

REMOVABLE PROSTHODONTICS



DENTISCOPE

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Complete denture



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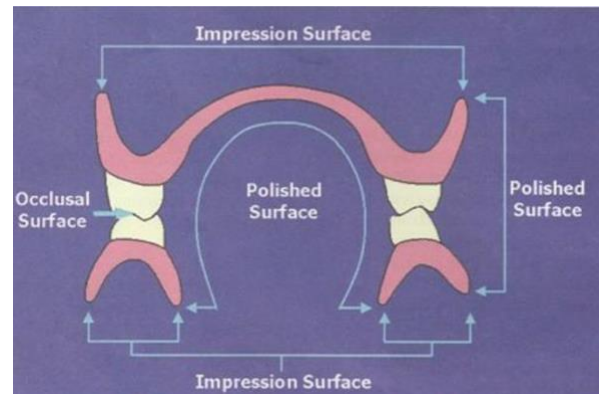


Functions of complete dentures:

- Restore function
- Improve aesthetics and speech
- Preserve supporting tissues

Surfaces of a complete denture:

- 1- Impression surface [fitting surface]: has a contour determined by the impression
- 2- Polished surface: the polished part (buccal and lingual surfaces)
- 3- Occlusal surface: the surface that contacts the antagonist



TERMS:

- Retention : Ability of the denture to resist movement away from the tissue specially in a vertical direction.
- stability: ability to resist horizontal movement
- Support: ability to resist tissue ward movement

Decreased OVD leads to:

- 1- Facial disharmony
- 2- Angular chelitis
- 3- TMJ disorders
- 4- Protruded chin
- 5- Vermilion border appears thin
- 6- Wrinkles around the lips

After tooth loss → alveolar bone resorbs (this is more obvious when multiple teeth are lost)

Mandible resorbs at a rate 4:1 compared to the maxilla

Bone resorption is more rapid in the first 6 months then occurs slowly over many years.

Q: why does the maxilla appear small in size and the mandible wider after resorption?

- Resorption in the maxilla occurs vertically + labially → maxilla is smaller
- Resorption in the mandible occurs vertically + lingually → mandible is wider

Complete dentures steps

Patient visit

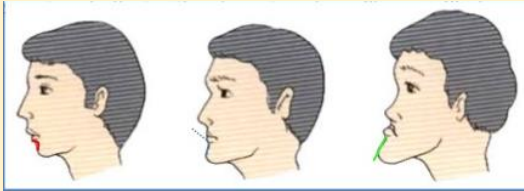
- 1- Primary impression
- 2- Final impressions
- 3- Jaw relation
- 4- Denture try in
- 5- Denture delivery

Lab procedure

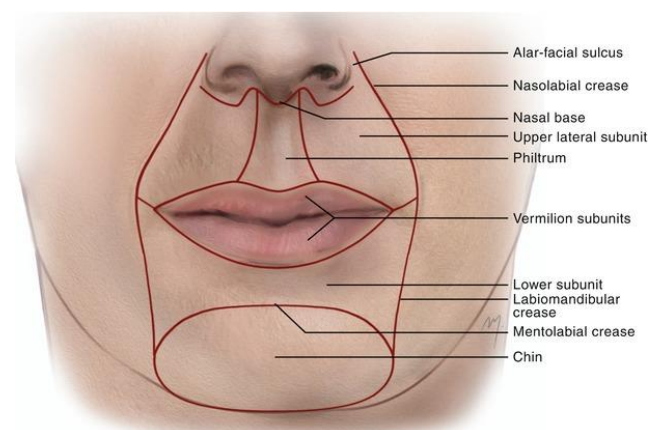
- Primary casts + special tray fabrication
- Master casts + record base fabrication
- Arrangement of anterior + post teeth



ANATOMICAL LANDMARKS FOR COMPLETE DENTURES

Landmark	Notes	Changes after tooth loss
Vermillion border	Transitional epithelium between mucous membrane of lip and skin	Disappears in the upper lip and gets accentuated in the lower lip
Philtrum	Diamond shape area between base of the nose and the upper lip	Becomes flat
Nasolabial angle	Angle b/w columella of the nose and the philtrum (normal is 90°)	
Nasolabial sulcus	Depression that extends downward and laterally from the nose to the corner of the mouth Affected by: Labial flange Ant teeth position OVD	Becomes deeper and more prominent
Mento- labial sulcus	Runs horizontally from side to side between the lower lip and the chin – it's curvature indicates maxilla- mandibular relationship  Class II angle Class I angle Class III angle	
Interpupillary line	Imaginary line b/w the 2 pupils – used to establish the ant occlusal plane	
Ala tragus line [camper's line]	An imaginary line running from the inferior border of the ala of the nose to the superior border of the tragus of the ear – used to establish post occlusal plane	

- Anterior occlusal plane of artificial teeth is established by the Interpupillary line.
- Posterior occlusal plane of artificial teeth is established by the camper's line or ala tragus line.





MAX. SUPPORTING AREAS (STRESS BEARING AREAS)	Residual alveolar ridge	Primary stress bearing area Crest of the ridge = the highest continuous surface of the ridge Can be U, V, round or flat
	Hard palate	Primary stress bearing area Formed by the palatine process of the maxilla + palatine bone
	Maxillary tuberosity	Medial and lateral walls of the max tuberosity resist horizontal and torquing forces Maxillary denture should cover the max tuberosity and fill the hamular notches
	Mucous membrane	Mucosa + submucosa Act as a cushion between the denture and the bone
MAX. RELIEF AREAS	Incisive papilla	Fibrous CT over the incisive foramen – immediately behind the central incisors Used for correct placement of artificial central incisors Should be relieved to avoid compression on the nerve bundle which can lead to burning sensation
	Median palatal raphe	The area where the 2 palatine processes join together Improper relief leads to denture instability
	Palatal rugae	Dense CT radiate from the median suture in the anterior 1/3 of the palate <u>Secondary stress bearing area + denture stabilizing area</u> <u>Associated with phonetics</u>
	Torus palatinus	Bony enlargement – large → remove surgically small → relieve the denture
	Fovea palatina	Bilateral indentations near the midline of the palate formed by the coalescence of several mucosal gland ducts (on the soft palate)
MAX. LIMITING STRUCTURES	Labial frenum	Just mucous membrane – no muscle V shaped notch should be recorded during impression Notch should be wide + deep to accommodate labial frenum
	Labial vestibule	Outer surface is formed by orbicularis oris
	Buccal frenum	Influenced by 3 muscles: Orbicularis oris (forward) Buccinator (backward) Caninus (position)
	Buccal vestibule	Size of the vestibule varies with: Contraction of the buccinator Position of the mandible Amount of bone lost from the maxilla **during impressions adequate depth and width of the sulcus should be recorded
	Hamular notch	Distal limit of the buccal vestibule (located bw max tuberosity and hamulus of medial pterygoid) Tensor veli palatine muscle runs horizontally through this notch Notch aids in achieving posterior palatal seal
	Posterior palatal seal	ST at the junction of the hard and soft palate (pressure within physiological limits aids in retention of the denture) Ant= Ant vibrating line / post = post vibrating line / laterally = 3-4 mm antero lateral to the hamular notch



MAND. SUPPORTING AREAS (STRESS BEARING AREAS)	Residual alveolar ridge	Cancellous bone - Primary stress bearing area
	Buccal shelf area	Primary stress bearing area (lies at right angles to vertical forces) Cortical bone Boundries: Medially – crest of the ridge/ laterally – external oblique ridge / distally – retromolar pad
MAND. RELIEF AREAS	Mental foramen	When resorption happens the mental foramen becomes closer to the alveolar ridge Should be relieved to avoid compression on the nerve bundle which can cause numbness of the lower lip
	Mylohyoid ridge	On the lingual side of the mandible might become closer to the crest of the ridge as a result of resorption ** sharpness of the ridge can be masked by the overlaying mucosa Should be relieved
	Mandibular tori	Bony enlargement on the lingual aspect on the mandible in the premolar region Small → relief large → surgically remove
	Genio tubercles	On the lingual aspect of the mandible – attachment of the genioglossus and geniohyoid muscles With bone resorption might become closer to the ridge and must be relieved
MAND. LIMITING STRUCTURES	Labial frenum	Should be recorded as a v notch on the impression – contains fibers from the orbicularis oris + mentalis muscle
	Labial vestibule	
	Buccal frenum	Fibers of the buccinator muscle are attached to the frenum Can be single or double (U or V shaped)
	Buccal vestibule	Impression is widest in this region Extent of the vestibule is affected by the buccinator muscle
	Lingual frenum	From the superior genial tubercles to the base of the tongue High lingual frenum is called – ankyloglossia (tongue tie)
	Alveolingual sulcus	Space between the residual ridge and tongue - from the lingual frenum to retro mylohyoid curtain Anterior = called sublingual crest Middle = called mylohyoid vestibule (largest portion of the lingual vestibule) Posterior =called lateral throat form or retromylohyoid fossa (should give S shape in proper impression)
	Retromolar pad	Mucous glands + loose CT Muscle attachments: Posteriorly= temporalis tendons Laterally = buccinator Medially= pterygomandibular raphe +superior constrictor of the pharynx



Complete denture diagnosis and examination

Q: how and what would you gather from a CD patient before you start tx ?

- 1- Personal information (name,age,gender,address etc..) **patient expectations differ with sex.

Why do you need to record pt's age? Because neuromuscular coordination and adaptability decrease with increasing age + oral and facial tissues lose elasticity and resiliency + know diseases related to age

- 2- Chief complaint (in their own words) – this also allows you to see if the pt's expectations are realistic
- 3- Medical history + dental history (number and type of previous dentures- pt with multiple previous dentures = poor prognosis , how long have they been wearing dentures reasons for replacement and expectations)
- 4- Examine current denture to know pt's level of oral care and knowledge and if there are any parafunctional habits
- 5- Pre extraction records (photographs, radiographs, casts etc..) – those records will be used to restore anterior aesthetics and facial support + evaluate OVD

HOUSE classification of mental attitudes of patients

- 1- **Philosophical** : the ideal patient, easy going, cooperative and optimistic (good prognosis)
“ do what you think is best for me”
- 2- **Indifferent**: least concerned about their oral health, not cooperative and avoid tx (poor prognosis)
“ how is your new denture? I couldn't care less”
- 3- **Exacting patient**: demanding and high expectations, you need to explain tx details, often not satisfied with previous tx , very precise and accurate **once satisfied becomes very supportive**
“ doctor make sure you do this or double check that”
- 4- **Hysterical**: nervous and apprehensive, unrealistic expectations, emotionally unstable, poor health and poor motivation (poor prognosis)
“ stop it doctor, you are hurting me”

Q: what systemic factors can affect CD tx? Anemia, diabetes, xerostomia , arthritis



Extraoral examination	Intraoral examination
1- Facial form: square , tapered , ovoid 2- Facial profile : retrognathic/ prognathic 3- Lips: cracking / ulcerations on the corners → vit B deficiency or candida infections or overclosure of the current denture (decrease in OVD) Pts with short upper lips → expose all upper ant teeth and some of the labial flange 4- TMJ : notice clicking/ popping, deviation on mouth opening and any tenderness in the joint or muscles of mastication	1- Arch size : determines basal seat available (the greater the size the greater the support and retention) Class 1 = large class 2= medium class 3 = small 2- Arch form: square, tapered, ovoid (the arch form might be different in each arch → this creates problems in tooth arrangements) 3- Ridge contour: Max ridge forms- • Class 1 = U shaped (best) • class 2 = V shaped (not favorable retention) • class 3 = flat (most difficult) Mand ridge forms- • class 1 = inverted U (parallel walls with broad crest) • class 2= inverted U (short and flat crest) • class 3 =inverted W,V or V with undercut 4- ridge relation: • normal = mand ant ridge segment is directly under max ant ridge segment or slightly behind it • class 2 = retrognathic (mand ant segment is posterior to max segment) • class 3 = prognathic (mand ant segment is ant to max segment) 5- ridge parallelism: unparallel ridges will cause movement of the bases because of un favourable direction of forces 6- interridge space = should be 20 mm • class 1= ideal • classs2 = excessive space • class 3 = insufficient space 7- mucosa : • class 1 = healthy • class 2 =irritated • class 3 = pathologic 8-saliva: • class 1 = normal • class 2 =excessive [makes impressions difficult] • class 3 = xerostomia [retention of the denture is affected] thin serous saliva is the best to work with



	8- Tongue: if the patient has been edentulous for a long time → tongue becomes large and powerful [jeopardize impression taking and denture stability] Small tongue → jeopardize the lingual seal 9- Redundant tissue : flabby tissue will cause denture to shift and move when force is applied – redundant tissue needs to be removed surgically 10- Prescence and size of tori (torus plaatinus / mandibularis) 11- Position of muscle and frenal attachments: unfavourable frenal attachments need to be surgically corrected to have proper border seal ** most commonly corrected frenum are max labial and mand lingual 12- Radiographical examination: Look for any defects in bone , enlargements Unerrupted teeth , root remnants Examine amount of ridge resorbtion
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Gypsum material

Gypsum:

- Dental plaster (gypsum type 2) = β form of calcium hemihydrate
- Dental stone (gypsum type 3) = α form of calcium hemihydrate
- Working time: from when you start mixing until the consistency of the material can't be used anymore
- Setting time: time until the material hardens into its permanent form .
Initial setting time: you can still carve soft material with a knife
Final setting time : the cast is hard enough to be worked on – indicated by the cast being warm

Setting time is measured by the ability of the material to resist penetration by a needle (vicat & Gillmore needles used)

- Accelerators and retarders affect setting time.

FACTORS AFFECTING SETTING TIME OF GYPSUM MATERIAL:

- 1- Adding accelerator (potassium sulphate) or adding retarder (borax)
- 2- Increasing mixing time will decrease setting time (crystals will break by mixing → more nuclei for crystallization)
- 3- Increasing W:P ratio will increase setting time but decrease hardness
- 4- Higher temp (37.5 °) → increase setting time [100° C → will not set at all]

When dental plaster / stone is mixed with water – **calcium hemihydrate changes into dihydrate** (exothermic reaction- highest temp when there is final hardening of the mixture)

Types of gypsum (same chemical structure but differ in physical properties)

Type 1	impression plaster	• For CD patients • Highly fluid when it is first mixed (requires special trays) • Used in patients with flabby ridges
Type 2	dental plaster	Beta hemihydrate White irregular particles Used to make study models
Type 3	dental stone	Alpha hemihydrate Yellow uniform particles
Type 4	dental stone	high strength, low expansion (die stone)
Type 5	dental stone	high strength, high expansion

- Acceptable gypsum expansion = 0.03 -0.1 mm
- Gypsum can be mixed by hand or by machine (faster)

Q: if you are mixing gypsum by hand why should mixing between powder and water be done vigorously?
To ensure no air entrapment in the mix

Water : powder ration = ml of water to 100 g of powder



Stone = 30 ml: 100 g

plaster = 50 ml : 100 g

Hygroscopic expansion: expansion of gypsum due to absorption of water from air [this is why the container should always be closed]

Normal expansion : **stone = 0.1%**

plaster = 0.4%

During pouring alginate impressions vibration is done to allow flow of material + prevent entrapment of air and bubbles

After pouring you wait 45-60 mins to remove (early removal can fracture the cast)

Edges of the alginate should not be allowed to dry after pouring → they become hard and inflexible and increase risk of fracture



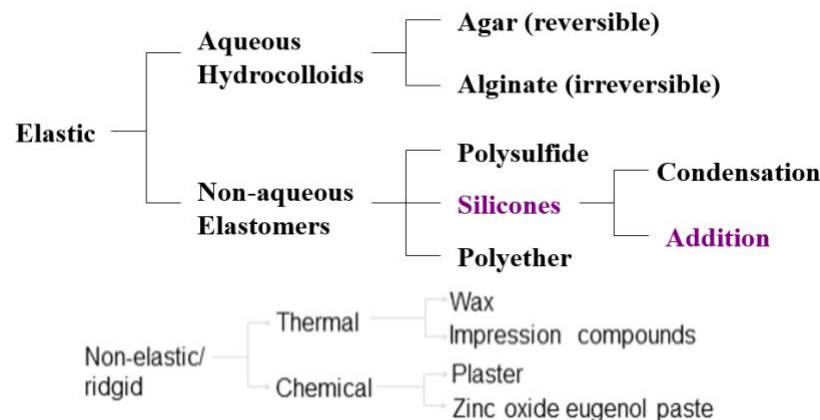
Impression materials

- Impression = -ve replica of teeth
- Cast / model = +ve replica of teeth

Requirements of ideal impression material:

- 1- Easy to manipulate + Adequate flow
- 2- Good dimensional accuracy and strength to resist perm deformation during removal
- 3- Acceptable setting time
- 4- Non toxic/ non irritating to the pt
- 5- Adequate shelf life + no degradation during disinfection

Impression materials:



Elastic – aqueous hydrocolloids :

Agar:

- **reversible** (gel can change to paste by heating , then can change back to gel by cooling)
- major component is **seaweed** – comes as **collapsible tubes**
- **you boil it at 100° C for 10 mins then store at 65°C for 10 mins then temper at 43-46° C 5-10 mins before you take the impression**
- **agar can be stored at 65°C for 5 days before it has to be reboiled again**

Alginate:

- **irreversible** -comes in **bulk or pre weighted packets**
- principle agent is **potassium alginate**
- **potassium alginate reacts with calcium sulfate to form calcium alginate (gel)**
- **easy to manipulate + cheap + does not require equipment**
- normal setting = 2-4 mins (working time = 1-2 mins, spatulation time = 1 min)
- fast setting = 1-2 mins (working time = 1.15 mins, spatulation time = 30-45 sec)
- hot water → decrease working and setting time



- increasing W:P ration → increase setting time
 - > what important areas should be recorded in impressions?

all teeth + alveolar process + (retromolar pad in lower arch / hamular notches in upper arch)

- > how do you select the proper tray ?

upper arch: tray should cover max tuberosity + all teeth + be 4 mm wider than the most apical portion of the alveolar process at the molar region + incisors should contact the flat arch of the tray.

Lower arch: tray should cover retromolar pad + all teeth + be 4 mm wider than buccal and lingual portions of the anterior teeth.

Modifications of the trays are done using soft wax to add to the heights of any of the flanges or add to the palate in case of deep palatal vaults.

Impression disinfection: 2% glutaraldehyde or 0.5% sodium hypochloride

Set alginate contains water

- Syneresis : water evaporation if the impression is placed in air and the impression shrinks
- Imbibition : water absorption if the impression is placed in water and it expands

Thermal – non elastic rigid impression materials:

1- Waxes: can be natural or synthetic

Pattern wax: used to create a model of a dental restoration that will be cast using lost was technique (inlay wax, baseplate wax, casting wax)

Processing wax: for models, impressions and soldering

- **Boxing and utility wax:** for pouting impressions (the red wax strips we use to adjust trays)
- **Sticky wax:** to assemble pieces temporarily together
- **Corrective impression wax:** used as a wax veneer over an original impression to register details of soft tissues in a functional state
- **Bite registration wax**

2- **Impression compounds:** cakes / sticks [what we use for border molding is impression compound]

Chemical – non elastic rigid impression materials:

1- **Impression plaster: (gypsum type 1)**

- Final impression material for CD + mount casts on articulator
- Used for patients with flabby ridges
- Needs special tray – poured using separating agent
- Very brittle
- Sets faster than model impression plaster
- Can't be used in pts with **xerostomia** (absorbs moisture on the surface of tissues allowing intimate contact b/w material and tissues) and **undercuts** (because it is very brittle and can fracture easily)



2-Zinc oxide eugenol :

2 tubes = one contains zinc oxide and the other contains eugenol – equal lengths of both tubes are mixed together until you get uniform color over an oil impervious paper or a glass slab.

