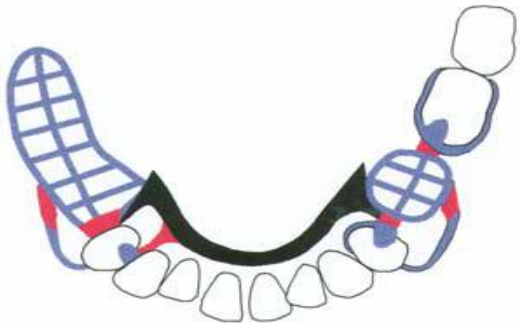
- ***Sheet no.: 5***
- ***Refer to slide no.:*** *2 (Dr. Nisreen) {All slides and picture had been included in the sheet.}*
- ***Written by:*** *Dalin Jihad and Aseel Ahmad*
- ***Corrected by:*** *Aseel Ahman & Dalin Jihad*

Minor connectors

The connecting link between the major connector of an RPD and other units of the prosthesis such as clasps, indirect retainers and occlusal rests



Functions of minor connectors

1- Connect the major connector to other parts of RPD

2- Transmit stresses evenly to all RPD components This is an abutment-to-prosthesis function of the minor connector

- It helps to transmit the forces in more than one direction to the major connector and the other parts of RPD, reducing the stress received by the abutment tooth. And vice versa; transmit forces from the prosthesis to the teeth.)

3- Transmit the forces acting on the prostheses to the edentulous ridge and the remaining teeth (therefore, must be rigid). ,this is a prosthesis-toabutment function of the minor connector.

- If it wasn't rigid, it would be flexible and would deflect under stress then create horizontal forces.

Types of minor connectors

- Joining the clasp assembly to the major connector.
- Joining the indirect retainer or the auxiliary rest to the major connector. (an indirect retainer is a basically a rest on the other side to achieve more retention, indirectly.)
- Joining the denture base to the major connector. (Acrylic to major connector, on the saddle area. The edentulous areas will have minor connector in a way according to classification [free end saddle, bounded…etc]. The acrylic will go over the metal covering the tissues then the teeth will come inside the acrylic. So, connecting the acrylic to the major connector.
- Approach arm in bar type clasp. (Bar type clasp is the one that comes gingivally approaching)

Minor connectors joining clasp assemblies to major connectors

- Should be broader buccolingually and thinner mesiodistally (strong but does not interfere with prosthetic tooth placement).
- Should be rigid enough to support the active component of RPD.
- Should have triangular cross section to facilitate teeth arrangements.
- Mostly located at the proximal surface of abutments adjacent to edentulous ridges. Otherwise, at the lingual embrasure to provide bulk but without being noticeble.
- It should conform to the interdental embrasure, *passing vertically* from the major connector so that the gingival crossing is abrupt and covers as little of the gingival tissues as possible. It should be thickest toward the lingual surface, *tapering* toward the contact area. The deepest part of the interdental embrasure should have been blocked out
- They should be designed to fit into the embrasure space so they are not visible.
- They arise at right angles from the major connector with a rounded junction.

General rule, the minor connect must never come halfway the lingual/palatal surfaces. By logic, components must be in a place least visible, and most comfortable for the tongue. Otherwise, it will cause irritation and discomfort to the tongue.

So, it should be placed interdental, in the embrasures. But not to the full depth of the embrasures, since it's a triangle and it will be impossible to place it there due to the tightness of these triangles. And also it will cause friction with the tooth movement. Usually, it's placed interdental spaces, we build it up by wax as not to reach full depth.

The bulk of the minor connector should be bucco-lingual, and thin mesio-distal, as if continuing the contour of tooth. No component coming out from the major connector is tilted or inclined. It must always be vertical.

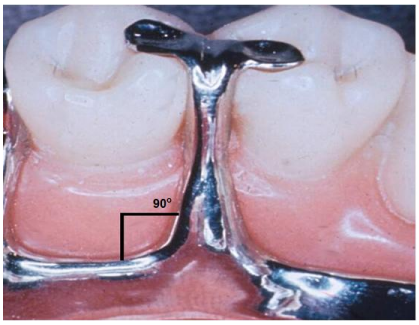
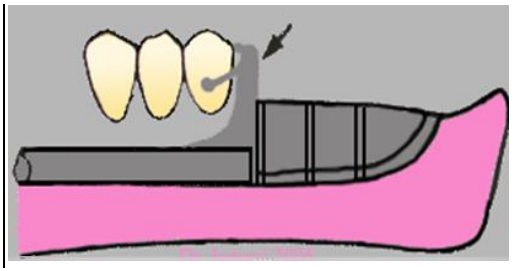
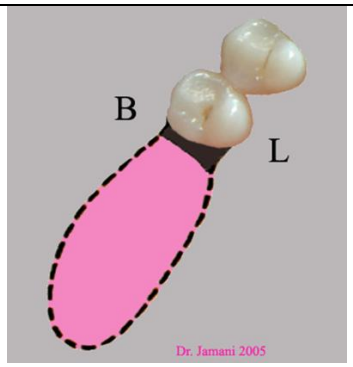
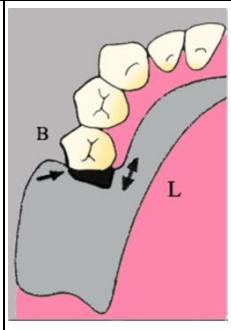
	

