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CLASSIFICATION AND COMPONENTS OF REMOVABLE PARTIAL DENTURES

CLASSIFICATION OF REMOVABLE PARTIAL DENTURES

PARTIAL DENTURE

Definition

A dental prosthesis that restores one or more but not all of the natural teeth and/or associated parts and that is supported in part by natural teeth, dental implant supported crowns, abutments, or other fixed partial dentures and /or the mucosa; *usage*: a partial denture should be described as a *fixed partial denture* or *removable partial denture* based on the patient's capability to remove or not remove the prosthesis.

From The Academy of Prosthodontics (1999). *Glossary of Prosthodontic Terms (7th ed)*. St. Louis: Mosby.

REMOVABLE PARTIAL DENTURE CLASSIFICATION

- KENNEDY CLASSIFICATION SYSTEM

-

CLASS I - Bilateral Posterior Edentulous Areas

CLASS II - Unilateral Posterior Edentulous Area

CLASS III - Unilateral or Bilateral Edentulous
Area(s) Bounded by Remaining
Tooth/Teeth

CLASS IV - Single Edentulous Area Anterior to
Remaining Teeth and Crossing the Midline

Note: The U of M follows this classification system and uses the rules proposed by Dr. O.C. Applegate for applying the system.

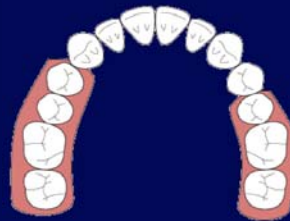
KENNEDY CLASSIFICATION SYSTEM RULES

(Proposed by Dr. O.C. Applegate)

1. Classification follows all mouth preparations including extractions
2. Edentulous areas with no teeth replacements are not considered
3. Third molars are not considered unless present or being replaced
4. Additional edentulous areas are "modification spaces"
 - a. Anterior space - A
 - b. Posterior space - P
5. Class I or II situations take precedence over IV situations
6. A Class III situation takes precedence over a Class IV situation

KENNEDY CLASS I

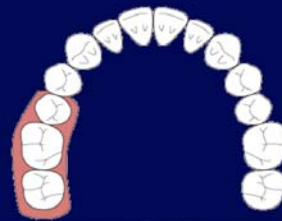
CLASS I - Bilateral Posterior Edentulous Areas



Source: Jeff Shotwell, University of Michigan, 2008

KENNEDY CLASS II

CLASS II - Unilateral Posterior Edentulous Area



Source: Jeff Shotwell, University of Michigan, 2008

CLASSIFICATION WITH MODIFICATION AREAS



CLASS II-P



CLASS II-A-2P



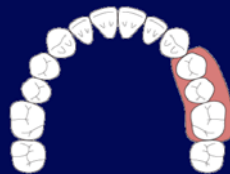
Source: Jeff Shotwell, University of Michigan, 2008

KENNEDY CLASS III

CLASS III - Unilateral or Bilateral Edentulous Area(s) bounded by Remaining Tooth/Teeth

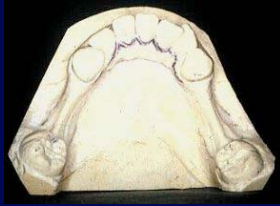


UNILATERAL



Source: Jeff Shotwell, University of Michigan, 2008

KENNEDY CLASS III

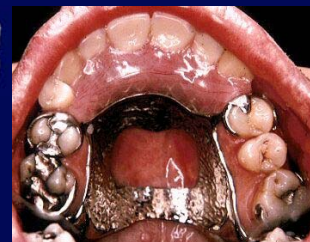
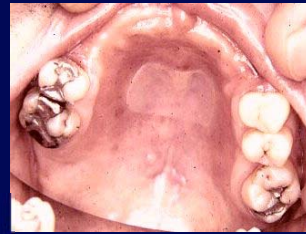


