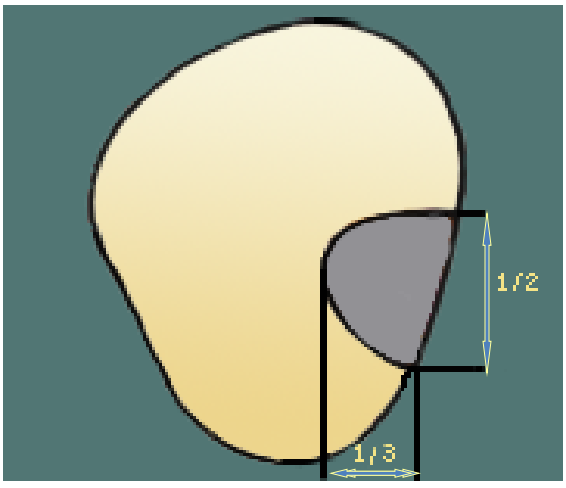
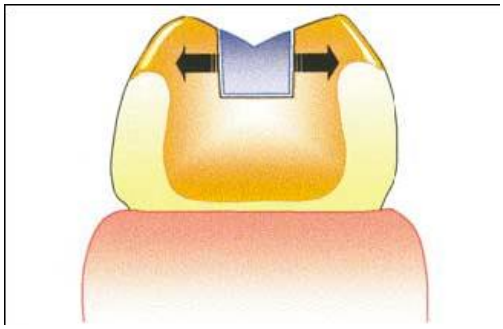
Tooth Preparation for RPD and Direct, indirect retainers

March, 4, 2015

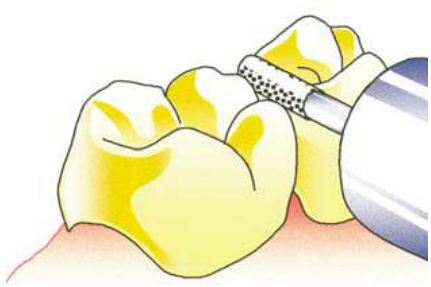
Occlusal Rest (Occlusal View)

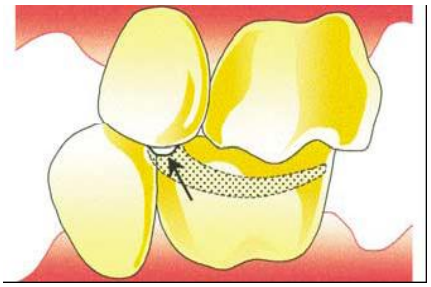




The use of a box-shaped rest seat may result in the rest applying damaging horizontal loads on the abutment tooth. These rest seats should be restricted to tooth-supported dentures where the periodontal health of the abutment teeth is good.

The rest should be at least 1 mm thick for adequate strength. To check that sufficient enamel has been removed during rest seat preparation, the patient should be asked to occlude on a strip of softened pink wax. The thickness of wax in the region of the rest seat will indicate if adequate clearance has been achieved.





Where a clasp is to extend buccally from an occlusal rest and there is no space occlusally for it, the preparation must extend as a channel onto the buccal surface of the tooth. In some circumstances it may also be necessary to reduce and recontour the cusp of the tooth in the opposing arch.

Anterior Rests

Types of anterior rests

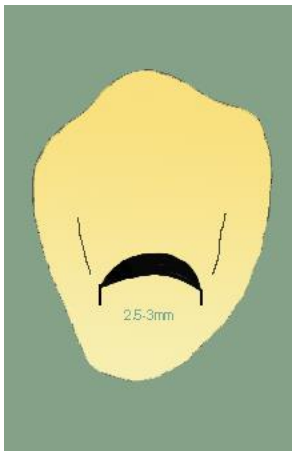
1- **Lingual or Cingulum Rests**

a-Inverted V Cingulum Rest
b-Cingulum Ledge
c-Cingulum Ball Rest

2- Incisal Rests:

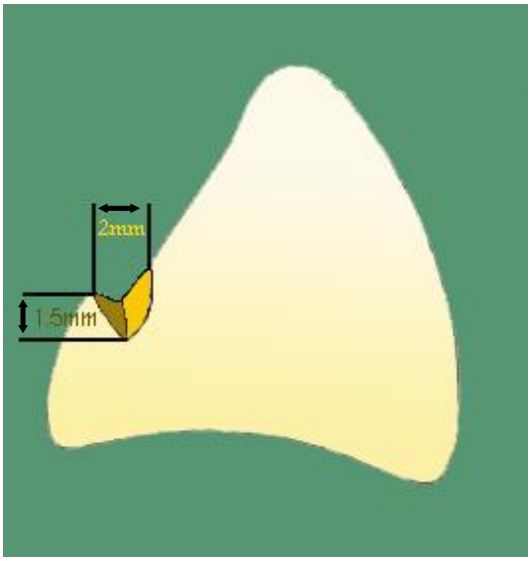
a. **Incisal hook**
b. **Incisal ledge**

Inverted V (Lingual View)



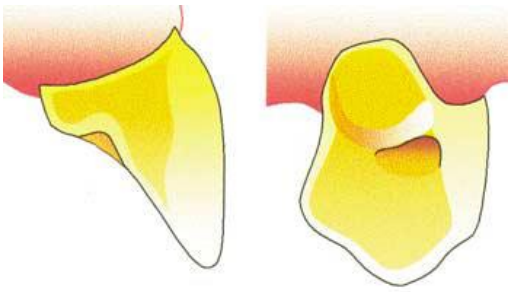
Mainly for upper canines > lower canines > upper incisors > lower incisors
Provide better aesthetics and stress transfer than incisal rests

