

Removable Prosthodontics

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EXAM-DAY SUMMARY

everything on this page → detail in §§ overleaf

OCCCLUSION TERMS → §1

- CR = condyle most retruded in glenoid fossa (joint position)
- CO = maximum intercuspation (tooth position)
- Both coincide = centric occluding relation, ideal, **only 20%**
- Canine guidance: canines last to disocclude · group function: many posteriors as "one long tooth"

SUPPORT VS RELIEF → §2

- Upper support: hard palate, maxillary tuberosity (+ rugae, residual ridge)
- Upper relief: incisive papilla, median palatine raphe, torus palatinus, fovea palatini
- Lower support: **buccal shelf + retromolar pad**
- Lower relief: crest of ridge, genial tubercles, torus mandibularis
- Muscles: upper 5 (orbicularis oris, buccinator, zygomaticus, palatoglossus, palatopharyngeus) · lower 8 (+ mentalis, masseter, genioglossus, geniohyoid, sup. constrictor, mylohyoid)

FABRICATION SEQUENCE → §3

- **Primary → secondary impression → facebow + jaw relation → wax try-in → insertion**
- Primary materials: alginate, elastomers (undercuts/flabby OK); compound = atrophic ridge, never undercuts
- Assess first: ridge form, undercuts, mucosa, torus, tongue, old dentures, medical history

SECONDARY IMPRESSION → §3

- Mucostatic (open mouth, minimal pressure): alginate/POP, flowy → flabby + prominent ridge
- Mucocompressive (closed mouth, definite pressure): ZOE/elastomer → flat atrophic ridge
- Selective pressure: mixed flabby + atrophic → **used in all cases now**

IMPRESSION ERRORS → §3

- Under-extended margins · overextended tray (borders show) · bubbles · tray not centred
- Gagging · inadequate relief → soreness → ulceration
- Xerostomia: **never ZOE — use elastomers**

TOOTH POSITION → §4

- Upper anteriors || interpupillary line (Fox bite plane)
- Upper posteriors || Camper's (ala–tragus) line
- Lower anteriors: modiolus → modiolus
- Lower posteriors: **½–⅔ height of retromolar pad**

VDR • VDO • FREEWAY → §4

- VDR: minimal separation, elevator/depressor equilibrium; nose convexity → chin convexity
- VDO: all teeth in maximum intercuspation, biting on rims
- Freeway = VDR – VDO = **2–4 mm**; Boley's gauge, Willis gauge, spring dividers
- > 4 mm = low VDO · < 2 mm = high VDO

HIGH VS LOW VDO → §4

- High: stretched face, **clicking**, sore muscles/TMJ, rapid resorption, difficult swallowing
- High Rx: selective grinding on articulator (not in mouth) · remake both or lower only
- Low: collapsed face, nasolabial fold, protruded chin, whistling, angular cheilitis
- Low Rx: occlusal pivots on premolars/molars · reline · remake

RELINING • REBASE • COPY → §5

- Reline = new fitting surface (self-cure soft in clinic · heat-cure hard in lab)
- Rebase = new base, occlusion unchanged → fracture, discolouration, porosity
- Both by **Hooper duplicator**; rebase impression in light-body rubber base
- Copy denture = copies fitting + occlusal, preserves polished surface → neuromuscular coordination; dementia/Parkinson's; alginate copy box

OVERDENTURE • IMMEDIATE → §6

- Over natural teeth / roots / implants — most often **lower canines**
- Needs ≥ 5 mm bone support, no mobility, excellent hygiene
- + support, retention, ridge preservation, psychology; – caries/PDL, repair, undercuts, mobility
- Attachments: studs (ball & socket), bars, magnets, telescopes
- Immediate denture: + aesthetics/phonetics/healing/preserved VDO; – recalls, reline/rebase, cooperation; ✗ uncontrolled DM, infection, uncooperative

KENNEDY + APPLEGATE → §7

- I bilateral free-end · II unilateral free-end · III bounded, not crossing midline · IV bounded, crossing midline
- Applegate: class = **most posterior saddle**, then add modifications
- Class IV has no modifications

RPD DESIGN + CONNECTORS → §8

- Support (rest) · retention (retentive arm) · stability (whole appliance) · reciprocation (abutment)
- Pressure-free → Cl III · physiologic → Cl I, II, IV · split cast → free-end only
- Surveyor: undercuts, ridge form, guiding planes (proximal/palatal, never buccal) → path of insertion
- Lingual bar needs **≥ 8 mm clearance**; palatal strap ≥ 8 mm wide

§1 Occlusion — the vocabulary

- **Centric relation (CR):** condylar head in **most retruded position** in the glenoid fossa · a *bone-to-bone* position → teeth do **not** have to be in centric occlusion
- **Centric occlusion (CO):** all teeth in **maximum intercuspation**, all cusps resting in all fossae · a *tooth-to-tooth* position → mandible not always in the most retruded position to the maxilla
- **Centric occluding relation:** CO coincides with CR = the ideal form · occurs in only ★20% of people

KEY POINTS

CR = joint position (condyle) · CO = tooth position (intercuspation) · the two coincide in only 20% → in the edentulous patient there are no teeth to record CO, so **every complete denture is built to CR**.

