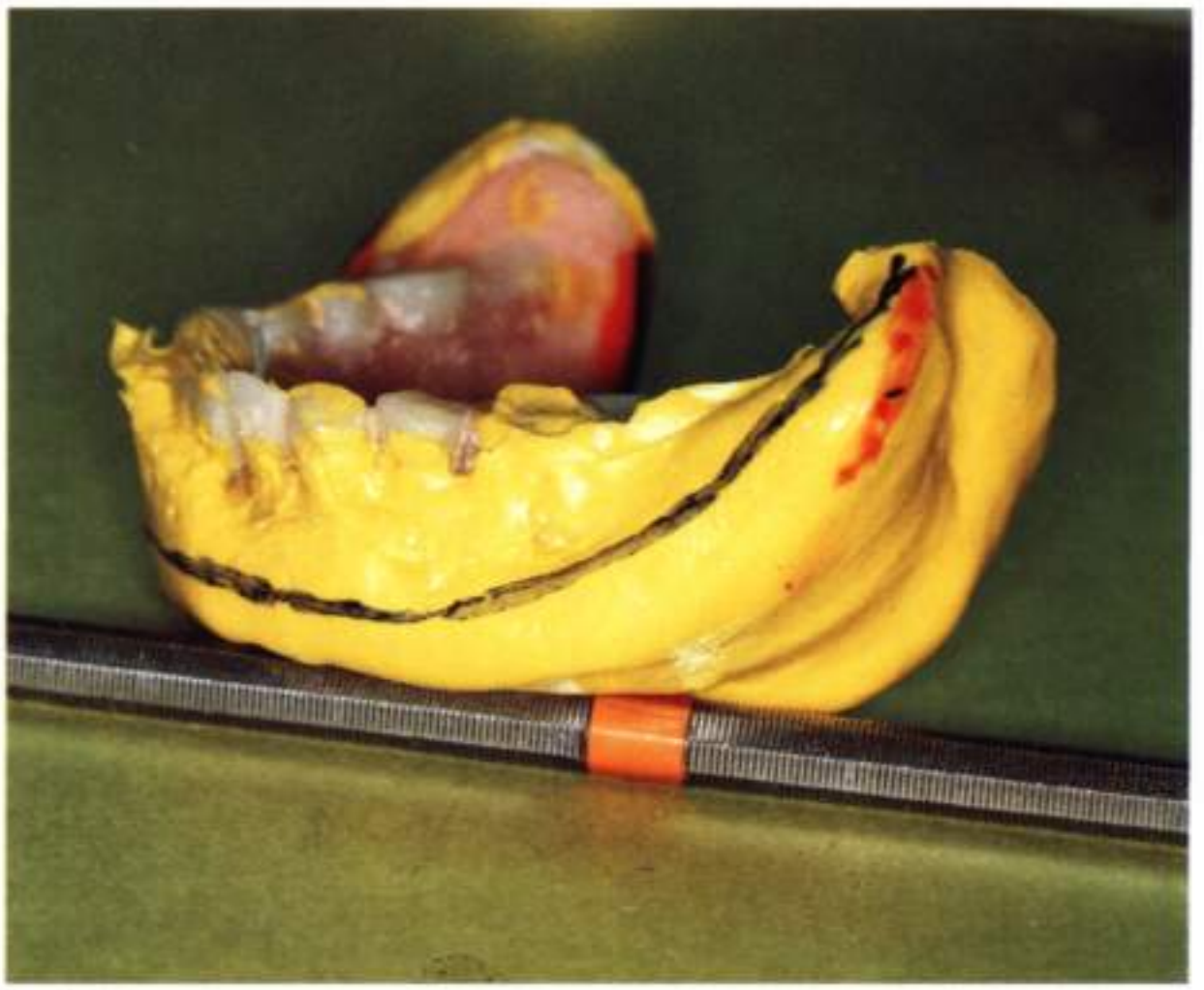

Fig. 9-18

Fig. 9-19

Fig. 9-20

Fig. 9-21

Fig. 9-22

Fig. 9-23

Fig. 9-24

Fig. 9-20 Since wax does not adhere to silicone impression materials, boxing is done using a 50:50 mix of polishing pumice and plaster.

Fig. 9-21 Use slurry water when mixing the pumice and plaster to accelerate the setting time. A boxing plaster can also be used in the mix.

Fig. 9-22 Place the pumice-plaster mix on a sheet and push the impression into the mix to the tissue level.

Fig. 9-23 Trim the circumference quickly since slurry water accelerates the set. Trim the mix along the previously scribed line for the height of contour.

Fig. 9-24 After the material has set, the 50:50 mix of pumice and plaster is easy to trim to the desired shape on a model trimmer.

Fig. 9-25 Completed trimming leaves adequate width around the impression.

Fig. 9-26 Use a sheet of boxing wax to wrap around the circumference and seal the junctions as described previously.

Fig. 9-27 Apply separating medium on the plaster surface prior to pouring stone; the medium also acts as a surfactant.

Fig. 9-28 Use a vacuum spatulator to mix the stone, then pour the stone directly from the mixing bowl. Always mix the stone with a vacuum spatulator to avoid incorporating air bubbles.

Fig. 9-29 Before the stone has set completely, carve triangular indentations for a split-cast method.

Fig. 9-25

Fig. 9-26

Fig. 9-27

Fig. 9-28

Fig. 9-29

Fig. 9-30

Fig. 9-31

Fig. 9-32

Fig. 9-33

Fig. 9-30 Boxing wax is made to a uniform thickness according to ADA specifications. Do not make the base of the master cast too thin or too thick.

Fig. 9-31 Use plaster scissors to remove boxing stone after the cast has set.

Fig. 9-32 Separate the cast from the impression.

Fig. 9-33 A silicone impression material can be separated from the cast or tissue conditioner more easily than an impression paste.

Fig. 9-34 The mandibular master cast shows the retromolar pads clearly reproduced. Also, boxing the impression results in uniform cast land areas surrounding the cast, adequate base thickness, and good position of the reproduced anatomy in the cast.

Fig. 9-35 The depth and thickness of both the buccal shelf and lingual regions have been reproduced well, following clinical information obtained from the interim denture, and provide the approximate thickness desired in the final denture.

Fig. 9-34

Fig. 9-35

Chapter 10

Posterior Palatal Seal

The postpalatal seal is established by carving away the necessary amount of stone between the anterior vibrating line and line connecting the hamular notches behind the maxillary tuberosities. This is an important area for creating a border seal. If the posterior border seal is inadequate, the retention of the maxillary denture is lost and the denture is less than half as effective.

Fig. 10-1 A border seal is difficult to achieve in the palate and considered unreliable if located immediately distal to the molars.

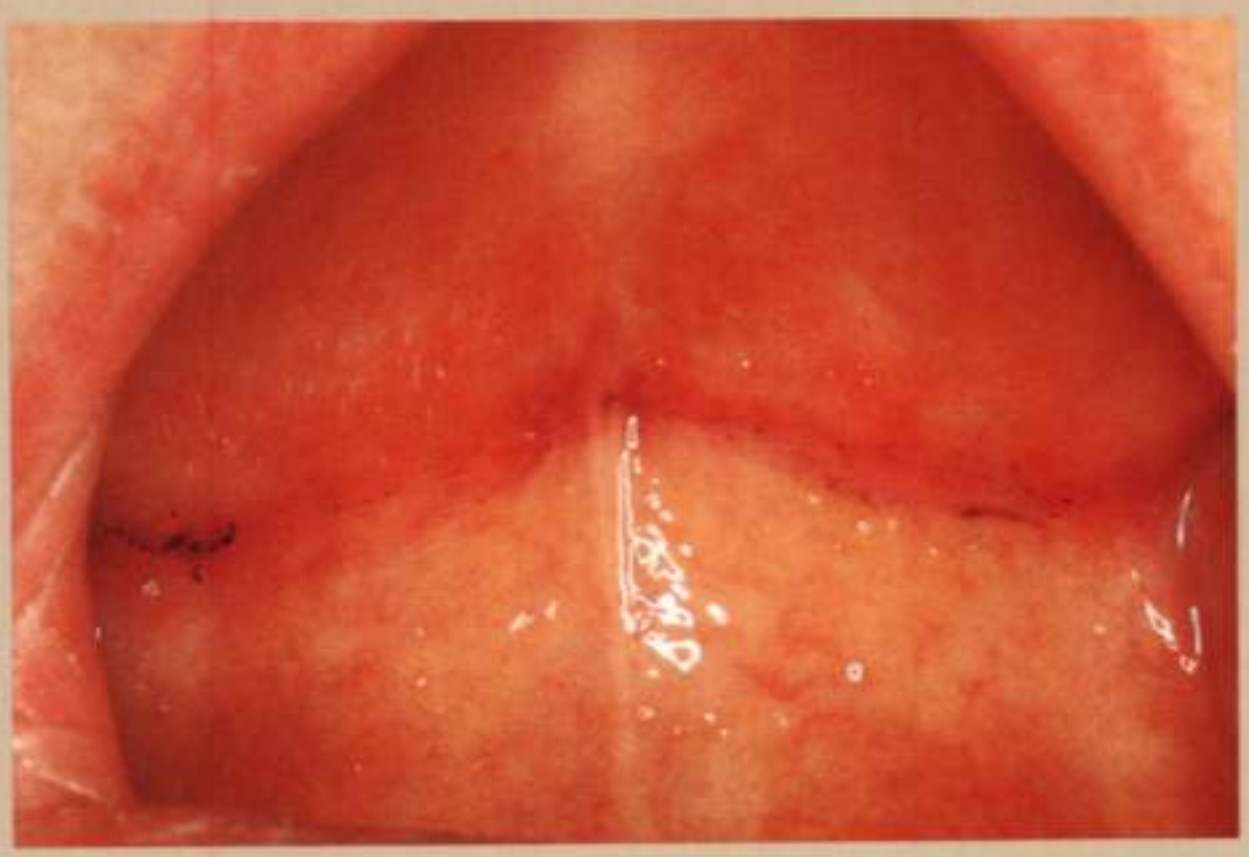

Fig. 10-1

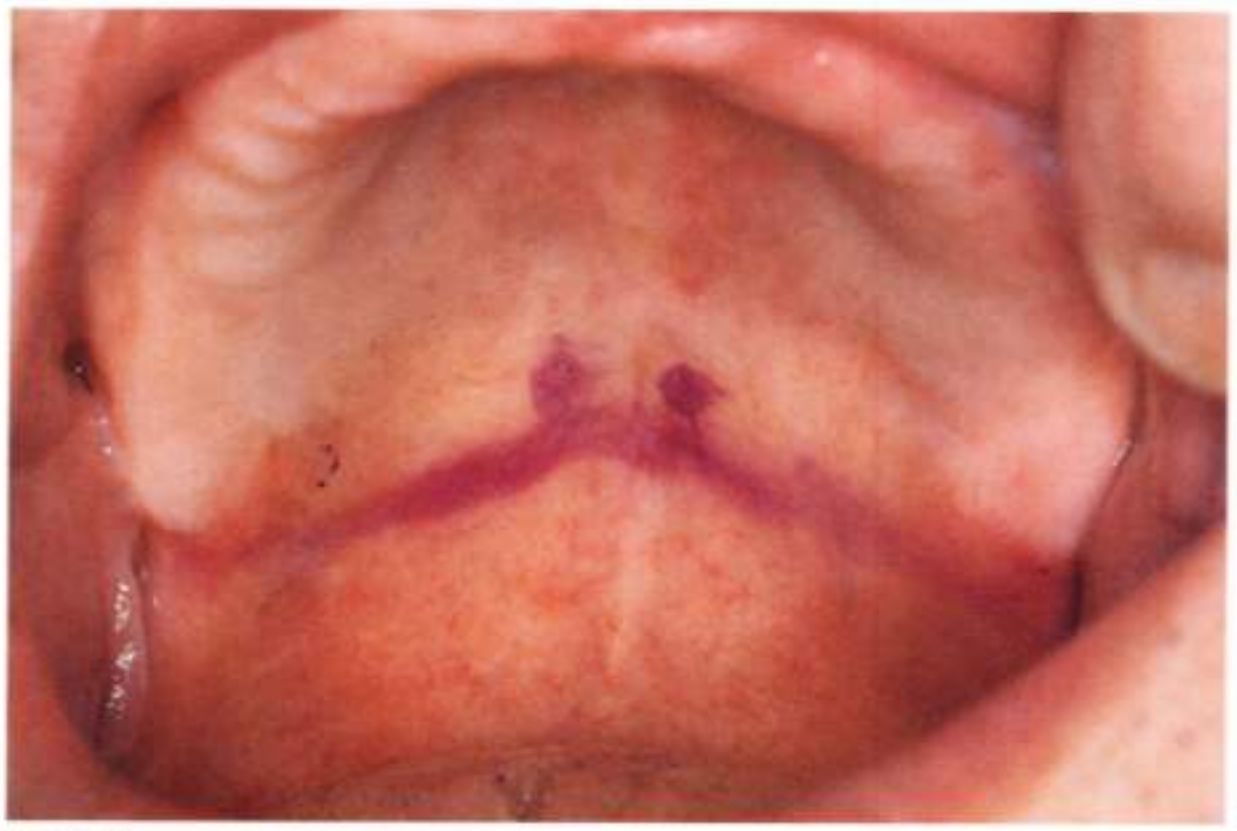

Fig. 10-2

Fig. 10-2 The vibrating line is scribed posterior to the fovea palatinae for determining the posterior palatal seal. The areas marked in blue are the fovea palatinae. The postpalatal seal varies among individuals and relates to the shape of the uvula, as discussed later.

Fig. 10-3

Fig. 10-3 This shows the situation when the postpalatal seal is determined on the master cast. The black points denote the fovea palatinae. the camel-back shaped mark anterior to the fovea palatinae corresponds to the anterior vibrating line and the posterior line corresponds to the posterior vibrating line or "ah-line". Observe the tissues intraorally as they vibrate, then transfer the positions to the cast with an indelible marker. Note the uvula elevates as the patient says "ah" since the nasal cavity is obturated and the "ah-line" vibrates.

This cast has a wave-like extension along the posterior between hamular notches. This represents the best location for the posterior border seal and does not vibrate. The midline area posterior to the fovea palatinae is not included in the extension since it is very mobile.

Fig. 10-4 Two methods are available for making the postpalatal seal. The first method uses instruments similar to those shown in the photo to carve the post-palatal seal and the second method uses a pressure-type impression of the posterior area. An additional method uses round burs to carve the wave or butterfly-shape in the cast.

Fig. 10-5 Cut away stone from the cast by pushing the tip of a chisel, rather than a pulling stroke.

Fig. 10-6 Remove stone in the post-palatal seal area with the deepest portion in the posterior, then gradually level toward the anterior.

Fig. 10-7 Both sides have been carved using the straight line connecting the hamular notches as the reference.

Fig. 10-8 Extend the postpalatal seal 1mm buccally beyond the hamular notch peak. The depth of carving increases from the hamular notch toward the midline and should be a smooth transition anteriorly. If a pressure area occurs on the movable mucosa in the postpalatal seal area, the resin can be reduced. Adding resin is easier than trying to add an arbitrary border seal after processing.

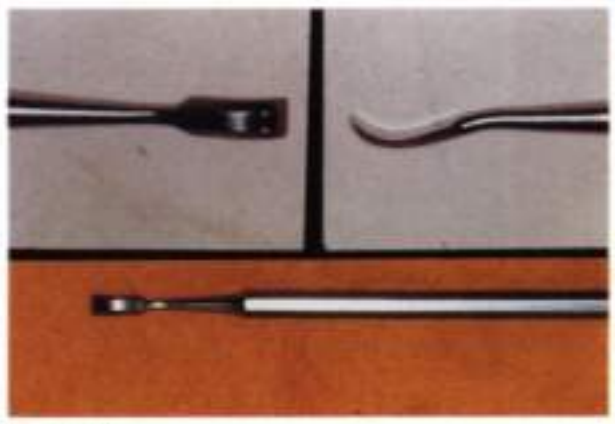

Fig. 10-4

Fig. 10-5

Fig. 10-6

Fig. 10-7

Fig. 10-8

Fig. 10-9

Fig. 10-9 The mucosa is relatively thick in the greater palatine foramen area. Carve a groove 1mm in depth and width along this area then taper it gradually short of the palatal rugae. Keep the same depth along the posterior areas.

Fig. 10-10 Carve a 1mm, uniform layer of stone from the horizontal plane of the palate; verify the depth using the gauge on the instrument.

Fig. 10-11 The depth of the postpalatal seal differs between individuals and has been carved to approximately 2mm in the photo. When carving the stone level, the 2mm depth may be observed along the vibrating line.

Fig. 10-12 Indicate relief areas on the cast.

Fig. 10-13 Scribe the design for the mandibular metal base on the cast by drawing the margin within the mucosa on the alveolar ridge.

Fig. 10-10

Fig. 10-11

Fig. 10-12

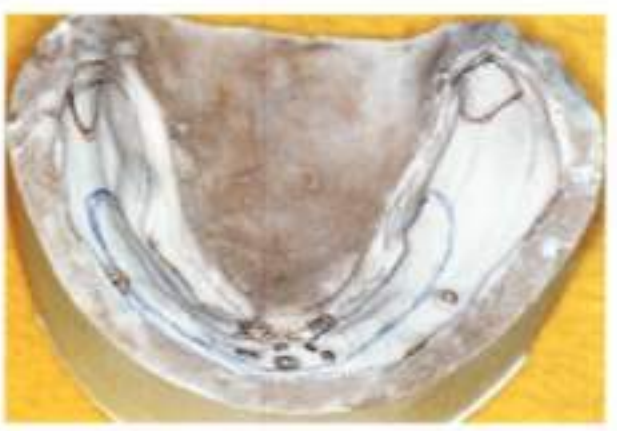

Fig. 10-13

Chapter 11

Preparations for Interocclusal Registration

The record base should fit the tissues well to obtain a more accurate interocclusal registration. Reline the tissue-bearing surface of the record base using a silicone impression material to improve the fit intraorally. Interocclusal registration is difficult even with an improved fit since the record must be transferred from the oral cavity to the articulator.

Fig. 11-1

Fig. 11-1 Although interocclusal registration may include difficult factors, the procedure is relatively simple. The registration can be done with a resin record base or by using the metal base to support an occlusion rim. The photo shows the completed occlusion rim on the metal base framework.

Fig. 11-2

Fig. 11-3

Fig. 11-2 Occlusal view of the metal base with occlusion rim removed from the cast.

Fig. 11-3 View of the tissue-bearing surface showing the postpalatal seal along the posterior border of the metal base. Note that the right molar region has a mesh framework design due to anticipated resorption following healing at the extraction site.

Fig. 11-4 Soak the cast in a water bath for 10 minutes at 45°C, approximately the same temperature as a hydrocolloid tempering bath. Soak the cast thoroughly and avoid placing the cast in very hot water since it could cause cracks or breakage. Do not worry about slightly dissolved edges on the master cast since it is not critical in complete dentures.

Fig. 11-4

Fig. 11-5 Apply a compatible adhesive, in this case Absolute adhesive, on the tissue-bearing surface of the metal base and wax since silicone impression material does not stick to wax.

Fig. 11-5

Fig. 11-6 Apply the adhesive on the surface and along the wax borders and allow it to dry slightly.

Fig. 11-6

Fig. 11-7 Although a low viscosity silicone is acceptable, a medium viscosity (Absolute Type I) was used. Use a mixing pad and follow the specified ratio for the base and catalyst.

Fig. 11-7

Fig. 11-8 Follow the mixing time suggested in the instructions and mix thoroughly for a uniform color.

Fig. 11-8

Fig. 11-9 Immediately after mixing, the medium viscosity material has good flow characteristics. Place the material where adhesive has been applied and spread it evenly. Whether used on the mandibular or maxillary record base, initially apply the material in a horseshoe-shape. Do not place material on the palatal surface in order to avoid displacing the record base. The procedures are identical to making alginate impressions.

Fig. 11-9

Fig. 11-10 Seat the record base on the cast and place heavy pressure on the occlusion rim, especially for the maxillary cast.

Fig. 11-10

Fig. 11-11 Wipe the excess silicone along the borders.

Fig. 11-11

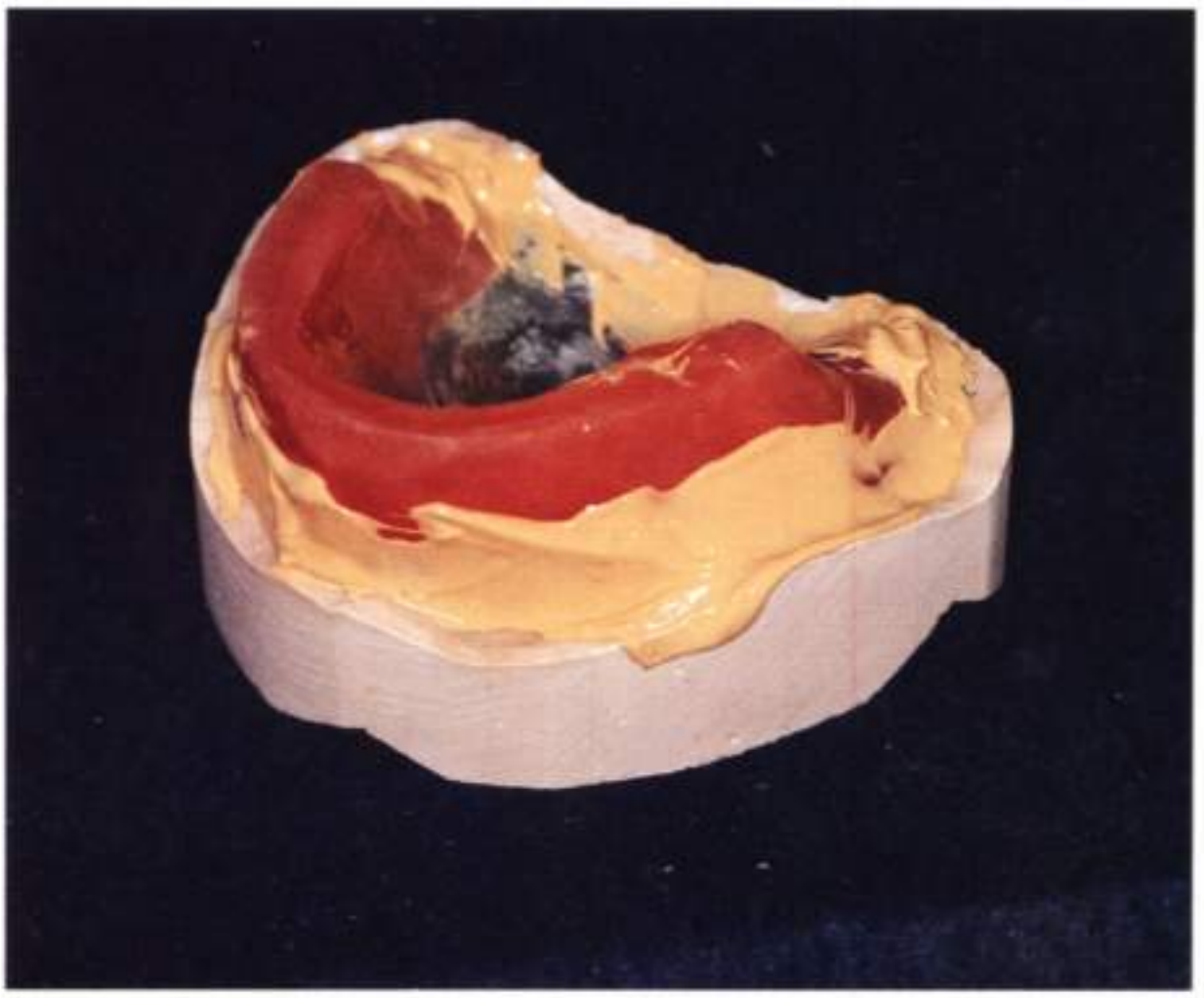

Fig. 11-12

Fig. 11-13

Fig. 11-12 Excess silicone completely covers the circumference of the occlusion rim as shown in the photo.

Fig. 11-13 The silicone material covers the circumference, even along the posterior border of the record base.

Fig. 11-14 The impression material sets rapidly due to the temperature difference between the material and the warmed cast, similar to the temperature difference present intraorally. Remove the impression using the air syringe.

Fig. 11-14

Fig. 11-15 Pry the record base off the master cast from the posterior border. If the cast was not soaked thoroughly, the impression material can infiltrate small stone crevices making it difficult to remove.

Fig. 11-15

Fig. 11-16 View of the tissue-bearing surface of the record base after removal from the cast.

Fig. 11-16

Fig. 11-17 Remove excess material using a Bard-Parker knife.

Fig. 11-17

Fig. 11-18 Use scissors to trim excess silicone borders.

Fig. 11-18

Fig. 11-19

Fig. 11-20

Fig. 11-21

Fig. 11-22

Fig. 11-23

Fig. 11-19 The silicone reline procedure creates a precise, well-fitting record base similar to the final prosthesis. Although excess silicone was not removed completely, the record base can be placed intraorally. Check several clinical factors such as stability, retention, soft tissue support, border thickness, and overall tissue adaptation.

Fig. 11-20 Mark the retromolar pads on the mandibular cast including the peak and center of the pads as references for the height of the occlusion rim.