Inverted*V* (Proximal View)

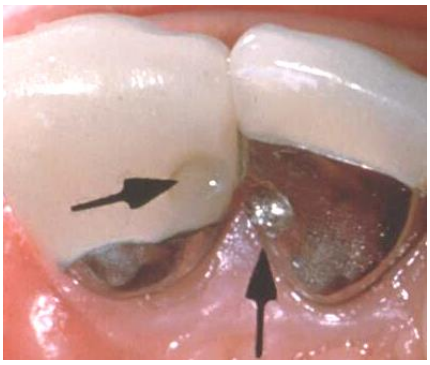


The floor of the seat is inclined labiogingivally and provides definite stop

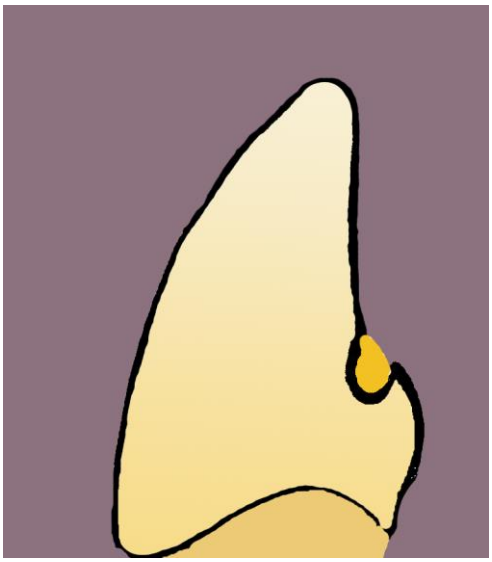
Cingulum Ledge



Cingulum Ball Rest



Cingulum Ball Rest (Proximal view)

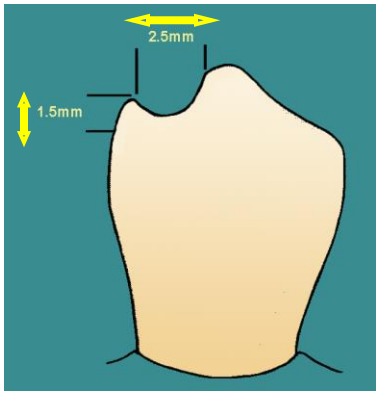


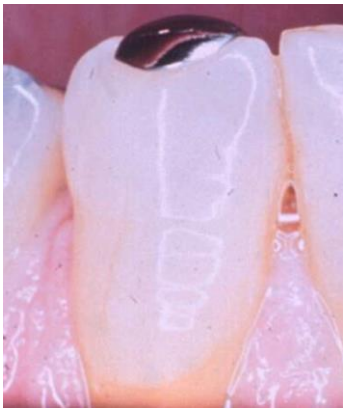
Indications for Lingual or Cingulum Rest

- **The Cingulum is prominent.**
- **The patient practices good oral hygiene.**
- **Low caries index.**

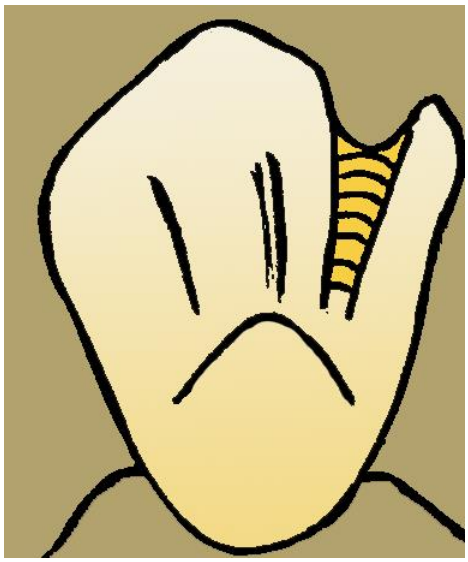
Incisal Rests

Incisal Rest (Labial View)



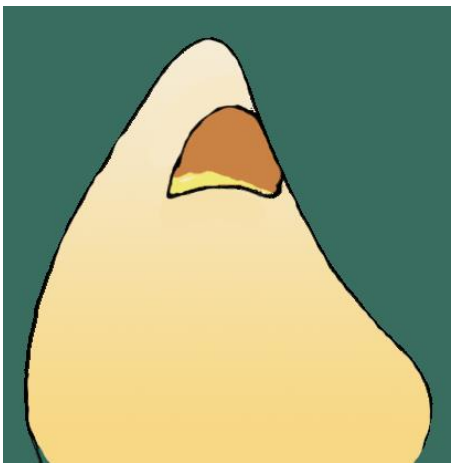


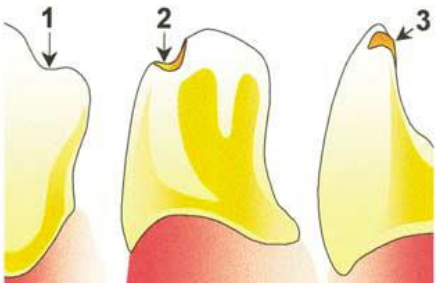
Incisal Rest (Lingual View)



The lingual surface is prepared to have a shallow depression to accommodate the minor connector

Incisal Rest (Proximal View)





Indications of Incisal Rests

- **Tooth morphology does not permit other designs.**
- **When the incisal edge is completely lost, the incisal rest can restore the lost contour.**

Direct Retainers

The Direct Retainer

It is that component of a removable partial denture that is used to retain and prevent dislodgment, consisting of a clasp assembly or a precision attachment

Retention

That quality inherent in the prostheses which resists the force of gravity, the adhesiveness of food and the forces associated with the opening of the jaws.

