

Terms in removable partial denture

د. حسين الديوه جي

- Removable Prosthodontics The branch of Prosthodontics concerned with replacement of teeth and contiguous structures of edentulous or partially edentulous patients by artificial substitutes that are readily removable from mouth

Introduction to Removable Partial Dentures

- Some basic **theoretical** and **practical** information is needed before a technician is able to construct a satisfactory removable partial denture. A knowledge of the **terminology** associated with removable partial dentures is essential.

- The term *partial denture* is used to describe many situations and several types of appliances. By definition, a partial denture is “a prosthesis that replaces one or more, but less than all, of the natural teeth and associated structures

- A *removable partial denture* is “a partial denture that can be readily placed in the mouth and removed by the wearer.



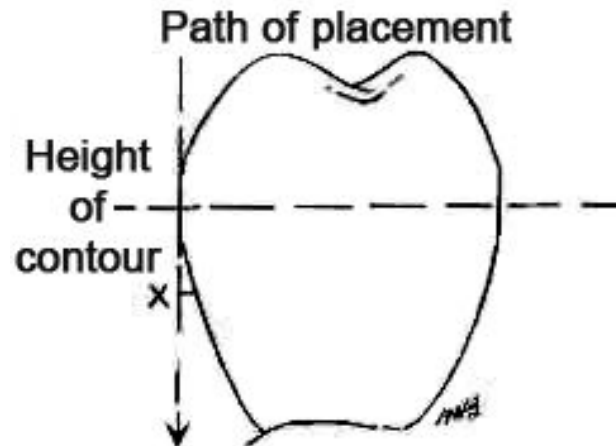
Interim or Provisional Denture

- Dental prosthesis used for a short time for reasons of esthetics, mastication, occlusal support, convenience or for conditioning a patient to an artificial substitute for missing natural teeth until a more definite dental prosthesis can be provided.

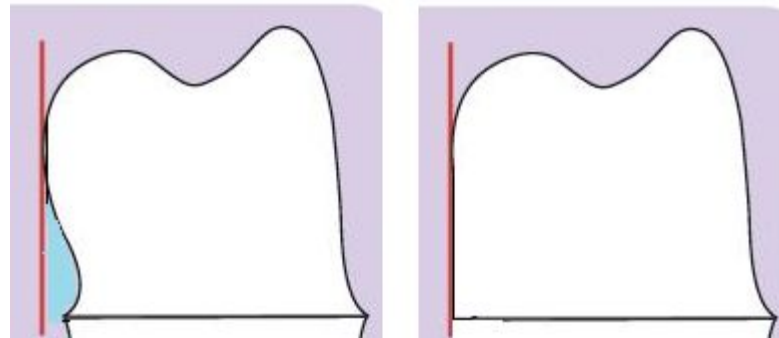
- The following terms are used in the following sections and apply to removable partial denture techniques:

- **SUPPORT** : The foundation on which a dental prosthesis rests.
- • **STABILITY** : Quality of a prosthesis to be firm, stable or constant and to resist displacement by functional, horizontal or rotational stresses.
 - **RETENTION** : Quality inherent in the prosthesis to resist vertical forces acting to displace it away from its foundation.

- **HEIGHT OF CONTOUR** A line encircling a tooth, designating its greatest circumference at a selected position determined by a dental surveyor.

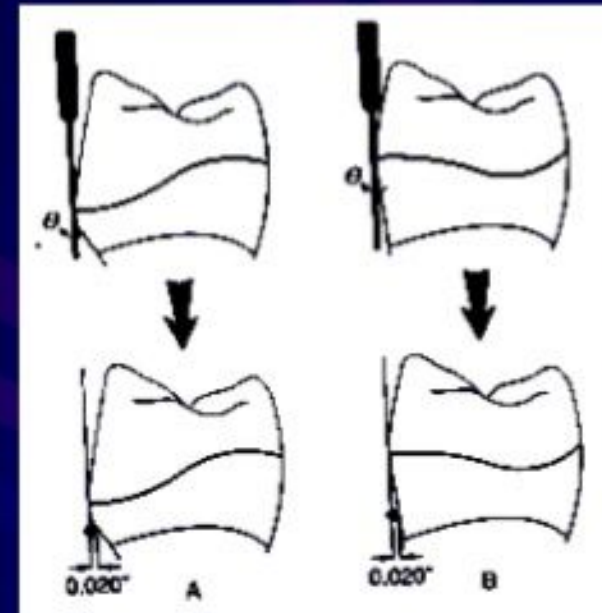
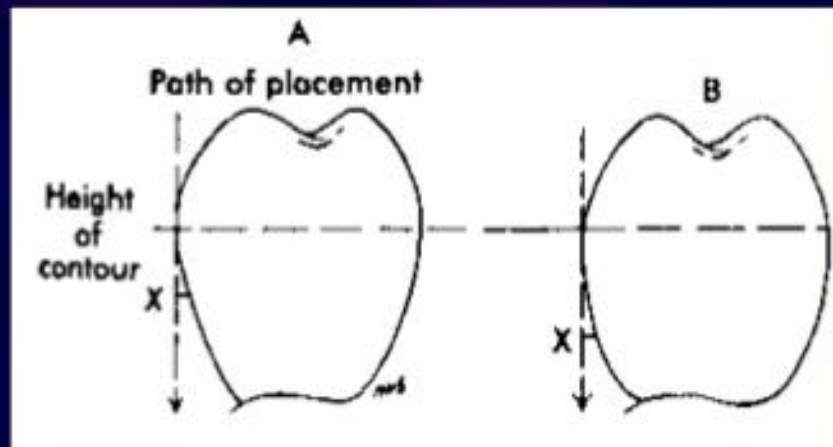


- **UNDERCUT** : Portion of a tooth that lies between the HOC and the gingiva.



- **Angle of Cervical Convergence** : Angle viewed between a vertical rod contacting an abutment tooth and the axial surface of the abutment cervical to the height of contour.

2- Angle of cervical convergence



Undercut depth depends on cervical convergence of the tooth rather than on distance below the survey line.

PARTIALLY EDENTULOUS TERMINOLOGY

- **Guiding Planes**

Two or more parallel surfaces of abutment teeth shaped to direct a prosthesis during its placement and removal.



Fig. (3.9): A: Large undesirable undercut adjacent to proximal surface should be reduced by altering tilt of cast or . B: By grinding of enamel surface, C: Grinding provides an additional guiding plane.

IDEAL GUIDE PLANES

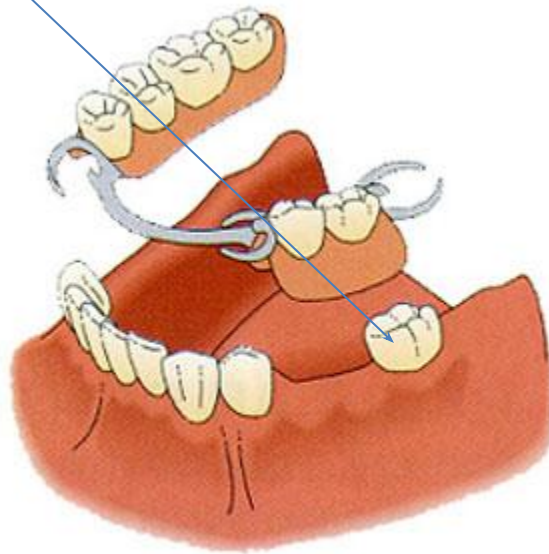
- parallel to each other
- directly opposing each other
- Prepared on several teeth
- Cover a large surface area



- DENTAL CAST SURVEYOR: An instrument used to determine the relative parallelism of two or more axial surfaces of teeth or other parts of a cast of a dental arch.

- **IMPRESSION** :A negative likeness or copy in reverse of a surface or an object. (teeth and adjacent structures)
- **DENTAL CAST** : An accurate and a positive replica of a maxillary or mandibular dental arch.

- ***Abutment***: A tooth which is used to support or retain a removable partial denture.



Removable Partial Denture

- **Base:** That portion of a removable partial denture that contacts the oral mucosa and serves as an attachment and support for the replaced teeth. Usually, the base provides support for the removable partial denture by being in close apposition to the oral mucosa covering the supporting bone (maxillae or mandible).

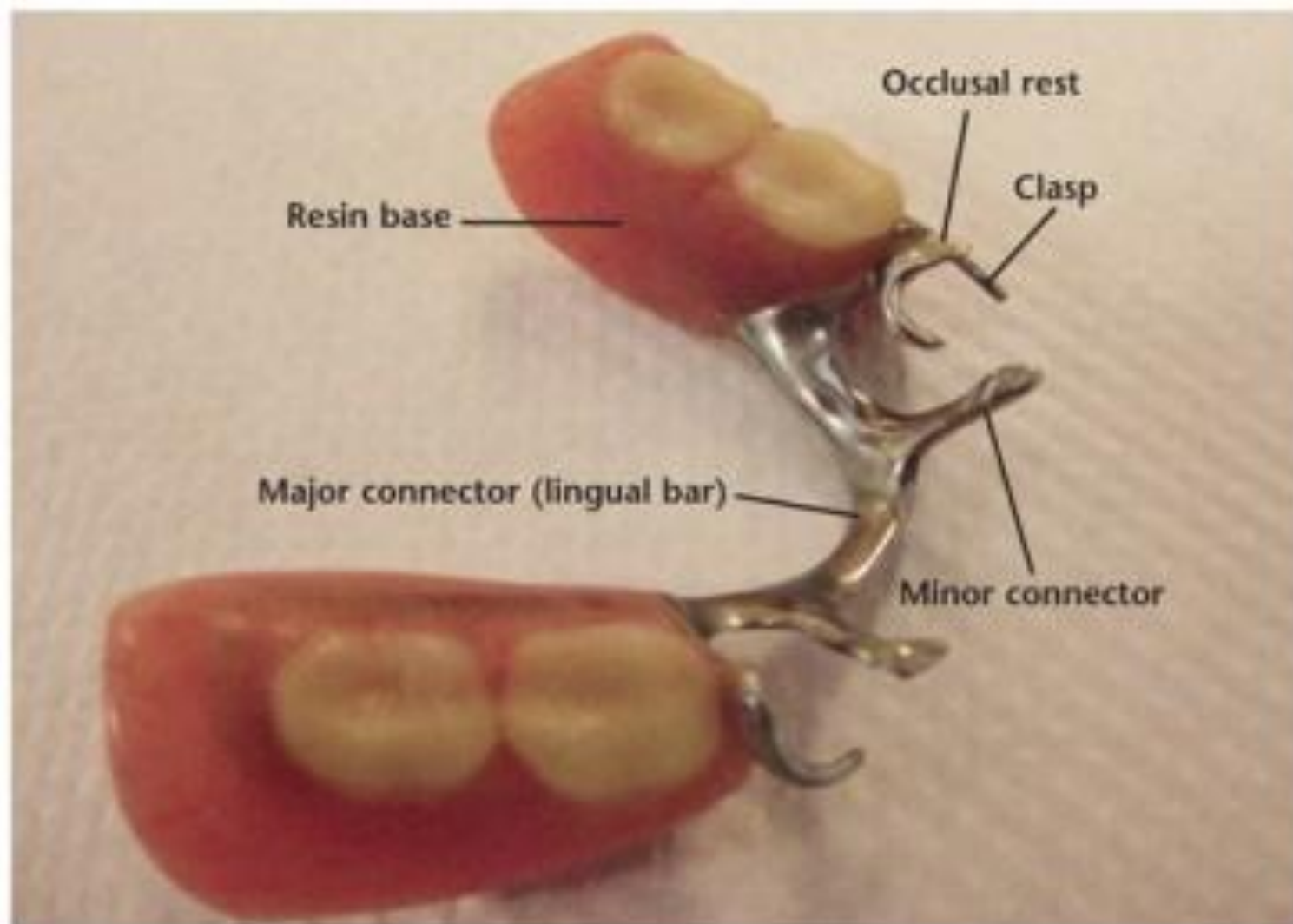


Figure 1. Components of a removable partial denture.

Dimensions of Dental Hygiene, August 2010

- ***Direct Retainer***: “A clasp, attachment, or assembly applied to an abutment tooth for the purpose of maintaining a removable restoration in its planned position in relation to oral structures.”



- The direct retainers with which we are concerned in this manual are clasps. A clasp usually consists of two arms joined by a body which may connect with an occlusal rest. A clasp is an extracoronal retainer, one that fits over the external surface of the tooth.

Parts of clasp assembly

Circumferential
Clasp
(Retentive Arm)

Reciprocating
(Bracing) Arm

Distal
Occlusal
Rest Seat

Proximal
Plate



- Thank you

Removable Partial Denture

Introduction

Tooth loss and age

Tooth loss and age are linked??????

- *specific tooth loss relationship with increasing age because some teeth are retained longer than others.

- *There is an inter arch difference in tooth loss.

(The maxillary teeth lost before mandibular teeth)

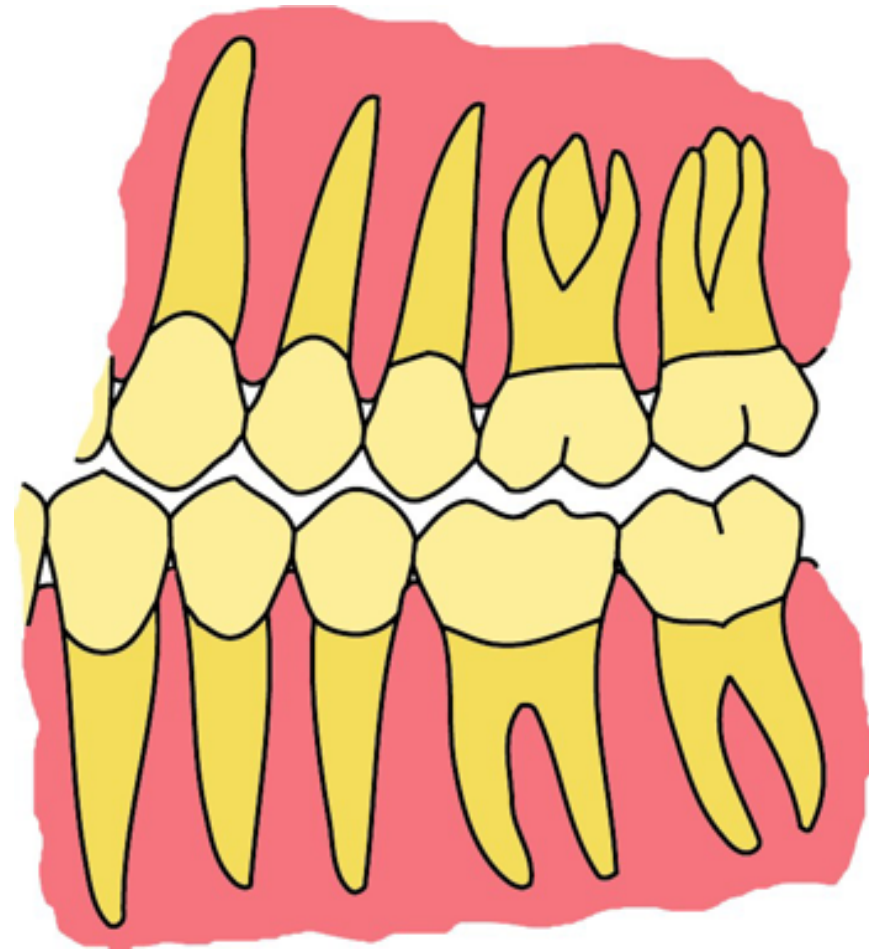
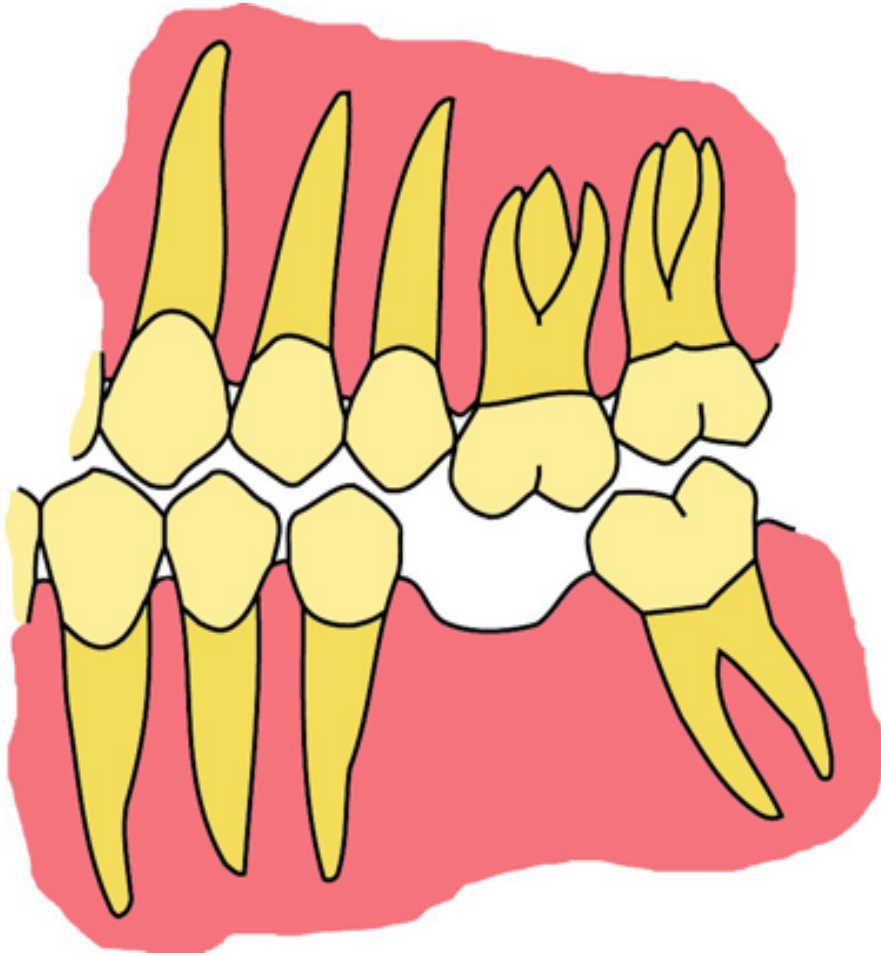
- * there is an inter arch difference, with posterior teeth lost before anterior teeth. the last remaining teeth in the mouth are the mandibular anterior teeth, especially the mandibular canines,(it is a common finding to see an edentulous maxilla opposing mandibular anterior teeth).

- * In general bone loss is greater in the mandible than the maxilla, more pronounced posteriorly than anteriorly, and it produces a broader mandibular arch while constricting maxillary arch.
- * With the loss of teeth and diminishing residual ridge, facial features can change secondary to altered lip support and/or reduced facial height as a result of a reduction in occlusal vertical dimension.

Consequences of tooth loss

- Movement of teeth – tilting, migration and overeruption
- Alteration of occlusal plane
- Alteration of path of mandibular closure
- Alveolar bone resorption
- Appearance
- Mastication and speech
- Psychological effects

Effects of tooth loss



Effects of tooth loss

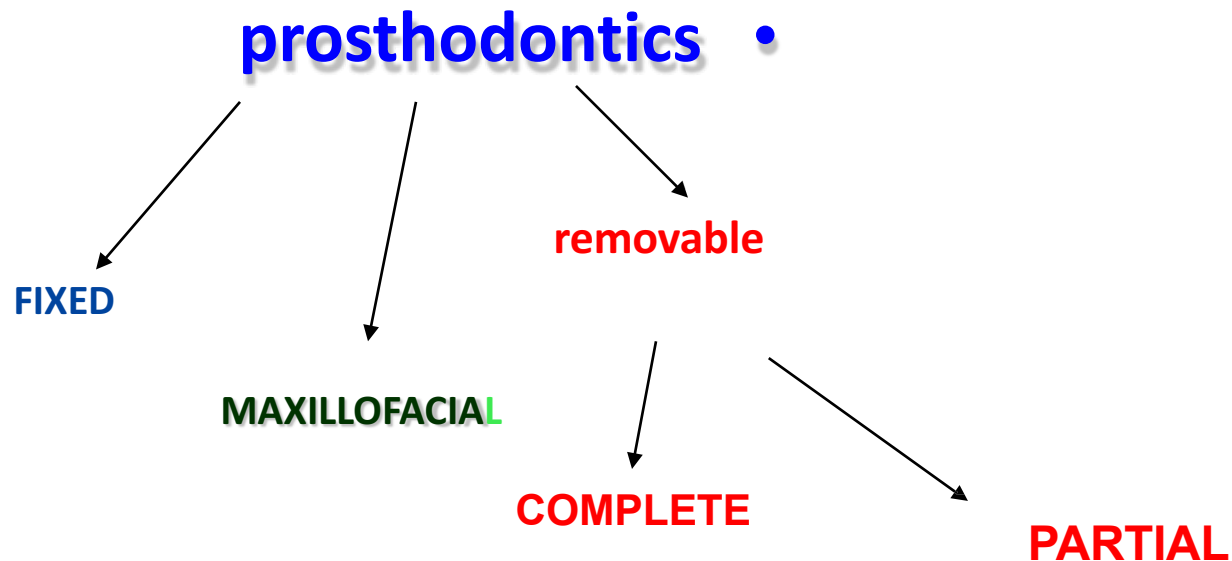


Terminology

Prosthetics: is the art and science of replacing missing parts of the human body.

