Operative dentistry

Lec.5 (Class III Amalgam Restorations) د. شذى

Definition

Class III caries:

Class III restorations are indicated for defects located on the proximal surface of anterior teeth that do not affect the incisal edge. Part of the facial or the lingual surfaces also may be involved in Class III restorations.

The Class III amalgam restoration is rarely used. Its use has been supplanted by tooth-colored restorations (primarily composite), which have become increasingly wear-resistant and color-stable. Because indications exist for Class III amalgam restorations, however, practitioners should be familiar with this restorative technique.

Indications:

It is generally reserved for the distal surface of maxillary and mandibular canines if:

(1) The preparation is extensive with only minimal facial involvement.

(2) The gingival margin involves cementum.

(3) Moisture control is difficult.

Contraindications:

In esthetically important areas because many patients object to metal restorations that are visible.

Advantages of amalgam as restorative material

(1) Amalgam restorations are stronger than other Class III and V direct restorations.

(2) They are generally easier to place.

(3) Less expensive to the patient.

(4)Because of its metallic color, amalgam is easily distinguished from the surrounding tooth structure. Amalgam restorations are usually easier to finish and polish without damage to the adjacent surfaces.

Disadvantages of amalgam as restorative material

(1)The primary disadvantage of Class III and V amalgam restorations

is that they are metallic and unesthetic.
(2)The preparation for an amalgam restoration typically requires 90-degree cavosurface margins and specific axial depths that allow incorporation of secondary retentive features. These features result in a less conservative preparation than that required for most esthetic restorative materials.

Clinical Technique for Class III Amalgam Restorations

Initial Clinical Procedures

- Local Anesthesia

- Pre-wedging in the gingival embrasure of the proximal site to be restored provides (1) better protection of soft tissue and the rubber dam, (2) better access because of the slight separation of teeth, and (3) better re-establishment of the proximal contact.

-Isolation (rubber dam recommended)

Tooth Preparation

A lingual access preparation on the distal surface of the maxillary canine is described here because the use of amalgam in that location is more likely.

For esthetic reasons, use of amalgam is best suited for caries that can be accessed from the lingual rather from the facial.

A facial approach for a mandibular canine may be indicated, however, if the lesion is more facial than lingual. The mandibular restoration is often not visible at conversational distance.

The outline form of the Class III amalgam preparation may include only the proximal surface. A lingual dovetail may be indicated if one existed previously or if additional retention is needed for a larger restoration.

Initial Tooth Preparation

Bur size selection depends on the size of the lesion. Bur options may include a No. 2 (or smaller) round bur. The bur is positioned so that the entry cut penetrates into the caries lesion, which is usually apical to (and slightly into) the contact area. Ideally, the bur is positioned so that its long axis is perpendicular to the lingual surface of the tooth (The bur position may be described as perpendicular to the distolingual line angle of the tooth.) This position conserves the marginal ridge enamel (Fig 1).Penetration through enamel positions the bur so that additional cutting isolates the proximal enamel affected by caries and removes some or all of the infected dentin. In addition, penetration should be at a limited initial axial depth (i.e., 0.5mm) inside the DEJ or at a 0.75mm axial depth when the gingival margin is on the root surface (in cementum) (Fig. 2). This 0.75mm axial depth on the root surface allows a 0.25mm distance (the diameter of the No. 1/4 bur is 0.5 mm) between the retention groove (which is placed later) and the gingival cavosurface margin. Infected dentin that is deeper than this limited initial axial depth is removed later during final tooth preparation.

