Diagnostic Impressions and Custom-Made Trays

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5.1 Diagnostic Impressions and Custom-Made Trays

An impression material used in edentulous patients should record the oral tissues to provide stability and retention. Two important factors in the impression stage are impression material and impression trays. Impression tray is the carrier or tool, which carries the impression material into the mouth, limits the material in the region that will be recorded, and controls the impression material during the setting. The impression of complete dentures is conventionally taken in two steps. Dental models in which individual trays will be fabricated are obtained by primary impressions. Primary impressions are usually taken with stock trays found in the market (Fig. 5.1). The chosen impression tray should include all the areas that the denture is going to seat. The primary impression which records the areas that denture is going to cover later provides a better final impression by letting the dentist prepare tissue stop points as wanted on the impression trays. The shape of the standard trays that are used for edentulous patients is usually oval or round, and their sizes vary from small, medium, or large. Standard impression trays are made of metal (aluminum or stainless steel), nonmetal materials (reusable), or plastic (disposable or can be sterilized). These trays are designed as perforated or nonperforated. Perforated trays are used when the impression is taken with alginate as nonperforated trays are used with impression compound.

Impression material should hold on or adhere to the impression tray during the impression, which could be achieved by perforations in perforated trays or by adhesives of the impression material used if the nonperforated tray is being used. While choosing the size of the tray, it is important that the teeth should locate in the middle of the reservoir of the impression tray.

The diagnostic impressions that are taken with standard impression trays require:

1. The depth of the sulcus
2. The thickness of the sulcus through each periphery
3. To record important anatomical structures correctly (e.g., maxillary tuberosity, retromolar protuberance) and give the opportunity to prepare the borders of the custom-made impression tray made for the patients correctly (Figs. 5.2 and 5.3)

The best results are obtained with the trays that sit on the crests in an appropriate way and have an average space of 5 mm for the impression material (Fig. 5.4). The dentist should be sure that the diagnostic impression taken from the mandible captures all lingual and buccal sulcus, external oblique line, all retromolar protuberances, and, if it exists, the buccal frenulum. The mylohyoid muscle may cause problems when the impression is taken from the mandible. An incorrectly designed short and vertical edged standard tray pushes down the impression material vertically and changes the place of the mylohyoid muscle. A standard tray with an appropriate length and smooth contour lets the clinician record the mylohyoid muscle without distortion when it is in function.

The diagnostic impression taken from maxilla should record all the sulcus in the same way, hamular and pterygoid notch and soft palate which lays posterior of the palatal foveas (Fig. 5.5). If these palatal foveas are not prominent, the palatal border should reach the imaginary line that connects the hamular notches. As a general method, while taking the primary impression, muscles should be given shape to reflect the functional activity of the muscles. When the impression compound is placed into the mouth, the surrounding muscles, especially the modiolus area, are mobilized both in the maxilla and mandible, and the modiolus determines the buccal sulcus inward and forward. The modi-

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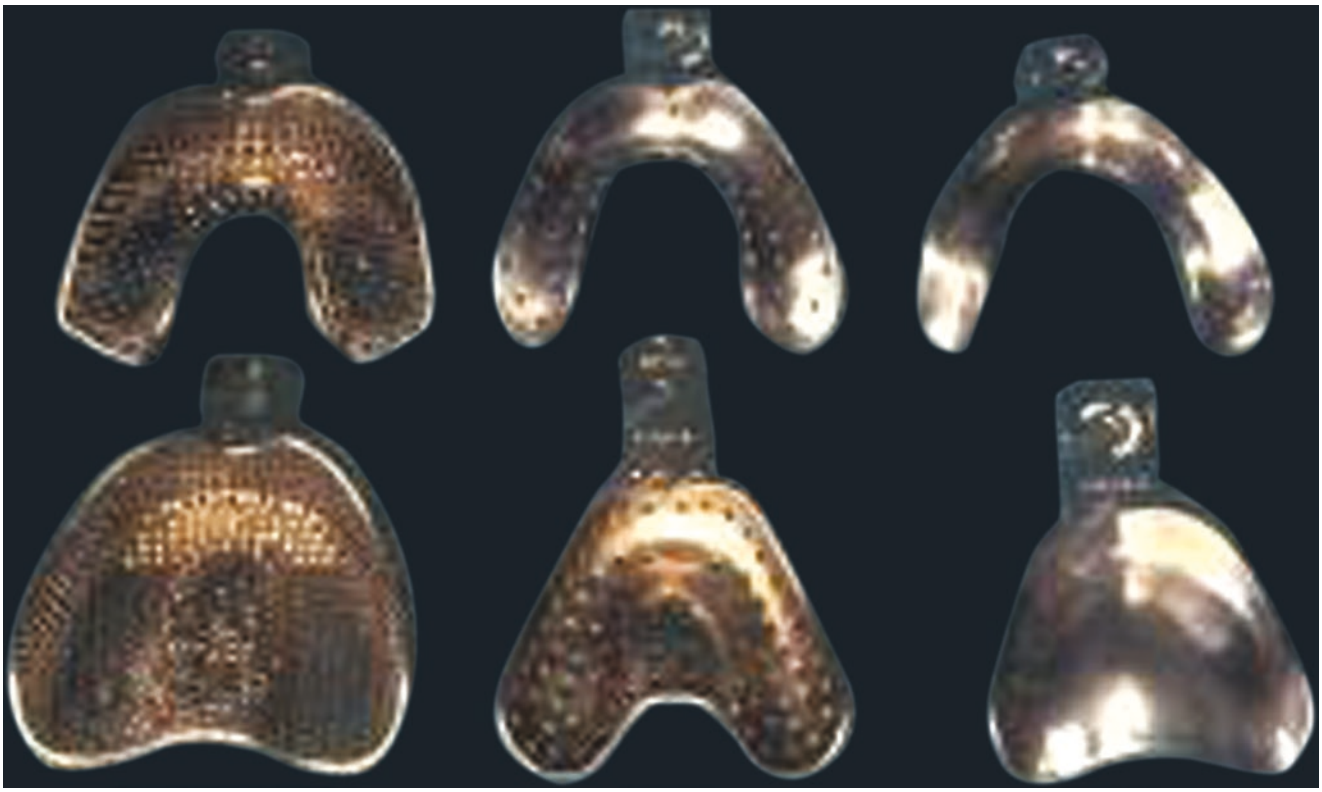
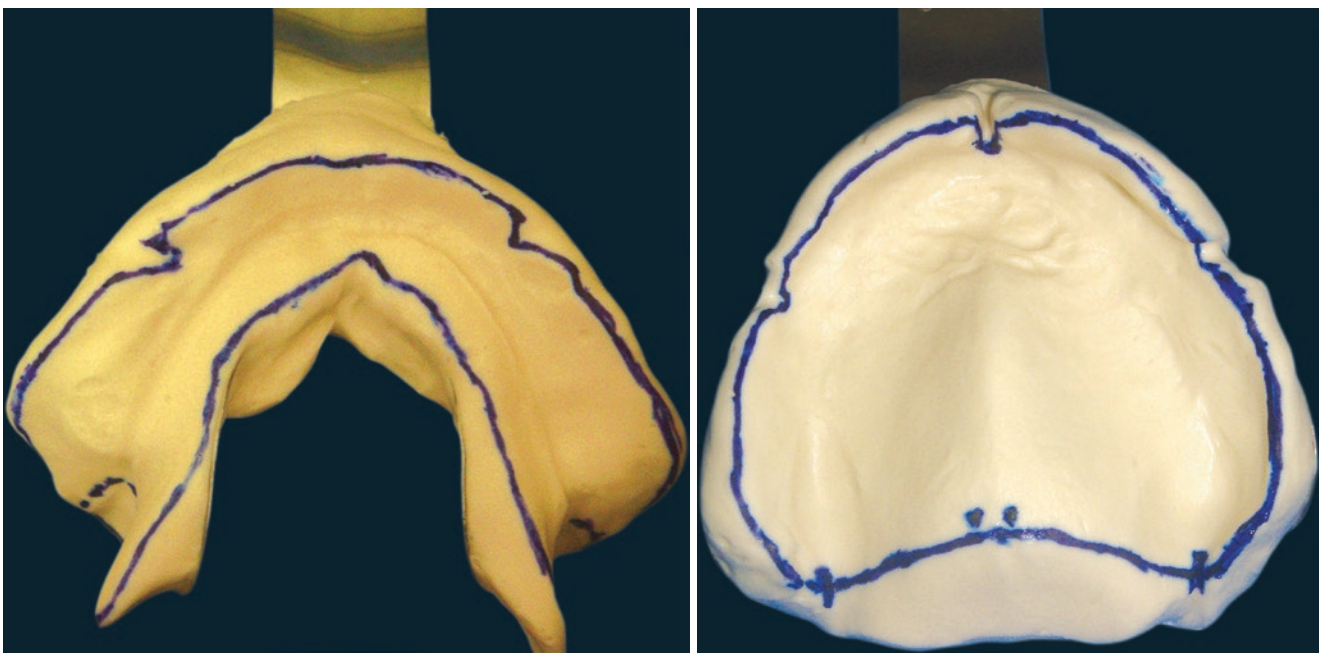


Fig. 5.1 Standard impression trays



Figs. 5.2 and 5.3 Diagnostic impressions

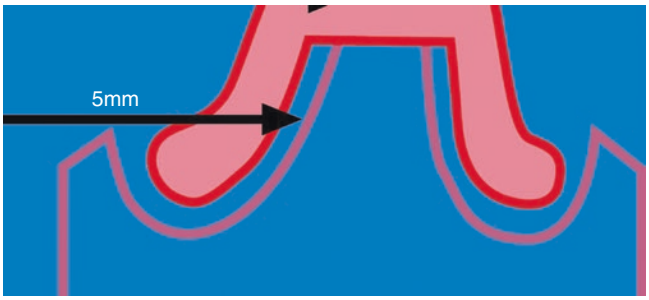


Fig. 5.4 Ideal impression tray

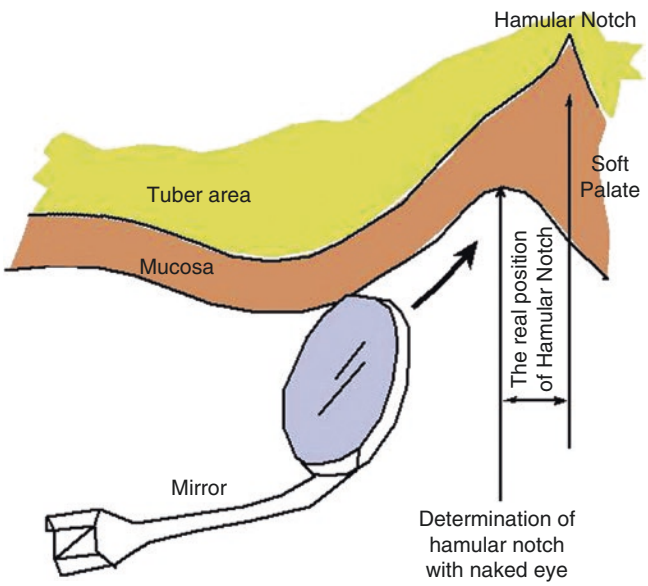


Fig. 5.5 The tuber region and hamular notch are located

olus shapes the labial sulcus to backward and inward with the pressure that the upper lip makes downward and inward and the lower lip makes upward and inward. The position of the mandibular lingual sulcus is determined by the protrusion of the tongue.

Usually, alginate is recommended because it is faster and more comfortable for the patient and because its softness causes less distortion of the soft tissues. Using alginate with high density, adjacent soft tissues like the sublingual glands, the cheeks are reflected better, and crest anatomy is protected. By adding wax or stench to standard trays, a clearer impression is provided.

5.1.1 Selection of the Tray in Maxilla and Mandible

Usually, in the maxilla, the distance between the external surfaces of the tubers is recorded by measuring with a compass (Fig. 5.6). The appropriate tray for the measured distance is chosen for the primary impression (Fig. 5.7). The same process is recorded by measuring the distance between retromolar protuberances in the mandible, and a suitable anatomical tray is chosen for this distance. The chosen prefabricated metal tray is not exact but almost suitable for the mouth of the patient (Figs. 5.8 and 5.9).

Making this tray more suitable for the mouth of the patient with some additions enables the clinician to take a better anatomical impression. For this purpose, the edges of the trays are covered with red wax (Fig. 5.10) and adapted to the mouth of the patient with a little heating (Fig. 5.11). After this process, the adaption of the edges is controlled (Fig. 5.12). Primary impressions are usually taken using a hydrocolloid impression material (alginate). Before taking the impression, first the mucosa is dried with gauze, and the

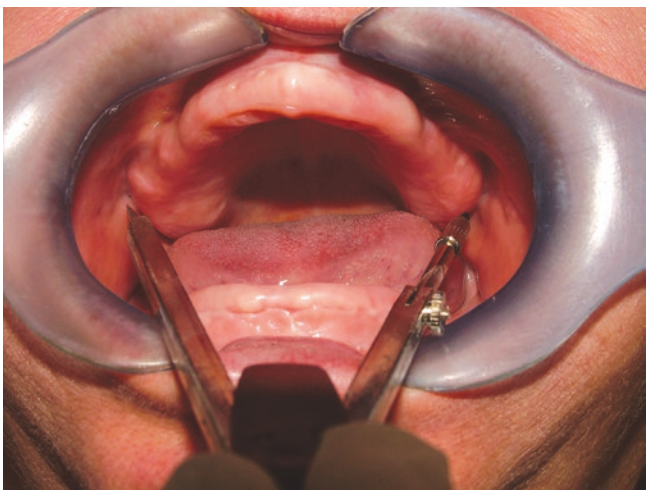


Fig. 5.6 The intertuber space is defined in the maxillary denture

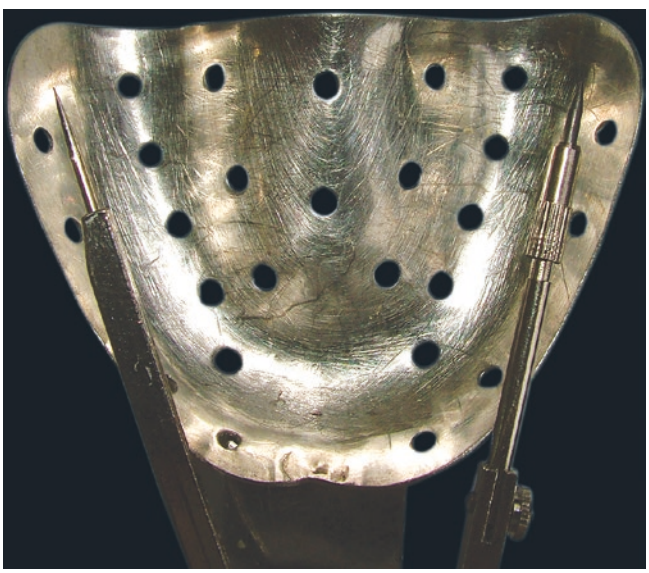


Fig. 5.7 Impression tray selection according to this distance

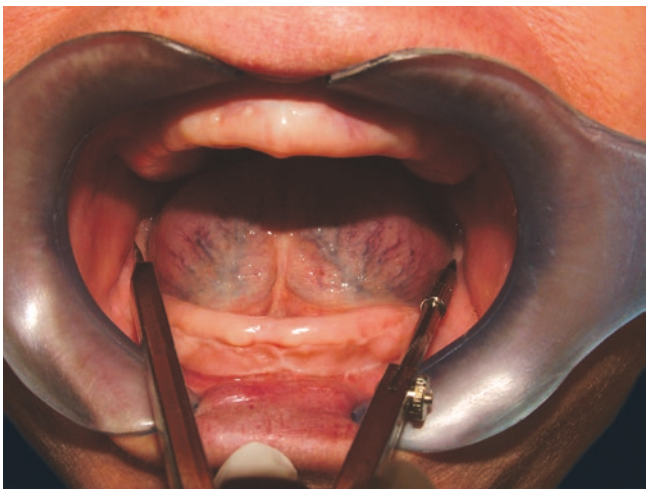


Fig. 5.8 Inter retromolar distance is defined

Fig. 5.9 Impression tray selection according to this distance

Fig. 5.10–5.12 5.10: Wax is applied in the impression trays. 5.11: Adaptation in patient mouth. 5.12: The adaptation is checked

patient is told not to close his/her mouth (Fig. 5.13). It will be suitable to determine the vibration line (Fig. 5.14) and to mark the place of hamular protuberance (Fig. 5.5) before taking the impression.

Fig. 5.13 The mouth is dried

Fig. 5.14 The vibration line is defined

5.1.1.1 Taking the Primary Impression of the Mandible

The alginate is prepared with 20% less water than is required for the preparation of the normal consistency (Fig. 5.15). If the crest is wide and has a good form, it is recommended to mix it with 15% less water (Fig. 5.16). If the crest is very flat, it is prepared with 25% less water. The tray should be filled with impression material until it is full and all the edges are covered. To gain better details of the tissue, the impression can be smoothed with a wet finger. It is necessary for the patient to lift his/her tongue 10–15 mm, and the tray is placed into the patient's mouth by turning (Figs. 5.17 and 5.18).

If the patient has limited mouth opening, the corners of the mouth are pulled with the help of a mirror. Alginate starts to gel after 30 s, and at this moment it is necessary for the patient to extend his/her tongue forward and to the corner of the mouth (Fig. 5.19). To activate the membrane attachment and frenum, the fingers are used to gently close the lips and cheeks. This provides round, closed borders and a correct primary impression. Depending on the brand, the alginate will gel within 2–4 min. The tray should be immobile until the material becomes completely gelled. To prevent the possibility of laceration or disruption while taking the impression out of the mouth, it can be held 1 or 2 min more until the elasticity and durability of the gel are obtained. If the patient feels uncomfortable, it is possible to remove the impression earlier, but no earlier than the gel phase. The lips and cheeks are stretched, and the impression is taken out quickly and carefully. All supporting tissues should exist, and all the borders should be round and exact (Fig. 5.20). Knife-edged and irregular borders are the signs of a poor impression (Fig. 5.21). After washing the impression with water, excess water is removed from the impression by shaking slightly and it is disinfected, so as to cover all the surfaces and the plaster should be poured after it is kept in a box for 10 min.

Fig. 5.15 The powder liquid ratio of the alginate is checked

Fig. 5.16 Alginate impression is placed

Fig. 5.17 The tray is placed in mouth

Fig. 5.18 The position of the patient and the dentist in mandibular impression

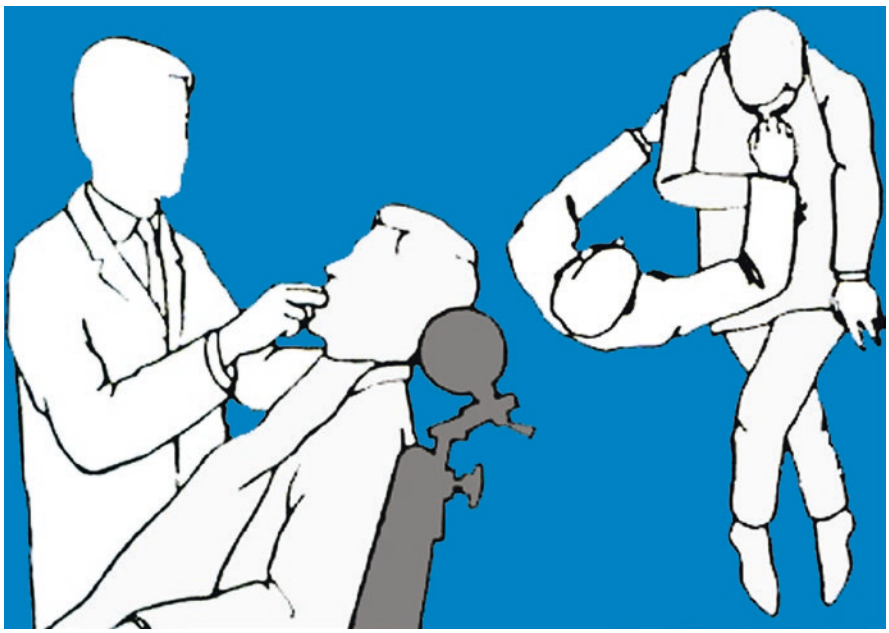


Fig. 5.19 The patient tongue is moved forward

If the patient has a gag reflex, he/she should be seated in a vertical position, suction should be placed into the anterior area of the floor of the mouth, and the patient should be told to take a deep breath (Fig. 5.18). The temperature of the water is raised to 23.3–23.9 °C, and the impression stage is accelerated. It is necessary to be careful, confident, and in control. If the patient has an extreme gag reflex, premedication or referring to a prosthodontist may be required.

The mandibular base of the denture and mandibular impression is examined by dividing it into ten regions, and the plaster is poured to create a model for the tray (Figs. 5.22 and 5.23).

5.1.1.2 The Impression of Maxilla

The alginate is prepared using 15% less water than the instructions of the manufacturer. If there is a loose mucosa area in the anterior or another region, 10% less water is

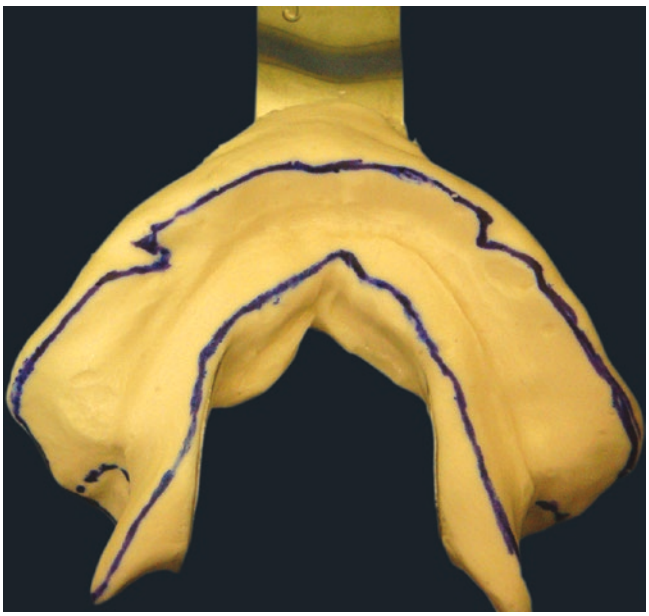


Fig. 5.20 Impression

Fig. 5.21 Faulty impression

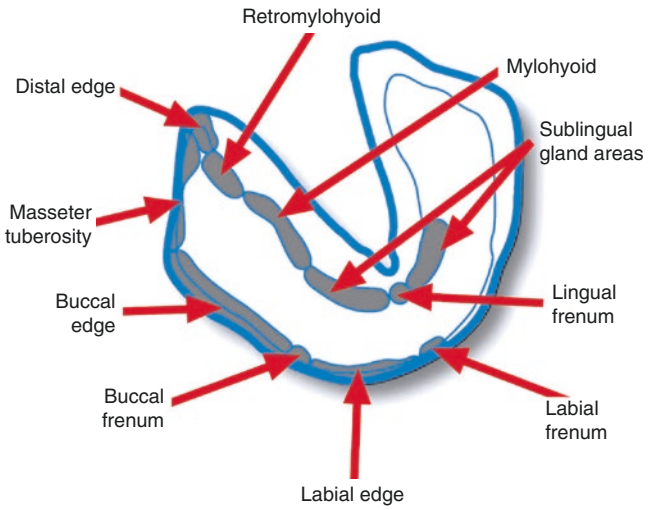


Fig. 5.22 The mandibular tray

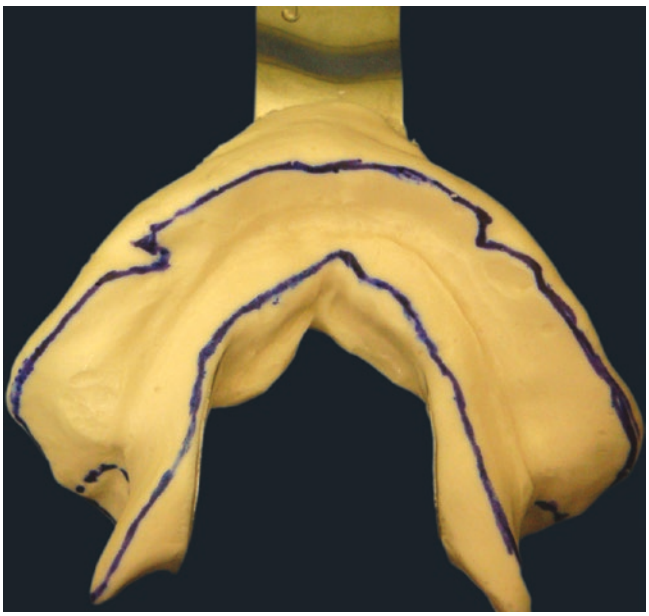


Fig. 5.23 The areas to be controlled

used (Table 5.1). If the palate is deep or V-shaped, soft wax is placed in the center of the tray. In addition, the alginate is placed on the deep parts of the palate with a finger. Alginate that is placed in the tray is flattened by a wet finger (Figs. 5.24 and 5.25). After stretching the lip, the tray is placed firstly at the anterior region by rotating (Fig. 5.26). The tray is placed slowly, so the alginate flows distally (Fig. 5.27). The placing procedure continues about 5–8 s till the alginate layer is seen at the posterior border. Then, the pressure is stopped and kept still (Fig. 5.28). If the alginate is flowing to the soft palate, it is removed quickly by finger or mirror. If the alginate is the desired viscosity, the flow would be of acceptable dimensions. The alginate becomes gel in 30 s, and during this process, the lips and cheeks are manipulated gently to form the closed and circular shape of the margins. After that, 1 or 2 minutes of waiting time is required for the alginate to fully become the gel formation. The lips and cheeks are stretched, and the tray is removed serially. The impression must include all supporting anatomical regions and all borders round and fully (Fig. 5.29). Thin and irregular borders indicate an unsuitable impression (Fig. 5.30). There is a viscous mucous saliva layer that covers the palate in the impression of the upper jaw (Fig. 5.31). To prevent this, some

Table 5.1 Thickness and location of wax relief areas

Researcher	Relief	Tissue stops
Roy MacGregor	Metal space in the middle palatinal raphe and incisive papilla	
Neill	0.9 mm modeling wax for all the area (Fig. 5.24)	
Sharry	Base plate wax for all areas including PPS (posterior palatal seal)	Four tissue stops
		In molar and canine areas 2 mm wide from palatinal to mucobuccal border (Fig. 5.25)
Bouchers		1 mm base plate wax except PPS in the maxilla (Fig. 5.26). Relief on the buccal shelf and retromolar pad areas in the mandible and two tissue stops on the canine area (Fig. 5.27)
Morrow, Rudd, Rhoads	Full wax 2 mm shorter than the borders	Three tissue stop
		4 × 4 mm away from each other (Fig. 5.28)
Barnard Levin	One layer of pink wax 2 mm away from sides except PPS and buccal raphe	