ADVANTAGES	DISADVANTAGES
• <i>Can be checked in the mouth repeatedly without deformation</i> • <i>Minor defects can be corrected</i> • <i>Doesn't require separating medium like impression plaster</i>	• Needs special tray • Sticky and adheres to the tissue • Eugenol causes burning and irritating to the tissue

The stone model made from ZOE is removed using hot water for 10 mins

Setting time = 3-5 mins

- Longer mixing time/ high temp and humidity = shorter setting time
- Cooling the mixing slab and spatula = longer setting time

Elastic – non aqueous hydrocolloids:

1- Polysulfide: [used for removable and fixed prosthodontics]

- 2 tubes – mix together equal lengths
- Has a by product of water
- Catalyst = lead dioxide
- Used with special tray + adhesive

ADVANTAGES	DISADVANTAGES
• <i>Long working time</i> • <i>Flexible + high tear strength</i> • <i>Cheaper than polyether and silicones</i>	• Bad odor and can stain clothes due to lead dioxide • Can't be used if pt has undercuts • Poor long term stability (because of water by product) • Long setting time • Deformation after removal (poured within 7-15 mins)

2- Condensation silicone: [for removable and fixed prosthodontics]

- Has ethyl alcohol byproduct
- Can be paste or putty-putty
- Bad odor from alcohol by product
- Poor dimensional stability due to evaporation of ethyl alcohol

3- Addition silicone:

- Can be putty – putty or 2 cartridges
- Light, medium, heavy body and putty
- Pastes = low molecular weight silicone **with vinyl groups**
- Putty = low molecular weight silicone with **silane hydrogens**
- Stock tray = use heavy + light body custom tray = use medium + light body



- Can be poured multiple times up to one week
- Sulfur in latex gloves or in ferric / aluminum sulfate retraction solutions → inhibit polymerization
- Possible hydrogen release which causes bubbles on the die – palladium is added to absorb the H₂ gas

4- Polyether:

- Bitter taste
- Can be poured multiple times
- Stiff and difficult to remove from undercuts (cast breaks when u remove it from the tray)
- Absorbs moisture – can't be immersed in disinfecting solutions or stored in an area with high humidity

Material	Setting time
Fast setting alginate	1-2 mins
Normal setting alginate	2-4 mins
Zinc oxide eugenol	3-5 mins
Addition silicone	3-7 mins
Condensation silicone	5-7 mins
Polysulfide	8-12 mins



Primary impressions

Primary impressions are made to fabricate a primary cast for diagnosis and fabrication of a special tray.

Impression materials for primary impressions

Impression compound

Non elastic rigid (thermal) impression material

Softened over flame or in hot water then pressed against the tissue until it cools

Used with non perforated trays

Adv:

- 1- Minimal danger of aspiration
- 2- Can be stored for a long time without distortion
- 3- Can be corrected by adding small amounts of impression compound

Types:

Type 1 Low fusing – green stick compound for border molding

Type 1 Medium fusing – impression compound for primary impressions

Type 2 high fusing compound – tray compound to make special trays

Q: how do you choose the size of the tray?

Either try the tray it inside the patient's mouth or by using calipers to measure the retromolar pad area in the mandible and the greatest width in the maxillary tuberosity in the maxilla

Q: what are common mistakes in the primary impressions?

- In adequate extension of the tray
- Not registering all the important anatomical landmarks
- Excess material or insufficient material
- Material not extending to the full depth of the vestibules

Q: what causes deficiency of material in the labial sulcus? Not lifting the lip and allowing the material to flow into the depth of the sulcus.

Irreversible hydrocolloids (alginate)

Elastic aqueous impression material

Powder and water mixed together

Used with perforated trays

Adv:

- 1- **Greater accuracy of surface details**
- 2- **Better flow properties – used in case of undercuts or easily displaced tissues**



Special trays

Special trays are made from the diagnostic cast after pouring the primary impression.

Purpose of taking an impression with a special tray:

- 1- More accurate impression (border molding → more accurate retention)
- 2- Prevent tissue distortion (more accurately adapted tray , less viscous material)
- 3- Minimize impression material distortion by using a rigid tray
- 4- Minimize cost by using less impression material

Special tray material requirements:

- Easy and safe to handle
- Biocompatible
- Rigid enough

Q: what materials are used to make special tray?

- Cold cured acrylic [easier to adjust once set , because it is softer than light cure resin]
** working area should be under proper ventilation to control fumes from polymerization reaction
- Light cured resin
- Other thermoplastic material [not suitable for border molding]

Q: what are the extensions of the special tray?

- The special tray should cover the entire denture base area + retromolar pad and hamular notches
- Be 2-3 mm short of the sulcus to allow border molding
- Lingual extension in the lower should stop at the mylohyoid line posteriorly and the junc with the floor of the mouth anteriorly

Q: what is the function of the tray handle? Where should it be placed?

Allow holding the special tray + preventing encroachment on the tissue during impressions – should be placed anteriorly so it does not interfere with border molding (where the wax rim or the anterior teeth will be placed in the future)

Q: what is a spacer used in complete denture?

A space for future impression material used [accommodates the thickness of the material] made by adapting wax on the cast before making the special tray.

- Zinc oxide eugenol – no spacer needed
- PVS, poly sulfides, polyethers → 2-3 mm spacer

Q: what is the thickness of the special tray? Thickness depend Uniform 2 mm thickenss to avoid distortion



Special trays for complete dentures should be made without perforations to ensure good peripheral seal with border molding, perforations using round bur #8 to retain impression materials can be made after border molding. Another way to retain the impression is using tray adhesives

Q: what are some mistakes in special tray fabrication?

- Border extensions are longer or shorter than needed
- Flexible tray due to insufficient thickness
- Handle position is wrong (interferes with border molding)
- Rough edges

Border molding and secondary impressions

Q: what is Border molding? Recording the depth and the width of functioning sulcus using green stick compound (type 1 low fusing impression compound) placed on the special tray.

Q: what impression materials can be used for secondary impression using special tray ?

- 1- **Impression plaster** – powder + water
easily broken when removed from patient's mouth, used with **flabby ridges cases**
- 2- **Zinc oxide eugenol paste** – 2 pastes (base paste containing Zinc oxide, catalyst paste containing eugenol)
Rigid when set - ** do not use with bony undercuts and dry mouth
Very long setting time
**** no need to add spacer in special tray****
- 3- **Elastomeric impression material** – polyether, polysulfide, silicones (addition and condensation)
Need spacer

Q: what is used for border molding and what are the techniques ?

Low fusing impression compound (greenstick)

- Incremental using tracing compound (record each area separately)
- One step technique using rubber base impression material (record all areas together)

**** during border molding the spacer is left in the special tray because it allows the tray to be positioned correctly over the ridge**

Flanges of the special tray should be reduced 2 mm .

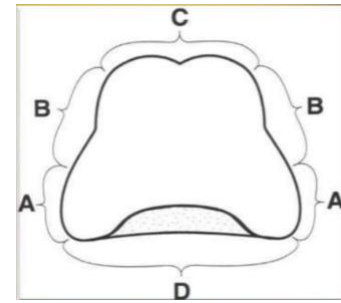
The vibrating line is recorded as the pt says a series of ahs.



Q: suggested order of border molding:

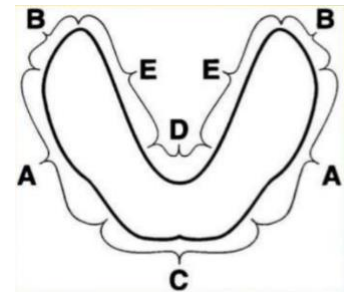
Maxillary tray

- 1- Distobuccal flange → move check out, down and in + ask the pt to open wide and smile then pucker
- 2- buccal frenum area → move check out, down, in + forward and backward
- 3- anterior region → massage the lips, move lips out and down ask pt to smile and pucker
- 4- posterior palatal area → ask pt to make multiple ahs



Mandibular tray

- 1- buccal flange → move the check out, up and in + backward and forward
- 2- masseteric groove and posterior border → pull the check buccally + up and in + ask the pt to exert closing force while the dentist exerts downward pressure on the tray
- 3- anterior region → lift the lip out, up and in
- 4- anterior lingual flange → ask the patient to protrude the tongue then push the tongue against the front part of the palate
- 5- retromylohyoid area → ask the pt to protrude the tongue to activate the mylohyoid muscles and raise the floor of the mouth + ask the patient to make the K sound



**** small defects in the impression can be corrected by beading wax, large air bubbles can be corrected by putting impression material and reinserting it inside the pt's mouth**

Posterior seal area

Posterior palatal seal area = soft tissues along the junction of the hard and the soft palate on which pressure within the physiological limit can be applied by the denture to aid in retention of the denture.

Q: importance of the posterior palatal seal area ?

- 1- enhance retention of the max denture
- 2- reduce food accumulation
- 3- reduce gag reflex [no space bw the denture and the soft palate during function]
- 4- compensate the volumetric shrinkage that occurs during the polymerization of the resin
- 5- reduce pts discomfort when the tongue touches the posterior aspect of the denture

Q: what are the extensions of the posterior seal area ?

Pterygomaxillary seal extends through the pterygomaxillary notch – extend medially from one tuberosity to another. [PSA is between anterior and posterior vibrating line]

PSA is narrow in the central part – wider laterally and then narrow again as it approaches the hamular notches



Average depth of the PSA = 1 mm

Anterior vibrating line: imaginary line at the junction of attached tissue overlaying hard palate and slightly movable tissue immediately adjacent to soft palate.

Anterior vibrating line is not straight because of posterior nasal spine projection.

Posterior vibrating line: imaginary line at the junction of the aponeurosis of the tensor veli palatine muscle + the muscular portion of the soft palate

Design of the PSA:

- 1- **single bed**
- 2- **double bed**
- 3- **butterfly**
- 4- **butterfly with posterior bed**

Q: how can you record the posterior palatal seal area ?

- 1- **conventional method** : during trial bases
PSA is marked with indelible pencil → insert trial base inside patient's mouth – markings will be transferred to the trial base → trim till the posterior vibrating line → seat trial base on the cast and mark the PSA area on the cast and scrap it to a depth of
1-1.5 mm in the area of the PSA on both sides of the mid palatine raphe
0.5- 1 mm in the mid palatine raphe
Anterior border of PSA should blend with the palatal tissue
- 2- **fluid wax technique** : immediately after final impression
used with ZOE or impression plaster because the wax adheres well to them
mark the anterior and posterior vibrating lines inside pts mouth → markings transferred to the secondary impression → place melted IOWA wax in the PSA outline on the impression → resinsert the impression into the mouth with gentle pressure
- 3- **arbitrary scraping on the cast [least accurate]**
visualize the anterior and posterior vibrating line inside the mouth and mark them on the cast
→ scrap 0.5 – 1mm on the cast

Q: what are the common mistakes in recording the PSA?

- **Under extension-** most common [caused by excessive trimming of the PSA]
- **Over extension** → can lead to ulcerations and painful swallowing
- **Under post damming** [due to improper head and mouth positioning]
Corrected by repeated the fluid wax impression with the correct head position or scrape more in the PSA region
- **Over post damming** [most commonly in the **hamular notch region**] happens due to excessive scraping on the cast]
Corrected by selective reduction of the denture border with a carbide bur followed by light pumice in the area.



Record base and wax occlusal rim

Record base

An interim denture that supports the occlusal wax rim and used to record the maxilla- mand relationship

**** in accurate baseplate = inaccurate maxilla mand relationship records**

Requirements:

- 1- **Fit accurately on the master cast**
- 2- **Smooth , no voids or porosities**
- 3- **Rigid , does not rock on the cast and is well retentive**
- 4- **1-2 mm thick**

Materials use to make record base/ base plates:

Temporary – will be later discarded and will not be included in the final denture

- 1- **Shellac baseplate**
- 2- **Reinforced shellac baseplate**
- 3- **Light cured acrylic**
- 4- **Chemical cured acrylic**

Permanente – will not be discarded later and will become part of the final denture

- 1- **Metals (gold, cobalt chromium , titanium)**
- 2- **Heat cured acrylic**

Functions of the record base:

- 1- **Support occlusal rim**
- 2- **Record centric relationship**
- 3- **Make trial dentures**



Occlusal wax rim

Occlusal surface fabricated on the baseplate to record maxilla- mandibular relationship and arrange teeth

Requirements:

- 1- Curvature of occlusal rim should follow curvature of the ridge
- 2- Should be placed on the crest of the ridge
- 3- Securely attached to the base
- 4- Contoured properly to support cheek and lips
- 5- Surface should be flat and smooth

Materials used to make occlusal rims:

- 1- Ready made horseshoe wax
- 2- Base plate wax

Functions:

- 1- Establish occlusal plane and vertical dimension
- 2- Establish proper cheek and lip support
- 3- Record max- mand relationship
- 4- Arrange artificial teeth





You start adjusting the Maxillary occlusal rim:

- Maxillary occlusal rim should be slightly facial to compensate for ridge resorption
- Inferior border of the upper rim should be visible 2-3 mm below the upper lip
- Edge of the upper rim should touch the wet line of the lower lip when the pt says F , V sounds or count 50-60
- Lips = unstrained , NLA = 90 , philtrum = depressed , vermilion border = showing
- Foxplane can be used to adjust occlusal planes
- anterior plane = parallel to interpupillary line / posterior plane = parallel to camper's line

Q: what markings should you make on the wax rim? Midline , canine lines, smile line

****** you first adjust the maxillary wax rim then you insert the mand rim and adjust:

- 1- freeway space (2-3 mm)
- 2- occlusal vertical dimension
- 3- Resting vertical dimension

Adjusting the lower rim:

- Anterior height = even with the corners of the mouth when the lips are relaxed
- Posterior height = intersects $\frac{1}{2}$ - $\frac{2}{3}$ of the retromolar pad

Occlusal rim relationships:

- 1-2 mm horizontal overlap in anterior and posterior in centric relationship
- Proper lip support
- Upper and lower rims should contact evenly

2 sharp v shaped notches of 1-2 mm depth in the premolar / molar area

Bite registration: thin layer of PVS material – no excess material should be on the side (excess material on the sides will cause deflection when checking the record)

Bite registration materials

- 1- ALUWAX
- 2- Plaster
- 3- PVS

Mounting on articulator :

- Semi or fully adjustable articulator → mount using facebow
- Mean value articulator → mount using occlusal table

Selecting teeth

The best person to select the teeth is the dentist.

Q: how do you select the teeth for the pt?

You listen to the pt ask them if they were happy or not with their old teeth



Ask them to get previous records of their teeth like models, photographs or old dentures

- Confirmative approach → pt was happy with their old teeth and is requesting the same teeth
- Reorganized approach → pt was not happy with his old teeth and is requesting a change in esthetics and appearance

Selecting anterior teeth

Shade	Width	Length	Shape
Give the pt a mirror and do "pair comparison" of the lightest and the darkest shade of teeth while bringing them close to the patient's lips, check them under different light sources (cubicle light, sunlight, white light) then select another shade in the preferred half of the shade guide and repeat pair comparison.	Use previous records Or mark the canine line (line from the inner canthus of the eye to the wax rim) The MD width of the 6 anterior teeth is the width from one canine point to the other + 8 (the distal portion of the canine)	Ask the patient to smile and then mark the smile line on the wax rim	Use previous records Use pair comparison between 2 different shapes and ask the pt about their preference ** shape of the anterior teeth should be in harmony with the shape of the face, ridge Or use SPA= Sex= Masculine form = large square with prominent laterals Feminine form = rounded with small laterals Personality = delicate , medium and vigorous Age = spaces between teeth and worn edges

Posterior teeth selection

- 1- Buccolingual width = should be narrower than normal teeth
 - A. Decrease occlusal table → less stress to supporting tissues
 - B. Enhance the correct form of the polished surface



- 2- Mesiodistal length = determined by the length of the ridge from the distal of the canine to the anterior border of the retromolar pad → decides if you can put 3 or 4 teeth [teeth are not positioned on an inclined plane]
- 3- Vertical height of posterior teeth = determined by the height of the anterior teeth and the inter arch space [height of max PM should be the same height as max canine]
- 4- Material of artificial teeth [acrylic or porcelain]
- 5- Cusp inclines [anatomic form , non anatomic or monoplaner form]

Q: what material can be used to make complete denture teeth?

PORCELAIN	ACRYLIC
1- FRACTURE + CHIP EASILY 2- DIFFICULT TO GRIND + POLISH 3- NEED MECHANICAL RETENTION 4- MAKE CLICKING SOUND 5- ABRASE OPPOSING NATURAL TEETH	1- Good wear resistance 2- Used when opposing is natural teeth or metallic restorations 3- Used when interarch space is limited → you can grind from acrylic teeth 4- Chemically bond to acrylic

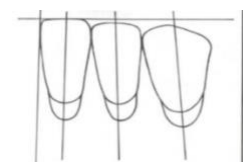
Q: what cuspal inclines forms are there?

ANATOMICAL FORM	NON ANATOMICAL FORM (MONOPLANE)
HAS CUSPS, GROOVES AND INCLINED PLANES CUSP ANGLE = 5-20-30° USED IN: PTS WITH BALANCED BILATERAL OCCLUSION NORMAL JAW RELATION WITH WELL FORMED RIDGES	Cuspless, flat teeth [called zero teeth] Used in: Pts with cross bite TMJ disturbance Hysterical pts with neuromuscular incoordination Advanced ridge resorption Flabby ridges

Anterior teeth set up

Labial surface of the central incisors should be 8-10 mm away from the incisive papilla

MAX CENTRAL	MAX LATERAL	MAX CANINE
LONG AXIS = DISTAL	Long axis = more distal than central	Long axis = vertical
INCISAL EDGE TOUCHES OCCLUSAL PLANE	Neck more depressed than central Incisal edge is 0.5-1mm above the occlusal plane	Incisal tip = on occlusal plane
MAND CENTRAL	Mand lateral	Mand canine
LONG AXIS = PERPENDICULAR TO OCCLUSAL PLANE	Long axis = more distal than central	Long axis = more distal than lateral + neck is more prominent





Posterior teeth set up

MAX 1 ST PM	MAX 2 ND PM	MAX 1 ST MOLAR	MAX 2 ND MOLAR
LONG AXIS= STRAIGHT FACIAL CUSP = TOUCHES OCCLUSAL PLANE PALATAL CUSP = RAISED OFF OCCLUSAL PLANE	Long axis= straight Facial and palatal cusp = touch occlusal plane	Long axis = inclined mesially Only mesiolingual cusp touches occlusal plane	Long axis = more inclined mesially None of the cusps touch the occlusal plane
MAND 1 ST PM	Mand 2 nd pm	Mand 1 st molar	Mand 2 nd molar
LAST TOOTH TO BE PLACED BUCCALLY COINCIDES WITH MMR OF 1 ST PM AND DMR OF CANINE	Long axis = straight Buccally coincides with MMR of max 2 nd PM and DMR of max first pm	First tooth to be placed Long axis = Inclined lingually Facial cusps fit into the fossa of the upper teeth	Set in the same way at the first molar

- Mand teeth height is determined by a line that bisects the vertical height of the retromolar pad
- Mand teeth are set over the crest of the ridge if the teeth need to be set outside the ridge then it is done in the maxillary denture



Occlusal schemes for complete dentures

Occlusion in centric position	Occlusion in eccentric position
Point centric [gnathological concept] : maximum intercuspation [MI] coincides with centric relation [CR] ** in 90% of people CR and MI do not coincide Slide in centric : centric relation and centric occlusion [CO] are different [because of wear , caries, loss of teeth etc.] 2-3 dimensional sliding movement that the mandible makes as it moves from retruded contact position [RCP] to MI Freedom of centric [long centric]: Flat area is created between CR and CO position on occlusal surfaces of teeth ** not present naturally but it can be created by occlusal adjustment of natural teeth – can also be created in completed dentures where the fossa can be altered to give freedom of movement A. No freedom in centric occlusion: occlusal contacts lock in the mandible to the maxilla B. Freedom in centric occlusion : mandible moves a short distance	Balanced occlusion: Even contacts between the maxilla and the mandible on the working side and multiple contacts on the non working [balancing] side Cusp angle of posterior teeth = 33° Upper anterior teeth are set to satisfy aesthetics Posterior teeth are placed in compensatory antero-posterior and medial curves Only in cases of well developed ridges and class 1 occlusion Unbalanced occlusion [monoplane occlusion] No attempt is made to create balanced occlusion – teeth are set at the horizontal Advantages of monoplane occlusion: 1- Used in class 2 and class 3 malocclusion and crossbites 2- Non anatomical teeth allow freedom – eliminating horizontal forces 3- Can accommodate better to negative changes in ridge height 4- Comfortable for the patient and has longer efficiency 5- Easy and less time consuming for the dentist Lingualized occlusal scheme: Maxillary teeth = anatomical 33° Mandibular teeth = anatomical 10° Done to maximize contact between upper palatal cusps and lower fossae + marginal ridges The buccal aspects of lower teeth are reduced in height and the central fossa is widened Indicated when: Pt wants high aesthetics but has severe ridge resorption/ class II or displaceable supporting tissues

Occlusal scheme : the type of tooth form (cusp or cusplless) that the dentist chooses to establish the occlusal concept

Q: what occlusal schemes are there for complete dentures?