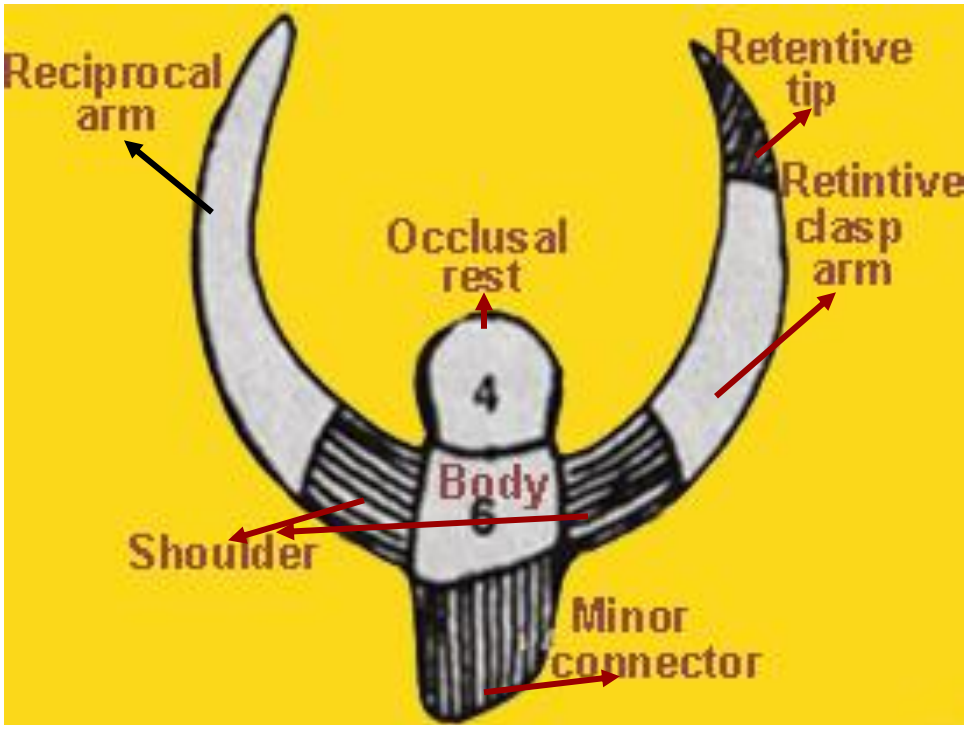
Direct Retention

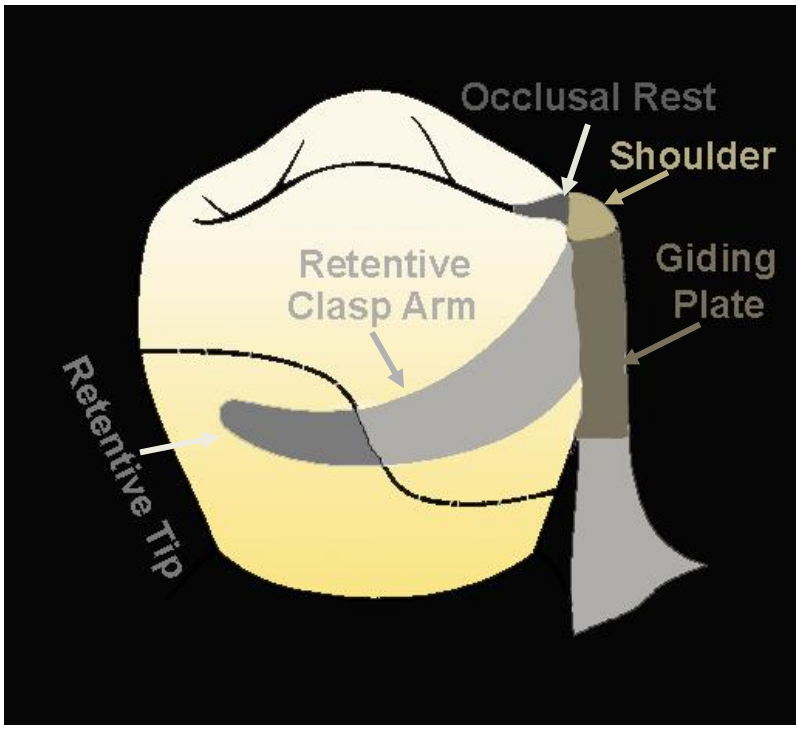
Retention obtained in a removable partial denture by the use of clasps or attachments which resist the removal from the abutment teeth.

Indirect Retention

Retention obtained in a removable partial dentures through the use of indirect retainers.

clasp assemblies





Principles of Clasp Design

Occlusal rest should be designed to prevent tissue-ward movement. The retentive arm of occlusally approaching clasp should not approach closer than 1 mm to the gingival margin

- **Each retentive terminal should be opposed by reciprocal component. The reciprocal elements should be placed at the height of contour and the retentive elements below the height of contour.**
- **Balanced retention: Where there are clasps on opposite sides of the arch, the retentive arms are best placed on opposing tooth surfaces, ie buccal/buccal or lingual/lingual**
- **Only the minimum amount of retention should be used.**

Functional requirements of the clasp

- **Retention**
- **Stability**
- **Support**
- **Reciprocation**
- **Encirclement**
- **Passivity**

Retention

The most important function of the clasp, provided by the retentive tip.