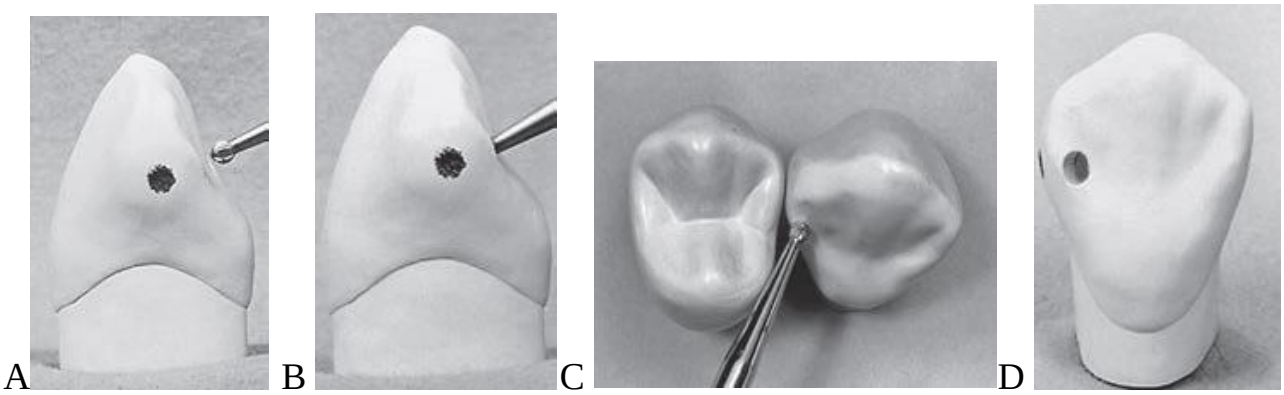

Fig.1 Entry for Class III tooth preparation on maxillary canine. A, Bur position is perpendicular to the enamel surface at the point of entry. B, Initial penetration through enamel is directed toward cavitated, caries lesion. C, Initial entry should isolate the proximal enamel, while preserving as much of the marginal ridge as possible. D,Initial cutting reveals the dentinoenamel junction (DEJ).

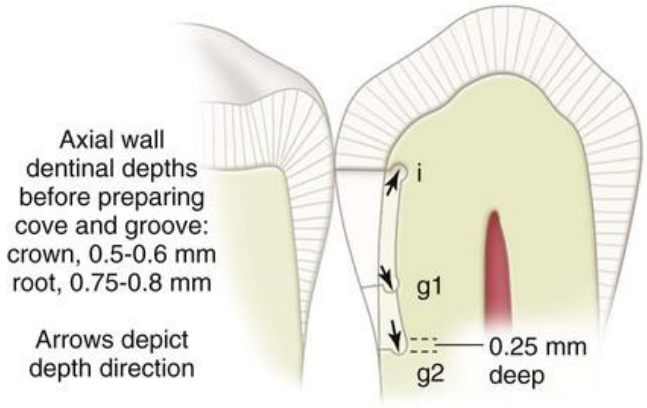

Fig 2: Mesiodistal vertical section showing location, depth direction *(arrows)*, and direction depth of the retention form in Class III tooth preparations of different gingival depths. *i*, incisal cove; *g 1*, gingival groove, enamel margin; g2, gingival groove, root surface margin. Distance from outer aspect of g2 groove to margin is approximately 0.3 mm; bur head diameter is 0.5 mm; direction depth of groove is half this diameter (or approximately 0.3 mm [0.25 mm]).

- The facial, incisal, and gingival walls should meet the axial wall at approximately right angles (although the lingual wall meets the axial wall at an obtuse angle or may be continuous with the axial wall)
    - The axial wall should be uniformly deep into dentin and follow the faciolingual contour of the external tooth surface.
    - Remove any unsupported enamel. ,
    - Cavosurface line angle (90-110 °).
    - Round internal line angles. If a large round bur is used, the internal angles are more rounded.
    - Incisal extension to remove carious tooth structure may eliminate the proximal contact. It is important to conserve as much of the distoincisal tooth structure as possible to reduce the risk for subsequent fracture. When possible, it is best to leave the incisal margin in contact with the adjacent tooth.
    - When preparing a gingival wall that is near the level of the rubber dam or apical to it, it is beneficial to place a wedge in the gingival embrasure earlier to depress and protect soft tissue and the rubber dam.

Final Tooth Preparation

Final tooth preparation involves removing any remaining infected dentin; protecting the pulp; developing secondary resistance and retention forms; finishing external walls; and cleaning. Any remaining infected carious dentin on the axial wall is

removed by using a slowly revolving round bur (No. 2 or No. 4), appropriate spoon excavators, or both.

Resistance form

Resistance form against post-restorative fracture is provided by

(1) Cavosurface and amalgam margins of 90 degrees,
(2) Enamel walls supported by sound dentin,
(3) Sufficient bulk of amalgam (minimal 1-mm thickness).
(4) No sharp preparation internal angles.

Retention form

(1) The box-like preparation form provides primary retention form.
(2) Secondary retention form is provided by a gingival groove, an incisal cove, and sometimes a lingual dovetail.

The gingival retention groove is prepared by placing a No. 1/4 round bur (rotating at low speed) in the axio-facio-gingival point angle. It is positioned in the dentin to maintain 0.2 mm of dentin between the groove and the DEJ. The rotating bur is moved lingually along the axiogingival line angle, with the angle of cutting generally bisecting the angle between the gingival and axial walls. Ideally, the direction of the gingival groove is slightly more gingival than axial (and the direction of an incisal [i.e., occlusal] groove would be slightly more incisal [i.e., occlusal] than axial).

Dovetail on the lingual surface:

If we have extensive caries and large class III cavity and previous retentive means is not enough, so we do dovetail on the lingual surface of maxillary canine, but this should be as conservative as possible, it should not exceed the midpoint of the lingual surface also the depth should not be more than 1 mm, if we make it with the same depth of the cavity, it may hit the pulp.

