

Class II Amalgam Restorations

Class II tooth preparation : preparation on the proximal surfaces of posterior teeth

This section introduces the principles and techniques of a Class II tooth preparation for an amalgam restoration involving a carious lesion on one proximal surface. For illustration, a mesio-occlusal (MO) tooth preparation on a mandibular second premolar is presented:

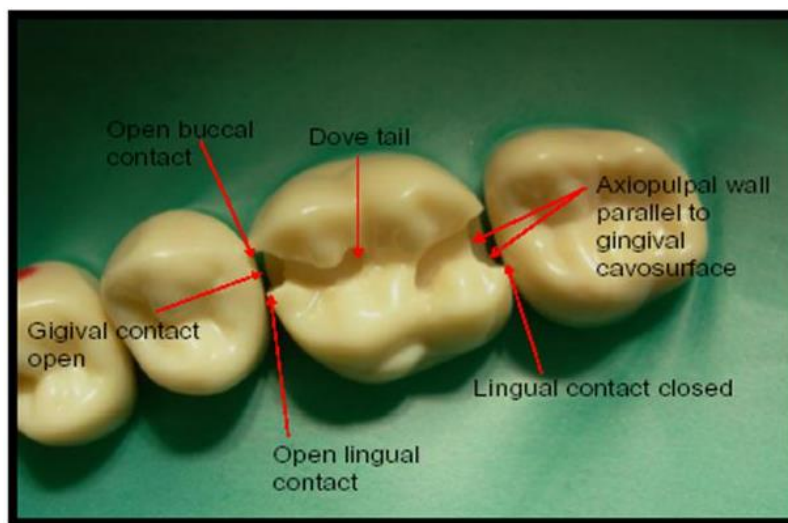


Figure 1

Initial Tooth Preparation:

- **Occlusal outline form (occlusal step):**

The occlusal outline form of a Class II tooth preparation for amalgam is similar to that for the Class I tooth preparation. Using high speed with air-water spray, enter the pit nearest the involved proximal surface with a punch cut using a No. 245 bur oriented as illustrated in Figure 2, A and B. During entering the pit, the bur should be rotating when applied to the tooth and should not stop rotating until removed. The long axis of the bur and the long axis of the tooth crown should remain parallel during cutting procedures.

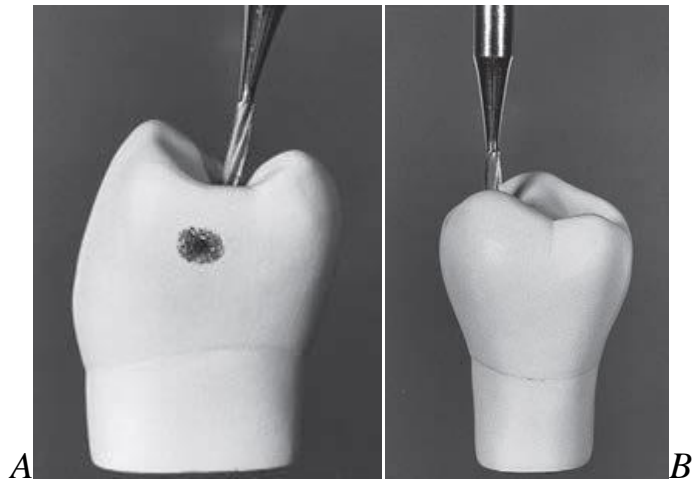


Figure 2: **A**, Bur position for entry, as viewed proximally. Note the slight lingual tilt of the bur. **B**, Bur position as viewed lingually.

The initial depth is 1.5 mm from the central pit and approximately 2mm from the prepared buccal and lingual walls. A target depth of 0.1–0.2 mm into dentin should be established (i.e., one-half to two-thirds the length of the cutting portion of a No. 245 bur)

