

Types of clasp

Dr. Saraa Almallah

Types of clasp

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

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.



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- Embrasure clasp (butterfly clasp)

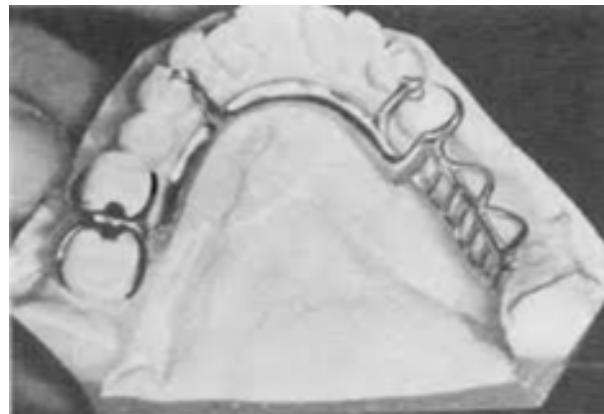
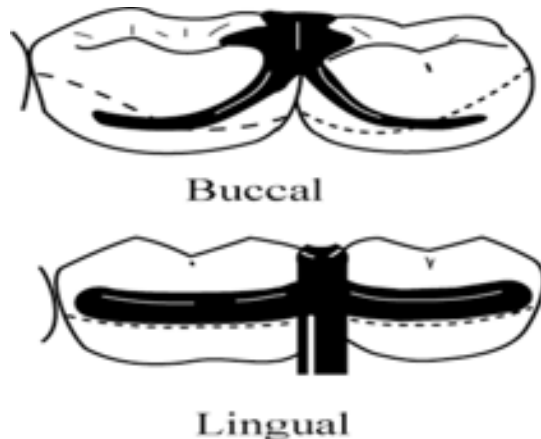
Its combination of two circlet clasp joined at the body.

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.

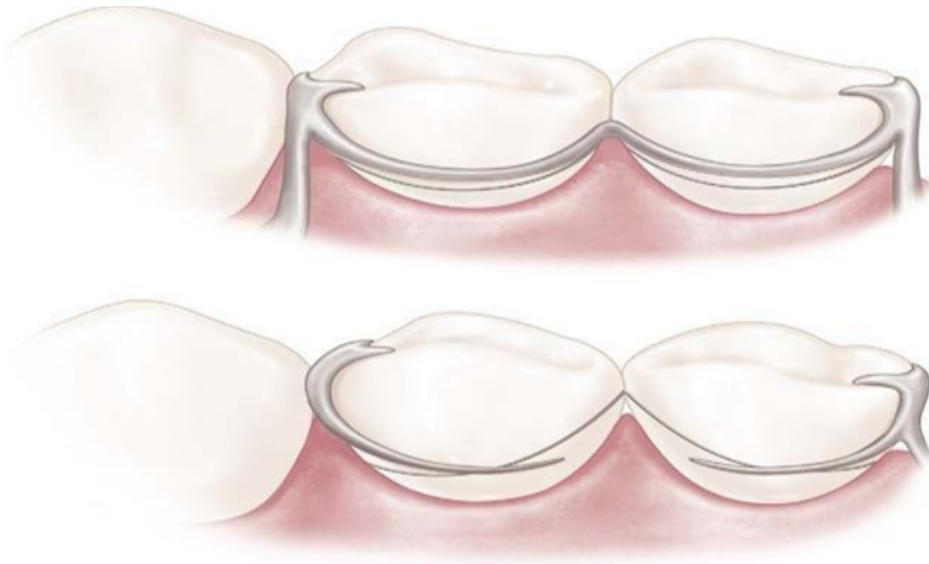
Indication

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



4- Multiple clasp

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



5- Half and half clasp

It has a retentive arm arising from one direction and reciprocal arm from another. Two minor connectors 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).



6- 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

7- 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

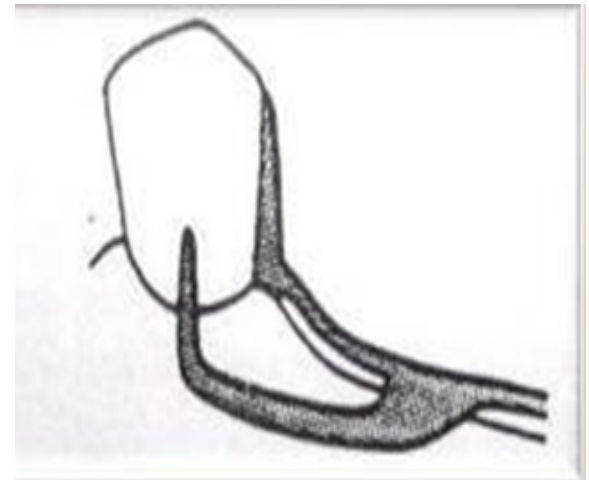
- Flexibility
- Adjustability
- Esthetic (smaller diameter than cast clasp).

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



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 unit are needed.

Indications

Used on abutments in free end extension partial denture.

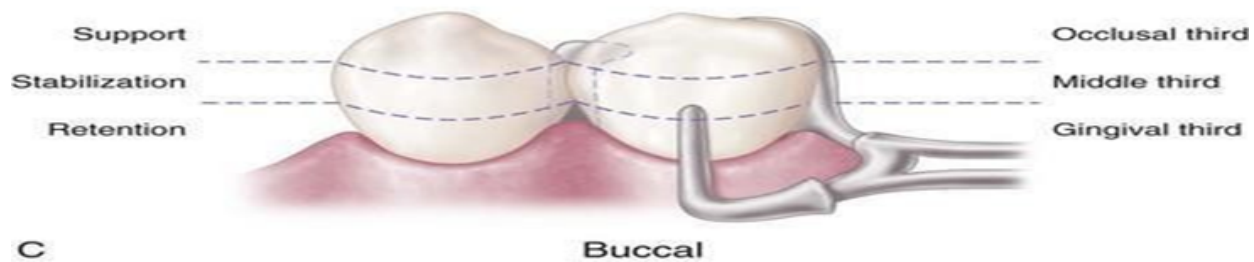
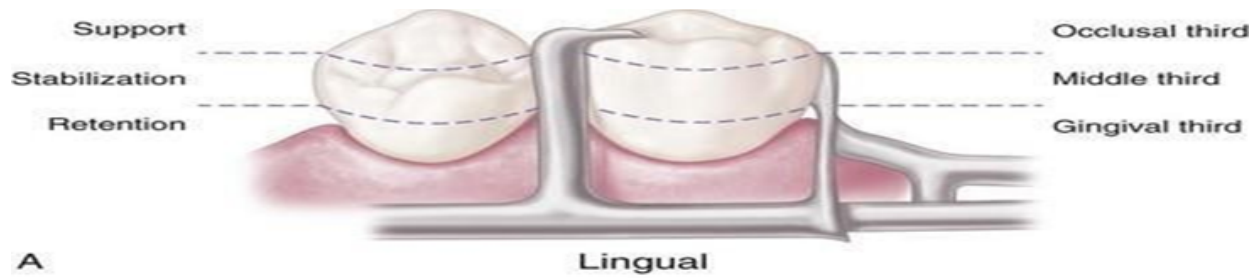
R.P.I. system (R: rest P: proximal I: I bar)

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



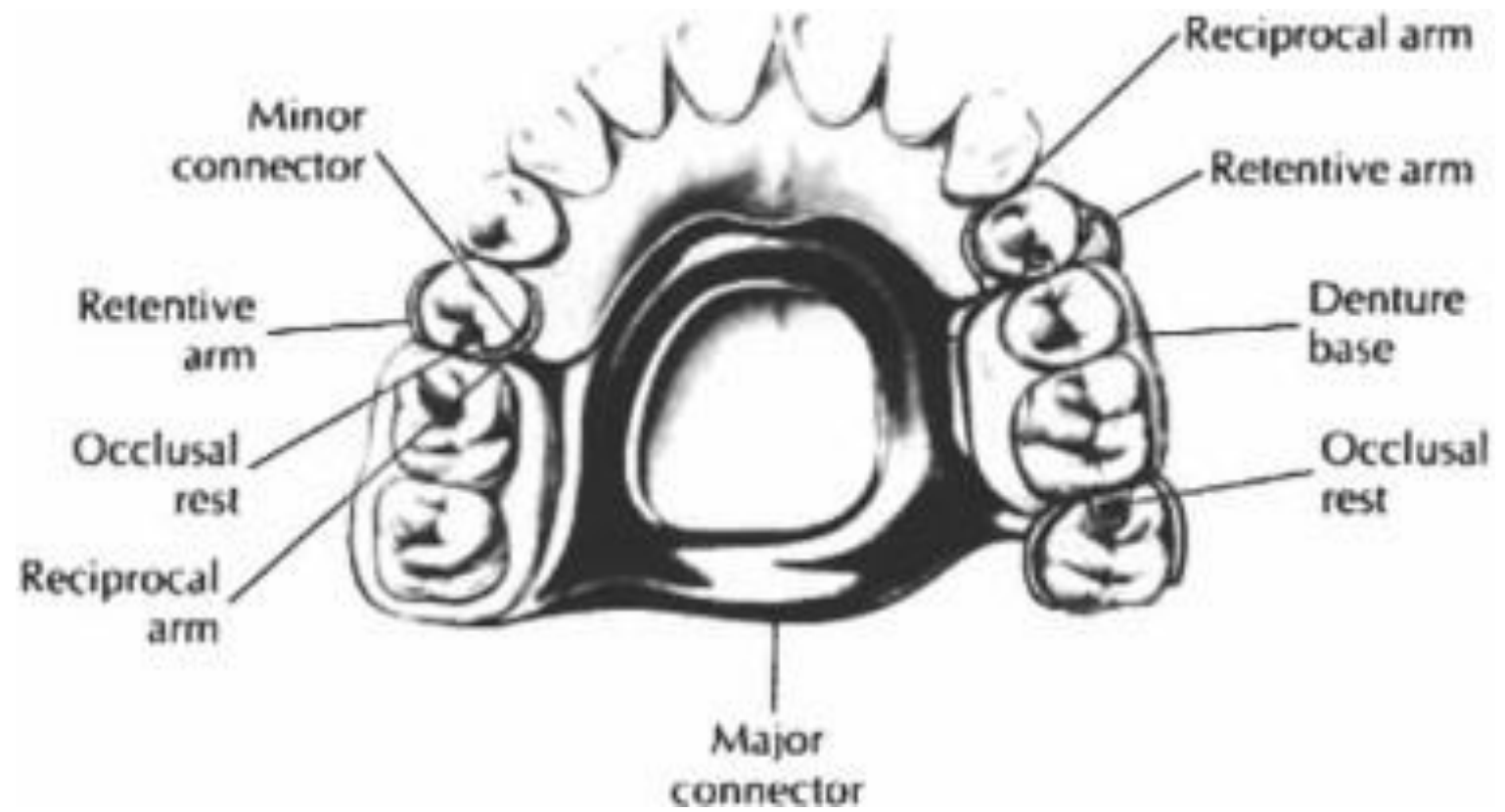
Chrome cobalt partial dentures



Dr.Hussein AlDewachi

The component parts of typical chrome-cobalt removable partial denture are:

- 1- Major connectors.
- 2- Minor connectors.
- 3- Rests.
- 4- Direct retainers.
- 5- Stabilizing or reciprocal components (as parts of a clasp assembly).
- 6- Indirect retainers in F.E.E
- 7- One or more denture base.



- When using a prosthesis that can be removed from the mouth, the prosthesis must extend *to both sides of the arch*. This enables transfer of functional forces of occlusion from the denture base to all supporting teeth and tissues within an arch for optimum stability.

- Chrome cobalt dentures are made from *cast cobalt chrome framework/ base*. They are made from type of alloy which consist of cobalt chrome (which is added to prevent corrosion).

Advantages of chrome cobalt dentures:-

- 1- Chrome cobalt dentures are more stable and retentive compared to normal acrylic dentures.
- 2- Has higher dimensional stability compared to normal acrylic dentures, which means it will change its shape easily.

- 3- Has higher thermal conductivity compared to normal acrylic dentures, which allow the patient to feel the temperature of food and beverages which they consumed.
- 4- More hygienic compared to normal acrylic dentures, this is because they are less porous and this will reduce the accumulation of food, plaque and calculus on metal surface.

- 5- Lighter in weight, they can cast thinner than acrylic dentures while maintaining its strength.

Disadvantages of chrome cobalt dentures:-

- 1- More expensive.
- 2- Some changes are difficult to do, (such as adding teeth, this depends on the design).
- 3- Problems with natural teeth such as fractured fillings will affect the fit of framework.

Steps to deliver removable partial denture

- The steps to construct dental prosthesis divided into **clinical** and **laboratory** steps:
- 1- Introduction to the patient and know the chief complain (**clinical step**).
- 2- Diagnosis and filling a case sheet with preparation and motivation the patient to the treatment (**clinical step**).

- 3- Treatment planning and suggestion of the prognosis after deciding to make removable partial denture (clinical step).
- 4- Making a study cast (for the offending arch and the opposing arch) by primary impression (clinical step).

- 5- Surveying the study cast by using the dental surveyor (laboratory step).



- 6- Suggestion of the removable partial denture design on the surveyed study cast, and determination of rests number and location (laboratory step).

- 7- Preparation of abutment teeth, reshaping, occlusal rest seat, restoration, crowning (clinical step).
- 8- Special tray fabrication using the study model (laboratory step).
- 9- Making the final impression with special tray (clinical step).



- 10- Resurveying the master cast (laboratory step).
- 11- Block out and relief the master cast (laboratory step).

Duplicating Procedure:
i. Blockout on the master cast with
Ney blockout wax (can withstand high
temperature)



Areas of relief

Relief

- Relief wax is placed in the edentulous areas
- Beneath lingual bar connectors
- Areas in contact with thin tissues





- 12- The blocked out master cast must be placed in a water bath contain piece of plaster or stone (slurry) at a maximum temperature of 38°C for 5-10 minutes before duplication, so that the cast will not etched because the water already contains calcium sulfate, and to allow the escape of any air trapped beneath the relief wax on the master cast (laboratory step).

- 13- Duplication the master cast by tertiary impression by agar impression to produce a refractory cast from investment material (laboratory step).





