



## **Impression Making for Complete Denture**

#### **COMPLETE DENTURE IMPREESION**

**Impression** *generally* is a negative likeness or copy in reverse of the surface of an object.

**Dental impression** is an imprint or negative likeness of the teeth and/or edentulous area and adjacent tissue.

**Complete denture impression** is a negative registration of the entire denture bearing, stabilizing and border seal areas of either the maxilla or the mandible present in the edentulous mouth.

## **OBJECTIVES OF IMPRESSION MAKING**

Complete denture impression procedure must provide five objectives:

- 1- Preservation of the residual alveolar ridge and soft tissue.
- **2-** Support for denture.
- **3-** Stability.
- 4- Support for esthetic.
- **5-** Retention.

• **PRESERVATION** of the remaining residual ridges is one objective. Prosthodontist should keep constantly in mind the effect of impression material and technique on the denture base and the effect of the denture base on the continued health of both the soft and hard tissues of the jaws. Pressure in the impression technique is reflected as pressure in the denture base and results in soft tissue damage and bone resorption.

• **SUPPORT** is the quality of prosthesis to resist the forces which try to dislodge the denture in a tissue-ward direction and this depends on the anatomical and histological factors of the ridge and the way of pressure direction on the ridge during impression making procedure, therefore the maximum coverage provides the greater the support, which distributes applied forces over as wide an area as possible. The best support for denture is the compact bone covered with fibrous connective tissue.

(Support depends on: Denture base + Bone + soft tissue).





• **STABILITY** is the resistance to functional horizontal or rotational movements which try to dislodge the denture. The stability decreases with the loss of vertical height of the residual ridges or with increase in flabby, movable tissue.

(Stability depends on: Denture base + Bone).

- **ESTHETICS** border thickness should be varied with the needs of each patient in accordance with the extent of residual ridge loss. The vestibular fornix should be filled, but not overfilled, to restore facial contour.
- **RETENTION** is the resistance to the forces which tries to dislodge the denture in a direction opposite to the path of insertion. It should be readily seen that if the other objectives are achieved, retention will be adequate.

(Retention depends on: Denture base + soft tissue).

Retention is the constant relation of the denture base to underlying soft tissues while stability is the relation of the denture base to underlying bone. Retention must hold the denture in its position when it is seated at rest. Stability must resist displacement by rocking when a force is applied to teeth over a limited area. Atmospheric pressure, adhesion, cohesion, mechanical locks, muscle control, and patient tolerance factors may affect the retention.

An impression that records the depth of the sulcus, but not its width, will result in a denture that lacks adequate retention.







## **PRIMARY IMPRESSION**

It is an impression made for the purpose of diagnosis, treatment planning and construction of special tray. It is the first impression made for the patient and from which the study cast was produced. These impressions are obtained by a stock tray.

When the primary impression is made, the objectives are to record all areas to be covered by the impression surface of the denture and the adjacent landmarks with an impression material that is accurate.

The maxillary impression should include the hamular notches, fovea palatina, frenum attachments, palate, and the entire labial and buccal vestibules.

The mandibular impression should include the retromolar pad, the buccal shelf areas, the external oblique ridges, frenum attachments, sublingual space, retromylohyoid space, and the entire labial and buccal vestibules.

Materials used for making primary impression

- **1-** Impression compound.
- **2-** Alginate impression material.
- **3-** Putty body silicon rubber base.



Figure (3-2): Alginate primary impression for complete edentulous maxillary and mandibular ridges.







Figure (3-3): Impression compound primary impression for complete edentulous maxillary and mandibular ridges.

# **IMPREESION TRAYS**

In complete denture prosthesis, we make two impressions for the patient:

## **1-**Primary impression.

#### **2-Final or Secondary impression.**

To make an impression we should have a suitable tray and impression material.

**TRAY** It is a device that is used to carry, confine and control the impression material while making an impression.

During the impression making, the tray facilitates insertion and removal of the impression material from the patient's mouth.

