STATE UNIVERSITY OF MEDICINE AND PHARMACY "N.TESTEMIȚANU"
DEPARTMENT OF PROSTHODONTICS

Preliminary and functional impressions for complete dentures

Preliminary impression

Definition. Impression is a negative image of prosthetic field that is obtained with different materials placed on a specific support (trays).

Preliminary impression

Aim of the impression: is to create a cast usually from plaster which will be a precise copy of intraoral situation and will be used to achieve the objectives in construction of the prosthesis. (Burlui V.)

Preliminary impression

Objectives of impression:

Can be grouped in Biomechanical, functional and biological objectives.

1. Biomechanical objectives aims to create conditions for stability, maintaining and support for the denture.

Stability of the denture is obtained by registration of retentive areas of prosthetic field (vertical bone structures) that will not allow prosthesis to be displaced.

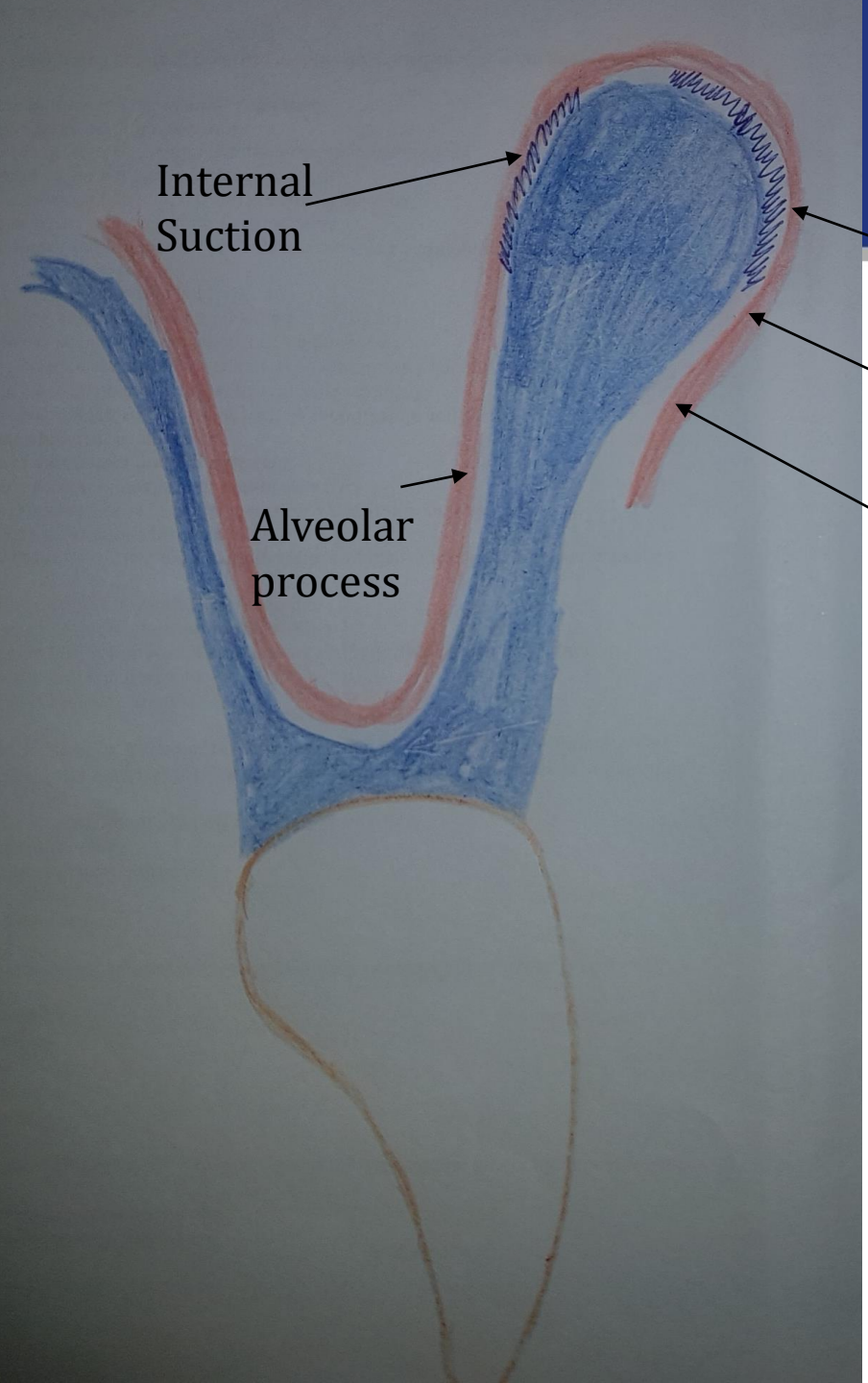
Maintaining is achieved through adhesion, internal and external suction, avoidance of mobile elements (frenulum) and use of muscle tonicity to maintain the denture.

a. Adhesion is obtained through a precise matching of prosthesis and mucosa with a thin layer of saliva interposed.

b. Internal suction is obtained with a precise closing of the prostheses margins at the level of alveolar mobile mucosa.

c. External suction will be achieved by means of a precise closure at the level of external flanges of prosthesis.

d. Avoidance of mobile areas is realized with precise impression without compression at the level of passive-active mucosa, frenula, Someya sinew string etc.