Making refractory cast (investment cast) - can withstand high temperature



- 14- Dipping the refractory cast in Bee's wax and drying in oven, to make the cast surface smooth and dense, and to facilitate the adhesion of wax and plastic patterns to the refractory cast (laboratory step).

- 15- Form the wax pattern on the duplicated cast according to the establish design, wax and plastic pattern (readymade) are used to form the pattern of the removable partial denture framework; these patterns are available in a variety of shape, size, and thickness (laboratory step).

Completed wax pattern



- 16- **Spruing of the wax framework**, to provide an entrance or channels to the mold space and to serve as a reservoir of metal during casting procedure, and to allow the gases to escape out of the mold cavity to avoid porosity of the framework (laboratory step).

- Sprues (ingates) have the purpose of leading the molten metal from the crucible into the mold cavity.



- For this purpose, they should be large enough to accommodate the entering molten metal and of the proper shape to lead the metal into the mold cavity as quickly as possible.

- 17- Investing the refractory cast with its wax framework in the ring and pouring of investment material in the casting ring to form a mold (laboratory step).

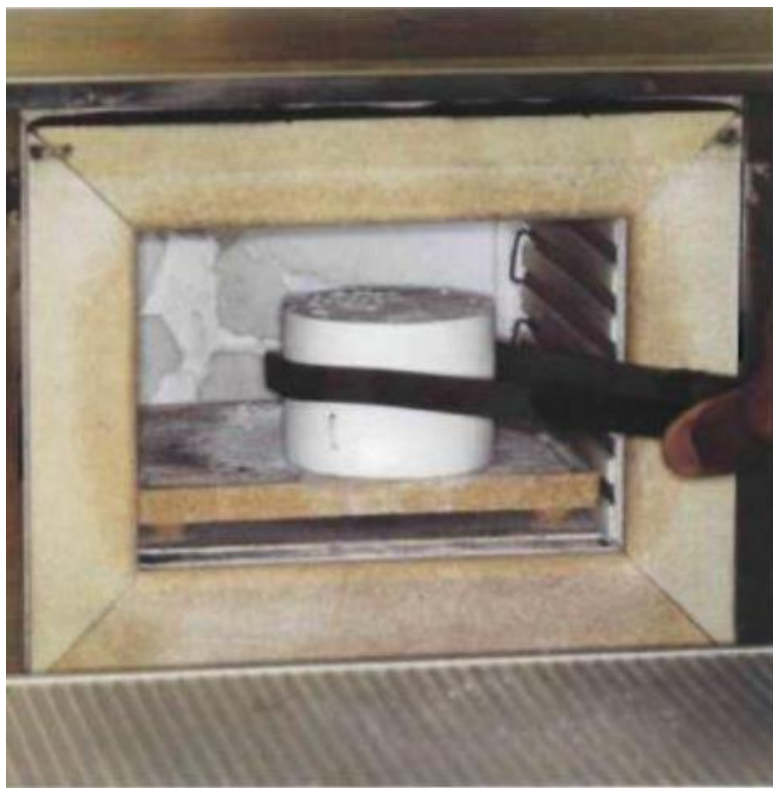
- The investment for a removable partial denture casting consists of two parts: the investment cast on which the pattern is formed,



- and the outer investment surrounding the cast and pattern. The outer investment is confined within a metal ring or silicone ring.

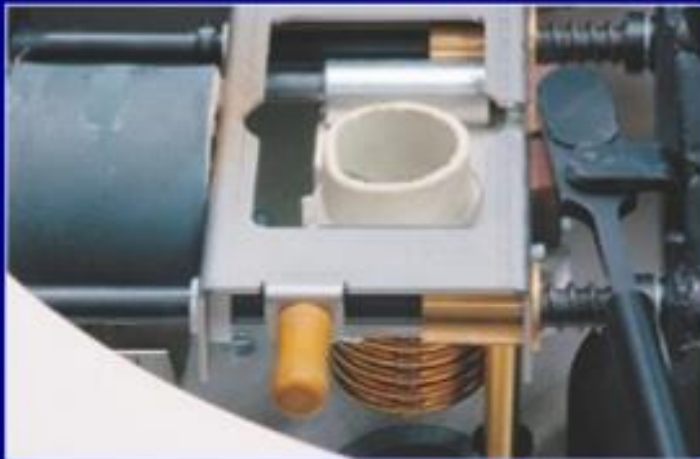


- 18- Wax elimination by burn out the refractory cast with its wax framework in high temperature furnace, to eliminate the wax pattern leaving a cavity in the mold, to drives off the moisture in the mold, to expand the mold to compensate shrinkage (contraction) of metal on cooling (laboratory step).



- 19- Melting the metal in the centrifuge, and casting the metal to occupy the space left from the wax elimination (laboratory step).
- ❖ Casting: it is a process of producing an object in a mold, heat was applied to melt the metal, then the molten metal was injected into the mold cavity by using force, this force may be either centrifuged or air pressure.

The metal is melted by an electric muffle and the molten alloy is forced into the mold cavity by centrifugal force.

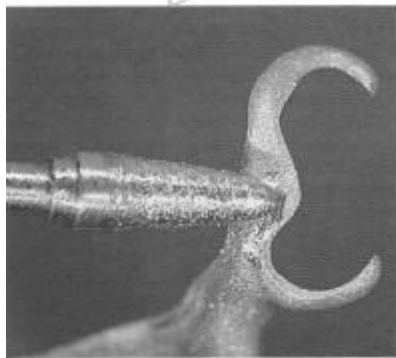




- 20- Cooling of the ring and opening of the mold to obtain the metal framework (laboratory step).



- 21- Finishing and polishing of the framework
(laboratory step)



- 22- Checking of the metal framework on the master cast (laboratory step).



- 23- Checking the metal framework inside the patient mouth (clinical step).
- 24- Registration of centric jaw relation from the patient and teeth selection (clinical step).



- 25- Mounting the casts on the articulator, setting of teeth and waxing (laboratory step).
- 26- Try in stage in the patient mouth (clinical step).
- 27- Flasking, wax elimination, packing, and curing (laboratory step).
- 28- Deflasking, finishing, and polishing (laboratory step).

Final prosthesis



- 29- Insertion in the patient mouth and give post insertion instructions (clinical step).
- 30- Periodic recall (clinical step).

Rest and Rest seat

Dr. Saraa Almallah

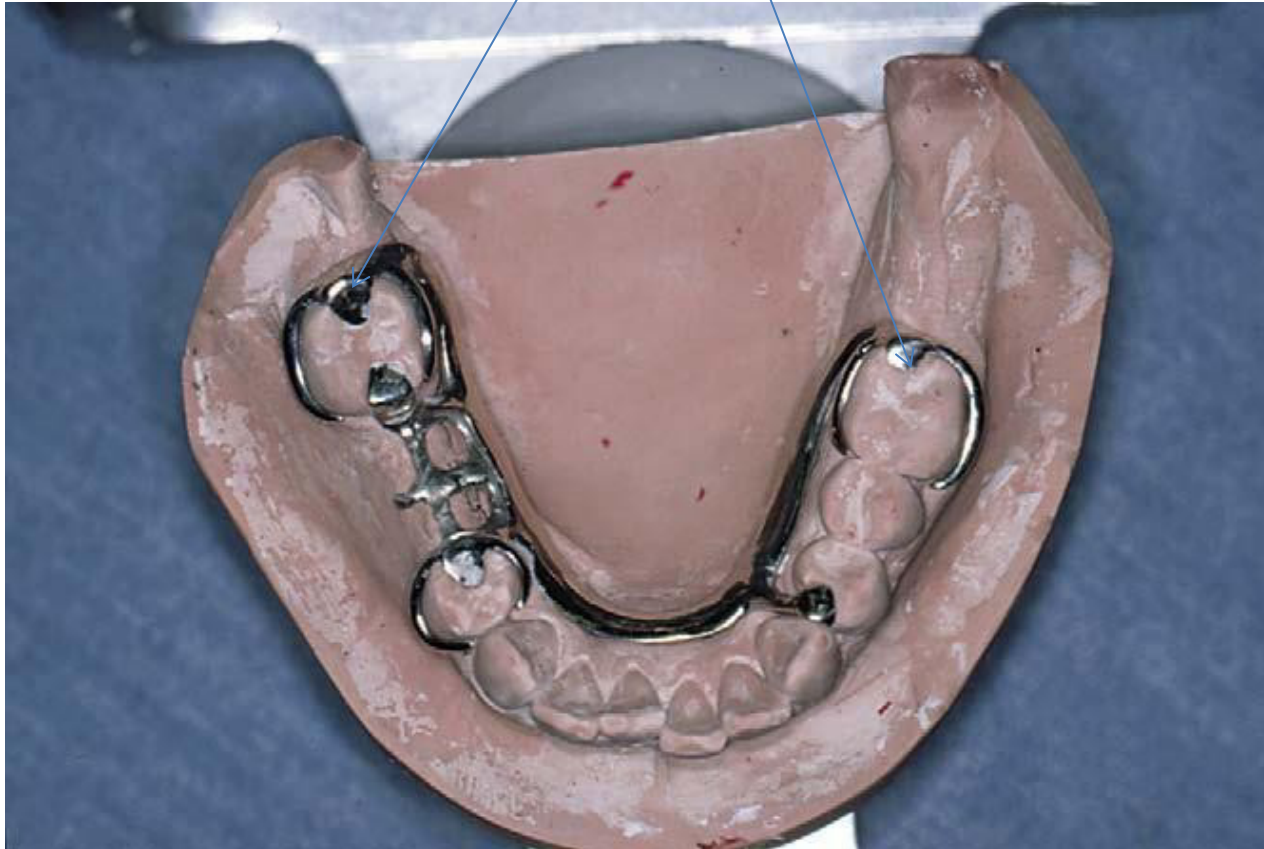
- **Rest** can be defined as any unit of a partial denture that rest on a tooth surface to provide vertical support (prevent movement toward the mucosa)

- **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

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.

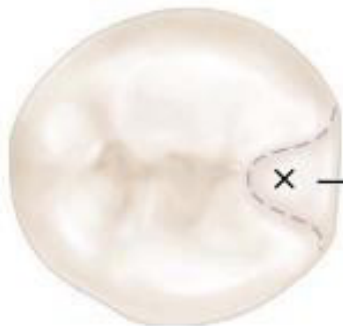
Occlusal Rest and Rest Seat:

- **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



x

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).

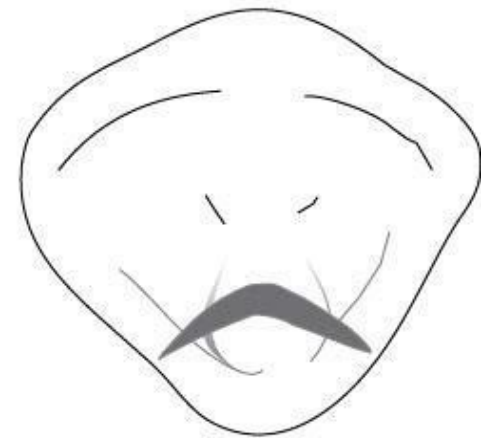
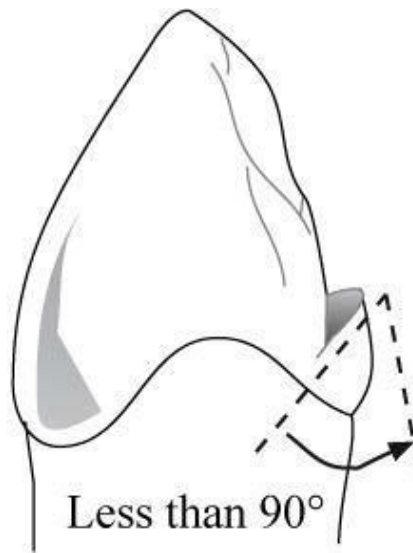
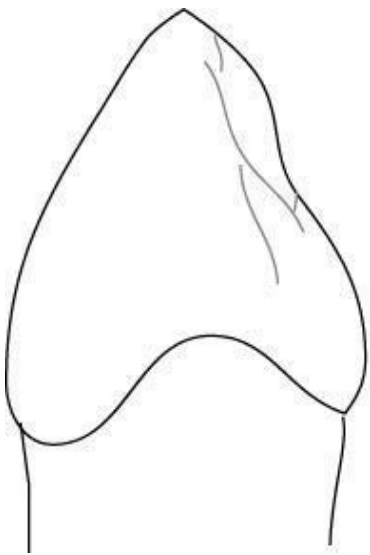
Form of lingual rest seat:

- 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:

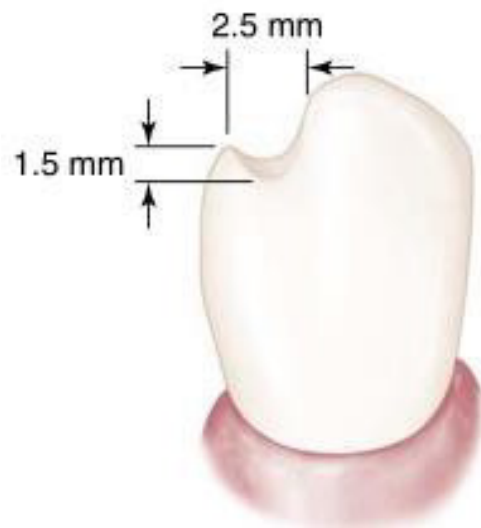
- Incisal rests are placed at the incisal angles of anterior teeth, it is more used for mandibular canine.
- **Incisal rests are usually used as auxiliary rests or indirect retainers.

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.

Direct Retainer

Dr. Saraa Almallah

In general a removable partial denture should have these requirements:

1-Support: The support derived from the abutment teeth through the use of rests and from the residual ridge through the use of well fitting bases.

2- Stability: Removable partial denture must be stable against horizontal movement through the use of rigid components like **reciprocal arm** of circumferential clasp and **minor connector**. Removable partial denture must also be stable against rotational movements through the use of rigid connector and indirect retainers.