Fig. 11-21 Reduce the posterior borders short of the retromolar pads to avoid interfering with record base placement and removal, either on the cast or in the mouth.

Fig. 11-22 Interocclusal registration differs from making impressions since registration requires a stable record base. Placement and removal of the record base on the cast and in the mouth is difficult with complete posterior border extensions, so terminate the borders anterior to the retromolar pads. Keep the height of the mandibular occlusion rim level with the midpoint of the retromolar pad.

Fig. 11-23 By removing the posterior segments, the centers of the retromolar pads are visible and the height of the occlusion rim can be adjusted easily. Also, it is easier to verify the width of the retromolar pad when arranging the posterior teeth in a lingualized occlusion.

Fig. 11-24 Thoroughly soak the mandibular cast in warm water, 45°C, in a similar manner followed for the maxillary cast.

Fig. 11-25 Apply the silicone adhesive to the tissue-bearing surface of the record base.

Fig. 11-26 Mix the medium-bodied silicone impression material following the directions and spread the material along the horseshoe-shaped surface.

Fig. 11-27 Firmly press the occlusion rim on the cast, forcing excess silicone to flow along the borders.

Fig. 11-28 Use a spatula to wipe and remove excess silicone along the borders.

Fig. 11-24

Fig. 11-25

Fig. 11-26

Fig. 11-27

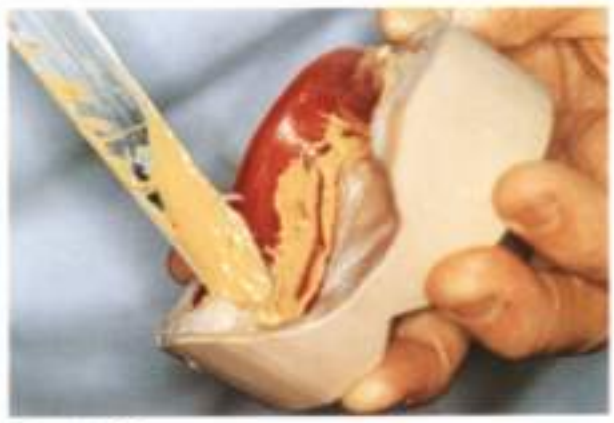

Fig. 11-28

Fig. 11-29

Fig. 11-30

Fig. 11-31

Fig. 11-32

Fig. 11-33

Fig. 11-34

Fig. 11-35

Fig. 11-29 Excess silicone has been removed as shown in the photo.

Fig. 11-30 Remove the record base from the cast using an air or air-water syringe while lifting the posterior border with an instrument.

Fig. 11-31 Photo showing the master cast and relined record base.

Fig. 11-32 The silicone material reproduces the tissue-bearing surface of the cast.

Fig. 11-33 Remove excess material using a Bard-Parker knife parallel to the occlusal plane, similar to procedures for the maxillary record base.

Fig. 11-34 It is difficult to trim thin edges of material using a Bard-Parker knife.

Fig. 11-35 Use scissors to trim thin edges.

Fig. 11-36 Occlusal view of maxillary and mandibular occlusion rims. The silicone reline improves accuracy of the interocclusal registration by increasing record base stability. When placed intraorally, the record bases can be used to verify the accuracy of the impressions and master casts.

Fig. 11-36

Fig. 11-37 View of the tissue-bearing surfaces of the maxillary and mandibular record bases. This form is the result of reline procedures and should resemble the completed denture shapes.

Fig. 11-37

Chapter 12

Interocclusal Registration

The interocclusal registration is a very important procedure in denture fabrication since the maxillomandibular relationship is the basis for occlusion. The relationship should be transferred to an articulator. This is a weak point for clinicians either in making dentures or crowns and fixed partial dentures; it is based on a disbelief or an intimidation of articulators. If transferring the record to an articulator is disregarded or considered difficult, there is no justification for using an articulator.

Some preparation is necessary prior to making the interocclusal registration. Figure 12-1 shows the equipment needed for this procedure; the equipment includes the following: two flat-plate instruments used to establish the occlusal plane, a guide used to determine the width of the anterior teeth, a locator to verify the position of the mandible, and a Fox plane to check the relation between the occlusal plane and Camper's line in a sagittal section, and between the interpupillary line and occlusal plane in a frontal section. Making an interocclusal record requires registration paste since it is difficult to make a record without placing material between opposing arches. A burner as shown in Figure 12-1 is important for this procedure. Alcohol torches such as a Hanau torch produce a variable flame using an air stream, while a burner maintains an even flame.

The procedures for the interim dentures result in balancing the occlusal plane and determining the vertical dimension of occlusion relative to the maxillomandibular relationship. This chapter details the procedures necessary to achieve an accurate interocclusal registration.

Fig. 12-1

Fig. 12-2

Fig. 12-1 Instruments used for the inter-occlusal registration.

Fig. 12-2 Initially determine the thickness of the denture in the molar region; the photo shows a measurement at the distal of the first molar. Use the calipers to measure the distance between the occlusal surface and tissue-bearing surface, and check the distance on the opposite side. This dimension can be maintained or changed according to a predetermined value.

Fig. 12-3 Position the calipers in an area using an anatomic landmark.

Fig. 12-4 The occlusogingival dimension is measured and transferred to the occlusion rim. Use the same anatomic landmark on the tissue-bearing surface of the record base to verify the measurement. The landmark can be located easily since the record base was relined with a silicone impression material.

Fig. 12-5 Repeat the measurement procedures in the anterior region.

Fig. 12-6 Use the indentation of the incisive papilla as an anatomic reference.

Fig. 12-7 Place the calipers on the same reference in the record base and mark the level on the anterior occlusion rim.

Fig. 12-8 Repeat the procedures for the right side.

Fig. 12-9 Position the calipers on an anatomic reference and measure the distance.

Fig. 12-10 Transfer the measurement and mark the level on the occlusion rim.

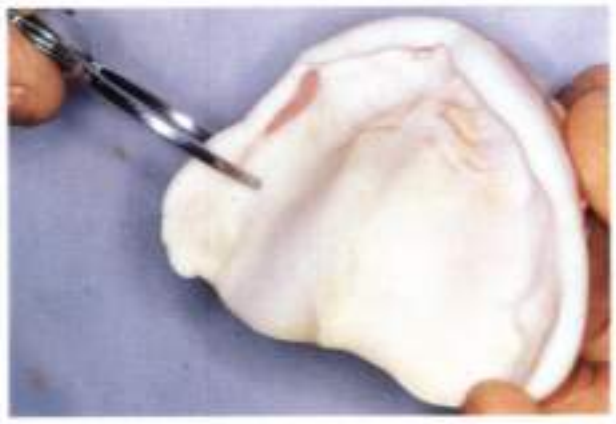

Fig. 12-3

Fig. 12-4

Fig. 12-5

Fig. 12-6

Fig. 12-7

Fig. 12-8

Fig. 12-9

Fig. 12-10

Fig. 12-11

Fig. 12-12

Fig. 12-13

Fig. 12-14

Fig. 12-15

Fig. 12-16

Fig. 12-17

Fig. 12-18

Fig. 12-11 Use a Bard-Parker knife to connect the anterior and posterior marks on the occlusion rim; the marks indicate the level of the occlusal plane corresponding to the same occlusal plane of the interim denture.

Fig. 12-12 Cut the occlusion rim along this line.

Fig. 12-13 The Occlusal Rim Inclinator has a slight curvature and inclination which is reproduced on the occlusal surface of the occlusion rim.

Fig. 12-14 The instrument has a posterior rim which is placed in the hamular notch regions then rotated onto the occlusal surface to reproduce the inclination.

Fig. 12-15 Apply the heated inclinator and melt the wax to the level of the marks scribed into the occlusion rim.

Fig. 12-16 After removing the inclinator, the occlusion rim has a flat occlusal plane at the marked level.

Fig. 12-17 Place the maxillary occlusion rim intraorally and mark the midline. The midline may not be a straight line if drawn from the patient's side and could be off-center if not checked from a distant position.

Fig. 12-18 Prepare the facebow fork to transfer the three-dimensional position of the maxilla to the articulator, prior to making the interocclusal records. Place the facebow fork on the occlusion rim to check the orientation.

Fig. 12-19 Fix the facebow fork to the occlusion rim using sticky wax. The facebow fork is difficult to remove if fixed to the occlusion rim using baseplate wax or if it was heated and melted directly into the occlusion rim.

Fig. 12-20 Make a reference mark 43mm above the incisal edge of the central incisors or use a reference in the Frankfort plane between the infraorbital margin and the tragus. The distance between the reference mark and the inner canthus of the eye is used to make an accurate recording.

Fig. 12-21 Set the facebow while holding it intraorally since the weight of the facebow might displace the record base.

Fig. 12-22 Mark the reference point.

Fig. 12-23 Set the facebow parallel to the interpupillary line in a frontal section and parallel to the face in the coronal section.

Fig. 12-19

Fig. 12-20

Fig. 12-21

Fig. 12-22

Fig. 12-23

Fig. 12-24

Fig. 12-25

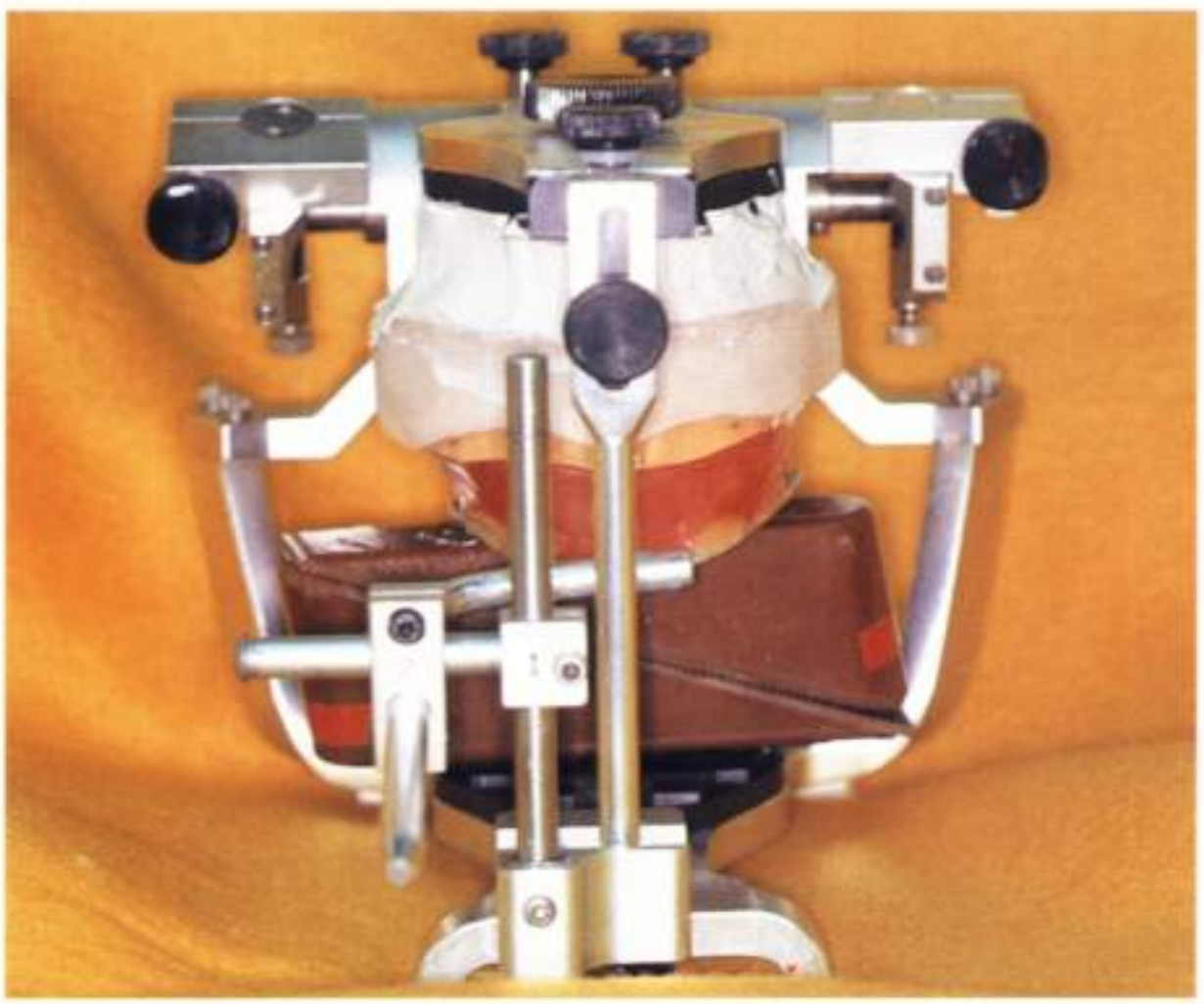

Fig. 12-26

Fig. 12-24 The Occlusal Pressure Equilibrator is a thin plastic template filled with liquid. Place the equilibrator between the occlusal surfaces and when the patient occludes, the record bases are held in position intraorally rather than displaced by movable tissues or the weight of the facebow.

Fig. 12-25 The record bases are stable and held in position when the patient occludes on the equilibrator. The occlusal forces are balanced with this method even when the opposing arch is dentulous. Cotton rolls can be used if the Occlusal Pressure Equilibrator is unavailable. However, inaccuracies can occur between opposing arches since the cotton rolls are firm and create an imbalance or a fulcrum.

Fig. 12-26 Mount the maxillary occlusion rim in an articulator; the photo shows a Denar articulator. After making the facebow record, remove the facebow fork and anterior jig from the earbow. Transfer the facebow fork and jig to the laboratory without the earbow. Attach the anterior jig into the incisal mounting index on the articulator; this reproduces the three-dimensional position recorded clinically. Mount the cast on the articulator by positioning the cast into the occlusion rim in the facebow fork.

Fig. 12-27 When mounting the cast, support the facebow fork using wedges or "door-stops" to prevent the weight of the cast from distorting the record.

Fig. 12-28 After mounting the maxillary cast, make the interocclusal registration to mount the mandibular cast. Adjust the occlusion rim in the same manner followed for the maxillary occlusion rim, by referring to the interim denture.

Fig. 12-29 Transfer the occlusogingival measurement of the interim denture to the occlusion rim.

Fig. 12-30 Locate an anatomic landmark for a reference on the tissue-bearing surface of the denture.

Fig. 12-31 Place the calipers on the same landmark in the occlusion rim and mark the level.

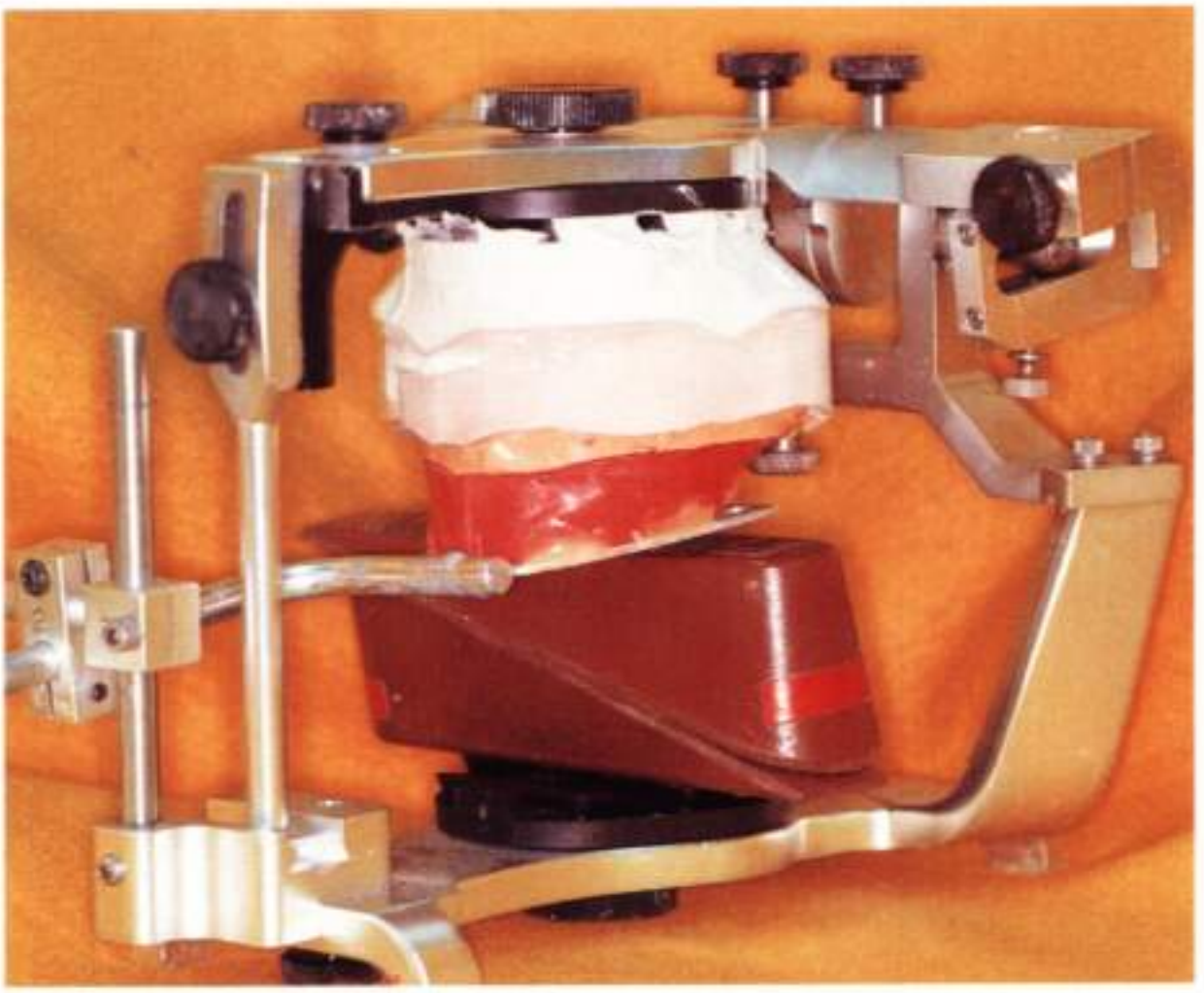

Fig. 12-27

Fig. 12-28

Fig. 12-29

Fig. 12-30

Fig. 12-31

Fig. 12-32

Fig. 12-33

Fig. 12-34

Fig. 12-35

Fig. 12-36

Fig. 12-37

Fig. 12-38

Fig. 12-39

Fig. 12-32 Measure three areas, one anterior and two posterior regions, as shown in the photo.

Fig. 12-33 Use a Bard-Parker knife to connect the marks that form the occlusal plane.

Fig. 12-34 Cut the occlusion rim along the line made with the Bard-Parker knife.

Fig. 12-35 The maxillary record base extends posteriorly to the postpalatal seal and the posterior extensions of the mandibular record base were reduced anterior to the retromolar pads. The occlusion rims will be stable intraorally since a silicone impression material was used to reline the tissue-bearing surfaces.

Fig. 12-36 Occlude the maxillary and mandibular interim dentures after adjusting intraorally and measure the distance between the tissue-bearing surfaces of both dentures, as shown in the photo.

Fig. 12-37 Since the occlusogingival heights of the occlusion rims were adjusted according to the same heights in the interim dentures, the measurement between tissue-bearing surfaces of the occlusion rims in occlusion is essentially the same as between interim dentures in occlusion.

Fig. 12-38 Verify the measurement of the occlusion rims in occlusion by comparing it with the measurement made of the interim dentures in occlusion.

Fig. 12-39 Reduce the anterior region of the mandibular occlusion rim to create space for the interocclusal registration material.

Fig. 12-40 The anterior region between the canines is reduced by approximately 3mm. Avoid having the patient thrust the mandible forward to make anterior contact during the interocclusal registration.

Fig. 12-41 The ala-tragus line or Camper's plane is used to establish the occlusal plane.

Fig. 12-42 The incisal edges of the anterior teeth are parallel to the interpupillary line in a frontal section.

Fig. 12-43 The vertical dimension of rest can be determined using the Willis method. Measure the distance from the interpupillary line to the corner of the mouth as the standard for the vertical dimension of rest.

Fig. 12-44 The distance from the base of the nose to the chin is approximately the same as the previously mentioned measurement (Fig. 12-43)

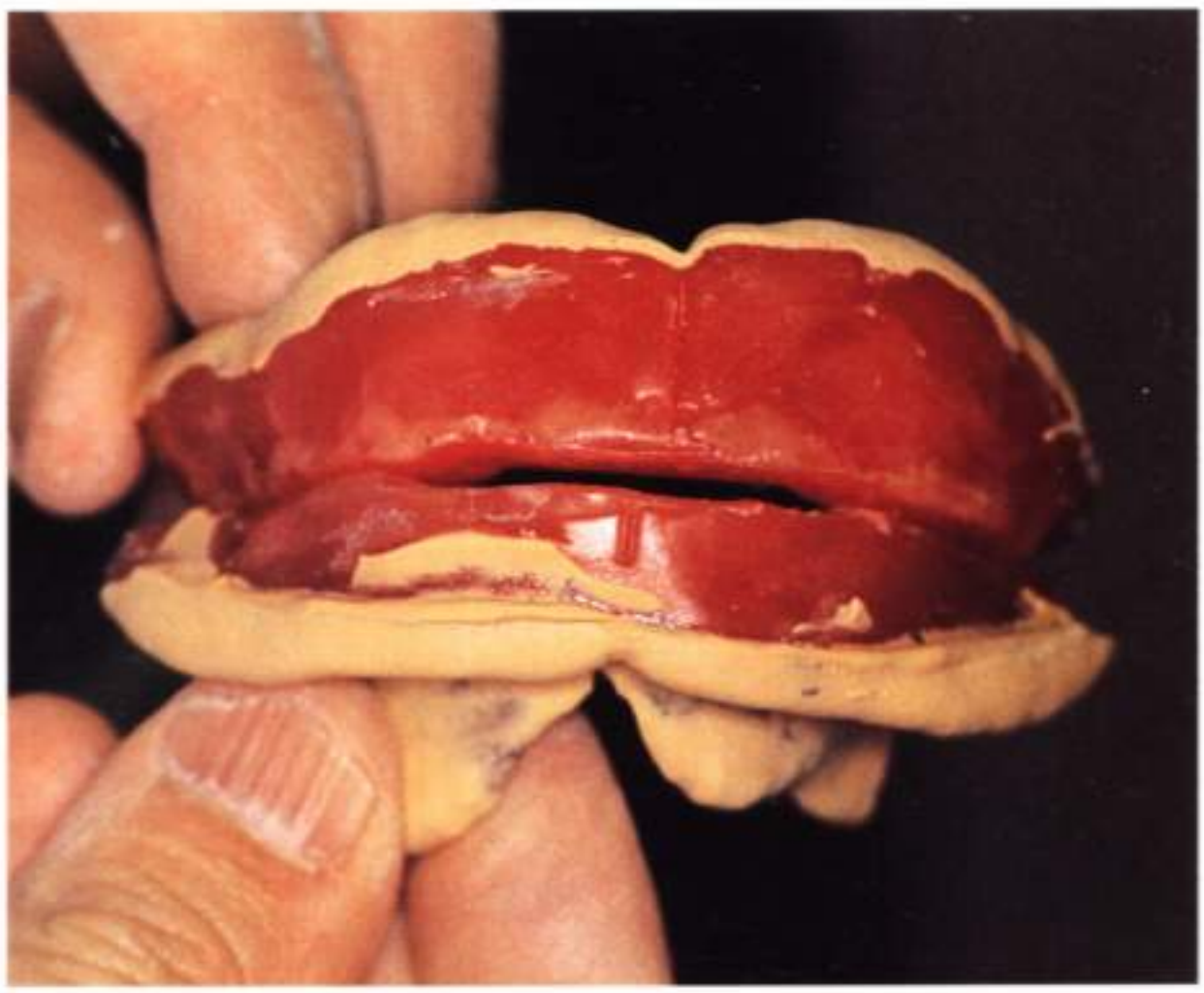

Fig. 12-40

Fig. 12-41

Fig. 12-42

Fig. 12-43

Fig. 12-44

Fig. 12-45

Fig. 12-46

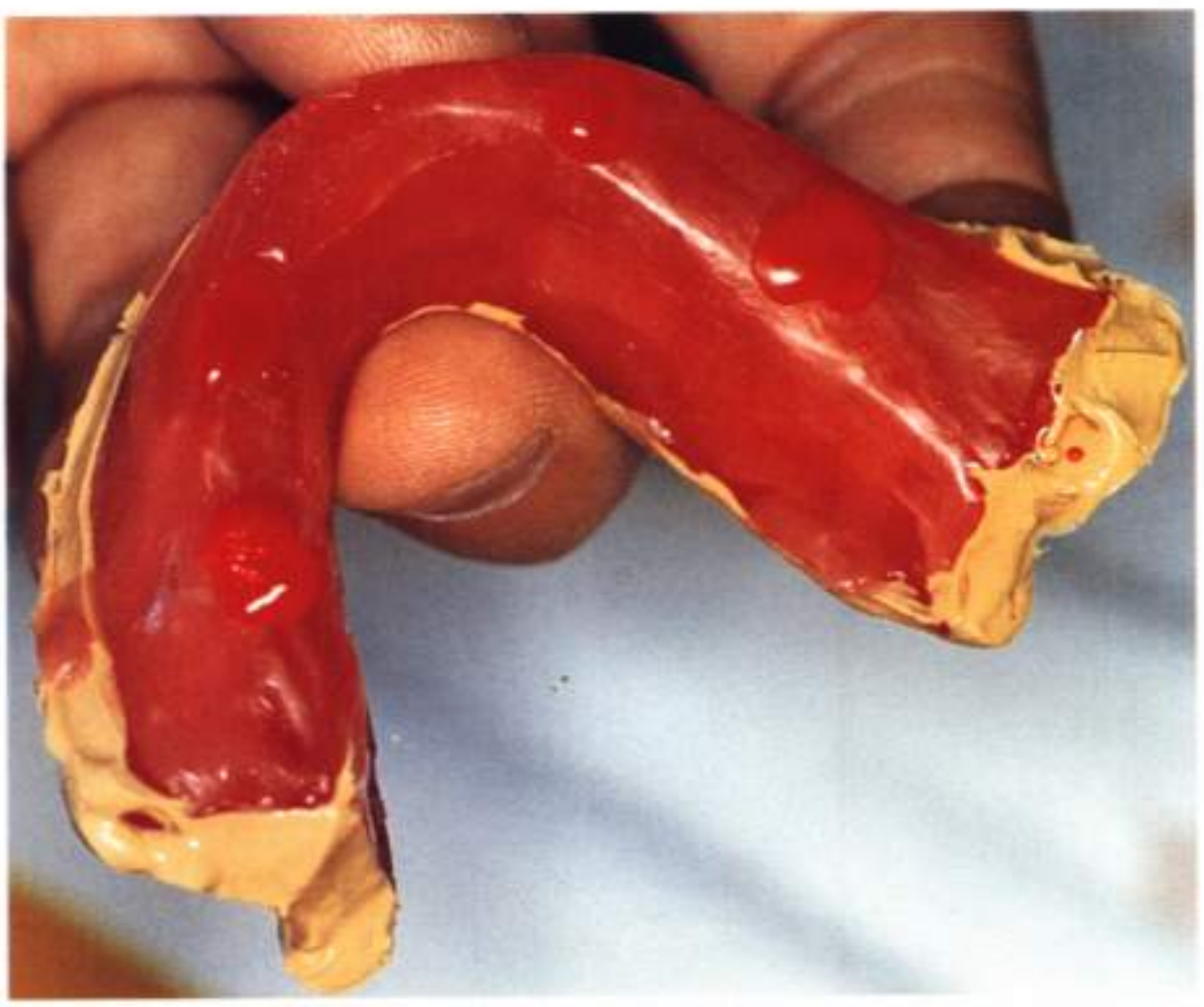

Fig. 12-47

Fig. 12-48

Fig. 12-49

Fig. 12-45 After adjusting the anterior region, check both occlusion rims intraorally and verify the anterior gap.