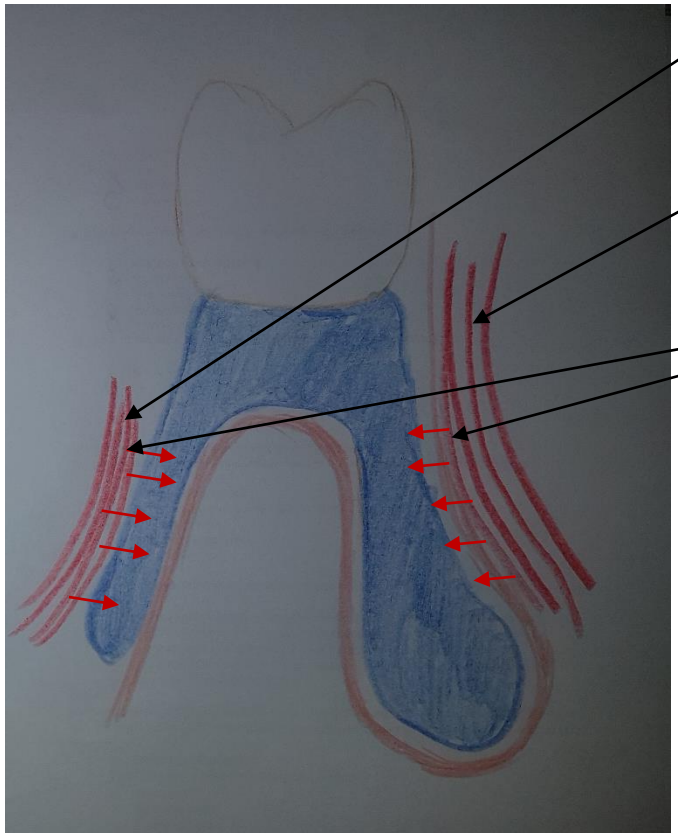


External Suction

Cheek

Prosthesis

e. Use of muscle tonicity is realized by a precise registration of thickness and with of prostheses so that the horizontal muscle fibers will tend to compress the prosthesis toward alveolar bone.



2. Functional objectives are achieved with an impression that will allow fabrication of a denture with proper phonetical and masticatory integration.

3. Biological objectives are related to biological properties of impression materials (not to be toxic or irritant, not to provoke allergies, not to deform the mucosa or provoke any lesions etc.).

Impression types

Impressions in full edentulism can be classified in:

- Preliminary impressions – obtained with standard trays for manufacturing of individual tray.
- Partially functional impressions – are obtained with standard trays that can be adjusted directly in the clinic for a better fitting but still are succeeded by a functional impression.
- Functional impressions (final impression) – are used to pour the working cast with a high precision of static and dynamic elements of prosthetic field. Are obtained with individual trays.

Standard trays

Standard trays

There are a variety of standard trays made for upper, lower jaws, of different sizes and from different materials. Can be from metal or plastic ones.

Requirements:

- The tray's margins should be at 4-5 mm away from prosthetical field transversally in order to provide enough space for impression material.
- In sagittal plane the tray must be at 4 mm away from the vestibular slope of the crest in anterior regions and pass the palatal foveolae with 4 mm.
  The tray should be 4 mm away from hard palate and not reach the vestibular sulcus by 2mm.

Impression materials

Impression materials

Elastic materials:

Synthetic elastomers

Polysulphides
Polyethers
Silicones

Hydrocolloids

Reversible
Irreversible

Non-elastic materials

Impression plaster
Impression compound
Zinc/oxide-eugenol
Impression waxes

Most often used impression materials for full dentures

- Alginate

Advantages:

1. Cheap;
2. Doesn’t deform the mucosa;
3. High precision.

Disadvantages:

1. Hard to manipulate;
2. High distortion if improperly used or transported;
3. Fast cast pouring;
4. Cannot be corrected in case of mistakes.

- Silicones

Advantages:

1. Easy to use;
2. Can be corrected if necessary;
3. Lower contraction.
4. Longer working time

Disadvantages:

1. Expensive;
2. Deformation of mucosa during insertion due to hard consistency;

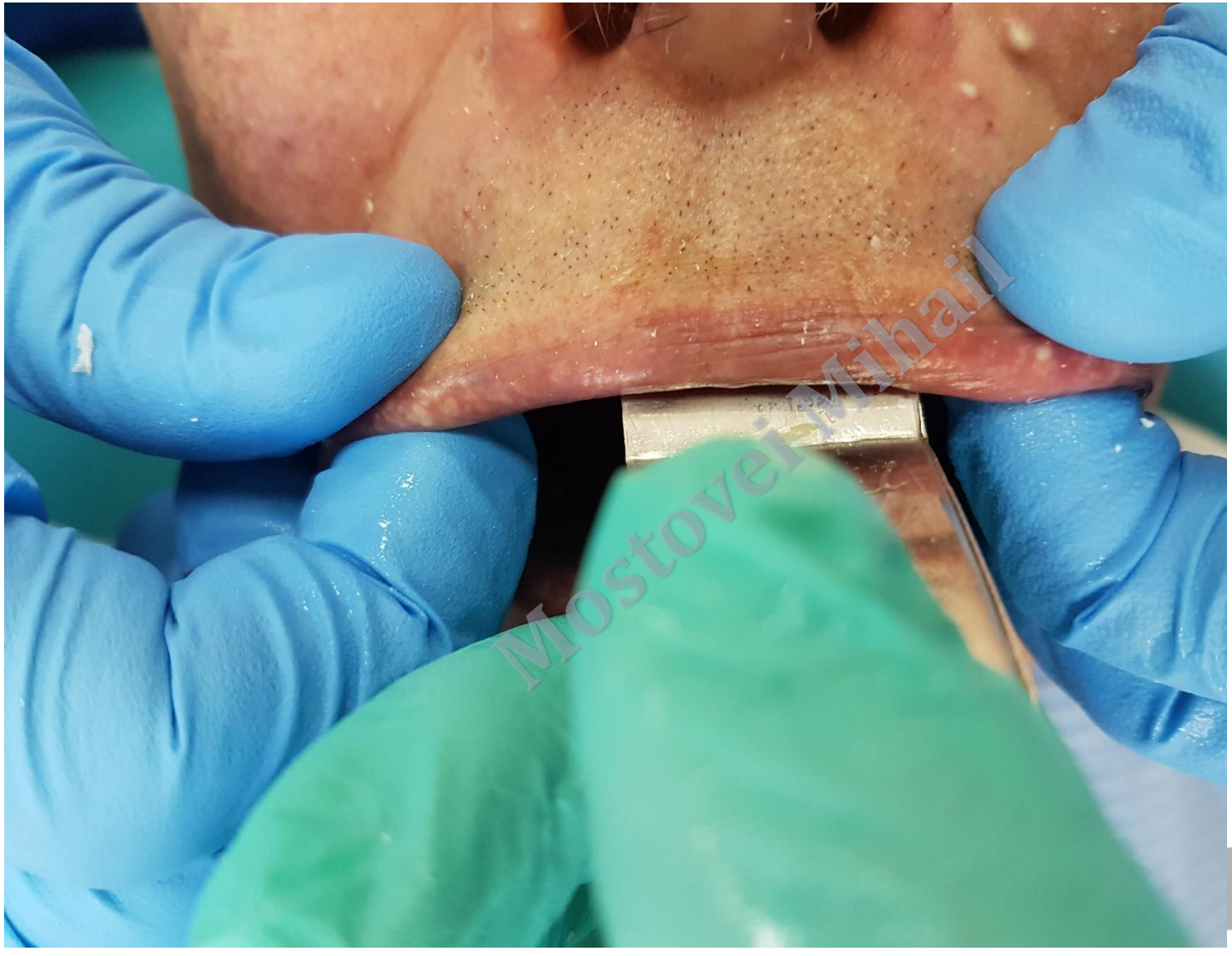
3. Deformation of mucosa during polymerization due to schrinkage.