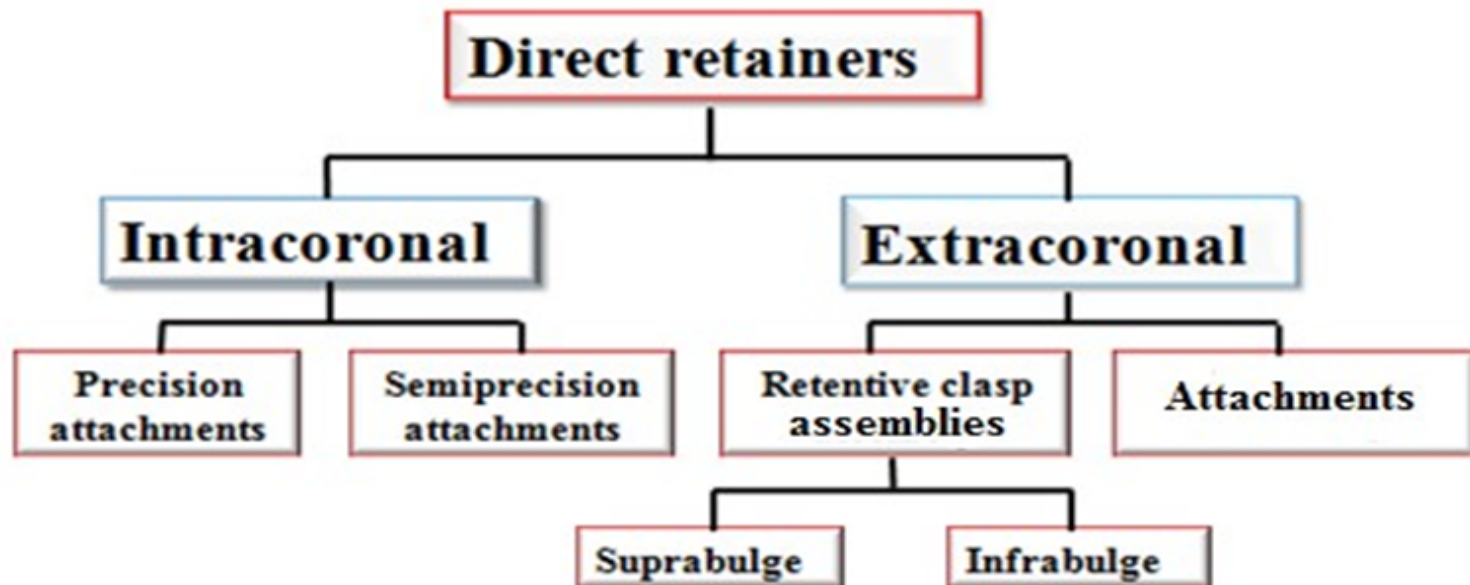
3-Retention: Sufficient retention is provided by two means. **Primary retention** for removable partial denture is accomplished mechanically by placing retaining elements (direct retainers) on the abutment teeth. **Secondary retention** is provided by the intimate relationship of the minor connector contact with the guiding planes, denture bases, and major connectors (maxillary) with the underlying tissue .

Retainers can be divided into:

- I. Direct retainers.
- II. Indirect retainers.

Direct retainers

is any unit of a removable dental prosthesis that engages an abutment tooth to resist displacement of the prosthesis **away** from basal seat tissue.



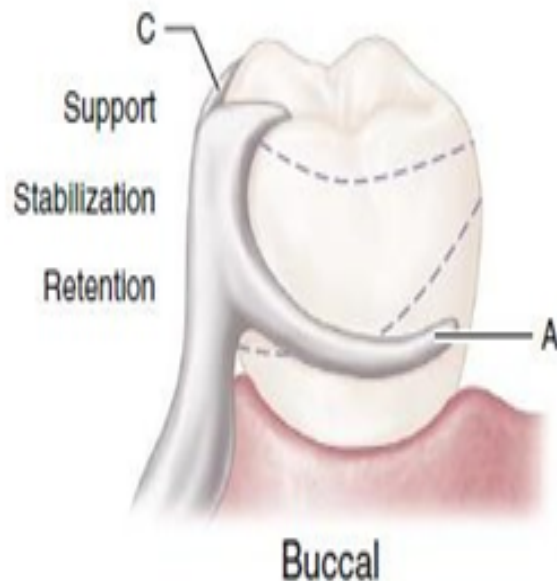
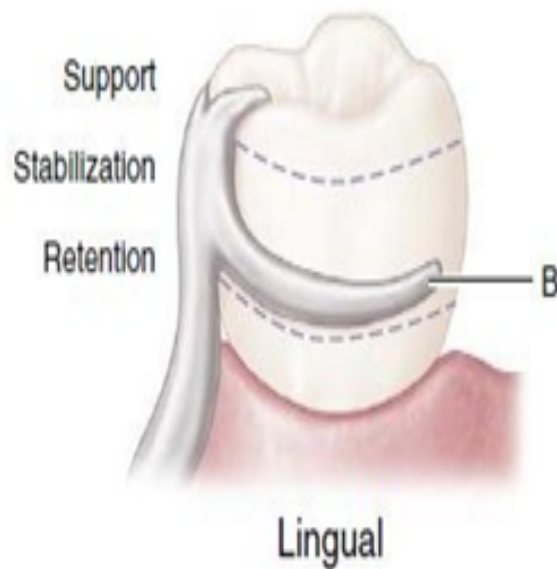
Classification of direct retainers

The extracoronal retainer (Clasp type)

extracoronal retainer is the most commonly used retainer for removable partial dentures, which uses mechanical resistance to displacement through components placed on the external surfaces of an abutment tooth

Component parts, Function and position of clasp assembly parts

<i>Component Part</i>	<i>Function</i>	<i>Location</i>
<i>Rest</i>	Support	<u>Occlusal</u> , lingual and <u>incisal</u> rests.
<i>Minor connector</i>	Stabilization	Proximal surfaces extending from a prepared marginal ridge to the junction of the middle and gingival one third of abutment crown.
<i>Clasp arms</i>	Stabilization (Reciprocation)	Middle one third of crown.
	Retention	Gingival one third of crown in measured undercut.

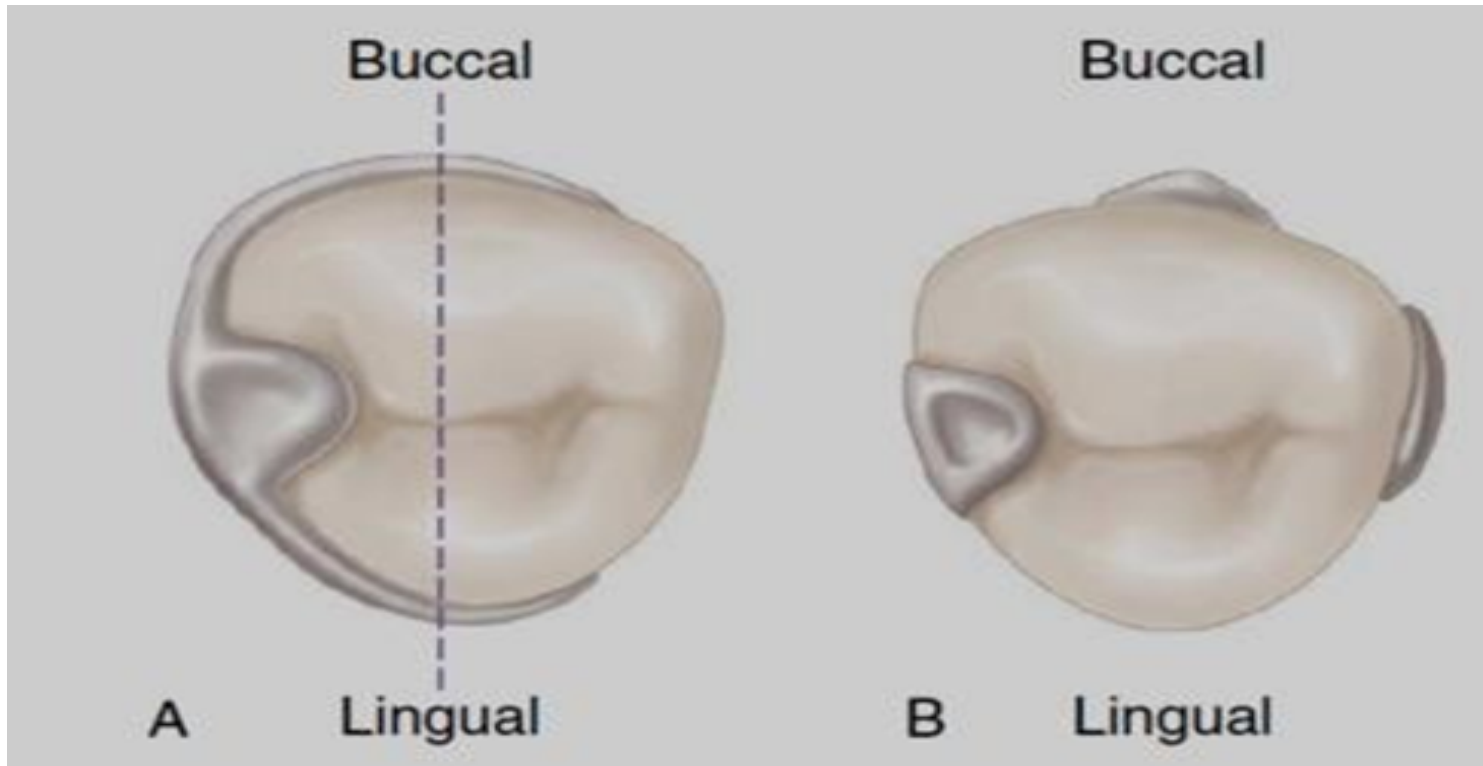


Extracoronal circumferential direct retainer
 Assembly consists of: (A) the buccal retentive arm; (B) the rigid lingual stabilizing (reciprocal) arm; and (C) the supporting occlusal rest. The terminal portion of the retentive arm is flexible and engages measured undercut. Assembly remains passive until activated by placement or removal of the restoration, or when subjected to masticatory forces that tend to dislodge denture base.

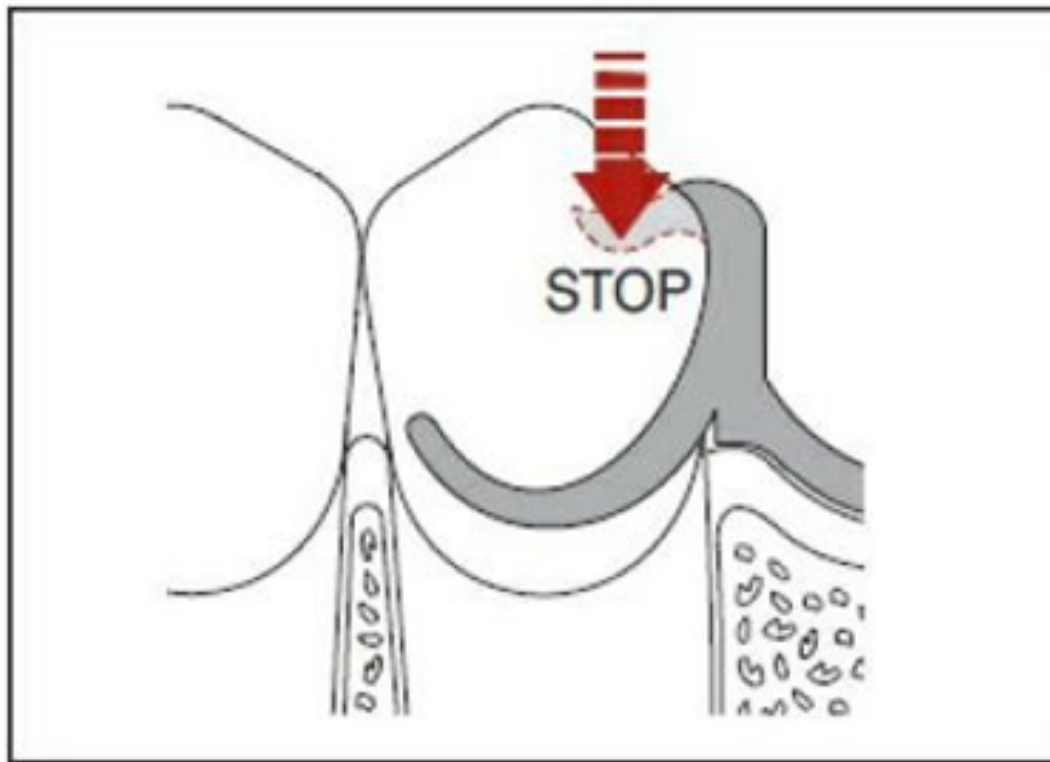
The basic principles of clasp design

1. Encirclement: The principle of encirclement means that more than 180 degrees in the greatest circumference of the tooth must be engaged by the clasp assembly.

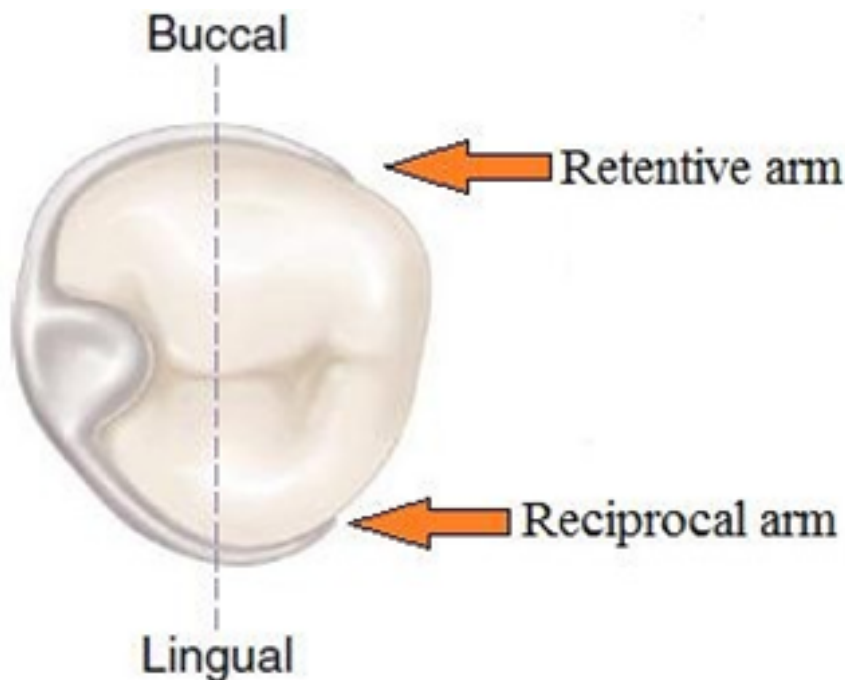
The engagement can be in the form of continuous contact, such as in a circumferential clasp (A), or discontinuous contact, such as in the use of a bar clasp (B).