Fig. 12-46 Melt utility wax onto the occlusal surface of the mandibular occlusion rim.

Fig. 12-47 Place utility wax or aluwax in four symmetrical positions corresponding to the molar and premolar regions. Observe the relation as the patient occludes lightly. The utility wax softens at mouth temperature and the symmetrical positions create even occlusal pressures as the patient occludes. If using a tripod arrangement for registration, a heavy anterior contact can displace the molar regions.

Fig. 12-48 Use a firm brush to apply a lubricant such as petrolatum. A cotton roll can be used but a brush is better.

Fig. 12-49 Apply the petroleum jelly on the maxillary occlusion rim; do not add utility wax to the occlusal surface of the maxillary occlusion rim.

Fig. 12-50 After verifying the dimensions of the occlusion rims, make the interocclusal record. Some methods for registration include having the patient occlude while fixing the opposing wax occlusal surfaces with a hot instrument or using rivet devices to connect the opposing rims. The method is not important as long as the maxillomandibular relation is accurate and secured.

An accurate interocclusal record requires registration without uneven forces so instruct the patient to occlude lightly. The utility wax has some elasticity with light occlusal pressure, but the dentures can rotate or the tissues are compressed under heavy occlusal pressure. Place the registration paste between opposing occlusal surfaces and try to prevent uneven forces.

Fig. 12-51 Mix then place the Bite Registration Paste on the occlusal surfaces; this material has a fast setting time intraorally. Use a fast-set registration material and have the patient occlude lightly to prevent muscle fatigue or deviations in the centric relation position.

Fig. 12-52 Use the centric locator to guide and verify the centric relation position using utility wax before making the interocclusal registration. When making the registration, hold the jaw lightly with the centric locator as the material sets.

Fig. 12-53 Remove the maxillary and mandibular occlusion rims as one unit when the registration paste has set. Displace the mandibular record, then displace the maxillary record to remove them together.

Fig. 12-54 Dislodge the maxillary record using an air syringe to release the seal and facilitate removal.

Fig. 12-50

Fig. 12-51

Fig. 12-52

Fig. 12-53

Fig. 12-54

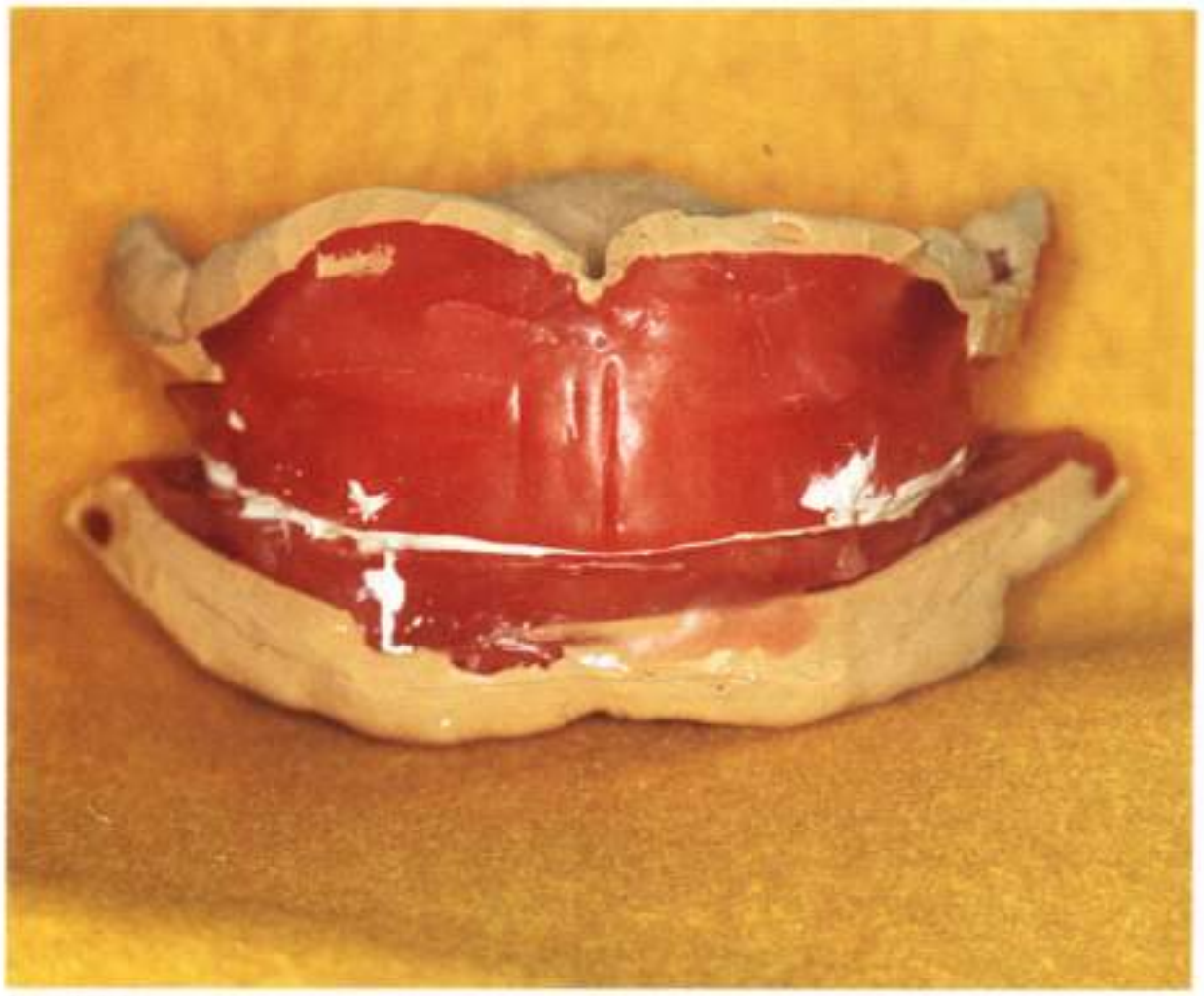

Fig. 12-55

Fig. 12-56

Fig. 12-57

Fig. 12-58

Fig. 12-59

Fig. 12-55 The maxillomandibular relation between occlusion rims is maintained since both rims were removed as one unit and fixed with registration paste. The low viscosity property of the registration paste insured that no unreasonable forces occurred due to the material and the close tissue adaptation was maintained by the silicone impression reline.

Fig. 12-56 The papillameter is used to observe the relation between the lip and alveolar ridge, the basis for the anterior tooth arrangement.

Fig. 12-57 The edge of the instrument is matched to the location of the incisive papilla to determine the length of the anterior teeth. The incisive papilla is relatively fixed in both dentulous and edentulous arches.

Fig. 12-58 Position the instrument in the vestibule at an inclination approximating the inclination of the central incisors. Moisten the lips and determine the lip line on the instrument.

Fig. 12-59 Place the small ledge on the back of the instrument against the incisive papilla on the cast.

Fig. 12-60 The next chapter discusses how the value obtained clinically is transferred to the cast.

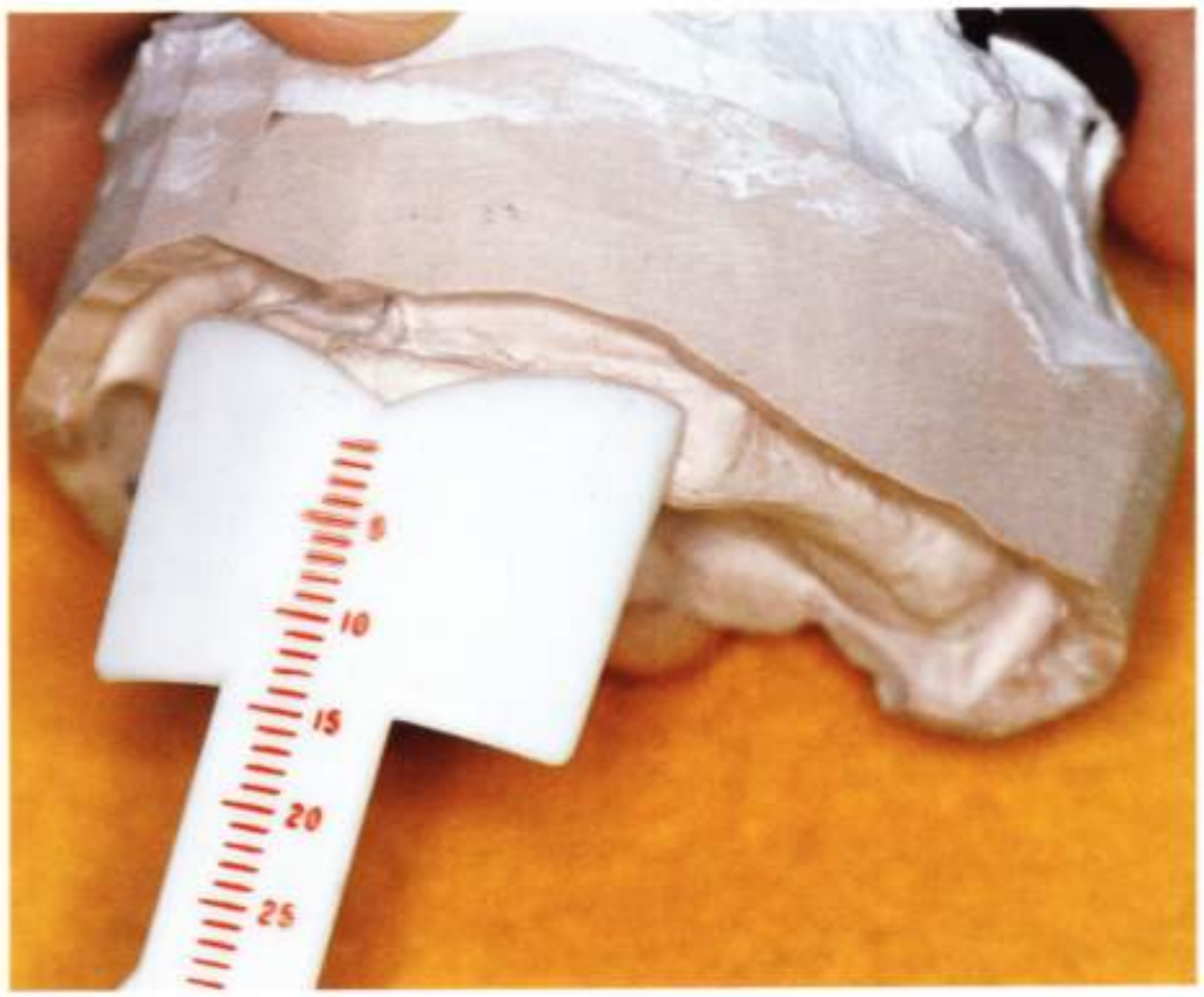

Fig. 12-60

Chapter 13

Laboratory Procedures
(Tooth Arrangement, Processing, Occlusal Adjustment)

The laboratory procedures in complete denture fabrication are very important but are time-consuming when compared to all other procedures. Recent developments in materials and equipment make the actual technique less critical. The laboratory procedures involve efficient use of the best available system, although the operator must have the necessary technical skills. A minimum amount of technical knowledge is necessary to make a judgement regarding efficient use of a particular system.

Fig. 13-1 Maxillary and mandibular casts have been mounted on the articulator and the artificial teeth have been selected.

Fig. 13-1

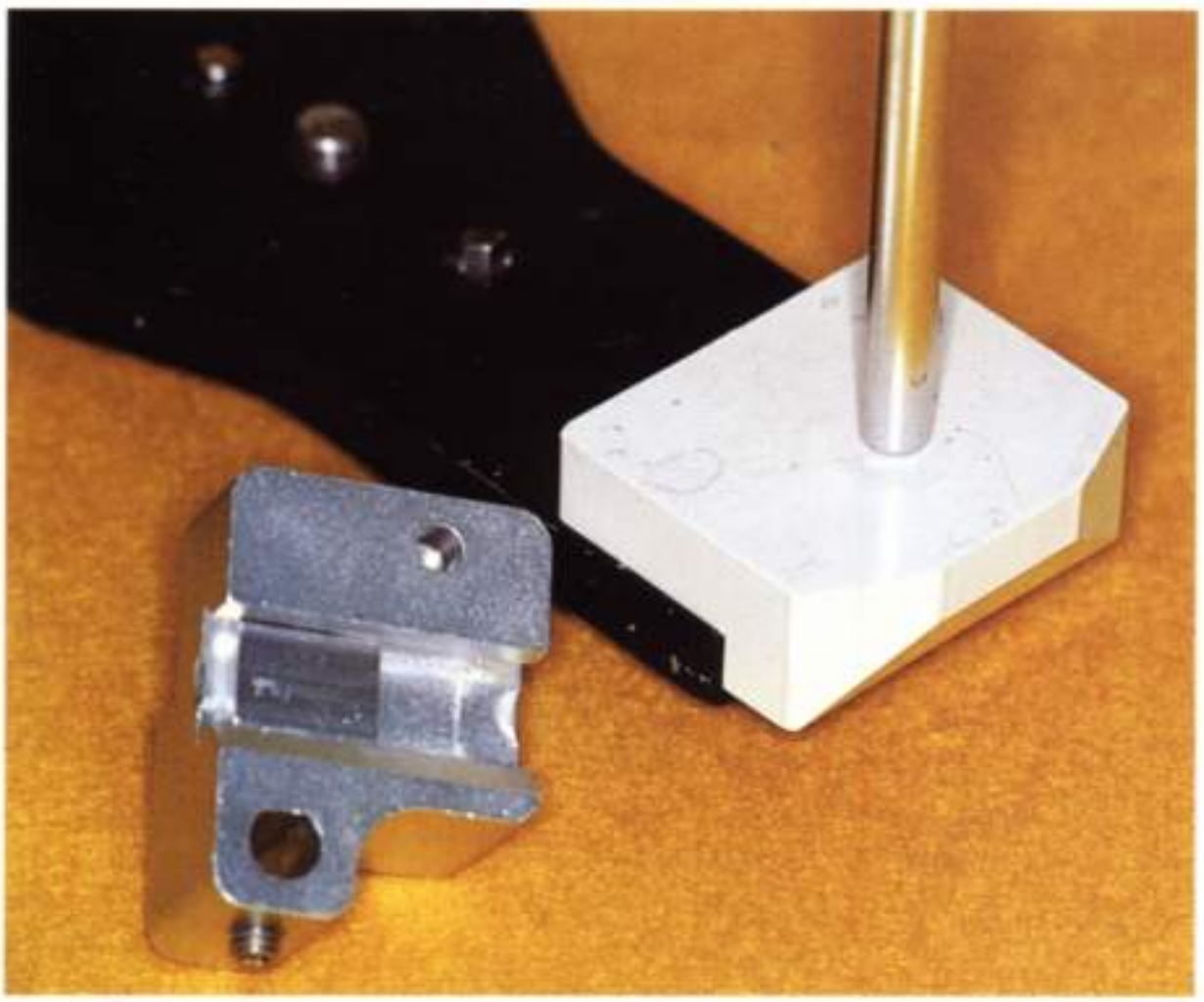

Fig. 13-2

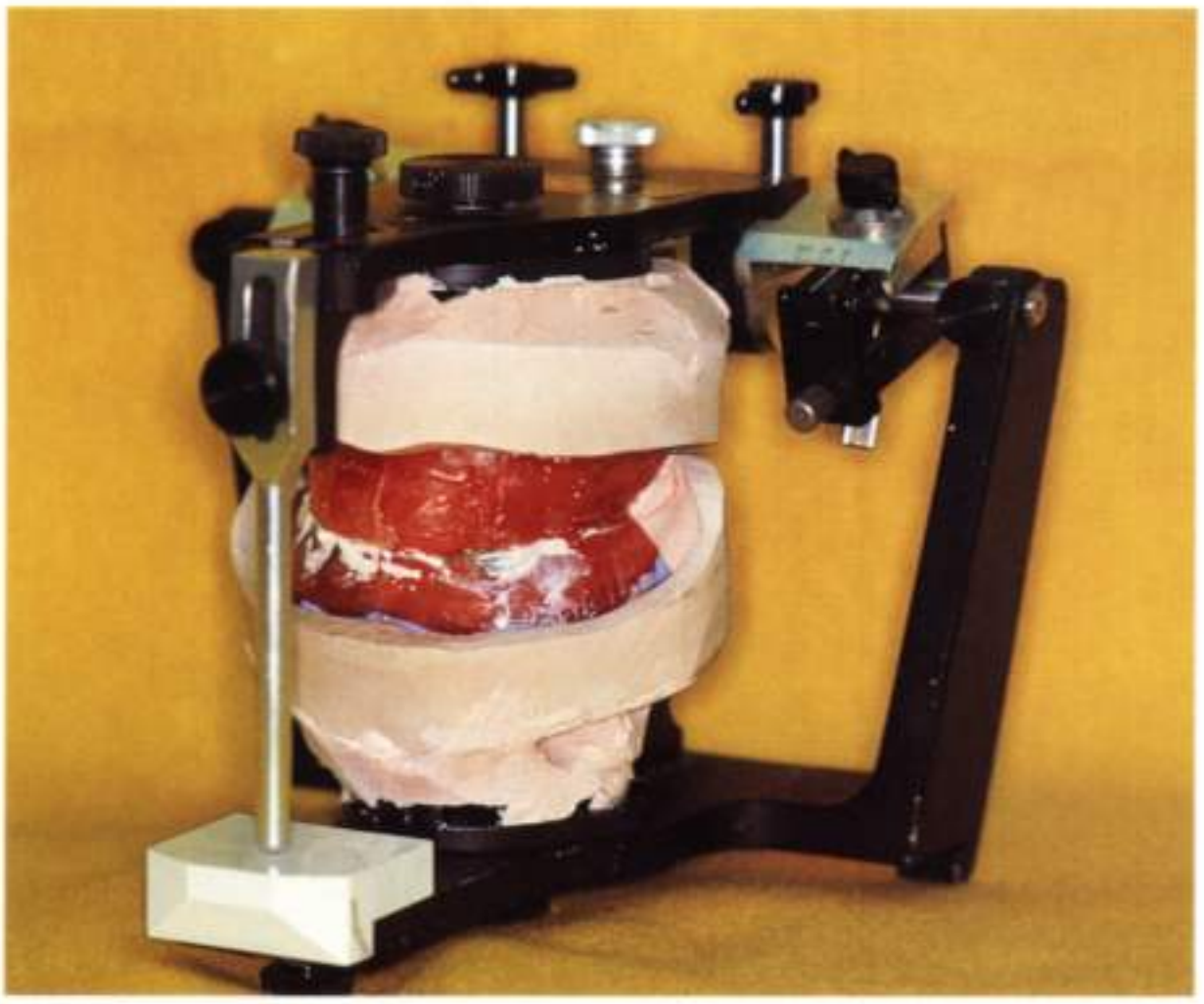

Fig. 13-3

Fig. 13-2 The incisal mounting index is removed and replaced with the incisal table.

Fig. 13-3 The mandibular cast has been mounted on the articulator.

Fig. 13-4 The artificial teeth have been selected using a tooth indicator and the shade was selected using a shade guide. In the past, porcelain teeth were used routinely but with developments in high polymer chemistry, resin teeth have properties that surpass the porcelain material. The porcelain teeth had a tendency to fracture and wear easily. The hard resin used to manufacture artificial teeth significantly reduces the occurrences of fractures and resists wear. The shades of resin teeth are excellent when compared to porcelain shades.

Resin teeth are easy to arrange when compared to the problems that occur with porcelain teeth. Porcelain teeth are held in position in the final prosthesis by a mechanical bond instead of a chemical bond. The chemical bond between resin teeth and the denture base material forms a foundation superior to the mechanical bond in porcelain teeth.

A decrease in the vertical dimension of occlusion may occur over time. The decrease can be due to wear of the occlusal surfaces and alveolar bone resorption which could result in an increased load on the anterior teeth. Flabby or unsupported alveolar tissues can easily occur in the maxillary anterior region with porcelain anterior teeth with increased load anteriorly. Resin teeth appear to wear in a balanced pattern; they can be used throughout both arches in anterior and posterior regions.

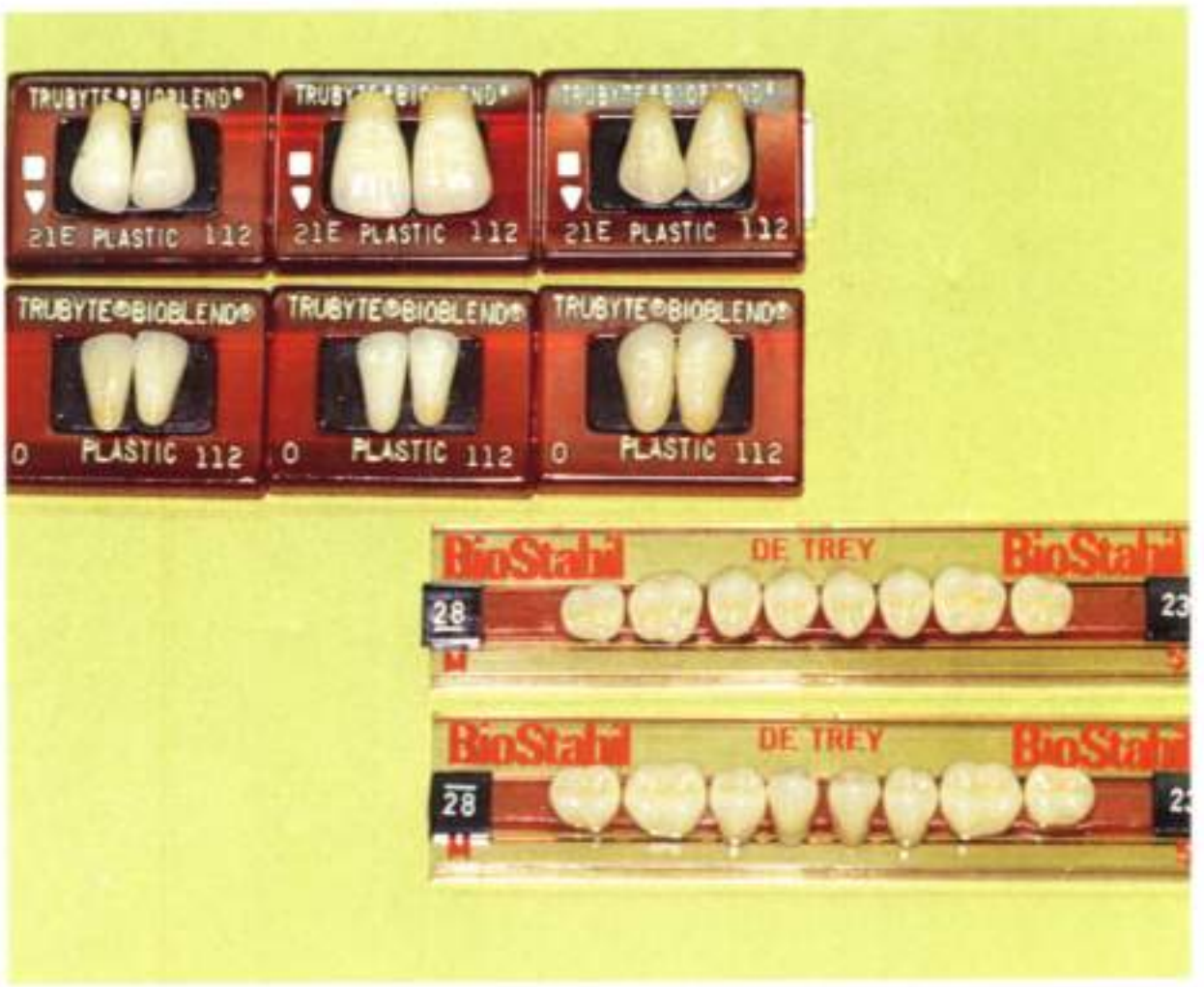

Fig. 13-4

Fig. 13-5 Different instruments such as a compass, ruler, and papillameter are used to transfer patient measurements made clinically to the articulator.

