Operative dentistry ا.م.د. زينب

(Definition, Classification, Principles)

DEFINITION OF TOOTH PREPARATION

Tooth preparation is defined as the mechanical alteration of a defective, injured, or diseased tooth to best receive a restorative material that will reestablish a healthy state for the tooth with normal form and function

OBJECTIVES OF TOOTH PREPARATION

In general terms, the objectives of tooth preparation are to:

-To remove diseased tissue as necessary

-To restore the integrity of the tooth surface

-To restore the function of the tooth- (so that under the force of mastication the tooth or the restoration or both will not fracture and the restoration will not be displaced

-To restore the appearance of the tooth-

NOMENCLATURE: Nomenclature refers to a set of terms used in communication by persons in the same profession that enables them to better understand one another**.**

CARIES TERMINOLOGY

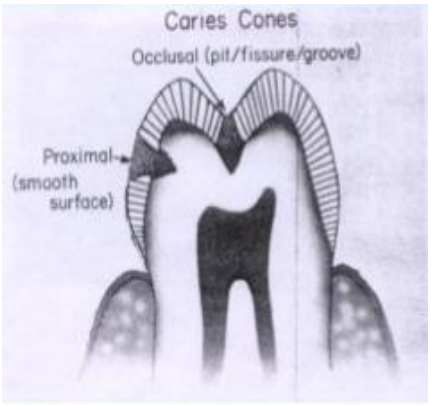
Dental caries is an infectious microbiologic disease that results in localized dissolution and destruction of the calcified tissues of the teeth.

Morphologic types of caries:

Carious lesions originating:
(1) on enamel pits and fissures,
(2) on enamel smooth surfaces, or
(3) on root surfaces (Senile caries).

1-Caries of Pit-and-Fissure Origin. The caries forms a small area of penetration in the enamel at the bottom of a pit or fissure and does not spread laterally to a great extent until the *dentinoenamel junction (DEJ)* is reached. In diagrammatic terms, pit-and-fissure caries may be represented as two cones, base to base, with the apex of the enamel cone at the point of origin and the apex of the dentin cone directed toward the pulp.

2-Caries of Enamel Smooth-Surface Origin. The disintegration in the enamel in smooth-surface caries also may be pictured as a cone, but with its base on the enamel surface and the apex at, or directed to, the DEJ. The caries again spreads at this junction in the same manner as in pit-and-fissure caries. Thus, the apex of the cone of caries in the enamel contacts the base of the cone of caries in the dentin. (Double inverted cone).



TOOTH PREPARATION TERMINOLOGY: A tooth preparation is termed
1-simple if a tooth preparation only one tooth surface is involved
2-compound if a tooth preparation two surfaces are involved
3-complex if a tooth preparation involving three (or more) surfaces
Abbreviated Descriptions of Tooth Preparations. the description of a tooth preparation is abbreviated by using the first letter, capitalized, of each tooth surface involved. Examples are:
(1) an occlusal tooth preparation is an O; (2) a preparation involving the mesial and occlusal surfaces is an MO; and (3) a preparation involving the mesial, occlusal, and distal surfaces is an **MOD.**

Tooth Preparation Walls

Internal Wall. An internal wall is a prepared (cut) surface that does not extend to the external tooth surface (Fig. 10).

Axial wall. An axial wall is an internal wall parallel with the long axis of the tooth (see Fig. 10).

Pulpal wall. A pulpal wall is an internal wall that is both perpendicular to the long axis of the tooth and occlusal of the pulp.

External Wall. An external wall is a prepared (cut) surface that extends to the external tooth surface, and such a wall takes the name of the tooth surface (or aspect) that the wall is toward (see Fig. 10).

Floor (or Seat). A floor (or seat) is a prepared (cut) *wall* that is reasonably flat and perpendicular to the long axis of the tooth). Examples are the pulpal and gingival walls.

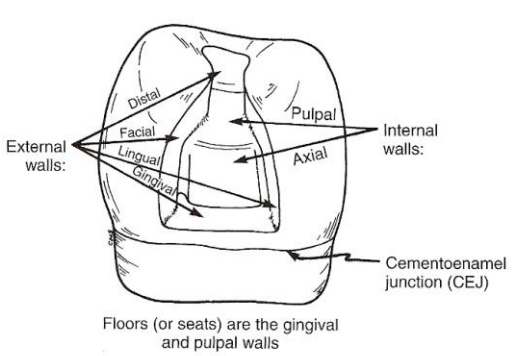


FIG. 6-10 Illustration indicating external and internal walls.

Tooth Preparation Angles: the junction of two or more prepared (cut) surfaces is referred to as an angle

Line Angle. A line angle is the junction of two planal surfaces of different orientation along a line. An internal line angle is a line angle whose apex points into the tooth. An external line angle is a line angle whose apex points away from the tooth

Point Angle. A point angle is the junction of three planal surfaces of different orientation.

