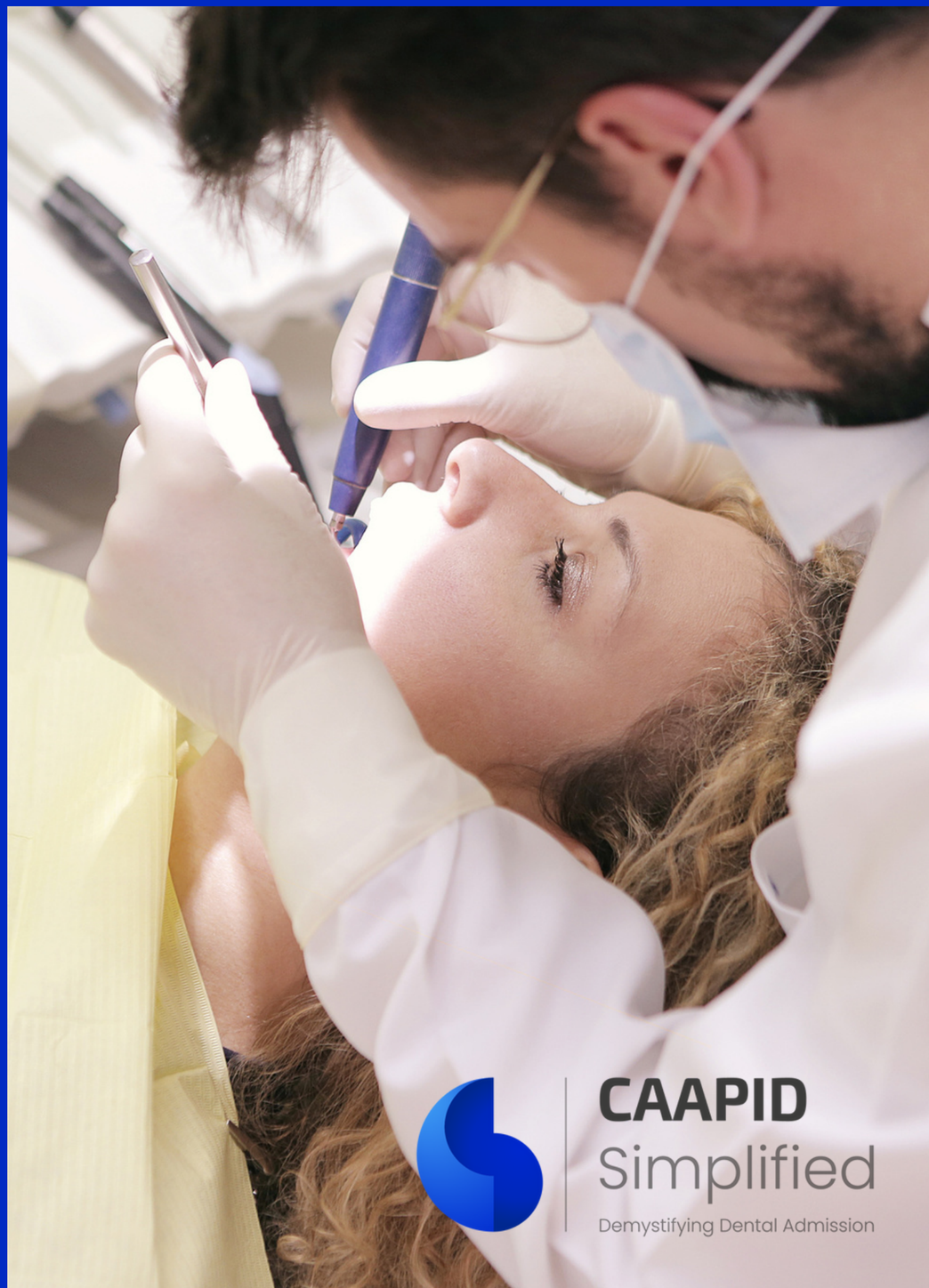
CAAPID
Simplified
Demystifying Dental Admission

Class II Amalgam Cavity Preparation

Agenda

Class II Amalgam Cavity

- Basic Concepts
- Principleof cavity Preparation Armamentarium
- Criteria for Evaluation Time-efficient Steps
- Tips & Tricks
- Reasons for failure



Cavity Classification

- **CLASS I CAVITY**
  1) Pits & fissures
  2) Occlusal surface of premolars & molars
  3) Occlusal 2/3 rd of buccal & lingual surface
  4) Lingual surface of maxillary incisors

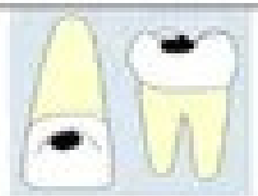
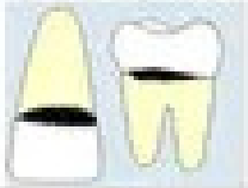
- **CLASS II CAVITY**
  Restoration on Proximal surface of posterior teeth

- **CLASS III CAVITY**
  Restoration on the proximal surface of the anterior teeth that do not involve incisal edge

- **CLASS IV CAVITY**
  Restoration on the proximal surface of anterior teeth that do involve the incisal edge

- **CLASS V CAVITY**
  Restoration on the gingival third of the facial/lingual surfaces of all teeth

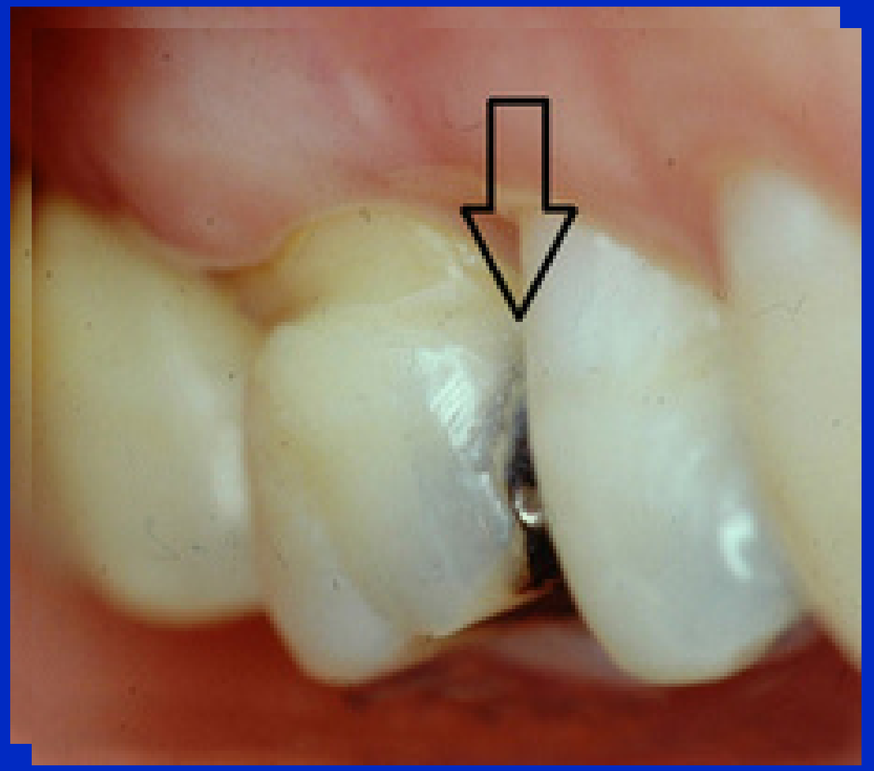
- **CLASS VI CAVITY**: Simon
  Restoration on the incisal edge of anterior teeth and occlusal cusp height of posterior teeth

Classes	Illustration
Class I	
Class II	
Class III	
Class IV	
Class V	
Class VI	

Basic Nomenclature

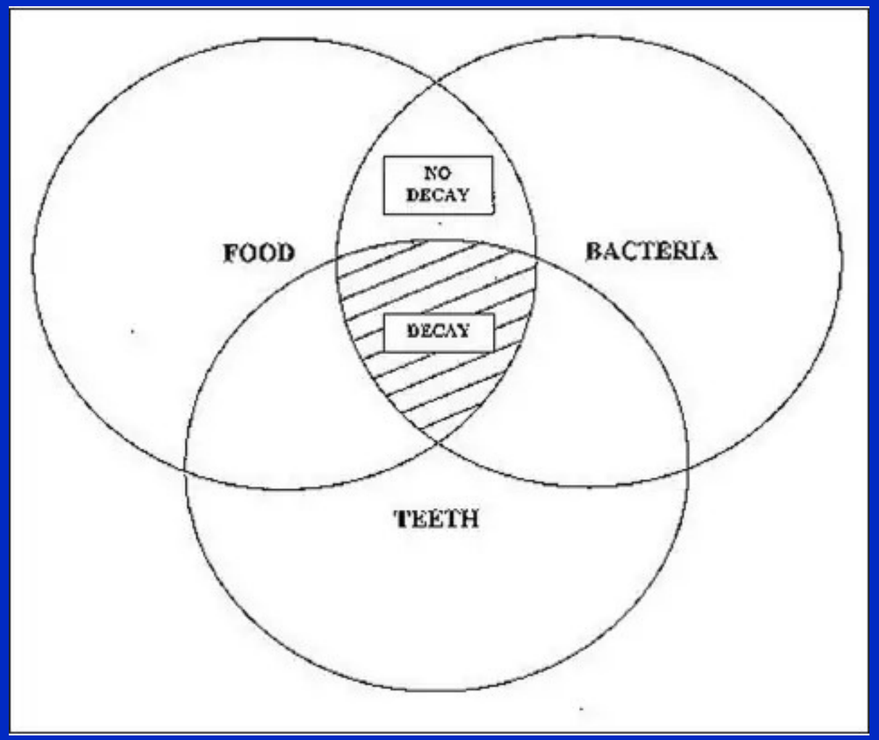
CLASS II CAVITY - DEFINITION:

A CAVITY THAT IS PRESENT ON THE PROXIMAL SURFACES OF PREMOLARS AND MOLARS (G V BLACK)



Metabolism

- Certain bacteria in the mouth (Streptococcus mutans) metabolize carbohydrates (leftover from food debris) to form acids.
- Attack the surfaces of the teeth and slowly cause demineralization through the loss of calcium and phosphorous
- Lesions develop on any tooth surface and start at the outer surface of enamel, slowly progressing towards dentin.
- A cavity is fully-formed once the lesion passes through the dentin-enamel junction into the dentin.



