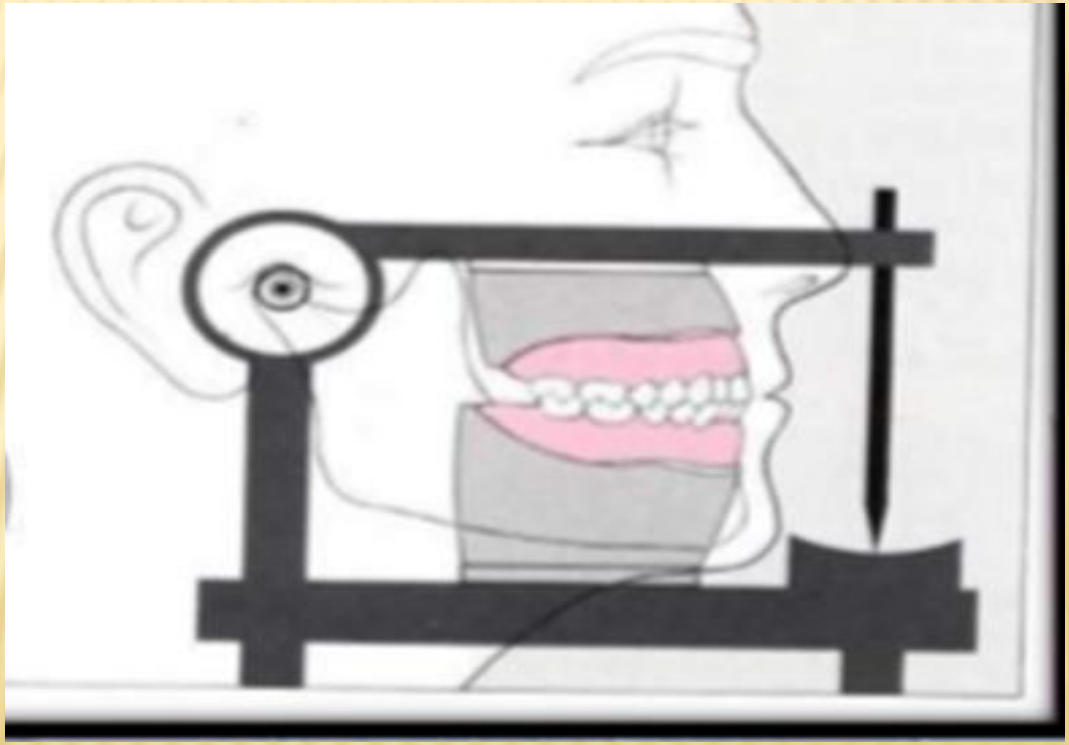
DENTAL ARTICULATOR

DENTAL ARTICULATOR

It is a mechanical device represents the TMJ, maxillary and mandibular arches to which maxillary and mandibular casts attached to simulate some or all mandibular movements.



FUNCTIONS

1- It allows most of the prosthetics work to be done in the absence of the patient.

2-Maintain jaw relation record during setting –up of teeth.

3-Denture re mounting after processing for correction of occlusal disharmony.

TYPES OF ARTICULATOR

- Simple hinge articulator (Class I) .
- Mean value (Class II).
- Adjustable articulator.

-semi adjustable(Class III).

-fully adjustable(Class IV).

- Digital computerized articulator.

CLASS I

Possible movement

1-Single hinge movement only (opening & closing).

2-No lateral movement.

.

Record required

-Vertical dimension of occlusion.

-Centric relation

Disadvantages

Not represented TMJ

CLASS II

Possible movement

1-Opening and closing

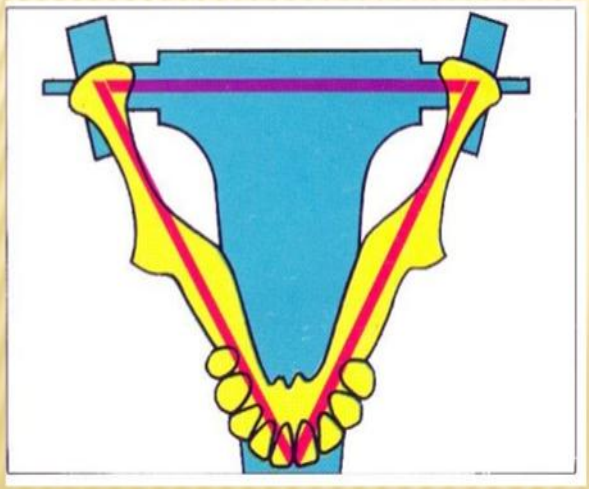
2-Protrusive movement

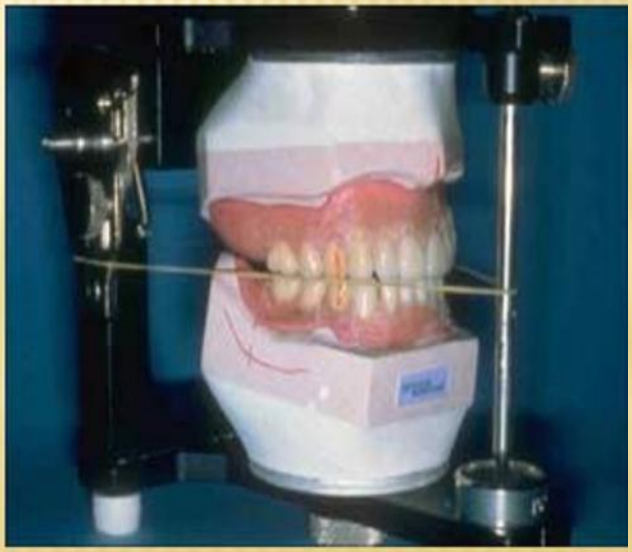
Record required

-Vertical and centric

-Face bow record

BONWILL TRIANGLE





DISADVANTAGES

- Most of these articulator not accepted face bow record
- No lateral movement
- It is successful in patient whose condyle approximate that of articulator

CLASS III

CLASS III

- The horizontal condylar path adjusted by protrusive movement obtained from the patient

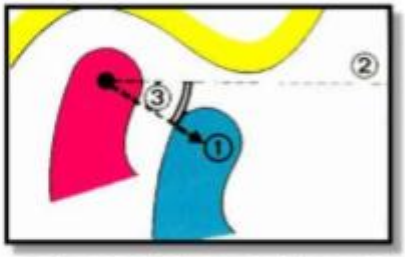
- lateral condylar path is adjusted according to hanau's formula:L = H / 8 +12

  L = lateral H =horizontal condylar path

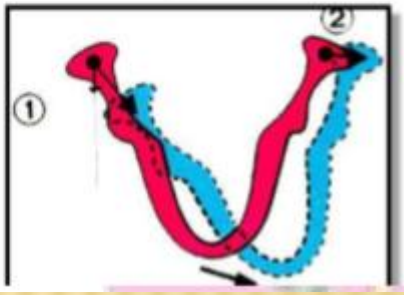
The inclination of the condylar path

Types :

A- Sagittal (HORIZONTAL) condylar path angle



B- Lateral condylar path angle

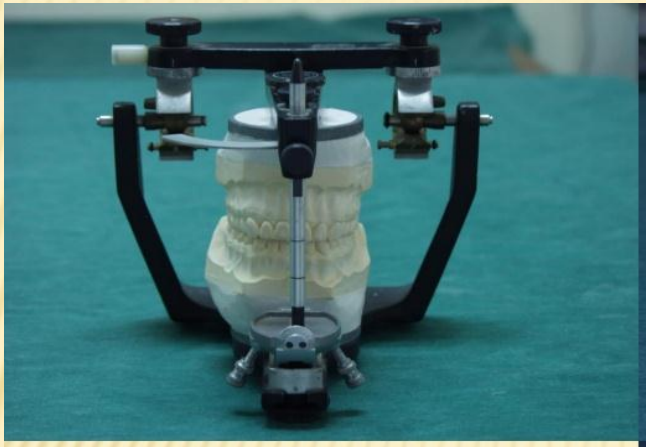


ARCON

MEAN IT HAS CONDYLES ON THE LOWER MEMBER AND THE CONDYLAR GUIDES ON THE UPPER MEMBER

Arcon articulator

NON ARCON



Non Arcon articulator

SEMI ADJUSTABLE ARTICULATOR

- **ARCON**: condylar elements are on the lower member of the articulator, mechanical fossae are placed on the upper member of the articulator
- **NON ARCON**: condylar path simulating the glenoid fossae are attached to the lower member, condylar elements are placed on the uper portion of the articulator

Possible movement

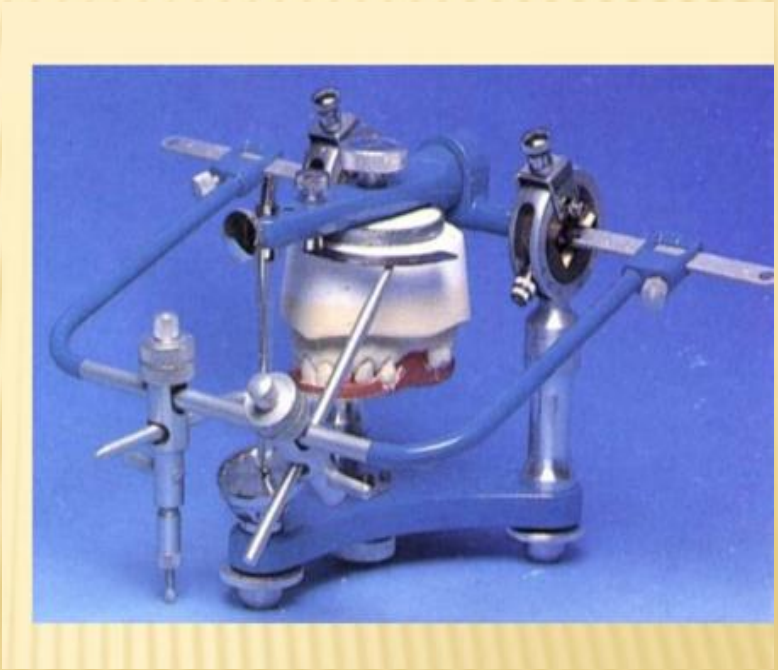
-Opening and closing

-Protrusive and lateral movement

-Some types have bennett movement

Record required

-Face bow record to mount the upper cast



-Vertical and centric relation record

-Protrusive record to adjust the horizontal condylar path inclination of the articulator

Disadvantages

-The lateral condylar path angle is determined from the formula.

-Most of them have no bennett movement

CLASS IV

It differ from the semi adjustable articulators in that the lateral condylar pat inclination are adjusted according to records taken from the patient.

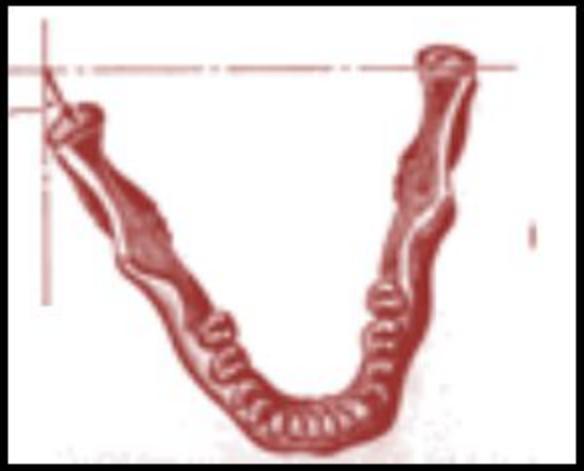
Possible movements

-The same movements of the semi adjustable articulators in addition they have Bennett movement.

Bennett Movement

It is defined as “the bodily lateral movement/ lateral shift of mandible resulting from movements of condyles along lateral inclines of mandibular fossa during lateral jaw movement”

Dr Norman Bennett



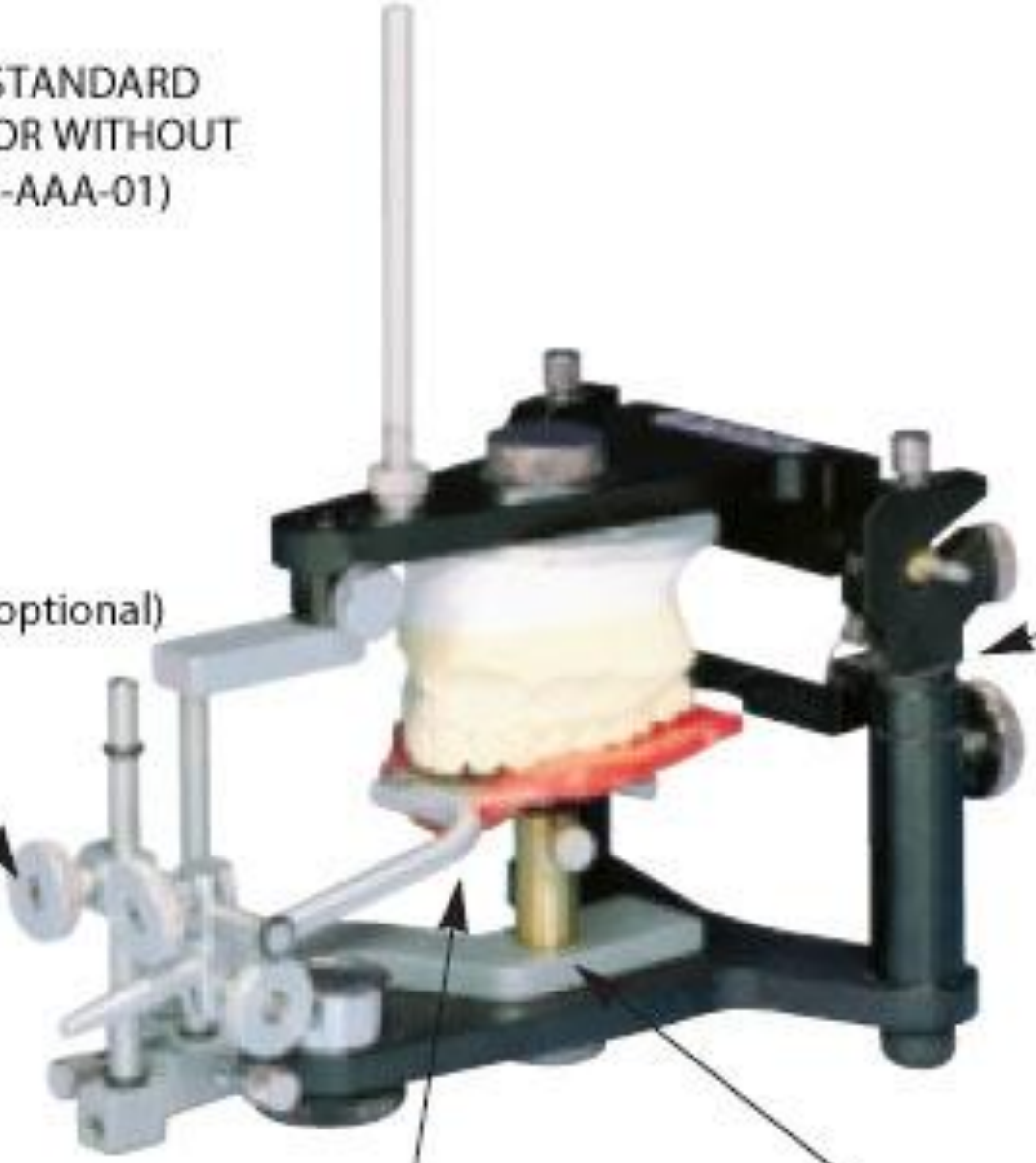
Records required:

-Face bow, vertical, centric and protrusive record. In addition:

-Right lateral record to adjust the left lateral condylar path inclination.

-Left lateral record to adjust the right lateral condylar path inclination.

VERSATILE STANDARD ARTICULATOR WITHOUT OPTIONS (D-AAA-01)



Provided with adjustable parts for a total, partial prosthesis, and a crown and bridge work.

Versatile Standard Articulator without options

D-AAA-01

D-AAD-01

Transfer Jig (optional)

D-AAG-01 Bite Fork (optional)

D-AAG-02 Bite Plane (optional)

D-AAC-01

Dual Index (optional item)

Disadvantages:

-Multi records are required with possibility of errors.

Therefore the ***semi adjusable***

enough for complete

denture construction

DIGITAL COMPUTERIZED ARTICULATOR

These are able to design prosthesis. They are capable of:

-Simulating human mandibular movements

-Moving digitalized occlusal surfaces against each other according to these movements

-Correcting digitalized occlusal surface to enable free movements

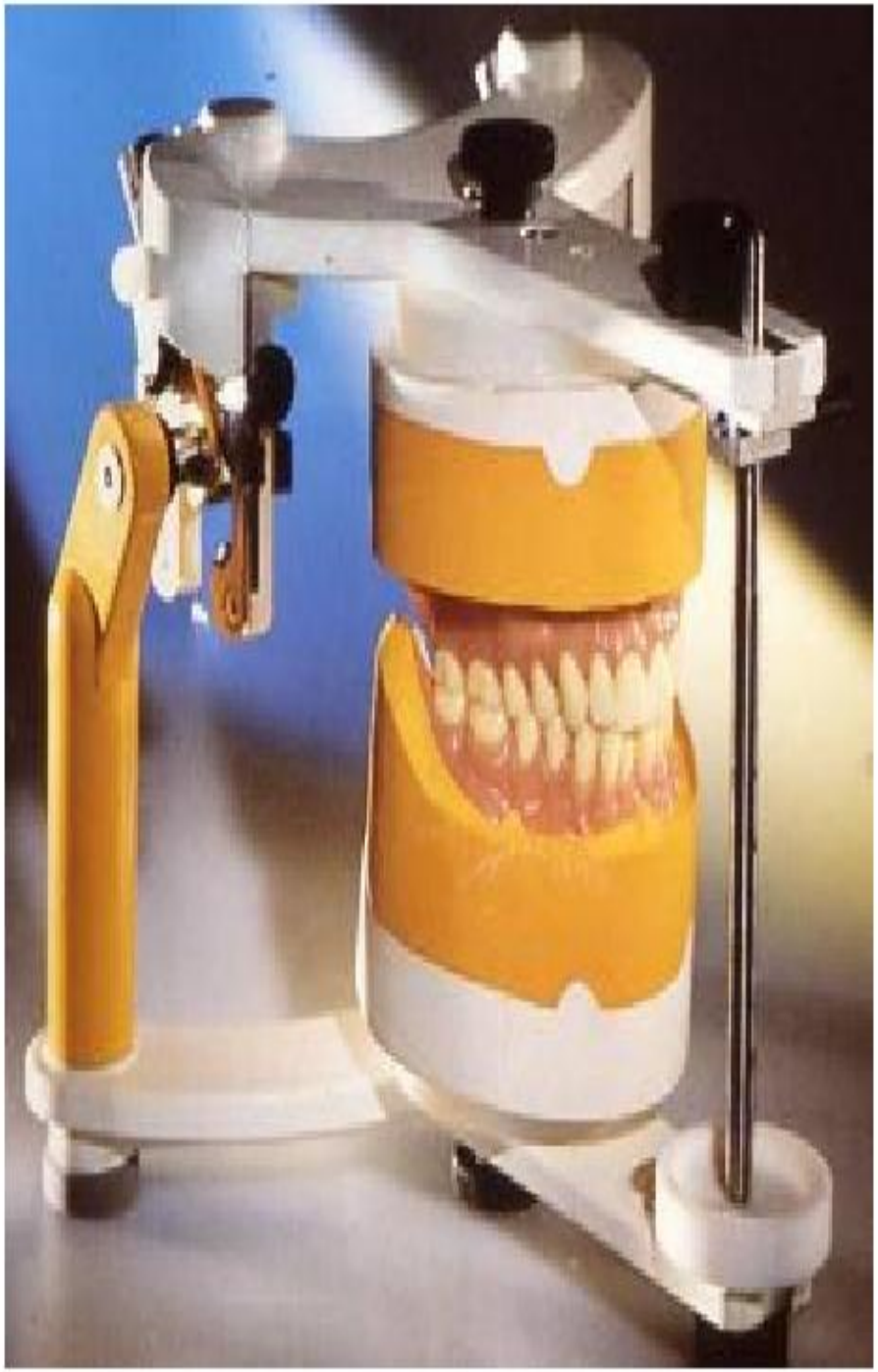
There are two types :

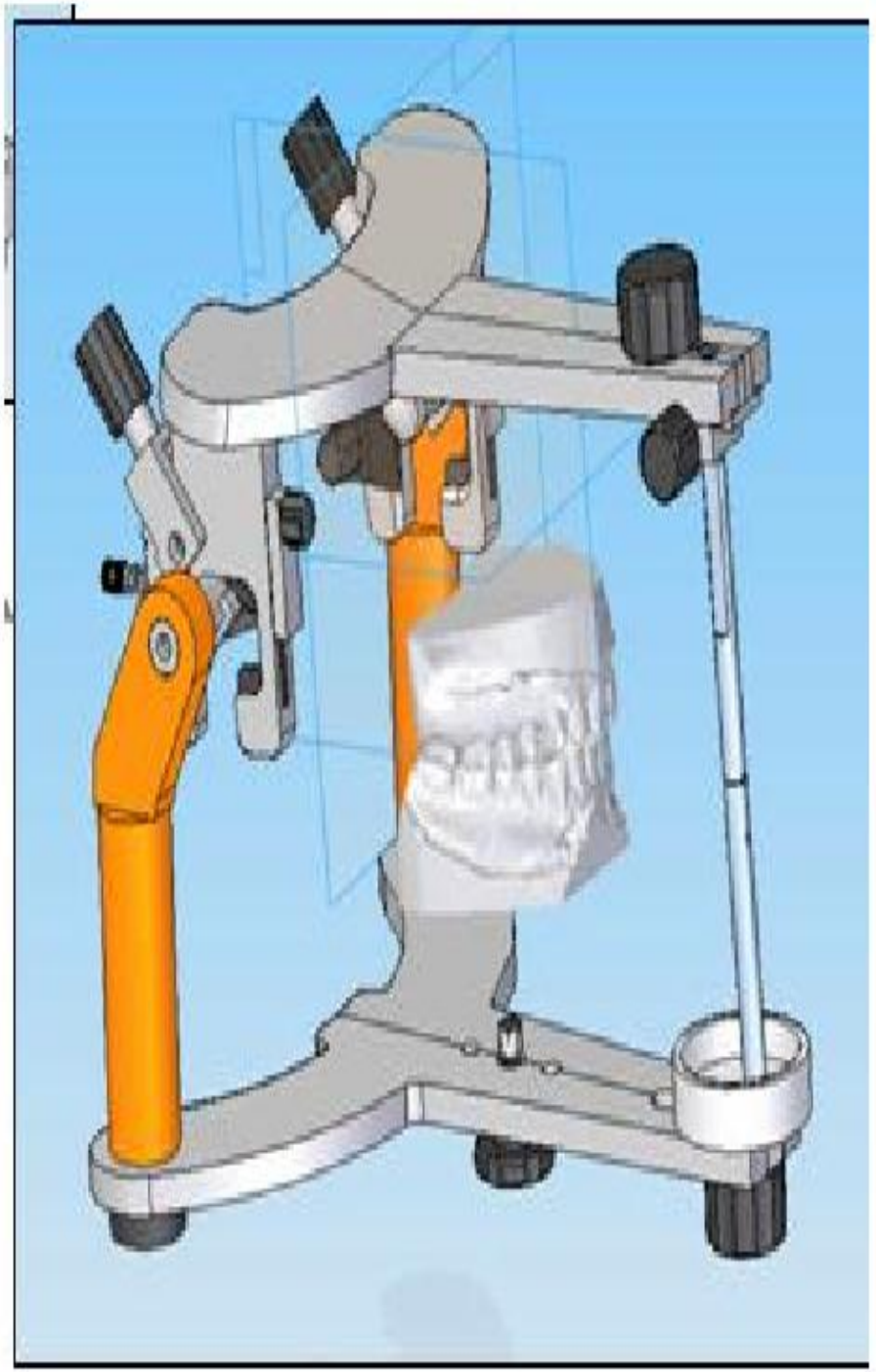
- **Completely adjustable articulators**

It records exact movement paths of mandible using electronic jaw registration system called (JMA).

- **Mathematically simulated articulator**

It is a fully adjustable 3D virtual articulator capable of reproducing the movements of a mechanical articulator





FACE BOW

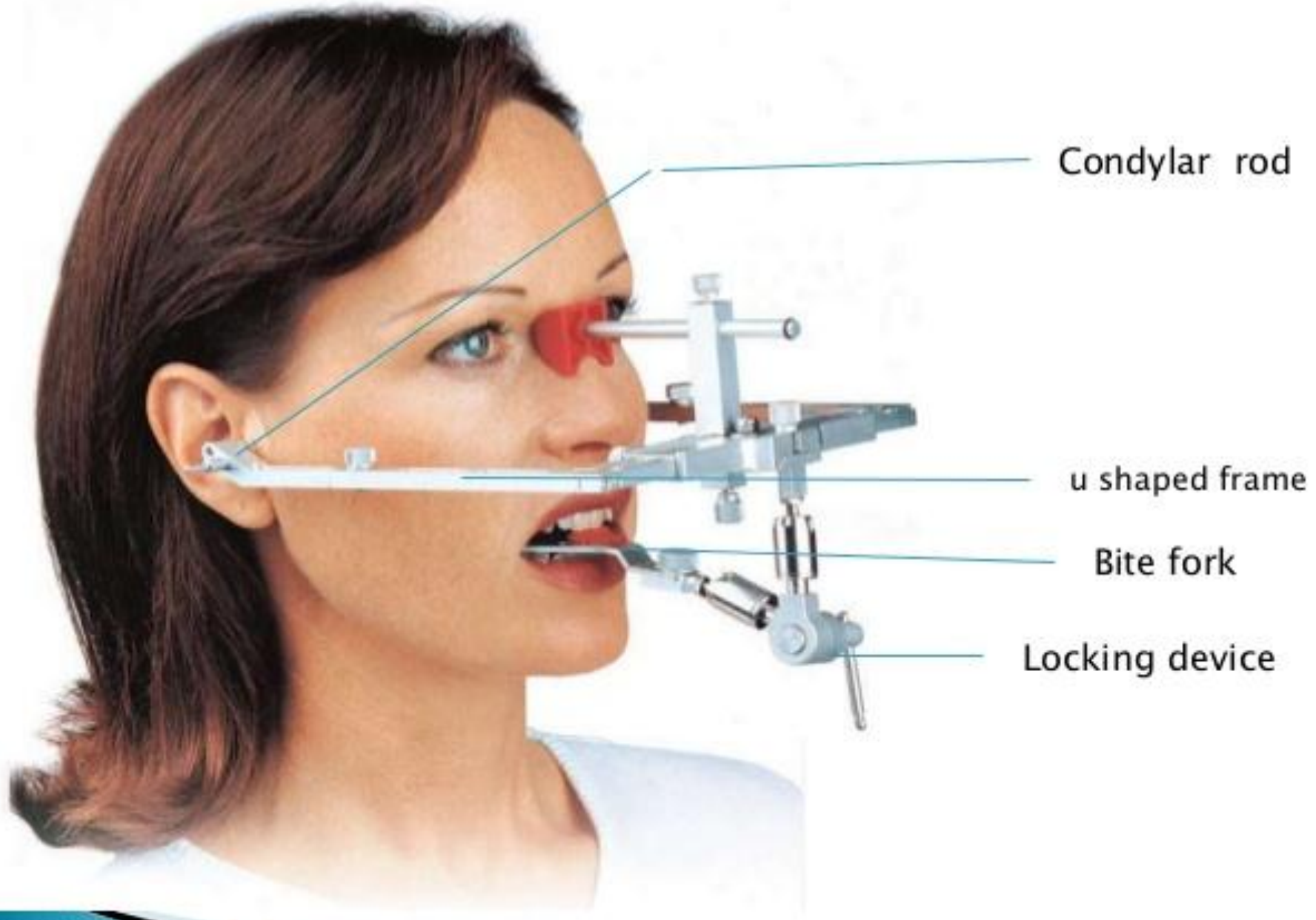
Caliper like device that is used to record the relationship of maxilla to the TMJ or the opening axis of the jaw and to orient the cast in the same relationship to the opening axis of articulator.

It consist of :

-U-shaped frame.

-The condyle rods.

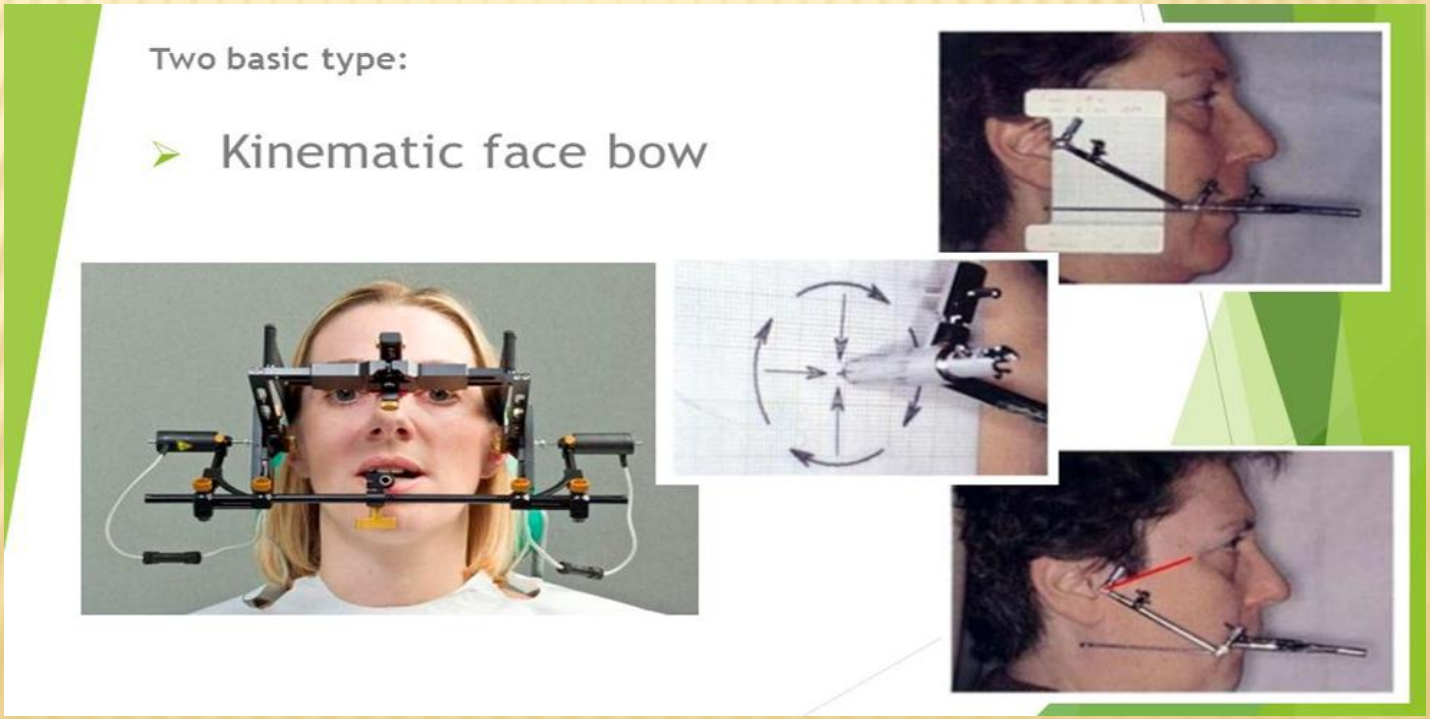
-The fork.


Condylar rod
u shaped frame
Bite fork
Locking device

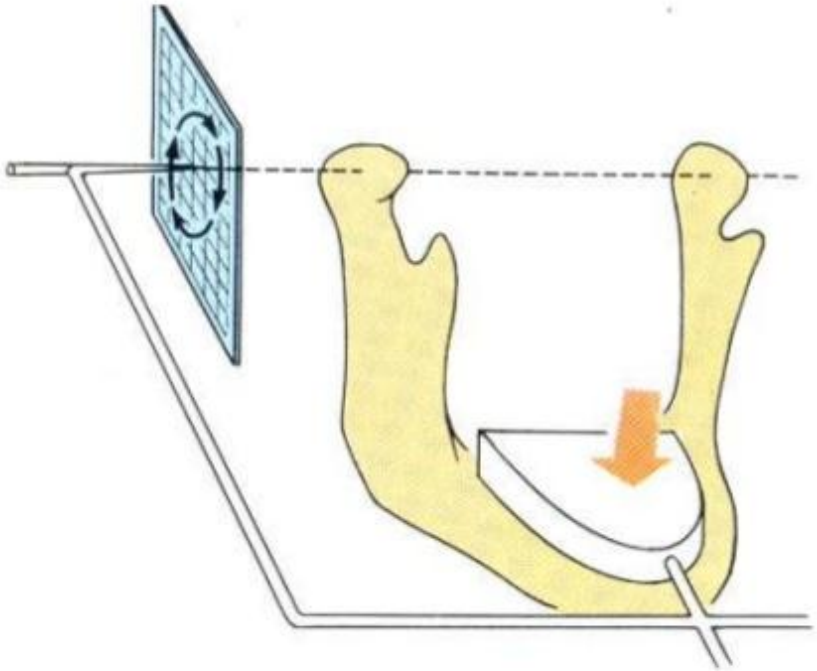
TYPES OF FACE - BOW

The kinetic face-bow

It is used to locate the kinematic transverse hinge which is an imaginary line in which the mandible rotates during opening and closing.

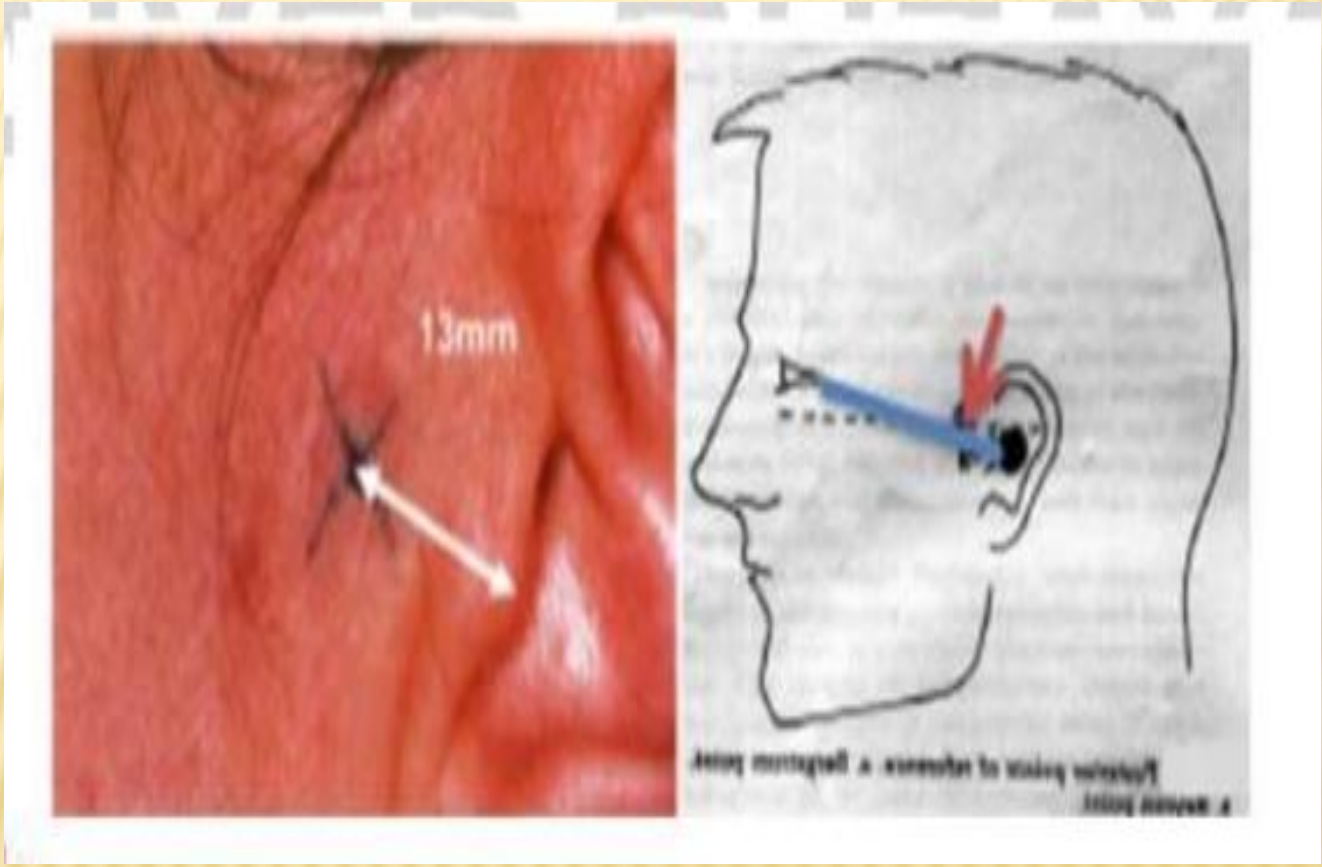


Use of kinematic bow for edentulous patients



The maxillary face-bow

It is used to record the position of the upper jaw in relation to the arbitrary hinge axis which is positioned on a line extending from the outer canthus of the eye to the middle of the tragus of the ear and approximately 13 mm in front of the external auditory meatus


13mm

IMPORTANCE OF THE FACE BOW

- An arbitrary mounting of the maxillary cast without a face bow transfer can introduce errors in the occlusion of the finished denture.
- It allows minor changes in the occlusal vertical dimension.
- It is helpful in supporting maxillary cast while it is being mounted on the articulator


thank
you

LECTURE ONE \ 2nd class \ prosthdontics- Dr. reem

Complete denture prosthesis definition and objective

Prosthodontics :Is (the branch of dental arts and science pertaining to the restoration and maintenance of oral function by the replacement of missing teeth and structures by artificial devices).

The term ***Prosthodontics*** is a combination of the words prosthesis and dentistry.

Prosthesis: Is defined as the replacement of an absent part of the human body by an artificial part. *Thus, any dental restoration is a prosthesis.*

Branches of prosthodontics:

1. Fixed prosthodontics

2. Removable prosthodontics

a) complete denture prosthodontics

b) partial denture prosthodontics

3. Implant prosthodontics

4. Maxillofacial prosthetics

.The complete denture: A dental prosthesis that replaces the lost natural dentition and associated structures of the maxilla and mandible.

The partial denture: A prosthesis that replace one or more, but less than all, of the natural teeth and associated structures and that is supported by the teeth and/or mucosa.

Anatomical and esthetic changes after loss of teeth

- Unattractive appearance when the person has lost one or more of anterior teeth.
- **Change in the shape of the lips or cheeks due to loss of support by teeth**
- **Change in a person's appearance due to conscious or subconscious efforts to avoid smiling**
- **Change in facial contour resulting from loss of support from muscles of facial expression**

- **Illusion prominent chin resulting from the mandible being closer to maxilla i.e. loss of vertical dimension.**

Objectives of complete denture

1. To restore masticatory function. Chewing makes eating more enjoyable.
2. To restore or improve the appearance of an individual.
3. To improve speech. Many sounds are formed by the tongue contacting or valving against the teeth.
4. To carry out these procedures in such a manner as to cause the patient no harm or discomfort. An uncomfortable patient is unhappy.
5. Preservation the health of alveolar bone and tempro -mandibular joint

The primary difference between a complete denture and a removable partial denture is the method by which the prosthesis gains support.

****A complete denture** is supported by bone covered by soft tissue (mucosa).

****A removable partial** denture gains support from the bone covered the mucosa, and from the remaining teeth

complete denture have 3surfaces:-

1- The fitting surface (denture basal surface)

It is that portion of the denture surface which has its contour determined by the impression. It includes the

borders of the denture and extends to the polished surface.

2- The occlusal surface. :-

The portion of the denture surface that makes contact with its antagonist (opposing occlusion) include teeth

3- The polished surface:

That portion of the denture surface which extends in an occlusal direction from the border of the denture and includes the palatal surface. It is part of the denture base which is usually polished and includes the buccal and lingual surfaces of the teeth.

Sequence of prosthodontic treatment of complete denture

1-The first step is to determine what the condition and the next step is to determine what to do (treatment plane)

2-Diagnosis is required to take the history from the patient

3-The construction of complete denture require five appointment , each appointment of the first four steps require laboratory.

A- First appointment :

-Clinical procedure : primary impression (preliminary

impression) are made with stock tray.

-Laboratory procedure: the impression are poured with plaster to produce primary cast (preliminary cast) on which the special tray is constructed .