BILATERAL



Source: Jeff Shotwell, University of Michigan, 2008

KENNEDY CLASS IV



Source: Jeff Shotwell, University of Michigan, 2008

KENNEDY-APPLEGATE CLASS VI



Source: Jeff Shotwell, University of Michigan, 2008

COMPONENTS OF REMOVABLE PARTIAL DENTURES

REMOVABLE PARTIAL DENTURE COMPONENTS

- Major Connector
- Minor Connector
- Direct Retainer
- Base
- Replaced Teeth
- Indirect Retainer (Class I and II RPD's only)

MAJOR CONNECTOR

Definition:

"The part of a removable partial denture that joins the components on one side of the arch to those on the opposite side." *The Academy of Prosthodontics (1999). Glossary of Prosthodontic Terms (7th ed). St. Louis: Mosby.*

MANDIBULAR MAJOR CONNECTORS

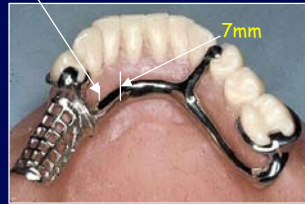
- Lingual Bar
- Labial Bar
- Lingual Plate

MAXILLARY MAJOR CONNECTORS

- Complete (or modified) Palatal Plate
- Anteroposterior Palatal Strap
- Anterior Palatal Strap

MANDIBULAR MAJOR CONNECTORS

1. **LINGUAL BAR** - Six gauge half-pear shape approximately 4 mm in height with superior border at least 3mm from fgm's.



The bar is pear shaped in cross section with the thickest part along the inferior border.

2. **LINGUAL PLATE** - Used when fgm to floor of mouth is less than 7mm, or when anteriors are mobile and their longevity is questionable.



Superior border is placed at the junction of incisal and middle thirds.

30ga relief wax is used to ensure that bar or plate does not contact tissue.

Source: Jeff Shotwell, University of Michigan, 2008

MAXILLARY MAJOR CONNECTORS

COMPLETE PALATAL PLATE



Posterior border must not impinge upon movable tissue

MODIFIED PALATAL PLATE



Anterior border ends in valley of rugae not less than 6mm from fgm

- Wide application to all classifications, but mostly to Cl I and II.
- Provides maximum support as plate rests on tissue (as do all maxillary major connectors.)
- Contraindicated where tori are present.

Source: Jeff Shotwell, University of Michigan, 2008

MAXILLARY MAJOR CONNECTORS

ANTEROPOSTERIOR PALATAL STRAP



Used where torus precludes use of palatal plate, provided a minimum of 5mm exists between the posterior aspect of the torus and the vibrating line.

Minimum width of 4mm



(MID)PALATAL STRAP

Used mainly in CI III situations - width of strap varies to suit the clinical situation.



Source: Jeff Shotwell, University of Michigan, 2008

MAXILLARY MAJOR CONNECTORS

1.

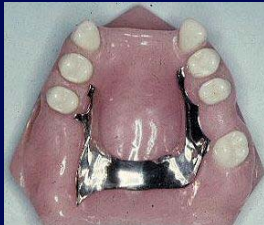


These designs are not recommended - the ones on the left lack rigidity and therefore do not distribute stress adequately.

3.



2.



The bars on the right are too high (thick) for comfort.

4.



The anterior palatal strap in design 1. is only used where a torus extends to within 5mm of the vibrating line.

Source: Jeff Shotwell, University of Michigan, 2008

LABIAL BAR -

Form and Usage: Same as the lingual bar but placed buccally (labially) due to severe lingual inclination of the remaining teeth



Labial Bar

Labial Bar

Source: Jeff Shotwell, University of Michigan, 2008

MINOR CONNECTOR

(Unification with Rigidity)

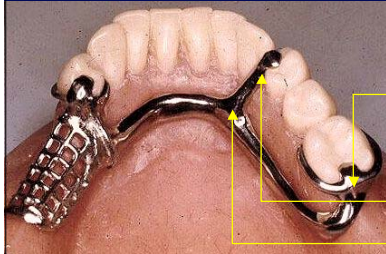
Definition:

"The connecting link between the major connector or base of a removable partial denture and the other units of the prosthesis, such as the clasp assembly, indirect retainers, occlusal rests, or cingulum rests." *The Academy of Prosthodontics (1999). Glossary of Prosthodontic Terms (7th ed). St. Louis: Mosby.*

Requirements:

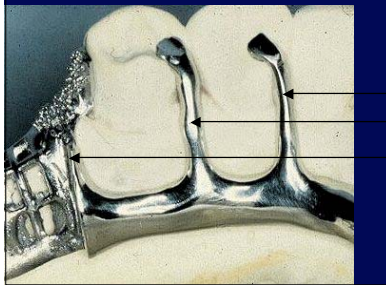
- must be rigid to distribute stress between linked components
- must not impinge on underlying mucosa; tissue relief (30 ga.) needed in the mandibular arch
- mucosal surface is highly polished to prevent plaque accumulation

MINOR CONNECTOR -



Usage:

- minor connector and rest junction must be at least 1.5 mm thick
- try to place interproximally
- joins major connector at a right angle
- should be located at least 5 mm from other vertical components

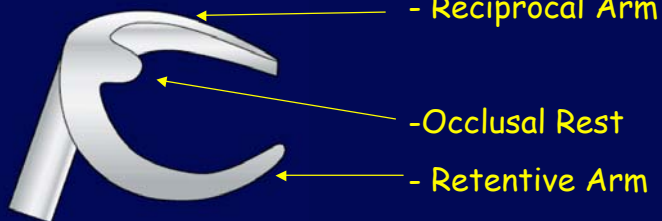


Source: Jeff Shotwell, University of Michigan, 2008

DIRECT RETAINER

Definition: "That component of a removable partial denture used to retain and prevent dislodgment, consisting of a clasp assembly or precision attachment." *The Academy of Prosthodontics (1999). Glossary of Prosthodontic Terms (7th ed). St. Louis: Mosby.*

Parts:



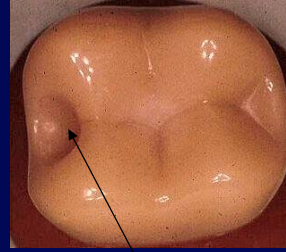
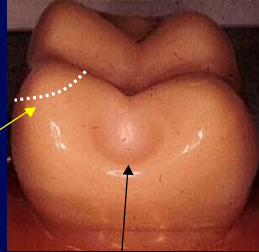
Source: Jeff Shotwell, University of Michigan, 2008

An OCCLUSAL REST:

- Transfers stress to the abutment tooth
- Resists movement of the prosthesis in a cervical direction
- Stabilizes the retentive arm in the proper position

Avoid placing the rest in Glass Ionomer - and choose composite over amalgam for Class II situations.

Less than 90 degree angle to make rest seat "positive"



Marginal ridge lowered to allow sufficient thickness without creating an occlusal interference.

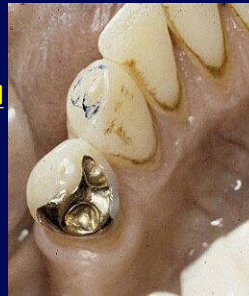
Deepest portion of rest seat; deeper than reduced marginal ridge area

Source: Jeff Shotwell, University of Michigan, 2008

OCCLUSAL RESTS - POSTERIOR

The image on the **right** shows a conventional occlusal rest seat prepared in a gold inlay.

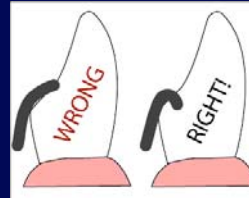
The images **below** show an **elongated occlusal rest** (left) and **continuous occlusal rest** (right). These are occasionally used to distribute the load more evenly over a molar tooth, or to stabilize a lone-standing tooth (and prevent it from drifting).