Fig. 5.24 Alginate impression is placed

Fig. 5.26 Placement of impression tray to the anterior part of maxilla

Fig. 5.25 Alginate impression is shaped with the finger

Fig. 5.27 Alginate impression is flowed distally

Fig. 5.28 The tray must be stable

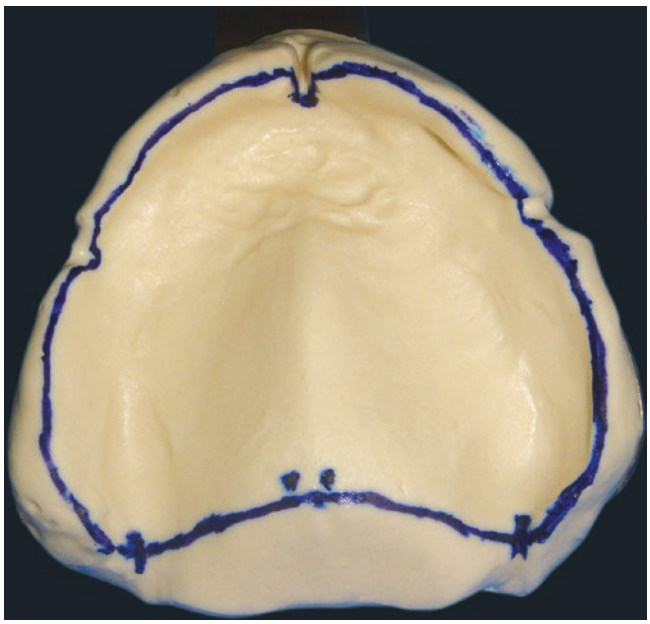


Fig. 5.29 Maxillary impression

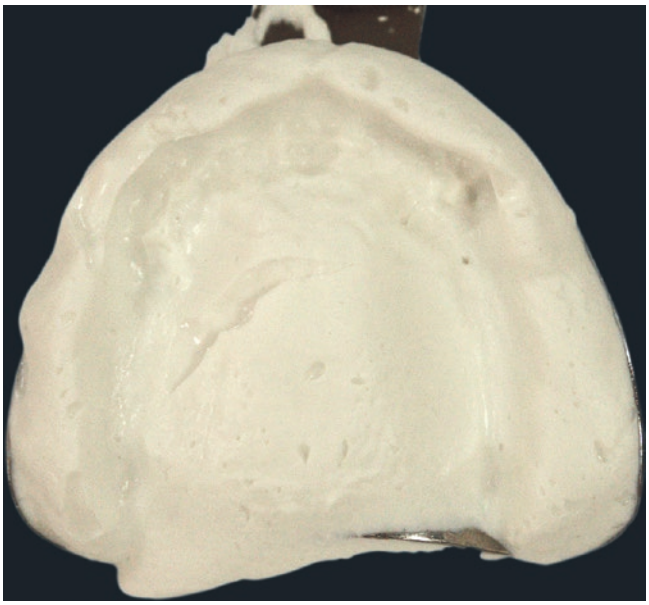


Fig. 5.30 Faulty impression

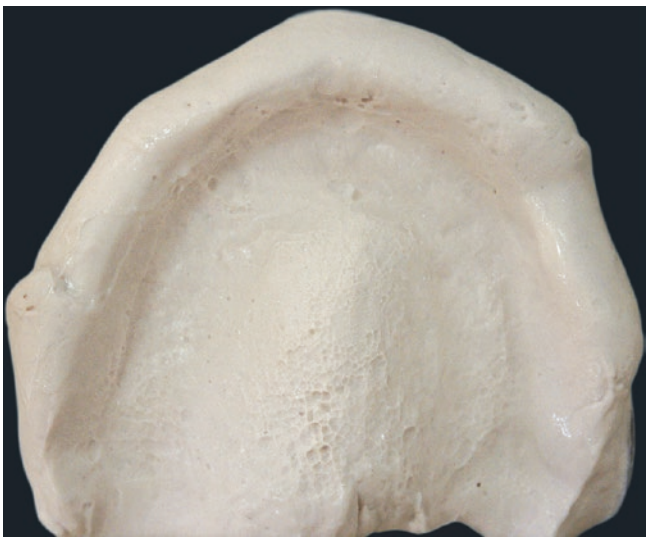


Fig. 5.31 Mucous layer in maxillary impression

laboratory plasters can be applied on the saliva and then easily washed. Six anatomical regions are determined (Fig. 5.32), and after the examination of these regions, the impression is sent to casting (Fig. 5.33). As with the impression of the lower jaw, the impression of the maxilla must record all the surrounding uncorrupted connections. It is not necessary to reach beyond the functional limit that shows the union of soft and hard palate during the recording of the hamular notch.

Figure 5.34 shows the position of the clinician or operator and patient during the impression of the upper jaw.

5.1.1.3 Faults in Diagnostic Impression

1. The existence of the incomplete extensions shows the failure in diagnostic impression. A defect in the deepest area of the sulcus is usually seen (Fig. 5.35). If the defect is small, it can be covered with wax or can be scraped from the model (Fig. 5.36). The edges must never be extended with wax because it is distorted during the pouring of plaster.
2. The pressing of the impression tray to tissue and the existence of penetrations in the impression are other impression mistakes, and the contact of the tissue with the tray

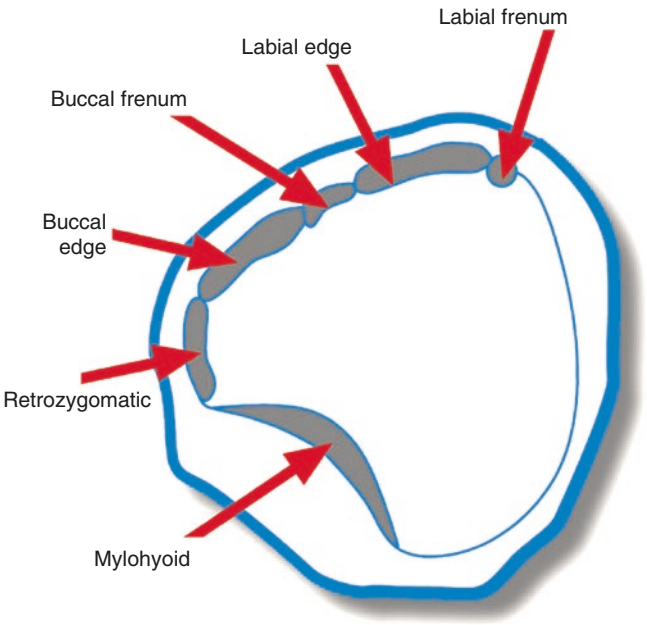


Fig. 5.32 The maxillary tray

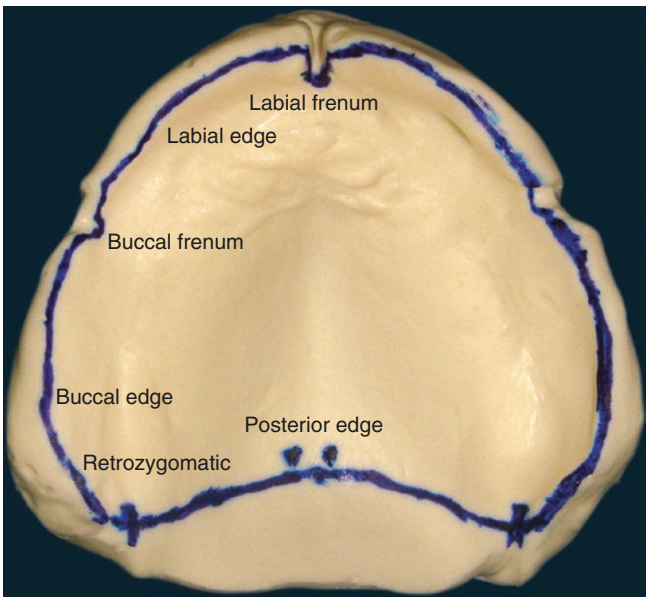


Fig. 5.33 The impression with anatomical landmarks

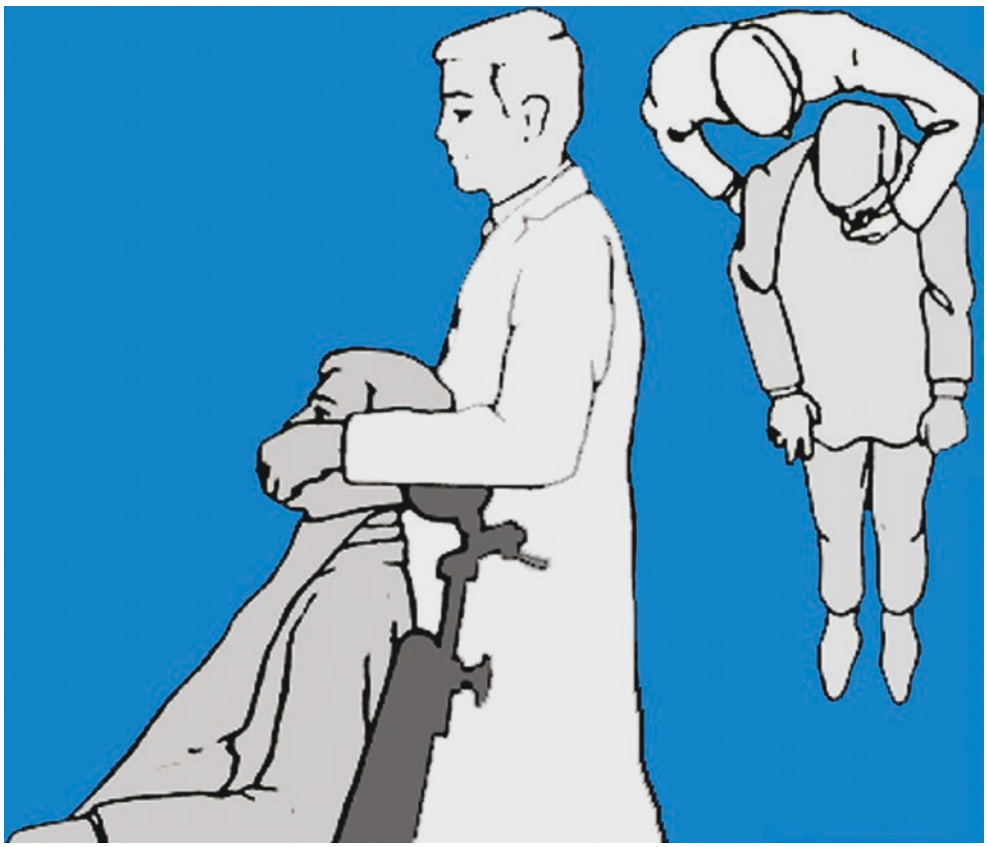


Fig. 5.34 The position of the patient and the dentist in maxillary impression

Fig. 5.35 The impression has to be repeated

Fig. 5.36 Small defects can be filled with wax

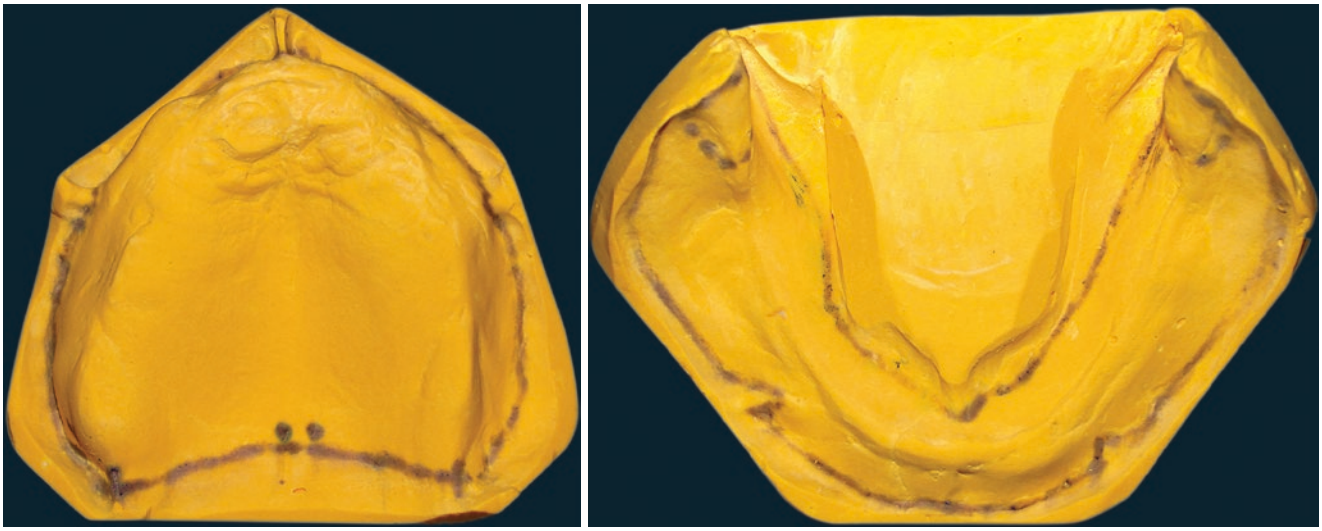
also indicates an inaccurate impression (Fig. 5.37). The impression should be repeated, or as an alternative, if there are no undercut areas, the wash technique can be applied using a low viscosity impression material.

3. Although alginate is a very popular impression material, adhesion to the tray cannot be achieved without help. Separation of the impression from the tray is a common fault; perforated trays or adhesives should be used to avoid this situation. The separation of the impression in the postdam area exists particularly while cutting off the impression material that extends to the soft palate. If there is no connection, the cast will be incorrect, too.
4. Impression materials, such as reversible or irreversible hydrocolloids and elastomers, are viscoelastic materials. To record the undercut areas correctly, the impression should be taken out of the mouth as quick as possible because tensile strengths are high but have a minimum amount of tensile. The impression should not undergo to elastic deformation. Ten to 15 min is ideal for preventing elastic deformation.

Fig. 5.37 Maxillary anterior part and tuber region contacts with the stock tray

5.1.1.4 The Transfer of the Impression

The resistance of the impression materials against long-term distortion changes. Reversible and irreversible hydrocolloids are the least resistive impression materials against stress and storage. The external surface of the impression should be covered with a wet towel, while it is being kept and supported. The dimension of alginate changes as it gains or loses water. The plaster should be poured immediately because of the low dimensional stability of alginate, and assistant staff should be trained on the subject of making a model from the impression. In the cases needed, boxing should be done to gain time for the technician.



Figs. 5.38 and 5.39 The borders in impression

5.1.1.5 The Production of the Diagnostic Model

To draw the borders of the individual tray on the impression, a stick with indelible ink is used. Wet alginate is easily marked with the indelible ink, and this is easily transferred to the model. To take note of and mark the important points on the impression offers advantages during the inspection of the impression. An indelible pencil should not be used because it cannot be sterilized. A stick with indelible ink is cheap and disposable.

Because the diagnostic model and master model are used for different purposes, the ways used to gain models are different, too. The model gained from the first impression is necessary for the technician to see all the borders of the impression and prepare the individual tray according to this. The part that fills more than the impression surface is shortened to a specific point. Plaster or class I plaster can be used to make models. Boxing is unnecessary to make the models of the diagnostic impression. It is not necessary to measure the amounts of water and powder; however, the mixture should be viscous enough to ensure the plaster does not flow and or spread much when the impression is turned. A vibrator can be used, but even so, a few air bubbles are not important. It is necessary to separate the impression from the model before the alginate starts to absorb water from the plaster because this can cause irregular surfaces on the model. When the model is separated, the indelible ink exists there as proof of the external lines (Figs. 5.39 and 5.39).

5.1.1.6 Custom Tray Construction

A custom tray is necessary to obtain a correct final impression of the complete denture, and the preparation of the custom tray for the appropriate impression method is the most important part of the procedure.

A custom tray:

1. Must be fully adapted to the edentulous ridges.
2. The dimensional changes of the impression materials will be less (uniform distribution).
3. The quantity of impression materials will be less.
4. It is more comfortable for the patient.

Also custom tray must:

- Be rigid, but not too thick
- Preserve its form
- Provide space for the uniform thickness of final impression material
- Be easy to trim and adapt
- Have smooth finishing surfaces

The overextended and underextended custom tray must be checked. If the extension of the custom tray is not corrected, the retention and lip support provided by the denture will decrease. The properly constructed custom tray should transfer the impression material to the mouth and not damage the supporting tissues. Otherwise, it will not accurately reflect the negative of the supporting tissues. Space must be prepared inside the custom tray with minimum or selective pressure during the molding of the surrounding tissues of the residual alveolar ridge and the palatinal section of the mouth. Another important factor is the position of the tray in the mouth. The custom tray must be checked in the mouth before commencing the impression procedure.

Most dentists have insufficient knowledge about the design of a custom tray to obtain the master impression of the edentulous mouth and trust the laboratory technician

concerning the design. A number of dental laboratories make some modifications during the construction of the custom-made tray because of mistakes in the primary impression.

5.1.2 Technical Features of Custom Tray

1. *Materials for an Impression Tray*

The custom tray can be fabricated from acrylic resin (chemically or light cured) or shellac (thermoplastic materials). The custom tray increases the adaptation of the impression materials and also diminishes the amount of the impression materials. Therefore, a master impression will include all the details to enable the construction of the correct complete denture.

Thermoplastic materials can be classified as:

(a) Shellac
(b) Impression compound materials
(c) Hydroplastic impression tray materials (they are not preferred as these materials have some problems with dimensional stability)

The mostly used materials are:

(a) Cold-cured polymethyl methacrylate (PMMA) (Fig. 5.40)
(b) Light-cured (VLC) dimethylacrylate resin (Figs. 5.41 and 5.42)
(c) Heat-cured PMMA

(a) *Cold-cured PMMA*

Cold-cured polymethyl methacrylate is the material most used for the fabrication of the custom tray. The biggest advantage is the low cost; however, as the contraction during polymerization is greater than with the other materials, nowadays, type II chemically activated PMMA (pikka material) is used. The related material has filler particles to diminish the contraction during polymerization and to increase the linear dimensional stability.

Generally, the cold-curing acrylic resin material is used to construct the custom tray and impression tray. The resin is mixed according to the manufacturer's directions.

Two basic techniques are used to fabricate the impression tray. There is the powder and liquid method and the dough method. If the dough method is used, the powder and liquid are mixed in a glass according to the manufacturer's directions. The top of the glass must be closed until the polymerization of the cold-curing acrylic resin is achieved. When it reaches the doughy stage, it is rolled into the desired shape. The resin sheet is transferred to the cast and adapted (Figs. 5.43 and 5.44). The material is lightly pressed to obtain the main thickness of the impression tray. This

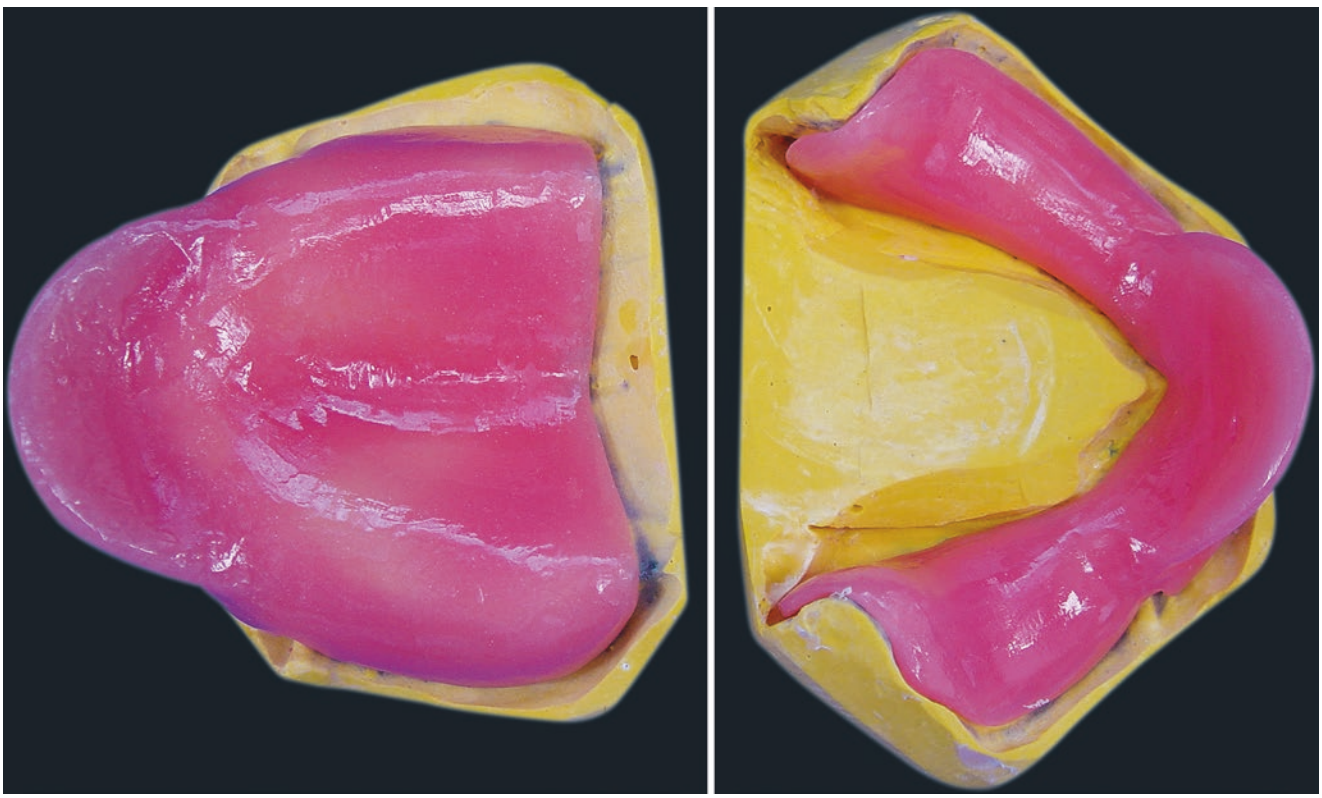
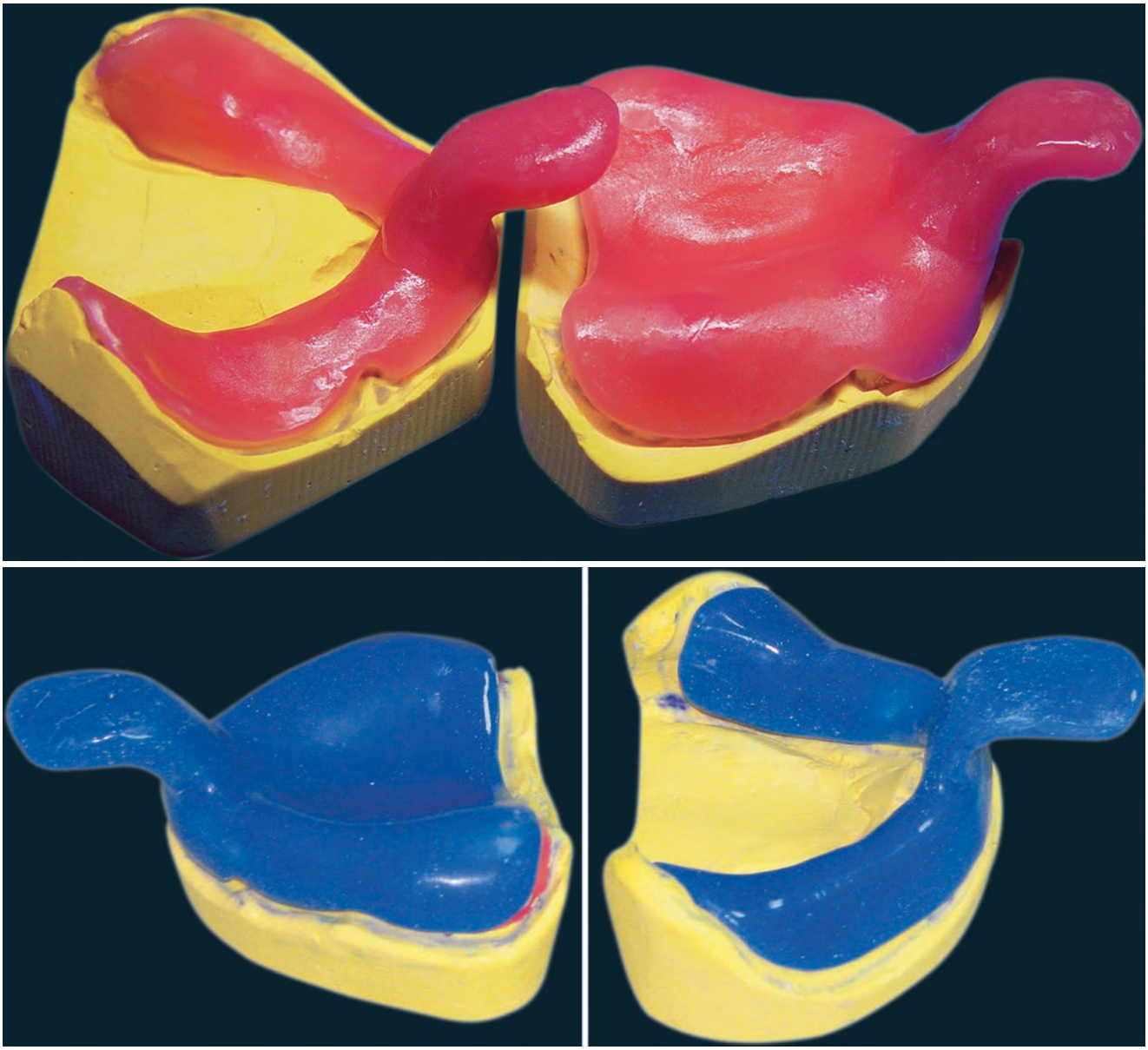
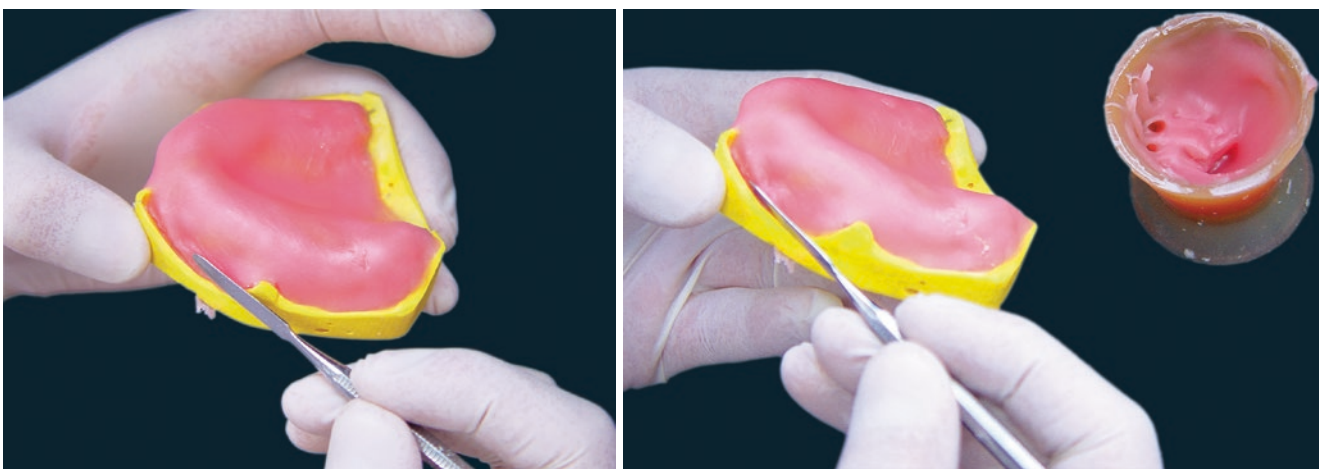


Fig. 5.40 Custom trays fabricated with autopolymerized (chemically cured) polymethyl methacrylate



Figs. 5.41 and 5.42 Custom trays fabricated with light-cured (VLC) dimethylacrylate resin



Figs. 5.43 and 5.44 Custom trays fabricated with autopolymerized (chemically cured) polymethyl methacrylate shaped on the cast

Fig. 5.45 The impression tray on the cast

thickness should be about 2 or 3 mm, according to the shape of the buccal vestibule. The constructed tray must be removed from the cast when polymerization is achieved. The border of the tray is marked on the preliminary cast before the imprints of the borderline are converted to the tray, and the border of the tray is truly trimmed. It should be done quickly to complete the corrections before the polymerization finish. The border of the tray is adapted to the cast. If the border of the tray is still too long, the heated spatula can be used. The heat will increase during the polymerization, due to the polymerization temperature. If the tray is removed from the cast, the acrylic will be deformed. The heat will melt the relief wax. The tray is removed from the stone model after the acrylic polymerization of resin is finished (Figs. 5.45 and 5.46), and the border is trimmed and polished (Figs. 5.47 and 5.48). To construct the handle part, more powder and liquid are mixed, and the monomer is applied to make a connection with new material and tray. Then, the handle is placed in the anterior portion of the custom tray.