*** Factors affecting retention:**

1- Depth of the undercut.

a- Buccolingual width: Determines the clasp alloy (more flexible alloys for deeper undercuts: 0.25 Co/Cr, 0.5 and 0.75 Gold and wrought).

b- Occlusogingival height: Determines the length of the clasp and thus its flexibility.

c- Mesiodistal depth: Determines the length of the retentive tip

2- Cross-sectional form of the clasp: Round clasps are flexible in all directions as opposed to half round (round clasps are preferred for distal extensions)

3- The approach of the clasp: Gingivally-approaching clasps provide better retention.

4- Cross-sectional dimension of the clasp: Inversely proportional with flexibility

5- Uniformly tapered clasp are more flexible than non-tapered clasps.

6- Curvature of the claps: A clasp curved in more than one plane has reduced flexibility.

Stability

The quality of a denture to be firm, steady, or constant, to resist displacement by horizontal functional stresses.

Provided by the reciprocal element, the shoulder of an occlusally approaching clasp and the vertically oriented minor connector.

Support

The resistance to the movement of the denture in a gingival direction

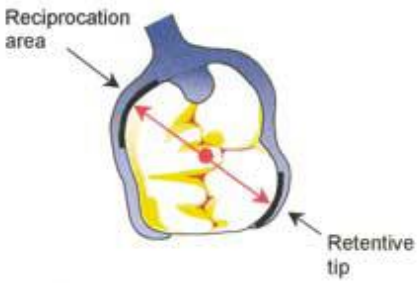
Provided by the rest part of the clasp assembly.

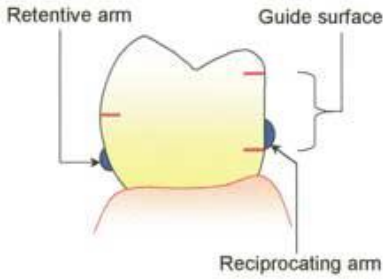
The shoulder and the minor connector might contribute to support to a much lesser extent.

Reciprocation

The means by which one part of a prosthesis is made to counter the effect created by another part.

- Reciprocation should be provided on clasped tooth diametrically opposite the retentive clasp tip. If a reciprocating clasp is used it should be placed at the gingival end of a guide surface on the clasped tooth. Where a plate connector is used, reciprocation can be obtained by a guide plate on the connector





Encirclement

The clasp must encircle more than 180 º of the abutment tooth. It can be either continuous (circumferential clasps) or broken contact (infrabulge clasps). This property prevents movement of the tooth away from the clasp assembly.

Infrabulge clasps must contact the tooth at 3 widely separated areas that encompass more than half of the tooth circumference.

Passivity

The quality of or condition of inactivity or rest assumed by the teeth , tissues, and denture when the RPD is fully seated (not under masticatory pressure). RPD should not exert any tipping movement on abutments.

Incomplete seating of the prostheses results in the retentive tip of the clasp applying harmful forces on teeth.

Types of Clasps

- **Occlusally approaching clasps (suprabulge clasps)**
- **Gingivally approaching clasps (infrabulge clasps)**

Occlusally – approaching clasps

Advantages

Easiest clasp to make and repair.

- **Less food retention.**
- **Best to be applied in tooth supported RPD.**
- **Drives excellent support, bracing and retention.**

Disadvantages

- **Covers a large tooth surface area.**
- **Difficult to adjust with pliers.**
- **Should never be used to engage the mesiobuccal undercut in distal extension RPD.**

Types of Occlusally approaching clasps

1-Simple circlet clasp.

2-Multiple circlet clasp.

3-Embrasure clasp

4-Ring clasp

5-Fishhook or hairpin or reverse action clasp

6- Combination clasp

7-Back-Action clasp.

A retentive tip of occlusally-approaching clasps should be at least 15 mm in length, and engages an undercut of no more than 0.25 mm if it is constructed in cast Co/Cr . Therefore, should be restricted to molars. A retentive clasp engaging a 0.5 mm undercut should be constructed in wrought wire. This should be at least 7 mm in length and hence suitable for premolars

- If an undercut on a tooth is less than 0.25 mm, then composite resin should be added to the tooth to create at least this amount of undercut

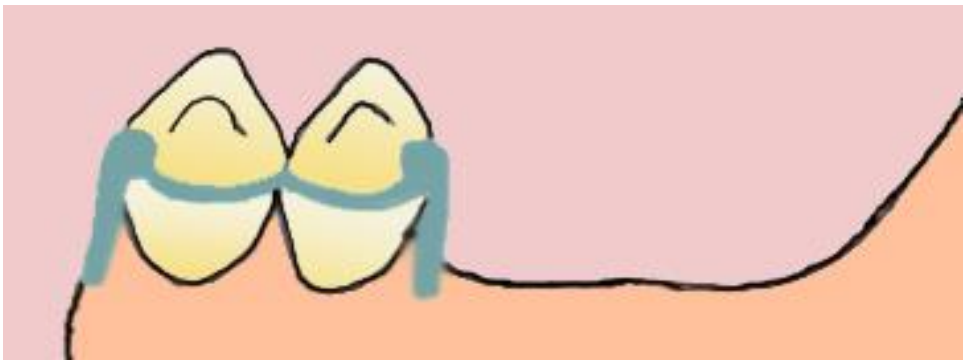
Simple circlet clasp

- Best for tooth supported RPD

- It approaches the undercut from the edentulous space and from the occlusal direction