Preliminary impression

- During preliminary impression the doctor will mold the margins of the impression by gently pulling down the patient's cheeks and lips.

Preliminary impression

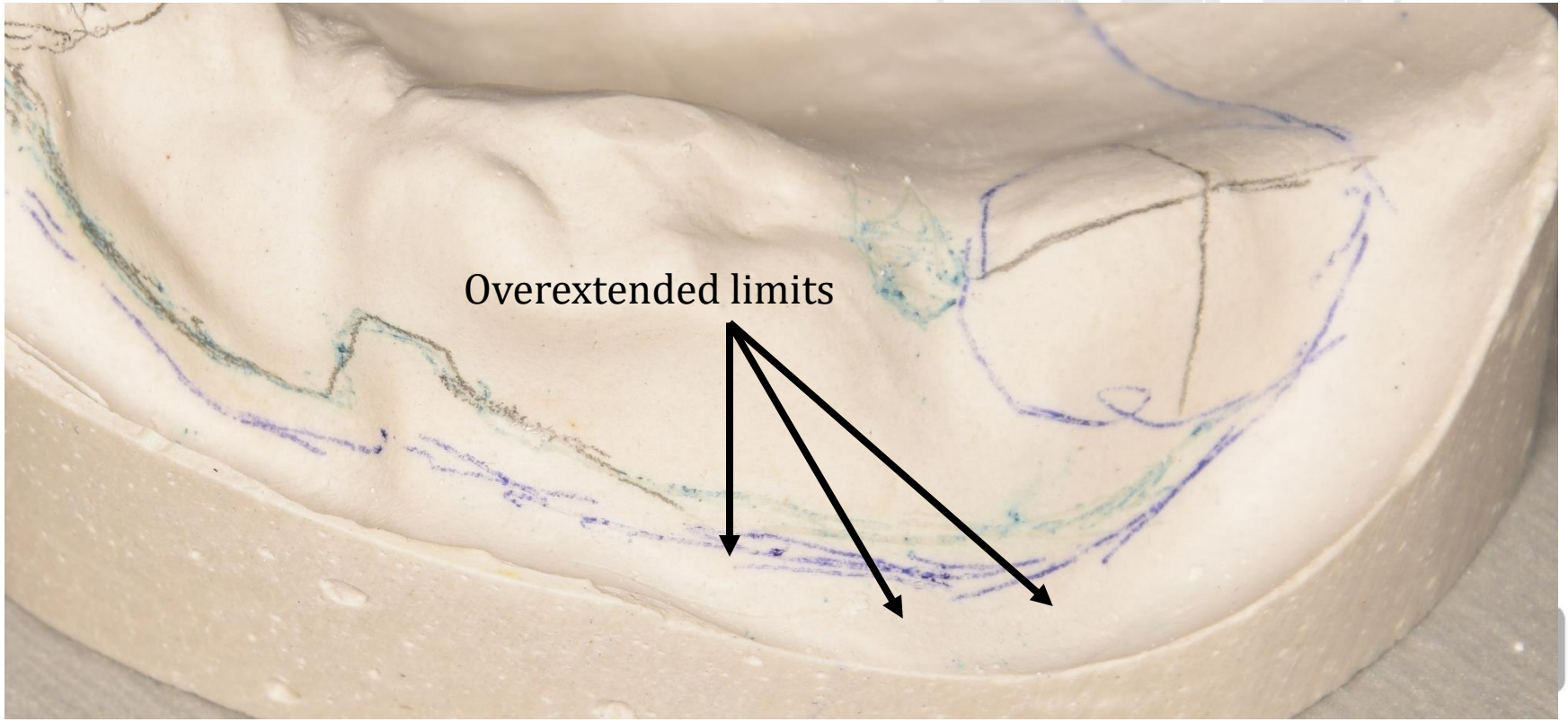
Preliminary impression



Preliminary impression

Preliminary impression

- Usually during the preliminary impression with silicone materials, the borders will be overextended due to the long borders of the standard tray and the hardness of silicone materials. This in the end will lead to pressure on the vestibule and overextension of the limits.



Functional impression

- Functional impression have the same objectives as the standard ones. They can be classified into mucostatic and mucodisplacive impressions.

Mucostatic impression. Are obtained with trays which have shorter borders in order not to influence the periphery of the denture. There are no movements performed during impression. The purpose of these impressions is to obtain adhesion and not suction. Usually the dentures are longer than they should normally be.

Mucodisplacive impressions. Are impressions obtained with mobilization of periphery of prosthetic field using different movements. They can be obtained either with open mouth, closed mouth or mixed. The functional impression are classified also according to the number of materials used for impression (simple – single type of material used and complex – more than one material used).

Depending on the degree of mucosa compression the functional impressions are classified into compressive, non-compressive and mixed.