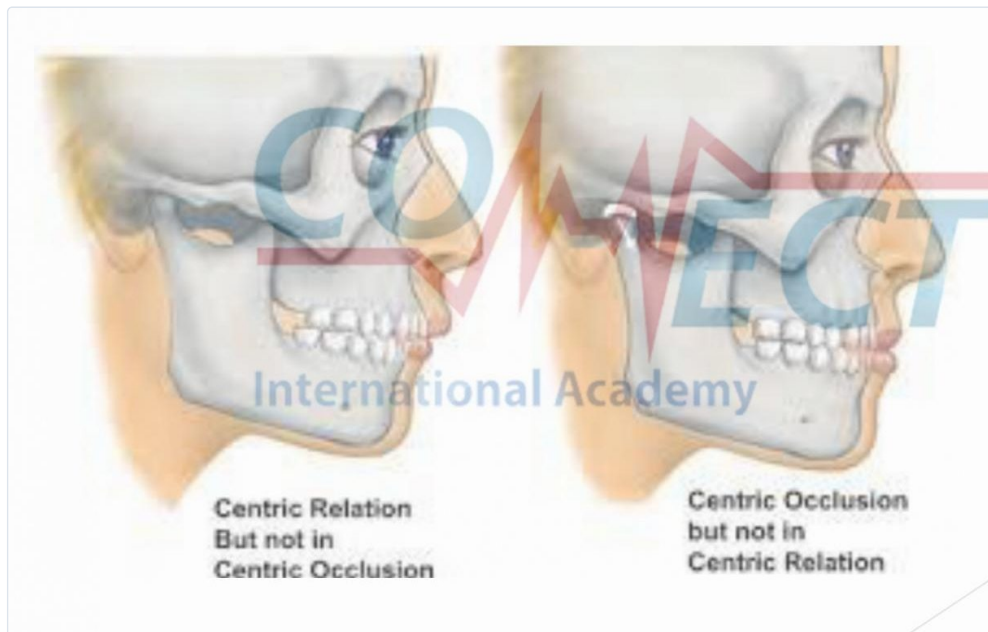


Fig. 1 — Left: centric relation but not centric occlusion (condyle retruded, teeth not intercusped). Right: centric occlusion but not centric relation (teeth intercusped, condyle translated forward).

1.1 Eccentric occlusion — lateral excursion

- **Canine-guided occlusion:** lateral excursive movement → disocclusion of **all** working-side teeth **except the canines** → canines are the ★last teeth to disocclude
- **Group function occlusion:** lateral excursion → **multiple posterior teeth contact** on the working side → then disocclude together, acting as **one long tooth**

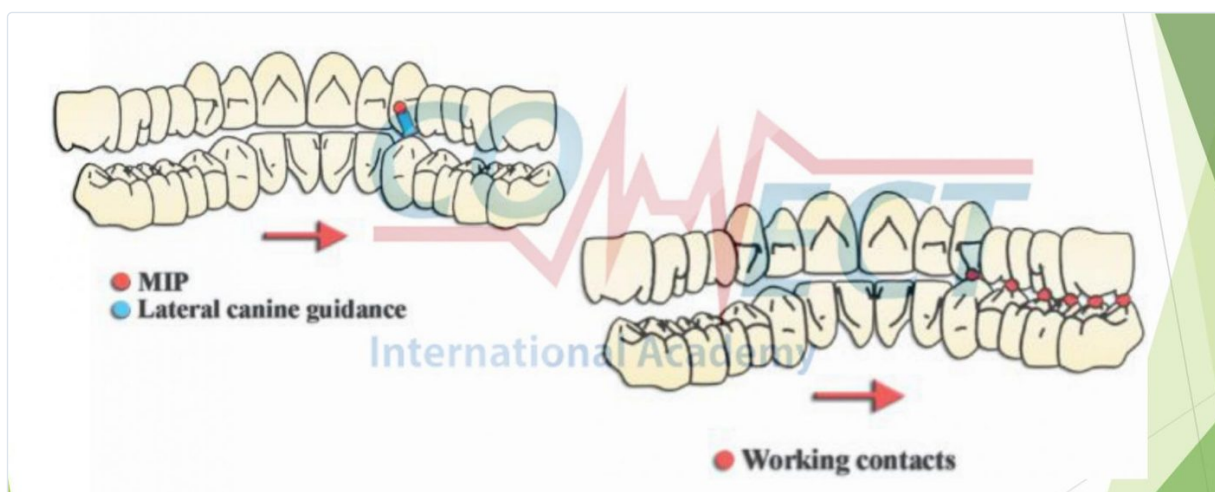


Fig. 2 — Left: maximum intercuspation (MIP, red) with lateral canine guidance (blue). Right: group function — multiple working-side contacts (red) sharing the lateral load.