Source: Jeff Shotwell, University of Michigan, 2008

OCCLUSAL REST: ANTERIOR

Must be placed in a prepared recess or be part of a material added to the lingual aspect of an anterior tooth to make the rest "positive"



WRONG RIGHT

MANIBULAR ARCH

- Raised Cingulum*
- Cingulum Ledge*
- Incisal Ledge (Notch)
- Cingulum Ball

MAXILLARY ARCH

- Cingulum Ball*
- Cingulum Ledge (Groove)*
 - Raised Cingulum
- Incisal Ledge (Notch)

Listed in decreasing order of frequency used.
(* Most often used at U of M)

Source: Jeff Shotwell, University of Michigan, 2008

OCCLUSAL REST: ANTERIOR - Maxillary

Cingulum Ball -

A small round bur type rest seat placed in the mesial or distal lingual cingulum area cervical to any opposing occlusal contact.

When placing, care is taken not to undercut the axial wall area to the path of placement of the rpd.



Cingulum Ledge (Groove) -



Rest seat needs to be deep enough to provide a positive stop for the rest. If dentine is exposed and sensitive, place a composite restoration.



Notice the positive seat created by rest preparation.

Source: Jeff Shotwell, University of Michigan, 2008

OCCLUSAL REST: ANTERIOR - Mandibular

Raised Cingulum -

- A small, semilunar shaped addition to the lingual of the anterior tooth that is part of a crown or formed from composite restorative material.
- It is the best rest type for a mandibular anterior tooth that is the direct retainer abutment since it can easily be made positive and also provides better bracing potential than any other anterior rest seat.



Rest as part of a crown



Class I situation prior to rest seat addition in composite



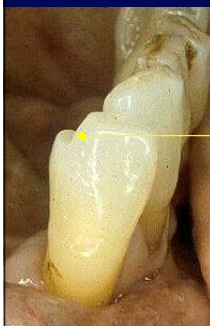
Composite added to canine and incisor to form rest seat

Source: Jeff Shotwell, University of Michigan, 2008

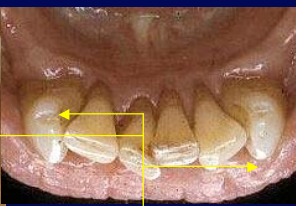
OCCLUSAL REST: ANTERIOR - Mandibular

Incisal Notch -

- Used infrequently because it is unesthetic and places the force application to the tooth some distance from the alveolar bone level.
- Used only when a raised cingulum or ledge type rest are not feasible.



Incisal notch in distal incisal corner of canines; teeth rotated too much to use a better type of rest seat



Lingual plate major connector has rest seat coverage as part of it

Source: Jeff Shotwell, University of Michigan, 2008

RECIPROCAL ARM (Reciprocation)

Definition: "A component of the clasp assembly specifically designed to provide reciprocation by engaging a reciprocal guiding plane; it counteracts the action of the clasp during removal and insertion of the removable partial denture."

Reciprocation: "The mechanism by which lateral forces generated by a retentive clasp passing over a height of contour are counterbalanced by a reciprocal clasp passing along a reciprocal guiding plane."

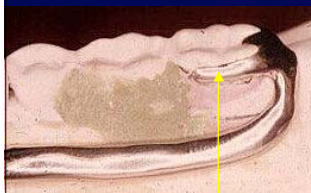
Guiding Plane: "A vertical parallel surface on an abutment tooth oriented so as to contribute to the direction of the path of placement and removal of a removable partial denture."

All definitions from The Academy of Prosthodontics (1999). Glossary of Prosthodontic Terms (7th ed). St. Louis: Mosby.

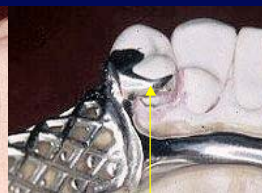
RECIPROCAL ARM - Functions:

- Resists lateral movement of the prosthesis
- Resists potential orthodontic movement of the abutment tooth generated by the retentive arm during placement and removal of the rpd

Types: Horizontal



Horizontal arm on molar
- it is rigid, non-flexible,
and placed in a non-
retentive area



