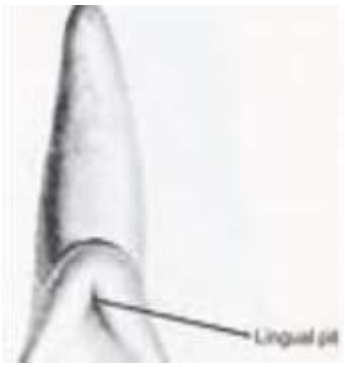
Class I cavity preparation for amalgam restoration

CLI preparation includes cavities in these surfaces:

- Occlusal pits and fissures of premolars and molars
- Facial & lingual pits and fissures of mandibular molars
- Palatal of maxillary incisors, most frequently in the pit near the cingulum





Objectives of cavity preparation:

1. Remove diseased tissue as necessary and at the same time provide protection to the pulp.
2. To locate the margins of the restoration as conservatively as possible.
3. To ensure the cavity form, it should not be under the force of mastication of the tooth.
4. To allow the functional placement of the restorative material.

Steps in the cavity preparation (Given by G. V. Black)

Initial Tooth Preparation Stage

Step 1: Outline form and initial depth
Step 2: Primary resistance form
Step 3: Primary retention form
Step 4: Convenience form

Final Tooth Preparation Stage

Step 5: Removal of any remaining infected dentin and or old restorative material, if indicated
Step 6: Pulp protection, if indicated
Step 7: Finishing of the Enamel Walls and Margins
Step 8: Final Cleaning and Inspection of the Preparation

Step 1: Outline form and initial depth

Outline form: This means extending the preparation margins to the place they will occupy in the final preparation, avoiding ending preparation margins in high-stress areas like the cusp tip and crest of the ridges, and placing the margins on sound tooth structure.



Principles

The three general principles:

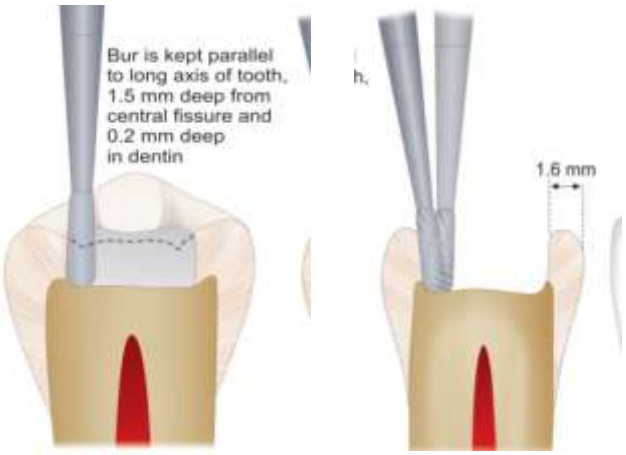
1. All friable and/or weakened enamel should be removed.
2. All faults (defective) should be included.
3. All margins should be placed in a position to afford good finishing of the margins of the restoration

Procedures:

1. Begin the Class I occlusal tooth preparation by entering the deepest or most carious pit with a punch cut using the No. 245 carbide bur at high speed with air-water spray (depth of cavity preparation, 1.5 mm (half the length of bur, i.e., 3 mm),
2. A punch cut is performed by orienting the bur so that its long axis parallels the long axis of the tooth crown, and then the bur is inserted directly into the faulty pit.



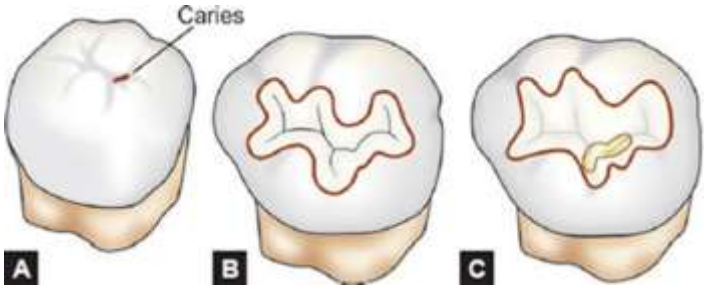
3. Maintain the initial depth of 1.5 mm from the central fissure at least 0.2–0.5 mm in dentin. While maintaining the same depth and bur orientation, move the bur to include defective pits and fissures.
4. Extend the margin mesially and distally but do not involve marginal ridges. These walls should have a dovetail shape to provide retention to the restoration.
5. While working towards the mesial and distal surface, orient the bur toward the respective marginal ridge. This results in a slight divergence of mesial and distal walls, which helps to provide dentinal support for marginal ridges.