## PARTS OF THE TRAY

**l- Body:** It consists of:a) Floor.b) Flange.

#### 2- Handle.



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There is upper tray and lower tray, the difference between them is that, in the upper tray, there is a palatal portion that called (*vault*), and in the lower tray, there is a (*lingual flange*).

**HANDLE:** It is an extension from the union of the floor and labial flange in the middle region (*midline*), it is (L) in shape so that, it will not interfere with lip during impression procedure.



## IN GENERAL THERE ARE TOW TYPES OF TRAYS

- **1-Stock tray:** It is used for primary impression procedure.
- **2-Special tray (individual tray) (custom tray):** It is used for final impression procedure.

#### I- STOCK TRAY:

It is an impression tray serves to carry the impression material to the mouth and support it in the correct position while it is hardening. This type of trays can be used for making primary impression. It makes from different materials such as Aluminum, Tin, Brass or plastic, in variety of shapes, sizes to fit different mouth.

#### **TYPES OF STOCK TRAYS**

- **1-** Stock tray for dentulous patient.
- **2-** Stock tray for edentulous patient.





(b)

#### We can distinguish between them by:

Stock tray for edentulous	Stock tray for dentulous
<ul><li>Short flanges.</li><li>Oval and narrow floor.</li></ul>	<ul><li> Long flanges.</li><li> Flat and wide floor.</li></ul>





Figure (3-6): The difference between stock tray of edentulous (a), and dentulous arch (b).

# Classification of stock tray according to the impression material used

**1-Perforated stock tray:** used with alginate impression material.

**2-Non-perforated stock tray:** used with sticky impression material like impression compound.















#### FACTORS AFFECT THE SELECTION OF STOCK TRAY

- 1- The type of material used in the primary impression procedure, like impression compound we used non-perforated tray, because it will be stick on the tray. And if we use alginate material we should use perforated stock tray for mechanical retention of impression material to the tray surface.
- **2-** Size of the arch, stock tray comes in different sizes.
- **3-** Form of the arch, (ovoid, square, V-shaped).

The stock tray must cover all the anatomical landmarks needed in complete denture and give a sufficient space (4-5 mm) for the impression material in all directions.

# **Production of study model (Primary cast)**

The *primary cast* is produced by pouring the primary impression with *plaster* which is the positive reproduction of the oral tissues.



Figure (3-9): Study casts (made from dental plaster).

The plaster mixed with water by the saturation method in the rubber bowl and pour in the impression compound impression material after beading and boxing of the impression. When the plaster becomes hard, the cast is separated from the impression by the use of hot water ( $55-60^{\circ}C$ ). When





using very hot water, the impression compound will be sticky and it will be difficult to remove from the cast. The special tray, which is used to make the final impression, will be constructed on the primary cast.

After construction of the special tray, it is tried in the patient mouth and checked for proper extension and adaptation on the residual ridge, the special tray is a primary factor in obtaining a good working impression.



# **SECONDARY IMPRESSION (FINAL IMPRESSION)**

It is an impression made for the purpose of fabrication of prosthesis. This impression is made with individual tray.

Final impression must be poured with *stone* material to produce the *master cast*.



Figure (3-11): Master casts (made from dental stone).

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Materials used for final impression

- **1-**Zinc Oxide Eugenol impression material.
- **2-** Alginate impression material.
- 3- Elastomers impression materials (Rubber base).
- 4- Impression plaster.

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Irrespective of which material is selected, the optimum result will be achieved only if the custom tray has been constructed and refined correctly.



Figure (3-13): Alginate impression material.















## The techniques used for making final impression

The basic differences in techniques for final impressions can be resolved as those that record the soft tissues in a:

- 1- Functional position (Closed mouth technique, Pressure technique)
- 2- Rest position
  - A. Nonpressure technique (Passive technique, Mucostatic technique).
  - **B.** Selective pressure technique.

