Class I Cavity Preparation for Amalgam Restorations

(3 principles + 6 steps) → needed for any cavity preparation
Steps can be changed according to restorative material

Notes in lecture

❖ We leave about (PM = 1.6 mm / M = 2 mm) from mesial and distal marginal ridge during cavity preparation
❖ Bur N 245 has:
  1. 3 mm length → 2/3 bur is 2 mm
  2. Taper width → under cut
  3. Flat end → flat pulpal floor
  4. Round corner of bur → roundation of line angle
❖ Box shape → Control of movement + Forces are perpendicular so not be effective as pulpal floor is parallel to occlusal table

السؤال فى الامتحان هيجى على هيئة كيس زى ما قالتكم كدا

Under cut only in buccal and lingual walls (in dentin)

Class I Cavities are pit and fissure type cavities that involve
1. The occlusal surfaces of molars and premolars.
2. The occlusal 2/3 of buccal and lingual surfaces of molars.
3. The palatal pits in maxillary anterior teeth.

❖ Pits & fissures are frequently susceptible to caries due to their inherent defective structure as areas of imperfect coalescence of enamel lobes.
❖ These areas are retentive for food and thus invite caries production.

These lesions are characterized by
☒ A small surface opening which may remain unnoticed until the lesion becomes of a considerable size.
☒ A conical spread in both enamel and dentin.
☒ Dentin caries spread rapidly than enamel one
☒ Enamel and dentin cone → Base toward the DEJ

Types of Class I
1. Simple include only one surface (occlusal, lingual, buccal, or palatal).
2. Compound include two surfaces as occluso-buccal or occluso-lingual.
3. Complex include more than two surfaces as occluso-lingo-buccal.

Cavity Preparation for simple class I

Outline form
The outline form for class 1 cavities should be very conservative since they involve cleansable areas. The outline form is governed only by the extent of caries in both enamel & dentin and the amount of extension needed to eliminate pits and fissures to secure smooth margins. Outline form varies in shape according to number of cusps and orientation of pits & fissures.

The outline form is performed by first gaining access through the enamel to the carious dentin floor of the cavity followed by making the necessary cavity extensions. Begin the Class I occlusal preparation by entering the deepest or most carious pit with a punch cut using the No. 1/2 carbide bur at high speed with air-water spray. Extension of the cavity done with a suitable size fissure bur. Alternatively, No. 245 bur can be used.

A No. 245 bur has a head length of 3 mm and a tip diameter of 0.8 mm is recommended to prepare a conservative Class I preparation. The No. 245 is, inverted cone bur reveals sides slightly convergent toward the shank (this produces an occlusal convergence of the facial and lingual preparation walls, providing adequate retention form for the cavity preparation).

The slightly rounded corners of the end of the No. 245 bur produce slightly rounded internal line angles that render the tooth more resistant to fracture from occlusal force. As the bur enters the pit, the proper depth of 1.5 mm (one half the length of the cutting portion of the bur) should be established. The 1.5 mm pulpal depth is measured at the central fissure. The necessary cavity extensions through pits, fissures, and deep developmental grooves are made keeping the bur at right angle to the surface of the tooth. Cutting bur should be oriented (tilted) so that its long axis is parallel to the long axis of the tooth crown.
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Designing the outline form

- It should include only the faulty, defective occlusal pits and fissures, all carious and undermined enamel.
- Extending around the cusps to conserve tooth structure and prevent the internal line angles from approaching the pulp horns too closely.
- Running in sweeping curves with a minimum width.

Angular irregularities in the outline are susceptible to fracture during condensation.

**A smooth flowing outline is easier to visualize and carve following condensation.**

- Minimal buccal-lingual width of the cavity, about 1/4 - 1/3 the inter-cuspal distance → To preserve the strength and function of the cusps while eliminating susceptible grooves or defective tooth structure (But, must be wide enough to allow condensation).
- Mesio-distally should be extended mid-way between the triangular fossa and the crest of the marginal ridge.
- The mesial and distal walls should have a slant or slight divergence from the pulpal floor outward to preserve strength of marginal ridges.
- Eliminating a weak wall of enamel by joining two outlines that come close together (i.e., less than 0.5 mm apart).
- Groove extensions are kept narrow (mesio-distally) where possible, terminating on smooth tooth structure → To preserve strength of cusps while eliminating susceptible grooves and/or defective tooth structure (But, must be at least as wide as the narrowest condenser).
- Extending the outline form to include enamel undermined by caries.
- Using enameloplasty on the terminal ends of shallow fissures to conserve tooth structure.
- Establishing an optimal, conservative depth of the pulpal wall.

