

**Clinical Technique for Class I Amalgam Restorations**

**Class I refers to**

- Restorations on the occlusal surfaces of posterior teeth,
- The occlusal two thirds of facial and lingual surfaces of molars,
- The lingual surfaces of maxillary incisors.

**These lesions are clinically characterized by:**

1. A small surface opening which may remain unnoticed until the lesion becomes of a considerable size.
2. A conical spread in both enamel and dentin, with the bases of cones at the Dentino-enamel Junction.

**Principles of class I Cavity preparation.**

**I. OUTLINE FORM :** The outline form for the Class I occlusal amalgam tooth preparation should include only the defective occlusal pits and fissures in a way that sharp angles in the marginal outline are avoided (Smooth flowing, regular curves).

Angular irregularities in the outline are susceptible to fracture during condensation, and a smooth flowing outline is easier to visualize and carve following condensation.

**II. EXTENSIONS** - Conservation of tooth structure is the basis for all cavity preparations in order to preserve the strength of the tooth.

However, sufficient extension of cavity preparations is necessary to ensure access (convenience form) for instrumentation, removal of defective tooth structure, insertion and finish of the restorative material, and maintenance of the restoration (prevention).

**A. Extensions include:**

1. Caries and decalcifications
2. Enamel unsupported by sound dentin
3. Pits and fossae
4. Major fissures and grooves

## 5. Existing restorations

eliminates defective tooth structure and eliminates areas (pits, fissures, etc.) which are susceptible to recurrent caries and facilitates oral hygiene procedures (extension for prevention).

### **B. Bucco - lingual extension**

1. Extend fully in areas of buccal and lingual 'grooves' to terminate on smooth surfaces.

To allow a smooth tooth-restoration margin to be created (easier to finish and keep clean).

2. Extend minimally in areas of triangular ridges (optimal isthmus width is  $\frac{1}{4}$  intercuspal distance or less) terminating on smooth surfaces. to preserve the strength and function of the cusps while eliminating susceptible grooves or defective , tooth structure (must be wide enough to allow condensation).

### **C. Mesio-distal extension**

1. Stop short of the marginal ridge crest, to preserve strength of marginal ridges.

2. Parallel the contour of the marginal ridge, to preserve a uniform bulk (strength) to the marginal ridges.

3. Groove extensions are kept narrow (mesio-distally) where possible (consistent with access for condensation and outline form), terminating on smooth tooth structure, to preserve strength of cusps while eliminating susceptible grooves and/or defective tooth structure (must be at least as wide as the narrowest condenser).

4. If marginal ridge is unsupported or very thin it should be included, resulting in a Class II preparation.

If not included the marginal ridge may fail (amalgam will be stronger than the unsupported enamel)

## **III. RESISTANCE/ RETENTION FORM**

**A. Depth** =  $\frac{1}{2}$  mm into dentin (approx. 2 mm measured at triangular ridges). The Minimum depth required to provide sufficient bulk to prevent fracture and retain the amalgam.

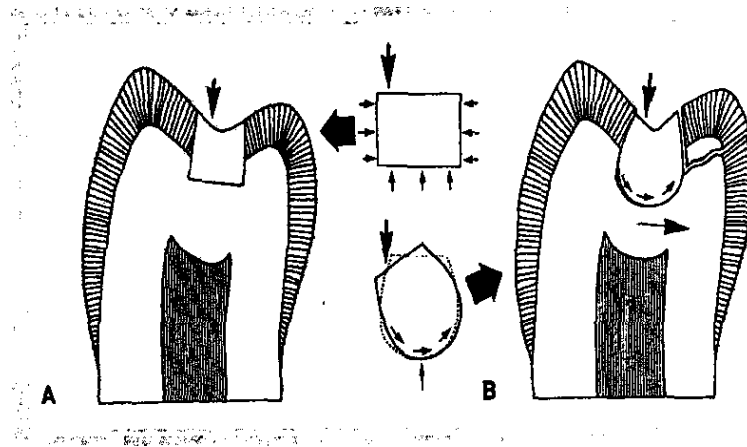
### **B. Pulpal floor**

1. Smooth and flat

Uniform thickness of restorative material.