# **II-SPECIAL TRAY (INDIVIDUAL OR CUSTOM TRAY):**

It is defined as a custom made device prepared for a particular patient which is used to confine and control an impression material making an impression. An individualized impression tray makes on the cast obtained from primary impression. It is used in making the final impression.

On the primary cast (study cast), special tray is constructed because edentulous ridge shows variations in shape and size, some have flattened ridges and other have bulky ridge, and the stock tray can fit the ridge only in an arbitrary manner.

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#### Figure (3-19): Special tray on primary cast.

## ADVANTAGES OF SPECIAL TRAY

- **1-**Economy in impression material (less impression material required in special tray).
- **2-** More accurate impression.
- **3-**Special tray provides even thickness of impression material. This minimizes tissue displacement and dimensional changes of impression material.
- **4-** The work with special tray is easier and quicker than modifying stock tray to provide accurate impression.
- 5-Special tray is more accurately adapted to the oral vestibules this helps in better retention of the denture.
- 6- Special tray is less bulky than stock tray which is more comfortable for the patient.

#### MATERIALS USED FOR CONSTRUCTION OF SPECIAL TRAY

- **1-** Cold and heat cured acrylic.
- **2** Light cured resin.
- **3-** Impression compound (higher fusing tray compound).







Figure (3-20): Materials used for construction of special tray. Cold and heat cured acrylic (a), shellac base plate (b), impression compound (c), Light cured tray material (d).











# **FABRICATION OF A SPECIAL TRAY**

- **1-** The cast should be soaked in water.
- 2- Severe undercuts should be blocked out using wax.
- **3-** The borders of the special tray and the relief areas should be marked.
- 4- The borders of the tray marked on the cast are grooved deeper using a carver, this act as guide to trim the tray later.

For close fit special tray	For spaced special tray
<ul> <li>5- Application of separating medium on study cast.</li> <li>6- Using the cold cure acrylic tray material by either dough or sprinkle on technique.</li> </ul>	<ul> <li>5- Adapting the wax spacer, should be about 2 mm thick, the posterior palatal seal area on the cast is not covered with the wax spacer. Spacer should be cut out in 2-4 mm places so that the special tray touches the ridge in this area. This is done to stabilize the tray during impression making. The part of the special tray that extends into the cut out of the spacer is called stopper, usually 4 stoppers are placed, 2 on the canine eminence and 2 in molar region on either side.</li> <li>6- Application of separating medium on the spacer and exposed surface of cast (stopper areas).</li> <li>7- Using the cold cure acrylic tray material by either dough or sprinkle on technique.</li> <li>8- When the special tray is removed from the cast, the wax spacer is left inside the tray to be properly positioned in the mouth during border molding procedure.</li> </ul>









Figure (3-24): Relief for maxillary (a) and mandibular tray (b).



Figure (3-25): Wax spacer (a), spaced special tray (b), removing of wax spacer (c).

#### **Dough technique**

The powder and liquid should be mixed in a mixing jar. After mixing the monomer and polymer the mix undergoes three stages (*sandy stage, stringy stage, dough stage*) in the dough stage the material is kneaded in the hand, to achieve a homogenous mix. Then the material shaped into a 2 mm thick sheet either by plastic roll or by pressing the material between two glass slabs the two techniques need a separating medium.

After that the sheet of acrylic is adapted over the cast from the center to the periphery to prevent the formation of wrinkles. Then cut the excess material with blade before setting the material. Then the material should be held in position until complete polymerization. After that the excess dough material is used to handle fabrication.







Figure (3-26): Acrylic material (a) shaped into a sheet by plastic roll (PR) over glass slab (GS).



Figure (3-27): The dough can also be flattened by pressing it between two glass slabs (GS).

#### Sprinkle-on technique

This technique used for construction of individualized impression tray, the monomer and polymer are applied in alternate layers till relative thickness is achieved.