Indications

- Moderate to large cavities
- Non-aesthetic areas
- Saliva loaded areas
- Zones of heavy occlusal loads
- Restorations extending to root surfaces

ContraIndications

- Anteriors
- Small to moderate carious lesions
- Galvanism
- Low pain threshold: Post-operative sensitivity

Why proximal box- Class II

- To include all caries, faults, or existing restoration
- Create a 90-degree cavosurface margin
- Establish ideally not more than 0.5mm clearance with adjacent facial, lingual, and gingival wall ⅔ of dentin (0.5-0.6mm) & ⅓ of enamel (0.2-0.3mm)

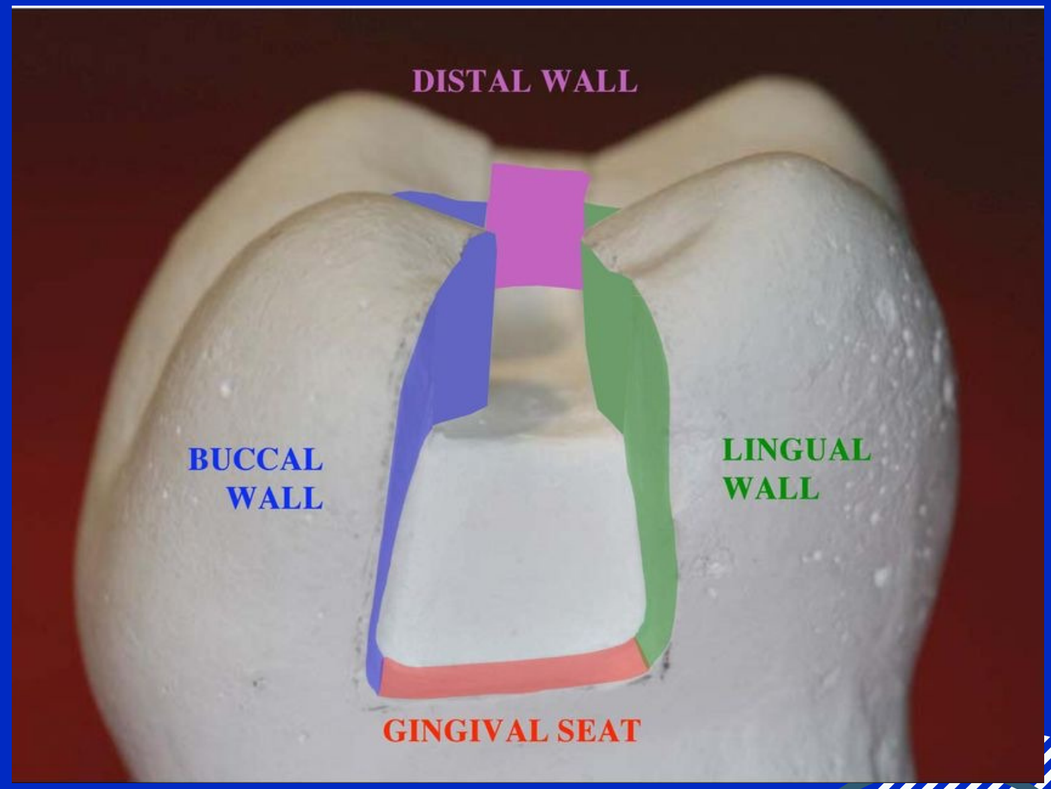
PROXIMALLY THE FACIAL AND LINGUAL WALLS ARE POSITIONED IN A SELF-CLEANSING AREA WITH CLEARANCE OF 0.2-0.3MM FROM ADJACENT TOOTH: CONVENIENCE FORM.

Components of Proximal Box

- Gingival seat
- Axial wall
- Facial and lingual wall Isthmus
- Exit Angles

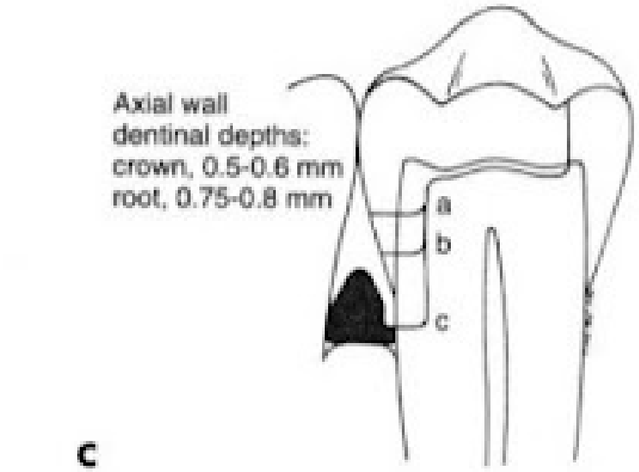
Gingival Seat

- Should be placed 1-2mm below contact (i.e., supragingival)
- Subgingival in young patients and patients with high caries index
- Shape: Flat and perpendicular to the long axis of the tooth
- Width: In premolars - 0.6 to 0.8mm and molars - 0.8 to 1mm
- When placing a gingival margin in cementum, the round toothpick/triangular wedge is placed in gingival embrasure to protect the underlying gingiva

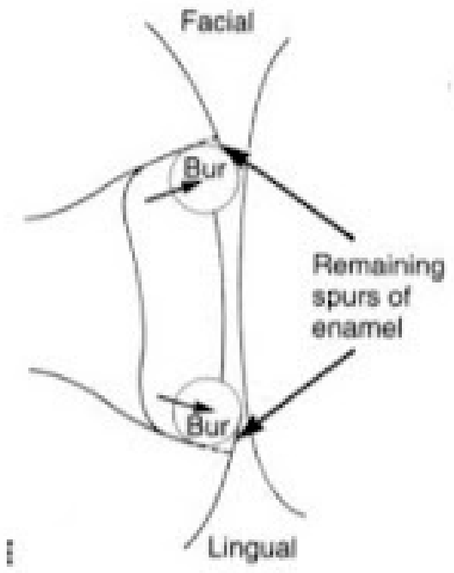


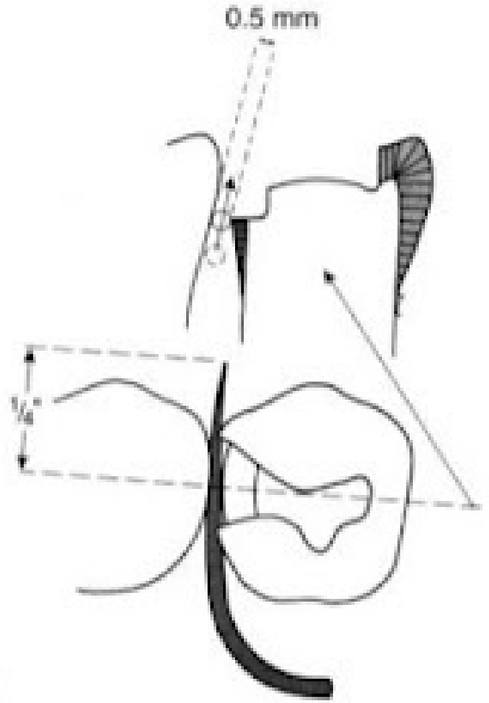
Axial wall

- Placement in dentin
- Should be parallel to the long axis of the tooth
  - For convenience form
  - Providing additional bulk of amalgam
- Retentive grooves can be easily placed in dentin.
- Shape: Follow the contour of the tooth (convex) or straight for increased resistance and retention
- The length of the axial wall from the pulpal floor is 0.4-0.6mm
- Width is not uniform triangular shape apex towards occlusal and base towards the gingival seat


Axial wall
dentinal depths:
crown, 0.5-0.6 mm
root, 0.75-0.8 mm
a
b
c

C

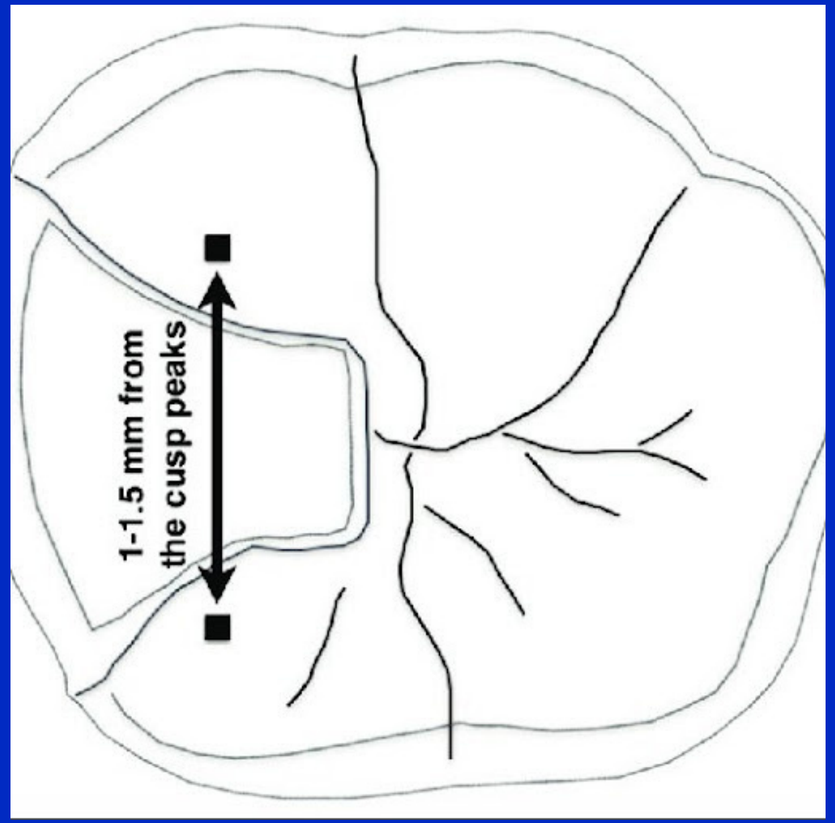

Facial
Bur
Remaining
spurs of
enamel
Bur
Lingual


0.5 mm
¼"