★ EXAM PEARL

The discriminator is **how many teeth carry the working side**: one (canine) vs many (group function). Canine guidance protects the posteriors by disoccluding them; group function shares load when the canine cannot take it alone.

§2 The edentulous foundation — muscles, support, relief

Denture-bearing tissue is not uniform: some areas take load, some must be relieved, and surrounding muscle dictates the border.

Table 1 — Muscles acting on the complete denture

	Upper complete denture	Lower complete denture
Muscles	Orbicularis oris · buccinator · zygomaticus · palatoglossus · palatopharyngeus	Orbicularis oris · mentalis · buccinator · masseter · genioglossus · geniohyoid · superior constrictor of the pharynx · mylohyoid
Count	5	8 — more muscles, less area → the lower denture is the harder one

Table 2 — Stress-bearing (support) vs relief areas

	Stress-bearing	Relieve
Upper	Hard palate · maxillary tuberosity (fig. 3 adds: posterior slopes of hard palate, residual ridge, rugae)	Incisive papilla · median palatine raphe · any sharp bony exostosis, e.g. torus palatinus (fig. 3 adds fovea palatini)
Lower	★ Buccal shelf of bone · retromolar pad	Crest of the ridge · genial tubercles · any sharp bony exostosis, e.g. torus mandibularis

★ EXAM PEARL

The single most-asked contrast: the **crest of the lower ridge is a relief area** (it resorbs and is thinly covered), while the **buccal shelf** — cortical bone at right angles to the occlusal load — is the primary lower stress-bearing area.

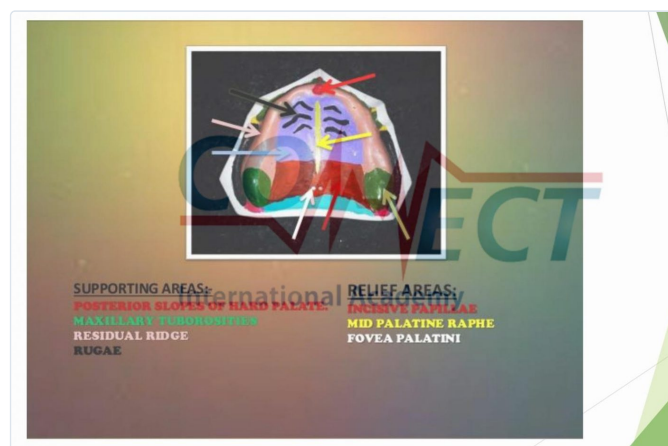


Fig. 3 — Maxilla. Supporting: posterior slopes of hard palate, maxillary tuberosities, residual ridge, rugae. Relief: incisive papilla, mid-palatine raphe, fovea palatini.

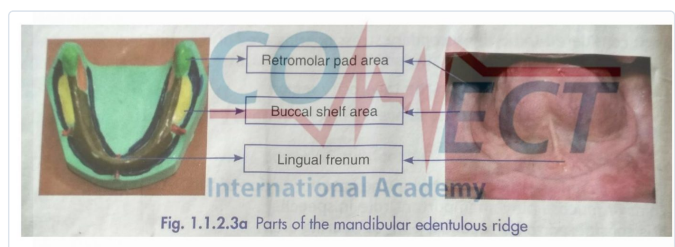


Fig. 4 — Mandibular edentulous ridge: retromolar pad area, buccal shelf area, lingual frenum.

§3 Complete denture — assessment and fabrication

3.1 Before fabrication — diagnosis and treatment planning

- **Assess:** ridge form · undercuts · mucosal type (flabby, thin) · presence of torus · tongue size and movement · history of old dentures · medical history

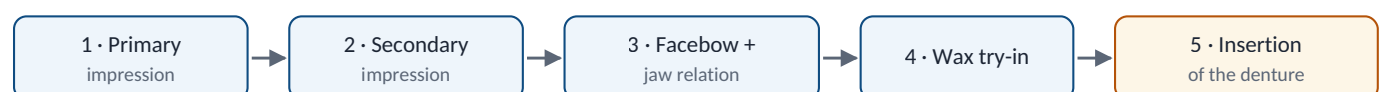


Diagram 1 — The five clinical stages of complete denture fabrication.

