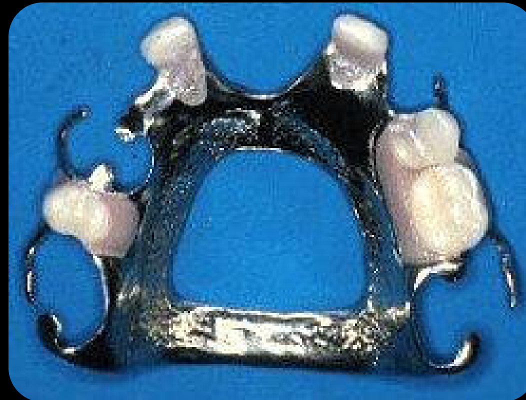
Major Connectors in RPD



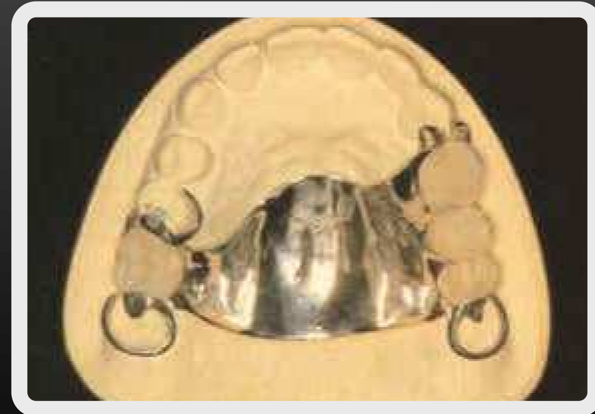
Contents

- Introduction
- Definition
- Functions of major connectors
- Ideal requirements
- Design cosiderations
- Types

  Maxillary major connectors

  Mandibular major connectors
- Conclusion
- References

Introduction



No component of removable partial denture should be added arbitrarily or conventionally. Each component should be added for a good reason and to serve definite purpose.

- McCracken

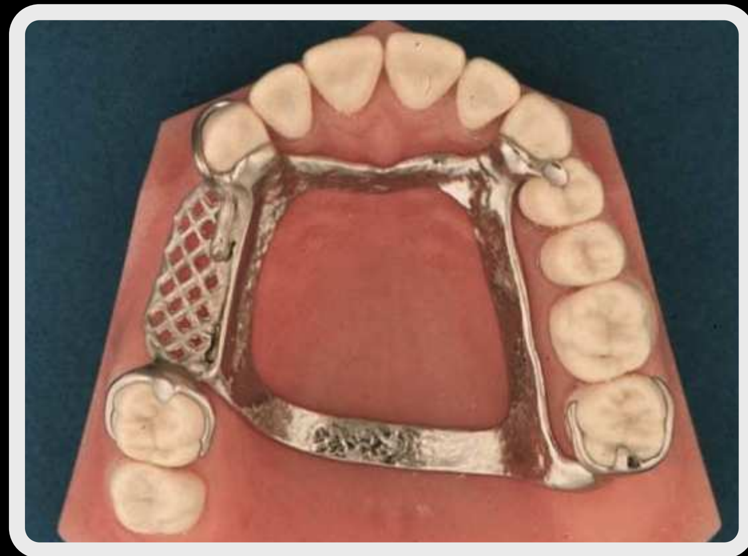
Major connector

A major connector is the component of the partial denture that connects the parts of the prosthesis located on one side of the arch with those on the opposite side.

GPT-8

Functions

- **Unification**
  - Partial denture acts as one unit
  - Connects various parts of the prosthesis



- **Stress distribution**

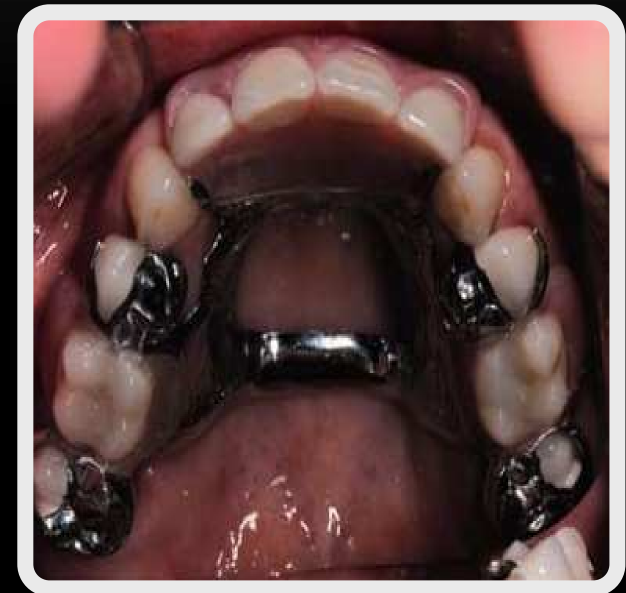
  Distributes functional loads to both teeth & mucosa across the arch