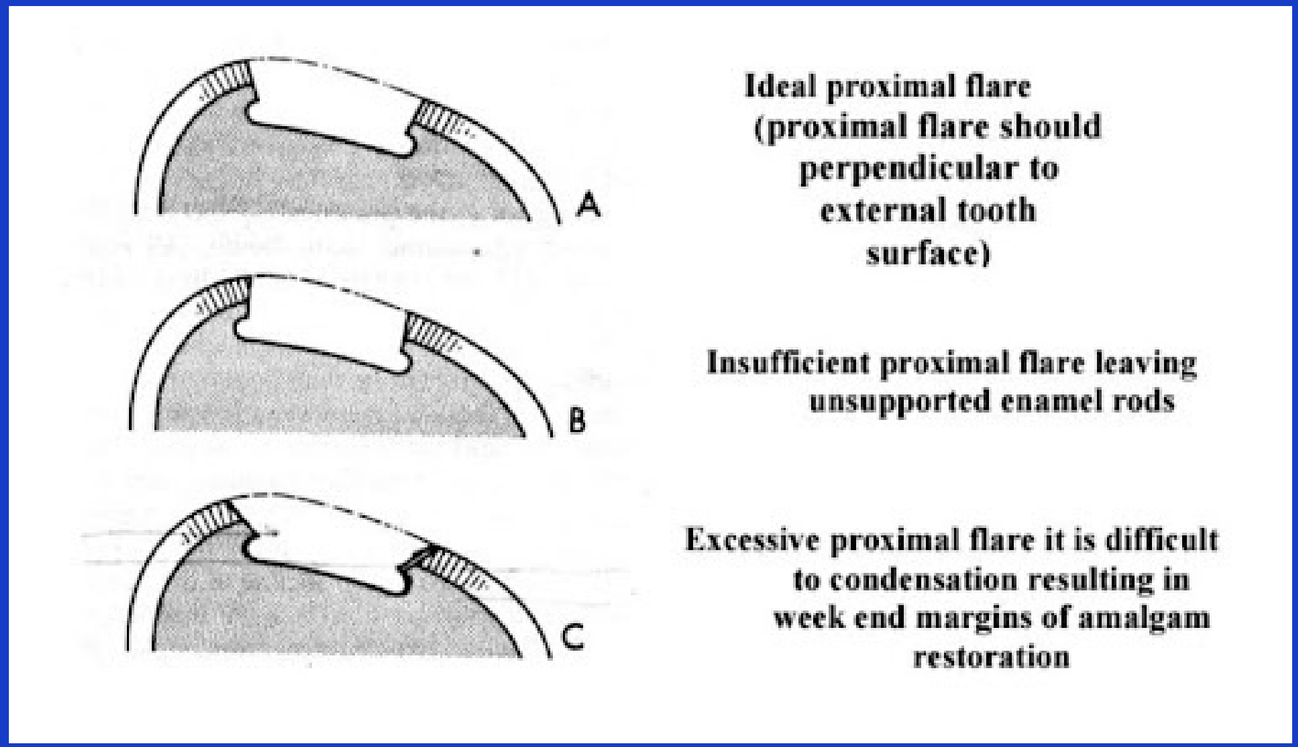
F

Isthmus

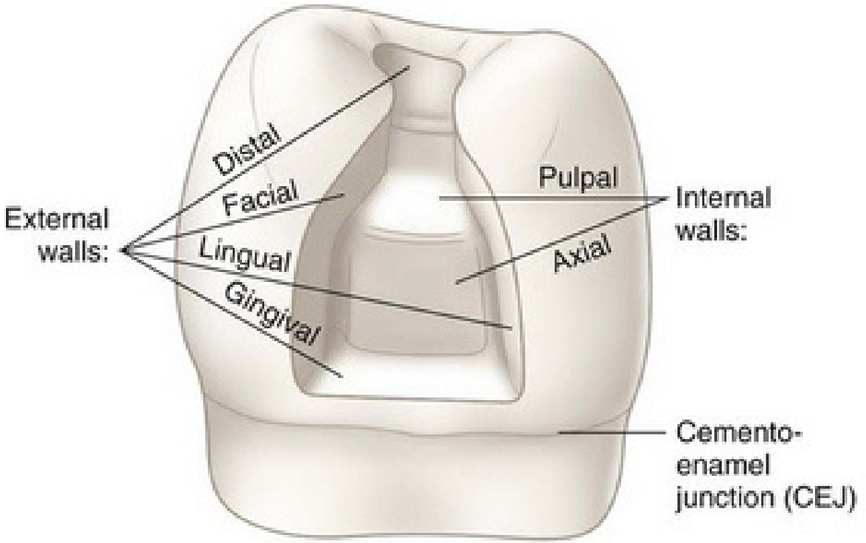
- The junction between the occlusal portion and proximal facial and lingual part of the preparation
- The width should be ¼ of the inter- cuspal distance

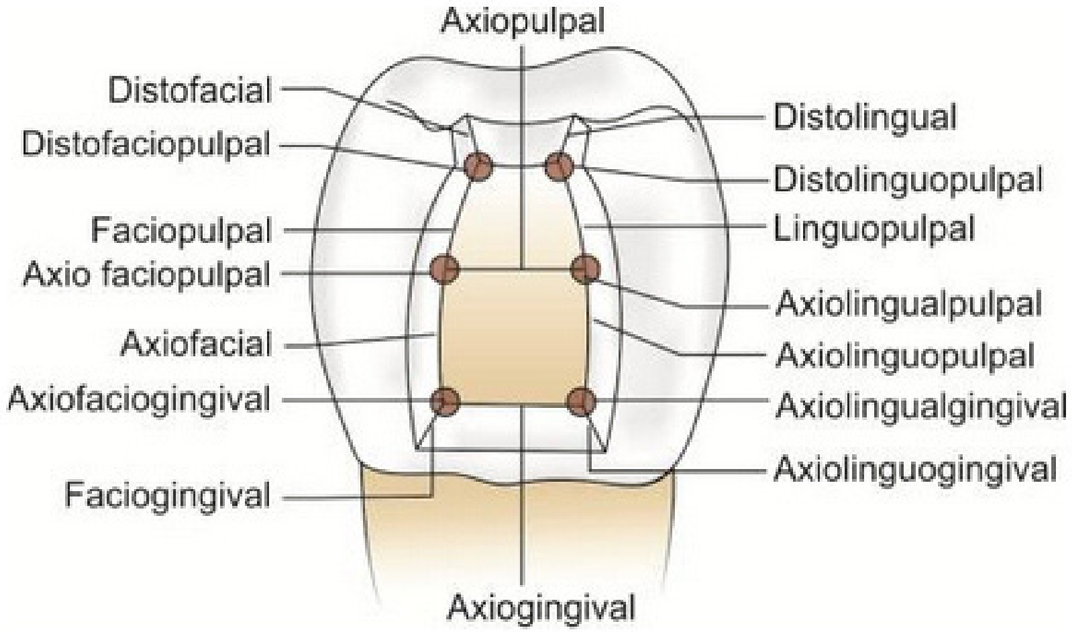


Ideally, the proximal flare should be perpendicular to the external tooth surface.



Walls, Line angles and Point Angles

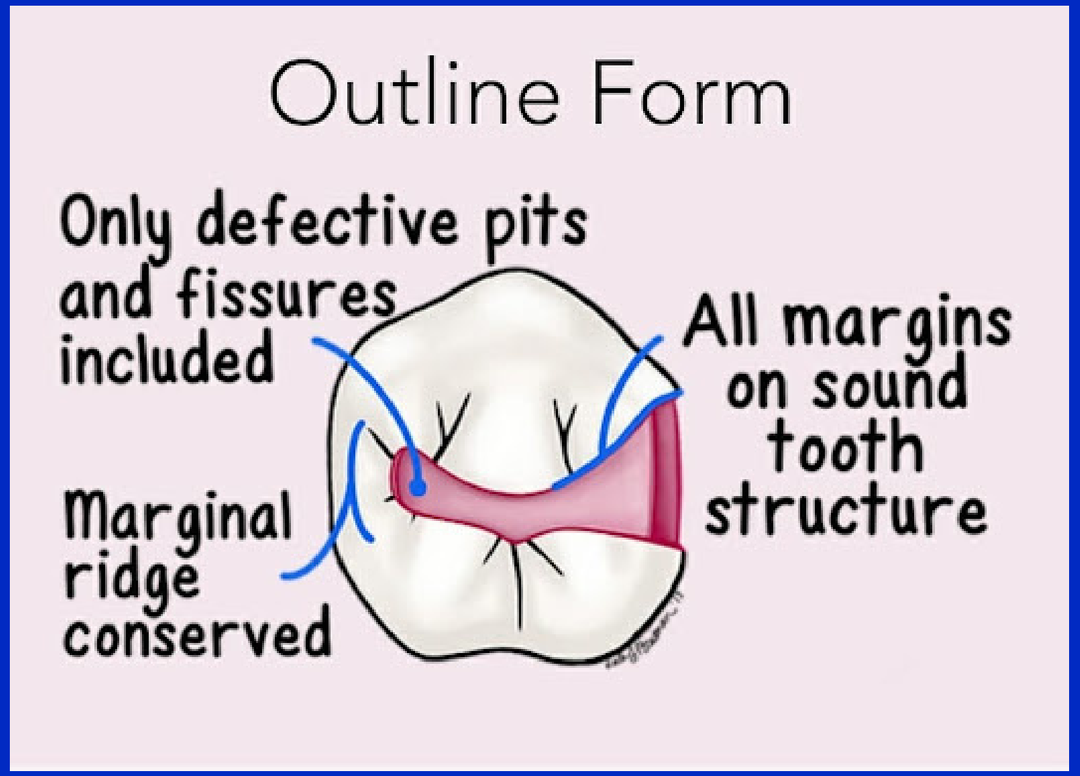




Principles of cavity preparation

Outline form and Initial depth:

- Establishing the outline form means placing preparation margins in positions they will occupy in the final preparation.
- Initial depth of 0.2 to 0.8mm pulpal to DEJ or normal root surface position