Fig. 13-5

Fig. 13-6 The ledge on the opposite side of the papillameter is placed on the incisive papilla.

Fig. 13-6

Fig. 13-7 A frontal view shows the number 10 scribed on the cast. This corresponds to the contact of the patient's lip line clinically on the 10mm line of the papillameter. It represents the distance between the papilla and the lip line.

Fig. 13-7

Fig. 13-8 An arbitrary length is selected as a reference measurement from a point on the cast, in this instance, 30mm was used to set the compass.

Fig. 13-8

Fig. 13-9

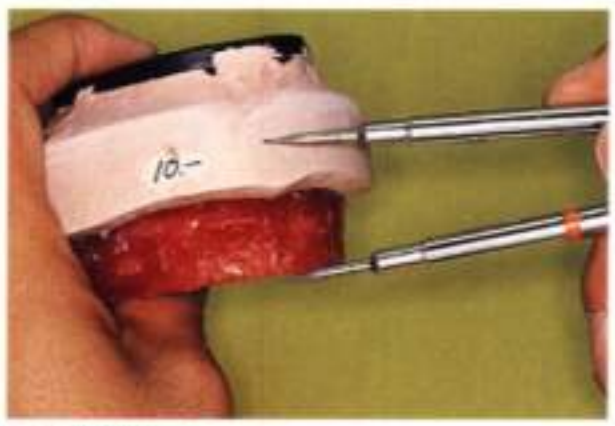

Fig. 13-10

Fig. 13-11

Fig. 13-12

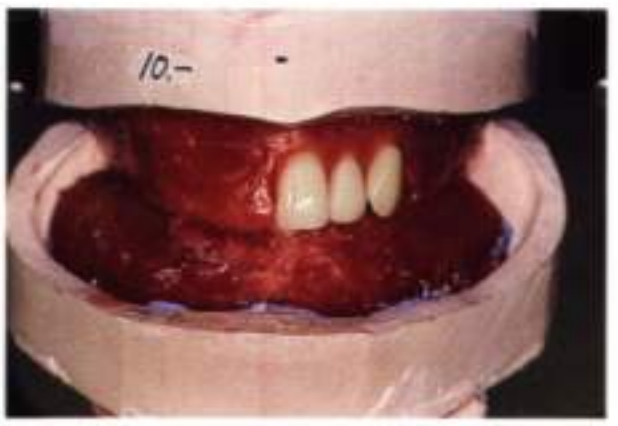

Fig. 13-13

Fig. 13-9 Use the set compass to place a mark on the cast measured from the 10mm line on the papillameter.

Fig. 13-10 The reference mark is used to determine the lip line with or without the occlusion rim in position.

Fig. 13-11 Before arranging the anterior teeth, apply sticky wax on the occlusion rim at the approximate tooth positions or on the backs of the teeth to prevent tooth movement during arrangement or denture try-in.

Fig. 13-12 Begin arranging the teeth by placing the central incisor initially.

Fig. 13-13 Arrange the lateral incisor and canine following the facial curvature of the occlusion rim.

Fig. 13-14 Arrange the anterior teeth and use a template to verify the teeth have been set on a horizontal occlusal plane.

Fig. 13-15 Verify the position of the anterior teeth using the compass set on the reference mark for the lip line. When the anterior teeth are set on the horizontal occlusal plane, the incisal edges may be even with the lip or shorter than the lip line, correct for a male patient over 40 years old.

Fig. 13-16 When the anterior teeth are set 1-2mm longer than the compass reference length, the teeth will show beyond the lip line, usually done for a younger look in women.

Fig. 13-17 When the doctor has some control over the procedures, the artificial teeth are set to the measurements made from the patient. The incisal edges of the anterior teeth are set to the compass reference length.

Fig. 13-18 Set the mandibular anterior teeth following the maxillary anterior teeth. The vertical overlap should not exceed 2mm.

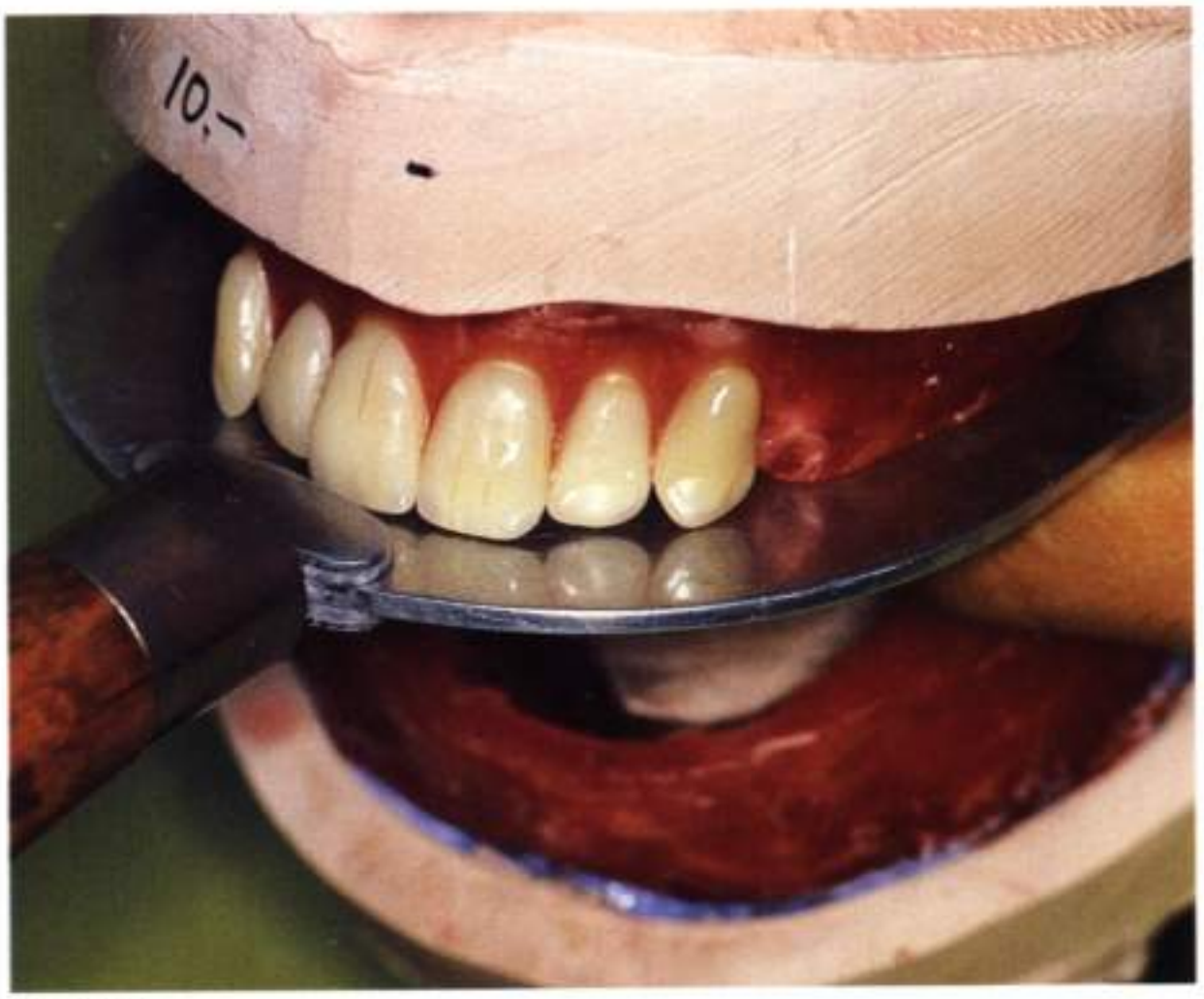

Fig. 13-14

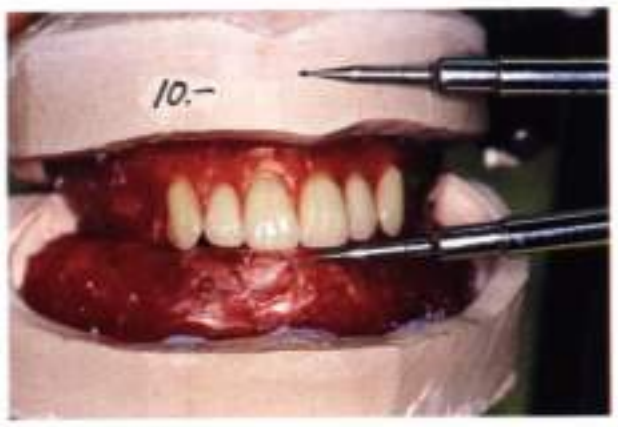

Fig. 13-15

Fig. 13-16

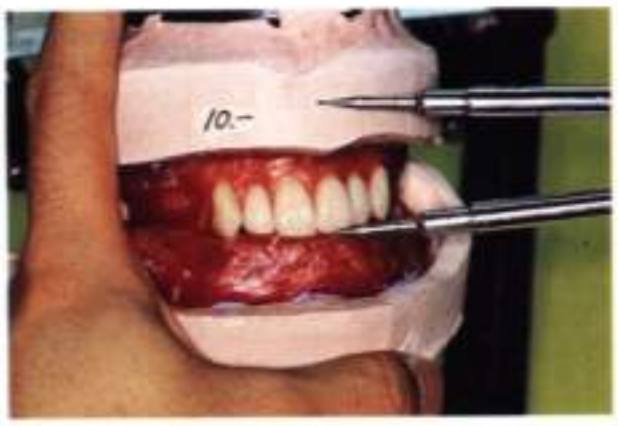

Fig. 13-17

Fig. 13-18

Fig. 13-19

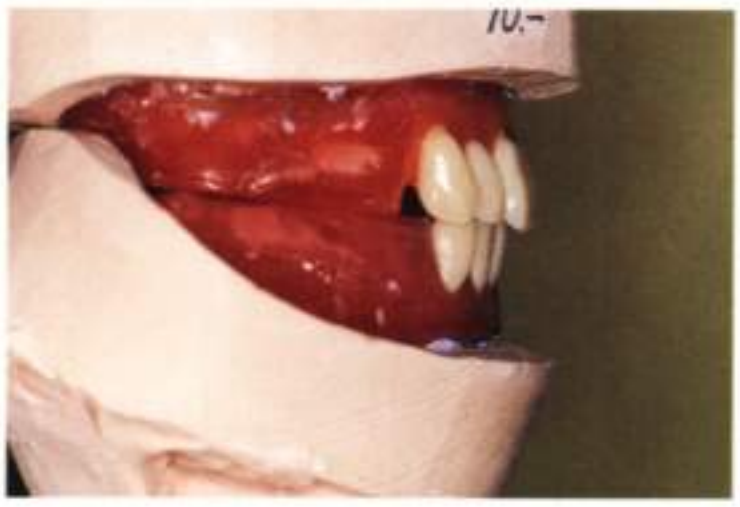

Fig. 13-20

Fig. 13-21

Fig. 13-22

Fig. 13-23

Fig. 13-24

Fig. 13-19 The mandibular anterior teeth should not touch the lingual surfaces of the maxillary anteriors. A minimum of 1mm horizontal overlap is required for complete dentures which differs from overlap in fixed restorative treatment. The amount of horizontal overlap also differs according to the patient's Angle classification, either Angle Class I, Class II, or Class III.

Fig. 13-20 The lateral view shows the 2mm vertical overlap has considerable depth. If the overlap is increased further, problems occur between balancing anterior guidance with the condylar inclinations.

Fig. 13-21 A reference line for setting the mandibular teeth is marked on the mandibular occlusion rim. Place a ruler along the inner side of the retromolar pad to the mesial line angle of the canine and scribe a line.

Fig. 13-22 Scribe another line on the occlusion rim between the mesial line angle of the canine and the buccal side of the retromolar pad. This line procedure uses Dr. Pound's method for arranging posterior teeth. Another method, Watt's method, uses one line marked from the canine cusp tip to the center of the retromolar pad.

Fig. 13-23 Arrange the maxillary posterior teeth in wax.

Fig. 13-24 The tooth arrangement is based on a lingualized occlusion advocated by Dr. Pound. The lingual cusps of the mandibular teeth are positioned between the two lines marked on the mandibular occlusion rim.

Fig. 13-25 After setting the posterior teeth, the tooth contacts can be seen in the reflection-view on the template. The lingual cusps of the first and second premolars, the mesial and distolingual cusps of the first molar, and the mesiolingual cusp of the second molar contact the occlusal template. The distolingual cusp of the second molar does not touch the template in order to create a compensating curve.

The compensating curve in the frontal section, Wilson's curve, is formed by elevating the buccal cusps of the first and second premolars, and gradually elevating the buccal cusps of the first and second molars more than the premolars. The tooth positions are illustrated in the following figures.

Fig. 13-25a The lingual and buccal cusps of the first premolar contact the occlusal template.

Fig. 13-25b The buccal cusp of the second premolar is elevated 1mm from the template.

Fig. 13-25c The buccal cusps of the first molar are elevated 1-2mm.

Fig. 13-25d The buccal cusps of the second molar are elevated 2mm and the distolingual cusp is elevated approximately 1mm.

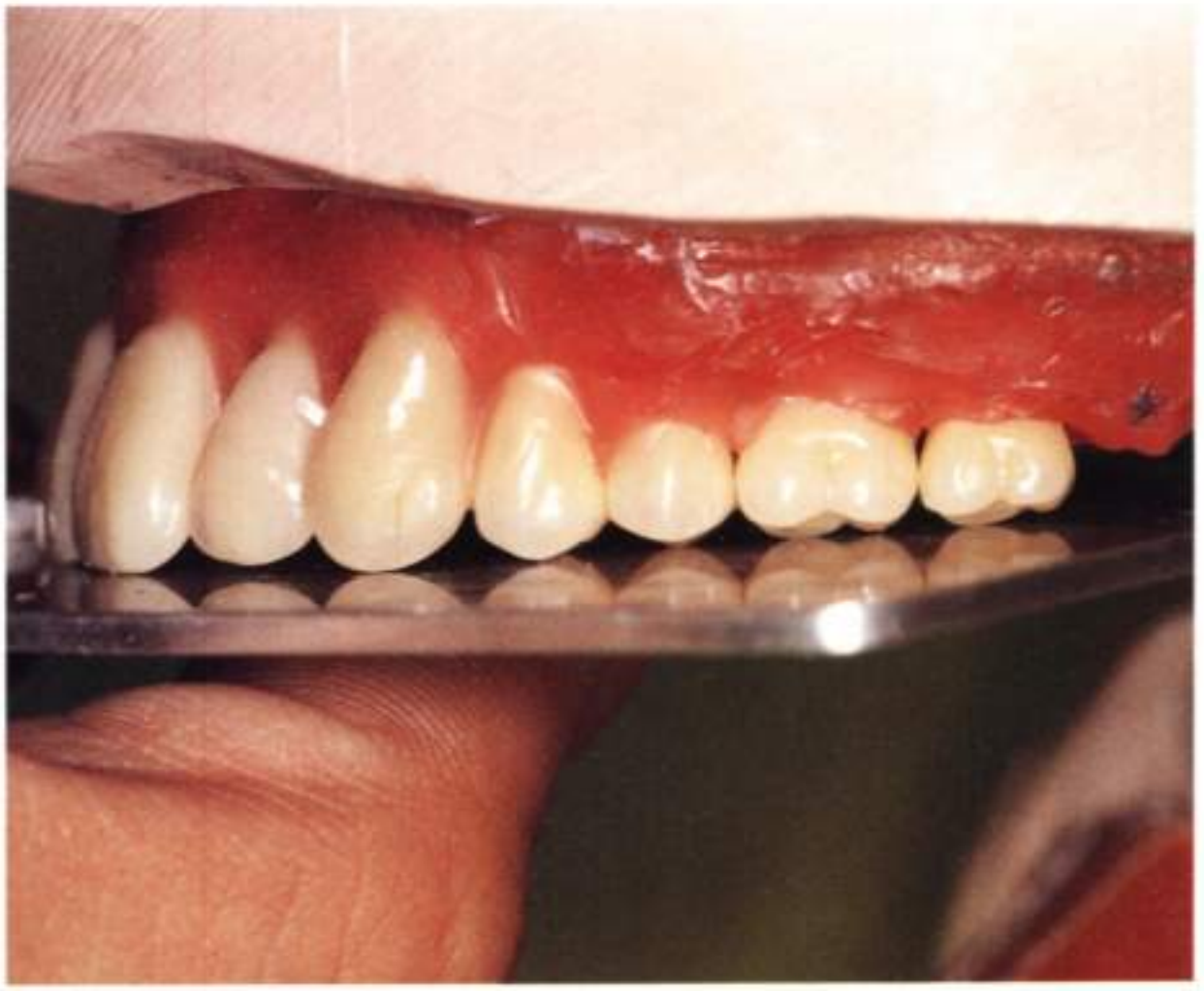

Fig. 13-25

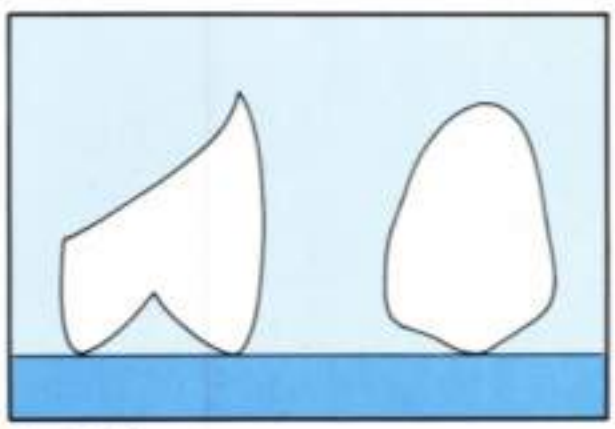

Fig. 13-25a

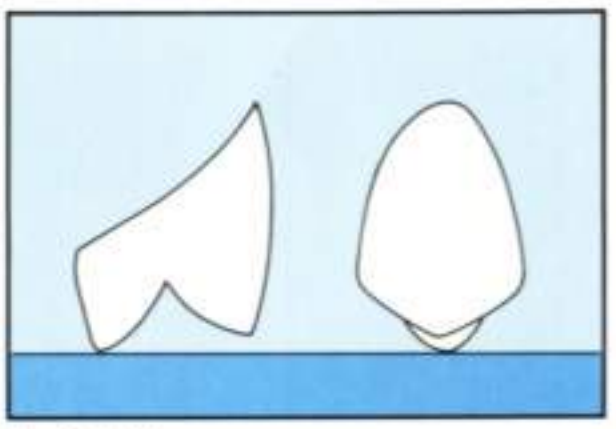

Fig. 13-25b

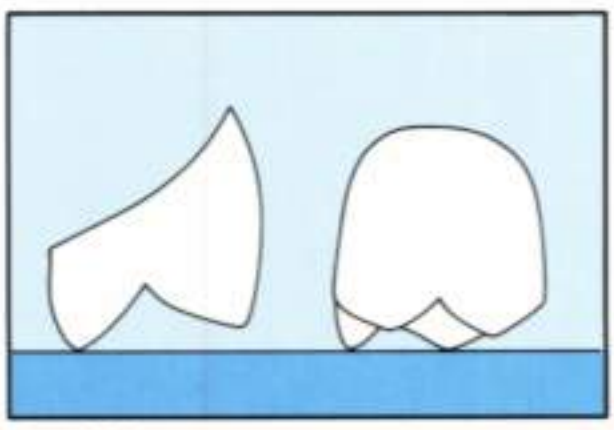

Fig. 13-25c

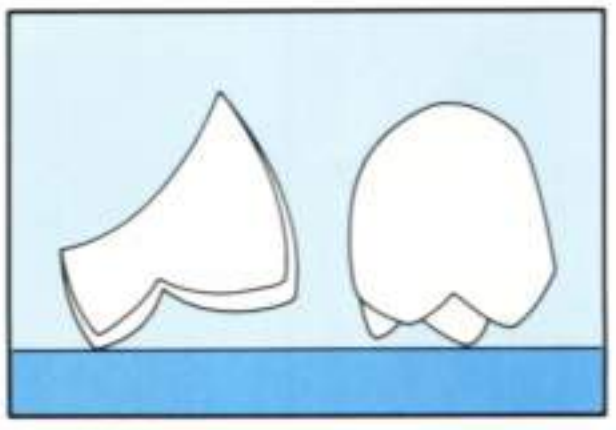

Fig. 13-25d

Fig. 13-26

Fig. 13-27

Fig. 13-28

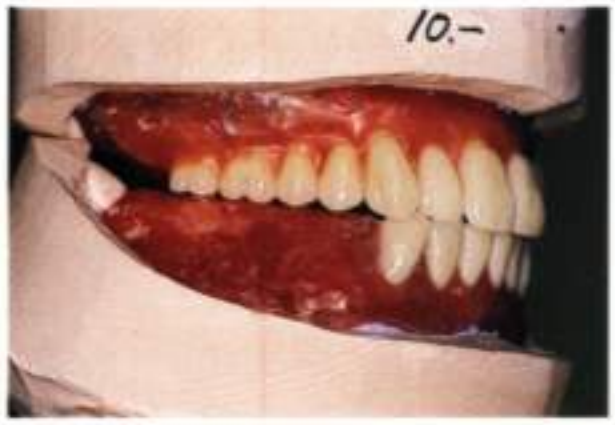

Fig. 13-29

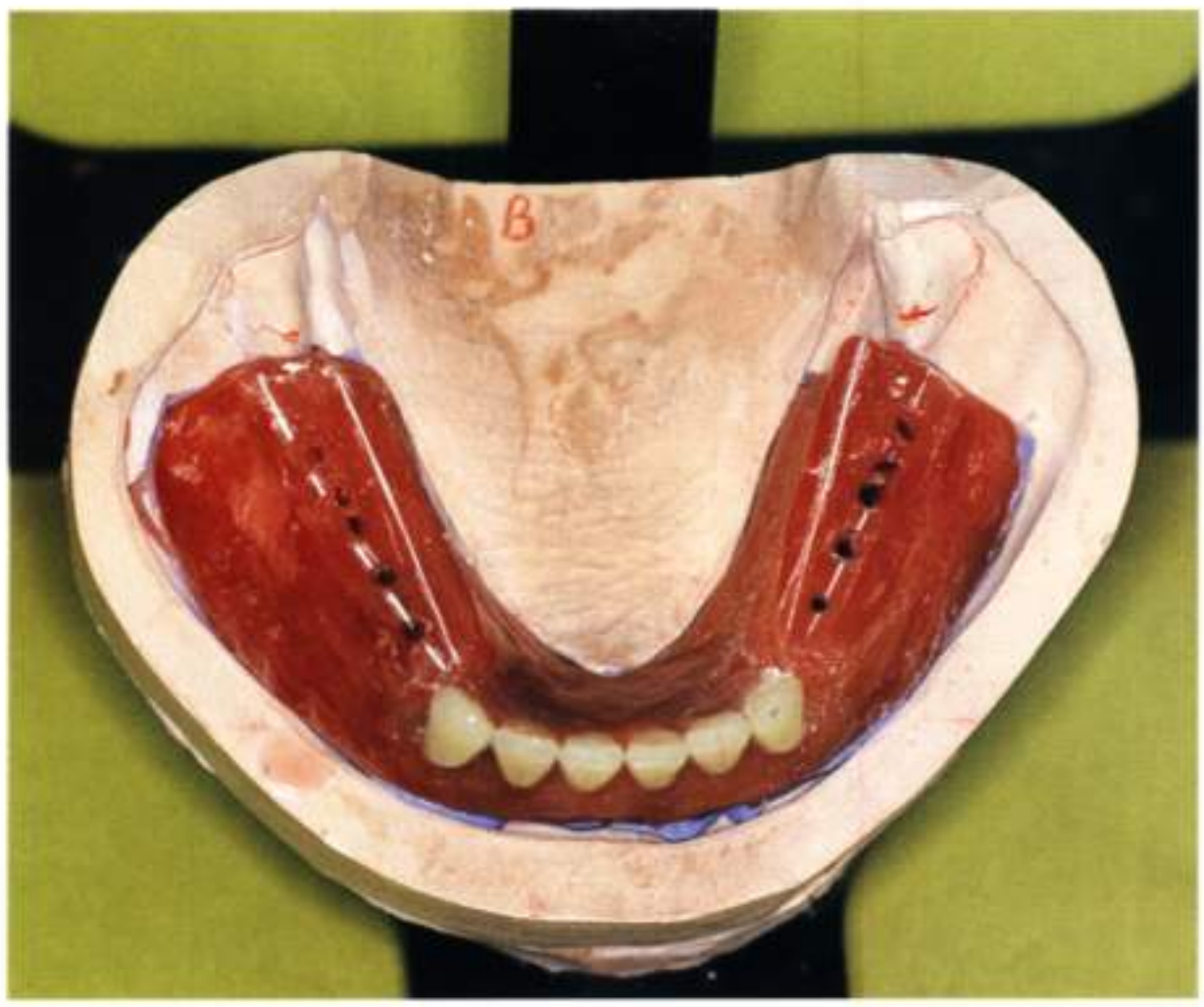

Fig. 13-30

Fig. 13-26 The maxillary posterior teeth occlude on the mandibular occlusion rim, shown on the left side.