3.2 Primary impression materials

- **Irreversible hydrocolloid (alginate)** and **elastomers**: both usable in **undercut areas and flabby ridge** → elastic recovery
- **Impression compound**: for the **atrophic ridge** · ★**X never in undercuts** → rigid, non-elastic → locks in / distorts on removal

3.3 Secondary impression techniques

Table 3 — Secondary impression techniques for the complete denture

	Mucostatic	Mucocompressive	Selective pressure
Also called	Open mouth · minimal pressure	Closed mouth · definite pressure	—
Pressure	Least possible	Moderate	Different forces on different areas
Materials	Alginate · plaster of Paris (POP)	Zinc oxide eugenol (ZOE) · elastomers	Combination
Mix	More flowy → records tissues at rest	Not flowy → records tissues under compression	—
Indication	★ Well-prominent and flabby ridge	★ Flat atrophic ridge	Ridge with both flabby and atrophic areas
Result / status	Denture more stable at rest	—	What is used in all cases now

★ EXAM PEARL

Match the technique to the tissue: flabby → **mucostatic** (don't displace what will rebound), atrophic → **mucocompressive**, mixed → **selective pressure**, which is the contemporary default for every case.

3.4 Common impression errors

- **Extension**: underextension of the impression margins · tray borders showing through after the impression (overextended tray)
- **Technique**: air bubbles · tray not centred
- **Patient factors**: gagging reflex · **xerostomia** → ★**X never use ZOE, use elastomers**
- **Relief**: inadequate relief → soreness → ulceration

CAUTION

ZOE needs moisture to set and irritates dry mucosa → in xerostomia it burns and sets unpredictably. Use an elastomer instead.



Fig. 5 — Lower special tray with tissue stops (perforations), used to seat the tray at a controlled, even space over the ridge.

§4 Tooth position and vertical dimension

4.1 Important relationships

- **Upper anteriors**: parallel to the **interpupillary line (IPL)** → verified with the **Fox bite plane**
- **Upper posteriors**: parallel to **Camper's line** (ala–tragus line)
- **Lower anteriors**: from **right modiolus to left modiolus**
- **Lower posteriors**: reach ★ **half to ⅔ the height of the retromolar pad**

4.2 VDR, VDO and freeway space

VDR — vertical dimension of rest

Minimal jaw separation · minimal contact between upper and lower teeth · the point where jaw **elevator and depressor muscles are in equilibrium** · measured between two points: maximum convexity of the nose → maximum convexity of the chin.

VDO — vertical dimension of occlusion

The vertical dimension at which all teeth are in **maximum intercuspation** · reached when the patient bites on the occlusal rims.

Freeway space

$VDR - VDO = \star 2-4 \text{ mm}$ · measured with Boley's gauge, Willis bite gauge or spring dividers.

KEY POINTS

Freeway space $\star > 4 \text{ mm} \rightarrow$ **low VDO** · $\star < 2 \text{ mm} \rightarrow$ **high VDO**. Get this one relationship right and both clinical pictures follow.

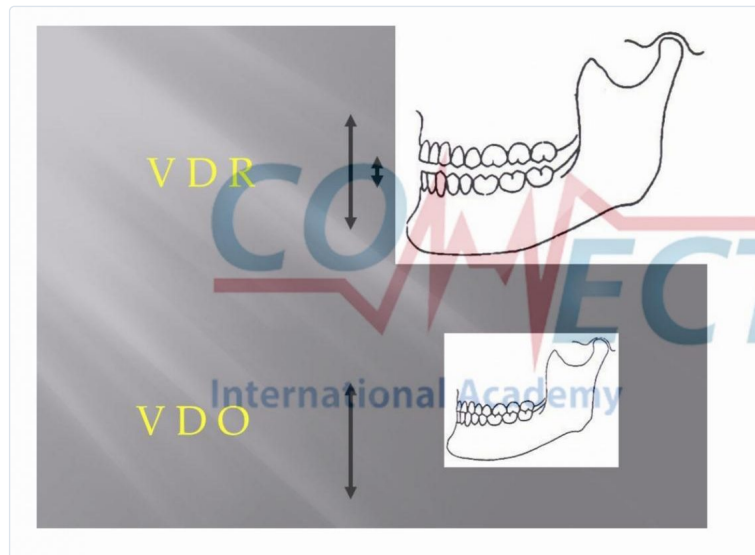


Fig. 6 — VDR (jaws slightly apart, muscles at equilibrium) vs VDO (teeth in maximum intercuspation). The difference is the freeway space.