Figure 1: When major connector ends, the minor connector comes out vertically, at 90O to the major, to cover more tooth structure.	Figure 2: This is an I-bar, and the arrow points to the minor connector component, between the rest seat and the major connector..	Figure 1: Minor connector joining indirect retainer. All come interdentally, all have the same properties.
		
Figure4: I-bar helps to position the retentive tip. If the clasp was really short, it will not be flexible, since flexibility comes from length. The first part should be rigid, and long to give the right position retentive tilt.	Same	Same

Minor connectors joining indirect retainer or auxiliary rest to major connectors

- They function to provide indirect retention and support to the RPD

Minor connectors that serve as approach arms in bar clasp

- Help for the positioning of the retentive tip of the gingivally approaching clasp.
- Should display a smooth and even taper from origin to terminus and should not cross a soft tissue undercut
- Should have limited flexibility to aid in removal but sufficiently rigid to support the direct retainer.

Figure 2: I-Bar made from wax

Minor connectors joining denture base to major connectors

- Should be rigid to resist breakage of the denture base and to anchor the denture base. All types are rigid.
- Should allow proper arrangement of the denture base (with no interference).
- In distal extension upper RPD, should extend up to the maxillary tuberosity (usually to the most prominent part of the tuberosity). In the mandible should reach 2/3 of the retomolar part.
- In distal extension lower RPD, should cover 2/3 the length of edentulous area (2/3 of the retomolar part).

Here the circles part is the part where the acrylic will sit, it will not sit on major connector.

Forms of minor connectors joining denture base to major connectors

- Lattice work construction (Ladder)
- Meshwork construction
- Bead, Wire or Nail head minor connector (Rarely to be used)

Question: Which is better for acrylic? Which gives better acrylic packing, mesh or ladder?

Answer: LADDER

Mesh has smaller spaces.

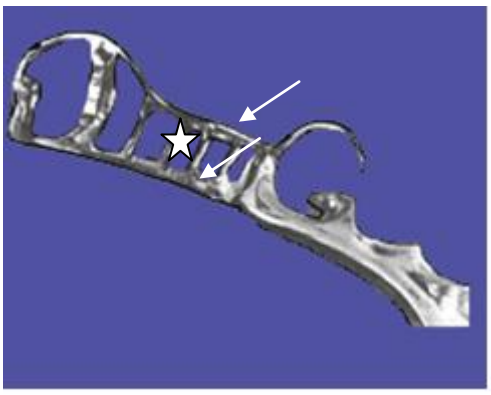
When we expect to have a lot of bone resorption, we need a relining by acrylic.

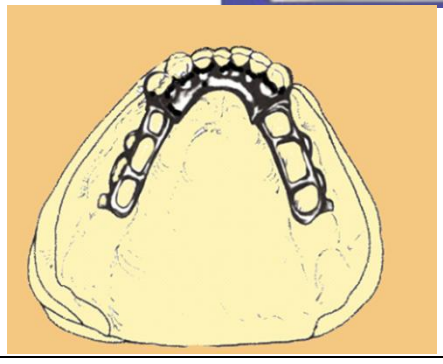
Class 1 and 2 have a higher probability for the bone to resorption so we use ladder type. Meshworks are placed in areas of low bone resorption such as class 3, low acrylic and high metal.

Lattice work construction

- Two longitudinal struts of metal (16 gauges) [Pointed at by arrows below] placed on the buccal and lingual slopes and connected by (12 gauge) struts [Stars]. No longitudinal struts at crest of the ridge to prevent interference with tooth placement or fracture of denture base. Number of transverse struts depends on space available and they are usually placed between the necks of teeth, to keep place for the bulf of the acrylic and teeth. Metal stopper: creates a space between framework metal and the tissue and be filled with acrylic.
- Relief is given between the struts and the ridge for acrylic base. This provides retention for the acrylic base (best retention among different types)
- Used whenever multiple teeth to be replaced and whenever the need for relining and rebasing is expected.
- Used for a long span.