- **Cross arch stability**

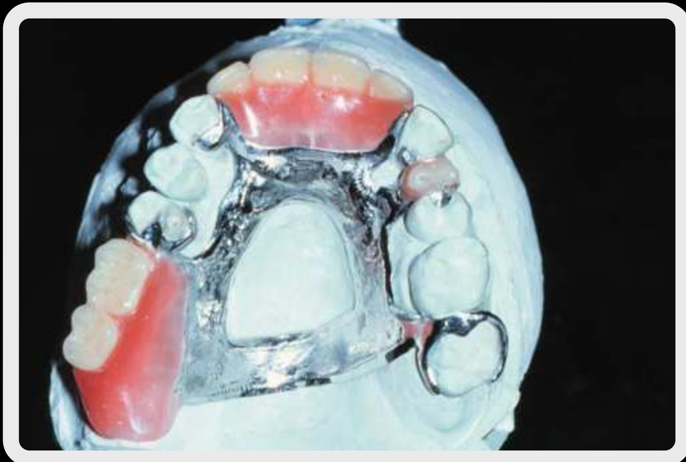
  Bracing elements on one side

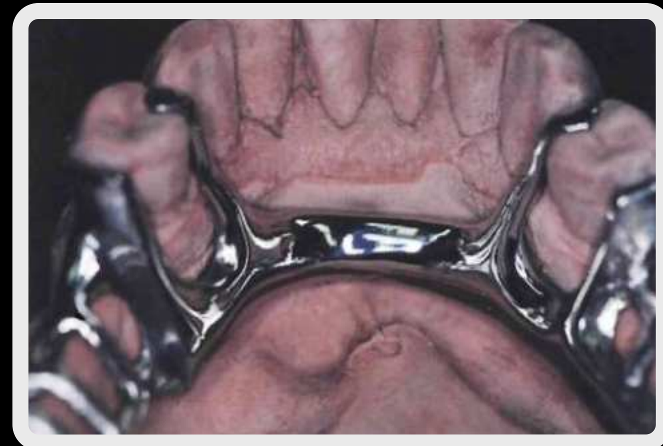
  of the arch provide stability

  to the other side



- **Support-** Maxillary major connectors
- **Indirect retention-** Mandibular major connectors
- Minimizes torque to the teeth





Ideal Requirements

- Rigidity
- Provide vertical support and protect soft tissues.
- Provide a mean of obtaining indirect retention.
- Provide a mean for positioning denture bases where needed.
- Maintain patient comfort.
- Conform to anatomical contour of the palate.

Stewart 2nd ed pg 22

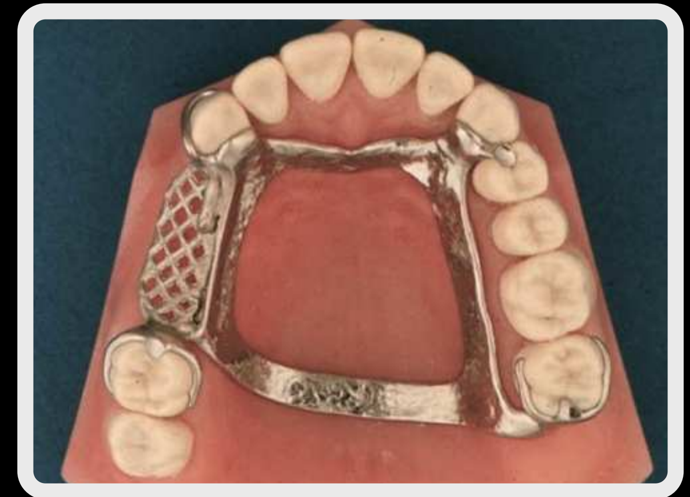
Border should

- run parallel to gingival margin of teeth away from gingival crevices

At least 6 mm away from maxillary teeth

4 mm away from mandibular teeth

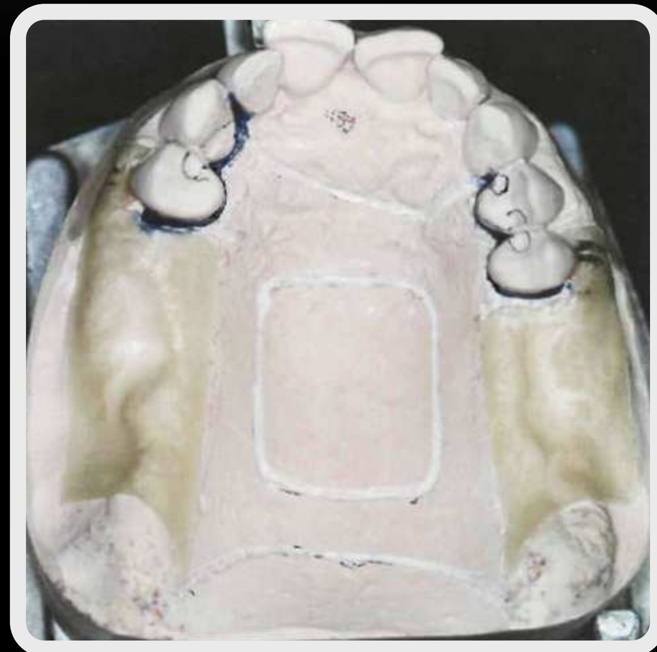
- cross gingival margin at 90°



- Anterior border should end in the valleys between the rugae crests
- Posterior border as far posterior as possible without contacting movable soft palate least noticeable to tongue
- Borders should cross midline at right angles.

- Edges rounded & tapered towards tissues
- Relief to avoid impingement of free gingival margin
- No food entrapment

- A specially prepared seal along all borders on soft tissues
- Beading on the master cast with spoon excavator
- Depth and width 0.5 to 1.0 mm



- Intimate contact provided between connector and supporting tissues.
- Relief should be provided for tori, prominent midline suture.
- Relief should be provided to prevent impingement of tissues due to rotation of distal extension denture bases.

Selection of Major Connector

- Ability to provide support and rigidity
- Compatibility with anatomical structures of maxilla and mandible
- Location and span of edentulous segment

Renner & Boucher. Removable partial dentures.