B- Second appointment:

-Clinical procedure: secondary or final impression are made .

-Laboratory procedure: the final impression are poured, then base plate and occlusal rim are constructed .

C- Third appointment:

-Clinical procedure: vertical dimension is determined and centric relation is taken.

-Laboratory procedure: the cast are mounted on articulator and the tooth are arranged on the bite rim.

D- Fourth appointment:

-Clinical procedure: (trial stage) the dentist tries the denture and check for proper placement and arrangement of teeth, appearance and speech.

-Laboratory procedure: flasking, packing, finishing and polishing .

E- Fifth appointment: the denture is delivered to the patient, it may require adjustment of the denture.

Anatomical landmarks of the mandibular arch

They can be divided into :

Limiting structures: which determine the extent of the denture

1- Labial frenum

2- Labial vestibule

3- Buccal frenum

4-buccal vestibule

5- lingual frenum

6- Alveo lingual sulcus

7- Retromolar pads

Labial frenum:- It is a fibrous band similar to that found in the maxilla .Unlike the maxillary labial frenum , it is active . It receive attachment from the Orbicularis Oris muscle.

Labial Vestibule:- This is the space between the residual alveolar ridge and the lips. The length and thickness of the labial flange of the denture occupying this space is influence lip support and retention.

Buccal frenum:- It should be relieved to prevent displacement of the denture during function.

Buccal Vestibule:- It extend posteriorly from the buccal frenum till the retro molar region

retromolar region . It is bounded by the residual alveolar ridge on one side and buccinator muscle on the other side .

Lingual Frenum:- The height and width of the frenum varies considerably . Relief should be provided in the anterior portion of the lingual flange. A high lingual frenum should be corrected if it affects the stability of the denture.

Alveo lingual Sulcus:- It extends from the lingual frenum to the retro mylohyoid curtain . It is considered in three regions anterior, middle and posterior.

a-Anterior region:- it extends from the lingual frenum to the pre mylohyoid fossa

b-Middle region :- it extends from the pre mylohyoid fossa to the distal end of the mylohyoid ridge this region is shallower than other parts of the sulcus this is due to the prominence of the mylohyoid ridge and action of the mylohyoid muscle.

c-Posterior region :- the retro mylohyoid fossa is present here this region complete the typical S –form of the lingual flange of the lower denture

Reromolar pad:- It is an important structure, which forms the posterior seal of the mandibular denture . It is non -keratinized pad of tissue seen as a posterior continuation of the pear-shaped pad, located distal to the third molar . It is a collection of loose connective tissues with an aggregate of mucosal glands.

Supporting Structure:-

The support for mandibular denture comes from the body of the mandible . The available denture –bearing area for an edentulous mandible is 14cm^2 but for maxilla is 24cm^2 . So, the mandible is less capable of resisting occlusal forces.

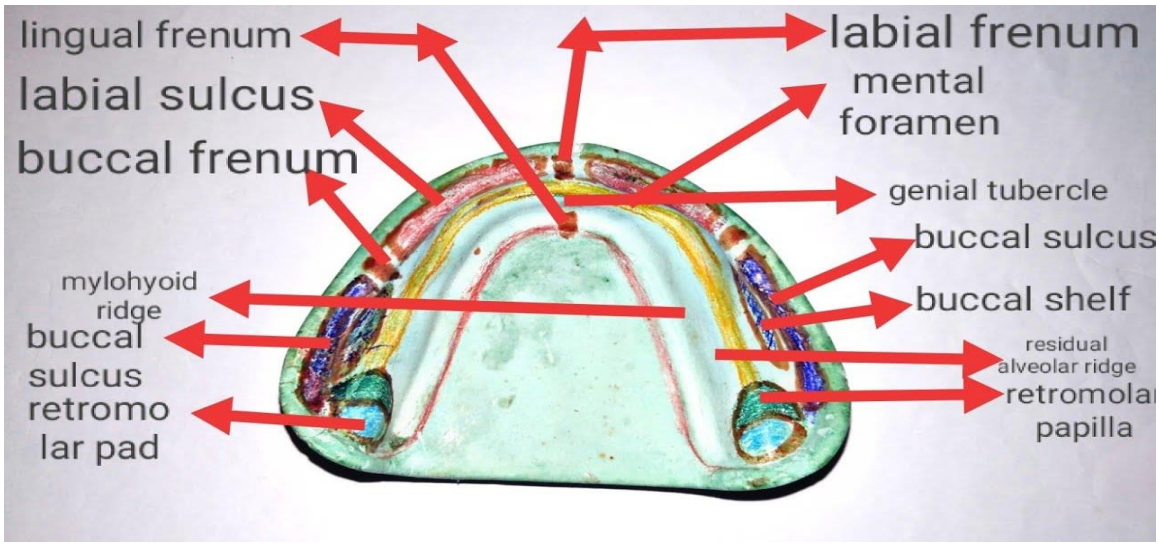
supporting structure are:-

1- Buccal shelf area

2- Residual alveolar ridge.

- **Buccal shelf area:-** It act as a primary stress bearing area , located between the buccal frenum and anterior border of the masseter muscle. *The external oblique ridge is most prominent in the molar area and forms a distinct ledge with relation to the base of the alveolar process, this ledge is called the buccal shelf. The buccal shelf is a ledge located buccal to the base of the alveolar ridge in the bicuspid and molar regions.*

  Residual alveolar ridge:- The edentulous mandible may become flat due to resorption and become inclines outward and becomes progressively wider.



Relief areas:-

1- Mylohyoid ridge.

2- Mental foramen

3- Genial tubercle

4- Torus mandibularis

Mylohyoid ridge:-

Located on the internal surface of the mandible, the mylohyoid ridge occupies a position similar to the external oblique ridge on the external surface. The mylohyoid ridge passes forward and downward from the internal aspects of the ramus onto the body of the mandible and fades out near the midline.

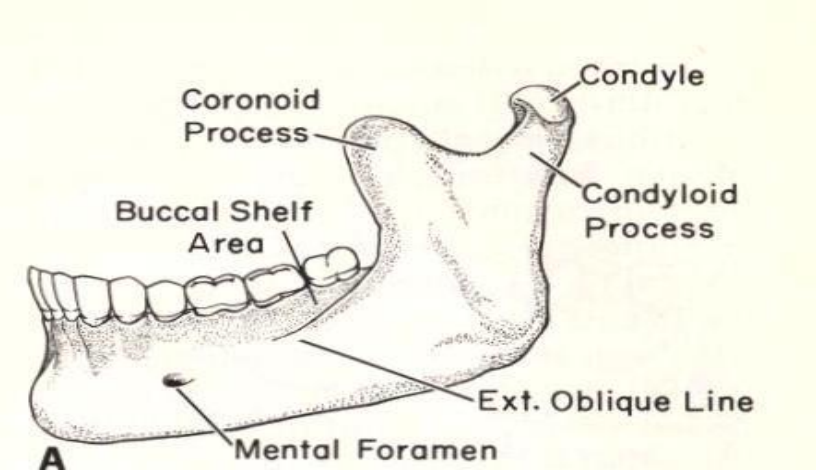
Thin mucosa over the mylohyoid ridge may get traumatized and should be relieved.

Mental foramen:- It lies between the 1st and 2nd premolar region .Pressure over the nerve produces numbness and paresthesia, so it should be relieved.

Genial Tubercles. *Slightly above the lower border of the mandible in the midline, the bone is elevated to a more or less sharply defined prominence forming the genial tubercles*

Due to resorption, it may become increasingly prominent making denture usage difficult.

Torus mandibularis:- *It is an abnormal bony prominence found bilaterally on the lingual side, near the premolar region. It is covered by a thin mucosa .It has to be relieved or surgically remove if large in size.*



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Impression trays, primary impression and stock tray

An Impression is defined as :- negative likeness of the teeth and/or edentulous areas where the teeth have been removed ,made by a plastic material which becomes relatively hard or set while in contact with these tissues. Impressions may be made of full complements of teeth , or areas where some teeth have been removed , or in mouth from which all teeth have been removed.

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.

Impression making is the primary step in the process of complete denture fabrication . Impression are made to produce a negative replica of the patient, s mouth into which plaster or stone can be poured to form the positive replica –the **cast**. The cast consider as a template over which complete denture is fabricated. Errors in impression making can lead to treatment failure. Impression for completely edentulous patient consist from two impressions:

1-primary impression

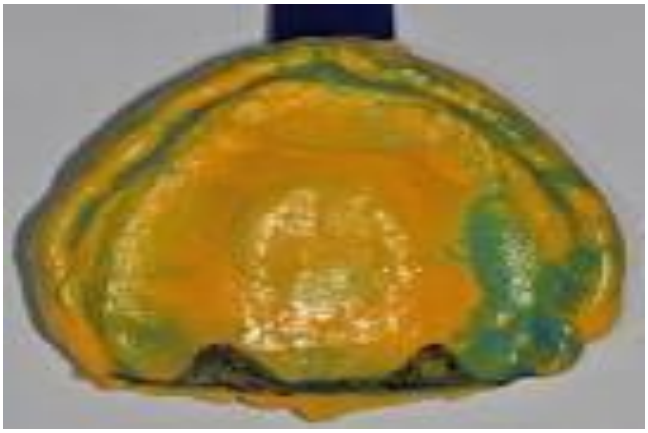
2-secondary or final impression

Primary impression

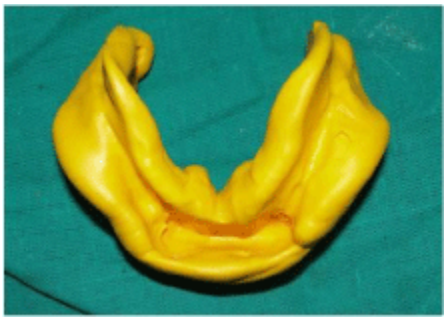
Also called preliminary or diagnostic impression is defined as a negative likeness made for the purpose of diagnosis ,treatment plan and for the construction of a special tray.

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.

When we making maxillary impression , it should include : the hamular notches, fovea palatine, frenum attachments, palate, and the entire labial and buccal vestibules.



When we making mandibular impression should include: the retro molar pad, the buccal shelf areas, the external oblique ridges, frenum attachments, sublingual space, retro mylohyoid space, and the entire labial and buccal vestibules.



Impression tray

is defined as:- A device which is used to carry ,confine and control an impression material while making an impression.

PARTS OF THE TRAY:-

1-Body (floor &flange)

2- Handle

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)

Classification of impression trays:-

l-classification based on whether they are prefabricated or individualized:-

1-Stock tray (ready made):used for making primary impression

2- Special tray (special made for individual patient): Used for making secondary or final impression also called custom tray

Trays used for primary impression making are called

stock trays:- They are factory prepared and are available in standard sizes. They are made of metal or plastic, can be perforated or non- perforated , disposable plastic stock trays are

also available. As standardized trays will not adapt closely to the patients arch , an approximately tray should be selected for each patient. 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.

II- Classification according to Materials used for fabrication of stock trays:

1- Metal

* Tin-lead alloy.

* Stainless steel.

2- Plastic

III- Based on whether it can be reused again or not

1-Disposable trays.

2-Non disposable trays

Advantages of stock tray

1- Rigid and support the set impression material.

2- Dimensionally stable.

3- Tray is smooth. So, no injury to the tissue.

4- Multiple set in several patients.

COMMON FAULTS IN IMPRESSION MAKING

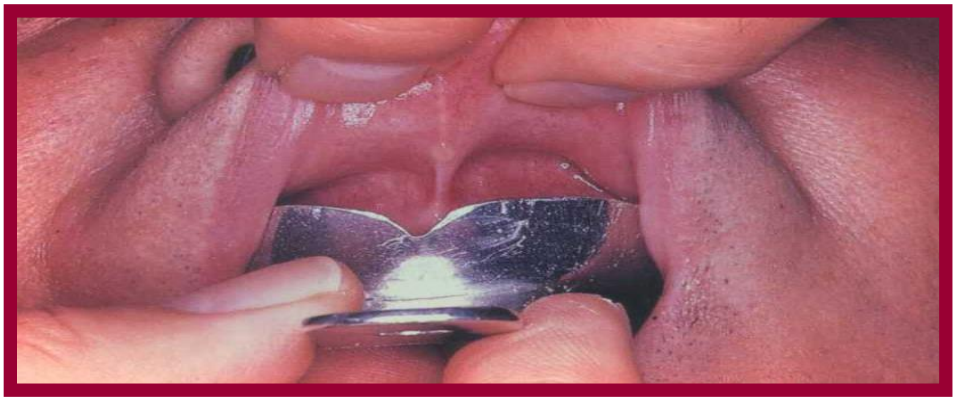
1- Poor selection of the tray and materials

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- Incorrect position of the tray before finally seating it



MATERIALS USED FOR MAKING PRIMERY IMPRESSION

1-alginate(irreversible hydrocolloid)

2-silicone (putty type)\non hydrocolloid

3-impression compound (disk form)

Production of study cast:-

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

The plaster mixed with water by the saturation method in the rubber bowel and pour in the impression. When the plaster becomes hard, the cast is separated from the impression.

Before making final impression we should making

Impression border molding:

The shaping of the border area of an impression tray by functional or manual manipulation of the tissues adjacent to the borders to duplicate the contour and size of the vestibule THEN MAKING FINAL IMPRESSION

OBJECTIVES of border molding

1-To shape the border of impression in order to allow the muscles to function in harmony with the denture.

2-To improve the border seal of the denture

MATERIALS USED FOR BODER MOLDING

1-Stick compound.

2-Polyether impression paste.

3-Impression wax

4-Tissue conditioners.

Objectives for taking final impression

1-To obtain an impression from which a retentive, stable and comfortable denture base can be constructed.

2-To record as accurately as possible the shape of the mucosa overlying the alveolar ridges and hard palate together with functional depth and width of sulci

RECORD BASES

A record base or base plate is a temporary form representing the base of a denture. It is used in recording maxillo-mandibular relations and in the arrangement of the teeth

Requirements :

1-should be rigid.
2-should be accurate.
3-should be stable.
4-the borders should be round & smooth as the borders of finished dentures.
5-should be thin at the crest ,labial & buccal slopes to provide space for tooth arrangement.

OBJECTIVES

1-To retain the recording medium or device used for recording maxillomandibular relations.

2-to aid in transfer of accurate jaw relationships to an articulator.

3-To enable the setting of artificial teeth for the trial denture.

TYPES OF RECORD BASE

1-Temporary record bases:

They are discarded and replaced by denture base material, once their role in establishing jaw relation, teeth arrangement and try in is complete.

Types of temporary record bases:

1-Shellac base plate

2-Reinforced shellac base plate

3-Cold cure acrylic resin

4-Visible light cure acrylic resin

5-Vacuum formed vinyl and polystyrene

6-Base plate wax

2-Permanent record bases: They are not discarded and become part of the actual base of the finished complete denture.

Types of permanent record bases:

1-Heat cure acrylic resin 2-Gold

3-Chromium-cobalt alloy 4-Chromium-nickel alloy

SHELLAC BASE PLATE

METHOD FOR USING SHELLAC

1-Any undercuts are relieved, and separating medium is applied to the cast.

2-The shellac record base forms are manufactured in the shapes of the maxillary and mandibular arches.

3-The forms are softened with an **open flame** and molded to the cast with an instrument or the fingers.

4-While the material is in a softened state, the excess is removed with scissors.

5-After hardening, the borders are smoothed but as a rule will not take a polish.

Advantages:

1-They will adapt to intimate contact with the master cast.

2-Require short time for construction.

3-Inexpensive and uniform thickness

4-Can be corrected easily by reheating and readapting to the master cast.

Disadvantages :

1-Although shellac record bases are easily and quickly adapted, they are not considered satisfactory.

2- They warp, do not fit accurately, distort easily, lack rigidity, become brittle and break, and will not permit polishing of the borders.

COLD CURE ACRYLIC

METHODS OF USING COLD CURE ACRYLIC:

Different methods can use this type of acrylic we can use either :

1-Sprinkle on method
2-Finger adapted dough method
3-Flasking method
4-Stone mold method *
5-Wax-confined method

SPRINKLE ON METHOD

1-Any undercuts are relieved, and separating medium is applied to the cast.

2-Using an eye dropper apply the monomer to the cast, carefully add the polymer (salt and pepper technique) until a sufficient thickness is gained over the entire surface of the cast.

3-The processed base is removed from the cast, smoothed, and polished at the borders.

FINGER ADAPTED DOUGH METHOD

1-Any undercuts are relieved, and separating medium is applied to the cast.

2-The self -curing resin is mixed according to manufacturer instructions

3-When it reach the dough stage, it is molded to the cast with instrument or fingers. It is allowed to polymerized completely.

4-The processed base is removed from the cast, smoothed, and polished at the borders.

Advantages:

- Good strength no need for reinforcement
- Good dimensional stability
- Does not wrap during manipulation
- Closely fit to the master cast

Disadvantages:

- Require more time in fabrication
- Difficult to control the thickness
- Residual monomer can cause irritation to oral tissues

VISIBLE LIGHT CURE ACRYLIC

Method of using

1-Any undercuts are relieved, and separating medium is applied to the cast.

2-Adapt a sheet of pink base plate material to the cast by fingers and prevent trapping of air.

3-Extend the material to the depth of vestibule.

4-Cure the record base for 4 minutes in the light cure unit. Carefully removed from the cast, invert and cure the tissue surface for 4 minutes.

5-The processed base is removed from the cast, smoothed, and polished at the borders

VACUUM FORMED Vinyle poly styrene

1-Any undercuts are relieved, and separating medium is applied to the cast.

2-A sheet of base plate material placed over the cast and inserted in the vacuum chamber.

3-Electric heater switched to heat the sheet.

4-Turn on the vacuum. The sheet will adapt closely to the cast.

5-Switch of the heater and allow the record base to cool.

6-Remove the record base and cut the excess material.

Advantages

1-Easy to fabricate

2-Uniform thickness

3-Accurate adaptation to the master cast

4-Good rigidity

Disadvantages

1-Expensive

2-Difficult to form smooth rounded borders

Base plate wax

Method of use

- 1-Wet the cast
- 2-Soften the base plate wax over the flame and adapt it to master cast
- 3-Remove the excess wax and make the borders round and smooth.

Advantages

1-Easy and rapid method

- 2-Inexpensive and available

Disadvantages

- It lacks rigidity
- It lacks dimensional stability

Heat cure acrylic

Advantages :

- they are rigid, accurate, stable, not subject to distortion, and suitable for arrangement of teeth.

Disadvantages :

- require considerable time, more expensive

Bite rim - Occlusion rim

Definition : **occlusion rims are occluding surfaces constructed on record bases to be used in recording jaw relations and \or arranging teeth.**

Requirements :

1-the position should be in the anticipated position of the artificial teeth.
2-it must be securely attached to the base.
3-the occlusal surface must be smooth and flat.
4-it should be contoured to support the lip and cheeks accurately.
5-all the surfaces should be smooth.

Uses : The occlusion rims are used :

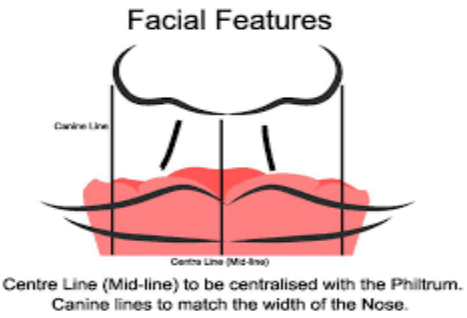
1-to establish the level of the occlusal plane.

2-to establish the arch form.

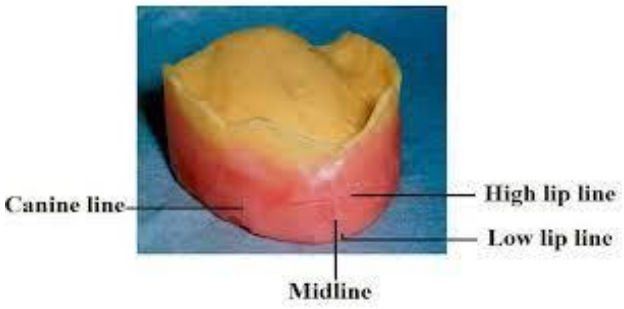
3-to record the maxillary mandibular jaw relations (vertical and horizontal).

4-for selection of teeth
a-the position of midline can be determined
b-canine line (cuspid line)is drawn on occlusal rim on the corner of the mouth on each side when occlusion rim seated in mouth and in occlusion
c-width of six anterior teeth is equal to distance between the2 canine line
d-the width of posterior teeth is equal to distance between the canine line and end wax rim posteriorly.
e-the high length of anterior teeth is determined by drawing high lip line(gum line or smiling line) when patient smiling ;the whole of anterior teeth should be seen
f-the low lip line (speaking line or relaxed lip line)is a line drawn on wax rim when lip is relax , in this case 2mm of anterior teeth should be seen .

4-for arrangement of the teeth.



Centre Line (Mid-line) to be centralised with the Philtrum.
Canine lines to match the width of the Nose.



occlusal rim should be:

1-Wax rims are smooth and have a flat occlusal surface. They are about as wide buccolingually as denture teeth – wider in the posterior, narrower in the anterior

2-The occlusal rim must be centered buccallingually over and parallel to the residual ridge crest.

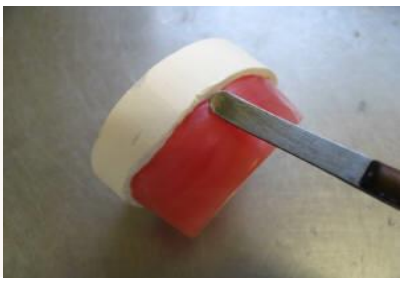
MATERIALS AND METHODS

A-bite blocks wax (ready made) occlusion rim

1-its supplied as a horse shoe shaped rim, adapt it in the proper position on the record base.

2-Softened it slightly, sealed it with the record base by the aid of a wax knife.

3-Smooth all the surfaces



B- Handmade Paraffine wax occlusion rim

1-Half a sheet of paraffin wax is softened and folded upon itself to produce a rectangular rim, approximately the length of the alveolar ridge.

2-Softened it slightly, sealed it with the record base by the aid of a wax knife.

3-Smooth all the surfaces .


c-modeling compound

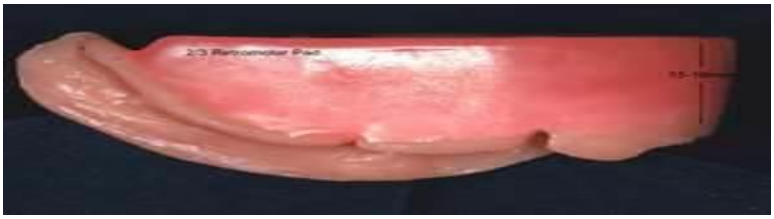
wax fequently used more than compound because easier to manage in registrations and in the arrangement of teeth

MAXILLARY BITE RIM

1-The anterior wax rim height is 20-22mm
2-The posterior wax rim height is 16-18mm.
3-The width of the anterior rim is approximately 3- 5mm.
4-The width of the occlusal rim in the posterior region is approximately 8-10mm.
5-The occlusal rim is properly sealed to the baseplate without any voids.
6-The posteriors of the occlusion rims are cut at a 30^0 to the occlusal plane
7-The anterior portion of the maxillary occlusal rim is labially oriented


MANDIBULAR BITE RIM

1-The anterior wax rim height is 16-17mm
2-The posterior wax rim height covers 2/3 of the retromolar pad.
3-The width of the anterior rim is approximately 3- 5mm.
4-The width of the occlusal rim in the posterior region is approximately 8-10mm. The occlusal rim is properly sealed to the baseplate without any voids



MAXILLO MANDIBULAR JAW RELATION

JAW RELATION:-any relation of the mandible to the maxilla

Types:-

1- Orientation jaw relation:- Establish the relation of maxilla to some anatomical landmarks in the cranium and orientation of occlusal plane.

2- Vertical jaw relation (at rest & at occlusion):- Establish the amount of jaw separation allowable for use for dentures

3-Horizontal jaw relation(Centric &Eccentric):- Establish front –to-back and side to side relations of one jaw to the other.

Recording jaw relation is very important step during complete denture construction after making final impression and obtaining Master cast. If the jaw relations are incorrect, **the dentures will move in order to occlude with subsequently be dislodged from the ridges during function**.

ORIENTATION JAW RELTION

1-determination occlusal plane by using fox bite (fox plane)

2-determination the relation between maxilla and crainium by using face bow

Occlusal plane

The average plane established by the incisal and occlusal surfaces of teeth. Generally, it is not a plane but represents the planar mean of the curvature of these surfaces. It is an imaginary surface which is related anatomically to the cranium and theoretically attached the incisal edges of the incisors and the tips of the occluding surfaces of posterior teeth.

The height of the occlusal plan (the vertical length of **maxillary** occlusion rim anteriorly) should be 1-2 mm below the relaxed **upper lip** and this will different from patient to other and affected by the age of the patient and type of the lip.

Generally there are 1-2 mm showing from the incisors in the average dentulous patient but each case should be considered separately in relation to the height of the lip, age of the patient and gender of the patient, e.g. for

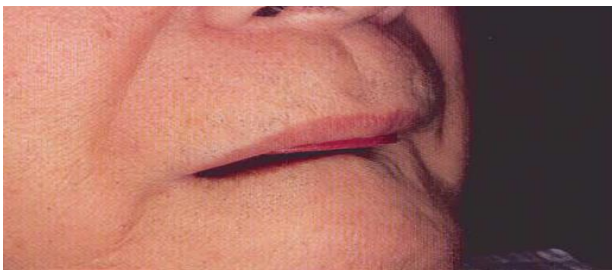
the patient that have long lip the height of the occlusal plane should be with the border of upper lip, while for the patient with short lip there is more than 2mm showing from upper lip.so each case should be considered separately for best appearance.

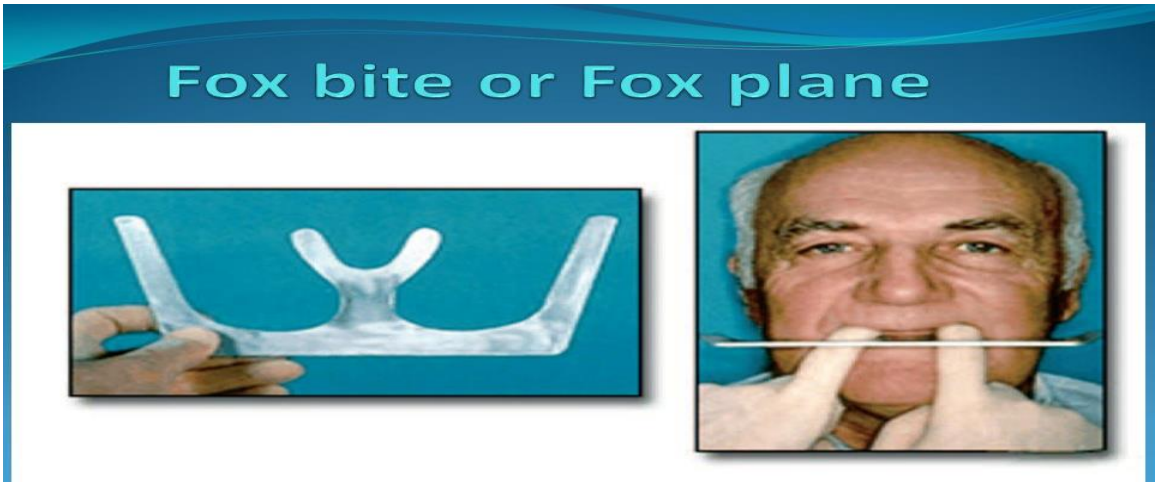
Fox bite (fox plane guide)

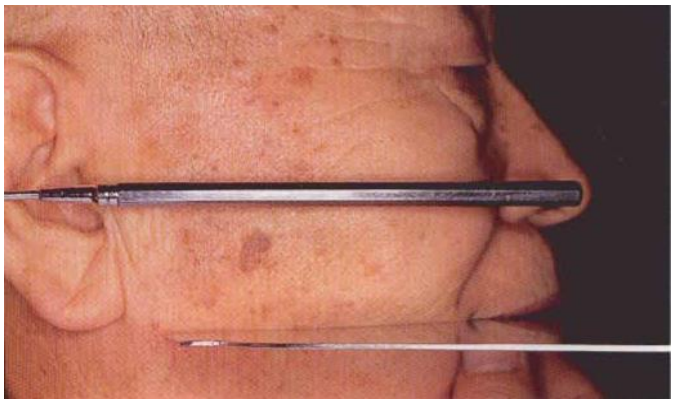
An appliance used to check the parallelism of wax occlusal rim anteriorly and posteriorly.

1-The anterior part of the wax rim should be parallel to the inter-pupillary line (this imaginary line running between the centers of the 2 pupils of the eyes when the patient is looking straight forward).

2-Posteriorly the occlusal plane starting from the canine region backward should be parallel to the (**camper´s line)**, this is a line running from the ala of the nose to the superior border of the tragus of the ear (ala-tragus line).







Campers line

The vertical length of the mandibular occlusion rim

1-Anteriorly the level of mandibular occlusion rim with the level of the lower lip & angle of the mouth.

2-Posteriorly the vertical length of the rim with level of the retromolar pad.

Horizontal jaw relation

Horizontal jaw relations :- is the relationship of mandible to maxilla in a horizontal plane (in anteroposterior and side to side direction). It include:

1) Centric jaw relation

2) Eccentric jaw relation which includes :

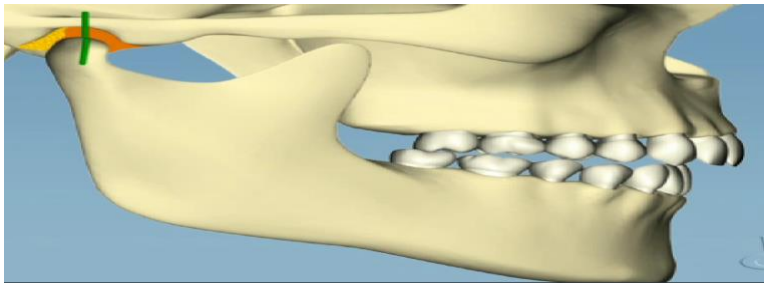
1. Protruded or forward relation. 2. Lateral relation (Left or right).

Centric jaw relation

Defnition1:It is the Maxillo-mandibular relationship in which, both condyles head articulate with the thinnest avascular portion of their respective disks with its complex in the anterior-superior position against the shapes of the articular eminencies.

Definition2:This position is independent on teeth contact and can be noticeable clinically when the most retruded relation of the mandible to the maxillae when the condyles are in the most posterior unstrained position in the glenoid fossae from which lateral movement can be made, at any given degree of jaw separation

It is restricted to a purely rotary movement about the transverse horizontal axis(bone-to-bone relationship)



Centric occlusion: It is the contact between the occlusal surface of the maxillary teeth with the opposing mandibular teeth when the mandible in centric relation,(tooth to tooth)relationship

• **Maximal Intercuspal Position**: The most complete interdigitation of the teeth independent of condylar position. Hence, maximal intercuspation is a maxillomandibular relationship determined by tooth-to-tooth relationship

Importance of centric relation

1- It is a reference position.
2- It is learnable, repeatable and recordable position.
3- It is the start point for developing occlusion.
4- Functional movement like chewing and swallowing are performed in this position.
5- It is a reliable jaw relation, because it is bone to bone relation.

Methods of Recording the Centric Jaw Relation

1-Physiological methods - Tactile or inter-occlusal check record method

2. Functional (chew-in) method

a– Needles house method

-b- Patterson method

c - Swallowing technique

3. Graphic methods - Intraoral - Extraoral

4. Radiographic method

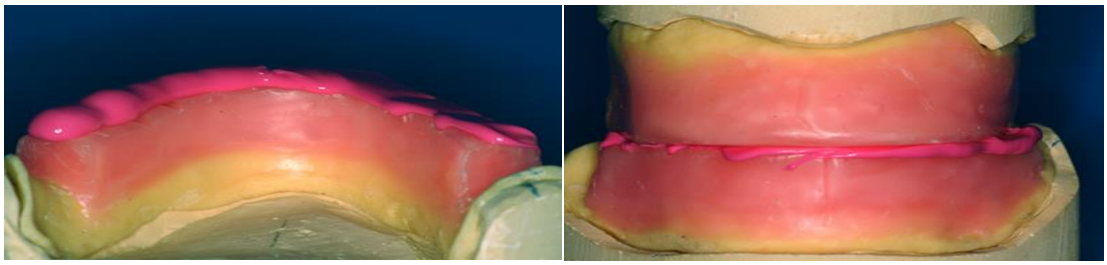
1- physiologic method\Tactile or inter-occlusal check record

According to this method, the centric relation recorded by placing a recording medium between the maxilla and mandible record bases when the jaws positioned at centric relation. The patient closes into the recording medium with the lower jaw in its most retruded unstrained position and stops the closure at the predetermined vertical dimension.

This method has the advantage of causing minimal displacement of the recording bases in relation to the supporting bone. This method is essential in making an

accurate record, the visual insight, the sense of touch by the dentist in the making of centric relation record, this phase developed with experience.

Materials that are commonly used for interocclusal check record include wax, plaster, zinc oxide eugenol, silicon and polyether.



Procedure:

1-Apply thin layer of recording medium on the mandibular occlusal rim.

2- Instruct the patient to close in centric relation position.

3- Remove both rims together

4- This method is simple, because mechanical devices are not used in the patient mouth and are not attached to the occlusion rims.

• Indication of inter occlusal check record method:

1- Abnormally related jaws.
2- Displaceable, flabby tissue.
3- Large tongue.
4- Un controllable mandibular movements.
5- It can also be done for patients already using a complete denture.

2-Functional Method or Chew-in Method

The patient is asked to perform border movements such as protrusive and lateral excursive movements in order to identify the most retruded position of the mandible include:

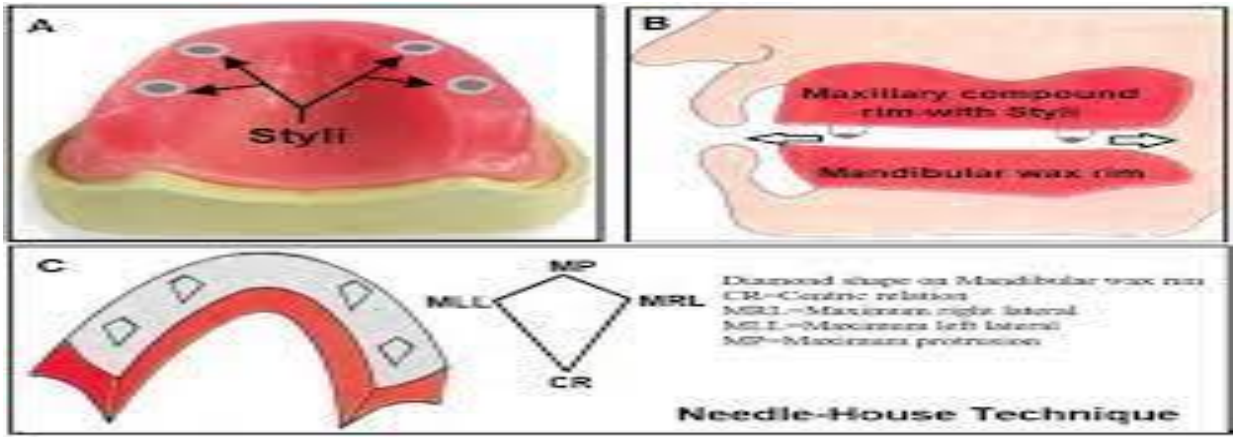
a--- Needles house method –

b-Patterson method

c- Swallowing technique

a-Needles house method

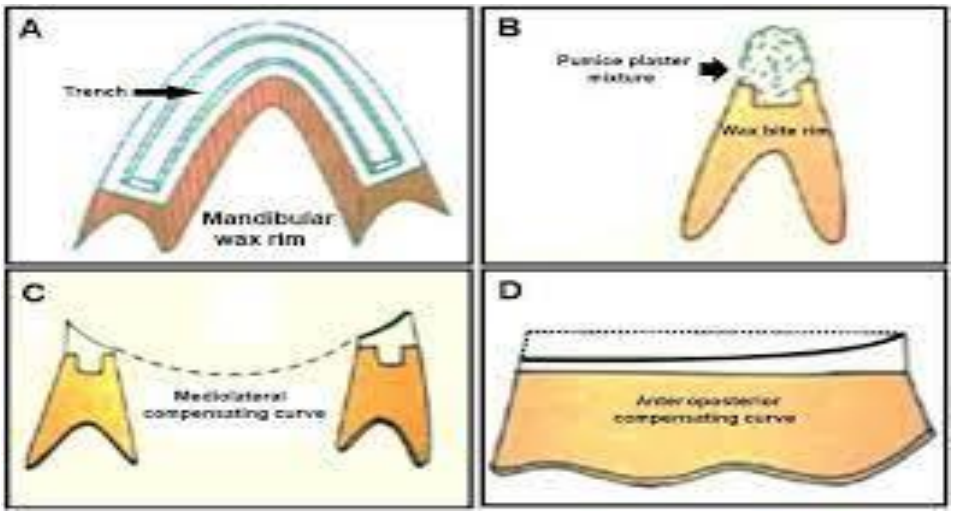
- occlusion rims made from impression compound.
- four metal styli placed in the maxillary rim.
- direct the patient to move the mandible on protrusive and right and left lateral.
- diamond-shaped pattern is formed.
- The anterior most point of this diamond pattern indicates the centric jaw relation



b-Patterson method –

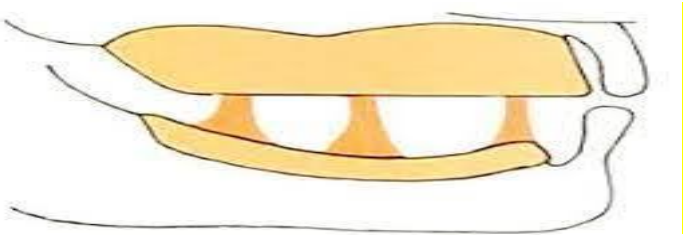
A trench is made along the length of mandibular rim. -mixture of pumice and dental plaster 1: 1 is loaded into the trench. -patient moves his mandible compensating curves on the mixture will produced, and the height of the mixture is also reduced, movements till a predetermined vertical dimension is obtained. -Finally the patient is asked to

retruded his jaw and the occlusal rims are fixed in this position with metal staples. The disadvantages of functional methods involve lateral and anteroposterior displacement of the recording bases in relation to the supporting bone while the record is being made.



c-Swallowing technique

In this method soft cones of wax are placed on the lower record base. The wax cones contact the upper occlusion rim when the patient swallows.



Methods used for assisting patient to retruding the mandible:

1. Instruct the patient to let his jaw relax, pull it back, and close slowly on his back teeth"

2. Instruct the patient to contact with his tongue a piece of wax placed on the posterior palatal seal area and slowly close

3. The patient asked to bring his upper jaw forward while occluding on the posterior teeth.

4. The head tilted backward, which makes protrusion more difficult

5. The patient asked to swallow and close slowly.

6. Instruct the patient to do routine jaw exercises

Factors that complicate centric relation record:

1- Resiliency of the tissues supporting the denture base.

2- Stability and retention of the record bases.

3- The TMJ and its neuromuscular mechanism.

4- Amount of pressure applied in making the record.

5- Technique employed in making the record.

6- The ability of the dentist.

Eccentric jaw relations:

Any relationship between the jaws other than centric relation.

1-Lateral jaw relation: The relation of the mandible to the maxillae when the lower jaw is in a position to either side of centric relation.

2-Protrusive jaw relation: The relation of the mandible to the maxillae when the mandible is thrust forward

Methods of recording eccentric jaw relations:

The main reason in making an eccentric jaw relation is to adjust the articulator to simulate the eccentric movement of the mandible to the maxilla, and establish balanced occlusion. The methods are similar to that made for centric relation and include, the functional, graphic and inter occlusal records Inter occlusal eccentric records (Protrusive, left and right lateral movement), can be made on the occlusion rim or on the posterior teeth at the try-in appointment. For Hanau articulator the following formula is used to obtain lateral inclination:

L=H/8+12 L= lateral condylar inclination. H= horizontal condylar inclination as established by protrusive record

Arrangement of posterior teeth

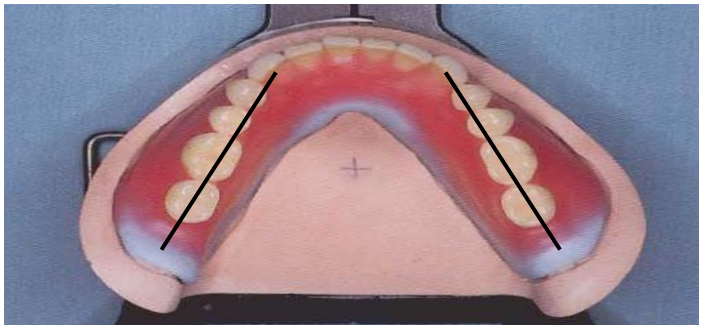
The arrangement of the posterior teeth involves the application of principles similar to those followed in the arrangement of anterior teeth. The artificial posterior teeth should be placed as nearly as possible where the natural teeth were.

position of teeth\notes

1-Posterior teeth should be put in **Neutral zone** area when forces exerted by the cheeks & tongue should be equal.