Table 4 — High vs low VDO: presentation and management

	High VDO (freeway space < 2 mm)	Low VDO (freeway space > 4 mm)
Muscles / joint	Soreness of muscles from constant tension · TMJ pain and problems	Sore muscles and TMJ
Soft tissue / bone	Sore spots in soft tissues · rapid rate of bone resorption	Possible angular cheilitis
Appearance	Stretched facial appearance	Collapsed facial appearance · prominent nasolabial fold · protruded chin
Speech	Dentures click during speech	Whistling during speech
Other	Difficult swallowing	—
Management	Selective grinding on the casts on the articulator — never in the mouth · denture remake: both, or the lower alone	Occlusal pivots (acrylic resin parts) on premolars and molars to raise the bite · relining · remake

- **Why grind on the articulator:** intra-oral grinding mis-measures because of **mucosal resiliency** → the dentures move as you mark them
- **Why remake the lower alone:** lower dentures usually rest on an atrophic ridge → decreasing lower VDO → better stability

★ EXAM PEARL

Speech splits the two instantly: **clicking** = **high VDO** (teeth meet too early), **whistling** = **low VDO** (over-closed, air escapes). Facial appearance does the same — stretched vs collapsed.

§5 Maintaining and modifying an existing denture

Table 5 — Relining vs rebasing vs copy denture

	Relining	Rebasing	Copy denture
What	Resurfacing the tissue-side surface with new base material for a more accurate fit → modification of the fitting surface	Resurfacing the denture base by replacing it with a new one — without changing the occlusal relation of the teeth	Copying both fitting and occlusal surfaces while preserving the polished surface
Indications	Loss of fit · part of low-VDO management	Fractured base · discoloured denture base · porosity in the denture base	Slight wear of denture teeth occlusal surfaces · discoloured base and teeth · slight loosening after long service · patients with dementia, Parkinson's, mental impairment
How	Self-cured (soft) relining → in clinic; non-hygienic, easy to fail Heat-cured (hard) relining → in the lab, Hooper duplicator	Hooper duplicator · impression made by the denture base , preferably light-body rubber base	Fabricated in an alginate box — the copy box
Why it works	Restores adaptation without a remake	New base, same occlusion	Preserves the patient's neuromuscular coordination on the denture · fewer visits than a new denture · adaptable · also used as a surgical stent in implants

★ EXAM PEARL

Reline = new **fitting surface only**. Rebase = new **base**, teeth and occlusion untouched. Copy = new denture that **reproduces the old one's surfaces** — the choice when the problem is the patient's ability to adapt, not the denture's design.

CAUTION

The lecture pairs "self-cured = soft relining" and "heat-cured = hard relining". Cure mode and liner hardness are in fact independent — chairside self-cure relines are usually **hard** acrylic, and soft liners exist in both self-cure and heat-cure forms. Learn the lecture's pairing for the deck, but know the distinction if it is examined on materials.



Fig. 7 — Hooper duplicator: holds the denture at a fixed vertical relation so the base can be replaced (rebase) or hard-relined without altering the occlusion.



Fig. 8 — Copy denture technique: the old denture is indexed in an alginate box / metal copy flask, reproducing fitting and occlusal surfaces.

§6 Overdenture and immediate denture

6.1 Overdenture

- **Definition:** removable prosthesis made **over natural teeth, remaining roots or implants**

- **Advantages:** better support (**ridge + teeth**) · better retention · better preservation of the alveolar process · better psychological effect
- **Disadvantages:** possible decay and periodontal (PDL) disease · difficult repair · unfavourable undercuts · possible tooth mobility
- **Abutment requirements:** most used type is over the **remaining lower canines** · at least ★5 mm bone support around the roots · **no mobility** · excellent oral hygiene measures
- **Internal attachments** used with a complete denture: **studs** (ball and socket) · **bars** · **magnets** · **telescopes**

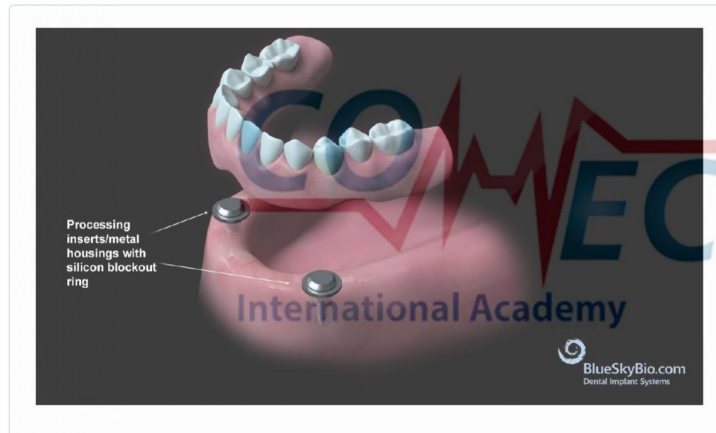


Fig. 9 — Implant overdenture: processing inserts / metal housings with silicone blockout ring seated in the fitting surface.