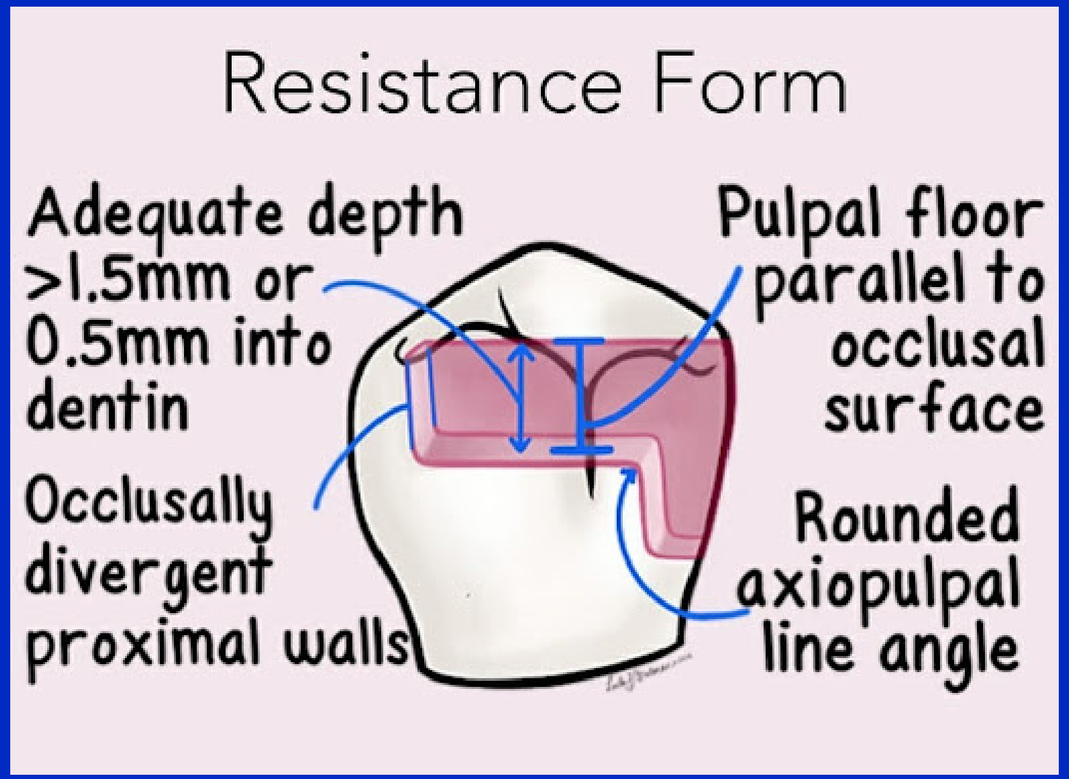


General principles to follow in outline form:

- Extend preparation to sound tooth structure
- Avoid terminating or margins on cuspal heights/ridge crests
- Extend margins to allow sufficient access for proper manipulative procedures
- Restrict the axial wall pulpal depth of proximal preparation to a maximum of 0.2-0.8mm into the dentin
- Gingival margins in the proximal contact area should extend apically to a minimum clearance of 0.5mm between gingival margins of the adjacent tooth
- The facial and lingual margin in the proximal area is usually extended into their respective embrasures

Primary resistance form

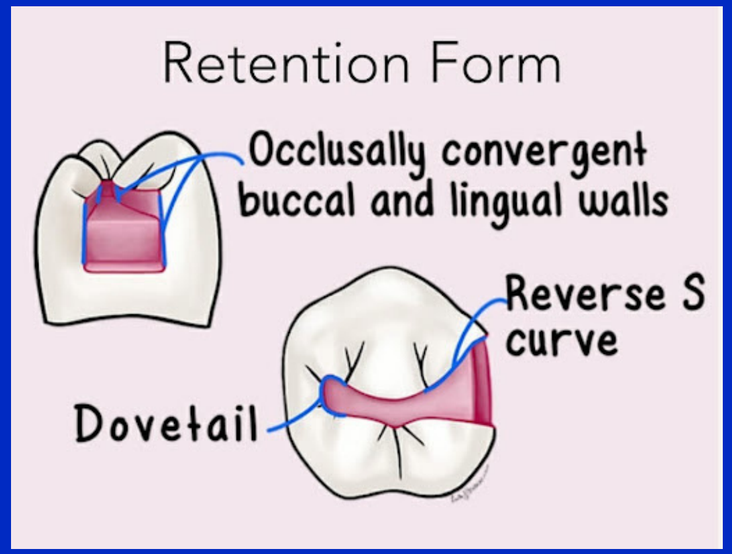
- Shape and placement of preparation walls that best enable tooth structure and restoration to withstand without fracture masticatory forces delivered principally in the long axis of the tooth

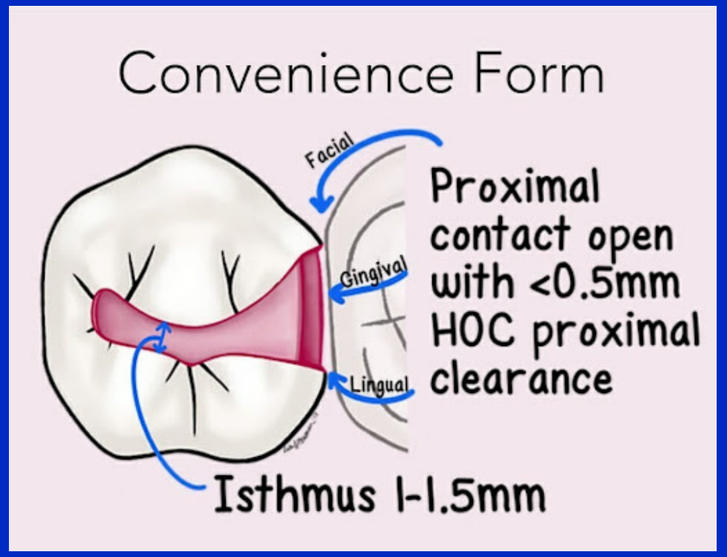


Primary Retention and Convenience form

Primary retention: That shape or form of the conventional preparation that resists the displacement or removal of the restoration from tipping/lifting forces

Convenience form: That shape or form of the preparation that provides for adequate observation, accessibility, and ease of operation in preparing and restoring the tooth