2-The mandibular posterior teeth should be placed so that the antero-posterior groove (central) is placed on the crest(center) of the residual ridge.

3-The crest of the mandibular residual ridge is marked on the edentulous cast by a line drawn from the crest of the ridge in the 1st premolar and canine area up to the mesial of the retromolar pads. If the teeth are placed buccal to the ridge, the dentures may tip on the opposite side when pressure is applied to these teeth. The teeth should not be placed lingual to the residual ridge because this will cause lack of space for the tongue, and the dentures will be displaced when the tongue moves**.**



Arrangement of maxillary posterior teeth

1-The maxillary 1st premolar:

1-FACIALLY:-The long axis of the tooth is parallel to the vertical axis from the front.

The facial surface of 1st premolar must harmonies with canine.

2-PROXIMALLY:-the long axis is parallel to the vertical axis when viewed from the side

3-OCCLUSALLY:-buccal cusp touches the occlusal plane and the palatal cusp is positioned about 0.5-1mm above occlusal plane.

4-Long axis of tooth perpendicular to the occlusal plane.

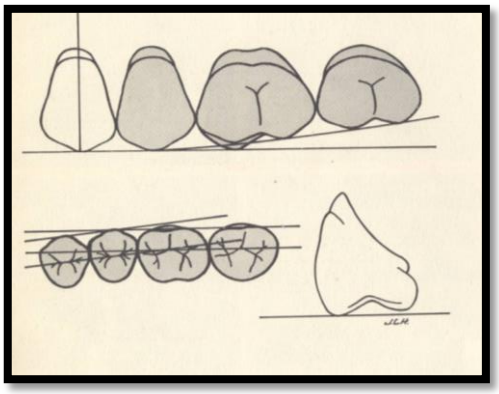
5-Palatal cusp over crest of mandibular ridge

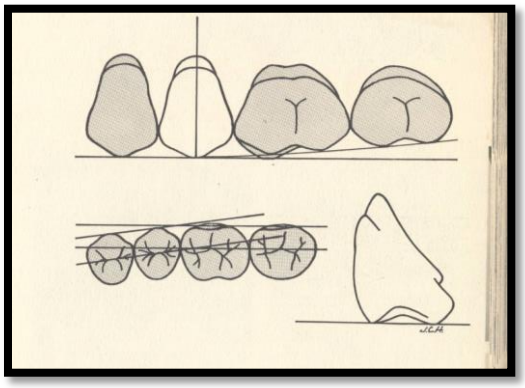
2-The maxillary 2nd premolar:

1--FACIALLY:- is parallel to the long axis

2-PROXIMALLY:-parallel to the long axis

3-OCCLUSALLY:-both buccal and palatal cusp touch the occlusal plane Long axis of tooth perpendicular to the occlusal plane. Palatal cusp over crest of mandibular ridge.





3-The maxillary 1st molar:

PROXIMALLY:-long axis is tilted buccally when viewed from the side.

FACIALLY:-when viewed from the front-tilted distally. The facial surface 1st molar must harmonies with 1st & 2nd premolar

OCCLUSALLY:-the mesio-palatal cusp touches the occlusal plane, disto palatal above occlusal plane about 0.5m .Palatal cusp over crest of mandibular ridge

4-The maxillary 2nd molar

PROXIMALLY:-the long axis is tilted buccaly, when viewing from the side

FACIALLY:-tilted distally , when viewed from the front side

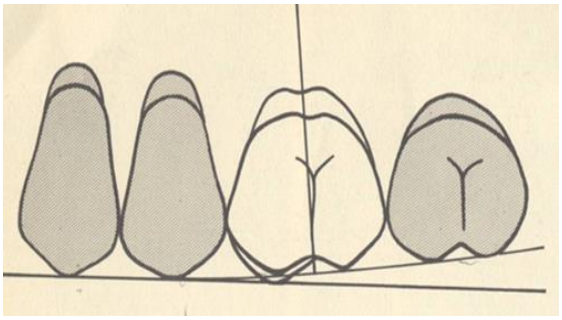
OCCLUSALLY:- All four cusps are above the occlusal plane. The facial surface of 2nd molar must harmonies with 1st molar

The maxillary teeth viewed from the occlusal surface should follow the following guidelines":

1- The distobuccal surface of the canine, the buccal surfaces of the premolars and the mesiobuccal surface of the 1st molar should follow a straight line.

2-Buccal surfaces of the 2nd molar are slightly inwards and are placed so that all buccal surfaces of the 1st and 2nd molars follow a straight line.

The posterior teeth should be placed so that the central grooves of the maxillary posterior teeth follow the line of the crest of the mandibular residual ridge.



The position of the mandibular posterior teeth:

The placement of the mandibular posterior teeth determines how well the teeth occlude, both in centric occlusion and in lateral and protrusive excursions. After placing each mandibular tooth in the correct position the incisal guide pin should be checked to insure that it is in contact with the guide table.

1-Lower first premolar

PROXIMALLY: the long axis of the tooth slopes slightly lingualy when viewed from the side.

FACIALLY:-the long axis parallel when viewed from the front.

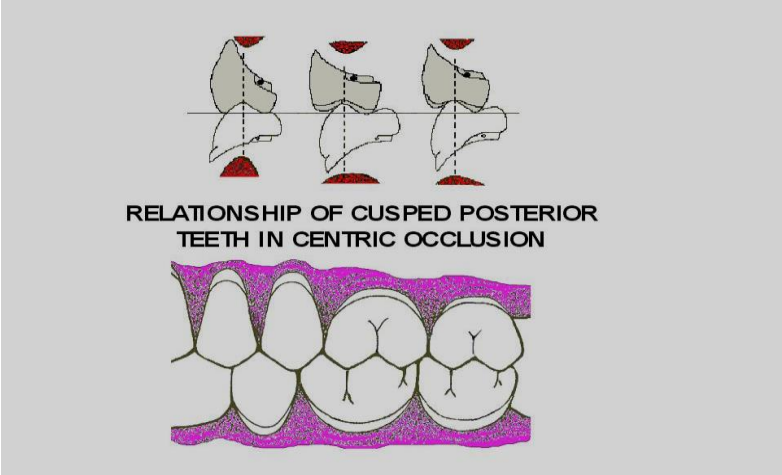
OCCLUSALLY:-the buccal cusp should be 2mm above the occlusal plane. Lingual cusp is below the occlusal plane.

2-Lower second premolar

Facially: the long axis slopes slightly lingually when from front

Proximally:-the same when viewed from side

Occlusally:-Both cusps are 2mm above the level of the occlusal plane.



3-lower first molar

FACIALLY:-the long axis of the tooth slopes slightly lingually when viewed from the side.

PROXIMALLY:-The long axis of the tooth is tilted mesially when viewed from the front.

OCCLUSALLY:-all the cusp above the level of occlusal plane.

4-lower second molar

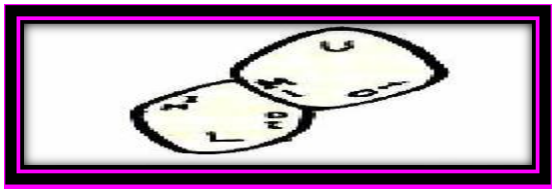
PROXIMALLY: the long axis slopes slightly lingually

FACIALLY:-the long axis tilted mesially when viewed from the front.

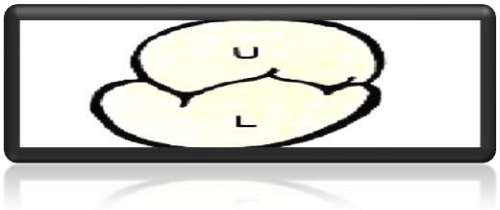
OCCLUSALLY:-All the 4 cusps above the occlusal plane.

Keys of Occlusion

a-Canine Key of occlusion: The distal arm of the lower canine should align with the mesial arm of the upper canine.



B- Molar Key of occlusion :-The mesio-buccal cusp of the maxillary molars coincides with the mesio-buccal groove (buccal groove) of the mandibular molars .



*Compensating curve

: is the anterio-posterior curvature of the occlusal surface of a complete denture teeth (in sagittal plane) and the mediolateral curvature in the (frontal plane). The compensating curves are called so because they compensate for that present in natural dentition. Compensating curves may be increased or decreased in an artificial dentition to help achievement of balanced occlusion.

1-Compensating curve for curve of Spee is the curvature of the occlusal alignment of the teeth. It begins at the tip of the lower canine follows the buccal cusps of the premolars and molars and continues to the anterior border of the mandibular ramus.

2-Compensating curve for curve of Wilson is the curvature in the frontal plane through the cusp tips of both the right and left molars.

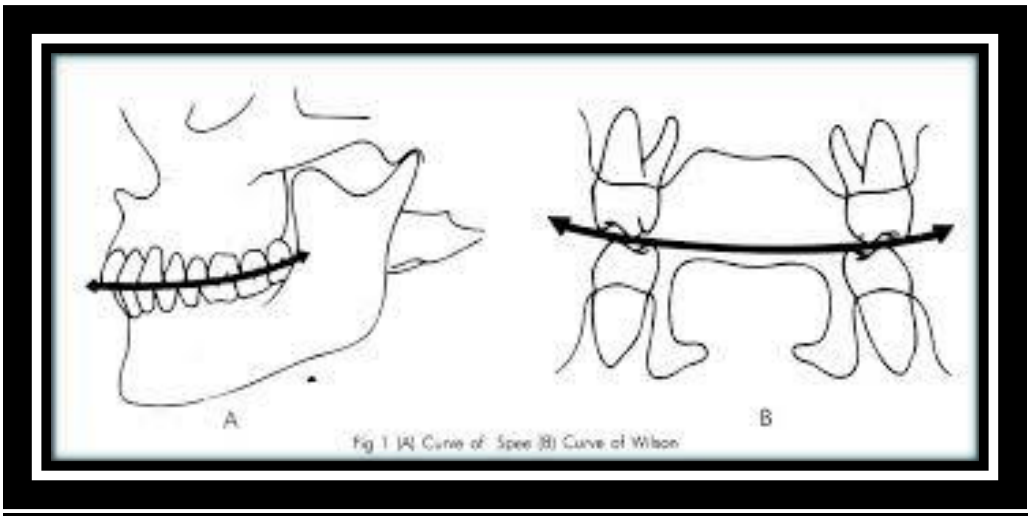


Fig 1 (A) Curve of Spee (B) Curve of Wilson

Lec-20 prosthodontics 2nd class

Repair of complete denture

Complete dentures are predominantly fabricated from acrylic resin, which is relatively weak and prone to fatigue and impact fracture.

Causes of fracture: 1. Impact fracture usually results from dropping the denture either onto the floor or into a sink while cleaning the prosthesis.

2. fabrication errors include excessive thinning of the palate of the upper denture.

3. Excessively accentuated frenal notches that act as stress raising features, resulting in crack initiation and subsequent propagation.
4. Excessive loads typically arise when a complete denture is opposed by natural teeth.

Types of repair:

1-maxillary denture base fracture all of the parts are available

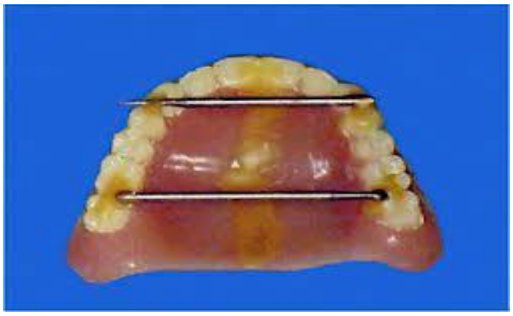
2-mandibular denture base fracture all of the parts are available
3-replacement of the broken or missing tooth or teeth

4-missing labial or lingual border .

maxillary denture base fracture all of the parts are available

1. Assemble the broken pieces of denture carefully and secure with sticky wax. It may be necessary to strengthen the joint by securing an old bur across the teeth with sticky wax. On

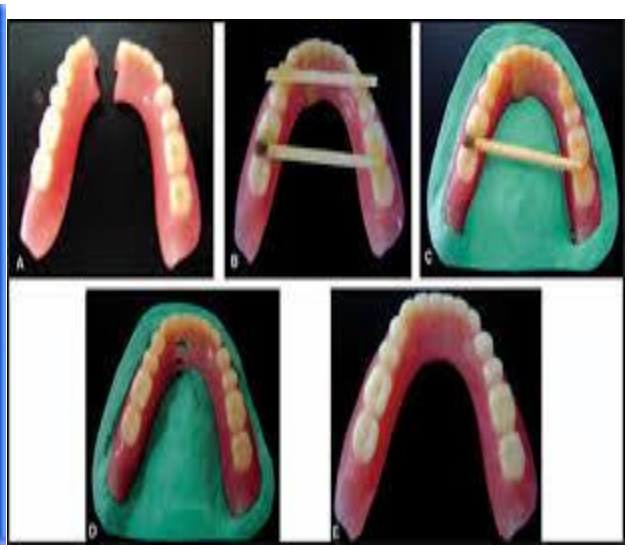
the fitting surface, block out with wax any large undercuts that do not involve the fracture site to enable easy removal of the model later.



2. Cast a model to the fitting surface of the denture using plaster mixed after placing separating medium on the tissue side of the denture.

3. When set, remove the denture from the new model, and then remove the wax from the denture..

4-Reduce the broken ends slightly to expose clean acrylic resin, and create a definite gap between the two parts of the denture when assembled on the model. A finishing line for the repair resin to 'butt' up to can also be ground into the resin.



5. Paint the model with separating medium, position the denture on the model and secure with sticky wax.

6. Mix the acrylic and fill the gap, leaving a slight excess.

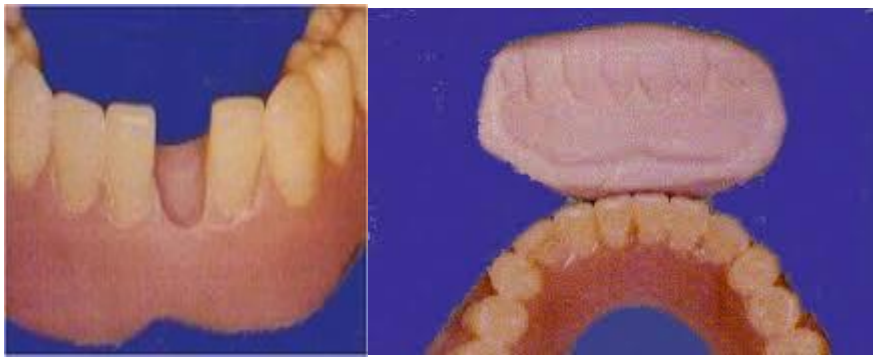
7. Place in a water pressure bath and cure for 15 minutes at 3 atm of pressure at 45°C.

8. After curing and removal of the denture from the model trim the cured material to leave the original contour of the denture.

9. Smooth with sandpaper and polish

Replacement of the broken or missing tooth or teeth

": procedure (single tooth repair) Basic procedure (single tooth repair Fracture of a single tooth may involve the entire tooth or just a part of it may fracture, leaving a fragment attached to the denture base. If the entire tooth has come off the denture, this is usually due to poor bonding with the acrylic resin (usually caused by separating medium left on the tooth during processing). If the tooth has fractured and a part of the tooth left bonded to the denture base, there may be a problem with the occlusion and this should be checked and corrected after placing the new tooth. In the following example a lower incisor was damaged during the processing of a denture.



1. Using a tungsten bur, remove the tooth from the denture.

2. Enlarge the tooth socket to allow room for new acrylic.

3. Position the new tooth in place using wax.

4. Mix a small amount of plaster using anti-expansion solution and make a plaster key to fit around the tooth, wax work and adjacent teeth and allow to set. Alternatively, use silicone putty.
5. Boil off the wax from the denture and plaster key.

6. Assemble the parts and secure with sticky wax.

7. Mix a small amount of self-curing acrylic to a runny consistency and fill the void. Place in a water pressure bath and cure for 15 minutes at 3 atm of pressure at 45°C. 8. Remove the plaster key and trim the denture to its original contour. 9. Polish the repair

Missing labial or lingual border: –

An impression is made with the denture placed in patient mouth. – After pouring the cast; either self cure (cold cure) is applied to replace the missing part, or wax is added and carved to resemble the broken denture part followed by flasking, packing, curing, finishing and polishing.

Relining and Rebasing

Relining is defined as, “A procedure to resurface the tissue surface of the denture with new base material to make the denture fit more accurately” - GPT.

Rebasing “A process of refitting a denture by the replacement of the denture base material” - GPT.

Rebasing is similar to relining **except** that there is extensive replacement of the denture base material in rebasing..

Contraindications for Relining and Rebasing:

1. When the residual ridge has resorbed excessively.

2. Abused soft tissues due to an ill-fitting denture.

3. Temporo-mandibular joint problems.

4. Patient dissatisfied with the appearance of the existing dentures.

5. Unsatisfactory jaw relationships in the denture.

6. Dentures causing major speech problems.

7. Severe osseous undercuts. A number of changes can occur in the tissues that support complete dentures.

They are more common under mandibular than under maxillary dentures, but they may be encountered under either, particularly when an upper denture is opposed by the natural dentition. The magnitude of the changes is what determines the nature of the resurfacing or refitting prescribed. If a new thin layer of resin is added to the denture base, the resurfacing is called a reline. If

more material is added when extensive refitting and polymerized material is necessary, this is called a rebase.

Indication for Relining and Rebasing:

1. Loss of retention and stability

2. Loss of vertical dimension of occlusion

3. Loss of support for facial tissues.

4. Due to financial reason, the patient can't afford a new denture, and no contra indications apply.

5. Medical and social reasons prevent the patient from attending the required number of visits for a new complete denture and no contra indications apply.

Relining Procedures •

Clinical procedures:

1. Static methods:

A• Open-mouth technique.

B• Closed-mouth technique.

2. Functional methods

3. Chair-side technique

• Laboratory procedures:

• Articulator method

• Jig method

• Flask method

Basic laboratory procedure for Relining:

1. Once the impression is received, a cast is poured immediately, that is an impression taken using the denture as a tray.

2. The denture and the cast are not separated, but any excess impression on the teeth or facial surfaces of the base is removed, then the denture flasked in the usual manner.

3. Wax elimination by heating in hot water for 5 minutes, then separated and all impression materials cleaned from the cast and the denture base.

4. Painting the cast with a separating medium.

5. Paint the surface of the denture with cotton pellet moistened with monomer.

6. Mix the acrylic resin and place it in the flask.

7. Curing for 9 hours at 165 F

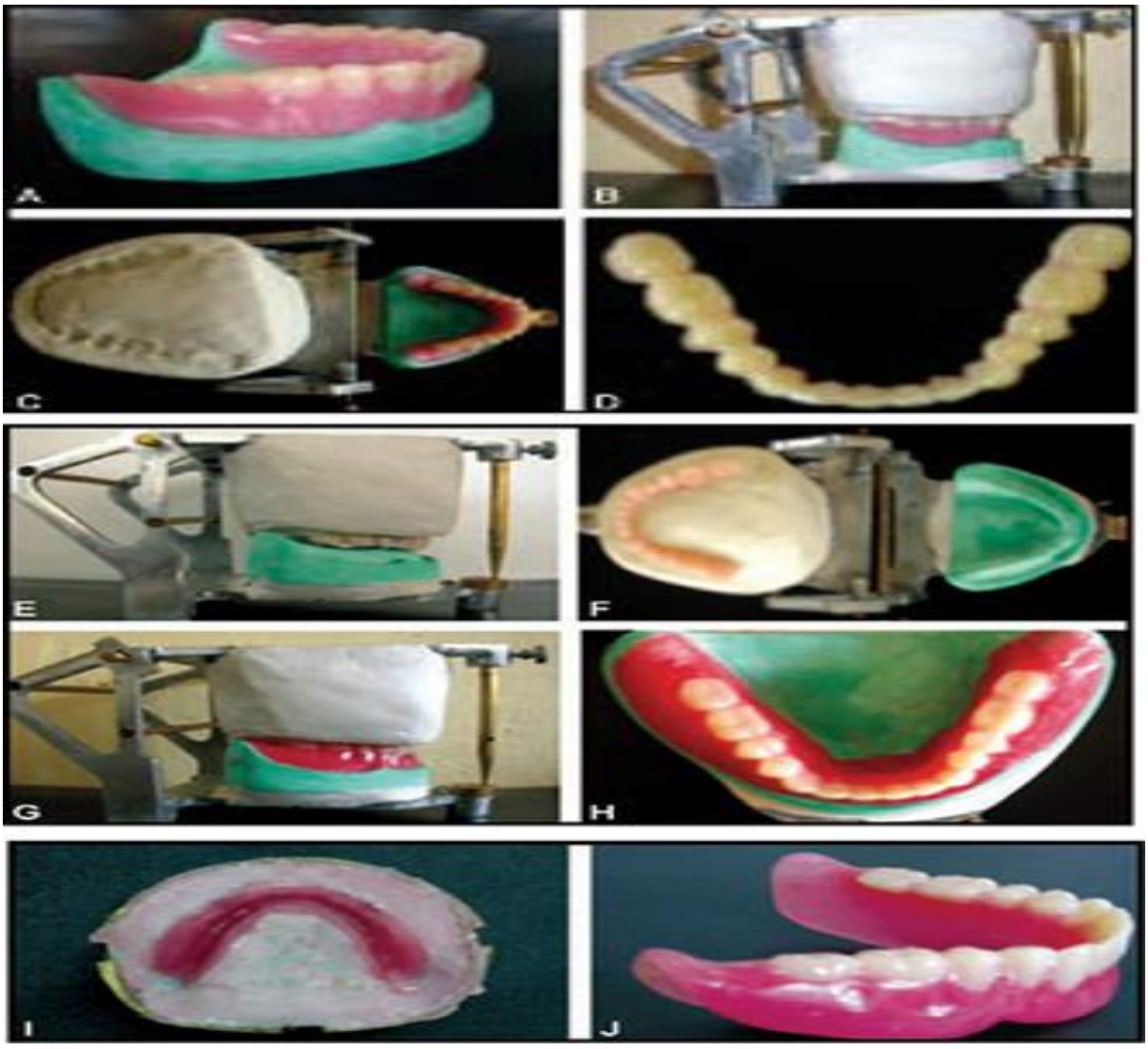
. 8. after curing, deflask, trim the excess acrylic resin, smooth, polish.

9. The maxillary and mandibular dentures remounted on articulator for correction of occlusion, then the denture is ready for insertion in patient's mouth.

Laboratory Procedures for Rebasing:

The laboratory procedures used for rebasing are the same as the ones used for relining. They include articulator method, flasking method and jig method. Irrespective of the methods used, rebasing **differ**s from relining only in denture trimming prior to wax-up.

Denture Trimming Prior to Wax-up This is the only step where rebasing **differs** from relining. After articulating or flasking the cast (depending of the method) the denture is removed from the cast and the entire denture base is trimmed leaving just 2 mm of acrylic around the porcelain teeth. The acrylic is retained to preserve the positions of the denture teeth. After trimming the denture wax up is done over all the supporting structures of the cast.


A
B
C
D
E
F
G
H
I
J

Anatomical Land marks of Maxillary arch

A good knowledge about the intra-oral landmarks for the maxillary and mandibular arch will help the clinician to carefully manage a patient and it will act as positive guides to the limit of the impression and denture extensions.

A-LIMITING STRUCTURE :-

They determine and confine the extent of the denture ,which include:

1-labial frenum

2-labial vestibule

3-buccal frenum

4-buccal vestibule

5-hamular notch

6-posterior palatal seal area

1-Labial Frenum: The labial frenum is a narrow fold of oral mucosa, which is found in the approximate midline. It extends from the inner surface of the lip to the labial surface of the alveolar ridge. The labial frenum is not a reliable guide for determining the midline of the face when natural teeth are absent.

- Need relief.

2-Buccal Frenum: There are two buccal frena. These frena are located on each side of the arch, usually in the first bicuspid region. Each frenum extends from the mucosa of the cheek to the buccal aspect of the alveolar ridge.

- Need relief.

3-Sulci (VESTIBULES)

- The maxillary sulcus (vestibule) is a groove formed by the mucosa of the cheek or lip and the mucosa at the base of the alveolar ridge.
- The portion of the sulcus which lies between the labial and buccal frena is called the **labial sulcus (vestibule).**
  The part of the sulcus between the buccal frenum and the hamular notch is the **buccal sulcus (vestibule).** The muscles shaping the sulcus cause its depth to change with every facial expression a person makes

4-Hamular Notch: is a deep depression located posterior to the maxillary tuberosity. The depths of this depression is part of a series of guides used to determine the posterior border of a maxillary denture.

5-Posterior palatal seal area(Post dam):- The soft tissues at or along the junction of the hard and soft palates on which pressure within the physiological limits of the tissues can be applied by a denture to aid in the retention of the denture.

Functions of the Posterior palatal seal :-

1-Aids in retention

2-Reduce the tendency for gag reflex as it prevents the formation of the gap between the denture base and the soft palate during functional movements

3-Prevent food accumulation between the posterior border of the denture and soft palate.

4- Compensates for polymerization shrinkage of acrylic.

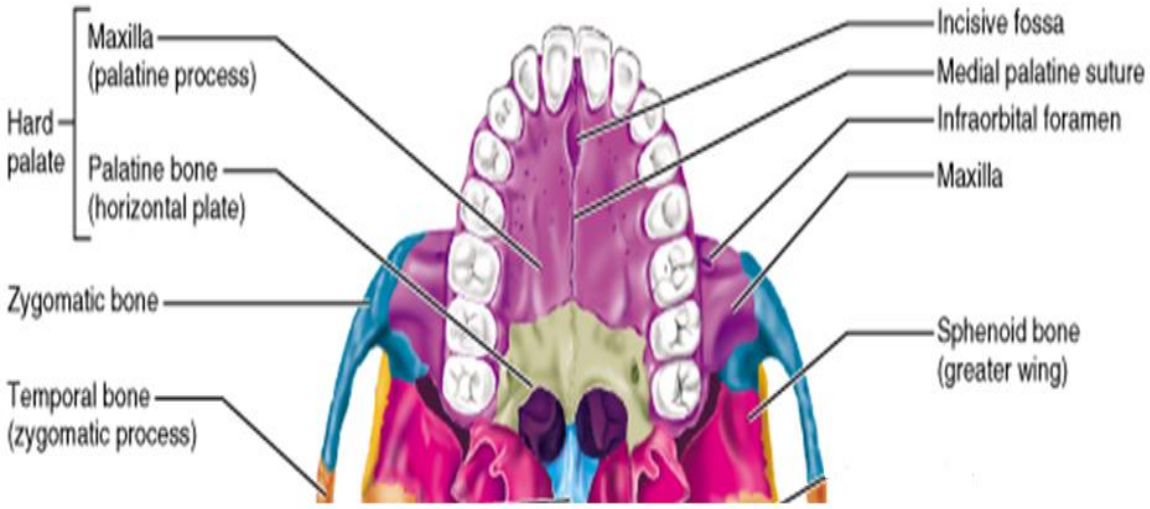
Palate

- The palate extends from the roof of the mouth all the way back to the uvula: divided into:
- 1-Hard Palate. The hard palate is made up of the anterior two-thirds of the palatal vault supported by bone (palatine processes of the maxillae and the horizontal plates of the palatine bones).

- The horizontal portion of hard palate lateral to mid line provides primary support area for denture.
-
- 2-Soft Palate. The soft palate is made up of the posterior one-third of the palatal vault that is not supported by bone. The soft palate is a muscular extension from the posterior edge of the hard palate, and it is very movable, especially during speaking and swallowing.
-

Vibrating Line

- The vibrating line is an imaginary line drawn across the palate that marks the beginning of motion in the soft palate when an individual says "ah".
- It extends from one hamular notch to the other.
- At the mid line it usually passes about 2 mm in front of the foveae palatine.



b-Supporting structure

These areas are the load-bearing areas . They show minimal ridge resorption even under constant load. The denture should be designed such that most of the load is concentrated on these areas which include:

Primary supporting structure

1- hard palate-

2- lateral slopes of residual alveolar ridge.

Residual ridge:-The portion of the alveolar ridge and its soft tissue covering which remains following the removal of teeth. It resorbs rapidly following extraction and continue throughout life in a reduced rate. The maxilla resorb upward and inward pattern.

Secondary supporting structure

1-Rugae

2-Maxillary tuberosity.

1-Rugae:are irregular ridges of fibrous tissue found in the anterior one-third of the hard palate.

- It plays important role in speech.
- It is considered secondary stress bearing area.
- Aids in stability and retention of denture.

Maxillary tuberosity:-It is a bulbous extension of the residual ridge in the second and third molar region .The posterior part of the ridge and the tuberosity areas are considered as one of the most important areas of support because they are least likely to resorb.

C-Relief Areas

These areas resorb under constant load or contain fragile structures within . The denture should be designed such that masticatory load is not concentrated over these areas.

1- Incisive papilla

2- Cuspid eminence

3- Mid-palatine raphe

4- Fovea palatine

1-Incisive papilla:- It is a midline structure situated behind the central incisors. It is the exit point of the naso-palatine nerves and vessels . It should be relieved if not , the denture will compress the vessels or nerves and lead to necrosis of the distributing areas and paresthesia of anterior palate.

2-Cuspid Eminence :- It is a bony elevation on the residual alveolar ridge formed after extraction of the canine. It is located between the canine and first premolar region .

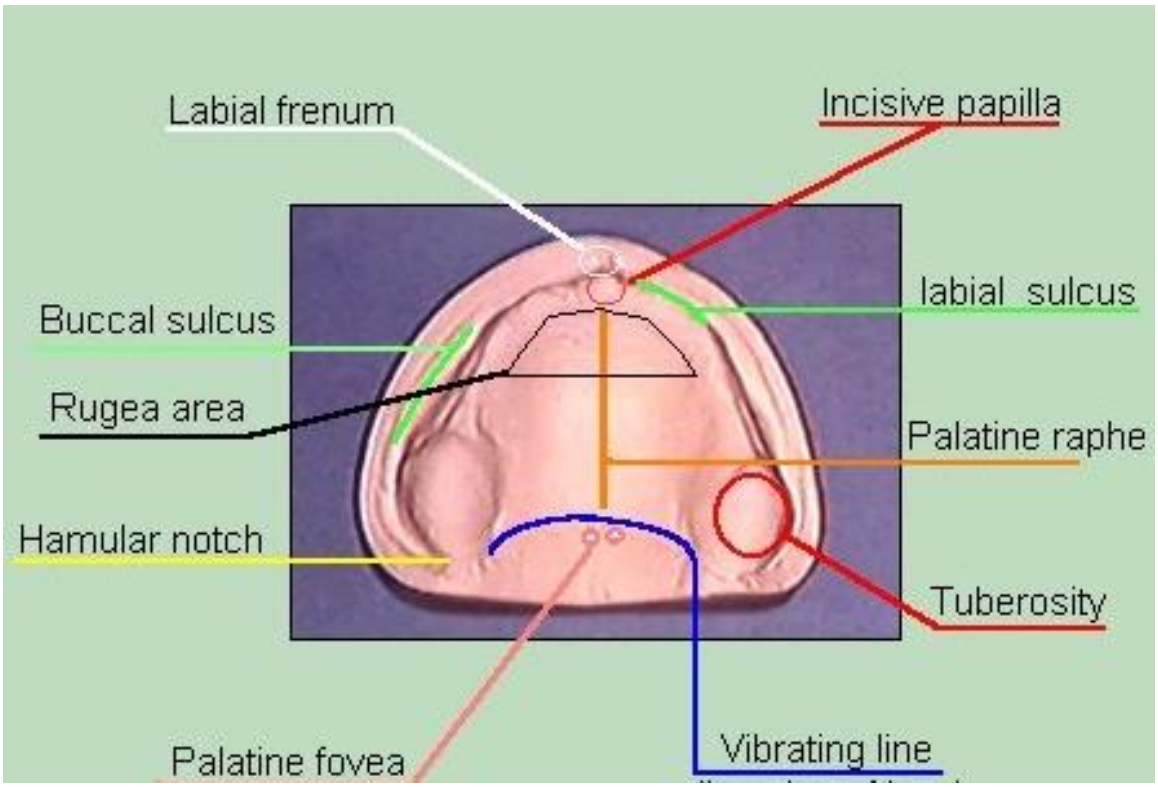
3-Mid-palatine raphe:-This is the median suture area covered by a thin sub-mucosa. It should be relieved during denture fabrication this area is the most sensitive part of the palate to pressure.

4-Fovea palatine

The fovea palatine are indentations located on each side of the midline of the palate and slightly posterior to the junction of hard and soft palates formed by coalescence of several mucous gland ducts.

They are always in the soft tissue which makes them an ideal guide for the location of the posterior border of the denture.

The secretion of the fovea spreads as a thin film on the denture there by aiding in retention. In patient with thick ropy saliva , the fovea palatine should left uncovered or else the thick saliva flowing between the tissue and the denture can increase the hydrostatic pressure and displace the denture.



Special tray definition , types and materials

Special Tray: a device that is used to carry, confine and control impression material while making a final impression.

On the study cast , special tray is constructed -as edentulous ridge show variations of shape & size, some have flattened ridges & other have bulky ridge, So stock tray can fit the ridge only in an **arbitrary manner**, so special tray is constructed.

Advantages of special trays:

1- Economy in impression material (used less impression material required in special tray).

2- More accurate impression.

3- Special tray provides even thickness of impression material. This minimize tissue displacement & dimensional changes of impression material

4- The work with special tray is more easier & 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 denture.

6- Special tray are less bulky than stock tray which is more comfortable for the patient.

Materials used in construction of special tray:

1-cold cure acrylic

2-shellac base plate

3-light cure acrylic

4- vacuum formed thermoplastic resin sheets

Types of special tray:-

1-spaced tray with wax(with or without stoppers)

2-closed fitted special tray without wax.

Fabrication of special tray with cold cure acrylic

1-The cast should be soaked in water.

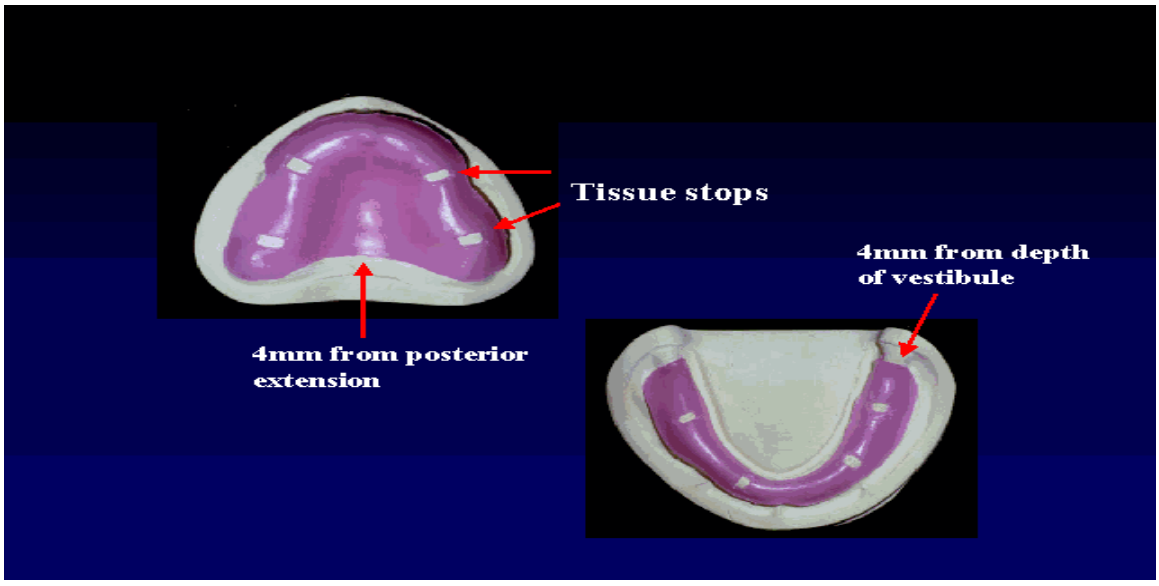
2-Severe undercuts should be blocked out using wax.

3-The borders of the denture border 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.

5-In closed fitted special tray :-application of separating medium on study cast **then** using the cold cure acrylic tray material

For spaced special tray:- adapting the wax spacer, should about 2mm thick, the posterior palatal seal on the cast is not covered with the wax spacer on the crest of the ridge ., wax should be cutted2 on canine and2 on molar area about 2-4mm and is called **stoppers** In order to stabilize the impression tray during impression making application of separating medium **then using the cold cure acrylic**



Methods of Application of cold cure acrylic

a-sprinkle on method

b-finger adapted dough method

by this method mixing acrylic ,the accepted polymer \monomer ratio was 3\1 by volume.

Final or Secondary impression:

It is a negative likeness or registration of the entire denture bearing, stabilizing area and border seal area of the mandible & maxilla for the purpose of fabricating a prosthesis. The final impression is made with special tray and it is used for making master cast which must be poured with stone material.

Master cast (definitive or final cast):A replica of the tooth surfaces, residual ridge areas and \or other parts of the dental arch and \or facial structures used to fabricate a dental restoration or prosthesis.

Materials used for final impression:-

1-zinc oxide eugenol impression material(rigid irreversible)

2-Alginate impression material(elastic-irreversible)

3-agar (elastic -reversible)

4- polysulfide, polyether and silicon light body,(elastomers impression material-irreversible)

5-impression wax(rigid reversible)

BOXING THE IMPRESSION

An impression is boxed by wax to preserve the borders of the impression so that it will be accurately reproduced in the cast.

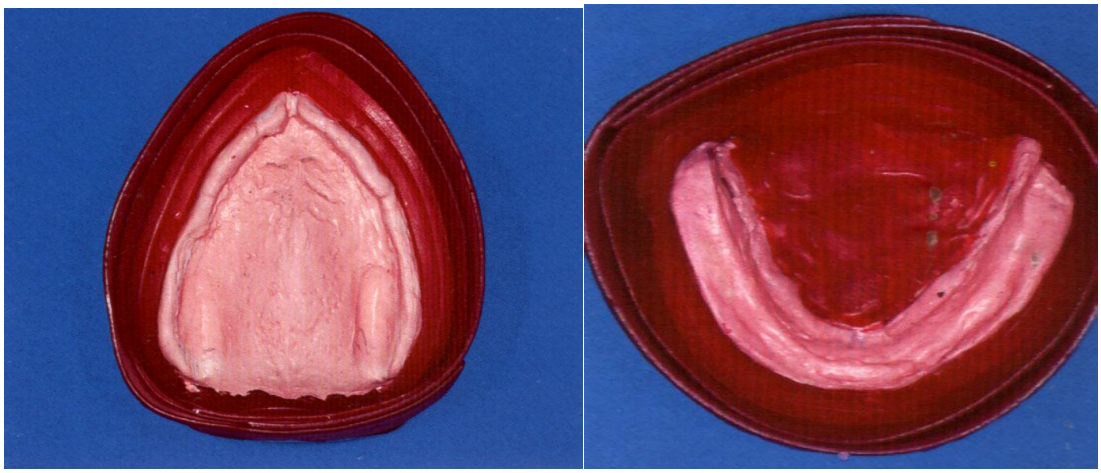
Advantages of boxing

1-the borders of the impression are preserved

2-the thickness of the cast can be controlled

3-time is conserved

4-material is conserved



Artificial stone is mixed according to manufacturer s direction and sufficient stone is poured into the final impression so that the base of the cast will be from 10-15mm in thickness .The cast is called master cast

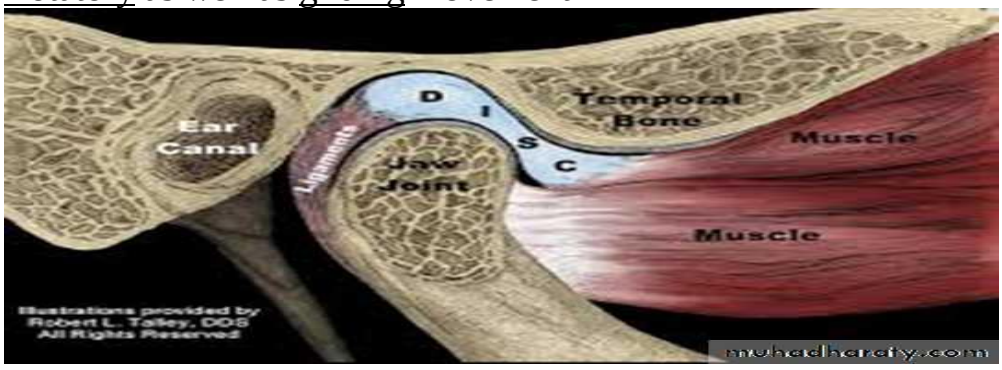
Tmj component and mandibular movements

TMJ :Is the area where the mandible articulates with the cranium. It is described as a complex, multi axial ,synovial also called craniomandibular joint

TMJ Components:

1-crainial component(glenoid fossa)
2-mandibular component(ovoid condylar process)
3-TMJ capsule:- A dense, irregular collagenous connective tissue capsule encloses the articulating surfaces of the TMJ. It is attached above to the articular tubercle and the margins of the mandibular fossa and below to the neck of the mandible.
4-synovial fluid
5-ligaments
A-lateral temporomandibular ligament
B-spheno mandibular ligament
C-stylo mandibular ligament
6-articular disc (meniscus)-an oval fibrous plate that divides the joint into an upper and lower compartments. The articular disc is a pad of tough, flexible fibrocartilage situated between the condyle and the glenoid fossa .The disc is a shock-absorbing mechanism.