Bilateral balanced occlusion - Mono plane – lingualized



Q: What factors do you consider before choosing the occlusal scheme?

- 1- Height and width of residual ridge
- 2- Aesthetic demands of the pt
- 3- Skeletal jaw relation [class 1,2,3]
- 4- Neuromuscular control and parafunctional habits

Q: what are the types of posterior teeth used in occlusal schemes?

Anatomical	Non anatomical / cusplless / zero degrees teeth	Teeth with lingualized features
• Aesthetic • effective chewing • used in balanced occlusion • Needs articulator that allows excursive movements	• Unaesthetic • not effective chewing • used in monoplane occlusal scheme • used with simple hinge articulator • no deflection during excursive movements • good when the mandibular ridge is resorbed	Support occlusion by broad contact of palatal cusp of upper teeth with central fossa of lower teeth Sluiceways are made to increase chewing efficiency Shallower maxillary cusps are used if denture stability is a problem
• If used and articulation is not balanced → denture instability + trauma to denture bearing tissues		

Acrylic resin teeth are used in implanted retained prosthesis against natural teeth [better wear resistance than acrylic]

Metal teeth are used if acrylic teeth wear was very rapid



Selective grinding of complete dentures

Q: why do we need to do selective grinding sometimes?

To ensure CO coincides with CR and to ensure that dentures have balanced eccentric contact in all positions

- Can be done as a lab procedure or as a remount after the denture has been tried inside the pt's mouth
- Can only be used to correct minor errors not major ones like incorrect recording of centric relation
→ in this case take out the posterior teeth then re record centric relation and either reset posterior teeth or process a new denture

Selective grinding is carried out in two stages :

- 1- Correction of CO in correct CR and and vertical dimension
- 2- Development of eccentric balancing contacts

Developing of centric occlusion:

- 1- Lock the condylar mechanism so it works as a hinge mechanism only
- 2- Teeth are tapped lightly with an articulating paper in between to mark premature contacts
- 3- Free condylar mechanism and mark with the other side of the articulating paper the contacts on the working and non working sides [this is done to make sure that the premature contacts in centric occlusion are not needed in eccentric occlusion]

Then if:

The cusp is high in both centric and eccentric positions → reduce the cusp

The cusp is high in centric but not in eccentric → deepen the fossa

The cusp is high in eccentric only → do nothing at this stage

Q: how do you know that you did enough grinding? The incisal guiding pin should touch the incisal table

Developing eccentric contacts :

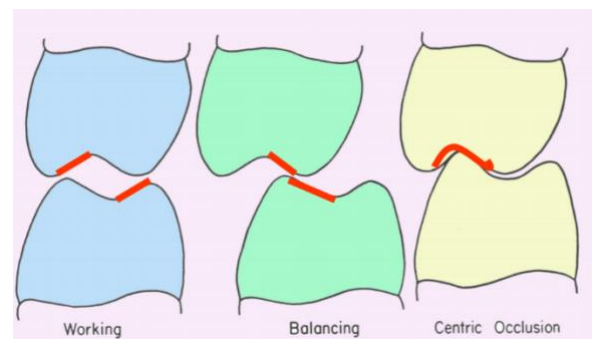
Do not:

- 1- Deepen the fossa of any tooth
- 2- Reduce functional cusps (max palatal and mand buccal)

Examine contacts in working and non working sides

Reduce the cusp inclines so u don't affect the aesthetic appearance of the teeth

Working side → BULL → reduce the inner inclines of upper buccal and inner inclines of lower lingual





Non working side → LUBL → reduce inner inclines of upper lingual or inner inclines of lower buccal

Protrusion → DUML →

- distal inclines of max lingual cusps
- mesial inclines of mand buccal cusps
- palatal surfaces of upper anterior + labial surfaces of lower anteriors
- distolingual slopes of upper canines and mesiobuccal slopes of lower canines



For perfect occlusion:

Working side reduce inner inclines of BULL , non working side reduce inner inclines of LUBL , in CO reduce the cusp and deepen the fossa



Maxillomandibular relationships

Vertical relationships:

- **Vertical dimension at rest [VDR]** = the position of the jaw when the muscles are relaxed
- **Occlusal vertical dimension [OVD]** = the vertical distance between the maxilla and the mandible when the teeth are in maximum intercuspation
- **Freeway space** = the difference between VDR and OVD [$RVD - OVD = 2-4 \text{ mm}$]

<i>Consequences of reduced vertical dimension</i>	<i>Consequences of increased vertical dimension</i>
1- facial disharmony 2- TMJ disorders 3- Angular cheilitis 4- Protruded chin 5- Wrinkles around the lips 6- Vermilion border appears thin	1- difficulty swallowing and chewing 2- abnormal wear of teeth + clicking sound 3- pathological bone resorption 4- elongated face 5- incompetent lips 6- facial expression of fatigue

Horizontal relationships:

Maximum intercuspation: complete intercuspation of opposing teeth independent of condylar position

Centric stops:

- 1- Palatal cusp tips of upper post teeth
- 2- Buccal cusp tips of lower post teeth
- 3- Central pits + marginal ridges of posterior teeth
- 4- Incisal edges of lower anterior
- 5- Palatal surfaces of upper anterior

Q: explain what is an ideal bite or ideal occlusion?

- Point contacts of the upper palatal cusp tips and the lower buccal cusp tips to the central fossa and marginal ridges of the opposing post teeth
- Forces should be along long axis of post teeth
- Maxillary buccal cusps should be buccally placed compared to mand buccal cusps

Centric occlusion = occlusion when the mandible is in centric relation [this may or may not coincide with maximum intercuspation]

Centric relation = when the condyles articulate with the thinnest avascular portion of the disc [most **anterior superior position** against the articular eminence]

Retruded contact position = most retruded position of the condyles in the joint cavity [more retruded than the centric relation position] – **it is used to record the anterior posterior position of the mandible relative to the maxilla**



Recording the mandibular guidance and RCP

Q: how can you record mandibular guidance and RCP?

Patient guided technique : 1- schuyler technique – ask the pt to place the tip of the tongue towards the back of the palate and then close onto a piece of softened horseshoe wax 2- using a myomonitor: electrical stimulating device used to relax the muscles and produce neuromuscular mand position 3- ask the pt to swallow then bit down 4- Gothic arch (arrow point tracing) – can be done intra and extra orally	operator guided technique: 1- chin point guidance 2- 3 finger chin point guidance 3- Bimanual manipulation method [Dawson technique] 4- Anterior guidance A. Using lucia jig B. Using tongue blade C. Using leaf gauge D. Using OSU Woelfel gauge Using anterior guidance / reference point : The anterior reference with form a tripod effect with the condyles → helps them locate in the most anterior superior position + stabilizes the mandible Because teeth are out of contact all proprioceptive reception from teeth and muscles are removed
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TMJ movements

<i>Upper compartment</i> <i>Sliding movement (translation between the condyles and the cranium)</i> <i>Sagittal plane = condylar path</i> <i>Coronal plane = lateral shift of the mandible [benette's movement]</i> Bennet shift= bodily shift of the mandible to the working side [1-2mm]	<i>Lower compartment</i> Hing movement (rotation)
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Bennet angle = the sagittal plane and the path of the advancing condyle during lateral movement – viewd in the horizontal plane

Movements :

- **Hinge movement**= rotation of the mandible along the imaginary hinge axis [drawn between the condyle heads] – occurs during mouth opening
- **Translation**=when both condyles move down the articular eminence without rotation – occurs during protrusive excursion movements
- **Lateral excursion** = condyle on the same side rotates – condyle on opposing side translates
Ex: Right side excursion → R condyle rotates and L condyles translates
- **Border movements**= **extreme ranges of movement of the mandible**

Group function [unilateral occlusion] – teeth on the working side are contacting but teeth on the non working side are out of contact



Canine function [mutually protected occlusion] – canines prevent the posterior teeth from making contacts during mand excursions – posterior teeth protect anterior teeth in max intercuspation [only slight occlusal contact on anterior teeth or slightly out of contact]

Canine function is the best tolerated for the pt

Ideal occlusion for a dentate:

- 1- **Stable contacts on all teeth**
- 2- **Equal anterior guidance on all anterior**
- 3- **Dislocation of all posterior teeth on protrusion**
- 4- **Dislocation of post teeth on lateral excursions (canine guidance)**



Processing + wax up of trial dentures

- **Waxing** : contouring the wax base of a trial denture into the desired form
- **Festoon**: carving the denture base to stimulate the contours of natural tissues

The correct form of the polished surface and the correct position of the teeth affect denture support, retention, aesthetics and support of lips and cheeks

Q: what are the wax up criteria in the upper and lower dentures?

Upper denture

- 1- Wax at the periphery should extend to the full depth of the vestibule and must be rounded and polished
- 2- Labial waxing can be thickened to compensate for lost facial contour
- 3- All teeth should be exposed till the CEJ
- 4- Gingival line should be scalloped
- 5- Indications for the length and the location of the roots should be made
- 6- There should be gentle concave contour of the palatal surfaces of the teeth to the horizontal shelf of the palate
**deep palate or near straight contour of the palate → tongue won't be able to control air during speech

Lower denture

- 1- Lingual and buccal surface are concave to conform tongue and cheek in position + their muscles will grip the seat of the denture
- 2- Peripheries = round and polished

Steps of processing the denture

<https://www.youtube.com/watch?v=vowbYucpJgQ>

Flasking = investing the cast and the waxed denture into a flask to form the acrylic resin denture base

Heat activated resins are polymerized by: microwave energy or injection molding technique

Parts of the flask = Cap = thin top cope
= middle drag= bottom



Steps of denture processing: disarticulation → flasking → wax boil out → packing acrylic → hand press → processing → deflasking → selective grinding → finishing and polishing

Detailed explanation:

Flasking:

- 1- Seal both dentures onto their respective casts and separate the casts from the mounting [without damaging cast or mounting]
- 2- Place the cast + waxed denture inside the drag and check for occlusal and peripheral clearance



3-6 mm should be available between occlusal surface of teeth and top of the flask

- 3- Base of the cast is coated with plaster separating medium [PSM]
- 4- Place stone in the drag and then push the cast+ waxed denture into the stone until the cast touches the base of the flask
- 5- After the first portion of the stone sets it is painted with PSM then placed the cope and another mixed stone is placed until the incisal edges and cusp tips
- 6- Wipe the stone from the incisal and occlusal surface of teeth and then apply another layer of PSM onto the set stone
- 7- Capping = Another mixed stone will be placed in the top half

Wax boil out: after the stone set the flask is placed in hot water to soften the wax → open the flask and remove the wax [when the wax is removed the teeth will be locked into the set stone]

PSM is applied over the mold surface [DO NOT PLACE PSM OVER THE TEETH THIS WILL CREATE VOIDS]

Packing acrylic : acrylic monomer and polymer are mixed and then the dough that forms is placed inside the mold created in the flask [over fill the mold] → close the flask and place it under a pneumatic press or hand press and apply **pressure gradually → remove excess**

Processing: flasks are held together by a clamp and inserted into the curing unit

** processing can be long cycle (7 hours at 74° C then one hour at 100°C) or short cycle (2 hours at 74° then one hour at 100°C)

Allow the clamp and flasks to cool down to room temperature slowly to avoid dimensional change in the acrylic → remove clamp

Deflasking: remove the denture without breaking the denture or separating it from the cast

Selective grinding : should be done before finishing and polishing

Finishing and polishing: using pumice wash (pumice over a rag wheel)

Denture should be stored in water until the day of insertion



Acrylic resin

Condensation polymerization: two molecules react to form longer molecules by eliminating small molecules like water, alcohol etc → dimensional change

Addition polymerization: two molecules react to form a longer molecules but don't eliminate small molecules – **more dimensionally stable, most dental materials undergo addition polymerization.**

Addition polymerization has 4 stages: activation – initiation – propagation – termination

Acrylic resin:

- Derived from acrylic acid
- Undergoes addition polymerization
- Mix of Liquid monomer (methyl methacrylate) + polymer beads

Acrylic resin is used in: Denture bases – denture teeth – bruxism mouth guards – ortho retainers
Poly Methyl Metha Acrylate : PMMA

- Easily processed
- Adequate physical properties for dental applications
- Color , optical properties and dimensions remain stable under intraoral conditions
- Not very strong
- Can distort with time
- Low thermal conductivity

Heat cured: the heat decomposes the peroxide to produce free radicals

Powder	Liquid
• Polymer = PMMA • Initiator = benzoyl peroxide – what produces the free radical • Titanium dioxide = to prevent it from becoming too transparent	Monomer = methyl meth- acrylate Volatile + flammable (should be kept in a sealed dark bottle away from sunlight) Inhibitor = hydroquinone (to increase shelf life)

GOLDEN RULE: ALWAYS USE THE P/L RATIO BY THE MANUFACTURER

Excess monomer → more polymerization shrinkage

- Dough- forming time – the time needed for the resin to reach a dough like consistency (approx. 10 mins)
 - Working time : the time the material remains in dough like consistency (approx. 5 mins)
- > Curing by heat – the heat must be controlled because the reaction is exothermic
- > Overheating → porosity (the monomer will boil and then evaporate)
- > Gradual heating → high degree of monomer to polymer conversion → high molecular weight polymer



Chemical cured denture base resin : also called self cured

- > Initiator = trietary amine (toolidine)
- > toluidine decomposes the peroxide to produce free radicals

<i>Heat cured</i>	<i>Chemical cured</i>
<i>Better color stability</i>	Less shrinkage → better dimensional stability
<i>Better degree of polymerization (less un reacted monomer)</i>	Shorter working time

Light cured denture base resin:

- > Initiator = champhroquinine (starts the polymerization)
- > Premixed sheets of Urethane Di- Metha acrylate (UDMA)
- > Used to make custom trays

Microwave cured denture base resin: resin cured by microwave energy (do not use metallic flasks)

Modified types of denture base:

- > Pour type of resin : have smaller acrylic beads when they are mixed they are fluid
- > High impact resin : reinforce with rubber like material
- > Rapid heat polymerized resin : has both heat and chemical activated initiators

Acrylic is transparent

Cold cured acrylics have lower impact strength - You can increase impact strength by adding plasticizers

Shrinkage = from polymerization shrinkage and shrinkage from cooling down → this does not affect the fit of the denture because the shrinkage is distributed all over the denture base + balanced out by the expansion due to water sorption

Q: after you processed a denture base of acrylic resin you noticed it is porous , mention possible reasons of this porosity?

- 1- The un reacted monomer evaporated due to increased heat during processing
- 2- Improper P/L ratio or improper mixing
- 3- Insufficient pressure during processing
- 4- Insufficient material in the mould.



Dental articulators

Q: what is an articulator and what is it used for?

Articulator = a device that represents the TMJ and jaws to which the upper and lower cast are attached to simulate jaw movement. [it acts as the patient when the patient is absent]

Uses:

1. Diagnosis + tx planning
2. During technical procedures in complete dentures, removable dentures fixed prosthodontics and some complex restorations

Q: what are the types of articulators?

1- Based on position of the condyles:

A. Arcon [**A**rticulator + **C**ondyle]

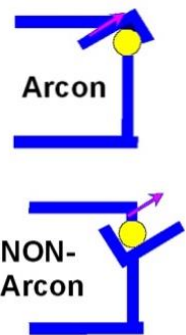
Condyles are on the lower membrane and condylar guides on the upper membrane

Ex: SAM, WHIPMIX, QUICK MASTER

B. Non – arcon

Condyles on the upper membrane and condylar guides on the lower membrane

Ex: Hanau , DENTATUS



2- Based on function:

Hinge articulators

Mean value articulator

Semi adjustable

Fully adjustable (gnathologic instruments)

Gnathology: the study of occlusion and occlusal rehab using fully adjustable articulators and pantograms

Pantogram = instrument that consists of 6 styli and tracing tables that produces 3D dynamic registration in the form of tracing

Articulator type	Notes
Simple hinge	Only hinge movement Used for study models, relining and rebasing, single crowns
Mean value articulators	Articular measurements based on averages Limited lateral and protrusive movements Only accepts centric records Used for : uncomplicated cases of CD or RPD Short span 3 unit bridge If u need to do intra oral adjustments (specially RCP to ICP discrepancy)



Semi adjustable articulators

Accepts centric and eccentric records

Needs facebow to relate max cast to hinge axis

Needs static records in protrusive and lateral excursion to program horizontal condylar guidance and benet's angle

For restorative procedures → CO and CR is required

For diagnostic procedures (orthognathic planning) → CR

**** you can adjust condylar + incisal guides + intercondylar distance**

Used in occlusal rehab , TMJ pts, replacement of anterior teeth

Fully adjustable articulators (gnathologic instruments)

Needs facebow + pantographic tracing (to record mand movements more accurately)

provides adjustments and greater accuracy in vertical dimension, benet angle , border movements etc

used mainly as diagnostic and prognostic tool in TMJ dysfunction

Maxillary facebow: used to record relationship of the maxilla to the skull base

Universal facebow: relates the maxilla to the condylar axis and the frankfort plane – can either be with an orbital pointer or nasal saddle

Frankfort plane: imaginary line from the lowest point in the bony orbit and the highest point of the bony auditory meatus

Beyron point: most commonly used post reference – located 13 mm anterior on a line from the center of the tragus to the outer canthus of the eye

Kinematic facebow: applied on the mandible to record the terminal hinge axis

Once the upper cast is secured onto the articulator [maxillary cast on the fork and the ear pieces on the condylar housing] → invert the articulator → set the lower cast using interocclusal record



Q: how do you adjust the horizontal condylar angle / lateral condylar angle (bennet's angle) on semi adjustable articulator?

- Horizontal condylar angle → use on protrusive record (ask the pt to protrude at least 6 mm and bite on registration material)
- Lateral condylar angle / bennet's angle → for adjusting the left side, ask the pt to make movement towards the right at least 6 mm and bite onto the registration material

In semi adjustable articulators (hanau) you can find out the lateral condylar angle (bennet angle) from the horizontal condylar angle

$$\text{Lateral condyle angle} = (\text{horizontal condylar angle} / 8) + 12$$

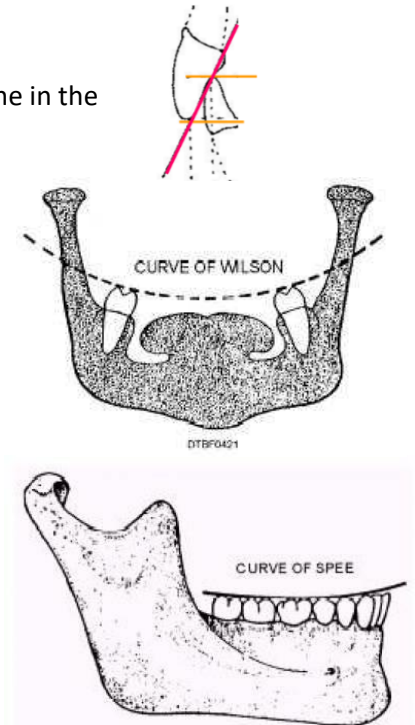
Incisal guidance angle: angle formed in the horizontal plane by drawing a line in the sagittal plane b/w the incisal edges of the upper and lower teeth in RCP.