Cavosurface Angle and Cavosurface Margin. The cavosurface angle is the angle of tooth structure formed by the junction of a prepared (cut) wall and the external surface of the tooth.The actual junction is referred to as the cavosurface margin.

Proximal surface: is the surface that face the adjacent tooth

Marginal ridge: border the lingual surface of anterior teeth and the occlusal surfaces of posterior teeth

CLASSIFICATION OF TOOTH PREPARATIONS

Classification of tooth preparations according to the anatomic areas involved as well as by the associated type of treatment was presented by G.V Black and is designated as Class I, Class II, Class III, Class IV, and Class V. Since Black's original classification, an additional class has been added, Class VI. Class I refers to pit-and-fissure lesions, whereas the reimaining classes are smooth-surface lesions. Classification was originally based on the observed frequency of carious lesions on certain aspects of the tooth.

Class I Restorations. All pit-and-fissure restorations are *Class I,* and they are assigned to three groups, as follows.

Restorations on Occlusal Surface of Premolars and Molars. The names of the walls, line angles, and point angles of an occlusal conventional tooth preparation take the name of the tooth surface (or aspect) that the wall is toward.

FIG. 6-12 Typical Class I tooth preparation for amalgam on maxillary premolar.

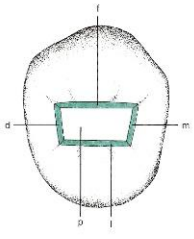


FIG. 6-13 Schematic representation (for descriptive purpose) of Fig. 6-12 illustrating tooth preparation *walls:* facial *(f),* distal *(d),* lingual *(l),* mesial *(m),* and pulpal *(p).*

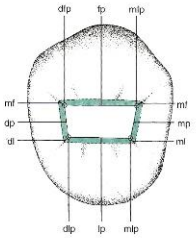


FIG. 6-14 Schematic representation (for descriptive purpose) of Fig. 6-12 illustrating tooth preparation line angles and point angles. *Line angles* are faciopulpal *(lp),* distofacial *(df),* distopulpal *(dp),* distolingual *(dl),* linguopulpal *(lp),* mesiolingual *(ml),* mesiopulpal *(mp),* and mesiofacial *(mf). Point angles* are distofaciopulpal *(dfp),* distolinguopulpal *(dlp),* mesiolinguopulpal *(mlp),* and mesiofaciopulpal *(mfp).*

Restorations on Occlusal Two Thirds of the Facial and Lingual Surfaces of Molars. The names of the walls, line angles, and point angles of these tooth preparations are the same as those depicted for the preparations for Class V restorations

Restorations on Lingual Surface of Maxillary Incisors. The names of the walls, line angles, and point angles of these tooth preparations also are the same as those depicted for the preparations for Class V restorations

Class II Restorations. Restorations on the proximal surfaces of posterior teeth are Class II.

Class III Restorations. Restorations on the proximal surfaces of anterior teeth that do not involve the incisal angle are Class III.

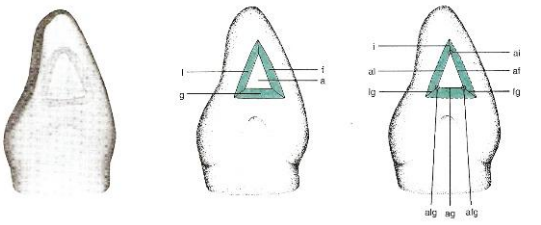


FIG. 6-18 Class III conventional tooth preparation on maxillary central incisor.

FIG. 6-19 Schematic representation (for descriptive purpose) of Fig. 6-18 illustrating tooth preparation *walls*: facial *(f)*, lingual *(l)*, gingival *(g)*, and axial *(a)*.

FIG. 6-20 Schematic representation (for descriptive purpose) of Fig. 6-18 illustrating tooth preparation line angles and point angles. *Line angles* are axiolingual *(al)*, linguogingival *(lg)*, axiogingival *(ag)*, facioginglval *(fg)*, axiofacial *(af)*, and incisal *(i)*. Point angles are axiolinguogingival *(alg)*, axiofaciogingival *(afg)*, and axioincisal *(ai)*. (Note that names for incisal line angle and point angle are exceptions to the general naming rule.)

Class IV Restorations. Restorations on the proximal surfaces of anterior teeth that do involve the incisal edge are Class IV.

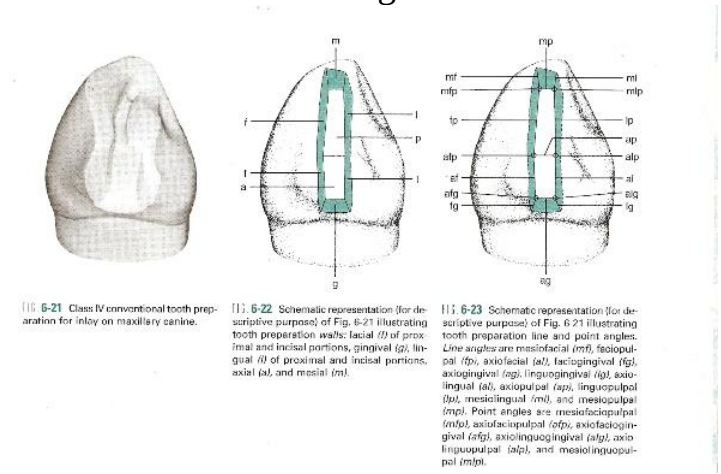


FIG. 6-21 Class IV conventional tooth preparation for inlay on maxillary canine.