Design of maxillary major connector

- 1953- Blatterfein –systemic approach in designing
- 5 basic steps applicable to most maxillary RPD situations.

- Step 1 - outline of primary bearing areas
- Step 2 – outline of non bearing areas
- Step 3 – outline of connector areas
- Step 4 – selection of connector type

  based on four factors

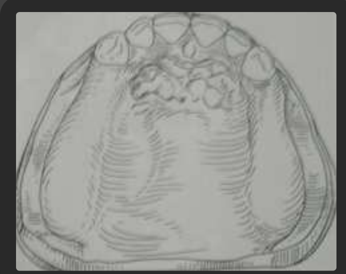
  a) mouth comfort

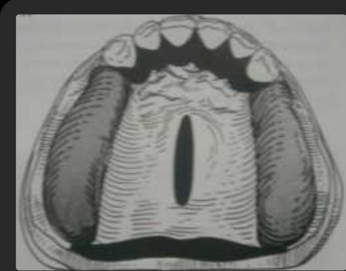
  b) rigidity

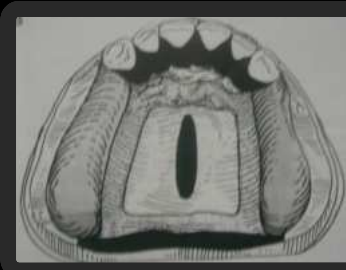
  c) location of denture base

  d) indirect retention
- Step 5 – Unification

(Campbell 1977, Lavere & Krol 1973)





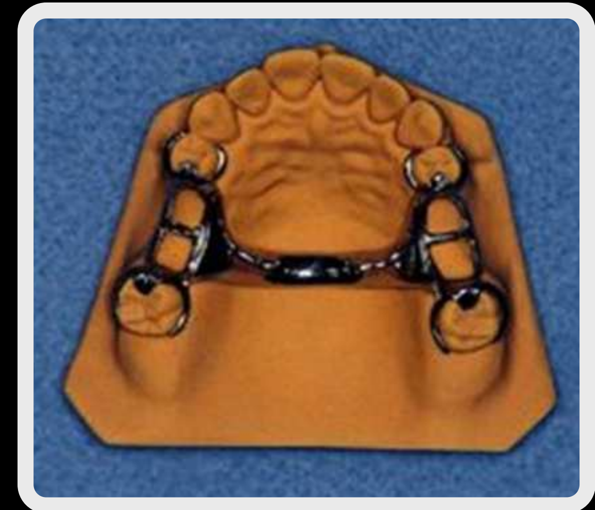


Types of Maxillary Major Connectors

- Single posterior palatal bar
- Palatal strap
- Antero- posterior or double palatal bar
- Horseshoe or U-shaped connector
- Closed horseshoe or Antero- posterior palatal strap
- Complete palate

Single Posterior Palatal Bar

- Narrow half oval bar with thickest centre
- Width less than 8 mm
- Narrow anterio-posteriorly & thick occluso-gingivally
- Objectionable due to bulk
- Interference to tongue



Indications

- Interim prosthesis
- Short span Kennedy class III arches

Palatal Strap

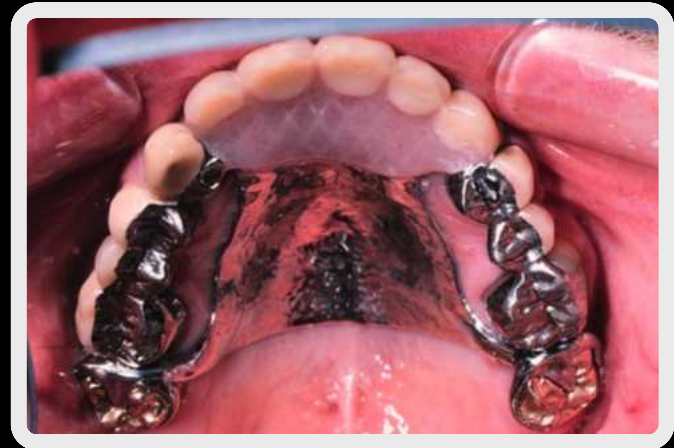
- Minimum 8 mm wide thin band of metal
- Thin metal comfortable for patient

Indications

- Class III or
- Class III mod1 arches
- Class II arches

Advantages

- Increased width improves rigidity and support.
- Resistance to bending and twisting forces.
- Little interference with tongue.



Disadvantages

- Excessive palatal coverage.
- Papillary hyperplasia.

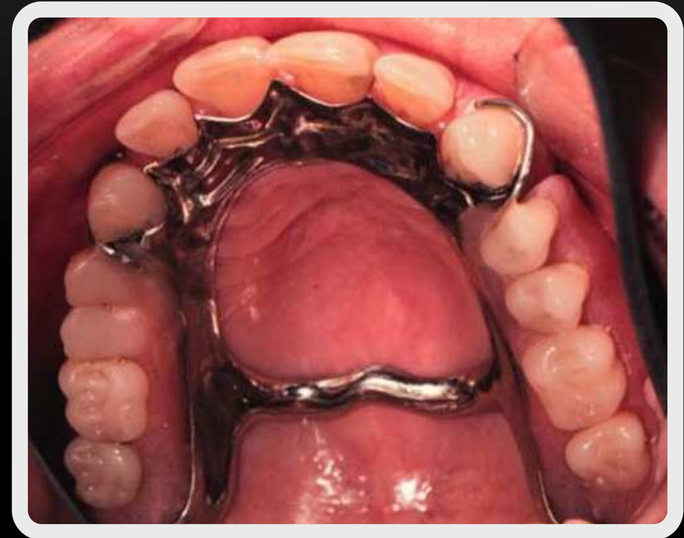
A- P or Double Palatal Bar

Anterior bar narrower than palatal strap.

