Cavity preparation for dental amalgam - part I

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Main topics

- Class Ist and V class cavity preparation - indication, basic configuration
- Characterization of basic cavity configuration
- Preparation techniques
Indications for 1st class cavity for dental amalgam

- Caries lesions on fosse and fissures of occlusal surfaces of molar and premolar.
- Caries lesions on foramen coecum area.
- Caries on the occlusal and lingual or facial surfaces of posterior teeth.
- Lesions on lingual surfaces of maxillary anterior teeth.
Indications for 1st class cavity for dental amalgam

Figure 5.19: Class I cavities present on occlusal surface of posterior teeth, occlusal two-thirds of buccal and lingual surface of molars and lingual surface of incisors.
Basic configurations

- Occlusal cavity 1st class 1st type
- Occlusal cavity 1st class 2nd type
- Occlusal –buccal or Occlusal – lingual cavity 1st class, 1st type
- Occlusal –buccal or Occlusal – lingual cavity 1st class, 2nd type
- Cavities of foramen coecum
Occlusal cavity 1st class 1st type

- Caries lesions on fosse and fissures of occlusal surfaces, including on the central and lateral fissures, extended in the area of triangular ridge of molars and premolars.

- The cavity margins should be located occlusally on smooth surfaces. All carious pits and grooves are involved in the preparation.
Main cavity components - 1st class

1st type

- External margins: Buccal, Lingual, Mesial and Distal
- External Walls: Buccal, Lingual, Mesial and Distal
- Internal Wall: Pulpal floor
Main cavity components - 1st class
1st type

Fig. 1-10. Walls of a prepared Class 1 occlusal cavity.
Main cavity components - 1st class 1st type

- Line angles /where two walls join/
  1. bucco-pulpal,
  2. linguo-pulpal,
  3. mesio-pulpal,
  4. disto-pulpal,
  5. mesio-buccal,
  6. mesio-lingual,
  7. disto-lingual and
  8. disto-bucal.

- Point angles /where three walls join/
  1. mesio-bucco-pulpal,
  2. mesio-linguo-pulpal,
  3. disto-bucco-pulpal,
  4. disto-linguo-pulpal.
Main cavity components- 1st class 1st type
The mesial and distal walls should have a slight divergence from pulpal floor to avoid undermining of the marginal ridges.

Margins should join each other in a very rounded fashion.
Outline form- 1st class 1st type

Buccal and lingual walls inclination in the area of cristal tubercule when:

- the cavity width i.e. buccal–lingual size is up to 1/3 from intercupsal distance then there is a slight convergence of opposing external walls of the tooth crown pulpo-occlusally, following the direction of enamel rods;
- buccal-lingual size is 1/3-1/2 from intercupsal distance they are paralell to each other and perpendicular to the pulpal floor;
- buccal-lingual size is 2/3 and more from intercupsal distance these bucal and lingual walls will have two planes—one perpendicular to the ledge portion of pulpal floor and formed completely of dentin and another plane following the direction of the enamel rods, which diverges occlusally.
Internal cavity anatomy- Ist class Ist type /buccal and lingual walls/
Outline form - 1st class 1st type /buccal and lingual walls/

Figure 20.17: Convergence of walls to provide retention to amalgam restoration
Outline form

Figure 7.32: Outline form should include all defective pits and fissures
Outline form

- Avoiding undermining the marginal ridges.
- Shape of the preparation for resistance form should be like a box with flat pulpal floor.
- Providing adequate thickness of amalgam, keeping the minimum occlusal depth of 2 mm.
- Providing the cavosurface angle of 90 degrees.
- Rounding of all the internal line and point angles.
Outline form

Figure 20.24: Conventional tooth preparation of maxillary first molar involving oblique ridge
Resistance form - definition and features

The best shape and placement of the walls for the restoration and for the tooth should resist forces without fracture.

Features:

- Enamel supported with dentin.
- Cavosurface angles at 90 degrees. This butt joint margin of enamel and amalgam is the strongest for both. Amalgam is a brittle material.
- Line angels and point angels should be slightly rounded to prevent stress concentration of forces at sharp area to prevent fracture of tooth.
Retention form - definition and features

Form of a cavity that best permits the restoration to resist displacement.

**Features:**

- Flat pulpal floor and walls perpendicular to mastication force.
- Rounded line and point angles - for better stress distribution through the tooth.
Retention form

- Enamel rods in most areas of the occlusal surfaces are directed parallel to long axis of tooth, a factor that should be considered when angulation of the margin of the amalgam preparation is designed.

- Cavosurface angle i.e. angle between enamel wall and amalgam interface should be 90 degree.
Preparation technique

- Class Ist cavity Ist type preparation starts by entering the deepest or most carious pits using a round carbide bur at high speed with air water spray.

- The long axis of bur is held perpendicularly to the plane of the pulpal floor.