## 2. Parallel to the occlusal plane

resists occlusal stress (resistance form) and forces of condensation.



## C. Buccal and lingual walls

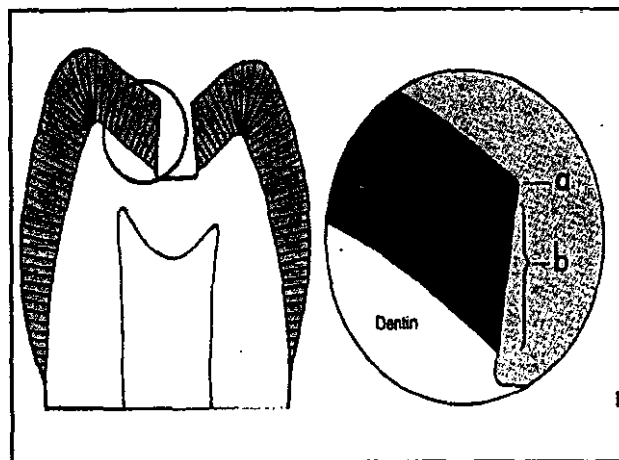
1. Smooth and curved mesio-distally.
2. Smooth and straight pulpo-occlusally.

Facilitates adaptation of amalgam and elimination of weak tooth structure.

3. Converge slightly pulpo-occlusally in areas of triangular ridges ( $6^\circ$ ).

To provide mechanical lock or retention to the occlusal portion and create bulk at the margins.

4. Diverge slightly pulpo-occlusally in buccal and lingual groove extensions ( $6^\circ$ ), protects buccal and lingual surfaces from being undermined (RESISTANCE FORM).



#### **D. Mesial and distal wall**

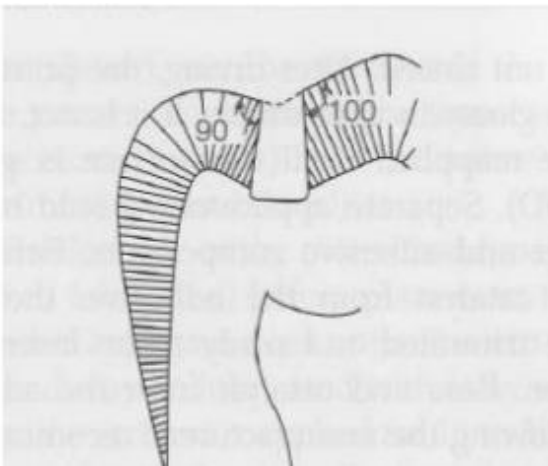
1. Smooth and straight, facilitates daptation of amalgam and elimination of weak tooth structure.
2. Diverges slightly pulpo-occlusally (forms an obtuse angle with pulpal floor). Protects marginal- ridge form being undermined or, weakened (enamel must be supported be dentin)

#### **IV.CAVITY FINISH**

**A.** Pulpo-occlusal line angle is well defined and follows general configuration of cavosurface outline, increases retention of the amalgam restoration and preparation is more easily visualized.