Posterior portion same as palatal bar.

Requires greater bulk for rigidity

Provides circular configuration



L beam effect

- The metal lying in two planes increases the resistance to flexing.
- Forces transmitted on different planes are counteracted more easily,offering resistance to bending and twisting forces

Indications

- When support is not a major consideration.
- When anterior and posterior abutments are widely separated.
- Long span Class II mod 1
- Class IV
- Large inoperable palatal tori

Advantages

- Improved rigidity
- Minimizes soft tissue coverage

Disadvantages

- Little support from bony palate
- Frequently uncomfortable
- May interfere with phonetics

Horseshoe or U-shaped Connector

Thin band of metal running along lingual surfaces of

remaining teeth & extends onto palatal tissues for 6- 8 mm

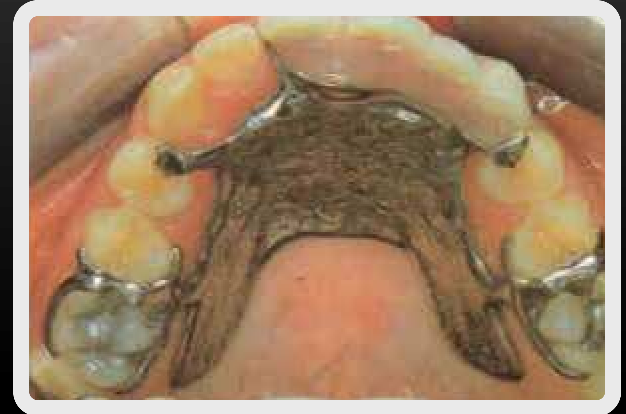
Palatine rugae should be reproduced in metal.

Indications

- An inoperable palatal torus
- Kennedy Class IV arches
- Mobile anterior teeth require splinting

Advantages

- Support is derived from teeth & tissues of hard palate

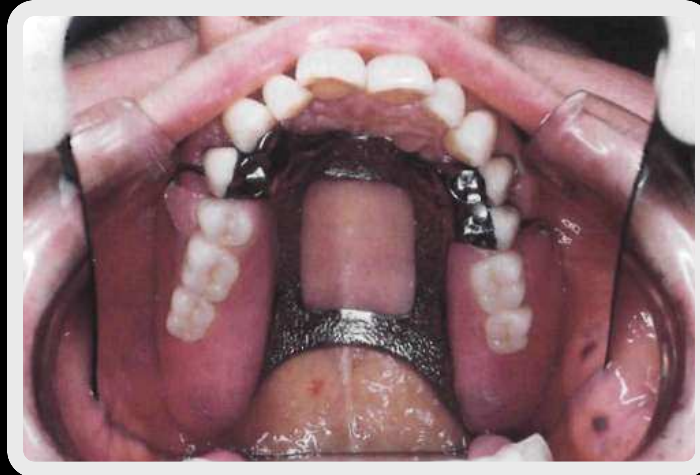


Disadvantages

- Lacks rigidity & cross arch stability
- Flexion occurs under vertical forces
- Greater bulk required to avoid flexion
- Irritation to gingival tissues covered

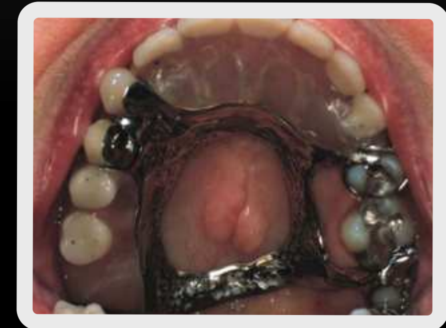
Closed Horseshoe or A-P strap

- Both the straps should be minimum 8 mm wide.
- Open area should be at least 20 X 15 mm.



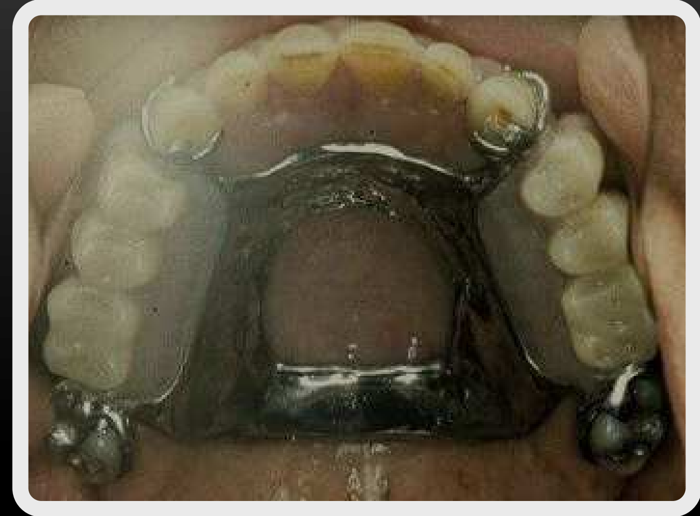
Indications

- Class I and II arches with excellent support from abutment & residual ridges.
- Class II modification 1 arches
- Class IV arches
- Presence of small tori.
- When cross arch stabilization required.