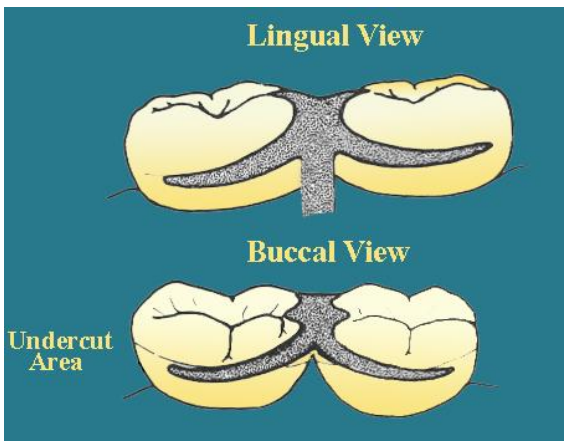
- Retentive arm should run from the side of the tooth with the least undercut to the side with the greatest undercut

Multiple circlet clasp



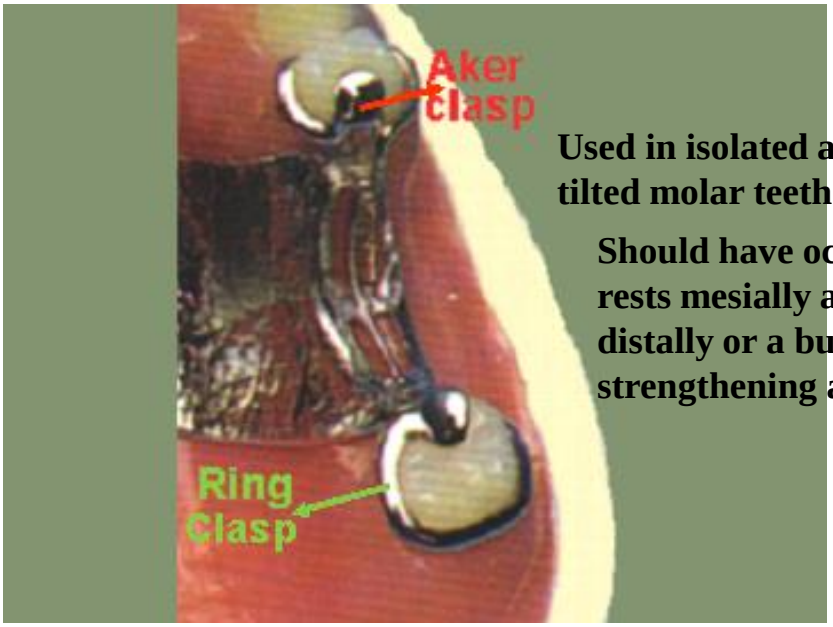
Used when the principal abutment has poor periodontal support.

Embrasure clasp (Double Aker's)