Horizontal arm on
a premolar



Horizontal arm is
incorporated into the lingual plate
major connector

Source: Jeff Shotwell, University of Michigan, 2008

RECIPROCAL ARM - Types: R.P.I. System

- A clasp assembly system that achieves reciprocation using two of its three components
- This system lacks bracing and lateral stress control that is found with a horizontal reciprocal arm

This image removed
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reasons

Proximal plate and mesial
minor connector combine
to provide reciprocation

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for copyright
reasons

Proximal plate extends
onto the lingual surface
with mesial connector
contacting tooth at "c"



RPD framework on
cast showing the
lingual components of
the R.P.I. system

Source: Jeff Shotwell, University of Michigan, 2008

RETENTIVE ARM (CLASP)-

Defintion: 1. "A clasp specifically designed to provide retention by engaging an undercut." 2. "A flexible segment of a removable partial denture that engages an undercut on an abutment and that is designed to retain the prosthesis." The Academy of Prosthodontics (1999). *Glossary of Prosthodontic Terms (7th ed)*. St. Louis: Mosby.

Function - provides resistance to vertical displacement of the rpd.

Types of clasps: (material)

1. Cast
 - circumferential
 - bar (infrabulge)
2. Wrought
 - circumferential

Types of Clasps:(approach to undercut)

1. Suprabulge (occlusal approach)
 - cast
 - wrought
2. Infrabulge (gingival approach)
 - cast

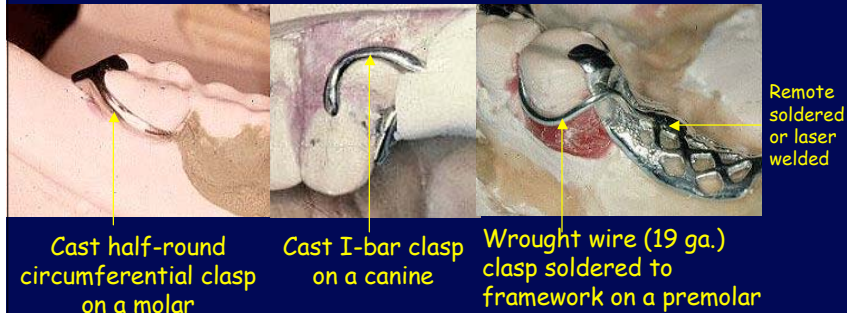
RETENTIVE ARM (CLASP) -

Retentive Surface Material:

Acceptable: enamel, gold, porcelain, composite

Not acceptable: amalgam, glass ionomer

Types of Clasps: (material)



Source: Jeff Shotwell, University of Michigan, 2008

DENTURE BASE

Definition: "The part of a denture (rpd) that rests on the foundation tissue and to which teeth are attached." *The Academy of Prosthodontics (1999). Glossary of Prosthodontic Terms (7th ed). St. Louis: Mosby.*

Attributes of a tooth-tissue supported (class I or II) rpd base:

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

Attributes of a tooth supported (class III or IV & modifications) rpd base

- only need contact with edentulous ridge
- metal or acrylic base is possible
- only need anatomic (unloaded) form of the ridge during impression procedure
- convenience coverage of the edentulous area only

DENTURE BASE - ACRYLIC

Usage:

- can be used in all rpd maxillary and mandibular classifications
- it can be relined if the edentulous ridge area changes
- attached to the rpd framework via meshwork



Meshwork wax-up on mand. Rpd. It is relieved off the ridge by using 24 ga. wax during block-out of the cast prior to duplication and waxing



Meshwork after casting for a class I mand. case



Cast meshwork for an anterior modification space



Acrylic base attached to meshwork - note gray shadowing of meshwork

Source: Jeff Shotwell, University of Michigan, 2008

DENTURE BASE - METAL

Usage:

- Can be used in mandibular class III or IV rpd's, maxillary class I-IV rpd's as well as all modification areas
- Cannot be used in mandibular class I or II rpd's since it can not be relined
- The acrylic material associated with the base is attached using small plastic beads at the time of base wax-up