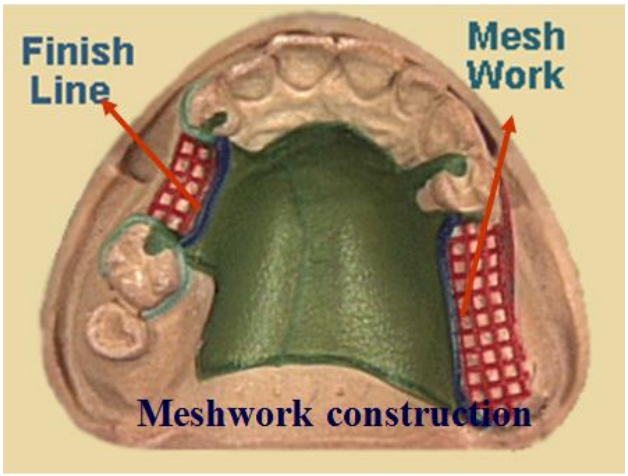
Below the minor connector which will be covered by acrylic there is a space.



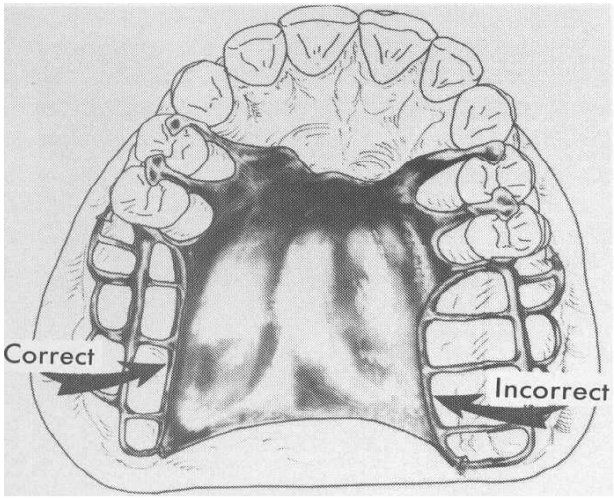


Meshwork construction

- Consists of sheet of metal placed over the crest of the ridge with small holes for retention of acrylic base.
- Used when many teeth are to be replaced but lattice is preferred.
- Can interfere with tooth arrangement.
- As the holes are smaller the retention to the denture base is weaker and packing of acrylic is more difficult. Relief and extensions are similar to lattice connector. Well retained but weak, due to many holes for packing the acrylic, which adds to retention, but limited packing leading to it being weak.
- Used when we have a short edentulous space, bounded saddle where we don't expect relining.
- Ladder has less retention, less holes but stronger due to large packing.



Notice the tiny spaces left for the acrylic to be placed in.

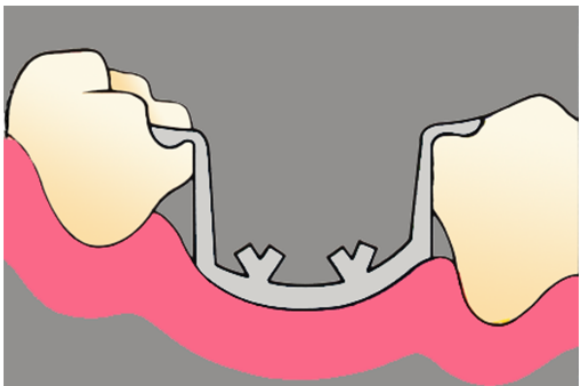


The incorrect area:
It is incorrect because they have extended the finish line to the flanges and there will never be acrylic there. This part should be covered by major connector. It should only be along the slope of the ridge.

Meshwork

Bead, wire or nail-head minor connector

- No relief is required.
- Indicated for short-span tooth supported RPD and for well-formed ridges.
- Relining is difficult.
- Weakest attachment with the overlying resin through surface projections.
- Allows better oral hygiene and thermal stimulation
- Rarely indicated.