Used at the side of the arch where there is no edentulous space

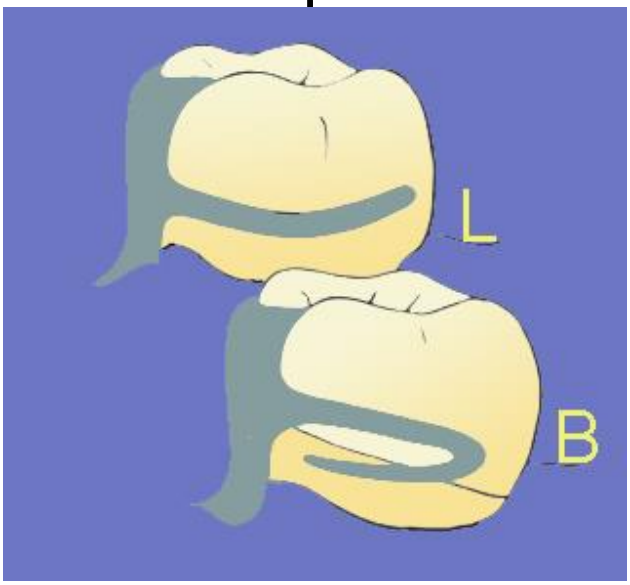
Ring clasp

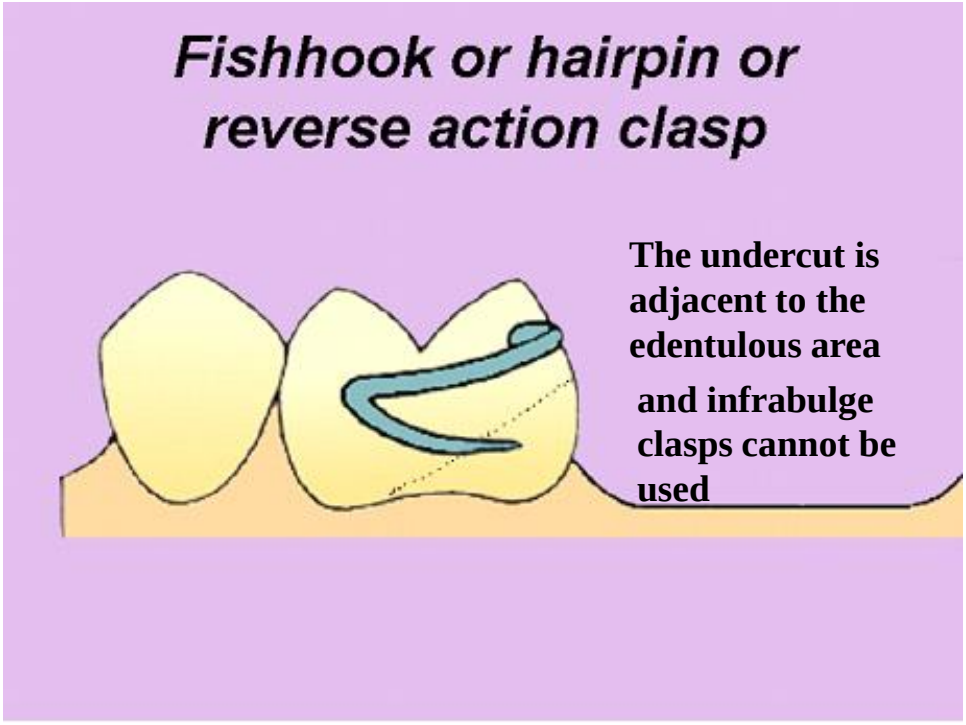


Used in isolated and tilted molar teeth

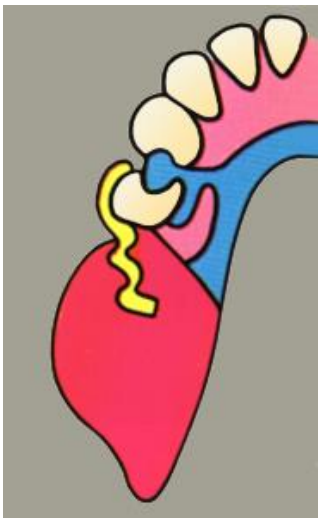
Should have occlusal rests mesially and distally or a buccal strengthening arm

Fishhook or hairpin or reverse action clasp





Combination clasp



*** Consist of a rest seat, a cast reciprocal arm and a wrought wire retentive arm (provides more flexibility)**

***Severe undercut**

***Maxillary Canines for aesthetics.**

Back-Action clasp

- A modification of a ring clasp but the minor connector is attached to the end of the clasp arm and the occlusal rest is left unsupported

- Lacks sufficient support and not commonly used

Gingivally approaching clasps

Gingivally approaching clasps

Approach the undercut gingivally and have a push type of retention.

Parts of Gingivally approaching clasps

All components of the clasp assembly are similar to those of suprabulge clasps except for the retentive arm which is comprised of:

1- Approach arm

2- Retentive terminal

Approach arm

It is a minor connector that connect the retentive tip to the denture base. It crosses the gingival margin at right angle and it is the only flexible minor connector.

Retentive terminal

It should end on the surface of the tooth below the undercut.

Gingivally approaching clasps

Advantages	Disadvantages
- Easy to insert and difficult to remove.	- Tend to collect food debris
- More aesthetic.	- Increased flexibility but reduced bracing and stability.

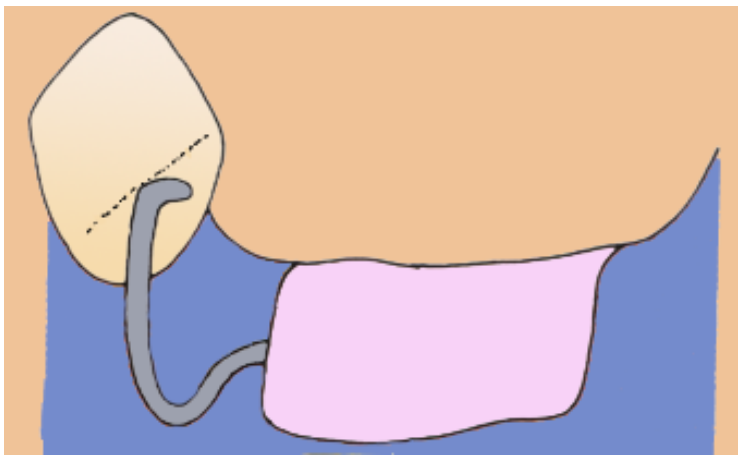
Types of Infrabulge Clasps

- **T Clasp.**
- **Modified T Clasp.**
- **Y Clasp.**
- **I Clasp.**

T Clasp

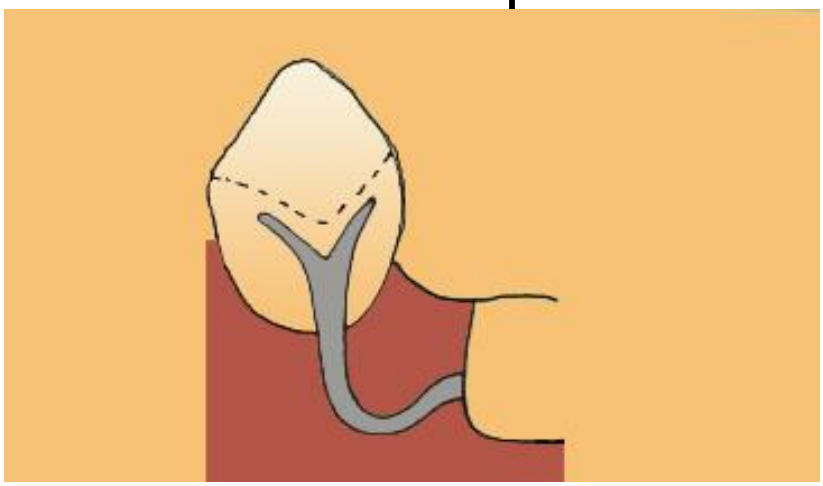
Used for Class I and II when the retentive undercut is next to the ridge. One end provides retention and the other improves bracing