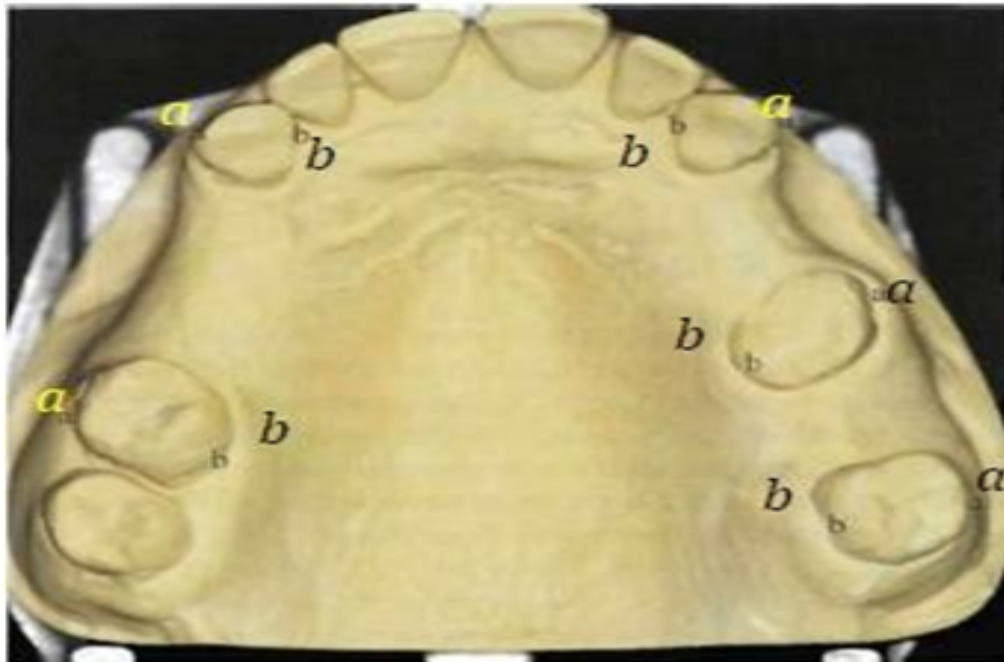
2. Support: The occlusal rest must be designed to prevent the movement of the clasp arms toward the cervical.



3. Reciprocation: Each retentive terminal should be opposed by a reciprocal component capable of resisting any transient pressures exerted by the retentive arm during placement and removal.



4. Retention: 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.

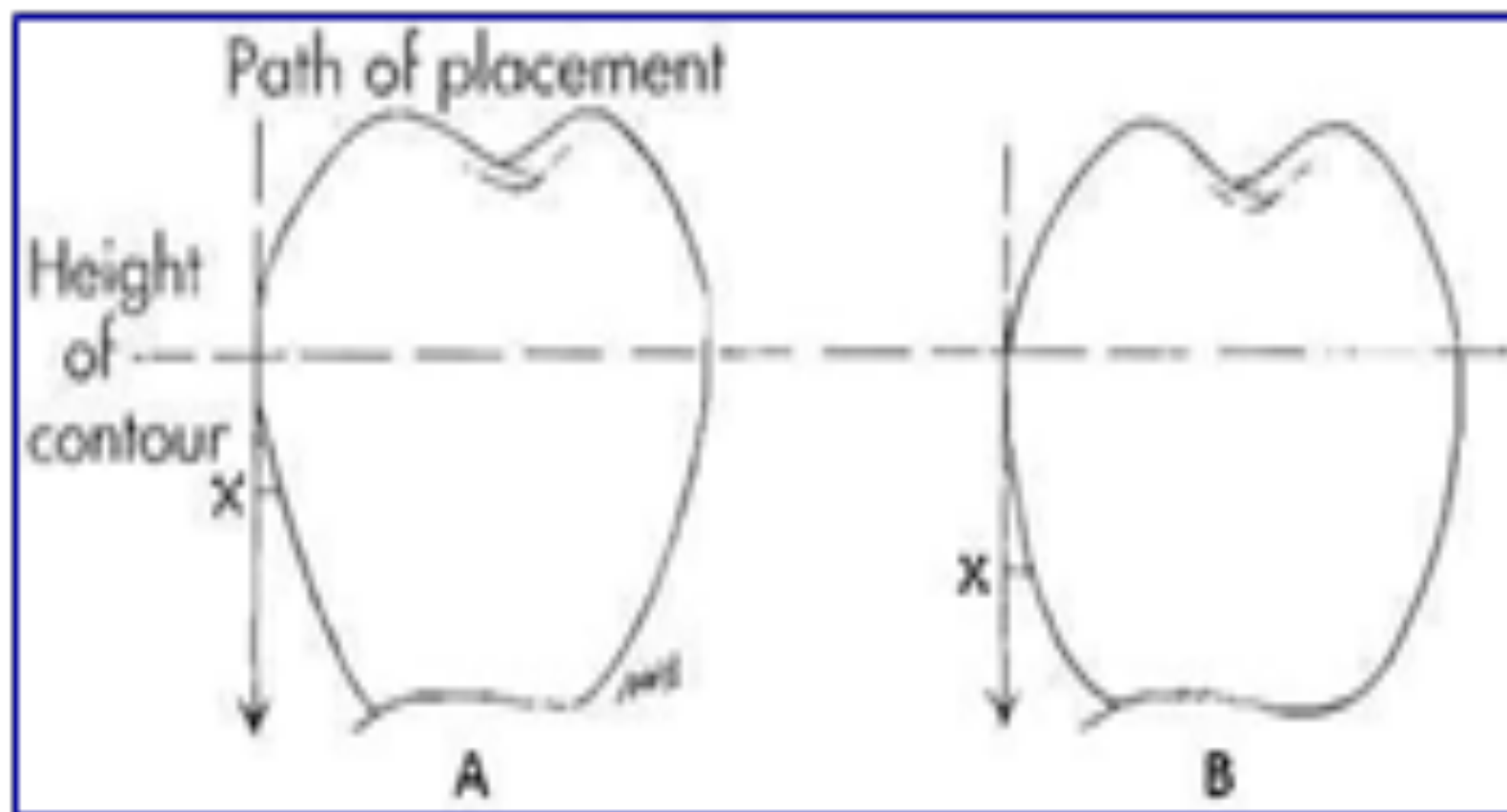


5. Passivity: When the clasp is in its place on the tooth surface, it should be at rest, the retentive tip of the clasp arm must be passive and remain in contact with the tooth ready to resist vertical dislodging force, so when a dislodging force is applied the clasp arm should immediately become active to engage tooth surface resist vertical displacement.

Factors affecting the magnitude of retention

I. Size of and distance into the angle of cervical (gingival) convergence and how far into the angle of convergence the clasp terminal is placed

When the angle of convergence between two abutments differs, uniformity of retention can be obtained by placing the clasp arms into the same degree of undercut (i.e. both 0.01"). A guiding principle of partial denture design is that retention should be uniform in magnitude and bilaterally opposed amongst abutments.



II. Flexibility of the clasp arm

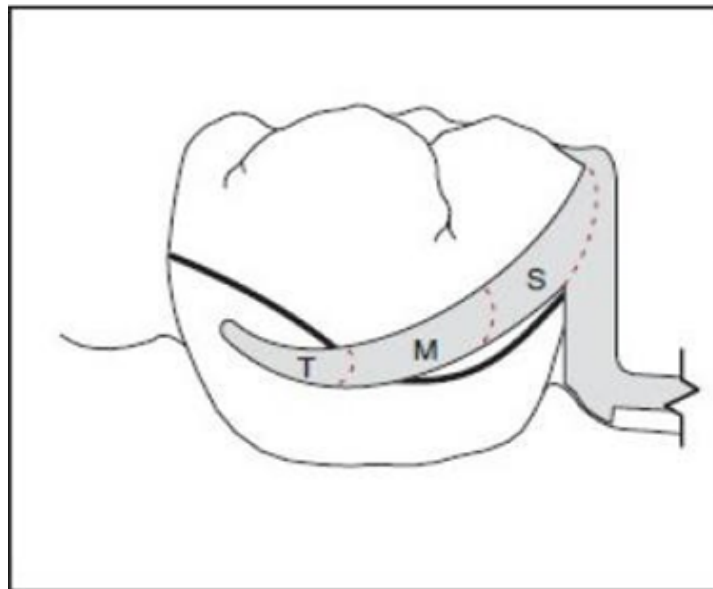
This is influenced by the following factors:

1. Length of clasp arm

- Increase length of clasp arm increase the flexibility of it (increasing clasp curvature increases length).
- Length of clasp arm may be increased by using curving rather than straight retentive arms.

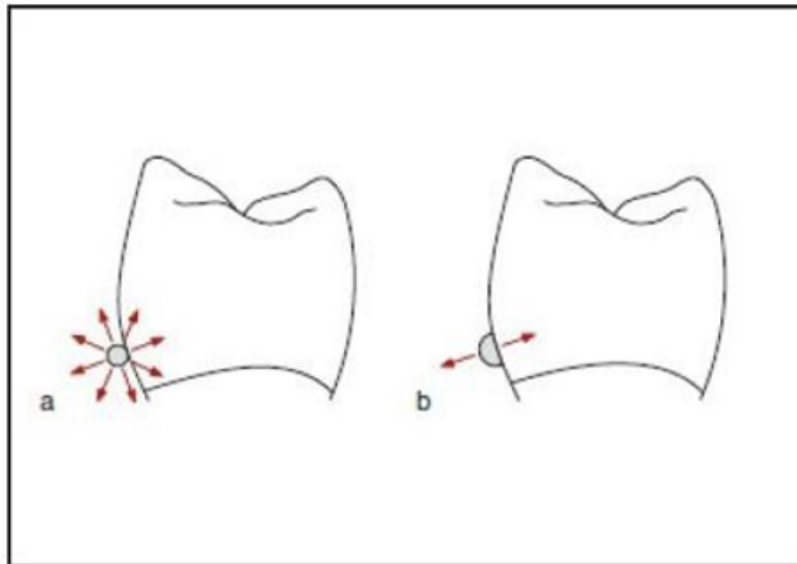
2. Diameter of clasp

- The greater the average diameter of a clasp arm the less flexible it will be.
- The clasp should always taper from the body to the tip, being thicker where the body is attached to the denture base metal or acrylic and thinnest at the end of the arm.



3. Cross-sectional form of the clasp arm

Flexibility may exist in any form, but it is limited to only one direction in the case of the half-round form (bidirectional flexure). The only universally flexible form (omnidirectional flexure) is the round form.



4. Clasp material

- Greater rigidity with less bulk is possible through the use of chromium-cobalt alloys.
- Wrought wire clasp have greater tensile strength than cast clasps and hence can be used in smaller diameter to provide greater flexibility without fatigue fracture.

5. Relative uniformity of retention

Having reviewed the factors inherent to a determination of the amount of retention from individual clasps, it is important to consider coordination of relative retention between various clasps in a single prosthesis.

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)

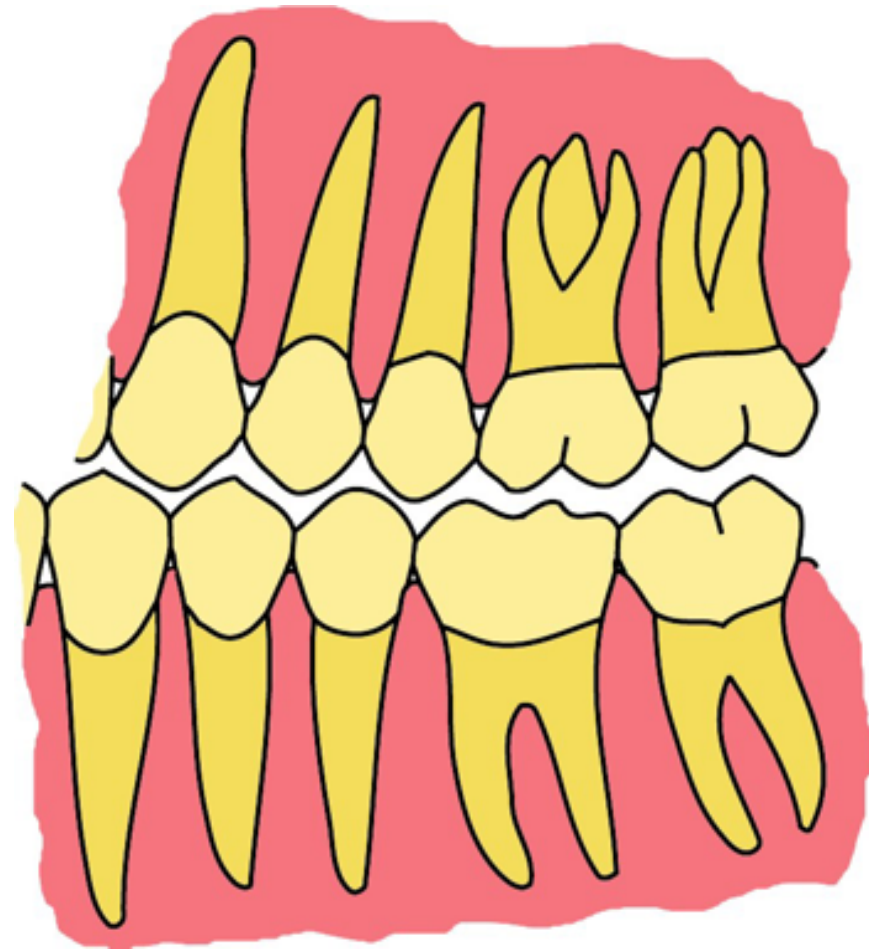
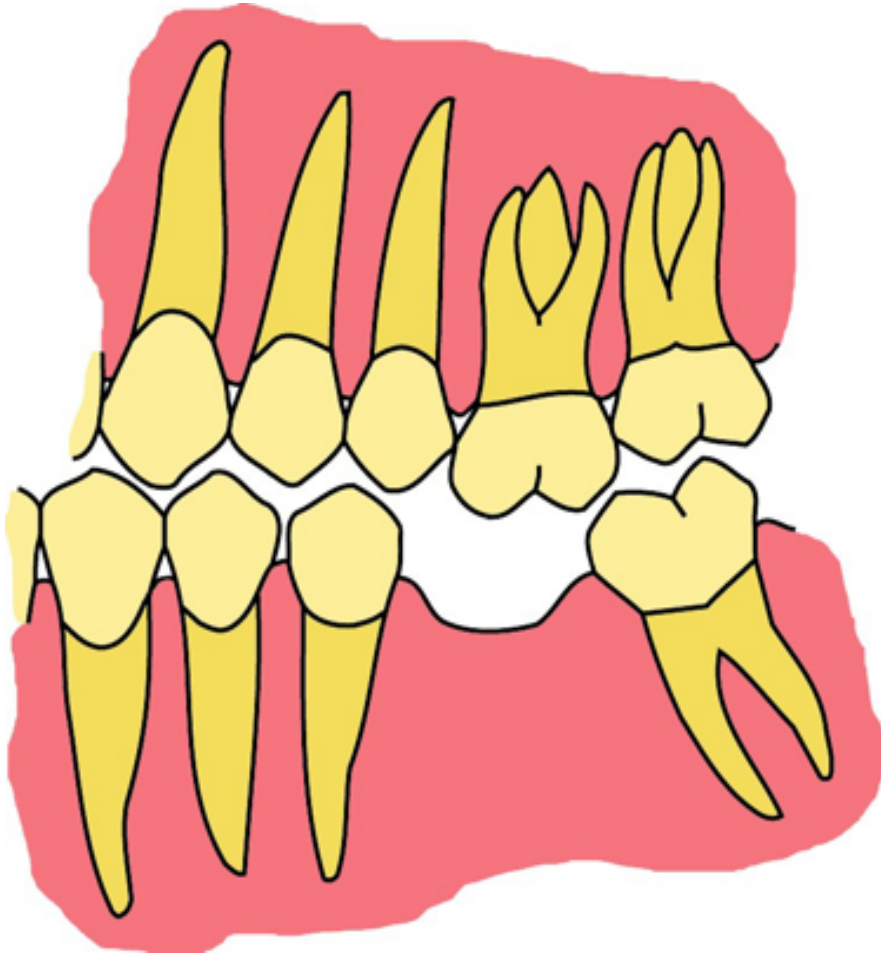
- * there is an inter arch difference, with posterior teeth lost before anterior teeth. the last remaining teeth in the mouth are the mandibular anterior teeth, especially the mandibular canines,(it is a common finding to see an edentulous maxilla opposing mandibular anterior teeth).

