

# GOLD INLAY CAVITY PREPARATION



# CONTENT

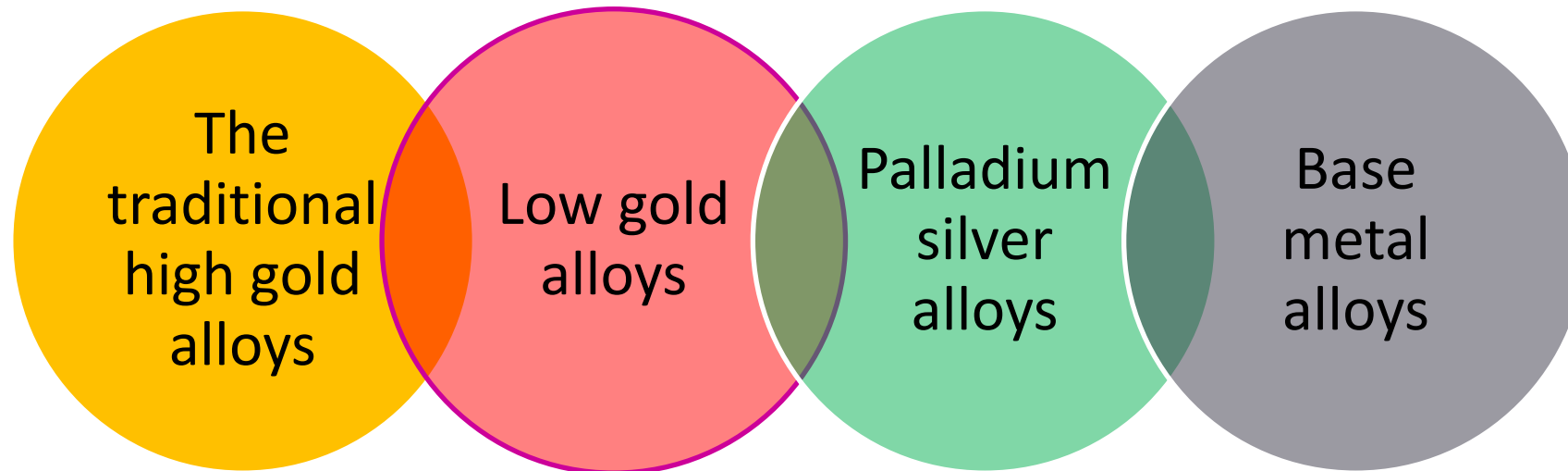
- ❖ Introduction
- ❖ Definition
- ❖ Indication
- ❖ Contraindication
- ❖ Advantages
- ❖ Disadvantages
- ❖ Armamentarium
- ❖ Basic concept of cavity design
- ❖ Principles of cavity preparation
- ❖ Difference between amalgam and inlay preparation
- ❖ Conclusion

# INTRODUCTION

Dr. Philbrook in 1897, was the first to introduce Inlay in dentistry who gave the concept of forming an investment around wax pattern, eliminating the wax, and filling the resultant mold with a gold alloy

In 1907, Taggart changed the practice of restorative dentistry by introducing his technique for cast gold restorations

ACCORDING TO STURDEVANT THERE ARE 4 DISTINCT GROUPS OF ALLOYS



## ACCORDING TO MARZOUK

**Class-I:**  
Gold and platinum group based alloys.

**Class-II:**  
Low gold alloys (gold content < 50%).

**Class-III:**  
Non-gold palladium based alloys.

**Class-IV:**  
Nickel-chromium based alloys.

Castable moldable ceramics

## ACCORDING TO ADA SPECIFICATION NO :5

Type-I (Soft): For restorations subject to very slight stress such as inlays.

Type-II (Medium): For restorations subject to moderate stress such as onlays.

Type-III (Hard): For high-stress situations, including onlays, crowns, thick veneer crowns and short-span fixed partial dentures.

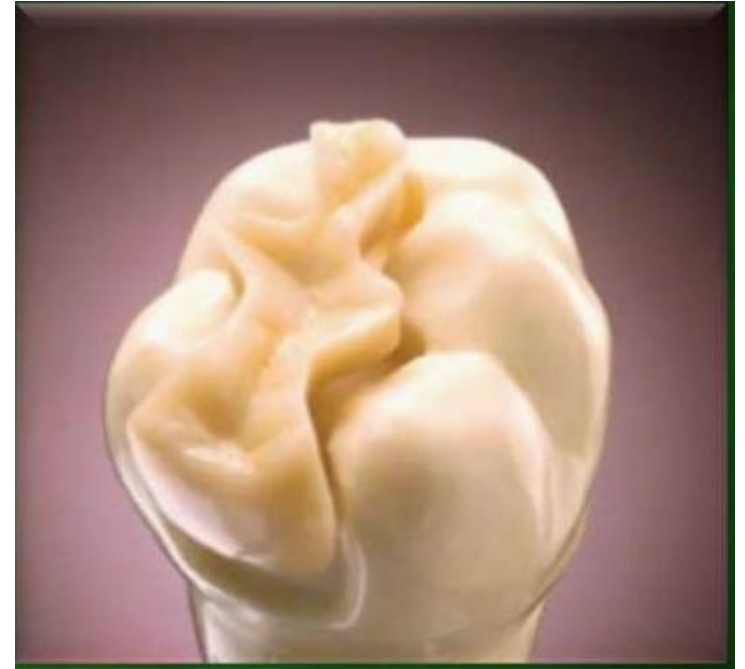
Type-IV (Extra hard): For extremely high stress states, such as endodontic posts and cores, thin veneer crowns, long span fixed partial dentures and removable partial dentures.

## DEFINITION :

An **Inlay** is defined as a restoration which has been constructed out of the mouth from gold, porcelain or other metal and then cemented into the prepared cavity of the tooth

❖ **Class II Inlay** is the intracoronal restoration which involves occlusal or proximal surfaces without involving the cusps

**-Sturdevant**



# INDICATIONS

Large restorations

Endodontically treated teeth

Teeth at risk for fracture

Dental rehabilitation with cast metal alloys

Prosthodontic abutment

Sub gingival lesions

Diastema closure and occlusal plane correction

Wide open contacts

Adjunct to periodontal therapy





Occlusal disharmony

High plaque/caries indices

Dissimilar metals

Small & shallow cavities

Esthetics



# ADVANTAGES



Excellent  
mechanical  
properties.

Low creep &  
corrosion

No tooth  
discoloration.

Control of  
contours &  
contacts

# DISADVANTAGES

Extensive  
tooth  
preparation

Cemented  
restoration,  
discrepancy  
&microleak  
age

Abrasive &  
splitting  
force on  
natural  
teeth

Galvanic  
currents

No. of  
appointments  
, cost and  
technique  
sensitive

# MOUTH PREPARATION PRIOR TO CAST RESTORATION

For a single tooth cast restoration , every precaution must be taken to ensure the longevity of the restoration

- ✓ Control of plaque
- ✓ Control of caries
- ✓ Control of periodontal problems
- ✓ Proper foundation
- ✓ Control of pulpal condition of tooth
- ✓ Occlusal equilibrium
- ✓ Diagnostic wax ups and temporary restorations



### Bur used in cavity preparation:

- Initial occlusal step and proximal extension – No. 271 carbide bur.
- Marginal bevel – given with slender fine grit flame shaped diamond instrument as No. 8862.
- Fine extension up the fissures is accomplished with a slender No. 169L bur.

# PRINCIPLES OF CAVITY DESIGN FOR CAST GOLD RESTORATIONS

# TOOTH PREPARATION FOR CAST GOLD INLAY

## INITIAL TOOTH PREP

Occlusal and Proximal  
Box:  
Outline,  
Retention,  
Resistance,  
Convenience

## FINAL PREP

Removal of Dentinal caries,  
Pulp Protection,  
Prep of Bevels and Flares ;  
Secondary Retentive  
Features;  
Finishing.

# Cavity Design

- Mortise Form (Box Form)
- Occlusally Divergent - 2-5 Deg wall (4-10 Deg Taper)- Single Path of Insertion
- Occlusal force should seat Inlay.





# EXTERNAL OUTLINE FORM

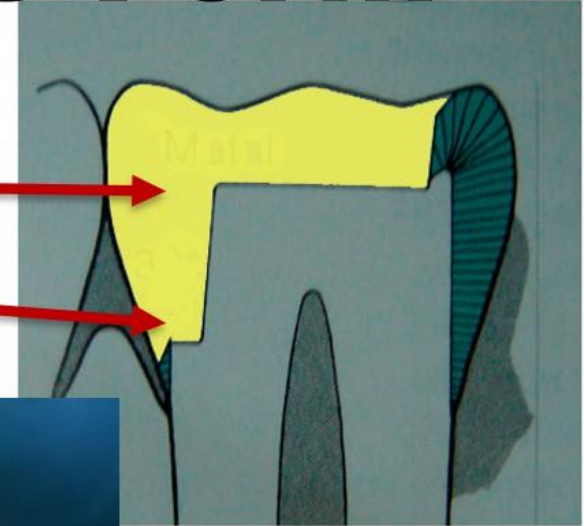
- ❖ Consist of straight lines and smooth following curves, avoiding any sharp angles
- ❖ Cavosurface margin is placed on sound, unbroken tooth tissue to obtain a well fitted casting
- ❖ Placement of bevels make the outline form slightly wider



# Internal Outline Form

Class II Axial Wall Is Tapered.

Line Angles -Should Be Well Defined.

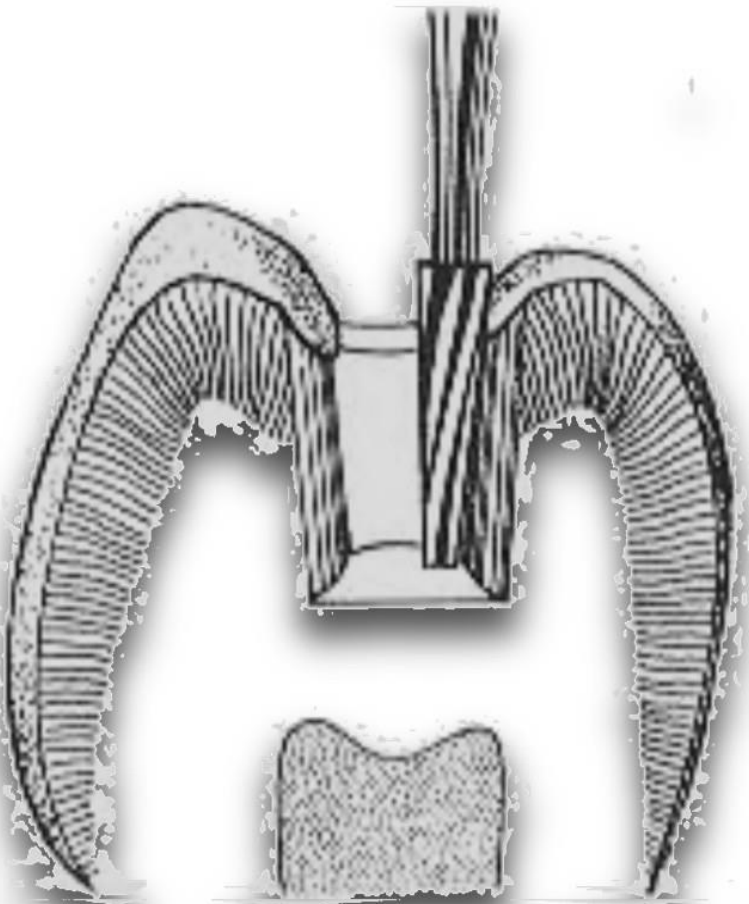
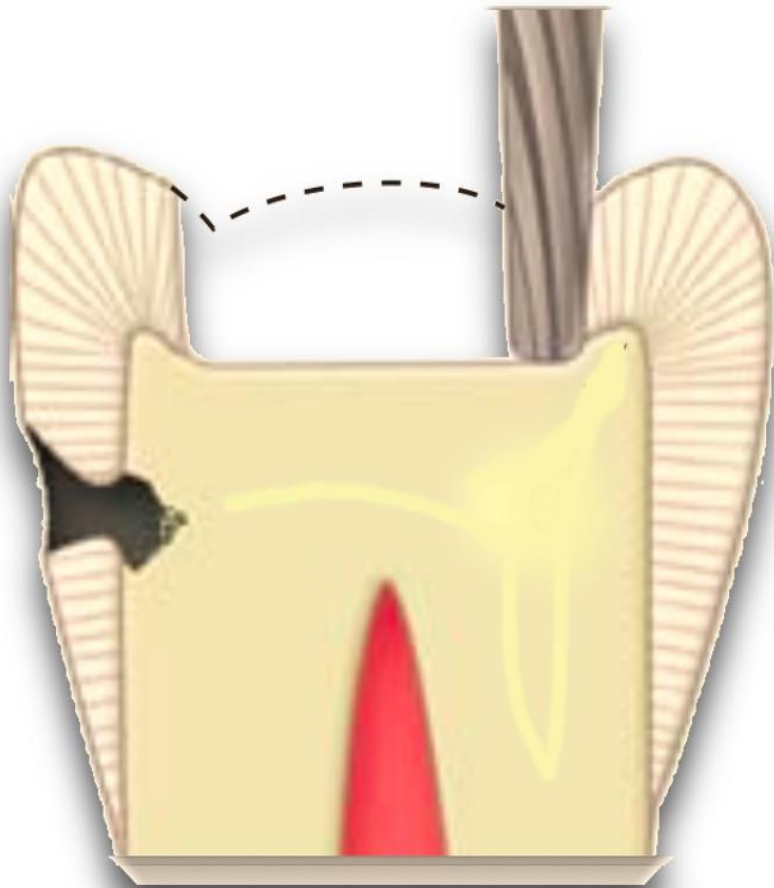