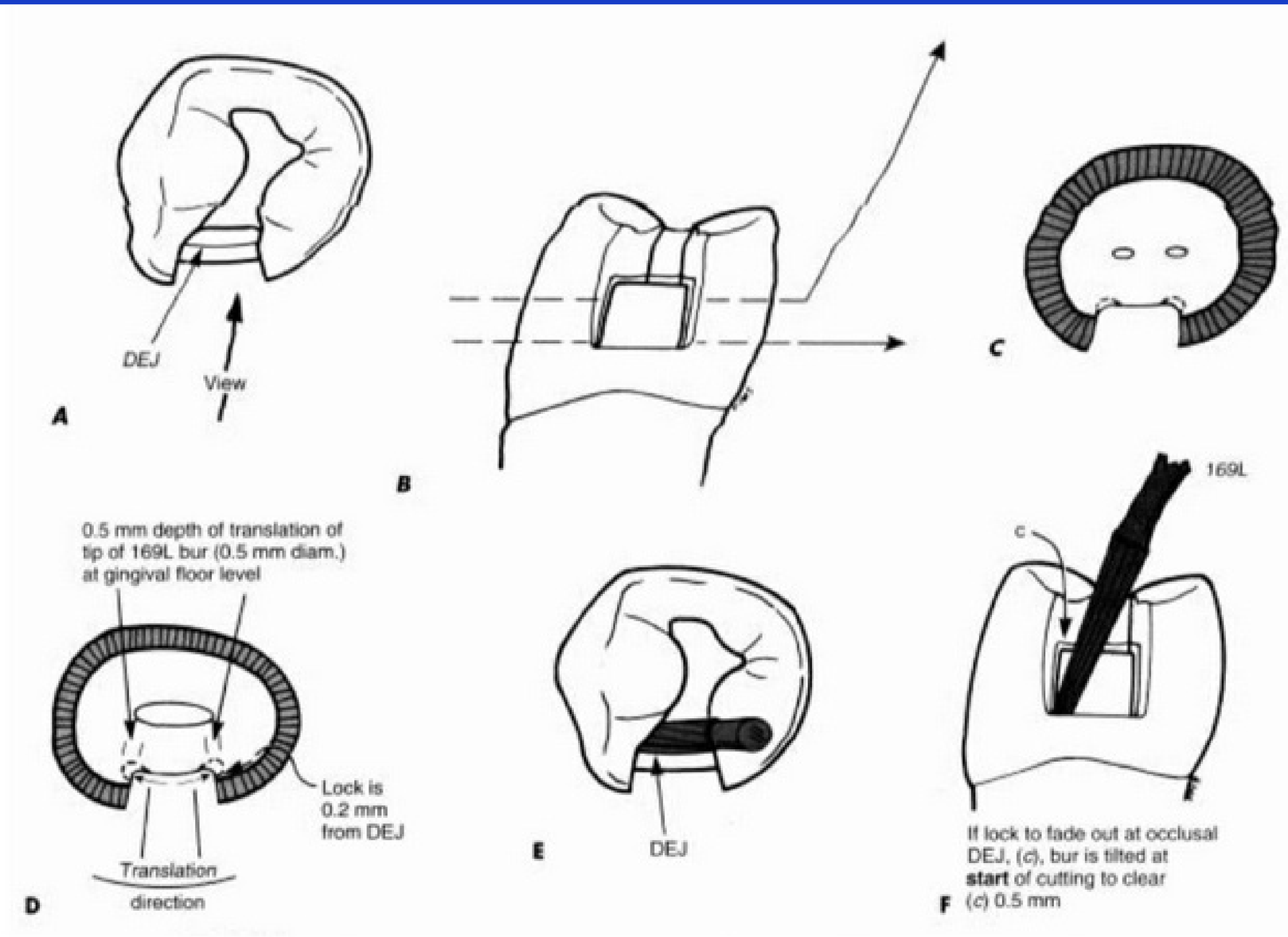




Secondary Resistance and Retention

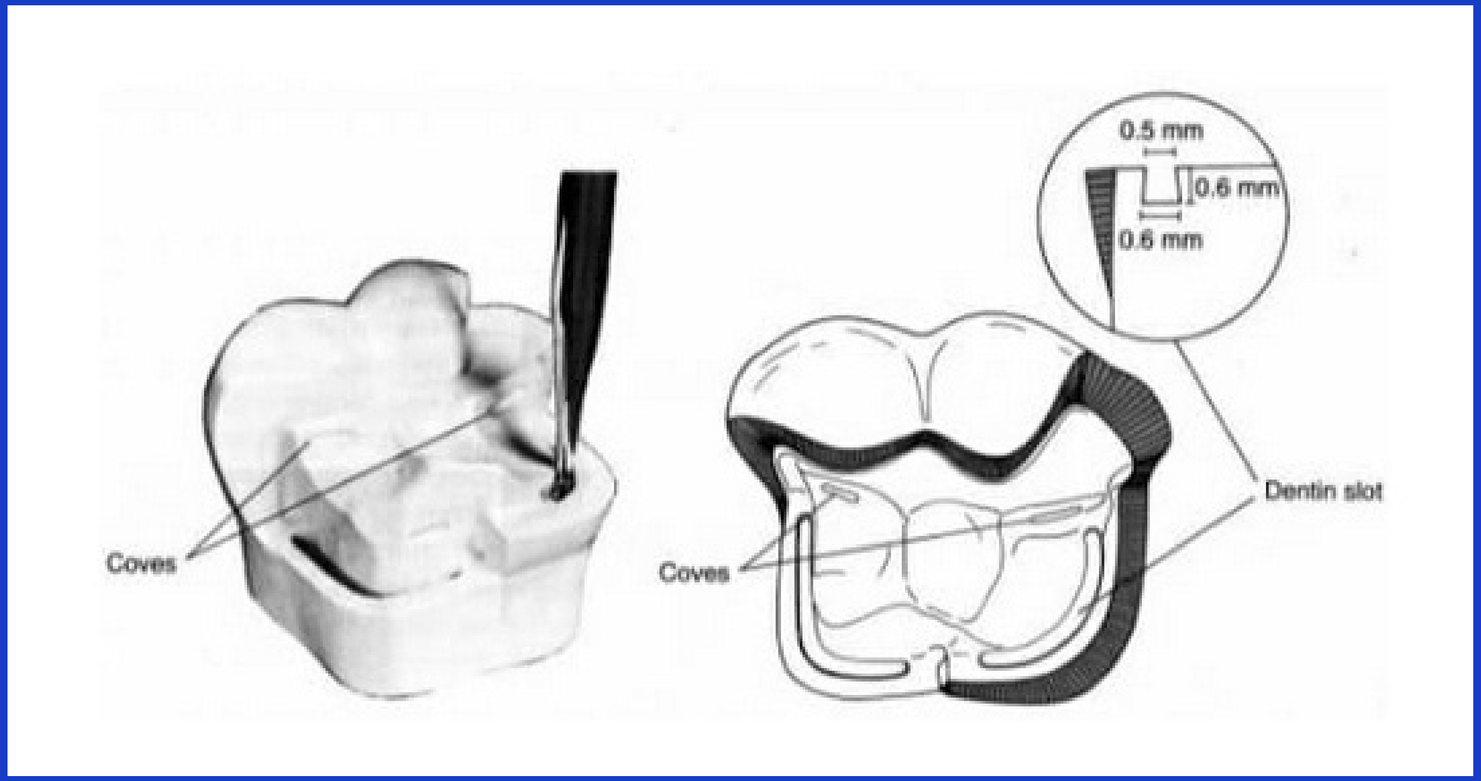
- Retention locks:
  - These are vertically oriented at maxillofacial and axio-lingual line angles
  - Should be placed 0.2mm inside the DEJ
  - Indicated in extensive proximal preparation; preparation with short walls

- Four characteristics of retention locks:
  - Position: Axiofacial and axio-lingual line angle
  - Depth: 0.5mm at the level of the gingival floor
  - Translation: No. 167L bur positioned parallel to DEJ so that it should bisect the axiofacial and axio-lingual line angles
  - Occluso-gingival direction


DEJ
View
A
B
C
0.5 mm depth of translation of tip of 169L bur (0.5 mm diam.) at gingival floor level
Lock is 0.2 mm from DEJ
Translation direction
D
E
DEJ
169L
c
If lock to fade out at occlusal DEJ, (c), bur is tilted at start of cutting to clear (c) 0.5 mm
F

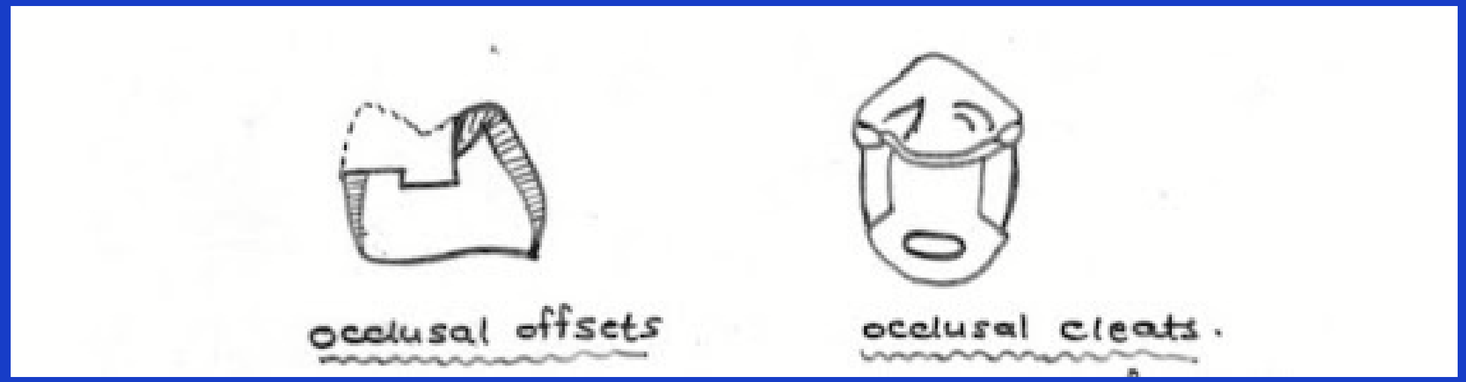
Slots:

- Horizontally placed retentive grooves in dentin primarily on gingival floors
- Indicated in crowns with short length and preparations with short walls



Pins:

- Small threaded structure placed in pinholes
- Placed in gingival seat/ axial angles
- The depth of pinholes is 2mm in dentin and 0.2mm in restoration
- Used when locks cannot achieve adequate retention form undercuts only
- Occlusal offsets and cleats:
- Horizontal grooves placed in a buccolingual direction prevents lingual displacement of restoration
- Occlusal cleats are placed in bulbous part of crown provide good anchorage



Other features of cavity design which helps to maintain the integrity of the restoration:

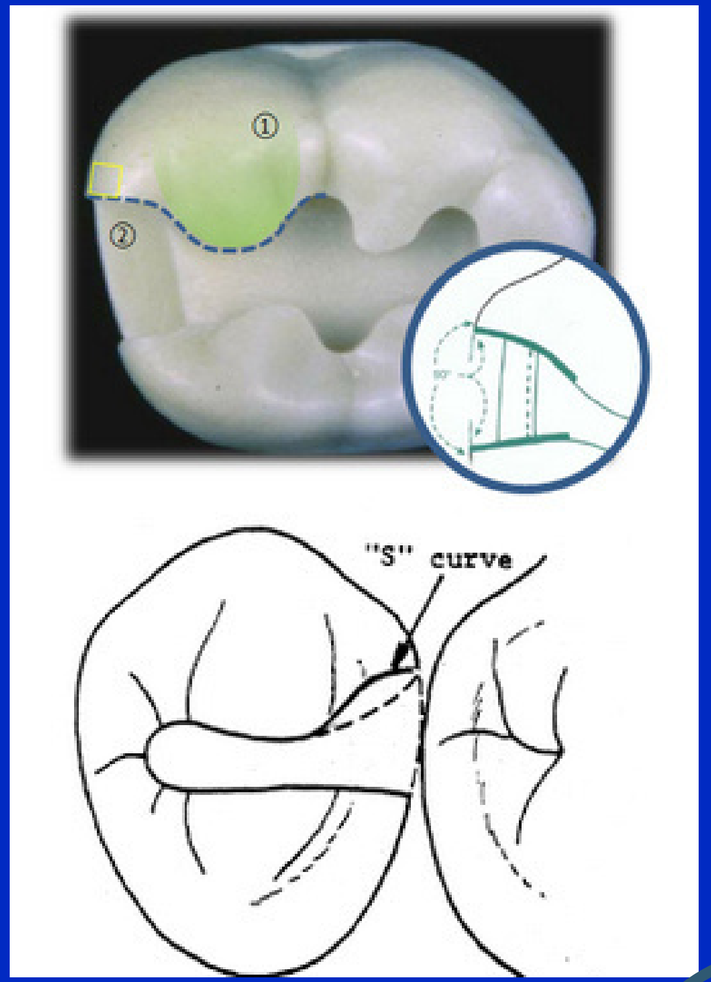
- Rounding of Axio-pulpal line angle
- Increasing depth of cavity near isthmus area
- Pulpal and gingival floor near isthmus should be perfectly flat By slanting the axial wall
- Every part of cavity preparation should be self retentive Remove all discontinuity in the preparation, i.e., scratches, grooves
- By eliminating the occlusal prematurities in the restoration

Reverse S Curve

- Develops while making mesio-facial enamel wall perpendicular to enamel rods
- Lingually reverse curve is very slight often unnecessary because of the large embrasure form.

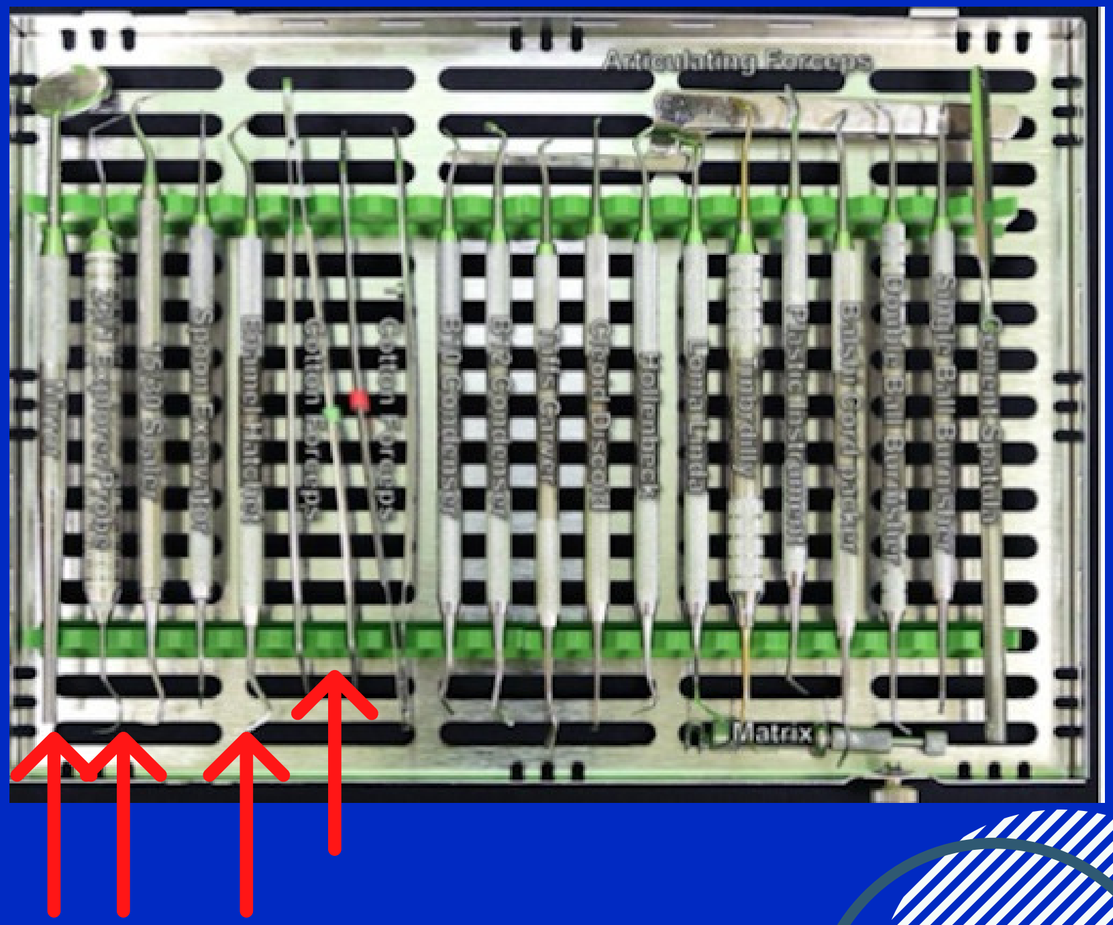
Created to provide:

- Butt joint in the preparation margin
- To relieve the contact
- To place the proximal margins in a self-
- cleansing area



Armamentarium

- Typodont
- Instrument cassette- Mouth Mirror, 23/1 Probe, Hemostat, Tweezer/cotton forceps,
- Class II: Hatchet, GMT
- Wooden wedges, matrix, metal bands (ultrathin, thin)
- Cotton rolls
- Burs
- Electric Handpiece



Bur Box

Difference between a #330 and #245?

#H7/330 | #245 | #H23/169L | #H31/556

Class II Amalgam Preparation - Criteria

Criteria	Description
Outline Form	• It should be smooth, flowy, and fluid • Circumvention and Centralisation • Occlusal Flare • The reverse S curve should not start in the proximal box • Should preserve the Oblique Ridge in the maxillary molars • Do not encroach Marginal Ridge integrity • Finger-like extensions not more than 0.5mm
Initial Depth	• The pulpal depth should be 1.5mm to 2mm • The axial wall height should be 3mm to 3.5mm • The axial wall depth should be 1.2mm to 1.4mm
Proximal Clearance	The buccal and lingual clearance should be 0.3mm to 0.5mm.
Gingival Clearance	• Gingival clearance should be 0.5mm. • Should restrict the gingival seat above the gingival margin

Class II Amalgam Preparation - Criteria

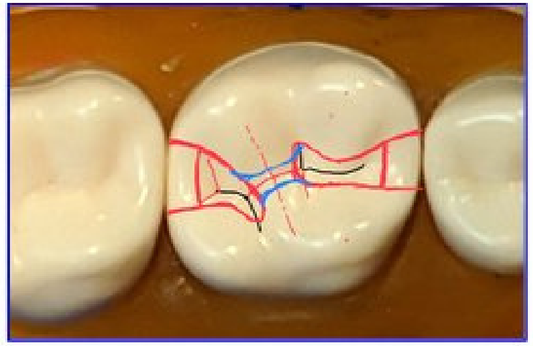
Criteria	Description
Internal Angles	Line angles and Point angles should be rounded and well-defined
Internal Walls	Pulpal floor and Gingival seat should be flat
Convergence	The buccal and lingual walls of the cavity should converge occlusally by 2 to 5 degrees
Dovetail	• The dovetail should be parallel to the adjacent marginal ridge • Distance of the dovetail from the marginal ridge in premolars should be 1.6mm and in molars be 2mm
Axial wall inclination	The axial wall should incline towards the center of the tooth
Axial wall curvature and bevel	• The axial wall should follow the curvature of the DEJ • The axiopulpal line angle should be beveled

Class II Amalgam Preparation - Criteria

Criteria	Description
Convenience form	• The Isthmus should be 1mm to 1.5mm • A small condenser should be able to walk through the cavity.
Cavosurface Angle	• It should be 90 degrees • No bevel present
Exit Angles	Both buccal and lingual exit angles should be 90 degrees
Operative Environment	• There should be no damage to the adjacent teeth and soft tissues • There should be no burn marks (especially when no coolant is given) • There should be no flash or debris present on the typodont
Secondary retention &resistance form	Pins, Slots, Coves, Groves, Locks

#3 MO

#18 MO

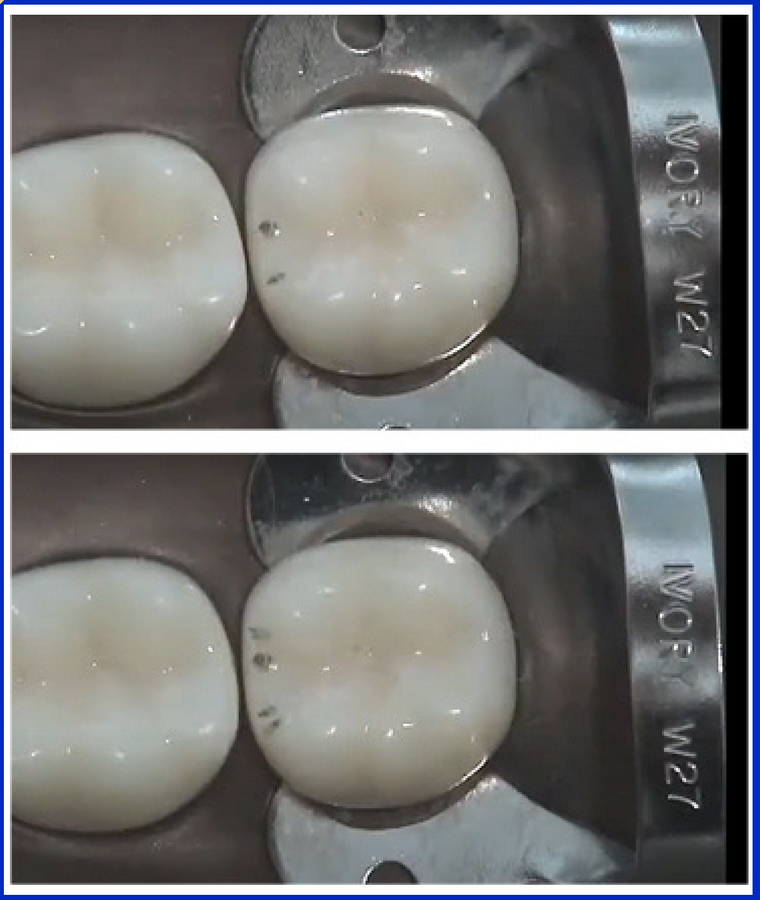


#19 MO

#29 MO

BASIC CONCEPTS

STEPS IN AMALGAM PREPARATION



First 10 minutes:

- Maintain Ergonomics- Thighs parallel to the floor, 11- 12 o'clock position, check the chair height, be comfortable with your surroundings.
- Try out your handpiece, check your burs, segregate the instruments you will be using, take note of the tooth you will be working on
- Check the tooth's stability of interest and check adjacent teeth for any damage.
- Spend 5 minutes imagining your markings and exit angles
- Take a pencil and mark the buccolingual extent of the proximal box

STEPS IN AMALGAM PREPARATION

OCCLUSAL CLASS I OUTLINE: 10min

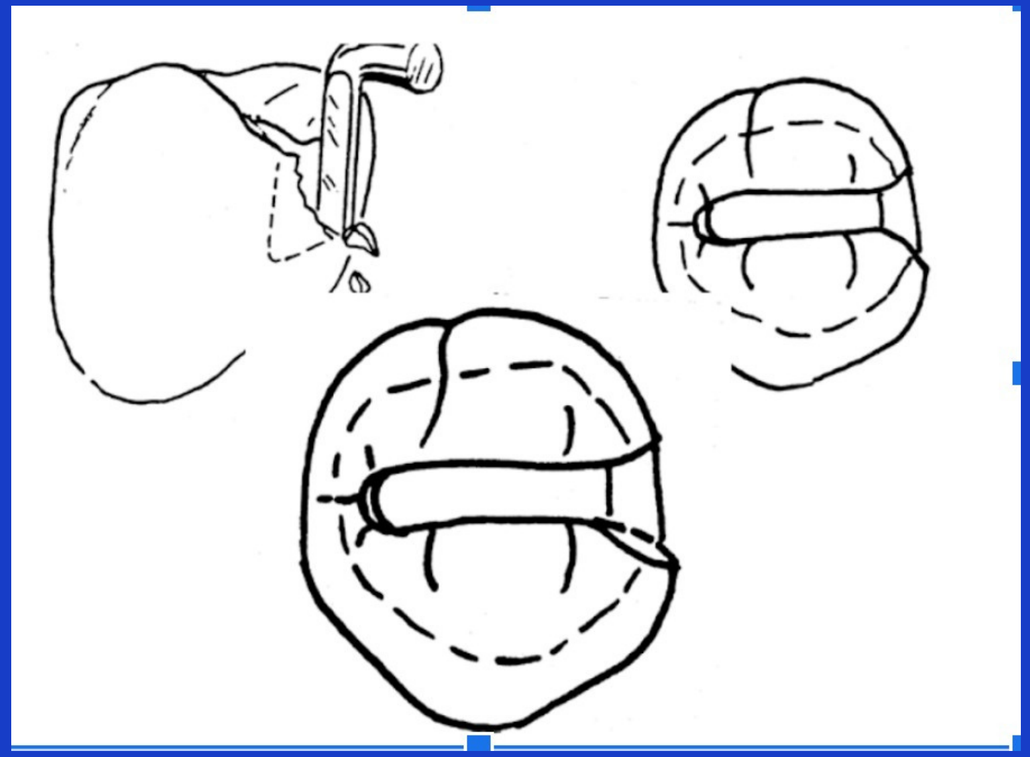
- Initial punch cut of 1 mm in depth at the central pit with 330
- Extend B-L and M-D along with the natural anatomy/ grooves of the tooth
- B-L extension should be minimal - 0.5 mm into the grooves