Fig. 13-27 The lingual cusps indent the mandibular occlusion rim at five points on either side. Although the indentations appear to be positioned buccally, they are actually positioned in the central fossae of the mandibular molars. A lingualized occlusion follows a tooth arrangement similar to the positions of the natural teeth. Conventional methods do not position posterior teeth buccally which creates problems with denture rotation and other functions. A lingualized occlusion has posterior teeth positioned buccally which creates a wider tongue space while stabilizing the occlusion simultaneously.

Fig. 13-28 Check the cusp contacts on the template for the right side.

Fig. 13-29 Determine the occlusal plane from a point selected between the center and upper margin of the retromolar pads. This reference line is used to determine the mandibular occlusal plane. The maxillary lingual cusps indent the mandibular occlusion rim corresponding to the central fossa of the mandibular molars, located slightly below the retromolar reference point.

Fig. 13-30 The five lingual cusp indentations on either side are located inside of Dr. Pound's line.

Fig. 13-31 Begin setting the premolars. The premolars are not critical to occlusion but are important for esthetics. Conventional tooth arrangement has the premolars positioned lingually, producing shadows. This method positions both maxillary and mandibular premolars buccally.

The occlusion rim has been reduced so that the retromolar pads are exposed. This helps when inserting or removing the occlusion rim clinically or on the cast. The short posterior borders do not affect interocclusal registration since the silicone reline material helps record base stability.

Fig. 13-32 Frontal view of maxillary posterior tooth arrangement.

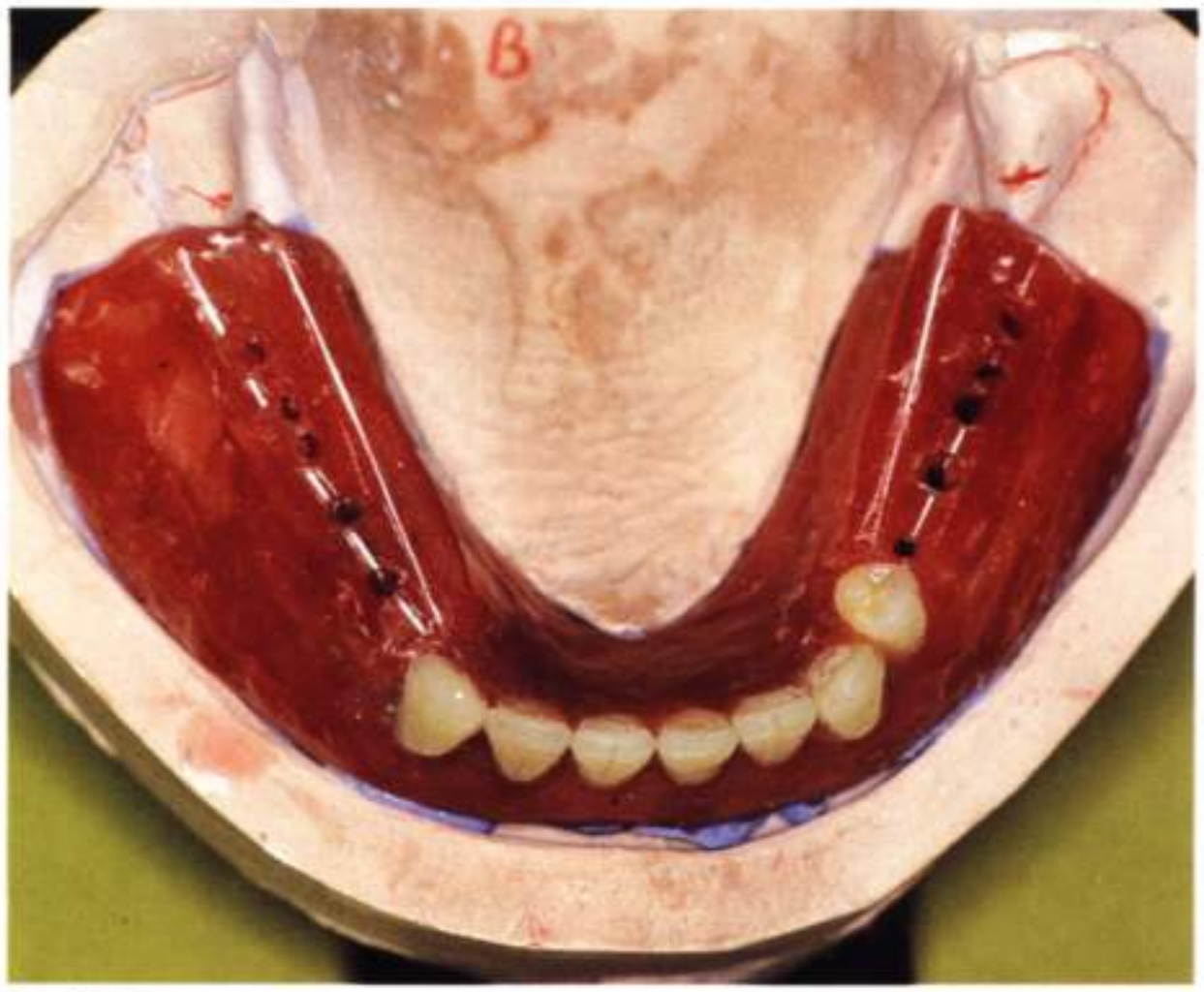

Fig. 13-31

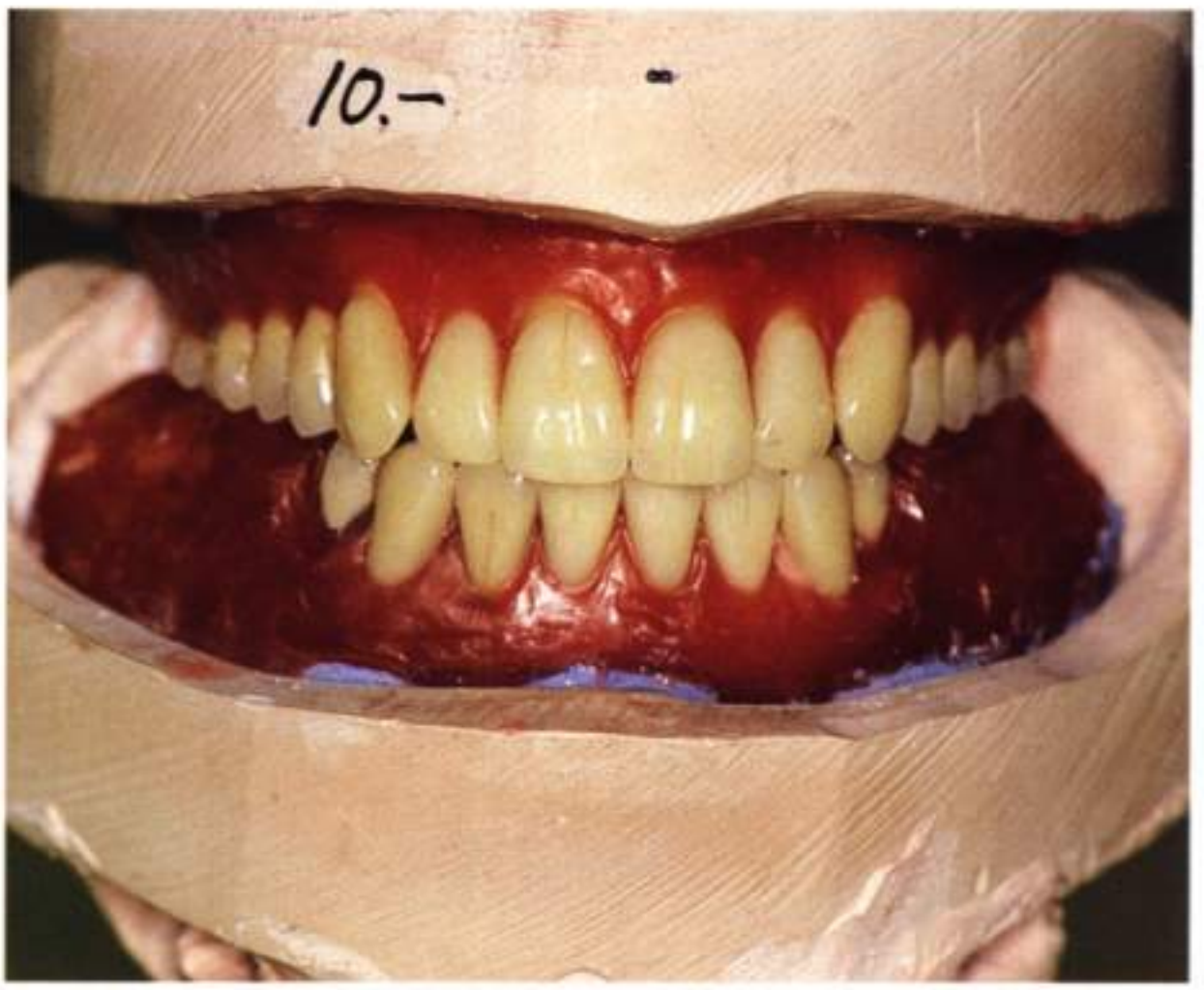

Fig. 13-32

Fig. 13-33

Fig. 13-34

Fig. 13-35

Fig. 13-36

Fig. 13-37

Fig. 13-33 Try in the tentative arrangement although the mandibular posterior teeth have not been set. Verify the centric relation position. Consult the patient on anterior esthetics since this is the first time the patient has seen the tooth arrangement. The anterior tooth arrangement should appear natural and does not include a metal crown on an anterior tooth. Check the shade in addition to the tooth arrangement since the patient was only shown the shade guide sample previously.

Fig. 13-34 Check the maxillary tooth arrangement in relation to the inner surface of the cheek. If the teeth are arranged lingually, a large triangular space is formed where food collects easily. The cheeks and tongue are important in mastication and cannot function properly if there is a large space adjacent to the teeth. The teeth should be arranged toward the buccal, near the original positions.

Fig. 13-35 Check the maxillary tooth arrangement on the left side.

Fig. 13-36 Remove the mandibular trial denture to check the esthetics and tooth arrangement; the premolars appear to be in good positions, not placed too far lingually.

Fig. 13-37 Check the esthetics and tooth arrangement on the left side.

Fig.13-38 Note the amount of overlap in the anterior region.

Fig. 13-39 Check the amount of vertical overlap by marking the length of maxillary incisal edges onto the mandibular anterior teeth.

Fig. 13-40 Measure the vertical overlap including the slope of the incisal edge; the vertical overlap limit is approximately 2mm.

Fig. 13-41 Observe the degree of overlap in this view. Even with a 2mm overlap, the maxillary lingual surfaces touch the mandibular incisal edges since the maxillary lingual surfaces guide the mandibular anterior teeth in protrusive movements. Excessive vertical overlap can create problems in the dentures.

A zero degree horizontal overlap is ideal but creates esthetic problems. Not all esthetics problems can be resolved in complete denture treatment since there are certain restraints, especially with the anterior teeth.

Patients with prominent maxillary teeth can be handled in two ways. First, in an Angle Class II patient, the maxillary teeth are positioned anteriorly to maintain this relationship. Secondly, the anterior teeth may be positioned anteriorly for esthetic reasons rather than conforming to the maxillomandibular relationship. Although the two methods differ, they seem similar since the tooth arrangement incorporates horizontal overlap. The contacts between the maxillary and mandibular anterior teeth should also be considered since a patient may protrude into anterior tooth contact.

Fig. 13-38

Fig. 13-39

Fig. 13-40

Fig. 13-41

Fig. 13-42

Fig. 13-43

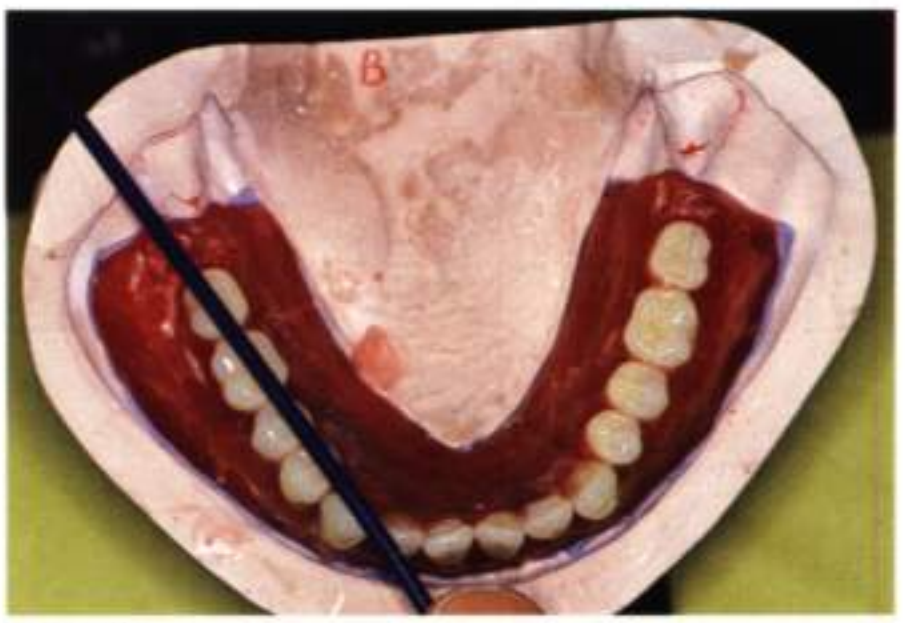

Fig. 13-44

Fig. 13-42 The lingual cusps of the mandibular molars have been arranged adjacent to a line connecting the buccal surface of the retromolar pad and the mesial line angle of the canine. This may be considered too far buccal but with a lingualized occlusion, there is no denture rotation since balance has been achieved.

Fig. 13-43 The mandibular occlusal plane is compared to the reference mark at the center of the retromolar pad; it should not be either above or below this level. This is important to achieve a balance between the surface of the tongue and linguo-occlusal surfaces of the mandibular molars. The tongue will cover the teeth if the occlusal plane is low. If the plane is high, greater tongue movements are required since mastication is obstructed.

A curve of Spee is not incorporated when setting the maxillary posterior teeth to avoid including complicating factors into the occlusion. Zero degree teeth are used to simplify the occlusion but also decrease masticatory capacity since there is no cusp-fossa relationship. Since natural teeth have a cusp-fossa relationship, some people think this same relation contributes to denture stability. However, a cusp-fossa relationship may cause maxillary denture displacement.

Fig. 13-44 Check the right side following the same comparisons used for the left side.

Fig. 13-45 Lateral view, left side of the occlusal relationship between the maxillary and mandibular trial dentures.

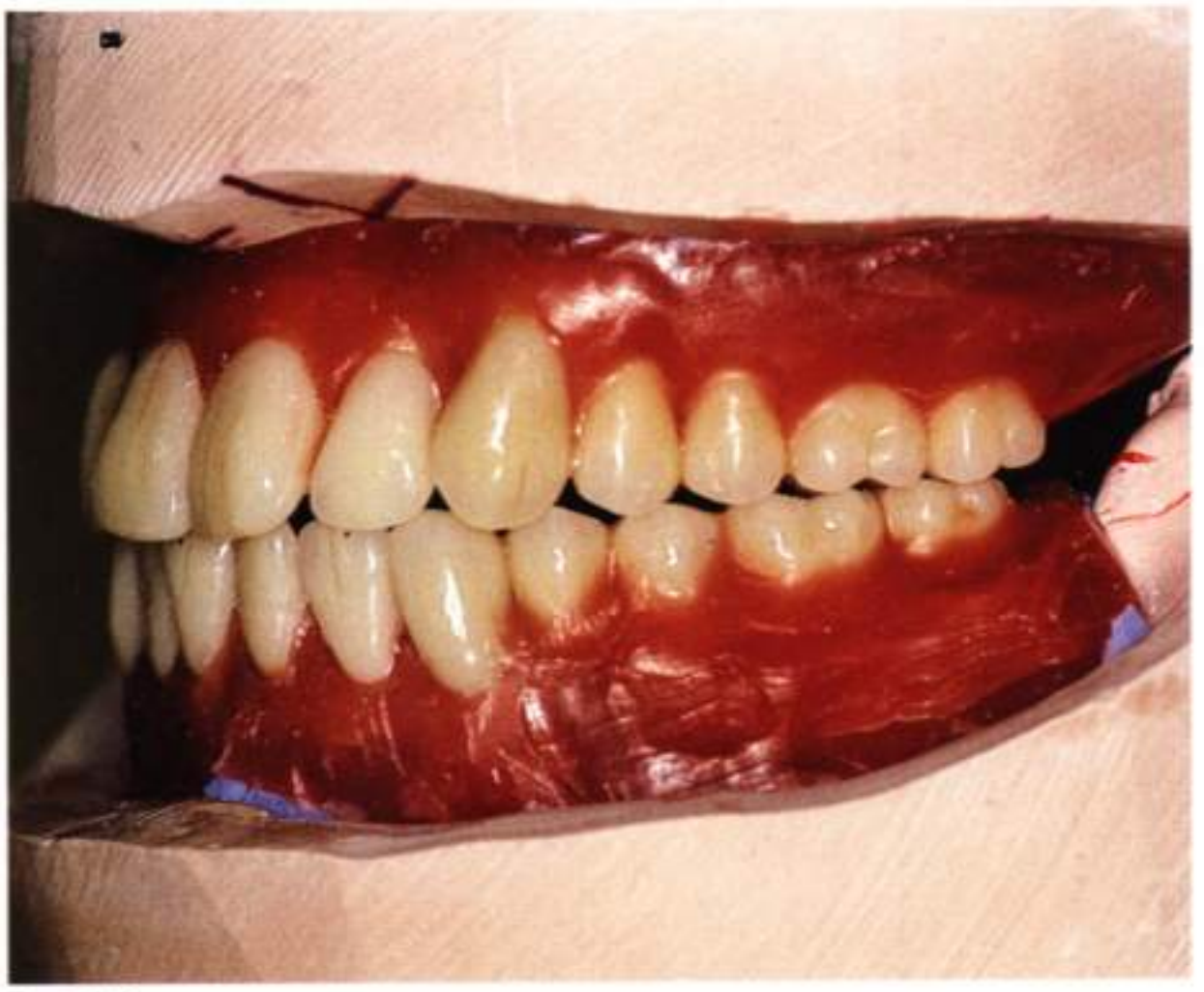

Fig. 13-45

Fig. 13-46 Lateral view, right side. The opposing buccal cusps do not contact from the second premolar to the second molar; the space between the buccal cusps is 2mm. For esthetic reasons, the first premolar has both buccal and lingual cusps on the horizontal plane.