(b) *Light-cured (VLC) dimethylacrylate resin*

Their mechanical feature is better than the other alternative materials. Although the light-cured dimethylacrylate resin is expensive, a polymerization lamp is needed for its polymerization, and the trimming stage of the material is difficult; the material is useful when the working area is narrow, and its dimensional stability is perfect. Acrylic resin can be used for patients with PMMA allergy, as it has no residual monomer. As the light-cured resin is rigid in nature and is easy to manipulate and the polymerization time can be controlled, these materials will be used much more in the future. This material consists of sheets, and to work with it, gloves should be worn. A single sheet of the material is adapted (Fig. 5.49) to cover the wax relief and basal seat areas of the preliminary cast (Fig. 5.50). Excess material is trimmed with a scalpel (Fig. 5.51) and is used to construct the handle of the tray (Fig. 5.52), and then the material is light cured for 2 min (Figs. 5.53 and 5.54).

(c) *Heat-cured polymethyl methacrylate (PMMA) resin*

The dimensional stability of this material is better than the other materials; it is less preferable because of its high price and difficult laboratory process.

2. *The Optimum Coverage of the Tray*

The border of the tray must occupy all the spaces of the denture without causing distortion of vestibule tissues. The border of the custom tray should be approximately 2 mm shorter than the anticipated functional border of the denture. Thus, marking the border of the tray with a pencil will aid the technician to trim the tray. Also, it is time-saving for the dentist to adapt the tray to the patient's mucosa (Fig. 5.55).

3. *Wax Relief and Thickness*

The thickness of the wax depends on the periost, the soft tissue connection, and the load-bearing capacity of the tissues. To prevent the distortion of the tissue, the thickness of the wax must be increased when the soft tissues attachments are on the residual ridge. Mucostatic impression material must be selected. The thickness of the wax will be selected according to the material. For irreversible

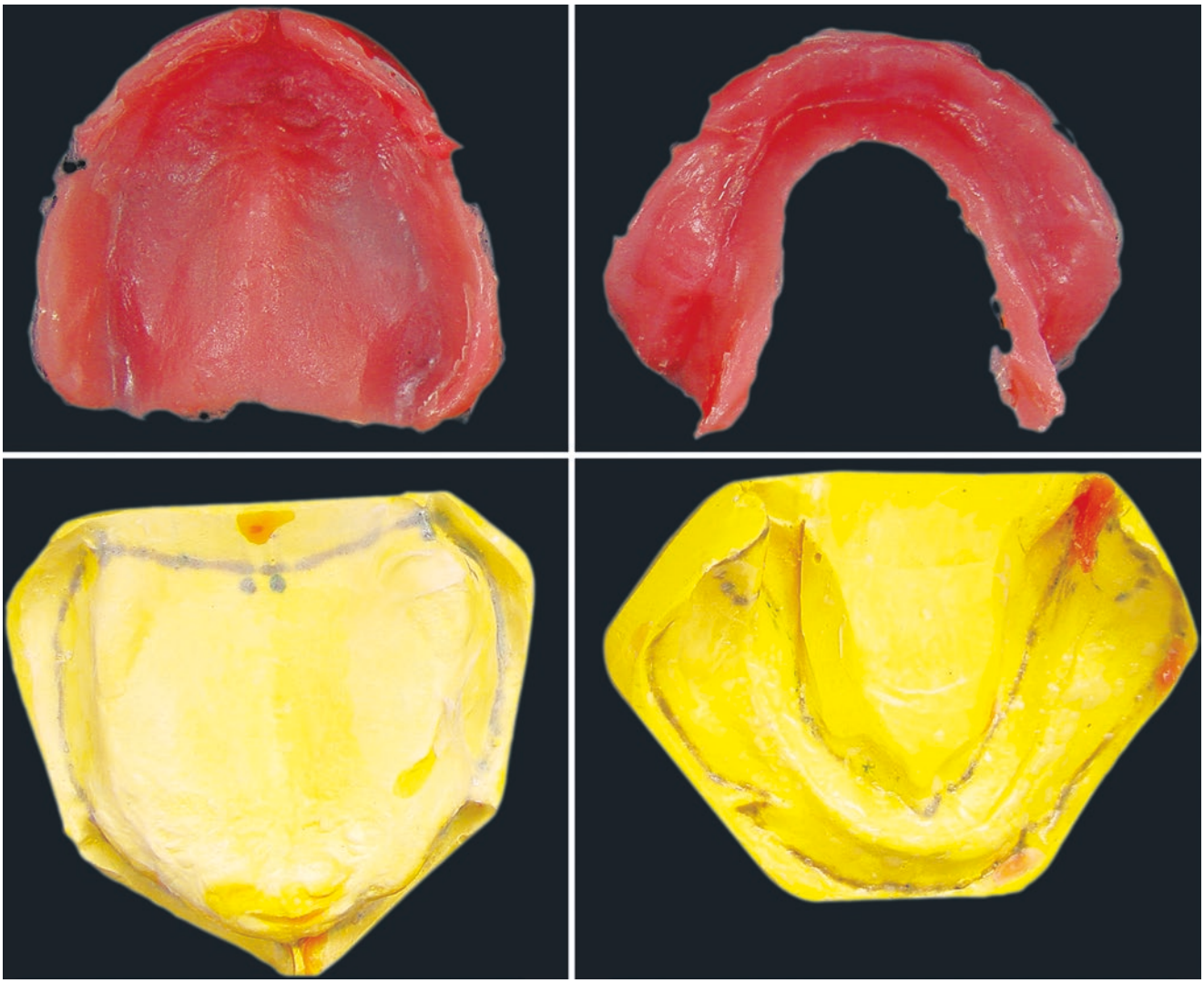
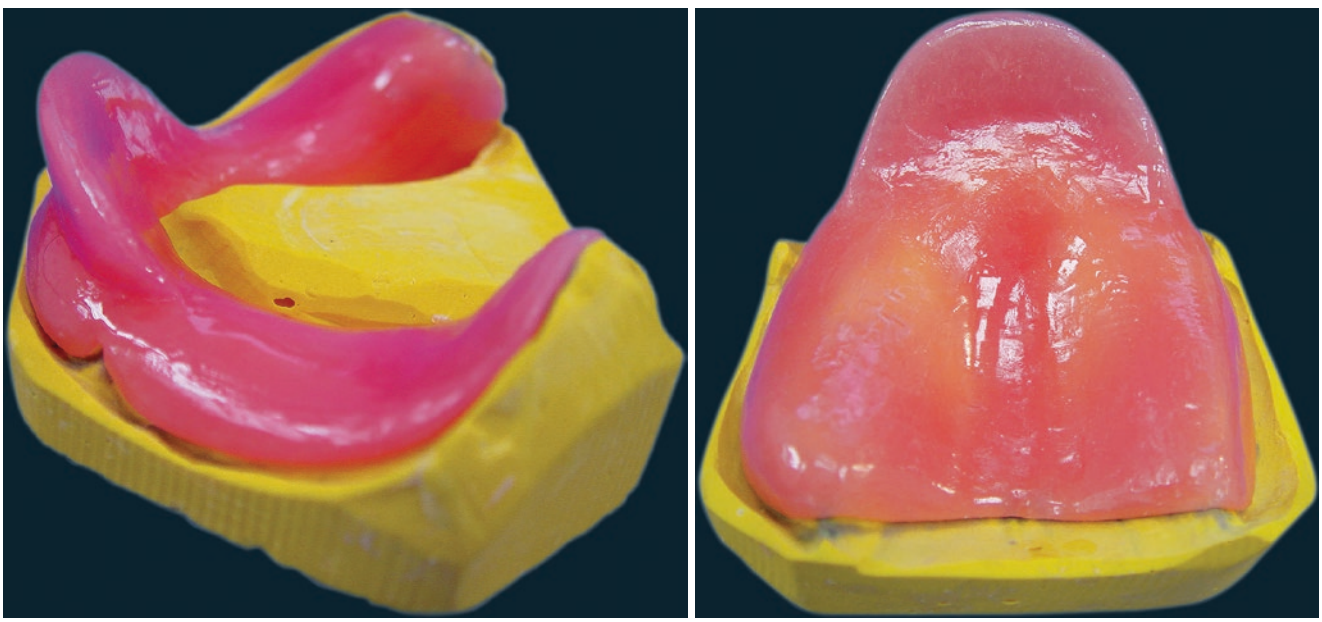
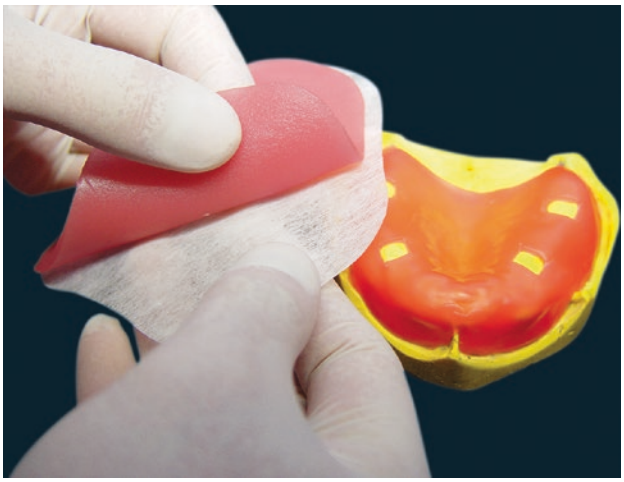


Fig. 5.46 Polymerized material removed from the cast



Figs. 5.47 and 5.48 The borders of the tray are trimmed and polished



Figs. 5.49 and 5.50 Light-cured (VLC) dimethylacrylate resin is placed over the cast and adapted

Fig. 5.51 The excess acrylic is trimmed away

Fig. 5.53 Polymerization of acrylic in the special unit

Fig. 5.52 The application of the tray handle

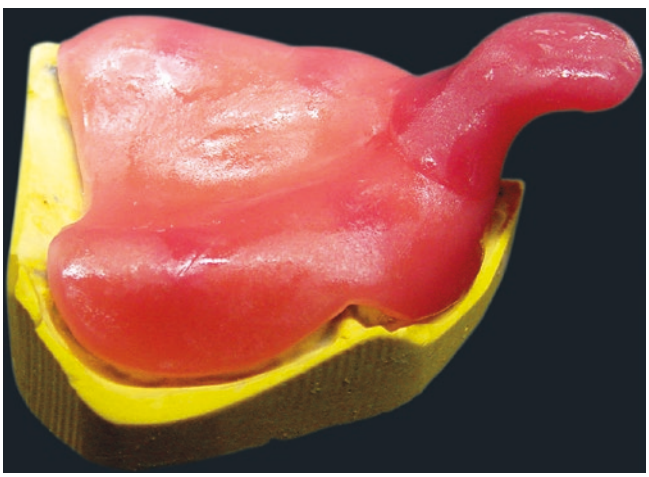


Fig. 5.54 Tray constructed from light-cured dimethylacrylate resin

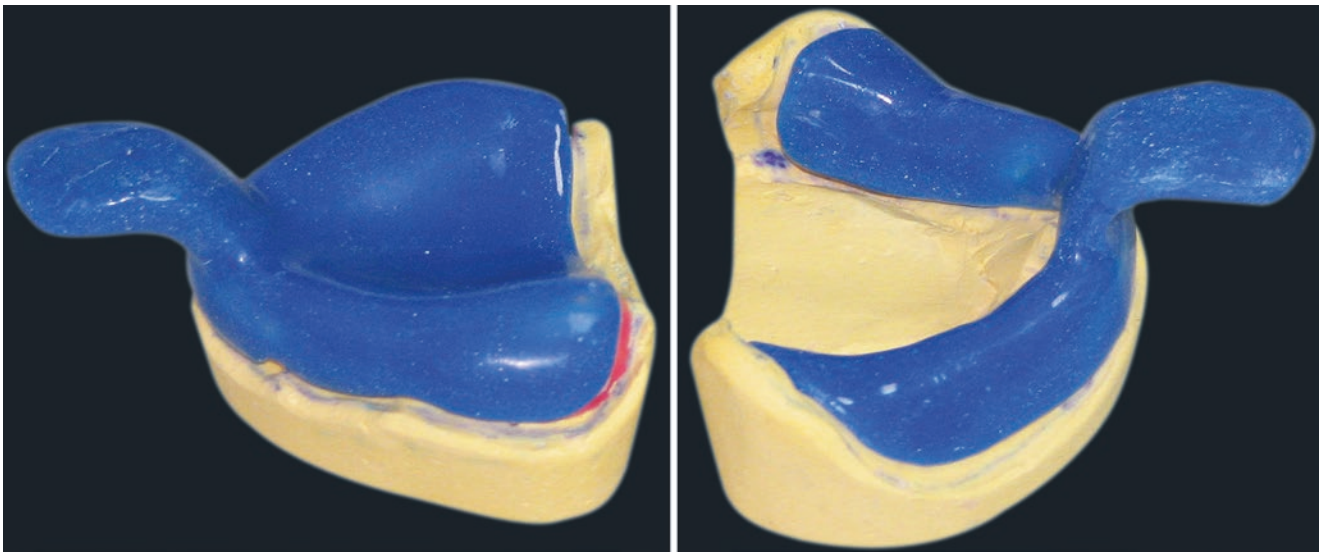


Fig. 5.55 The tray should be 2 mm shorter than the vestibule on the cast

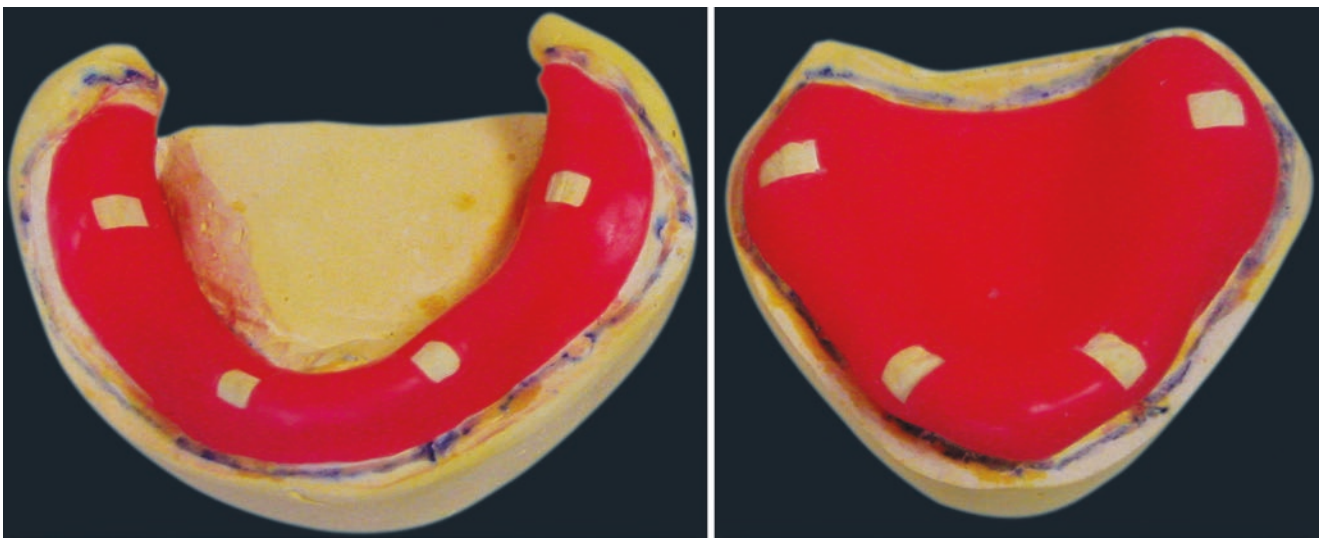


Fig. 5.56 Four tissue stops on the canine and premolar region in 2 mm width extending from the palatinal surface to the mucobuccal fold

hydrocolloids recommended material thcikness is 2 mm, for elastomeric impression materials 3 mm and dental plaster 1.5 mm.

When zinc oxide eugenol (ZOE) impression paste and impression wax are used, the close tray can be used, and no wax relief is needed for these impression materials; however, 0.6 mm or 1 mm of wax thickness can also be used. The thickness of one sheet of wax is approximately 2 mm. When ZOE impression paste is used, a thinner layer of the wax sheet could be used, or the wax can be refined to leave 1 mm wax space.

4. *Tissue Stoppers*
The aim of the tissue stoppers of the custom tray is to provide an equal thickness of impression materials. For the complete denture, it is recommended to place four tissue stoppers to the canine and first molar region, in 2 mm of width and lying from the palatial to the mucobuccal area of the alveolar ridge (Fig. 5.56). These two to four stoppers are useful when the mucostatic impression technique is used. Minimal compressive pressures will act on the mucosal surface. Sufficient impression material is placed in a wax relief's tray and is correctly placed into

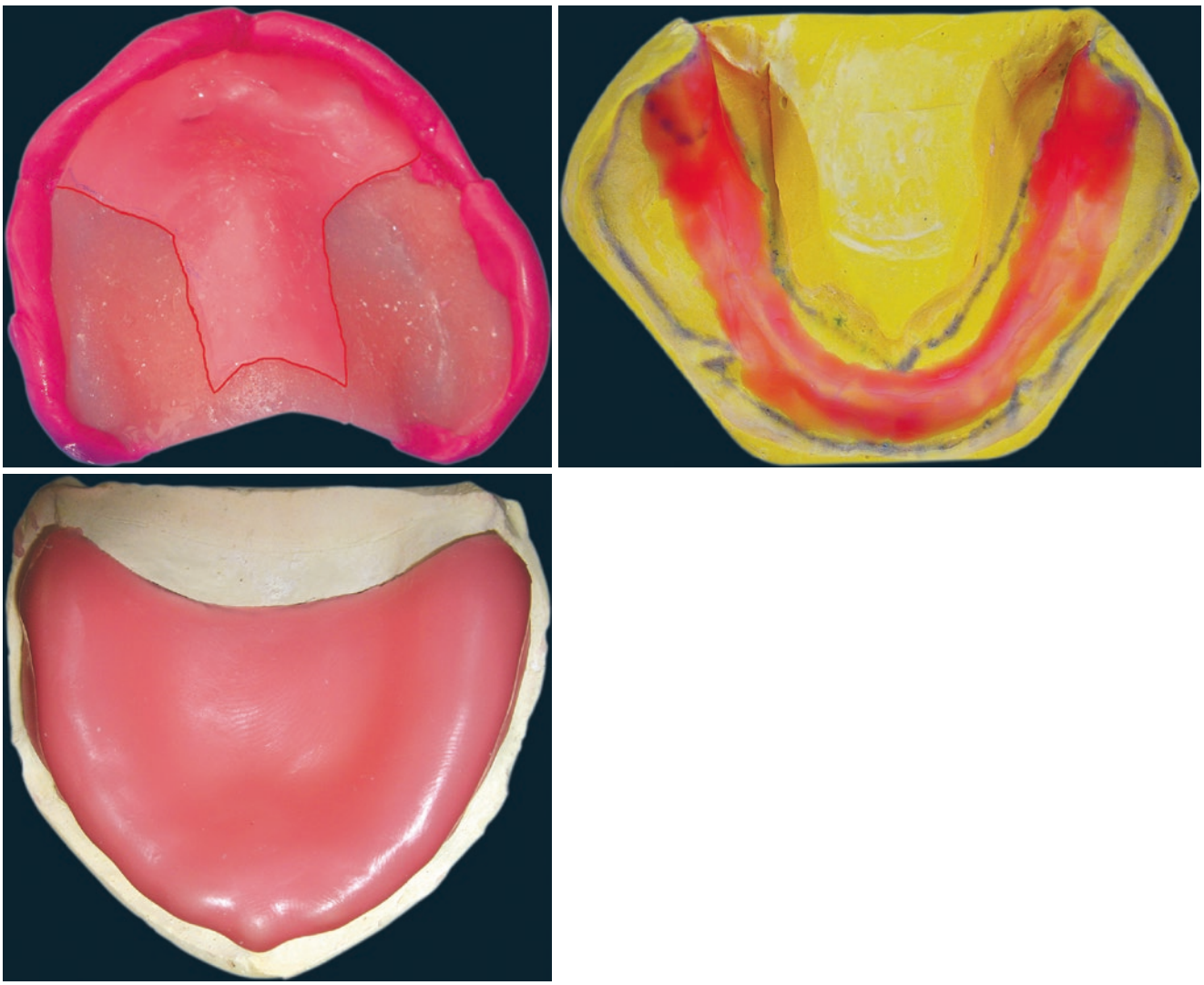
the mucosa. The stoppers are important for placing the tray accurately. The preparation of the stoppers can be carried out in the mouth with impression materials and/or on the primary cast during the construction of the tray. Softened impression wax or harder wax or impression compound can be used to prevent the pressure areas.

In selective pressure impression, the design of the wax can be prepared according to the stress-bearing area and also the relief areas. Maxillary stress-bearing areas are the horizontal palatal bone, and the relief areas are mid-palatal raphe and incisive papillae (Fig. 5.57).

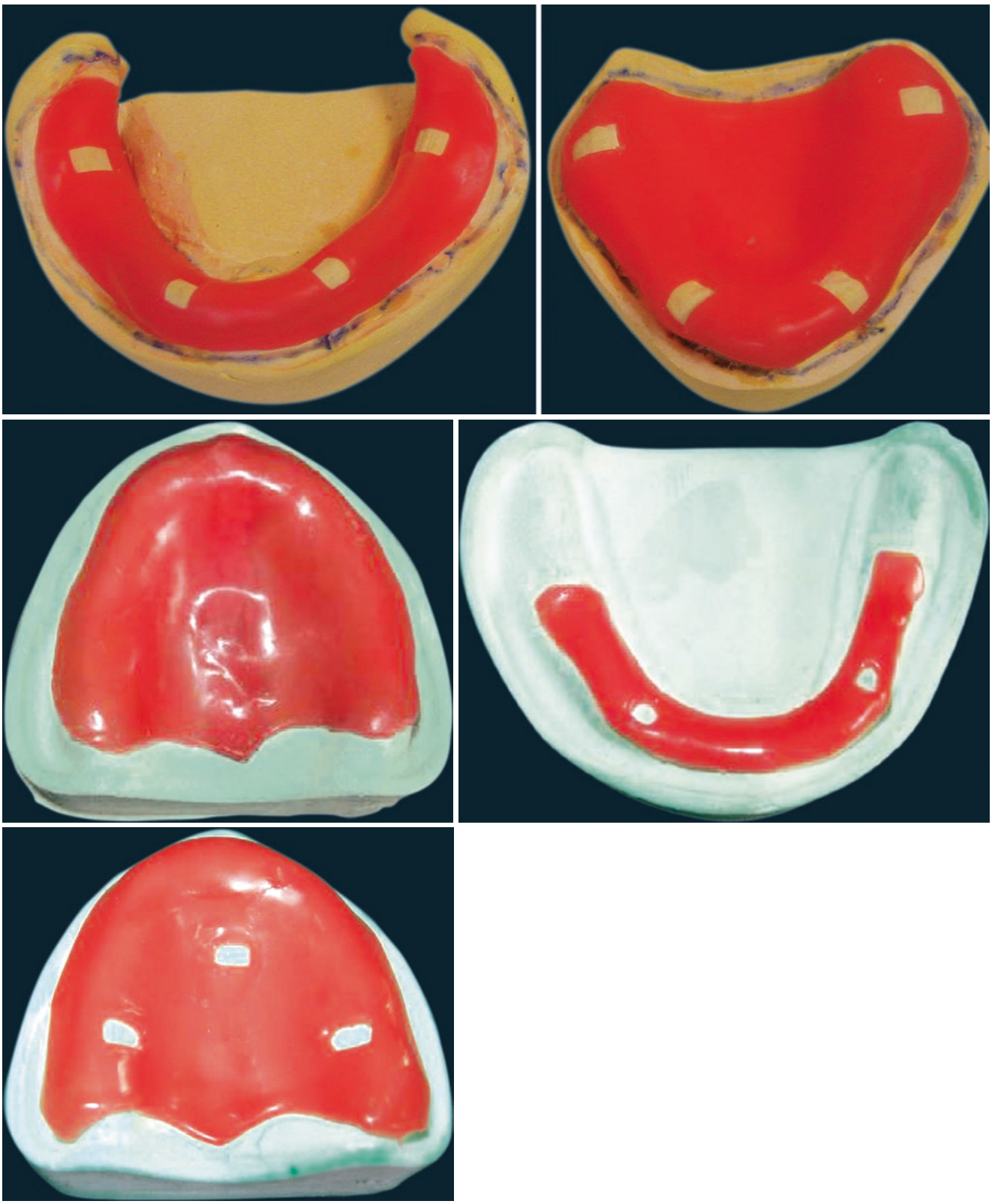
Mandibular stress-bearing areas are the buccal shelves areas, and the relief areas are the mylohyoid edge and the alveolar crest ridge (Fig. 5.58). Various researchers suggest that the wax relief should not be applied to the primary stress-bearing areas, and in these areas positive tissue contact must be provided.

This procedure will apply further pressure to the primary stress-bearing areas and diminish the stress on the other areas and provide the selective pressure impression; however, there are different ideas about the wax relief's design (Table 5.1; Figs. 5.57, 5.58, 5.59, 5.60, 5.61, 5.62, and 5.63).