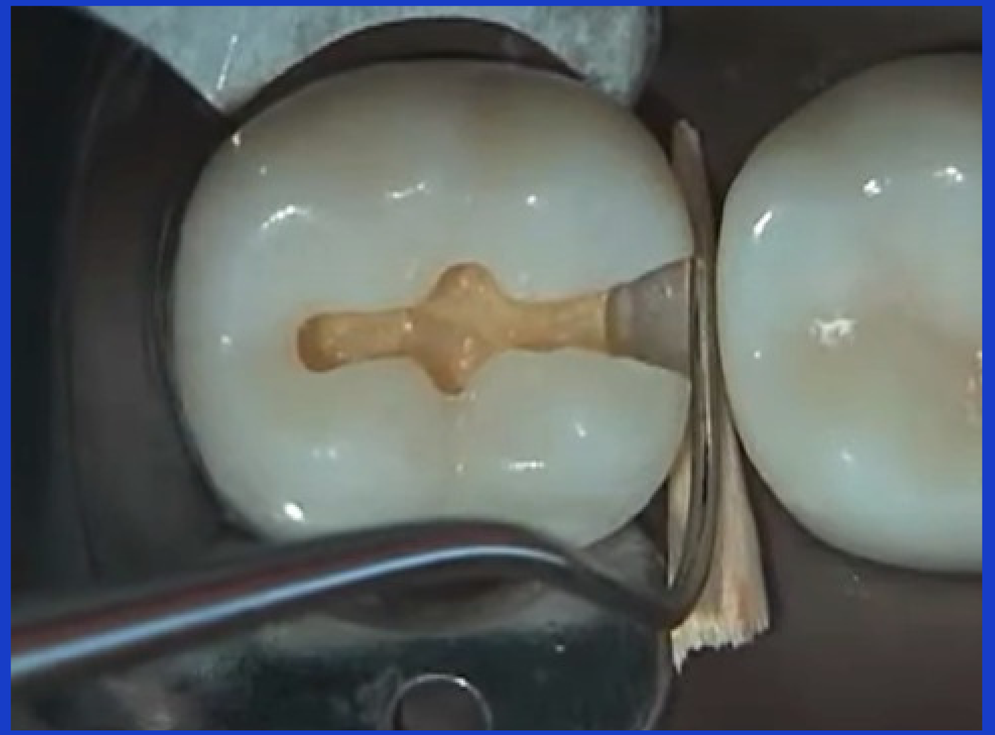
- Use a 330 bur to increase the width of the cavity and have a uniform depth of 1.5 mm.
- Adjacent tooth protection using the band technique or insert a wedge

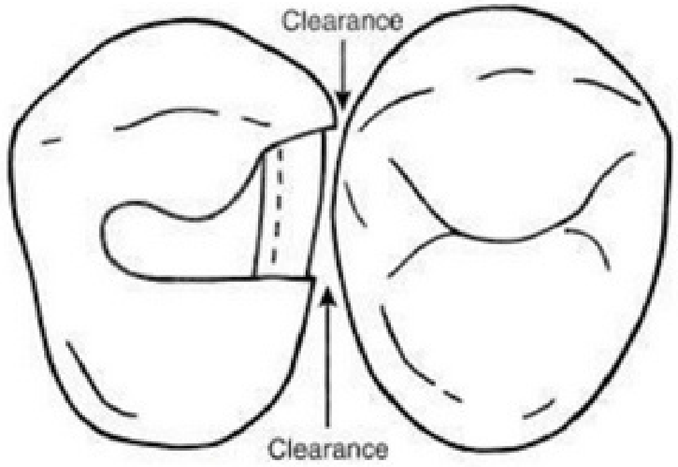
STEPS IN AMALGAM PREPARATION

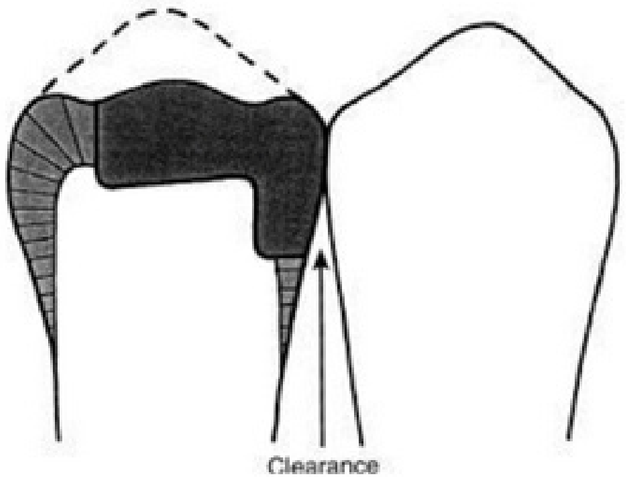
PROXIMAL BOX: 15 min

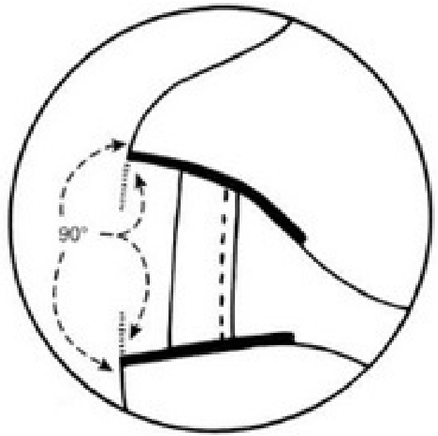
- Use 245 burs to make a ditch cut on the proximal side
- B-L motion and go deep
- Leave thin ledge of enamel, break off with a hatchet
- Check the gingival clearance - a probe should be able to pass through - beyond the contact area
- Check the B-L extension of the box.
- Check if the buccal and lingual walls are exiting at 90 degrees.
- Incorporate reverse curve in maxillary premolars and molars, and other teeth.
- Tip 169 burs by 5 degrees to give slight occlusal convergence

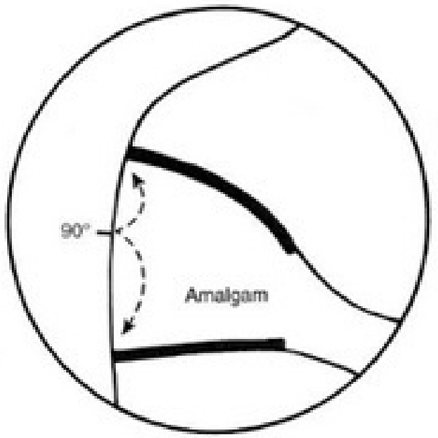




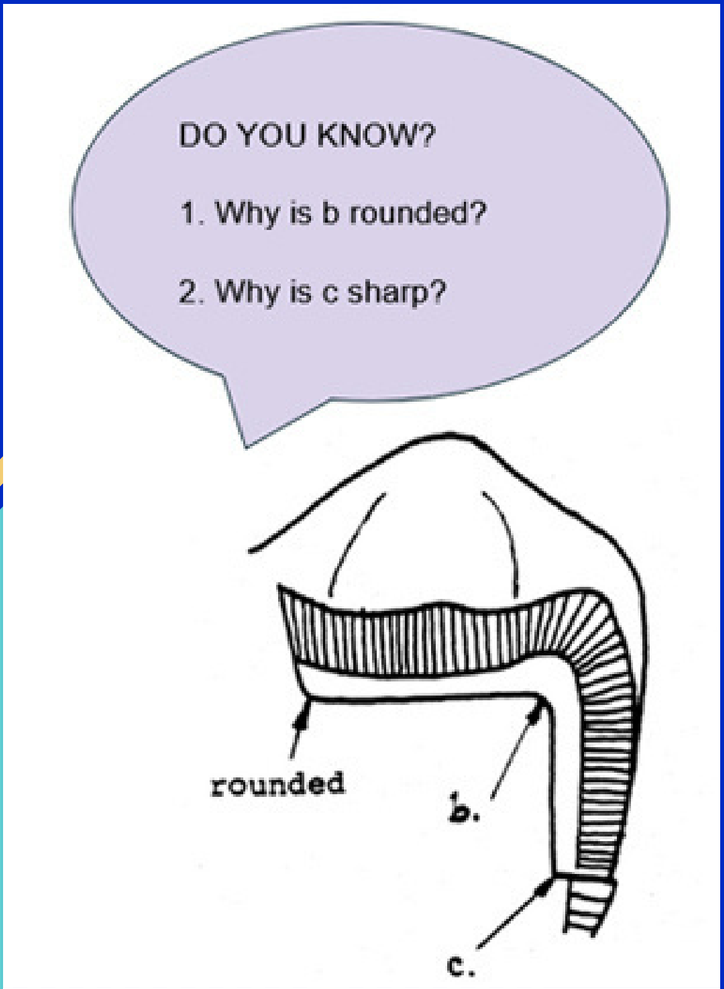

Clearance
Clearance


Clearance


90°


90°
Amalgam

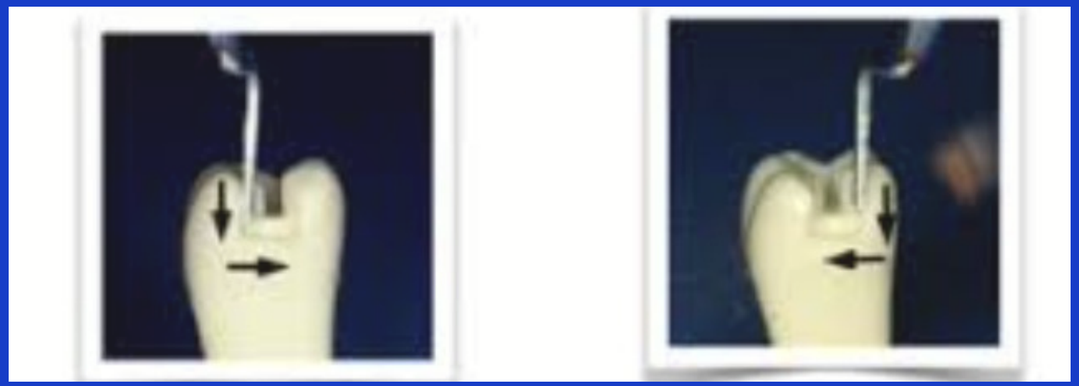
STEPS IN AMALGAM PREPARATION



SMOOTHENING THE PREPARATION: 5 min

- Use the 556 burs slow speed in the occlusal cavity to define the line and point angles.
- Use the 169L slow speed for the cavity walls to smoothen it.
- Use the hatchet to remove any spurs of enamel or irregularities.
- Make sure that the hatchet is sharp (a blunt hatchet may fracture the tooth)