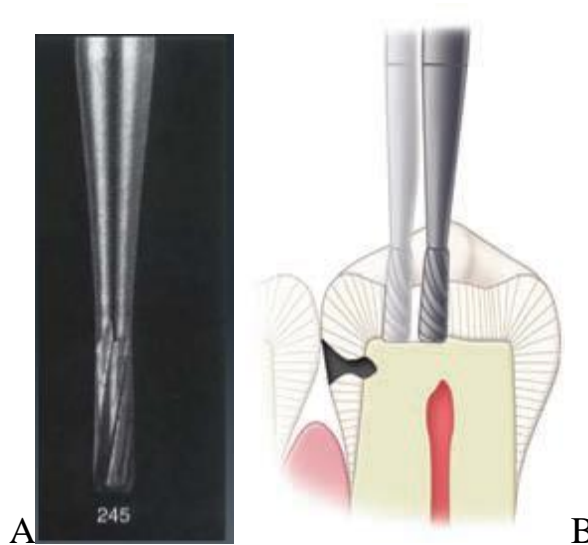


Figure 3: **A**:Bur No. 245(width 0.8mm length 3mm), **B**: The tooth is entered with a punch cut, and extension is done distally along central fissure at a uniform depth of 1.5 to 2 mm (1.5 mm at central fissure)

- For the very conservative preparation the isthmus width should be as narrow as possible, preferably no wider than one-quarter the intercuspals distance. Ideally, it should be the width of the No. 245 bur. Narrow restorations provide a greater length of clinical service. Generally, the amount of remaining tooth structure is more important to restoration longevity than is the restorative material used.
 - Maintaining the bur parallel to the long axis of the tooth crown creates facial, lingual, and distal walls with a slight occlusal convergence, which provides favorable amalgam angles at the margins. It may be necessary to tilt the bur to diverge occlusally at the distal wall if further distal extension would undermine the marginal ridge of its dentinal support.
 - During development of the distal pit area of the preparation, extension to include any distofacial and distolingual developmental fissures radiating from the pit may be indicated.
 - The distal pit area (in this example) provides dovetail retention form, which may prevent mesial displacement of the completed restoration.
 - A dovetail feature is not required in the occlusal step of a single proximal surface preparation unless a fissure emanating from an occlusal pit indicates it. However, without a dovetail the occlusal step should not be in a straight direction, which may reduce retention form.
 - This type of retention form is also provided by any extension of the central fissure preparation that is not in a straight direction from pit to pit. A dovetail outline form in the distal pit is not required if radiating fissures are not present.



Figure 4: Completed occlusal step.

- Before extending into the involved proximal marginal ridge (the mesial ridge, in this example), the final locations of the facial and lingual walls of the proximal box

are visualized. This action prevents overextension of the occlusal outline form (i.e., occlusal step) where it joins the proximal outline form (i.e., proximal box). Figure 5 illustrates visualization of the final location of the proximo-occlusal margins before preparing the proximal box.



Figure5: Visualize final location of proximo-occlusal margins (*dotted lines*) before preparing the proximal box.

Proximal Outline Form (Proximal Box)

The objectives for the extension of the proximal margins are as follows:

- ✓ Include all caries, defects, or existing restorative material
- ✓ Create 90-degree cavosurface margins (i.e., butt-joint margins)
- ✓ Establish (ideally) not more than 0.5 mm clearance with the adjacent proximal surface facially, lingually, and gingivally

The initial procedure in preparing the outline form of the proximal box is the **isolation of the proximal (i.e., mesial) enamel by the proximal ditch cut**. While maintaining the same orientation (parallel to the long axis of tooth crown) of the bur, it is positioned over the DEJ in the pulpal floor next to the remaining mesial marginal ridge (0.8mm from the mesial marginal ridge) (Figure 6).

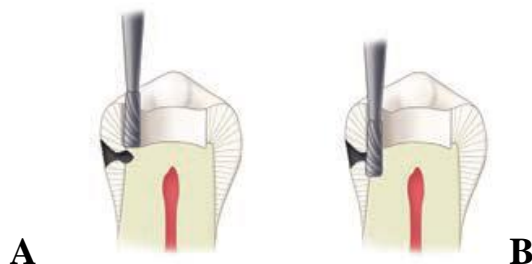


Figure 6: **A**, Bur position to begin the proximal ditch cut. **B**, The proximal ditch is extended gingivally to the desired level of the gingival wall (i.e., floor)

The end of the bur is allowed to cut a ditch gingivally while the bur is moved facially and lingually along the exposed DEJ. The ditch is extended gingivally just beyond the

caries or the proximal contact, whichever is the greater (figure 6 B).