When the condyle moves out onto the articular eminence, the disc travels with it. The upper compartment (gliding movement),the lower compartment .permits Rotatory as well as gliding movement



How does the TMJ move during function:-

Replacement dentures must work in harmony with the patients TMJ which consist of the condyles which articulate with the temporal bones and are located in the

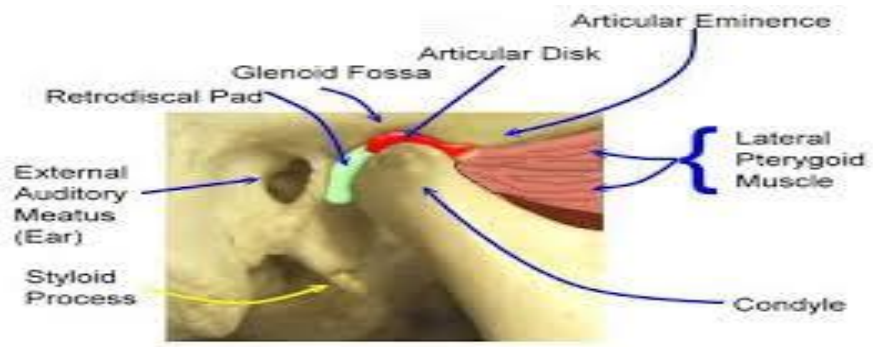
elliptical concave depressions called the glenoid fossae in which they travel forward, from side to side, and in some instances slightly backward. Between the dome- shaped concavities in the temporal bones and the condyles are interposed the interarticular fibrocartilages, the meniscus, which are attached at their margins to the articular capsules.

The meniscus divided the joint into upper and lower compartments. Normally the movements in the upper compartment is chiefly gliding anteroposterior motion in which the condyles and the cartilage move as a unite, the movement in the lower compartment is hinge like.

Therefore condylar path are the controlling factor in the mandibular movements. These movements are results of action of muscles of mastication, suprahyoid, and infrahyoid muscles

Muscles of mastication :

1-temporalis 2-masseter 3-lateral pterygoid 4-medial pterygoid

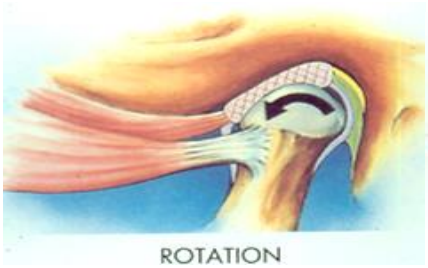


Movement of mandible

All the mandibular movements lies into 2 types of movement :

1-rotation : when an opening of 20-25mm measured at the central incisors the condyle rotates within glenoid fossa.

2-Translation occurs whenever a condyle leaves the glenoid Fossa opening at the central incisors more than 20-25mm



Resting position: Is defined as having the patient's head in the anatomic position (in an upright posture). This places the masticatory musculature at rest, permitting a small free-way space to exist between the teeth of the upper and lower jaws but having the upper and lower lips touching. It is in this attitude that the mandibular condyles are positioned so that the anterosuperior articulating surfaces are opposite the posterior slopes of the articular eminence of the temporal bone, with the disc between the two bones.

Mandible Depression (opening)

As the mouth is opened, the head of the mandible rotates on the undersurface of the articular disc around a horizontal axis. To prevent the angle of the jaw impinging unnecessarily on the parotid gland and the sternocleidomastoid muscle, the mandible is pulled forward (protracted). This is accomplished by the contraction of the lateral pterygoid muscle, which pulls forward the neck of the mandible and the articular disc so that the latter moves onto the articular tubercle

Depression of the mandible is brought about by contraction of the digastric, the geniohyoids, and the mylohyoids. The lateral pterygoids play an important role by pulling the mandible forward.

Mandible Elevation (closing)

The movements in depression of the mandible are reversed. First, the head of the mandible and the disc move backward, and then the head rotates on the lower surface of the disc. Elevation of the mandible is brought about by contraction of the temporalis, the masseter, and the medial pterygoids. The head of the mandible is pulled backward by the posterior fibers of the temporalis. The articular disc is pulled backward by the fibroelastic tissue, which tethers the disc to the temporal bone posteriorly.

Mandible Protrusion

The articular disc is pulled forward onto the anterior tubercle, carrying the head of the mandible with it. All movement thus takes place in the upper cavity of the joint. In protrusion, the lower teeth are drawn forward over the upper teeth, which is brought about by contraction of the lateral pterygoid muscles of both sides, assisted by both medial pterygoids.

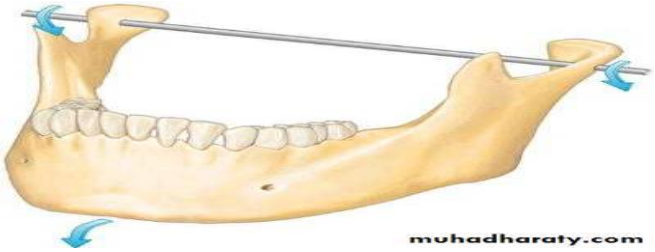
Mandible Retraction

The articular disc and the head of the mandible are pulled backward into the mandibular fossa. Retraction is brought about by contraction of the posterior fibers of the temporalis.

Mandibular axis:

There are three axes around which the mandibular movements takes place in horizontal, sagittal and frontal planes. These axes include the followings:

1. Hinge axis: or transverse horizontal axis: An imaginary line around which the mandible may rotate within the sagittal plane. (During the opening and closing movement).



2. Sagittal axis of the mandible : An imaginary anteroposterior line around which the mandible may rotate when view in the frontal plane..

3-. Vertical axis of the mandible: An imaginary line around which the mandible may rotate through the horizontal plane.

Vertical jaw relation

We have some definitions that are important in understanding the vertical jaw relation ❖

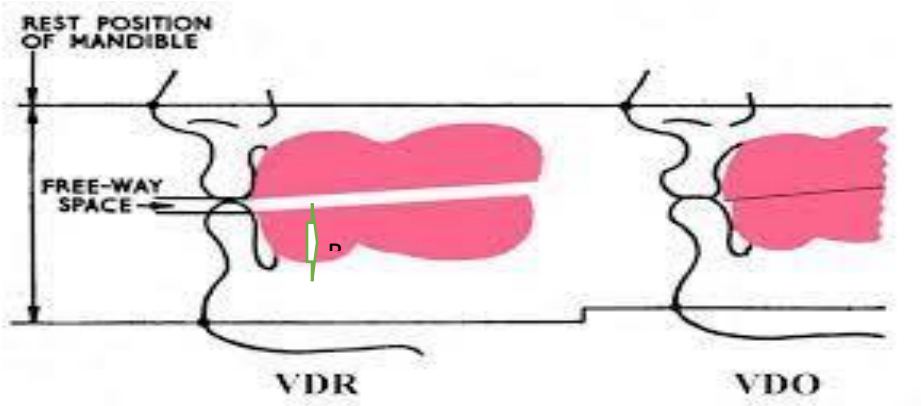
Vertical dimension: the distance between two selected marked points (usually one ;on the tip of nose and the other on the chin), one on a fixed (maxilla) and one on a movable (mandible) member. ❖

Occlusal vertical dimension (O.V.D.): the distance measured between two points when the occluding members are in contact (teeth or occlusion rims are in contact).

❖ **Rest vertical dimension (R.V.D.)**: the distance between two selected points measured when the mandible is in the physiologic rest position.

❖ **Rest position (physiologic rest position):** it is the postural position of the mandible when an individual is resting comfortably in an upright position and the associated muscles are in a state of minimal contractual activity.

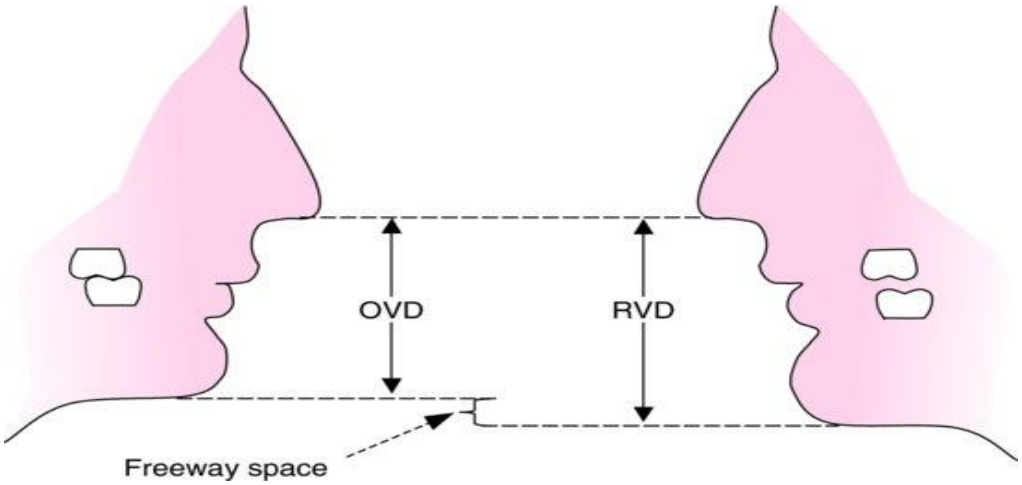
❖ **Inter-occlusal distance (Freeway space)**: the distance between the occluding surfaces of maxillary and mandibular teeth (or rims) when the mandible is in physiologic rest position. The difference between the (RVD) and the (OVD) is called freeway space and as an average it is 2-4 mm. (RVD- OVD = freeway space).



The closest speaking space:is the closest relationship of the incisal edges of the mandibular teeth to the maxillary teeth during rapid speech (sounds ch, s, j).

Importance of vertical dimension: Accurate vertical dimension of occlusion and rest will affect the following:

1. Function (mastication, respiration , deglutition, phonetics)
2. Esthetic (normal profile of the face)
3. Comfort (by maintenance the health of mucosa , bone, muscles and TMJ



Consequence of incorrect vertical dimension:

A. Increased vertical dimension (freeway space less than (2-4)mm) :

1. Interference with speech.
2. Accelerated resorption of residual ridge.
3. Loss of biting power.
4. Clicking of teeth during mastication.
5. Muscle fatigue.
6. Inharmonious facial proportion.
7. Excessive display of teeth causing poor aesthetic.

B. Decreased vertical dimension (freeway space more than (2-4 mm):

1. Presence of wrinkles in the face (unsupported muscle).
2. Loss of biting power.
3. Muscle fatigue.
4. Pain in the (TMJ).
5. Cheek biting. **
6. Decreased lower facial height with prominence of chin.
7. Poor esthetic (thin lip appearance).
8. Angular cheilitis **(due to folding of the corner of mouth)

METHODS OF RECORDING VERTICAL DIMENSION

These include the following:

A. Methods of recording **REST Vertical Dimension**.

1-facial measurement: Patient is instructed to sit upright and asked to wet his lip with the tongue and swallow, then relax. In relaxation, the mandible should be at rest position, at this stage we measure between the two points (chin & nose).

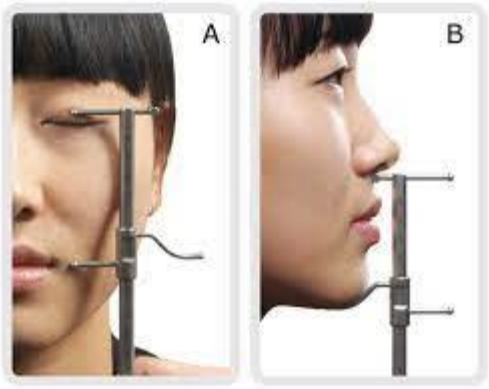
2-phonetics: Instruct the patient to say the letter "M" and "hum", and we measure the distance between the two points .**The "M" sound is often close to R.V.D..**

3-tactile sensation: Patient is asked to open wide until he feel strain in the muscles, then he close the jaw slowly until he reach comfortable position, we measure the distance between the two points.

4-facial expression: This depends on the experience of the dentist to notice the relaxed facial expression of the patient. Usually upper and lower lip are in slight contact and the skin around the eyes and the chin are relaxed and not stretched.

5-ELECTRO MYOGRAPHY(EMG): A special device which measure the tone of the masticatory muscles. When the tone is at its least, it means that these muscles are in rest position and therefore the jaw will be at rest.

6-anatomical landmarks: The jaws are considered at rest when the distance from the pupils of the eye to the corner of the mouth is equal to the distance from the anterior nasal spine to the lower border of the mandible. This is measured using **Willis guide**



WILLI 'S GAUGE

Methods for recording occlusal vertical dimension

B. Methods of recording OCCLUSAL Vertical Dimension. –1- With Pre-extraction records: (these records are made before the patient extract all his teeth) -2- Without Pre-extraction records

1-With pre extraction record

1-Profile photograph: They are taken in maximum occlusion and enlarged to life size. The anatomical land marks of the photograph are compared to that of the face at the try –in denture

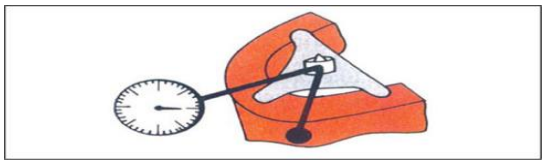
2-Articulated cast :Maxillary and mandibular cast are made and mounted in articulator before extraction. It is compared to the same cast of the patient after extraction (interarch distance)

3- Radiograph :Profile radiograph may be used to determine the vertical dimension. This method is limited because of its inaccuracy

4- Measurements of old (former) denture: Measurements of old denture are made and used as a guide in the new denture.

2-without pre extraction record

1-power point(by Boos): The theory of this method based "when teeth came in contact at OVD they will exert the maximum force". The method is applied by using a special apparatus which is made of metal plate attached to the UPPER occlusion rim and the bi meter is attached to the LOWER occlusion rim. The rims are inserted in the patient's mouth and the patients is asked to bite at different jaw separation until the highest reading is reached, which indicate the **ovd**



2- Neuromuscular perception(tactile sense):- A central bearing device attached to record bases. Different vertical relation are experienced by the patient through adjusting the screw upward or downward until the height of contact is comfortable to the patient and this represent the OVD of the patient.

3- Phonetics:- Used to evaluate the proper OVD. In some sounds like (ch, s, j) the upper and lower teeth reaches their closest relation without touching each other at the proper vertical dimension.

4- Swallowing threshold:- This method is based on the theory that when a person swallow the teeth come very light contact at the beginning of the swallowing cycle. The technique is by placing soft wax cones on the lower record base and saliva is stimulated by piece of candy so the patient can swallow many times against the upper record base. The repeated action of swallowing will gradually reduce the height of wax cones to allow the mandible to reach the proper OVD when the cones are evenly reduced

Lec-11 2nd class Dr:reem

Articulators:

defined as a mechanical instrument that represents the tempro mandibular joints and jaws to which the maxillary and mandibular casts may be attached to simulate some or all mandibular movements.

Uses\ function:

1- It allows most of the prosthetics work to be done in the absence of the patient.
2- Maintain jaw relation record during setting –up of teeth.
3- Denture re mounting after processing for correction of occlusal disharmony.

Types of dental articulators:

1. Simple hinge articulators (Class I).
2. Mean value or fixed condylar path articulators (Class II).
3. Adjustable condylar path articulators.

a. Semi-adjustable condylar path articulators (Class III).

b. Fully-adjustable condylar path articulators (Class IV).

4. Digital computerized articulator programming

1. Simple Hinge Articulators (plane line):

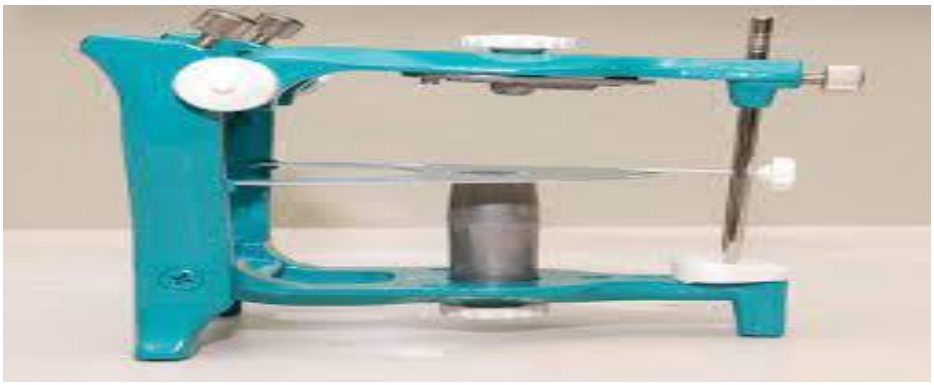
Design: It consists of un upper and lower members held apart at a certain distance by a screw which acts at the back. The screw can increased or decrease the distance between the two members, and permits only a hinge
Possible movements: This type of articulators gives only opening and closing movements.

Records required: a. Vertical dimension of occlusion. b. Centric relation records.

Disadvantages: These articulators do not represent the temporomandibular joint .

2. Mean Value or Fixed Condylar Path Articulators:

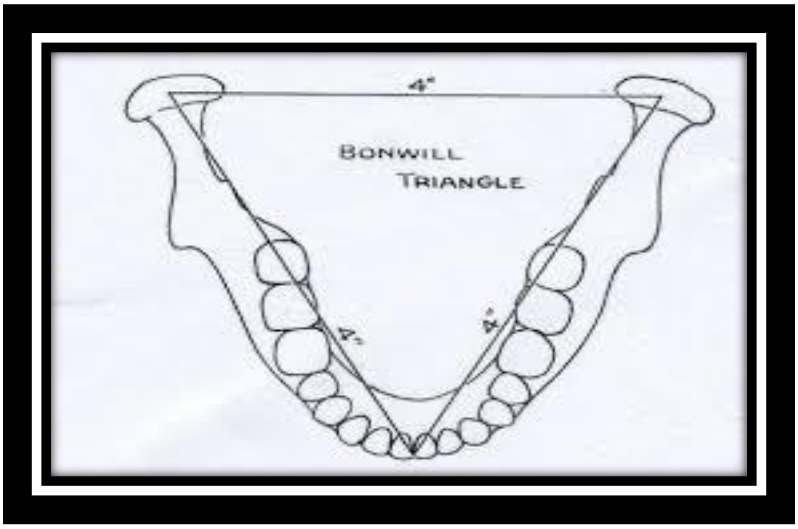
Design: The two members of these articulators are joined together by two joints which represents the TMJ. The horizontal condylar path is fixed at certain angle that ranges from(30^0-40^0) which is the average of the most patients. The incisal guide table is also fixed at a certain angle from horizontal.



Possible movements: 1. Opening and closing. 2. Protrusive movement at a fixed condylar path angle.

Records required: a. Vertical dimension of occlusion. b. Centric relation record. c. Face-bow record. When the articulators dose not accepts face-bow record, the mounting is made according to Bonwill triangle.

Bon will: found in mandibles that the inter-condyle distance as well as the distance from each condyle to the contact point of the lower central incisors was 4 inches equilateral triangle. An anterior pointer is attached to the incisal pin of the articulator to locate the tip of the occlusion rim labially and thus to orients cast in relation on the **Bon will triangle**



Disadvantages of mean value:

a. Most of these articulators do not accept face-bow record.

b. The condylar path moves to a fixed angle and it is successful in patients whose condylar angle approximates that of the articulator.

c. No lateral movements.

3. Adjustable Condylar Path Articulators:

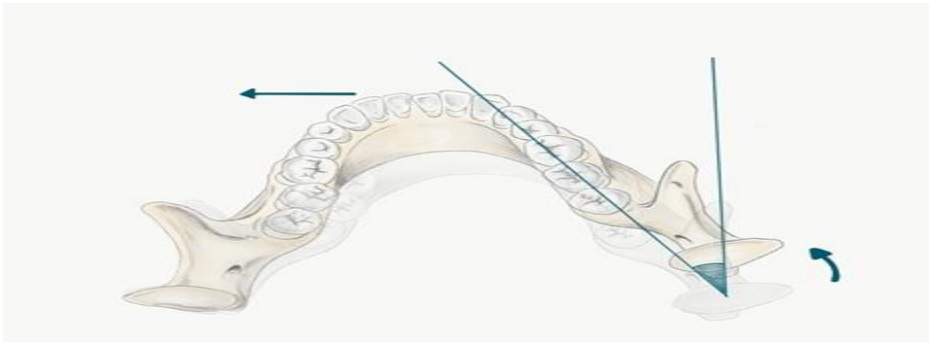
These types of articulators differ from the fixed condylar path articulators in that it has adjustable condylar and incisal guidance. They can be adjusted so that the movements of its jaw members closely resemble all movements of the mandible for each individual patient.

A- Semi-adjustable condylar path articulators(CL III):

Design: In these articulators (e.g. Hanau`s articulator ). The lateral condylar path inclination is adjusted according to the **Hanau`s formula**: L= H/ 8+12. Where; L= The lateral condylar path. H= The horizontal condylar path.

Some semi-adjustable articulators are Non-Arcon while others are Arcon . The term Arcon (Ar mean articulator Con mean condyle)is commonly used to indicate an instrument that has its condyles on the lower member and the condylar guides on the upper member.

Possible movements: a. Opening and closing. b. Protrusive movement according to the horizontal condylar path angle determined from the patient. c. Lateral movement to the angle estimated from the Hanau`s formula. d. Some types have Bennett movement-(bodily lateral movement of mandible)resulting from movement of condyle along lateral inclines of mandibular fossa during lateral jaw movement)



Bennet angle

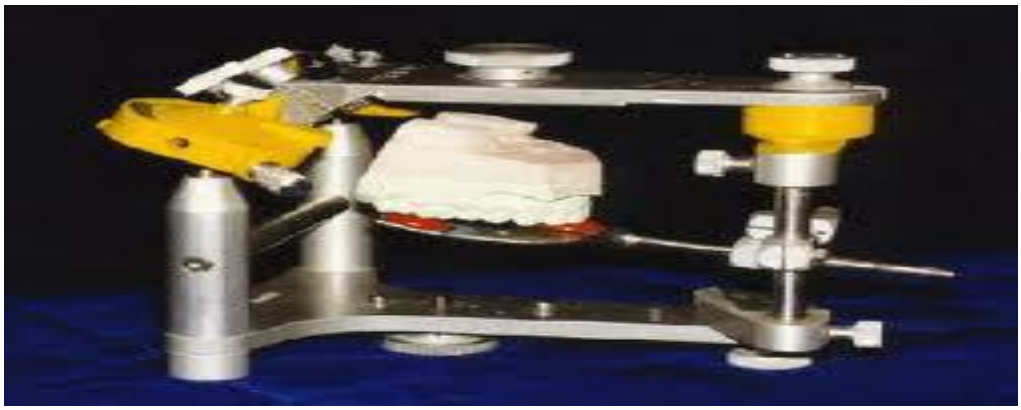
Disadvantages: a. The lateral condylar path angle is determined from the formula.

b. Most of these articulators have no Bennett movement.

B- Fully-adjustable articulators: They differ from the semi-adjustable articulators in that the lateral condylar path inclinations are adjusted according to records taken from the patient

Possible movements: The same movements of the semi-adjustable articulators. In addition they have Bennett movement

Disadvantages: Multiple records are required with the possibility of errors. Therefore, the semi-adjustable articulators are usually enough for complete denture construction.



4-Digital articulators

The Virtual articulator can be defined as a software tool for improved clinical outcome based on virtual reality technology .There are two types of virtual articulators namely -Completely adjustable and Mathematically simulated

The virtual articulators are able to design prostheses kinematically. They are capable of: -

1- simulating human mandibular movements.

2- moving digitalized occlusal surfaces against each other according to these movements

3. - correcting digitalized occlusal surfaces to enable smooth and collision-free movements.

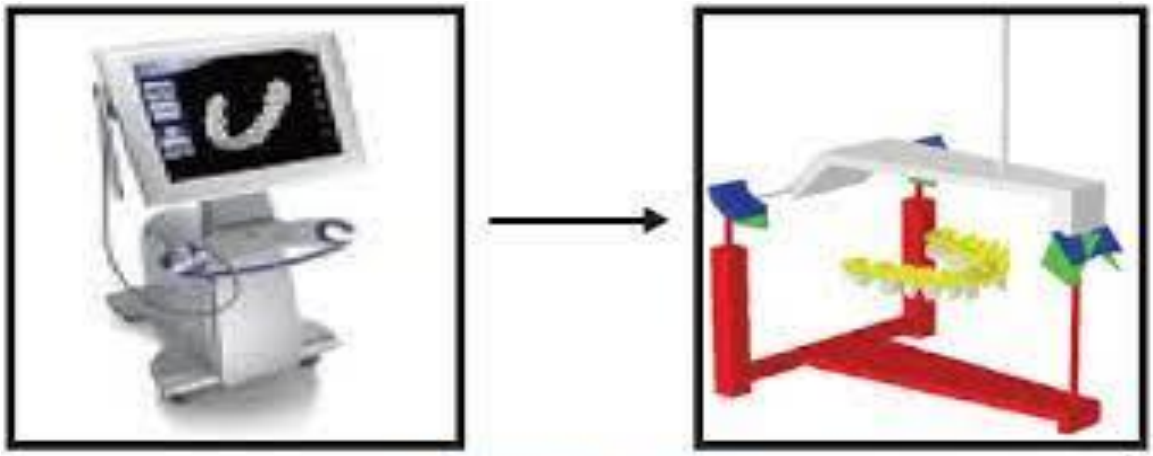
There are two types of digital articulators. One is Completely Adjustable Articulators, another is Mathematically Simulated Articulator. –

1-**Completely adjustable articulators (motion analyzer):-**

It was designed by Kordass and Gaertner. It records/reproduces exact movement paths of the mandible using an electronic jaw registration system called **Jaw Motion Analyzer (JMA).**

2-Jaw Motion Analyzer is device for tracking the jaw of patient. It is consists of face bow with receiver sensors, lower jaw and pointer sensor, occlusal adapter and software

Mathematically simulated articulator (motion parameter):- It is designed by Szentpétery. It is based on a mathematical simulation of the articulator movements. It is a fully adjustable three dimensional virtual articulator capable of reproducing the movements of a mechanical articulator



Mathematically Simulated

The advantage of the digital articulator

1-Digital articulator is kept in digital form so no need for a storage place

2-quick transmission to technician

3-an estimation of digital cast is simple, automatic, and accurate.

4-digital cast can be magnified and consequently pointing on anatomic focuses without any problem.

5-it can save original malocclusion in digital format.

6-there is no dust from alginate, plaster. etc.

7-patient can get prosthesis in just one visit.

8• Provides best communication between the dental specialist also, technician

9• Simulate the real patient's specific data

10–stimulate the movement of the human mandible

The disadvantage of the digital articulator

1- during indirect scanning, the plaster dental cast ought to be pure (no errors)

2 - mixed dentition is difficult to measure and recognize. •

3- high expense of system as it requires the digital scanners an sensors, software's.

The scanning can be done in 2 ways: •

1- Direct digitizing - done directly from the patient's mouth using an intra oral scanner.
2-• Indirect digitizing - done outside on the patient's master cast obtained after making final impression.

Face bow

Definition: is a caliper-like instrument used to record the spatial relationship of the maxillary arch to some anatomic reference point or points and then transfer this relationship to an articulator.

Important of the face-bow:

1. An arbitrary mounting of the maxillary cast without a face-bow transfer can introduce errors in the occlusion of the finished denture.

2. A face-bow transfer allows minor changes in the occlusal vertical dimension on the articulator without having to make new maxilla-mandibular records.

3. It is helpful in supporting maxillary cast while it is being mounted on the articulator

4. Allows more accurate programming of the articulator.

Types of face-bow: There are two basic types of face-bow; 1-the kinematic, and 2-the maxillary.

1-The kinematic (mandibular, hinge axis locator) face-bow: It is used to locate the kinematic (true or terminal) transverse hinge axis. The transverse hinge axis is an imaginary line, in which the mandible rotates during opening and closing for about 20 mm.

2. The maxillary face-bow: It is used to record the position of the upper jaw in relation to the hinge axis and transferring the relation to the articulator (. The maxillary face-bow is oriented to the kinematic or arbitrary hinge axis.

The arbitrary axis is positioned on a line extending from the outer canthus of the eye to the middle of the tragus of the ear and approximately 13 mm in front of the external auditory meatus

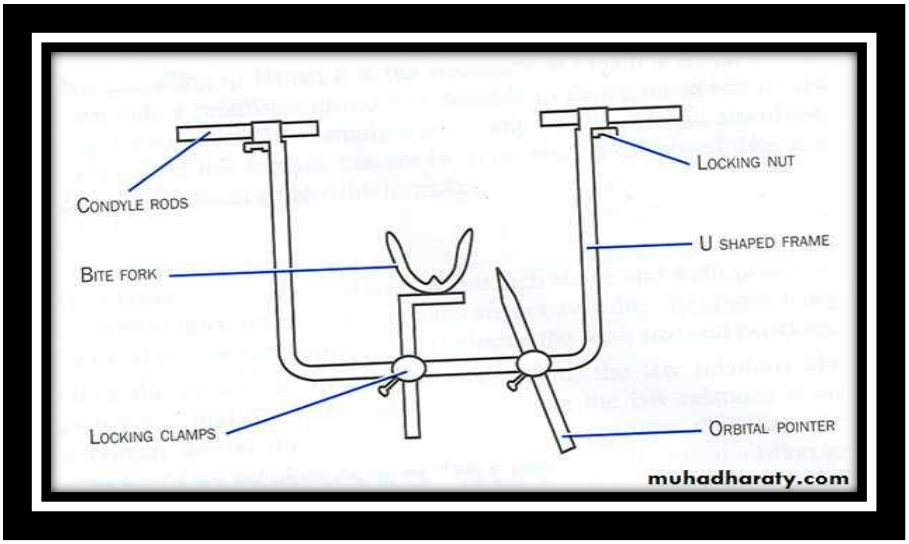
The ear face-bows are designed to utilize an arbitrary axis by fitting into the external auditory meatus.

Components of the face-bow :

1. **U-shaped frame or assembly.**
2. **Condyle rods / Ear pieces.**
3. **Bite fork**
4. **Locking device**
5. **Orbital pointer**
6. **Nasion relator assembly**
7. **Intercondylar scale**
8. **Electronic device**
9. **Transfer zig**

1-U-shape frame

- It is the main part of face bow to which all other parts are attached with the help of clamps.
- It should be large enough that extend from the region of one TMJ around the front of the face to the other TMJ and wide enough to avoid contact with sides of face



2-Condylar rod and ear piece

They are attached on either side of the free end of U-shaped frame.

• Fascia type of arbitrary face bows and kinematic face bows have condylar rods. Ear piece type of arbitrary face bows have ear pieces.

3-bite fork

• They are attached on either side of the free end of U-shaped frame.

• They are positioned on the patient at the approximate or absolute location of the hinge axis or opening axis of jaws.

4-locking device

• Locking device helps in attaching bite fork to the face bow.

• It also serves to support the face bow, the maxillary occlusion rim and the maxillary cast while the casts are being attached to the articulator

5-orbital pointer:

• It is present in Hanau arbitrary face bows.

• It marks the anterior reference point, which is orbital in case of Hanau arbitrary face bows

6-inter condylar scale:

• It is a part of whip-mix quick mount arbitrary face bow.

• It is present in front of face bow and indicates the inter condylar distance as small, medium and large (S, M, L).

Selection of artificial teeth

OBJECTIVES: •

1. Esthetics •
2. Masticatory function •
3. Correction of speech defects •
4. Preservation of the remaining tissue and muscle tone

•Primary selection of the teeth must be carried out at the first appointment).

Selection of anterior teeth

A-pre-extraction guides which include:

1. Diagnostic casts with natural teeth.
2. Pre-extraction photographs.
3. Pre-extraction radiographs.
4. Observation of teeth of close relatives.
5. Preserved extracted teeth.

B- Post extraction guide: when pre-extraction guides are not available we depend on the following factors:

A. Shade (color).

B. Size.

C. Form.

A-Shade:

• Shade mean degree of darkness of the color. There are two basic shades, the yellow and gray are the basic shades, and the other shades vary in between . Also it should be compatible with the general coloring of the skin, hair and eyes.

The factors of shade selection are:-

1. Age. 2. Sex. 3. RACE. 4. Patient -preference

1. Age:- The younger the patient, the lighter the color is preferred. The color of natural teeth darken with age because of deposition of secondary dentin , wearing a way of enamel and external staining from oral fluids, foods or tobacco.
2. Sex: - The sex may effect color, it seems that females given brighter teeth than males
3. race:- The color of the face should harmonize the color of teeth. Lighter teeth are suitable for lighter skin, while darker teeth are suitable for darker skin, although darker people with dark skin seemed to have very light teeth. This is because of contrast in the skin and tooth color.
4. Patient preference (method of pair comparison):- Show the patient a complete shade guide and select the two tabs that are lightest and darkest, hold them against the patient lip and ask them to point to the one that they prefer. More than two or three shades should be selected and comparison between them would help in final right selection.

B) **Size** To select size of anterior teeth we have to consider the following:

1. Length. 2. Width. 3. Method of pair comparison.

1. Length:- • The length of upper anterior teeth is controlled by:-

1- Inter-ridge distance. 2- Length of upper lip:

A. In short lip more than 2mm seen from upper central incisor.

B. In medium lip 1-1.5 mm seen from upper central incisor.

C. In long lip nothing can be seen from upper central incisor.

• The length of lower anterior teeth should be with level of lower lip.

2-Width: -

A. The width of upper central incisor equals approximately 1/16 of bi-Zygomatic width , and width of upper ant teeth equal to 0.3 bi-Zygomatic width.

B. The width from the tip of left canine to the right canine is almost equal to the width of the nose when measured in a straight line by a caliper.

If the base of the nose is wide the central incisor should be wide, if the root of the nose is narrow the lateral incisor should be narrow

C. Width of anterior teeth can be measured on upper occlusion rim depending on Labial frenum(mid line), corner of the mouth(Incisal papilla & cuspid eminences) By: drawing a line from the distal termination of the eminence (or anterior to buccal frenum attachment) following the contour of the ridge , reaching the anterior border of incisal papilla, then terminate distal to canine eminence of opposite side A mark is placed at occlusion rim at each corner of the lips when the patient is relaxed

D. Maxillomandibular relations

1. In class I – Normal relationship, the teeth in one arch are compatible with the teeth in the other arch.

2. In class II – The mandible is retruded and the mandibular teeth are frequently smaller

3. In class III – The mandibular teeth are frequently larger and longer than normal

C. FORM:- THE FORM OF ANTERIOR TEETH DEPENDS ON THE FOLLOWING:
1. FACE FORM.

2. SEX, AGE AND PERSONALITY.

3. METHOD OF PAIR COMPARISON.

1. Face form:- According to frontal out-line, face could be classified into square, ovoid and tapering. The upper central incisor form should be in harmony with patient face.

2. Sex, age and personality(SPA factor):-

Sex: Masculine form is associated with square, cuboidal and angular form. While feminine form associated with more rounded, ovoid and tapering features.

Age: In old patients the teeth tend to have square form due to attrition, more round features disappears and line angle quite seen in those patients.
Personality: It seems reasonable that a large vigorous type of persons have teeth of a size and form with prominent markings, different from those of a delicate appearing woman

3-Method of pair comparison: Allow the patient to select between the same size teeth but different forms. Set two different forms of teeth on the right and left sides of a piece of wax rope, and ask the patients which they prefer

SELECTION OF POSTERIOR ARTIFICIAL TEETH

Posterior teeth are selected for color, buccolingual width, mesiodistal length, vertical height (occluso-gingival length) and occlusal form

. **1- Shade (color)**: Shade of posterior teeth should be harmonized to the shade of anterior teeth, maxillary first premolars are sometimes used for esthetic more than function, so it's advisable to select premolar teeth with lighter color than the other posterior teeth, but not lighter than anterior teeth. Generally the shades of posterior teeth are slightly darker than anterior teeth (post. Contain dentin more than ant.).

2- Buccolingual width:- The buccolingual width of posterior teeth should be slightly narrower than natural teeth to decrease occlusal surfaces which direct less stress during function to supporting tissue, and also enhance the development of the correct form of polished surfaces of the denture.

3- Mesiodistal width: The mesiodistal width of posterior teeth should be equal to the distance between canine line and anterior border of maxillary tuberosity for upper teeth. For lower teeth should be equal to distance between canine line and anterior border of retro molar pad area.(the width with in design limit)

Note : Placing a tooth on an inclined plane should be avoided, otherwise dislodgment of denture occur.

4- The occlusogingival height :The occlusogingival height or length is controlled by the available inter-arch distance. The length of the maxillary first premolar should be comparable to that of maxillary canine to have the proper esthetic effect. The height of posterior teeth usually divided into long, short, medium. Long posterior teeth are generally more esthetic in appearance than are shorter teeth.

5- Occlusal form: There are two forms:-

a) Cusp form (anatomical teeth): Anatomical teeth have cusp angles 30, 20 degrees.(angle between the cusp tip and flat occlusal plane)

b) Non cusp (cusp less) form teeth: also called monoplane or zero degree teeth.

Advantages of cusp form teeth:- -1- More effect(functional). 2- Can be arranged in balance occlusion in eccentric position. 3- The cusp fossa relationship between upper and lower posterior teeth form definite point for return to centric occlusion. 4- More acceptable esthetically. 5- More compatible with surrounding oral environment. 20° 10° 30°

Advantages of non-cusp form teeth:- 1- Offer less resistance in non -masticatory movement like bruxism, therefore less damaging to supporting tissue. therefore, they are indicated in excessively resorbed ridges. 2- More comfortable. 3- Allow greater range for movement which is necessary in patients with mal-related jaw. 4- Can be used with less damaging effect than cusp form teeth in patients with uncoordinated neuromuscular control which jaw relation records are not repeatable.

Disadvantage of cusps on teeth is that alveolar resorption which cause reduction in vertical dimension and the interlocking of the cusps causes the lower denture to be displaced forwards and the upper backward causing damage to the underlying tissues.

Materials of artificial teeth:-

There are two main types: 1. Porcelain, 2. Acrylic

1--Porcelain teeth: We have vacuum fired and air fired. The vacuum is better because they are harder and have luster. Generally porcelain teeth are preferred particularly for young person because they look more vital, very smooth and difficult to abrade.

2-. Acrylic teeth: They are made from acrylic resin, indicated when there is insufficient inter-occlusal distance, and grinding becomes necessary, also in situation where there are opposing natural teeth, partial denture and gold bridge. They are inferior when they are compared with porcelain because they cannot maintain luster for long time and abraded easily.

ACRYLIC TEETH :

1- NOT BRITTLE, BUT POOR ABRASION RESISTANCE.
2- ESTHETIC VERY GOOD.
3- CHEMICAL BONDING WITH DENTURE BASE.
4- EASILY GROUND AND POLISH.
5- TRANSMIT FEWER FORCES TO THE MUCOSA
5- NO CLICKING ON CONTACT.
7- THERMAL EXPANSION SAME AS ACRYLIC DENTURE BASE.