The pulpal floor and axial wall  
– placed in dentin

Care should be taken to  
protect the pulp

**Axio Pulpal Line Angle  
Is Rounded or Bevelled.**

## Occlusal Prep - 271 Bur Held Parallel, 1.5 to 2mm Deep



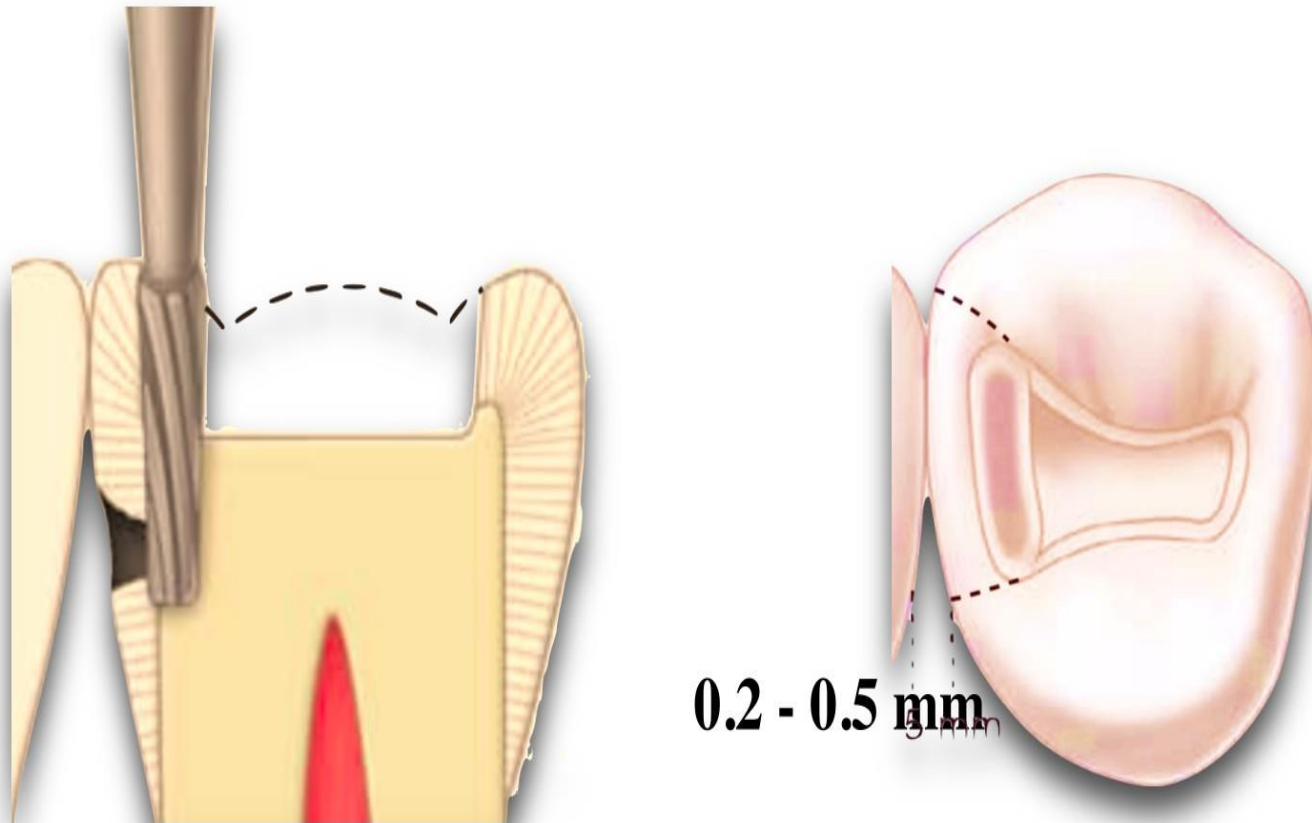
For mandibular molars and premolars , the bur is tilted 5-10 degree lingually to conserve the strength of lingual cusp



## Proximal Ditch Cut (Proximal Depth

**1-1.5mm** from Pulpal Floor)

Axial Depth - **Minimum 0.8mm**



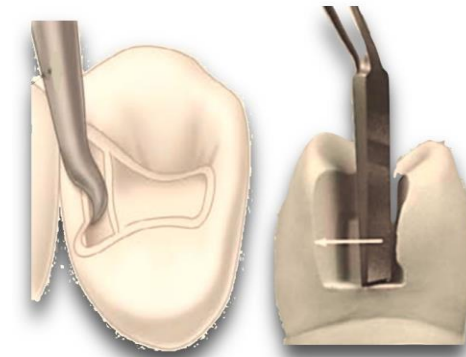
- ✓ Proximal ditch cut is made
- ✓ 0.3 mm of enamel and 0.5mm of dentin is cut since the width of the bur is 0.8mm
- ✓ Gingival seat is kept just below the contact area.
- ✓ In ideal box, the buccal and lingual walls should be perpendicular to proximal surface clearing adjacent tooth by 0.5 mm

Place a cut on the facial and lingual limit –  
Isolate enamel . Establish Primary Flare

Cleave the slice with enamel hatchet

Finish with sharp hand instruments –  
Chisel , Hatchet and GMT

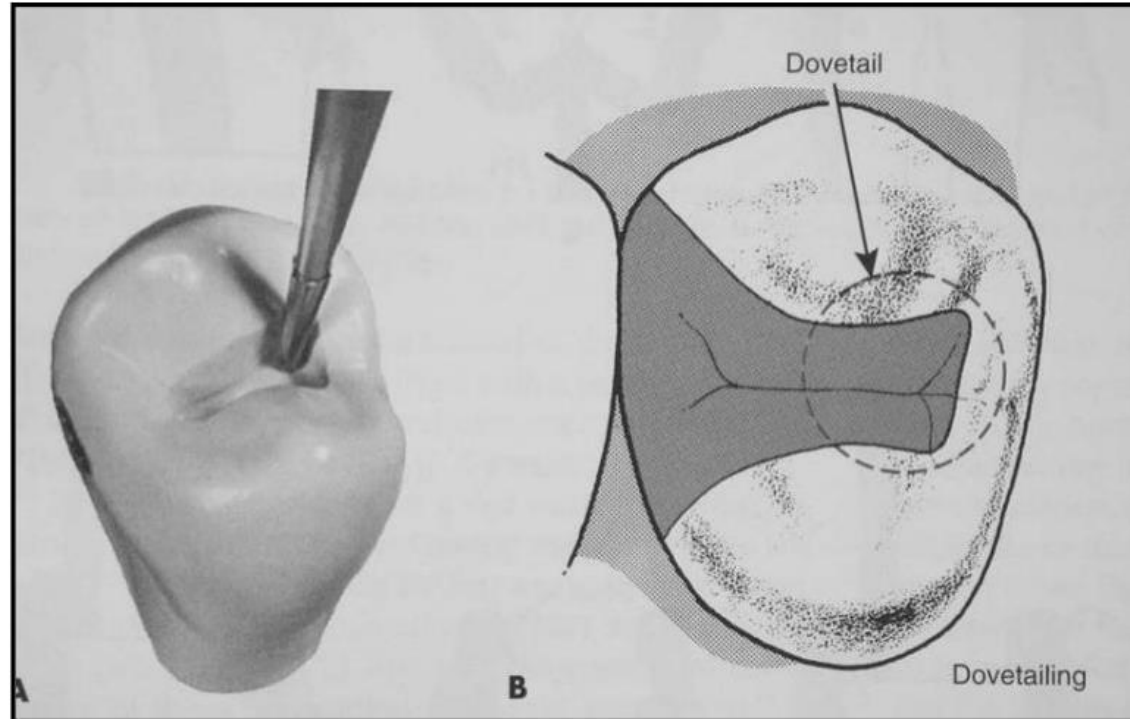
Establish 0.5 mm clearance from adjacent  
tooth. May require Secondary Flare



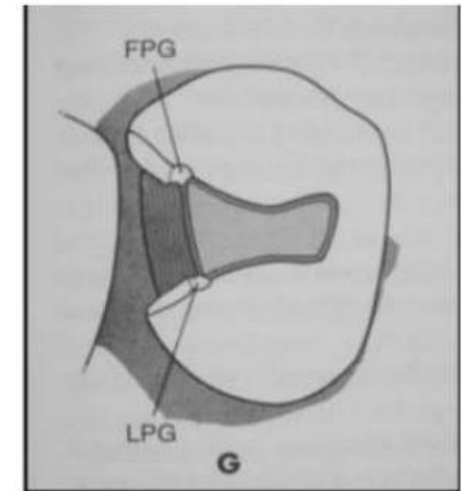
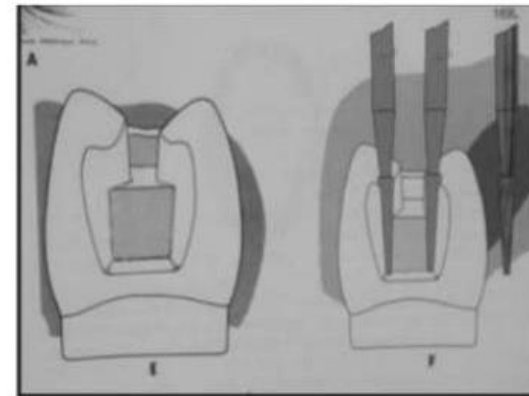
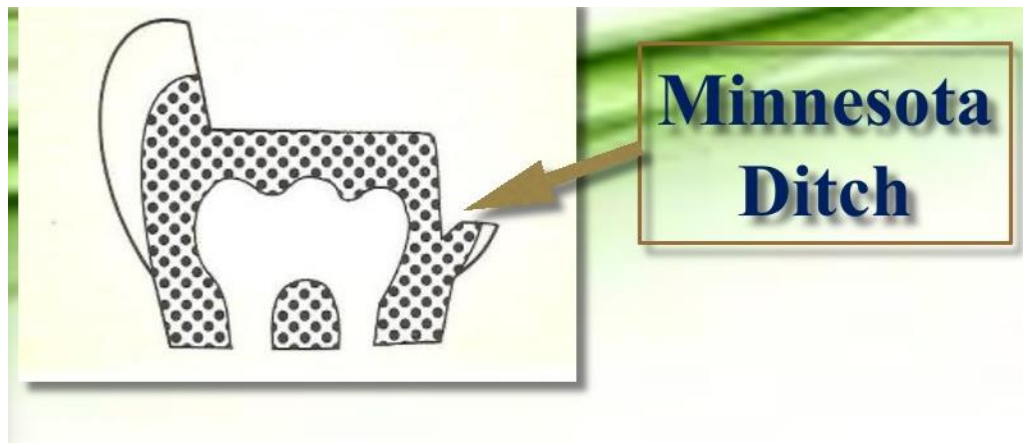


# Features for resistance and retention

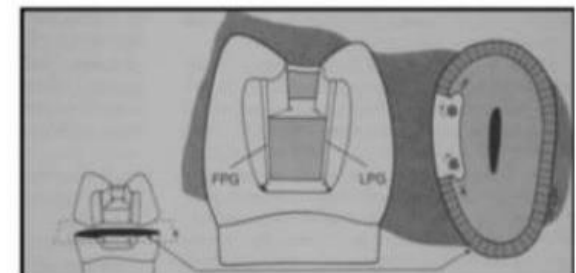
- Axio-pulpal line angle rounded to dissipate stress equally.
- Occlusal dovetail or interlock prevents proximal displacement of restoration.