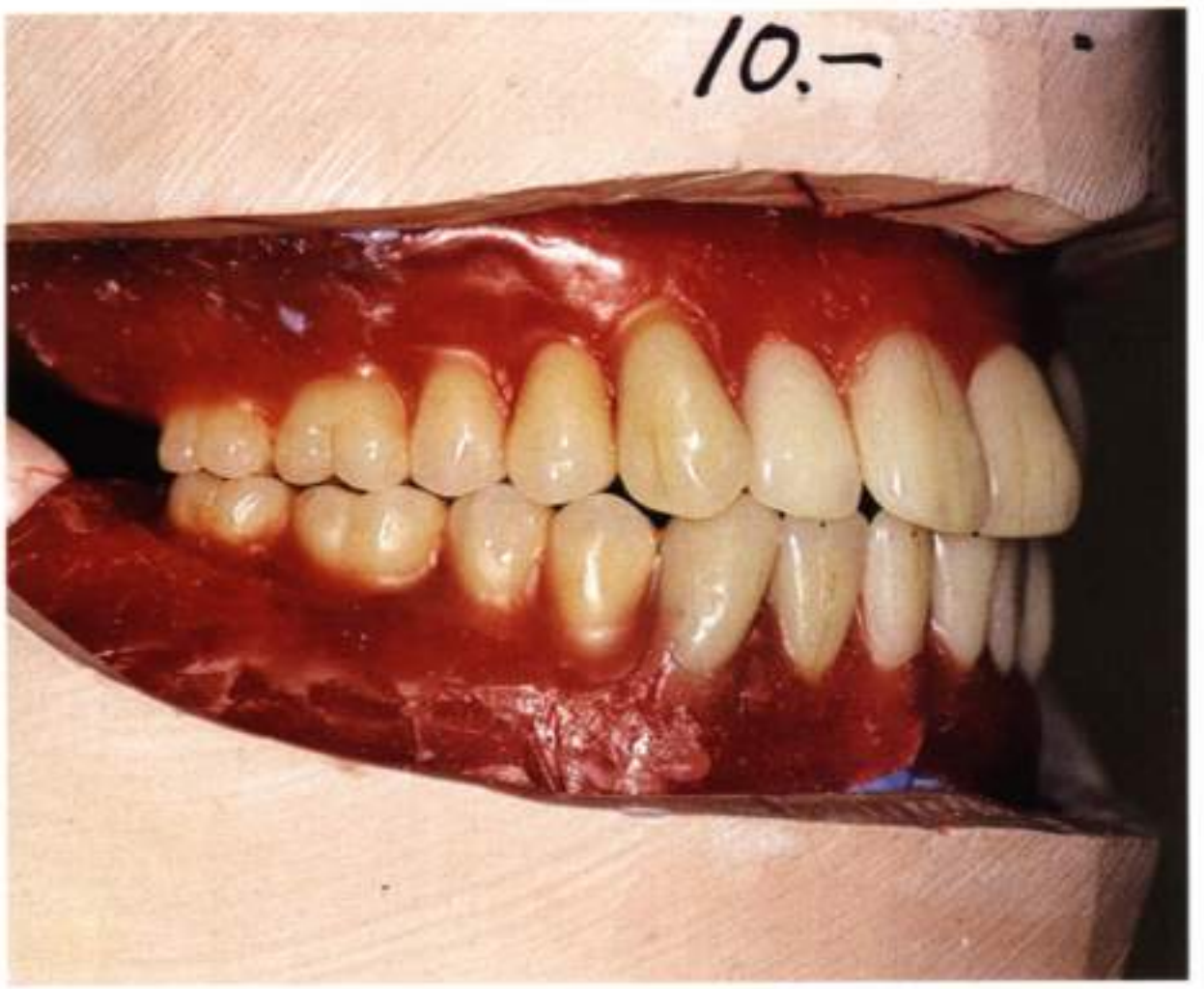

Fig. 13-46

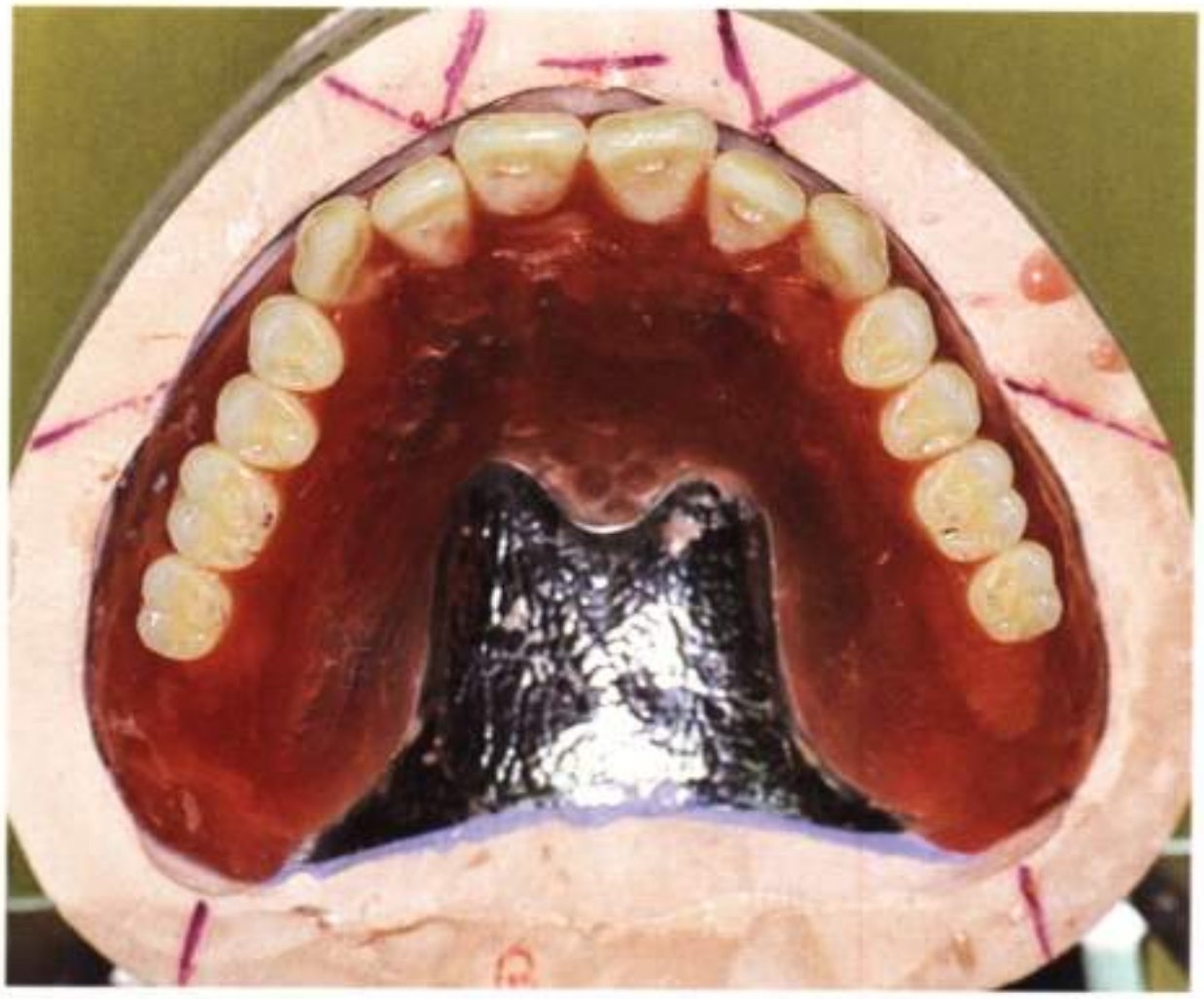

Fig. 13-47

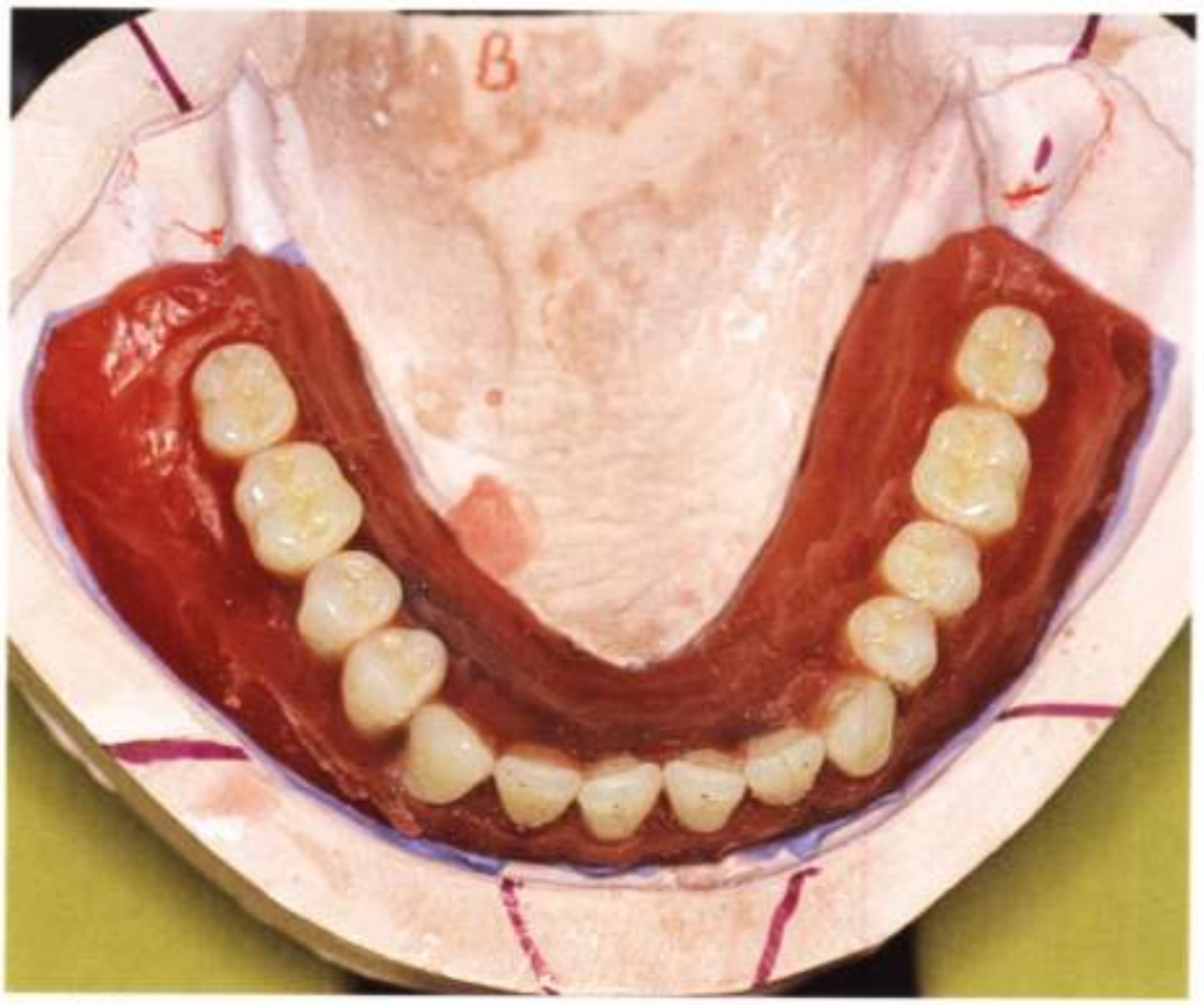

Fig. 13-48

Fig. 13-47 Occlusal view of the maxillary tooth arrangement shows buccal placement of the posterior teeth. The space in the molar region is restored with the buccal positions.

Fig. 13-48 Occlusal view of the mandibular tooth arrangement shows a 1cm space between the distal of the second molar to the base of the retromolar pad. The posterior teeth can be changed to create this space, for example one premolar can be removed leaving one premolar and two molars, instead of placing four teeth in the posterior region.

Fig. 13-49 Place wax on the buccal surface for gingival festooning.

Fig. 13-50 Use a hot spatula to soften the wax in the cervical region so the wax adheres to the artificial teeth.

Fig. 13-51 Carve the cervical region using the same instrument angulation from anterior to posterior.

Fig. 13-52 Carve the cervical regions of the anterior teeth using the instrument. Do not create a pronounced step, taking into consideration the flow of food.

Fig. 13-53 The cervical margins are important for ideal esthetics and there should not be large variations created between teeth, mesiodistally. From the frontal view, the cervical inclinations in the wax around the posterior teeth were carved similarly.

Fig. 13-54 From a lateral view, the first and second premolar cervical margins are similar. A protruding cervical collar around the first premolar may be inevitable.

Fig. 13-55 Remove excess wax contours.

Fig. 13-56 Carve the cervical areas and place contours in the gingival regions.

Fig. 13-49

Fig. 13-50

Fig. 13-51

Fig. 13-52

Fig. 13-53

Fig. 13-54

Fig. 13-55

Fig. 13-56

Fig. 13-57

Fig. 13-58

Fig. 13-59

Fig. 13-60

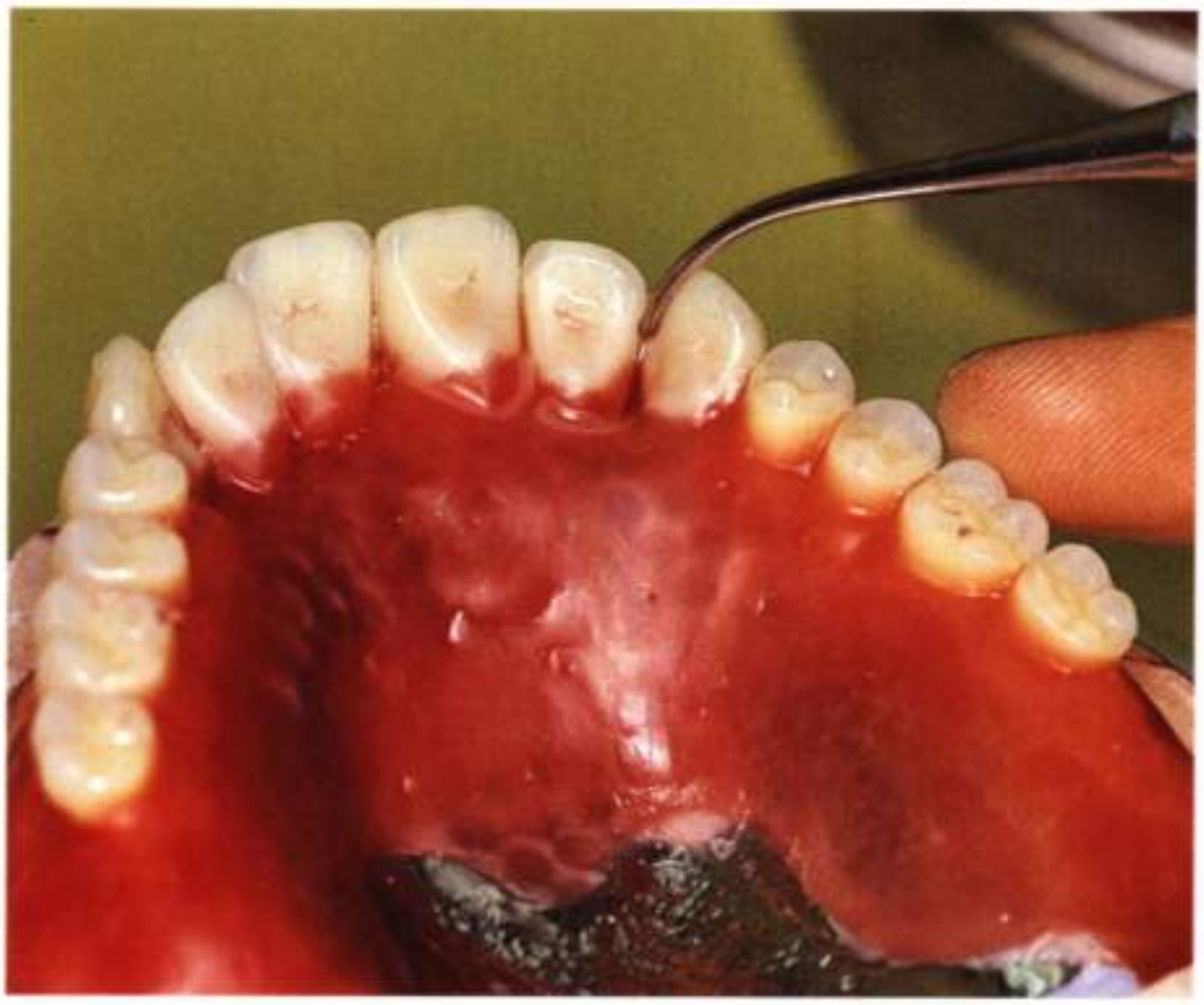

Fig. 13-61

Fig. 13-57 Carve the cervical areas on the lingual surfaces but do not make a sharp ledge since it can affect natural cleansing.

Fig. 13-58 Remove excess wax between the teeth using a knife.

Fig. 13-59 Gingival festooning is important for esthetic reasons, as well as natural cleansing. An elderly patient may not have the dexterity to perform adequate dental hygiene procedures, so make the cervical regions smooth and shallow to avoid collecting debris.

Fig. 13-60 Use an alcohol torch to smooth the wax surface.

Fig. 13-61 The cervical regions on the lingual surfaces are made smooth using a PKT waxing instrument or probe to create a smooth form that will not trap debris.

Fig. 13-62 Wax palate patterns can be used to form rugae and are simple to use. Sharp surfaces should be reduced and polished in the completed denture so the patient's tongue will not become irritated. Palatal rugae function by acting to collect and distribute food while the tongue controls the bolus; smooth rugae do not contribute to this role.

After extractions and alveolar ridge resorption, a patient will feel a difference between the natural tissue level and the denture. Avoid overcontouring the anterior palate area or the patient will complain of discomfort.

Fig. 13-63 Ready-made palatal rugae forms are available in wax for single use only or in a material that can be reused. The rugae patterns vary in depth and form.

Fig. 13-64 Frontal view showing the completed gingival festooning. A diastema can be made, as shown between central incisors, for esthetic reasons according to the patient's age and ability to maintain hygiene procedures.

Fig. 13-65 Lateral view; buccal cusps do not appear to have occlusal contact. After processing and selective grinding, the shapes will appear differently.

Fig. 13-62

Fig. 13-63

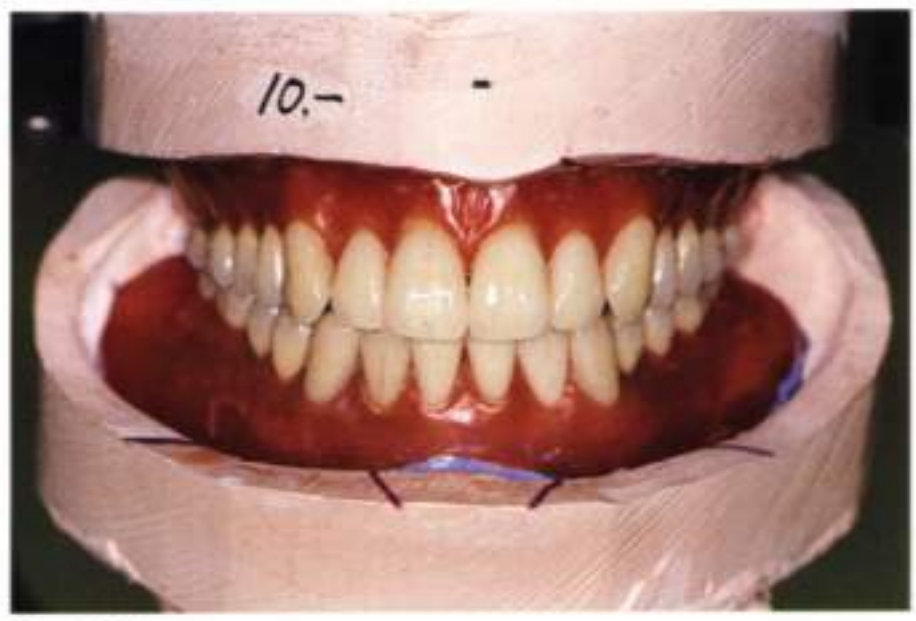

Fig. 13-64

Fig. 13-65

Fig. 13-66

Fig. 13-67

Fig. 13-68

Fig. 13-66 Prepare the base of the casts for the split-cast method which is necessary for remount procedures and occlusal corrections after processing the resin.

Fig. 13-67 Occlusal view of the processed mandibular denture; the SR Ivocap System was used as the resin system.

Fig. 13-68 Occlusal view of the processed maxillary denture.

Fig. 13-69 Remount the casts on the articulator using the split-cast method.

Fig. 13-70 The processing error is checked at the incisal pin and estimated at approximately 1mm.

Fig. 13-71 Proceed with the selective grinding procedures.

Fig. 13-72 Selective grinding procedures for a lingualized occlusion requires deepening the mandibular fossae and sharpening the maxillary lingual cusps.

Fig. 13-73 The maxillary second molar contacts the corresponding buccal surface of the mandibular tooth. Adjust either contact and be certain to sharpen the maxillary cusps rather than reduce the cusp height.

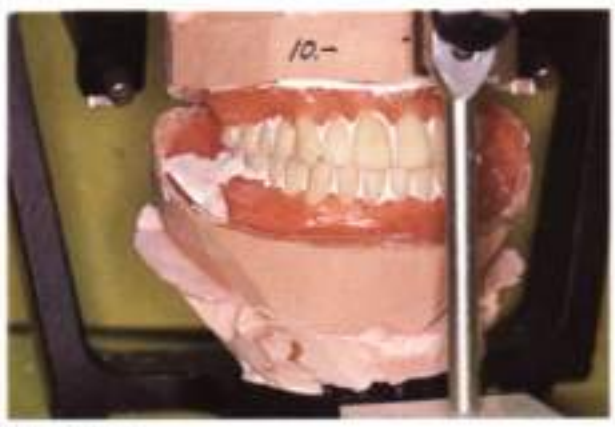

Fig. 13-69

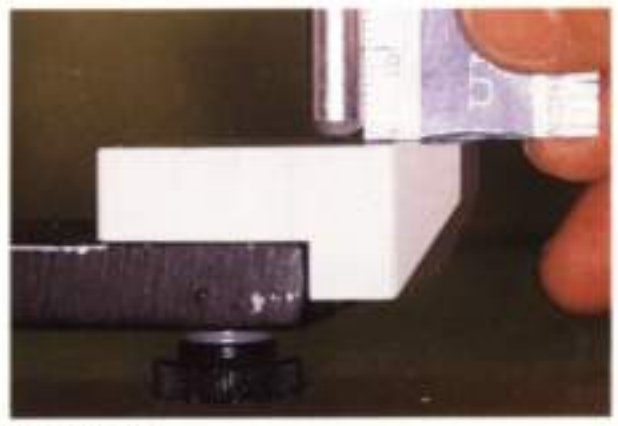

Fig. 13-70

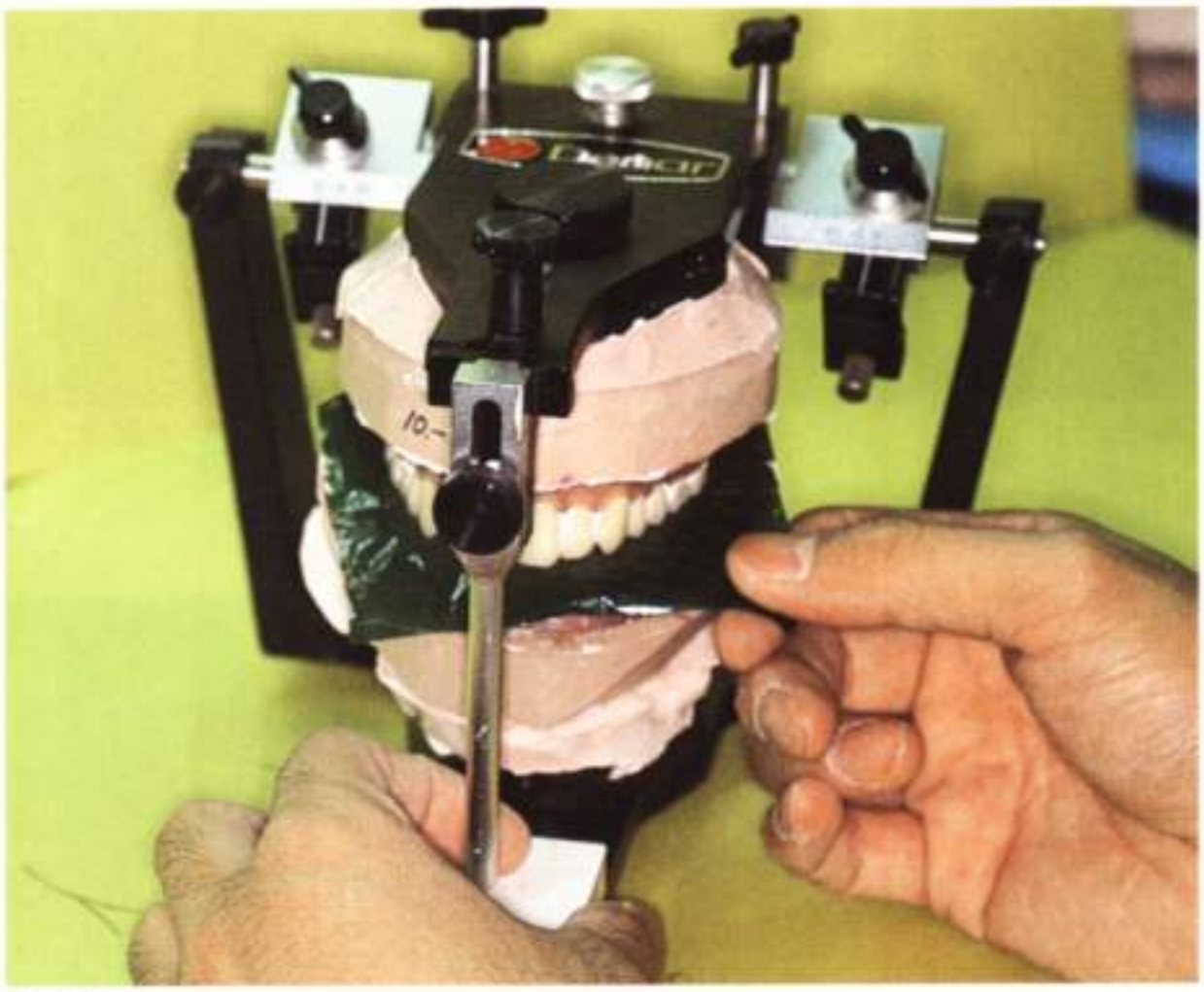

Fig. 13-71

Fig. 13-72

Fig. 13-73

Fig. 13-74

Fig. 13-75

Fig. 13-76

Fig. 13-77

Fig. 13-78

Fig. 13-79

Fig. 13-80

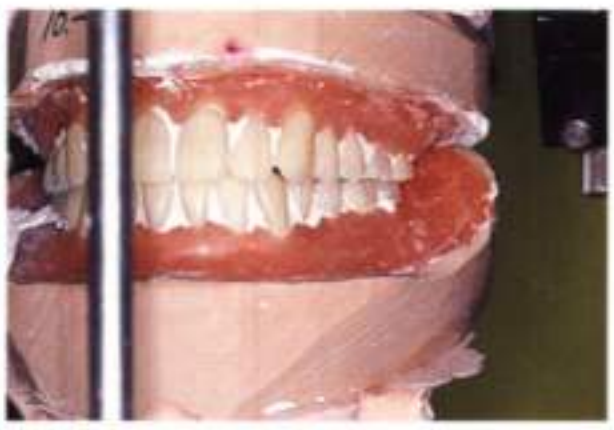

Fig. 13-81

Fig. 13-74 Deepen the mandibular fossae during the selective grinding procedure.

Fig. 13-75 The contact points are seen, five on either side, after occlusal adjustment.

Fig. 13-76 Only the lingual cusps contact in occlusion; the buccal cusps do not contact.

Fig. 13-77 After occlusal adjustment, there is minimal overlap and minimal influence from the maxillary buccal cusps on the occlusion; these factors will be corrected. During selective grinding, the posterior borders of the denture bases may contact and prevent accurate occlusal adjustment. Check for contacts between posterior denture bases or between opposing casts throughout the procedures.

Fig. 13-78 From a posterior view, the cuspal inclines of the buccal cusps appear to be at an angle rather than parallel with the occlusal plane.

Fig. 13-79 Reduce the cuspal inclination on the buccal cusps.

Fig. 13-80 Reduce the mandibular buccal cusps parallel with the occlusal plane since the opposing buccal cusps do not contact in a lingualized occlusion.

Fig. 13-81 After selective grinding has been completed, the overlap is easily discerned in the photograph. The overlap increases from the second premolar to the second molar and the adjustments prevent contacts between cuspal inclines of the buccal cusps.

Fig. 13-82 Do occlusal adjustments in lateral positions.

Fig. 13-83 A fully balanced occlusion for complete denture occlusion was advocated by Gysi. Ideally, fully balanced occlusion helps stability but is difficult to maintain after denture insertion due to the compressibility of mucosa and changes in occlusion. Pound felt that unilateral balance was better than bilateral balance. Unilateral balance has working side contacts without balancing contacts and if the dentures have adequate retention, no denture rotation occurs. Denture stability is improved with the posterior teeth arranged medial to the alveolar ridge but also results in inadequate tongue space and poor food bolus control by the buccinator muscles.

When a lingualized occlusion is used with poor denture retention, denture stability is compromised. Adequate denture retention is important when a unilateral balance is used in lingualized occlusion. The required procedures can be done on a semiadjustable articulator rather than a sophisticated articulator.