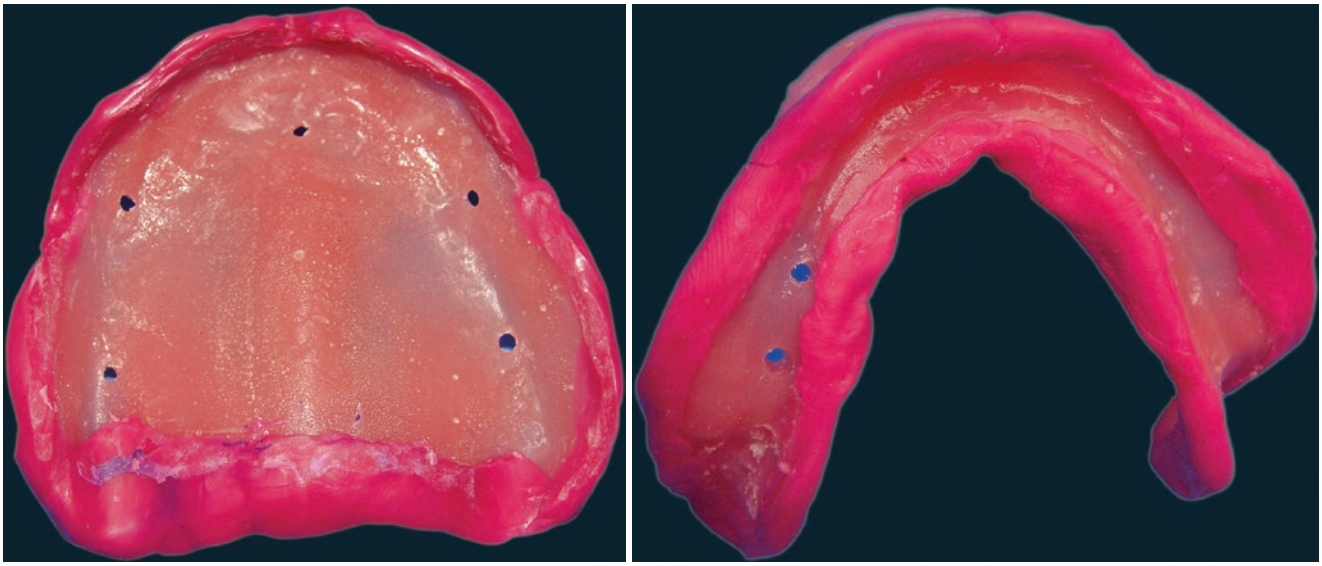
5. *Holes Prepared on the Tray*
After removing the wax spacer from the inner side of the tray, a series of holes about 12.5 mm are marked in the center of the alveolar groove and the retromolar fossae of the tray and are cut in the tray with a no. 6 round bur. The holes provide escape ways for the final impression material and relieve pressure over the crest of the residual ridge and the retromolar pads during the final impression stage (Figs. 5.64 and 5.65).



Figs. 5.57–5.63 The wax space and relief area with different methods



Figs. 5.57–5.63 (continued)



Figs. 5.64 and 5.65 Relief holes in the upper and lower trays

6. *Handle of the Tray*
   The handle of the tray is used to carry the final impression tray into the mouth, to position it over the residual ridge, and to stabilize the tray in the correct position with minimal distortion of soft tissues, while the final impression materials set. If the handle of the tray is not constructed properly and placed in the mouth, it will cause distortion of the lips and change the functional alveolar sulcus, and the final impression in the related area will be larger (Fig. 5.66).

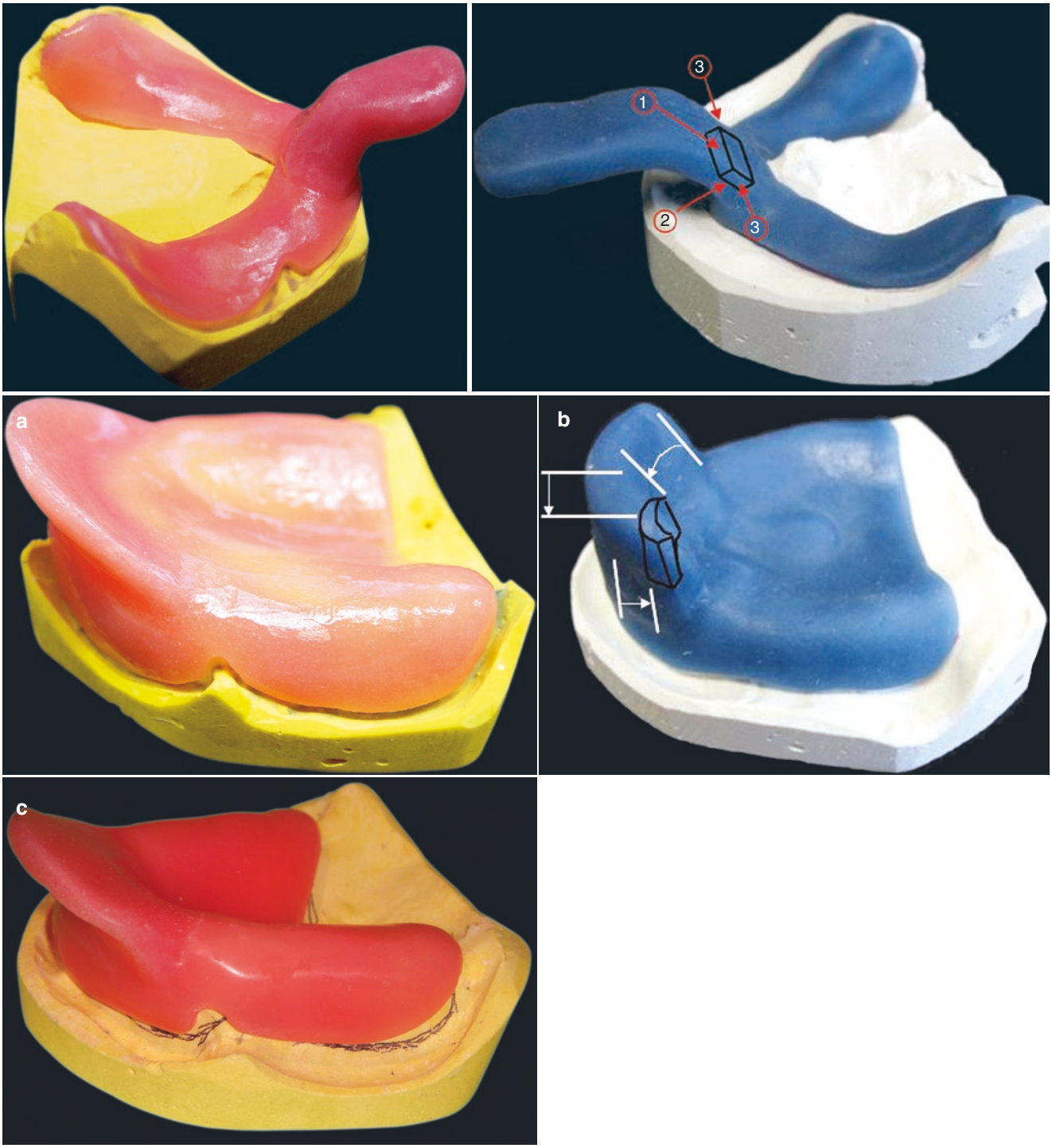
   The thickness of the tray handle must be 3–4 mm and must be placed vertically to the labio-anterior alveolar ridge crest. The height of the handle must be 10–15 mm and must be perpendicular to the basal area of the tray. The top of the handle must be approximately 25 mm from the vestibule, so as not to interfere with the position of the lips and not to change the border molding procedures (Figs. 5.67 and 5.68).

   The mandibular handle of the tray also must be 25 mm distant and 12 mm in thickness from the labial sulcus. In this way, the mandibular handle does not disturb the mandibular lip and tongue. If necessary, two additional handles can be placed on each side in the first molar region (Fig. 5.69).

   These handles are cantered over the crest of the residual ridge, and its lowest point is approximately 19 mm in height. Posterior handles are used as finger rests to complete the placement of the tray on the residual ridge and to stabilize the tray in the correct position with minimal distortion of soft tissues while the final impression materials set (Fig. 5.70).
7. *Maturation Time*
   The time between the fabrication of the impression tray and taking the final impression is defined as the maturation time. This is characterized by the polymerization of the residual monomer that causes polymerization shrinkage of the acrylic resin material. This is related to the linear dimensional stability; in the course of 9 h, the tray materials show linear dimensional changes. As the maximum shrinkage will occur in the first 30 min following the fabrication of the tray, the tray must be used after 9 h of fabrication time. If there is insufficient time to wait for the polymerization, the impression tray is seated on the master cast, and the impression tray is placed in boiling water for 5 min and afterward cooled at room temperature.

5.1.3 Fabrication of the Impression Tray According to Impression Materials and Impression Techniques

Before the fabrication of the tray, the undercuts must be marked on the master model, and if necessary these areas could be blocked out (Fig. 5.71a–c). If the undercut areas are not marked on the model, the adaptation of the impression tray will be of a poor quality. The thickness of the wax relief inside the impression tray can be modified according to the impression material (3 mm for elastomeric impression material, 1 mm or no wax relief for the ZOE impression material, 1.5 mm for dental plaster products, and 2 mm for irreversible hydrocolloid impression material). If there is no undercut area, no wax relief is needed. If the adaptation of the impression tray is satisfactory, in these circumstances any of the impression materials can be used (Fig. 5.72). If the border molding procedures are carried out, the border of the impression tray must be 1–2 mm down to the border of the master model (Fig. 5.73).



Figs. 5.66–5.68a–c The tray handle should be 3–4 mm in thickness and should be vertical to the anterior crest

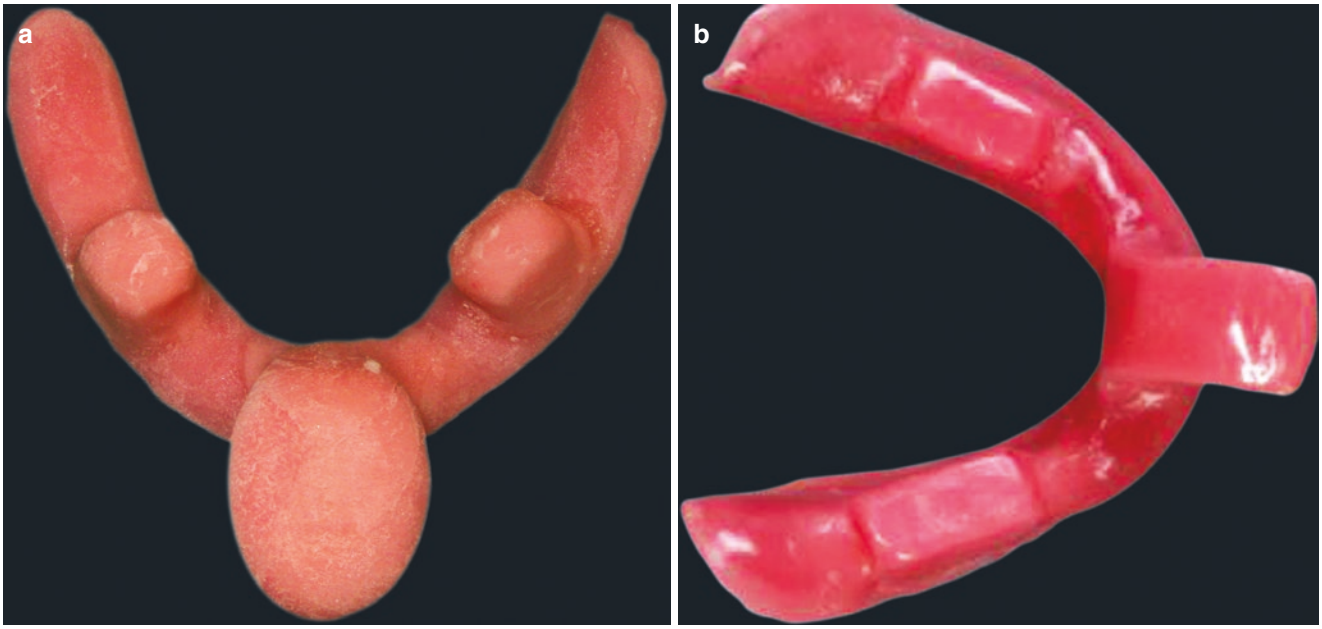


Fig. 5.69 (**a**, **b**) Two additional handles in the premolar region

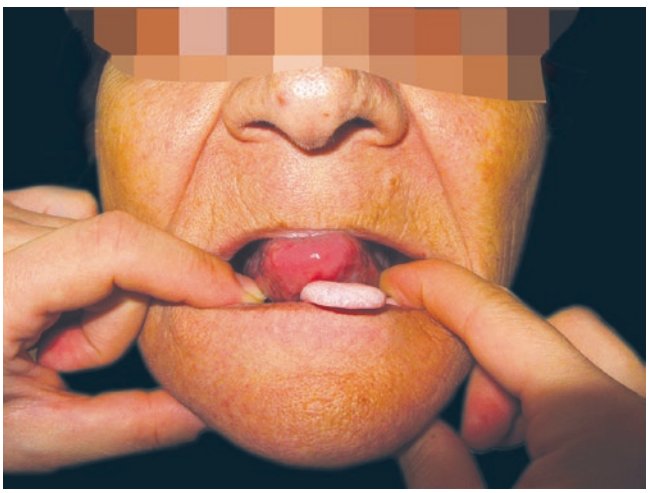


Fig. 5.70 The tray is stabilized with the fingers through the additional handles

If there are some undercuts on the cast model, elastomeric impression materials can be used, and the thickness of the wax relief will be decided according to the selected impression material. The compression and tension strength will occur under the undercut areas of the elastomeric impression materials. Permanent deformation depends on the force that will be subjected to the materials. When it is removed more rapidly, less distortion occurs. In the presence of deep undercut areas, more space should be prepared to prevent the disruption of the impression material.

The presence and the depth of undercuts will be different in the same patient's residual crest areas. In such cases, a tray both with and without a spacer should be prepared. When it is removed from the undercut, the tray will be faced with two problems. First, the forces acting on the impression material can separate the tray and impression material. To prevent separation of material from the impression, it is necessary to prepare holes in conjunction with applying adhesives to the impression tray. Another problem is the use of too much elastic material. In these cases, when removing the tray, the patient will feel excessive pain.

When the selective pressure impression technique is used, wax (2 mm thickness) is adhered to the soft tissue areas to prepare the space (Figs. 5.74, 5.75, 5.76, and 5.77). The heated spatula can be used to soften the wax and refine the edges.

In the anterior region, unnecessary block-out should not be made because it will pull the impression tray away from the edges of the crest and create extreme coverage. More waxing can be carried out in extremely soft, thin, and thick edges. After the relief and undercuts are resolved, Vaseline is applied to the entire model, and the custom tray is prepared.

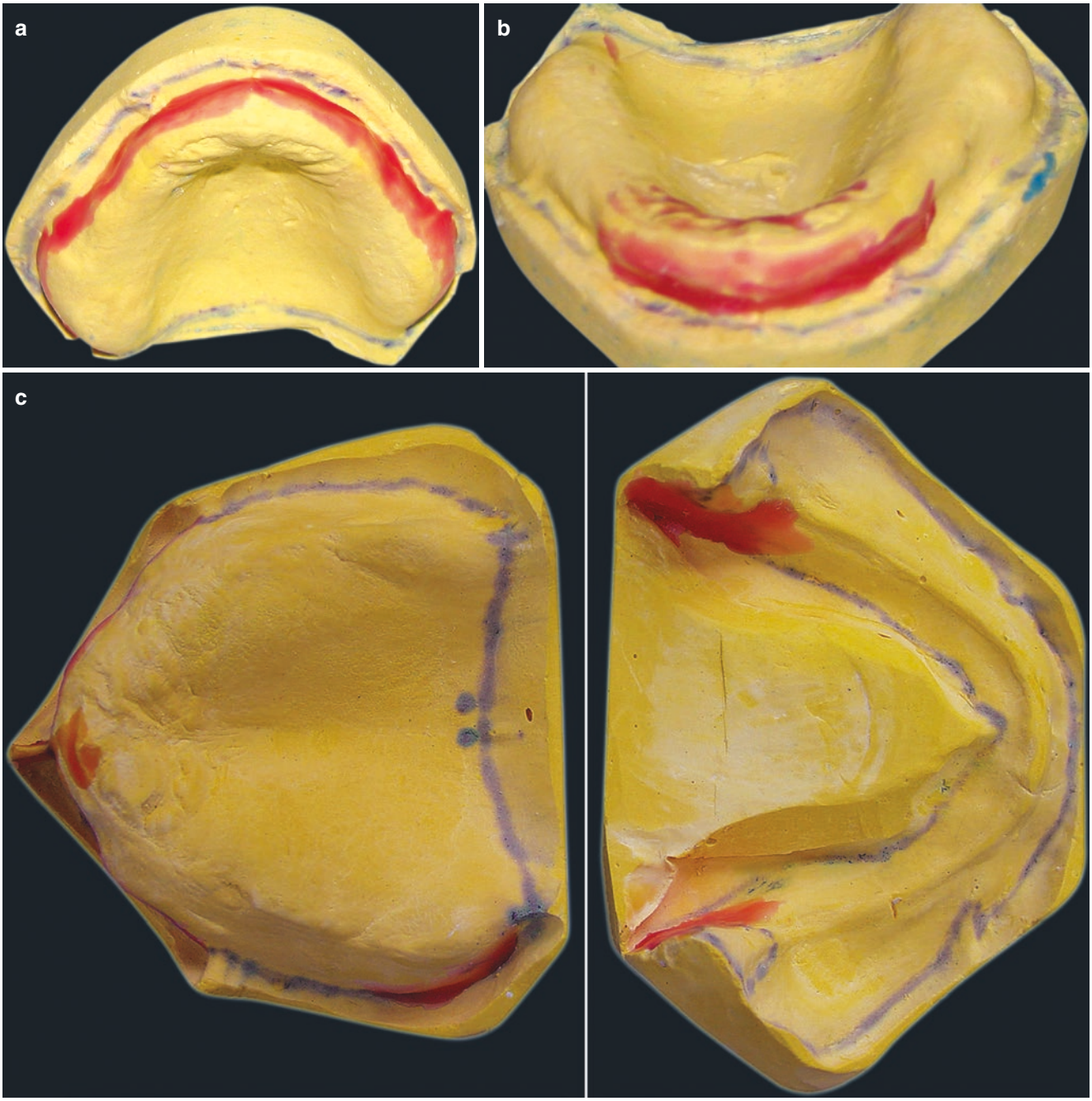


Fig. 5.71 (**a**–**c**) The undercut areas are blocked away before the tray construction

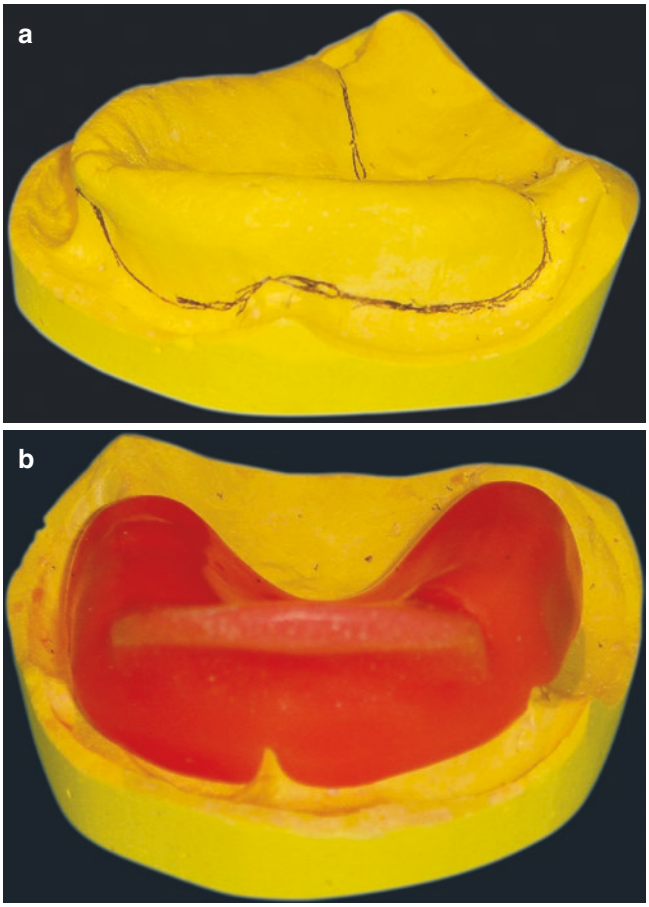


Fig. 5.72 (**a**, **b**) The borders are marked on the cast. b: The tray is finished on the cast

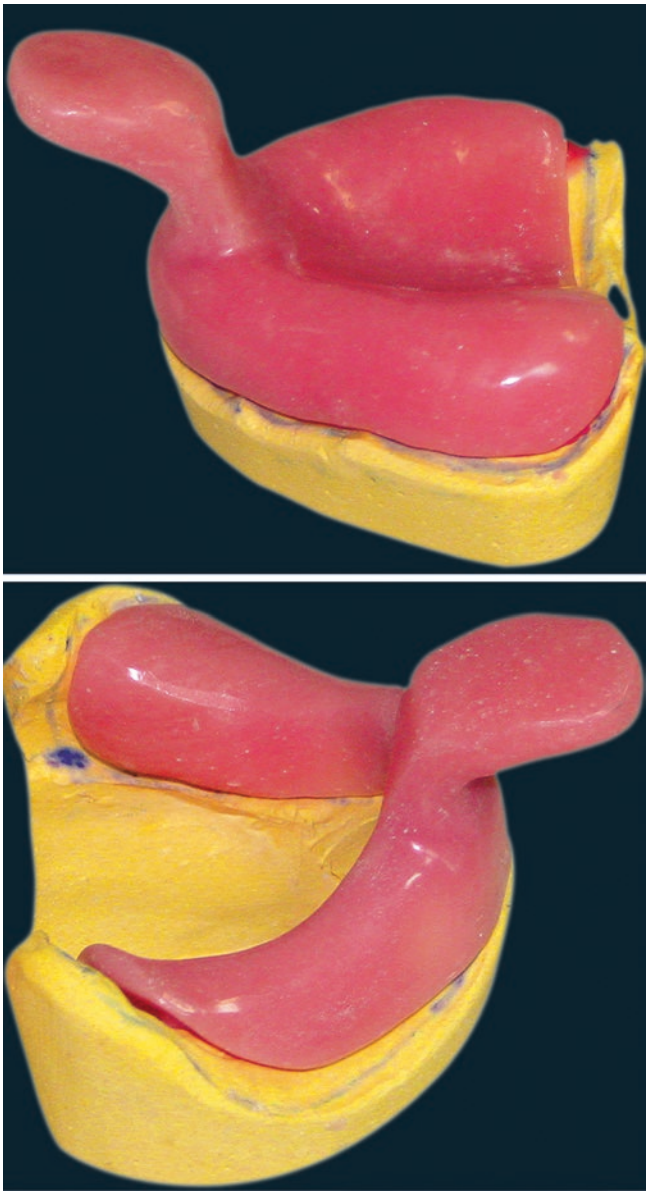
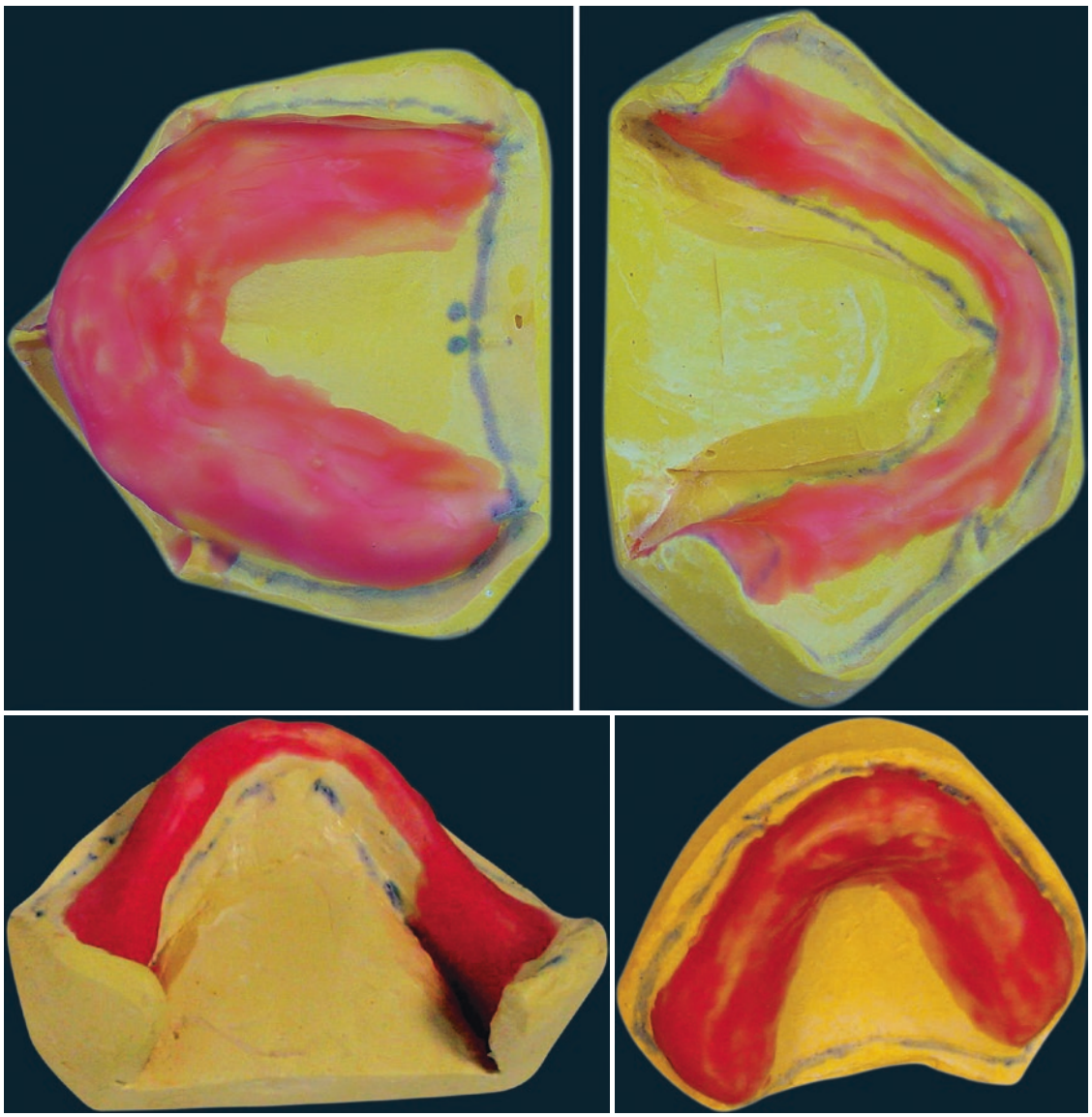


Fig. 5.73 The borders of the tray can be seen on the cast



Figs. 5.74–5.76 The wax relief on the cast for the selective pressure impression technique