PORCELAIN TEETH :

1- BRITTLE, MORE RESISTANCE TO ABRASION
2- EXCELLENT (DOES NOT STAIN).
3- MECHANICAL BONDING BY PINS OR UNDERCUTS HOLES
4-DIFFICULT TO GRIND AND POLISH.
5-MORE FORCES TO THE MUCOSA.
6-CLICKING ON CONTACT.
7-MUCH LOWER THAN ACRYLIC CAUSES STRESSES IN ACRYLIC DENTURE BASE.

Arrangement of anterior teeth

It is important that the artificial anterior teeth are placed in the same anterio posterior position and at the same length as the original natural esthetics and phonetics

Arrangement of maxillary anterior teeth:

In placing and positioning the maxillary anterior teeth the objective isto provide balance between maximum esthetics and proper phonetics.The maxillary anterior teeth should support the upper lip in a natural position.

1. After the loss of the natural anterior teeth, bone resorption usuallyoccurs more on the labial aspect than on the palatal aspect of the maxillary ridge. To compensate for this loss of bone structure the maxillary anterior teeth should be placed labial to the residual ridge.

2. The incisive papilla in the edentulous maxillary arch acts as a guide to proper placement of the maxillary central incisors. The maxillary central incisors fall approximately (8 to 10 mm)anterior to the point of intersection of a line that bisects the midline of the palate perpendicularly through the incisive papilla.

3. The labial contour of the teeth should follow the labial contour of the occlusal rim.

4. The right and left maxillary anterior teeth should be positioned symmetrically on either side of the arch.

Maxillary anterior teeth

1-MAXILLARY CENTRAL INCISOR:

-Mesio-distal inclination:

The maxillary central incisor is placed so that the long axisis parallel to the vertical axis, when viewed from the front

-Labio-lingual inclination: The neck of the tooth should be slightly depressed whenviewed from the side, the tooth slopes (incisal edge) towards the labial side.

-The incisal edge: Is in contact with the occusal plane

2-MAXILLARY LATERAL INCISOR:

-Mesio-distal inclination: The maxillary lateral incisor is placed with its long axisinclined distally when viewed from the front.

-Labio-lingual inclination: The neck of the maxillary lateral incisor is depressed morethan the central incisor, although the labial surface will benearly in line with the central incisor.

-The incisal edge: is ½ to 1mm above the level of the occlusal plane

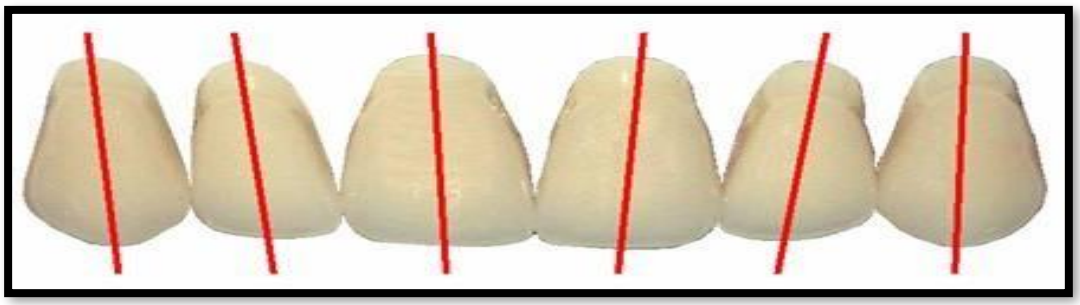
3-MAXILLARY CANINE:

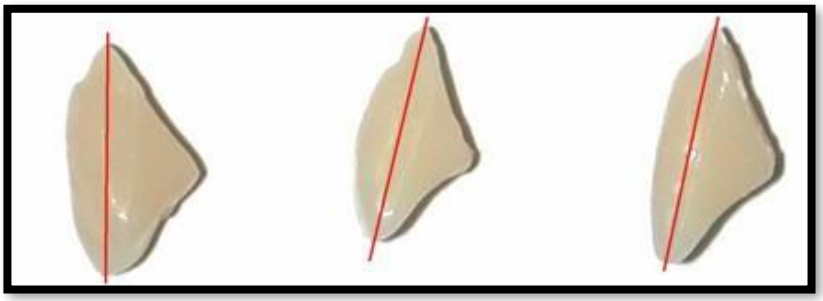
-Mesio -distal inclination The maxillary canine is placed so that the long axis is parallelto the vertical axis when viewed from the front

-Labio -lingual inclination The neck of the maxillary canine is prominent. The tooth axisis vertical (straight)when viewed from the side

-Incisal tip Is in contact with the occlusal plane.

Note: the maxillary canine has two planes on the labial surface, mesial plane should follow the contour of the anterior teeth while the distal plane will be in line with theposterior teeth





SAGITTAL VIEW

FRONTAL VIEW

Arrangement of mandibular anterior teeth

Notes:

1. The midline of the maxillary central incisor should be followed while placing the mandibular central incisor.

2. The imaginary roots of the mandibular anterior teeth should be directed towards the residual ridge. this will often place the mandibular teeth labial to the residual ridge.

3. The mandibular anterior teeth should not be in contact with the maxillary anterior teeth.

1-Mandibular central incisor

Mesio-distal inclination:

The long axis is perpendicular to the occlusal plane (vertically upright).

Labio-lingual inclination:

The central incisor is placed with its neck depressed and the tooth will show that it's labially inclined when viewed from one side.

The incisal edge:

Are 1-2 mm above the occlusal plane.

2-Mandibular lateral incisor

Mesio-distal inclination:

The mandibular lateral incisor is placed with its long axis showing a slight distal inclination.

Labio-lingual inclination:

The labial surface is perpendicular to the occlusal plane.

The incisal edge:

Are 1-2 mm above the occlusal plane

3-Mandibular canine

Mesio-distal inclination:

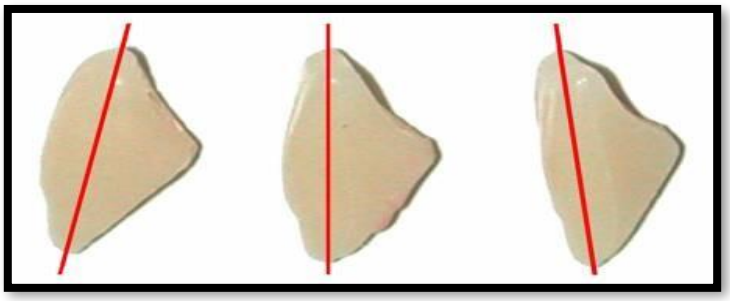
The mandibular canines are placed with a more distal inclination (neck distally placed) than the mandibular lateral incisors.

Labio-lingual inclination:

The neck of the tooth is placed prominently. The tooth shows a slight lingual inclination (at the incisal edge) when viewed from the side

The incisal tip:

Lies 1-2 mm above the occlusal plane.

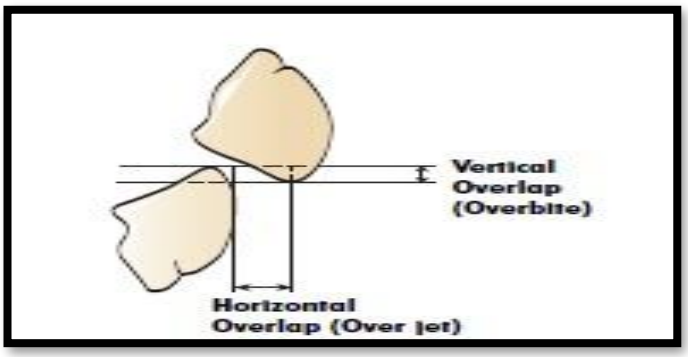


Horizontal overlap (over jet):

This the horizontal distance between the incisal edge of the maxillary central incisor and the labial surface of the mandibular central incisor.

Vertical overlap (overbite):

The maxillary anterior teeth overlap the mandibular anterior teeth and this overlap on the vertical axis is called the vertical overlap.



end

Principles of Arrangement of posterior teeth

The arrangement of the posterior teeth involves the application of principles similar to those followed in the arrangement of anterior teeth. The artificial posterior teeth should be placed as nearly as possible where the natural teeth were .

*** The inclination of the occlusal plane is an important factor in stability or instability of dentures. Ideally, the occlusal plane should be parallel to both ridges.**

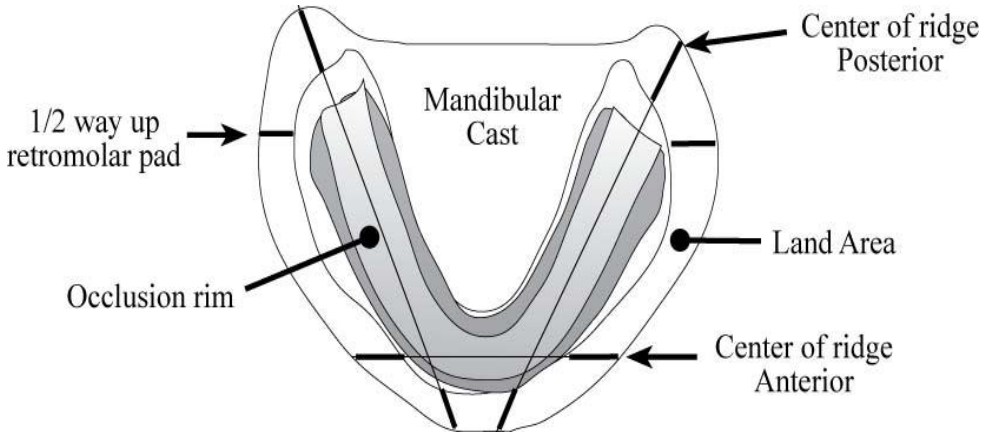
However the level of the occlusal plane must be placed as nearly as possible to the position of the occlusal plane of the natural teeth.

Bucco-lingual position of posterior teeth

*** The bucco-lingual position of the posterior teeth and the posterior arch form are determined anteriorly by the positions of the anterior teeth. Posteriorly, it is determined by the shape of the basal seat provided by the maxilla and mandible. The mandibular posterior teeth should be placed so that the antero-posterior groove (central) is placed on the crest(centre) of the residual ridge(fig. 1).**

The crest of the mandibular residual ridge is marked on the edentulous cast by a line drawn from the crest of the ridge in the 1st premolar and canine area up to the mesial of the retromolar pads. If the teeth are placed buccal to the ridge, the dentures may tip on the opposite side when pressure is applied to these teeth. The teeth should not be placed lingual to the residual ridge because this will cause lack of space for the tongue, and the dentures will be displaced when the tongue moves.

Figure(1):mandibular cast with bite rim



The maxillary 1st premolar:

FACIALLY:-The long axis of the tooth is parallel to the vertical axis from the front

PROXIMALLY:-the long axis is parallel to the vertical axis when viewed from the side

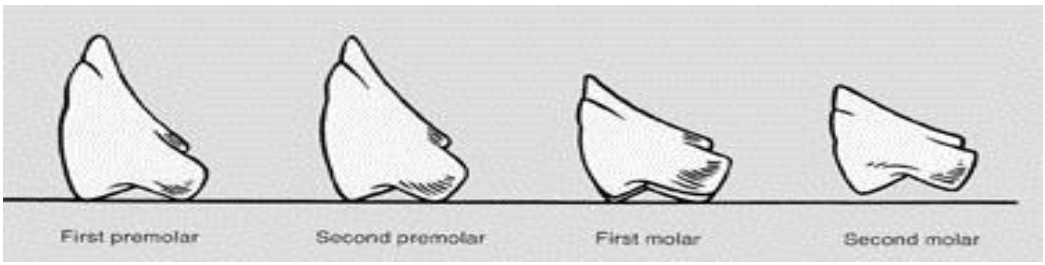
OCCLUSALLY:-buccal cusp touches the occlusal plane and the palatal cusp is positioned about 0.5mm above occlusal plane.

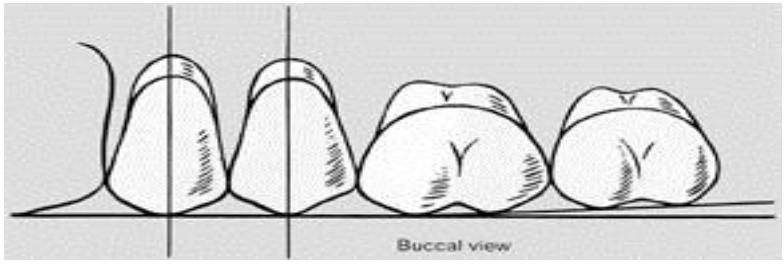
The maxillary 2nd premolar:

-FACIALLY:- is parallel to the long axis

PROXIMALLY:-parallel to the long axis

OCCLUSALLY:-both buccal and palatal cusp touch the occlusal plane .





The maxillary 1st molar:

PROXIMALLY:-long axis is tilted buccally when viewed from the side.

FACIALLY:-when viewed from the front-tilted distally

OCCLUSALLY:-the mesio-palatal cusp touches the occlusal plane, disto palatal above occlusal plane about 0.5mm.

The maxillary 2nd molar

PROXIMALLY:-the long axis is tilted buccaly, when viewing from the side

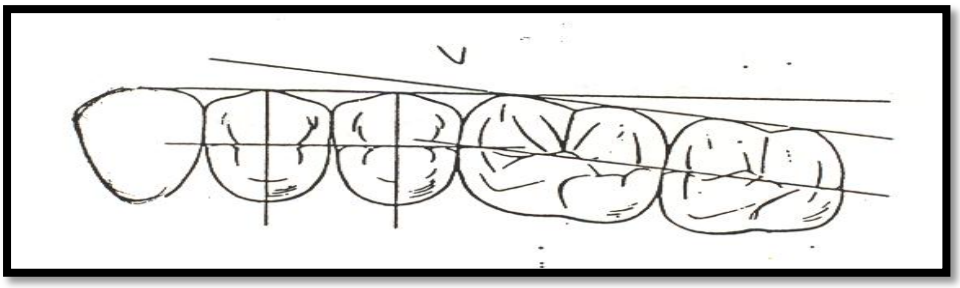
FACIALLY:-tilted distally , when viewed from the front side

OCCLUSALLY:- Cusps is raised above occlusal plane.

"The maxillary teeth viewed from the occlusal surface should follow the following guidelines":

- The distobuccal surface of the canine, the buccal surfaces of the premolars and the mesiobuccal surface of the 1st molar should follow

a straight line. Buccal surfaces of the 2nd molar are slightly inwards and are placed so that all buccal surfaces of the 1st and 2nd molars follow a straight line. The posterior teeth should be placed so that the central grooves of the maxillary posterior teeth follow the line of the crest of the mandibular residual ridge.



The position of the mandibular posterior teeth:

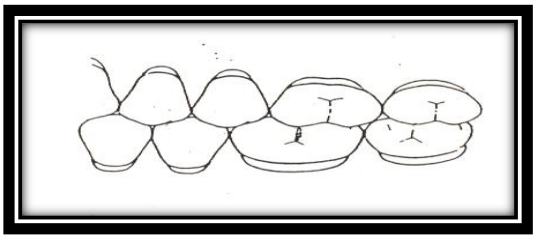
The placement of the mandibular posterior teeth determines how well the teeth occlude, both in centric occlusion and in lateral and protrusive excursions. After placing each mandibular tooth in the correct position the incisal guide pin should be checked to insure that it is in contact with the guide table.

Position of the mandibular 1st premolar

PROXIMALLY:-the long axis of the tooth slopes slightly lingualy when viewed from the side.

FACIALLY:-the long axis parallel when viewed from the front.

OCCLUSALLY:-the buccal cusp should be 2mm above the occlusal plane.



Position of the mandibular 2nd premolar

the long axis slopes slightly lingually when from front

-the same when viewed from side

-Both cusps are 2mm above the level of the occlusal plane.

1st molar:

FACIALLY:-the long axis of the tooth slopes slightly lingually when viewed from the side.

PROXIMALLY:-The long axis of the tooth is tilted mesially when viewed from the front.

OCCLUSALLY:-all the cusp above the level of occlusal plane.

MANDIBULAR 2nd molar

PROXIMALLY: the long axis slopes slightly lingually

FACIALLY:-the long axis tilted mesially when viewed from the front.

OCCLUSALLY:-All the cusp above the level of the 1st molar.

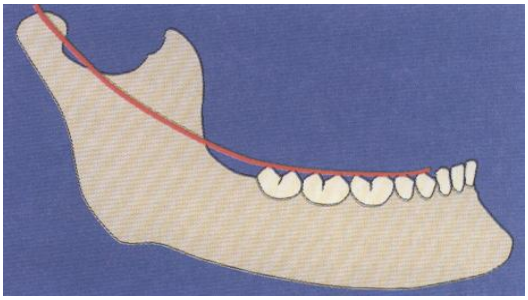
Compensatory curve:- anteroposterior and lateral curvature in alignment of occluding surfaces and incisal edges of artificial teeth , used to develop balanced occlusion.

1-an Antero-posterior curve(Curve of Spee)

2-Lateral curve

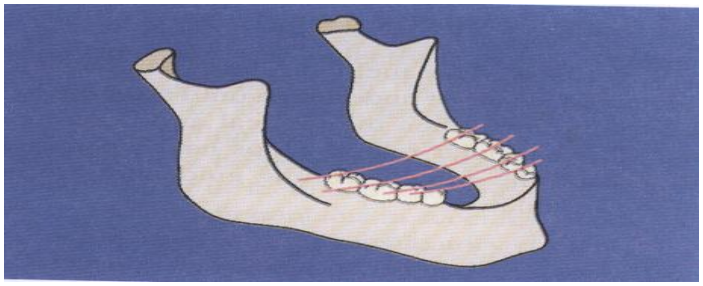
CURVE OF SPEE:-

Anatomic curvature of the occlusal alignment of the natural teeth beginning at the tip of the lower canine and following the buccal cusps of the natural premolars and molars called curve of spee.



Lateral curve:-

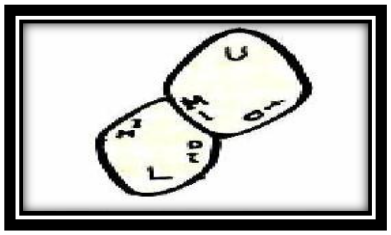
It is the Curve of occlusion touching the cusp tips of posterior teeth in frontal plane.



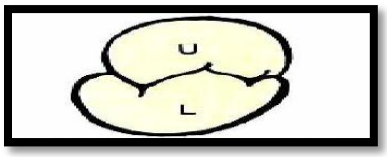
Keys of Occlusion

a-Canine Key of occlusion:

- **The distal of the lower canine should align with the mesial arm of the upper canine.**



- **B- Molar Key of occlusion :-The mesio-buccal cusp of the maxillary molars coincides with the mesio-buccal groove (buccal groove) of the mandibular molars .**



Processing the denture

1) Flasking. ■
2) Wax elimination. ■
3) Mixing. ■
4) Packing. ■
5) Curing. ■
6) De-flasking. ■
7) Shaping and Polishing

1-**Flasking of the denture**: is the process of investing the cast with the waxed denture in a flask to make a two sectional mold used to form the acrylic resin denture base.

The flask: is a metal case or tube used in investing procedures or can defined as a sectional metal case in which a sectional mold is made of artificial stone or plaster of Paris for the purpose of compressing and processing dentures or other resinous restorations

The flask is consists of: 1. Lower half that contains the cast. 2. Upper half. 3. The cover or lid.

Flasking techniques

There are two technique used either

1-**Compression technique** ,the most popular method used or

2-injection molding technique

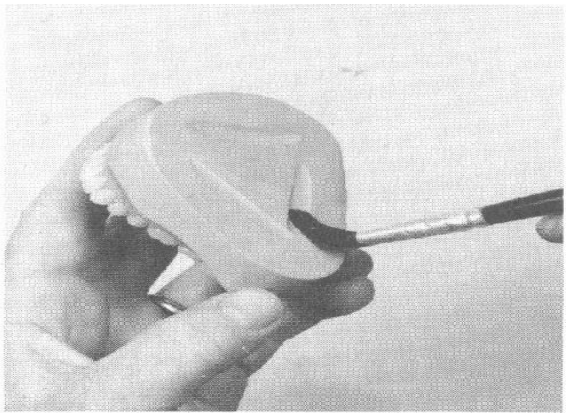
The procedure of processing the denture in compression technique(flasking):

1. Sealing of the upper and lower trial dentures all over the border until the margin of the cast while the casts on the articulator.

2. Soak the cast and the mounting plaster in water a few minute to separate the cast from the mounting plaster, save the plaster mounting, as it will be used to reposition the cast on the articulator after the dentures are processed.

3. Make sure that there is enough space between the incisal and occlusal surface of the teeth and the top of the upper ring about 3-6 mm., if there is no space then the cast must be reduced in thickness

4. apply separating medium to the cast and flask



5. Invest the lower half of the flask first:

a. Use a mixture of plaster or stone and placed in the base of the flask.

b. Center the cast in the lower half of the flask and pushed to place until the bottom of the cast touches the base of the flask. Note that the posterior portion of the cast is level with the edge of the flask.

c. Remove any undercuts in the plaster. Undercuts will prevent the separation of the upper ring from the lower portions of the flask.

d. The plaster smoothed even with the base of the cast and allows the plaster to set. Then it will be coated with separating medium.

6. Investing the upper half of the flask:

a. Reposition the ring (upper portion) of the flask

b. Mixing of stone or plaster done, pouring of the plaster to flow and reach all surfaces of teeth without any air babbles by putting the flask on the vibrator, the plaster or stone must reach the incisal edge and occlusal surface of teeth.

c. Separating medium painted on the second layer of plaster after setting and smoothing of plaster.

d. A third mixing of stone done and pouring it until the flask is filled with stone and the flask is covered and some stone enter through the holes in the cover and around the edges, it is essential to have metal-to-metal contact.

e. The stone left to set completely for about 45 minutes.

Wax elimination

After the complete set of the gypsum, the flask is ready for the next step which is "Wax elimination": (**second step of processing**) complete denture.

a- Place the flask into boiling water for 5 minutes. This will soften the waxed denture base, which can easily remove from the mold when the flask opened.

b. After five min., remove the flask from the boiling water and gently open it, insert a wax knife between the lower and upper half and gently separate them.

c. Remove the semisolid pieces of the waxed denture base. All the teeth should remain in the top half of the flask. Using more hot (boiling) water to flush out all the remaining wax.

d. Wax solvent can be used with stiff brush to remove any remaining wax on teeth.

e. It is essential to remove all wax remenant. Acrylic resin will not adhere to a surface coated with wax.

f. Stand the flask on its side and allow it to drain, dried and cooled

3-mixing heat cure acrylic

a. Separating medium used on plaster or stone, care should be taken not to painting the teeth with separating medium.

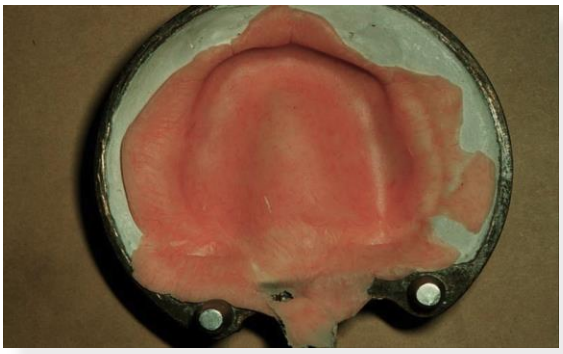
b. The flask is left to dry and another coat is painted on the flask and left to dry.

c.heat cure acrylic is used polymer/ monomer mixed according to manufacture instruction. Usually 10 CC of monomer and 30 CC of polymer will be enough to pack an average-sized denture, after mixing of the material on clean jar and reach dough stage, it's ready for packing

4-packing

1-Pack the material in the upper half of the flask, being sure to press it well into the area around the teeth.

2-Use enough material to insure over-packing on the first closure using nylon sheet. At least two trial closures done and before the final closure, a thin layer-separating medium applied on the cast and the nylon pressure by bench hydraulic press of about 100 kg/cm2.
3-Then the flask is put in spring clamp sheet is removed and then the two halves of the flask are closed and the clamp is closed tightly, it is essential to have metal-to-metal contact.



Continue to previous lecture \-Curing

It is the process of polymerization of acrylic resin by heat, the amount of heat must controlled while processing acrylic resin. Types of curing cycle:

A. Slow curing cycle: The flask is heat to 70ºC for 7 hours then 100 ºC for 3 hours (the total 10 hours), or heated to 75 ºC for 6 hours then 100 ºC for 1 hour or 74 ºC for 8 hours.

B. Rapid curing cycle: The flask is heated to 140 ºC for10 minutes with 40 P.S.I. pressure. The best curing cycle is the slow curing cycle because most of the conversion of monomer to polymer occurs during the period at 70 ºC and the rapid cycle method may induce greater dimensional changes in the dentures than slow – cure method

6-Deflasking

: It is the removal of the mold from the flask and separate the mold from the denture and the cast. The flask removed from the mold using a flask ejector, which used to separate the flask from the mold after removing of the cover. By using a saw, longitudinal and horizontal cuts carefully made through the plaster or stone and the pieces gently removed. The cured dentures and their casts have been removed from the mold.

7-Finishing and polishing of complete denture

1-Finishing:\- Finishing the complete denture consist of perfecting the final form of the denture by removing any flash (excess) of acrylic resin at the denture border, any flash and stone remaining around the teeth and any nodules of acrylic resin on the surfaces of the denture base resulting from processing

The flash:- Is the acrylic resin that was forces out between the halves of the flask by the pressure applied during the processing procedure.

The grinding and cutting instruments:-

1. Acrylic carbide burs 2. Acrylic stone burs 3. Fissure burs.

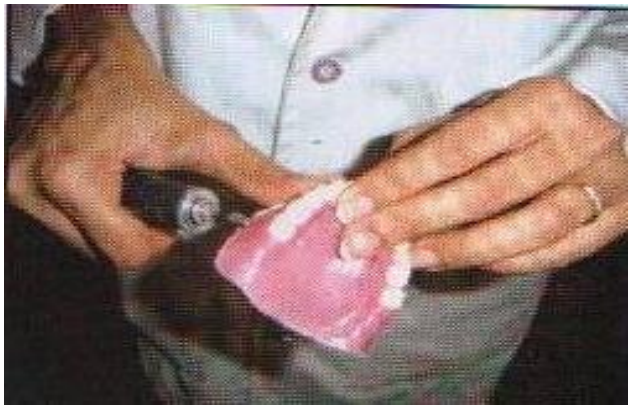
4. Rubber wheels 5. Sand paper.

Procedure of finishing:-

1. To remove the flash of acrylic resin from the denture border, press the denture base lightly against a slowly revolving arbor band mounted on the lathe. An alternative but less satisfactory to use a large acrylic or stone bur mounted in a straight hand piece to remove the excess resin. Take care not change the form of denture border but only remove the excess resin on the border of denture

2. Carefully remove any flash and any remaining stone from around the neck of teeth

3. Remove any nodules of acrylic resin with small stone or acrylic carbide burs that are made for denture finishing. The posterior area of the palate has thinned to its proper thickness.



2-Polishing:- Is a process of removing scratches , Polishing the dentures consist of making the dentures smooth and glossy without changing the contours.

Principles of polishing:-

1. The tissue surface of a denture is never polished as a polishing destroys the details necessary for good fit and retention.

2-. The polished surface extends just over the border, but the borders are not reduced in height or width during polishing.

3-Care must be taken when using pumice (used as wet slurry) as this material is very abrasive and may obliterate the details placed on denture when they were waxed.

4. Resin teeth have approximately the same hardness as the denture base, so polishing a denture with resin teeth requires some precautions not necessary with porcelain teeth.

5. When polishing, only the denture base and not the teeth are polished. During the finishing and polishing we should minimize the reduction of bulk because this is cause warpage.

Procedure of polishing:-

1. Smooth the labial, buccal, lingual and palatal external surfaces of the denture with wet pumice on a rag wheel running at slow speed.

2. Polish the resin around the teeth with pumice and a brush wheel moving at slow speed.

3. Felt cones or small buff wheels may be used to polish the palatal portion of the upper denture. The choice of wheels or cones dependent on the shape of the palate.

4. If stippling is desired in the denture base and was not placed during the final waxing it can be added at this time using small round bur lightly stipple the denture base from the second

premolar to the second premolar on the other side. Lightly pumice the stippling with a brush wheel at low speed.

5. Next stage use of Tripoli (greasy material). This material is applied to dry muslin buffing wheel, this differs in that the polishing compound is applied to the wheel and not as pumice to the piece of work being polished.

6. After the denture completely polished with Tripoli, it is scrubbed thoroughly. Final polished is placed on the denture with a (high shine) material.

7. Store the polished dentures in water until they have been delivered to the patient with high gloss, compatible contour, and natural appearance. Store the dentures in water all the time otherwise it will go under dimensional changes and shrinkage

OCCLUSAL CORRECTION

Every new set of complete denture should be tested in mouth for tissue adaptation and retention and any pressure area or over extended borders should be indicated by using **pressure indicated paste**. Following that the dentist should be routinely **remount** the dentures on the articulator from new centric relation record, making necessary correction before the patient is permitted to wear them home. This procedure created to correct any slight processing shrinkage of denture base, any tissue change or error in the impressions and occlusal discrepancies.

Artificial teeth move about to a minor degree during waxing and processing of the trial denture to a resin one. This tooth movement is due primarily to dimensional changes in the wax denture base, the investing materials, and in the resin denture base during curing. Occlusal discrepancies caused by these dimensional changes ordinarily are removed before the dentures are polished.

Causes of errors in occlusions:

1. Inaccurate maxillo-mandibular relation record by the dentist.

2. Errors made in the transfer of maxillo-mandibular relation to the articulator.

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4. Failure to seat the occlusion rims correctly on the cast (ill-fitting record base).

5. Incorrect arrangement of the posterior teeth.

6. Failure to close the flask completely during processing.

7. Warpage of the dentures by overheating them in polishing stage.

8. Dimensional changes of the acrylic resin (denture base material).

The errors that are a result of processing changes can be eliminated before insertion of the dentures in the patient's mouth, correcting occlusal surface of the teeth by selective grinding.

Selective grinding:

Defined as "modification of the occlusal forms of the teeth by grinding according to a plan. The modification of the occlusal forms of teeth by grinding at selected places market by spots made by articulating paper, or marked by parts of the teeth cutting through a thin layer of wax placed over the teeth".

Correction of occlusal errors: Two methods are generally used in correcting errors due to processing changes, In both, the occlusal surfaces of teeth are altered by selective grinding:

1. Intra-oral (inside the patient mouth).

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Disadvantages of intra-oral method correction:

1. It is difficult to see the errors because the soft tissues will be distorted and obscure the errors.

2. The denture bases will be shift in relation to the underlying bone when there are errors in occlusion due to the resiliency of the soft tissues.

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LEC 19 / CONTINUE TO PREVIOUS LECTURE-------

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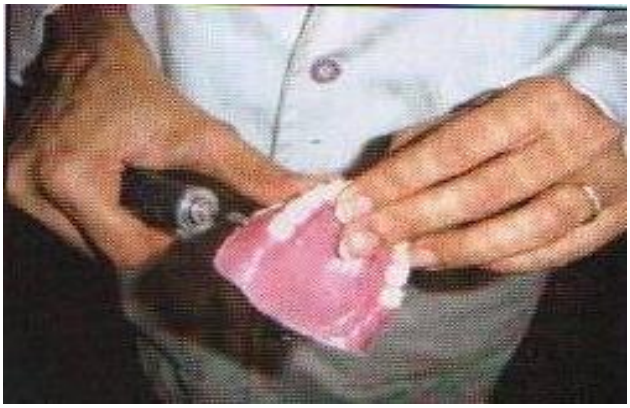

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Complete denture occlusion

Occlusion: Any contact between teeth of opposing dental arch usually referring to contact between the occlusal surfaces.

Occlusion of complete denture: The static relationship between the incising and masticatory surfaces of the maxillary and mandibular teeth analogues.

Centric occlusion: The occlusion of opposing teeth when the mandible is in centric relation. This may or may not coincide with maximum intercuspation. **(It is tooth-to tooth relation**).

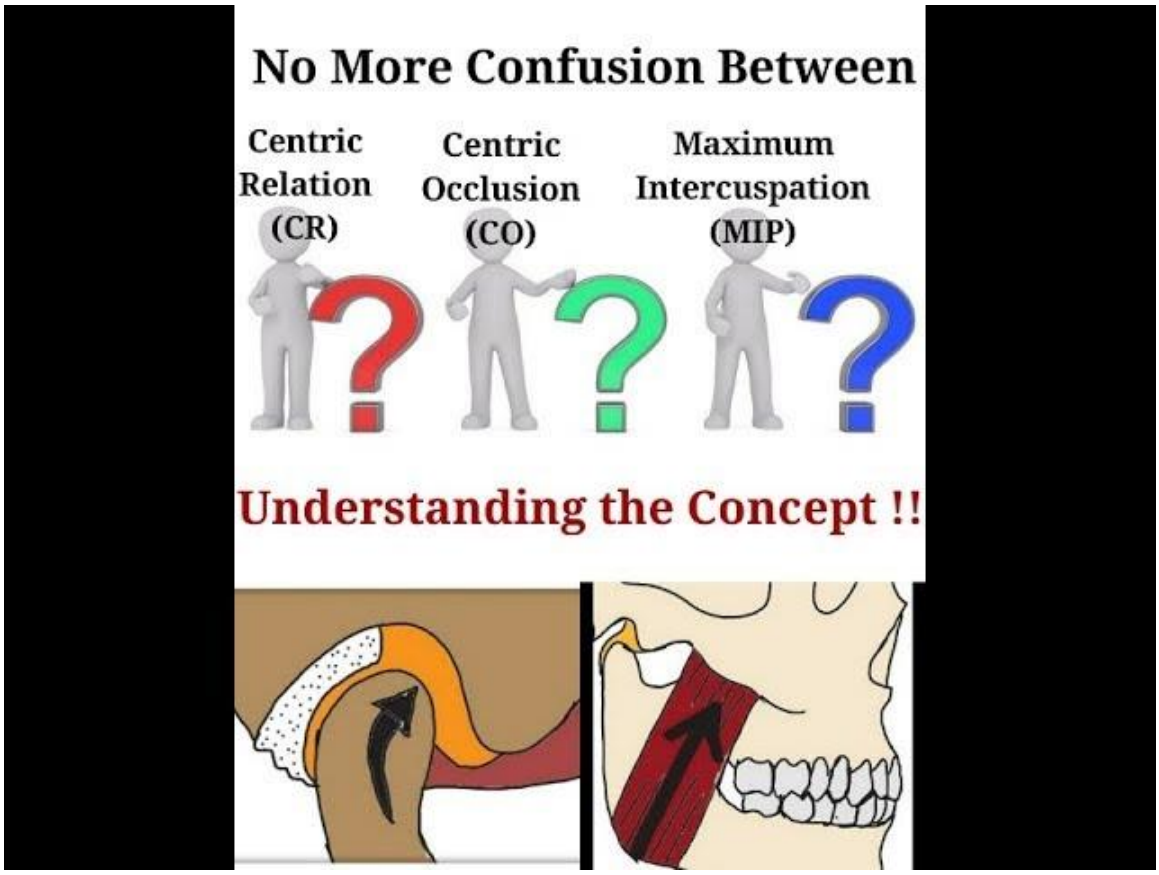
Centric relation: It is the most retruded relation of mandible to the maxillae when the condyles are in most posterior unstrained position in the glenoid fossae from which lateral movement can be made, at given degree of jaw separation. **(It is bone-to-bone relation)**

Maximum intercuspation (intercuspal position): The complete intercuspation of the opposing teeth, independent of condylar position

If in maximum intercuspation the condyles are physiologically centered, then both the maximum inter cuspal position and the centric occlusion position are the same. However, if maximum intercuspation occurs with the condyles being out of centricity, then both positions would not coincide, with the maximum intercuspation in that case, referred to as the **habitual closure**, and considered as an eccentric position.

In complete denture construction it is essential that centric occlusion is in harmony with centric relation even though this condition doesn't always occur in natural dentition, so the dentist

is responsible to record centric relation, and maintain this relationship in the laboratory procedure during mounting and arrangement of teeth in centric occlusion. In centric occlusion, the buccal cusps of the mandibular teeth contacts the central fossa of maxillary teeth, while the lingual cusps of the maxillary teeth fill into the central fossa of the mandibular teeth. This facial overlap prevents cheek biting when the denture are completed



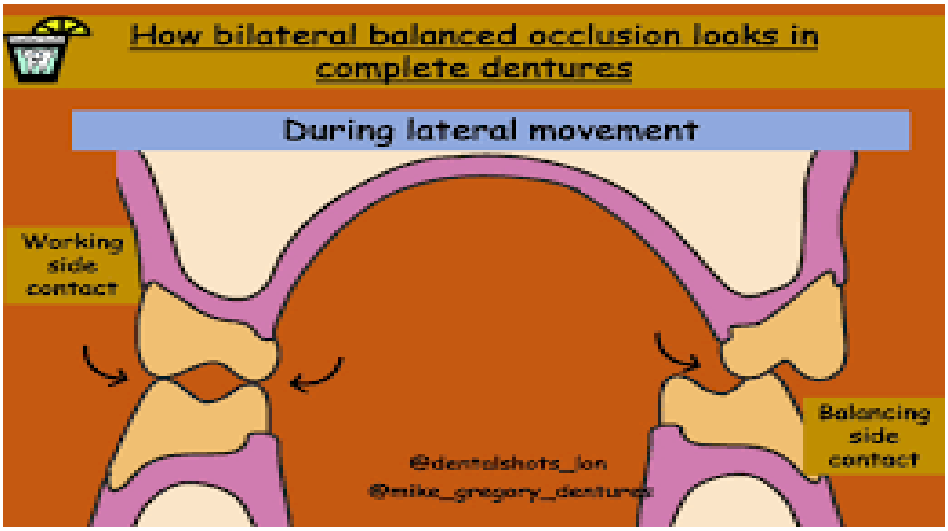
Concepts of complete denture occlusion:

1. Balanced occlusion.
2. Monoplane or non-balanced occlusion.
3. Lingualized occlusion.

Balanced occlusion: Means the simultaneous contacting of the upper and lower teeth on the right and left and in the anterior and posterior occlusal areas (working, balancing and protrusive).

Working side: The side toward which the mandible move in a lateral excursion

Balancing side (non-working side): That side of the mandible that moves toward the median line in a lateral excursion (the side opposite the working side).



Working or functional occlusion: Occurs when the facial or buccal cusps of maxillary teeth meet the facial cusps of the mandibular teeth and the lingual cusps of the maxillary teeth meet the lingual cusps of the mandibular teeth. The relationship is not cusp tip to cusp tip, but cusp tip into cusp "valley" with each maxillary cusp distal to the corresponding mandibular cusp. Working occlusion enable a person to hold and crush food.

Balancing occlusion: Occurs simultaneously on the opposite side from working occlusion. Balancing occlusion functions is to maintain the dentures in position during lateral excursive movements.

In balancing occlusion, the lingual cusps of maxillary teeth contact the buccal cusps of the mandibular teeth. In many techniques, balancing contacts are necessary only on the second molar

Protrusive occlusion: It is the relation acquired by the mandible when it moves in protrusive direction from centric position. The protrusive direction are downward and forward. When the condyles travels in this direction, it brings the anterior teeth into a position favorable for incision . In protrusive balance, the distal inclines of the maxillary buccal cusps contact the mesial inclines of the mandibular buccal cusps. Protrusive balancing contact may occurs on lingual cusps this help to maintain denture stability.

Importance of balanced occlusion:

1. It avoid displacement of denture and help in its stability during functional and non-functional movements .

2. It help in earlier repositioning of denture, which become displaced during mastication.

3. It minimize period required for adaptation of patient to the denture due to its stability

4. Prevent trauma to the supporting tissue since the pressure is equally distributed on the teeth.

Factors controlling the balanced occlusion

: 1. Inclination of condylar guidance.