Advantages

- Maximum rigidity
- Good support
- Minimum bulk
- Circular configuration
- Resistant to flexion

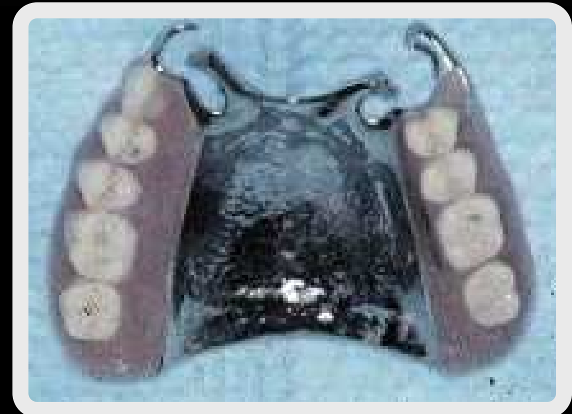


Disadvantages

- May interfere with phonetics
- Extensive borders cause irritation to tongue.

Complete palate

- Covers wider area of the palate
- Should be thin, broad & anatomically contoured
- 3 structural designs
  - Complete acrylic resin palate
  - Complete cast palate
  - Combination cast & acrylic resin complete palate



- Complete acrylic resin palate

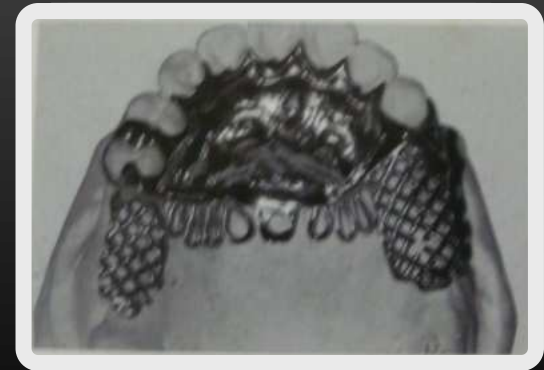
  Transitional or interim RPD

- Complete cast palate

  Anatomical replica form

  Thin & strong

  Comfortable



- Combination cast & acrylic resin complete palate

  Palatal plate supported anteriorly & designed to attach acrylic resin posteriorly

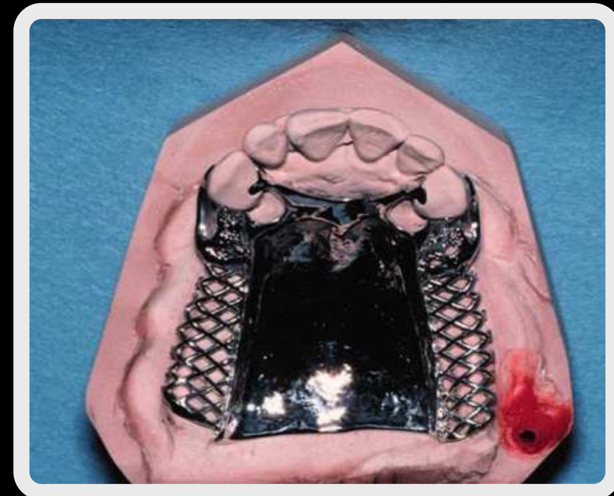
  Combines advantages of both.

Indications

- Class I arches
- Anterior missing teeth with Class I arches
- Six or less anterior teeth remain
- Poor residual ridge
- Periodontally compromised remaining teeth

Advantages

- Best support & retention & stability
- Maximum stress distribution
- Reproduces anatomic contours of palate
- All metal connectors enhances thermal conductivity

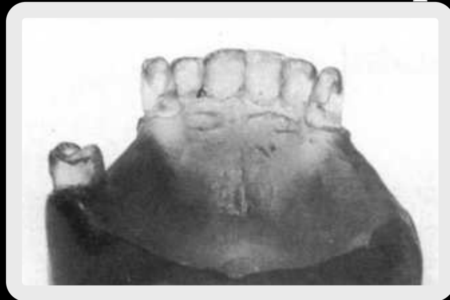


Disadvantages

- Soft tissue hyperplasia

Split palatal major connector

- Split palatal major connector did reduce the stress delivered to the distal-extension abutment when the base was loaded on the experimental model.



A photoelastic study of a split palatal major connector.

P. V. Reitz, J. L. Sanders and A. A. Caputo. JPD 1984, 51:19-23.

Choice of Major Connector

- Weak periodontal support of remaining teeth –
 Wide palatal strap or Complete palate

- Adequate periodontal support of remaining teeth – Palatal strap or Double palatal bar

- Long span distal extension bases – Closed horseshoe or Complete palate

- Anterior teeth to be replaced - Horseshoe, Closed horseshoe or Complete palate
- Presence of palatine torus – Horseshoe,
  Closed horseshoe or Double palatal bar
- Single palatal bar is rarely indicated

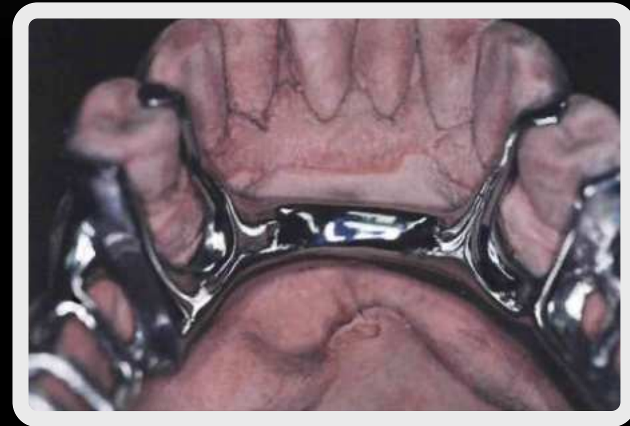
End of 1st part

Mandibular Major Connectors

- Lingual bar
- Linguoplate
- Sublingual bar
- Lingual bar with cingulam bar / double lingual bar
- Cingulam bar(continous bar)
- Labial bar

Lingual Bar

- Basic form –half pear shape
- Made of 6 gauge, half pear shaped wax
- Superior border tapered toward the gingival tissues
- Greatest bulk at inferior border



Lingual bar design. B. T. Cecconi. J. Prosthet. Dent.1973, 29 : 635-639.