6.2 Immediate denture

- **Definition:** denture fabricated **immediately post extraction** — made before, fitted at the extraction visit
- **Advantages:** better aesthetics · better phonetics · better healing · **preserved VDO**
- **Disadvantages:** more recall visits · needs relining and rebasing (the ridge resorbs under it) · needs patient cooperation
- **Contraindications:** uncontrolled diabetes mellitus · presence of infections · uncooperative patient

★ EXAM PEARL

The immediate denture's headline benefit is that the patient is **never without teeth** and the pre-extraction VDO is preserved — paid for with a guaranteed reline/rebase and extra recalls as the socket heals.



Fig. 10 — Immediate denture: dentition before extraction (above) and the denture in place at the same visit (below).

§7 Removable partial dentures — indications and classification

Table 6 — RPD: advantages vs disadvantages

Advantages	Disadvantages
Speech · mastication · maintaining health of the masticatory system · preventing undesirable tooth movement · improving distribution of occlusal loads	Increased plaque accumulation · caries and PDL disease · abrasion or chipping of abutments · aggravating already existing PDL disease · tooth mobility

- **Prerequisite:** an RPD needs **good oral hygiene and a caring patient** — the disadvantages are all plaque-driven

7.1 Kennedy's classification

Table 7 — Kennedy classification of the partially edentulous arch

Class	Saddle
Class I	Bilateral free-end saddle
Class II	Unilateral free-end saddle
Class III	A bounded saddle not crossing the midline
Class IV	A bounded saddle crossing the midline

- **Applegate's rule:** the class is determined by the **most posterior saddle** → then modifications are added · ★ **Class IV has no modifications** (by definition it is the only saddle)

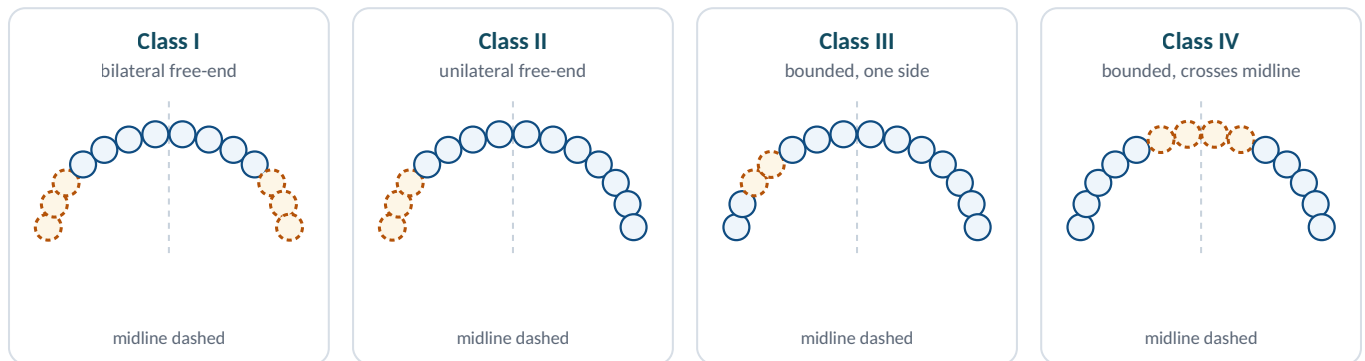


Diagram 2 — Kennedy classes, occlusal view. Amber dashed = edentulous saddle, blue = teeth present. Class I/II end distally with no tooth behind the saddle (free-end); Class III/IV are bounded by teeth at both ends.

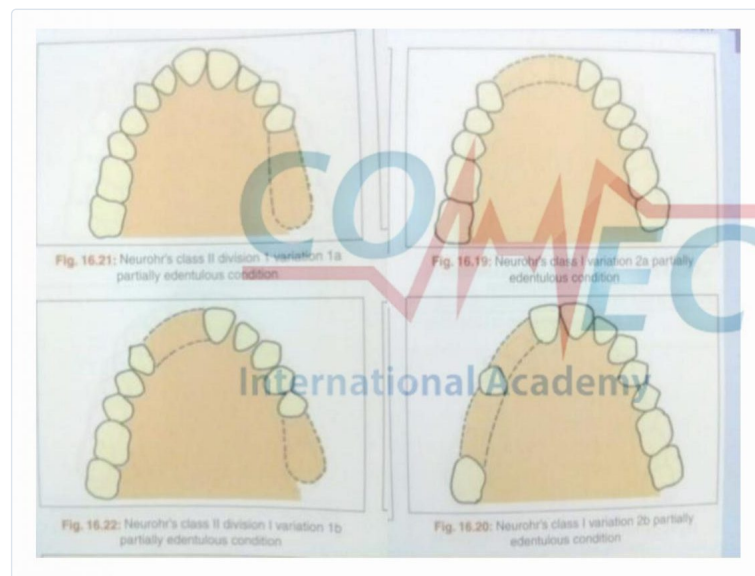


Fig. 11 — The lecture's own arch diagrams (Neurohr's classification variations of the partially edentulous condition), showing the same saddle patterns Kennedy's classes describe.