**B.** Cavosurface margins 90-100 degree

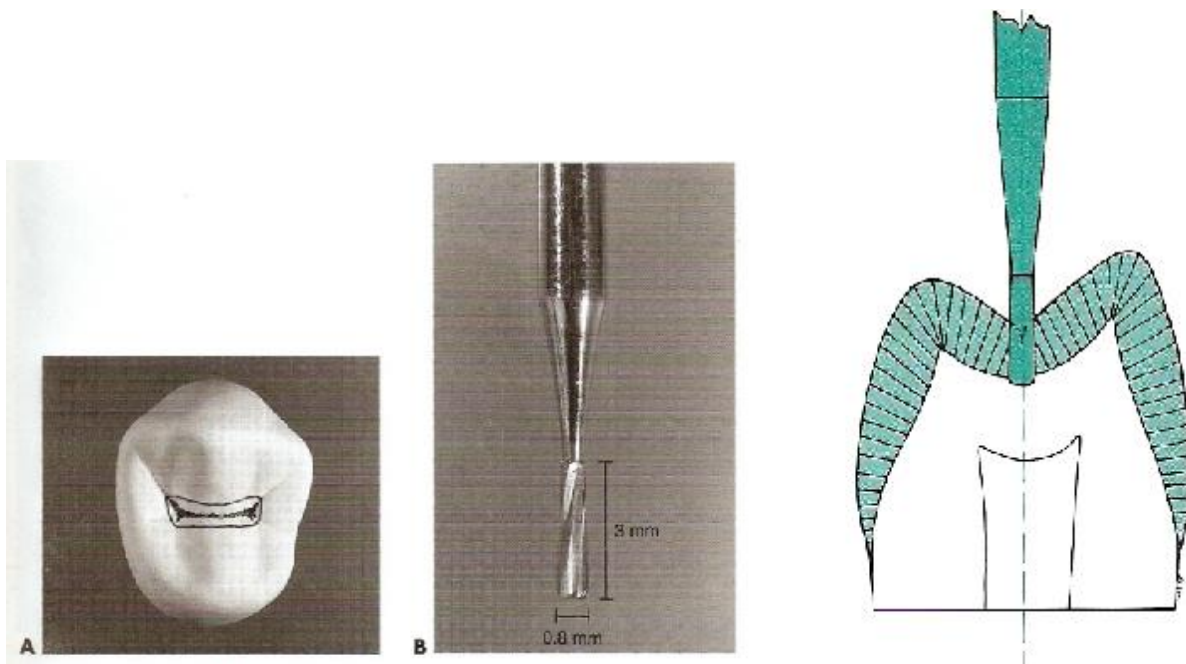
1. Sharp (well defined) easier to visualize and carve
2. Sound (well supported) Provides marginal integrity.



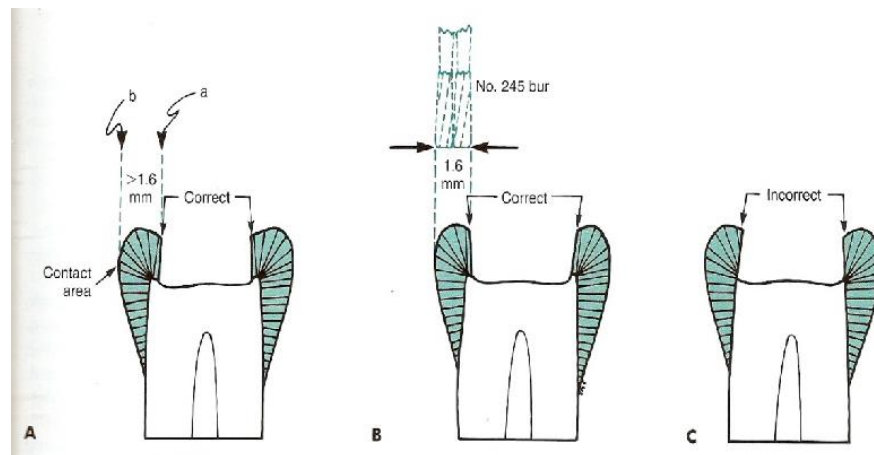
Enamel cavosurface angles of ( 90 to 100 )degrees are ideal.

**C. Cleanliness** - cavity is free of debris and moisture.

Facilitates adaptation of amalgam to the cavity and improves the physical properties of the restoration by elimination of void or foreign material.



Outline and entry. **A**, Ideal outline includes all occlusal pits and fissures. **B**, Dimensions of head of a No. 245 bur. **C**, the bur should be perpendicular to the occlusal surface.



Mesio-distal extension

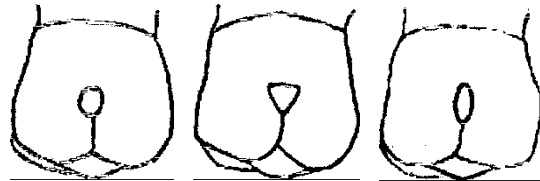
**Buccal Pit Cavities:**

The outline of these cavities usually described as a triangle with its base forming the gingival wall and its sides forming the mesial and distal walls.

The gingival wall is placed at or slightly occlusal to the height of contour of the tooth.

- All walls are extended just enough to eliminate defective enamel and dentin.