Prosthesis: is the artificial part that replaces the missing part of the human body such as leg, eye, denture.

Prosthodontics: it is the branch of dental art and science that deals with the replacement of missing teeth and oral tissues to restore and maintain oral form , function ,appearance and health.



Removable Prosthodontics :is the branch of prosthodontics concerned with the replacement of missing teeth and surrounding tissues with a prosthesis designed to be removed by the wearer.

Partial denture: A prosthesis that replaces one or more, but not all of the natural teeth and supporting structures. It is supported by the teeth and/or the mucosa. It may be fixed (i.e. a bridge) or removable.

Abutment: is a tooth , a portion of a tooth or a portion of an implant that serves to support and or retain a prosthesis.

Partial denture construction: The science and techniques of designing and constructing partial dentures.

Removable Partial Denture (RPD): A removable denture that replaces some teeth in a partially edentulous arch; the removable partial denture can be readily inserted and removed from the mouth by the patient. It is either acrylic type or metallic type (cobalt/chrome).

Tooth-supported prosthesis

A term used to describe a prosthesis which depends entirely upon the abutment teeth for support.

Tooth-Tissue – supported prosthesis

A term used to describe a prosthesis or part of a prosthesis which depends upon abutment teeth and mucosa of the residual ridge and basal bone areas for support.

Or Distal extension removable partial denture

A removable partial denture that is supported and retained by natural teeth at one end of the denture base segments and in which a portion of the functional load is carried by the residual ridge

Denture base: is the part of denture that rests on the foundation tissues and to which teeth are attached.



Treatment options for the partially dentate patient

- 1• No treatment –short dental arch
- 2.Fixed restorations – conventional bridges
- 3• Removable partial dentures
- 4• Implant retained restorations





BEFORE



AFTER

Objectives of removable partial denture (purpose)

1. Restore esthetic (especially for anterior teeth).
2. Restore function (phonetic and mastication) for proper speech, proper occlusion and proper food mastication.
3. 3. To prevent opposing teeth extrusion or migration and tilting of adjacent teeth.

4. To fill empty space or spaces.

5. Prevent disease atrophy by a form of stimulation to the underlying tissue and ridge.

6. For proper muscular balance.

7. To restore the psychological status of the patient.

Causes of teeth loss:

- 1. Caries (main cause in a young people below 35 years).
- 2. Periodontal diseases (main cause in old people above 35 years).
- 3. Trauma or accident (such as receiving a blow or falling down on them).
- 4. Congenital missing teeth.

Indications of removable partial dentures :

- 1. Distal extension situations (free end situation).
- 2. Long span tooth-bounded edentulous area.
- 3. Need for cross-arch (bilateral) stabilization.
- 4. Excessive loss of the residual ridge..

- 5. Unusually sound abutment teeth.
- 6. If the prognosis of remaining teeth are questionable or reduced periodontal support of remaining teeth (these teeth cannot support fixed prostheses).
- 7. After recent extraction (need immediate replacement of extracted teeth).

8. Patient younger than 18 years old. .

9. Economic consideration .

Classification of RPD



د. حسين الديوه جي

REQUIREMENTS OF AN ACCEPTABLE METHOD OF CLASSIFICATION

- Permit immediate visualization of the type of partially edentulous arch under consideration
- Permit immediate differentiation between the tooth-supported and tooth-tissue supported removable partial denture
- Universally acceptable
- Serve as a guide to the type of design to be used



KENNEDY'S CLASSIFICATION

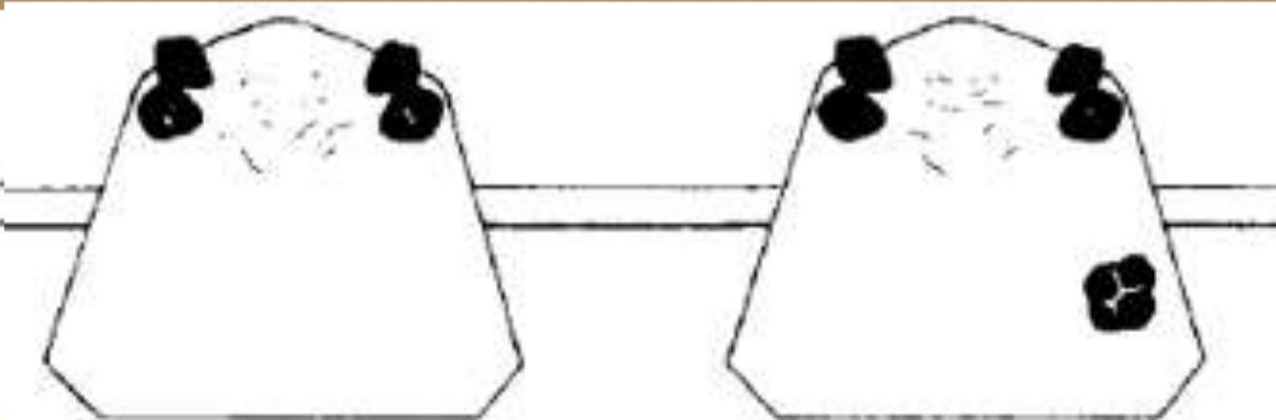
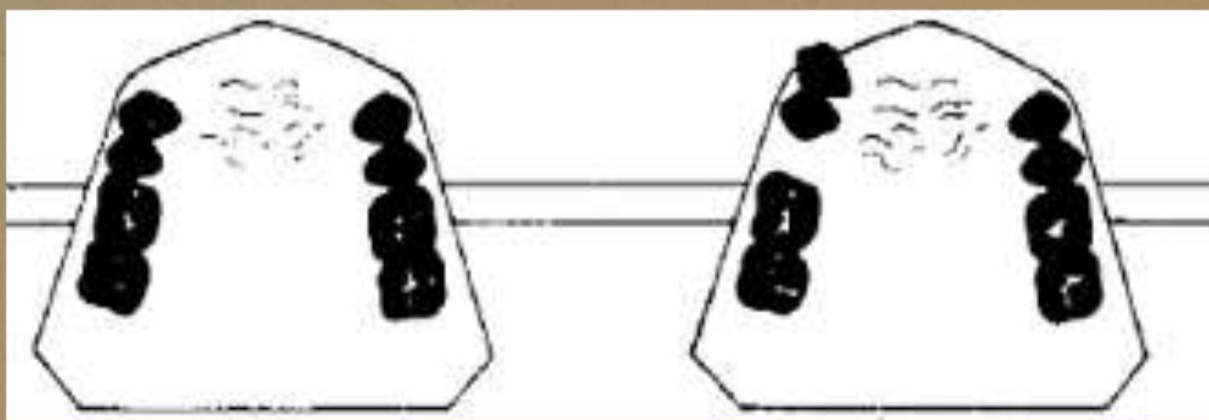
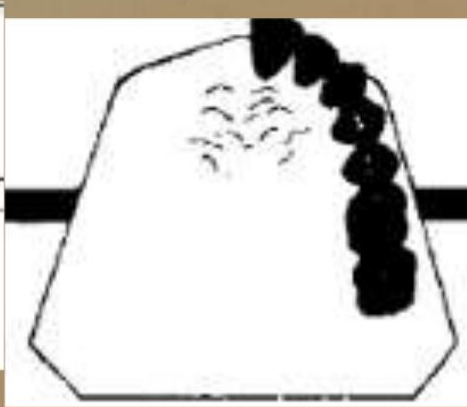
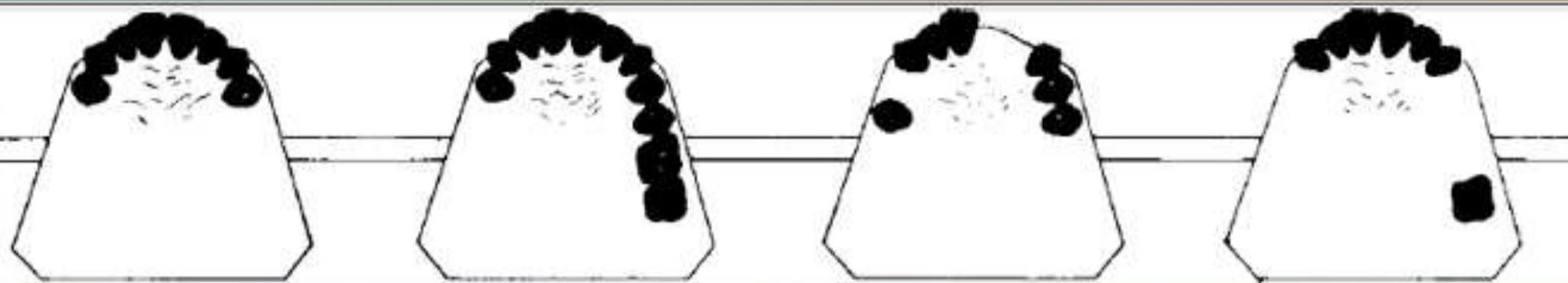
- Most widely used method of classification
- Proposed in 1923 by Dr. Edward Kennedy.
- Based on relationship of partially edentulous spaces to abutment teeth, unlike Cummer, who classified on basis of dentures
- Classification is positional or anatomical (gives mental picture of teeth and their relationships)

- **Class I: Bilateral edentulous spaces located posterior to remaining natural teeth**
- **Class II: Unilateral edentulous space located posterior to remaining natural teeth**
- **Class III: Unilateral edentulous space with natural teeth both anterior and posterior to it.**
- **Class IV: Single, bilateral (crossing the mid-line), edentulous space located anterior to remaining natural teeth**



APPLEGATE'S RULES

- Rule One: *Classification should follow rather than precede extractions that might alter original classification*
- Rule Two: *If third molar is missing and not to be replaced, it is not considered in the classification*
- Rule Three: *If third molar is present and is used as an abutment, it is considered in the classification*
- Rule Four: *If second molar is missing and not to be replaced, it is not considered in the classification*
- Rule Five: *The most posterior edentulous area or areas always determine the classification*
- Rule Six: *Edentulous areas other than those determining classification are referred to as **modification areas** and are designated by their number*
- Rule Seven: *The extent of modification is not considered, only the number of edentulous spaces are considered.*
- Rule Eight: *There can be no modification areas in class IV. Because if there are any additional*









Major connector

Dr.Hussein AlDewachi

- Major connector **defined** as “It is that part of the R.P.D that joins the components on one side with those of the other side. It is bar or plate that unit of the partial denture **to which** all other parts are directly or indirectly attached”.



- The major connector may be compared with the frame of an automobile or with the foundation of a building. It is through the major connector that other components of the partial denture become *unified and effective*.

The chief functions of a major connector include:

- 1. Connect the major parts of the prosthesis so that the partial denture acts as one unit.
- 2. Distribution of the applied force throughout the arch to selected teeth and tissue so that no one abutment is subjected to extreme loading.

Requirements of major connector

- 1- Rigidity: a major connector should be rigid enough to effectively distributes forces throughout the arch
- 2- Rounded margins, free from sharp edge.
- 3- Does not interfere with and is not irritating to the tongue and doesn't alter the natural contour of lingual surface of the mandibular alveolar ridge or of the palatal vault.

- 4- Does not contribute to the retention or trapping of food particles.
- 5- Aids in the support of the prosthesis.
- 6- Made from an alloy that is compatible with oral tissues.

Types of major connector:

- 1- Maxillary major connector
- 2- Mandibular major connector.

Maxillary major connector

- It should fulfill these additional requirements
-
- Beading (rounded thick border) should be given to the posterior border of maxillary major connector to provide a seal with soft tissues (prevent entry of food beneath the maxillary major connector), Beading created by making 0.5 to 1mm groove on master cast.
- ☐ Usually relief should not be given for maxillary major connector, close adaptation is required for better retention and stability, relief required when tori is presented.

Types of Maxillary major connectors

- Six basic types of maxillary major connectors are considered:
- 1. Single palatal bar
- 2. Anterior-posterior palatal bars
- 3. Single palatal strap
- 4. Combination anterior and posterior palatal strap–type connector
- 5. Palatal plate-type connector
- 6. U-shaped palatal connector

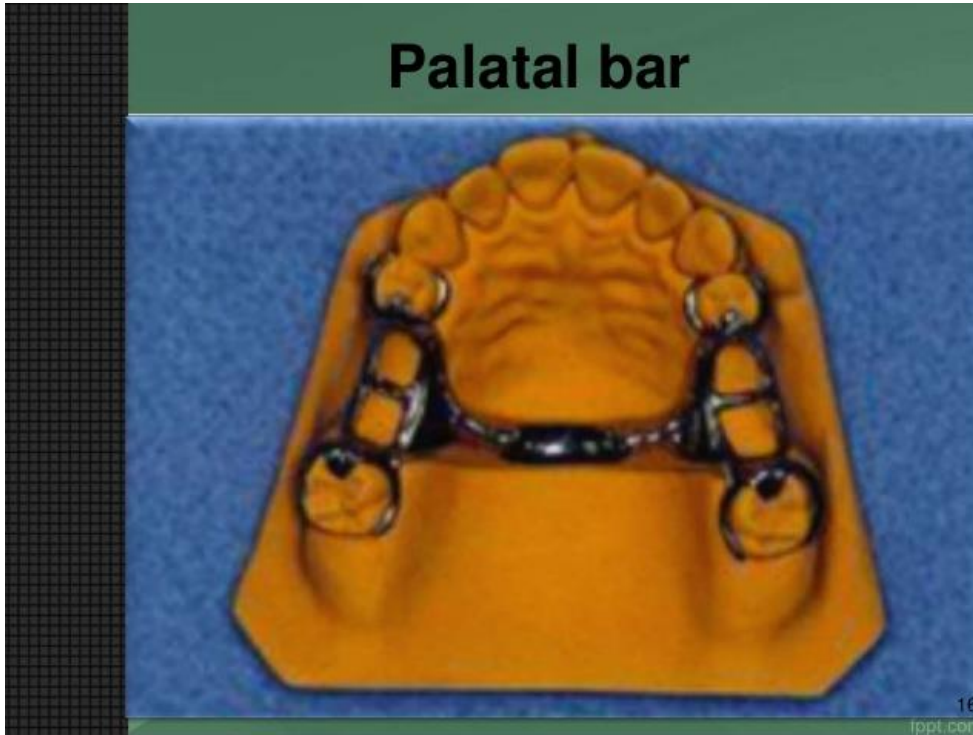
1. Single palatal bars

Palatal bar



- It is used in a tooth born unilateral or bilateral limited spaces for cross arch stabilization (CL III and CL III mod 1) when only one or two teeth are missing.
- ☐ It cannot be used in anterior region to premolar region due to interferences with tongue.

Palatal bar



2. Combination anterior and posterior palatal Bar type

- The anterior component is a flat bar located as far as possible from the rugae area and tongue interference (6 mm away from gingival margins) while the posterior bar is a half oval in cross section located as far as possible but still entirely on the hard palate, and at 90° on the mid palatal suture.

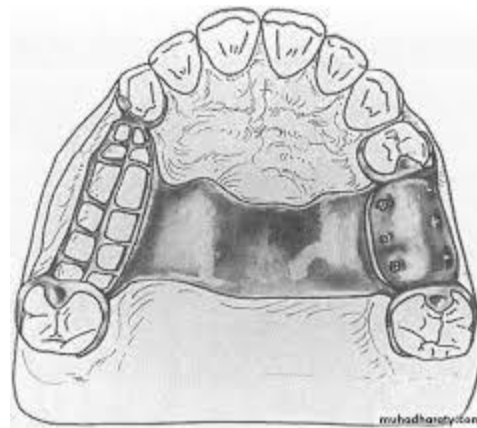
Combination anterior and posterior palatal Bar type



- The anterior and posterior part are connected by two lingual elements along the lateral slopes of palate giving a circular configuration provides rigidity.
- ➤ *It is indicated in cases with *large inoperable palatal tori, **long edentulous span in Cl II modification 1 arch ***and in CL III with or without mod.*

3. Single palatal straps or middle palatal strap

- ☐ It is located in the middle of the palate, it does not cover the rugae area which make it **more tolerable to the patient**.
- ☐ Strap should be **8mm wide** or as wide as the combined width of a maxillary premolar and first molar.
- ☐ **Indicated in:-** A Class III or Class III mod 1 partially edentulous arch, Short edentulous spaces.



4. Combination anterior and posterior palatal strap type major connector

- The posterior and anterior connectors are joined by a lateral longitudinal connectors forming square or rectangular frame.



Anterior-Posterior Palatal Strap*

- Maximum rigidity
- Minimum bulk
- Use in most cases
- Especially torus palatinus



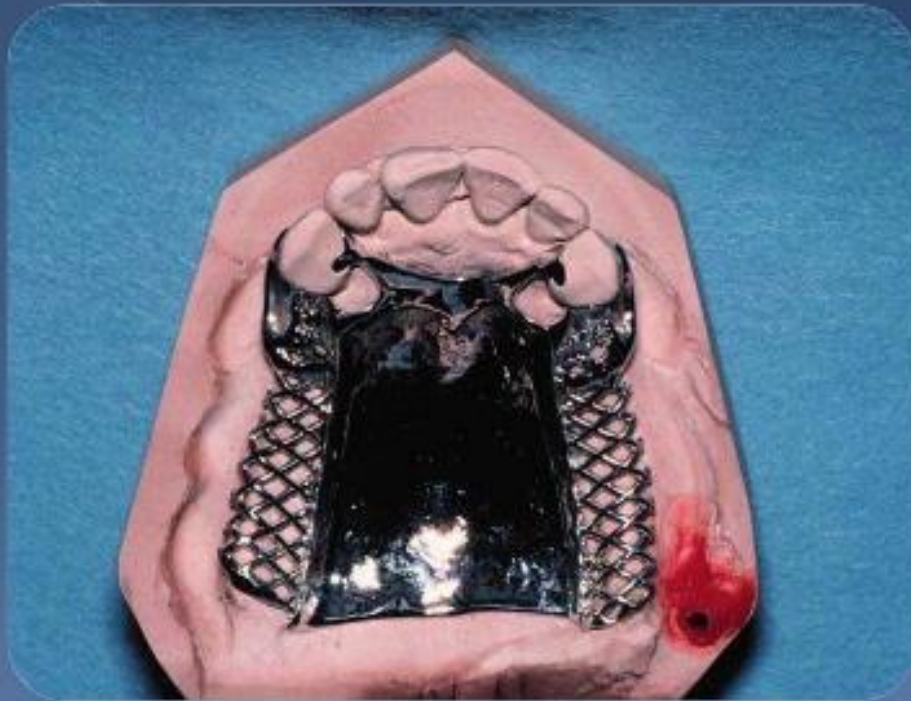
Indications:

- 1. Class I and II arches.
- 2. Long edentulous spans in Class III, modification 1 arches.
- 3. Inoperable palatal tori that do not extend posteriorly to the junction of the hard and soft palates.

5. Palatal plate major connector (Anatomic Replica)

- ☐ Major connector covers the entire palate.
- ☐ Used when many posterior teeth are replaced.
- ☐ Anterior border should be 6mm away from gingival margin or extend up to the cingula of anterior teeth.

Palatal Plate Type Connector :



- □ The posterior border usually extends to the junction of hard and soft palate.
- □ A slight border seal can be obtained by giving a beading posteriorly, to prevent accumulation of food beneath the major connector.

- **Shape**: it can be constructed using:
 - a. All cast metal.
 - b. Combination of metal and acrylic, here the metal extend over the anterior half of palate while acrylic covers the posterior part of the palate, the posterior border of the metal contain small projections for retention of acrylic.