FIG. 6-22 Schematic representation (for descriptive purpose) of Fig. 6-21 illustrating tooth preparation *walls*: facial *(f)* of proximal and incisal portions, gingival *(g)*, lingual *(l)* of proximal and incisal portions, axial *(a)*, and mesial *(m)*.

FIG. 6-23 Schematic representation (for descriptive purpose) of Fig. 6-21 illustrating tooth preparation line and point angles. *Line angles* are mesiofacial *(mf)*, feciopulpal *(fp)*, axiofacial *(af)*, facioginglval *(fg)*, axiogingival *(ag)*, linguogingival *(lg)*, axiolingual *(al)*, axiopulpal *(ap)*, linguopulpal *(lp)*, mesiolingual *(ml)*, and mesiopulpal *(mp)*. Point angles are mesiofaciopulpal *(mfp)*, axiofaciopulpal *(afp)*, axiofaciogingival *(afg)*, axiolinguogingival *(alg)*, axiolinguopulpal *(alp)*, and mesiolinguopulpal *(mlp)*.

Class V Restorations. Restorations on the gingival third of the facial or lingual surfaces of all teeth (except pit-and-fissure lesions) are Class V

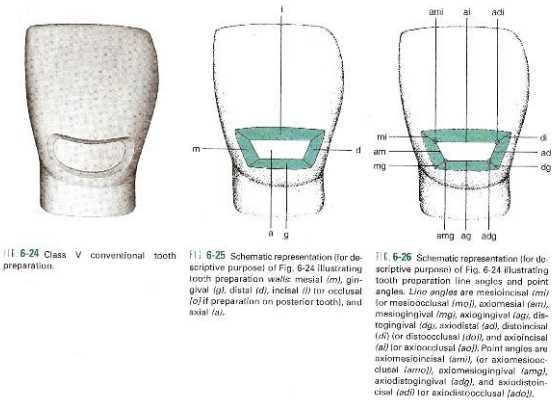


FIG. 6-24 Class V conventional tooth preparation.

FIG. 6-25 Schematic representation (for descriptive purpose) of Fig. 6-24 illustrating tooth preparation *walls*: mesial *(m)*, gingival *(g)*, distal *(d)*, incisal *(i)* (or occlusal *(o)* if preparation on posterior tooth), and axial *(a)*.

FIG. 6-26 Schematic representation (for descriptive purpose) of Fig. 6-24 illustrating tooth preparation line angles and point angles. *Line angles* are mesioincisal *(mi)* (or mesioocclusal *(mo)*), axiomesial *(am)*, mesiogingival *(mg)*, axiogingival *(ag)*, distogingival *(dg)*, axiodistal *(ad)*, distoincisal *(di)* (or distoocclusal *(do)*), and axioincisal *(ai)* (or axiooccdusal *(ao)*). Point angles are axiomesioincisal *(ami)*, (or axiomesiooccdusal *(amo)*), axiomesiogingival *(amg)*, axiodistogingival *(adg)*, and axiodistoincisal *(adi)* (or axiodistoocclusal *(ado)*).

Class VI Restorations. Restorations on incisal edges of anterior teeth and cusp tips of posterior teeth are Class VI.

Cavity preparation according G.V.Black principles:-

G.V.Black'sApproach to Cavity Preparation

1. Outline form
2. Resistance form
3. Retention form
4. Convenience form
5. Removal of remaining caries
6. Finish enamel walls
7. Clean cavity preparation

1. Outline form

- Based primarily on the location and extent of the caries.
- Final outline form is not established until the carious dentin and, usually, its overlying enamel has been removed

2. Resistance form

- Resistance to both fracture of the tooth and filling material must be built in so both will be resistant to fracture during function

3. Retention form

- The tooth preparation must be shaped in such away to retain the filling material, without weakening the remaining tooth structure

4. Convenience form

- Allows adequate observation, accessibility, and ease of operation during the preparation and restoration of the tooth.
- Only the minimal amount of reduction that will provide the necessary convenience should be done

5. Removal of the remaining caries

- Deeper caries not removed by the initial cavity

preparation. Care must be exercised as the pulp may be in close proximity.

6. Finish of enamel walls and margins

- Remove unsupported enamel, make the margins

smooth and continuous to facilitate finishing of the restoration.

7. Clean the cavity preparation

- Rinse away all debris and dry the cavit preparation.