Indications

- Sufficient space exists between elevated lingual sulcus & lingual gingival margin.
- Location – at least 4mm inferior to marginal gingiva.
- Vertical height of a lingual bar – at least 4mm.

Contra-indications

- Insufficient space less than 8mm
- Lingually inclined teeth
- Mandibular tori

Advantages

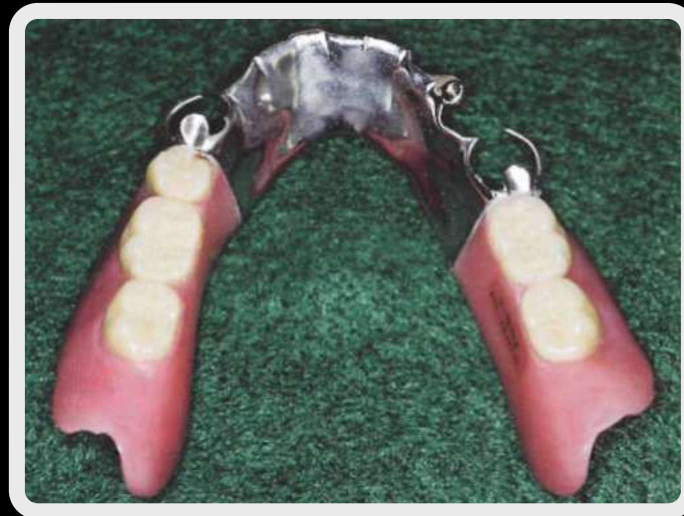
- Simplicity in design
- Covers minimal surface of teeth & tissues.
- Long term health is maintained.
- Minimal interference with function.

Disadvantages

- Less rigid than linguoplate
- Extreme care while waxing & finishing.
- Weak areas in casting prone to fracture.

Linguoplate

- Contacts the cingula of remaining teeth.
- Thin & follow contours of the teeth & embrassures.
- Gingival crevices & deep undercuts blocked parallel to path of placement
- All interproximal spaces closed upto contact point of teeth.

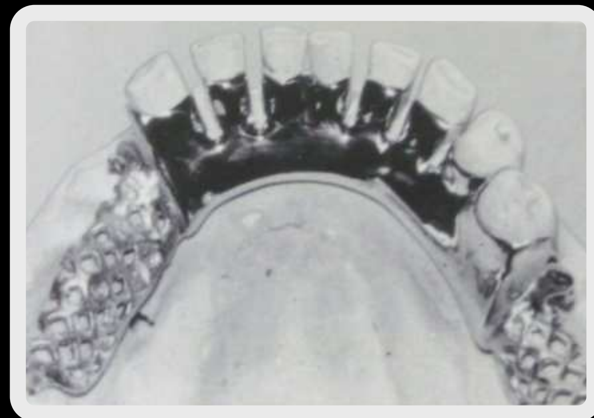


Indications

- High lingual frenum or space available for lingual bar is limited.
- High muscle attachment
- Kennedy class I with severe resorption of residual ridges.
- Stabilization of peridontally weakened teeth
- Future replacement of one or more incisors is anticipated
- Need for indirect retention

- Spacing present in anterior teeth & patient objects to visibility of metal

Interrupted Linguoplate design / Cut-back/ step-back



Advantages

- Most rigid
- More support & stabilization
- Indirect retention
- More comfortable

Disadvantage

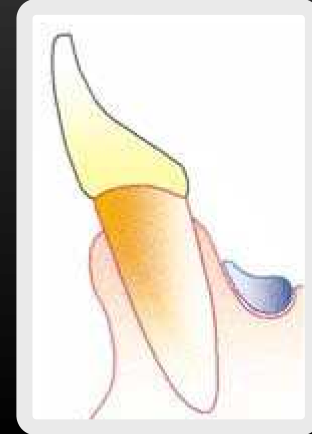
- More coverage of teeth & soft tissues
- Meticulous oral hygiene required.

Sublingual Bar

Brantenburg & Tryde (1965)

Inferior & posterior to lingual bar

Greatest bulk of metal in horizontal plane.