Modified T Clasp



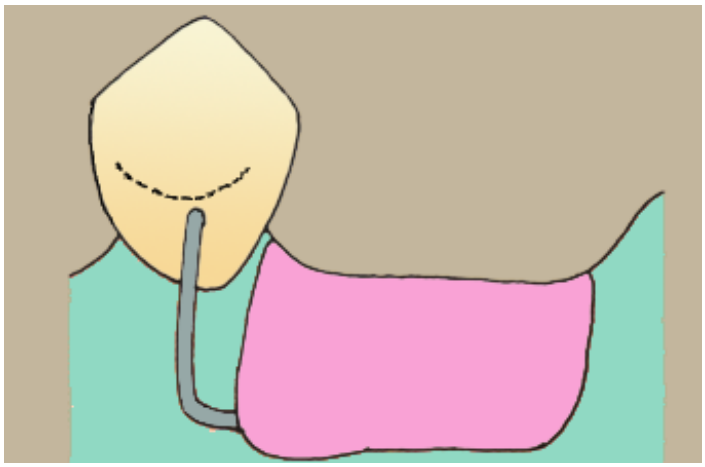
Similar to T-clasp but lacks the non-retentive arm. Has better aesthetics and best for premolars and canines

Y Clasp

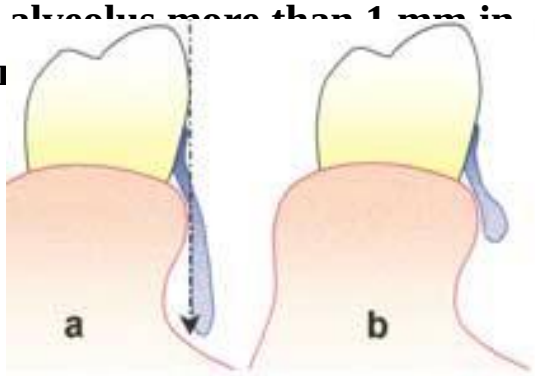


Similar to T-clasp but slightly different morphology

I Clasp



- **A gingivally-approaching clasp is contraindicated if the buccal sulcus is less than 4 mm in depth**
- **Gingivally-approaching clasps are contraindicated if there is a tissue undercut buccally on the alveolus more than 1 mm in depth within 3 r**

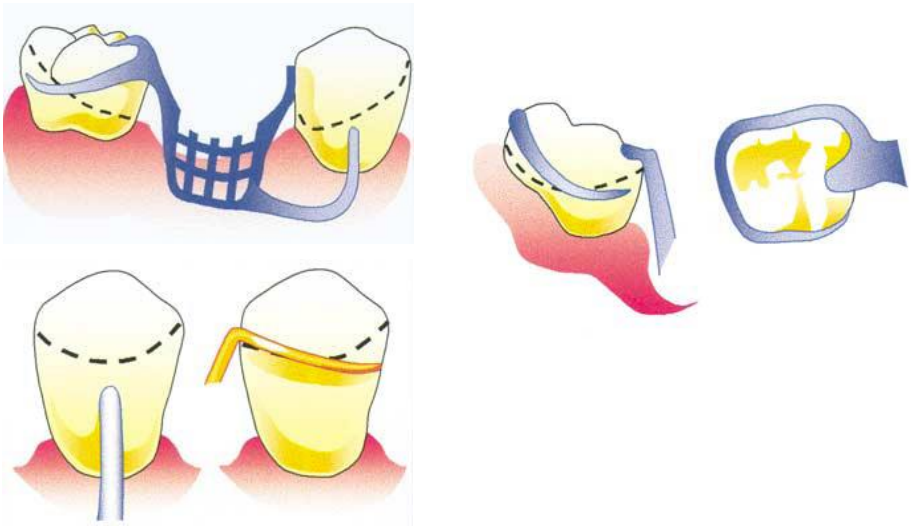


- **A gingivally-approaching clasp should be used if a retentive cast cobalt chromium clasp is required on a premolar or canine tooth.**
- **A distal extension saddle should have a retentive I-bar clasp whose tip contacts the most prominent part of the buccal surface of the abutment tooth mesiodistally. The RPI system (Rest, Plate, I-bar clasp), in this case, should be used if the tooth and buccal sulcus anatomy are favourable**
- **If a cast gingivally approaching I-bar cannot be used for these cases, a wrought wire occlusally-approaching clasp might be used.**

Factors affecting the choice of clasps

- **Position of the undercut.**
- **Health of the periodontal ligament.**
- **Shape of the sulcus.**
- **Length of clasp.**
- **Appearance.**
- **Occlusion.**

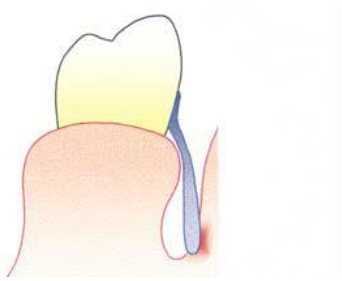
Position of retentive undercut



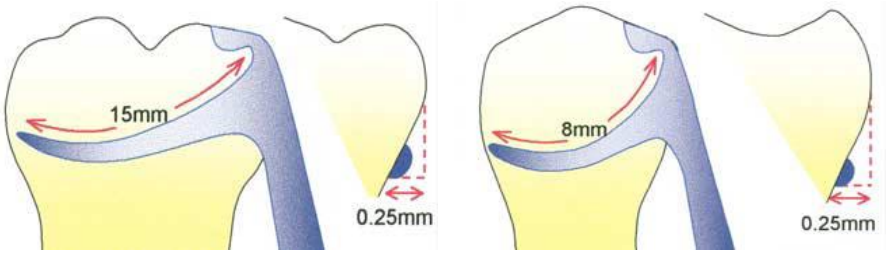
The health of periodontal ligament

Further damage will occur on this canine if a relatively inflexible retentive clasp system, such as a cast cobalt chromium occlusally approaching clasp, is provided. A possible solution is to prescribe a more flexible gingivally approaching clasp. However, this option should be used with caution if the gingival recession is associated with root caries in which case a wrought wire occlusally approaching clasp might be more suitable.