2. Inclination of Incisal guidance.

3. Cusp height.

4. Orientation of the occlusal plane.

5. Prominence of the compensating curve

Monoplane occlusion:

Monoplane occlusion characterized by occlusal contacts of maxillary and mandibular teeth initially in maximum intercuspation. The disocclusion of posterior teeth occurs because of their arrangement in a single plane, and the contact of the anterior teeth during movement of the mandible (teeth are set in a flat plane with no vertical overlap of the anterior teeth)

Indications of the monoplane occlusion (neutron centric concept):

1. Flat ridge(s)

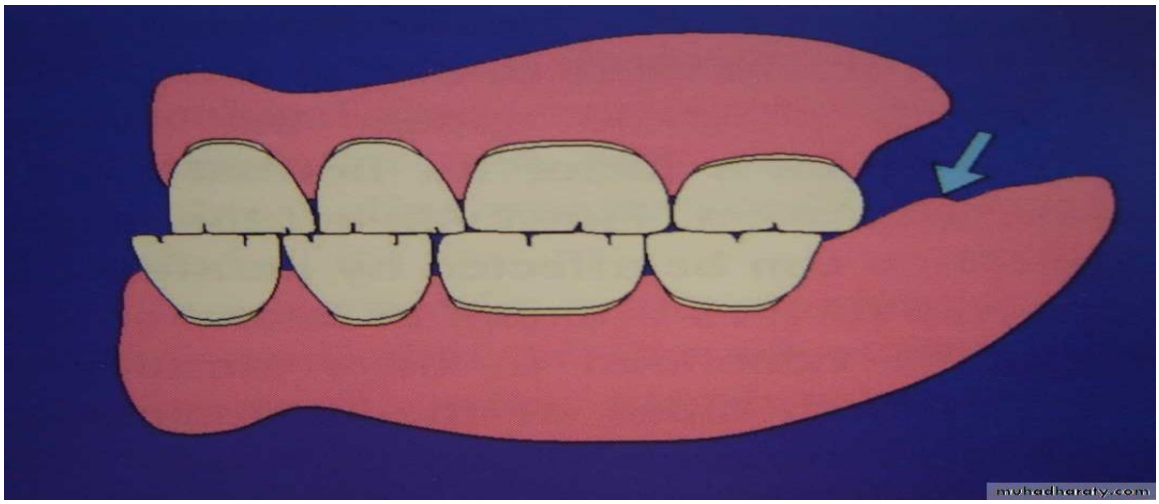
2. Class II jaw relations

3. Class III jaw relations

4. Handicapped patients

5. Cross bite

6. Doubtful or Without any perfect centric relation records



Lingualized occlusion:

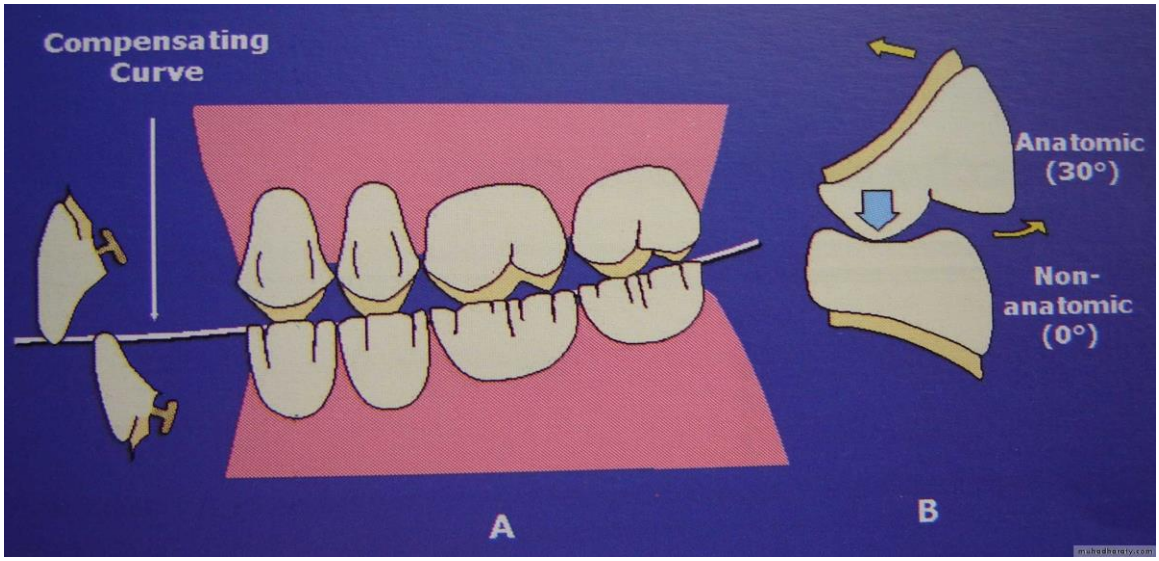
The maxillary lingual cusps are the main functional occlusal elements. These may oppose mandibular 0º or shallow cusp teeth in balanced or nonbalanced patterns depending on the needs of the patient.

Advantages:

1. The presence of a cusped tooth in the maxillary premolar and first molar regions looks more natural when compared to a zeroº tooth.

2. The use of maxillary lingual cusps could be expected to centralize the occlusal forces and reduce the frictional resistance of flat teeth sliding over one another.

3. Additional stability can be gained during para-functional movements



. **Try-in appointment:**

Note: this section come after setting anterior and posterior teeth.

In the try-in appointment (clinical-stage) the teeth are tried in before processing them in acrylic resin to:

1. Verify the maxillo-mandibular records that were made without teeth (tentative record).

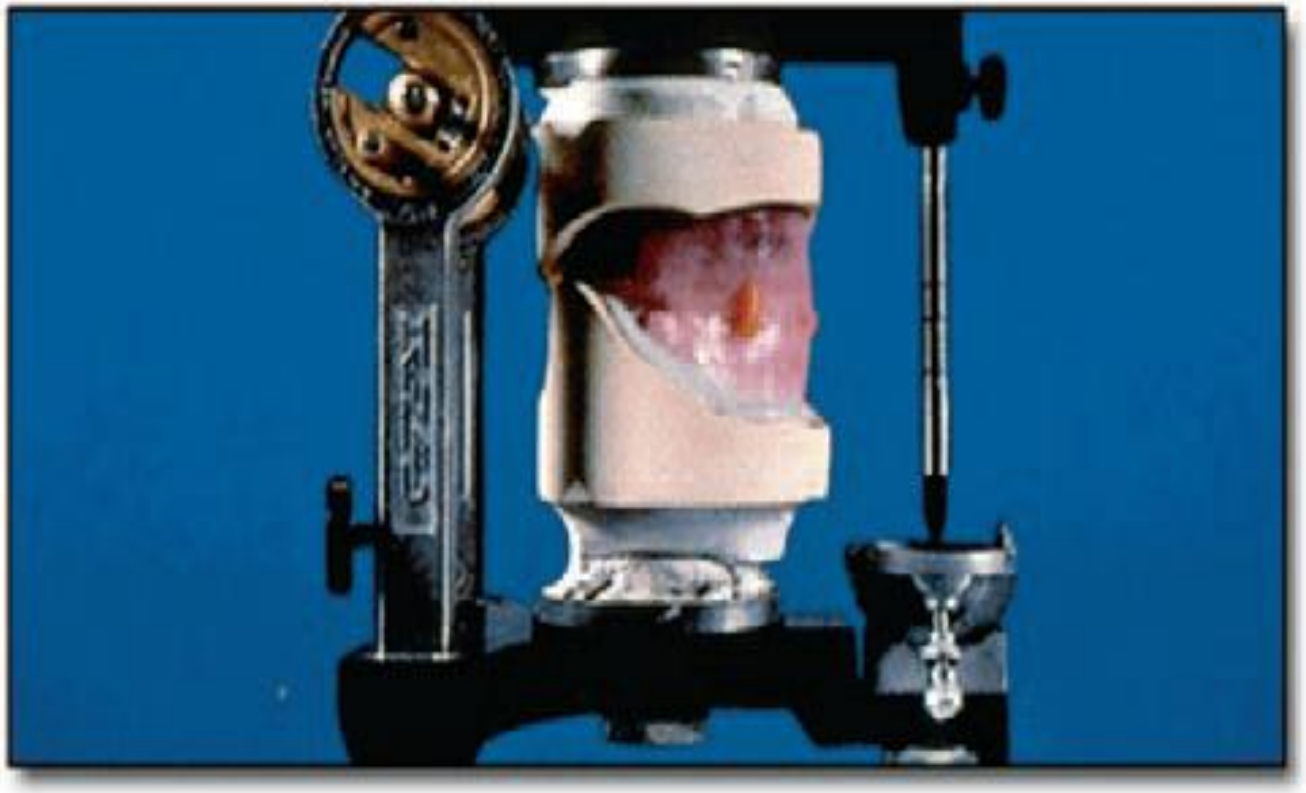
2. Test for the acceptance of the established vertical dimension of occlusion.

3. Determine if the positions of the teeth and the contours of the denture base are compatible with the surrounding oral environment.

4. Evaluate the arrangement for esthetic requirements.

5. Make additional inter-occlusal maxillo-mandibular records if needed for further adjustment of articulator for excursive movements after the try-in like protrusive

MOUNTING



DEFINITION:-

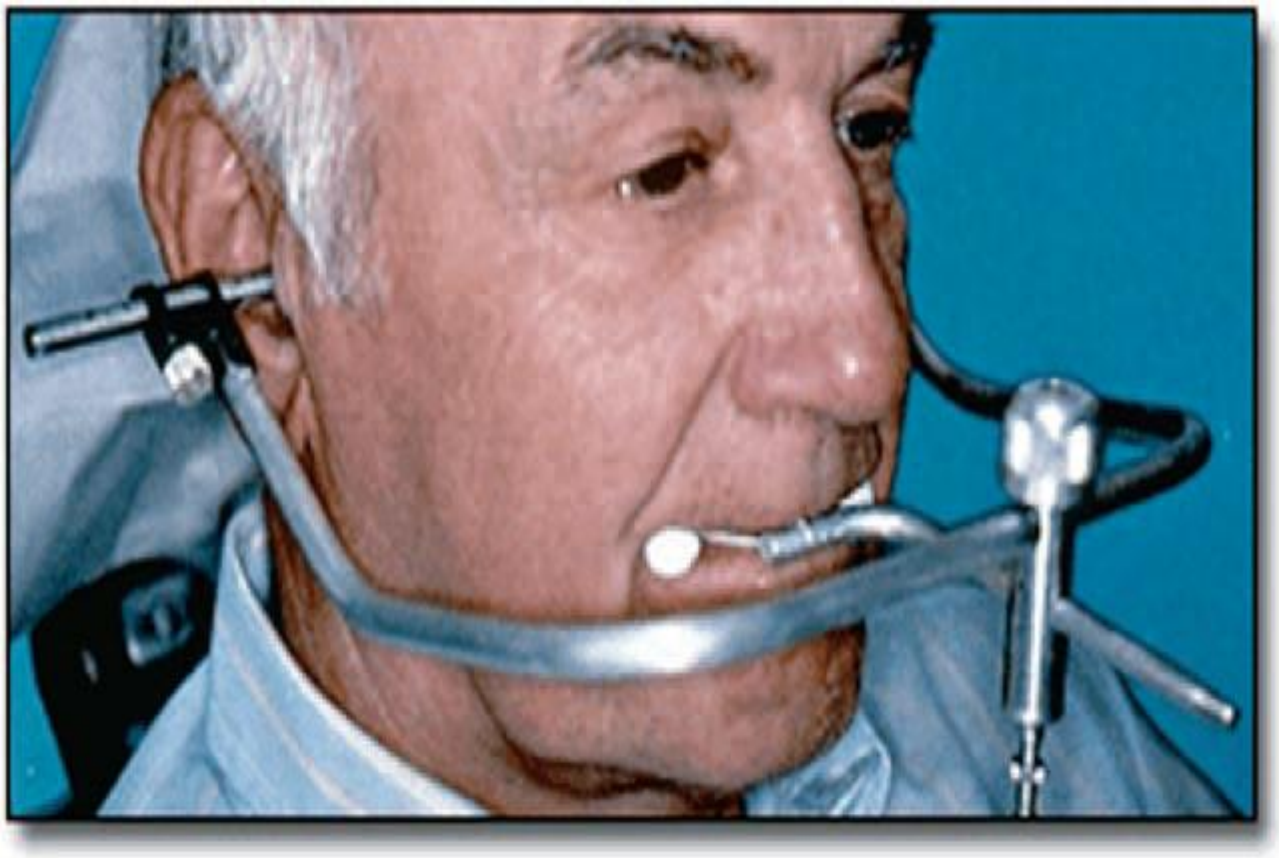
- **It is the procedure of attaching the maxillary and mandibular casts to the articulator in their recorded jaw relation. It is also called articulation.**

The maxillary cast is first articulated, and then the mandibular cast is articulated after recording the vertical and centric jaw relations.

We have 2types of mounting

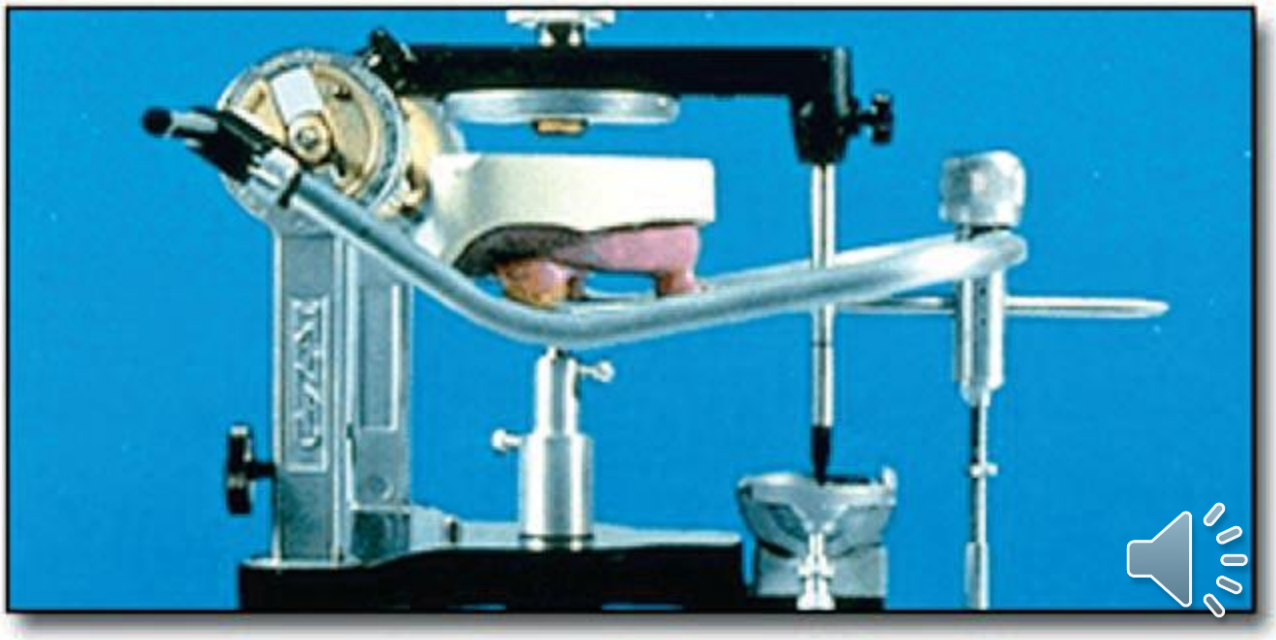
1-arbitrary mounting

2-mounting using face bow



Facebow Record

Relates Maxilla to Transverse Hinge Axis



Zeroing or re-setting the articulator before mounting

IN MEAN VALUE ARTICULATOR (CL II)

1- The articulator should be clean from any remnant of previous plaster.
2- The movable surfaces of the articulator should move freely without any hindrance.
3- The incisal pin should be flushed with the top of upper member of articulator to give zero reading.
4- The mounting table should be properly fixed to the articulator

Mean value CLII ARTICULATOR

Preparation of the casts for mounting

- **1- Determine the midline of the cast according to the midline of incisive papilla and continue this line posteriorly all around the cast.**
- **2- The casts should be placed in slurry water for better adhesion of the casts to the mounting plaster.**
- **3- With wax knife, 3-4 V-shape cuts on the base of upper and lower casts, so as to facilitate the laboratory remounting. The cut should be approximately 1/4 inch depth and 1/2 inch width.**
- **4- Lightly coated the base of the casts with Vaseline or any separating medium.**
- **5- The base plate with occlusion rim should be sealed to the cast by wax.**

Mounting the maxillary cast

- **The maxillary cast is first attached to the upper member of the articulator after orientation jaw relation by using the face-bow with adjustable type of articulators, while for the mean value articulator use the mounting table to support the maxillary occlusion rim in its position during mounting. The mandibular cast is articulated after recording the vertical and centric jaw relations.**

After recording the orientation jaw relation, the following steps are carried out

1- Enough space should be present between the base of the cast and the upper member of the articulator to accommodate for the plaster material over the cast. If there is not enough space trimming should be done to the base of the cast;

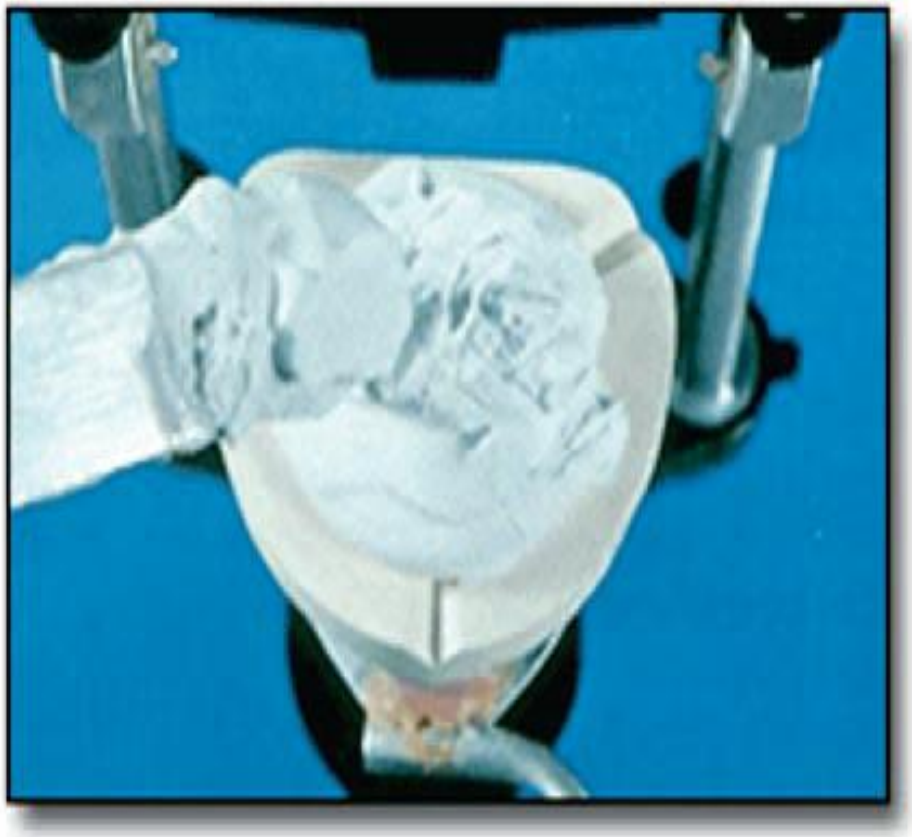
2- Alignment of the midline of the maxillary occlusion rim to the center of the cross midline which found on the mounting table anteriorly and posteriorly, so that the cast will be centralized to the mounting table and the occlusal rim fixed to the mounting table by wax;

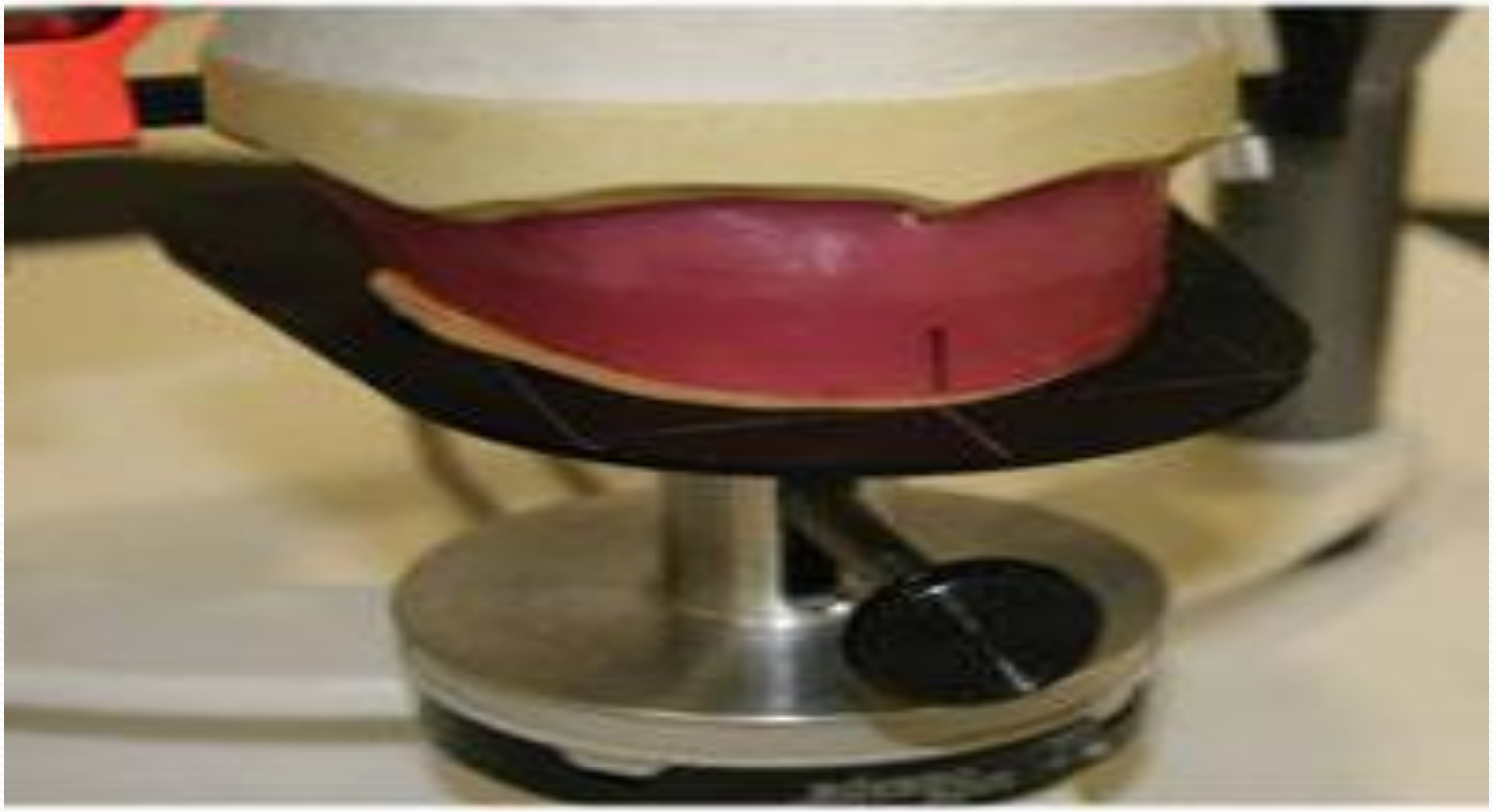
3- Plaster is mixed according to the manufacturer instruction then the plaster is poured over the base of the cast and the upper member is closed until the incisal pin touches the incisal table

4- Smoothing and polishing of the plaster is done. The mounting should be cleaned and any debris removed from the articulator and mounting table.

Indexing the master cast

- Indexing is done to accurately remount the cast on an articulator.





For laboratory remounting of dentures

Mounting the mandibular cast

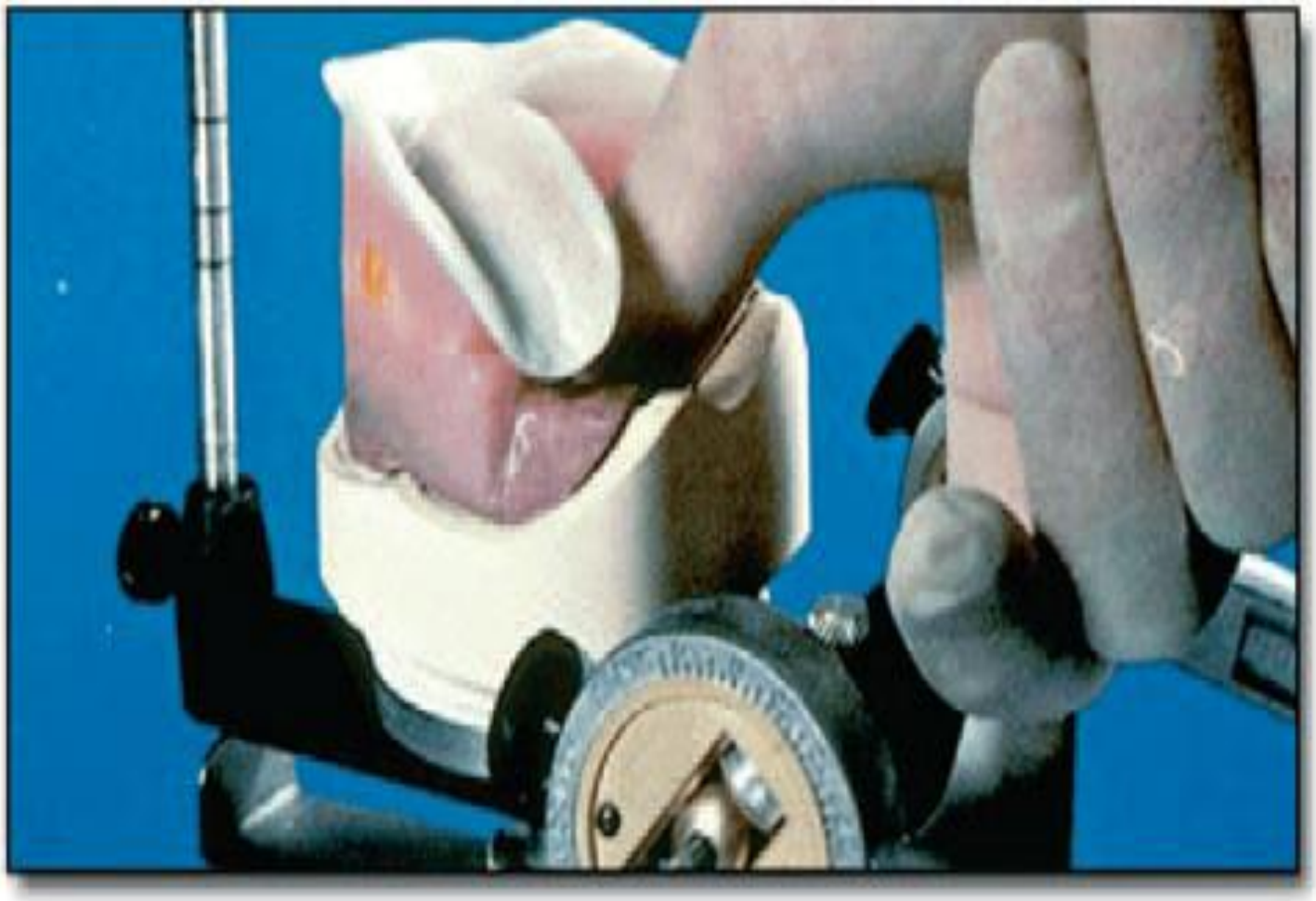
The mandibular cast is mounted after recording the tentative vertical and centric jaw relations.

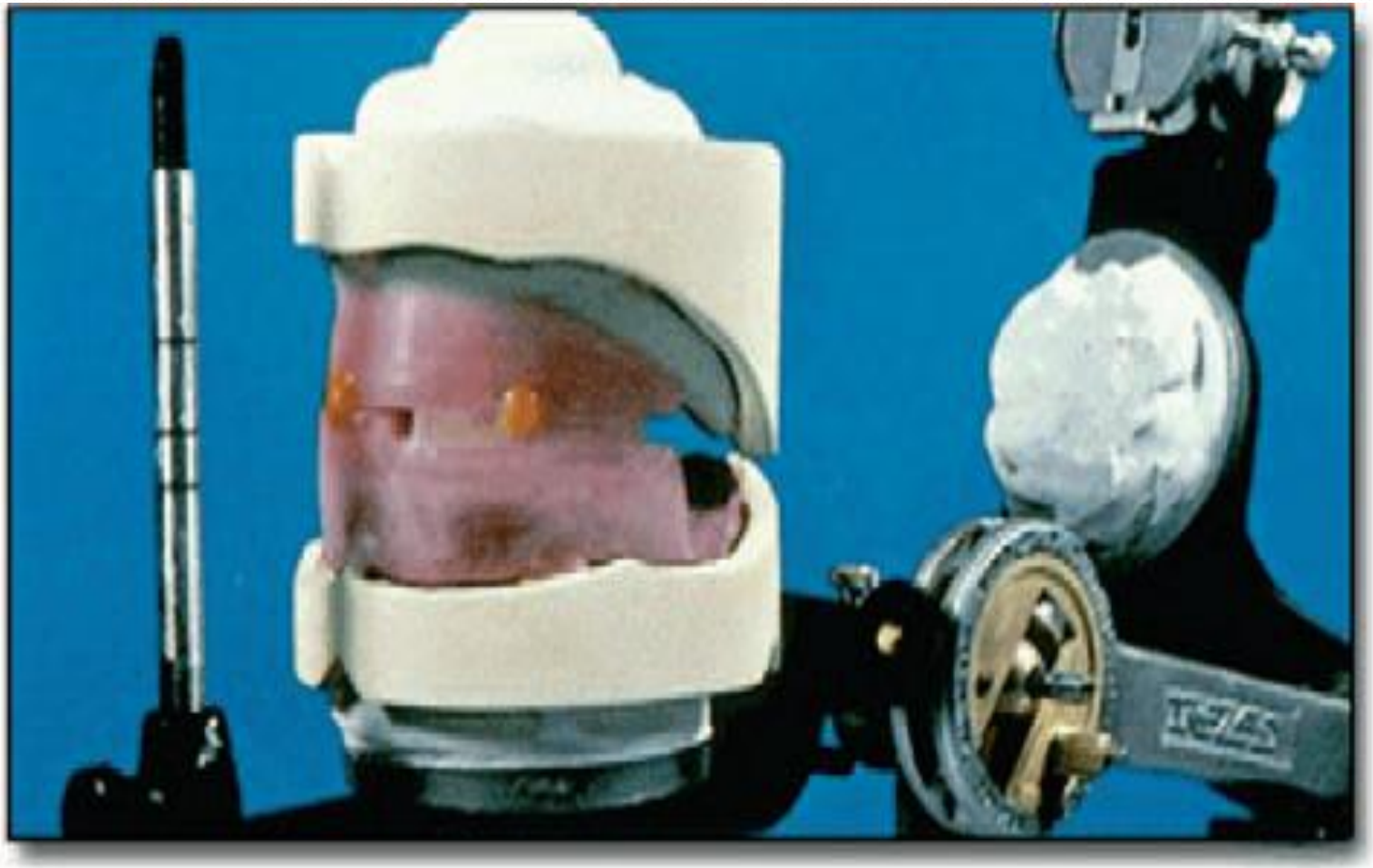
1- The mandibular occlusion rim should be well secured to the mandibular cast with it record base by using wax, also sealing should be done between the maxillary and mandibular rims after making tentative centric jaw relation.

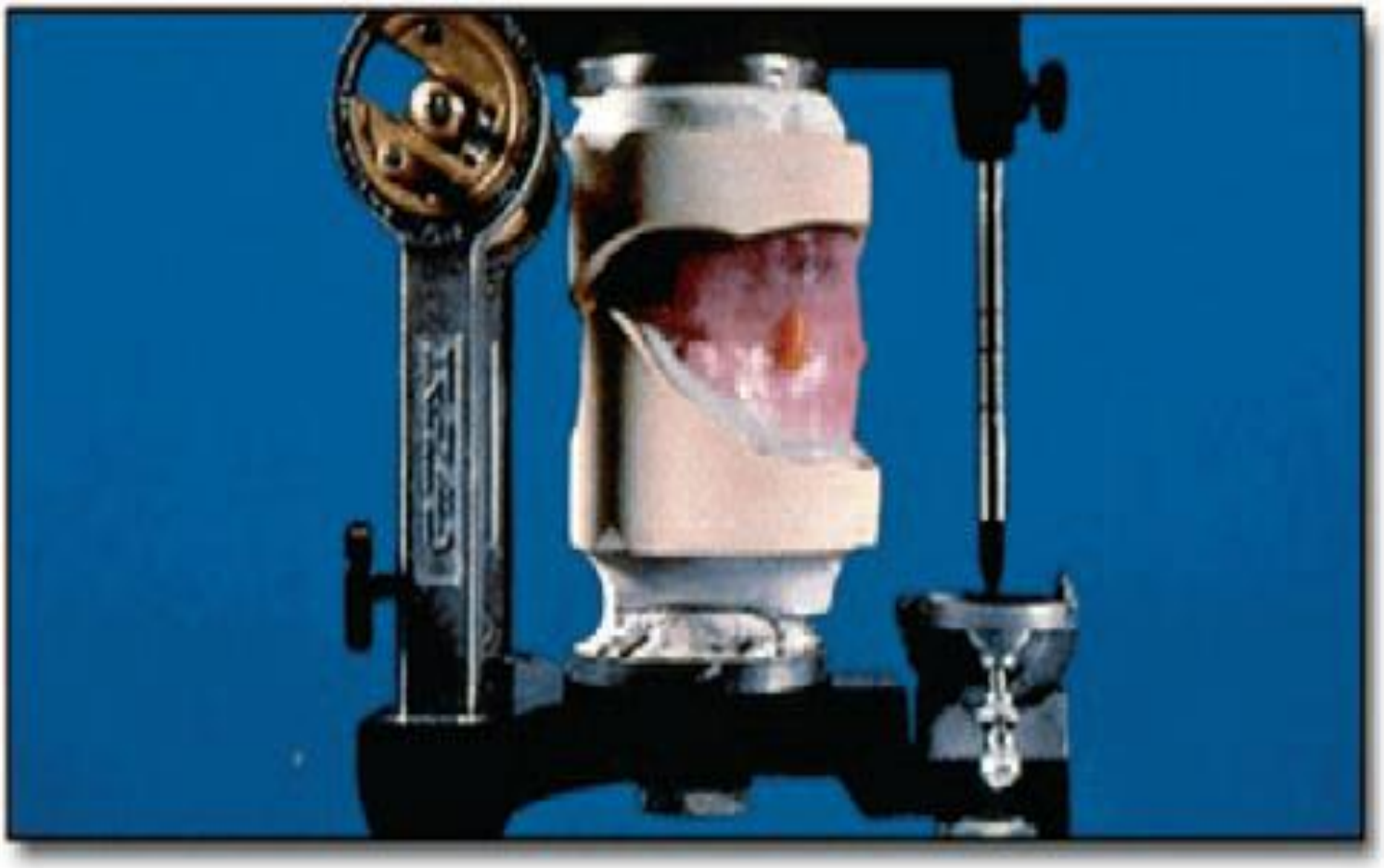
2- Care should be taken that there is no posterior interference between the maxillary and mandibular casts (Heel area).

3- The articulator with the mounted maxillary cast is inverted to aid in the mounting the mandibular cast.

- **4- The maxillary occlusal rim with mandibular occlusal rim (centric record) placed on the maxillary cast.**
5- The mandibular cast is placed on the mandibular occlusal rim (It should be soaked in slurry water before mounting).
6- The plaster is mixed and poured over the base of the mandibular cast and the articulator is closed until the incisal table touch the incisal pin, then the plaster should be smoothed and polished.







Checking the mounting

1- The midline of maxillary cast should be coincided with the midline of mandibular cast and midline of articulator.
2- Centralization of maxillary cast with upper member of articulator then the centralization of lower cast which depend on accuracy of the maxillary cast.
3- Incisal pin checked if it does not touch the incisal table.
4- Healer s area checked if there is any contact between the maxillary and mandibular casts.

Possible errors might occur during mounting

1- The record base is not properly secured to the cast.
2- Interference of the casts posteriorly.
3- The incisal pin does not touch the incisal table.
4- The incisal pin is not properly screwed.

5- Wrong transference of the midline of the articulator with that of the casts (shifting of the midline).

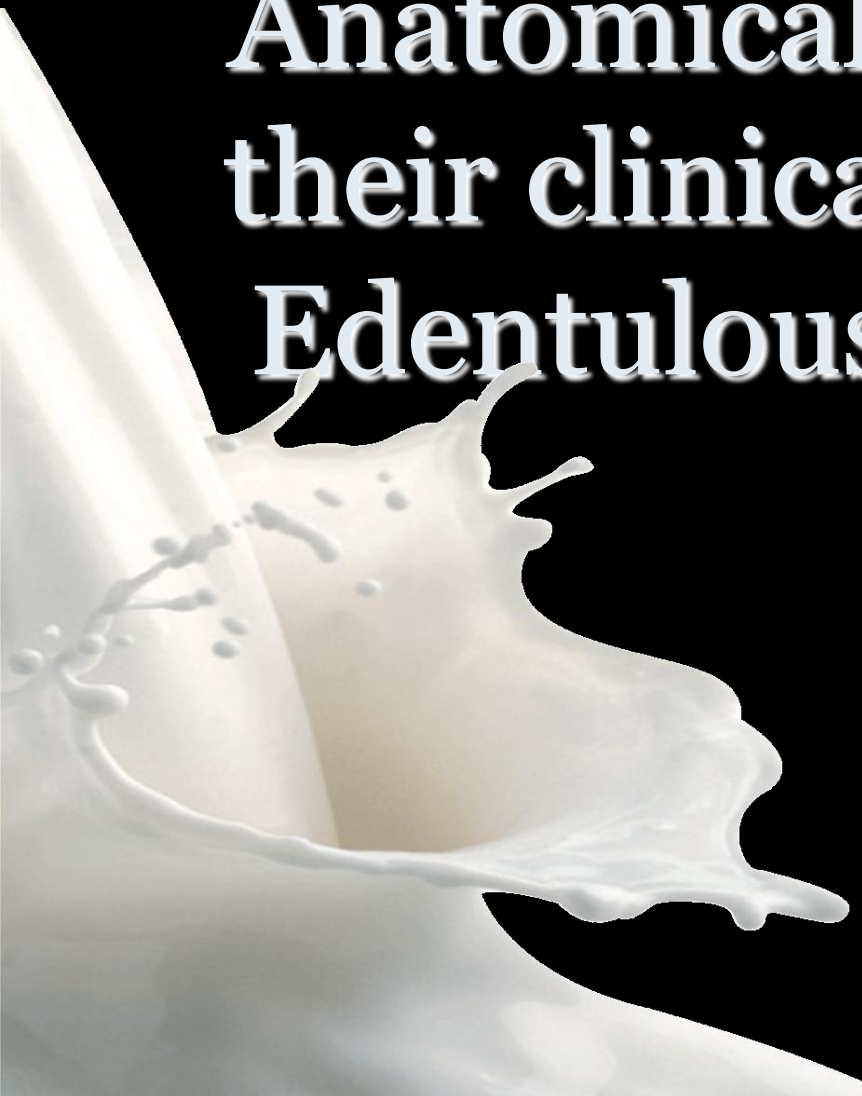
6- Movement of the casts during mounting.

7- Maxillary and mandibular rims are not properly fixed after making centric record.

8- Dimensional changes in the plaster material.