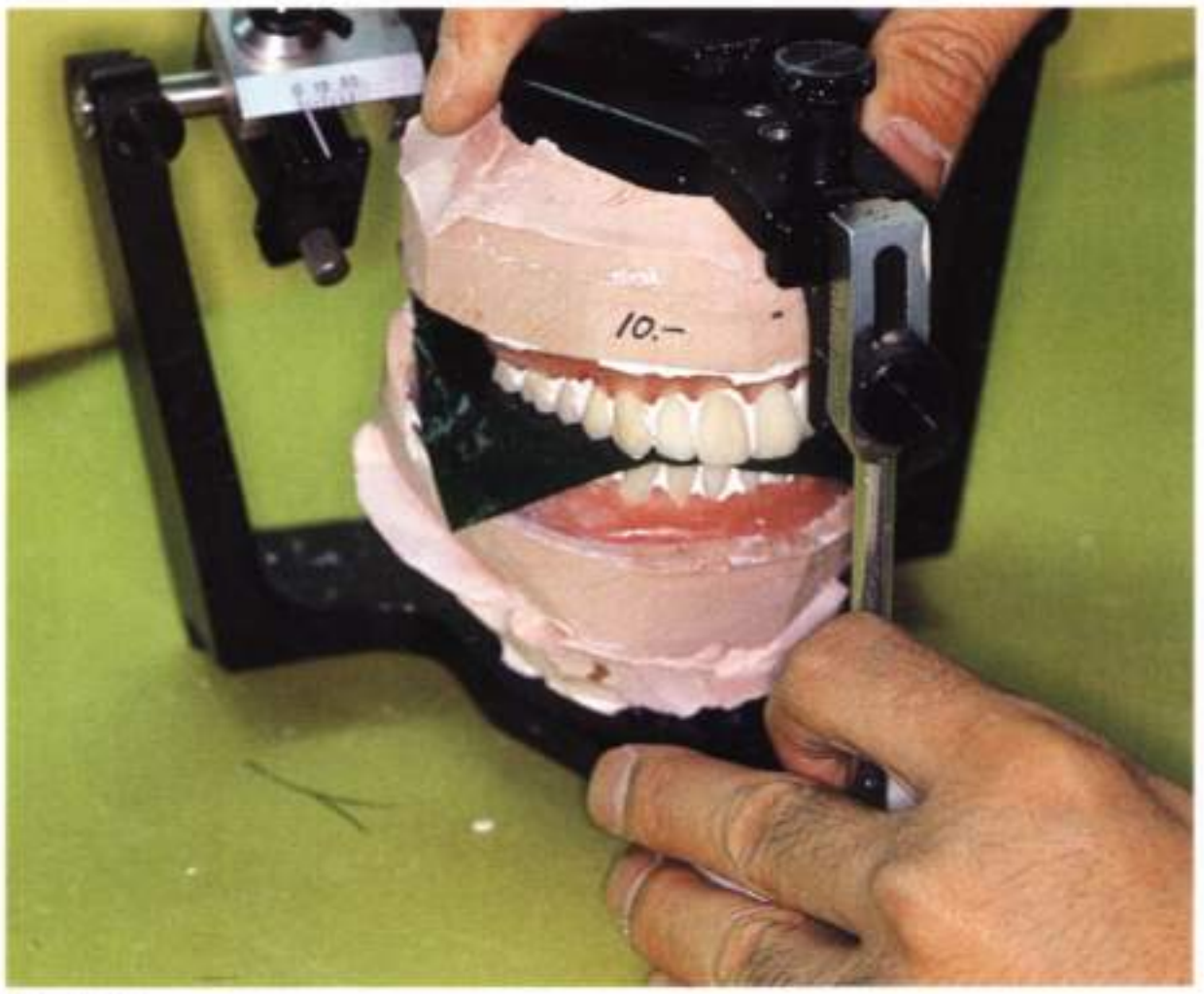

Fig. 13-82

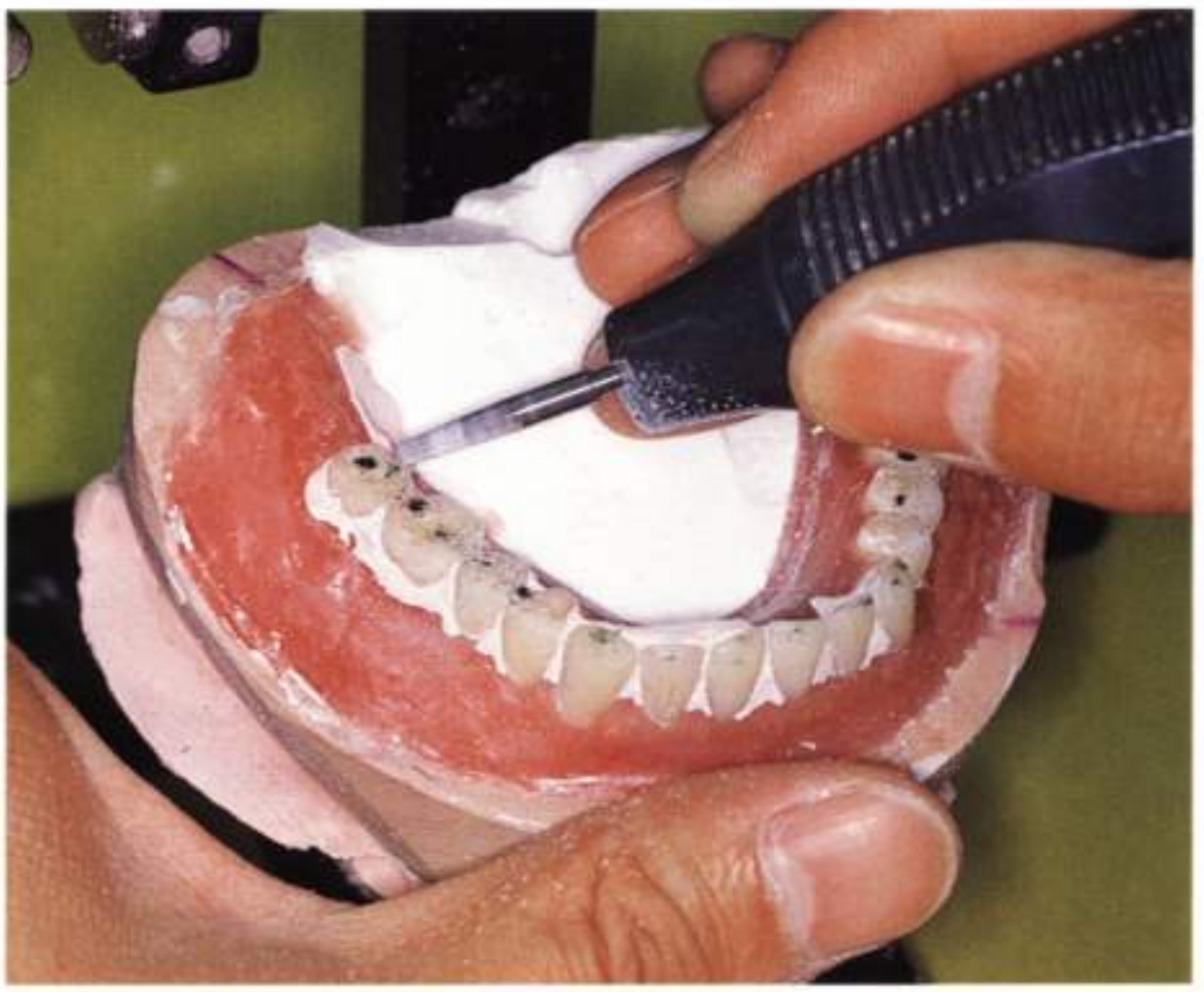

Fig. 13-83

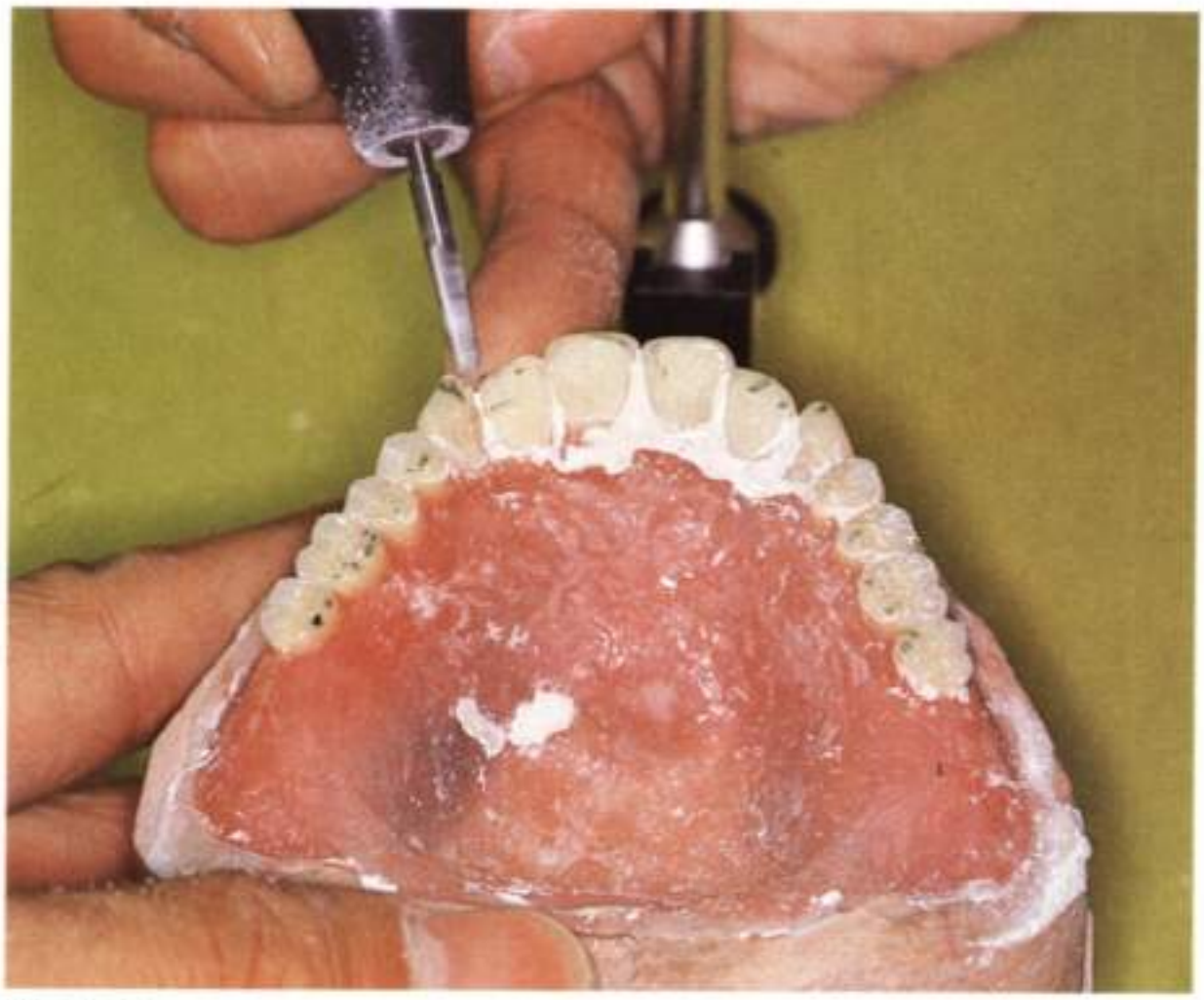

Fig. 13-84

Fig. 13-85

Fig. 13-86

Fig. 13-87

Fig. 13-88

Fig. 13-84 Anterior guidance and balance with the posterior occlusion is important to prevent denture rotation due to excess anterior contacts.

Fig. 13-85 Use a pneumatic chisel to remove stone from the processed denture; this instrument is strong, durable, and effective. Other instruments are available such as large stone scissors, but are inferior to the chisel.

Fig. 13-86 The chisel used to remove stone is effective in reducing labor time during denture fabrication; the mandibular denture is shown.

Fig. 13-87 Photograph shows the stone removed and separated.

Fig. 13-88 During polishing procedures, make all adjustments using a vacuum intake which is important for the operator's health.

Fig. 13-89 Use a carbide bur to reduce the thickness of material. Be careful when reducing the material in the anterior region, including the six anterior teeth, since this is an important area for esthetics. It is best to determine adequate thickness for the anterior region by checking the appearance clinically. If the anterior border is reduced significantly, it could affect denture retention and stability.

Fig. 13-89

Fig. 13-90 Use the Exa Dental point to polish the resin since is produces less dust, less heat, and does not need to be replaced frequently.

Fig. 13-90

Fig. 13-91 After polishing the borders and other resin areas, remove stone remnants between the teeth. Although a plaster solvent can be used, microblasting with glass beads removes pieces of stone easily.

Fig. 13-91

Fig. 13-92 Polish the areas using a brush and polishing paste.

Fig. 13-92

Fig. 13-93 Use a denture brush and tapping-like motion to remove paste and plaster particles.

Fig. 13-93

Fig. 13-94

Fig. 13-95

Fig. 13-94 Occlusal view of completed maxillary denture.

Fig. 13-95 Occlusal view of completed mandibular denture. Although some of the contact points are not clear, a selective grinding procedure will be done clinically.

Fig. 13-96 View of the tissue-bearing surface of the maxillary denture. Remove any resin flash between the metal base and resin finish line but do not remove resin in the hamular notch areas. Do not reduce the frena areas until checked clinically.

Fig. 13-96

Fig. 13-97 View of the tissue-bearing surface of the mandibular denture. Note the metal base has a mesh design between the right premolar area to the left canine; this design is based on the assumption that more resorption may occur in this region, requiring a reline at a later time.

Fig. 13-97

Fig. 13-98

Fig. 13-98 Frontal view of maxillary and mandibular denture in occlusion. The molars appear positioned lingually, but when checked clinically, were found to be in the correct position. Finish the tissue-bearing surface lightly with a brush to remove any sharp edges.

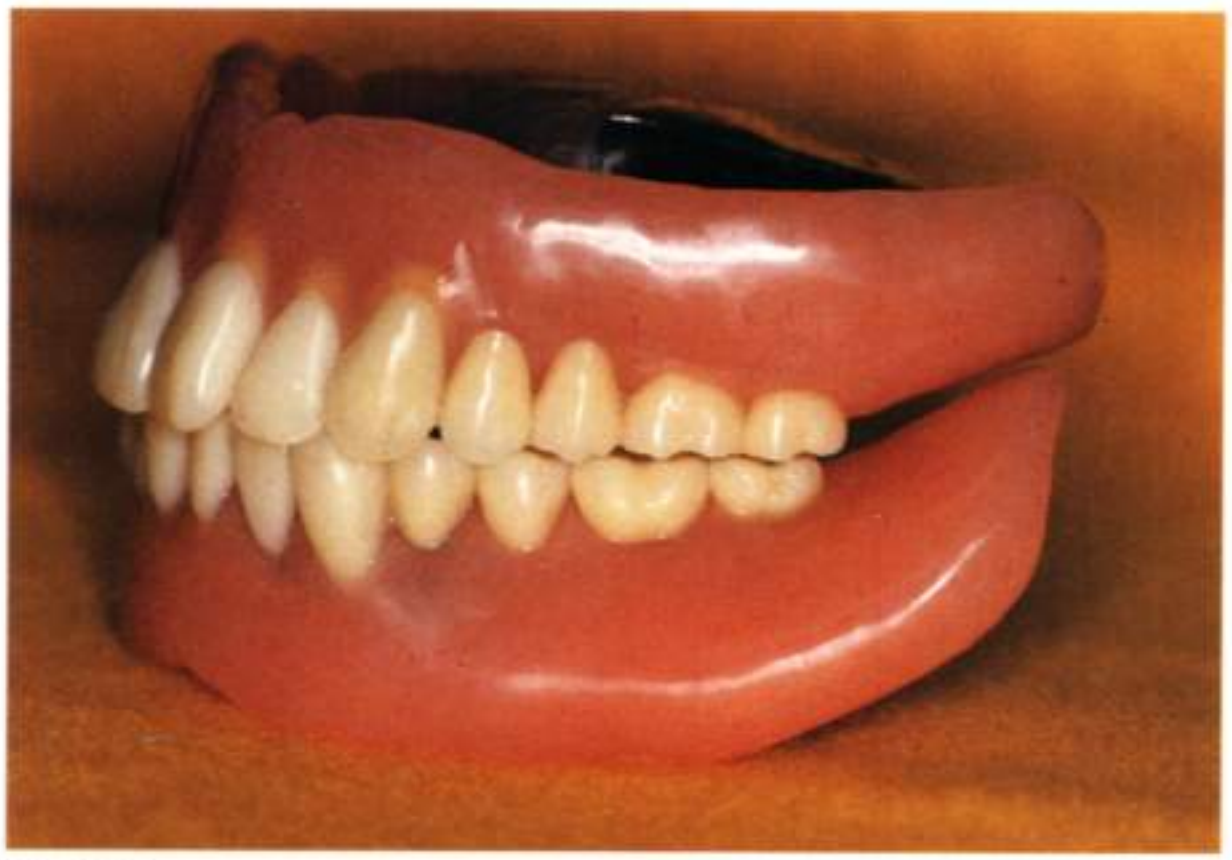

Fig. 13-99

Fig. 13-99 Lateral view shows no contact between the retromolar pad area and the maxillary tuberosity. The dentures should be checked clinically since some patients will protrude into contact in this area. Although the anterior overlap can compensate during a protrusive movement, interference between the denture bases could compromise denture stability.

Fig. 13-100 From a posterior view, the lingual frenum border appears jagged although the impression was smooth. Smooth the notches to prevent irritating the tongue. Make the tongue space wider by reducing the lingual flange thickness, especially in the second molar area. Although the tendency is to create large denture bases, a wide tongue space is important and a decisive factor to denture comfort.

The postpalatal seal should be smooth at the posterior border even though the tongue cannot reach this area. Do not reduce the postpalatal seal thickness; the pressure areas can be reduced clinically without compromising the posterior extension.

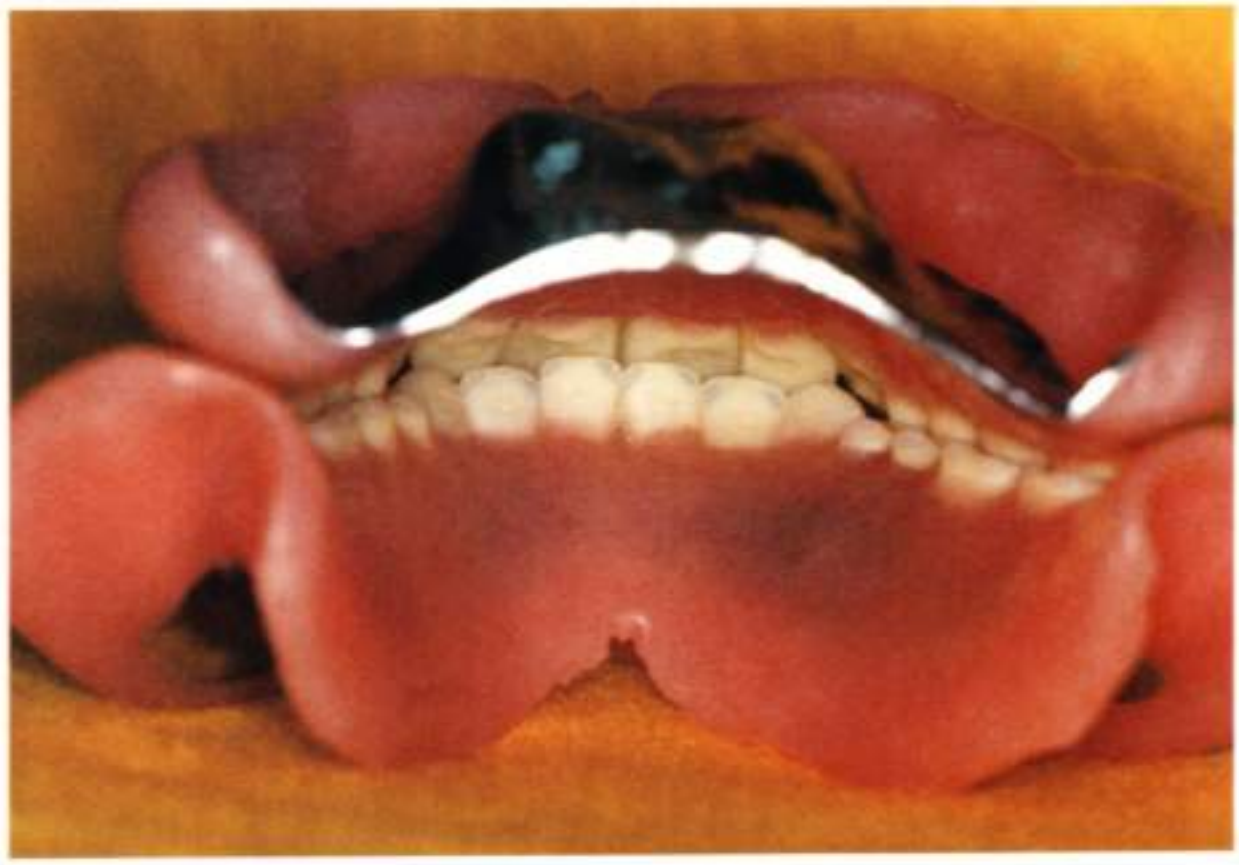

Fig. 13-100

Chapter 14

Denture Insertion

The last step in the denture treatment sequence is denture insertion in the patient's oral cavity. The result of clinical and laboratory treatment is the creation of dentures as an artificial organ.

Fig. 14-1 Occlusal view of the completed maxillary denture. The molars have a narrow buccolingual dimension which decreases the occlusal forces and load on the supporting tissues. Since a lingualized occlusion was used, the molars appear to be arranged buccally when compared to a conventional tooth arrangement. This creates a wider tongue space which is more comfortable for the patient.

Fig. 14-2 Occlusal view of the completed mandibular denture. The notch placed in the denture base below the molars creates space for a posterior, buccal frenum. The buccal placement of posterior teeth creates more tongue space and a ledge for the tongue on the lingual surface, both important for mandibular denture stability.

Fig. 14-3

Fig. 14-4

Fig. 14-5

Fig. 14-6

Fig. 14-3 A comparison of the interim and final maxillary dentures shows the final denture completed to a form similar to the interim denture. The exceptions include the posterior border region and margins, the resin thickness, and the anterior tooth arrangement.

An important factor in the denture was the metal base which was used to rapidly transmit temperature changes to the palate. The dome of the palate does not change so it is desirable to make this denture area as thin as possible. Increased thickness in resin, bilaterally, was created to compensate for resorption.

Fig. 14-4 A comparison of the tissue-bearing surfaces of the interim and final maxillary denture shows similar forms. The anterior region of the metal base between premolars has a mesh design which allows for resin adjustments at a later time. Increased loads in the anterior region are inevitable so when the occlusion changes, alveolar bone resorption continues.

Fig. 14-5 A comparison of the interim and final mandibular dentures shows the buccal placement of the molars due to the lingualized occlusion.

Fig. 14-6 A comparison of the tissue-bearing surfaces of the interim and final mandibular dentures shows similar border shapes. The metal base was designed to cover immobile mucosa, where minimal changes in the alveolar ridge occurs.

Fig. 14-7 After a try-in intraorally, use Fit-Checker to evaluate the tissue adaptation.

Fig. 14-8 Place Fit-Checker in the areas corresponding to the alveolar ridges, not over the palate.

Fig. 14-9 When checking the tissue adaptation, use the Occlusal Pressure Equilibrator to examine the denture occlusion at the same time. The Equilibrator does not create uneven pressures or interferences.

Fig. 14-10 Place the denture with Fit-checker intraorally and instruct the patient to occlude on the Occlusal Pressure Equilibrator. The maxillary and mandibular dentures do not appear to be in contact.

Fig. 14-11 Use a pencil to mark exposed resin areas on the denture.

Fig. 14-12 Evaluate the surface where the Fit-Checker has been displaced and the resin shows through the material. Make pencil marks on the exposed areas.

Fig. 14-13 Use a bur to reduce and eliminate the pencil-marked areas.

Fig. 14-14 During this evaluation procedure, try-in the denture after adjusting sharp, rough areas created when eliminating pressure areas. Repeat the procedures to fit the denture intraorally.

Fig. 14-7


Fig. 14-8


Fig. 14-9


Fig. 14-10


Fig. 14-11


Fig. 14-12


Fig. 14-13


Fig. 14-14

Fig. 14-15

Fig. 14-16

Fig. 14-17

Fig. 14-18

Fig. 14-15 The dentures have been removed after the patient occluded on the Occlusal Pressure Equilibrator between the dentures. The buccal spaces adjacent to the cheeks are considered satisfactory after evaluating regions such as the left and right premolar areas where the Fit-Checker flowed.

Fig. 14-16 Evaluate the Fit-Checker on the tissue-bearing surface of the mandibular denture. Good tissue adaptation is evident from a uniform, thin layer of Fit-Checker covering the surface. Pressure areas are seen anterior to the retromolar pad but the remaining surfaces are fine.

Fig. 14-17 Evaluate the right buccal space in the molar area by checking the amount of Fit-Checker present. This amount of space is important to prevent cheek biting due to an overcontoured denture or teeth placed too far buccally. If the denture base is over-extended buccally, muscle actions could lead to denture instability.

Fig. 14-18 Evaluate the left buccal space. The denture base contour near the junction of the buccinator and masseter muscles protrudes slightly due to increased muscle tension when the teeth occlude. This is thought to be a physiologic condition and only requires observation.

Fig. 14-19 Evaluate the tissue-bearing surface of the mandibular denture. Check the pressure spot on the inner surface of the retromolar pad, located at the posterior extent of the mylohyoid line.