The shape of the sulcus



The length of the clasp



A Co/Cr clasp arm, approximately l5 mm long, should be placed in a horizontal undercut of 0.25 mm. If the undercut is less the retention will be inadequate. If it is greater, the clasp arm will be distorted because the proportional limit will be exceeded. A Co/Cr occlusally-approaching clasp engaging the same amount of undercut on a premolar is likely to distort during function because it is too short. In such a situation, a gingivally-approaching clasp is recommended.

- Whether this choice is appropriate depends on certain clinical factors. Alternatively, an alloy with a lower modulus of elasticity but similar proportional limit, such as a platinum–gold–palladium wire, can be used. Another option is to use a material with a higher proportional limit but similar modulus such as wrought stainless steel.

Appearance

Either type of clasp can detract from appearance when placed on a tooth that is toward the front of the mouth. However, the gingivally approaching clasp has more potential for being hidden in the distobuccal aspect of a tooth provided that there is a suitable undercut area for the clasp.

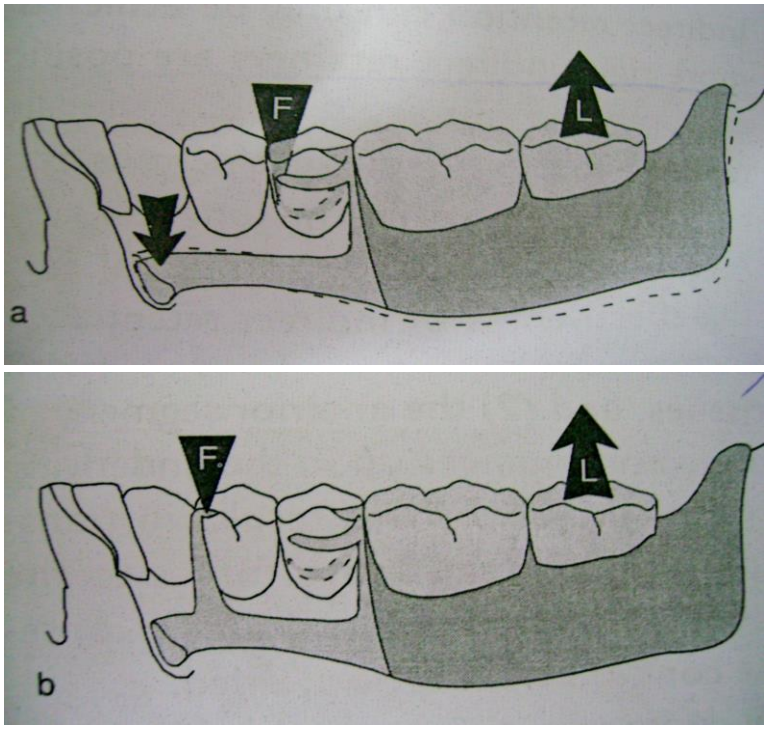
Occlusion

An occlusally approaching clasp must begin, and have two thirds of its length, in the area bounded by the occlusal contacts of the opposing teeth and the survey line on the tooth to be clasped. Provision of an adequate space for the clasp may require tooth preparation. Occlusal contacts, however, have no influence on gingivally approaching clasps.

Indirect Retainers

The Indirect Retainer

A part of an RPD which assists the direct retainers in preventing displacement of distal extension bases



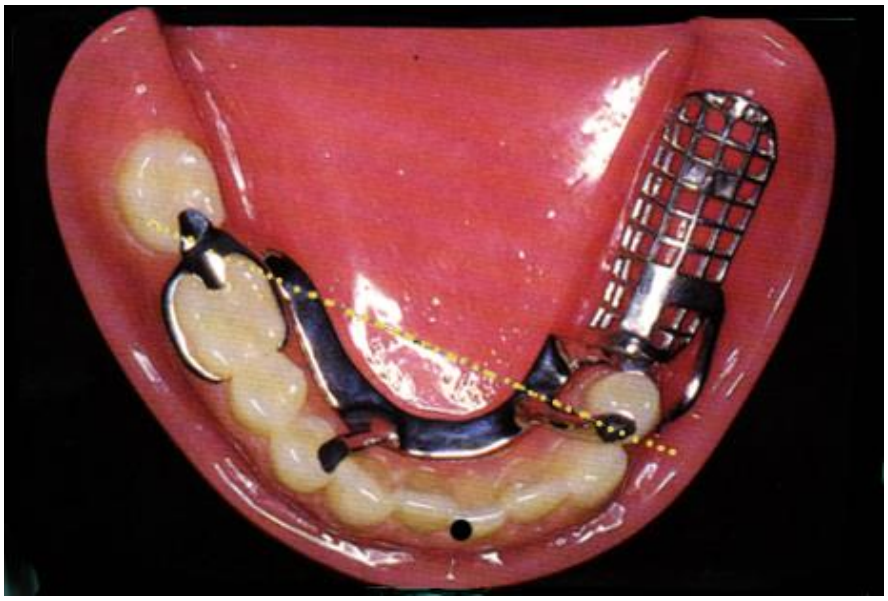
Effectiveness of indirect retainers

- **Location of the fulcrum line.**
- **Distance of the indirect retainers from the fulcrum line (the longer the distance the better the indirect retention)**
- **Rigidity of the connector.**
- **Effectiveness of the supporting tooth (premolars and canines are better than incisors).**

Types of indirect retainers

- **Auxiliary occlusal rest or canine rest.**
- **Canine extension of the occlusal rest.**
- **Continuous bar and lingual plate.**
- **Indirect retention from the major connector**

Auxiliary Occlusal Rest



Canine extension of the Occlusal rest

Indirect retention from the major connector