The vertical and horizontal over lap of anterior teeth affects the cusp height of posterior teeth →

- The greater the vertical overlap → the greater the post cusp height
- The greater the horizontal overlap → the shorter the post cusp height

Christensens phenomena: if the artificial teeth are set along the horizontal there will be a space bilaterally during protrusion and on the non working side during lateral movement

Artificial teeth should be set in a curve so they maintain contact during all movement





Trial dentures

Q: what are the things that you do in a trial denture appointment, what do you check ?

1- verify vertical jaw relationships (OVD, VDR, freeway space)

- There is not one specific way, it depends on :Preextraction records, phonetics and aesthetics , facial dimensions and expressions

2-Verify horizontal jaw relationships (static - centric relation + dynamic – lateral and protrusive)

- Intraoral method: guide the pt into CR (place the thumbs on the anterior inferior portion of the chin and the index fingers bilaterally on both sides of the buccal flanges of the lower denture) → teeth should occlude properly as in an articulator (if they slide over each other or do not touch → mounting is wrong)
- Extraoral method: soften a piece of ALUWAX and place it on mand post teeth then guide the pt into CR → remove the denture from the mouth and mount it on the articulator → the opposing teeth should fit into the indentations . if they don't fit → CR was wrong
- > Check working + non working + protrusive contacts (at least 3 widely spaced points / areas of occlusion must exist)

3-Establish posterior palatal seal – draw the posterior palatal seal using indelible pencil → transferred onto the trial base → transfer it onto the cast and carve that area to 1-1.5 mm deep

4-create facial and functional harmony with anterior teeth

- > excessive lip support → stretched lips →eliminate normal lips contour →dentures dislodge during function
- > Check the size, form and color of the artificial teeth

5- Check phonetics

F and V sounds → upper incisal edges should touch lower lip wet line

S and Z sounds → anterior and posterior teeth should not touch

Q: if you find out that the centric relation recording was wrong what do you do?

Check the anterior teeth overlap and lip support → remove post teeth → place registration material and ask the pt to bite until u reach the same vertical overlap before removing the post teeth → mount the new records on the articulator

- setting max anterior teeth directly over the ridge is not aesthetic , setting them far back → insufficient lip support
- Max anterior teeth should be set in a way their palatal surface is 8-10 mm away from incisive papilla
- The amount of upper teeth seen during function and speech an facial expressions → depends on length + movement of the upper lip



Q: how can you determine the amount of tooth that will be covered by the upper lips?

You place your index finger on the incisive papilla → the amount of your finger is covered is the length of the upper lip and the extent it will cover the upper anterior teeth.



Q: why is the lower lip a better guide for the vertical orientation of teeth?

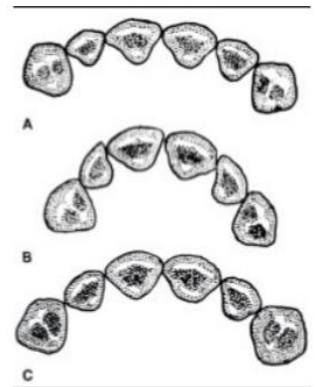
The cusp tip of the lower canine and the cusp tip of the lower first premolar should be even with the corners of the mouth when the mouth is slightly open

If they are above the corners of the mouth it means:

- 1- Occlusal plane is too high
- 2- Vertical overlap between anterior teeth is too much
- 3- Vertical space between the jaws is excessive

Q: how do you match between the dental arch form and the residual ridge form?

- A. Square ridge → central incisors are more in line with the canine + the 4 central incisors should have little rotation to give broader effect of teeth
- B. Tapering ridge → central incisors are more forward than the canines + slightly rotated
- C. Ovoid arch → teeth are rotated showing greater amount of labial surface



- > The midline of the upper teeth should coincide with the lower teeth midline and the general facial midline.
- > A line formed by the upper anterior teeth should follow the curve of the lower lip during smiling
- > The shape of the smile line is controlled by the vertical position of the upper canines

Q: what is asymmetrical asymmetry and why is it important in complete dentures?

The labial and the buccal lines of the upper and lower teeth should have equal opposing angles (if the upper lateral is set 5 ° to the perpendicular the lower lateral should also be 5 ° to the perpendicular in the opposite direction) → this gives natural appearance



Q: what is the neutral zone why it is important in setting artificial teeth in complete dentures?

A position in the mouth where the inward pressure of the lips and the cheeks is balanced by the outward pressure of the tongue

You should set the teeth in the neutral zone otherwise you'll end you with (lack of tongue space or cramped tongue)



Q: what is cramped tongue and how do you check clinically for lack of tongue space?

- > Lack of tongue space happens when the teeth are not set in the neutral zone (set too lingually , tilted lingually of the teeth are too broad buccolingually)
- > You check clinically by asking the pt to raise their tongue (if there is lack of tongue space the denture will rise with the tongue)



Insertion of the final denture

Before inserting the new denture the pt should be told not to wear their previous dentures for 12-24 hours

Check the following before insertion into pt's mouth:

1. No imperfections on tissue surface
2. Smooth polished surface
3. Borders are round and smooth
4. Flanges are not thick and don't have sharp angles – no sharp edges in frenal notches

Using pressure indicating paste [PIP] you can locate irregularities on the tissue surface - Adjustments to the tissue surface should be made before occlusal adjustments (the areas of the denture that show through the paste should be relieved)

Q: during the final denture insertion – what should you check?

- 1- **Check for Basal surface errors** (use pressure indicating paste to locate high areas and relieve them)
- 2- **Check border extensions** (apply thick layer of PIP one area at a time on the borders→ do border modling and relieve areas that should through the paste which indicate over extended borders)
- 3- **Check for occlusal errors (extraorally)**

Q: list 5 possible causes of occlusal errors during insertion of complete denture?

- 1- Improper recording of maxillomandibular relationship by the dentist
- 2- Improper transfer of maxillomandibular relationship to the articulator
- 3- Change sin OVD on the articulator
- 4- Incorrect arrangement of posterior teeth
- 5- Failure to close the flasks properly or applying too much pressure while closing the flasks

Q: how do you check for occlusal errors?

Intraorally : ask the pt to tap onto the articulating paper – correcting occlusal errors by selective grinding of the markings made inside the mouth will actually increase the errors

**** detecting occlusal errors intraorally is hard because:**

- 1- Denture bases shift on the ridges
- 2- Soft tissues get displaced
- 3- Mandible moves to eccentric position
- 4- Saliva prevents the articulating paper markings

Extraorally: best way for detection and correction

Remount of the articulator after getting accurate interocclusal records (by softening 2 pieces of wax and placing them on the lower posterior teeth and asking the pt to bit down while you guide them into CR – 1mm imprint of the teeth should be made on the wax without teeth penetration)

Q: what are the advantages of checking and correcting occlusal errors on an articulator?



- 1- Denture will be form and will not rotate around the ridges
- 2- Occlusal errors can be observed visually
- 3- Markings are made on dry teeth
- 4- Avoid the eccentric closure of the mandible

Q: what instructions do you give the pt after denture insertion?

- 1- be patient adjustment to the new denture need 6-8 weeks
- 2- eat slower , cut the food to small pieces and chew on both sides
- 3- practice reading out loud to improve the speech
- 4- leave the denture out at night in water
- 5- clean the denture with soft brush and liquid soap – clean it over a sink filled with water so if it falls it wont break

Q: follow up after inserion should be _____ and you should do the following:

After 24 hours and 72 hours (1 and 3 days)

- 1- listen to the pt and ask them about their experience
- 2- examine occlusion before denture removal (guide the pt to CR then feel the first tooth contact as the pt closes then teeth should close tightly – if the teeth touch and slide there is an error in CR)
- 3- examine intra oral sore spots
- 4- examine border extensions
border over extension mostly occurs in : hamular notches , mand retromylohyoid area, mand buccal area , anterior frenal area

Common error	Cause
Soreness on the crest of the ridge	Heavy pressure contact from opposing teeth
Soreness on the slopes of the ridges	The denture base is shifting from deflective occlusal contacts
Lesion in the buccal mucosa in line with the occlusal plane	Cheek biting → corrected by reducing mand buccal cusps
Gag reflex while wearing the denture	Over or underextension of the post border of the max denture If underextension → add modelling compound then replace it with acrylic
Max denture becomes loose when the pt opens widely	Disto buccal flange is thick and interfering with the coronoid process movement
Maxillary denture becomes loose when smiling	Excessive thickness or height of the flange in the buccal notch area or distal to it → reduce the width of the border posterior to the buccal notch



Support = ability to resist tissue ward movement	Provided by : Primary stress bearing areas: Maxilla – crest of the ridge and flat areas of the palate Mandible – buccal shelf (area between external oblique ridge and crest of the ridge) Secondary stress bearing areas: Maxilla – rugae and slopes of the ridge Mandible – slopes of the ridge The max biting force the ridge can tolerate is directly proportional to the surface area covered For proper support → good cortical bone with sufficient keratinized tissue
Retention = Ability to resist tissue away movement in a vertical direction	Factors that contribute to denture retention: Cohesion- force of attraction between similar bodies (b/w saliva molecules) – strong force Adhesion- force of attraction between dissimilar bodies (saliva and denture base) – strong force Interfacial surface tension: force between two parallel surfaces separated by thin film of liquid Capillary action: when the space bw the denture and the ridge is narrow it will act as a small tube that sucks saliva and distributes it across the denture bearing area to increase retention Gravity : for lower denture Atmospheric pressure : when air is expelled between denture and mucosa. Shape of the ridge and undercuts Viscosity and volume of saliva Having balanced occlusion Position of occlusal plane and teeth in relation to the ridge
Stability = ability to resist movement in horizontal direction	Depends on: Size and form of the basal seat Quality of final impression Form of polished surf Proper location and arrangement of artificial teeth



Sequelae of wearing dentures

Denture stomatitis

inflammatory process – affects more people with complete dentures
 some say it affects women more
 mostly in the palate
 it occurs less in the lower jaw – because of the washing effect of the saliva
 mostly asymptomatic – but some complain of Halitosis, bleeding + swelling in the mucosa,
 burning sensation, dygeusia (altered taste) , xerostomia

Q: mention a classification used for denture related stomatitis and explain it?

Newton's classification

- **Newton type 1** : localized simple inflammation (pinpoint hyperemic lesions)
- **Newton type 2**: general simple inflammation (diffuse erythema confined to the mucosa contacting the denture)
Newton type 1 and 2 → treated by low energy laser
- **Newton type 3** : inflammatory papillary hyperplasia (granular surface) → treated by surgical removal (cryosurgery, scapel, electrosurgery, laser beam)

Candida stomatitis

SYSTEMIC FACTORS	LOCALIZED FACTORS
OLD AGE DIABETES IMMUNE DEFICIENCY (CORTICOSTEROIDS, IMMUNOSUPPRESSIVE) MALIGNANCIES NUTRITIONAL DEFICIENCIES (IRON, FOLATE, VIT B 12)	Smoking Xerostomia Broad spectrum antibiotics Poor oral hygiene

TX of candida:

1. Proper oral and denture hygiene – soak the denture in disinfectant
2. Stop smoking and wearing dentures at night
3. Correct ill fitting dentures
4. Anti fungal therapy – if it is a yeast infection or it did not improve with improved hygiene

** conditioning agent are porous and could easily be colonized → should not be used in pts with candida



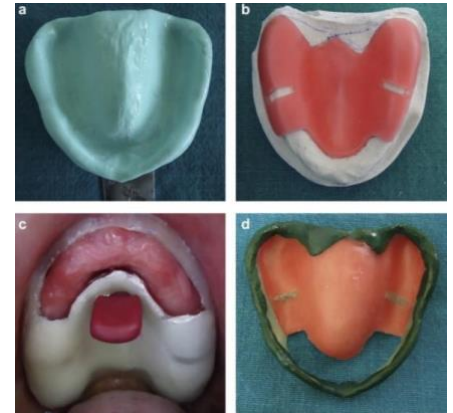
Flabby ridge

Caused by bone being replaced by fibrous tissue
 Mostly in the anterior part of the maxilla opposed by lower natural teeth
 Results in poor support for the denture

Impression of a flabby ridge

Q: how do you take an impression of a flabby ridge?

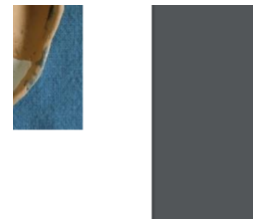
Sectional impression technique (window technique) – take primary alginate impression then make custom tray → cut the region over the flabby ridge → mucodisplastic impression is taken → once it is set the impression plaster is painted over the flabby ridge and allowed to set (mucostatic impression) → both removed as one impression



Flabby ridges tx → surgical removal

Hyperplastic tuberosities

Combination syndrome : upper complete denture opposing lower distal extension RPD – whenever the pt make a protrusive movement → the denture tips anteriorly causing bone resorption of the premaxilla + fibrous hyperplasia of the maxilla tuberosities



They should be surgically reduced specially if they don't allow denture base extension into the hamular notches or there is no sufficient space at the correct OVD to cover the tuberosities

Denture irritation hyperplasia:

Caused by thin over extended flanges or an unstable denture
 Inflammation + edema + ulceration

TX: adjust / replace the denture or surgically remove the proliferated tissue

Traumatic ulcers

Small painful lesions covered by grey necrotic membrane surrounded by inflammatory halo with firm elevated borders

Caused by unbalanced occlusion + over extended flanges

Pts with: xerostomia, nutritional deficiencies, diabetes, radiation therapy

TX: correction of the denture

Burning mouth syndrome

Mucosa appears healthy – pt complains of burning sensation of the tissue in contact with recently placed denture

Pt complains of burning sensation – altered taste and dry mouth (might have insomnia, depression and irritability)



TX: help the pt understand the benign nature of the problem – provide implant supported overdenture in collaboration with Psychiatrist

Residual ridge resorption

The resorption is dramatic in the first year after extraction. It can be accelerated if you place a poorly adapted complete denture and improper occlusal scheme

Tx of atrophic mandible : either bone augmentation or deepening of the vestibule

Prevention: retain some teeth in strategic positions to act as over denture abutments or implant supported dentures



Partial removable denture



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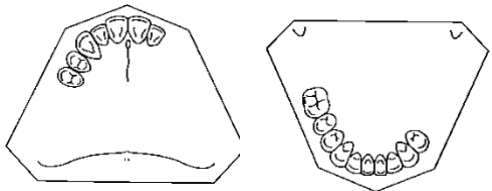
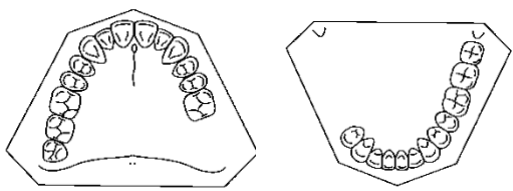
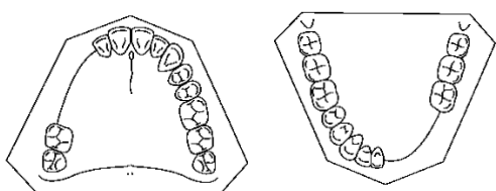
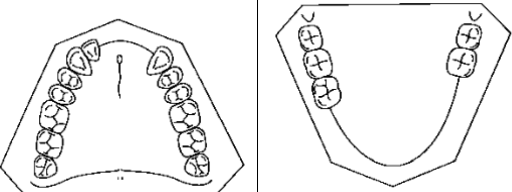
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Kennedy classification

Kennedy classification	Description
Class I	Bilateral edentulous area located posterior to remaining natural teeth 
Class II	unilateral edentulous area located posterior to remaining natural teeth 
Class III	Unilateral edentulous area between natural teeth located anterior and posterior to it 
Class IV	Single bilateral edentulous area (crossing the midline) located anterior to remaining natural teeth 

Applegate's rules

- 1- Classification should follow and not precede extractions that might alter the classification
- 2- If a 3rd molar is missing and it will not be replaced it is not included in the classification
- 3- If a 3rd molar is missing and it will be an abutment it is included in the classification
- 4- If a second molar is missing and it will not be replaced , it will not be included in the classification
- 5- The most posterior edentulous area determines the classification
- 6- Edentulous areas other than those that determine classification are called modification spaces and they are designated by a number
- 7- The extent of the modification area is not important it is the number of modification areas is what is important
- 8- There is no modification for class IV



Treatment planning for RPD

Q: a pt comes in with an edentulous space what step do you take in tx planning?

- 1- Medical + dental history + Listen to the pt's concern
- 2- Intraoral soft tissue examination + examine for available interarch space
- 3- Evaluate the loss of vertical dimension (specially in case of post tooth loss)
- 4- Examine the prognosis and periodontal status of the abutment teeth (mobility, crown root ratio, presence of large caries or restorations etc..)
Decide if any teeth need modifications (recontouring, changing composites to amalgams in abutment teeth , dimpling, creating undercuts using composite, do any of the teeth need surveyed crowns?
- 5- Radiographs (OPG + bitewings + PA for abutments)
- 6- Take primary impression for study casts for diagnosis , designing and surveying

Dimpling: creating undercuts on tooth surface to engage the terminal part of the retentive arms

NOTE: you ALWAYS seek specialist consultation with a referral letter.

Referral letter should include: pt details, medical + dental history, reason for referral, what advice or tx do they suggest.

If the pt already had a previous RPD:

- 1- Check the RPD
Color
Hygiene
Condition (is it repaired or added to? How did it break ? how was it repaired? And when.)
Design of the denture and if there are any abnormal wear patterns
- 2- Intraorally check
Denture extensions + retention + stability
Occlusion:
Check contacts in CR, CO, ICP and eccentric positions
** if there are enough teeth remaining → restore the RPD in CO/ ICP
If many teeth are missing → restore the RPD in CR (treat it as Complete denture)

Indication for cobalt chromium RPD : IMP !!