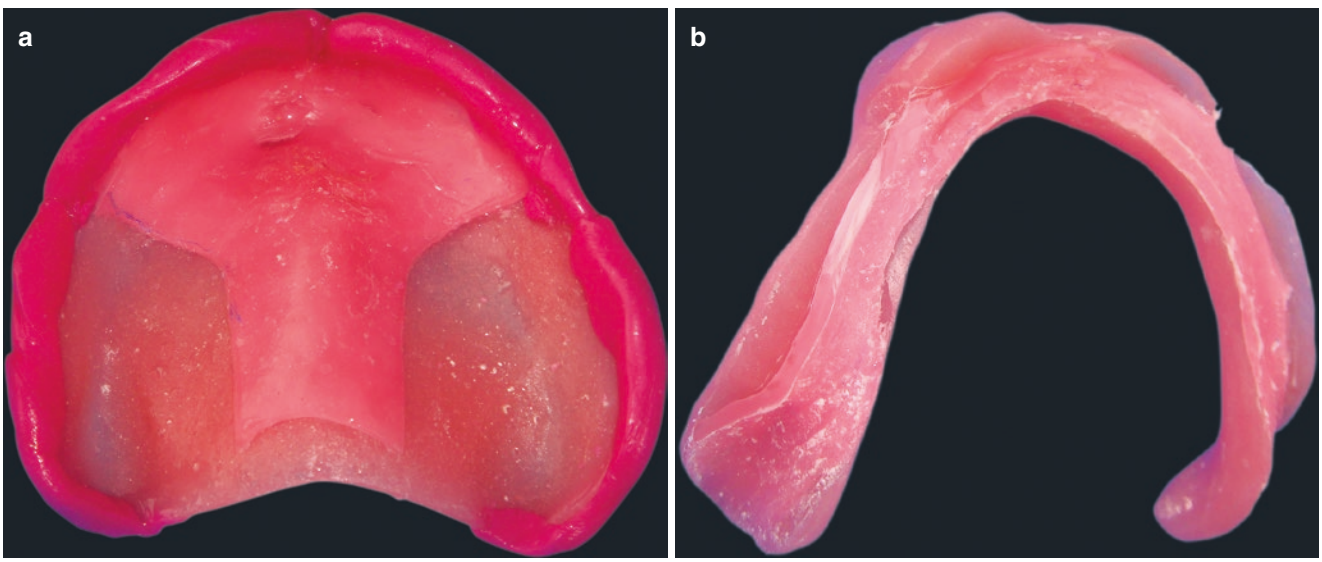


Fig. 5.77 (**a**, **b**) The wax can be seen inside of the tray

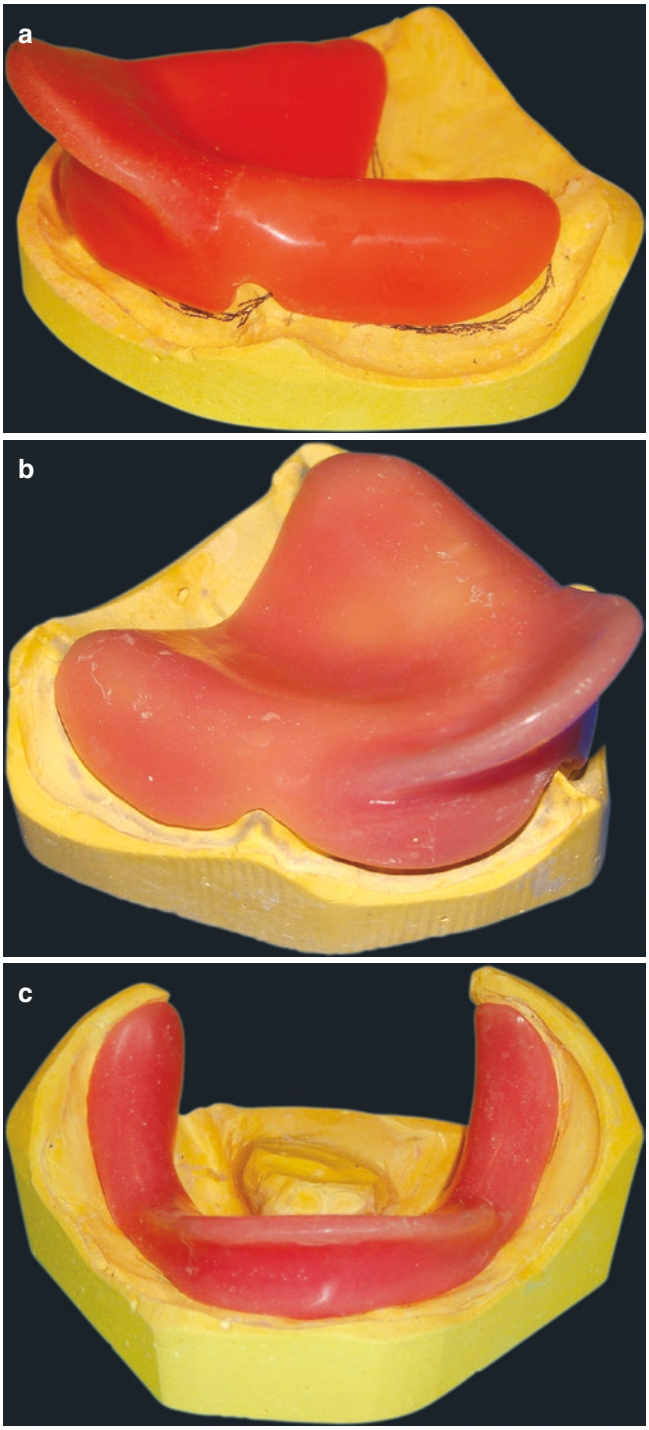


Fig. 5.78 (**a**, **b**) Maxillary and (**c**) mandibular impression trays

5.1.4 Adjusting of the Custom Tray and Functional Borders for the Impression

To arrange the custom tray:

- The borders will be 2–3 mm shorter than the functional borders of the denture.
- The tray should have the same shape of the final impression (Fig. 5.78a–c).

Fig. 5.79 Maxillary impression trays

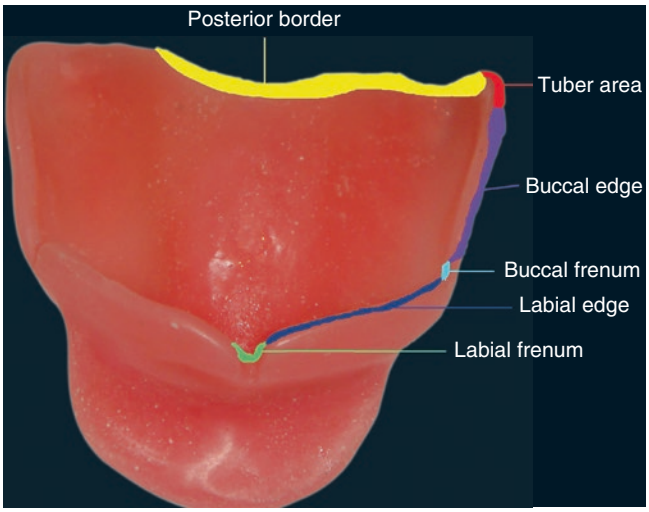


Fig. 5.80 The anatomical landmarks of the maxillary tray

5.1.4.1 Checking the Maxillary Impression Tray

The maxillary denture base has been divided into six anatomic areas. The border of the tray must be arranged using these reference points, and the final impression must be completed using the same guidelines (Figs. 5.79, 5.80and 5.81). The impression tray will be placed in the patient's mouth and be examined and adjusted according to area.

5.1.4.2 Retrozygomatic Area

The retrozygomatic area is the extension with the greatest width. The tray should not be thinned excessively here (Figs. 5.82 and 5.83) because it would be difficult to capture the proper width of the border. The impression compound must not only be supported in height but also in width. This

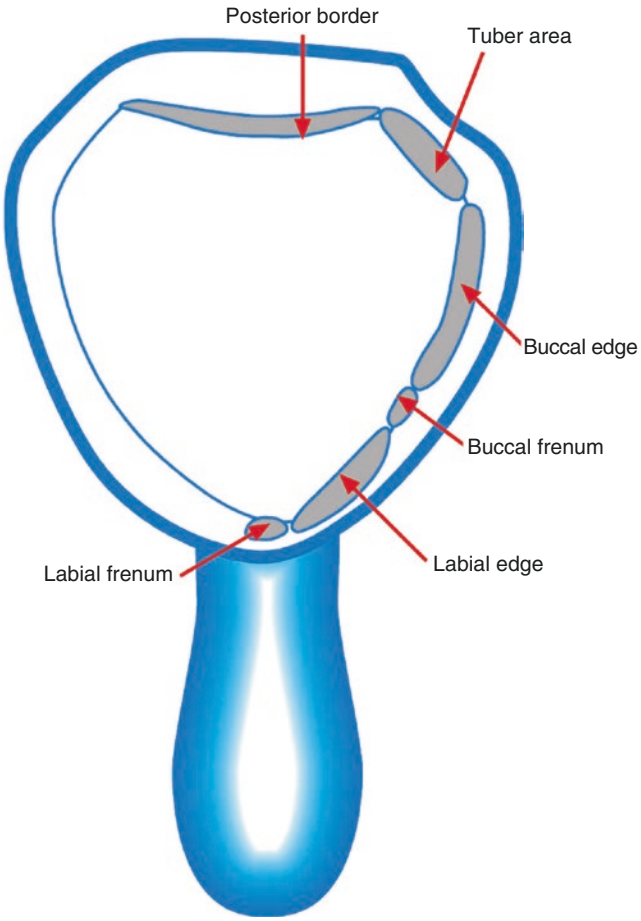


Fig. 5.81 The anatomical landmarks of the maxillary tray

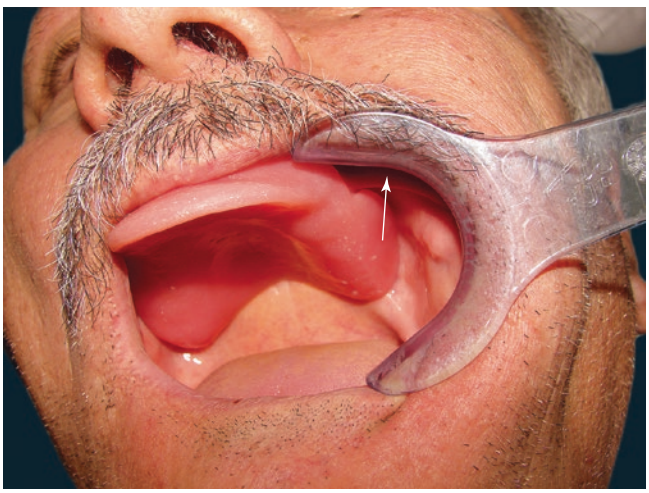


Fig. 5.82 Intraoral view of the retrozygomatic region

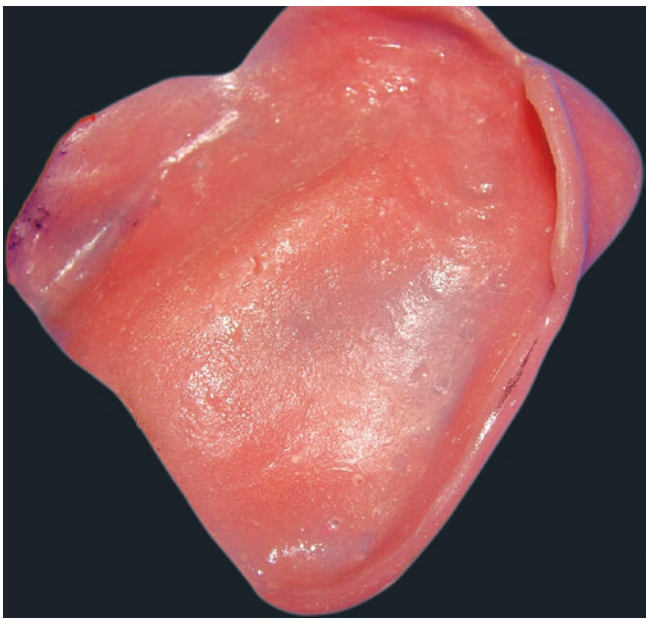


Fig. 5.83 Retrozygomatic region on the tray

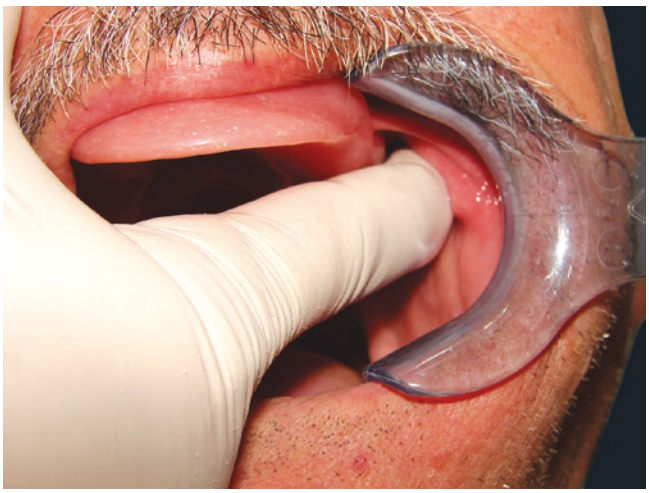


Fig. 5.84 The retrozygomatic region is palpated with the finger

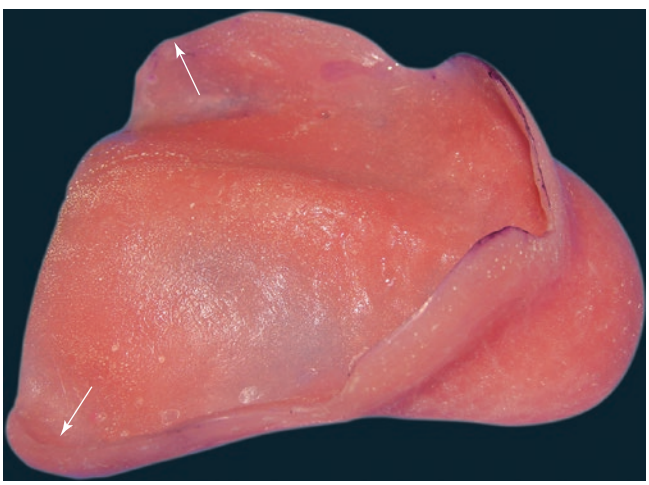


Fig. 5.85 The tuber region of the tray is shortened

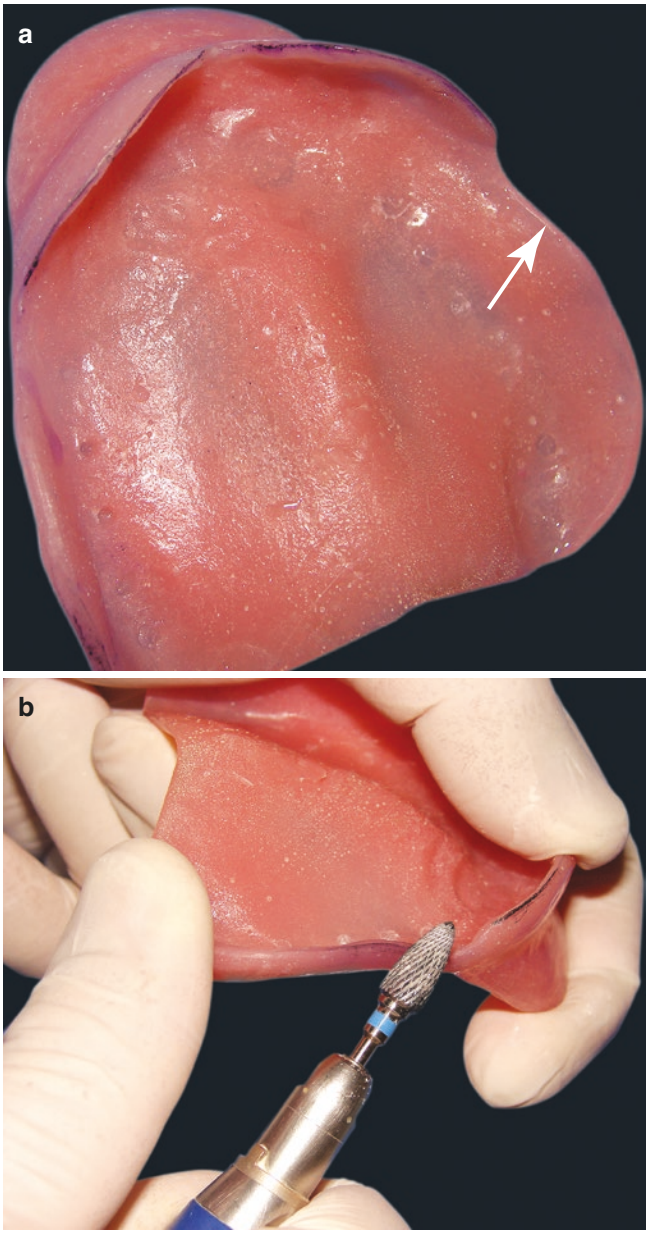


Fig. 5.86 (**a**) The zygomatic area should be narrower than the retrozygomatic region. (**b**) The zygomatic region is shortened

factor is often overlooked in the fabrication of impression trays. Many maxillary impression trays are made with knife-edged borders that do not adequately support the border molding material used. The dentist must place their index finger in the retrozygomatic area and instruct the patient to close (Fig. 5.84). The closing of the mouth will cause the coronoid process to move posteriorly and allow the dentist to feel the extension of the impression tray. The tray should be 1–2 mm shorter than the intended extension.

5.1.4.3 Coronoid Process Area

This area should be trimmed to provide space for the coronoid process as the mandible moves from side to side and opens wide. The area that corresponds to the tuber region should be shortened outward (Fig. 5.85).

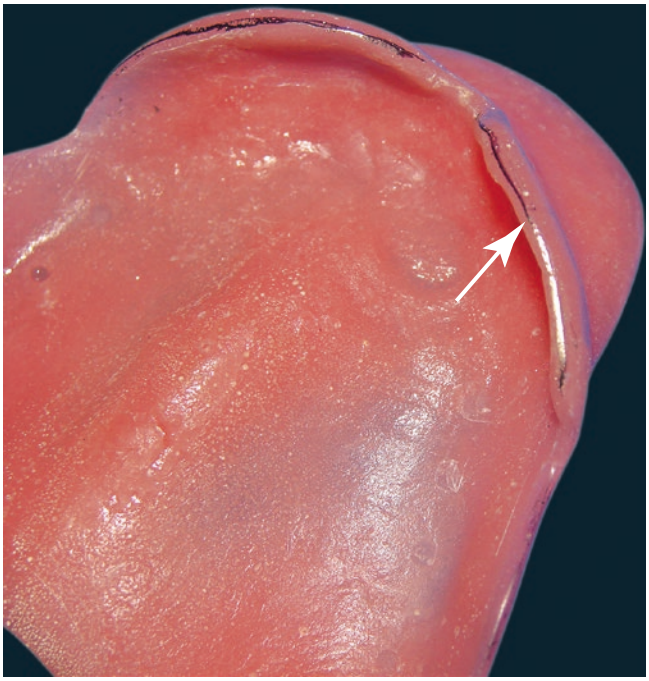


Fig. 5.87 The labial edge should be approximately 2 mm in thickness

5.1.4.4 Zygomatic Region

The custom tray should be trimmed, and the zygomatic part of the tray is made thinner than the retrozygomatic area. The width of the tray becomes progressively thinner proceeding anteriorly up to the buccal frenulum (Fig. 5.86). To determine the appropriate extension, the index finger could be used. The impression tray should be approximately 2–3 mm short of the reflection. In this region, control of the borders can be made by reflecting the cheeks, but the borders of the tray should not prevent the function of the buccal frenum.

5.1.4.5 Labial Flange and Labial Frenum Areas

The impression tray must be thinner than the retrozygomatic and zygomatic areas and should not be a knife-edged form in this area. The border should be rounded with an average thickness of approximately 2 mm (Fig. 5.87). By pulling the lip height of the impression tray, the peripheral sulcus is controlled (Fig. 5.88). The outer surface of the lip and cheeks must be palpated to ensure that there is no overextension. The lip and cheeks should feel flat, as bulky border extensions affect esthetics. The dentist should step back and look at the patient's lips to make certain that the tray does not adversely protrude from the facial tissues. The free action of the labial frenum should be provided by the manipulation of the frenum on functional ways (Fig. 5.89).

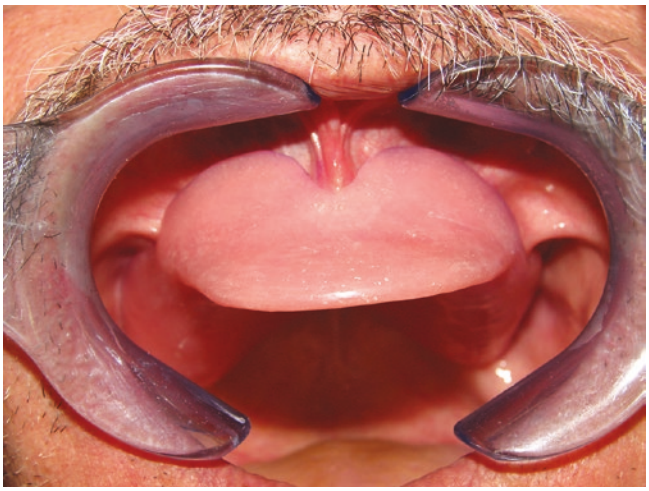


Fig. 5.88 The labial edge is controlled in the mouth

Fig. 5.89 The labial edge is shortened

5.1.4.6 Posterior Palatal Seal Area

The posterior extent of the tray must be trimmed to just reach the vibrating line, the imaginary line indicating the beginning of the motion of the soft palate. The vibrating line is marked between the movable and immovable soft palate using an indelible pencil by asking the patient to say "Ah" in a non-ulgorious manner (Fig. 5.90). The line marked should reach the hamular notch on both sides. It should be controlled by placing the tray in the patient's mouth (Fig. 5.91).

5.1.4.7 Checking the Mandibular Impression Tray

The mandibular denture base plate is divided into ten anatomic areas. The border of the tray must be arranged using these reference points, and the final impression must be completed using the same guidelines (Figs. 5.92, 5.93, and 5.94).

Fig. 5.90 The marking of the vibrating line

Fig. 5.91 The tray is placed in the mouth and the vibrating line is controlled

The retention and stability of the mandibular impression are directly related to the adaptation and quality of the mandibular impression tray. The proper insertion of the tray is extremely important. Due to the undercut of the retromylohyoid area, the tray must first of all be seated a little distally (approximately 6 mm) and then anteriorly to the final position. Also, when the tray is removed from the mouth, initially,

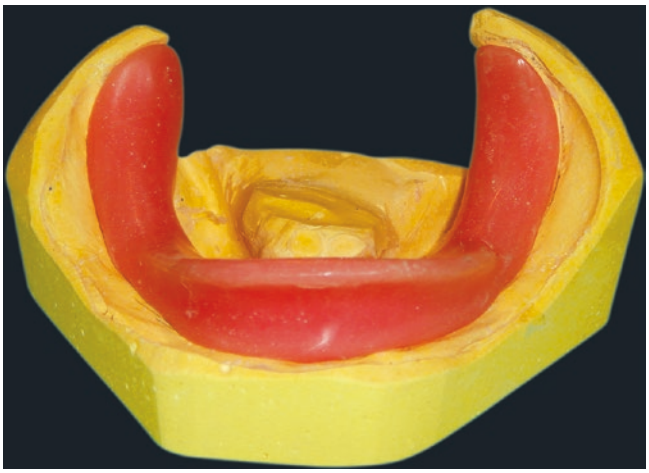


Fig. 5.92 The fabricated mandibular impression tray

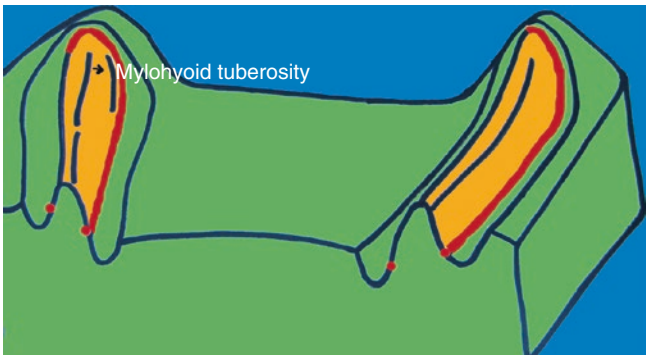


Fig. 5.93 The tray border should reach the deepest region buccally through the residual crest with 1–2 mm distance (red line). The mylohyoid ridge (black arrow) should be covered approximately 1 mm

the tray is pulled up and then pushed back and removed from the mouth. This procedure is important, especially for the border molding and for the final impression, to prevent the distortion of the retromylohyoid area. All parts of the tray are adjusted, respectively, after it is controlled in the mouth.

5.1.4.8 Masseteric Notch and Distal Extension Area

The masseteric notch area will be trimmed to form an appropriate angle to the buccal shelf. The degree of the angle is approximately 45°; however, it can differ from patient to patient. The masseteric notch region of the denture base is angled from the buccal shelf because of the action of the masseter muscle and the bony anatomy of the region. As the masseter muscle contracts, it pulls medially and therefore molds the impression material in that direction. The distobuccal corner between the masseteric notch and the buccal flange should be rounded, and the masseteric notch should be slightly concave. It should not displace the buccal fat pad but allow the pad to assume an undistorted position overlying the masseteric notch of the tray (Fig. 5.95).

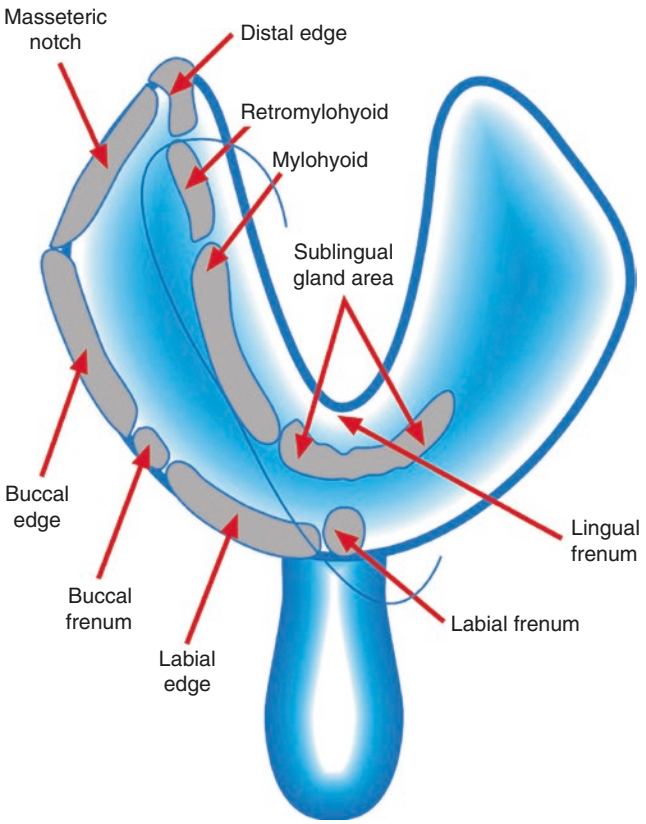


Fig. 5.94 The landmarks of the mandibular tray

Fig. 5.95 The masseteric notch and the distal regions are controlled

The distal extension area of the impression tray is trimmed according to the combination of anatomic and functional factors.

Anatomic factor:

The tray must be adjusted to cover the retromolar pad, which is done visually by locating retromolar pad and marking its distal extent with a marker (Fig. 5.96).

Fig. 5.96 The distal side of the retromolar region is marked

Functional factor:

The patient is instructed to open wide to stretch the pterygomandibular raphe. The raphe often attaches distally to the retromolar pad region. During border molding, the raphe is sometimes registered in the impression material. The distal extension area of the tray should just contact the pterygomandibular raphe when the mouth is partially closed.

5.1.4.9 Buccal Flange and Buccal Frenum

The buccal flange is adjusted to a line parallel to the ridge crest and 2–3 mm short of the external oblique ridge (Fig. 5.97). The external oblique ridge and the edge of the tray are palpated intraorally using the index finger and checked (Fig. 5.98). The external oblique ridge and the tray border must be felt. Also, extraoral palpation of the cheek must be used to ensure that the tray is not overextended in this region. The tissue of the cheek should drape to the outer surface of the impression tray. The buccal frenulum area must be adjusted until there is no interference when the frenulum is manually manipulated within the range of normal function.