§8 RPD — impressions, surveying and design

8.1 Impressions

- **Primary impression:** hydrocolloid or elastomers · ★X **no impression compound in a dentate patient** (rigid → locks into interdental undercuts) · used for the **primary surveying procedure**

Table 8 — RPD secondary impression techniques

Technique	Principle	Used in
Pressure-free	Least possible tissue displacement	Tooth-supported only → ★ Class III
Physiologic / functional	Occlusal pressure applied on the tissue-supported (edentulous) area	Tooth-tissue supported → ★ Classes I, II, IV
Split cast	Compensates for the difference in compressibility between teeth and mucosa → decreases torque on the key abutments	Free-end saddles only

★ EXAM PEARL

Support decides the impression: teeth alone (Class III) barely move, so record them undisplaced; a free-end saddle sinks into mucosa under load, so record the mucosa **under function** — otherwise the saddle drops in service and torques the abutment.

8.2 The surveyor

- **What it is:** a device / caliper used to assess and detect —
 - topography of the casts
 - exact sites of **undercuts** — those to **engage** and those to **block**
 - ridge form and ridge undercuts
 - **guiding planes:** preparations on **proximal or palatal** surfaces — ★X **never buccally** → they guide the denture's guide plates, which slide along them
- **Purpose of all of it:** establish the proper **path of insertion and path of removal** of the RPD
- **Parts:** horizontal arm · vertical arm · surveying arm · mandrel with attached analysing rod · surveying table · surveying platform

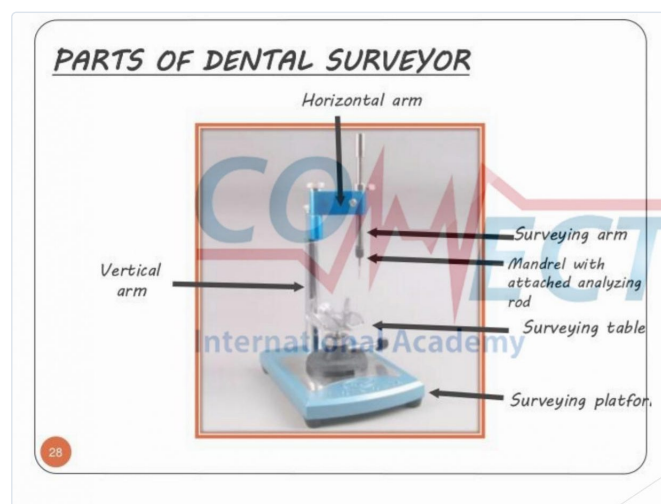


Fig. 12 — Parts of the dental surveyor: horizontal and vertical arms, surveying arm, mandrel with analysing rod, surveying table and platform.

8.3 Principles of design and components

Table 9 — Design principles and the components that deliver them

Principle	Resists	Delivered by
Support	Tissue-ward movement	Occlusal rest
Retention	Tissue-away movement	Retention arm (clasp)
Stability	Lateral movement of the whole appliance	Reciprocal arm · vertical parts of the major connector
Reciprocation	Lateral movement of the abutments	Reciprocal arm

- **Major connector:** connects the saddles with each other

- **Minor connectors:** connect any other part to the major connector

KEY POINTS

Stability vs reciprocation is the classic pair: **stability** = the denture doesn't rock; **reciprocation** = the abutment isn't pushed sideways as the retentive arm flexes over the survey line. The reciprocal arm does both.

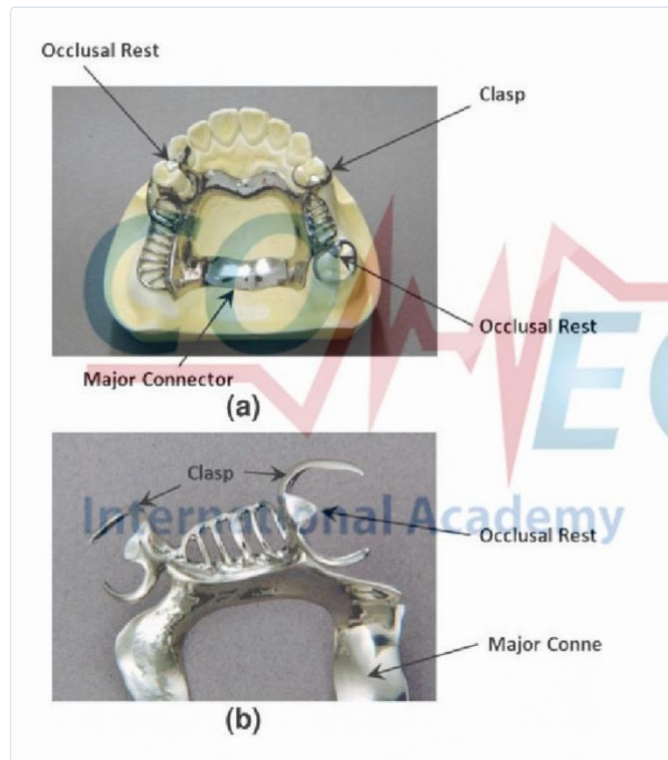


Fig. 13 — RPD components labelled on (a) an acrylic-based and (b) a cast metal framework: occlusal rests, clasps, major connector.