(Uses)

- ☐ In Cl I thus relieving loads apply to the weak abutment, when some of remaining anterior teeth.
- ☐ In Cl III with a badly condition few remaining teeth.
- ☐ In Cl II when only posterior teeth are present.
- ☐ Patient with cleft palate to close any passage nasal and oral cavities.

6. U-shaped major connector (horse shoe shaped) maxillary major connector:

- ☐ The U-shaped palatal connector is the least desirable of maxillary major connectors. It should never be used arbitrarily.
- ☐ Used when many anterior teeth are to be replaced and in the presence of tori.





Thank you

LOWER MAJOR CONNECTOR

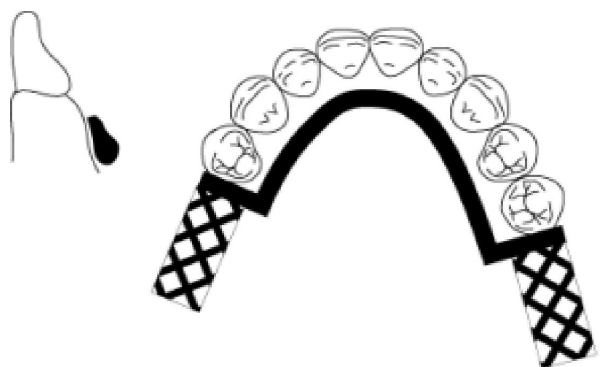
Dr. Hussein AlDewachi

TYPES OF LOWER MAJOR CONNECTOR

- ⦿ 1- Lingual bar
- ⦿ 2- Sub-lingual bar.
- ⦿ 3- Double lingual bar
- ⦿ 4- Lingual plate
- ⦿ 5- Cingulum bar
- ⦿ 6- Labial bar.

1- LINGUAL BAR.

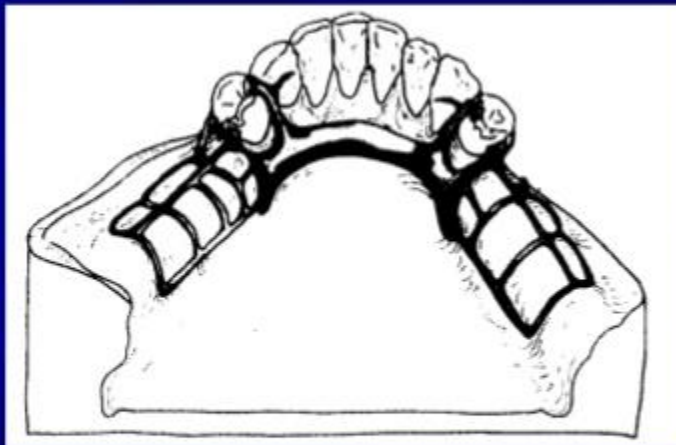
- ◉ ☐ It is half-pear shaped in cross section with thickest portion placed inferiorly and should be tapered toward the gingival tissue superiorly.
- ◉ ☐ There must be a minimum of 8mm vertical clearance from the floor of mouth. The upper border of major connector should have a 4mm clearance from gingival margin to avoid any soft tissue irritation.
- ◉ ☐ Cannot be used in cases with tori.



2- SUB LINGUAL BAR

- ⊙ □ It is modification of lingual bar.
- ⊙ □ The cross section is similar to the lingual bar except that it is placed more inferiorly and posteriorly than lingual bar.
- ⊙ □ It is indicated if the sulcus depth is too little and lingual bar cannot be placed with at least 4mm clearance from free gingival margin.
- ⊙ □ Cannot be used in case of lingual tori and high frenal attachment.

SUBLINGUAL BAR



Location and form:

- extending over and **parallel to the anterior floor of the mouth.**
- It has **a tear drop configuration** whose base is towards the base of the tongue.

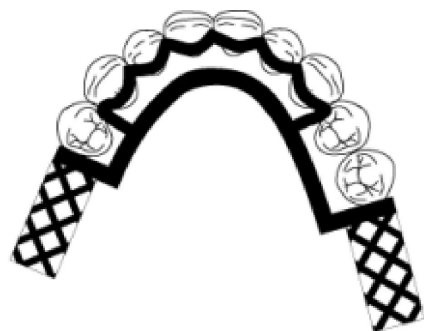
3- DOUBLE LINGUAL BAR (KENNEDY CONTINUOUS BAR)

- ⊙ ☐ Lower part is pear- shaped, similar to lingual bar.
- ⊙ ☐ Upper part its bar and is half oval, 2-3mm high and 1mm thick.
- ⊙ ☐ The upper bar should not run in straight line instead it should dip into the embrasures
- ⊙ ☐

Double lingual bar



- ⊙ The two bars are connected with help of a minor connector placed between the canine and the premolar.
- ⊙ ☐ **Provide indirect retention.**
- ⊙ ☐ If upper bar is not properly fitted, food entrapment may occur.



4- LINGUAL PLATE

◉ 2

- ◉ ☐ It is most rigid and stable
- ◉ ☐ The superior border extends up to the cingulum of the lingual surface of the teeth.
- ◉ ☐ Superior border is scalloped and has intimate contact with teeth.

- ◉ ☐ Indicated in:
- ◉ ☐ CLI, when remaining teeth are not periodontally sound
- ◉ ☐ Indicated when there is no space for lingual bar
- ◉ ☐ Indicated when one or more incisor teeth have to be replaced in the future
- ◉ ☐ Provide indirect retention

Lingual Plate/Linguoplate





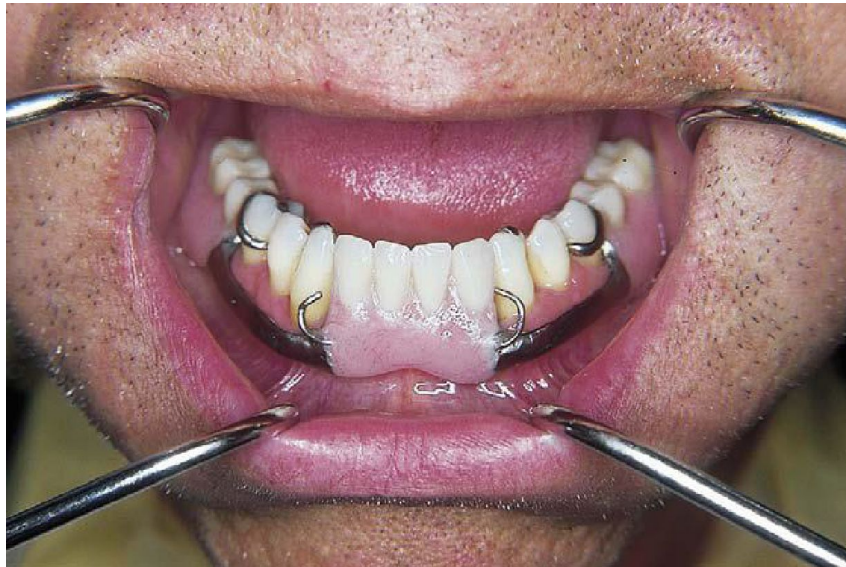
5- CINGULUM BAR (CONTINUOUS BAR)

- ⦿ ☐ It is located on or slightly above the cingulum of anterior teeth.
- ⦿ ☐ Indicated in case with large diastema to avoid unaesthetic display of metal.

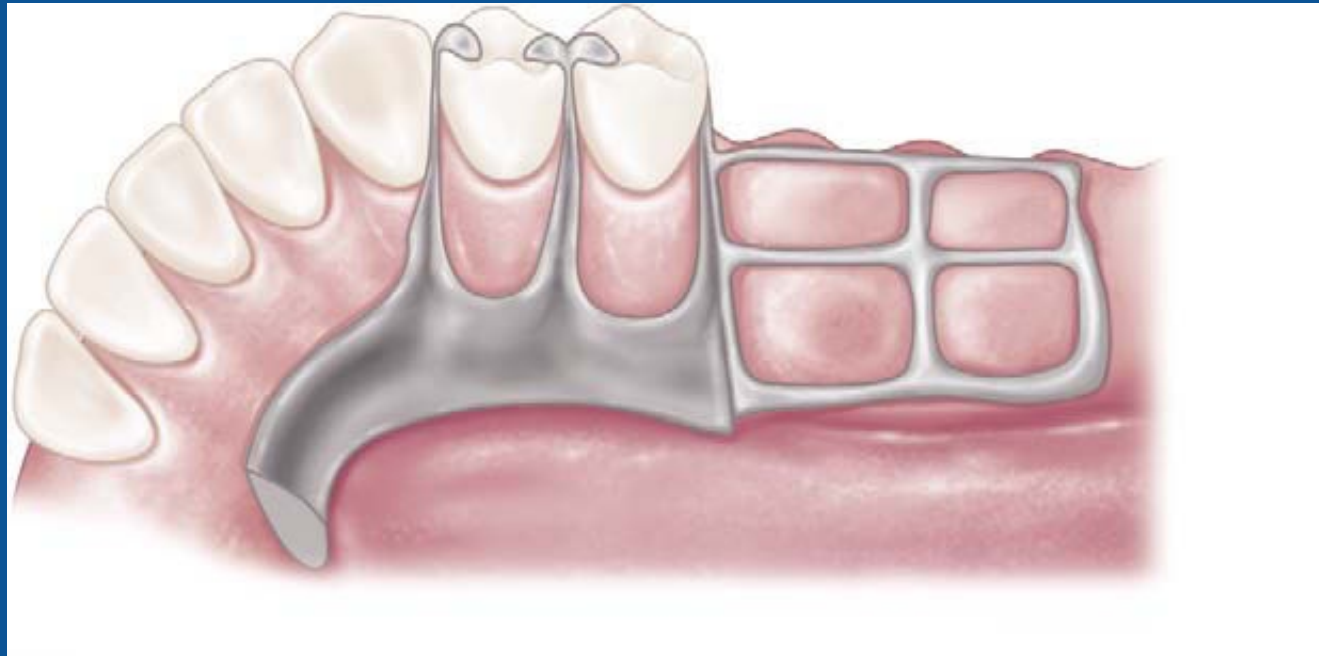


6- LABIAL BAR

- ◉ ☐ It is placed on the labial surface
- ◉ ☐ It is also half pear shaped in cross section
- ◉ ☐ It is run along the labial mucosa of anterior teeth.
- ◉ ☐ It is used when the teeth are lingually placed or inclined
- ◉ ☐ But it poor esthetic and tend to distorted lower lip.



Minor Connectors



∞ Components that serve as the connecting link between major connector or base of a removable partial denture and other components of the prosthesis, such as the clasp assembly, indirect retainers, occlusal rests, or cingulum rests.

Minor Connectors

Connects components to the major connector

Direct retainer

Indirect retainer

Rest



Requirements of minor connector:

1.sufficient rigidity . Like the major connector, the minor connector must have sufficient bulk to be rigid to transmit forces between the linked components.

2. must not impinge on marginal gingival tissues.
Slight relief is required when crossing the gingival margin especially in tooth-mucosa borne dentures.



3. Minor connectors should be located at least **5mm** from other vertical components.



- 4. Minor connector contacting axial surface of abutment teeth should not be located on convex surface, instead should be located on the embrasure.
- 5. Should conform to the interdental embrasure.



❧ 6. Should be thickest towards the lingual surface, tapering towards the contact area.

- 7. Deepest part of interdental embrasure should have been blocked out to????

✧ 8. The framework designs offering strong retention for acrylic resin bases allowed the use of a greater bulk of acrylic resin projecting through openings in the metal retention design.

Functions of Minor Connectors

1. Unification and rigidity
2. Stress distribution
3. Bracing through contact with guiding planes
4. Maintain a path of insertion
5. Distributes forces on the edentulous ridge to the ridge and the remaining teeth.

Types of minor connector

- 4 types –

- Join the clasp assembly to the major connector.

- Join indirect retainers or auxiliary rests to the major connector.

- Join the denture base to the major connector.

- Serve as an approach arm for a vertical projection or bar type.

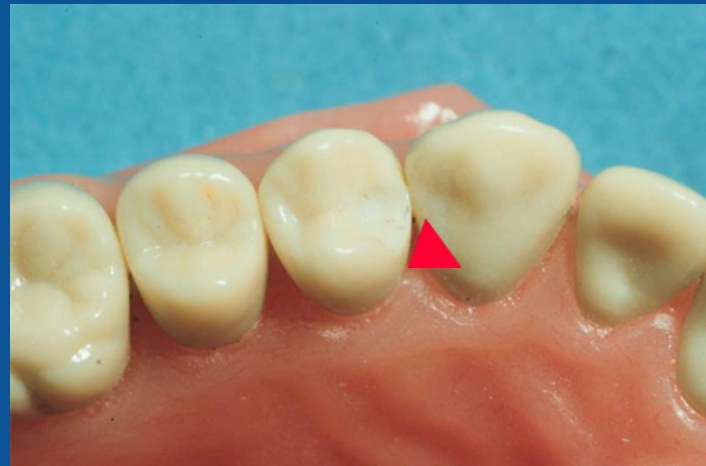
**Minor connectors that join indirect retainers
or auxillary rests to major connectors**

Embrasure Minor Connectors

Between two adjacent teeth



Triangular shaped in cross section
Joins major connector at right angles
Relief placed so connector not directly on soft tissue



Minor connectors that join the clasp assembly to the major connector.

- **Proximal minor connector**

Proximal minor connector:

Those that join the clasp assembly to the major connector.

If the minor connector is located on a proximal surface of a tooth adjacent to edentulous areas, it should be broad buccolingually to provide strength but thin mesiodistally to minimize encroachment on the saddle area.



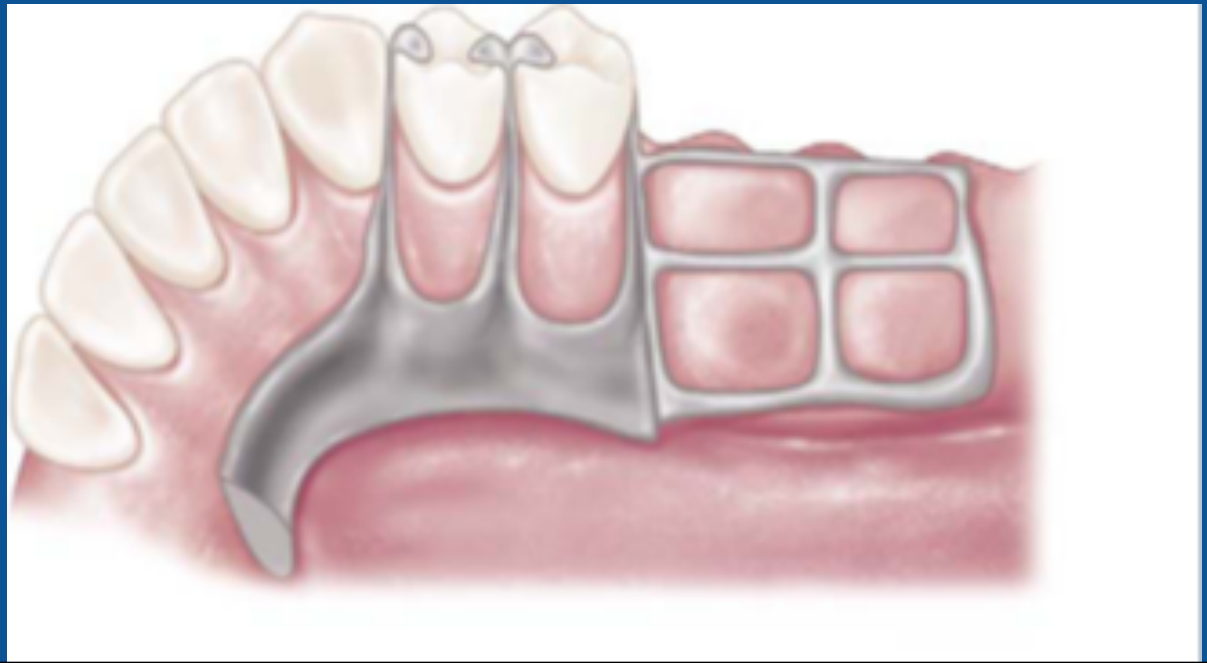
- ❧ Should be rigid to support the active component of the partial denture, the retentive clasp.
- ❧ Support the component of the prosthesis that prevents vertical movement towards the tissue (Rest).
- ❧ Located on proximal surfaces of teeth adjacent to edentulous areas.

❧ If clasp assembly is not being placed on a tooth adjacent to an edentulous space, minor connector must be positioned in embrassure between two teeth.

- Never position on convex lingual surface of a tooth



mesial and distal minor connectors and • proximal plates adjacent to the edentulous areas should swing back to join the major connector in a rounded acute angle in order to increase gingival exposure.



Gridwork minor connectors that connect the denture base and teeth to the major connector.

Latticework construction,

Mesh construction,

Bead, wire, or nail-head minor connectors .



Gridwork Minor Connectors

Open lattice work
mesh types



✧ Must be strong enough to anchor the denture
● base.

- Rigid enough to resist breakage or flexing

Mesh type

Flatter

Potentially more rigid

Less retention for acrylic
if openings are small



Lattice Type

Potentially superior retention

Interferes with setting of teeth, if struts are too thick

This type can be relined easily after ridge resorption.



Bead, wire, or nail-head minor connectors

no relief is provided for this type of minor connector. It cannot be relined if ridge resorption takes place. It should be used on tooth-supported ridges.