- If no proper parallelism or no proper depth of cavity is there , then secondary retentive devices like slots and pinholes can be given
- Shallow retentive grooves , 0.3 mm deep , may be given on buccoaxial and linguoaxial line angles. – indicated when preparation is shallow

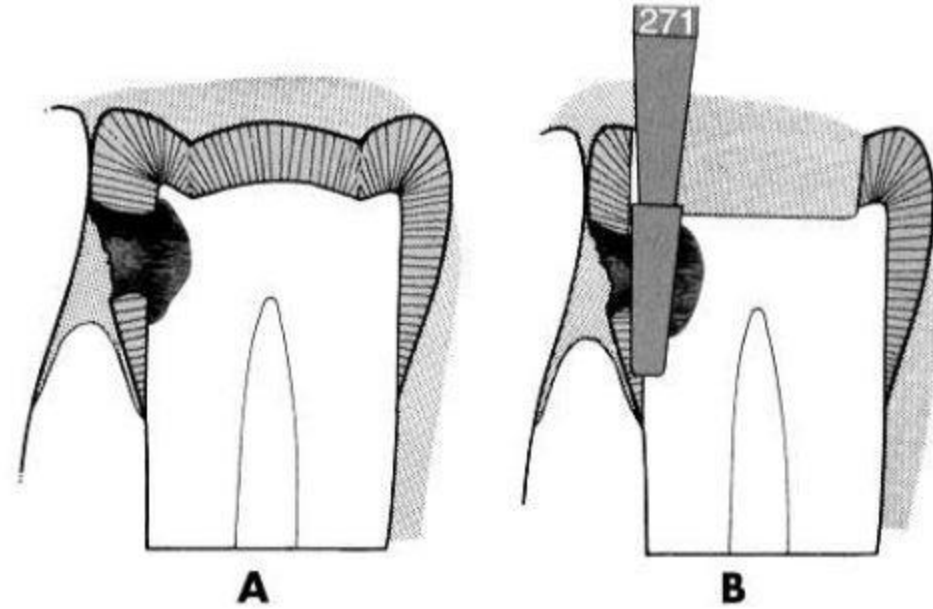


**Preparation of retention grooves(0.3mm)**



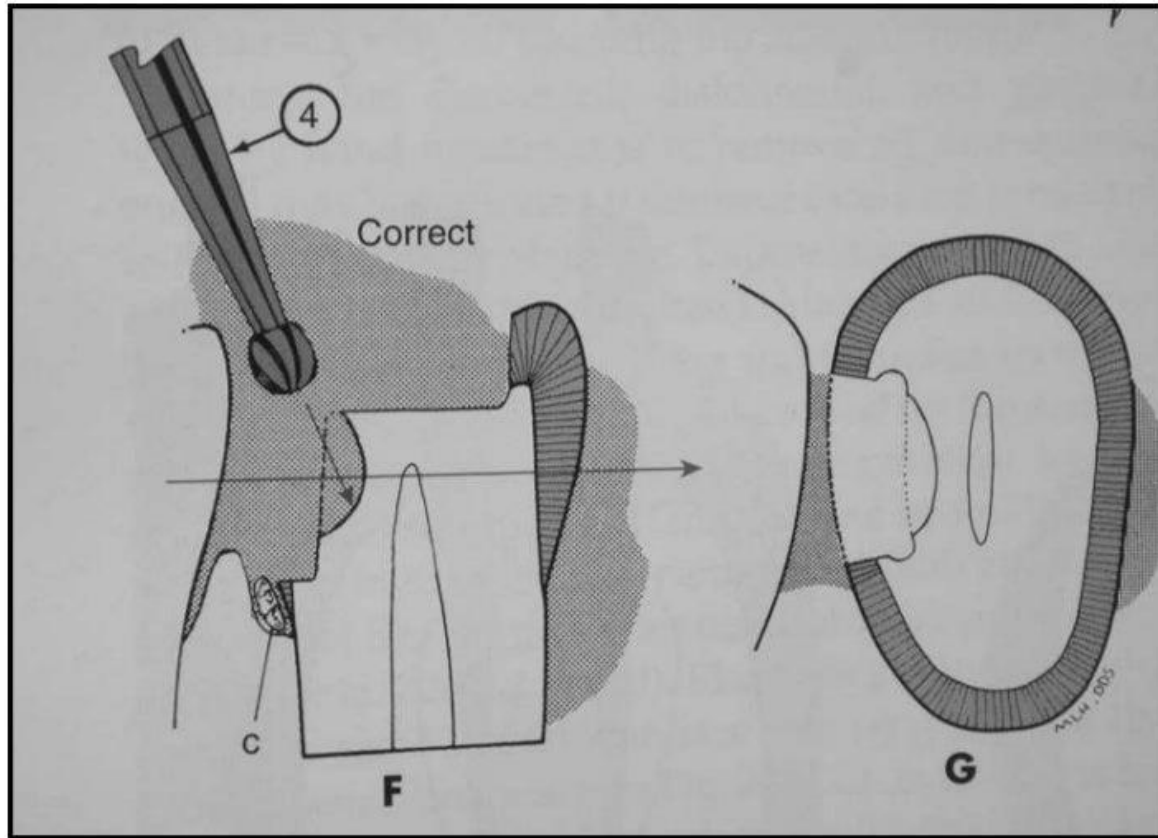
## FINAL PREPARATION

Removal of infected carious dentin and pulp protection

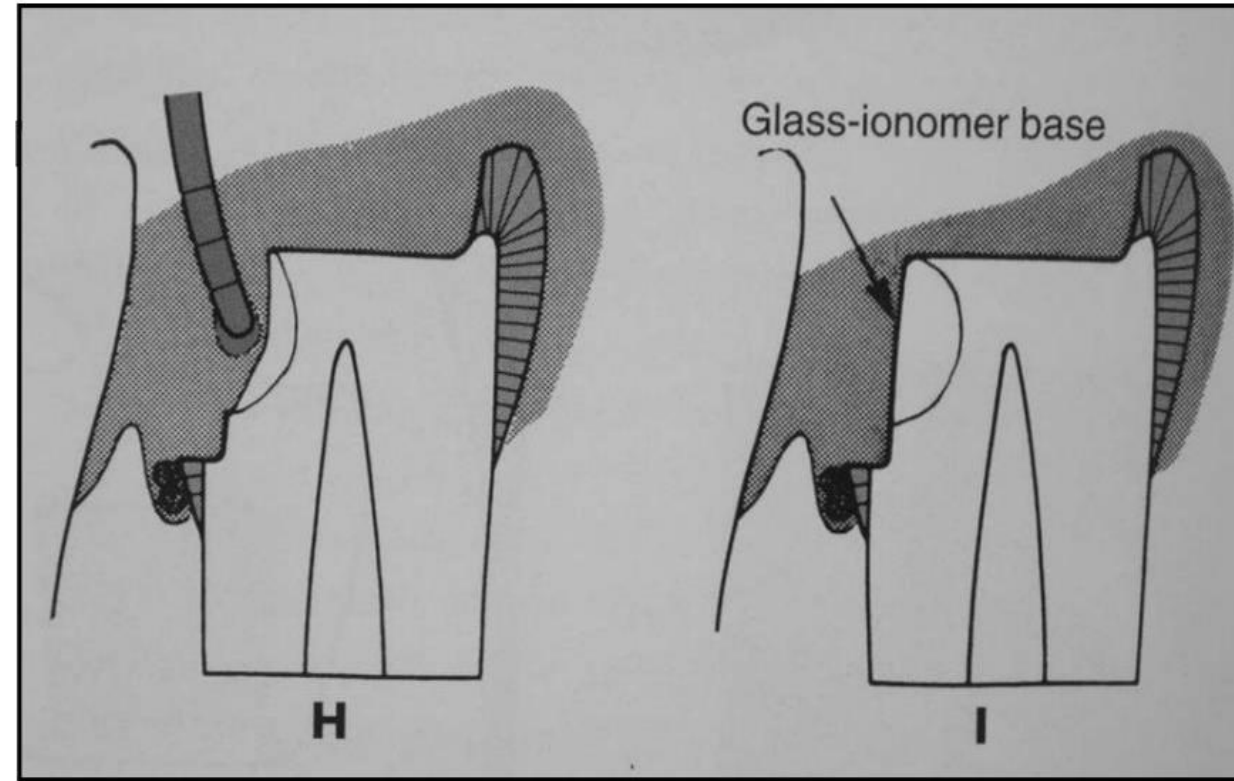


**Extending the proximal ditch gingival to a sound floor**



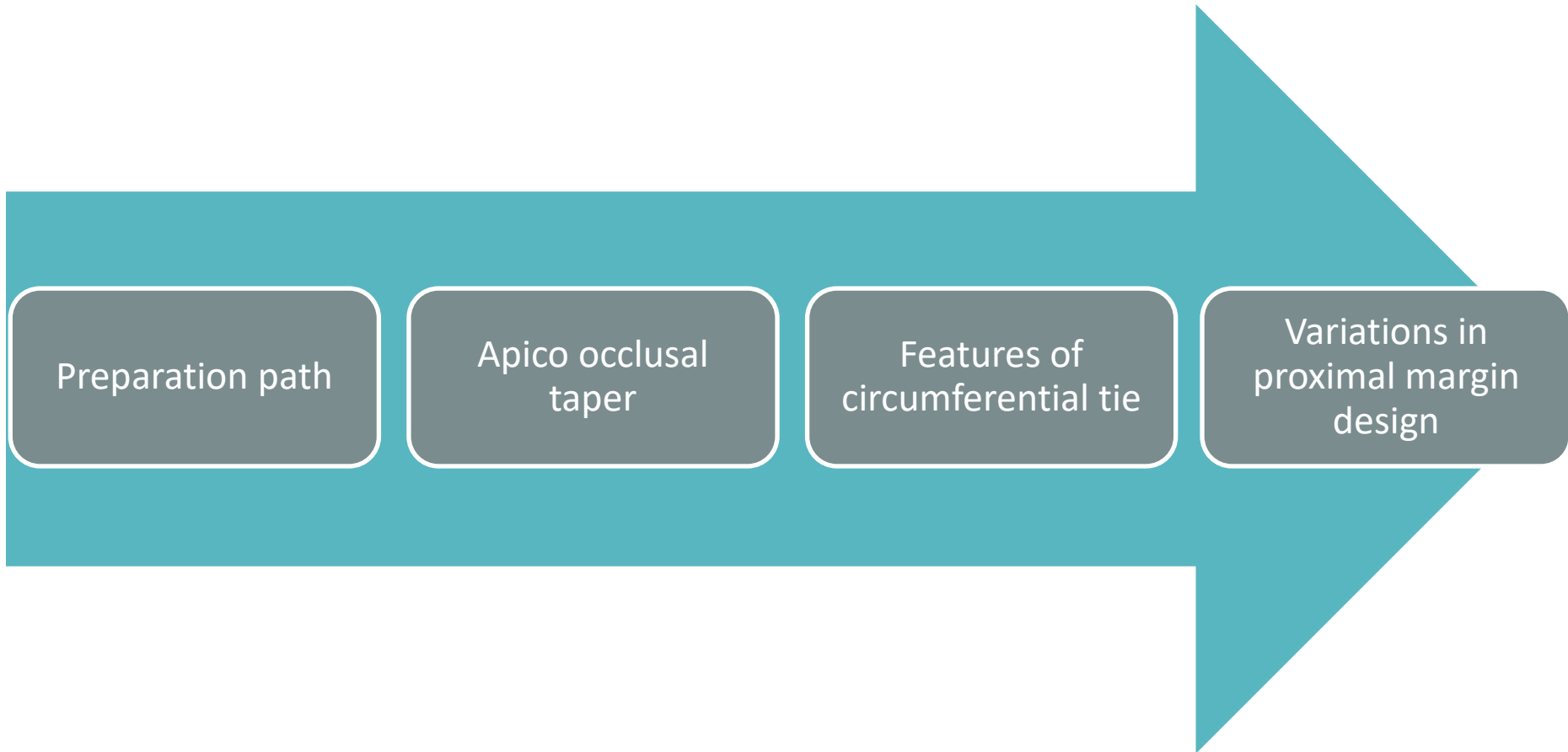


**Removing the remaining infected dentin with  
no. 2 or 4 round bur**



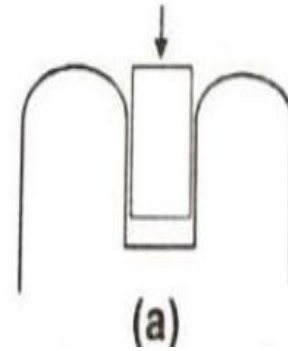
**Insertion of suitable base and completed base.**

Besides applying all the general principles of tooth and cavity preparations, cast restoration preparation should have following features