Fig. 5.97 Buccal border should be parallel to the alveolar crest and should be 2–3 mm shorter than the external oblique ridge

5.1.4.10 Labial Flange and Labial Frenum

The labial flange of the tray is adjusted until there is no muscle or tissue interference and until the tray is about 2 mm short of the tissue flexion line when the lip is gently reflected horizontally. Pulling the lip up or down can provide a false indication of the appropriate position of the vestibule in relation to the denture border. Palpation of the lip is needed to feel overextensions. The labial frenulum must be adjusted until there is no interference when the frenulum is manually manipulated in any functional direction (Fig. 5.99).

Fig. 5.98 The external oblique ridge is palpated

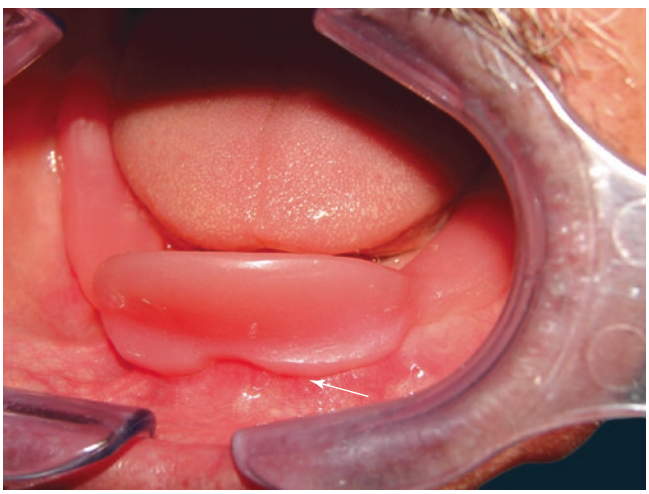


Fig. 5.99 The labial borders are controlled

5.1.4.11 Lingual Borders

Pressure indicating paste is a practical method for identifying the lingual borderlines. The paste, 2 mm in thickness, is applied to the lingual surface of the tray with a spatula (Fig. 5.100). Owing to the consistency of the paste, the tray is put in place and removed from the mouth without distortion. When the tray is in the mouth, the patient is advised to make some movements, such as closing the mouth, swallowing, slightly opening, and sweeping the lips. The lingual borderlines will appear on the tray, and the tray will be ready for trimming. If the indicating paste forms a wide shape, indicating that the borderlines are prepared shorter, the dentist must reshape this area with the impression compound material.

5.1.4.12 Retromylohyoid and Mylohyoid Areas

The patient is instructed to protrude his/her tongue as far as possible, while the dentist holds the tray in position (Fig. 5.101). The retromylohyoid area must be adjusted until the dislodging forces will be less than the mylohyoid region. To feel the tension on the floor of the mouth, the index finger is placed into this region (Fig. 5.102). This area can also be controlled with a mirror (Fig. 5.103). The retromylohyoid area should be thin and contoured to allow for free tongue movement.

The outer surface of the tray should be concave to allow the tongue at rest to stabilize the tray during the impression procedure. Further trimming of the lingual border of the tray may be necessary after the compound has been added during the border molding procedures. In this region, overextended

Fig. 5.100 The pressure indicating paste is applied to the lingual region

Fig. 5.102 The mylohyoid ridge is palpated

Fig. 5.101 The retromylohyoid and mylohyoid region are controlled with the help of the patient's tongue

Fig. 5.103 The mylohyoid region is controlled with a mirror

Fig. 5.104 The patient's tongue is placed over the tray handle, and the incisal edges of the anterior teeth is evaluated

areas of the tray can usually be visualized through the compound.

5.1.4.13 Sublingual Fold Space and Lingual Frenum

The patient is instructed to place the tip of his/her tongue against the tray handle, which represents the position of the incisal edges of the anterior teeth (Fig. 5.104).

While the tongue is in this position, the tray is adjusted until it is about 1 mm from the floor of the mouth. The lingual frenulum area is checked with a mirror, while the patient is asked to protrude his/her tongue directly forward and side to side. The tray is adjusted to allow adequate freedom for tongue movement.

5.1.5 The Border Molding Procedures: Materials and Techniques

The border molding procedure is an important step for the impression. The border molding materials must have specific properties, in order to ensure:

1. There is enough volume to be stable on the tray.
2. It is not adhered to the finger before the molding procedure.
3. The setting time should be 3–5 min.
4. It is not flowable during the insertion of the tray into the mouth.
5. Following insertion of the tray extra material can be added to missing areas with the finger.
6. Not cause the displacement of the vestibule area tissues.
7. Any excess material can be removed easily and the border molded again.
8. There is enough stability when the setting time is over.
9. It is easy to apply.

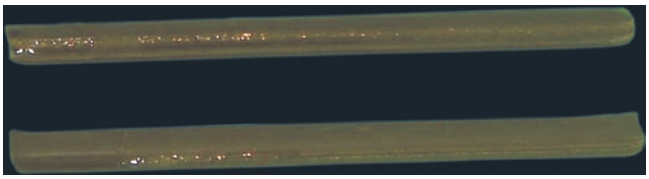


Fig. 5.105 Kerr compound

5.1.5.1 Materials

Many materials are used for border molding; however, they are usually:

1. Impression compound
2. Autopolymerizing acrylic resin
3. Elastomeric materials and metallic pastes
4. Impression waxes

All the impression compound materials were introduced by Green's brother and used by Fournet and Tuller. Boucher, Tench, and Kile, as well as other clinicians, used impression compound for border molding procedures. There are several advantages with this material: it can be softened easily; however, it is rigid in the mouth and also at room temperature. Due to these properties, the impression compound material can be used in the tray portion by portion. These properties are also advantageous when taking final impression, boxing the impression, and making the master model. Due to these advantages, they have extensive uses, especially for the education of students. Their working time and stabilities can be adjusted using different materials.

Impression compound (Kerr Restorative) is manufactured in five different colors: brown, green, gray, white, and black. The brown impression compound's conditioning temperature is 55.5–56.1 °C. It is rigid at room temperature, and it is suitable for extending the short borders of the tray. Sheet formed impression compound is usually used for taking the impression. The green impression compound's conditioning temperature is 50.0–51.5 °C. It is flowable, easy to use, and suitable for the molding procedure (Fig. 5.105).The gray compound's conditioning temperature is 53.3–54.4 °C, it is more flowable than the green one, and its viscosity is much greater than that of the green compound. It is simple to use, and it is not brittle when it is in rigid form. The white (55.5–56.6 °C) and the black (56.1–57.2 °C) impression compound materials are flowable at high temperatures, and the sheets are usually used to take the primary impression. Impression compound material has a high working temperature; therefore, the dentist should take care not to injure the patient. The late insertion of the tray and the time taken for the impression compound's temperature to decrease result in the borders becoming longer. As the working time with this material is limited, a manipulating capability is necessary

to form the borders of the impression tray. Impression compound is placed on the tray in small pieces; however, according to the dentist's skill, larger pieces can be used.

Isofunctional (compound) (GC, America) is a synthetic resin for muscle trimming and rebasing and for impression of missing portions of dentures. Isofunctional plastic impression compound is useful, due to easy softening and much more working time. It is softer than the impression compound at room temperature, but it is more rigid than Adaptol. There is a range of impression compound materials manufactured by various manufacturers; the dentist should select the most suitable materials.

Rimseal (Keystone, USA) Acrylic Peripheral Impression Material is the first material for the border molding procedure. Rimseal extends to the proper peripheral height without slumping. This soft material records peripheral detail without distortion and sets to become a rigid part of the tray. The mixed material is yellow, providing a distinct contrasting color from impression materials. This no-burn, no-sting formula will ensure patient acceptance. The polymer and monomer are mixed in accordance with the manufacturer's recommendation. When the setting time is realized, the material is placed on the border of the tray. The dentist can make the functional movements and manual manipulation for border molding. It is difficult to make the mandibular border molding in one step. Therefore, labia-buccal surfaces should be melded first; then continue with the lingual surfaces. As monomer is harmful to patients, the ingredients of Rimseal have changed and modified, but this procedure has changed the physical properties of the material.

There are many resin materials for the border molding procedure but some of them cause the patient irritation. Smell, degree of chemical irritation, and heat are the disadvantages of resin border molding materials. They must be removed from the mouth before the working time is over due to the polymerization temperature. Furthermore, it is difficult to remove it from the mouth if the material has set on the undercuts areas. Removing the material before the working time is over will deform the border molding procedure. For substandard areas, the materials will have to be mixed again.

Denturlyne and Reprodent are softened resins that are premixed and used for the denture border procedure. In a few hours, the material will be polymerized in a semirigid stage. This property provides functional and physiological borders as much as the conventional method. If needed, the additional border mold will be made with impression compound or with other materials, and the master impression is taken with semi-viscosity material. This procedure should be used for relining, rebasing, or making new denture's impressions.

Premixed resins have fewer irritant materials and are easy to use. The problem is that the viscosity of the material changes with each package. It is difficult to maintain the original viscosity of the material and the major problem for this material that the old denture borders should be regular for usage of it because this material should not be elongated of 4–6 mm to the vestibule area. If the border of the denture is not in correct place, the materials will not form the borders correctly too. Old denture's borders should be corrected with a Rimseal of Flexacryl if they are too short and irregular. However, this process is not easy, and it is unnecessary to make too much adjustment in the old denture.

An autopolymerizing resin should be modified to change the setting time and also the final viscosity. This modification helps to develop the manufacturing of tissue conditioners.

Tissue conditioners should be used to condition the mucosa, the functional border of the denture, and take the mucodynamic impression. And also, they are usually used for the temporary denture base material (Hydrocast). When this material reaches the gel-like form (approximately 10 min), it undergoes a degree of plastic flow inversely proportional to the time their viscosity will decrease over time; however, the material always keeps its resilient form. Some material can be added when the mucosa becomes healthier to shape the border of the denture and to obtain an equal thickness of the material. Tissue conditioner is effective when used with the right indications; however, the patient must retain his/her old denture. If there are some mistakes as a result of the old denture such as a shorter border or some other issue, the tissue conditioner material cannot be used properly. This mucodynamic material is effective during daily activity, which is an advantage, not only for the clinician but also for the patient.

Metallic pastes and elastomeric materials are manufactured in light, medium, and hard viscosities. Hard ones are used for the molding procedures because their viscosity and their working time are suitable for the handling of the border molding procedure. The longer part of the tray can be seen after applying these materials. Also, the shorter part of the tray can be corrected. The final impression is taken with a lightbody impression material. Metallic oxide like zinc oxide eugenol paste can be used for border molding the tray. Equal quantities of the material are dispensed on the paper pad from both the tubes of base and catalyst and mixed following by rolling the material into a rope shape and applying on the borders of the tray for recording the tissues in the functional condition. The main limitation of the material is that zinc oxide eugenol can be irritating to the patient and once set is hard enough and can't be retracted from the undercuts. Utmost care is required to get the proper body DETAX which presents a new, addition curing special silicone, specifically developed for functional impressions and functional margin forming. The material is characterized by its particularly smooth initial consistency and outstanding malleability and safe and easy dosage and handling due to the convenient measuring syringes.

Detaseal function (DETAX) is an addition curing special silicone, specifically developed for functional impressions and functional margin forming. The material is characterized by its particularly smooth initial consistency and outstanding malleability and safe and easy dosage and handling

due to the convenient measuring syringes. The prolonged setting time in the mouth guarantees that the different muscular functions can be reproduced reliably; prostheses obtain the secure and solid seat in all functions and thus more security for patients. The components' color contrast system (base red, catalyst yellow) enables visual check of dosing and mixing.

Impression waxes can also be used to record the borders of the tray. One of the oldest impression materials, wax, is used in different forms and techniques. They were used as impression materials in the stock tray of the nineteenth century and earlier; however, it was abandoned after it was understood that usage of this material caused mucosa irritations because of its pressure. A more advanced wax is now manufactured (Adaptol). Adaptol is a suitable material, and the border molding procedure can be implemented in one step. The consistency of wax can be prepared by changing the temperature of the water. Wax can be shaped easily without insertion into the mouth. There are no problems regarding the working time, as the fluency of the wax continues at mouth temperature. Moreover, the material can be softened repeatedly with hot water. The wax is shaped easily when it is hot and cuts easily when it is in rigid form. It is easy to add material. The smell of the wax is less, and it does not cause chemical irritation. It does not cause tissue damage when it is used at the optimum temperature (48.9 °C). Wax has nearly all the qualities required for a good border molding material, but the limitations are it becomes hard once set so it can't be removed from undercuts. Wax is sticky, so petroleum jelly must be applied on the operator hands and patients mouth. Wax also does not have enough strength and is brittle and may flake once chilled. It is easily distorted and the dentist needs to take extra care while using this material. Also, the adaptation time can be long for the dentist. A constant temperature water bath can be used. The heated material is inserted into the mouth, and the patient is advised to make functional movements so as not to shape longer borders. After removing the wax from the mouth, it should be immersed in cold water to harden. Extreme care must also be taken while removing it, so as not to cause distortion of the material. Undercuts cause the distortion of the materials. The wax needs to be cooled to cut the excessive materials. Cold wax is brittle, and it does not have enough resistance to elongate the shorter border at the maxillary posterior and mandibular lingual areas (6 mm and over).

As the wax is slightly sticky, Vaseline should be applied to the patient's face and the dentist's finger. As it is not a stable material, the master model should be prepared at the dental clinic.

5.1.5.2 Techniques

Most dental faculties prefer to teach the proven, successful, and reliable techniques; however, methods that require less time and effort can also be chosen. To elongate the shorter borders, the dentist must be familiar with the impression compound.

Fig. 5.106 Isofunctional plastic impression material

Fig. 5.107 Impression compound's application to the retrozygomatic region

Impression compound, isofunctional streaks, and elastomeric impression materials will be explained in this chapter. Satisfactory results can be obtained with any of these materials. The disadvantages of these materials are more important than their use. New materials are constantly being manufactured. They can be tried but their use may cause money and time loss.

Border Molding Procedures with Impression Compound and Isofunctional Materials

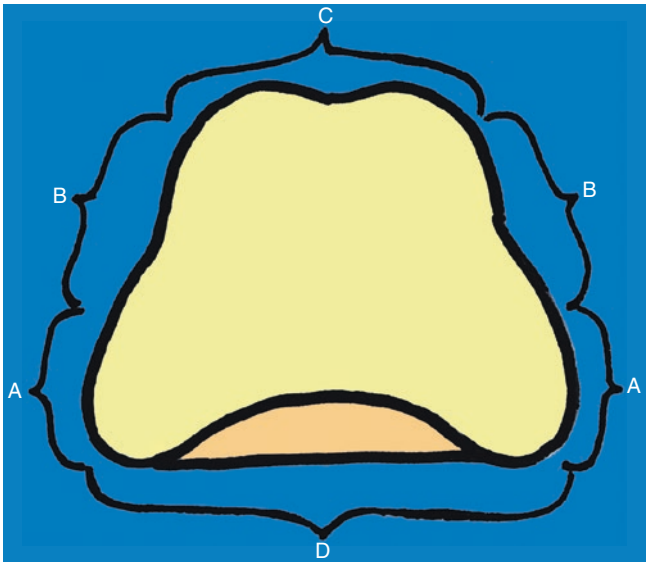


Fig. 5.108 The order of border molding in the maxilla

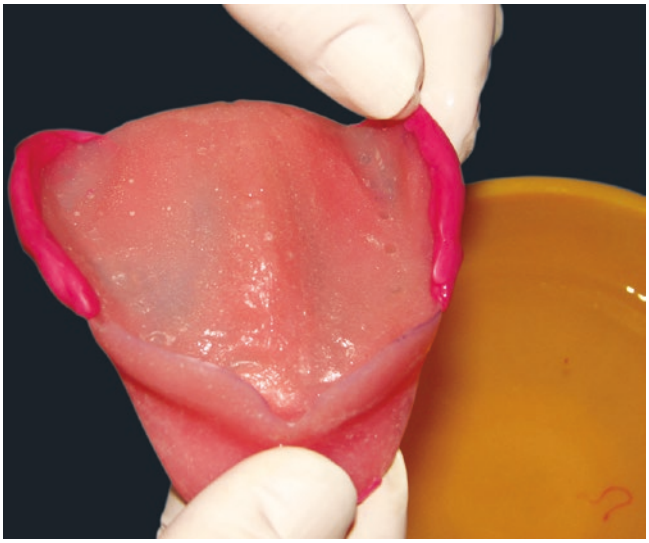


Fig. 5.110 The impression compound is formed with the finger

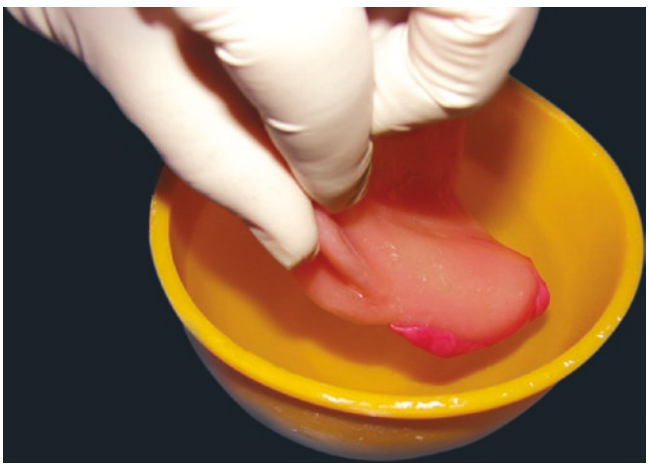


Fig. 5.109 The impression compound is softened in hot water

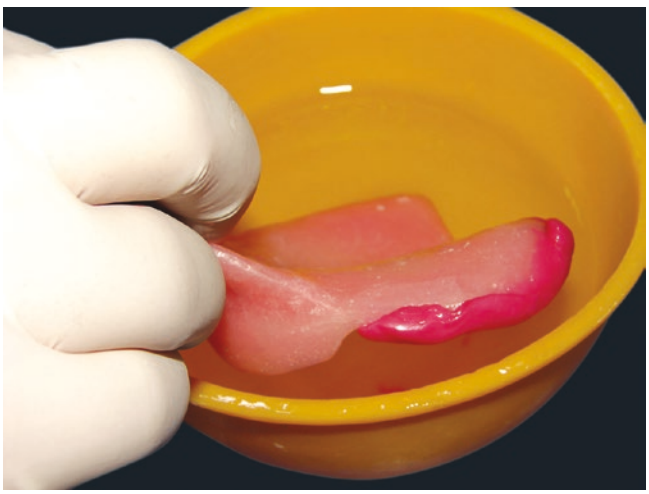


Fig. 5.111 The impression compound is hardened in cold water

The procedures are the same for these two materials; however, the softening temperature is different. Impression compound is softened (green) at 50.0–51.5 °C, while isofunctional impression material is softened at lower temperatures (Figs. 5.106 and 5.107).

The maxillary border molding procedure is shown in Fig. 5.18.

Figures 5.35, 5.36, 5.37, 5.38, 5.39, 5.40, 5.41, 5.42, 5.43, 5.44, 5.45, 5.46, and 5.47 show maxillary border molding procedures with isofunctional impression material. Border molding materials are written as an impression compound (Fig. 5.108).

Retrozygomatic and Coronoid Process Area

The tray is dried and the compound is softened and applied to the retrozygomatic areas. The impression compound is immersed in hot water again (Fig. 5.109), shaped with the finger (Fig. 5.110), hardened in cold water (Fig. 5.111) and dried (Fig. 5.112), and softened over a

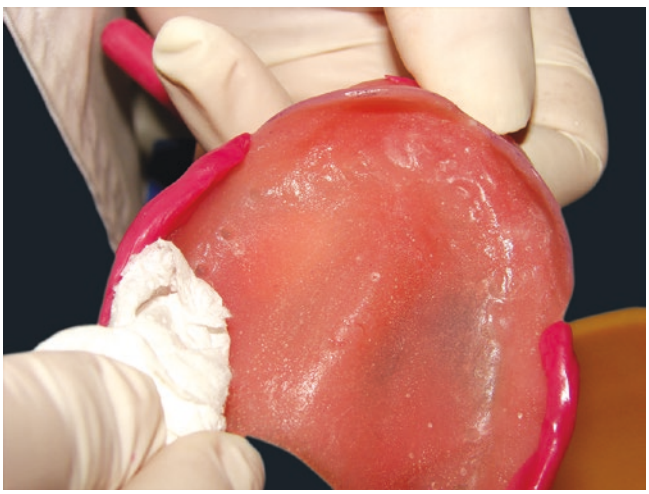


Fig. 5.112 The impression compound is dried

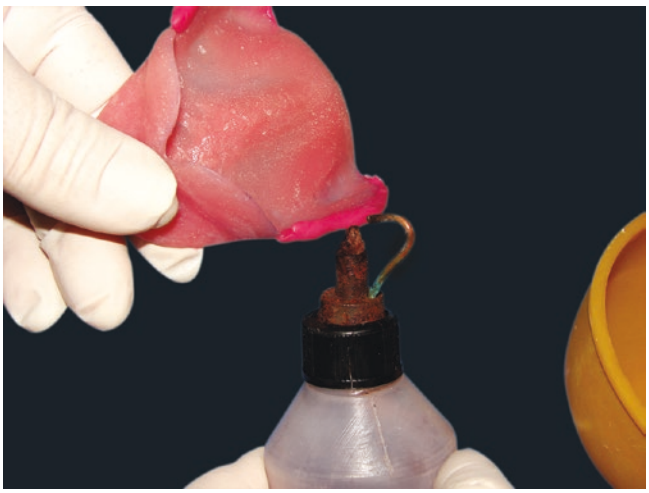


Fig. 5.113 The impression compound is reheated

Fig. 5.114 Manipulation of the cheeks of the patient

Bunsen burner and again with hot water (Fig. 5.113). The tray is inserted into the patient's mouth. The cheek of the patients is manipulated manually in the anteroposterior direction (Fig. 5.114). The index finger is used to push the warmed compound up into the retrozygomatic areas before functioning the patient. For retention, it is important to adequately extend the impression material in this area. The tray is removed from the mouth and immersed in cold water. The Bunsen flame is used to heat the coronoid process area on both sides and inserted again into the mouth.

The patient is instructed to close and to move his/her mandible from side to side and then immediately asked to open wide. The side-to-side motion records the activity of the coronoid process in a closed position; whereas, opening causes the coronoid process to sweep the posterior of the denture periphery (Figs. 5.115 and 5.116). It is sometimes necessary to reheat and reactivate this area several times to record the effect of the coronoid process (Table 5.2).

Fig. 5.115 The mouth is moved from left to right when it is slightly closed and it is suddenly opened widely

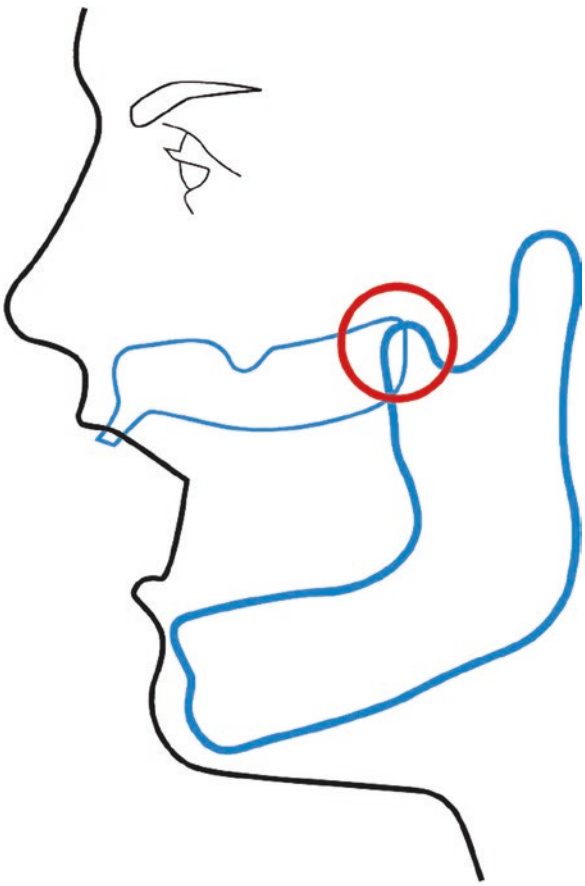


Fig. 5.116 The coronoid process will be contoured with the impression compound when the mouth is widely open

Zygomatic Areas and Buccal Frenum

Table 5.2 Retrozygomatic and coronoid process areas

Anatomic region	Mobile tissues	How to activate?	What brings activation?
Retrozygomatic area	Buccinator muscle and overlying mucosa	When patient's mouth is slightly opened, softened impression compound is pressed on the retrozygomatic area. The cheek is moved anteroposteriorly and downward. The patient is asked to apply force in the opposite direction of the finger pressure	Provides molding of the impression compound. Buccinator muscle is activated, and overlying mucosa is moved. Masseter muscle contracts over the impression compound
Coronoid process area	Coronoid process, temporal muscle fibers attached to coronoid process	Mouth is opened too wide and then closed, and the patient is asked to move the jaw to the opposite direction	Coronoid process and related temporal muscle fibers are activated over the impression compound

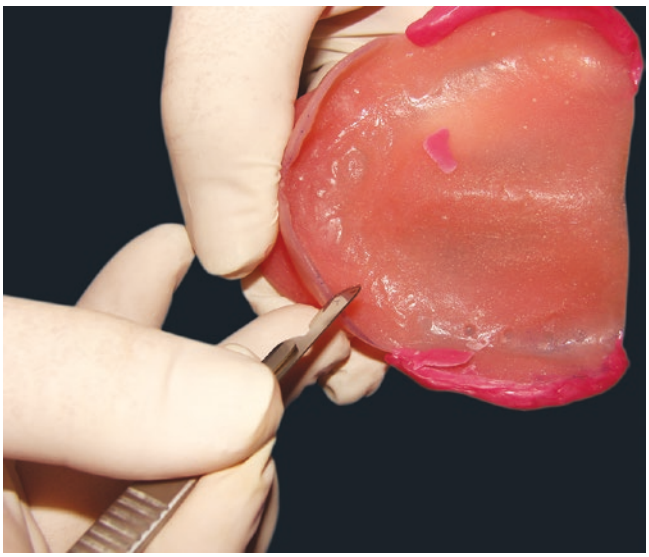


Fig. 5.117 The impression compound is controlled

The impression compound is heated over the Bunsen flame and softened in the zygomatic area bilaterally, shaped lightly, and reinserted to the mouth. The patient's cheeks can be manually manipulated, or the patient is told to suck the dentist's finger. Afterward the tray is removed from the patient's mouth and immersed in cold water. The buccal frenulum area is heated on one side and reinserted to the mouth. Dentists manipulate the cheeks and the frenum manually first downward into the compound and, then, in an anteroposterior direction, before removing the impression and immersing it in cold water; then, heat is applied to the opposite side for the same activity (Figs. 5.113, 5.114, and 5.117; Table 5.3).

Labial Flange and Labial Frenum Area

The labial flange of the impression tray area is heated bilaterally (Fig. 5.118), and the tray is inserted in the patient's mouth (Fig. 5.119).