- 1- Long edentulous span [** short spans → FPD or implants]
- 2- No posterior abutment [distal extensions]
- 3- Several edentulous spaces
- 4- Excessive ridge resorption [a bridge will not replace the resorbed ridge]
- 5- Splinting of periodontally weakened teeth (a lingual plate that goes up to the cingulum will support anterior teeth that are not abutments)
- 6- Obturators
- 7- Pt desire

**Q: what are the objectives of any treatment plan?**

- 1- Manage and treat existing disease / condition
- 2- Prevent future disease
- 3- Restore function
- 4- Improve appearance

**** advanced phase: endo , strategic extractions (retained root , perio involved abutment) , pre prosthetic surgeries, periodontal surgeries , orthodontics (correction of tilted teeth)**

RPD components

- Tooth supported RPD = class III and class IV [depends entirely on natural teeth for support]
- Tooth tissue supported RPD = class I and class II [supported by teeth on one side , portion of the functional load is carried by the residual ridge]

Class III and IV can become tooth – tissue supported RPD if:

- Abutment teeth have poor periodontal condition
- Long edentulous span [mucosa will also provide support]

RPD components:

Tooth supported

Direct retainer (clasp assembly)
Major connector
Denture base

Retainers:

Intra coronal : the hinge is inside the crown –
more aesthetic but requires more tooth structure
removal and made by the lab

Extra coronal : hinge is outside

Manufactured retainer (dalbo)

Clasp type : engages the undercut below the
greatest convexity

Survey line: line on the cast that indicates maximum convexity of the tooth and alveolar bone in relation to the path of insertion

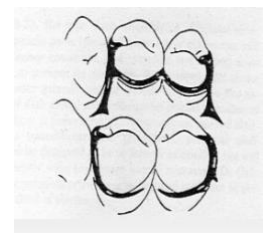
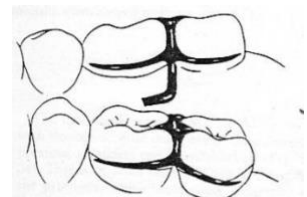
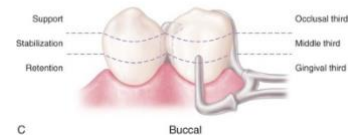
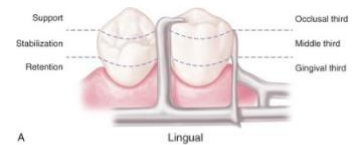
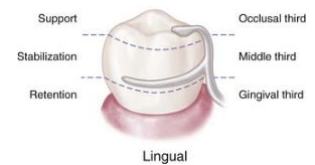
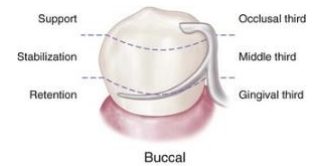
Tooth tissue supported

Direct retainer (clasp assembly)
Major connector
Denture base
Indirect retainer

Direct retainer [clasp assembly] - Provide retention and stability



Retentive clasp	engages the undercut for retention Can be made of – • CC → very strong but not flexible • Wrought wire → flexible • Gold → very flexible Types of retentive clasps: 1- Suprabulge (c- clasp, circumferential clasp, Akers clasp) Approach the retentive undercut from <u>occlusal</u> or suprabulge direction 2- Infrabulge (Bar, Roach) Approaches the under cut from <u>cervical</u> or infrabulge direction Types of bar clasp (T, modified T, Y, I) ** only on terminal of the T or Y clasp engages the undercut [the remainder of the clasp is extra unless it is needed to provide encirclement of the tooth of more than 180] 3- Embrasure clasp: Consists of : 2 rests, 2 retentive arms, 2 reciprocal arms and 1 minor connector Used in unmodified class II or class III [when there are no edentulous spaces on the opposing side for clasping] ** needs sufficient space between the abutment teeth in their occlusal third 4- Multiple clasps: 2 opposing circumferential clasps joined at the terminal end of the 2 reciprocal arms Used when the retentive areas are adjacent to each other Disadvantage: 2 embrasure approaches are necessary – this could harm the interdental papilla
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	5- Ring clasp : Almost encircles all of the tooth – unaesthetic Used when you have a lone standing posterior tooth or when the proximal undercut cannot be approach in any other way 6- Combination clasp: Basically a c- clasp but contains 2 types of metal Reciprocal arm = cobalt chromium Retentive arm = tapered , round wrought wire (can be either c- clasp or bar)	
Reciprocal clasp	remains above the height of contour	

Clasps should embrace more than ½ of the tooth circumference (more than 180 of the greatest circumference of the crown) in RPI system (infrabulge clasps) this is achieved with components that are separated.

Only the terminal end of the retentive clasp is flexible – all the other parts are rigid.

Disadvantages of c- clasps:

- 1- More tooth surface is covered because of it's occlusal direction of approach
- 2- May increase the width of the occlusal surface of the tooth
- 3- In the mandibular arch more metal may be displayed
- 4- Because it is ½ round it prevents adjustment

Contraindications to using Bar types of clasps:

- 1- Severe buccal or lingual tilts of abutment teeth
- 2- Severe tissue undercuts
- 3- Shallow buccal/ labial vestibule

Advantages of wrought wire retentive arms:

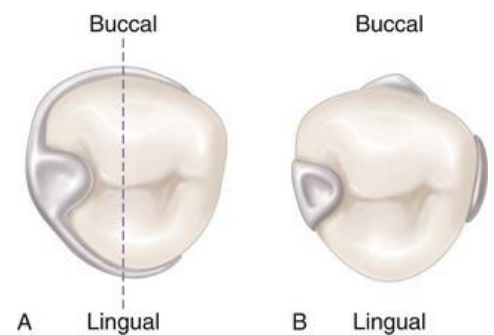
- 1- Flexibility + adjustability
- 2- Can be used in smaller diameters without fracture
- 3- Less fatigue failure
- 4- Minimum tooth surface is covered (line contact rather than surface contact)

Rest : rigid extension of the RPD - provides support

Types: occlusal , cingulum , incisal

Functions:

- 1- Maintains the components in their positions
- 2- Directs and distributes occlusal force to abutment teeth





- 3- Prevents movement towards the mucosa

Minor connector: connecting link between the major connector and other components of the RPD

Must be rigid to distribute the stress between the linked components , must not impinge on the mucosa , mucosal surface must be highly polished

- Ex: guiding plate – vertical minor connector that contacts the guiding plane on abutment teeth – establishes path of insertion
- Those that join the clasp assembly , or rest to the major connector
- Those that serve as approach arms for Bar clasps

Functions of the minor connector :

- 1- Join the denture parts together
 - 2- Transfer functional stresses to abutment teeth through the occlusal rest
 - 3- Transfer the effect of the retainer, rests, stabilizing components to the rest of the denture
- **Junction of mandibular major connector** → strong butt joint (not more than 90° - without too much bulk)
 - **For mandibular distal extension** → minor connector should cover **2/3** of the ridge + have elements on both buccal and lingual surfaces (ex: open lattice, mesh , ladder type)
 - **Junction of maxillary major connector** → less than 90° (like an undercut) – finish line is placed to restore natural palatal shape and contour
 - **For maxillary distal extension** → minor connector should cover the whole length of the ridge (ex: ladder or loop type)
 - **Junction of major connector and bar clasp** → butt joint (needs finish line at the junction to prevent flexing of the direct retainer with can lead to chipping and food impaction)

Major connectors:

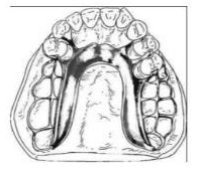
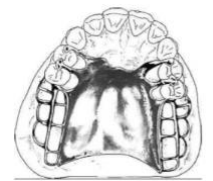
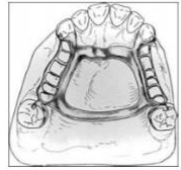
Unit of an RPD that connects components located on one side of the arch with those on the opposite side – a part of the RPD that all the other parts are attached to directly or indirectly.

- Should be rigid to be able to provide support
- Major connector design is determined before mouth prep
- Should not interfere or irritate the tongue or change the natural contour of the palatal vault or ridges
- Should not impinge on the oral tissues and cover only necessary tissue
- Should not trap food

The amount of relief needed under a major connector is determined by **difference in tissue displaceability** .



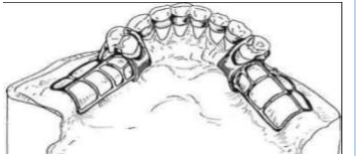
Maxillary major connectors

Type	Explanation	
Single palatal strap	Used in cases of bilateral, short span, tooth borne restorations DISADV: not very rigid – to make it rigid it will become bulky It should be as wide as the max PM and 1st molar	
U shaped palatal connector	Least desirable of all max connectors Used in cases of inoperable tori [located more posteriorly] or if Several anterior teeth need to be replaced Anterior border should be 6 mm away from teeth – if it touches teeth it should be supported by rests Any part of the connector that extends anteriorly from the principle occlusal rests should be supported by indirect retainers DISADV: not very rigid – to make it rigid it will become bulky	
Combination anterior & posterior palatal strap like connector	MOST RIGID TYPE Used in cases of : Class 1 and class 2 arches with good abutments Long edentulous span [class I and II] Class III where ant teeth need replacing Inoperable palatal tori [located in the center] Can be : square, parallelogram, rectangle Ant and post strap = 6-9 mm longitudinal strap = 5-6 mm Posterior strap is located at the junction of movable and immovable parts of the palate Needs 6 mm relief from the gingiva	
Palatal plate	Thin contoured plate covering ½ or more of the palate Used in cases of: 1- Class 1 with minimal ridge resorption 2- V or U shaped palates 3- No tori 4- More than the 6 anteriors remaining Does not extend anterior to the occlusal rests or indirect retainers Post border is slightly ant to the PSA but borders are extended to the hamular notches Can be ½ coverage or full coverage- full metal or ½ metal and ½ acrylic Casting anteriorly with retention posteriorly for acrylic → easier to reline and rebase + easier to make post seal Indicated in: Class 1 with one or more premolars + all anterior teeth Class 2 with some missing anterior teeth Full cast extending to PSA → expensive but more preferred by pt	
Single palatal bar or anterior post palatal bar	Palatal bar = less than 8 mm width Can be very thin and flexible or very bulky Irritating to the tongue	

- Any part of the connector that touches teeth should be supported by rests
- rests should be anterior to the major connector ALWAYS



Mandibular major connectors

Type	Explanation	
Lingual bar	Used in cases where there is sufficient space between elevated alveolar lingual sulcus and lingual gingival tissues <u>4 mm from GM to the bar + 4 mm thickness of the bar + few mm below = 9-10 mm at least</u> Superior border should be at least 4 mm away from gingival margin and should be tapered to the soft tissue without a step Inferior border at the height of the alveolar sulcus when the tongue is slightly elevated DISADV: traps food	
Sublingual bar	Used in cases that don't have enough height of the floor of the mouth The bar is narrower than the lingual bar → more flexible → you need to use retainer on top of it. More uncomfortable to the pt	
Lingual bar with continuous bar retainer	Used in cases the axial alignment of teeth requires excessive block out of interproximal undercuts or if bar needs to be placed close to the gingival margin to obtain enough rigidity Located slightly above the cingulum of anterior teeth & extends to interproximal contact points MUST be supported by rests	
Labial bar	Used in cases : Extreme lingual inclination of lower incisors and premolars Inoperable mand tori Lingually inclined teeth can be adjusted by disking, crowns , block out	
Linguoplate	Used in cases: The lingual frenum is high or there is no space for lingual bar For stabilizing periodontally weakened teeth In class 1 where the ridge had severe vertical bone resorption If you expect one or more incisor teeth will be lost later → you can add artificial teeth by retention loops A thin metal apron extends superiorly to contact the cingula of anterior teeth and the lingual surfaces of post teeth up to the height of contour it extends inferiorly to the height of the alveolingual sulcus extends interproximally to the contact points	

Q: how can you determine the height of the floor of the mouth?

- 1- By perioprobe and asking the pt to touch with their tongue the vermillion border of the upper lip (from GM to floor of the mouth)



- 2- On the cast – make the special tray 3 mm short then during border molding ask the pt to lick their lips → inferior border is located on the cast

Indirect retainers: only in tooth tissue support

Rest + minor connector located anterior to the fulcrum line

Fulcrum line = an imaginary line that passes through the most posterior clasp assembly – indicates the line around which the denture will rotate during function

Types of indirect retainer:

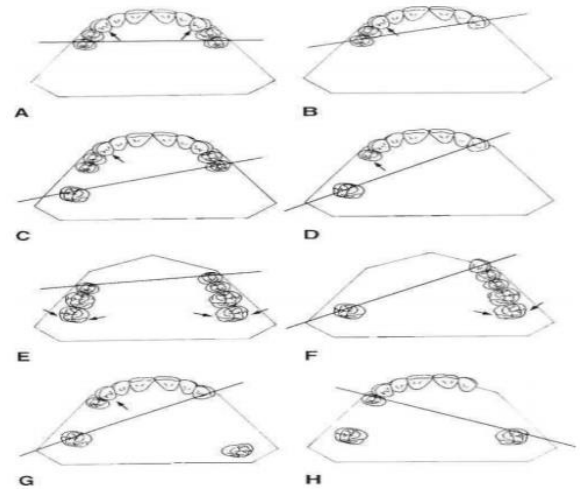
1. Occlusal rests
2. Canine rests
3. Canine extensions from occlusal rests

Cingulum bars (continuous bars) + linguoplates act as indirect retainers

In class 1 → ideal indirect retainer would be a mesial occlusal rest on the premolars or 2 cingulum rests

In class 4 → embrasure clasps will act as indirect retainers

- In tooth supported RPD the occlusal stresses are transferred to the bone by the PDL (PDL displaced only 0.25 mm)
- In tooth tissue supported RPD the occlusal stresses are transferred to the bone by PDL + mucoperiostum (mucoperiosteum displacement = 2 mm)



Surveying

Surveying: is analysis of the contours of the abutment teeth to locate –

- 1- Height of contour and survey line + areas that need adjustments
- 2- Undercut areas and areas that can be used for retention
- 3- Path of insertion
- 4- Proximal tooth surfaces that will act as guiding planes
- 5- Determine areas of interferences of the alveolar bone that might need surgical correction

Q: why do we need to locate a single path of insertion?

- 1- To allow insertion and removal of the prosthesis without interferences
- 2- Direct the force along the long axis of the tooth
- 3- Provide frictional retention
- 4- Cross arch stabilization
- 5- Minimize torque on abutment teeth

Guiding planes = vertically parallel proximal surfaces on abutment teeth used to direct the prosthesis along during placement and removal because they are parallel to the path of insertion



- The first contact of the RPD → guiding planes
- Guiding planes provide stability and retention + ensure one path of insertion
- Each guiding plate is a minor connector but not each minor connect is a guiding plate

Q: what is the height of contour [HOC] and why do we need to locate it during surveying?

Height of contour = line encircling the crown at the greatest circumference , it allows us to know where the undercuts are to place our retentive arms

Undercuts are usually between HOC and gingival margin

- **Desirable undercut:** undercut that engages the retentive arm of the clasp assembly and used to retain the RPD [the contact between the retentive arm and the undercut should be PASSIVE]
- **Undesirable undercut:** will not be used in retention – usually produce damaging effects on teeth

Q: how can you eliminate undesirable undercuts?

- 1- Blocking it out with wax
- 2- Alter the tooth surface minimally
- 3- Surveyed crown

Q: what is the importance of the tripod dots or lines on the cast ? To allow you to reposition the cast according to the selected path of insertion

Q: what if you can't locate a buccal undercut for retention? Ake the retentive arm lingually and the reciprocal buccally.

Types of surveyors:

Ney (what we use)
Has a non swivel
horizontal arm



Jelenko
Has a swivel horizontal
arm



Surveying tools

- **Analyzing rod:** to determine the HOC and the undercut areas before drawing the HOC line.
- **Carbon marker:** used to draw the survey line on the cast (a metal shield protects the marker from breaking
- **Undercut gauge:** used to measure the extent of the undercut in the retentive area (3 gauges available , 0.25,0.3,0.5 mm) - to determine the undercut bring the vertical part of the gauge in contact with the tooth then move the surveying arms until there is contact with the terminal end of the gauge as well.





- **Wax trimmer** : used to contour the wax that is used to block the undercuts [shaving motion]



Factors that affect path of insertion :

- 1- Guiding planes
- 2- Retention areas [must exist for a selected path of insertion]
- 3- Aesthetics [the path of insertion selected should be the most aesthetic showing least metal]

Path of insertion selected should not have any interferences, you can select a path of insertion that has interferences if they can be corrected by tooth preparation, blocking the master cast or surgical correction of ST interferences.

If interferences cannot be corrected → choose another path of insertion even if it means a less desirable guiding plane and retentive areas should be selected.

Q: explain how would you survey a cast for RPD designing ?

- 1- Determine the best antero – posterior tilt of the cast – to determine interproximal guiding planes, minimize food trap areas under the framework [close to horizontal is best]
- 2- Determine the best lateral tilt of the cast [close to horizontal is best]
- 3- Draw the HOC line on all teeth surfaces and the buccal and lingual sides of the alveolar ridge + create the tripod re- orientation marks [one on the heel and one on each side]
- 4- Locate the depth of the desired undercut areas using undercut gauge and mark the area on the cast

Zero tilt = when the occlusal surface of the cast is parallel to the surveyor base.

- Antero-posterior tilt with redistribute the undercuts mesio-distally → ant tilt increases mesial undercuts, post tilt increases distal undercuts
- Lateral tilt to change buccal and lingual undercuts

RPD design

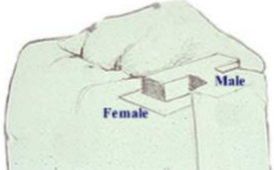
Designing RPD framework has 10 principles:

- 1- Symmetry
- 2- Simplicity
- 3- Retention
- 4- Resistance / reciprocation
- 5- Indirect retention
- 6- Stability
- 7- Support
- 8- Passivity
- 9- Phonetics
- 10- Esthetics



Direct retainers: the part of the RPD that retains the denture and prevents dislodgement

2 types of direct retainers:

Clasp assembly	Precision attachment
Consists of : 1- Rest 2- Minor connector 3- Retentive clasp 4- Reciprocal clasp Rests requirements: 1- Must be 1-1.5 mm thick to withstand forces 2- Located perpendicular to the direction of vertical forces 3- Should not be made on inclined surfaces Tooth supported RPD [class III, IV] → place rests ADJACENT to edentulous areas Tooth tissue supported RPD [class I, II] → rest seat is AWAY from edentulous area Minor connector [guiding plate]: Should contact the guiding plane that is ALWAYS adjacent to the edentulous area. Tooth supported RPD [class III, IV] → extends from below the marginal ridge to the junction of the middle and gingival 3rds – <u>relieved at the gingival margin</u> Tooth tissue supported RPD [class I, II] → extends from below the marginal ridge and extends to the junction of the occlusal and middle 3rds – <u>relieved at the gingival 3rd</u> Retentive clasps: 1- Suprabulge [Circumferential] – come from the guiding plate 2- Infrabulge [I bar] – comes from the denture base 3- Wrought wire Reciprocal clasp: 1- Lingual plate 2- Circumferential	Most aesthetic direct retainer [but can be extra coronal or intracoronal] Requires a surveyed crown Has 2 parts: MATRIX: female component Intracoronal -contained within the crown Extracoronal – attached to the external surface of the abutment  PATRIC: male component Extracoronal or intracoronal -attached to the framework 



Q: what are the factors that affect the flexibility of the retentive clasp?

- 1- Cross sectional shape [round is more flexible than ½ round]
- 2- Cross sectional size [smaller diameter = more flexible] – **the standard diameter = 18 gauge**
- 3- Length [the greater the length the more flexible] – cannot really be change because it depends on tooth dimensions
- 4- Taper [uniform taper = more flexible]
- 5- Type of metal [wrought wire = more flexible than cast metal]

Q: if the clasp tapers to half of the thickness at the tip how many times it will be more flexible? X2

Wrought wire:

- Stronger → can be used in smaller diameters
- Flexible → can be used in deep undercuts close to the gingiva [less visible and more esthetic]
- Stress breaking concept → can flex in all directions to dissipate forces

Cast metal c- clasp [circumferential] :

- **The choice for tooth supported RPD** – but can be used in tooth tissue supported as well
- Class 1 → 2 clasps class 2 → 3 clasps class 3 → 4 clasps
- Retentive area is usually located AWAY from edentulous space

C- clasp parts:

- Proximal 3rd → rigid + above survey line
- Middle 3rd → slightly flexible + crosses survey line
- Terminal 3rd → flexible + below survey line to engage the undercut

Suprabulge C clasp specifications	
Tooth supported RPD	Tooth – tissue supported
Retentive clasp = 18 gauge ½ round cast metal	Retentive clasp = 18 gauge round cast metal
Retentive undercuts away from edentulous space Retentive depth of the undercut = 0.25 -0.35 mm	

Wrought – wire circumferential :

- Choice for tooth – tissue supported RPD – can be used in tooth supported RPD

Wrought – wire circumferential clasp specifications	
Tooth supported RPD	Tooth – tissue supported
Retentive clasp = 18 gauge round , wrought wire [polished to 19 gauge] – it is soldered to the framework	
Retentive undercuts away from edentulous space Retentive depth of the undercut = 0.25 -0.5 mm	



Most esthetic direct retainer = precision attachment , most aesthetic in clasps assembly = infrabulge Bar clasp

Infra bulge bar clasp:

- **Mainly in canines and PM [esthetic areas]**
- **tooth tissue supported RPD**
- **Undercut is close to edentulous area**

Specifications: 18 gauge ½ round cast bar clasp , should pass at least 3 mm below the gingival margin and approach the undercut at 90° - undercut depth = 0.25 mm

Contra indication:

1. tissue undercut [common with canine eminence]
2. shallow vestibule or frenal attachment preventing the 90° approach of the bar.