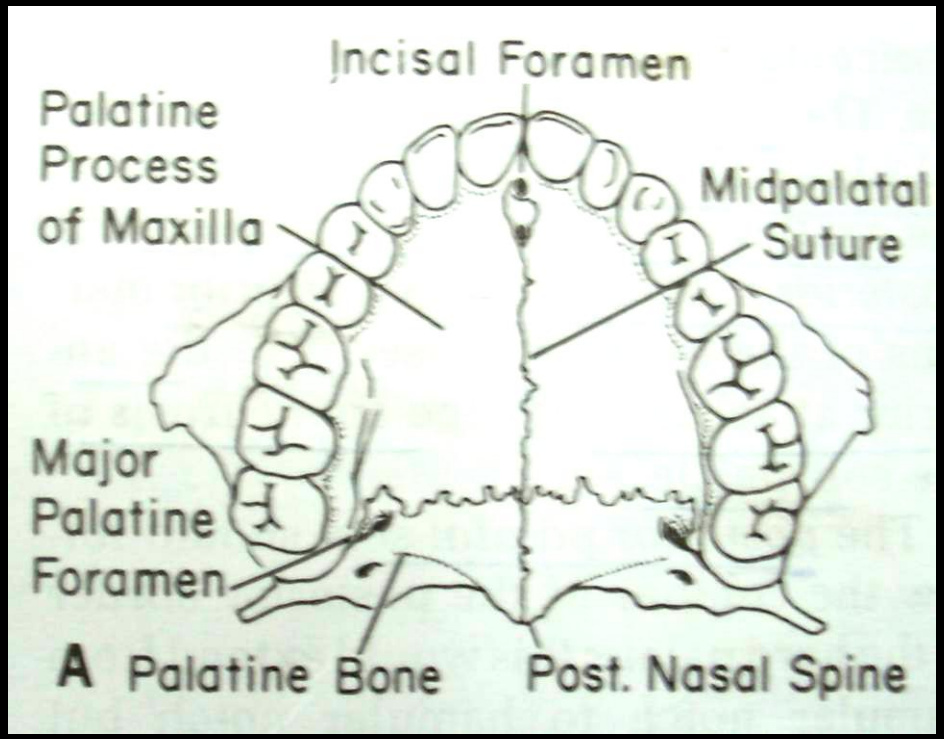

Thank You

Anatomical landmarks and their clinical significance in Edentulous Maxillary arch

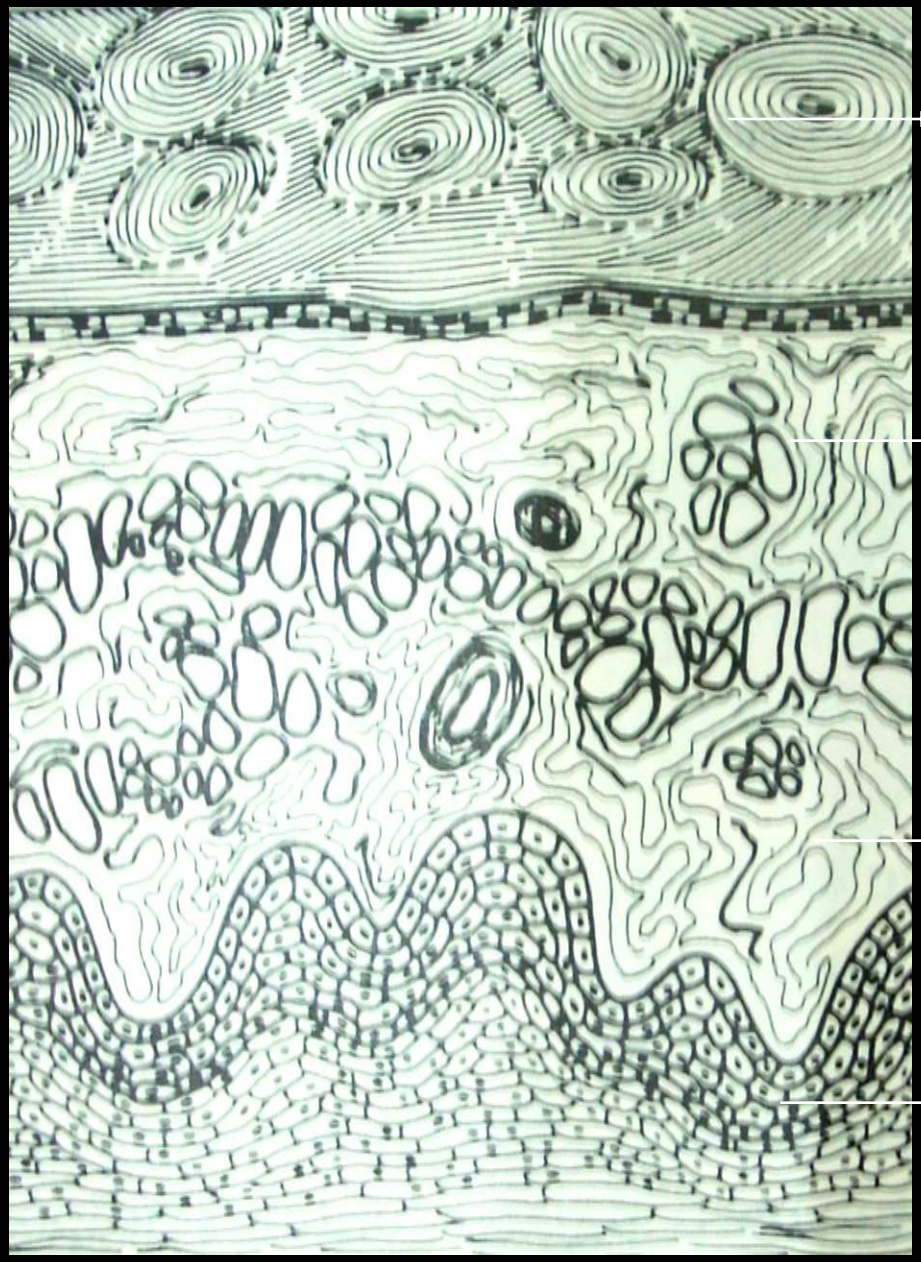


Importance…

- To decide upon the distribution of forces in various locations of the foundation area.
- The dentures and their supporting tissues coexist for a reasonable length of time.



The ultimate support for maxillary denture comes from the hard palate and the soft tissues that increases the surface area of the basal seat.


Compact bone
Adipose tissue
Sub mucosa
Mucosa

ANATOMIC STRUCTURES

- LIMITING STRUCTURE
- SUPPORTING STRUCTURE
- RELIEF AREAS

LIMITING STRUCTURE

- Labial frenum
- Labial vestibule
- Buccal frenum
- Buccal vestibule
- Hamular notch
- Posterior palatal seal area

Supporting structures

- Support is the resistance to the displacement towards the basal tissue or underlying structures.

Primary stress bearing area / Supporting area

- The horizontal portion of the hard palate lateral to the midline – posterolateral slopes
- Slopes of residual alveolar ridge

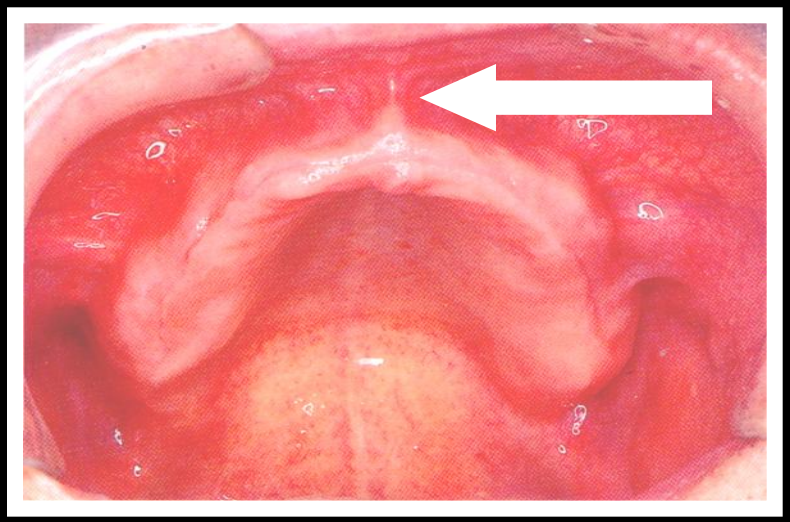
Secondary stress bearing area / Supporting area

- Rugae area – set at an angle to residual ridge
- Maxillary Tuberosity

RELIEF AREAS

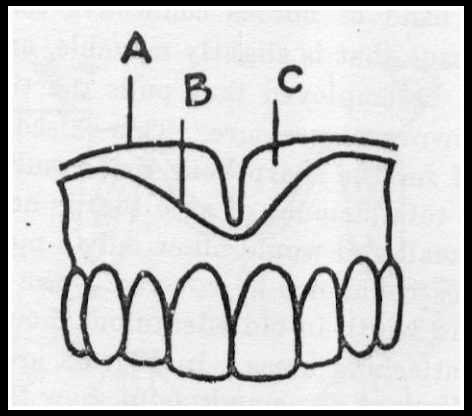
- Incisive papilla
- Mid-palatine raphe
- Crest of the residual alveolar ridge
- Cuspid eminence
- Fovea palatine

LIMITING STRUCTURES



Labial frenum:

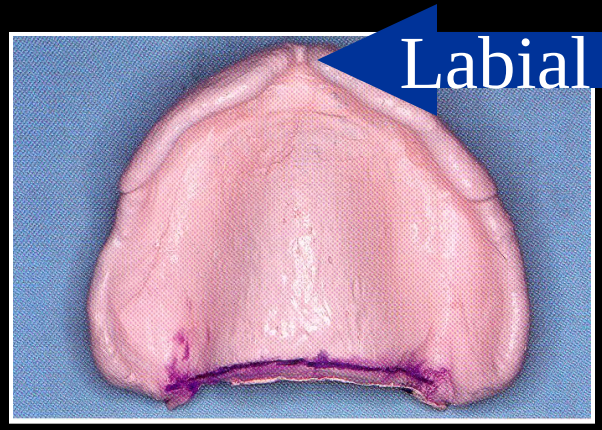
- Fold of mucous membrane at the median line.
- Moves with muscles of lip.
- No muscle of its own
- Action: vertical – narrow notch



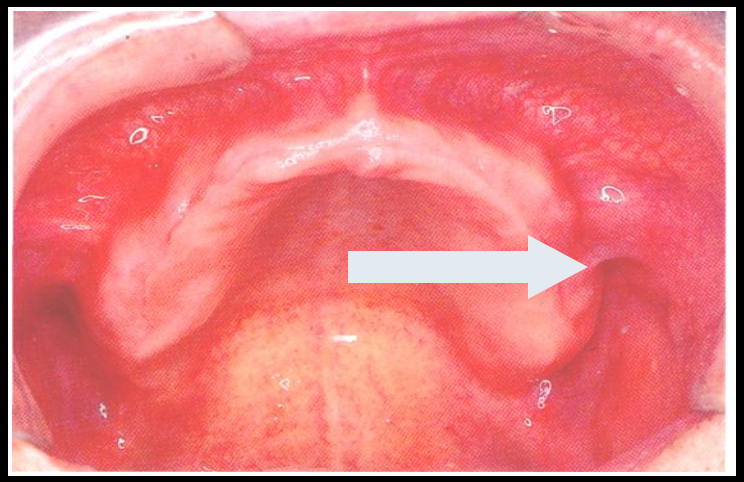
•A- correct contour

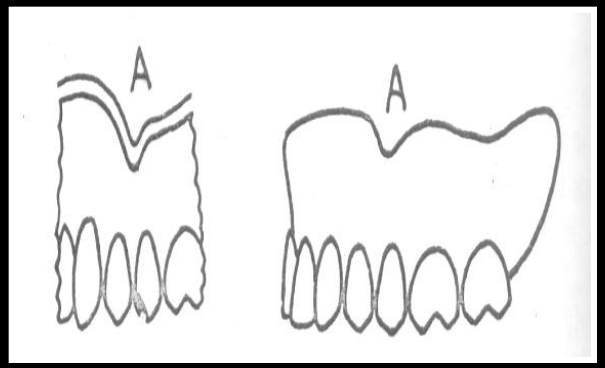
•B –incorrect contour.

•C- area should have been covered.

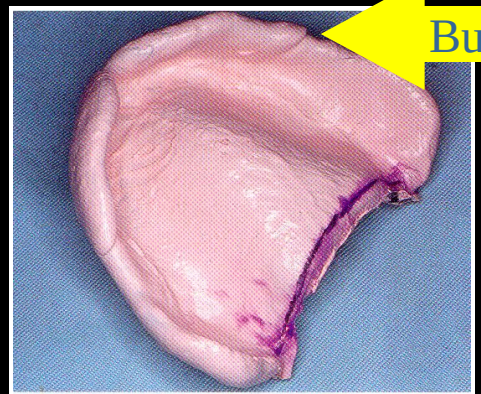


BUCCAL FRENUM





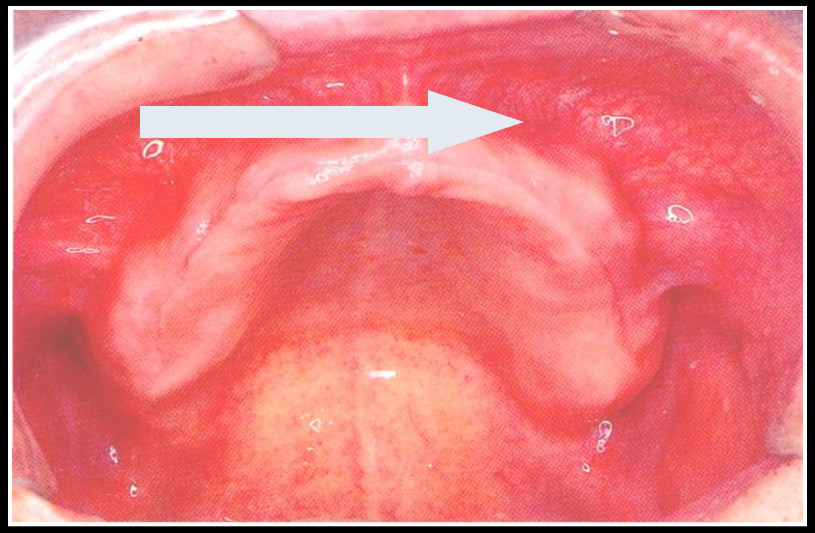
- Single or double folds of mucous membrane.
- Broad and fan shaped.
- Moves with muscles during speech and mastication.(levator anguli oris, orbicularis oris, buccinator)
- Adequate relief for muscle activity-more clearence.

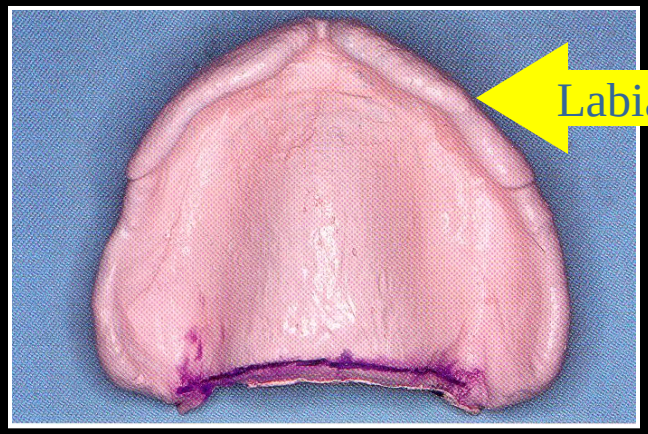


•Maxillary buccal frenum area.

•Denture border contour in buccal frenum area.

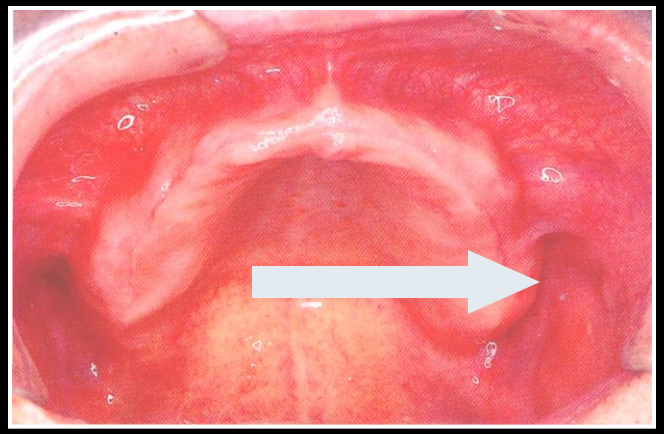
LABIAL VESTIBULE

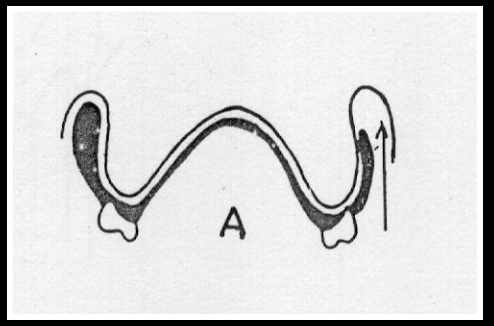


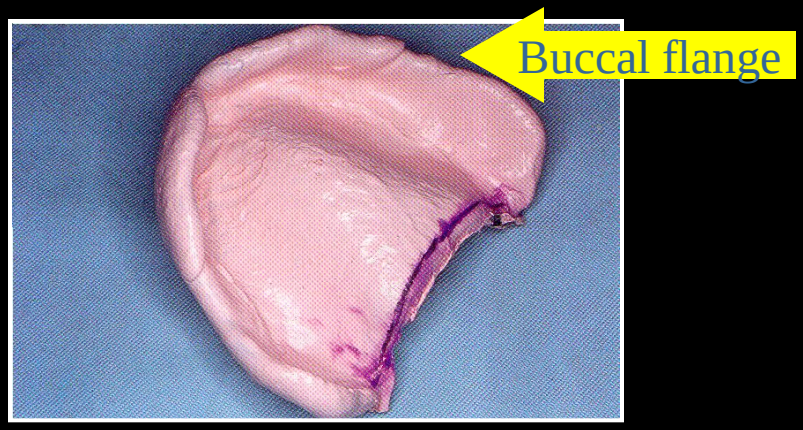


- Labial to buccal frenum.
- Muco-gingival line- limits upper border.
- Record adequate depth/width.
- Overextension causes instability/soreness.
- Proper contouring gives optimal esthetics.

BUCCAL VESTIBULE

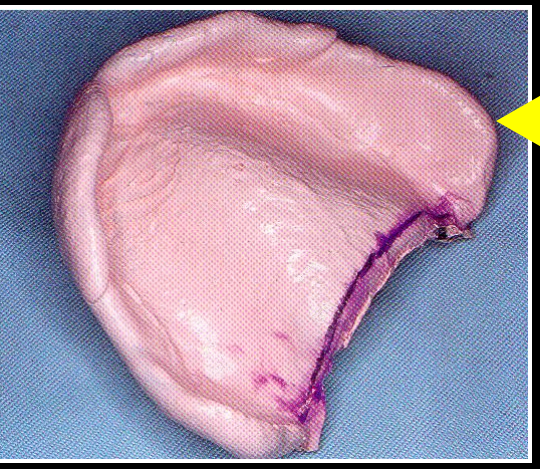






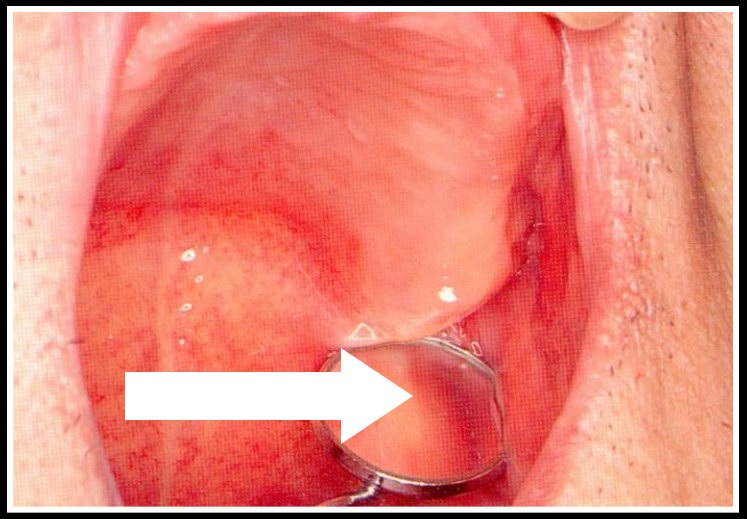
- Buccal frenum to hamular notch.
- Record adequate depth/width.
- Improper extension causes instability/soreness.
- Size varies – contraction of buccinator, position of mandible & the amount of bone lose from maxilla.

Disto-buccal area / Corono-maxillary space

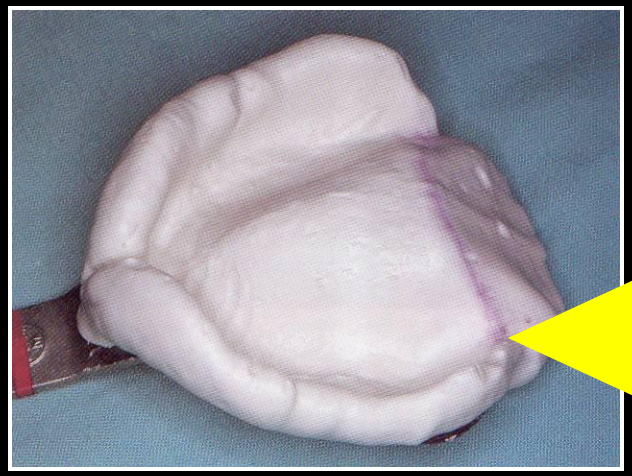


- Distal end of the buccal vestibule
- Influenced by coronoid process of mandible.
- This space is usually higher than any other part of the border.
- Should be examined with the mouth as nearly closed as possible

HAMULAR NOTCH.

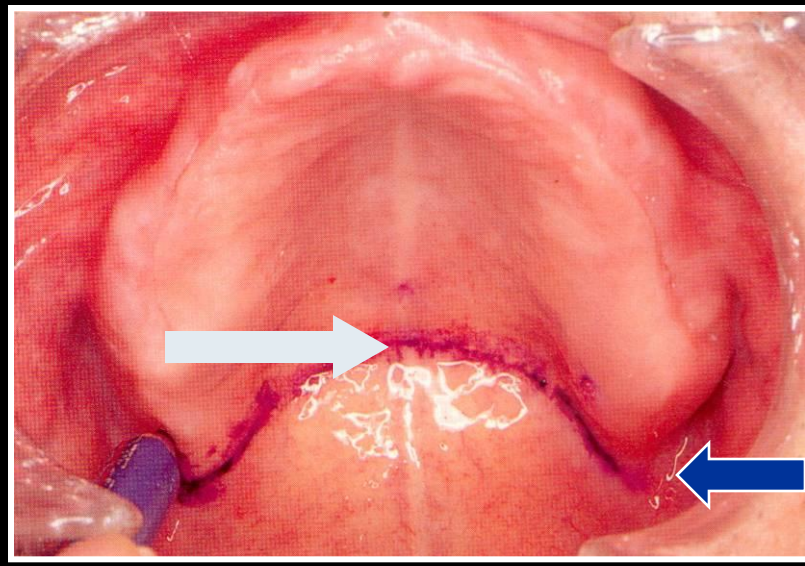


- Is a soft area of areolar tissue between distal surface of tuberosity and the hamular process of the medial pterygoid plate.
- Significance : it houses the disto-lateral termination of the denture
- Aids in achieving posterior palatal seal.
- Overextension causes soreness.
- Underextension – poor retention



POSTERIOR PALATAL SEAL AREA

- The soft tissue area at or beyond the junction of the hard and soft palates on which pressure within physiological limits, can be applied by a complete denture to aid in its retention.
- Parts
  - Postpalatal seal
  - Pterygomaxillary seal
- Extensions
  - Anteriorly – Anterior vibrating line
  - Posteriorly – Posterior vibrating line
  - Laterally – 3-4mm anterolateral to hamular notch.

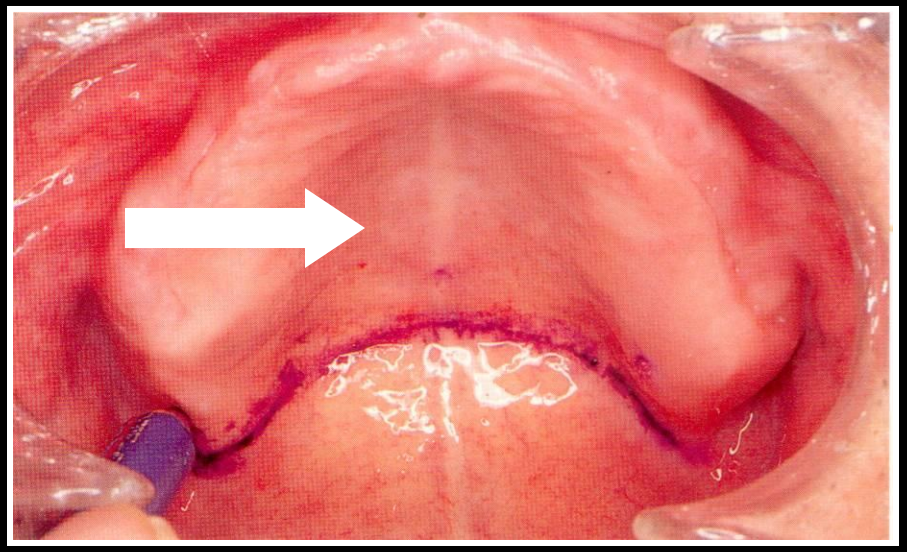


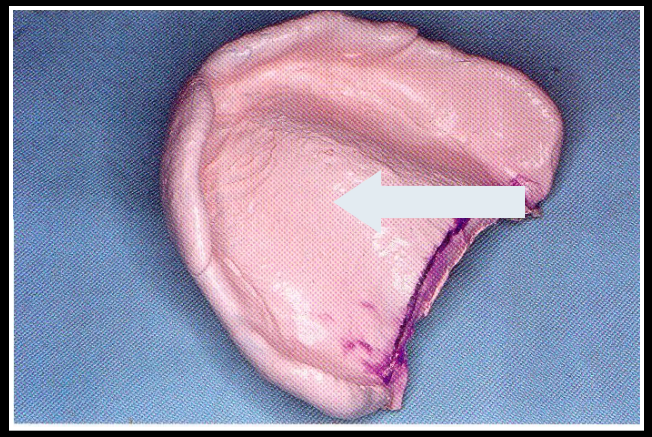
VIBRATING LINE

- An imaginary line across the posterior part of the palate marking the division between the movable and immovable tissues of the soft palate. This can be identified when the movable tissues are functioning.

- Anterior vibrating line
  - valsalva maneuver
  - ‘ah’ with short vigorous bursts
- Posterior vibrating line
  - ‘ah’ in short bursts in a normal, unexaggerated fashion.

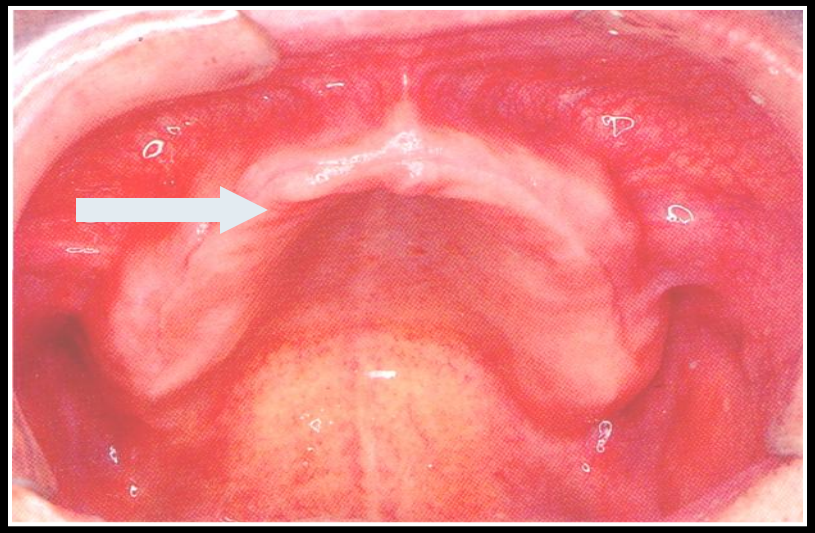
Hard palate

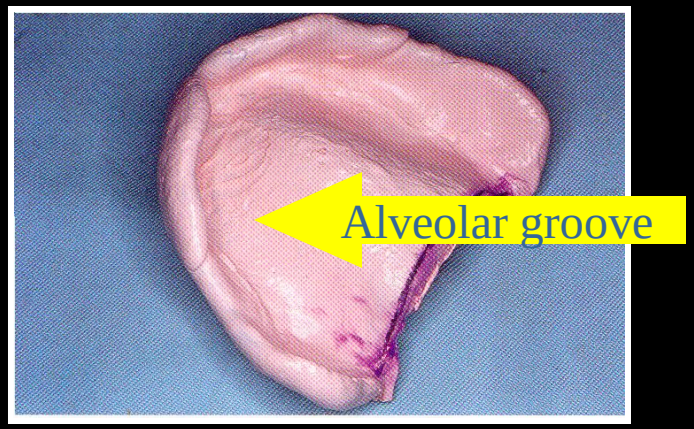




- Support for the maxillary denture.
- Primary stress bearing area- horizontal portion of hard palate lateral to midline.

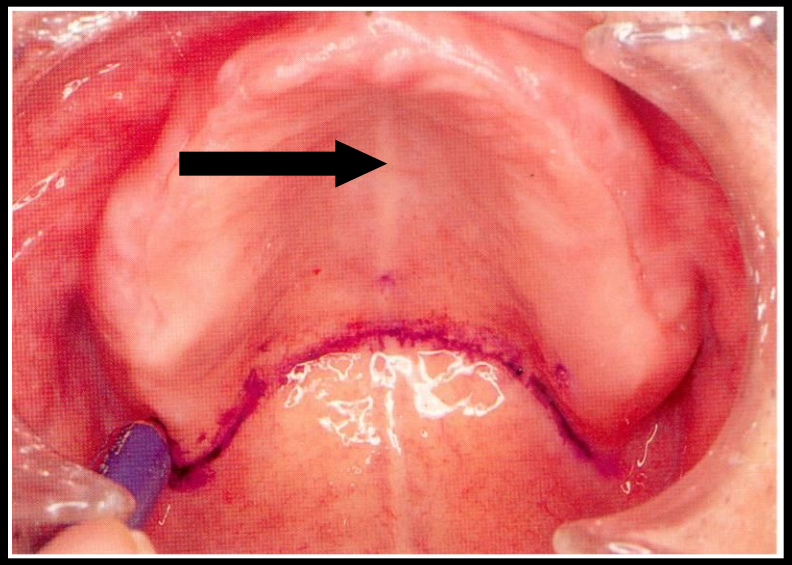
Residual alveolar ridge

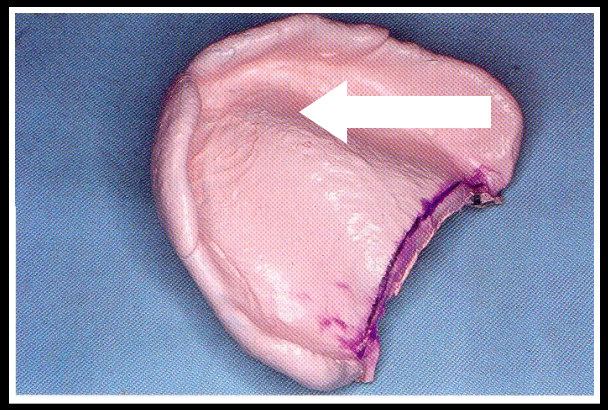




- The portion of the residual bone , soft tissue covering that remains after the removal of teeth .
- Important support area – subjected to resorption.

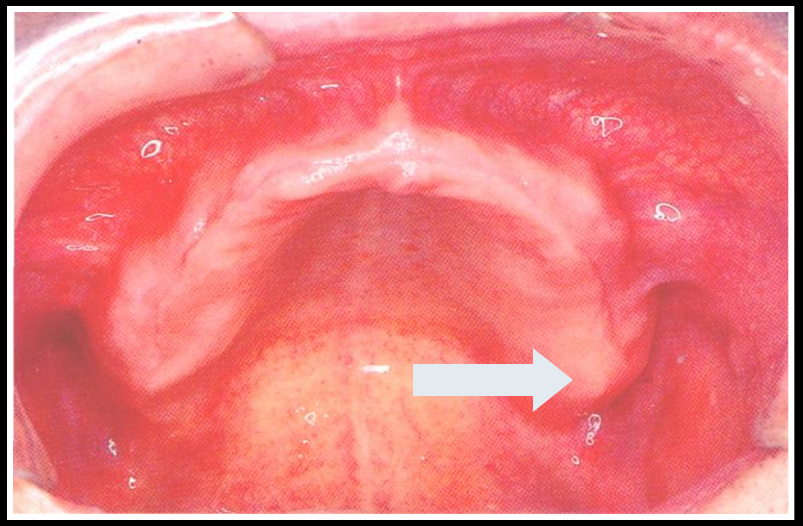
Rugae

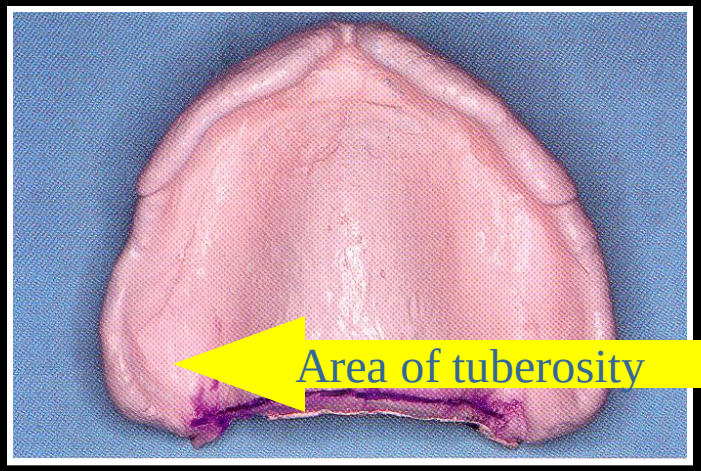




- Raised areas of dense connective tissue radiating from the median suture in the anterior 1/3rd of palate .
- Secondary stress bearing area.
- Should not be distorted in the impression.

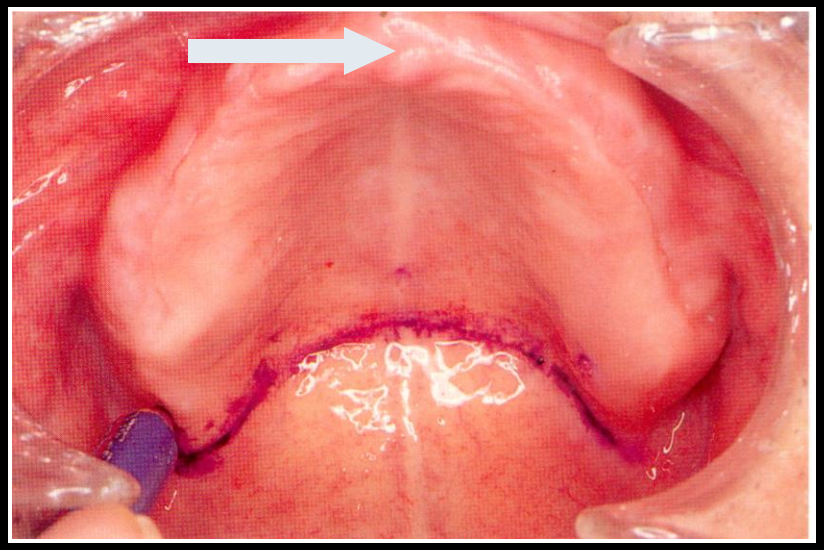
MAXILLARY TUBEROSITIES.

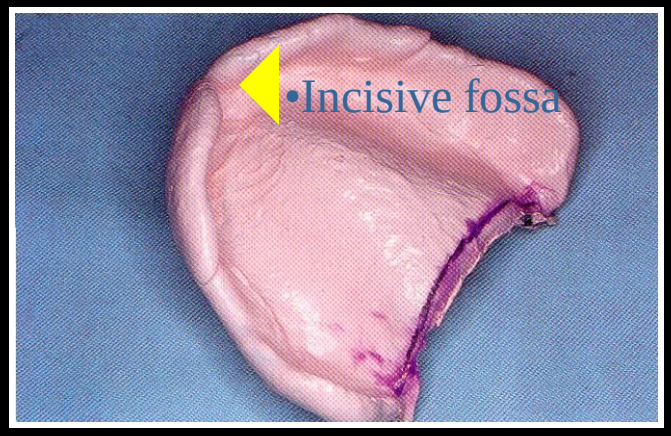




- Are distal aspects of the posterior ridge terminating in the hamular notch
- Gross enlargement(fibrous or bony –surgical correction.

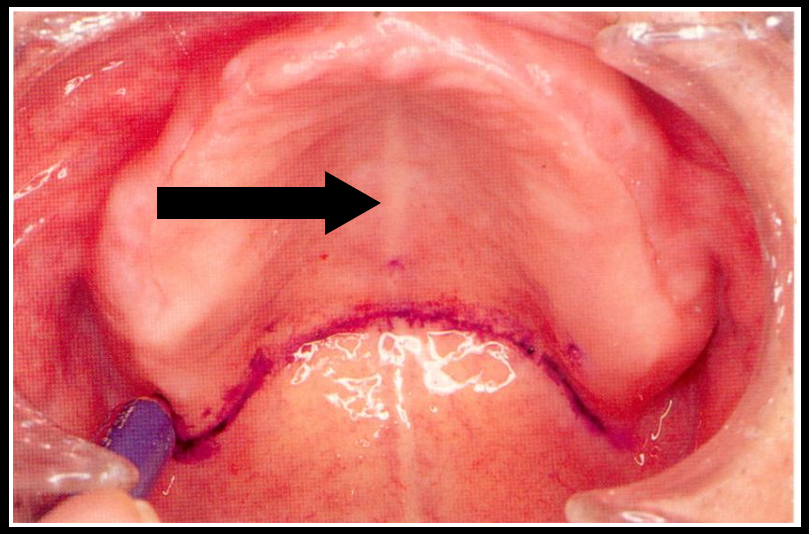
INCISIVE PAPILLA



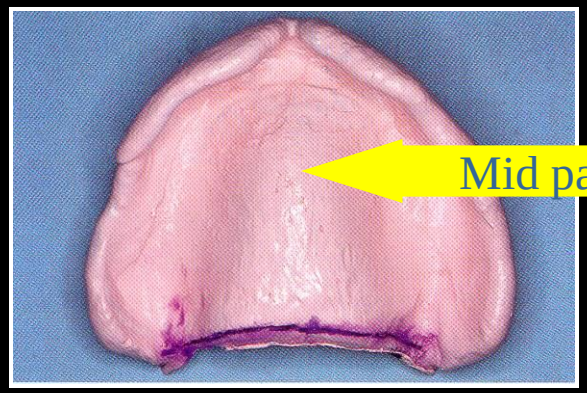


- Incisive papilla – pad of fibrous connective tissue over the incisive foramen.
- Location :behind and between the central incisors
- Relief necessary - burning sensation and pain.
- Indication of resorption.

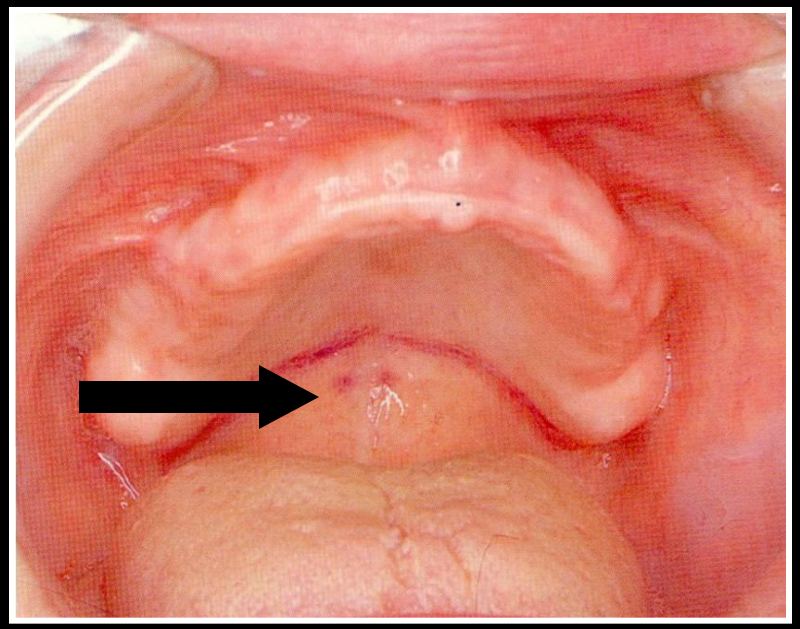
Mid palatine raphae.

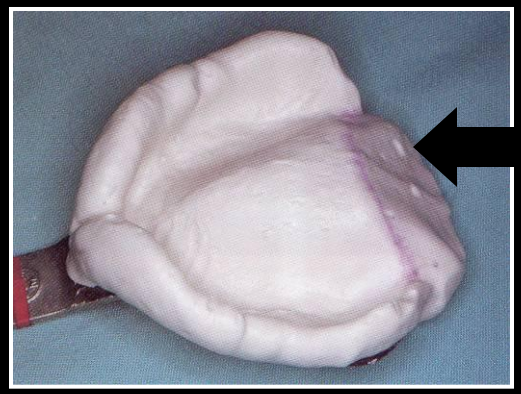


- Extends from incisive papilla to distal end of hard palate.
- Thin mucosal covering and non-resilient..
- Relieve adequately to avoid trauma from denture base.