STEPS IN AMALGAM PREPARATION



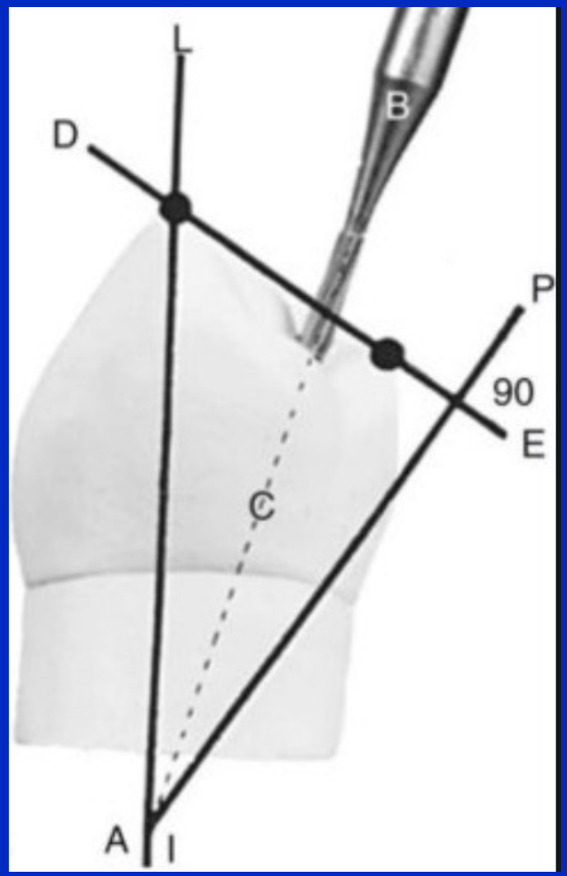
FINISHING: 5 MIN

- Round of the axio-pulpal line angle/ Bevel - Use hatchet/ GMT
- Remove undermined edges from the gingival cavosurface - Use hatchet/ GMT [Bevelling of the gingival cavosurface is not required)
- Check if there are any irregularities on the adjacent tooth surface - use a polishing strip if correctable.
- Retention grooves - Bucco-axio and Linguo- axio line angle
- Clean the operating field

Important Tips

- Give yourself at least three weeks of practice with specific typodont teeth.
- Indirect vision: Practice to keep air-rotor head and working field in the same line of axis
- The best Ergonomic position for mandibular posteriors is a 7'0 clock (Curve of Wilson)
- With all the markings, mark the axial wall too
- Create punch in the narrowest and straightest area of the central groove
- Keep #245 perpendicular or slightly tapered while placing the gingival seat
- Go very slow while making a proximal box; spend a minimum of 30 minutes
- Chip the proximal wall before the gingival seat placement for better visibility

- Break the contact area proximally before creating a Reverse S curve
- Use #245 at an angle for occlusal convergence in an occlusal segment
- Use an off-angle chisel to create Exit angles (No enamel spurs). Practice all the movements with a chisel and GMT Arrange dental tray in order: PPEs, cotton pellets, PMT's, Chisel, GMT's Ask for new burs from the proctor, if required Use ADEX criteria for self-evaluation
- Take only an experts' criticism
- Practice with the parameters once the school calls, especially if it's dry cutting. Use light and small strokes
- Mandibular first premolars: 30 degrees inclined pulpal floor Columbia typodont: fishtail
- Distal wall divergence



Mnemonic for your Amalgam Cavity

F - Flow (Outline)
O - Occlusal Depth
C - Circumvention
C - Centralisation
C - Curve (S)
C - Cavosurface Angle at Proximal Boxes
C - Clearance (Proximal, Gingival)
I - Isthmus (Width of the occlusal cavity)

I - Internal Line Angles (Axio-pulpal, gingival)
F - Floor (Pulp and Gingival)

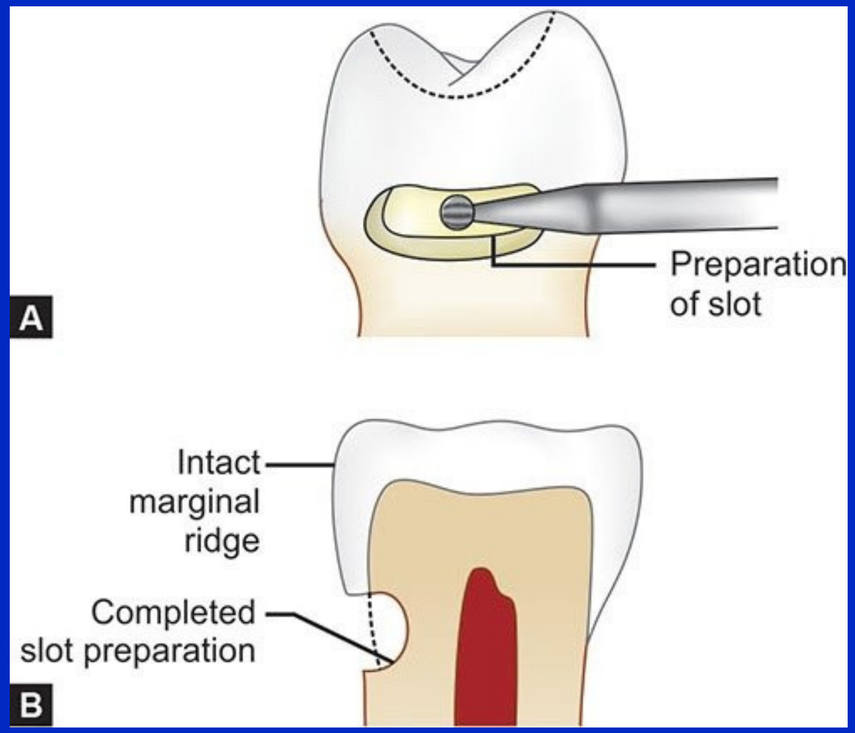
A - Axial Wall (Depth, Convexity, Divergence)

M - Marginal Ridge
C - Convergence (Occlusal and Proximal)
D - Dovetail (Form, Divergence)

Finish - Damage, Burn Mark, Roughness, Debris

FOCI (5C) IF A McD Finish

Modifications in class II cavity preparation

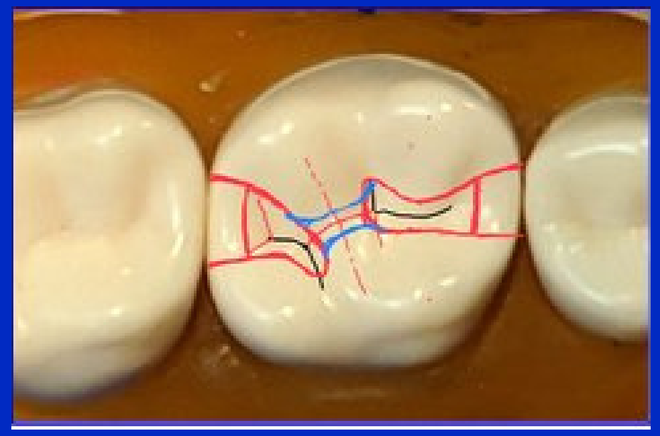


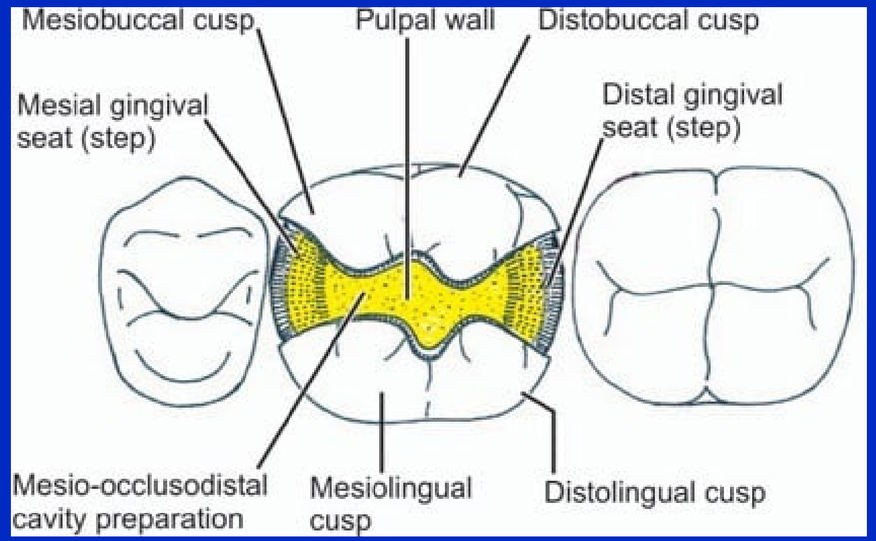
SLOT PREPARATION:

- Older patients with gingival recession assume that contact does not need restoration.
- Initial depth: 0.75-0.8mm at gingival aspect if the enamel is present.
- Infected caries were not removed at this stage, only at the end with a round bur.
- Prepare retention grooves with ¼ bur in occlusoaxial and gingivo axial line angles (0.2mm inside DEJ)

- The external wall should have a 90-degree cavosurface angle

MODs





- Indicated in the case where both proximal surfaces involved
- Both proximal surfaces share one pulpal floor
- Cavo-surface margin design should have a 90-degree configuration
- Secondary retention features should be included in the cavity preparation

Reasons for failure

- Due to faulty case selection
- Faulty cavity preparation
- Poor matrix adaptation
- Due to faulty amalgam manipulation

- Failure of Isthmus leads to insufficient bulk of amalgam
- The excessive flare of cavosurface margin leads to Marginal failure in the proximal box area
- Failure to extend preparation adequately leads to recurrent caries

- **At the microstructure level:**
  Corrosion and Tarnish
  Stresses associated with masticatory forces

Tip:

Victory is always possible for the person who refuses to stop fighting!!

Napolean Hill

References

- Conservative preparation designs for Class II amalgam restorations J R Sturdevant, DF Taylor, R H Leonard, WF Straka, T M Roberson, A D Wilder
- Sturdevant’s Art and Science of Operative Dentistry - 6th Edition
- Modified cavity preparation for class II amalgam restorations - Joseph Rubenstein

Thank You

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