Shortcomings – ● :

Difficult to adjust metal base. ●

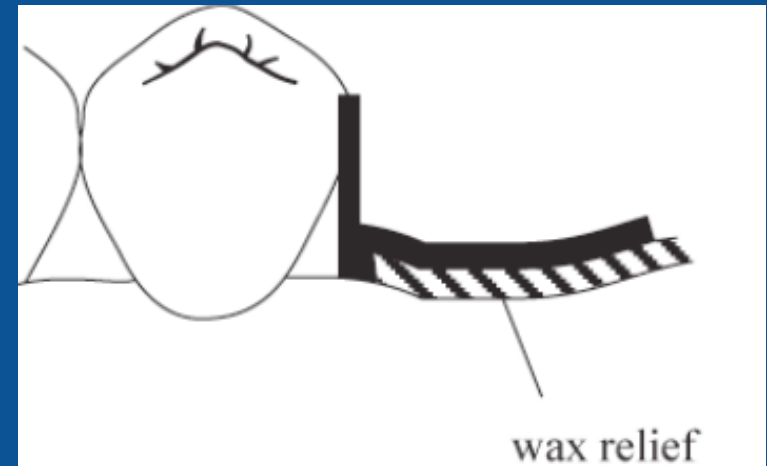
Cannot be adequately relined. ●

Weakest attachment of 3 types. ●

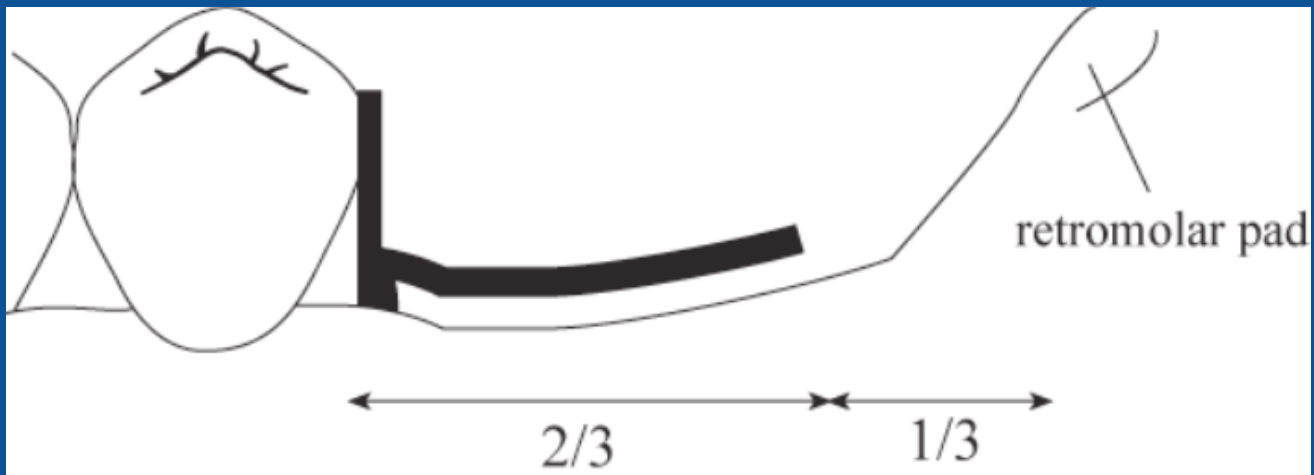
Gridwork Relief

Usually one thickness of baseplate wax is about **1 mm** of relief sufficient

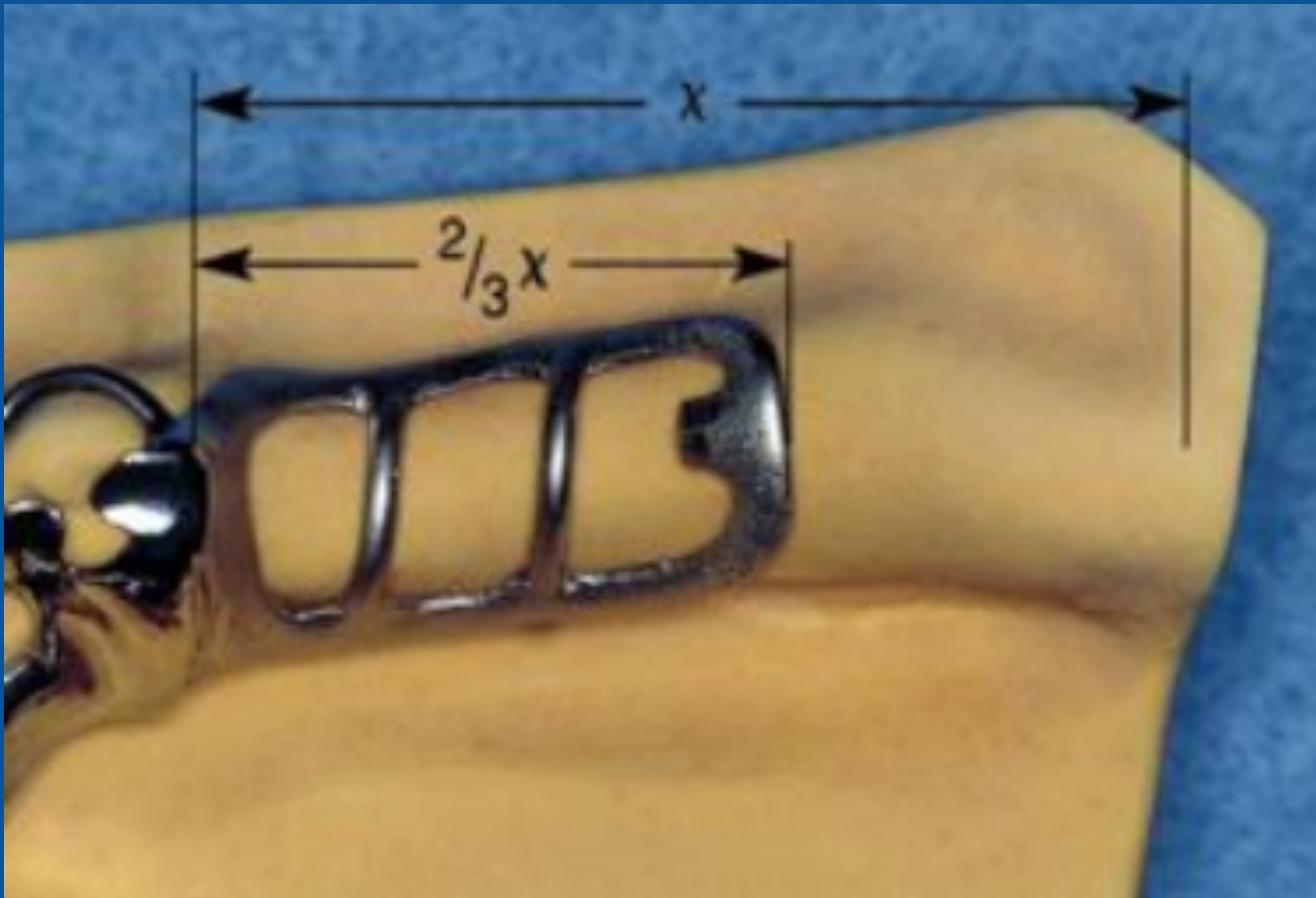
the space provided by the relief wax is available for the mechanical retention of the acrylic resin



The minor connector for the mandibular distal extension base should extend posteriorly about two-thirds the length of the edentulous ridge and should have elements on both lingual and buccal surfaces.



Mandibular Gridwork Design

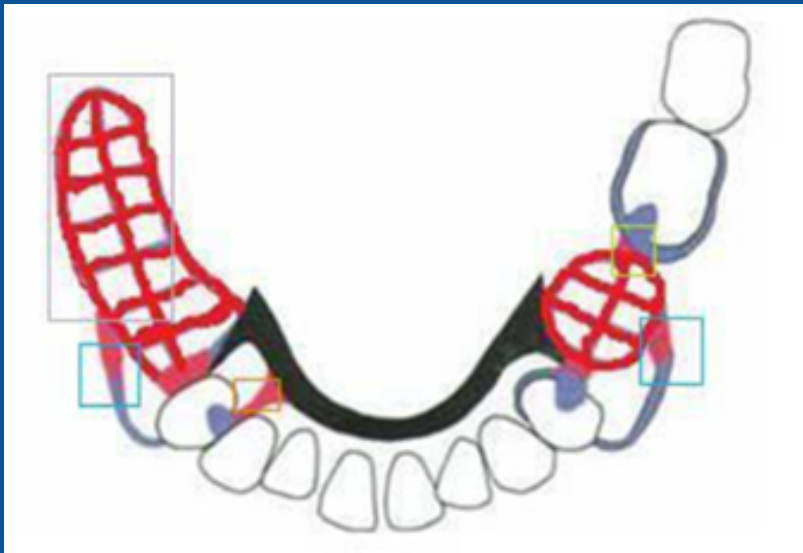


- Minor connectors for maxillary distal extension denture bases should extend the entire length of the residual ridge and should be of a ladderlike and loop design.



The minor connector

that serve as an approach arm for a vertical projection or bar-type clasp.



☞ Only non rigid minor connector.

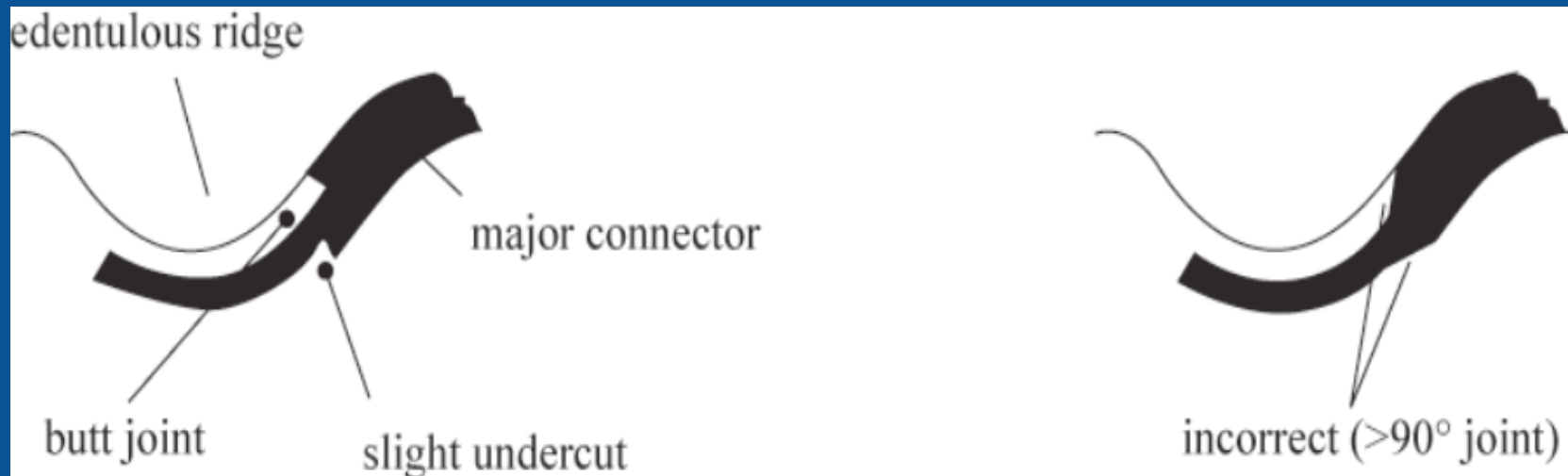
☞ Supports a direct retainer that engages an undercut on a tooth from below.

☞ Approaches tooth from gingival margin.

☞ Should be smooth, even and taper from its origin to its terminus.

Finishing Lines

The junction of gridworks to the major connector • should be in the form of a butt joint with a slight undercut in the metal. The angle formed by the metal at this juncture must not be greater than 90 degrees.





- If these butt joints occur on the outer aspect of the major connector they are called external finish lines; if they are on the internal or tissue side of the major connector ,they are internal finish lines .



The picture can't be displayed.

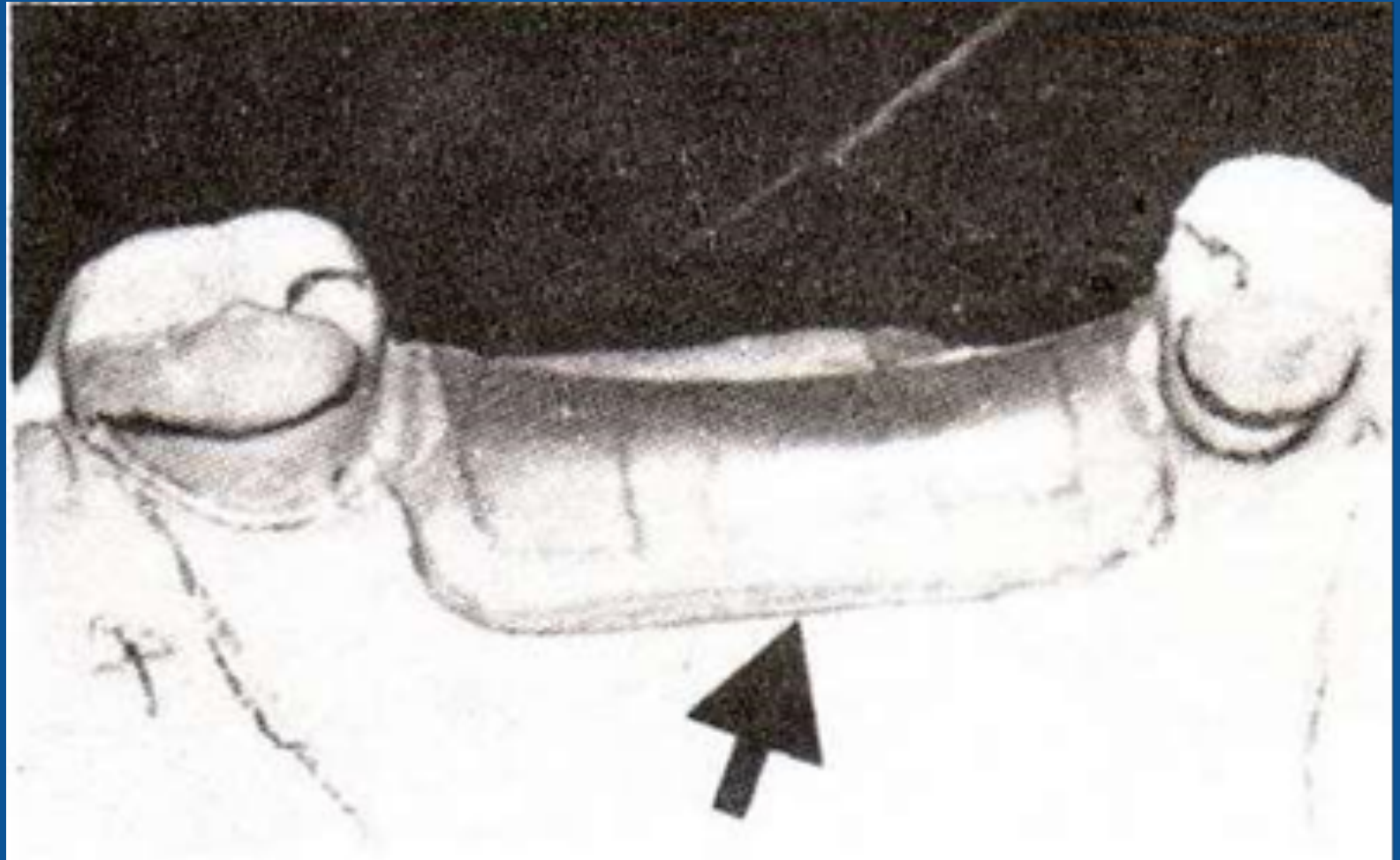
External finish lines

- ✧ Sharp and definite and should be slightly undercut to help lock acrylic resin securely to major connector.

- ✧ Angle the finish line forms with major connector – less than 90 degree.
- ✧ Should extend on to the proximal surface of teeth adjacent to edentulous space.

- Finish line begins at lingual extent of rest seat and continues down the lingual aspect of minor connector on proximal surface of the tooth



• Internal finish lines

- Formed from relief waxes used over edentulous ridge on master cast.
- 24-26 guage thick.
- Margins of relief wax – internal finish line.
- Ledge created by wax – sharp and define

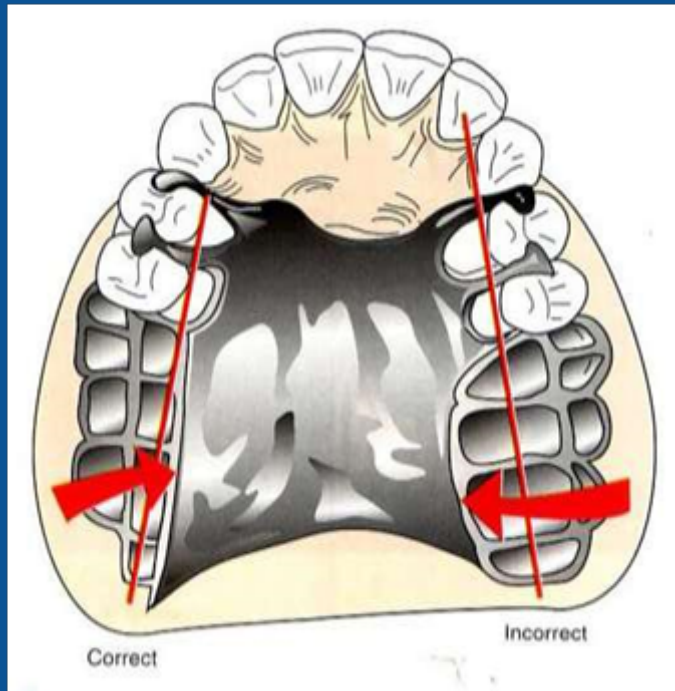


Angle of the finish line forms with major connector – less than 90 degree.

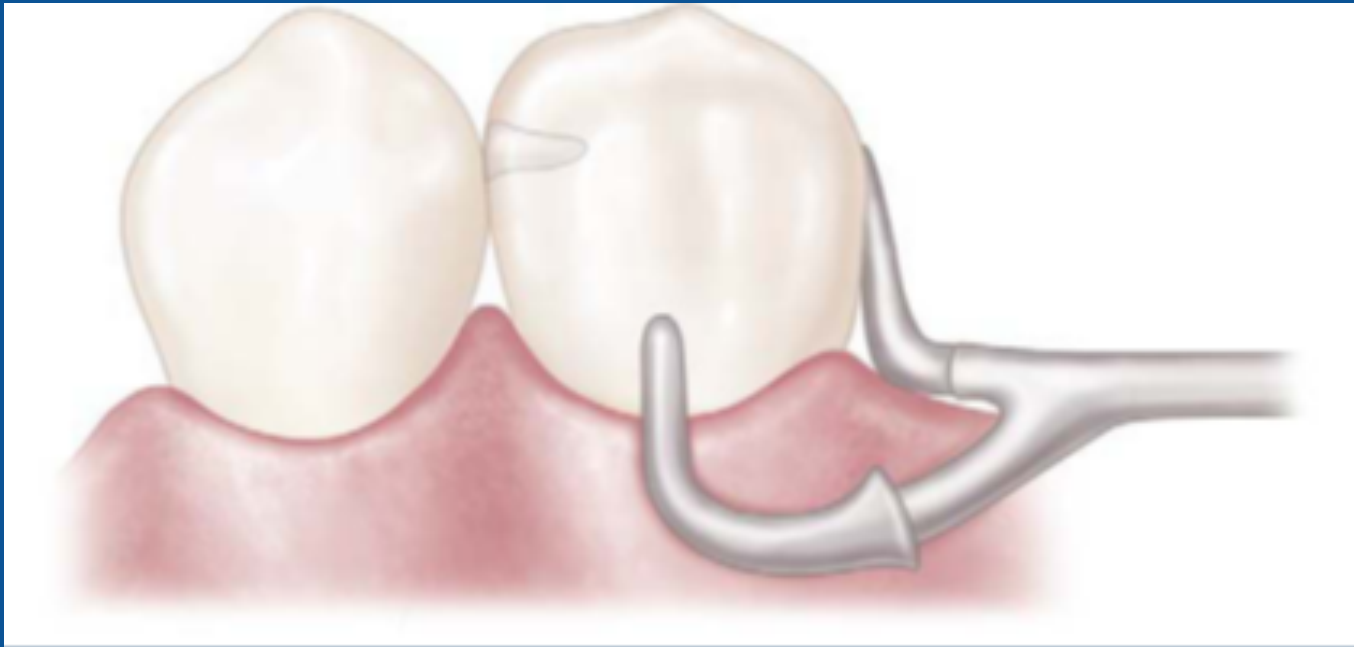


NOTE

Finish line located too far medially— natural contour of palate altered by thickness of acrylic
Too far buccally— difficult to create a natural contour of acrylic resin on lingual surface of artificial teeth



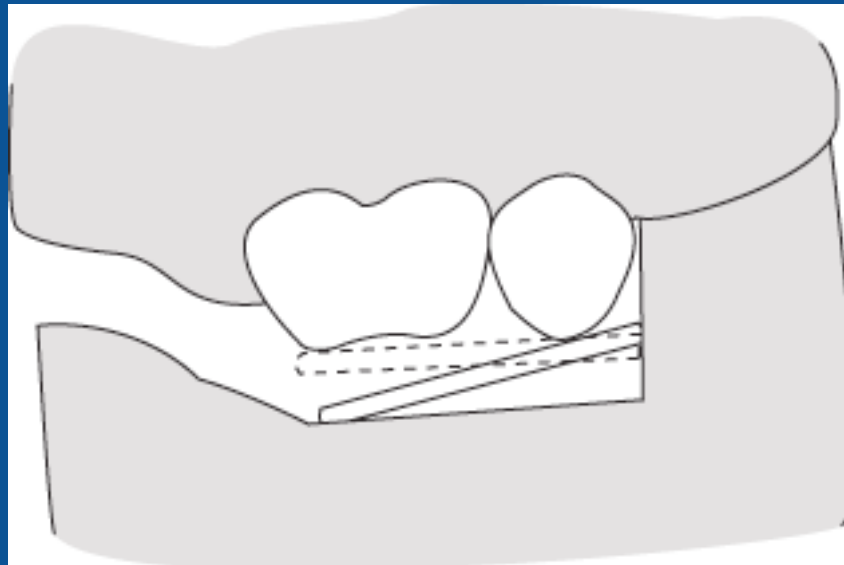
90-degree butt-type joints



Tissue stop : a small projection of metal at the distal end of an extension base frame that contacts the cast and prevents downward movement of the plastic retention area during packing with resin



Closure of the flask under hydraulic pressure can causes distortion of the framework, pushing it tissue ward.









- ✧ Another integral part of minor connector designed to retain acrylic denture base is similar to tissue stop but serves different purpose.
-
- ✧ Located distal to the terminal abutment and is continuation of the minor connector contacting the guiding plane.
-
- ✧ To establish a definitive finishing index stop for acrylic resin base after processing.