Table 5.3 Zygomatic and buccal frenum areas

Anatomic region	Mobile tissues	How to activate?	What brings activation?
Zygomatic area or buccal flange	Muscles that maintain facial expression, buccal frenum, buccinator muscle, and zygomatic maxillar crest	Patient's cheeks were pulled on both sides. The patient is asked to move his/her jaw on both sides for molding of the impression compound by the coronoid process	The movement of buccinator muscle and related soft tissues are stimulated. The movement of the lips provides the contraction of the buccinator muscle, and esthetic form of the lips and the cheeks occurs by this way
			It helps to determine the borders. The esthetic form of the lips and cheeks is improved
Buccal frenum	Buccal frenum and tissue fibers that are attached to it and facial expression muscles (caninus and orbicularis oris muscles that affects the frenum movement)	Buccal frenum is pulled	Connective tissue fibers of the frenum are activated and muscles that affect facial expression (caninus and orbicularis oris muscles) are functioned

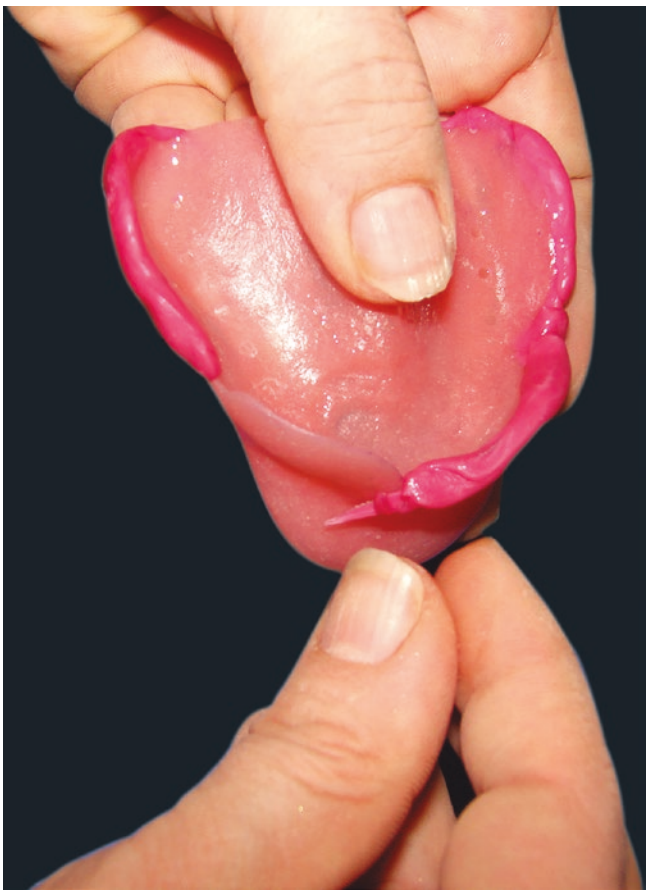


Fig. 5.118 The impression compound is placed on the labial borders

Fig. 5.119 The impression compound is manipulated in the mouth

The lip of the patient is moved manually to a side-to-side direction while simultaneously applying finger pressure to control the width of the border. The patient is instructed to purse and smile. The upper lip should not be pulled downward. This movement causes a shorter denture flange. Once

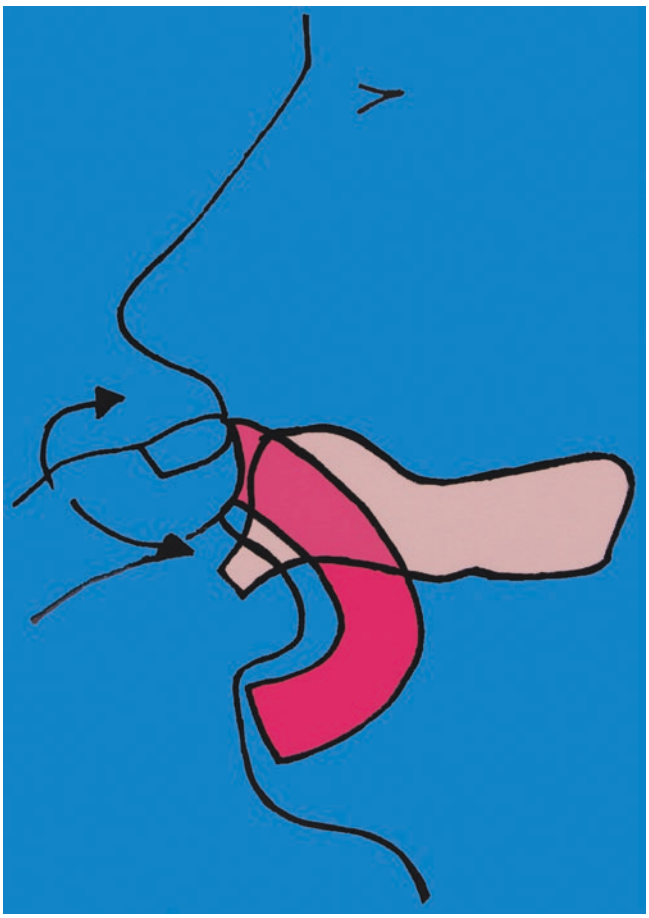


Fig. 5.120 The activation is performed with the manipulation of the lips and the orbicularis oris muscle

removed, the impression tray is immersed in cold water. The labial frenulum area is heated, softened, and replaced in the patient mouth again. The upper lip of the patent is lifted, and the frenulum is placed vertically into the softened compound, and the frenulum is activated side to side (Fig. 5.120).

Manual pressure should be used to mold the compound. Esthetics plays a dominant role in this border. The compound could be added or removed as necessary to achieve the desired facial support. The excess material should be removed with a scalpel. This procedure is simple for the isofunctional impression material (Fig. 5.121 and Table 5.4).

Posterior Palatal Seal Area

The posterior palatal seal area is the most critical area of the maxillary denture to obtain retention. For the retention of the maxillary denture, the posterior band of the denture should be in positive contact with the mucosa. The posterior palatal seal should be obtained during the border molding procedure. The distal extension of the maxillary denture is obtained with locating the palatal foveas and pterygomaxillary notches (hamular notches). The palatal foveas are located near the soft and hard palate. The exact location of

Fig. 5.121 The excess material is trimmed away

Table 5.4 Labial borders and labial frenum

Anatomic region	Mobile tissues	How to activate?	What brings activation?
Labial border	Orbicularis oris	The patient's lips are moved anteriorly and posteriorly. For maintaining the marginal width, pressure is applied	Border seal is provided on the immobile tissues by manipulating the lips and the related muscles
	Quadratus labii inferioris (superior incisive muscles)		
	Risorius	The patient is asked to lick his/her lip in the area where the impression compound is heated	The pressure applied helps to control the esthetic form of peripheral border. It moves the orbicularis oris muscle
		Esthetic examinations are made	For esthetic purposes, impression compound can be added or removed
Labial frenum	Labial frenum	The upper lip is moved vertically, frenum is placed over the impression compound and under the pressure applied for the border width control, lip is moved, and molding is provided	By placing the frenum over the impression compound, molding during function is provided. Pressure both provides seal and esthetics

Fig. 5.122 The vibrating line

the posterior palatal seal area is the vibrating line (Fig. 5.122). Usually, the vibrating line is seen clearly and is located further forward in the palate of the patient. The vibrating line of patients with a flat palate is wider, slightly significant, and more posterior. The impression compound applied from one hamular notch to the other hamular notch is heated (Fig. 5.123) and inserted into the patient's mouth. The patient is instructed to open his/her mouth and to protrude his/her mandible (Fig. 5.124). After removal from the mouth, the impression compound is dried. The vibration line should be located by having the patient say "Ah" and marked with a disposable marker. The tray is inserted into the patient's mouth to determine the location of the posterior extension. If the impression is too short posteriorly, the ink mark will be visible (Fig. 5.125). Compound should be added or removed to finalize the posterior extension.

If a favorable prognosis is made initially, the impression should have good retention and stability. Additional retention could be achieved by adding a second layer of compound to the posterior palatal seal area (Table 5.5). The border molding material width should be approximately 2–4 mm.

Common border molding errors in maxillary dentures are reported below:

Fig. 5.123 The impression compound is applied in the posterior region

Fig. 5.124 The tray is placed in the patient's mouth

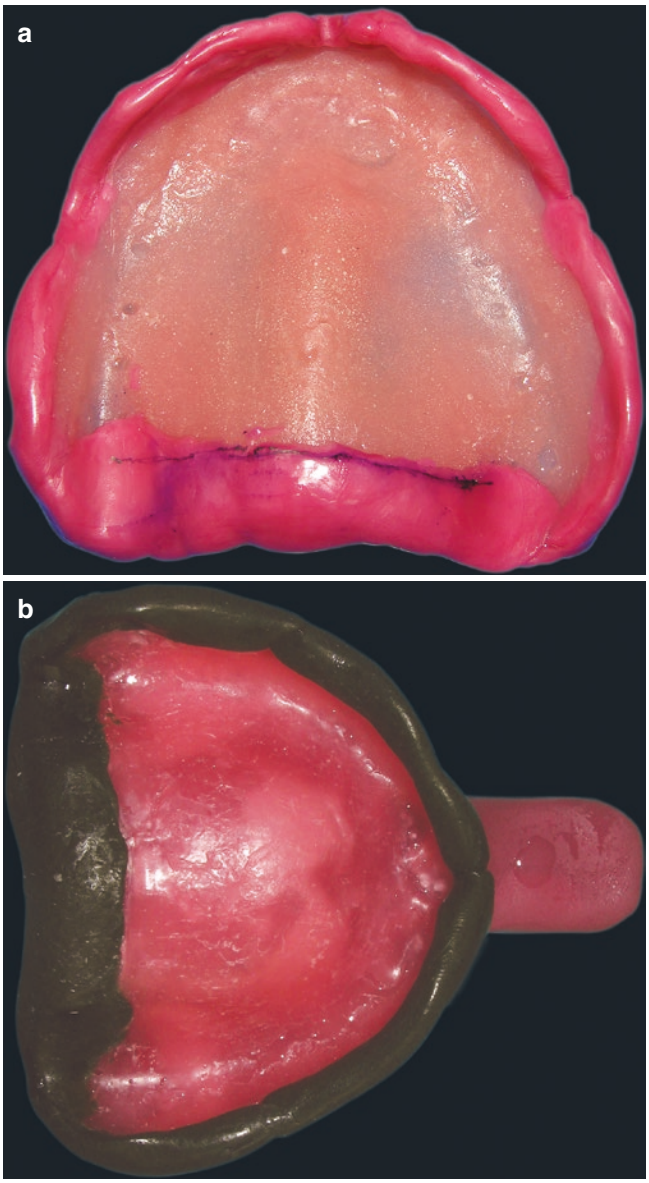


Fig. 5.125 (**a**, **b**) The maxillary tray with border molding. (**a**) Isofunctional and (**b**) impression compound

Table 5.5 Posterior palatal seal area

Anatomic region	Mobile tissues	How to activate?	What brings activation?
Posterior palatal seal area	Pterygomaxillary raphe, pterygoid hamulus and hamular notch, palatopharyngeus muscle, palatoglossus muscle, tensor veli palatini muscle, levator veli palatini muscle	The patient is asked to open his/her mouth widely	Pterygomaxillary raphe tightens
		After closing the nostrils of the patient, he/she is asked to breathe out of his/her nose	By the contraction of tensor veli palatini muscle, the soft palate is placed on the impression compound, and the border between soft and hard palate becomes visible
		Impression compound is added to the border, and the patient is asked to swallow	By the minimal pressure of the tensor veli palatini, upward movement of the posterior palatal tissues is provided

1. If the borders are not being extended to the functional area for support and retention, usually over- or underextended areas in height and/or width are obtained. The purpose of a functionally bordered molded and properly extended denture base is to create a denture that is physiologically and esthetically adapted to the tissues in function and at rest. When a person speaks, chews, swallows, yawns, whistles, wets his/her lips, or opens and closes his/her mouth, the peripheral border tissue moves. The tissues are changing their shape, location, and tension. Thus, if an impression is not functionally adapted or adequately extended, the denture will lack stability and/or retention.
2. The functional movements of the coronoid process can cause the denture to be dislodged or cause soreness if the borders are overextended.
3. Overextended or underextended areas can cause the maxilla to appear unesthetic because of too much or too little bulkiness of the denture base material in the labial region. Too much bulkiness can also be uncomfortable for the patient.
4. A properly extended denture base extends the denture over a large area to increase the surface area of support and thus increases both stability and retention.

   Appropriately extended denture borders have varying thicknesses. Many dentures have thin, knife-edged borders throughout. An arbitrary determined denture border can be discernible to the tongue or peripheral tissue areas and therefore can result in the patient's discomfort. A functionally molded or properly extended border makes the peripheries of a denture blend well with oral tissues. The proper extension and contour of the posterior palatal seal area of the maxillary denture base are important for this region. Otherwise, food and saliva can easily become trapped under the denture, leading to discomfort and the possible dislodgement of the denture.
5. The area of frenum attachment is often either under- or overextended. Overextended frenulum areas are a common cause of soreness. Over relief of a frenulum area can decrease retention.

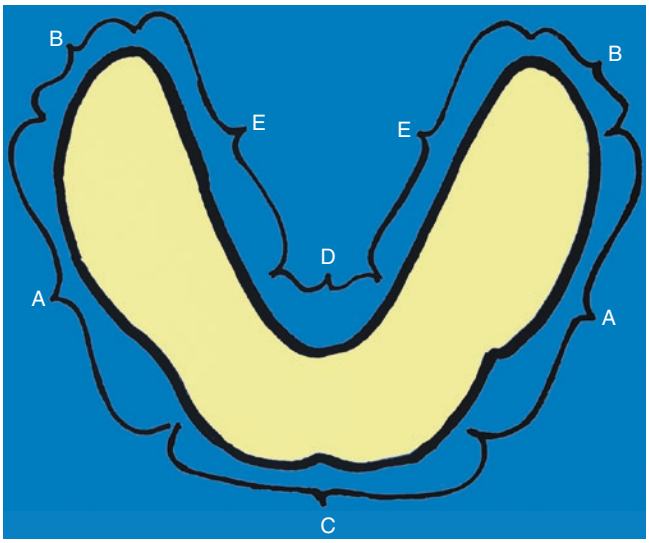


Fig. 5.126 The order of the mandibular border molding is as shown

Mandibular border molding procedures are shown in Fig. 5.126.

Masseteric Notch and Distal Extension Areas

The impression compound is dried and heated at the masseteric notch and distal extension areas bilaterally (Figs. 5.127 and 5.128). The tray is inserted to the mouth. The patient is instructed to open wide and then close on the tray handle or against the resisting force of dentist's finger (Fig. 5.129). Opening wide activates the muscles of the pterygomandibular raphe by stretching. This stretching impresses the raphe against the compound and defines the most distal extension of the impression. It is important to mold this area to cover the retromolar pad and to end the impression on the displaceable tissue distal to it (Fig. 5.130). This allows the denture to cover the maximum amount of bearing area.

The patient is instructed to close against dentist's fingers on the tray handle. This function causes the masseter muscle to contract and push against the medially situated buccinator muscle and adjacent soft tissues and softened compound (Fig. 5.131).

Fig. 5.127 The application of the impression compound on the masseteric notch and the distal region

Fig. 5.128 Impression compound is softened

Fig. 5.129 The tray is placed in the patient's mouth and shaped

Fig. 5.130 The impression compound is formed on the retromolar pad

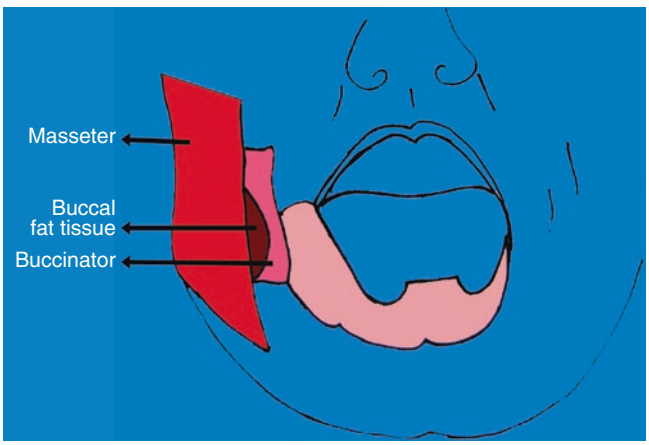


Fig. 5.131 The tissues that effect the denture base in the masseteric region

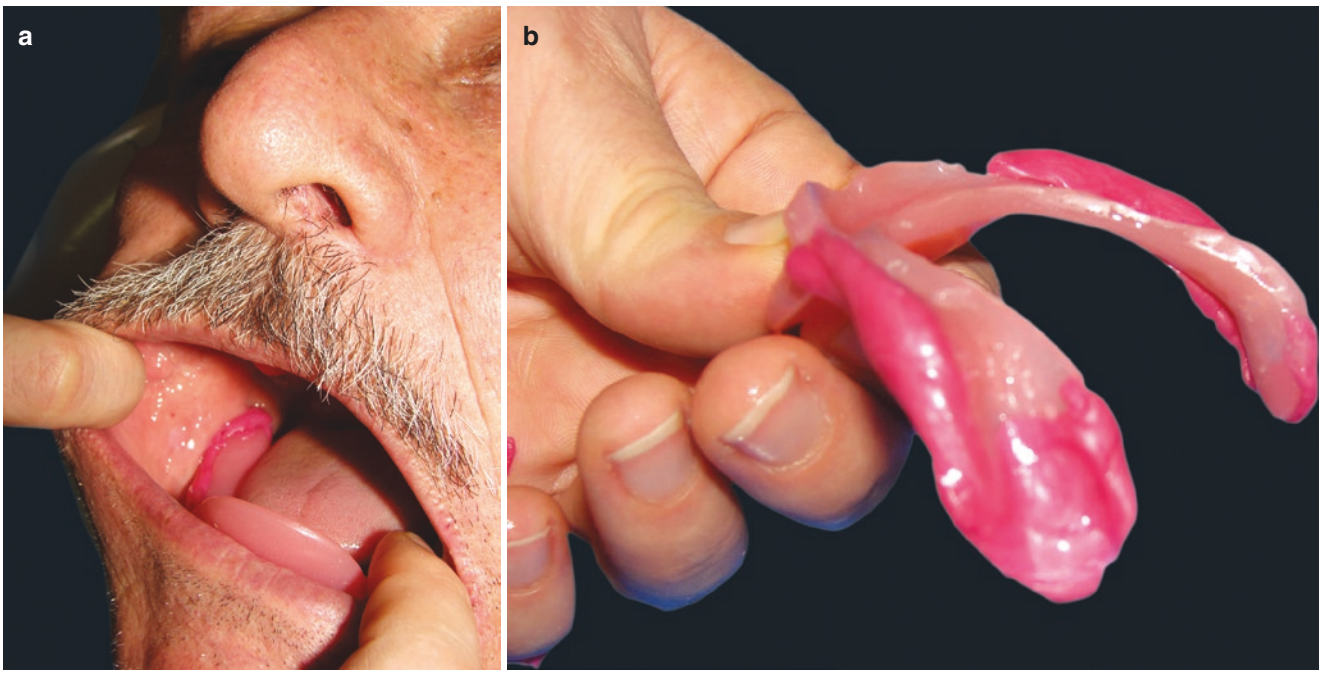


Fig. 5.132 (**a**) The borders of the buccal fat pad is shaped and (**b**) impression compound

Table 5.6 Masseteric notch and distal extension areas

Anatomic region	Tissues affecting the borders	Activation	Result of activation
Masseteric notch	Masseter muscle, buccinator muscle, buccal fat tissue	The patient closing his/her mouth toward the dentist's fingers and tray handle	Masseter muscle is contracted toward the buccinator muscle
		The buccal fat tissue is manipulated for the overextended impression compound to overflow	Buccal fat tissue is located over the outer peripheral border and provides the stabilization of the denture and the seal
Distal extension area	Pterygomandibular raphe, retromolar pad	The patient is asked to open his/her mouth widely	Pterygomandibular raphe is extended by determining the most distal extension of the impression
			The denture base covers maximum tissue, and tissue seal is provided

The compound is heated in the masseteric notch area on one side, and then the tray is inserted. The tray is held with one hand, while the other hand draws the cheek up and brings excess compound onto the outer tray surface. This action manually manipulates the buccal fat pad onto and over the outer border (Fig. 5.132).

This permits the fat pad tissues to rest upon the outer surface of the denture border, which helps stabilize and seal the denture. This procedure is repeated for the other side. The excess compound is removed (Table 5.6).

Buccal Flange and Buccal Frenum Areas

The buccal flange area is heated bilaterally, and the compound is heated and inserted into the patient's mouth. The tray is held in position with one hand, and the compound is held by massaging the cheek in an anteroposterior direction using moderate manual pressure against the compound. This moves the fibers of the buccinator muscle and the tissues of the cheek in the direction of the functional action. The cheeks contour should not disturb the flange extension in the mouth, and the tissues of the cheeks rest unstrained upon the outer surface of the impression tray (Fig. 5.132). The denture border should extend up to the external oblique ridge but not beyond it. The cheeks are palpated externally to check for overextension. It is also important to look at the patient's facial form for the esthetic purpose to determine if the area is overextended. The buccal frenulum area is heated on one side and placed in the mouth, holding the tray in position, and molded (Table 5.7).

Labial Flange and Labial Frenum

The labial flange area is heated (Fig. 5.133). The compound is heated, softened, and inserted to the patient's mouth with one hand, while the tray is held in position with the

Table 5.7 Buccal border and buccal frenum

Anatomic region	Tissues affecting the borders	Activation	Result of activation
Buccal border	External oblique ridge	Manual manipulation of the denture is maintained by finger pressure anteroposteriorly	Buccinator muscle fibers and soft tissues of the cheek are moved
	Buccinator muscle	Buccal borders are examined in the mouth, and while the cheeks are at rest position, dentures border seal is checked	Overextended borders are determined, and movement of the denture is prevented
		Overextensions of the borders are checked with finger pressure	By determining the overextended borders, esthetics and facial form views are predicted
		Cheeks are examined extraorally, and the overextensions are checked	
Buccal frenum	Buccal frenum	The frenum is pulled in and upward through the impression compound, and the cheeks are moved anteroposteriorly	Freedom of movement is maintained for connective tissue bands. Seal is obtained by the anteroposterior movement. Therefore, maximum seal and contact are provided together with the freedom of movement

Fig. 5.133 The impression compound is added to the buccal border

Fig. 5.135 The lips are activated and the impression compound is placed in the labial sulcus region

Fig. 5.134 The tray is placed

other (Fig. 5.134). The lip is massaged with the hand from one side to another to mold the compound to the desired functional extension (Fig. 5.135). This moves the orbicularis oris muscle, along with its associated muscles of facial expression (Fig. 5.136). The flange should extend to contact the mucous membrane reflection at rest and have sufficient thickness to restore the proper esthetic position of the lower lip. The patient can be instructed to lick or purse his/her lower lip with his/her tongue. Pursing activates the mentalis muscle; licking the lower lip activates the muscles of the lower lip as it moves (Table 5.8).

Retromylohyoid Area

The impression compound at the retromylohyoid area is heated bilaterally and softened (Fig. 5.137) and then inserted into the mouth (Fig. 5.138a), and the tray is held in position bilaterally. The patient is instructed to push his/her tongue against the tray handle (Fig. 5.138b). This area is reheated,

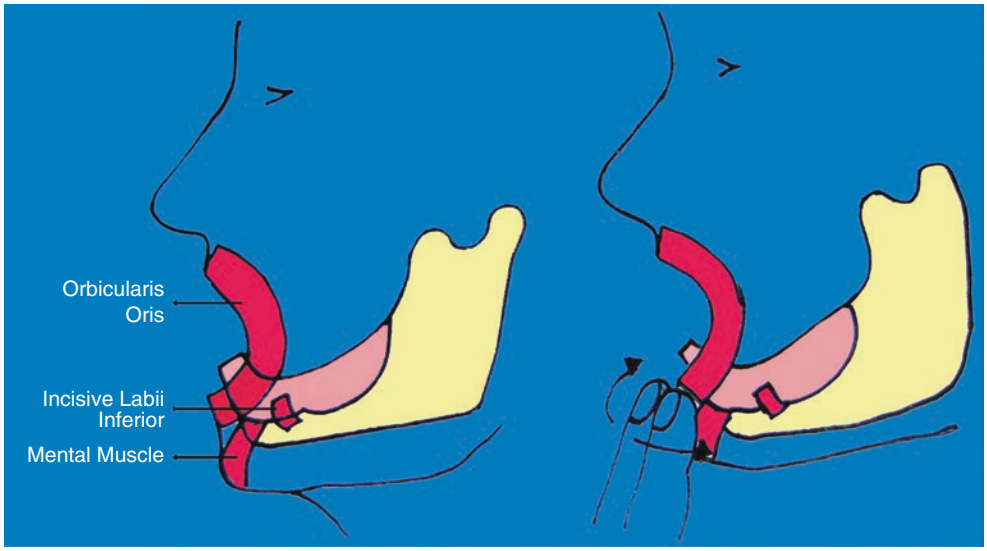


Fig. 5.136 The lips are moved in the direction of the arrow

Table 5.8 Labial margin and labial frenum areas

Anatomic region	Tissues affecting the borders	Activation	Result of activation
Labial margin	Mentalis muscle, incisive labii inferior, orbicularis oris, and related mimic muscles	Activation massage with fingers and movement of the lip toward both sides	Orbicularis oris and mimic muscles are activated
	Labial frenum	Patient is instructed to contract his/her lower lip	Mental muscle is activated over the impression compound
		Patient is instructed to lick his/her upper and lower lips	
Labial frenum	Labial frenum and related connective tissue fibers	Frenum is elevated over the impression compound, and massage is made by moving the lip to both sides	Frenum is relieved
			By maintaining the movement of the lip on both sides, seal and freedom of movement are obtained

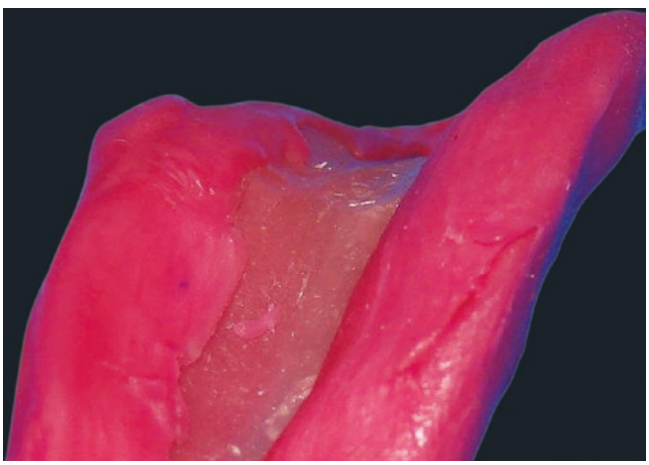


Fig. 5.137 The impression compound application on the retromylohyoid region

and the patient is instructed to force his/her tongue into his/her inner right and left cheek, while the tray is held in position. With these actions, the superior constrictor and glossopalatine muscles contract and impress the overlying tissues against the impression compound (Fig. 5.139a). These tongue movements displace excess compound from the borders so that the denture will not to be unseated, while the patient moves his/her tongue during function (Table 5.9).