Variance in gingival seat depth (figure 7)

- a. At minimal gingival extension.(in crown)
- b. At moderate extension.(0.5-0.6 mm of the root)
- c. At extension that places gingival margin at cementum. (0.75-0.8mm)in cementum.

**Axial wall dentinal depths:
crown, 0.5-0.6 mm
root, 0.75-0.8 mm**

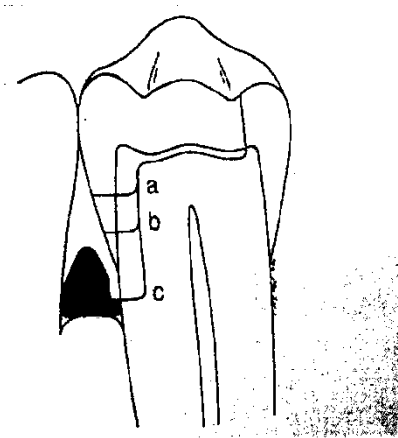


Figure 7

Side of the bur may emerge through the proximal surface at the level of gingival floor (Figure 8A).

Removing isolated enamel with spoon excavator to fracture out weakened proximal enamel (Figure 8B).

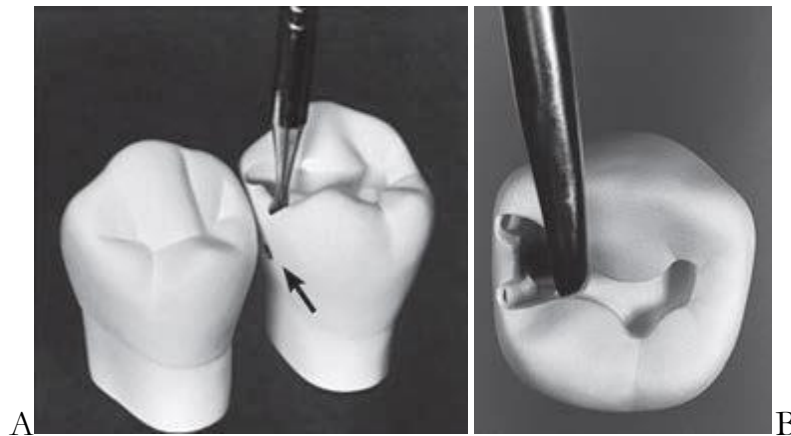


Figure 8 :A, The side of the bur may emerge slightly through the proximal surface at the level of the gingival floor (*arrow*). **B,**Using a spoon excavator to fracture the weakened proximal enamel.

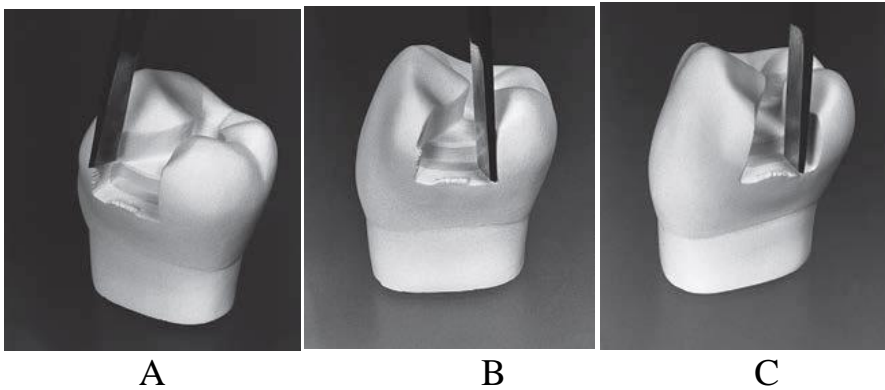


Figure 9: Occlusal view with the proximal enamel removed



Figure 10: Proximal view with proximal enamel removed

Removing remaining undermined proximal enamel, with enamel hatchet, on facial proximal wall (Figure 11A), the lingual proximal wall (Figure 11B), and the gingival wall (Figure 11C).