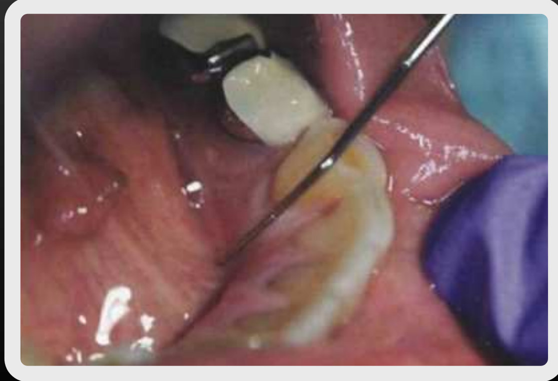


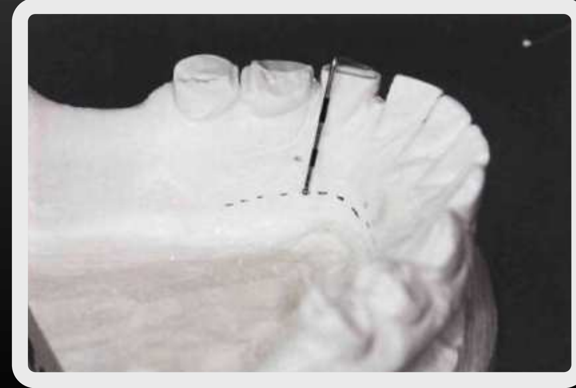
Indications

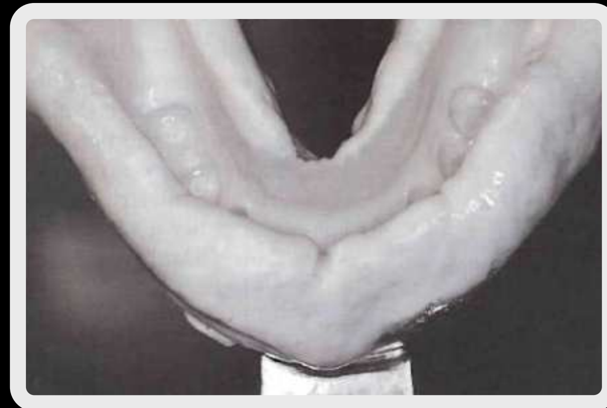
- When height of the floor of the mouth does not allow placement of superior border of the bar at least 4mm below the free gingival margins
- Anterior severe lingual undercut.

Partial Dentures. Osborne & Lammie pg 248.

Height of floor of the mouth

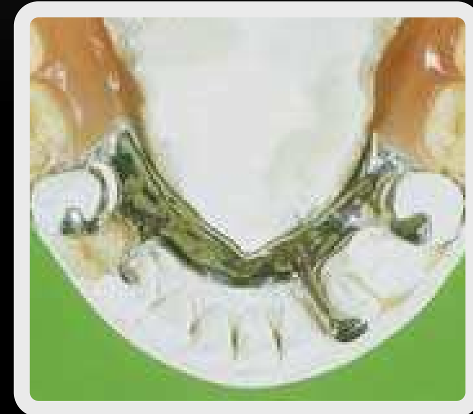






Contraindications

- Interfering lingual tori
- Periodontally weak teeth & require indirect retention
- High lingual frenum attachment
- Severe lingual tilting of remaining anterior teeth



Advantages

- Does not contact anterior teeth
- Allows stimulation of lingual tissue by tongue, flow of saliva.
- More esthetic
- More rigid than lingual bar

Double Lingual Bar/ Kennedy Bar/ Split Bar

Upper bar – Half oval, 2-3mm high & 1 mm thick,

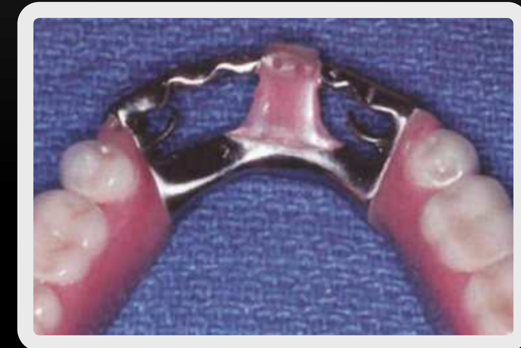
On or slightly above the cingula of anterior teeth.

Indications

- Axial alignment of the anterior teeth poses excessive block out of interproximal undercuts.
- Wide diastema
- Open cervical embrassures

Advantages

- More rigid than ligual bar
- Covers less tooth & tissue surfaces
- Natural stimulation of gingiva

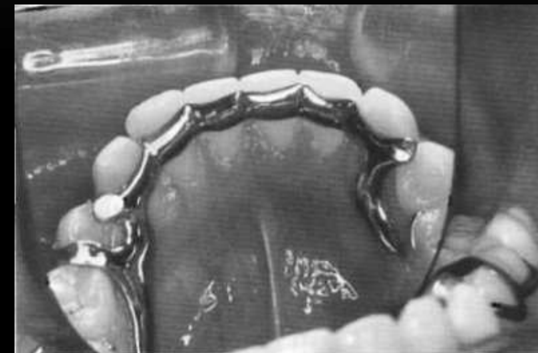


Disadvantages

- Annoyance to tongue
- Food trap in open space
- Patient discomfort

Cingulum Bar/ Continuous Bar

Thin, narrow 3mm metal strap located on cingula of anterior teeth, scalloped to follow interproximal embrassures.



Indications

- Inoperable tori
- Severe undercut of lingual alveolar ridge
- Severe gingival recession
- Shallow floor of mouth

Contra- indications

- Short crowns
- Large interdental spaces
- Crowding or lingually inclined anterior teeth

Disadvantages

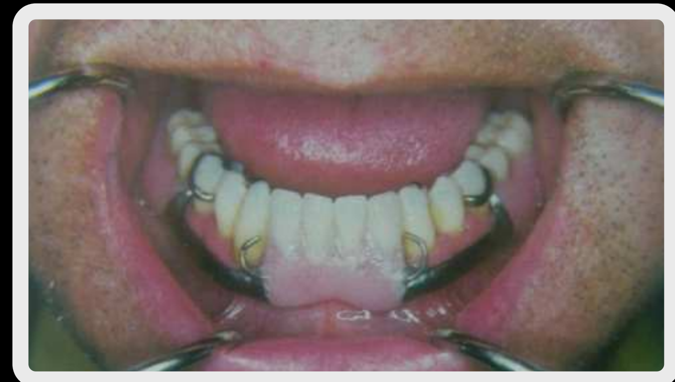
Lacks necessary rigidity

Must be made bulky

Objectionable to tongue

Labial Bar

- Half pear shaped with bulkiest portion inferiorly placed on the labial & buccal aspect.
- Inferior border located in the labial or buccal vestibule at the juncture of attached & unattached mucosa.