Recoprical clasps: ½ round cast circumferential clasp – does not engage undercut – located in the MIDDLE 3rd.

- Recoprication for a cingulum rest is the lingual plate (the minor connector that connects the cingulum rest to the major connector)

Q: write the specifications of an I- bar used on a canine?

- 18 gauge , ½ round, cast metal engages and mid facial undercut at 0.25 mm depth
- Recoprication by the lingual plate connected to the cingulum rest

Q: case of class III cobalt write specifications of the clasp assembly?

- Rest: adjacent to edentulous area
- Guide plate: adjacent to the edentulous space - extends to the junction of the middle and gingival 3rd – relieved in the gingival margin
- Retentive clasp : 18 gauge ½ round circumferential cast metal – engages the undercut away from the edentulous area at a depth of 0.25-0.35 mm
- Recoprication : by the lingual plate or ½ round circumferential cast metal

In tooth tissue supported RPD – there are 2 **stress bearing systems** that are used in terminal (most distal abutments)

1. RPI
2. RPA

If there are anterior modifications for a distal extension then a combination wrought wire clasp is used on those anterior abutments. [modification spaces are treated as tooth supported RPD]

- Rest: adjacent to edentulous space
- Guiding plate: adjacent to the edentulous space - extends to the junction of the middle and gingival 3rd – relieved in the gingival margin



- Retentive clasp: 18 gauge , round, wrought wire metal [polished to 19 gauge] , soldered to the framework- engages the undercut away from the edentulous space at a depth of 0.25 -0.5 mm
- Recoprication: either lingual plate or ½ round circumferential clasp

Terminal abatements in tooth tissue supported RPD :

RPI	RPA
Rest = mesial [away from edentulous space] Guiding plate = distal [adjacent to edentulous space] Recoprication = by the mesiolingual minor connector	
Retentive clasp = I bar , engages the undercut midfacial or mesiofacial – depth 0.25 mm	Retentive clasp = Akers [circumferential clasp] engages the undercut away from the edentulous area – depth 0.25 mm

Tooth preparation

Q: what is the goal of tooth preparation for RPD?

- 1- Create positive rest seats that will not interfere with opposing teeth or provide non axial loading on the teeth
- 2- Reduce undesirable undercuts and sharp areas that might interfere with the RPD components
- 3- Alter the position of the survey line to allow the proper placement of the retentive and reciprocal arms
- 4- Create space for the denture components (areas where the connectors or the clasp arms need to pass)
- 5- Restore the occlusal plane if teeth are slightly tilted or over erupted

Tooth preparation should always be as minimal as possible , remaining in the enamel

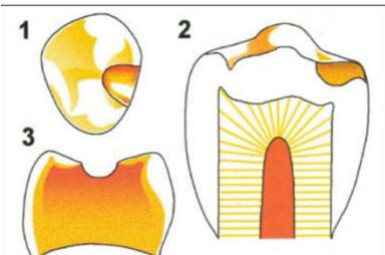
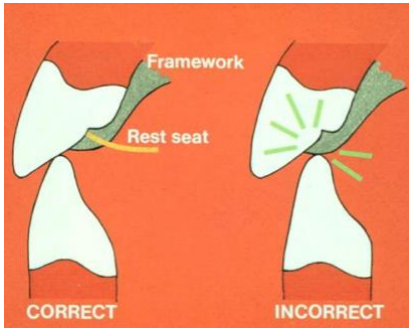
First thing you prepare is the guiding planes using a cylindrcial bur

Rest seat prep:

Occlusal rest seats can be prepared in amalgam but not composite – cingulum rest seats can be prepared in composite (because the direction of the force is axial)

You don't give the pt anesthesia because you should stay in the enamel.



Occlusal rest seat	Cingulum rest seat
- You can use diamond or carbide round burs with water and light pressure - Width should be ½ the intercusp width The base of the rest seat should equal 1/3 of the bucco lingual width - Entirely in the enamel - Triangular shape [apex towards the center] and round edges - Flared occlusally, buccally, lingually to ensure no sharp angles + smooth walls - Marginal ridge = 1mm deep , central part seat = slightly more than 1 mm deep (to provide positive rest seat) - Floor should incline towards the center – the deepest point (angle between the minor connector and the rest seat = less than 90) - Floor should be spoon shaped  If the rest seat needs to be placed away from the edentulous area → it is not flared to the facial line angle and should be more flared lingually (to provide space for minor connector)  Embrasure rest seat: - Flared more buccally and lingually without affecting the contact area - U shaped trough that is 1mm wide and 1 mm deep (without breaking the contact - Use a shoulder bur to create a 1 mm bucco – lingual clearance from the proximal side then use a round bur to create the seat  In RPA rest seat : - Open the margins more and do slight lingual flaring for the minor connector	- Use Long cylindrical bur along the long axis of the tooth or ¼ round bur then tapered diamond - Inverted L shape seat - Created at the junction of the cingulum and the lingual inclined tooth surface - Rest seat is perpendicular to the lingual surface - Depth = 0.75 – 1 mm (so the metal does not become too bulky and interferes with occlusion) - Facial wall = flares to the incisal (no undercuts to the path of insertion) - Lingual wall = less than 90 with the path of insertion - Round without sharp angles - The opposing tooth should occlude incisal to the cingulum rest  If the cingulum is too low, or not too well developed → 1- use a different tooth 2- composite to create the undercut 3- use surveyed crown in mand anteriors → thin enamel → use composite to create rest seat

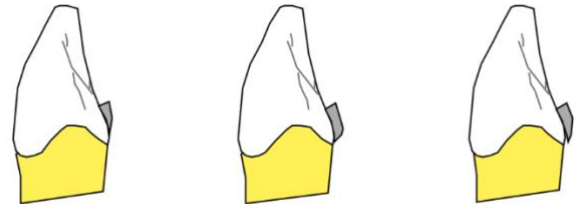
Q: how can you know that this is the correct width of the rest seat? It should be the exact width of a # 8 bur.



Q: how do you check for a positive rest seat in occlusal rest seat and cingulum rest seat ?

- Occlusal rest seat - Bring an explorer move it from the center towards the marginal ridge there should be resistance
- Cingulum rest seat – going incisally the explorer should not have any resistance, the explorer should only have resistance in the cingulum area.

Bonded cingulum rests [creating the rest with composite] : they should have flat emergence profile (not rounded or with undercuts to prevent plaque accumulation)



Correct

Overcontoured

**Overcontoured
Open margin**

If the teeth are too rotated and you can't use cingulum rest seat → use incisal notch seat (un aesthetic + places the force away from the alveolar bone)

NOTES:

- After tooth prep you should apply fluoride varnish
- I bar clasp engage the undercut away from the edentulous areas
- Retentive arms = tapered reciprocal arms = same diameter
- Deep retentive undercut → use wrought wire because it is more flexible
- If the only undercut is found close to the edentulous area → use ring clasp
- Extension of the guiding plate in tooth / tissue supported RPD or class IV → into the junc of the occlusal and middle 3rd

Embrasure clasp criteria:

- 1- Periodontally sound teeth
- 2- Equal Marginal ridge
- 3- Same HOC
- 4- Some space between the teeth and enough clearance with the opposing tooth

Pier abutments:

- Tooth supported → put rest and guiding plate mesially and distally
- Tooth, tissue supported RPD → retentive and reciprocal arms away from the edentulous areas



Impressions for RPD

2 types of impressions are taken after tooth prep

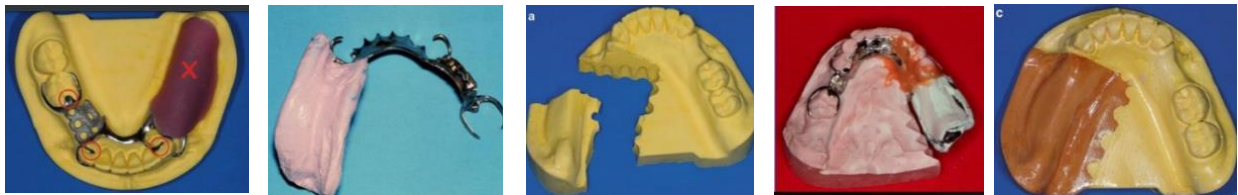
Class III and IV [tooth supported] → anatomical form , one stage impression with elastic impression material – the obtained cast represents soft tissues at rest and not function

- Anatomical impressions cannot be used in class I and II because then the RPD will exert excessive pressure on the abutment teeth during function

class I and II → physiological/ functional form

impressions for distal extensions [class I and II]

- **before framework construction :**
border molding of the distal extension of the special tray and take secondary impression
- **after framework construction – altered cast technique :**
importance: helps equalize the support between the teeth and the residual ridge + directs the force to the primary stress bearing areas
after framework is tried inside the pt's mouth → seat the framework over the cast and apply soft acrylic resin over the mesh of the framework on the distal extension area [this will act as a special tray] → border molding of the acrylic resin → load the special tray with impression material and insert it into the pt's mouth while placing 3 fingers on the occlusal rests and indirect retainers until the material sets → after the impression is taken the edentulous area of the cast is cut off [with retention grooves] → seat the framework with the impression on the cast and stabilize it with sticky wax. → bead the impression and pour stone [of a different color] in the distal extension area



impression material that can be used in this technique:

- 1- ZOE
 - 2- Fluid wax [has the ability to flow at room temp] – IOWA wax and KORREKTA wax [time consuming because it is applied layer by layer]
 - 3- Rubber based impressions
- **after denture insertion – functional relining method**
during the denture insertion or when ridge resorption indicates the need for relining borders should be shortened and border molding done → impression material placed in the distal extension with the fitting surfaces used as the special tray → over all (alginate pick up impression) → pour the impression and the RPD on the cast should be flasked again and processed then remounted on an articulator to check occlusion



impression material used:

- 1- ZOE
- 2- Silicones
- 3- Tissue conditioning materials

Q: how do you test for RPD retention?

Apply finger pressure on the distal extension and look for lifting of the indirect retainer

Steps of RPD construction

- 1- Diagnosis + tx planning
- 2- Primary impression and pouring of study casts
- 3- Surveying the study cast + draw design
- 4- Intra oral mouth prep of guiding planes + rest seats
- 5- Final impression → pour master cast → survey master cast + draw design
- 6- Block out on the master cast all the areas that the framework should not sit on (teeth, undercuts, soft tissues)
Arbitrary block out → for ST parallel block out → for guiding plane
Relief all the areas that will have acrylic later on (denture bases etc)
- 7- Duplicate the master cast to form a refractory cast
You make a mold of the master cast using silicone → pour investment material in this mold to create the refractory cast
Refractory cast : is to preserve the master cast from any damage + the refractory cast is made from investment material which can withstand the high temperatures and pressure of casting
- 8- Wax pattern is made on the refractory cast with sprues that will act as channels to allow the molten metal to flow + add a plastic funnel
- 9- Cover the refractory cast and wax with investment material [don't cover the funnel]
- 10- Subject the investment to heat to melt the wax pattern and create a mold
- 11- Insert the molten metal into the mold created → de investment [remove investment material]
- 12- De spruing and finishing + polishing of the metal framework
- 13- Try the framework on the cast

Master cast is made of plaster / refractory cast is made of investment material

Wax pattern is made on the refractory cast → lost wax technique that will change the wax into a mold inside the investment material to pour the molten metal and form the framework

- [wax pattern + framework casting are done on the refractory cast]
- Investment material = silica + binder (gypsum , phosphate, silicate)
- Investment material should expand equal to the metal shrinkage to maintain dimensions during casting.
Investment has 3 types of expansion: thermal, hygroscopic, setting expansion [all 3 should be equal to the metal shrinkage]

> Gypsum bonded investment [low heat] → for gold inlays/ onlays crowns etc



- > Phosphate bonded [high heat] → PFM or CC
- > Silicate bonded investment [high heat] → for CC RPD

The funnel will not transfer to metal because it will not melt because it is made of plastic

Framework try in

- 1- Check if the design matches what your ordered
- 2- Check the fit of the framework on the cast – remove the framework and check for scratches
If the framework does not fit nicely on the cast it might be due to errors in duplication, wax up, investing or casting
Scratches on the cast – due to errors in block out and relief
- 3- Try the framework inside the pt's mouth – ensure passive fit
All areas should be relieved except for tooth contact areas
If the framework does not fit inside the mouth → error in impression or pouring
If there are any areas that are preventing the seating of the framework properly → relieve with high speed carbide then rubber points
If it fits on the cast but not inside pt's mouth → no proper block out of undercuts
 - > **If the framework does not fit at all → new impression must be taken**
 - > **If the framework fits but there is rotation around the fulcrum line [pressing on the molar area dislodges the anterior teeth] → do altered cast technique**
 - > **If the framework fits very well → shade selection and interocclusal record**

Jaw relation and wax try in

How can you establish occlusal relationships for RPD?

- 1- Direct opposition of the casts by hand
- 2- Interocclusal records (a piece of softened wax
- 3- Occlusal record bases
- 4- Functional generating path [dynamic occlusion] – a hard type of wax is placed on the bases and the pt is instructed to chew in all directions → wax will be carved by opposing teeth

Desired occlusal contacts for RPD:

In centric occlusion	Bilateral contacts of opposing post teeth
Eccentric position	
Mand RPD against maxillary CD	Bilateral balanced occlusion
Mand class I against maxillary CD	
Mand class I RPD against max class I RPD	
Class III	Working side contacts only
Class III mand RPD against class III maxillary RPD	
Mand class I RPD against max natural dentition	
Class II RPD against natural dentition	
Maxillary class IV RPD against mand natural teeth	Centric position: contact anteriorly is needed to prevent over eruption of natural teeth In eccentric position: contact anteriorly should be avoided [to eliminate unfavourable forces]



Anterior teeth selection	Posterior teeth selection
1- Depend on previous records (photographs, casts etc..) 2- Shape should follow the form of the face and the ridge 3- Length = from (2 mm below the lip to the smile line) 4- Width = greatest bi zygomatic width / 16 = the width of the upper central incisor 5- The color of the face should be the basic guide for the color of the tooth Fair skin → lighter teeth dark skin → darker teeth	1- Buccolingual width = less than natural teeth to decrease occlusal table 2- Mesiodistal width = depending on the distance from the canine to the retromolar pad and the max tuberosity (in case of distal extension) 3- Length = length of the first PM = the canine

Individual teeth have graduation in their color → translucency in the incisal edges + darkening towards the neck

The central incisors are the lightest teeth , laterals are a bit darker then canines are darker

Q:What do you check during try in of the RPD?

1. Pt's approval
2. Aesthetics and phonetics
3. Vertical jaw relationships (RVD, OVD, and freeway space)
4. Horizontal jaw relationship (ICP and CR)

RPD insertion

Before you insert it inside the pt's mouth:

- Run your fingers around the borders to check for any sharp areas
- Inspect the RPD for any deficiencies [some of the acrylic might stick to the metal and interfere with the seating]
The denture should be well polished [rough areas can accumulate plaque , cause pain and ulcerations]

Insert inside pt's mouth and check with PIP for any high areas that need to be relieved

Check occlusion using articulating paper [make sure the rest seats or other parts of the RPD are not interfering with occlusion]

** you need to recall the pts after 2 weeks to recheck occlusion again – at this time the muscles will become adjusted to the RPD

If you have 2 opposing RPD – occlusal adjustment is done one at a time

Instructions given to the pt:



- 1- Show the pt the correct way for denture insertion and removal (from the denture base and not the clasp arms)
- 2- Explain to the pt that it needs about 2 weeks to adjust to the new denture and there might be increased salivation – if any soreness develops the denture can be adjusted
- 3- Encourage them to wear the denture and read out loud to improve speech (problems in speech should disappear in few days)
- 4- Clean the denture after every meal with soft tooth brush and non abrasive toothpaste or liquid soap – clean it over a sink half filled with water to prevent fracture if it falls
- 5- Remove the denture at night and place it in water
- 6- Recall after 24 and 72 hours and every 6 months [to check for caries on the abutments , RPD fit retention and stability etc]

** if a pt comes back after a few days still speaking in a weird way → they weren't wearing the denture

** if calculus builds up remove it with ultrasonic scaler

Class I and II RPD → require relining over time



Interim RPD [temporary RPD]

**** might be a case in need of an interim denture , explain other indications for interim denture , mention the steps of fabrication****

They are RPD that are worn for a short period of time

made from acrylic major connector that extend to the HOC lingually/ palatally and wrought wire clasps

Indications:

- 1- **Children – they will quickly out grow any prosthesis**
- 2- **To act as temp space maintainers**
- 3- **Whenever you cannot design a perm denture or during transitional stage**
- 4- **Large pulps → you can't do FPD [make an interim until you decide what you can do like implants]**
- 5- **Financial reasons**
- 6- **In accidents where there is sudden loss of teeth and the pts wants an immediate solution for esthetics and function**
 ** teeth that will be extracted are trimmed from the cast + the ridge is made to have a convex shape simulating the condition after extraction .
 Main problem with immediate dentures is : no ant teeth try in, retention and stability are unpredictable, needs several appointments for relining and adjustment
- 7- **To act as a transitional denture:**
 - Pt with couple of teeth left that are indicated for exo but the pt is refusing + they are physiologically not prepared to become fully edentulous → place interim RPD until they are prepared for CD
 - Or if the pt is medically compromised (recent MI) → only emergency tx can be done [use interim until you can do the exo and place a denture]
- 8- **To act as a treatment denture :**
 - to improve the condition before a definitive TX
 - for tissue conditioning
 - for implant healing (to allow the extraction socket to heal + bone to organize)
 - alteration of the OVD – use an interim denture to increase the OVD gradually and monitor pt response
 - surgical splint after tori removal

Q: explain the fabrication steps of interim dentures?

- 1- No framework design or try in
- 2- Take primary impression
 Class I and II → special tray + border molding for final impression
 Class III and IV → no need for final impression
 (long span → border molding on custom tray is needed)
- 3- Bite registration + select tooth shape and shade

Next appointment → denture try in next appointment → insertion



A preferred step is to do all teeth prep , so when the extraction sockets heal you can take just take a final impression for definitive denture

Design of the interim denture:

- **Clasps:** c- clasp ,ball clasp, adam's clasp [wrought wire]
- **Bracing :** provided by the acrylic since it will extend to the HOC
- **Rests:** usually wrought wire – acrylic may be used over cingulum rests
- **Major connector:** should extend as much as possible to the 1st molar [in the lower arch make it like a lingual plate [clasps are embedded into the major connector]



Areas that need frequent adjustments:

- 1- Interproximal extensions
- 2- Where the clasp exits the resin
- 3- Tissue undercuts

Flipper [flexible RPD]

- Biocompatible nylon material
- No metal clasps – clasps are made from the same material as the base
- Need teeth on both sides for retention [class III]





Dental alloys and dental materials

Imp terms/ facts:

- **Casting:** a wax pattern is used to create a mold then melted metal is placed to take the shape of the mold
- **Cold working:** mechanically bending and shaping metals at low temperatures
- Metals can be mixed with mercury [amalgam] to harden by chemical reaction
- Quenching : rapid cooling of molten metals to achieve finer grains
- Metals with finer grains = are harder
- 2 ways you can achieve finer grains = quenching or seeding (adding another metal to a molten metal to create nuclei for crystallization)
- Alloy = mixture of 2 or more metals
- Since alloys are mixtures of metals , they show a range of solidification temperatures (pure metal has only one solidification temp)
- Finishing= remove surface defects
- Polishing = remove scratches on a surface until it appears shiny

Q: why do we need to do finishing and polishing of metals?