- The bur enters the pits, proper depth of 1.5 to 2.0 mm should be established. The depth is measured from the central pit.

- Diverging of mesial and distal walls.

- Walls inclination depend on the buccal – lingual size.

- Minimum 2 mm depth of cavity.
Occlusal 1st class cavity IIInd type

Indication:

- Located on one surface-occlusal.
- One or two caries lesions in the area of triangular fossa on occlusal surface of molar or premolar. Minimal distance between carious lesions after cavity preparation is 1.5 - 2mm in caries resistant patients with good oral hygiene.
Occlusal Class Ist-type IIind

**Figure 20.23:** Conservative tooth preparation on occlusal surface of maxillary first molar showing preservation of oblique ridge

*Outline form:* The outline form for occlusal portion follows the same principles as given for pit and fissure lesions except that the external outline is extended proximally toward defective proximal surface.
Main cavity elements – IInd class cavity type

- External walls:
  Mesial, distal, buccal and lingual.
- External margins:
  Mesial, distal, buccal and lingual.
- Internal wall:
  Pulpar
- Angles:
  Line and point
Occlusal Class Ist type IIInd basic elements

Mesial occlusal margin is at least 0.5 mm from the marginal ridge.

Distal occlusal margin is located across from the central fissure or parallel in case of transverse crista.
Occlusal Ist class IIInd type – internal anatomy

- Mesial and distal walls are parallel to the marginal transverse.
- Buccal and lingual walls consist of enamel and dentin in one plane.
- Mesial wall consists of enamel and dentin in one plane. It diverges to the tooth axis.
- Distal wall consists of enamel and dentin in one plane. It is parallel to the tooth axis. The wall is prepared without having in mind the direction of enamel rods.
- Pulpal floor is plain - on first mandibular premolar.
Technique of preparation

- Penetration depth is 1,5 mm.
- Cut in direction of lateral fissure up to 1/3 from their buccal/lingual size.
- Pulpal floor is flat.
Cavity preparation of foramen coecum - main configuration

- Rounded
- Elliptical
- Pear-shaped (triangular)
Cavity preparation of foramen coecum - indication and basic configuration

- Carious lesion on lingual surface of upper anterior teeth or buccal/lingual surface of molars
- The location in this lesions is on self-cleaning surface
- All walls are joined together in continuous fashion
- Basic configuration:
  1. Rounded
  2. Elliptical
  3. Pear-shaped
Cavity preparation of foramen coecum - main components

**Rounded configuration**
- External walls:
  1. Mesial
  2. Distal
  3. Occlusal
  4. Gingival

**Elliptical configuration**
- External walls:
  1. Mesial
  2. Distal

**Pear-shaped / triangular**
- External walls:
  1. Mesial
  2. Distal
  3. Gingival
Cavity preparation of foramen coecum - main configurations

- Pear configuration
- Rounded configuration
Internal anatomy of foramen coecum cavity

- All walls are joined together in continuous fashion.
- External walls - consist of enamel and dentin in one plane.
- Axial wall is plain or convex in buccal or lingual direction.
Internal anatomy of foramen coecum cavity

- External walls consist of enamel and dentin in one plane, at ideal cavity form.
- Mesial and distal walls – perpendicular to pulpal floor.
- Gingival floor follows the equator’s contour in rounded and pear configurations.
- Axial wall - plain or slightly convex in buccal direction, but in clinical cases plain or slightly concave in pulpal direction.
Technique of preparation

- Gaining access using straight fissure bur N 0.8 placed in the involved pit and with lateral dragging removing tooth structure within the outline of the preparation.

- Penetration depth - 1.5 mm.
Occlusal – buccal or Occlusal – lingual cavity 1st class, 1st type

Indication

This cavity configuration is performed at caries lesion on occlusal surface of molars, but undermining bucal occlusal or lingual occlusal marginal ridges, and may reach foramen coecum.
Cavity preparation has 3 parts: occlusal, buccal or lingual and transitional.

Occlusal portion has the same characteristics as the design of Ist class Ist type.

Buccal or lingual parts will assume a prismatic shape.

Transitional part is designed appically from buccal occlusal marginal ridge.
Occlusal – buccal or Occlusal – lingual cavity 1st class, 1st type - main components

Buccal part:
- External walls: Mesial, distal and gingival floor
- Internal wall: Axial
- External margins: Mesial, distal and margin of the gingival floor
- Location of margins:

Occlusal part:
- External walls: Mesial, distal, buccal and lingual
- Internal wall: Pulpal floor
- External margins: Mesial, distal, buccal and lingual
Occlusal – buccal or Occlusal – lingual cavity 1st class, 1st type-main components

Transitional part:

- External walls: Mesial, distal
- Internal wall: Pulpal floor
- External margins: Mesial, distal
- Internal margins: Axio-pulpal and bucco-pulpal
Occlusal – buccal or Occlusal – lingual cavity 1st class, 1st type - internal anatomy

**Occlusal part:**
1. Mesial and distal walls consist of enamel and dentin in one plane.
2. The internal anatomy of buccal and lingual walls is similar to the occlusal 1st class cavity 1st type.
3. Pulpal floor consists of dentin.