Plastic beads



Beads cast on modification base



Acrylic attached to metal base - note acrylic flange

Source: Jeff Shotwell, University of Michigan, 2008

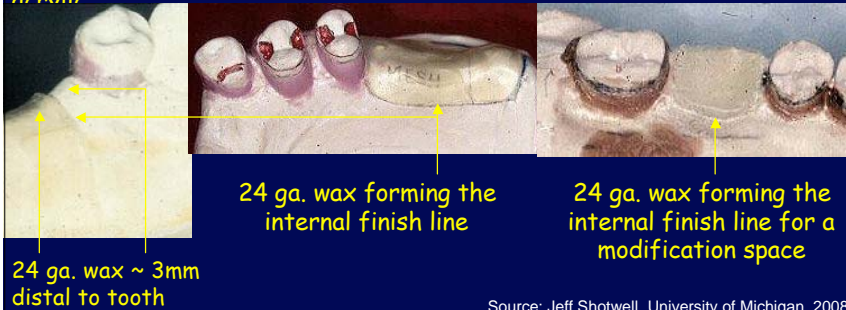
DENTURE BASE - FINISH LINES

Definition: "The planned junction of different materials." *The Academy of Prosthodontics (1999). Glossary of Prosthodontic Terms (7th ed). St. Louis: Mosby.*

Types: Internal (Acrylic bases only)

- Associated with the junction between the metal of the rpd framework and the acrylic base material

- Formed by the 24 ga. relief wax used to provide space for the denture acrylic

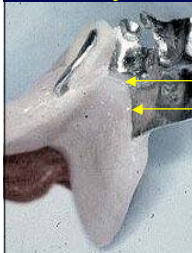


DENTURE BASE - FINISH LINES

Types: Internal (Acrylic bases only)



Internal finish line in cast framework -note definite edge for acrylic material junction

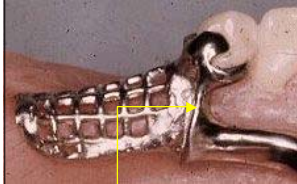


Acrylic base-framework junction on finished rpd - it should be a smooth transition between the two

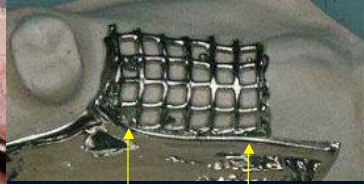
Source: Jeff Shotwell, University of Michigan, 2008

DENTURE BASE - FINISH LINES

Types: External (Acrylic and Metal bases)

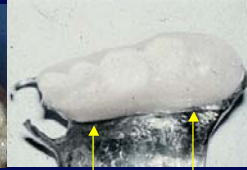


External finish on mandibular framework



External finish line on maxillary framework

Note- External and internal finish lines when present are not placed opposite each other to prevent potential fracturing of the base



External finish line junction between acrylic and metal on a mandibular extension base, a mandibular modification base, and a maxillary extension base - again there is a smooth transition between the two.

Source: Jeff Shotwell, University of Michigan, 2008

REPLACED TEETH

Functions:

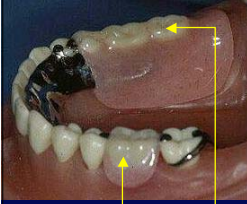
- Prevent migration of the remaining teeth
- Restore masticatory efficiency
- Retain proper interarch space
- Maintain esthetics of a normal facial contour
- Achieve distinct enunciation

Types of Material:

- Acrylic
- Porcelain
- Metal: gold and chrome

REPLACED TEETH - POSTERIOR

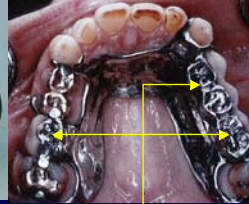
- Material:



Acrylic posterior denture teeth - standard tooth used on rpd's and cd's. Much easier to set and adjust than porcelain. Clinical wear helps dissipate occlusal forces.



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



Occlusal chrome surfaces on this maxillary class III RPD are an extension of the framework. Acrylic facings are placed on the buccal for esthetics.