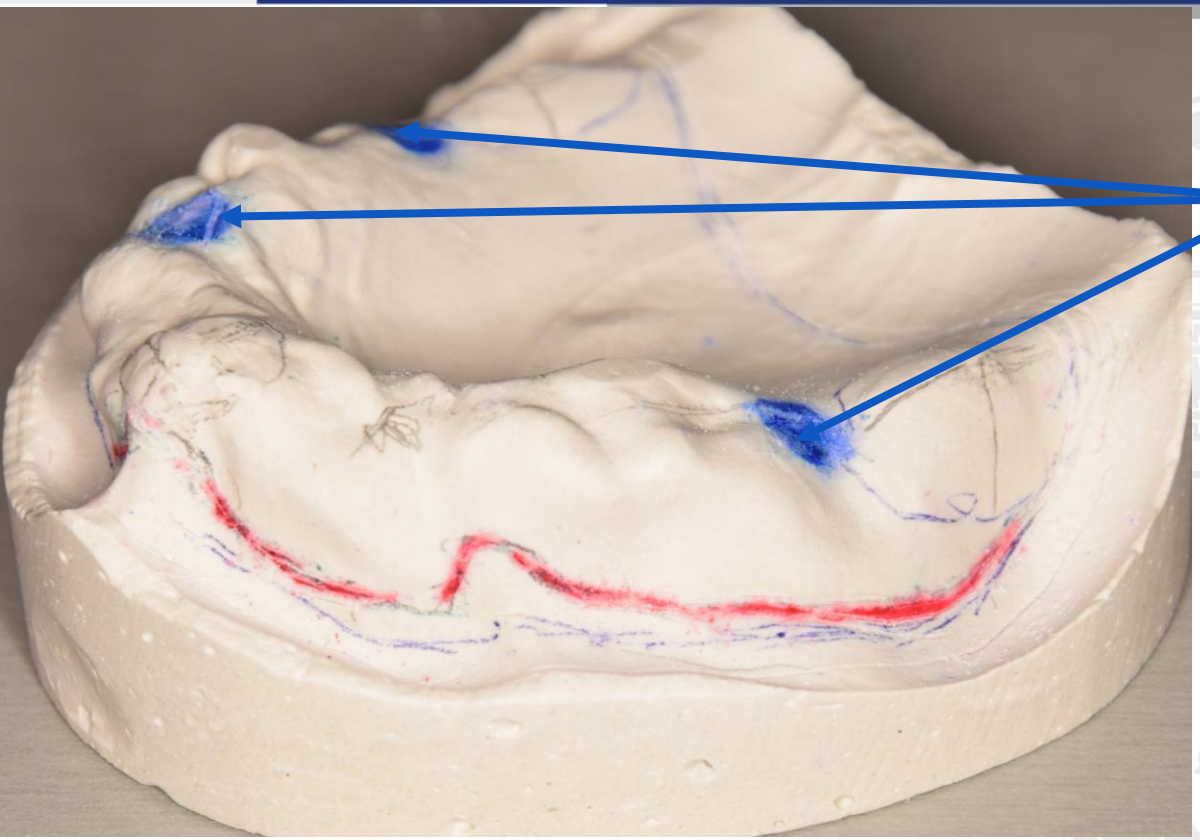
Types of individual functional trays

- **Close-fitting trays –** are the trays that rely completely on the mucosa without any space between them**.**
- **Spaced trays –** have a space between the tray and mucosa of different value depending on the tearing strength of the used material.
- **Windowed trays** – have a window in the tray at the level were hypermobile mucosa is in order not to cause displacement during impression. The impression is taken in two steps, first for the prosthetic bearing areas and then for the window by adding material onto mucosa directly.

Spaced trays

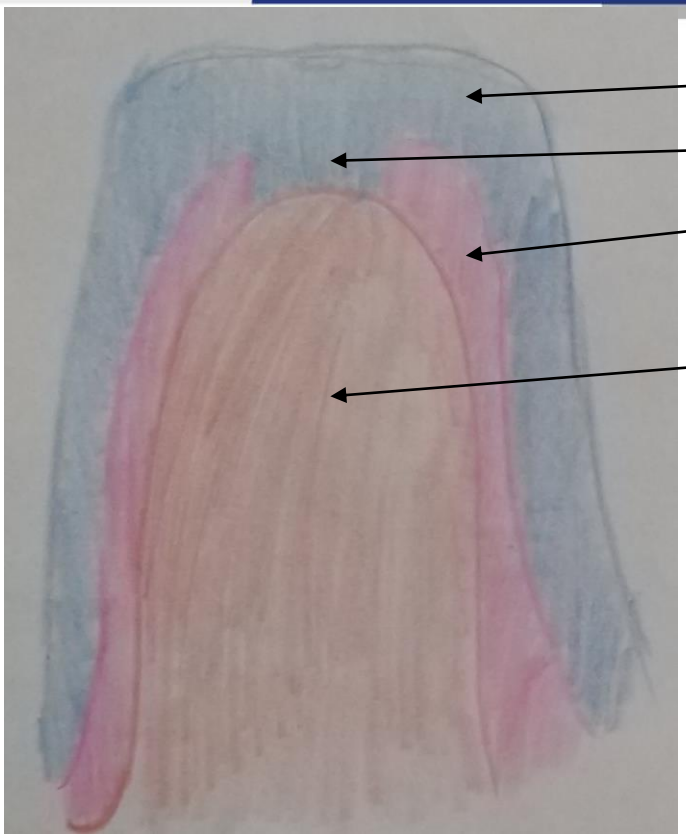
Spaced tray provide a space between the mucosa and the tray that will be filled with material. The space is done by placing a sheet of wax on the cast and perforate it in several points in such a way that the tray has contact with the mucosa in three points, other surfaces of the tray do not touch the cast. The points are selected in such a way that the tray will be stable on those points and the mucosa underneath in healthy (usually class I by Supple)

Spaced tray



Marking the areas for stoppers

Spaced tray (Scheme)