6. Isthmus width should not be more than one-fourth of intercuspal distance.
7. Deep pit and fissure defects less than 0.5 mm apart should be included in the outline form
8. External outline form should have smooth curves, straight lines, and rounded angles. All unsupported and demineralized enamel should be removed.

Extension for Prevention

- GV Black noted that, in tooth preparations for smooth-surface caries, the restoration should be extended to areas that are normally self-cleaning to prevent the recurrence of caries. This principle was known as extension for prevention and was broadened to include the extension necessary to remove remaining enamel defects, such as pits and fissures. Therefore, restored teeth are stronger and more resistant to fracture



Enameloplasty

- The procedure of reshaping the enamel surface with suitable rotary cutting instruments is sometimes a pit or groove.
- Enameloplasty is done whenever required to remove sharp and irregular enamel margins by “rounding” or “saucering”, thereby converting these into self-cleansable areas. Enameloplasty should not extend the outline form.



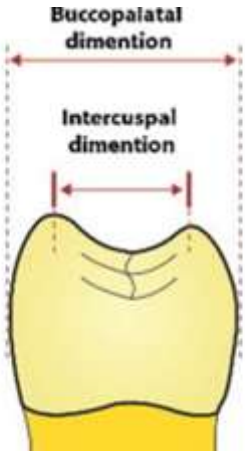
Step 2: Primary resistance form

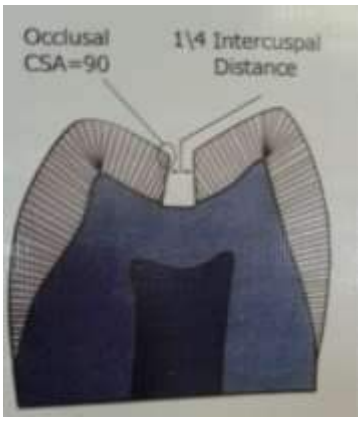
It is the shape of the cavity that enables both the tooth and restoration to withstand occlusal forces without fracture

Primary resistance is achieved by having the following features in the preparation:

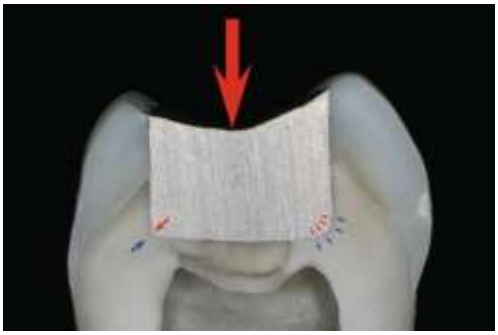
A. Prevention of fracture of the tooth includes :

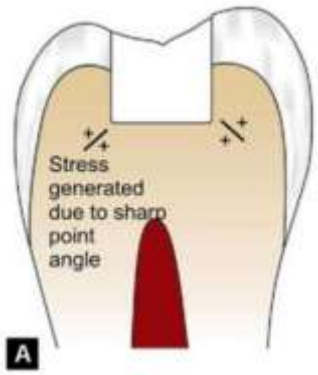
1. Box-shaped preparation with flat floors: This helps the tooth to resist occlusal masticatory forces without fracture (to prevent stress concentration area.)
2. Maintaining minimal width of cavity which is not more than 1/4th of intercuspal distance.





3. Removal of unsupported enamel by making the margin (90º-110º) because less than 90º the tooth is more subjected to fracture
4. Mesial & distal walls of the cavity should be parallel and slightly diverge occlusally to be within the enamel rod direction and prevent any unsupported enamel at the marginal ridge.
5. All internal line and point angles should be rounded to prevent stress concentration area