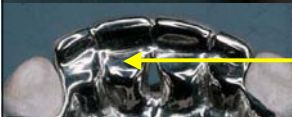
Note- Not used very often clinically

Source: Jeff Shotwell, University of Michigan, 2008

REPLACED TEETH - ANTERIOR

Material:

Porcelain



Porcelain denture teeth are rarely used since they are difficult to set. Porcelain facings as shown on left were used for many years but not now. The backing of the facing is framework metal with the facing adjusted to fit the buccal mucosa so no acrylic is associated with this area. The facings can come off during ultrasonic cleaning so beware.

Source: Jeff Shotwell, University of Michigan, 2008

Acrylic



Acrylic denture teeth on class IV RPD. The standard denture tooth type used for rpd's and cd's at the U. Of M.

INDIRECT RETAINER

(Class I and II RPD's only)

Definition: "The component of a removable partial denture that assists the direct retainer(s) in preventing displacement of the distal extension denture base by functioning through lever action on the side opposite of the fulcrum line when the denture base moves away from the tissues in pure rotation around the fulcrum line." The Academy of Prosthodontics (1999). *Glossary of Prosthodontic Terms (7th ed)*. St. Louis: Mosby.

FULCRUM LINES

- Page 96 of your text (you need to know this material - all three columns, especially fulcrum and retentive fulcrum axes.)
- *Definition:* FULCRUM LINE AXIS (sometimes referred to just as FULCRUM LINE) An imaginary line, connecting the most distal occlusal rests, around which a removable partial denture tends to rotate TOWARDS the tissue under masticatory forces.
- *Definition:* RETENTIVE FULCRUM LINE AXIS - Movement of the base AWAY from the ridge around an imaginary line connecting the retentive clasp tips. (This is the axis relevant to indirect retention.)

INDIRECT RETAINER -

Effectiveness and Placement:

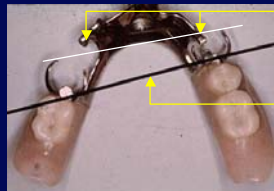
- Usually it is a rest seat placed anterior the the fulcrum line on the side opposite the extension base. Theoretically, the further anterior the rest seat is placed the more effective it is. The rest seat is usually located on a canine or first premolar mesial fossae.

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reasons*

Note the placement of a rest seat in the mesial fossae of the first premolar that prevents tissue-ward movement of the major connector. It is attached to the major connector by a minor connector.

The RPD base as shown by arrows can rotate away from the ridge around the fulcrum pt. "F" if foods stick to the base during function. This would cause the major connector to rotate into the underlying mucosa and produce soreness.

INDIRECT RETAINER - Class I RPD Usage:



Indirect retainers

Primary fulcrum line through most distal rest seats



Ideally , a class I rpd has two indirect retainers as shown above; one for each extension base



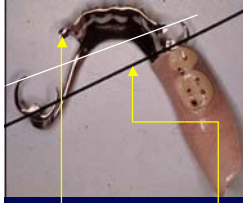
Practically, only one indirect retainer is needed for a class I rpd as shown on the right two pictures. Usually, the site furthest from the fulcrum line is chosen.



Source: Jeff Shotwell, University of Michigan, 2008

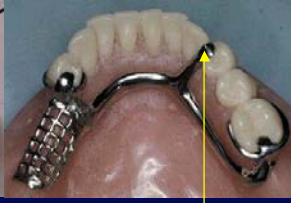
INDIRECT RETAINER -

Class II RPD Usage:

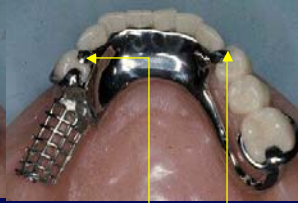


Indirect retainer rest seat; only one and on the side opposite the extension base

Primary fulcrum line through most distal rest seats



Indirect retainer rest seat



Indirect retainer rest on tooth #28; only a secondary rest seat on the mesial of tooth #21 to support the lingual plate major connector

Source: Jeff Shotwell, University of Michigan, 2008

QUESTIONS

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