- 1- Improve strength
- 2- Improve esthetics and function (food slides better over polished surfaces)
- 3- Reduce plaque and stain accumulation and corrosion

Q: mention 3 abrasives? Sand, aluminium oxide, granet , rouge

- High noble metals are polished with rouge.
- Emery or corundum → to grind acrylic or custom trays
- White stone burs → are made from aluminium oxide
- The abrasive particle must be harder than the surface being abraded
- Grit = the size of the abrading particle
- Fine abrasive are termed as F, FF, FFF (as they become more fine)
- When the abrasive particles are bonded onto paper they are termed as O,OO,OOO
- Spherical particles = less abrasive than irregular particles
- Higher pressure and speed → more abrasion
- Hazards of finishing process: hard particles , aerosol might contain infectious particles for the eyes and lungs [you need ventilation, high suction, safety goggles and masks]

Ceramic can be finished using diamond burs then polished using white stones and sent for glazing

Steps of finishing and polishing cobalt chromium:

- 1- Any investment material remaining on the metal framework is removed using sandblasting
- 2- Cut the sprues using separating discs or stone + remove excess sharp areas
Electrolytic polishing [acid + electrical current] then mechanical polishing [rubbers and polishing pastes]



Classification of Alloys:

High noble alloy	Contains at least 60 % noble metal	Gold -palladium Gold platinum palladium Gold palladium silver Excellent corrosion resistance but expensive
Noble alloy	Contains at least 25% noble metal [gold]	Palladium silver Palladium gallium Palladium copper gallium Good corrosion resistance and burnish ability
Base metal	Contains less than 25% noble metal [gold]	Nickle chromium Cobalt chromium St steel Titanium High stress resistance and fatigue strength But difficult to finish and cut and has biocompatibility issues

- Titanium has corrosion resistance due to oxide layer
- Pure titanium is available in 4 grades

Q: mention 5 requirements of ideal dental alloys.

- 1- Biocompatible (non allergic , non toxic)
 - 2- Sufficient strength
 - 3- Easy to fabricate and polish
 - 4- Corrosion resistance
 - 5- Able to tolerate high temperature
- Metals must have the same Coefficient of thermal expansion as porcelain.
Metals bond to porcelain via the **oxide layer**



Preporsthetic surgeries

Ideal ridge :

- 1- broad and rounded ridge crest with vertical sides
- 2- enough amount of keratinized mucosa
- 3- displaceable tissues in the posterior seal area

common problems in the mandible

- 1- severe ridge resorption → impaired stability and support + risk of pathological fractures
- 2- unfavorable floor of the mouth position → length of the lingual flange is affected → impaired stability of the denture
- 3- reduced keratinized mucosa → impaired support [usually occurs with ridge resorption]
- 4- thin , knife edged alveolar ridge → impaired support + pain and discomfort
- 5- IAN exposed on the ridge crest → severe discomfort + inability to tolerate lower denture

common problems in the maxilla

- 1- Severe ridge resorption → impaired stability + difficulty in maintaining denture seal
- 2- Redundant tissue [premaxilla has very fibrous tissue and underlying bone is resorbed] → do not remove the fibrous tissue because the underlying ridge is likely to be knife edged
- 3- Bilateral undercuts [can be prevented by socket compression after extraction] → impaired retention
- 4- Low frenal attachments → impaired seal and fracture of the denture
- 5- Inflammatory papillary hyperplasia → impaired adaptation and support

Ridge resorption in maxilla and mandible	
cause	Prevention
• ill fitting dentures • wearing the dentures at night • opposing arch with natural teeth	• well adapted dentures • take out dentures at night • retain roots in the mandible or place implants



Problem	Solution
Epulis fissuratum [fibrous tissue caused by the flanges of ill fitting dentures]	Surgical excision
Low frenal attachment [frenum is a band of fibrous tissue , no muscles]	Surgical excision
Inflammatory papillary hyperplasia [caused by ill fitting denture + poor OH + candida infection]	Correct denture fit [reline / rebase] + give anti fungals + surgical removal [by electrosurgery]
Hyperplastic tuberosities [caused by combination syndrome or super eruption of unopposed 3 rd molars , then the bone was not trimmed after extraction of the molars]	Excision of underlying fibrous tissue
Knife edge crest	Alveoloplasty to reduce the knife edge and remove undercuts – only remove half of the desired amount because there will be bone resorption after surgery

Combination syndrome : when the pt has an upper complete denture and lower distal extension RPD- during protrusion the maxillary CD will be tipped anteriorly → bone resorption in the pre maxilla and maxillary tuberosity hyperplasia

Q: when is tuberosity hyperplasia indicated for surgical removal?

- 1- Inability to extend the maxillary denture to the hamular notches
- 2- Inability to cover the retromolar pad
- 3- Not enough space at the correct OVD to cover both tuberosities

Q: when should you remove bony exostoses?

- 1- If they interfere with speech or the construction of an RPD / CD
- 2- When the overlying mucosa is traumatized and ulcerated

NOTE: if the mandible has severe resorption and the IAN is exposed you can :

- A. Surgically reposition the nerve → risk of perm nerve damage [parasthesia, hypersthesia etc.]
- B. Place 4-5 implants anterior to the mental foramen and make a **fixed edentulous bridge**

Vestibuloplasty : deepening the oral vestibule by changing it's soft tissue attachment

Implant-Supported Dentures (fixed)





Relining & Rebasing

Rebasing	Relining
Re adaptation of the denture base to the underlying tissues by replacing the entire denture base without changing the occlusal relationships Indications: Denture base is unsatisfactory [porous, crazed, stained]	Re surfacing the denture base to correct it's adaptation to the underlying tissue by adding resin material to it's fitting surface without changing occlusal relationship. Indications: Loss of retention, instable dentures , food under the denture , abused mucosa under the denture Contraindications: Worn out dentures, un acceptable esthetics, loss of OVD, speech problems, significant mucosal inflammation

Types of relines

- Permanent - temporary
- Chairside [direct] – made in the lab [indirect]
- Hard acrylic – soft acrylics

You always reline the least stable denture first [usually the lower]

Relining for complete denture / RPD

Indirect reline [in the lab]	Direct reline [in the clinic – chairside]
1- Clean the denture 2- Adjust occlusion [obtain stable occlusal contacts] 3- Remove tissue undercuts 4- Reduce tissue base [fitting surface] • If you have acceptable interocclusal space → reduce 1 mm from fitting surface • If you have excessive interocclusal space → just roughen fitting surface [upper denture must be perforated] 5- Reduce the denture flanges by 2 mm 6- Border molding and recording of Post palatal seal area using greenstick compound [occlusal surface needs to be separated by applying a layer of Vaseline] 7- Impression using light body PVS [wash] or ZOE [using the current denture as a tray] ** wash PVS – easy to use and remove from undercuts , requires tray adhesive ** ZOE – sticky and not used if pt has undercuts , does not require tray adhesive but pt lips should be covered with Vaseline <i>Make sure you don't place excessive impression material – this can reduce freeway space</i>	** not very durable [short term solution] Using tissue conditioner: 1- Clean the denture 2- Roughen / slightly reduce tissue base [fitting surface] 3- Remove undercuts 4- reduce flanges 5- tissue conditioning material is mixed and applied on the fitting surface [occlusal surface needs to be separated by applying a layer of Vaseline] Tissue conditioning material requires thickness to be accurate [you need to reduce fitting surface] + cannot extend to borders → <u>if the flanges are greatly underextended → better do lab reline [impression technique]</u> 6- seat denture inside the mouth and remove any excess conditioning material using a cotton swab before it sets 7- do slight border molding 8- setting time take 8-12 mins [during this time allow the pt to talk, swallow, and lightly occlude]



During impression pt should occlude lightly until the first contact is achieved and hold this position until material sets

- 8- Send impression to the lab [**the lab will process it by self cure or heat cured acrylic resin**]
- 9- Deliver in the **same day** and check occlusion

OVD might increase a little with this technique

any excess material on the flanges [remove with **a hot knife or scalpel**

- 9- pt wears the reline and goes home and only takes off the denture if they will eat or drink sth hot
 - 10- pt returns after 24-48 hours and a cast is poured **using soft relines:**
 - a soft flexible silicone material is used
 - redone every year
 - used if the mouth cannot tolerate a hard denture base
 - prone to fungal infections, staining, delamination [separation from denture base]
- using hard relines:**
made from the same material as the denture base [perm solution]

- If you are doing indirect reline using impression technique for RPD – once the impression for the tissue surface is set → take an alginate pick up impression
- If RPD is broken → reassemble pieces → place in the mouth and take over all alginate pick up impression



Tissue conditioners ,denture cleansers and fixatives

Q: what is tissue conditioning? Non surgical improvement of the denture foundation tissue by using:

- A. Tissue resting
- B. Occlusal correction
- C. Improving OH
- D. Temporary soft relines

Tissue conditioning is usually done before doing a permanent reline or making final impressions for a denture .

Q: what are the indications of tissue conditioning?

- 1- Occlusal disharmony [if there is increased or decrease in OVD or contact on some teeth only]
- 2- Tissue abuse [red inflamed areas, ulcerations, denture induced stomatitis , epulis fissuratum flabby ridges]
- 3- Temporary reline of immediate surgical splint or immediate denture or cleft palate speech aid
- 4- Tissue conditioning during implant healing

Tissue conditioning :

- A. **Tissue rest:** remove the denture for 48 – 72 hours [older pts need more time for recovery] – if the pt is socially active and cannot remove the dentures for long ask them to remove it as much as possible when they are at home
- B. **Improving OH :** show the pt how to brush all denture surfaces and massage the tissues with a soft tooth brush twice daily.
- C. **Occlusal correction :** This is one of the most overlooked causes of tissue irritations can be done by:
 - **Add to occlusal surfaces of acrylic teeth with acrylic resin** to improve vertical dimension and balance occlusion
 - **occlusal pivots** [Acrylic resin added to the lower denture to convert it to a pivot appliance and to provide **occlusal contact in posterior region** then flatten the opposing teeth and leave onlys cusp tip contacts between the upper denture and the flat acrylic resin pivot]
 - **Clinical remount and occlusal adjustment**
- D. **Temporary soft relines:** act as a cushion to absorb the load a redistribute it allowing the underlying tissues to heal – only temporary solution and have to be removed after **7- 14 days**



Tissue conditioning procedure

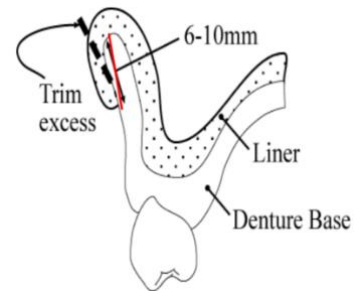
Educate the patient [brushing denture, massage tissues and tissue rest - 8 hrs./day and don't wear the denture for 24 hours before relining]

- 1- Clean & disinfect the denture [to minimize the presence of microbes, which might subsequently colonize the liner → shorter lifespan]
- 2- Check if you need to reduce from fitting surface and flanges [check if they are over extended]



****Normally, patients have excessive interocclusal distance or freeway space, so there may be room to place the liner without reduction of the denture base, otherwise trim the fitting surface slightly. If the denture base is not reduced → the incisal display will increase once the liner is placed**

- 3- Remove slightly the polished surface around the denture periphery **(at least 6 mm past the edge of the flange, and create a bevelled surface)**. This helps ensure that the conditioner will adhere to the denture to minimize separation, leakage and microbial colonization.
- 4- Apply a **thin layer of material** to make sure it sticks to the denture base – then wait for it to become a little bit more viscous before you insert it inside the pt's mouth or add more material



- 5- **reline the least stable denture first (normally the lower)** so that the more stable denture can be used as reference for positioning – you ask the pt to **bite down in CR [for 15 mins]**

CAUTION: you should not hold the denture for the pt because you will have:

Errors in positing and seating the denture

Wrong jaw relation and wrong OVD

- 6- Remove the denture and check that you have equal thickness of 2 mm of the material [if there are any empty spots you can add material and re insert again]
- 7- Remove excess using a warmed scalpel blade

Most relines will result in increase in OVD you need to check after placement if there is any increase in OVD → trim the fitting surface



Denture cleaning

- A. **Mechanical:** brushing with denture abrasives – should be done after every meal [regular tooth paste is too abrasive for dentures and should not be used]
- B. **Immersion denture cleansers:** done every few days
 - 1- **Hypochlorite :**
Antibacterial BUT corrosive if the denture has metallic parts + causes the denture to whiten + not effective in removing calculus and stains
 - 2- **Alkaline peroxide :** might not be compatible with certain type of relining materials
 - 3- **Oxidizing agents [peroxides] :** they clean only superficially – SHOULD NOT BE USED IF THE DENTURE HAS A SOFT LINER → IT WILL HARDEN THE LINER
 - 4- **Mild acids [hypo chloric or phosphoric acids] :** dissolve calculus but attack the metal used in RPD [not recommended for routine use]
 - 5- **Enzymes :** to break down mucin deposits but their efficacy against candida is less than alkaline peroxide



Both mild acids and hypo chlorites cannot be used if the denture has metal – both alkaline and oxygenating agents cannot be used if the denture has relining material.

Denture adhesives

- Self prescribed by the pt to improve the retention of the denture
- Patients should be educated that **they need to frequently remove these materials** from their dentures and tissues and **not pile up the adhesives** [they work best in a thin layer]

Types: paste or cream, powder, sheet wafer and woven cloth like material. **No advantage of one type over the other, whatever is convenient is used.**

Denture adhesive removal :

- Wafer, woven cloth and strip type are easily removed by **peeling them off**.
- powder, cream or paste type → use denture adhesive removers and follow instructions



Single complete denture

Single complete denture : a complete denture on one arch only [the opposing arch can have natural teeth , FPD or RPD] – **mostly it is maxillary CD against distal extension RPD**

Q: why is making a single complete denture harder ?

- 1- opposing natural teeth can generate heavy occlusal loads which can result in → bone loss of the residual ridge , denture fracture ,denture displacement and tilting leading to combination syndrome
- 2- opposing natural teeth might be supra erupted or drifted producing un harmonious occlusal plan and minimizes the space for artificial teeth

Q: how can you minimize problems with single complete denture ?

- 1- complete all steps of CD construction without any minor errors
- 2- make the occlusal plane of the opposing arch more harmonious
- 3- extend the denture base borders as much as possible [within the anatomical limits] – to distribute the forces over the largest area possible

**** never use porcelain denture teeth in single dentures → it will cause severe attrition of the natural teeth**

- most cases of single denture fractures are in the midline – because most forces are directed anteriorly and there will be tipping and flexure leading to fracture

in normal upper and lower CD there is balanced occlusion and posterior contact during lateral excursions, but in single complete denture because the opposing natural teeth might not be properly aligned → no bilateral balance [no contact posteriorly during lateral excursions] → the denture will tip anteriorly causing combination syndrome + denture fracture

if the denture fractures repeatedly → make cast metal denture base.

NOTE: avoid excessive incisal overlap of the anterior denture teeth because this will cause the denture to tip anteriorly causing severe resorption of the premaxilla

Q: How can you minimize the bone resorption in single dentures ?

- Correct occlusal discrepancies: [Reshaping by grinding of natural teeth, Provide new restorations, Reshape with RPD framework]
- Retain root tips or place implants particularly in the premaxilla as overdenture abutments to facilitate support.

Q: how do you manage a case of single denture?

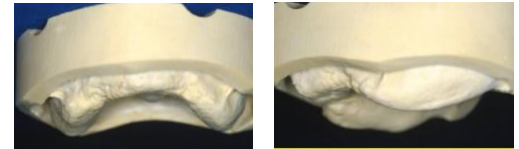
- 1- **Make the opposing occlusal place harmonious :**
Mark the adjustments needed on a study cast then you can do:
 - A. If adjustments needed are all within the enamel → Simple enameloplasty to reduce severe curve of spee and adjust supra erupted teeth



- B. Fixed partial denture [constructed before the single complete denture – during bite registration for the FPD you do the occlusal rim for the single complete denture]
- C. Removable partial denture [constructed at the same time with the single complete denture]

combination syndrome:

- caused by wear an upper CD against a lower distal extension RPD



Five signs or symptoms that commonly occur:

- 1- Loss of bone from the anterior part of the maxillary ridge [premaxilla]
- 2- Overgrowth of the tuberosities.
- 3- Papillary hyperplasia in the hard palate
- 4- Extrusion of the lower anterior teeth.
- 5- The loss of bone under the partial denture bases

If the pt has been fully edentulous for a long time → habitual class 3 malocclusion

Additional signs of combination syndrome:

- 1- Loss of OVD & occlusal plane discrepancy.
- 2- Anterior repositioning of the mandible (protrusion)
- 3- Poor adaptation of the prostheses → Epulis fissuratum
- 4- Periodontal changes

Prevention of combination syndrome:

- 1- Avoid upper CD against lower distal extension RPD
- 2- Retain mandibular posterior teeth to ensure posterior support
- 3- Place an overdenture on maxillary anterior teeth to reduce resorption of the premaxilla

Treatment of “Combination Syndrome”:

- A. Make impression that doesn't compress tissue
- B. Be sure patient wears mandibular RPD
- C. Frequent recall to adjust occlusion and reline RPD as necessary
- D. No “cure” available: implants may be used

Mandibular Single Denture vs. Natural Maxillary Teeth:

Very poor prognosis: Discomfort and accelerated resorption → TRY TO AVOID

Q: why does bone resorption occur more in lower single dentures?

- 1- The denture supporting tissues for the mandibular CD is smaller than than the upper supporting tissues → excessive load is generated
- 2- The mucosa and submucosa of the lower residual ridge is thin → minimal denture foundation area.

Prevention :

- 1- Consider extraction of the healthy upper teeth.
- 2- Maintain lower bone by implants or overdentures



There are two situations when a mandibular complete denture, opposing upper natural teeth may be acceptable:

1. **Class III jaw relationship.** This occurs when the mandible is larger than normal or the maxilla is smaller than normal.
2. **Cleft palate**

Management of flabby ridge :

Flabby ridge = excessive mobile soft tissue , mostly in the upper anterior region

- If minimal → treated by tissue rest and conditioners
- If extensive → surgery

[removing the shock absorbing flabby ridge may lead to trauma of the underlying bone → pt discomfort and pain] and an increased bulk of denture material.

Management during impression making [constructing a denture over the flabby ridge]

A **mucostatic impression technique** is done (no displacement of flabby tissue at rest and under pressure) so that the flabby ridge does not recoil back into its original position and displace the denture.

Mucostatic impression procedure:

- 1- Primary alginate impressions + pour study cast
- 2- Special tray is made with 1-2 layers of wax placed anteriorly over the flabby ridge area
- 3- Border molding + make holes in the anterior region of the tray [so the impression material does not apply any pressure in this area and excess can flow out of the holes]
- 4- Take impression with ZOE or medium body silicone
- 5- Pour a master cast and construct denture on the resulting cast.





Immediate dentures

Immediate dentures = dentures that are placed immediately after extraction

- Teeth that maintain **OVD should be extracted at the day of delivery** not before [usually posterior teeth are extracted before and then only anterior teeth are extracted at the day of delivery]

Indications	Contraindications
1- Socially active pt and wishes to retain their natural appearance 2- Medically fit [there will be multiple extractions] 3- Has time for multiple visits [there will be many post insertion adjustments]	1- Pt cannot comes for multiple appointments 2- Indifferent patients or emotionally unstable pts 3- Systemic problems that prevent multiple extractions

Advantages	Disadvantages
1- Better healing [because surgical site is protected] + better ridge form 2- Prevents muscle collapse 3- Faster pt adaptation to dentures 4- Prevent embarrassment 5- Provide guide for OVD	1- Multiple relines are needed [financial and time problem] 2- The denture cannot be assessed fully before insertion

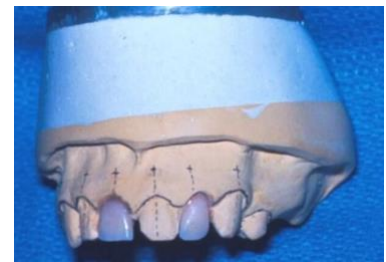
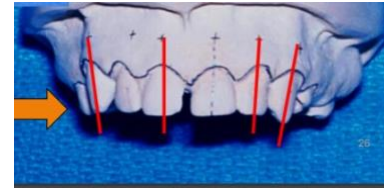
Types of immediate dentures	
Conventional [classic] – CID	Interim [transitional] - IID
1. Definitive long term prosthesis 2. After healing , this denture is relined 3. At the day of delivery only anterior teeth [maybe with premolars] are remaining. 4. Good retention and stability at insertion [which can be maintained during healing] 5. Cheaper than IID 6. Tx process takes longer because there is delay of 3-4 weeks for the posterior extraction areas to heal 7. Indicated when the pt can function without posterior teeth for 3 months 8. At insertion only anterior teeth are extracted 9. Esthetics cannot be changed 10. At the end the pt has one denture	1- Interim short term prosthesis 2- After healing is a new denture is made 3- At the day of delivery both anterior and posterior teeth are remaining 4- Fair retention [must be improved by relines and tissue conditioning] 5- More expensive 6- Tx process takes less time 7- Indicated when the pt cannot go without posterior teeth or existing RPD 8- At insertion [anterior and posterior teeth are extracted] 9- The second denture allows change in esthetics 10- At the end the pt has a spare denture to use

- In conventional denture you extract the posterior teeth and keep only the teeth that maintain OVD – the anterior teeth [you might keep the premolars] at the day of delivery you extract the anteriors and the premolars [if you left any] – in CID you need to wait 3-4 week for the extraction sites of the posterior teeth to heal.