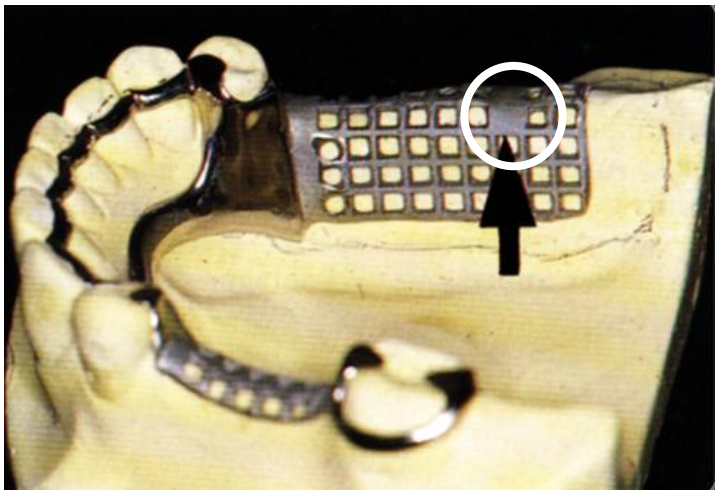
Looks as though extensions are coming out of it (nail- head). Relining Is difficult for lack of spaces. It is totally dependent on the upper part

Here they used it for a very short span, very few teeth.

Tissue Stops

Metal projections (2 x 2 mm), at the end of the meshwork or lattice minor connector used to stabilize the framework during packing of acryl and give adequate space for acrylic to flow in-between the framework and the tissue surface of the cast.

Tissue stops are integral parts of minor connectors designed for retention of acrylic resin bases. They provide stability to the framework during the stages of transfer and processing. They are particularly useful in preventing distortion of the framework during acrylic resin processing procedures. *Tissue stops should engage buccal and lingual slopes of the residual ridge for stability*



Arrow/ circle:
this is a clogged space, beneath it there's indentation to stop the metal from going in any further.

When we create metal frame, we place wax all over, and make a hole where we want the metal to stop. By that should achieve stability. Otherwise, it will keep rocking out of place.

Finish Lines

- The junctions between the acrylic denture base and the major connector.
- Acrylic resin should always meet the metal in a butt joint to provide sufficient bulk of acrylic to prevent its chipping. Look like steps on the internal and external metal surfaces.

Finish line will separate between the acrylic and the major connector, the margin is rolled creating a well-noticed step butt-joint). This also adds to the retention of the acrylic.

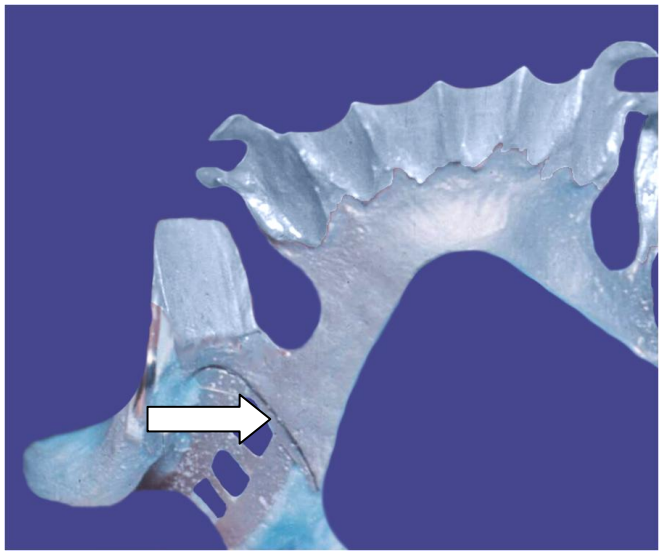
External finish line (EFL)

The Junction between the acrylic base and the polished surface of metal. Should be slightly sharp with an undercut to help lock the acrylic.

Internal finish line (IFL)

- The resin-metal interface created at the inner surface of the denture resulting from the space between the metal framework and the tissue surface of the cast during wax relief. Only created with mesh and lattice work minor connectors.

Same as external, but from the fitting surface.
They're not on the same level; the minor connector is slightly raised by the space created. This line will have acrylic placed upon. As if we made a finish line all around. If the two made an intimate contact with the tissues we won't have this line. Step will not be felt by patient since it will be covered by acrylic.



Denture Base

"The part of a denture that rests on the foundation tissue and to which teeth are attached."