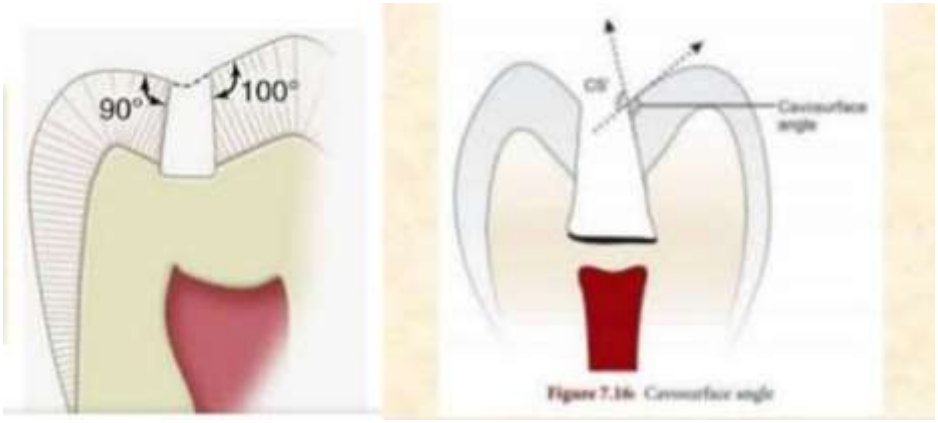




B. Preventing fracture of restoration that includes:

1. Minimum occlusal depth of 1.5 mm, to provide an adequate thickness of amalgam
2. The pulpal floor should be smooth to prevent concentration area on restoration
3. Facio-lingual width should be 1\4 intercuspal distance because a large surface area exposed to more force and fracture occurs.

4. The margins or Cavosurface line angle should be (90º-110º) if more than this lead to fracture of the restoration



Step 3: Primary retention form

Primary retention form is that shape or form of the conventional preparation that resists displacement or removal of the restoration from tipping or lifting forces.

To provide retention, the cavity should have the following:

1. Opposing wall should be parallel to each other or converge occlusally (2-5º). This convergence is done on the buccal and lingual walls.
2. The floor of the cavity should be flat to prevent restoration movement.
3. The outline form should be small as possible to prevent displacing force on it (Occlusal dovetail)



Step 4: Convenience form

Is the shape of the cavity that allows adequate observation, accessibility this achieved by giving good depth (1.5-2mm) and width (1\4) intercuspal distance

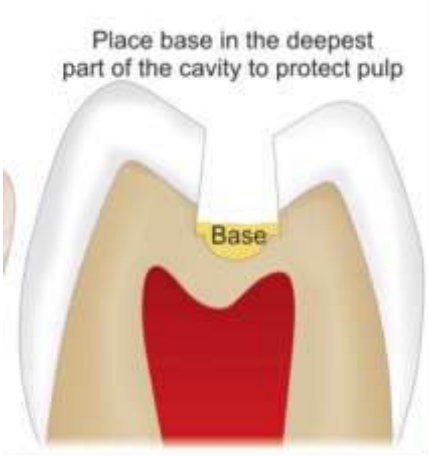
Step 5: Removal of any remaining infected dentin and or old restorative

In this, remaining caries, old restorative material, and adjacent deep pits and fissures are removed and involved in the preparation. In the large preparations with soft caries, the removal of carious dentin is done with a spoon excavator or slow-speed round bur. In this, a stepped or two-level pulpal floor is made, i.e. only a portion of the tooth that is affected by caries is removed, leaving the remaining floor untouched



Step 6: Pulp protection, if indicated

- The base is not required in shallow preparations (1.5-2.0 mm deep). In these cases, only varnish is used.
- In a deep preparation, a base is placed in the deepest part in the thickness of 0.5–0.75 mm, so as to protect the pulp



Step 7: Finishing of the Enamel Walls and Margins

At this stage, all unsupported enamel is removed. Cavosurface angle should be made 90° butt joint type. This provides bulk to restoration, which in turn, provides maximum strength

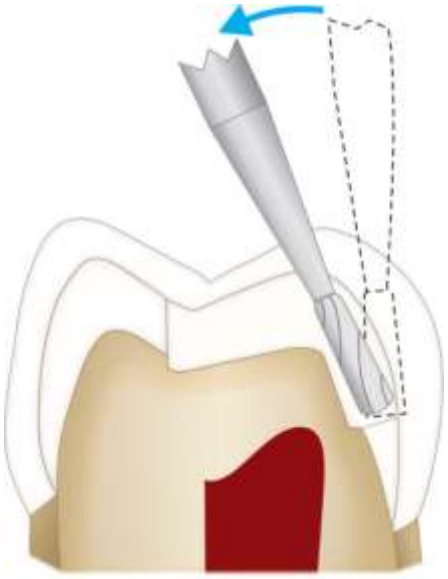
Step 8: Final Cleaning and Inspection of the Preparation