THANK YOU



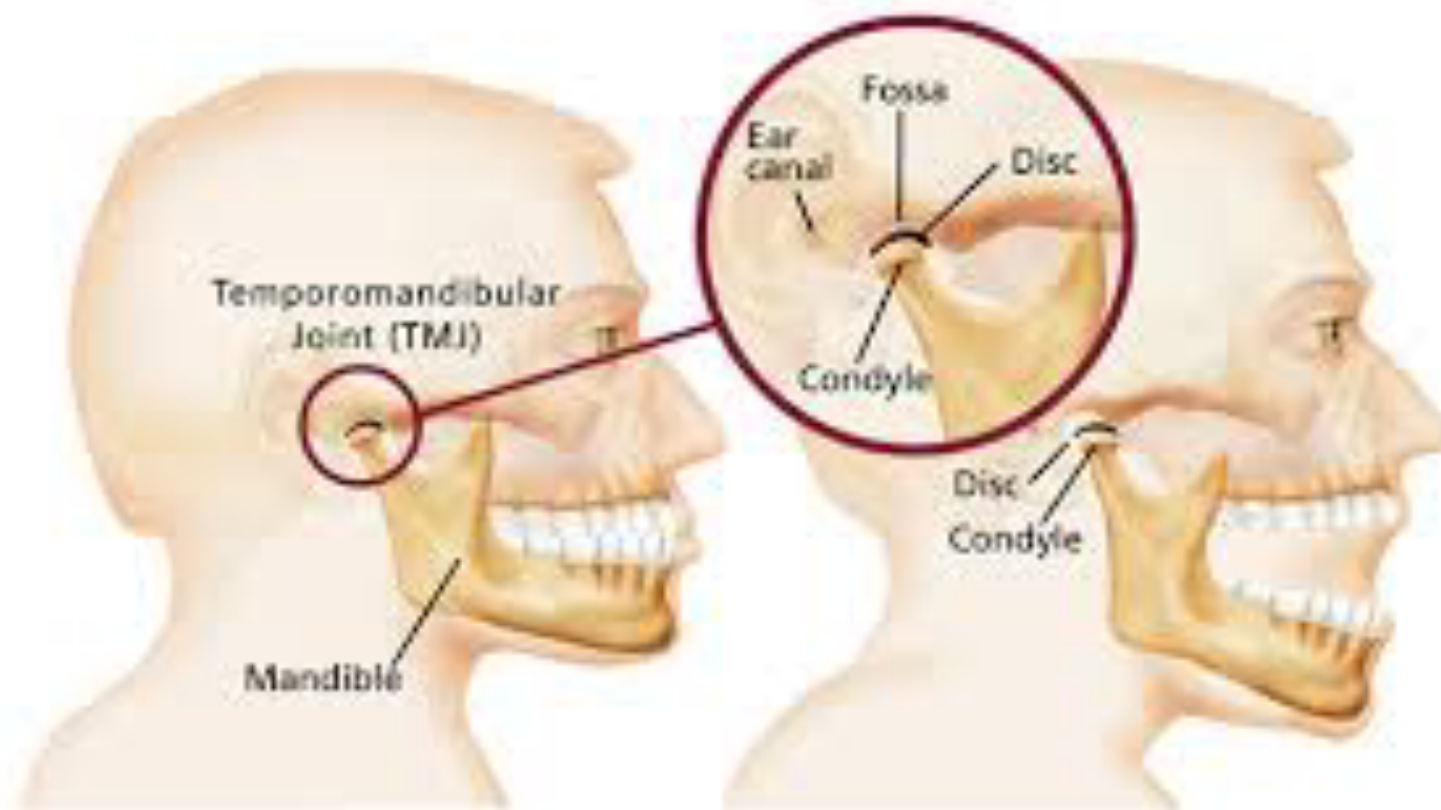
TMJ & Mandibular Movement

د. حسين الديوه جي

- Temporo mandibular joint(TMJ):- Is the area where the mandible articulates with the cranium. It is described as a complex, multi axial ,synovial also called cranio mandibular joint.

- **TMJ component:-**

-
- 1-cranial component(glenoid fossa)
-
- 2-mandibular component(ovoid condylar process)
-
- 3-TMJ capsule:- thin sleeve fibrous tissue investing joint completely inside fibrous capsule, a synovial membrane is present.
-
-



- 4-Ligaments:

- a-lateral or tempro-mandibular ligament

It is the major ligament of the TMJ. This ligamentous originates from the entire rim of the glenoid fossa and articular eminence, attaches to the edges of the articular disc, and passes to insert around the rim of the condyle
:

- **b -Stylo-mandibular Ligament**; originates on the styloid process of the temporal bone and inserts on the posterior border of the ramus near the angle.

TEMPORAL BONE

ARTICULAR
CAPSULE

LATERAL
LIGAMENT

Styloid process
of temporal bone

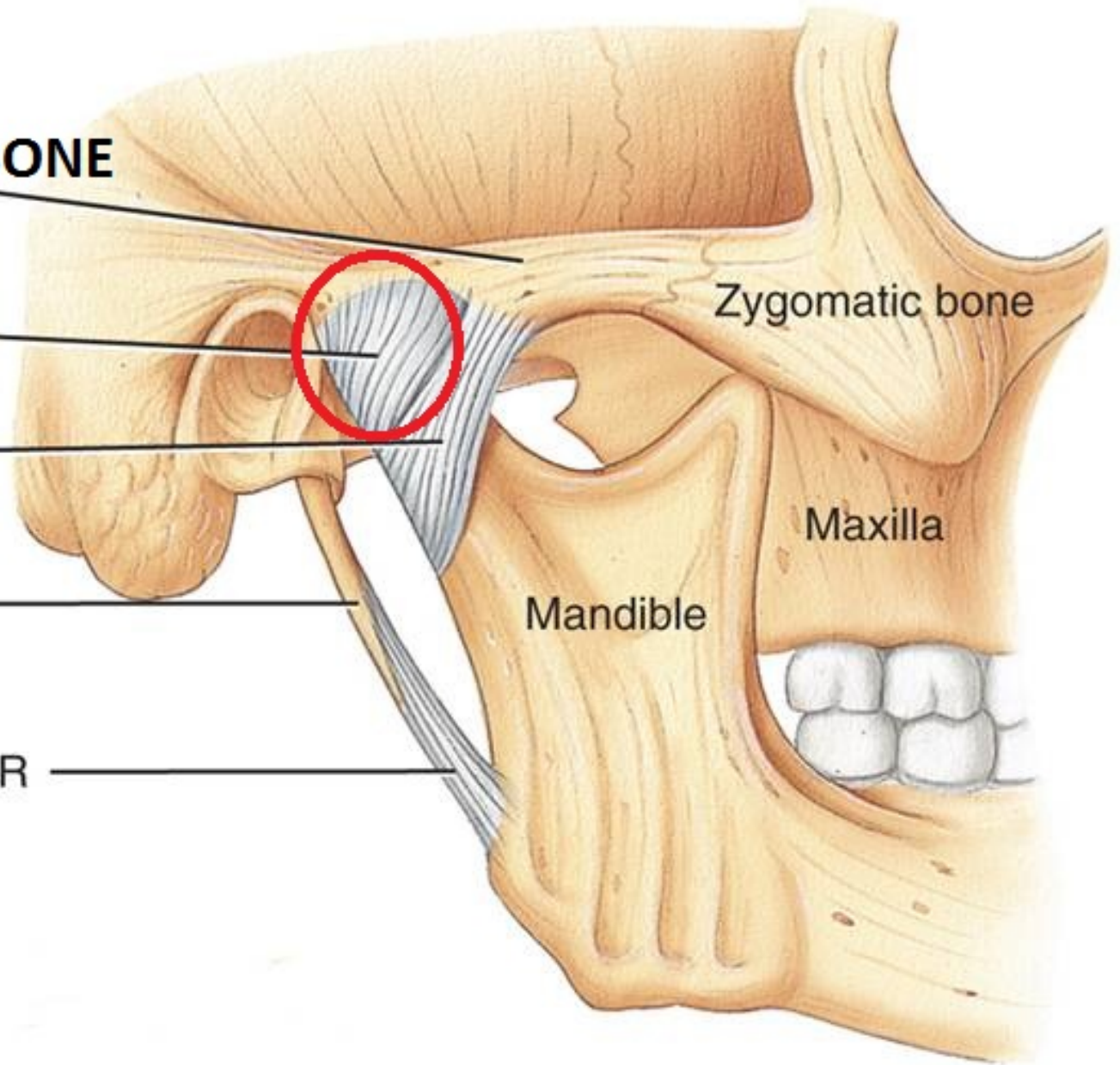
STYLOMANDIBULAR
LIGAMENT

Zygomatic bone

Maxilla

Mandible

(a) Right lateral view



C- Sphenomandibular Ligament;

originates on the spine of the sphenoid bone and inserts on the anterior-superior of the mandibular foramen (lingula). The mandibular foramen is found on the internal surface of the ramus of the mandible

- **5-Articular discs**:-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.

- **Muscles of mastication:-**

- 1-masseter(superficial and deep)
- 2-temporalis
- 3-medial pterygoid
- 4-lateral pterygoid(superior and inferior)

- **Basic Mandibular Movements**

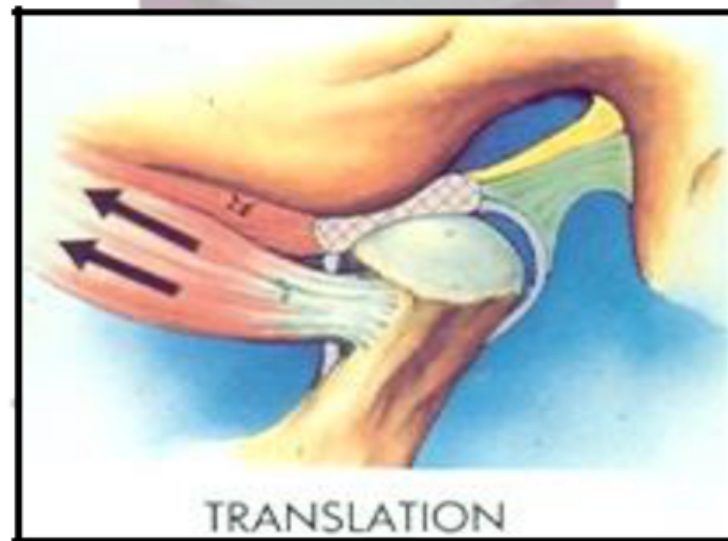
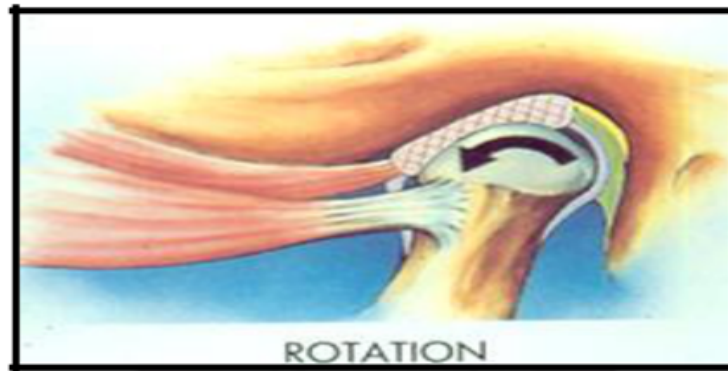
- **1-Opening and Closing:-**

From a position of centric relation, pure hinge movements are possible in opening and closing. In a hinge movement, the condyles rotate within the glenoid fossa.

- Opening and closing movements, where the measured distance between maxillary and mandibular incisors is between 20-25mm and is called rotation ,more than 25mm, result in combined rotation and translation of the condyles.
- (Rotational movement=hinge movement)
- Translation occurs whenever a condyle leaves the glenoid fossa

• **2-Protrusion and Retrusion**

- Protrusion is when the mandible moves forward and both condyles leave their respective fossae and move down their eminences.
- The opposite process is called Retrusion.
- Protrusion and retrusion are translatory movement.



cden.tu.edu.iq

- **3-Lateral movement (right and left direction)**
- **a-the side to which the mandible is moving is called the working side**
- **b-the side that is opposite to the working side is called balancing or non working side.**

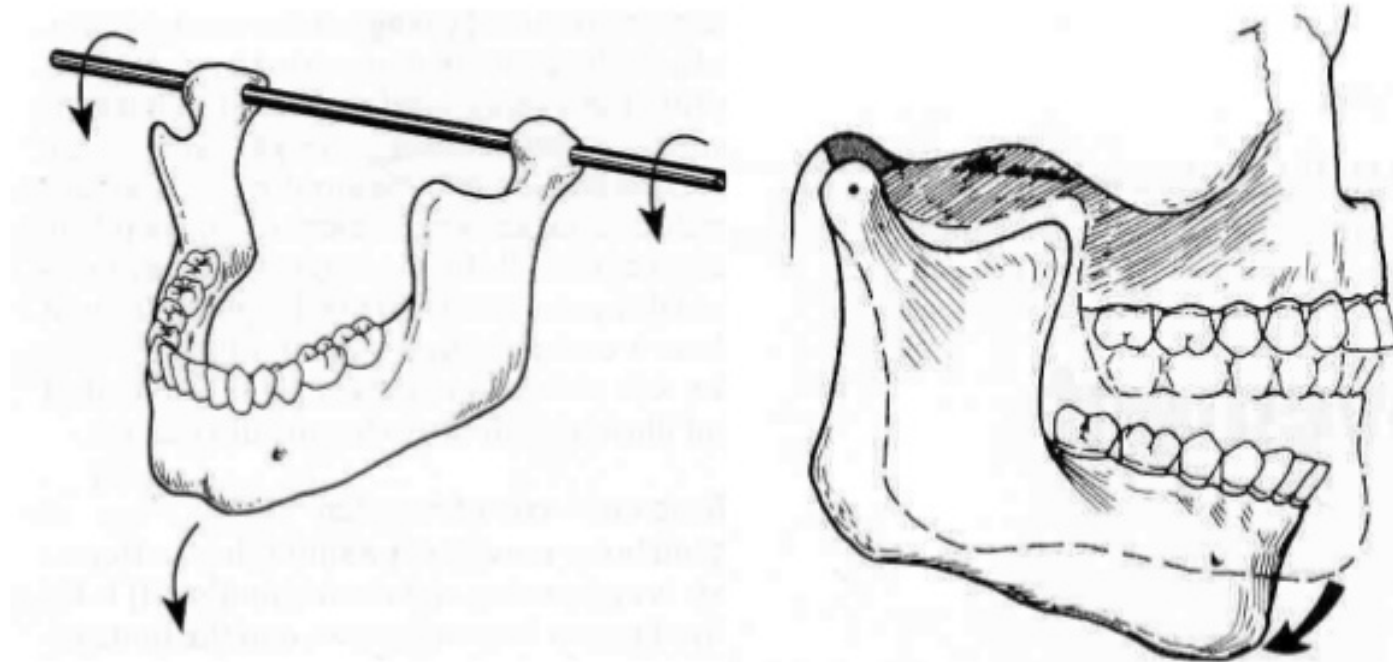
- **TYPES OF MANDIBULAR MOVEMENT**

a-ROTATIONAL:- when an opening of 20-25mm measured at the central incisors.

- 1-Horizontal axis of rotation(HINGE AXIS)
- Hinge axis:-defined as an imaginary line passing through the two mandibular condyles around which the mandible rotates without translatory movement.
- This line Stable , recordable, reproducible and repeatable

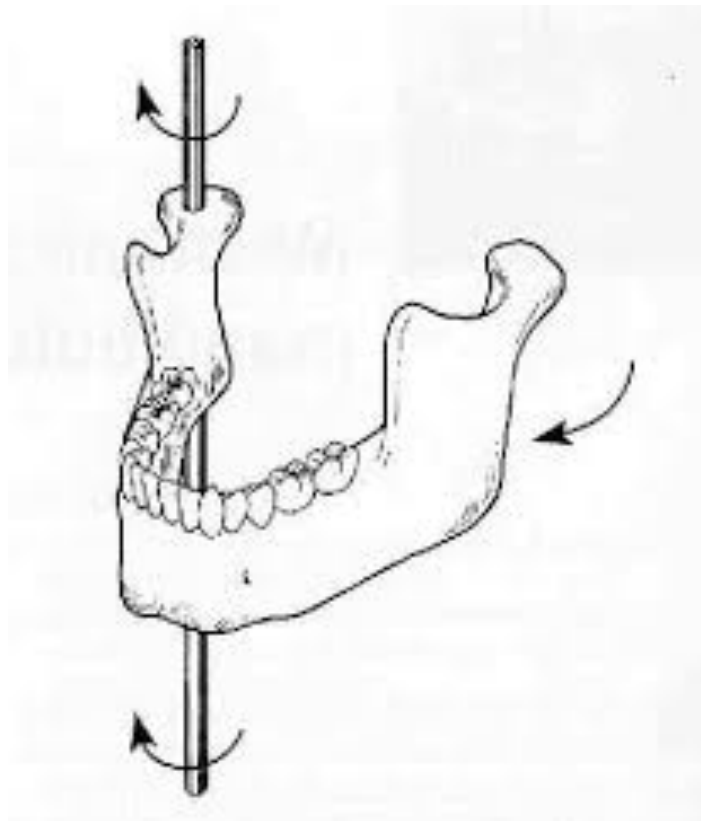
Rotational Movement

Oussama SANDID- Ibrahim Y ALHUSSAIN- Mohamad ABOUNASER



Around the horizontal axis (hinge axis)

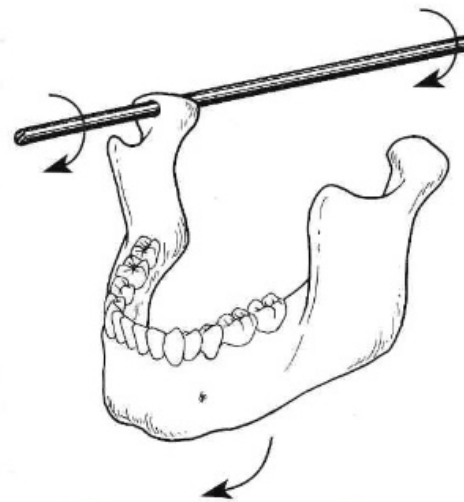
- 2-AROUND VERTICAL AXIS(FRONTAL)



- 3-AROUND SAGITTAL AXIS

Rotational Movement

Oussama SANDID- Ibrahim Y ALHUSSAIN- Mohamad ABOULNASER

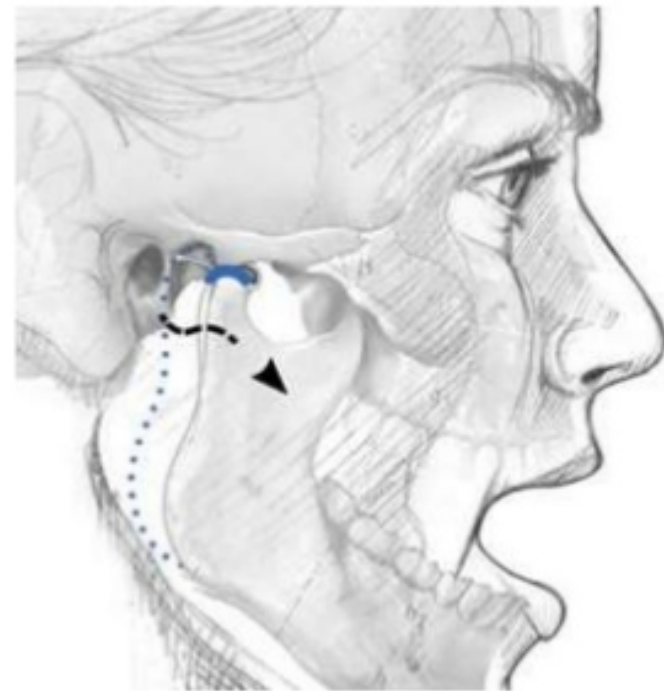
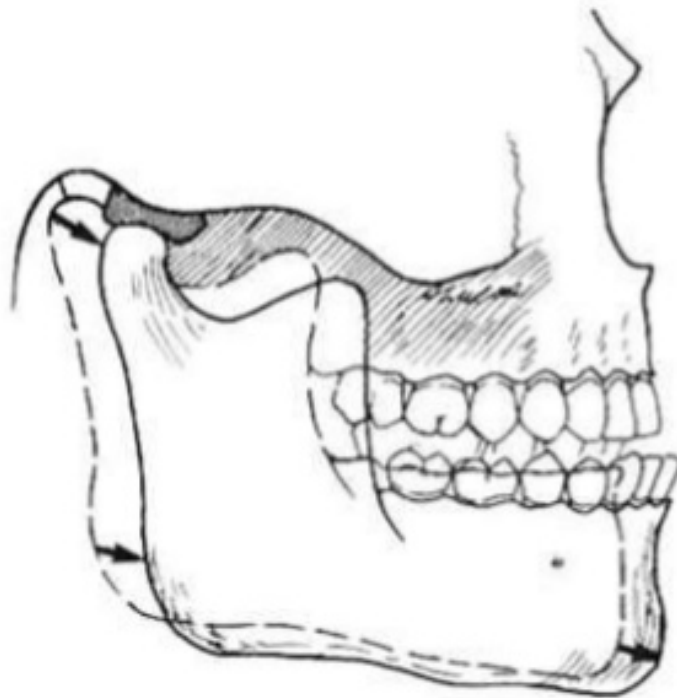