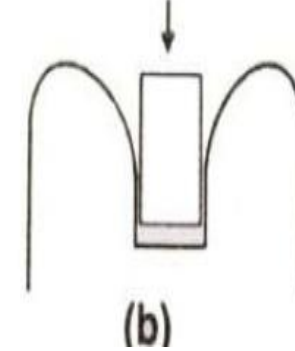


## PREPARATION PATH :

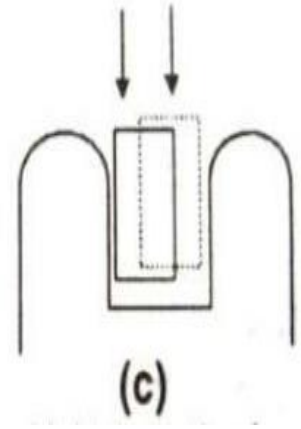
- ❖ The preparation should have a single insertion (draw) path, opposite to the direction of the occlusal loading
- ❖ This path is usually parallel to the long axis of the tooth.
- ❖ So that the completed cavity will have no undercut
- ❖ Helps in retention & decrease micromovements during function



Single path of  
Insertion wall  
Height proper  
And parallel



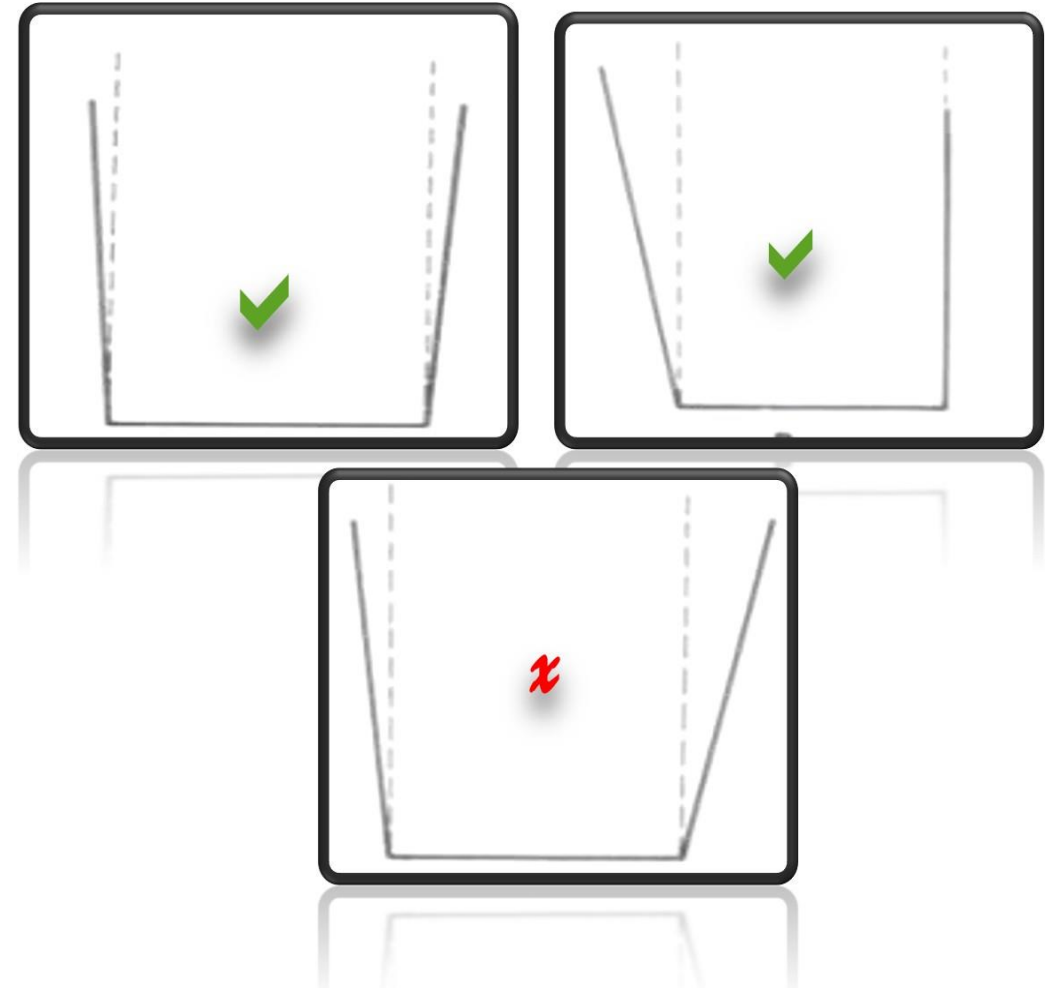
Single path of  
insertion half  
the walls  
parallel



Multiple path  
of insertion , no  
retention even  
if walls parallel

# INLAY TAPER

- ❑ Taper permits an unobstructed removal of wax pattern and seating of the subsequent casting
- ❑ The taper is 2-5 degree from the path of preparation
- ❑ Each wall should make a right angle or slightly obtuse angle with the pulpal floor



# PREPARATION FEATURES OF CIRCUMFERENTIAL TIE

The peripheral marginal anatomy of the preparation is called circumferential tie

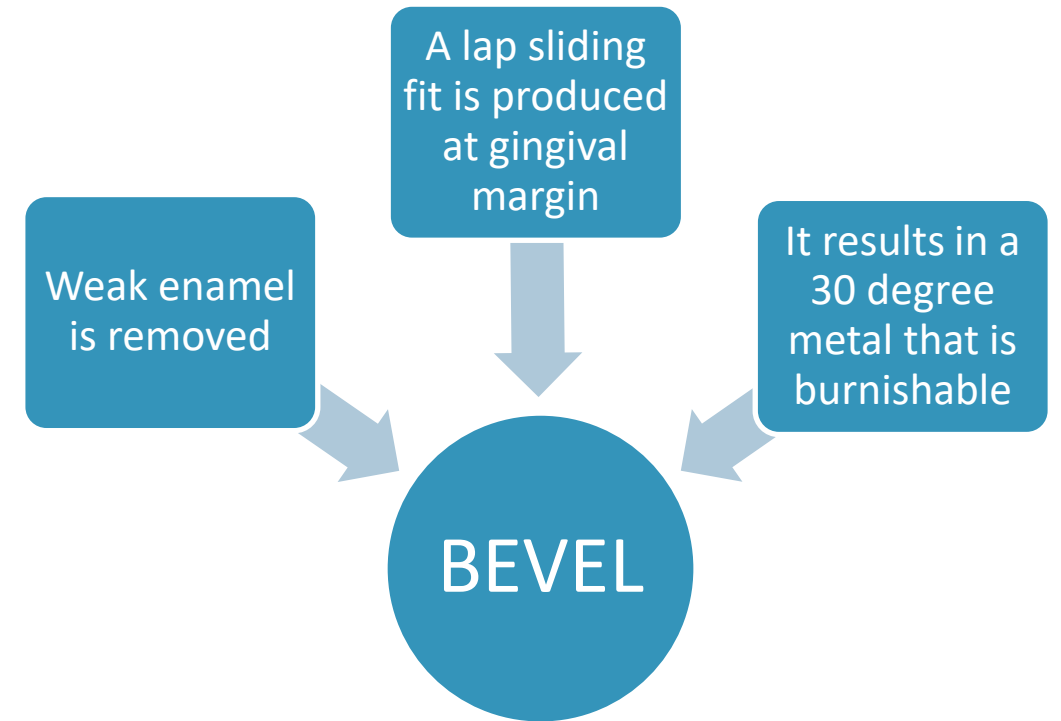
If the margin ends on enamel, enamel wall should fulfil NOY 's principle

- Enamel must be supported by sound dentin.
- Enamel rods forming the cavosurface margin should be continuous with sound dentin.
- Enamel rods forming the cavosurface margin should be covered with the restorative material
- Angular cavosurface angles should be trimmed

# BEVEL

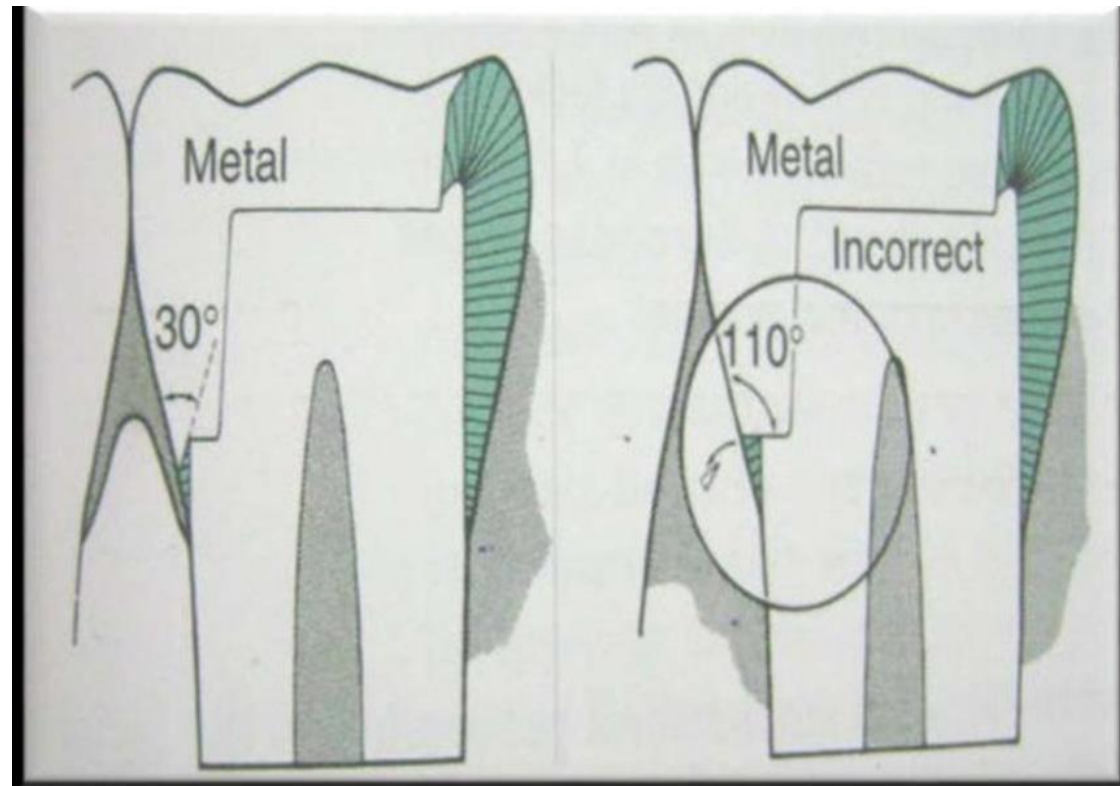
Bevels are the flexible extensions of a cavity preparation, allowing the inclusion of surface defects, supplementary grooves or other areas on the tooth surface.

Beveling of enamel margin serve the following purpose:

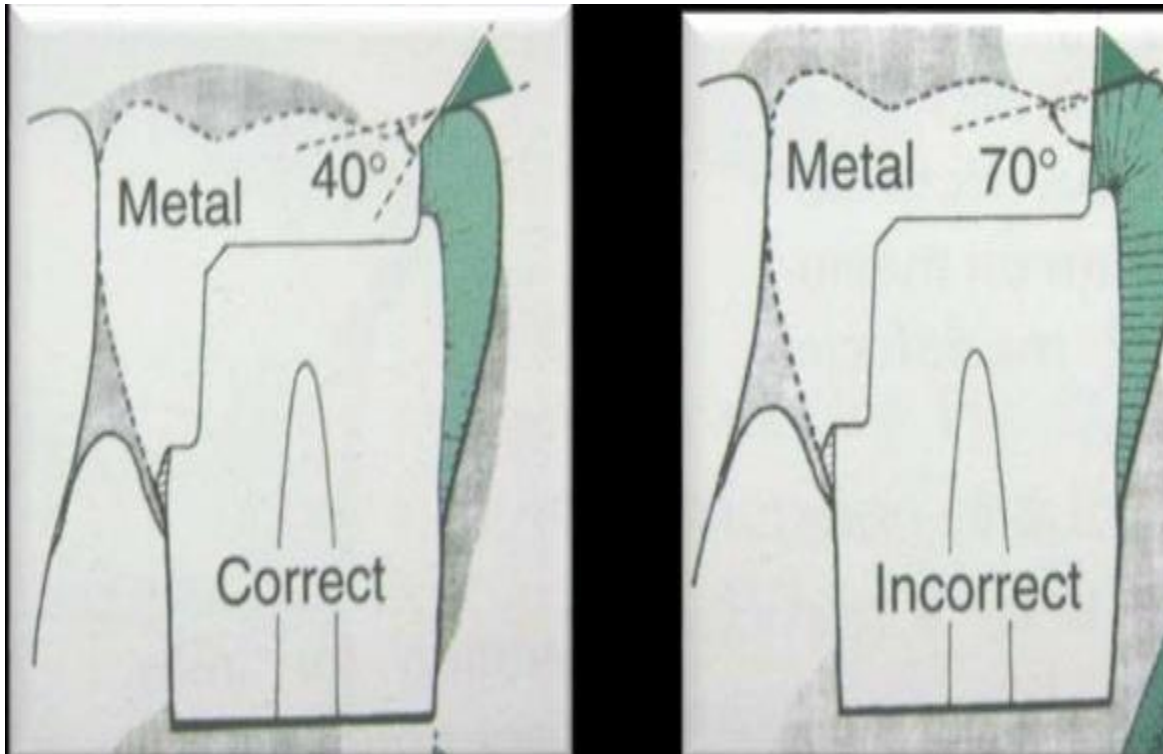


Properly directed gingival bevel resulting in **30 degree marginal metal**

Failing to bevel gingival margin resulting in undermined rods and difficulty in burnishing.