The final stage of cavity preparation is to clean the preparation thoroughly with water and air spray. Then dry it with moist air and inspect it for final approval

Cavity preparation on Occlusal Surface with Buccal or Lingual extension

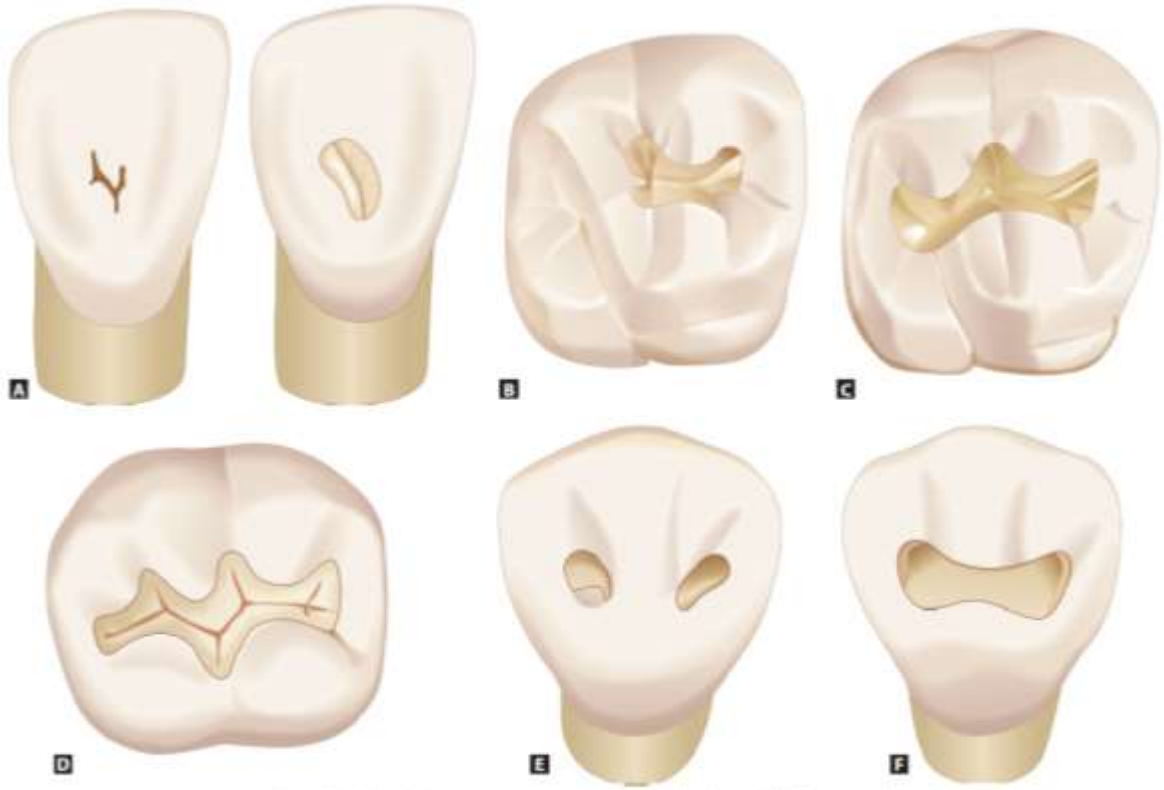
1. To prepare the lingual surface, hold the bur parallel to the lingual surface
2. Inclined the bur facially to establish the axial wall of the lingual portion

3. The axial wall should follow the contour of the lingual surface of the tooth and it should be 0.2 mm in the dentin
4. Make a box-shaped preparation with parallel mesial or distal walls
5. Round off the axiopulpal line angle
6. Accomplish the final tooth preparation by removal of remaining caries and pulp protection. finally, inspect the prepared cavity for amalgam restoration



Cavity preparations on Occlusal Surfaces of Different Teeth (Figs. A to F)

a. Cavity preparation on maxillary incisors (Fig. A).
b. Conservative preparation on occlusal surface of maxillary first molar (Fig. B).
c. Conventional preparation on occlusal surface of maxillary first molar (Fig. C).
d. Conventional preparation on occlusal surface of mandibular first molar (Fig. D).
e. Conservative preparation on occlusal surface of mandibular first premolar (Fig. E).
f. Conventional preparation on occlusal surface of mandibular premolar (Fig. F).



Figs. 19.12A to F: Cavity preparations on occlusal surfaces of different teeth.