Operative  Lec 5
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 posterior teeth,
- The lingual surfaces of anterior teeth.

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 Amelo-Dentinal Junction.

Principles of class I Cavity preparation.
I. OUTLINE FORM – Smooth flowing, regular curves.
Angular irregularities in the outline are susceptible to fracture during condensation – 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 circumscribe:
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 facilities 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 ¼ intercuspal distance or less) terminating on smooth surfaces.
to preserve the strength and function of the cups 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 = ½ mm into dentin (approx. 2 mm measured at triangular ridges). Minimum depth is 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 under the cusps (6⁰).
To provide mechanical lock or retention to the occlusal portion and crate bulk at the margins.

4. Diverge slightly pulpo-occlusally in buccal and lingual groove extensions (6⁰).
protects buccal and lingual surfaces from being undermined (RESISTANCE FORM).
D. Mesial and distal wall

1. Smooth and straight facilitates adaptation 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 (no point angles are present) 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.

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.
Mesio-distal extension

**Buccal Pit Cavities:**

The outline of these cavities usually describes 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
Buccal Pit Cavities

Occlusal pits of mandibular first premolars

Mandibular 1st premolars have 2 exceptions:

1- We can made 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 weakening the tooth unless the fissure is involved by caries so we have to included 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 lingual (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.

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.
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 amelo-dentaral 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 amelo-dentaral
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 1st molar

The same principles and procedures for Cl 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 distolinguinal cusp).

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