- * 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



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.

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



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

8. Patient younger than 18 years old. .

9. Economic consideration .

Acrylic partial denture



Presented by:
Dr. Saraa Almallah

Acrylic partial denture

Definition:

Is a dental prosthesis that substitute teeth and associated structures in partially edentulous arch made from acrylic resin and can be removed and replaced at will.

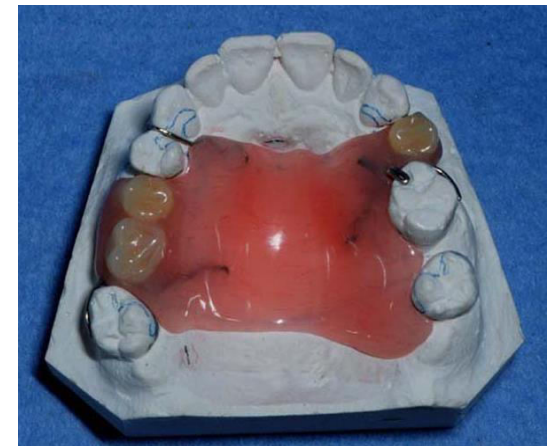
Types

Temporary Removable Partial Dentures

Transitional Denture

Treatment Denture

Immediate RPD





Temporary RPD: a removable prosthesis that is used temporarily for a period of time until a more definitive prosthesis can be provided .

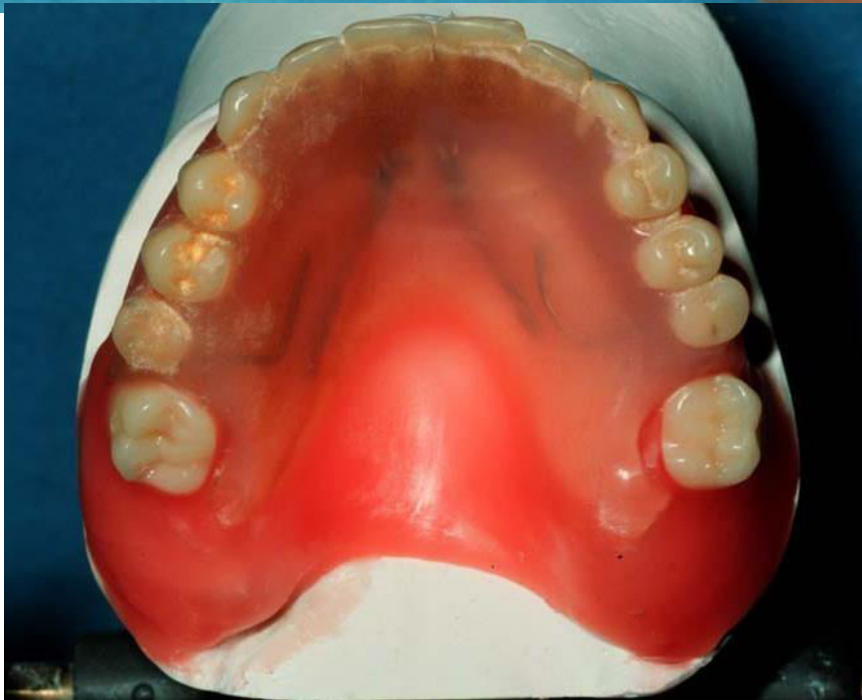


Transitional Denture

- Transition to a complete denture
- Teeth need to be extracted but not immediately (medically compromised)
- Patient is not psychologically prepared to loose all the teeth at one time



Transitional Denture



Treatment Denture

Improve a condition before a definitive denture can be made

Treatment Denture may include:

- 1-Tissue conditioning
- 2-Alteration of Vertical Dimension /Occlusion
- 3-Surgical Splint -Removal of palatal tori

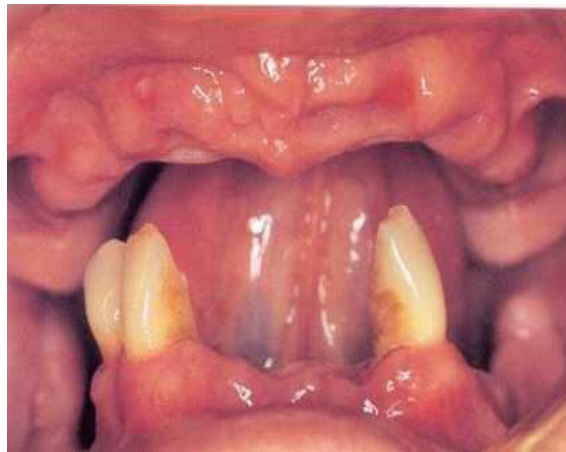
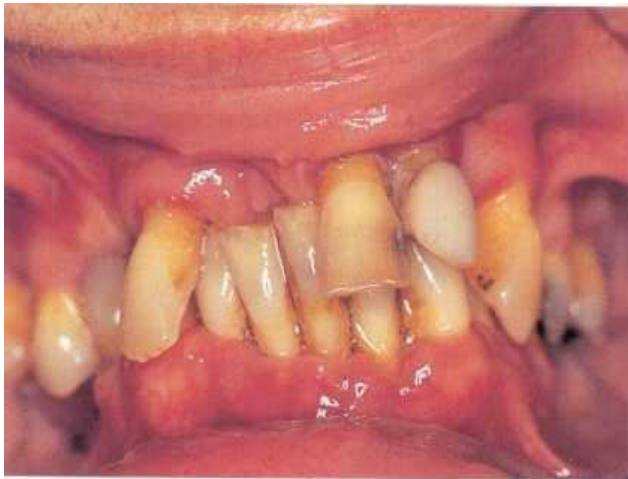


Immediate RPD

Any removable dental prosthesis fabricated for placement immediately following the removal of a natural tooth/teeth.

It is a partial denture constructed before the extraction of unwanted teeth and is inserted immediately after their removal.

An immediate denture, which may be complete or partial, is constructed to replace teeth immediately after their extraction.





Uses of Temporary Removable Partial Dentures

1. **Esthetic or appearance.**
2. **Space Maintenance .**
3. **Reestablishment of occlusal relationships**
4. **Interim restoration during treatment**

1. Esthetic or appearance.

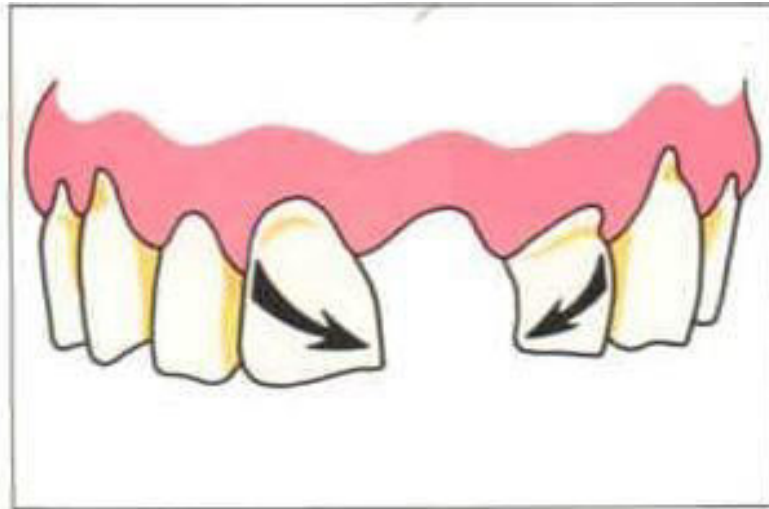
For the sake of appearance, a temporary removable partial denture may replace one or more missing anterior teeth or it may replace several teeth, both anterior and posterior



2. Space Maintenance

In younger patients the space should be maintained until the adjacent teeth have reached sufficient maturity to be used as abutments for fixed restorations

In adult patients the maintenance of the space can prevent undesirable migration and extrusion of adjacent or opposing teeth until definitive treatment can be accomplished.



3. Reestablishment of occlusal relationships

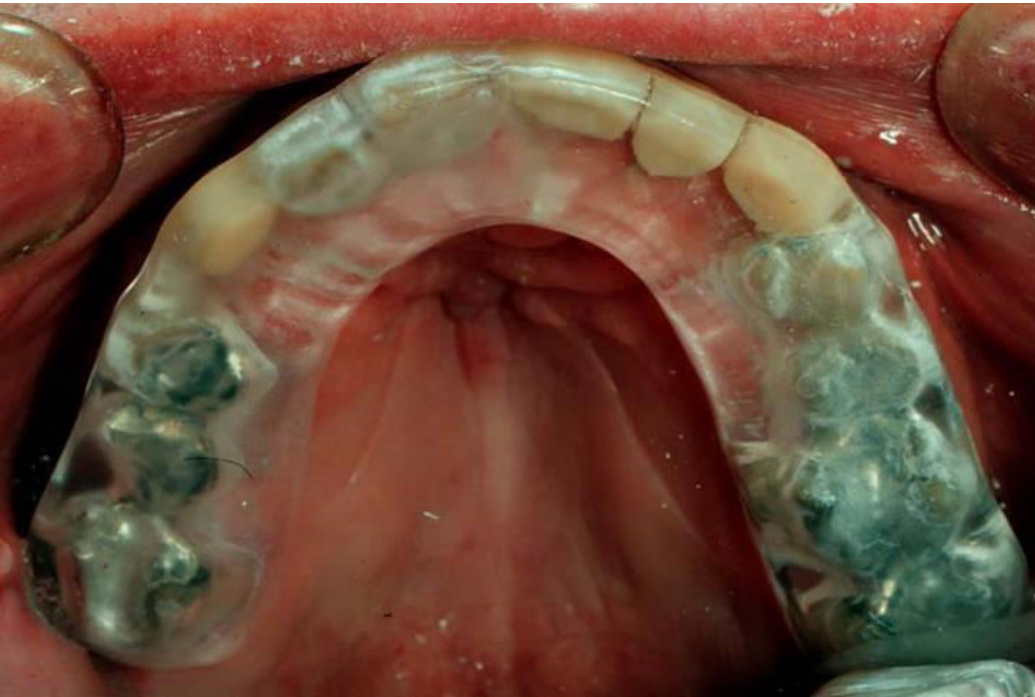
Temporary removable partial dentures may be used as **occlusal splint**

Temporary removable partial dentures are used to establish a new occlusal relationship or occlusal vertical dimension

occlusal splint



OCCLUSAL SPLINT



4. Interim restoration during treatment

Sometimes a temporary removable partial denture must be made to replace missing anterior teeth in a partially edentulous arch, which are ultimately to be replaced with **fixed restorations**



Advantages of acrylic partial dentures over Cobalt Chrome partial dentures

- **Light in weight.**
- **Good appearance**
- **Not expensive (Low cost).**
- **Easy to construct and to repair.**
- **Less laboratory and clinical time consuming**

Disadvantages of acrylic partial denture

Poor thermal conductivity

Lower strength (easily broken)

Less hygienic

Components of acrylic partial denture

1- The acrylic denture base:

The base acts as a saddle and as connectors and has a reciprocal function for the retentive wrought wire clasp arm



2- wrought wire clasp

- Wrought stainless steel wire clasps are used with acrylic partial dentures; they are attached to the acrylic denture base by embedding their non-retentive portion into the denture base.

The wrought wire clasps consist of a **retentive portion** and **non-retentive portion**, which should be looped or twisted to help anchorage it in the acrylic resin of the base.

Partial Denture Design: Clasps (Wrought wire)



3- Acrylic teeth:

They are attached by chemical bond to acrylic denture base.