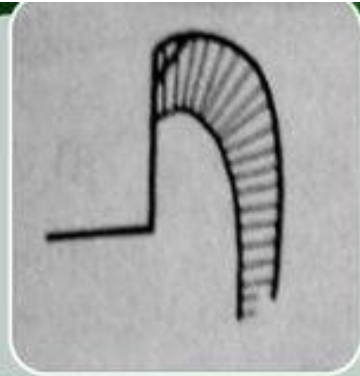




- ❖ Mesial bevel directed correctly to result in 40 degree marginal metal.
- ❖ Unbeveled mesial margin is incorrect because it results both in weak enamel margin and unburnished marginal metal.



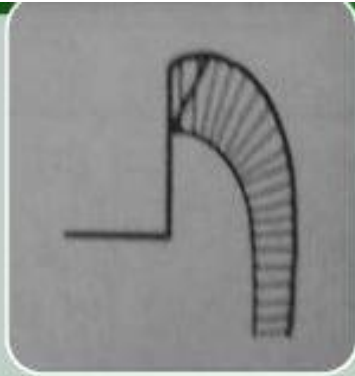
# TYPES OF BEVEL



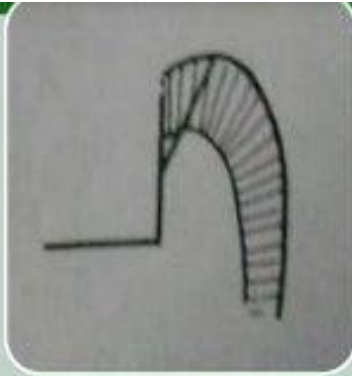
Partial bevel  
Involves the part of the enamel wall, not exceeding 2/3rd of its dimensions.

Not used in cast restorations

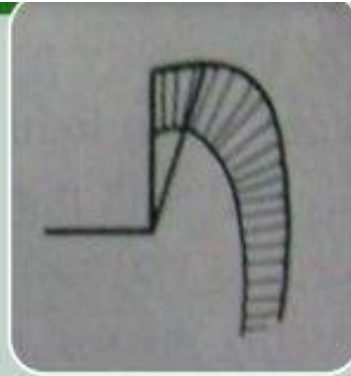
Used to trim weak enamel rods from margin peripheries



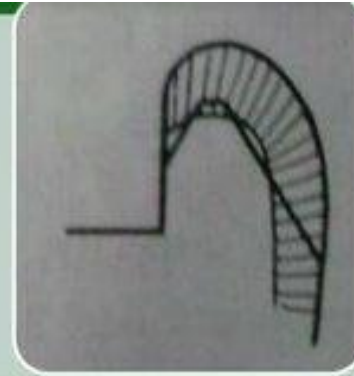
Short bevel  
Includes the entire enamel wall but not dentin



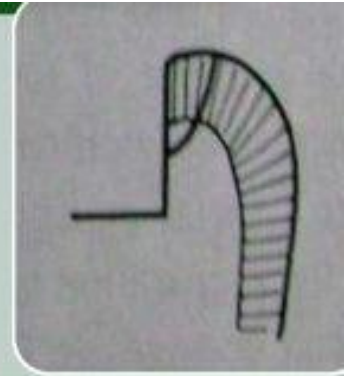
Long bevel  
Includes all of the enamel wall & up to one half of the dentinal wall.  
**Advantage:** preserves the internal boxed up resistance & retention features of the preparation



Full bevel  
Includes all of the dentinal & enamel walls.  
**Disadvantage:** deprives the preparations internal resistance & retention form



Counter bevel  
Given opposite to an axial wall, on the facial or lingual surface with the gingival inclination facially or lingually. Used for the capping of cusps to protect & support them`



Hollow ground (concave) bevel  
Prepared in concave form. It allows more space for cast material bulk

# FLARES

Flares Are The Flat Or Concave Peripheral Portions Of The Facial And Lingual Proximal Walls

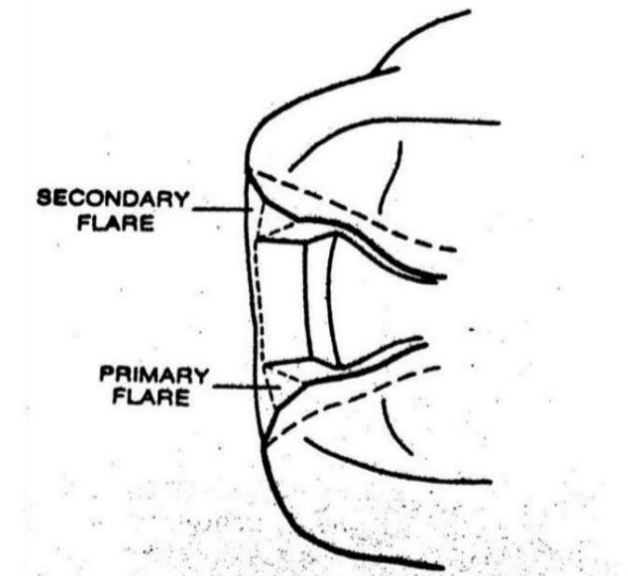
## Two types

1. **Primary flare** – similar to long bevel formed on the facial and lingual wall of proximal box. It has angulation of  $45^\circ$  to inner dentinal wall proper

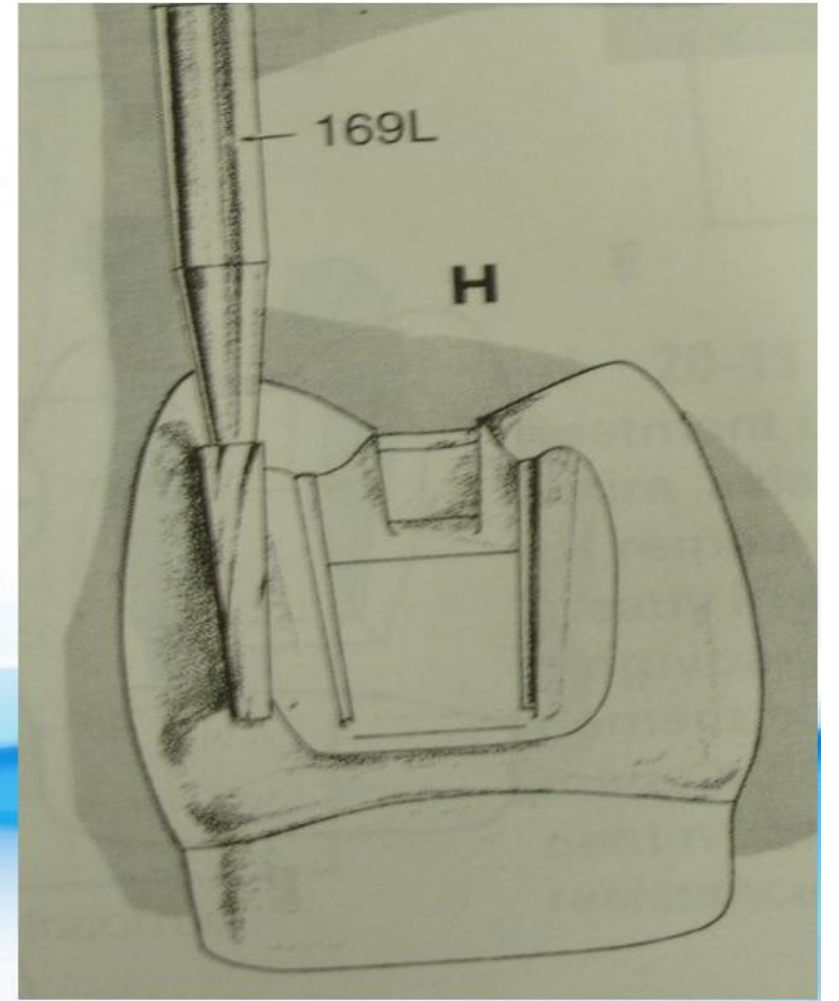
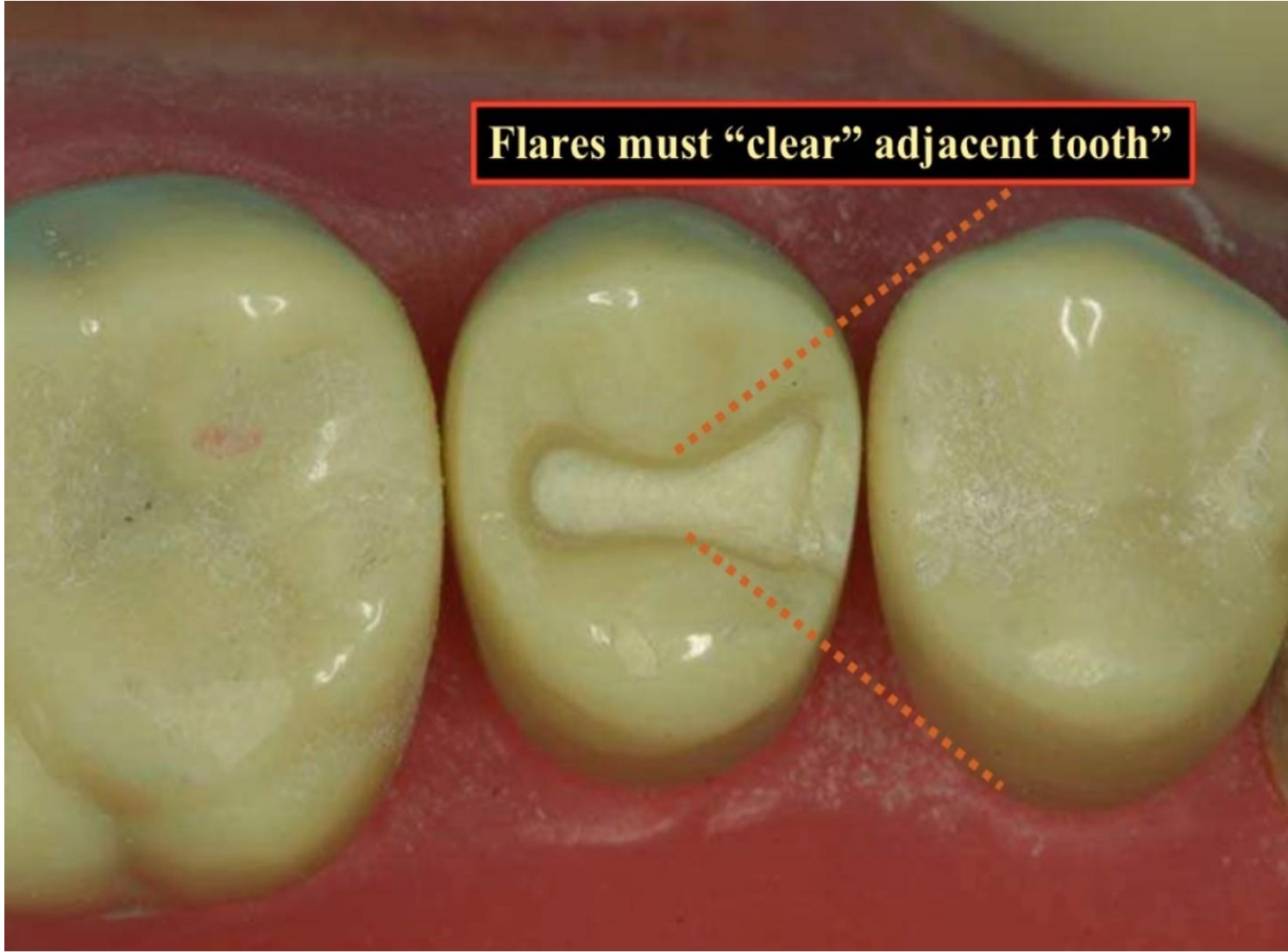
**Functions** : makes the proximal portion of the restoration self cleansable.