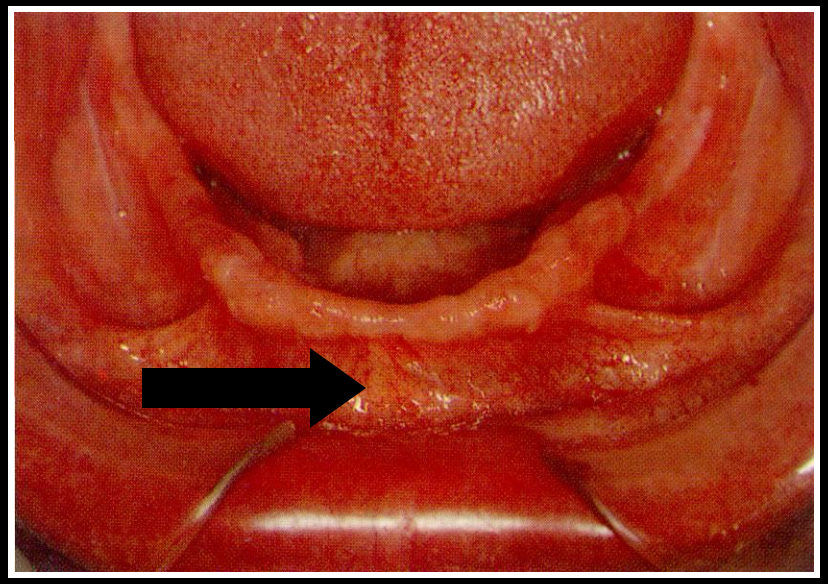
Fovea Palatinae





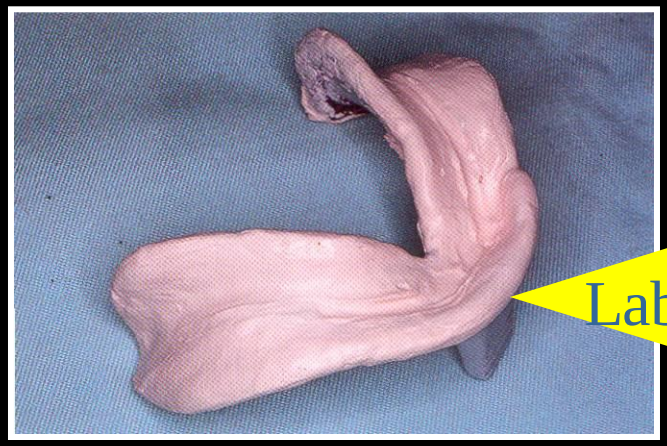
- Bilateral indentations near the midline of palate.
- Formed by coalescence of several mucous gland ducts.
- Posterior to junction of hard and soft palate.
- Always on soft palate

Mandibular arch.

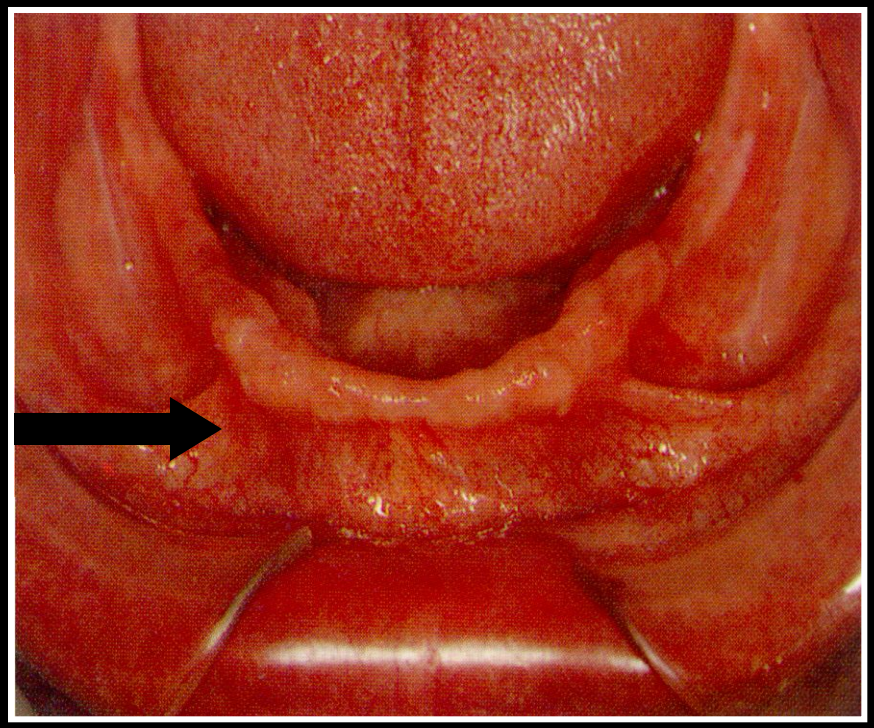


Labial frenum.

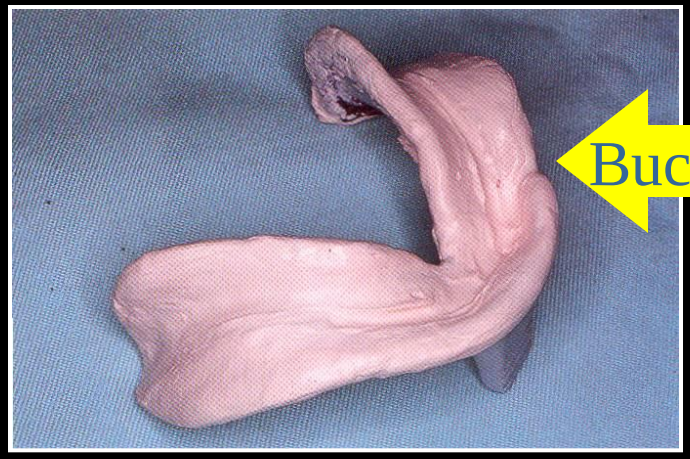
- Shorter and wider than the maxillary frenum.
- Adequate relief for muscle activity (mentalis).
- Proper fit around it maintains seal without soreness.

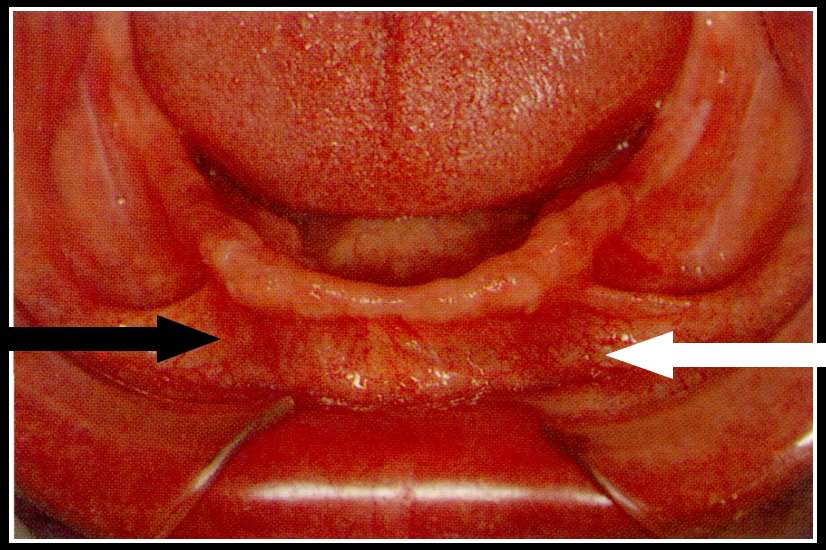


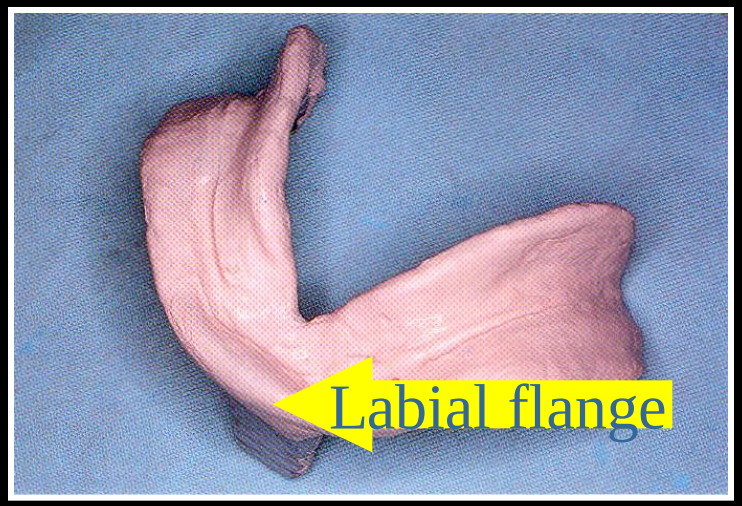
Buccal frenum.



- Adequate relief for muscle activity.
- Proper denture seal.



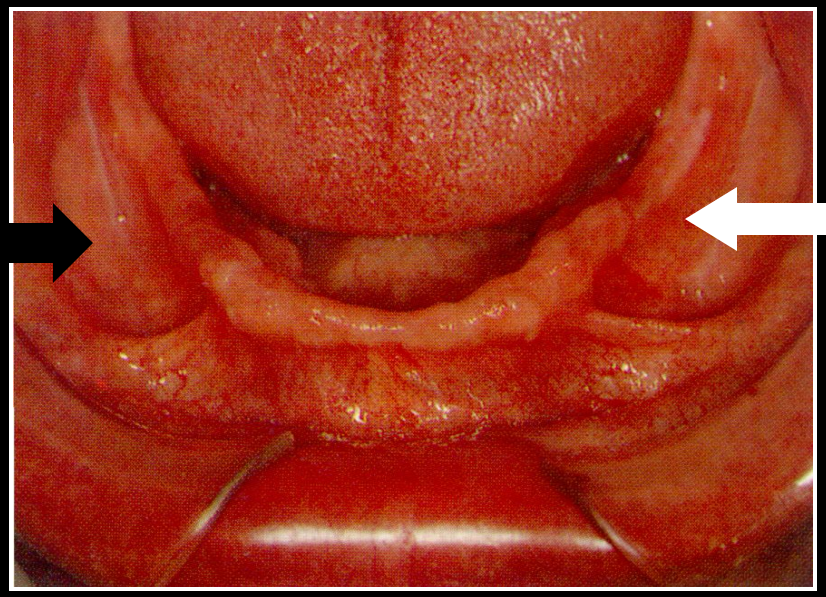




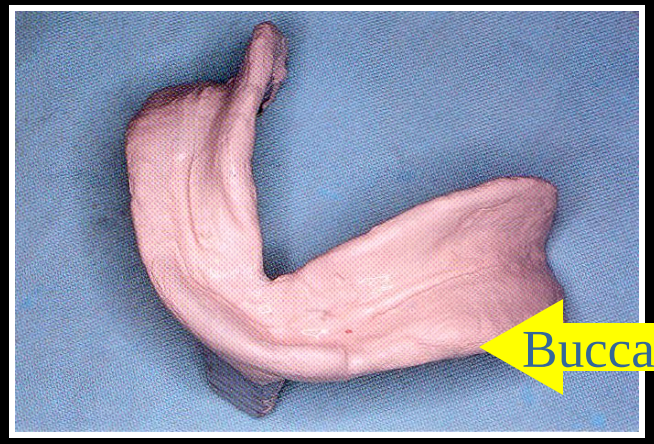
Labial vestibule.

- Labial-buccal frenum.
- Overextension causes instability/soreness.
- Muscles attachment close to the crest of the ridge- limits the denture flange extension.
- Mucolabial fold limits the depth of the flange.
- Record adequate depth and width.
- Proper contouring gives optimal esthetics.

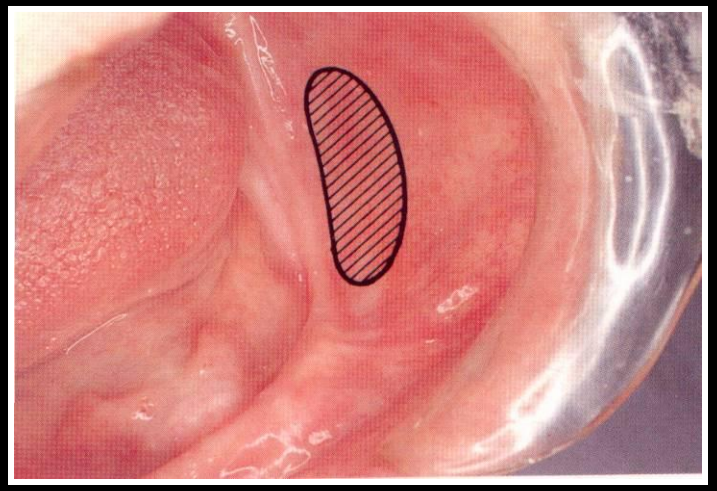
Buccal vestibule.

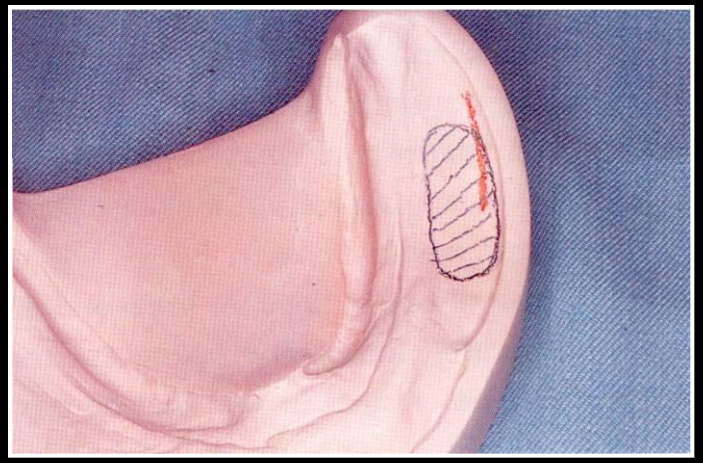


- Buccal frenum-retromolar pad.
- Record adequate depth and width.
- Impression is widest in this area.

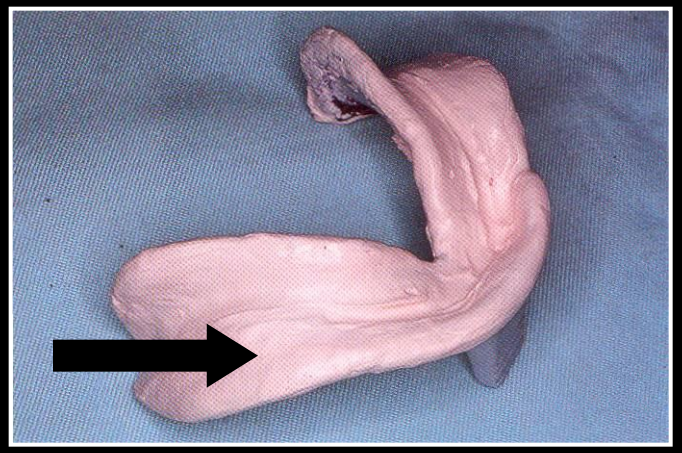


Buccal shelf

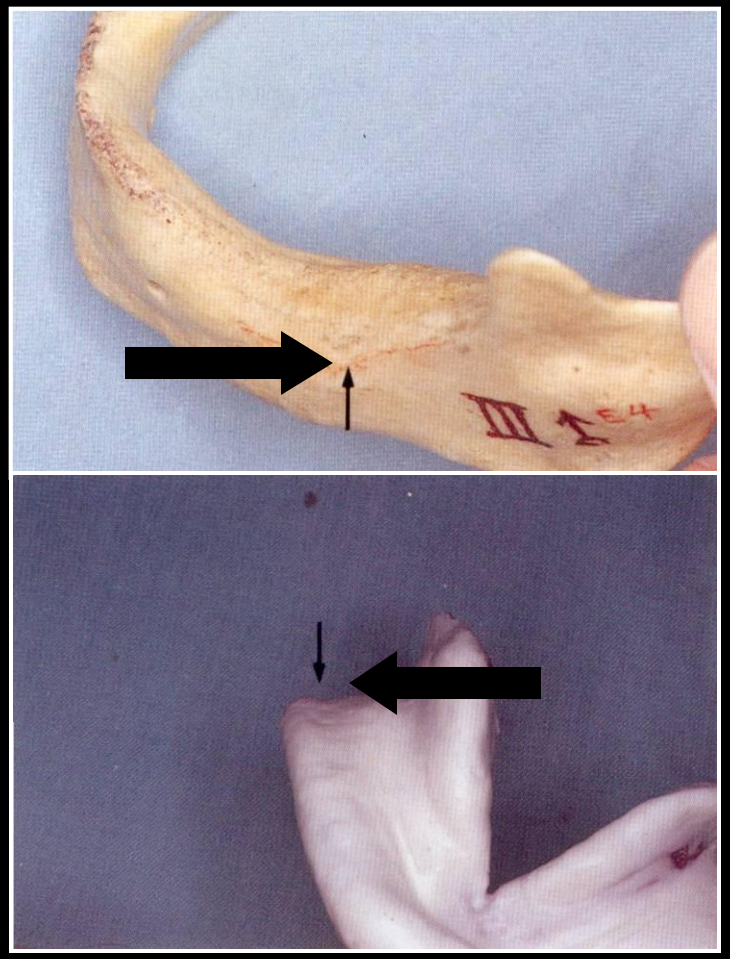




- Extends from buccal frenum to retromolar pad.
- Between external oblique ridge and crest of alveolar ridge.
- Primary stress bearing area(cortical bone)- lies at right angles to vertical

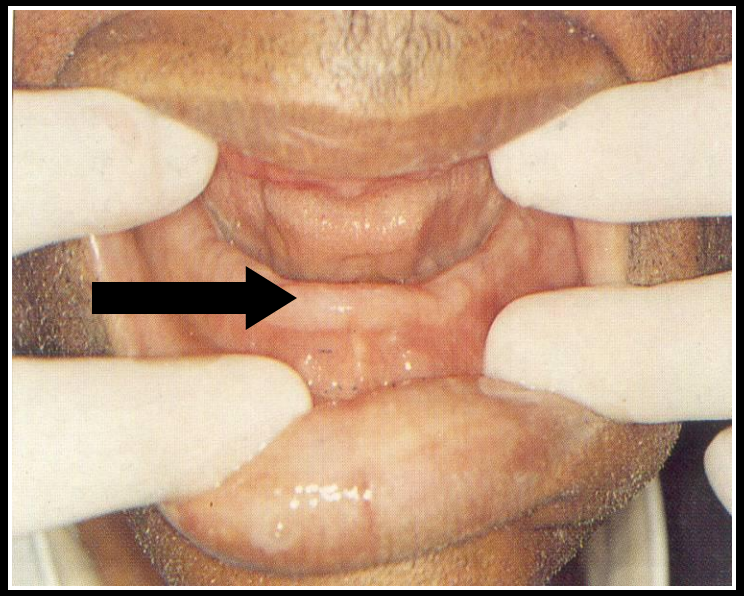


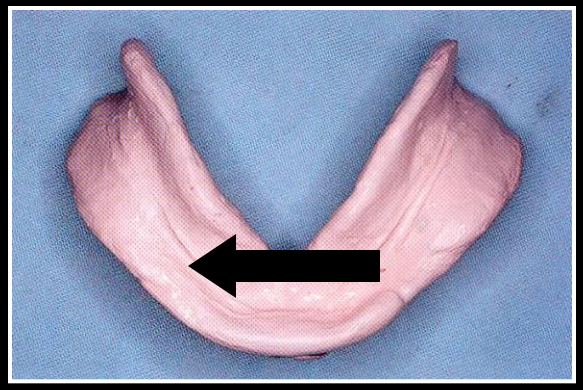
External oblique ridge.



- A bony ridge runs antero-posteriorly outside the buccal shelf.
- Denture border 1-2 mm beyond this ridge.
- Shows as Groove in impression.

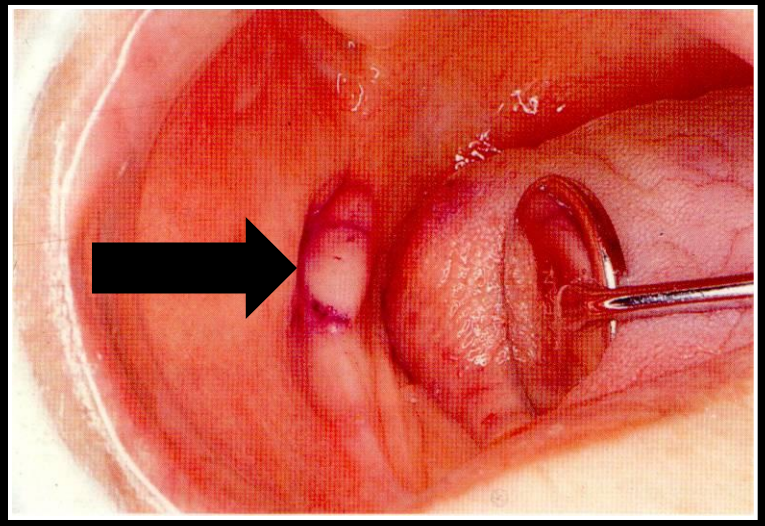
Alveolar ridge

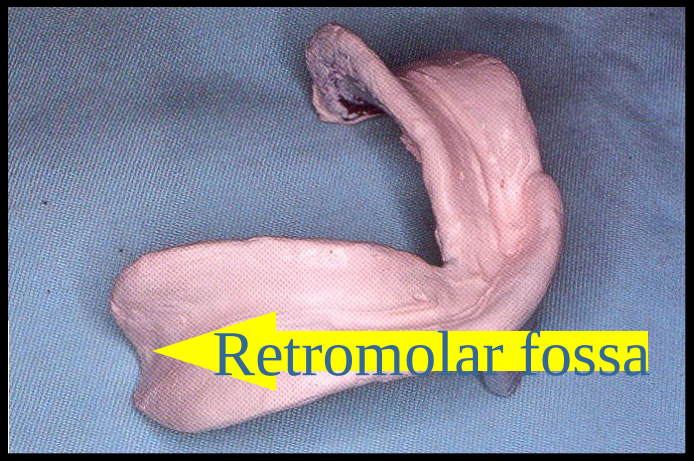




- Residual bone with mucous membrane.
- Crest to be relieved.
- Buccal and lingual slopes are secondary stress bearing areas.

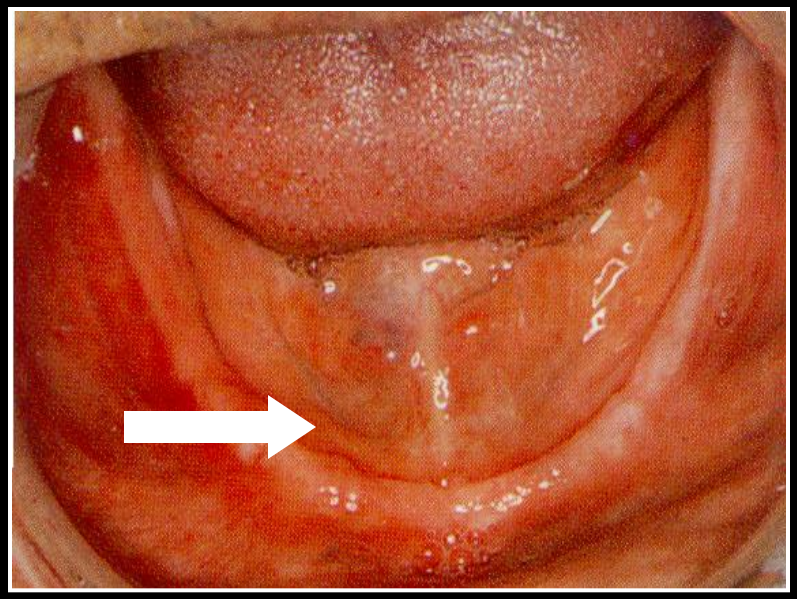
Retromolar pad.

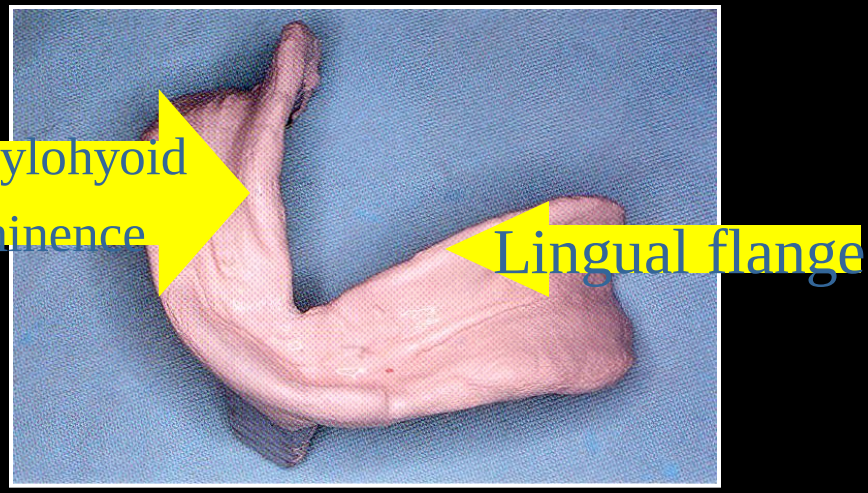




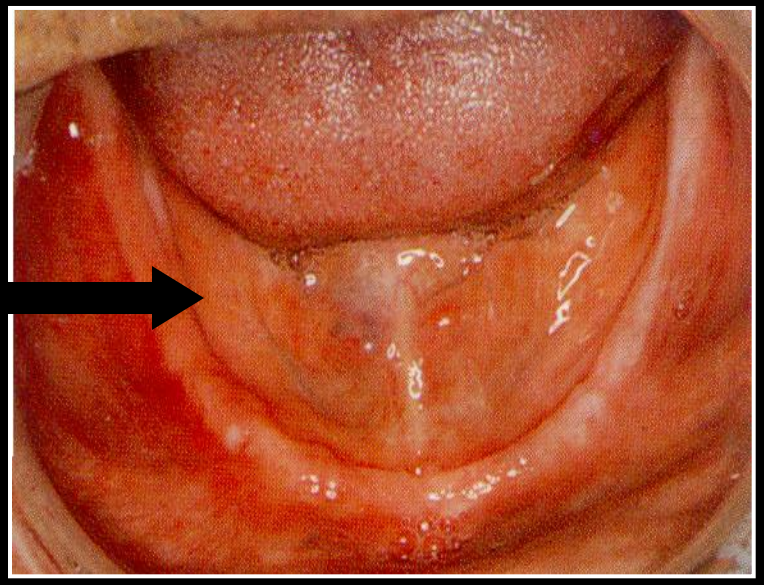
- Triangular soft pad of tissue.
- Posterior end of lower edentulous ridge.
- Limiting landmark of distal extension of complete denture upto ant 2/3 rd of retro molar pad.
- Determines height and width of the occlusal table.

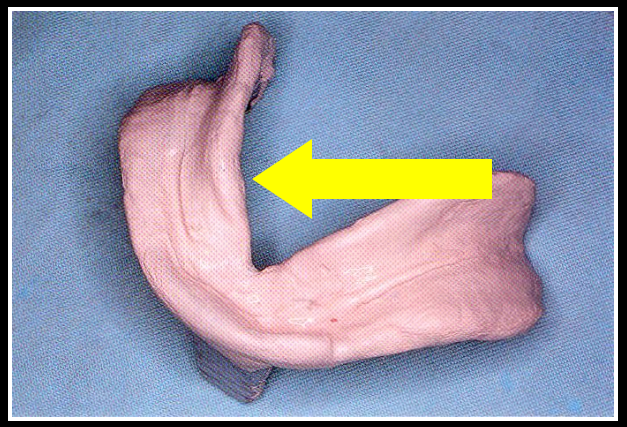
Alveolo-Lingual sulcus.





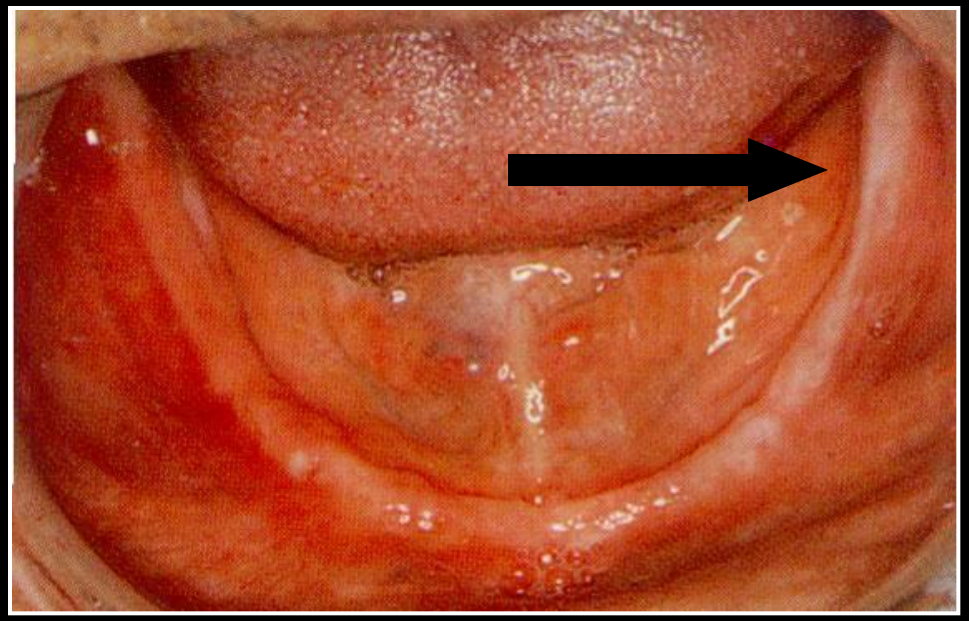
- Between lingual frenum to retromylohyoid curtain.
- Anterior region- lingual frenum to mylohyoid ridge.
- Premylohyoid fossa- premylohyoid eminence in impression.
- Border of Impression to make contact with the mucosa of the floor of the mouth when tongue touches the upper incisor.
- Overextension causes soreness and instability.





Middle region.

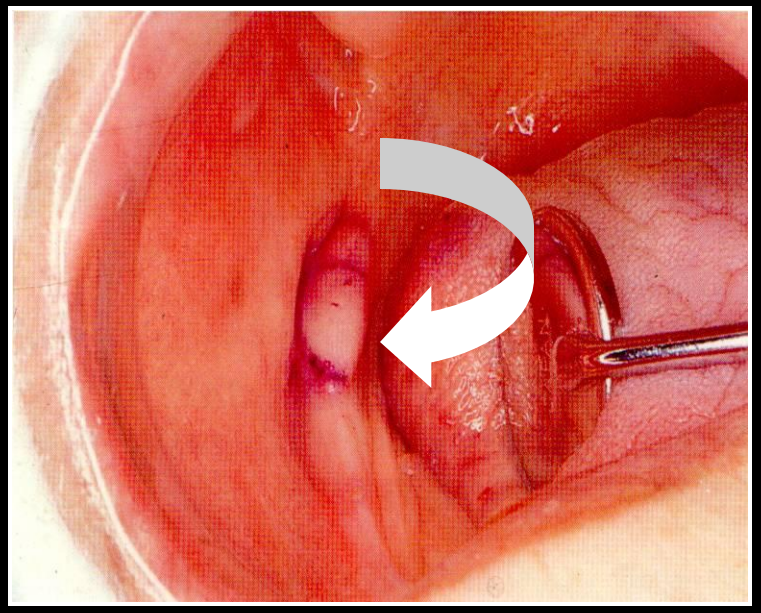
- From pre-mylohyoid fossa to the distal end of the mylohyoid ridge.
- Lingual flange extends below the level of the mylohyoid ridge- tongue rests on the top of flange and aids in stabilizing the lower denture.



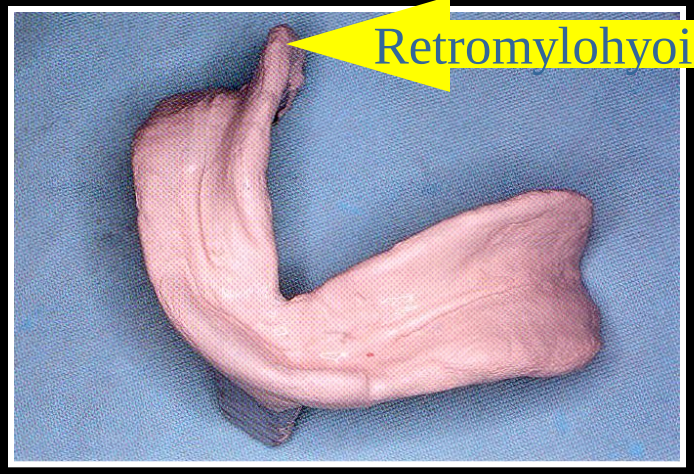
Posterior region.

- The flange passes into the retromylohyoid fossa.
- Proper recording gives typical S – form of the lingual flange.

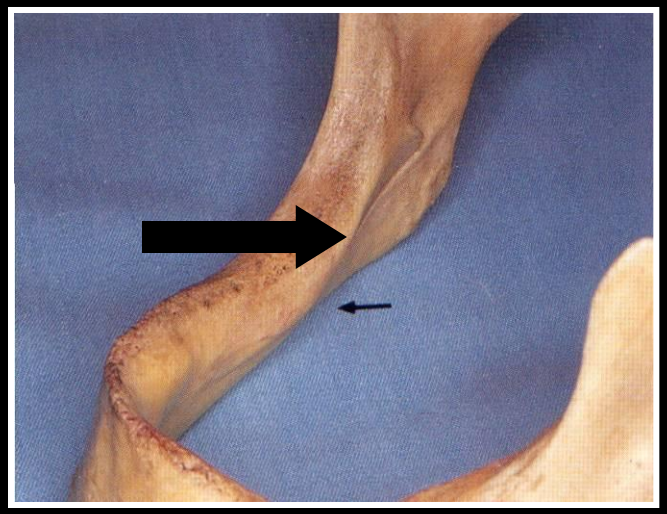
Retromylohyoid space.

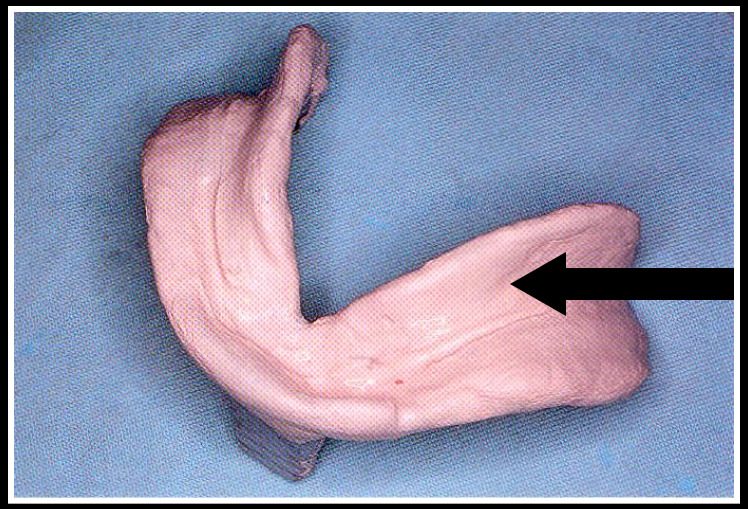


- Distal end of lingual sulcus.
- Area posterior to the mylohyoid muscle.
- Good seal aids in retention and stability.



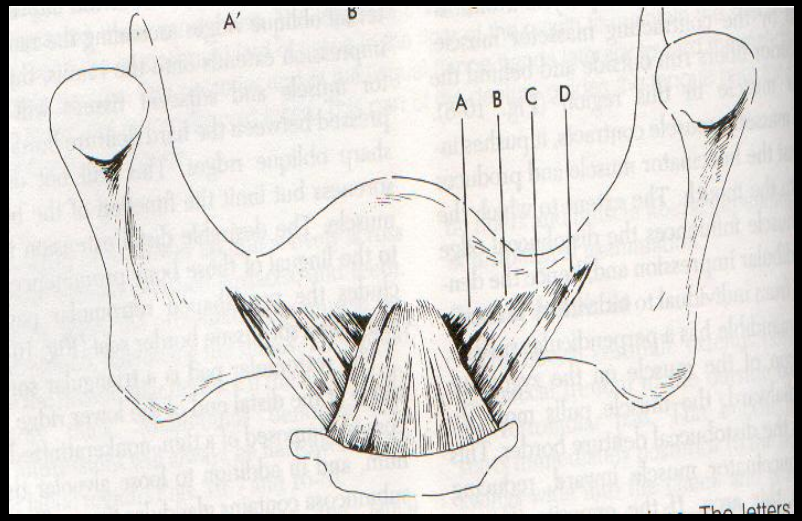
Mylohyoid ridge.





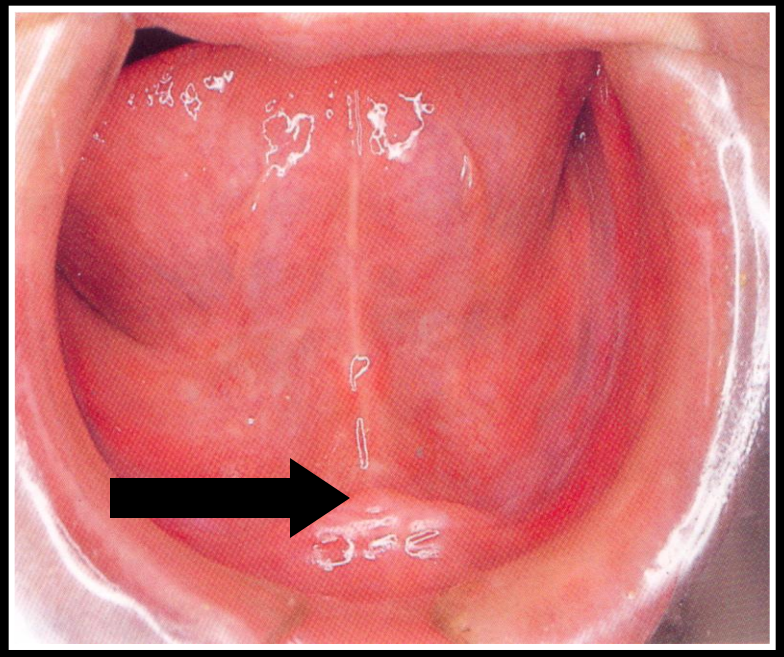
- Attachment for the mylohyoid muscle.
- Sharp or irregular covered by the mucous membrane.
- Trauma from denture base –relief necessary.

Mylohyoid muscle.



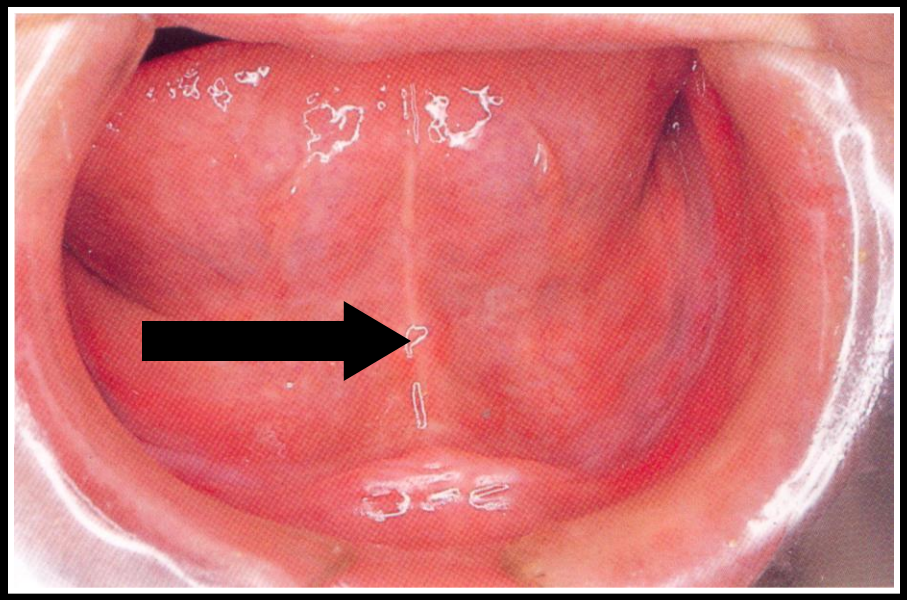
- Floor of the mouth is formed by mylohyoid muscle.
- Lies deep to the sublingual gland in the anterior region- does not affect the border of denture.
- Posterior region –affects the lingual border in swallowing and tongue movements.

Genial tubercle.



- Area of muscle attachment (Genioglossus and Geniohyoid).
- Lies away from the crest of the ridge.
- Prominent in Resorbed ridges.
- Adequate relief to be provided.

Lingual frenum.



- Fold of mucous membrane.
- Base of tongue to supragenial tubercle.
- Registered in function.