Waxing of acrylic partial denture

Dr. saraa almallah

Waxing & carving

important terms

1-The polished surface: are the outer surfaces which are in contact with the oral tissues (lip, cheek and tongue) must be smooth and have the natural details. they developed by contouring the wax

2-Waxing: is the contouring of the wax base of the trial denture into the desired form to simulate natural gingival contour.



3- Festooning: is the process of carving the denture base to simulate the contour of the natural tissues which are being replaced by the denture.



Benefits of waxing & carving:

1-Improved esthetics (specially for patients with a high smile line who display significant amounts of gingiva).

2-Provides appropriate support and contour of the lip and cheek.



3-Improved tolerance and comfort.

4-Facilitates stability and retention

5- Feeling of patient and phonetics (because there is a relation between the tongue and the palatal part of the teeth.

Criteria for waxing:

Upper denture:

- 1-The wax at the periphery must be extended to full depth ,Fully rounded and polished
- 2-The labial waxing may be thickened in order to restore lost facial contour
- 3-The palatal section of the maxillary denture should be nearly a reproduction of the patient palate & rugae.

Criteria for waxing:

Lower denture:


- 1 The labial surface is concave
- 2 The peripheries fully rounded and polished
- 3 In the premolar region the buccal surface is flat and thin
- 4 In the molar region the buccal surface is thick

The procedure of waxing:

- 1-Contour the wax carefully to prevent movement of the teeth.
- 2-Avoid a bulky wax up, the additional bulk of acrylic resin may contribute to porosity & dimensional processing error.
- 3-Place strips of base plate wax along the facial surface of the trial denture so that they extend from the gingival third of the teeth to the edge of the cast.


4- With a hot spatula lute the strips to the underlying wax at 1/4 inch intervals & melt the wax into contact with the necks of the teeth. After the wax has cooled, carve the interdental papillae






5-Develop the margin by carving with lacron carver at 45° angle to the neck of the teeth.

6-Waxing buccal surface by triangular marking can be placed as a guide to the length and position of the root indications,



7- kept in mind that the root of canine is the longest, the root of lateral incisor the shortest and the central incisor root between these two roots

8- On the mandibular denture the root of canine is the longest, the root of central incisor the shortest, and the lateral between these two. The wax is scraped out of these triangular areas.



9- Palate must be smooth and approximately 2.5 or 3mm thick, when the processed resin is smoothed& polished, the palate will be as thin as possible& yet sufficiently thick to provide adequate strength.



waxing and arrangement of posterior teeth

Stippling of wax: an alternative to gingival contouring
some people stipple the wax & this produce a finished
denture whose surface shows an (orang- peal) effect,
produces a very pleasing result.

Disadvantage of stippling is that it produces a denture
which is more liable to contamination by calculus deposits.
If it done it should be confined to the area of the denture
which can be seen when the patient grins broadly.

5. Stippling of the facial surface.

Stippling



Why stipple?

a) Esthetic

b) Keeps food particles from traveling up to the periphery of the denture



Flasking in acrylic partial
denture



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Flasking is the process of **investing** **the cast** with the waxed denture in a **flask** to make a sectional mold that is used to form the acrylic resin denture **base**. Therefore it is also known as .

Flask

The flask is a metallic mold that supports the models and the try in denture during the flasking procedure.



Components of a Flask

It is composed of 3 parts:

The **base** in which the model & the try-in denture will be placed.

The **mid-part** in which the teeth will be located.

The **cover**





Flasking / Investing Procedure

1. The master cast and the wax dentures are placed in the flask, to insure that the cast fit in the flask.



2. The Inner surface of the flask is coated with Vaseline, while the base of the cast is painted with separating medium (cold mold seal). To prevent the investment material (plaster of Paris) from attaching to the cast



3. The first layer of gypsum investment is poured in the lower half and the cast is placed on top of the investment.



4-After the set of the first gypsum investment layer, a plaster separating medium is painted on it, to prevent the sticking of the second layer of gypsum investment to the first layer.

5-The upper half of the flask is put in place, then the second mix of gypsum investment is placed on the first layer and covers the wax, denture base and teeth.



6- Before the second layer sets the lid or flask cover is put in place and tapped to sit properly allowing the excess gypsum to flow out of the holes in the lid.

Wax Elimination

- After setting of gypsum, wax elimination procedure is to be done.
- Put the flask in boiling water for 5-7min.



Remove the shellac base plate and the wax using the boiled water and detergent.

Place the clean flask in open air to dry and cool it.



Note:

- Remove ALL wax residue since acrylic resin will NOT adhere to a surface coated with wax.
- Any residual wax will contaminate the acrylic resin and prevent bonding between teeth and the denture base.

Finishing and Polishing

Dr. Saraa Almallah

- **Finishing** of denture : is the process of perfecting the final form of the denture by removing any flash, stone remaining around the teeth, and any nodules of acrylic resin on the surfaces of the denture base resulting from processing.

- **Flash:** It is the excess of acrylic resin at the denture border, the acrylic resin that was forced out between the two halves of the flask by the pressure applied during the processing procedure.





Note>>>>

- Take care to preserve the border and contour of the denture during the finishing process. If the impression was correctly molded and boxed, and the trial denture was carefully waxed and contoured into the form desired in the finished denture, little finishing will be necessary.

Procedure of finishing

- 1-Carefully remove *remaining stone around the neck of teeth with a small sharp knife.*

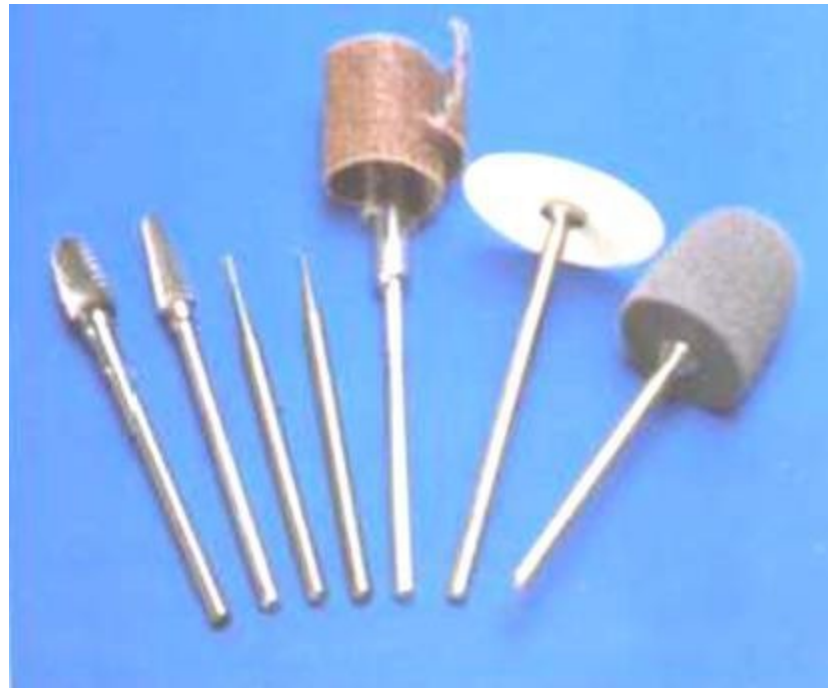


- 2-To remove the *flash of acrylic resin from the denture border, press the denture base lightly against a slowly revolving arbor band mounted on the dental lathe.*



- An **alternate** but less satisfactory to use a **large acrylic bur or stone bur** mounted in a straight hand piece to remove the flash. Take care not to change the form of the denture border but only remove the excess resin on the border of denture.

Various carbide acrylic burs, abrasive cloth on slotted mandrel, sandpaper disk, and rubber polisher



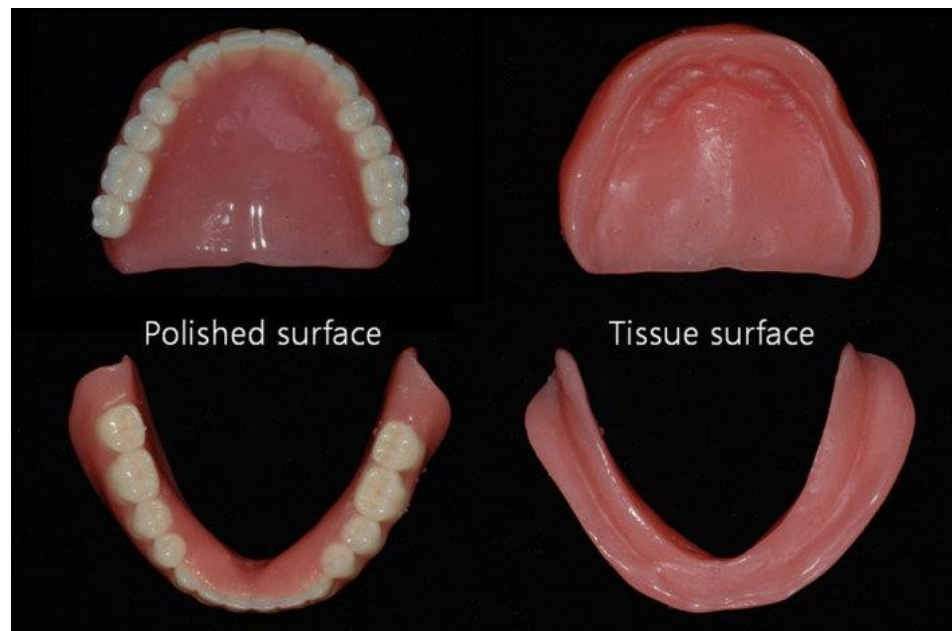
- 3-**Remove** *nodules of acrylic with small stone or acrylic carbide burs.*
- 4-*The posterior area of the palate has been* **thinned** *to its proper thickness.*

Polishing

- is a process of removing scratches. Polishing consists of making the dentures smooth and glossy without changing the contours.

Principle 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 and width during polishing.**

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



- **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.**
- **6- During the finishing and polishing we should minimize the reduction of bulk because this cause fracture of the denture**

Procedures of Polishing

- **A) Smoothing**
- **B) Making the denture glossy**

smoothing

- 1-Polish *labial, buccal, lingual, and palatal external surfaces of the denture with wet pumice on rag wheel attached to dental lathe running at slow speed. Keep plenty of pumice on the denture surface and keep the denture moving at all times; press the denture lightly against the wheel.*

Rag wheel attached to dental lathe



- 2- Polish ***acrylic around the teeth*** with wet pumice and a brush wheel attached to dental lathe moving at slow speed. Be careful not remove previously developed contours.

Brush wheel attached to dental lathe.



- 3-Polish the ***border, lateral and palatal surfaces of denture by using wet muslin buffing wheel attached to dental lathe.***

Making the denture glossy

- 1-Use *Rouge (greasy material)* this material is applied to dry muslin buffing wheel, this differ in that the polishing compound is applied to the wheel not as pumice to the piece of work being polished.

A- Muslin buffing wheel attached to dental lathe. B- Rouge



- 2- After the denture completely polished with rouge, it is scrubbed thoroughly..



- 3-Final polish is obtained by placing high shine material on the denture.
- 4-Store the polished dentures in water until they have been delivered to the patient. Store the dentures in water all the times otherwise they will undergo dimensional changes and shrinkage.

Major connector

Dr. Saraa Almallah

- 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 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 requirement

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.



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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

It is located in the middle of the palate, it does not cover the rugae area which make it more tolerable to the patient.

It is narrow half-oval in shape, bar **should** be less than 8 mm wide

-



- 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.

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.

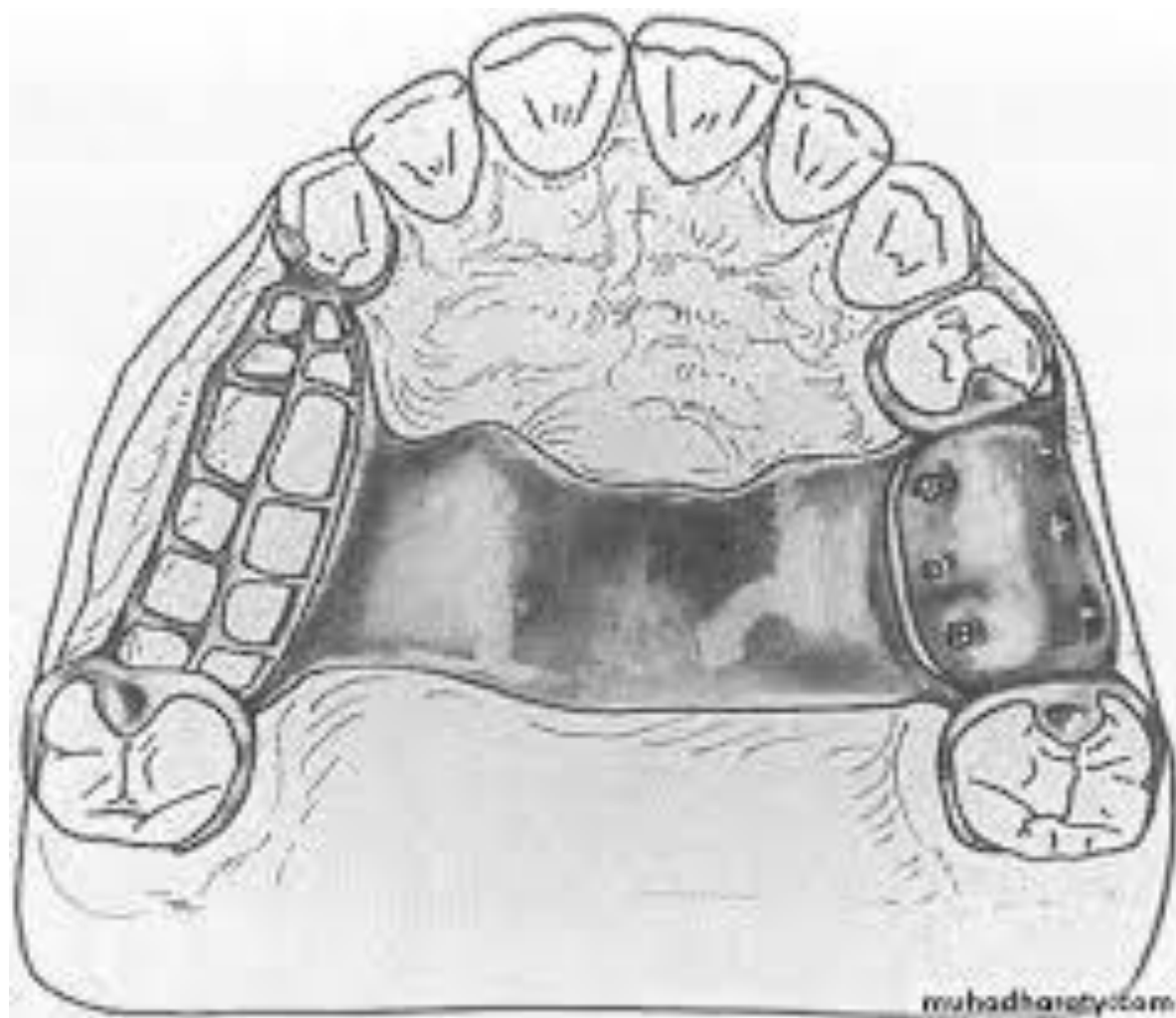
Combination anterior and posterior palatal Bar type