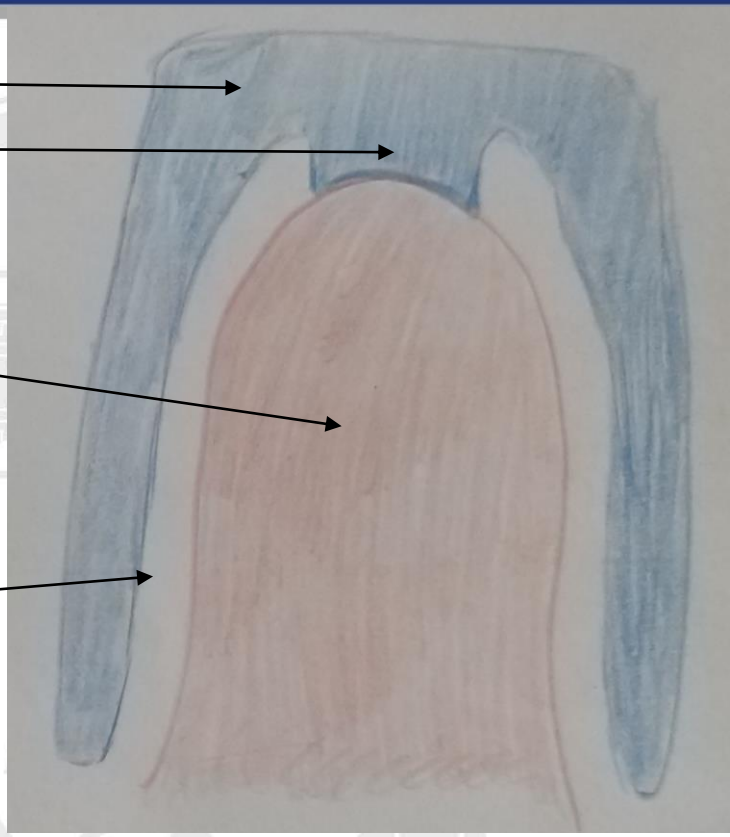
Tray

Stopper

Layer of wax

Alveolar process

Space between the tray and mucosa after wax is melted



The amount of space is determined by the thickness of the wax. The latter is determined by the type of material that will be used for impression, the more viscous is material the less space is required.

Spaced tray

Stoppers in the tray before (left) and after impression (right)

Spaced tray (required spaced for different materials)

Impression material	Space required
Zinc oxide and eugenol paste	No spacer wax (0.5–1 mm)
Silicone (medium bodied)	1.5–3 mm (one layer of wax)
Alginate	3 mm (two layers of wax)
Silicone (heavy bodied)	3–4.5 mm (three layers of wax)
Impression plaster	4.5 mm (three layers of wax)

Windowed tray

- Windowed trays are performed in cases when there is flabby ridges that cannot be surgically removed for some reasons. In this case the standard impression will move the flabby mucosa which will lead to lack of coincidence between mouth mucosa and the one from the cast.

Windowed tray

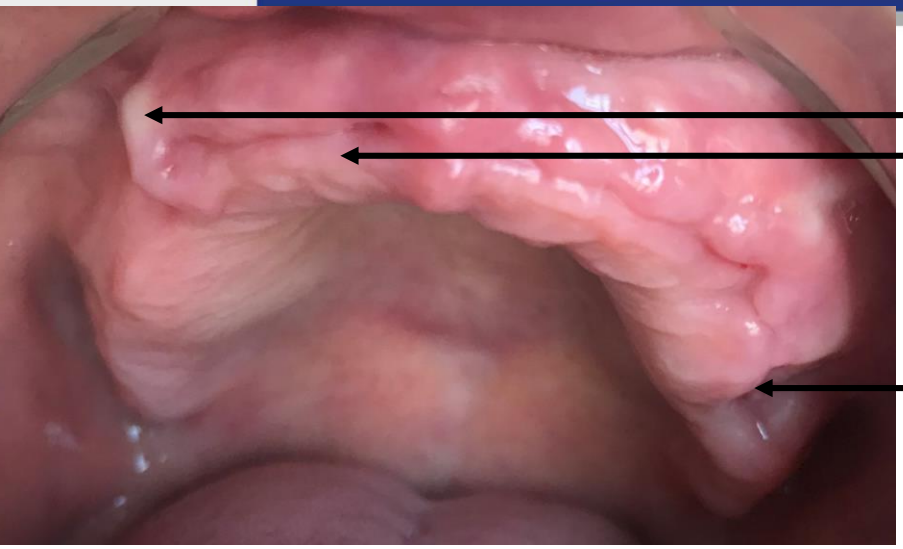
- The impression material is poured in the tray and inserted in the mouth, the windowed area will be covered gently with material without touching it at all the mucosa.

Before and after

Before making the individual tray but after marking the model analysis, the areas with thin mucosa, thick mucosa, small exostoses and undercuts must be highlighted. These areas must not be compressed during impression taking, the undercuts will not allow the removal of individual tray manufacturing or will traumatize the mucosa. Other elements (exostoses, thin mucosa, thick mucosa) will lead wither to trauma or lack of prostheses stability. These areas will be covered with a thin layer of wax.

Thus the tray will selectively compress the healthy mucosa and will not compress the areas that can cause pain. Such type of impressions are called selective-compressive impressions.