- The enamel walls are planned in the direction of enamel rods and perpendicular to the axial wall.
- Hoe excavators are used to smooth the axial wall and make it parallel with the external surface of the tooth.
- It should be re-emphasizing that the shape of the cavity will be governed by the extension of caries, accordingly the outline of these cavities may be a rounded or oval in shape.



Outline form for pit restorations

**FIGURE 49**

**FIGURE 50**

**FIGURE 51**

**FIGURE 52**

**FIGURE 53**

The depth of the pulpal wall extends pulpally to include the pulpal extent of the caries. If caries is minimal the pulpal wall must be in sound dentine. The mesial, distal, and gingival walls are divergent to one another as they pass from the surface to the pulpal wall (Figures 51 and 52). The pulpo-mesial, pulpo-distal, and pulpo-gingival line angles are rounded to the extent of the end of the #330 bur (Figures 51 and 52).

The enamel walls are planed by using the cutting sides of the hatchet #12/13 in a scraping motion. (See the arrow Figure 53.)

The cavity debridement is performed in the same manner as for the Class I (occlusal) cavity preparation for amalgam.

## Occlusal pits of mandibular first premolars

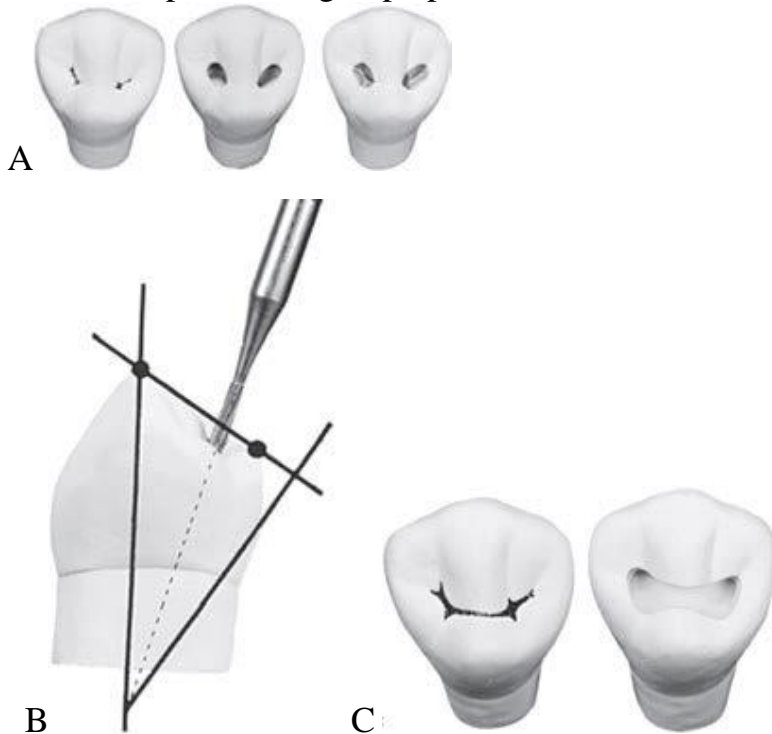
Mandibular 1<sup>st</sup> premolars have 2 exceptions:

1. We can make 2 separated cavity one on mesial occlusal pit & one on distal without including central fissure if this fissure not involved by caries because of the presence of well-developed transverse ridge & in order not to weaken the tooth unless the fissure is involved by caries so we have to include all pits & fissure in one class I preparation.

2. The buccal horn of pulp is higher than the lingual one So according to this when we prepare the cavity floor it should be inclined lingually (not flatted) in order not to harm the pulp.

To achieve this cutting instrument is held so that its long axis is parallel with bisector of angle formed by long axis of tooth and the line perpendicular to plane drawn through facial & lingual cusp point (see lower Fig)

All the principles of cavity preparation for class I as discussed previously were applied here except flattening of pulpal floor.



**A**, Preparation design and restoration of carious occlusal pits on the mandibular first premolar. **B**, Bur tilt for entry. The cutting instrument is held such that its long axis (*broken line, CI*) is parallel with the bisector (*B*) of the angle formed by the long axis of the tooth (*LA*) and the line (*P*) that is perpendicular to the plane (*DE*) drawn through the facial and lingual cusp points. This dotted line (*CI*) is the bur position for entry. **C**, Conventional outline, including occlusal pits and central fissure.