CLEARANCE:

When a small lesion is prepared, gingival margin should clear adjacent tooth by 0.5 mm. This clearance can be measured by passing the side of the explorer. The diameter of the tine of a No.23 explorer is 0.5mm, 1/4 inch (6.3mm) from its tip (Figure 12).

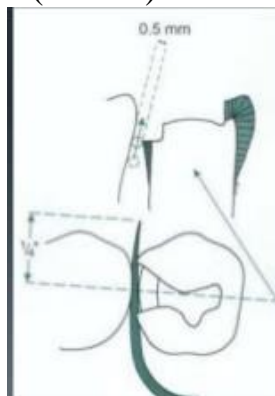


Figure 12

Retention form

1. In addition to the convergence of the buccal and lingual walls of the occlusal class I cavity, and the dovetail. We do convergence of the buccal and lingual walls of the box occlusally to ensure that the buccolingual dimension of the box is greater gingivally than occlusally.
2. Flat gingival wall (seat) to prevent dislodgement of the restoration.
3. Retentive grooves,,: using a small fissure bur to make a retentive grooves on axiobuccal and axiolingual line angles, they should be placed in dentine because its resiliency.

Resistance form

1. width of the cavity $\frac{1}{4}$ of intercuspal distance.
2. cavosurface line angle (90° - 110°).
3. Axiopulpal line angle is beveled. To eliminate stress concentration on the restoration.
4. Gingival cavosurface line angle is beveled. To remove the unsupported enamel
5. rounded internal line angles.
6. Removal of the unsupported enamel.

Note : the buccal and lingual walls of the box is diverge proximally to free them from the contact and to remove the unsupported enamel , but the restoration will -not be dislodged proximally , due to the retention means in the occlusal cavity , the dovetail act as a lock preventing the restoration from being dislodged proximally, in addition to the retention grooves.

Isthmus: is the area present at the junction between the occlusal part and proximal part of the cavity (proximal box), it should be as narrow as possible ($\frac{1}{4}$ of ICD) to reduce the force on it and prevent fracture of the restoration. The depth of Isthmus is 1.5 – 2mm to have a good bulk of the restoration at this area.

Convenience form

The axial wall should be parallel to the long axis of the tooth, to have a good accessibility to the deepest point of the cavity.

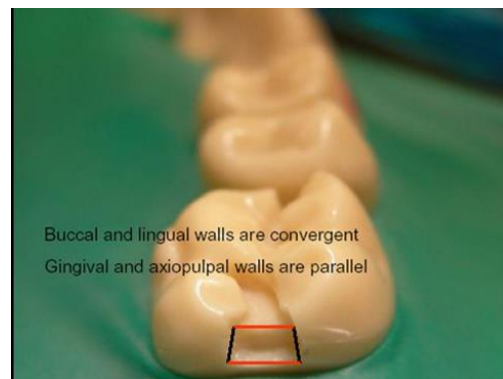
CHECK LIST AFTER CLASS II PREPARATION:

1. The Buccal and lingual contacts are just broken, enough to let the tip of the explorer pass through.
2. The lingual clearance could be a little more.



Figure 13

3. The Gingival contact just broken, just enough to reach and finish these areas when placing the restoration.
4. All the buccal and lingual walls of the preparation should be convergent.
5. Note the occlusal convergence of buccal and lingual walls and parallelism of gingival and axiopulpal walls. The occlusal convergence of the walls offers retention in the proximal portion of the cavity against displacement occlusally.
6. Note all the cavosurface margins are smooth.
7. The occlusal preparation follows the central groove, with the preparation width of not more than $\frac{1}{4}$ th the occlusal table.
8. The axio-pulpal and other line angles should be rounded, (Axio pulpal line angle should be beveled by gingival marginal trimmer this is resistance form preventing fracture of amalgam restoration at isthmas area).
9. The parallelism of occlusal table, pulpal floor and gingival floor.



10. Make all walls approximately 90 degrees to cavosurface.

Final tooth preparation:

- ☒ **Removal of any remaining defective enamel and infected carious dentine:** the presence of carious dentine on a portion of either the pulpal or axial wall does not indicate

deepening the entire wall. The infected carious dentine is removed with slowly revolving round bur of appropriate size or with discoid type spoon excavator or both(Figure 14).