2. **Secondary flare** – it is a flat plane superimposed peripherally to a primary flare. Indicated in lesions with wide contact areas and wide bucco- lingual extensions

## Primary And Secondary Flare



**Flares must "clear" adjacent tooth**

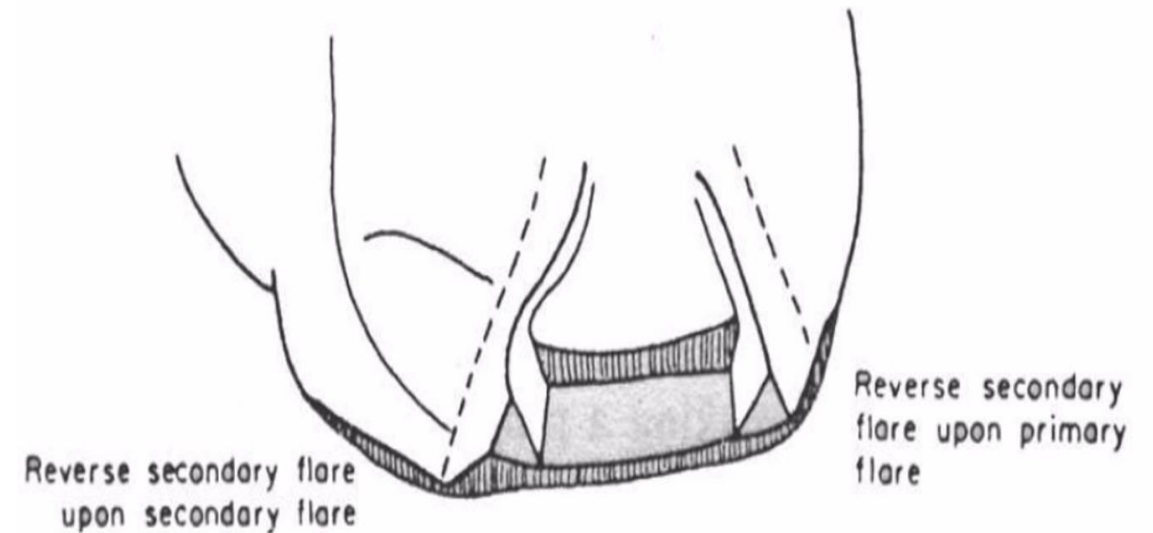




## REVERSE SECONDARY FLARES

- Can be added to a cavity preparation in lieu of a secondary flare
- The reverse secondary flare is in the form of a partial bevel. It involves only enamel with its maximum depth at its junction with the main cavity preparation.
- It ends on the facial or lingual surface with a knife edge finishing line and its extent should not exceed the height of contour of the facial or lingual surface in the mesio – distal direction nor should it include the tip of the cusp

## Occasionally A Reverse secondary Flare

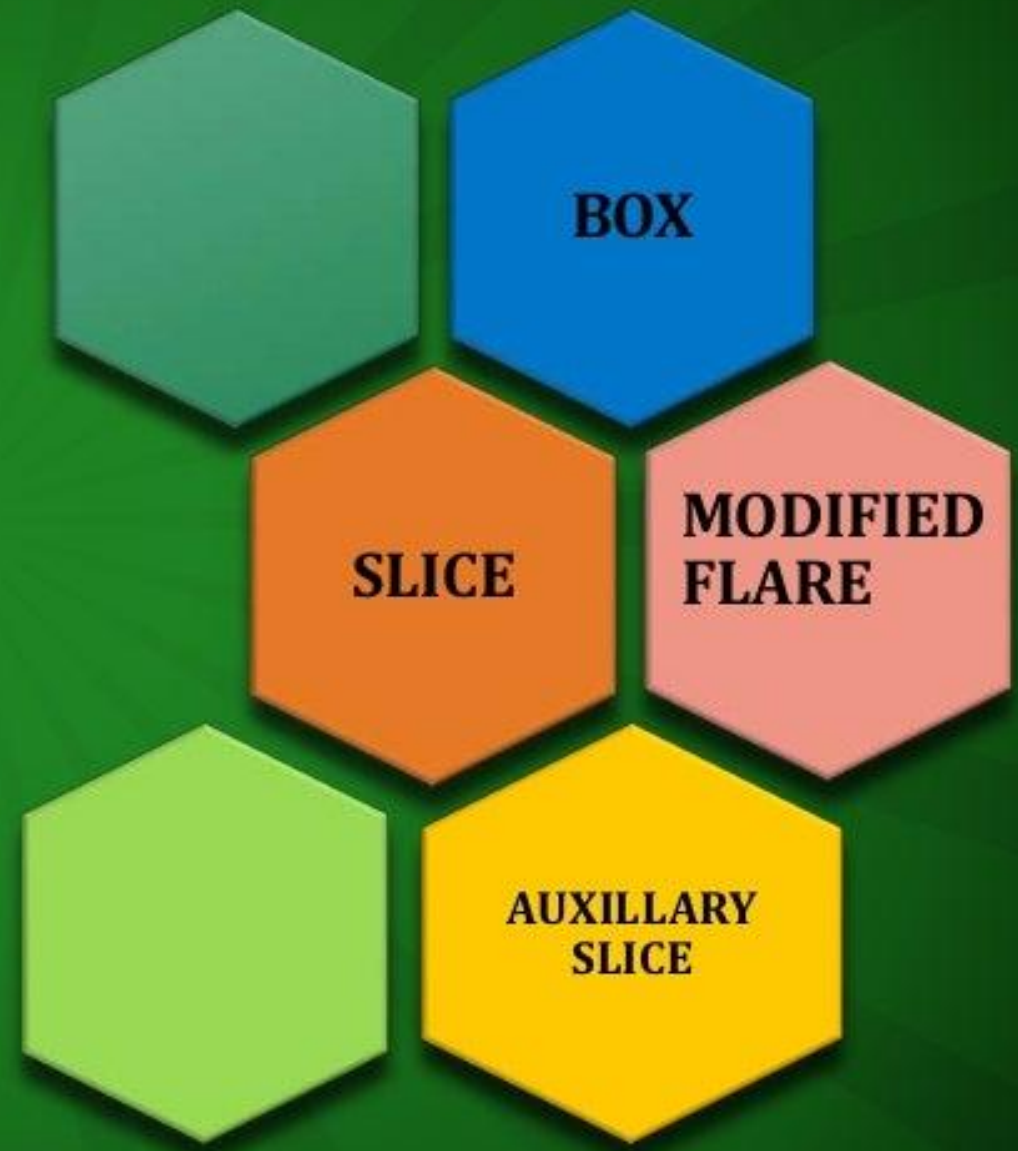


In Narrow/Small contact, Conserves Tooth Structure.

Often involves ONLY Enamel Unlike Secondary Flare

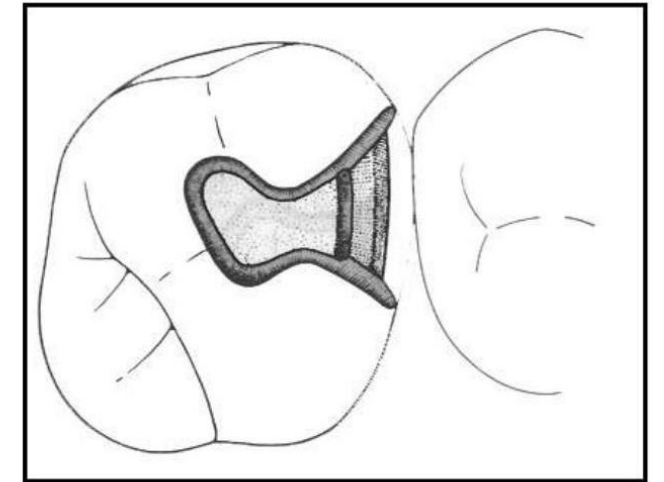
## Design of proximal margins will vary with:

- The extent of tissue loss
- The location of that loss
- Tooth form
- The positional relationship with adjacent teeth
- Need for retention form
- convenience



# BOX

Introduced by Dr. G.V. Black in which the proximal cavities are prepared box shaped with buccal and lingual walls and a definite gingival floor.



Box preparation

## Advantages –

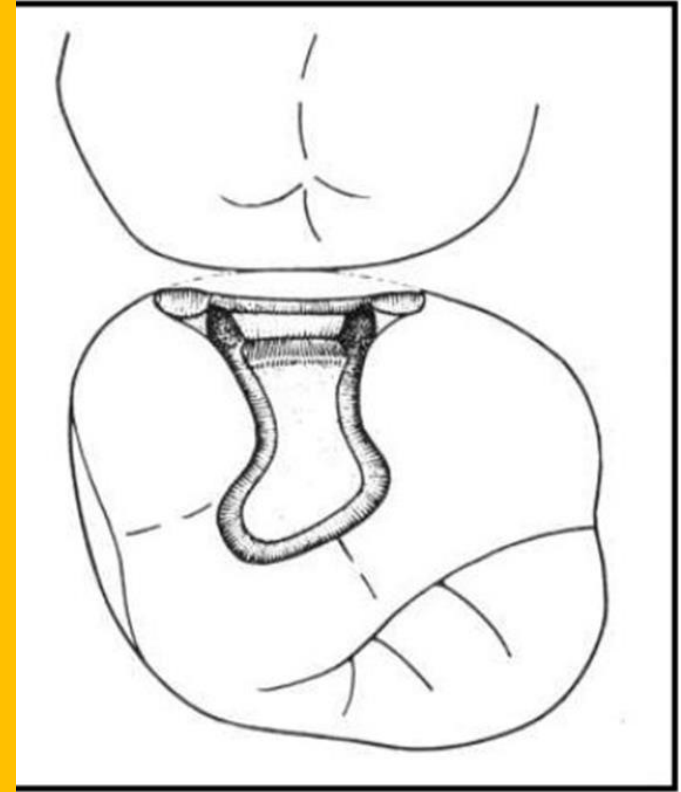
- It has its own resistance and retention form
- Direct wax pattern can be made on all types of teeth.
- Minimum display of metal

## Disadvantages –

- It involves removal of lots of tooth structure
- Clinically it is time consuming.
- Narrow bevels leave a sharp edge and an undercut gingivally , which cannot be satisfactorily reproduced.
- While taking impression distortions and breaking of wax pattern occurs

# SLICE PREPARATION

- This form of cavity is modified so that the proximal surface is flat without definite side walls. This slice preparation which depends for its retention mainly on the occlusal key, channels or locks cut in the axial wall.
- A slice referred to the placement of extra coronal taper using a disk of adequate diameter to contact nearly the entire proximal surface .
- Slice preparation involves conservative disking of the proximal surface to establish the buccal and lingual extent of finish lines and provide a lap joint for finishing





## INDICATIONS

- As abutment in bridge work
- Small carious lesion only on the middle of the proximal surface.
- To improve retention form.
- Teeth with proximal undercuts can be eliminated which facilitates taking impression.
- For indirect wax pattern technique

### ADVANTAGES :

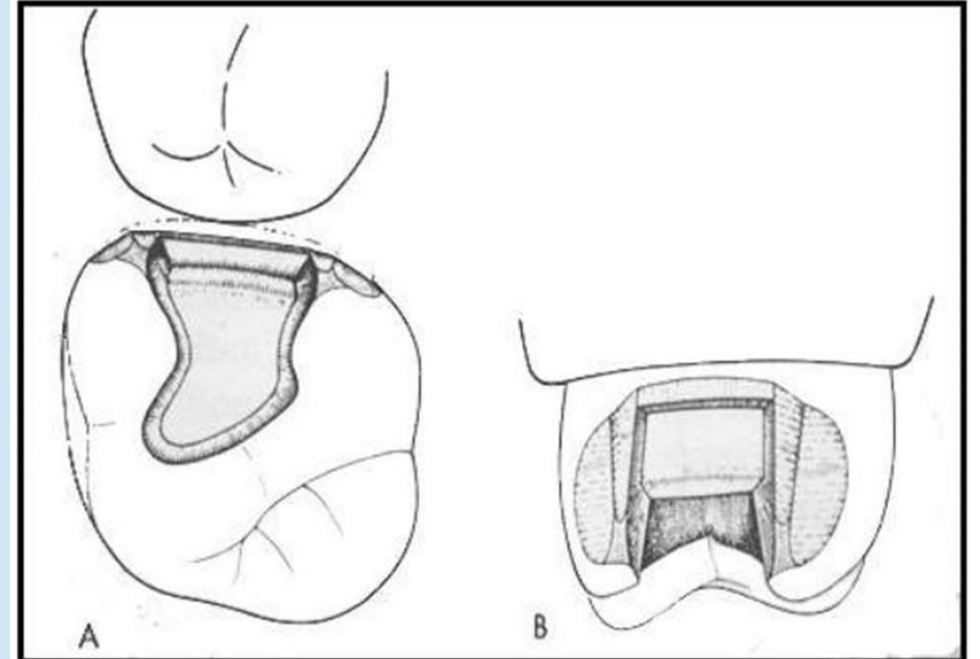
- Less tooth structure is sacrificed
  - Quicker and easier.
- Well protected enamel margins
- Increases resistance and retention form by exposing a larger amount of tissue surface to the frictional grasp of the restoration

### DISADVANTAGES –

- Thoma (1951) pointed out that it displays unnecessary amount of gold
- Direct wax pattern cannot be made as distinguishing between the margins is difficult.
- The margins of metal are very thin which can get distorted

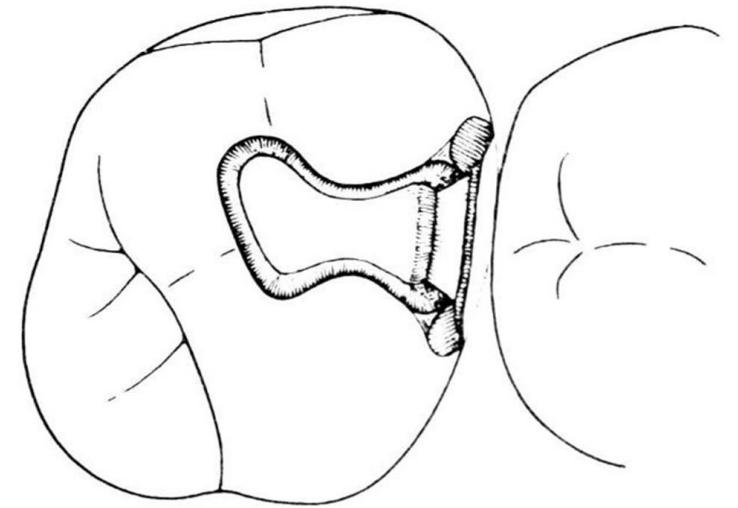
## AUXILIARY SLICE PREPARATION :

- wraps partially around the proximal line angles , thus providing additional tooth support
- Resistance form is enhanced
- Provide external retention form



## MODIFIED FLARE

- In view of the shortcomings of box type and slice type preparations , Barishman advocates a modified preparation which may be called the box cum gingival slice.
- Modified flare is nothing but a combination of box and slice preparation taking advantage of the box preparation & slice preparation.
- Minimum diskling of the proximal walls is done for better finishing and polishing.



