Indications for Removable Partial Dentures
1. Distal Extensions
2. Long Tooth Borne Spans
3. Severe Bone Loss
4. Recent Extractions
5. High Caries Index
6. Poor Crown/Root Ratio
7. Cost

Kennedy Classification of Partially Edentulous Arches
- **Classified by:** The most posterior space to be restored by the partial
- **Modified by:** The number of remaining spaces to be restored by the partial

Partial Denture Movement
- **Tooth Borne**
  - Vertical movement
  - Rotational movement
- **Distal Extension**

Rotation & Classification
- All Class I partials rotate
- All Class II partials rotate
- Some Class III partials rotate
- Some Class IV partials rotate
Important Facts #1-4

1. Rotation Causes Torque
2. Torque causes tooth loss
3. Tipped teeth are more likely to torque
4. Lone standing teeth are more likely to torque

Teeth most likely to tip

Parts of a cast partial framework

Anterior/Posterior Palatal Bars
- Most common
- Most rigid
- Anterior bar:
  - Broad & thin
  - Between rugae
  - 6mm from gingival margin
- Posterior bar:
  - Narrow & thick
  - ½ pear shaped
  - Thickest at posterior
  - Ant to jx of hard & soft palate
- No right < between bars
- Bars ⊥ to median suture

Broad Palatal Strap
- Thickness for rigidity may cause speech problem
- Anterior border as far posterior as possible
- Posterior border ⊥ to median suture
- Used only when few teeth missing

Full Palatal Coverage
- Ideal for Kennedy Class I
- Includes Post Palatal Seal
- May be all metal:
  - Good thermal conductor
  - Decr bulk
  - No Post Dam
  - Not adjustable

Horseshoe
- Rotates horizontally
- Best with tooth borne
- Best with many guide planes
- Gaggers last resort
- Inoperable torus @ jx of hard & soft palates
- Thickness for rigidity may cause speech problems

Lingual Bar
- Most common
- Relieved from tissue
- ½ pear shape or bulk inferiorly
- Superior margin 3mm from FGM
- Bar is 3mm wide
- Requires a min of 3mm fold depth during tongue fx
Lingual Blanket
- Indications include:
  - High lingual frenum
  - Perio splinting
  - Past experience
  - Contacts teeth, but not gingiva
  - Requires seat seals on all lower anterior
  - Inferior border at depth compatible with tongue movement

Major Connectors
1. A/P Palatal Bars: most rigid, 1st choice-max
2. Broad Palatal Strap: thick, small case
3. Full Palatal Coverage: upper Class I
4. Horseshoe: inoperable torus @ H/S palate
5. Lingual Bar: most comfortable, 1st choice-mand
6. Lingual Blanket: shallow floor, splinting

STEELE'S FACING
- Acrylic facing
- Metal backing
- Cemented or cured
Recommended for small anterior space

STEELE'S FACING
- Metal backing
- Slot projection

TUBE TOOTH
- Single Posterior
- Hollow ground tooth
- Nail head projection
Recommended for small posterior space

Abutments
- Definition: any tooth which contacts the metal framework
- Primary (1º) abutment: has a clasp
- Secondary (2º) abutment: has no clasp

The Direct Retainer (Clasp)
- 1. Rest
- 2. Retainer
- 3. Bracer
Type I vs Type II

- **Type I**
  - Occlusal origin
  - From minor connector
  - Crosses bulge
  - 1/3 rd retentive
  - B or L retention

- **Type II**
  - Gingival origin
  - From meshwork
  - Doesn’t cross bulge
  - All retentive
  - B retention only

Other “Overwrought” Options

- Likely to break
- Likely to wedge
- Too rigid

Approach Arms

- Narrower spaces require longer approach arms

Approach Arms

<table>
<thead>
<tr>
<th>Tooth + Tissue</th>
<th>Tissue undercut below 3mm</th>
<th>Tissue ledge</th>
<th>Tissue undercut above 3mm</th>
<th>Severe tilt</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Approach Arms

- Severe tipping
- Severe tissue undercut
- Shallow fold
Approach Arm Misuse

- Reverse
- Skipping teeth
- Molars

Inappropriate Uses For Approach Arms

- NO approach arms on MOLARS
- NO DOUBLE approach arms or SKIPPING of teeth
- NO approach arms positioned DISTALLY
- NO LINGUAL or PALATAL approach arms or arms

Important Fact #5

**Clasps Cause Torque**

Clasp Location

To reduce rotational or tipping forces, place clasps as gingivally as possible

Important Fact #6

**Lowering Clasps Reduces Torque**
Bracing (Reciprocation)

Bracing prevents tooth movement as clasp crosses bulge. Absence of bracing causes tooth movement.