Around the sagittal axis

- b-TRANSLATIONAL MOVEMENT:-if the opening of the mandible continues beyond 20-25mm then translation of the mandible occurs. The condyle and articular disc leave glenoid fossa anteriorly

Translational movement

Oussama SANDID- Ibrahim Y ALHUSSAIN- Mohamad ABOULNASER

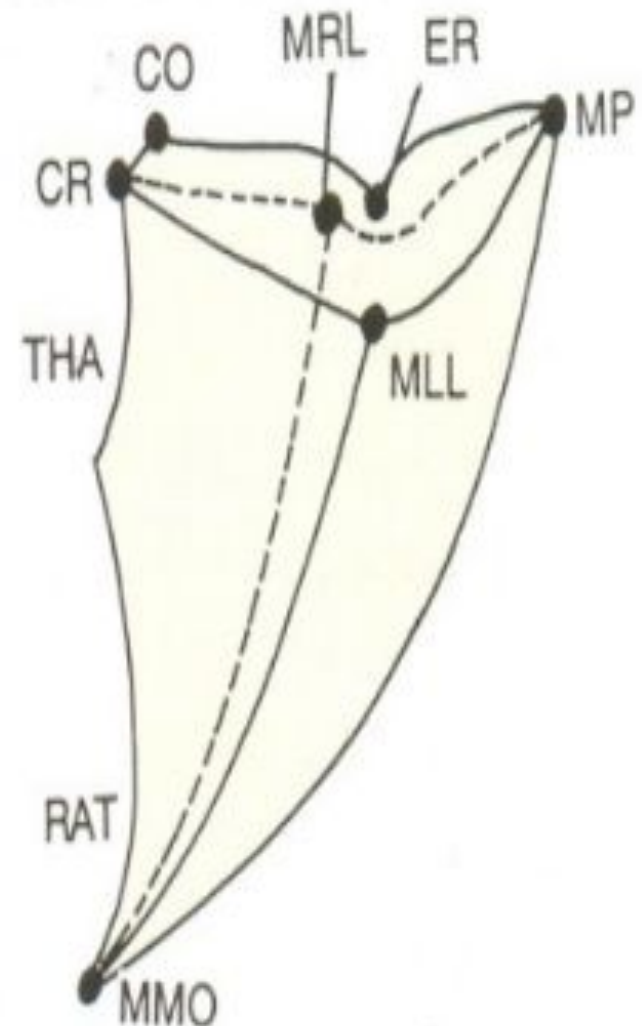


- **ENVELOPE OF MOTION (Posslet's motion)**

- Dr posselt's in 1952 first described a 3Dimensions concept of mandibular movements
- It was a combination of border movements in all 3 planes:-
 - a-Sagittal
 - b-Horizontal
 - c-frontal

ENVELOPE OF MOTION:

- When we combine the border movements of all the three planes, we get a three-dimensional space within which mandibular movement is possible.
- This three dimensional limiting space is called as “Envelope of motion” which was first described by *Posselt* in 1952.

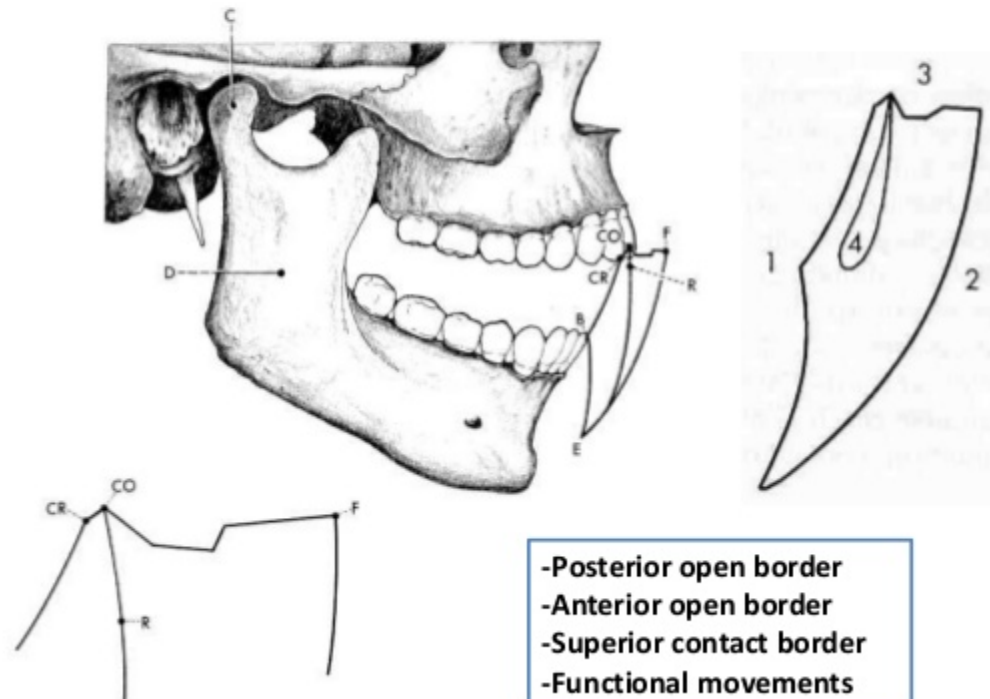


- **with 3 reference positions**
 -
- **1- Centric relation (CR)**
 -
- **2- Maximum inter cuspal position (MIP):-this is a position in which the maxillary and mandibular teeth make maximum surface contact with each other. The mandible is elevated as superiorly as possible in the sagittal plane.**

- 3- Resting position (Postural position-PP):- is the habitual position of the mandible when the patient is resting comfortably in the upright position and the condyles are in a neutral unstrained position in the glenoid fossa.
- In this position, the teeth are apart and there is a wedge space between the teeth. This space is called the (inter occlusal space) and is usually 2-3mm and also called (physiological rest position)
- The superior portion of the envelope is determined by the tooth contact
- The other borders are primarily determined by TMJ ANATOMY AND LIGAMENT

Sagittal Plane Border Movement

Oussama SANDID- Ibrahim Y ALHUSSAIN- Mohamad ABOULNASER





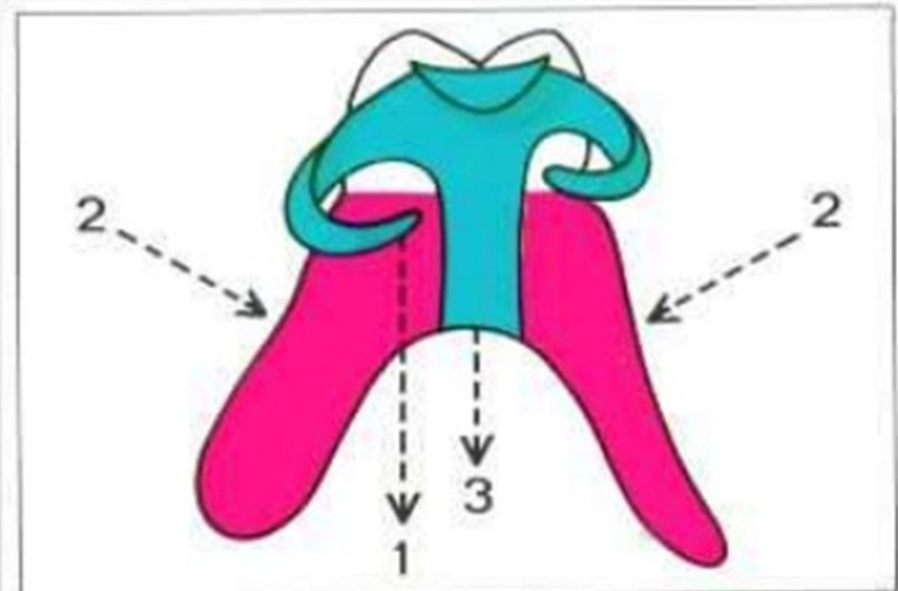
DIRECT RETAINERS

Retention is the ability of a removable partial denture to resist dislodging forces during function.

Bracing: it is the resistance to horizontal components of masticatory force

Types of retention in a removable partial denture

- Primary retention.
 1. By clasps
- Secondary retention.
 2. Acting through polished surface of the denture.
 3. Tissue coverage.



Direct retainer: is a unit of a removable partial denture that engages an abutment tooth in such a manner to resist displacement of the prosthesis away from basal seat tissues

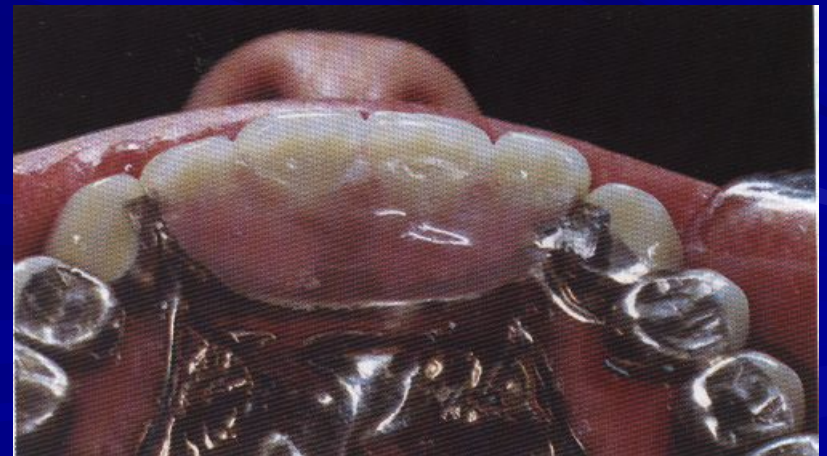


Intracoronal retainers (precision attachments)
are mechanical devices set into the casting of a full crown.

Intracoronal



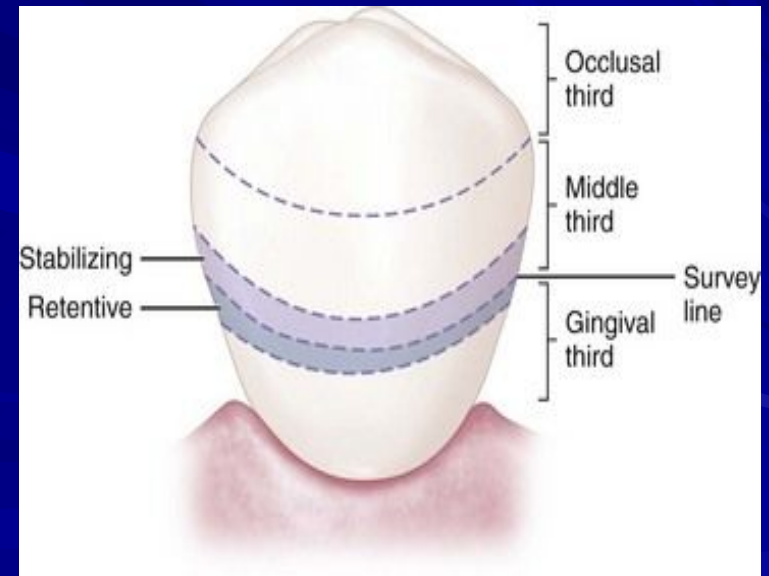
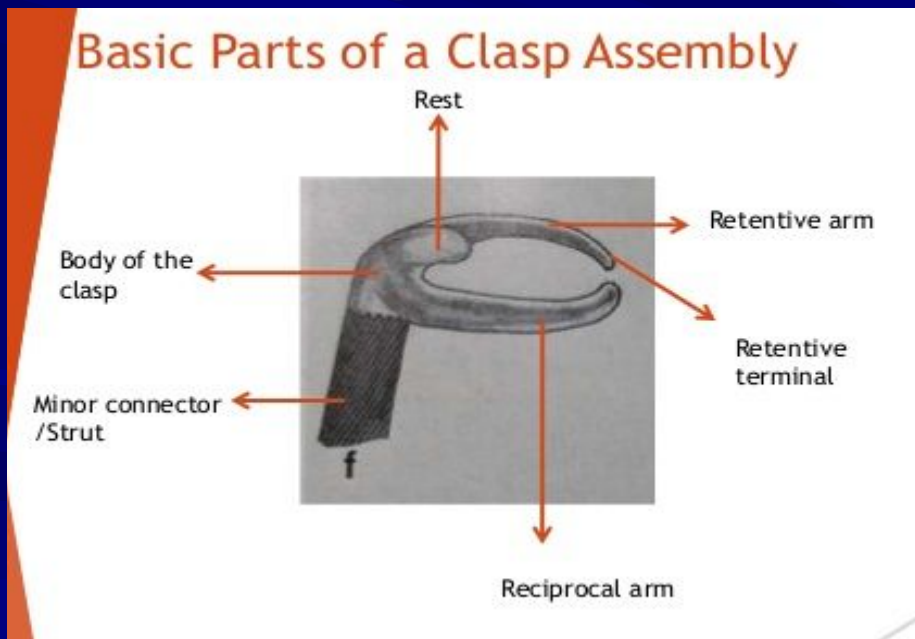
- Proposed by Dr Herman E S Chayes in 1906.
- Cast or attached within the contours of natural teeth(abutment).
- Keyway and key.....Opposing vertical walls → provides retention.
- Retention is achieved by → frictional resistance.



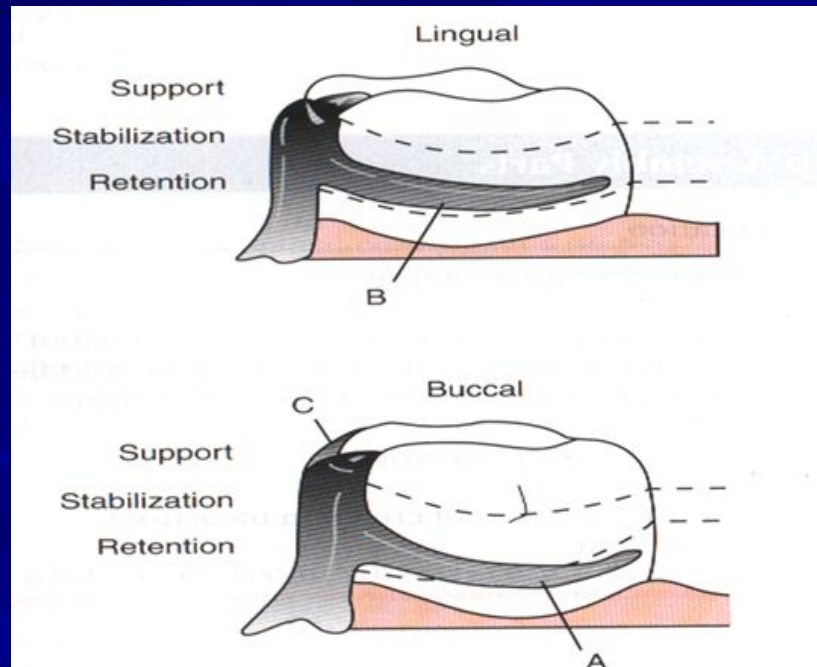
Extracoronary retainers engage an external surface of an abutment in a natural undercut or in a prepared depression

Clasp: is that part of a removable dental prosthesis that acts as a direct retainer and/or stabilizer for a prosthesis by partially encompassing or contacting an abutment tooth.

- components of the clasp assembly include: **retentive arm** , **reciprocal arm**, **rest**, and **minor connector**



Clasp retention is based on the resistance to deformation of the metal. For a clasp to be retentive, it must be placed in an undercut area of the tooth where it is forced to deform upon application of a vertical dislodging force



Extracoronary retainers

Suprabulge clasp: a removable partial denture retentive clasp that approaches the retentive undercut from an .occlusal or suprabulge direction

Infrabulge clasp: a removable partial denture retentive clasp that approaches the retentive undercut from a .cervical or infrabulge direction



Basic principle of clasp design

All clasps must be designed so that they satisfy the following six basic requirements:

- 1.Retention
- 2.Support
- 3.Stability
- 4.Reciprocation
- 5.Encirclement
- 6.Passivity

Relative uniformity of retention:

1. Retention on all principal abutments should be as **equal as possible**.
2. Retentive clasp arms should be located so that they lie in the **same approx. Degree of undercut** on each abutment tooth.
3. Retentive clasp positioning should also be **same on the contralateral side of arch.(atleast for one teeth)**.

Retention is provided by the retentive arm which prevents the partial denture from displacement away from the .tissues toward the occlusal

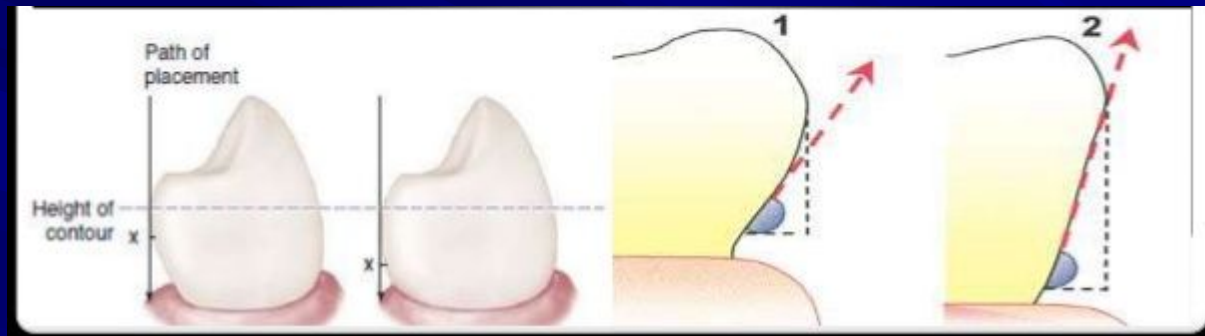
While the partial denture is seated the retentive tip must be **passive**. However, it should touch the tooth in the undercut .area

Factors that determine the amount of retention provided by a particular clasp

Tooth factor -1

.The size of the angle of the cervical convergence □

How far is the clasp terminal is placed in angle of cervical convergence □



flexibility of the clasp arm .2

.The length of the clasp arm.1

.The diameter of the clasp arm.2

.The cross-sectional form.3

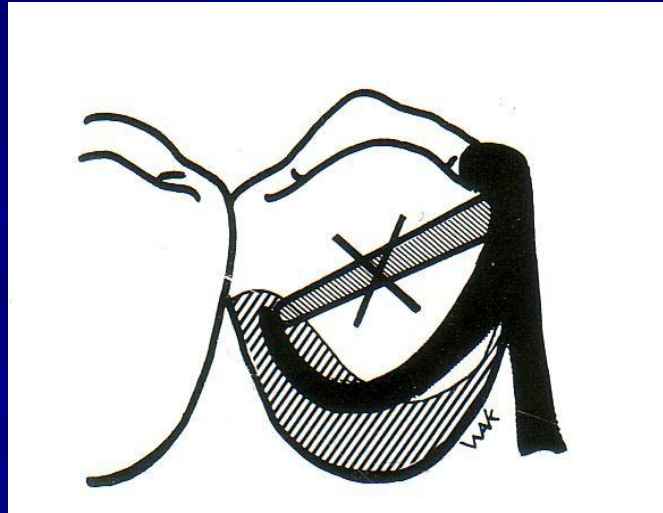
.The type of metal used.4

length of clasp arm .1

The length is measured from point of origin to the terminal end. The longer the clasp arm the more flexible it will be. (flexibility directly proportion to the cube of the length)