## SKIRT :

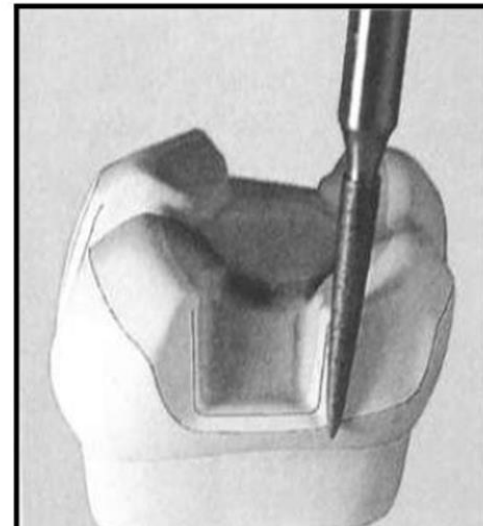
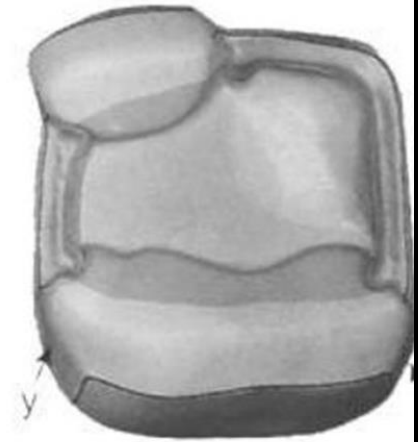
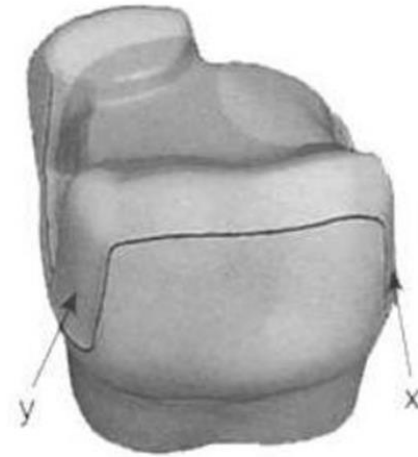
- This is a more extensive surface extension than the reverse secondary flare also superimposed on the basic intracoronal inlay or onlay cavity preparation facially and or lingually

## INDICATIONS

- Skirting is required to involve defects with more dimensions ( especially depth ) than those that can be involved in a reverse secondary flare
- A skirt is required to impart resistance and retention on a cast restoration in lieu of a missing or shortened opposing facial or lingual walls.

Skirting is necessary when the contact areas and contour of the proximal surface are to be changed

Skirts are essential facially and lingually for tilted teeth in order to restore the occlusal plane



## COLLAR

- ❖ This type of surface extension is the most involving surface wise and depth wise.
- ❖ They are two types

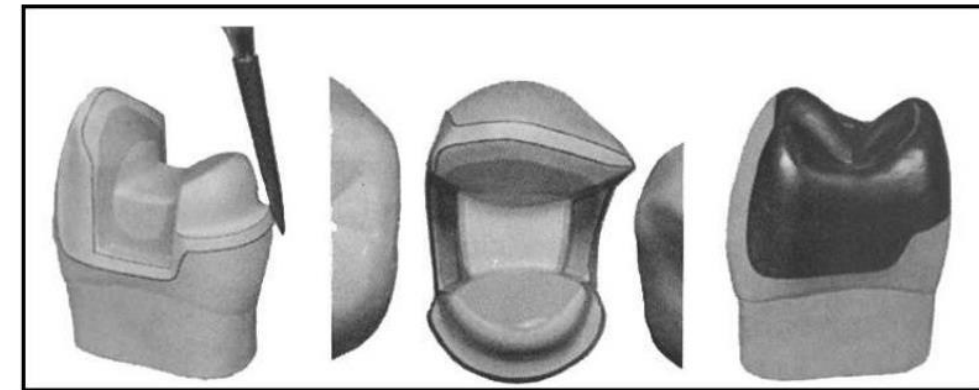
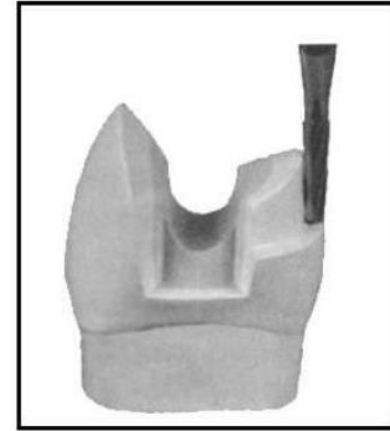
1. Cuspal collars
2. Tooth collars

- Cuspal collars which involve the facial or lingual surface of one cusp only in a multi – cusped tooth
- Tooth collars involve the entire facial or lingual surfaces of the tooth.



## INDICATIONS :

- They help in retention and resistance when an entire cusp is lost prior to the tooth preparation or when it is necessary to remove it due to excessive undermining.
- They help retention in shortened teeth
- They help resistance and to enhance support for tooth that is endodontically treated



# TUCKERS TECHNIQUE :

Dr. Richard Tucker developed a conservative cast gold inlay preparation technique.

The cavity preparation sequence is as follows:

- ❑ After placement of rubber dam, the existing restoration, if any, and carious tooth structure is removed.
- ❑ Then, a thin film of calcium hydroxide is placed on the internal surface of the preparation with a small cotton pellet. It acts a separator for easy removal of composite build up prior to cementation.
- ❑ The use of resin composite build up conserves tooth structure.
- ❑ The resin composite build up allows the operator to cut a precise cavity preparation that has an ideal taper, smoothness and proportions.
- ❑ An autocure resin composite can be placed with a packing instrument or a syringe.
- ❑ The build up is usually entirely removed prior to cementation.
- ❑ The casting often seats more completely because of the absence of the composite pulpal wall and the area of the previous build up is filled with luting cement.

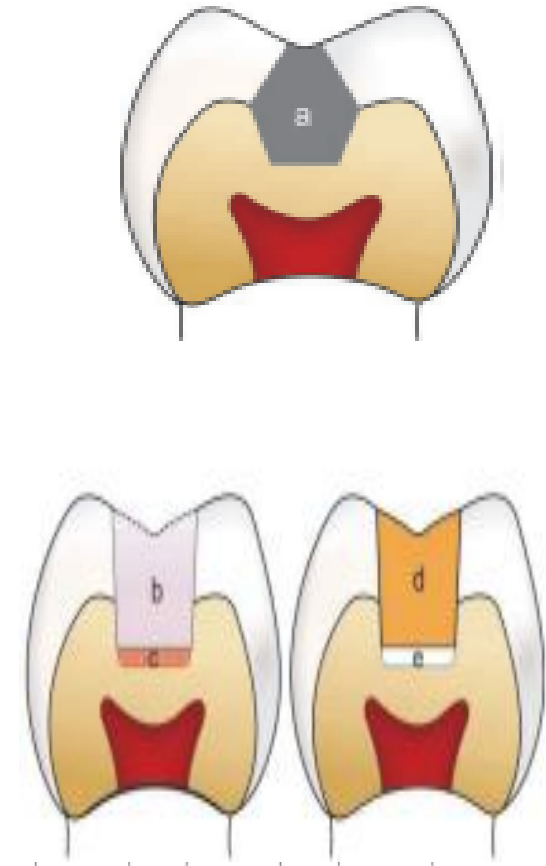


Fig. 13.21: Tucker's Technique: (a) Carious Lesion; (b) Cavity Preparation for Inlay; (c) Composite Build-Up; (d) Inlay; (e) Luting Cement

- ❑ The occlusal box is prepared with straight fissure bur and pulpal floor are placed to a depth of 1.5 to 2.0 mm and a uniform inclination of the walls of 3 to 5 degrees.
- ❑ The proximal box form is established next and is blended with the occlusal preparation.
- ❑ The buccal and lingual walls must be extended sufficiently (1 mm) beyond the adjacent tooth.
- ❑ The proximal walls have slight flare ( $45^\circ$ ) that eliminate unsupported enamel rods.
- ❑ Occlusal and gingival bevels are placed and cavity walls are finished.
- ❑ The gingival bevel is a small bevel 0.5 to 0.75 mm wide. The bevel should be definitive and smooth but not too wide.

□ Tucker's gingival margin trimmer are used in this technique. The No.232 Tucker (10-98-10-16) GMT is used on distal aspect and the No.233 Tucker (10-78-10-16) GMT is used on the mesial aspect. **The bevels on non Tucker GMT instruments are less acute (45 degree) than the ones marked Tucker (30 degree).**

□ The occlusal bevel is placed with the straight fissure bur inclined only a few degree more than that of the occlusal wall. The finishing of the proximal walls is completed with a 0.5 inch garnet disk.



*RETROSPECTIVE CLINICAL EVALUATION OF 1,314 CAST GOLD RESTORATIONS IN SERVICE FROM 1 TO 52 YEARS. , 16(3), 194–204. Terry Donovan; R.J. Simonsen; G. Guertin; R.V. Tucker (2004).*

A total of 1,314 restorations were evaluated, 636 in maxillary teeth, 678 in mandibular teeth. Seven hundred six of the restorations were placed in molars, 530 in premolars, and 78 in canine teeth. The time of service for the restorations ranged from 1 to 52 years

The literature indicates that these tooth-colored restorations provide a significantly shorter life span than does cast gold. The evidence presented in this article indicates that properly fabricated cast gold restorations can provide extremely long-term restorative service. It has been speculated that perhaps the esthetic dentistry pendulum has swung too far



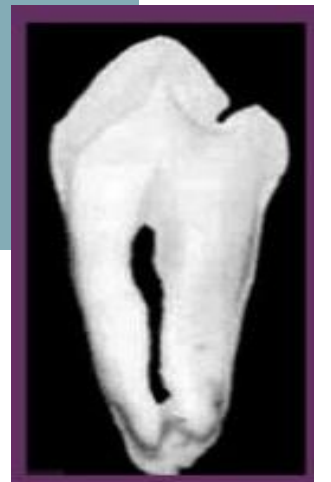
# SPECIAL MODIFICATIONS IN CAVITY PREPARATIONS

Exceptions : Mandibular bicuspids

Mandibular first premolar : Occlusal preparation needs two thirds of the occlusal width prepared by removal of structure situated buccally to the central groove & one third from the lingual aspect.