☒ **Pulp protection**

☒ **Secondary resistance and retention form:** In large class II we have to place extra retention means by placing grooves at axiofacial & axiolingual line angle with 0.5 mm in dentin (Figure 15).

☒ **Finishing external wall**

☒ **Final procedure :cleansing, inspecting and desensitizing .**

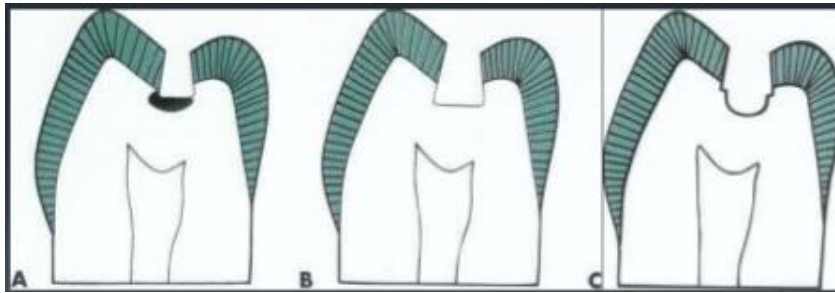


Figure 14: Management of small- to moderate-sized carious lesion on the pulpal wall. A, Infected carious dentin extending beyond the ideal pulpal wall position. B, Incorrect lowering of the pulpal wall to include infected carious dentin. C, Correct extension facially and lingually beyond the infected carious dentin. Note the excavation below the ideal pulpal wall level and the facial and lingual seats at the ideal pulpal wall level.

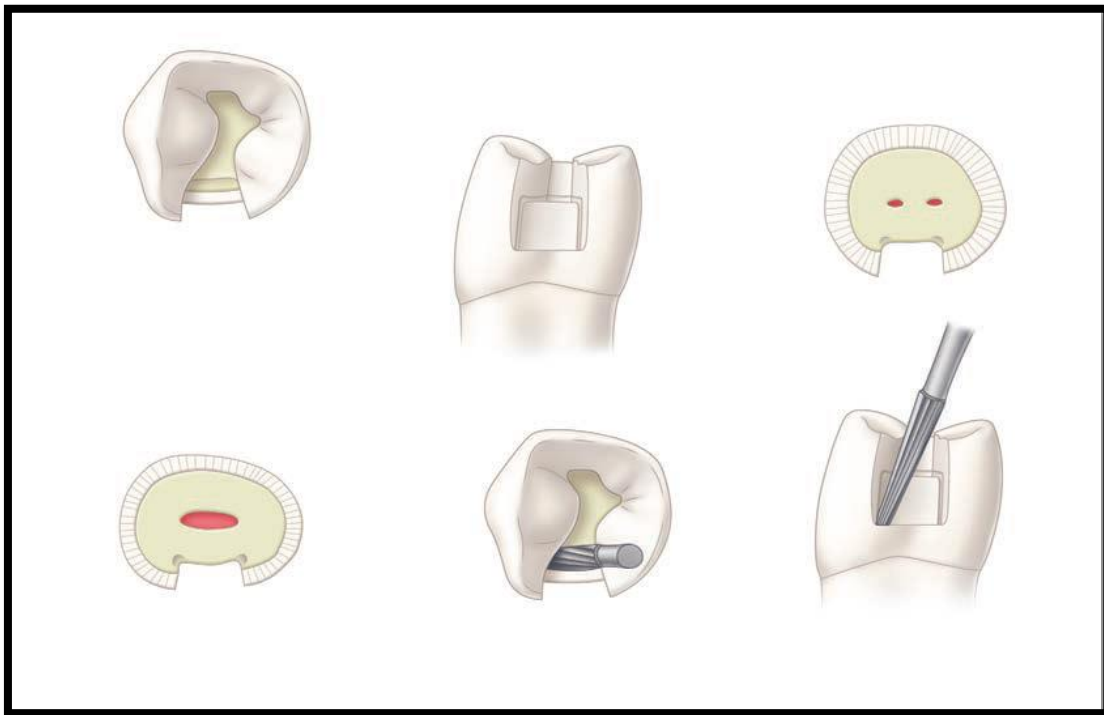


Figure 15