Resistance and Retention Forms

Resistance form achieved chiefly by boxing the preparation.

- Sufficient area or areas of relatively flat pulpal floor to resist forces directed in the long axis of the tooth and provide a strong, stable seat for the restoration.
- Minimal extension of external walls, which reduces weakening the tooth.
- Strong, ideal enamel margins.
- Sufficient depth (i.e., 1.5 mm) to result in adequate thickness of the restoration.
- Slight occlusal convergence of two or more opposing, external walls provides the primary retention form.

Convenience form

- Establishing resistance and retention gives adequate convenience to instrumentation, removal of decay and insertion of the restoration.
- Although conservation of tooth structure is very important, convenience form in some cases may require extent of the preparation to provide adequate access and visibility.
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Removal of Carious Dentin

- In small size cavities, the carious dentin should have been removed during making the cavity extensions.
- In moderately deep and deep cavities, the carious dentin is peeled off carefully using large spoon excavator or round bur.
- Only light pressure in a direction parallel to that of the pulp is utilized (This is continued until a sound dentin floor is reached).

Removal of dentinal caries is accomplished with round bur (A) or spoon excavators (B). C, Resistance form may be improved with flat floor peripheral to excavated area.

Pulp Protection

- If the cavity preparation is of ideal or shallow depth, no liner or base is indicated.
- In deeper carious excavations (where the remaining dentin thickness is judged to be 0.5 to 1.0 mm, place a thin layer of a light-cured, resin-modified glass-ionomer RMGI base).
- The RMGI base insulates the pulp from thermal changes, bonds to the dentin, releases fluoride, and is strong enough to resist the forces of condensation.

Base application. A, Inserting RMGI with periodontal probe. B, In moderately deep excavations a base (b) thickness of 0.5 to 0.75 is indicated.

In very deep cavities calcium hydroxide liner is placed then the resin modified glass ionomer base applied.

Planning of Enamel Walls

- The enamel walls of the cavity should be finished free from any loose, short, or undermined enamel, and trimmed to meet the tooth surface at a right cavo-surface angle.
- This may be done by sharp chisels and hatchets, fissure burs, or stones.
- All sharp corners in enamel must be rounded, as they may contain short enamel rods.

**Cavo-surface margins should be**

1. Well-defined
2. Well supported

In order to:

- Be easier to visualize and carve.
- Provides marginal integrity.
**Toilet of the cavity**

- A sharp explorer is then used to check the details of the prepared cavity and to loosen the tooth debris which are then blasted out with air.
- Facilitates adaptation of amalgam to the cavity and improves the physical properties of the restoration by elimination of void or foreign material.

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**Buccal or Palatal Pits Preparation**

- Shape varies (oval – round – oblong) depending upon the extent of caries
- Walls continually joined and slightly convergent towards the cavosurface margin
- Axial wall follows the contour of the buccal/lingual surface

These preparations may be accomplished with a No. 245 bur or, if the lesion is very small, a No. 330 or 169 bur may be used.

Depending on the extent of the caries and the angulation of the walls, retention grooves may be added with a No. 1/4 or 33 1/2 bur.

**Compound Class I Cavities**

**Compound Class I Cavities (Class I with buccal or palatal extension)**

- 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 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 #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 axial wall should follow the contour of the lingual surface of the tooth.
- An axial depth of 0.5 mm inside the DEJ is indicated if retentive locks are required; an axial depth of 0.2 inside the DEJ is permissible if retentive locks are not required.

**Outline form**

Extension to include the carious or retentive area. It may be extended:

- **With step** forming axial wall and gingival floor.
- **Without step**: in cases of extended caries or fissure at the level of the pulpal floor.

**Resistance and Retention Form**

- Roundation of axio-pulpal line angle to:
  1. Prevent stress concentration.
  2. Provide bulk to the restoration.

- The axial wall direction should be parallel to the corresponding external tooth surface in order to:
  1. Prevent pulp exposure.
  2. Provide uniform thickness of the restoration.

- Retention grooves (if needed) cut in dentin along the axio-mesial and axio-distal line angles (as secondary retention form).
A, Facial occlusal fissure continuous with fissure on facial surface.
B, Extend through facial ridge onto facial surface.
C, Appearance of tooth preparation following extension through ridge.

D, Facial surface portion of extension is cut with side of bur.
E, sharpen line angles by directing bur from facial aspect.
F, Sharpening line angles from occlusal direction with No. 169 bur.

G, Ensuring retention form by preparing retention locks with No. 1/4 round bur.
H, Completed tooth preparation.

Good Luck
Dr SaGeD