- 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



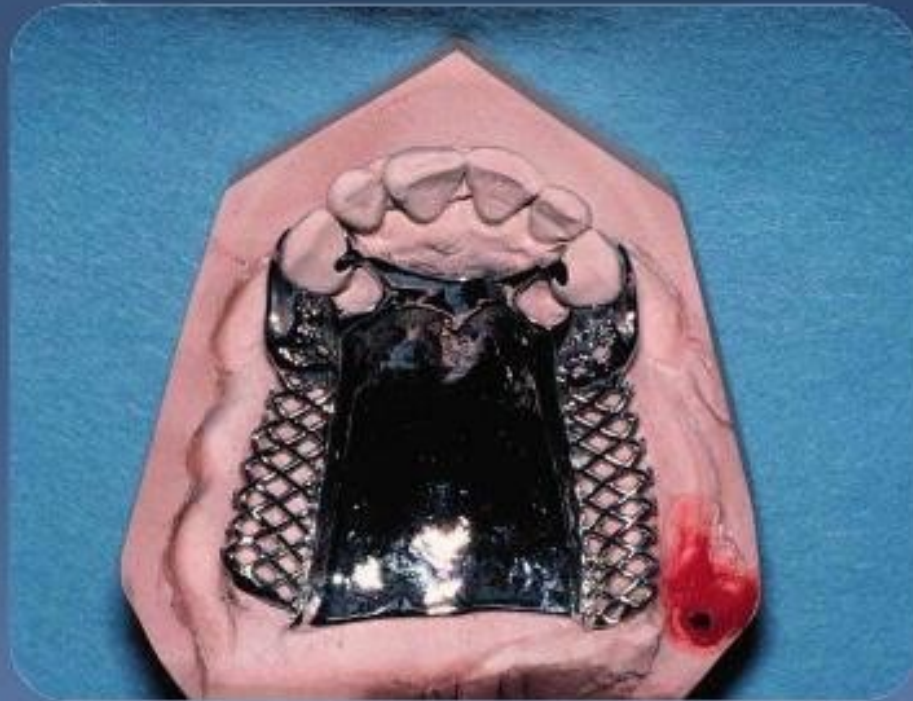
Indications

- 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 II when only posterior teeth are present.

□ In Cl III with a badly condition few remaining teeth.

- □ 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.



Lower major connector

Dr. saraa almallah

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.

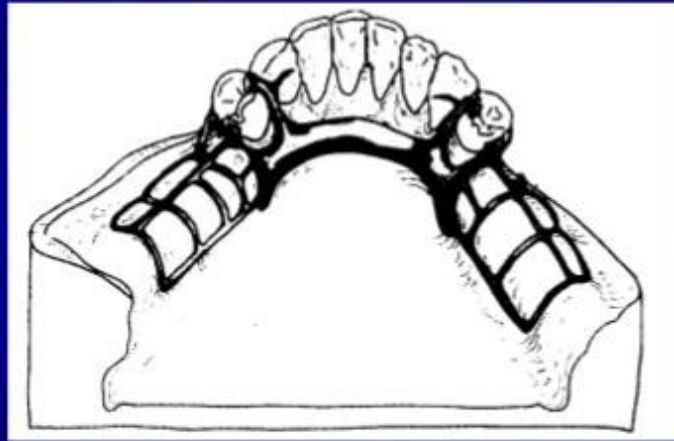
- It is half-pear shaped in cross section with the thickest portion placed inferiorly and should be tapered toward the ☐ gingival tissue superiorly.
- There must be a minimum of 8mm vertical clearance from ☐ the floor of mouth. The upper border of major connector should have a 4mm clearance from gingival 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

- ☐ 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.



Processing of acrylic partial denture

**Presented by
Dr. Saraa Almallah**

Acrylic Packing Procedure

- . The cold mold seal should be **thin** and even on **all the parts** of the mold **except** the **teeth** which should not be separated. If the teeth covered by cold mold seal, **they will not adhere to the denture base.**

Acrylic Packing Procedure

Mixing

- Acrylic resin is a resinous plastic material of various esters of acrylic acid. It is used as a denture base material. It is formed of a powder and liquid.

- **Powder:** polymethyl methacrylate PMMA
(polymer) + Benzoyl peroxide (initiator)
+pigments.

Liquid: methyl methacrylate (monomer) +
hydroquinone (inhibitor) Powder and liquid are
mixed in a ratio of **3 to 1** by volume for an
average sized denture.

Stages of acrylic mixing

- A **sandy** stage : where a fluid mass occur due to the settling of the polymer into the monomer.
- A **stringy** or **fibrous** stage: where the monomer starts to attack the polymer. In this stage the mix is tacky, sticky and adheres to the sides of the mixing jar.
- **Smooth** dough like stage: where the monomer diffuses into the polymer.

- **Rubber** like stage: further penetration of the monomer into the polymer. In this stage the acrylic resin cannot be packed or molded being too stiff.
- **Stiff** stage : hard



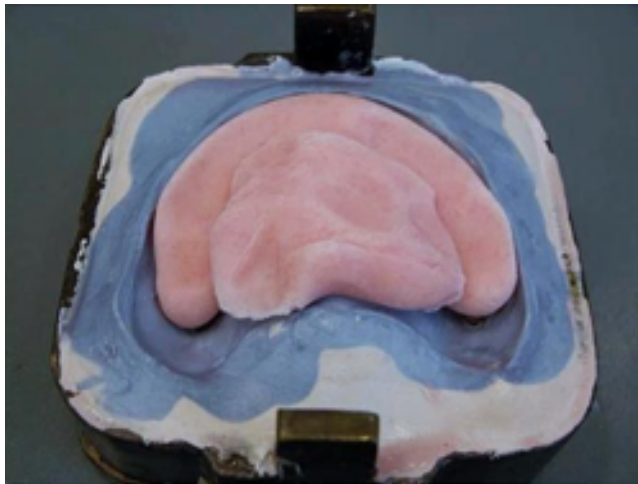
Acrylic Packing Procedure

Packing of acrylic

It is the procedure of application of acrylic resin into the mold and pressing the flask by using sufficient pressure to compensate for the contraction of the acrylic after polymerization to prevent shrinkage and porosity.

Put acrylic in the mold, press in a clamp, do curing immediately.

- Note:
- **Too early**– (Stage II) – acrylic resin has too low viscosity to densely fill the mold. Results in porosity in the final prosthesis.
- **Too late**– (Stage IV) – inability to close the flask, loss of detail and increase in vertical dimension of occlusion in final prosthesis, as well as, movement and/or fracture of teeth.



Acrylic Packing Procedure

- Acrylic placed into mold cavity and covered with **cellophane** for **trial pack**.



- Flask pressed until **excess acrylic squeezes out** around edges.
- Acrylic **flash** to be **trimmed** away, **small amount** of acrylic to be **added where needed**. Take note of the wrinkles from cellophane.
- The mold is full when the acrylic is pressed smooth and dense. A small amount will be added at wrinkles.
- **Close** the upper and lower parts of the **flask** together



Curing of Acrylic

- The packed mold is heated (cured) in an oven or in water bath. Temperature and time should be controlled.

Two water bath heating techniques

- a) **Heating the bath of water, beginning from the room temperature until reaching 72°C for 16 hours.**

- **b) Heating the flask in an ordinary water bath beginning from the room temperature, until reaching 72°C, lasting for 2 hours, then the temperature is raised to boiling for another 1 hour.**
- This technique takes shorter time but there is a likelihood to be distorted during de-flasking. Also, the free monomer is more.

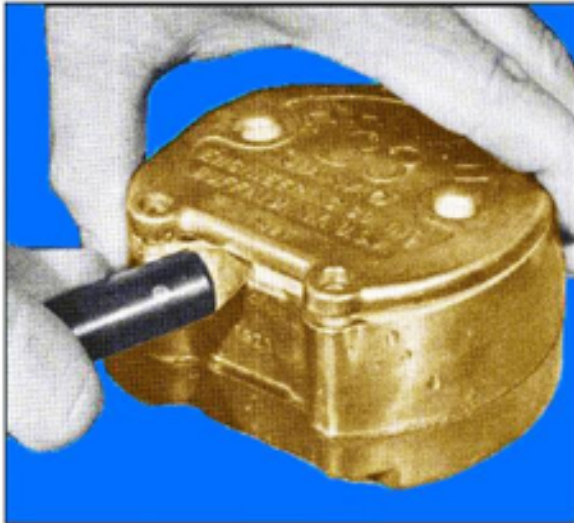
- **Cooling of the flask / Bench Cooling:**
- After curing, the flask is to be **cooled slowly on the bench in its water bath.**
- The **slow cooling** will permit the **relief of the internal stresses** caused by the difference in contraction between the acrylic and the mold material.

Cooling of the flask / Bench Cooling:



De-flasking Procedure

- It is the procedure of **opening the flask** after curing of acrylic resin. It should be done carefully to prevent the breakage of the denture. It includes the following steps:
- **Remove the flask from the clamp.**
- **Remove the upper and lower lids.**



Removing the lid



Separate the flask

De-flasking Procedure

- **Separate the 2 parts** of the flask with attention using the **plaster knife**.
- Liberate the denture with its model, then try to **remove the model carefully**. If there is undercut, split the model into 2 or 3 parts to remove them easily.
- After gaining the denture, **remove the excess of acrylic** using the acrylic bur.





Minor connector

Dr. Saraa Almallah

Minor Connector

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.



Functions of minor connectors

The primary function of a minor connector is to join the denture parts to major connector.

The minor connector serves other purposes.

1- To transfer functional stress to the abutment teeth. This is a (prosthesis-to- abutment function) of the minor connector.

Occlusal forces applied to the artificial teeth are transmitted through the base to the underlying ridge tissue if that base is primarily tissue supported.

Occlusal forces applied to the artificial teeth are also transferred to abutment teeth through occlusal rests.

2- To transfer the effect of the retainers, rests, and stabilizing components throughout the prosthesis. This is an (abutment-to-prosthesis function) of the minor connector.

Thus forces applied on one portion of the denture may be resisted by other components placed elsewhere in the arch for that purpose.

3- Provide unification and rigidity.

4- It might help in retention and stability of the prosthesis.

5- Through its connection to the guiding plane; it helps as a bracing element.

6- Share in the path of insertion and removal maintenance.

Basic types of the minor connectors

1. Embrasure minor connectors.

Minor connectors placed into embrasures between two adjacent teeth or adjacent to an edentulous space to join clasp assembly, indirect retainer and auxiliary rest.



2. Denture base retention mechanism

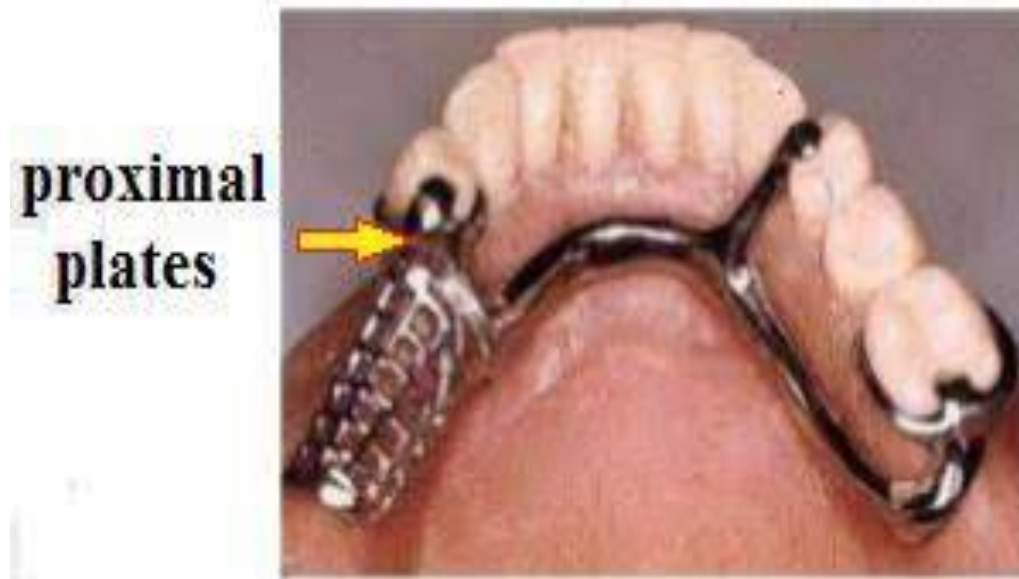
Grid work minor connectors that covers the edentulous area to join denture base to major connector.

- a. Retentive mesh.
- b. Retentive lattice.
- c. Retentive loops.
- d. Retentive bead.
- e. Retentive posts.



3. Proximal minor connectors

Proximal minor connectors contact an abutment tooth adjacent to an edentulous space. Proximal minor connectors are usually term **proximal plates**



4. Surface minor connectors

Surface minor connectors are located on the lingual surface of incisors and canines. They connect lingual rests to the major connector.



Form and location

1- The minor connector must have sufficient bulk to be rigid; otherwise the transfer of functional stresses to the supporting teeth and tissue will not be effective.

2- A minor connector contacting the axial surface of an abutment should not be located on a convex surface. Instead it should be located in an embrasure where it will be least noticeable to the tongue.