Procedure for CID

- 1- Extract posterior teeth and give time for healing
- 2- Take primary impression → pour study casts → special tray → final impression + jaw relationship
- 3- Study cast [working cast] should be duplicated **to have a reference of teeth before trimming**
- 4- Master casts should be mounted on articulator and posterior teeth setup in **centric occlusion** → **posterior teeth try In [the trimming is done on the master cast]**
- 5- Preserve the **incisal edge position** and **tooth angulation** prior to removal of the stone teeth.
- 6- Mark in pencil:
 - A. A line **around each tooth at the level of the gingival margin**
 - B. A line **1 mm below the gingival line**
 - C. A line **on the long axis of the tooth [to know the angulation]**
 - D. Then using gauge mark a horizontal line that is **15 mm apical from the incisal edge** [to preserve the incisal edge position of the tooth
trim the teeth from the cast up to the level of the gingival margin then 1 mm into the socket and then round all edges to create the natural convex contour of the ridge [avoid removing incisive papilla]
 - E. Remove one stone tooth and set one wax tooth [to use the adjacent teeth as guides for length and angulation]



Post both teeth set up and trimming of teeth are done on master cast

Q: if your pt decided to have immediate denture , what should you inform them before you start?

- 1- Those dentures do not fit as well as regular complete dentures
- 2- The extractions will cause pain and discomfort + the dentures might cause sore spots
- 3- Esthetics is not predictable
- 4- Immediate dentures have to be worn for the first 24 hours after extraction [without being removed]
- 5- Because supporting tissue changes are unpredictable the immediate dentures might loosen up after 1-2 years .

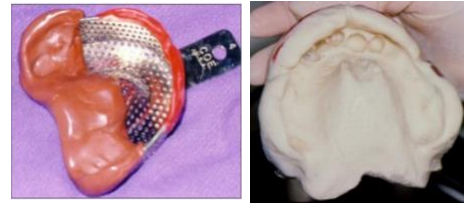
Q: why should the pt keep on wearing the denture for 24 hours after insertion of immediate denture?

Because there will be swelling after the extractions + tissue changes (if the pt removes the denture he might not be able to re insert it again)



Primary Impression for CID:

Impression compound is placed in the area of the post teeth extraction, then apply adhesive and then alginate anteriorly and posteriorly [impression compound is applied to increase stability of the impression, in case of supra eruption of the anterior teeth and you only use alginate → the ridge area will not be recorded properly].



- If you don't have adhesives you can scratch and roughen the impression compound then place alginate]

Primary impression for IID: Regular alginate impression in stock tray

Final impressions

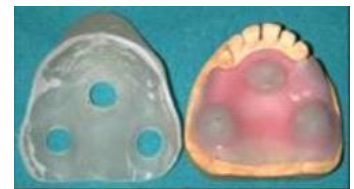
Single tray method [for IID]

- 1- Wax is applied over the remaining teeth anteriorly then another layer of wax is placed all over the teeth and edentulous ridge then tray material is applied over the wax [if anterior teeth remain – there is no need for a handle]- **Once you receive the tray the wax will be inside of it**
- 2- Border molding inside the pt's mouth [with the wax inside the tray because you want the wax to retain the special tray]
- 3-
- 4- After border molding remove the wax from the fitting surface and take an impression with medium body silicone



Two tray method [for CID or when very loose teeth are present]

- 2 special trays that are designed to fit over each other
- First tray is adapted over the edentulous ridge only + **border molding is done on this tray + final impression using ZOE [keep this tray inside the mouth]**
- **The second tray is 2 mm shorter than the depth of the sulcus** but extends anteriorly to cover the remaining teeth – this tray is loaded with alginate to capture anterior natural teeth and seated over the first tray that is already inside the mouth.
When you remove the second tray – both the first and the second will come out [alginate anteriorly and ZOE posteriorly]



Q: why can't you use medium body in the 2 tray method? Because medium body can flow anteriorly and interlock with the natural teeth – but ZOE will remain in the edentulous area



- The flanges of a completed immediate denture are very thin because little bone resorption has occurred

In clinic procedures:

- 1- Extraction of teeth + blood clot confirmation
- 2- Fit in the denture and adjust any obvious errors like over extended flanges or up open frenum area [avoid excessive adjustments at this stage because the pt is already tired]
- 3- 24 hours later you can do more adjustments at this time [look for pressure spots that need adjustments and internal relief of the denture]
Always keep the adjustments as minimal as possible [because the ridge is still healing and changes are still happening]
During healing phase tissue conditioners can be applied until either a new denture is made or a permanent reline is done.
Tissue conditioners can only be kept for 2 weeks because it loses it's elasticity and becomes hard [after 2 weeks you need to remove the old material and apply a new one – if you add to the old material → the material will become hard and harbor plaque and bacteria + it will affect denture stability]
- 4- Recall after 1 week.

If the immediate denture is for one or two teeth [mostly done for anterior teeth only and maximum up to the premolar , you don't do for posterior teeth unless the pt insists]:

Take alginate impressions → pour casts → trim casts and wax in the tooth

Retentive clasps are needed and they should pass as far posteriorly as possible to be more retentive [premolar or a more posterior tooth – you cannot place them on a canine because they will show and they won't be very stable]

The most common problem after relining is increase in OVD [either because the pt did not bite fully or because you did not reduce from the fitting surface]



Copy dentures

Copy dentures = you copy the favorable features and modify the unfavorable features [contraindicated if big changes are needed]

If the pt was edentulous for a long time → they might end up having crossbite [because the maxilla gets smaller and the mandible gets larger] + large tongue

- **Most complete dentures are replacement and not new dentures**
- The surface that will decide if the denture can be copied or not is **the polished surface [from the tip of the cusps to the flanges]**

Q: why is it important that the polished surface must be good before you do a copy denture? Because the polished surface is what maintains the neuromuscular control [elderly have less ability to adapt to neuromuscular changes] so the polished surfaces must be intact and not need any changes to make them able to adapt to the denture quicker

- If the teeth are not set properly this will compromise the polished surface
- If the teeth are set too lingually → compromised stability because the tongue will dislodge the denture
- If the teeth are set too high → compromised stability because the tongue wont be able to rest on the lingual cusps and will keep on displacing the denture
- In copy dentures the pt keeps their dentures with them throughout the entire procedure

Q: Do you correct all defects in the copy denture? No, only the one's that the patient wants to repair because if there was a problem the pt's neuromuscular control is already adapted to it so it you correct if the pt might complain.

Indications of copy denture	Contraindications of copy dentures
Elderly patients Immunocompromised pts Poor neuromuscular Worn out denture that is otherwise satisfactory Poor adaptation to the denture bearing area To make spare dentures	Unsatisfactory polished surface Extensive changes are needed to improve esthetics, occlusion, and arch forms When the underlying tissue requires a special impression technique [flabby ridge]

Copy techniques

- 1- Soap container technique
- 2- Modified flask technique
- 3- Replica record block technique

Replica record block technique : <https://www.youtube.com/watch?v=sTJRqhhdg3U>

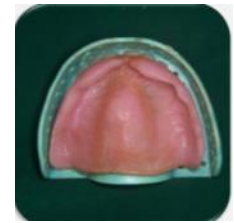
- 1- Examine old dentures and identify what needs to be altered



- 2- Adjust underextensions with green stick compound
DO NOT ADJUST OVER EXTENSIONS

Impressions for copy dentures are done extra orally

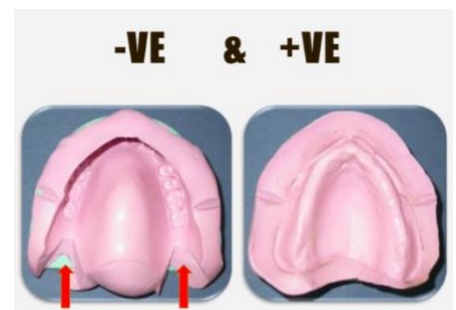
- Copy dentures have special trays [without handles] – you use 2 trays for each denture [because you are coping the fitting and occlusal surface]
- 1- try in the denture inside the tray : denture should seat fully inside the tray and have equal spacing from all around to allow adequate thickness of material
 - 2- Apply adhesive onto the tray [wait until it dries] then place condensation silicon or putty onto the tray and then seat the denture until the flanges of the denture are flushed with the borders of the tray + you have equal thickness of the material



- 3- Cut grooves in the area surrounding the denture + apply Vaseline
- 4- Apply a second mix of putty to record the fitting surface of the denture and the second tray is inverted



- 5- Create notches [in the maxillary tuberosity in case of maxillary denture and in the retromolar pad area in case of a lower denture]



- 6- Heat shellac record bases and adapt them → trim and seal the rough edges with wax
[shellac base plates are used as carriers for impression material if the fitting surface needs adjustments , if the fitting surface is fine → no need for impression]



- 7- cut sprues in the polished surface → close the trays again and secure them with a rubber band and then heat dental wax and pour it inside the mould formed by the trays
- 8- Do the necessary adjustments





For ex: if more incisal show is needed or increase in OVD – add wax to the occlusal surfaces and incisal edges

If fitting surface needs adjustments : use the shellac record bases as trays and inject light body .

You need to take the impression with both arches together while the pt closes their mouth [closed mouth technique]

You are taking an impression of one arch at a time but the other denture should be placed inside the mouth

If you take the impression separately for each arch → you will increase OVD

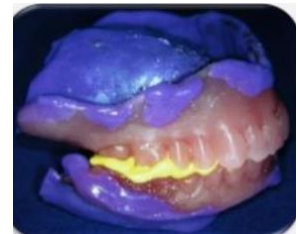
9- Bite registration

10- Lab mounting and teeth set up

11- Try in and record post dam [post dam recording can be done at try in or at impression stage]

12- Flasking

13- Delivery



NOTE: in copy dentures the primary impression is done outside the pt's mouth and the secondary impression is done inside the pt's mouth [light body and closed mouth technique]

Advantages	Disadvantages
1- Less number of clinical visits	1- Clinically and technically demanding
2- You can reproduce the desired feature and alter the undesirable features	2- Cannot be used in all cases
3- Reduce difficulty in adaptation	3- Cost

Q: after copy denture the pt will tell you that their old dentures used to fit better , why?

The neuromuscular control of the pt adapted to the old dentures that did not fit properly, because the new denture has accurate impression surface the underlying tissues will be loaded by occlusal forces [the tissues were not under load for a long time] so the mucosa might not be able to withstand the new forces→ causing discomfort.



Surveyed crowns

Indications:

- 1- Tooth is indicated for a crown and will serve as an abutment [ex: badly broken down tooth]
- 2- I cannot get the desired criteria for a good RPD abutment
[ex: no proper cingulum to place cingulum rest , you cannot correct the over eruption without exposing the dentine, contour cannot be corrected without removing tooth much of tooth structure, no proper undercuts for retentive components, inclined teeth that make it difficult to get path of insertion]

A surveyed crown is prepared the same way as a normal crown but it has all the features for a perfect abutment tooth . when you send the impression to the lab you should include your RPD design, where you want the rests, guiding planes and clasps to be placed.

NOTES:

- If the surveyed crown has an opposing tooth & it's a tooth supported RPD → you can just take bite registration after crown prep
- If the surveyed crown does not have an opposing tooth → take jaw relation [record bases and occlusal rims]
- If the crown is opposing natural teeth + long span RPD → take jaw relation
- All rest seats and guiding planes should be in metal
- If the crowns needs adjustment after you receive them from the lab → adjust metal with carbide and adjust porcelain with diamond bur then polish with rubber points and send to the lab for glazing and polishing of the metal.

Fixed prosthesis is always done before removable

Lower RPD + surveyed crown against upper existing denture :

- 1- After deciding that the tooth is indicated for a surveyed crown → make the RPD design
- 2- Prepare the crown → take a full arch PVS impression [record the edentulous areas as well] then temporize the tooth
- 3- PVS impression is sent to the lab [the lab will pour the impression twice]
 - First pour is to make the **pindex cast** [the cast where you will make the crown on]
 - Second pour to make the **soft tissue cast** [the cast where the technician will check the surveyed crown as an abutment]





The crown wax up is made on the **pindex cast** first then put on the soft tissue cast to check [positive rest seats, proper guiding planes etc .]

The soft tissue cast has the design drawn on it + the surveying will be done on this cast – it must not be trimmed to preserve the soft tissue contours



- 4- Jaw relation using record bases and occlusal rims taken **at the time of final impression for the crown** [to record the occlusal plane so the technician does not make the crown higher]
- 5- **Deliver the crown and take final impression for RPD**
- 6- **Jaw relation for RPD → wax try in → delivery**



If you are doing both upper CD and lower RPD with surveyed crowns :

Before you take the final impression for the surveyed crown you should orient the record base of the upper CD and the lower RPD [to determine occlusal plane, so the technician does not make the crown higher] – you need to do the jaw relation twice [once for the crown final impression and once for the RPD]

- **Upper arch:** Take primary impression → pour cast + special tray fabrication → final impression and make the record base
- **Lower arch:** crown prep + take impression → pindex and soft tissue casts are made → record base for lower RPD at the same time of taking the final impression for the crown → cementation for the crown → final impression for the lower RPD

You process the lower RPD first then the upper CD and then you insert both of them together



Overdentures

Overdenture = a removable prosthesis that rests over **natural teeth or implants**

Mandible resorption is X4 more than maxilla resorption

Maxilla will also undergo resorption because most cases are lower distal extension against upper CD

Advantages	Disadvantages
1- Minimize bone resorption by maintaining teeth or implants 2- Improved sensory feedback [because you are keeping the PDL which give sensation of mouth opening and closing] 3- Improved retention 4- Decreased psychological trauma [specially for pts who don't want to extract their teeth to get a complete denture]	1- Requires high degree of maintenance 2- Potential for caries and periodontal disease [because you are retaining teeth] 3- difficulty with undercuts [specially with maxillary canines- the undercuts will make the flanges look unnatural → bulky lips , this is solved by making the flanges shorter] 4- fracture of acrylic [in areas of the abutments – where the denture is thin]

Q: which teeth are the best for overdentures? Canines , because they have the longest roots then premolars , then molars then incisors

Q: do you always need to do RCT for overdenture abutments? No, if there is excessive tooth wear the pulp retracts so it is better to take an xray [you might not need an RCT] – you just rounded the edges



Indications

- 1- **single complete denture**
- 2- **cleft palate / surgical defect**
- 3- **hypodontia**
- 4- **severe tooth wear**
- 5- **potentially un favorable complete denture**

Contraindications

- 1- indifferent pt
- 2- very old pt, poor cooperation, mentally handicap [because they cannot maintain the denture]
- 3- any contraindication to make RCT **

Overdenture abutments:

- 1- dome shaped root surface with amalgam plug or coping
- 2- has attachment [stud attachments]
- 3- thimble shaped coping for telescopic crowns





- **Amalgam plugs:** simple , no need for multiple visits and impressions [you go down with a round bur then condense amalgam over it]
- **Copings:** multiple visits are needed + more expensive because it is precious metal but the **coping covers all of the exposed dentine and protects it from decay**

Copings should be made easy to clean [convex surface] with pins [for retention] and anti rotational components [for proper seating of the coping]



- **Stud attachments:** rod and a ball made over the coping [made to increase retention because it engages a part of the denture] – **requires more space than amalgam plugs**



- **Thimble shaped coping :** forms the inner layer of a telescopic crown – perfect for tilted teeth
You do a regular crown prep on the tooth then send the impression to the lab → the coping will not have any details mostly just parallelism and finish lines

After you cement the thimble coping → border molding + take impression with special tray → the final denture will have the telescopic crowns as part of it



- Overdentures and telescopic crowns are very good in esthetic regions because there will be not pink acrylic and the tooth will appear emerging from the socket
- If only a single tooth is left in the arch → better extract it [you need to preserve the teeth bilaterally]
- When an abutment is lost from a normal RPD → you need to make a new one but when an abutment is lost from an overdenture you can do minor adjustments and the pt can still use the denture.
- **Precision attachment:** provides additional retention + less palatal coverage and **open face [you don't need a flange because you are getting better retention from teeth]**
Precision attachment can be done on normal teeth and on implants

A. **Extra coronal :** the stud [patrix] is on the tooth and matrix is in the overdenture



B. **Intracoronal :** the stud [patrix] is in the overdneture and the maxtrix is Inside the tooth



Zest anchor = implant type intracoronal precision attachment

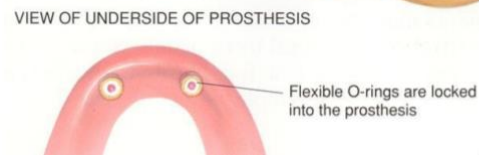
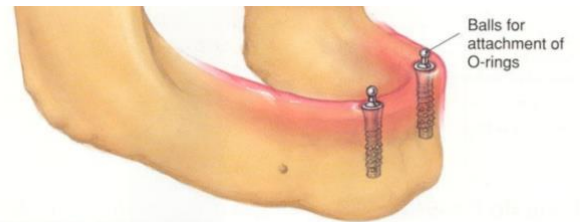




Q: how can you increase the retention of over dentures?

- 1- **Use precision attachment**
- 2- **O- rings**
- 3- **Bar attachments**
- 4- **Magnets** [perfect for pts who lack manual dexterity for proper placement of the denture but because of saliva they will become ineffective and need replacement]
- 5- **Screws [in overdentures supported by implants]**

O- ring = a ring of resilient material [plastic] that is placed inside the MATRIX and helps in retaining the matrix to the patrix



Bar attachments :

The amount of movement permitted depends on the type of teeth left and the type of bar used.

- Round Ackerman → allows most movement
- U shaped Dolder → allows some movement
- Keyhole shaped Hader → little movement



Round Ackerman

U shaped Dolder

keyhole Hader bar

Q: how do you select which teeth to serve as over denture abutments?

- 1- Adequate C:R ratio
- 2- No subgingival caries
- 3- RCT is possible
- 4- Cleansable
- 5- At least 2 abutments are needed and preferably symmetrically distributed



References

- Zarb, G. A., Bolender, C. L., Carlsson, G. E., & Boucher, C. O. (1997). Boucher's prosthodontic treatment for edentulous patients. St. Louis: Mosby.
- Anusavice, K. J., Phillips, R. W., Shen, C., & Rawls, H. R. (2013). Phillips' science of dental materials. St. Louis, Mo: Elsevier/Saunders.
- Gladwin, M. A., Bagby, M. D., & Stewart, M. (2004). Clinical aspects of dental materials: Theory, practice, and cases. Lippincott Williams & Wilkins.
- Carr, A. B., Brown, D. T., & McCracken, W. L. (2011). McCracken's removable partial prosthodontics. St. Louis, Mo: Elsevier Mosby.
- Phoenix, R. D., Cagna, D. R., DeFreest, C. F., & Stewart, K. L. (2008). Stewart's clinical removable partial prosthodontics. Hanover Park, IL: Quintessence Pub.



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