Important Fact #7

Bracing Reduces Torque

Bracing Options
1. Arm
2. Blanket
3. 2 Minor Connectors

Bracing effectiveness must also be evaluated from the proximal. Heights of contour may be mismatched.

Important Fact #8

Lowering Bracer Reduces Torque

Functions of Rests

- Preventing cervical movement
- Preventing rotational movement
- Maintaining or establishing occlusion
- Maintaining relationship of clasp to abutment

Rests may cause tooth movement.
Important Fact #9

Rests Cause Torque

Functions of Rest Seats
- Directing occlusal force along tooth long axis even without opposing tooth present
- Decreasing torque on abutment
- Preventing hyperocclusion of rest

Important Fact #10

Rest Seats Reduce Torque

During rotation Direct retainers = Levers
The Rest determines the type of lever

Important Fact #11

Levers Cause Torque

Clasps as 1st Class Levers

Clasps as 2nd Class Levers
Important Fact #12

**2nd Class Levers**

Reduce **Torque**

During rotation **Indirect** retainers = “Anti-levers”

Indirect Retention

As the denture base lifts away from tissue, an opposing rest seats against tooth

The effectiveness of indirect retention decreases as the distance from the axis of rotation decreases.

Important Fact #13

**Indirect Retention** Reduces **Torque**

**O-R-A-C-G-U-B-T**

A partial denture design system

**Occlusal analysis**

**Rotation analysis**

**Abutment selection**

**Clasp selection**

**Guide plane survey**

**Undercut survey**

**Bracing survey**

**Tripodization**
Occlusal Analysis

1. Plane Correction?
2. Extrusion Potential?
3. Overbite Problem?
4. Spaces Selected for PD?

Plane correction?
- ✓ same arch
- ✓ opposing arch
- ✓ retromolar pad
- ✓ radiograph

Overbite problem?
Anterior overbite may result in Incisal Guidance
Steele’s Facing solution

Rotation Analysis

1. Spaces to be restored by the partial?
2. Size of those spaces?
3. Support of those spaces?

Kennedy Classification
1. Bilateral Distal Extension (+/- Mods)
2. Unilateral Distal Extension (+/- Mods)
3. Unilateral Tooth Borne (+/- Mods)
4. Bilateral Tooth Borne (No Mods, X Midline)
ABUTMENT SELECTION

1. As many guide planes as possible
2. As far apart as possible
3. Symmetry where possible
4. No incisors
5. No lone-standing premolars as 1st abut.
6. No lone canine/molar if prox. contact poss.
7. Extrusion prevention
8. Indirect retention
9. Esthetics OK if design OK

1. As many guide planes as possible...exposed proximal surfaces
2. As far apart as possible
3. Symmetry where possible
4. No incisors
5. No lone-standing premolars as 1st abut.
6. No lone canine/molar if prox. contact poss.
7. Extrusion prevention
8. Indirect retention
9. Esthetics OK if design OK

1. As many guide planes as possible...exposed proximal surfaces
2. As far apart as possible
3. Symmetry where possible
4. No incisors
5. No lone-standing premolars as 1st abut.
6. No lone canine/molar if prox. contact poss.
7. Extrusion prevention
8. Indirect retention
9. Esthetics OK if design OK

1. As many guide planes as possible
2. As far apart as possible...for stability
3. Symmetry where possible
4. No incisors
5. No lone-standing premolars as 1st abut.
6. No lone canine/molar if prox. contact poss.
7. Extrusion prevention
8. Indirect retention
9. Esthetics OK if design OK

1. As many guide planes as possible
2. As far apart as possible...for comfort
3. Symmetry where possible...for comfort
4. No incisors
5. No lone-standing premolars as 1st abut.
6. No lone canine/molar if prox. contact poss.
7. Extrusion prevention
8. Indirect retention
9. Esthetics OK if design OK

1. As many guide planes as possible
2. As far apart as possible
3. Symmetry where possible
4. No incisors
5. No lone-standing premolars as 1st abut.
6. No lone canine/molar if prox. contact poss.
7. Extrusion prevention
8. Indirect retention
9. Esthetics OK if design OK

1. As many guide planes as possible
2. As far apart as possible
3. Symmetry where possible
4. No incisors
5. No lone-standing premolars as 1st abut.
6. No lone canine/molar if prox. contact poss.
7. Extrusion prevention
8. Indirect retention
9. Esthetics OK if design OK
1. As many guide planes as possible
2. As far apart as possible
3. Symmetry where possible
4. No incisors
5. No lone-standing premolars as 1º
6. No lone canine/molar if prox. contact poss.
7. Extrusion prevention
8. Indirect retention
9. Esthetics OK if design OK…evaluate “high smile line”