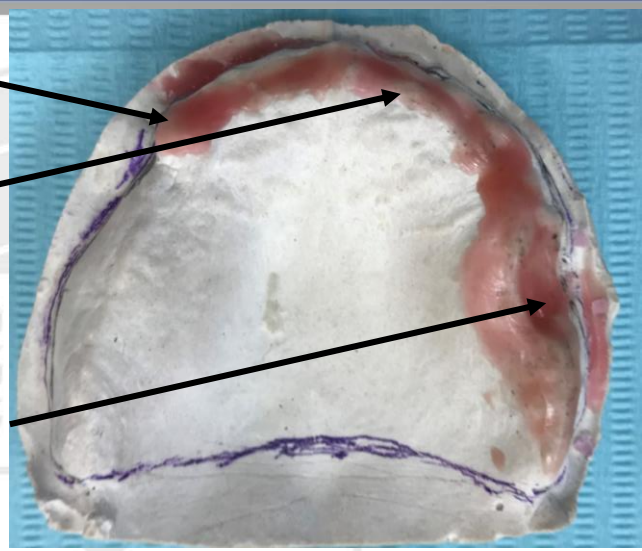
Before and after



exostosis

Unhealed mucosa

Unhealed post-extraction socket

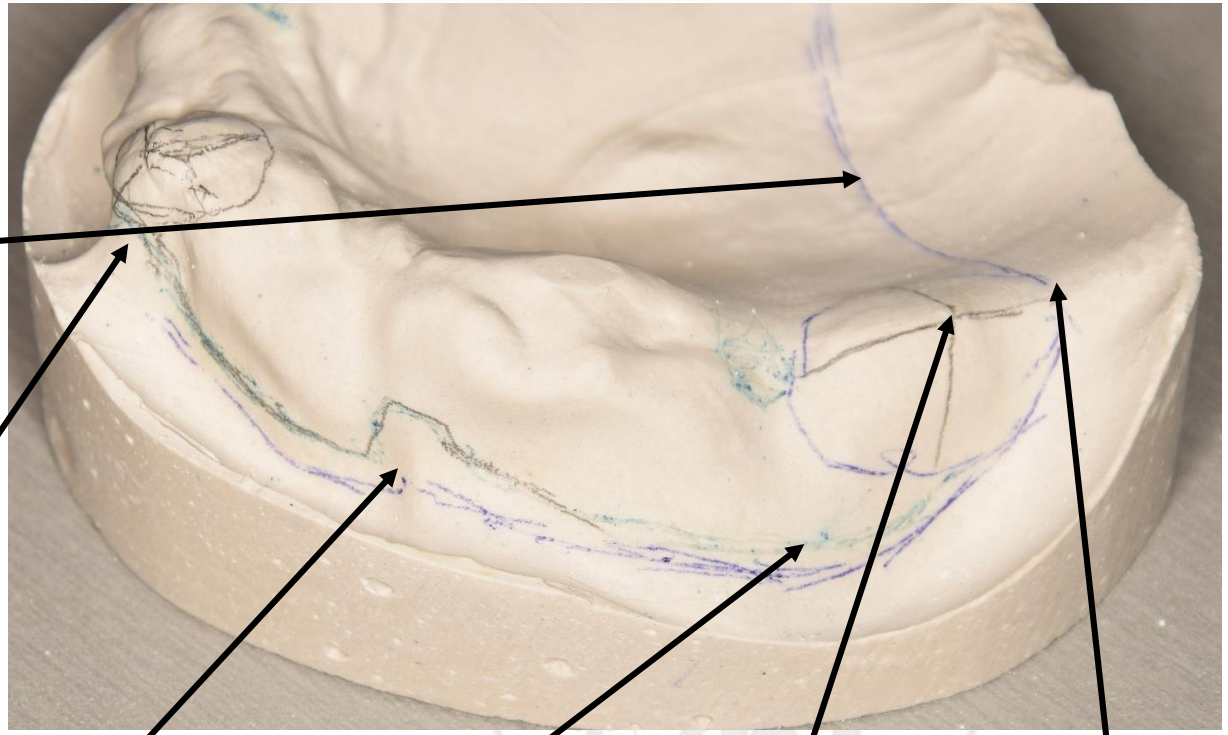


Would be ideally to reduce exostoses and hypertrophied mucosa or flabby ridges prior to fabrication of prostheses.

Individual tray manufacturing

Maxillary tray limits:

Go 2 mm away from fovea palatinae connecting the 2 hamular notches



Avoid the labial frenulum

Avoid buccal frenulum

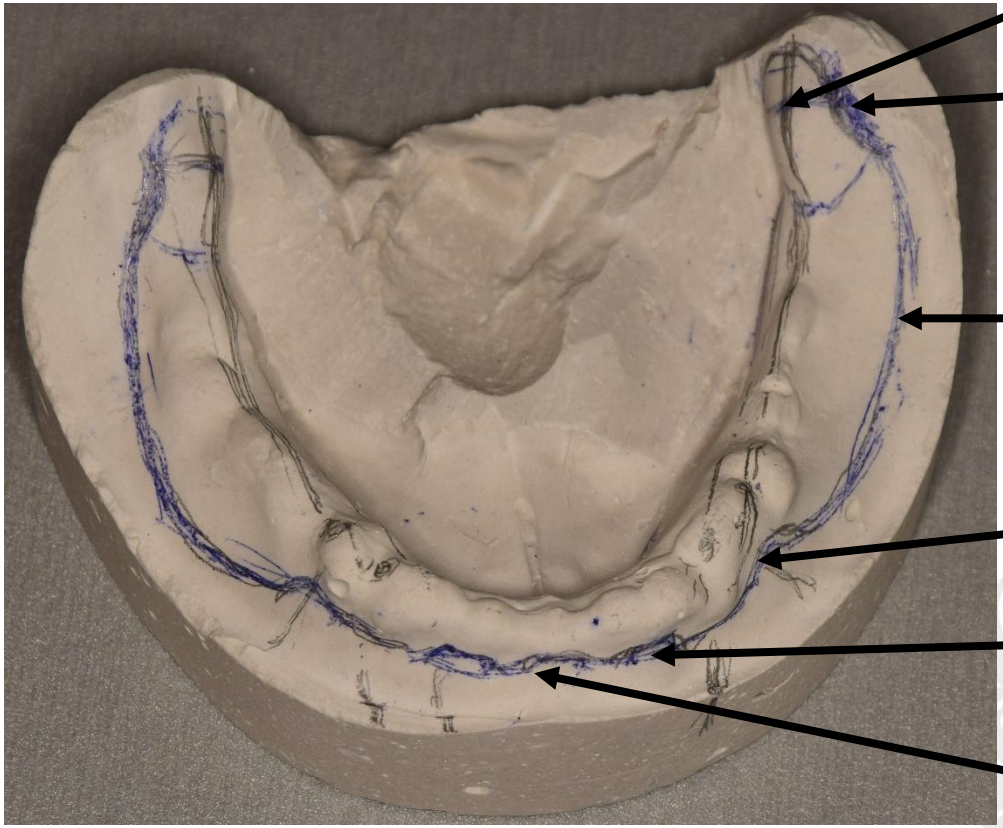
Go 2 mm above the deepest point

Draw the outline of tuberosities

Mark the hamular notch

Individual tray manufacturing

Mandibular tray limits:



Draw the limits of the retromolar pad

Avoid Someya sinew string

2mm above the deepest point of the sulcus or across the external oblique line

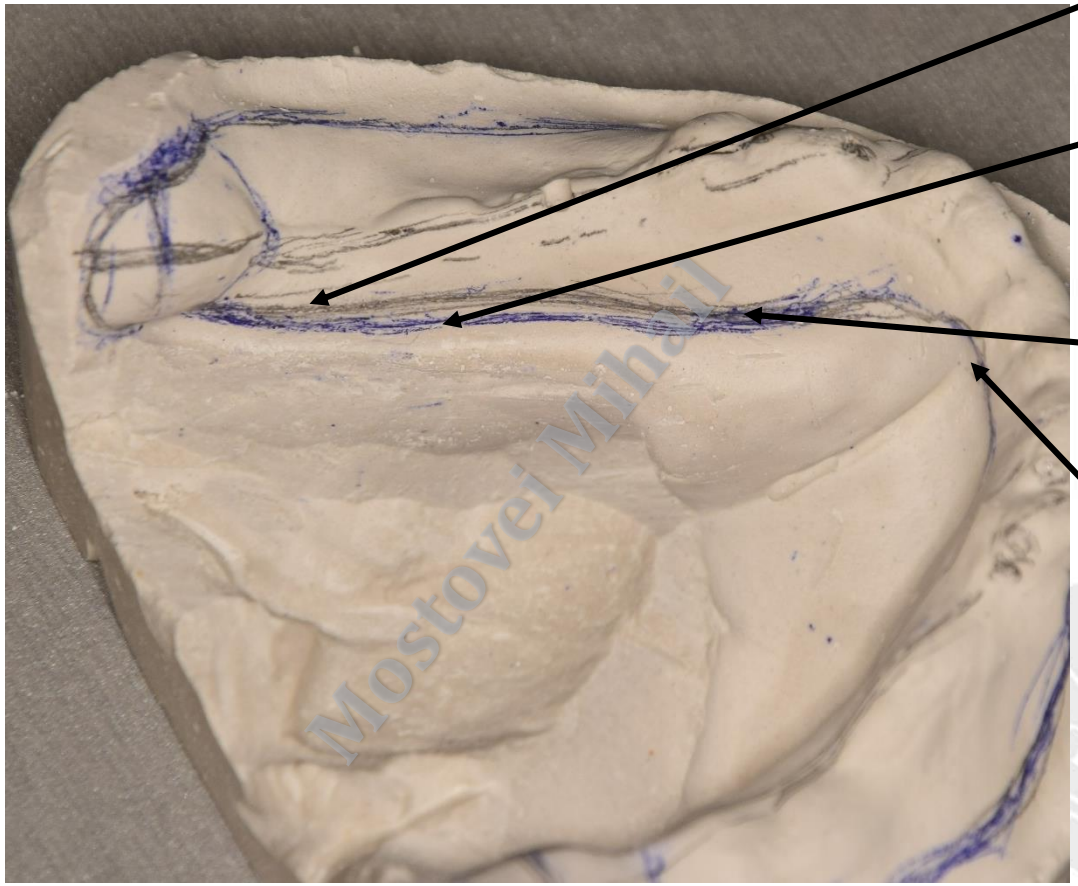
Avoid the buccal fold/frenulum

Avoid mentalis muscle or cover max 50%

Avoid labial frenulum

Individual tray manufacturing

Mandibular tray limits:



Draw the the mylohyoid line

Draw another line 2 mm below the mylohyoid line connected with retromolar pad

At the level of premolars follow the most convex part

Follow the most convex part in lingual central area avoiding the frenulum.

Individual tray adjustment

Extra-oral adjustment

Intraoral adjustment:

1. Passive adjusting.
2. Active adjusting.

Passive adjustment and active adjustment

- Firstly the impression is inserted in the mouth with no pressure and the borders are checked so they will correspond to the limits seen on the cast. If the tray is too long, then it will be trimmed.
- After passive adjustment, doctor will start the active adjustment by moving the patient's cheeks and lips slightly holding the tray, if the tray is displaced then adjustments are required.
- Afterwards Herbst tests are performed slightly holding the tray in place, if the tray is displaced then adjustments are required.