Pulpal floor slanted to the lingual side

Cervical floor may or may not follow the pulpal floor



# SPECIAL MODIFICATIONS IN CAVITY PREPARATIONS

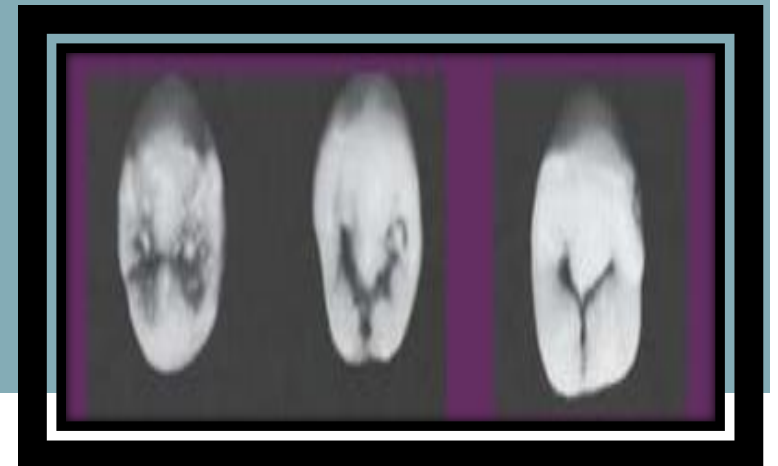
Mandibular second bicuspid:

Central groove forms : H, Y or U patterns

H type : protection of the integrity of the lingual cusp

U and Y types :  $\frac{2}{3}$  –  $\frac{1}{3}$  relationship & requires operation with great care to avoid undue weakening of the lingual cusp

Extension to include the lingual groove





## MESIO - OCCLUSODISTAL PREPARATION

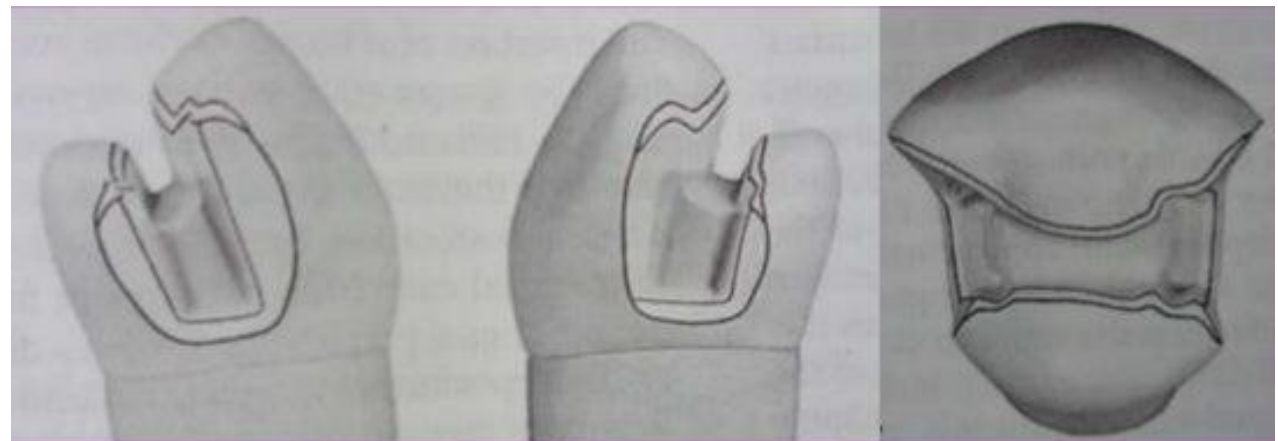
Excessive weakening of the marginal ridge

Preparation outline is altered to include the proximal surface

DO → MOD

Whether the remaining marginal ridge would withstand occlusal forces without fracture

Caries on both proximal surfaces : definite indication for MOD



# ESTHETICS

Mesiofacial proximal wall – maxillary premolars & first molars : minimal flare

Margin barely visible from a facial viewing position

Secondary flare omitted

Wall & margin developed

: chisel or enamel hatchet & final smoothing with a fine – grit paper disk

: narrow diamond/ bur when access permits



## FACIAL & LINGUAL SURFACE GROOVE EXTENSION

Faulty facial groove on the occlusal surface – continuous with the faulty facial surface groove :

Mandibular molar

Faulty distal oblique groove on the occlusal surface continuous with faulty lingual surface groove : Maxillary molar

Preparation outline extended to include the fissure to its termination

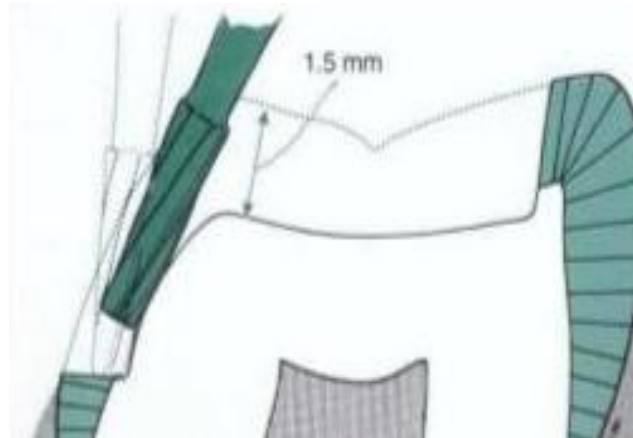
Further gingivally to improve retention form

Sufficient retention form \_ though the facial or lingual surface grooves are not fissured

No.271 carbide cur held parallel to the line of draw , extend through the facial ridge

The depth of the cut : 1.5 mm

The floor ( pulpal wall ) should be continuous with the pulpal wall of the occlusal portion



With the bur still aligned with the path of draw, the side of the bur is used to cut the facial surface portion of this extension

The diameter of the bur serves as a depth gauge for the axial wall, which is in dentin.

The blade portion of the no. 271 bur is 0.8mm in diameter at its tip end and 2mm at the neck

The axial wall depth should approximate 1mm or slightly more

The bur should be tilted lingually as it is drawn occlusally, to develop the uniform depth of the axial wall.

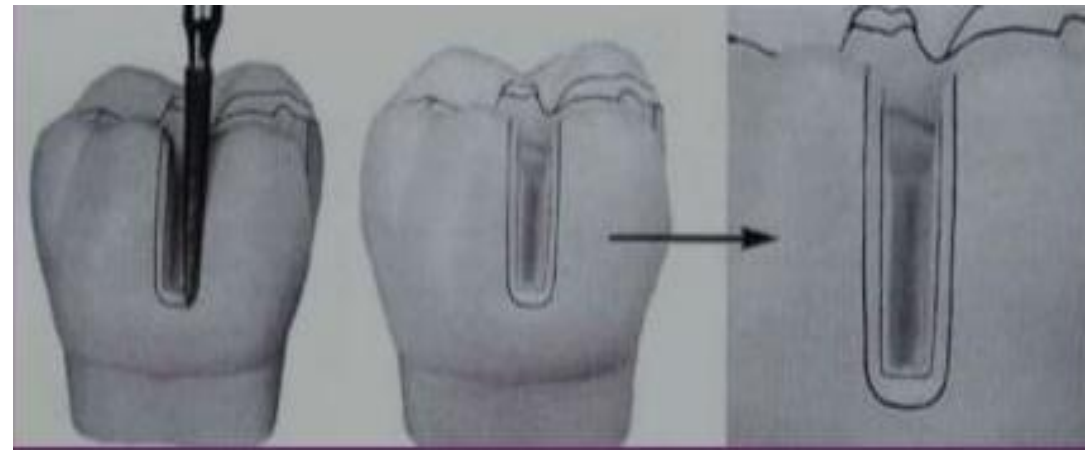


Included facial or lingual groove – bevelled

With the flame – shaped , fine grit diamond – provide for 30 degree marginal metal .light bevel on the mesial and distal margins- continuous with the occlusal and gingival bevels

40-degree metal at these margins

The bevel width – approximately 0.5mm



# ABUTMENT TEETH

Facial, lingual and gingival margins – the proximal surfaces for RPDs

Increase the surface area for development of guiding planes

Occlusal outline form wide faciolingually-accommodate any contemplated rest preparation without involving the margins of the restorations

Accomplished by simply increasing the width of the bevels



## EXTENSION GINGIVALLY TO INCLUDE ROOT SURFACE LESIONS

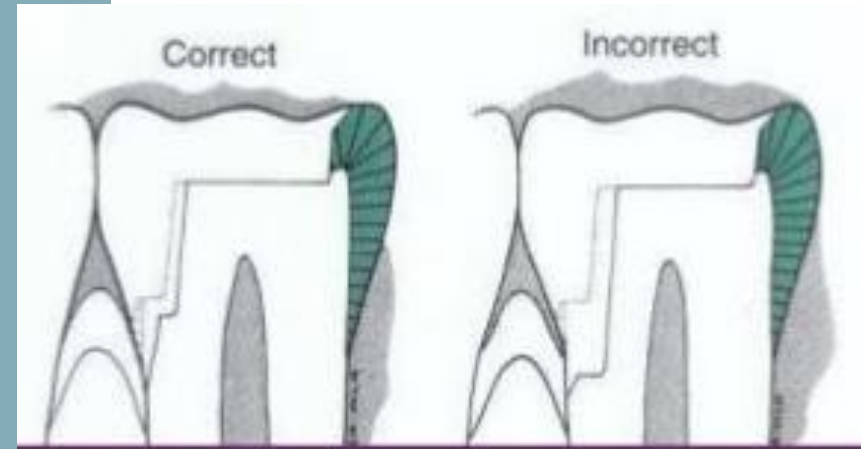
Primarily by lengthening the gingival bevel- a longer clinical crown due to gingival recession

Slightly extend (gingivally) the gingival floor, and although

Minimal movement of the axial wall pulpally

Additional extension of the gingival floor if necessary, narrower pulpally the floor level is at a normal position.

Extending the preparation gingivally without these modifications – dangerous encroachment of the axial wall on the pulp



# MAXILLARY FIRST MOLAR WITH UNAFFECTED , STRONG OBLIQUE RIDGE

Strong oblique ridge preserved

Distal surface lesion-after the insertion of a MO  
restoration

Prepared for a distoocclusolingual inlay

Distolingual cusp capping – prevents subsequent  
fracture



# MAXILLARY FIRST MOLAR WITH UNAFFECTED , STRONG OBLIQUE RIDGE

Retention form ;

1. Creating a maximum of 2 degree occlusal divergence of the vertical walls
2. Accentuating some line angles
3. Extending the lingual surface groove to create an axial height in this extension of at least 2.5mm occlusogingivally



# MAXILLARY FIRST MOLAR WITH UNAFFECTED , STRONG OBLIQUE RIDGE

Resistance form ;

1. Routine capping of the distolingual cusp and
2. Maintaining sound tooth structure between the lingual surface groove extension and the distolingual wall of the proximal boxing



# DIFFERENCE BETWEEN CERAMIC AND CAST GOLD INLAY

	<b>CERAMIC INLAY</b>	<b>CAST GOLD INLAY</b>
<b>THICKNESS/ BULK</b>	More needed (1.5-2mm)	Less
<b>OCCLUSAL BEVELS</b>	- Contraindicated - HGB – Shallow cavity	Bevels necessary
<b>GINGIVAL BEVELS</b>	Not necessary	Necessary
<b>CERVICO- OCCLUSAL DIVERGENCE</b>	3° per wall (6° occlusal divergence)	2-5° per wall (4-10° divergence)

MARGINAL ADAPTATION	Bonding (Adhesion)	Frictional retention
PULPAL FLOOR	<ul style="list-style-type: none"> <li>- NEED NOT be flat &amp; perpendicular to long axis</li> <li>- Shallow- Parallel to cuspal inclines</li> </ul>	Flat & perpendicular to long axis of tooth
INTERNAL LINE ANGLES	Rounded	Well defined
CAVO-SURFACE ANGLE	90° butt joint	140°- 150° (30°- 40° marginal metal)
AXIAL WALL	<ul style="list-style-type: none"> <li>- 10° occlusally convergent</li> <li>- Depth- 1-1.5 mm</li> </ul>	
SIZE OF THE CAVITY	Shallow	Deep
A.P. GROOVES	-	Secondary retention

# DIFFERENCE BETWEEN SILVER AMALGAM AND CLASS II INLAY

	SILVER AMALGAM	CLASS II INLAY
Outline form	Narrow , walls converge occlusally	Wide , walls diverge occlusally
Cavity width	1/4 <sup>th</sup> of intercuspal distance	1/3 <sup>rd</sup> of intercuspal distance
Cavosurface angle	90 , butt joint	130-140 , lap sliding fit joint
Undercuts	Improve retention	No undercuts should be present
Minimum clearance	0.5 from adjacent teeth	More clearance needed
Secondary retention	Grooves, slots, pins	Grooves, slots, internal boxes, skirts, collars & reverse bevel
Internal line angle	Rounded	Well defined
Proximal walls	Provided with primary flares	Provided with primary & secondary flares
Reverse curve	Present in proximal outline	Not provided

## **CONCLUSION :**

Understanding the principles of tooth preparations and the intricacies of cast restorations will enable to optimally utilize this excellent option when the clinical situation demands



## **REFERENCES :**

1. Sturdevants 4<sup>th</sup> edition
2. Marzouk
3. Charbeneau
4. Anusavice 11<sup>th</sup> edition
5. Textbook of operative dentistry – Vimal sikri

**THANK YOU**