**CLASP SELECTION**

1. Type I vs. Type II Clasps
2. Rotating vs. Non-rotating Partialss
3. Class I vs. Class II Levers

**Non-rotating PD vs. Rotating PD**

- Moves occluso-gingivally
- Does not cause torque
- Uses simplest clasp
- Moves antero-posteriorly
- Causes torque
- Must protect all abutments

**Non-rotating Partial:**

- C = clasp of choice
- 2nd choice = any

**Rotating Partial:**

- RPI = clasp of choice
- 2nd choice = Combo

**Class I vs. Class II Levers**

**Rotating Clasps in Function:**

- Biting vs. Lifting
- 36 psi vs. gravity
● C: DO REST MB TIP
Protects tooth at ridge's expense by "disengaging" from tooth

● RPI: MO REST MidB TIP
Protects tooth at ridge's expense by "disengaging" from tooth

● RPA Combo*: MO REST MB TIP
Protects tooth at its own expense by flexing

*Wire clasp is up to 3 times more flexible than a cast clasp

● BAR: MO REST DB TIP
Protects tooth by having less contact than a C BAR MO REST DB TIP

* Cast clasp is up to 3 times less flexible than a wire clasp

Protects only by using a Class II lever

1st Choice: has potential to disengage from tooth

2nd Choice: if wire, is more flexible than a cast clasp

3rd Choice: is smaller than C, so reduces force on tooth

4th Choice: if cast, is less flexible than a wire clasp & is larger than a bar clasp
RPI vs RPA (Combo)

RPI: Breaks contact but uses ridge as fulcrum.
RPA: Remains in contact but wire absorbs stress.

**CLASP SELECTION**

1. Non-rotating? C = Clasp of Choice
   2nd Choice = any
2. Rotating? RPI = Clasp of Choice
   2nd Choice = Combo
3. Lever? 2nd Class Lever

**Non-rotating vs. Rotating PD**

- Moves occluso-gingivally
- Does not cause torque
- "C" is simplest, but any may be used if "C" cannot

- Moves antero-posteriorly
- Causes torque
- Must protect all abutments @ ridge's expense... RPI @ clasp's expense... Combo w/ 2nd class lever

**GUIDE PLANE SURVEY**

1. Proximal Surfaces
2. Occlusal 1/3rd
3. Disk Parallel to Path

**Design Priorities**

#1: Protect Bone if teeth strong
#2: Protect Teeth if bone strong
#3: If Teeth weak, treat as DE w/ RPI
#4: If Bone weak, treat as DE w/ Combo
**Important Fact #14**

Guide Planes Reduce Torque

**UNDERCUT SURVEY**

1. Facial or Lingual Surfaces (+/− tissue)
2. Gingival 1/3rd
3. Dimple Flat Surface → .01 (.02 → .03)
4. Disk Non-parallel to lower Type I clasp
5. Disk Parallel to lower Type II clasp

**Clasp Location**

To reduce rotational or tipping forces, place clasps as gingivally as possible

**Creating an Undercut**

To create a .01 undercut, dimple a flat area by .01
To create a .02 undercut, dimple a .01 undercut by .01
To create a .03 undercut, dimple a .02 undercut by .01
Lowering a Clasp or Decreasing Bulge

- Disk Non-Parallel to lower a Type I clasp
- Disk Parallel to lower a Type II clasp

Type I vs Type II

Lowering a Type I Clasp – Disk Non-Parallel

Lowering a Type II Clasp – Disk Parallel

If a bulbous tooth creates a tissue undercut that cannot be eliminated by changing the tilt, the tooth may need enamoplasty.

Disk Parallel for a Type II clasp w/ a straight bur

Disk Non-Parallel for a Type I clasp w/ a tapered bur

3 Bracing Types:

BRACING ARM

May torque the tooth

BRACING SURVEY

1. Arm, Blanket or 2 Minor connector (more than 180° around circumference)
2. Gingival 1/3rd
3. Disk Non-parallel to Lower Ht. of Contour
BRACING MINOR CONNECTORS

Reduce torque – with less metal contact

Bracer should be directly opposite Retainer

Teeth may be tilted or plastied to lower the height of contour.

Disk non-parallel to path to lower the height of contour.

Partial by the Numbers

1. Guide Planes: as ___ as possible
2. Clasps: as ____ * as possible as ____ as possible as ____ as possible
3. Rests: as ____ as possible
4. Major connectors: as ____ as possible

* Ant's Rule

References


Tripodization

1. On 3 sides of cast
2. Records A/P & Lateral Tilts
3. Must be included in Crowned abutments