Tooth-tissue supported (class I or II) RPD base:

- Contacts edentulous ridge in a way that provides support
- Acrylic base mandatory in mandibular arch; metal possible in maxillary
- Modified (loaded) anatomic form captured during impression procedure (functional form)
- -Maximum area of coverage needed for stress distribution

Tooth supported (class III or IV & modifications) RPD base:

- Only need contact with edentulous ridge
- Metal or acrylic base is possible
- Only need anatomic (unloaded) form of the ridge during impression procedure
- Convenience coverage of the edentulous area only
- Metal bases can be made of different materials, have better strength, adaptation, hygiene and thermal conductivity

DENTURE BASE -ACRYLIC

- Can be used in all RPDs
- It can be relined if the edentulous ridge area changes
- Attached to the RPD framework via mesh or lattice work
- Available in different shades

DENTURE BASE - METAL

- Can be used in mandibular class III or IV RPDs, maxillary class I-IV and modification areas
- Cannot be used in mandibular class I or II RPDs since it cannot be relined
- The acrylic material is attached using small plastic beads at the time of base wax-up

Denture Base

Will hold the teeth

Contacts the edentulous area

Mostly we use acrylic base but metal bases are available for maxilla

When we design the RPD one of the differences between classes 1&2 and classes 3&4 is the type of impression we make: for classes 1&2 we make functional impression, for classes 3&4 we use anatomical impression "a simple impression first we make a special tray then we take the impression "

Anatomical impression is used for classes 3&4. Why?? Because the support here comes from the teeth

Functional impression is used for classes 1&2 since in this case the support is from both soft tissues and teeth. The movement of the teeth in their socket is really limited comparing to mucosa so we have

to maximize the factors that will compensate for this difference and one way for this is using the functional impression "will be discussed later"

- Convenience coverage of the edentulous area only: coverage is depends on the amount of tissues to be replaced

A good thing about metal bases is the thermal conductivity but it's not a problem in cobalt because the major connector is metal "so that's not an indication to make the whole base metal!"

Acrylic bases can be relined while metal ones cant.

Relined means: after we give the patient the denture with time there will be changes like resorption of the ridge so the denture will undergo further sinking so we lost the intimate contact "there's a space" so we take a new impression on the same prosthesis " " /: وبنبطنها يعني بنعملالها بطانة to compensate for the more resorption

We can't add extra metal so metal denture bases can't be relined

In any case which we expect there will be resorption and a need for relining we use acrylic denture base

You have to think about the maintenance of your prosthesis

We can make adjustments on acrylic base but we can't on metal base

The acrylic denture base is acrylic

Acrylic bases are better than metal bases:

- Better esthetics: there's different shades for it
- Better bonding to the teeth: in metal you will need projections mechanical means to keep the teeth "

It's not common to use metal bases

Replaced Teeth

Functions:

- Prevent migration of the remaining teeth
- Restore masticatory efficiency
- Retain proper interarch space
- Maintain esthetics of a normal facial contour
- Achieve distinct enunciation
- **Types of Material:**
  - Acrylic

- Porcelain
- Metal

Acrylic denture teeth: standard teeth used on RPDs and CDs. Much easier to set and adjust than porcelain. Clinical wear helps dissipate occlusal forces.

Gold occlusal surfaces added to acrylic denture teeth opposite fixed partial denture gold occlusal surfaces to even out wear potential

Occlusal Cr surfaces on this maxillary class III RPD are an extension of the framework. Acrylic facings are placed on the buccal for esthetics. Metal is preferred with limited interarch space

Why do we replace the teeth in RPD?

- To restore the function and esthetics and to stop the movement or migration of the teeth and for phonetics "especially the anteriors".
- Notice that when someone have missing teeth "especially the anterior " for long time there will be protrusion and they will lose the original occlusion
- When there's missing teeth the load on other teeth will increase so we will have periodontal problems because of the high load

Porcelain denture teeth are rarely used since they are difficult to set. Porcelain facings as shown on right were used for many years but not now. The backing of the facing is framework metal with the facing adjusted to fit the buccal mucosa so no acrylic is associated with this area. The facings can come off during ultrasonic cleaning.
Full porcelain teeth can *abrade* opposing enamel or dentin. Porcelain has the *best aesthetics*.

** If you have limited interarch space, you don't use porcelain because it needs extra space to put the projection for mechanical retention.

Acrylic teeth are kinder on the tissue "if we have long span and the situation is compromised we don't use porcelain because it increases the load on the tissues".

Porcelain is better esthetically.

With porcelain, teeth produce clicking sound especially if the upper and lower are replaced with porcelain.

Acrylic teeth:

- Chemical bond to denture
- base material
- Easy to grind during occlusal adjustment
- Do not wear natural, artificial opposing teeth
- Easily repolished
- Compatible with denture base material
- Stain over time
- Easily wear

Porcelain teeth:

- Better esthetics
- Biocompatible
- Mechanical retention to denture base
- Difficult to adjust
- Produce clicking sound
- Wear opposing natural teeth
- Transmit greater forces to supporting tissue
- Heavy