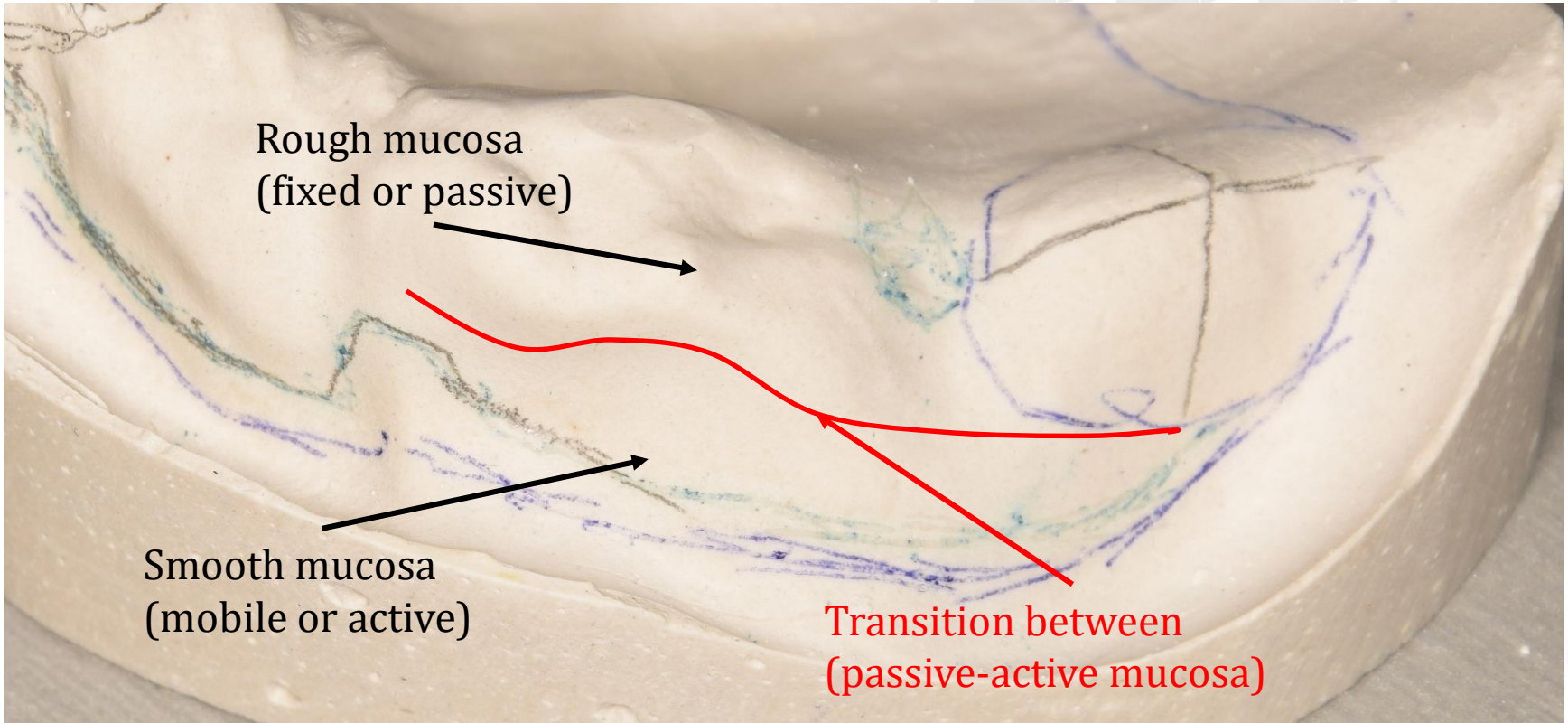
Border molding

Peripheral functional impression has the purpose to create the internal and external suction by registering the shape and size of functional areas.

For this purpose could be used impression compounds (Stens) or Silicon impression materials (heavy body).

Tips

Would be much easier to make the tray till the passive-active mucosa (transition between rough and smooth mucosa on cast) then to fill the required gap with border molding material.

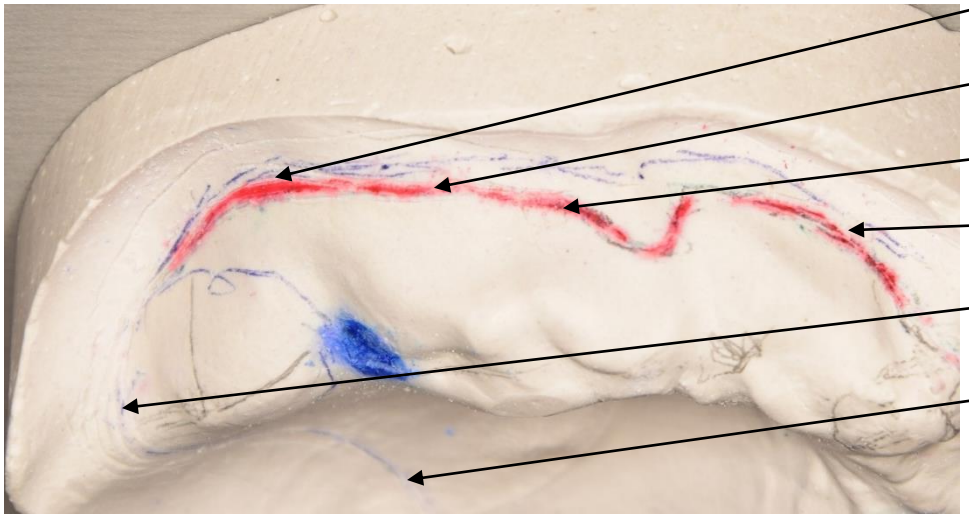


Border molding

Border molding maxillary tray

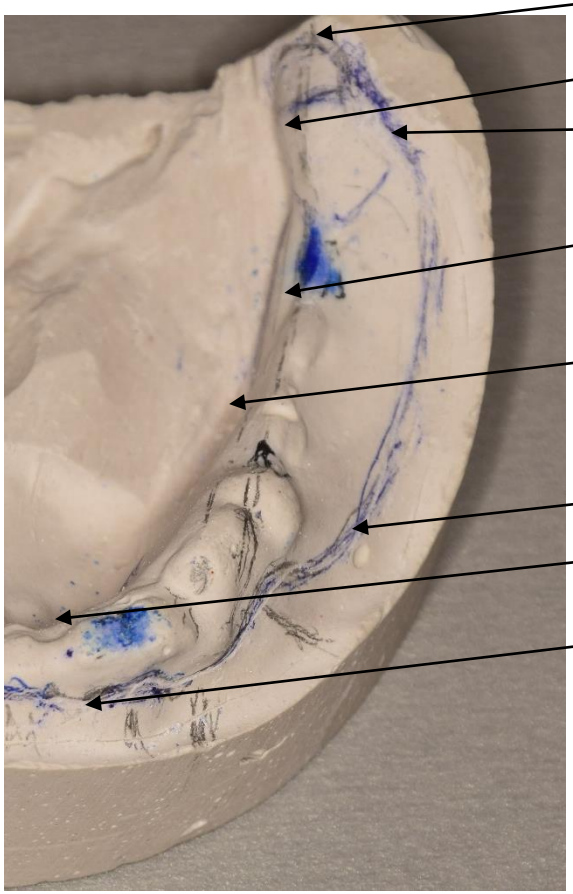
Border molding, mandibular tray

Functional impression, Herbst tests



- Moving mandible side to side.
- Slight opening of the mouth
- Forced smile
- Thumb sucking
- Wide mouth opening
- Valsalva test, phonetic test with a letter Ah.

Functional impression, Herbst tests



- Wide mouth opening
- Deglutition
- Slight mouth opening
- Tongue side to side to mouth corners
- Tongue side to side to the cheeks
- Forced smile
- Tongue to the nose
- Thumb sucking

Additional

- Pushing with the tong into inner part of the tray.

Final impression

Functional impression, maxilla

Functional impression mandible

Errors during functional immpresion



Errors during impression:

1. Air bubbles
2. Excessive material that can be swallowed or inhaled
3. Not enough placed material
4. Excessive material that will over-compress the mucosa during impression.