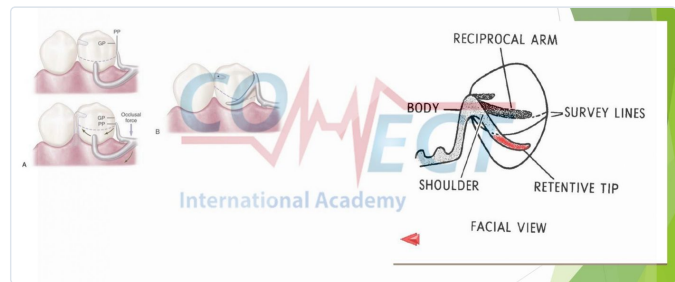


Fig. 14 — Reciprocal arm and guide plane under occlusal force (left); clasp anatomy (right): body, shoulder, retentive tip, reciprocal arm, and the survey line they are placed relative to.

8.4 Major and minor connectors

Table 10 — Major and minor connectors: indications, advantages, disadvantages, key to clinical success (lecture Table 54.1)

Connector	Indications	Advantages	Disadvantages	Key to clinical success
Mandibular lingual plate	Commonly used · where the lingual sulcus is shallow	Teeth can be relatively easily added · with prepared rest seats can provide excellent indirect retention	Covers much gingival tissue · has to be fenestrated if diastemas are present	Must be well adapted to the lingual aspects of the incisor teeth
Mandibular lingual bar	The other most commonly used mandibular connector	Minimal tissue coverage	Teeth cannot be added subsequently · requires minor connectors to connect to rests for support and indirect retention in Kennedy Class I and Class II situations	Half-pear shape in profile · needs ★ at least 8 mm clearance between the gingival margin and the raised floor of the mouth
Mandibular sublingual bar	Where a bar connector is required but the lingual sulcus is shallow	Minimal tissue coverage	Can be bulky due to profile · projects out towards the tongue and risks being poorly tolerated	Very accurate functional impression of the raised floor of the mouth is required
Mandibular continuous bar (cingulum bar)	Where a bar connector is required but the lingual sulcus is shallow	Minimal tissue coverage · teeth can be added	Needs to be bulky on the cingula of the teeth for rigidity · poor aesthetics if diastemas are present	Needs to be well supported and well adapted to the teeth · can be used with a lingual bar (Kennedy connector); both components can then be made with reduced dimensions
Mandibular labial bar	Rarely used · bar placed in the labial sulcus when the lingual aspect is undercut	Highly retroclined incisor and premolar teeth, precluding a lingual connector	Placed in the labial sulcus → long connector, has to be quite substantial · possibly poorly tolerated by the patient	Cannot be used if there are labial soft tissue undercuts in the canine and premolar regions
Complete palatal coverage	Commonly used maxillary connector · with bilateral free-end saddles and large unilateral free-end saddles	Support can be derived from the palate where there is lack of tooth support	Difficult to get well adapted to a high palatal vault · patients usually prefer the palate to remain uncovered	Ensure no anteroposterior rock on the major connector before accepting the fit of the casting · ensure good adaptation to the posterior border
Palatal strap connector	For use with short bilateral bounded saddles	Reported to be well tolerated by patients · some palate uncovered	No specific disadvantages	Must include biplanar curves in the palate to ensure rigidity · must be ★ at least 8 mm wide
Anteroposterior palatal bar connectors	Commonly used connector · ideal if there is good tooth support · often loosely called a skeletal pattern connector	Reduced palatal coverage · versatile connector system that can avoid gingival margins · palate uncovered to sense texture, flavour and temperature of food	Very long circumference (inside and outside the loop), all of which needs to be well adapted to the mucosa · technically more difficult to make than full coverage, where only the posterior margin has to fit closely	Ensure good soft tissue adaptation prior to accepting fit of the casting
Maxillary U-shaped connector	Not commonly used	Useful if there is a large palatal torus that would impinge on a plate or a bar; otherwise to be avoided	Can be flexible posteriorly if insufficient anterior and roof of palate is not engaged · design tends to cover the gingival margins	Ensure good soft tissue adaptation

★ EXAM PEARL

Two numbers from this table are exam currency: the lingual bar needs **≥ 8 mm** between gingival margin and floor of mouth (otherwise use a lingual plate), and the palatal strap must be **≥ 8 mm** wide to be rigid.