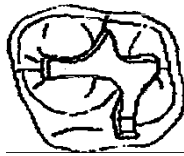
## Cavity preparations for maxillary first molars

Upper 6 also had exceptions because of the anatomy of the tooth. The presence of oblique ridge in between distobuccal & mesiopalatal cusps gives the possibility to do 2 separated cavities one mesial & one distal without the need to include oblique ridge within the preparation unless it is involved by caries or weakened due to cavity preparation in this case one outline cavity design extended from mesial pit through oblique ridge to distal pit were performed.

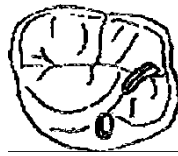
### Maxillary first molar: Variations in the design of distolingual groove preparations.



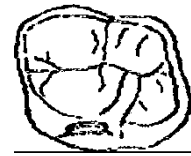
Conservative design  
central & distal pits involved



Caries involving  
oblique ridge



Distal & lingual pits  
involved



Defective groove along  
side cusp of Carabelli

### Mandibular first molar: Variations:



Involving facial  
Groove & pits



Conservative preparation, mesial,  
central & distal pits



Extensive occlusal preparation  
& small facial pit



Outline necessary to include  
the mesial and central pits  
connected by the fissure



Preparation outline extended  
from outline in A to include  
distal pit and connecting deep  
fissure in oblique

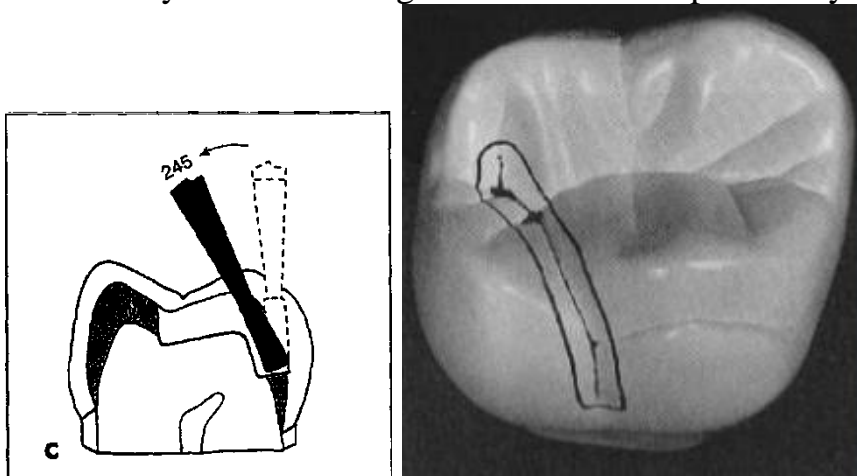


Preparation outline extended  
from outline in B to include  
distal oblique & lingual fissures



## Buccal and Lingual Extensions:

- In case of occluso-buccal and occluso-lingual cavities extensions are made through the fissures and towards the respective surfaces.
- The cutting is done in dentin at the dentino-enamel junction using a #56 fissure bur until the occlusal ridge is undermined and removed.
- If the caries is still gingival to the level of the pulpal seat, a step is indicated: a #330 or 56 bur is used to cut the dentin at the dentino-enamel junction, applying pressure in a gingival direction and at the same time moving the bur mesio-distally.
- The enamel thus undermined, is broken down with chisels.
- Retention grooves are then cut in dentin along the axio-mesial and axio-distal line angles. The cavity walls and margins are finished as previously described.



### Class I with Palatal extension of upper 1<sup>st</sup> molar

The same principles and procedures for Class I cavity preparation were applied occlusally.

**For the extension:** The tooth preparation for the extension should be no wider than necessary; ideally the mesiodistal width of the palatal extension should not exceed 1 mm, except for extension necessary to remove carious or undermined enamel or to include unusual fissuring.

The tooth preparation should be cut more at the expense of the oblique ridge rather than centering over the fissure (weakening the small distolingual cusp).

Especially on smaller teeth, the margins on the occlusal portion should extend as little as possible on to the oblique ridge and distolingual cusp.