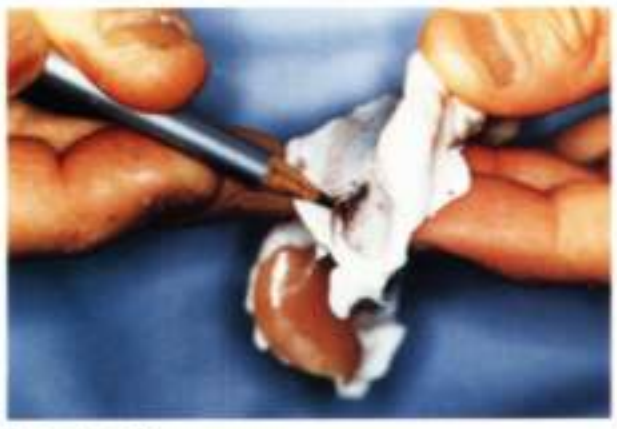

Fig. 14-19

Fig. 14-20 Mark the pressure areas where Fit-Checker has been displaced with a pencil. This is a common area for pressure spots.

Fig. 14-20

Fig. 14-21a After completing the evaluation of the tissue-bearing surface, use occlusal indicator wax to check the occlusion. Checking the occlusion with articulating paper is not precise clinically.

Fig. 14-21A

Fig. 14-21b Checking denture occlusion differs from checking occlusion in natural dentition since dentures are not fixed intraorally. Be careful using occlusal indicator wax since different occlusal forces result in changes in the occlusion. For example, when the dentures occlude unilaterally as in (1), they may seem to occlude bilaterally as in (2).

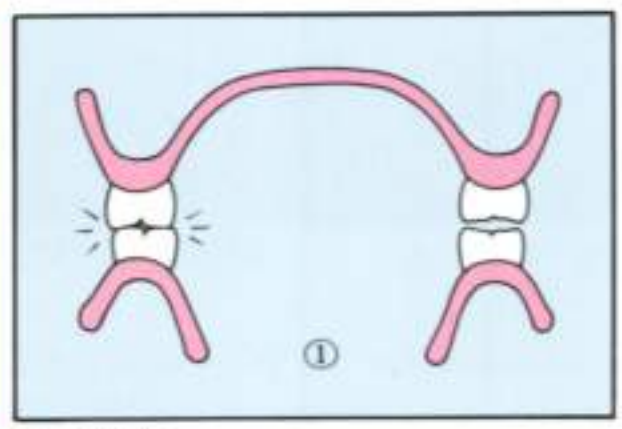

Fig. 14-21B

Fig. 14-22 Wet the occlusal surface of the denture, then place the smooth, glue surface of the indicator wax on the occlusal surface. Lightly press the wax on the surface.

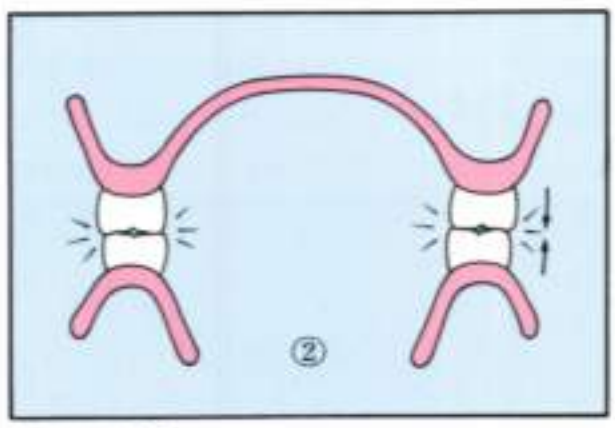

Fig. 14-21B

Fig. 14-22

Fig. 14-23 After placing wax over the mandibular occlusal surface, paint a light coat of petrolatum over the wax and instruct the patient to tap the teeth together several times.

Fig. 14-23

Fig. 14-24 Check for translucent areas in the wax which correspond to heavy occlusal contact areas. Reduce the heavy occlusal contacts. The indicator wax was placed on the mandibular denture in this photo since a lingualized occlusion was utilized. If mandibular natural teeth are present opposing a maxillary complete denture, the wax would be placed on the maxillary denture.

Fig. 14-24

Fig. 14-25

Fig. 14-25 Frontal view of maxillary and mandibular dentures placed intraorally. The buccal spaces have been filled adequately when comparing the relationship between the denture and the cheek.

Fig. 14-26

Fig. 14-26 Although relining may be necessary in six months to one year, a well-fitting denture can improve the prognosis of the alveolar bone.

Fig. 14-27 A good relationship is seen on the right side between the artificial teeth and buccal contours on both dentures.

Fig. 14-28 A good relationship is seen on the left side also.

Fig. 14-27

Fig. 14-28

24-Hour Post-Delivery Adjustments

Recall the patient to check the denture intraorally the following day. Changes in tissue color are evident if the denture has rubbed or irritated the mucosa. Although the patient may not have a complaint, these areas should be adjusted. It is rare to find an intolerable pressure spot after 24 hours of denture use. If the post-delivery check is postponed for two days following insertion, the patient may have a complaint regarding a sore spot and denture adjustment can be considered late. By having the post-delivery check after one day of use, the patient may not feel the pain due to a pressure spot and future problems can be avoided.

Fig. 14-29 Tissue color changes are evident one day after denture insertion. Mark the areas with red ink, dry the tissue-bearing surface of the denture, then adapt it intraorally.

Fig. 14-30 Remove the denture and check the mark that was transferred from the mucosa to the denture surface.

Fig. 14-29

Fig. 14-30

Fig. 14-31

Fig. 14-31 The incisal edges of the anterior teeth could have been placed more labially since the patient originally had maxillary protrusion. The wet-dry lip line appears slightly posterior to the incisal edges of the anterior teeth; exthetics requires a compromise with facial features.

Fig. 14-32

Fig. 14-32 Frontal view of facial features with dentures placed intraorally.

Supplement

I. The Double Alginate Impression

II. The Essentials of Using Tissue Conditioner

I. The Double Alginate Impression

Alginate is the most commonly used impression material even though many impression materials and methods are available for use in fabricating complete dentures. This chapter offers some techniques which are useful in fabricating complete dentures, such as the alginate impression method and the double impression technique. The operator should master these techniques since they have characteristics inherently distinctive and helpful to the particular complete denture technique described throughout the previous chapters.

Fig. S-1

Fig. S-1 Intraoral view of the maxillary alveolar ridge following suture removal. The extraction sockets have not healed completely but an impression must be made to fabricate a provisional denture. Alginate impression material will be used to make an impression.

Fig. S-2

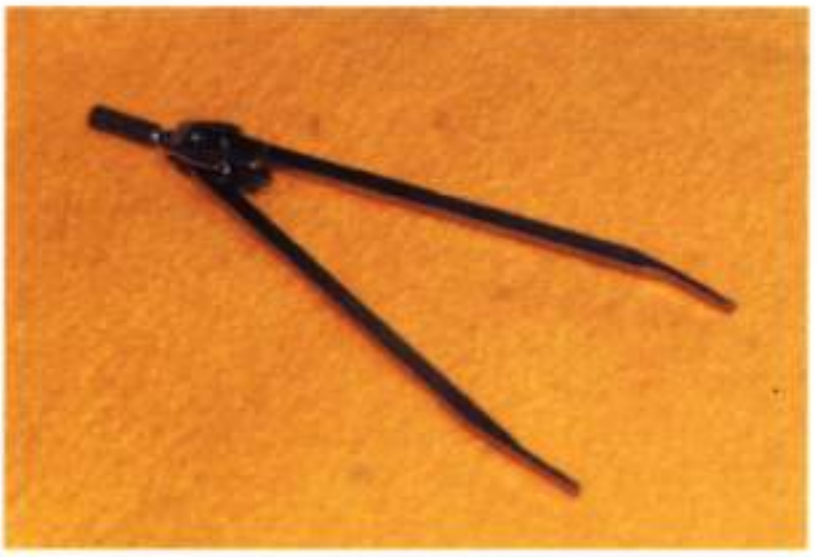

Fig. S-3

Fig. S-4

Fig. S-2 The most important aspect to a successful alginate impression depends on tray selection. The operator may be accustomed to 2 or 3 different stock trays and although they may not fit like a custom tray. It is important to select the appropriate stock tray for the impression. In order to select the best stock tray, evaluate the alveolar ridge and the width of the ridge. A wider ridge may interfere with placement of a tray intraorally so this problem should be avoided if possible.

Fig. S-3 Use a compass to measure the distance between buccal surfaces of the alveolar ridge. The tips of the compass should be rounded not sharp, to avoid injuring the oral tissues. The compass should be easy to adjust and at the same time, should maintain the correct position upon removal, resisting forces of the orbicularis oris muscles.

Fig. S-4 After measuring the width of the alveolar ridge, the width at the tips of the compass should fit within the buccal flanges of the tray. If the measurement fits within the tray, the tray should fit over the alveolar ridge in the posterior region. There is some leeway between the width measured with the compass and the width of the alveolar ridge. The width should not exceed the measurement between the tray flanges.

Fig. S-5 Many stock trays are available for use such as the Caulk rimlock trays (shown in the photo), Schureinemakers rimlock trays (Fig. S-4), or COE rimlock trays; the trays are designed basically the same.

Fig. S-5

Fig. S-6 Select a tray and try it in the mouth. Since many sizes are available, select a size that fits over the alveolar ridge well. Use a tray for an edentulous arch since the dentulous stock trays incorporate space for teeth. If there is a large space in the tray, a larger amount of alginate is used to fill the space and the material is considered less stable. The edentulous stock trays insure a uniform thickness of impression material over an edentulous arch.

Fig. S-6

Fig. S-7 Despite the impression material used for making impressions, the impression will be inaccurate if thick mucosal secretions are present of the oral mucosa. For example, if a static-type impression material is used, the material cannot displace a large amount of saliva and the impression is inaccurate. To avoid this problem, place gauze intraorally to absorb some of the secretions. Blotting the tissues with gauze will leave a slight amount of moisture, so do not expect to dry the mucosa completely.

Fig. S-7

Fig. S-8

Fig. S-9

Fig. S-10

Fig. S-11

Fig. S-8 A gag reflex tendency can be ascertained when the gauze is placed intraorally, and if present, the gauze placement can help suppress the gag reflex prior to making the impression. The photo shows a mix of Jeltrate alginate placed in the tray. The regular type of alginate has the necessary viscosity for making an impression of the edentulous arch. The preliminary impression can be difficult if the material flows too easily. This is similar to the use of putty for a silicone impression in that a firm base is needed for the wash impression.

Fig. S-9 Place an excessive amount of alginate in the tray, more than normally used for preliminary impressions.

Fig. S-10 The alginate material should not flow or drip from the tray when inclined as in Figure S-9. Excess saliva should be absorbed by placing gauze in the mouth. If saliva is present after the gauze has been removed, alginate placed with a finger will not adhere to or spread over the mucosa.

Fig. S-11 Spread liberal amounts of alginate impression material in bilateral, buccal regions.

Fig. S-12 Seat the patient in an upright position when making the impression. Insert the tray using the right hand and lightly move it side-to-side while holding the tray with the left middle finger. The amount of tray-seating force is difficult to quantify for obtaining an ideal material thickness; do not press the tray into position with excess force. Check for excess material in the posterior region since a large amount of alginate is placed in the impression tray. Low viscosity materials are not good for this procedure since a certain consistency is used to avoid flow of material towards the throat.

Fig. S-13 From a position behind the patient, place the pads of the thumbs below the zygomatic process and muscle trim the alginate on either side of the maxillary labial frenum using the tips of the thumbs. The tray can be placed from a position in front of the patient by seating it with the right hand while supporting it from below with the left index finger.

Fig. S-12

Fig. S-13

Fig. S-14

Fig. S-15

Fig. S-16

Fig. S-17

Fig. S-14 Retract the lip and check the border of the tray. The alginate has filled the vestibule above the margin of the tray, with air bubbles incorporated on either side of the labial frenum. To avoid trapping air bubbles, use the fingers to spread alginate into the vestibules prior to seating the tray.

Fig. S-15 Remove the impression and inspect it for accuracy. Air was trapped in the posterior palate and the anterior area shows an exposed tray margin that possibly contacted the alveolar ridge. The handle of the tray should be held and vibrated side-to-side to avoid being pressed on the alveolar ridge. In this instance, utility wax could be used to adapt the margins of a well-fitting tray.

The method described in these procedures does not require utility wax since excessive pressure areas or deficient areas are trimmed for the double impression technique. Based on the author's experience, it is difficult to obtain an adequate impression with alginate the first time.

Fig. S-16 Trim excess material with a knife. Due to the large amount of impression material, certain areas may require trimming such as unsupported extensions, molar regions, or facial surfaces of the tray margins.

Fig. S-17 View of the impression surface after trimming is completed.

Fig. S-18 Do not be concerned with voids in the impression nor excess trimming around the circumference of the impression since a double impression technique is used.

Fig. S-19 Use a hot-air hair dryer to dry the alginate impression surface. If the surface is wet, the second impression in the double impression technique will not adhere to the first impression.

Fig. S-20 The alginate water-to-powder ratio is 2:1 for the wash impression so the mix will have a low viscosity.

Fig. S-18

Fig. S-19

Fig. S-20

Fig. S-21

Fig. S-22

Fig. S-23

Fig. S-24

Fig. S-21 Place a thin layer of alginate over the impression.

Fig. S-22 Place enough alginate to cover the impression surface and borders.

Fig. S-23 Place the tray intraorally and lightly vibrate it into position. Hold the tray firmly while muscle-trimming the anterior region.

Fig. S-24 The general impression shape is determined from the first impression so it is not necessary to wipe material into the vestibules before seating the tray, although air bubbles may still occur. Place the alginate in the tray and be certain to check the posterior area after seating the tray since the thin mix flows easily. Wipe the excess material to the side with the tips of the fingers. Retract the lip after some time elapses to check the border.

Fig. S-25 Be careful when removing the impression since excess removal forces can distort it. Use an air syringe in the maxillary labial frenum area to release the seal, then remove the impression.

Fig. S-26 The impression reproduced the fovea palatinae with well-formed borders. There are adequate border extensions beyond the margin of the tray which is important for a successful alginate impression. If the tray displaces the material and impinges on mucosa, the impression is not accurate.

Fig. S-27 The lateral view of the left side shows adequate posterior extension covering the maxillary tuberosity.

Fig. S-28 The deficient area in the posterior buccal area is filled with inlay wax to reinforce the material. Prepare the impression for boxing procedures to insure adequate reproduction of the borders and impression surface. Scribe a line using an indelible marker along the height of contour. The impression should be viewed from above and the line should follow the height of contour; the line may be as much as 3 to 4mm or less than 2mm from the border. Do not mark a line measured from the peak of the border to a set distance, such as 2mm, around the circumference.

Fig. S-25

Fig. S-26

Fig. S-27

Fig. S-28

Fig. S-29

Fig. S-30

Fig. S-31

Fig. S-32

Fig. S-29 Lateral view of the impression surface.

Fig. S-30 A mandibular impression is more difficult than a maxillary impression since the former is affected by the tongue and sublingual regions. The impression should reproduce the retromolar pads and alveolar ridges.

Fig. S-31 Although the outer dimension of the alveolar ridges are measured for selection of a maxillary impression tray, the compass is used to measure the distance between lingual surfaces of the retromolar pads for a mandibular tray. The buccal surfaces can be measured also but the lingual dimension should be measured initially.

Fig. S-32 Place the compass in the posterior areas of the mandibular impression tray. If the tray is slightly wider than the compass measurement, the space can accommodate a good impression of the retromolar pads since the material will flow over the area.

Fig. S-33 The appropriate tray is selected and tried in intraorally; a Schureinemaker tray was selected since it adapts well in the posterior region.

Fig. S-34 View of the right posterior area showing adequate tray adaptation.

Fig. S-35 Place two pieces of gauze over the mandibular alveolar ridges and under the tongue. The gauze is essential for both maxillary and mandibular impressions, and can help ascertain a gag reflex. Do not use cotton or tissue since remnants adhere to the mucosal surface making it difficult to remove and disrupting the impression timing sequence. Recline the patient with the head in a horizontal position to prevent saliva from pooling and affecting the impression adversely.

Fig. S-36 Mix the alginate following the normal water-to-power ratio. Remove the gauze and place some impression material in the vestibules using the fingers.

Fig. S-33

Fig. S-34

Fig. S-35

Fig. S-36

Fig. S-37

Fig. S-38

Fig. S-39

Fig. S-40

Fig. S-37 For the first impression, use the normal water-to-powder ratio and place an excessive amount of material in the tray, similar to the maxillary impression procedures.

Fig. S-38 Muscle trimming while the tray is suspended above the ridge is similar to procedures for the maxillary impression. Since the alginate adheres to dry mucosa and has high viscosity, some material is wiped into the vestibules before seating the tray. The anterior region of the mandibular impression does not require special muscle trimming, such as protruding the tongue. Muscle trimming the maxillary impression requires having the patient open so the coronoid processes mold the buccal surfaces; use the thumbs to mold the anterior region. Remove the impression and trim excess material using a Bard-Parker knife.

Fig. S-39 The first impression has air bubbles and exposed tray areas in the right premolar region and posterior mylohoid region. The impression has been trimmed with a knife and is ready to be used as a base for the wash impression, similar to maxillary impression procedures.

Fig. S-40 Overextended areas in the left buccal region have been trimmed with a knife.

Fig. S-41 Dry the impression surface with a hot-air hair dryer.

Fig. S-42 Use a 2:1 water-to-powder ratio for the wash impression. Check the consistency of the alginate using a spatula. The material flows easily due to the low viscosity.

Fig. S-43 Place the material over the impression surface quickly.

Fig. S-44 Seat the tray intraorally.

Fig. S-41

Fig. S-42

Fig. S-43

Fig. S-44

Fig. S-45

Fig. S-46

Fig. S-47

Fig. S-48

Fig. S-45 Insert the tray and gently vibrate it side-to-side. Keep the tongue in the normal position while holding the tray.

Fig. S-46 Retract the lip after a short time to check if the material has set. Small bubbles can be observed in the border.

Fig. S-47 Use the air syringe to release the seal along the anterior border. Remove the impression using a quick, snap removal.

Fig. S-48 Evaluate the impression surface. The right premolar region has been covered but the tray is exposed in the posterior mylohyoid region.

Fig. S-49 The lateral view of the left side shows a good reproduction of the retromolar pad region.

Fig. S-50 From a frontal view, the inner surface of the lingual flanges reproduced the mylohyoid lines; the lingual borders extended deep sublingually.

Fig. S-51 Box the maxillary alginate impression using a 1:1 ratio of pumice and plaster. Use slurry water to mix the pumice and plaster, then place the stone on a plastic sheet. Place the impression into the mix then remove stone to the level previously scribed around the borders.

Fig. S-52 Pumice and plaster are used to box an alginate impression since boxing wax does not stick to alginate.

Fig. S-49

Fig. S-50

Fig. S-51

Fig. S-52

Fig. S-53

Fig. S-54

Fig. S-55

Fig. S-53 After the boxing stone sets, trim the pumice and plaster then wrap a sheet of boxing wax around it.

Fig. S-54 Photo shows the cast (left) poured in diestone and the boxed impression (right).

Fig. S-55 The completed cast has been made using a double alginate impression technique. The red line connects the hamular notches and two red marks indicate the fovea palatinae; the impression covered the necessary anatomical landmarks. This cast is used in making an immediate provisional denture.

Ⅱ. The Essentials of Using Tissue Conditioner

Fig. S-56 COE-Comfort tissue conditioner.

Fig. S-57 This material is normally used for tissue conditioning and also can be used to build denture borders by increasing the viscosity. Decrease the liquid by 20% from the standard recommendation to increase the viscosity of the mix. Mark a line to indicate the 20% reduction for this special mix.

Fig. S-58 Mix the conditioner for the mandibular denture until the material adheres to the spatula.

Fig. S-59 Place the mix in the denture and quickly insert it intraorally after confirming the mix does not drip off the prosthesis when inverted.

Fig. S-56

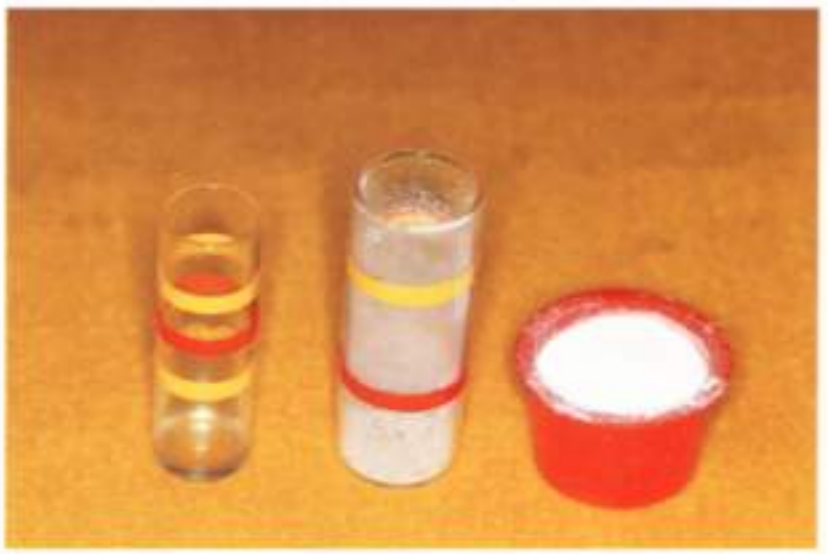

Fig. S-57

Fig. S-58

Fig. S-59

Fig. S-60

Fig. S-61

Fig. S-62

Fig. S-63

Fig. S-60 Border mold the mandibular conditioning material.

Fig. S-61 View of the impression surface shows the tissue conditioner on the left lingual border is overextended. Any conditioner extended longer than 2mm should be supported by resin.

Fig. S-62 Place Kooliner in the unsupported area.

Fig. S-63 Use a hot spatula to trim excess conditioner; the heated spatula will produce smoke when trimming the material.

Fig. S-64 Trim the material with a Meisinger abrasive pink point under a water spray.

Fig. S-65 Finish the surface with a Masamune point under a water spray.

Fig. S-66 Two views showing completion of tissue conditioner application on the mandibular denture.

Fig. S-64

Fig. S-65

Fig. S-66

Fig. S-67

Fig. S-68

Fig. S-69

Fig. S-70

Fig. S-67 Apply a surfactant (benzalkonium chloride) to prevent surface contamination by food or drink.

Fig. S-68 Rinse the denture with water then seat it intraorally.

Fig. S-69 It is necessary to microblast the metal base with alumina and reline with resin, since tissue conditioner does not adhere to a metal surface.

Fig. S-70 Seat the denture intraorally.

Fig. S-71 View of the tissue-bearing surface of the maxillary denture after relining the surface with resin.

Fig. S-72 Use a tissue conditioner consistency as shown in the photo for the maxillary denture.

Fig. S-73 After mixing, place the tissue conditioner into the maxillary denture directly from the mixing cup, then insert the denture immediately.

Fig. S-74 View of the tissue-bearing surface of the maxillary denture after placing the tissue conditioner. Apply a surfactant, rinse the denture with water, then seat it intraorally.

Fig. S-71

Fig. S-72

Fig. S-73

Fig. S-74

Dental Materials at a Glance

Absolute Medium Viscosity	COE Company	Chapter 11
Absolute Low Viscosity	COE Company	Chapter 8
Occlusal Pressure Equilibrator (Omnibite)	Omnico	Chapter 12, 14
Alike	COE Company	Chapter 7
SR-Ivocap System Resin	Ivoclar	Chapter 13
Occlusal Indicator Wax	Kerr Company	Chapter 14
Navigator's Compass	Itoya	Chapter 12
Surface Active Agent	Fuji Film	Chapter 5, 6
Gas Torch	Prince	Chapter 5
Carbide Bur HM416 Cone HM79S Bullet	Meisinger Company	Chapter 3, 4, 5, 6
Kooliner	COE Company	Chapter 3, 4
Comfort Tissue Conditioner	COE Company	Chapter 6
Schureinemakers Trays	Yoshida Company	Supplement
Jeltrate Impression Material	Caulk Company	Supplement
Centric Locator	Yoshida Company	Chapter 5
Denar Slidematic Facebow	COE Company	Chapter 12
Dental Timer	GC Dental Industries	Chapter 8
Denture Calipers	Omnico	Chapter 12
Template	Hayashi Dental Supply	Chapter 12
Vernier Calipers	Yamaura Manufacturing	Chapter 7
Nogenol	COE Company	Chapter 12
Bioblend Resin Teeth	Dentsply Company	Chapter 13
Bio Stabil Resin Teeth	De Trey	Chapter 13
Livdent 20° Mandibular Resin Molars Livdent 30° Maxillary Resin Molars	GC Dental Industries	Chapter 13
Hydroflask (Dacol)	Yoshida Company	Chapter 4
Papillameter	Dentsply	Chapter 12
Paraffin Wax	GC Dental Industries	Chapter 3
Heatless Stone	Mizzy	Chapter 4
Fasteeth (Powder Denture Stabilizer)	Vick Chemical Company	Chapter 1, 14
Fit-Checker	GC Dental Industries	Chapter 3, 4, 5, 6, 14
Fit Tissue Conditioner	Kerr Company	Chapter 5, 6
Boxing Stone	Key See	Chapter 9
Boxing Wax	Moyco	Chapter 9
Boxing Wax Stick	Kerr Company	Chapter 9
Post Dam Carver	Hibino Dental Equipment	Chapter 10
Poly Sand	Yamada Dental Industries	Chapter 9
Masamune Point, M1	Naigai Dental Materials Nisshin Dental Company	Chapter 4, 5, 6