:Diameter of clasp arm.2

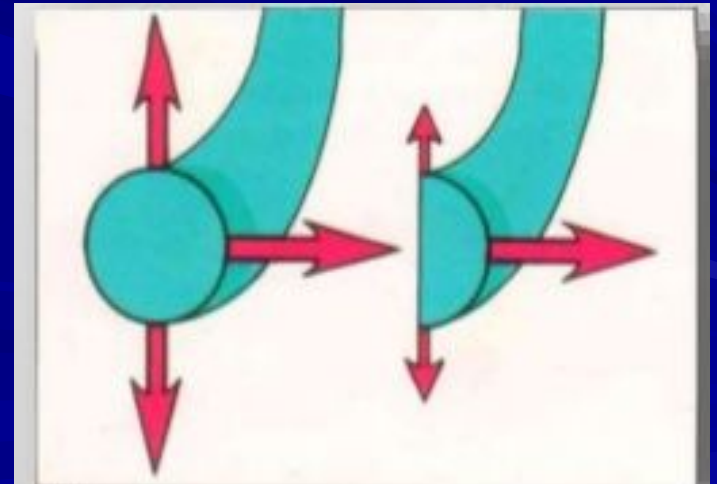
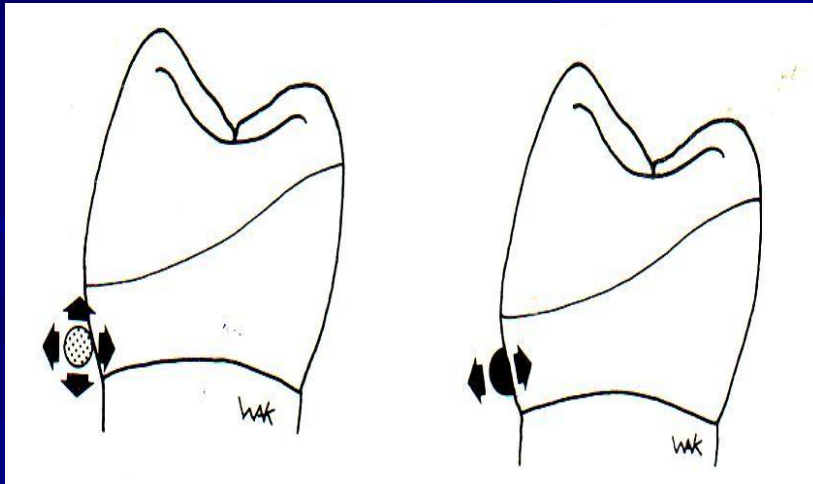
The greater average diameter of the clasp arm the less flexibility it will be. (flexibility inversely proportion to the diameter of the clasp)



:Cross sectional form of the clasp arm .3

Flexibility may exist in any form (round, half round .and other)

The cross sectional form affects flexibility. A round clasp has greater flexibility than a half-round clasp with the same diameter. It also has the ability to flex in all plans, whereas a half round clasp .normally flexes in only a single plane





3

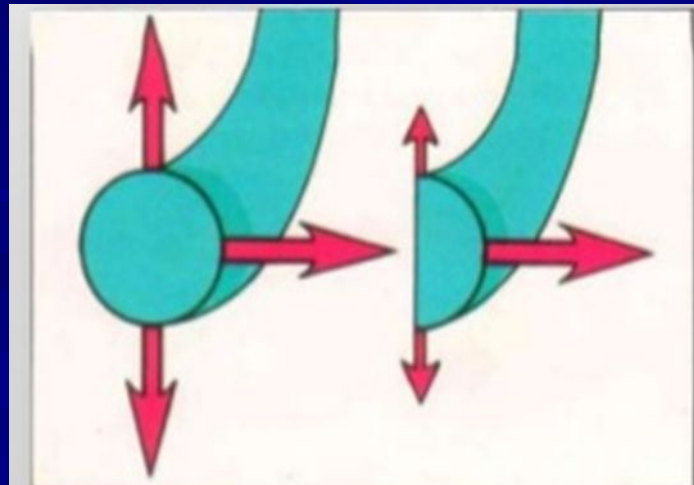
4

○ Material used for construction:

- Gold alloy → greater flexibility than chrome alloys ,
- Disadvantage of cast gold alloys → bulk of the prosthesis → costly.
- Chrome alloys have a **higher modulus of elasticity** & therefore **less flexibility**.
- So in **less undercut areas** **CoCr alloy** can be used but in cases of deep undercut wrought metal can be used.

Therefore a **smaller cross-sectional form** of the clasp and **less depth of retentive undercut** must be used when **chrome alloy** is the metal selected for the framework of the partial denture

Because of the internal structure of wrought wire, it has greater ability to flex than cast alloy. To obtain equal retention, therefore, **a greater depth of undercut is required for a wrought wire clasp than for a cast clasp**



2

Support



- *“Support is the quality of a clasp assembly that resists displacement of a prosthesis in an apical direction.”*
- Provided by occlusal rest.
 1. A **properly prepared rest seat** and corresponding rest serve to resist displacement of the prosthesis toward the supporting teeth and soft tissues, thereby ensuring that the clasp assembly maintains its intended relation to the abutment, and
 2. Transmit functional forces parallel to the long axes of the abutments.

stabilization or bracing -3

- *"Stability is the quality of a clasp assembly that resists displacement of a prosthesis in a horizontal direction."*
- *It helps the denture be steady **constant firm and resist** displacement due to function stresses and **also prevent change in position of the denture.***
- *It is provided by :-*
 1. Reciprocal element.
 2. The shoulder(s) of a cast circumferential retentive clasp.
 3. Vertically oriented minor connectors.



-4

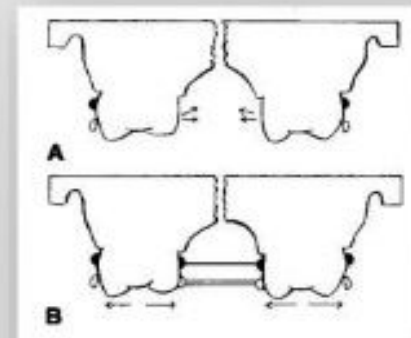
Reciprocation

- *“Reciprocation is the quality of a clasp assembly that counteracts lateral displacement of an abutment when the retentive clasp terminus passes over the height of contour.”*
- As the retentive arm passes over the height of contour it flexes creating lateral forces → damage to the tooth.
- The reciprocal element may be a
 1. reciprocal arm of clasp
 2. Lingual plating,
 3. Combination of mesial and distal minor connectors.



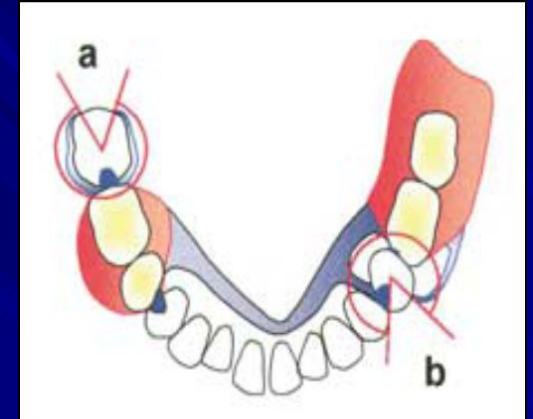
Points to be remembered while providing reciprocation

1. To optimize reciprocation, the axial **surface of an abutment** should be prepared **parallel to the path of insertion** and removal.
2. It should be placed above the height of contour.
3. To provide true reciprocation, the **reciprocal clasp arm must be in contact during the entire period of retentive clasp deformation.**

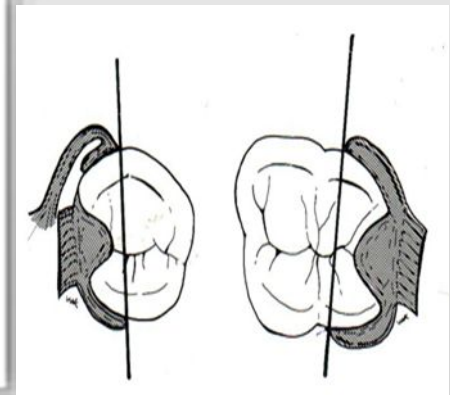
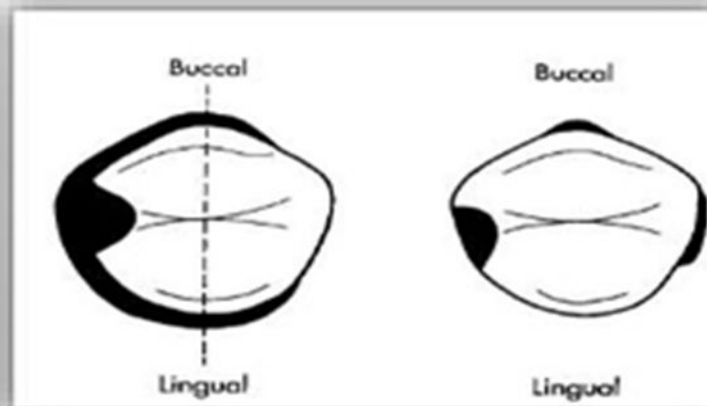


encirclement -5

Any clasp assembly must satisfy the basic principle of clasp design, which is that more than 180 degrees in the greatest circumference of the tooth crown referred to as the *principle of encirclement*. The engagement can be in the form of continuous contact, such as in a circumferential clasp, or discontinuous contact, such as in the use of a bar clasp.



- The engagement can be in the form of continuous contact, such as circumferential clasp, or discontinuous contact, such as Bar clasp.
- Both provide tooth contact in at least 3 areas encircling the tooth-



-6

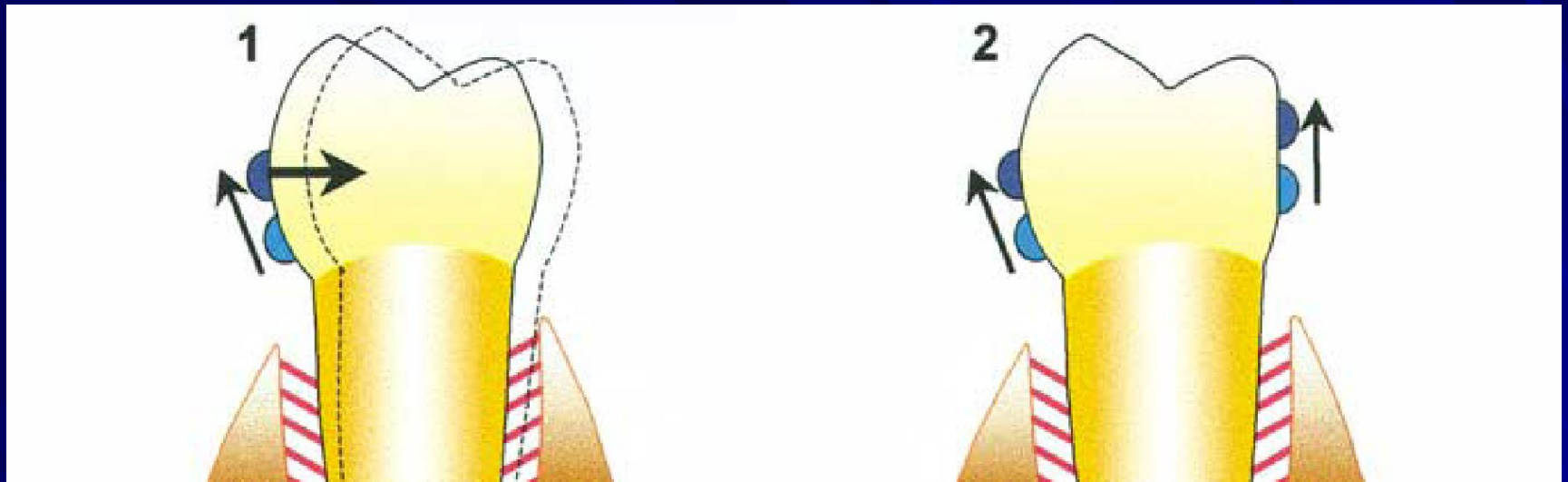
Passivity.

- *“Passivity is the quality of a clasp assembly that prevents the transmission of adverse forces to the associated abutment when the prosthesis is completely seated.”*
- When fully seated → it should be passive.
- Should be activated only when dislodging forces are applied.

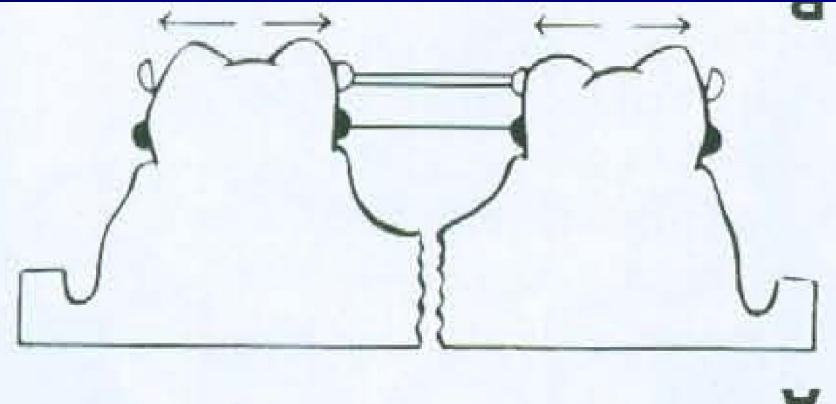
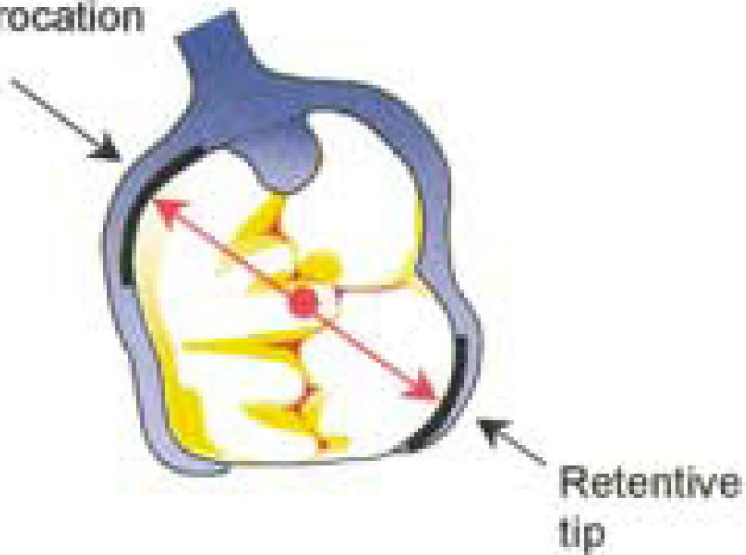
In addition to encirclement, other basic principles of clasp design are as follows

The occlusal rest must be designed to prevent the -1 movement of the clasp arms toward the cervical

Each retentive terminal should be opposed by reciprocal -2 component capable of resisting any transient pressures .exerted by the retentive arm during placement and removal



Reciprocation
area



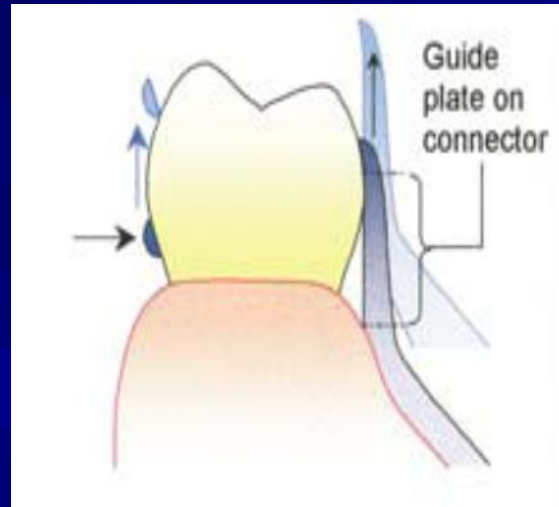
***Stabilizing and reciprocal
components must be rigidly
connected bilaterally
(cross-arch)***

The amount of retention should always be the minimum-3 necessary to resist reasonable dislodging forces

Clasp retainers on abutment teeth adjacent to distal .4 extension bases should be designed so that they will avoid direct transmission of tipping and rotational forces to the .abutment

The path of escapement for each retentive clasp terminal .5 must be other than parallel to the path of removal for the prosthesis to require clasp engagement with the resistance to .deformation this is retention

Unless guiding planes will positively control the path of removal and .6 stabilize abutments against rotational movements, retentive clasps should be bilaterally opposed, i.e., buccal retention on one side of the arch should be opposed by buccal retention on the other, or lingual on one side opposed by lingual on the other



Reciprocal elements of the clasp assembly should be located at the .7 junction of the gingival and middle third (or above height of contour) of the crown of abutment teeth. The terminal end of the retentive .arm is optimally placed in the gingival third of the crown

retentive **Passivity**. A clasp in place should be completely passive. The .8 function is activated only when dialing forces are applied to the partial denture, One of the main causes of pain or tenderness In an abutment tooth following insertion of a partial denture is incomplete seating of the clasp. If the clasp is not seated, the retentive terminal cannot reach the depth of undercut it was planned to reach and therefore always applies force to the tooth producing .pain

A retentive occlusally-approaching clasp should run from the side of .9 the tooth with the least undercut to the side with the greatest undercut

Occlusally-approaching retentive clasps should have the terminal .10 .third of the retentive arm entering the undercut

THANK YOU

Types of clasp

د.حسين الديوه جي

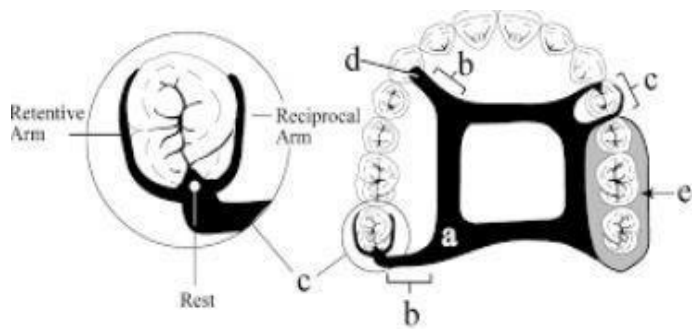
- Akers clasp (supra bulge)
- Bar or roach clasp (infra bulge)

Akers clasp (supra bulge)

This include

1- Circumferential clasp:-

This clasp encircles a tooth more than 180, it is originate at minor connector usually near the occlusal rest and approach the undercut from an occlusal direction.



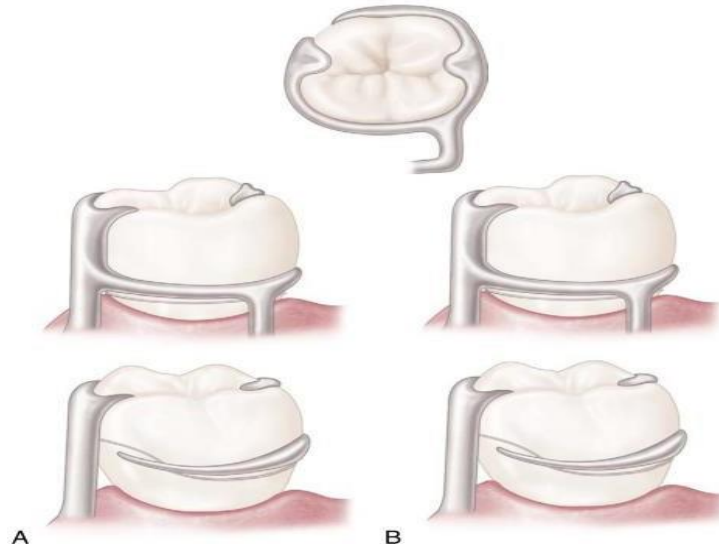
Advantages of circumferential clasp:

- 1- Easiest clasp to make and repair
- 2- Less food retention
- 3- Derive excellent support, stability and retention.
- 4- Best when applied in a tooth supported removable partial denture.

2-Ring clasp:

It encircles nearly all of a tooth, used in case with lingual inclination of molar abutment tooth.

- a- Clasp originates on mesiobuccal surface and encircles tooth to engage mesiolingual undercut.
- b- Clasp originates on mesiolingual surface and encircles tooth to engage mesiobuccal undercut.