The No. 245 bur is positioned in the proximal portion at the correct depth and angulation and moved in a mesial direction (Fig.3, *A* and *B*). The correct angulation places the long axis of the bur perpendicular to the lingual surface. The bur is moved to the point that corresponds to the most mesial extent of the dovetail (see Fig. 3, *C* and

D). The bur is then moved incisally and gingivally to create sufficient incisogingival dimension to the dovetail (approximately 2.5 mm) (see Fig. 3, *E* and *F*). The incisal and gingival walls of the isthmus are prepared in smooth curves connecting the dovetail to the proximal outline form (see Fig.3G,H)

The gingival margin trimmer can be used to bevel (or round) the axiopulpal line angle (i.e., the junction of the proximal and dovetail preparation). This increases the strength of the restoration at the junction of the proximal and lingual portions by providing bulk and reducing stress concentration. The lingual convergence of the dovetail's external walls (prepared with the No. 245 bur) usually provides a sufficient retention form.

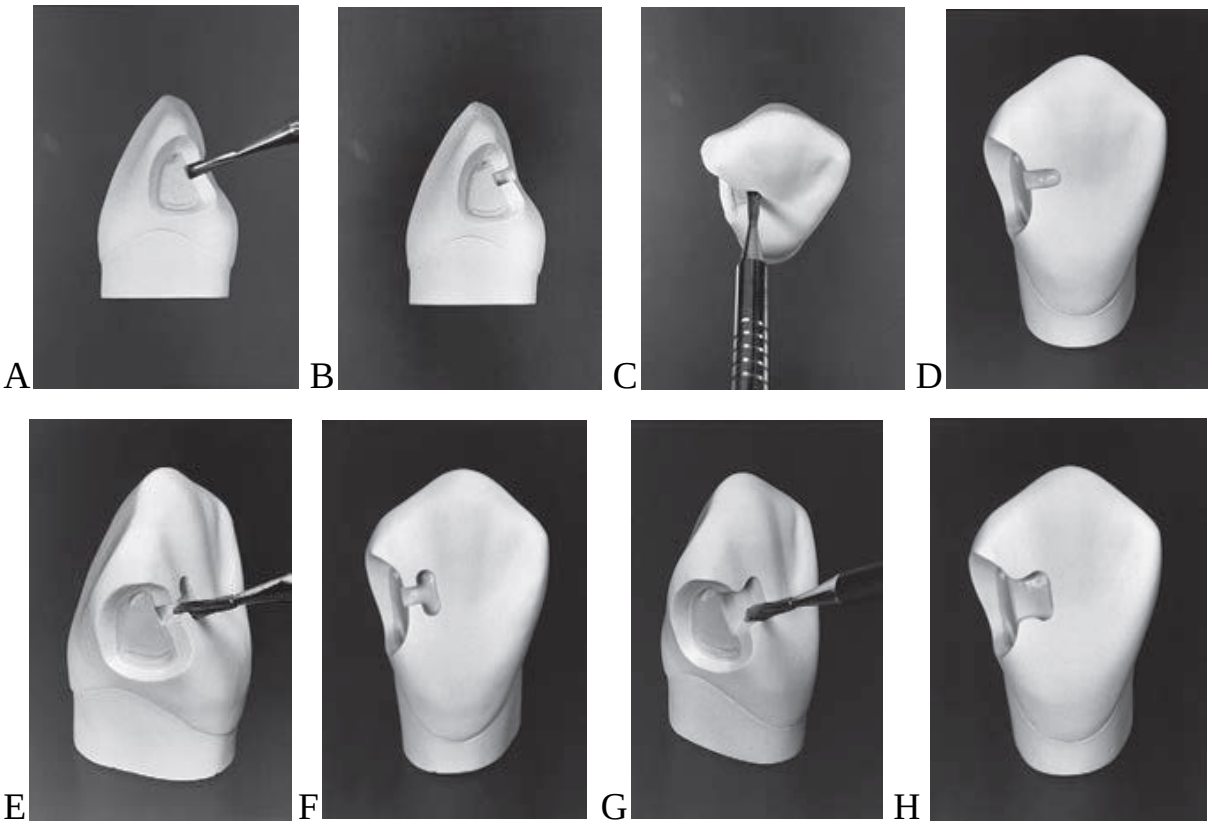

Fig2 Lingual dovetail providing additional retention for extensive amalgam restoration. **A,** Bur position at correct depth and angulation to begin cutting. **B,** Initial cut in beginning dovetail. **C,** Bur moved to most mesial extent of dovetail. **D,** If possible, cutting should not extend beyond the midlingual position. **E,** Bur cutting gingival extension of the dovetail. **F,** Incisal and gingival extensions of the dovetail. **G,** Completing the isthmus. The proximal and lingual portions are connected by the incisal and gingival walls in smooth curves. **H,** Completed lingual dovetail.