Mylohyoid Area

Impression compound on the mylohyoid area is heated bilaterally, molded, and inserted in the patient's mouth (Figs. 5.140 and 5.141). The tray is held in position with both hands. The patient is instructed to place the tip of his/her tongue through the upper and lower vestibules, on both the right and left sides (Fig. 5.142). This area is reheated again bilaterally, and the patient is instructed to swallow two or three times. The tongue movements raise the floor of the

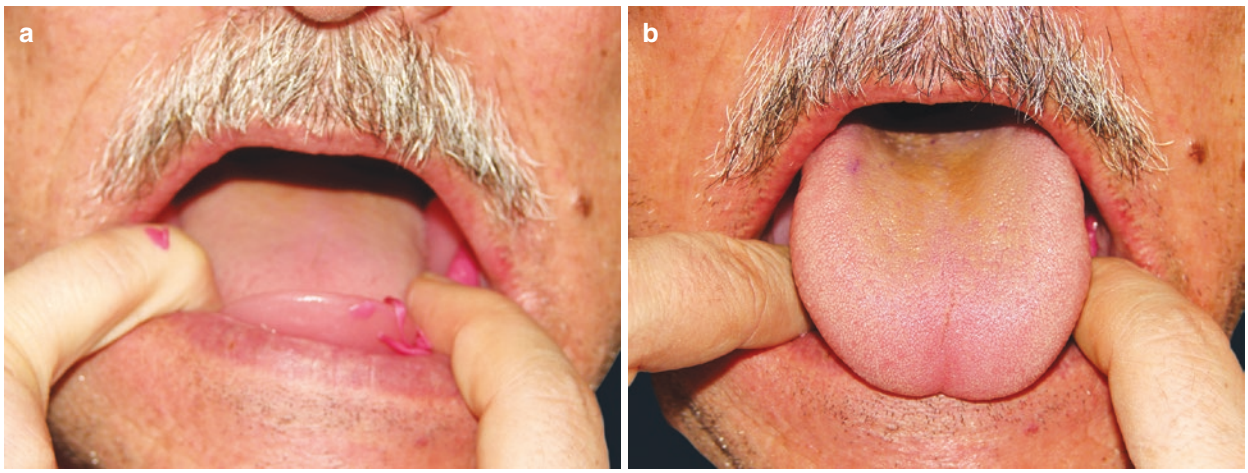
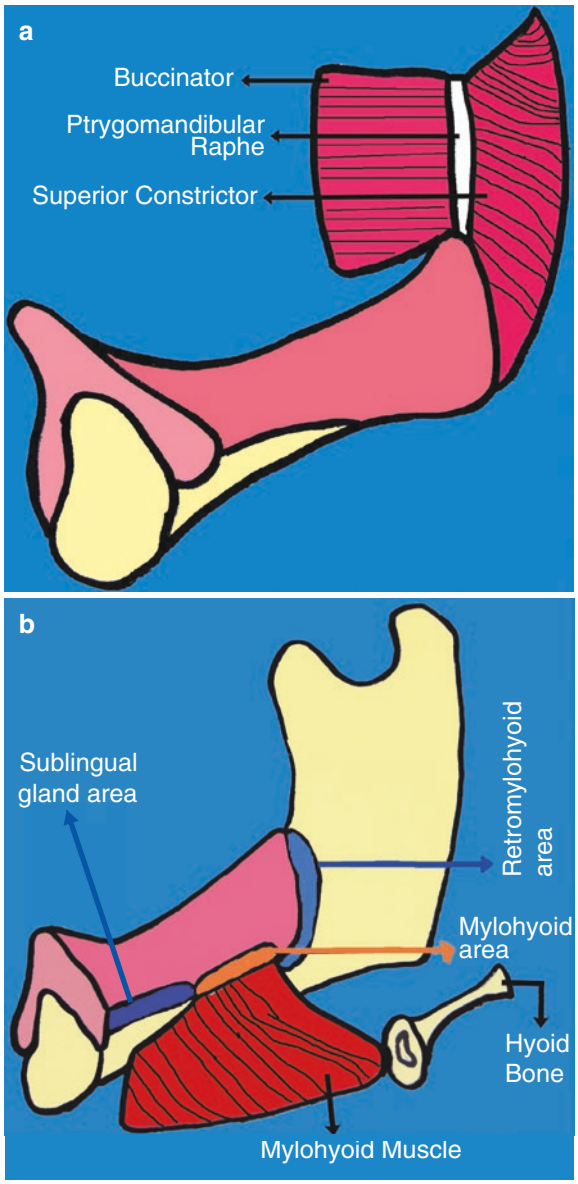


Fig. 5.138 (**a**) The tray is placed and (**b**) the patient moves the tongue forward



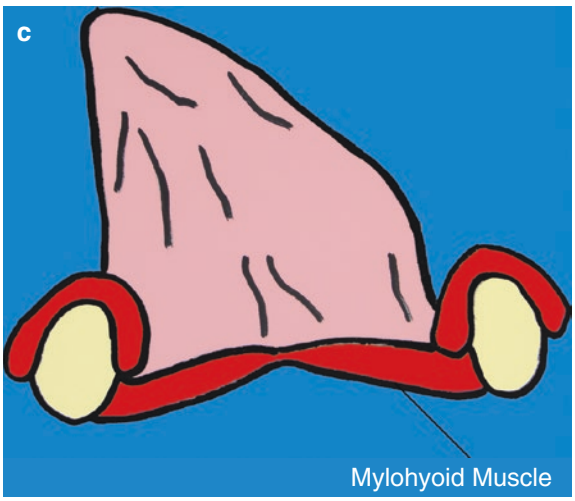


Fig. 5.139 (continued)

Fig. 5.139 (**a**) The muscles at the retromylohyoid region, (**b**) the muscles that effect the mylohyoid region of the denture, and (**c**) the floor of the mouth raises and cases a contraction of the mylohyoid muscle when the tongue is raised

Table 5.9 Retromolar region and retromylohyoid area

Anatomic region	Tissues affecting the borders	Activation	Result of activation
Retromolar region	Superior constructor muscle	Patient is instructed to force his/her tongue through the tray handle and closes his/her mouth toward the fingers	When the patient forces his/her tongue against the tray handle, superior constructor and glossopalatinal muscles contract and mimic the denture margin. When the patient makes biting movement, internal pterygoid muscle contracts and mimics the denture margin
Retromylohyoid area	Glossopalatinal muscle	While positioning the tray stable, patient is instructed to move his/her tongue to left and right sides	By the movement of the tongue, impression material is activated, and the movement of the denture by the possible movements of the tongue is avoided after the denture is completed

Figs. 5.140 and 5.141 The impression compound is applied to the mylohyoid region

Fig. 5.142 The tray is placed and the patient is instructed to swallow

mouth through the contraction of the mylohyoid muscle (Fig. 5.115b, c). During tongue movements, the quality of motion of the mouth floor may be greater than the quantity of motion of the swallowing. The swallowing action will sometimes allow the denture to extend over to the floor of the mouth for the peripheral seal. The repetitive swallowing usually allows the compound to extend further down more to the peripheral border than the tongue movements will permit. Individual variation is seen among patients. If significant different configurations result from the time, different actions, the function that provides for minimal extension, should be selected so that the denture will not be dislodged during the function. The mylohyoid extension should be contoured laterally to pass under the tongue inferiorly and medially to the mylohyoid ridge. The tongue will increase the stability of the denture as it rests upon the denture flange and border (Table 5.10).

Sublingual Fold Space and Lingual Frenum

The impression compound is placed on the sublingual fold space and the lingual frenum area (Fig. 5.143). The compound is heated, softened, and placed into the tray. The tray is placed in the mouth. The finger is placed directly on the compound, and the compound is pushed in a downward and anterior direction until it is firm (Fig. 5.144). The tray is removed and immersed in cold water. This area is reheated, softened, and reinserted into the mouth. The patient is instructed to force his/her tongue forward to the tray handle and lick his/her upper and lower lips with the tip of his/her tongue. These functional movements cause a slight contraction of the genioglossus muscle, which pushes the tissues superior. The slight function of the genioglossus muscle is sufficient, so that the lingual flange in this area can be reduced to the most favorable level. The mylohyoid muscle is activated when the tongue is elevated; however, its effort is more limited in this area because it is inferior to the geniohyoid muscle and the soft tissues above it. The lingual flange in this area is reduced and contoured by these functional movements until the most favorable level is reached. The aim is to provide maximum soft tissue placement for a peripheral seal and also

Table 5.10 Mylohyoid region

Anatomic region	Tissues affecting the borders	Activation	Result of activation
Mylohyoid region	Mylohyoid muscle	Patient is instructed to swallow repeatedly	Contraction of mylohyoid muscle fibers is obtained, and the impression compound is molded interiorly and medially
	Mylohyoid ridge and medial side of the mandible		
	Size, position, and movement ability of the tongue	Patient is instructed to move his/her tongue toward upper and lower vestibule areas on both sides	By the contraction of mylohyoid muscle, the floor of the mouth is elevated
		By contouring the border and the external side of the border, it is ensured that the region is positioned under the border	Elevation of the floor of the mouth generated by tongue movements is greater
			Swallowing motion often enables the denture to seat over the crests better and increases stabilization If there is a different situation, the activation which is most compatible with the function and which provides maximum extension should be chosen By placing the denture border interiorly and medially from the mylohyoid ridge: • Injury of crestal tissues is prevented • Stabilization of the denture is increased since the tongue is placed over the polished surface of the denture

Fig. 5.143 The impression compound application on the sublingual area

Fig. 5.144 Pressure is applied on the impression compound with finger

to allow freedom of tongue movement for patient comfort. If this area is over shortened, the seal and the retention may be lost. If a prominent or active lingual frenulum is present, the lingual frenulum area is heated and the patient is instructed to protrude his/her tongue and to move it from side to side to register the narrowly defined area (Figs. 5.145 and 5.146). The patient is instructed to move to his/her tongue and mandible, and retention of impression is checked. The retention is checked, and if the impression does not have enough retention, the sublingual fold, and the masseteric notch, is checked. If it is not sufficient, the dentist should try to modify the extension into the masseteric notch area to fit under the surface of the buccal fat pad to a closer extent. The border seal in the sublingual fold space is crucial for the overall retention of the mandibular complete denture base. The masseteric notch area should be checked to see if a seal has formed. Once these procedures are accomplished, the impression is completed (Fig. 5.147; Table 5.11).

Border Molding Procedure with Elastomeric Materials

In this section, the border molding procedure with Detaseal elastomeric impression material is explained. Usually, Detaseal is suitable for the patients who have mistakenly done some tease jaw movements. It can be used in a single piece. As its working time is long, the functional movement can be done easily. It is a paste-paste form (base: red, catalyzer: yellow). The mixing procedure and adjusting ratio is easy. The viscosity of the material is enough for making an impression, and no overflow occurs down the

Figs. 5.145 and 5.146 The lingual frenum is shaped

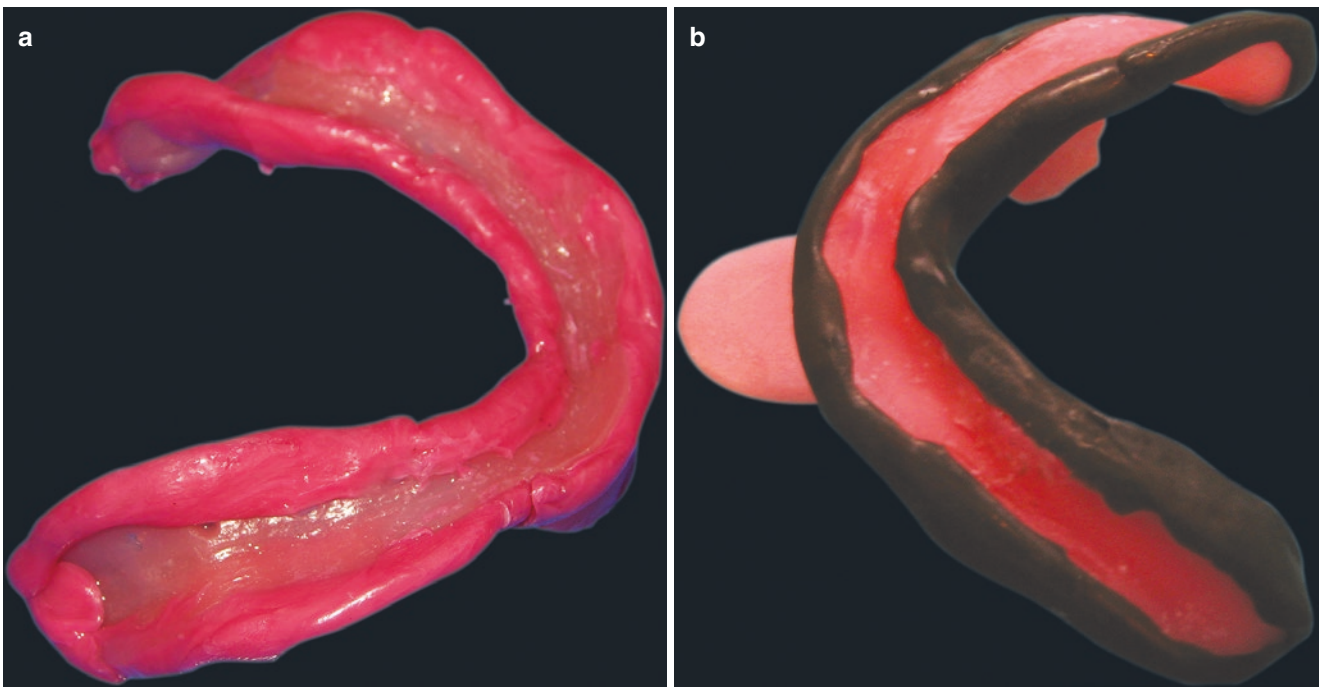


Fig. 5.147 The tray with completed border molding, (**a**) isofunctional compound, and (**b**) Kerr compound

border. The adhesive is applied to the tray (Fig. 5.148). The proportioning is carried out by extruding equal lengths of each paste in a 1:1 ratio. The material is mixed once with the spatula (Fig. 5.149), placed in an injection syringe (Fig. 5.150), and applied to the border of the impression tray (Fig. 5.151).

If thicker border molding is needed, the tip of the injection syringe is shortened, and the thicker material is placed. The working time of Deasil is 2 min, and the setting time is approximately 4 min (the material goes to the plastic phase after 2.5 min). The polymerization of the material is about 6 min. The functional border molding procedure can be achieved with this material without displacement of the soft tissues.

The tray is inserted to the patient's mouth (Fig. 5.152), and the procedure is continued with the same movements of the impression compound and isofunctional material (Fig. 5.153).

Important Notes

The impression tray should be rigid, practical to use, and properly contoured for each patient. The tray should be positioned in the same way for each insertion. The unrelieved

Table 5.11 Sublingual fold and lingual frenum areas

Anatomic region	Tissues affecting the borders	Activation	Result of activation
Sublingual fold (last region, needed to be peripherally sealed)	Genioglossus muscle	Impression compound is added to this region. By pushing down with the forefinger, maximum closure is obtained	By obtaining slight contraction of the genioglossus muscle, tissues above are pushed, so peripheral seal and lingual border molding allowing tongue movement is obtained
	Tongue (together with internal and external muscles)	The impression compound is heated, the patient is instructed to force his/her tongue to tray handle, and the area is shortened	When the tongue elevates, mylohyoid muscle gets activated. But the tissue above and geniohyoid muscle restricts the movement at this region
	Lingual frenum	Patient is instructed to wet his/her upper and lower lips	By relieving the connective tissue band, lingual frenum prevents the movement of the denture during normal tongue movements
	Genioglossus muscle and tissue folds covering the sublingual gland	Patient is instructed to force his/her lips forward lightly and to move to both sides	
	Mylohyoid muscle	Only the region where the labial frenum corresponds must be heated	

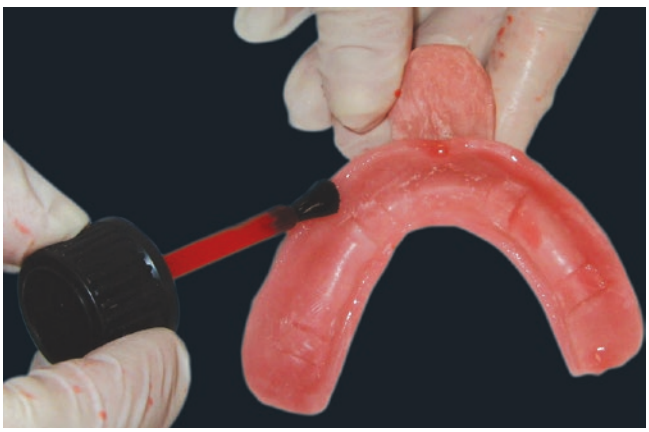


Fig. 5.148 Adhesive application on the tray

Fig. 5.149 (**a**) The material is applied in equal amounts, (**b**) mixing of the material, and (c) shaping with finger

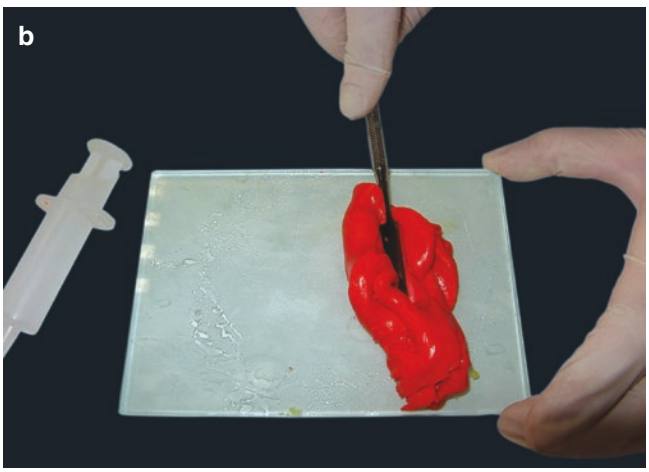


Fig. 5.149 (continued)

Fig. 5.150 The material is placed in the syringe

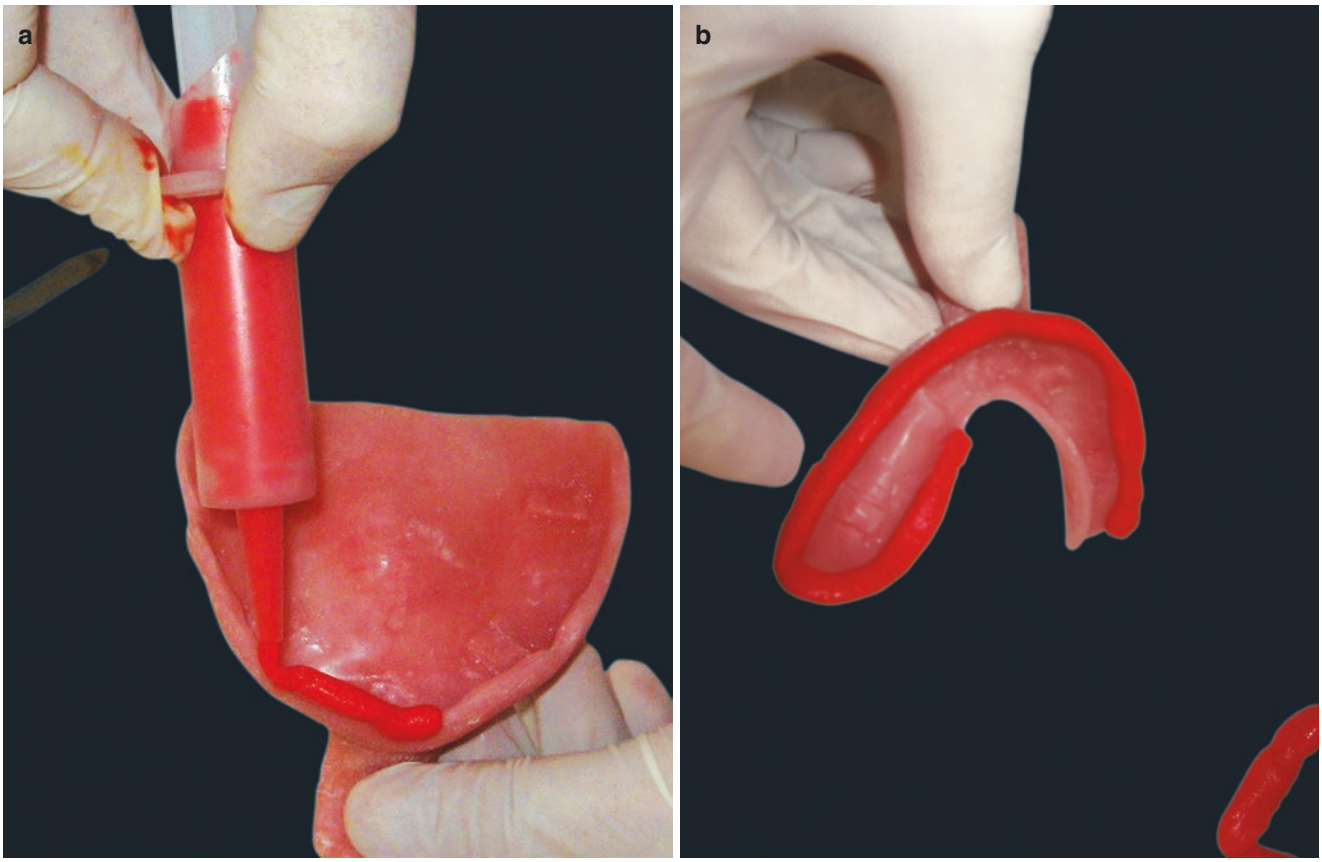


Fig. 5.151 (**a**, **b**) The material is applied in the borders

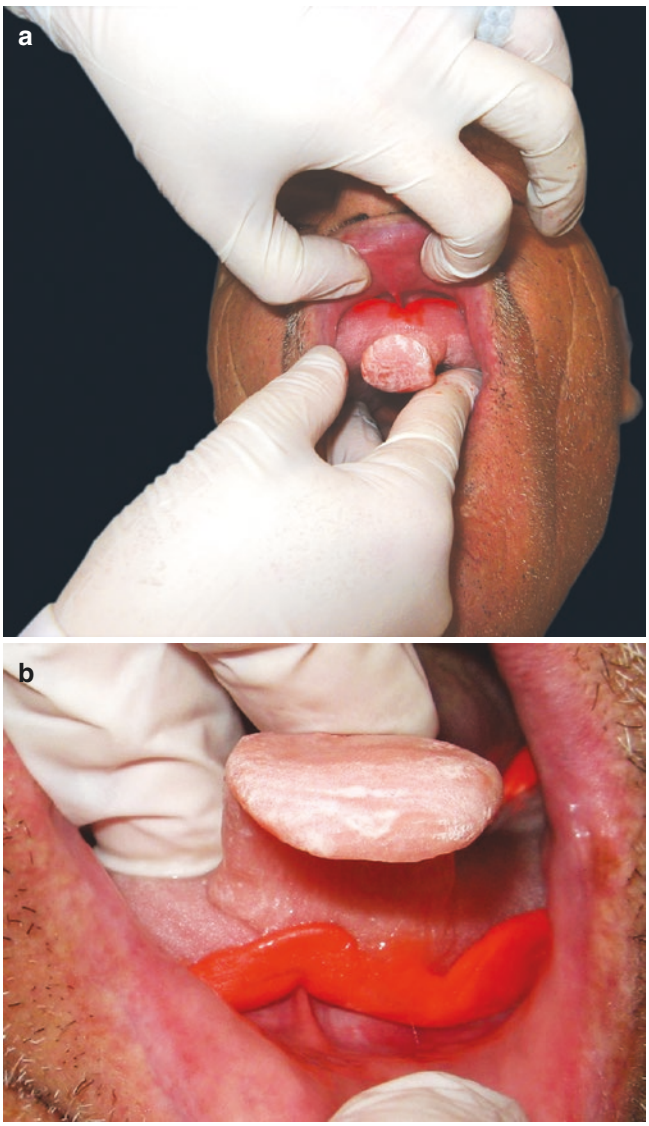


Fig. 5.152 (**a**, **b**) The application of the tray in the patient

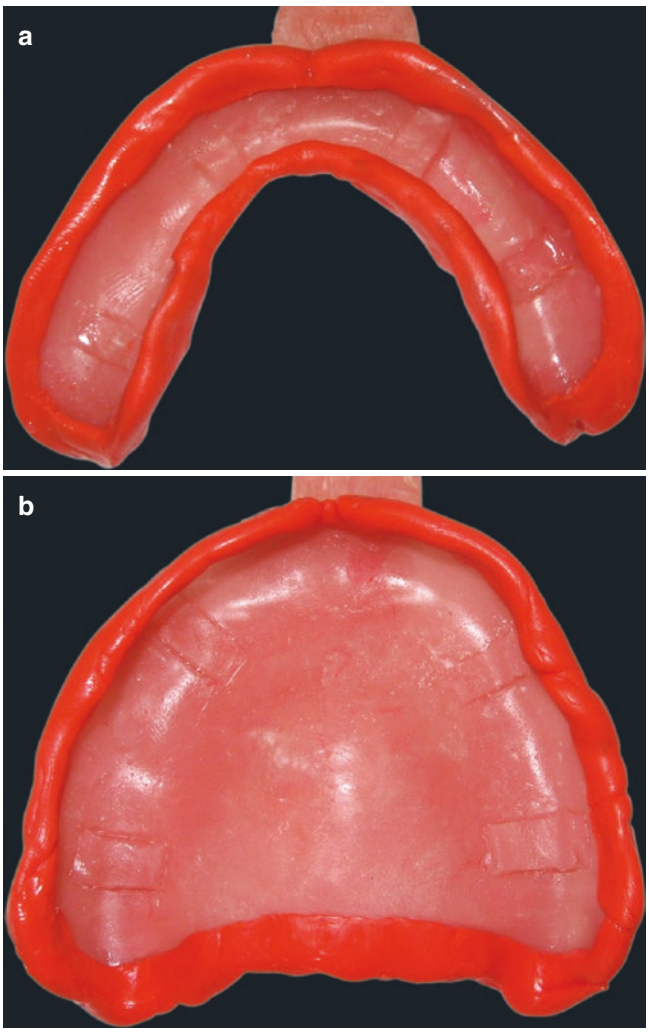


Fig. 5.153 (**a**, **b**) Completed border molding

resin surfaces cover a large tissue area to act as a positive stop and seat for the custom tray. The custom tray gives excellent support in height and width to the compound during border molding. The custom tray with peripheral relief offers a method to control the amount of tissue placement. The slopes of the ridges are primary supporting and bearing areas, and they are functionally loaded with the compound during the molding of the final impression. Through the set of the compound, areas may be built up or reduced to develop maximum retention and stability in the final impression. The stability and retention of the impression can be tested before the final completion.

The border of the impression tray should be rounded and smoothened step by step. The surface of the impression compound should be matte. The colder impression tray is inserted into the patient's mouth. The patient is instructed to open his/her mouth approximately 15–20 mm and to move his/her tongue and lips. The peripheral seal of the tray should be obtained, and the tray should not move in the mouth. If the retention is not satisfactory, the peripheral areas should be checked. The retromolar pad areas and the lingual surface should be checked again. The tray is reinserted into the mouth slowly; the place in which the output of saliva bubbles is observed is the area that must be corrected. Usually, inadequate impressions are often seen at the lingual frenulum, the retromolar pad area, or the border of the lingual surface. Impression compound should be added.

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