Disadvantages

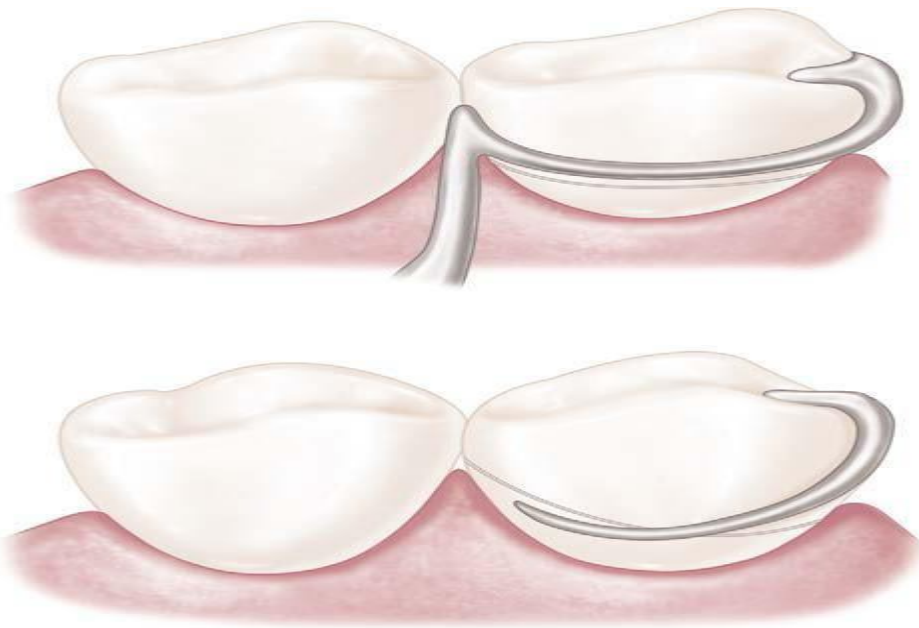
- Difficult to adjust or repair
- Increased tooth surface coverage.

3- Back action clasp:

It is modification of the ring clasp, the minor connector is attached to the end of the clasp arm end and the occlusal rest is left unsupported.

Disadvantages:

Lack of support to the occlusal rest so reduces its function.

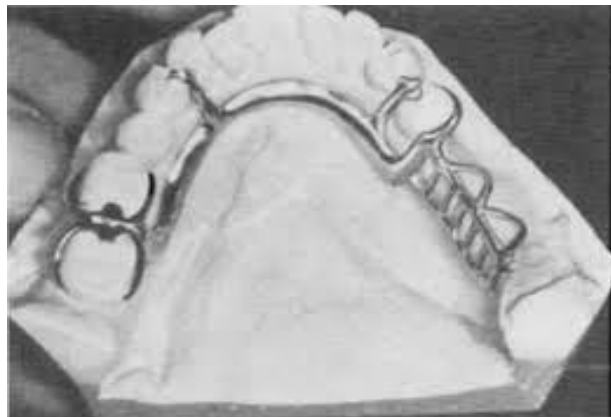
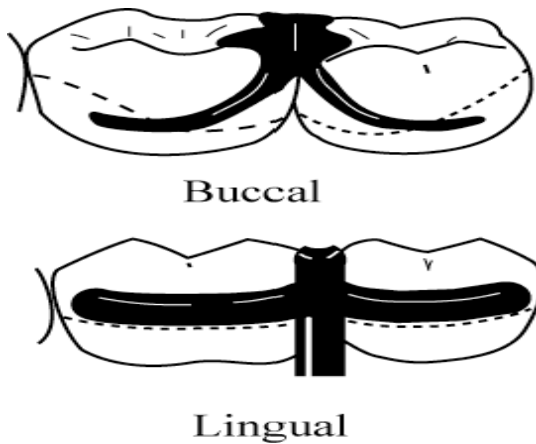


4- Embrasure clasp (butterfly clasp)

- Its combination of two circlet clasp joined at the body.
- It is used on the side of the arch where there is no edentulous space.
- The clasp crosses the marginal ridge of two teeth to form the double occlusal rest.

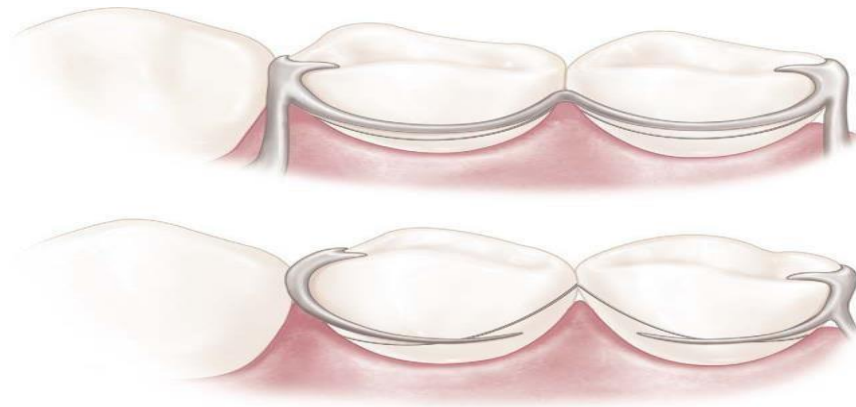
Indication

Kennedy Cl II and Cl III without modification, also Cl IV.



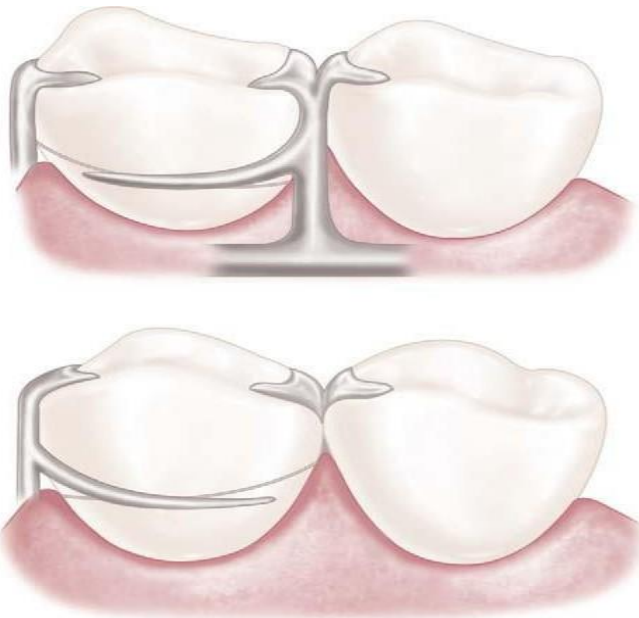
5- Multiple clasp:

It is combination of two circlet clasps joined at the terminal end of the reciprocal arms.



6- Half and half clasp:

It has a retentive arm arising from one direction and reciprocal arm from another. Two minor connector are needed for this type of clasp (the first minor connector attaches the occlusal rest and retentive arm to the major connector, the second minor connector connect the reciprocal arm and the occlusal rest).



7- Reverse action clasp (hairpin or fish hook clasp)

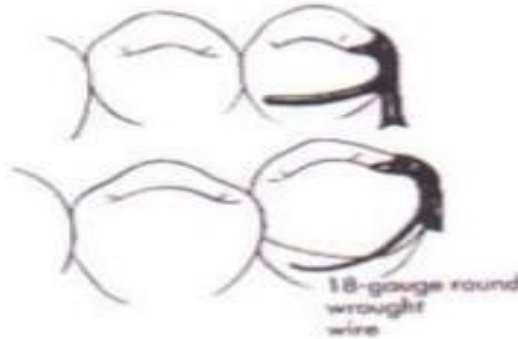
- It is type of circlet clasp, which after crossing the facial surface of tooth loops back to engage the proximal undercut beneath the point of origin.
- It is used in conditions where the undercut is near the edentulous space.
- The upper arm is rigid and the lower arm is flexible, the upper arm should be positioned above the height of contour in such a way that it does not interfere with occlusion.
- **Disadvantages:**
 - It is poor esthetic
 - It tend to trap and accumulate food debris.



A reverse-action, or hairpin, clasp arm may be used on abutments of tooth-supported dentures when the proximal undercut lies below the point of origin of the clasp.

8- Combination clasp.

It is consist of wrought wire retentive clasp arm and reciprocal cast arm.



Indication

- It is used on an abutment tooth adjacent to distal extension base where only a mesial undercut exists on the abutment tooth.
- Used when abutment tooth is weak.

Advantages

- Flexibility
- Adjustability
- Esthetic (smaller diameter than cast clasp).

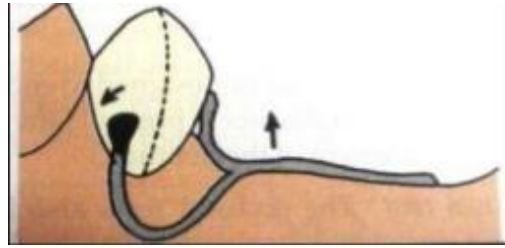
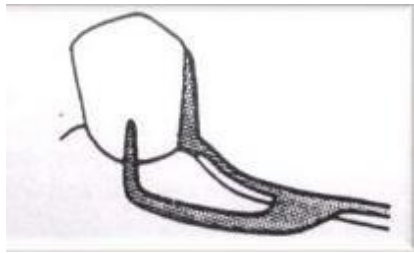
Disadvantages:

- Extra- step in fabrication
- Distortion may occur with careless handling by patient.
- It may provide less stabilization.

Bar or roach clasp (infra-bulge)

- Approach the undercut gingivally.
- The retentive arm in a bar clasp have two parts namely the gingivally approach arm and the retentive tip
- Approach arm it is minor connector that connect the retentive tip to the denture base and it should cross the gingival margin at the right angle.

- Retentive tip should end on the surface of the tooth below the undercut



Advantages of bar clasp

- It is easy to insert and difficult to remove.
- Esthetically acceptable as it covers less tooth surface.

Disadvantages:

- It tends to collect food debris
- Less stabilization so additional stabilizing units are needed.

Indications

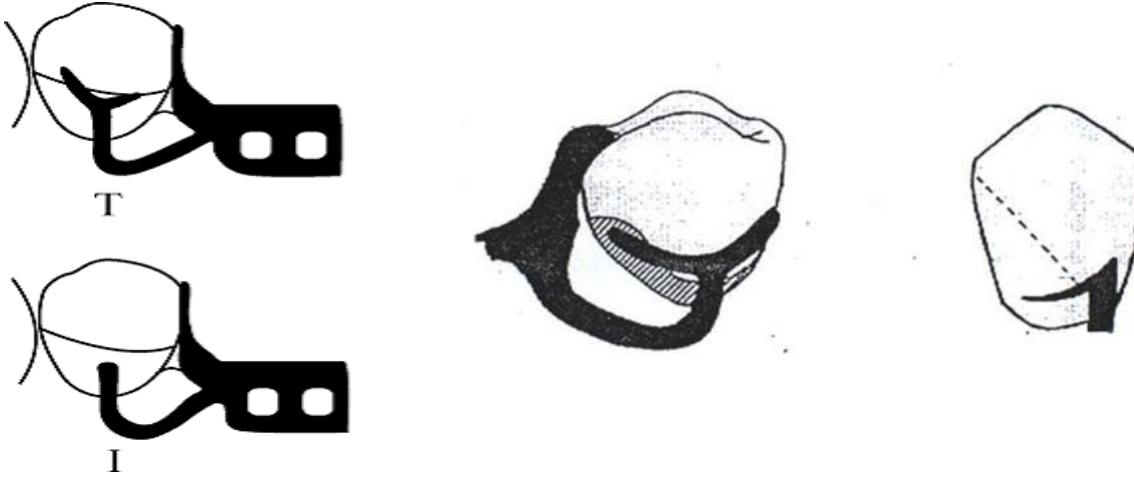
- Used on abutments in free end extension partial denture.

Design consideration of bar clasp:

- Approach arm should not impinge as it crosses the soft tissues
- Approach arm should be smooth and polished
- Approach arm should cross the gingival margin at the right angle
- Tip of the retentive terminal should always point to the occlusal surface
- The bar clasp should be placed as low as possible on the tooth.

Types of bar clasp (according to the form)

- I form
- T form
- Y form



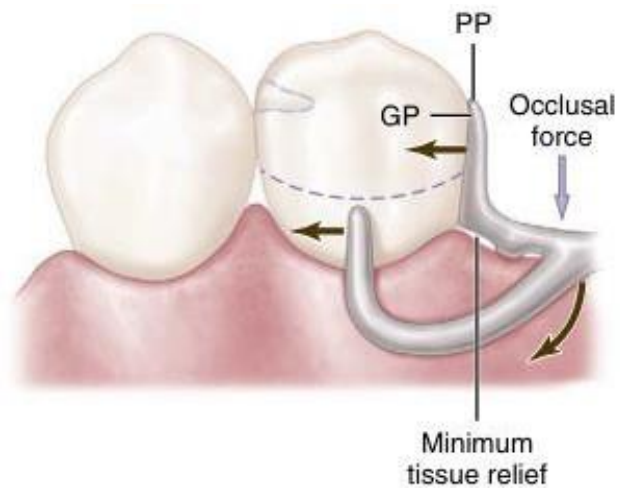
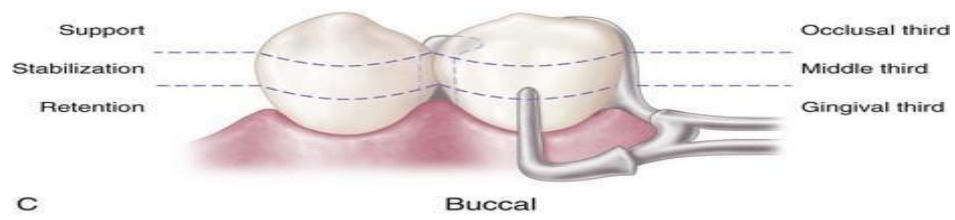
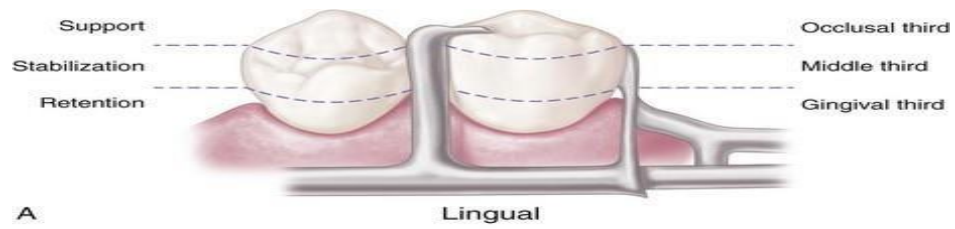
R.P.I. system (R: rest P: proximal I: I bar)

Parts of R.P.I. system:

- 1- Mesio-occlusal rest with minor connector placed into the mesiolingual embrasure.
- 2- Proximal plate of minor connector.
- 3- I bar located in the gingival third of buccal or labial surface of the abutment tooth.

Indications

- It is mostly used in free end extension partial denture.



Rest and Rest seat

د. حسين الديوه جي

- **Rest** can be defined as any unit of a partial denture that rest on a tooth surface to provide vertical support (prevent movement toward the mucosa)

- **Rest Seat** defined as that portion of the tooth have been selected and prepared to receive a rest.
- Rest seat prepared on the abutment teeth for direct retention or other teeth for indirect retention to receive the rest

Rest seat



Rest



Function of rest (purposes of rest):

- 1- The primary purpose of the rest is to provide vertical support for the partial denture.
- 2- Maintain the components in their planned position.
- 3- Maintain established occlusal relationships by preventing movement of denture.
- 4- Directs and distributes occlusal loads to abutment teeth.

Types of Rests:

- 1- Occlusal rest.
- 2- Lingual rest.
- 3- Incisal rest.

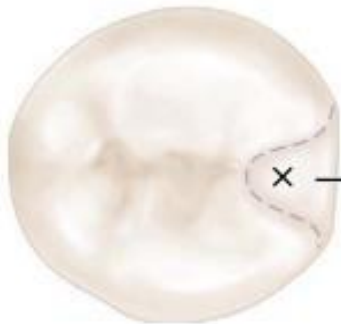
Occlusal Rest and Rest Seat:

- **Form of occlusal rest seat:**
- The outline form of occlusal rest seat should be a rounded triangular shape with the apex toward the center of occlusal surface of a tooth.
- It should be as wide as it is high, and the base of triangular shape at the marginal ridge, and should be lowered at least 2 to 2.5mm for premolars and molars.

- The floor of the occlusal rest seat should be spoon shaped or concave.
- The angle between the occlusal rest and the minor connector from which it originates should be less than 90 to permit the forces to be directed towards the long axis of the tooth and prevent slippage of the denture away from abutment tooth.

- Occlusal rest seat may be prepared on sound enamel or filling restoration or crown.

Occlusal rest seat



Deepest
part of
rest seat



Lingual rest and rest seat:

- Lingual rest is preferred to prepared on maxillary anterior teeth especially the canine more than mandibular anterior teeth due to the :
 - a. Lingual slope of the mandibular canine is usually too steep.
 - b. Less bulk of tooth (lack thickness of enamel).

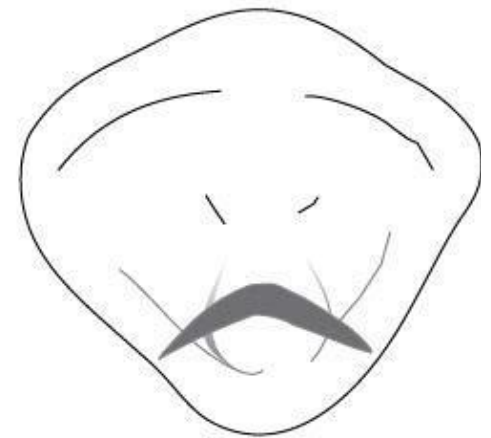
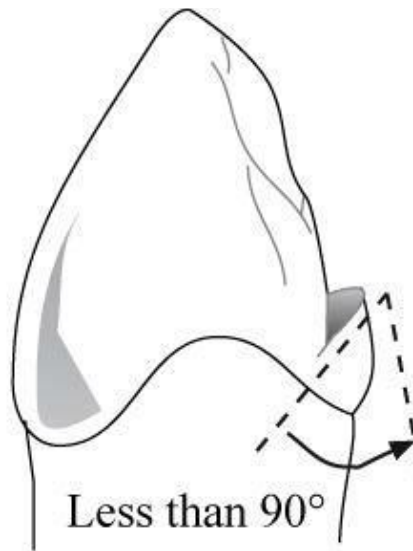
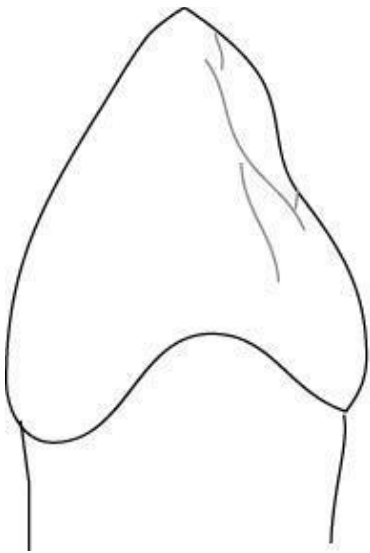
Form of lingual rest seat:

- Slightly rounded V shape is prepared on the lingual surface at the junction of the gingival and the middle one third of the tooth, the apex of the V is directed incisally and the floor of the rest seat should be toward the cingulum.

Form of lingual rest seat:



Form of lingual rest seat:



Incisal rest and rest seat:

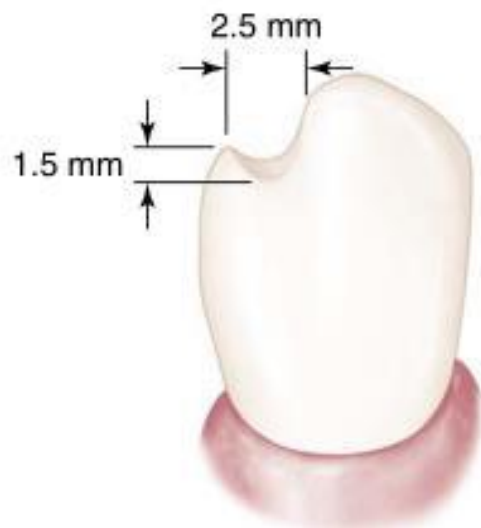
- Incisal rests are placed at the incisal angles of anterior teeth, it is more used for mandibular canine.
- **Incisal rests are usually used as auxiliary rests or indirect retainers.

Incisal rest seat



The form of incisal rest seat:

- An incisal rest seat is prepared in the form of rounded notch at the incisal angle or incisal edge, with the deepest portion of the preparation apical to incisal edge, 2.5mm wide and 1.5 mm deep.



- ***Note:* lingual rest is preferred more than incisal rest due to:**
- ❖ It is placed nearer the horizontal axis of rotation (tipping) of the abutments and therefore will have fewer tendencies to tip the tooth.
- ❖ Lingual rests are more esthetically acceptable than incisal rests.