The powder and liquid are loaded in separate dispensers. A small quantity of powder is sprinkled on a particular area over the cast and liquid is sprinkled over the powder. Sprinkling drops of the liquid polymerizes the powder. This is continued till the entire ridge and the associated landmarks are covered. Then roughen the ridge area on the top of the tray anteriorly at the midline to make the handle from acrylic resin and attach to the tray.

The *advantages* of this technique include its ease of use and minimal wastage of material.

*Figure (3-28): In sprinkle on technique, the powder is dispersed and consecutively wet with drops of liquid.* 



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Figure (3-29): Finished special tray.





LIGHT CURED RESIN SPECIAL TRAY



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**1-** The full upper edentulous working model.

**2-** Using wax spacer, the wax is heated and formed to the upper model.

**3**, **4**, **5**- A sheet of the special tray material is then formed to the upper working model and trimmed to shape.

**6**, **7**- A strip of the special tray material is cut, rolled and flattened/shaped to fabricate the handle. Take care to fabricate a handle that is long and wide enough for the clinician to hold whilst making the upper impression.

7- The handle is then attached to the upper tray.

**8-**The formed special tray is then placed into a light curing box and allowed to go through its initial curing cycle.

**10-** The upper working model and cured special tray are then boiled free of wax, then the upper tray is inverted and again placed into the light curing box to cure the inside of the handle area, which can be quite thick.

**11, 12-** Once fully cured, the periphery of the upper special tray is then trimmed, rounded with a carbide bur and smoothed with a silicone wheel or point, taking care to relieve the frenum attachments.

## **CRITERIA FOR SPECIAL TRAY CONSTRUCTION**

- 1- The tray should be rigid and of sufficient even thickness that it will not fracture during its use.
- 2- The special tray must not impinge upon movable structures.
- **3-** The borders must be (2 mm) under extended.
- 4- The posterior limits of the impression tray should be slightly over extended to ensure inclusion of the posterior detail for development of the post-dam area in upper tray.
- 5- The tray must have a handle for manipulation, and the handle must not interfere with functional movement of the oral structures.
- 6 The tray must be smooth on its exposed surfaces and should have no sharp corner or edges which would injury the patient.





#### **BEADING AND BOXING IMPRESSION AND MAKING THE CAST**

Beading is done to preserve the width and height of the sulcus in a cast. Boxing is the enclosing of an impression with a beading wax to produce the desired size and form of the base of the cast.

Boxing impression can be used for primary and final impressions, this procedure cannot usually be used on impression made from hydrocolloid materials (*alginate*) because the boxing wax will not adhere to the impression material as well as the alginate can be easily distorted.



Figure (3-30): Beading (a) and boxing (b) the maxillary ZOE impression.



Figure (3-31): Beading (a) and boxing (b) the mandibular ZOE impression.

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## MATERIALS USED FOR BOXING IMPRESSION

- 1-Beading wax: a strip of wax is attached all the way around the outside of the impression approximately (2-3 mm) below the border; figure (3-31), and sealed to it with wax knife.
- 2-Boxing wax: a sheet of wax is used to made the vertical walls of the box and it is attached around the outside of the beading wax strip so that it does not alter the borders of the impression, the width of the boxing wax is about 9-15 mm.





**3-Base plate wax:** a sheet of wax can be used to fill the tongue space in the mandibular impression that is sealed just below the lingual border of the impression.



Figure (3-34): Beading wax (a), boxing wax (b), base plate wax (c).

# **COMMON FAULTS IN IMPRESSION MAKING**

- **1**-Poor selection of the tray and materials.
- **2-** Insufficient material loaded in the tray.
- **3-**Excessive material loaded in the tray.
- **4-**Failure to press the tray completely to position (insufficient seating pressure or excessive seating pressure).
- 5- In correct position of the tray before finally seating it.
- 6- Obstruction of the proper flow of the material by lips, check or tongue.