**Buccal part:**
1. Mesial and distal walls consist of enamel and dentin in one plane if they are perpendicular to the buccal surface.
2. Gingival floor – enamel and dentin, the enamel part follows the enamel rods direction.
Occlusal – buccal or Occlusal – lingual cavity 1st class, 1st type - internal anatomy

Transitional part:

Axio-pulpal and bucco-pulpal angles are rounded and rise over the pulpal floor.
Resistance and retention forms

In any of these situations the mesial and distal walls should consist of enamel and dentin in 2 planes: one consists of dentin with grooves and another of enamel following the direction of the enamel rods.
A large caries lesion on the occlusal and buccal or lingual surfaces with significant destruction of buccal or lingual cups.
Occlusal – buccal or Occlusal – lingual cavity 1st class, II nd type - main components

- This configuration has 3 portions, like the occlusal – buccal cavity type I.
- The differences between these two types are that IIInd type is more extensive – buccal/lingual size is 2/3 from intercuspal distance.
- External walls
- Mesial wall, distal wall, bucal wall – where it remains, close to the buccal cups and lingual wall.
Occlusal – buccal or Occlusal – lingual cavity 1st class, IIInd type

**Buccal part:**
- Mesial wall
- Distal wall
- Axial wall
- Gingival floor

**Transitional part**
1. Mesial wall
2. Distal wall
3. Axial wall
4. Buccal
5. Pulpal part
Occlusal – buccal or Occlusal – lingual cavity 1st class, IIInd type - internal anatomy

**Occlusal part**

External walls consist of enamel and dentin in one plane if the size is close to 2/3 from intercuspal distance or in two planes if the size is more than 2/3.

**Buccal part**

Mesial and distal walls consist of enamel and dentin in two planes. One plane is completely dentin, the other-outer enamel-dentin plane following the direction of the enamel rods.

Gingival floor consists of enamel and dentin in one plane, when the level of gingival floor corresponds to tooth equator.

Axial wall is parallel to the buccal surface or concave in pulpal direction.
Occlusal –buccal or Occlusal – lingual cavity 1st class, IIInd type-
resistance and retention form

- Enamel supported with dentin in the occlusal and buccal portions
- Double chamber are at least 2 mm in their width, depth and length
Instrumentarium for cavity preparation

- Perio probe.
- A round bur and straight fissure bur number 08, 09 and 10 depending from the buccal lingual size of cavity.
Indication of V class preparation

- Large carious lesion in the gingival one third area (cervical area) of the facial and lingual surface of the tooth crown, axial angles are intact.
- V class preparation is used also for non-caries lesions treatment - erosio, usurae cevicalis etc.
Carious lesion in the gingival one third area (cervical area)
V class cavity – basic configuration

- Conventional cavity preparation - kidney like
- Conservative cavity preparation
Basic characteristics of conventional and conservative configurations.

- The difference between the conventional and conservative configuration is that the outline form of conventional cavity is enlarged.
- The conservative configuration is confined by the lesion borders at caries resistant patients with good oral hygiene.
Basic cavity elements of V class cavity

- External ridges – occlusal, mesial, distal and gingival.
- External walls – they are 4 walls – occlusal, mesial, distal and gingival floor.
- Internal wall – axial.
Basic cavity elements of V class cavity

- Internal angles
Basic cavity elements of V class conventional cavity

- Occlusal wall and gingival floor should be perpendicular to the long axis of the tooth and parallel to each other, any convergence of these walls will lead to unsupported enamel.
Internal cavity anatomy

- Mesial and distal walls consist of enamel and dentin in one plane, they should diverge.
- The mesial and distal margins should be located far enough mesially and distally to include all decayed tooth structure.
- Axial wall is rounded, following the curve of the facial surface
Resistance and retention form

- Enamel ridge - enamel supported with dentin.
- Enamel cuts follow the rods orientation.
- Groove, point and chamber retentions.
Retention form

- Two retention points are made in dentin using a small round bur at axio-occlusal line angle.
V class cavity preparation technique

- Using round bur to start entry to the cavity, the direction of the bur should be perpendicular to the buccal (or lingual) surface of the tooth.
- Using the fissure bur to do the outline form, just remove the caries and the margins should be in sound tooth structure.
- The form of V class conventional configuration is kidney-like.
Conservative V class cavity preparation

- Cavity outline is limited to the caries defect only – no extension. Performed in caries resistant patients with oral good hygiene
Basic elements of conservative configuration of V class

- External margins are located in sound tooth structure. Cavity outline is limited to the caries defect only.
- Internal anatomy – preparation is following the direction of rods.
- Smooth transitions between the particular cavity components.