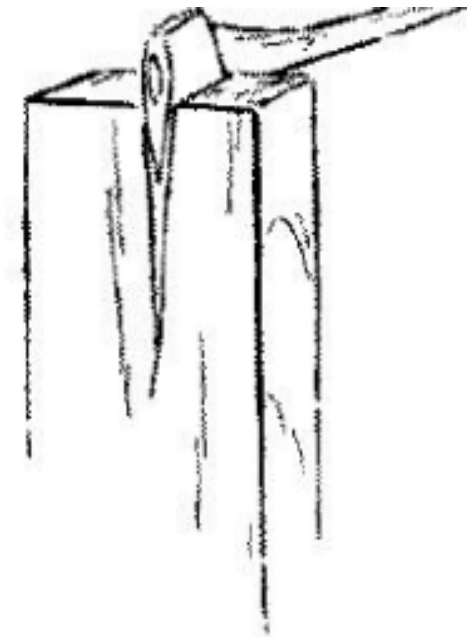
3. Minor connector that contacts the guiding plane surface of the abutment teeth adjacent to an edentulous space must be **broad buccolingually** to use the guiding plane to the fullest advantage, and **thin mesiodistally** to place a prosthetic tooth in a natural position.



4. The minor connector cross the free gingival area must be relieved in order not to impinge the tissue.



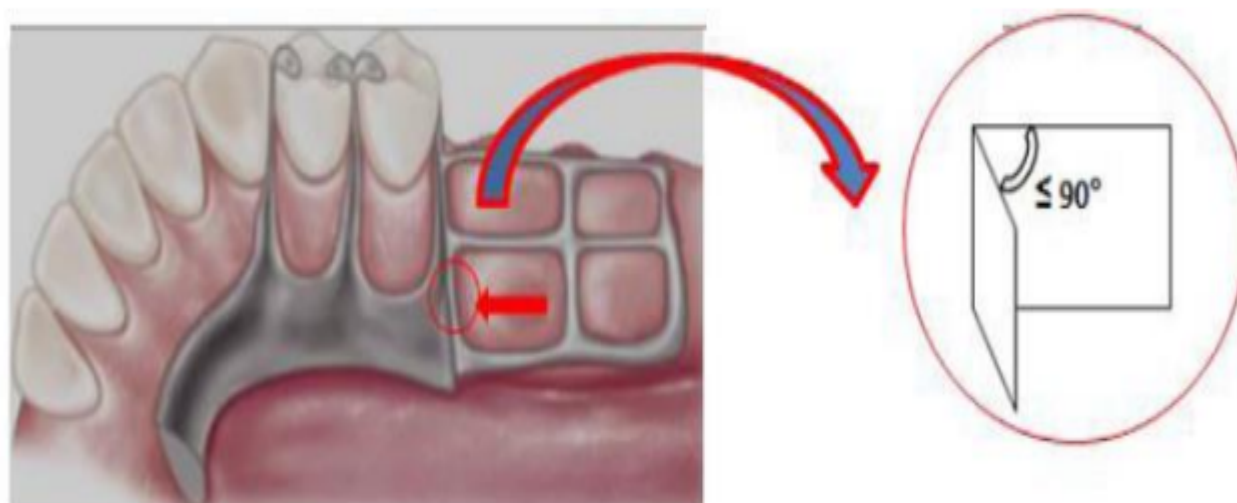
5- The deepest part of the interdental embrasure should have been blocked out to avoid interference during placement and removal, and to avoid any wedging effect on the contacted teeth.



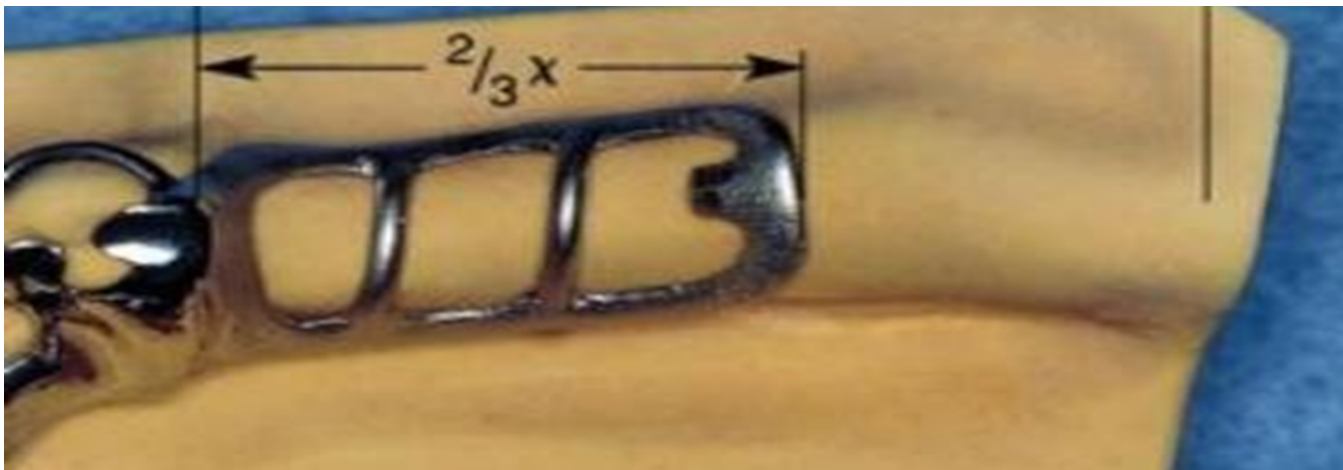
6- Minor connector that covers the edentulous area to join denture base to major connector should be completely embedded within the denture base.



7. The junctions of the mandibular minor connectors with the major connectors should be strong **butt-type joints**. Angles formed at the junctions of the connectors **should not be greater than 90 degrees**, thus ensuring the most advantageous and strongest mechanical connection between the acrylic resin denture base and the major connector.



8. 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.



9. Minor connectors for maxillary distal extension denture base should extend entire length of the residual ridge and should be of a ladder-like or mesh-like



Finishing line

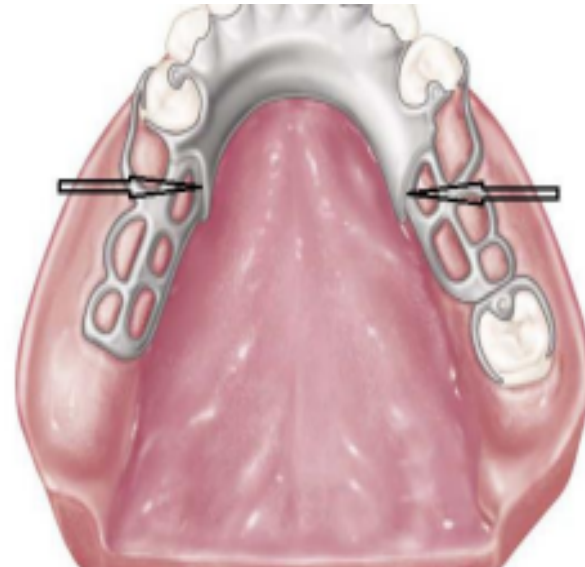
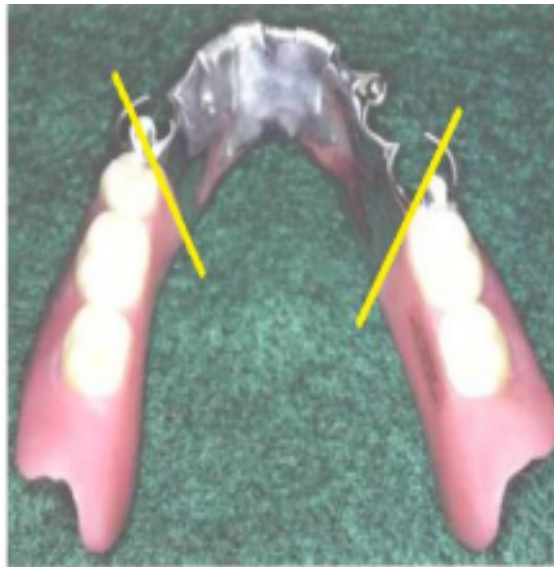
It is the junction of minor connector that join denture base to major connector.

The minor connector must be joined to the major connector in angle **not greater than 90°** , to ensure rigidity of acrylic denture base and to help lock the acrylic resin to the major connector. The acrylic resin denture base must join the major connector in a smooth, even fashion. Any irregularity or step between the two surfaces will irritate the tongue.

Types of finishing line

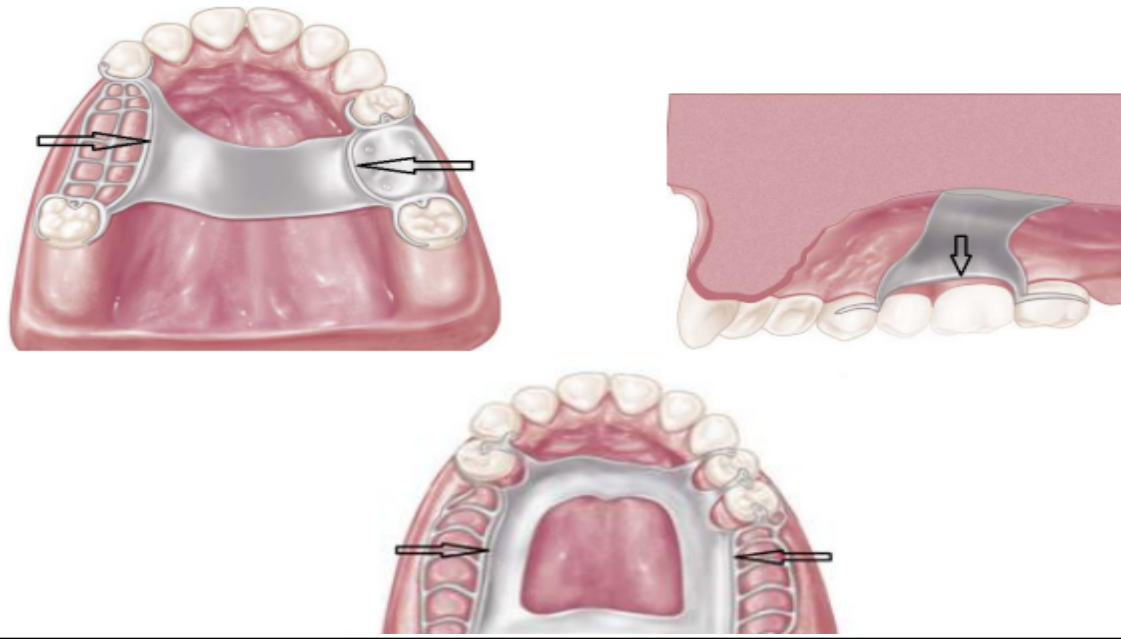
1. Vertical finishing line

It is the finishing line at the junction of ladder area and major connector in free end extension cases (Class I and Class II) in mandibular arch, and Class III or Class IV mandibular arch with labial bar major connector.



2. Horizontal finishing line

It is the junction of major connector and ladder area and it extends horizontally forming an undercut area that support acrylic resin that carrying artificial teeth, this type of finishing line is detected in all maxillary partial denture cases and in Class III and Class IV mandibular cases




Clasp making for partial denture

Dr. Saraa Almallah



INTRODUCTION.

- Various type of denture designed for partially edentulous patients using varieties of denture base material.
 - Although the cast partial dentures are more accurate and satisfactory, more of acrylic partial dentures are used because of its simplicity and various other factors.
 - The frequency of acrylic partial denture is more than 90 to 95% in routine clinical cases when compared to cast partial denture.
- 



Component of acrylic partial denture.

- Unlike cast partial denture, acrylic partial denture contains only
 - 1) Acrylic denture base
 - 2) Teeth
 - 3) Direct retainer(clasps).

Direct retainer.

- The components that engages an abutment tooth and in doing so resist dislodging forces applied to a removable partial denture

It is generally preferable not employ clasp to retain the partial denture unless natural retentive factors are exceedingly unfavorable

Clasps will strain the abutment tooth due to improper tooth preparation and clasp design.

Caries may develop beneath the clasp component, especially if the patient fails to keep the prosthesis clean.






CLASPS.

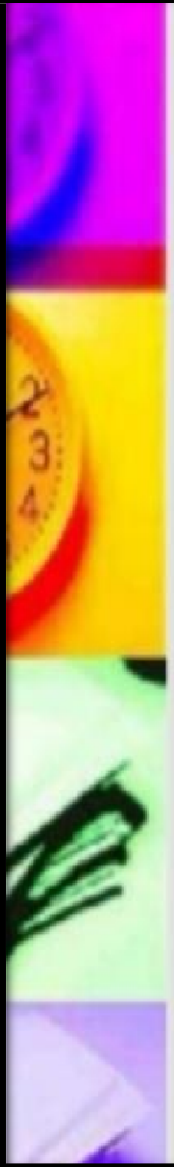
Clasp can be made either of wrought wire or castable clasp or combination of both .

The most common design employed is the simple circlet clasp with 18 gauge wire.

Material used for clasp.

wrought alloy wire is superior to cast by virtue of its internal structure. It is more flexible, minimum friction compared cast clasp.






Requirements of clasp design.

Retention ; to provide retention against dislodging forces.

The amount of retention is depends on Flexibility,

The amount of clasp arm that extends below the height of contour

The depth that retentive terminal extends into the under cut.

- 
- Flexibility.; it's a most variable factor in determining retention.
 - Greater the length greater will be flexibility
 - It is inversely proportional to the diameter of clasp.
 - Cross sectional form.
 - Material of the clasp; wrought alloy are more flexible when compared to cast alloy.

Design

- Clasps (Wrought wire 0.02")
 - Circumferential



Design

- Bracing
 - **Lingual/palatal major connector provides bracing**
 - **Contacts teeth at the heights of contour**



'Flipper'

- Slang - No Clasps



Criteria of clasp

Positioning of the clasp.

- Encirclement.; clasp should be designed to encircle more than 180° (more than half of the tooth.)
- Passivity. A clasp must be completely seated on a tooth to be passive.
- Location of the retentive tip.
- It should be placed such that resultant force should fall near center of gravity of denture.

Modification in clasp design.

- Double wire clasp.
Indicated when the gauge of the wire is less.
- Ball end clasp; when undercuts are not present for conventional clasp (0.040 inch).
- Zig zag shaped clasp; they also act as occlusal rest.
- Single wire clasp with blunt end. (thick gauge)



- Thank you