Indications

- Extreme lingual inclination of the remaining teeth
- Severe and abrupt lingual tissue undercuts
- Inoperable lingual tori.

Disadvantages

- Longer & broader than lingual major connector
- Visible in mouth – poor esthetics
- Distorts lip contour
- Encroaches on free gingival margins

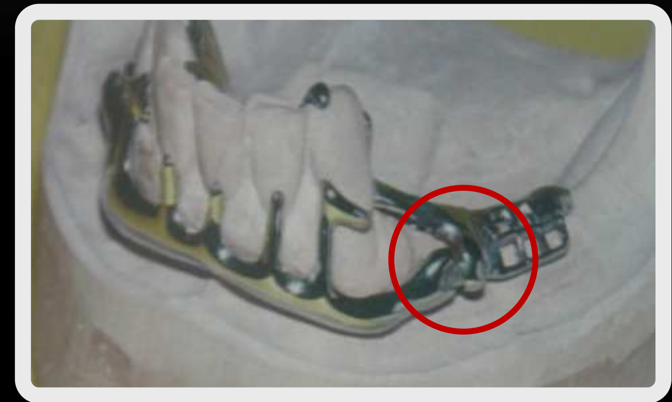
Hinged continuous labial bar

- Swing –Lock design
- Labial or buccal bar connected to major connector by a hinge at one end & a latch at the other end.

Indications

- Missing key abutments
- Unfavourable tooth contours
- Unfavourable soft tissue

  contours

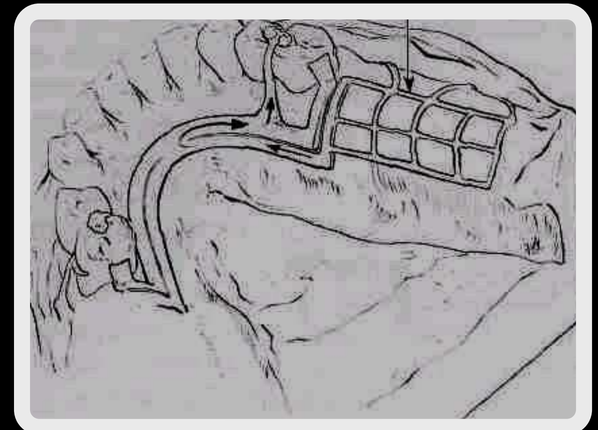


Disadvantages

- Poor esthetics
- Distortion of lower lip
- Can not be placed in shallow vestibule

Split bar major connector

- 1969 McCracken
- Vertical & diagonal forces applied to tissue-supported base must pass anteriorly along lower bar & then back along more rigid upper bar to reach abutment tooth.
- Thus tipping forces transmitted directly to abutment tooth are dissipated by flexible lower bar.

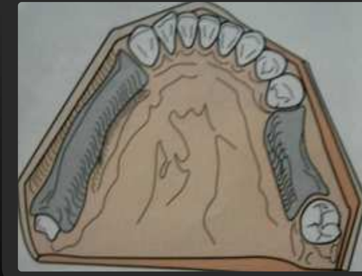
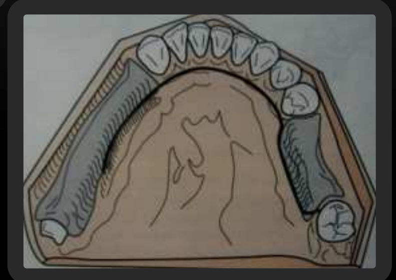
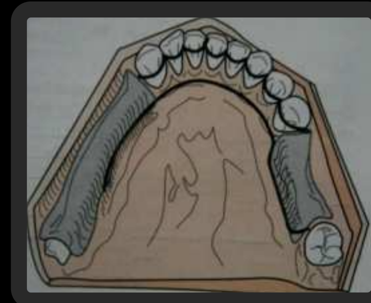
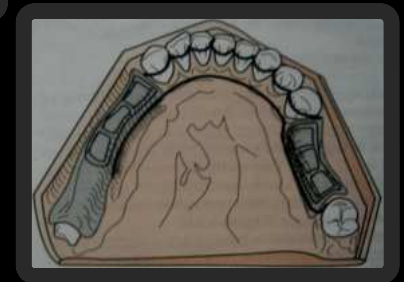


Choice of Mandibular Major connector

- Tooth supported denture- Lingual bar
- Distal extension RPD- Lingual plate
- Sufficient space between lingual marginal gingiva and elevated floor of mouth – Lingual bar
- Periodontal splinting , indirect retention desired- Lingual plate
- Labial bar is rarely indicated

Design of Mandibular Major Connector

- **Step 1-** Outline the basal seat areas on the diagnostic cast
- **Step 2 -**Outline the inferior border of the major connector
- **Step 3-** Outline the superior border of major connector
- **Step 4-** Connect the basal seat areas to the inferior and superior border of the major connector and add minor connector to retain the acrylic resin denture base material

Conclusion

- Major connector chosen to suit the individual condition must unite the various components so that the prosthesis functions as a single unit.
- It should provide necessary rigidity and restore function without harming the teeth & soft tissues & also meet the demand of esthetics.

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Thank you