

Dental caries and tooth cavity preparation

Dental caries

Definition:

Dental caries is a multifactorial disease that causes destruction to the hard tooth structures due to acids released by bacteria.

There are several factors combine to cause dental caries at which they are:

1. Host (tooth and saliva).
2. Diet (carbohydrates).
3. Dental plaque (bacteria).
4. Time.

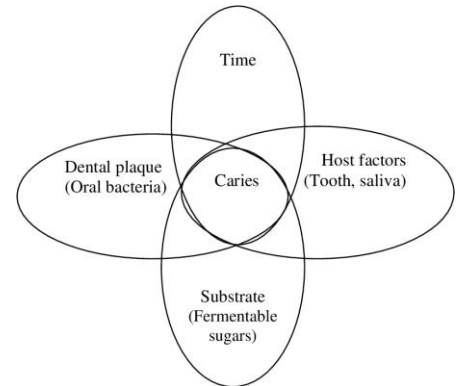


Types of dental caries:

*According to the location:

a. Primary caries:

1. Pit and fissure caries.
2. Smooth surface caries.
3. Root surface caries.
4. Residual caries.

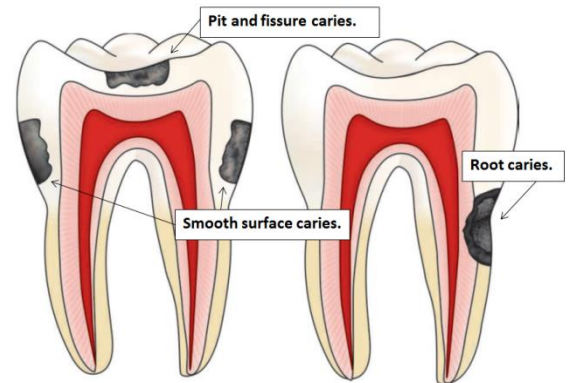


b. Recurrent (secondary) caries:

1. Adjacent to restoration margins.
2. Beneath the restoration.

*According to the amount of tooth involvement caries:

1. Incipient caries (white spot).
2. Cavitated (advanced) caries.



*According to the rate of progression caries:

1. Acute caries.
2. Chronic caries.

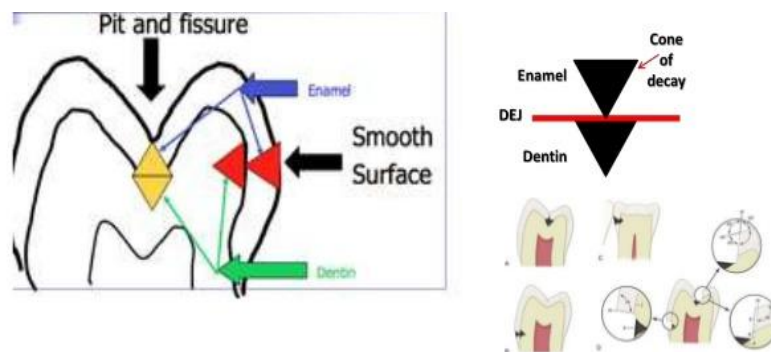
In this lecture, only primary caries will be explained and the other types will be explained later.

1. Pit and fissure caries:

It is a type of caries that occurs in pits and fissures of anterior and posterior teeth. Diagrammatically, it can be seen as two cones, base to base, with the apex of the enamel cone at the point of entry in enamel and the apex of the dentin cone towards the pulp.

2. Smooth surface caries:

It is a type of caries that occur in smooth surfaces of the teeth such as; (proximal, facial and lingual surfaces). Unlike pit and fissure caries, smooth surface caries involves a larger area of enamel on its outer surface. Histologically, smooth surface caries can be seen as two inverted cones, the base of enamel cone is toward the outer surface of enamel, while the base of dentine cone is at the dentino-enamel junction.

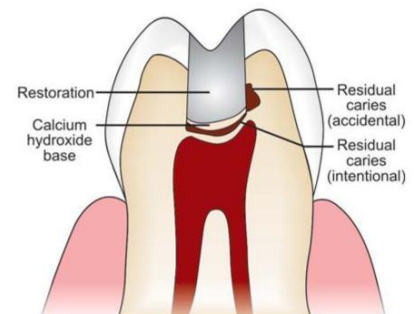


3. Root caries:

Caries that occurs at the root surface of the tooth (cementum layer). It is usually seen where there is gingival recession. Clinically, the lesions appear as saucer shaped cavities. Other than carious lesions, erosion, abrasion and idiopathic resorption can affect cementum.

4. Residual caries:

Refers to carious tissue that was not completely excavated prior to placing a restoration



* Stages of dental caries:

1. Incipient caries (white spot):

It is also called initial caries or reversible caries. It is just the beginning of the caries activity and the lesion is evident as a white opaque area (white spot) on the surface of the enamel.

2. Enamel decay: Caries in this stage is started to form a cavity in the enamel surface.

3. Dentin decay: Caries in this stage forms cavity in the dentin surface.

4. Pulp involvement: Caries in this stage reaches pulp tissues causing pulp diseases (pulpitis).

5. Abscess formation: If the pulp is not treated in the previous stage, pulp necrosis will occur and abscess at the periapical area will be formed.

6. Tooth loss.

Cavity preparation

Definition:

Is a removal of dental caries and weak tooth structure to reconstruct the tooth with suitable dental restorative materials. Cavity preparation shape and names are termed according to their classifications and simplicity of preparations.



Objectives of tooth preparation

1. Conserve healthy tooth structure.
2. Remove all defects and caries.
3. Restore function by preparing a cavity that provides fracture resistance to both tooth and restoration.
4. Restore esthetic of the tooth.

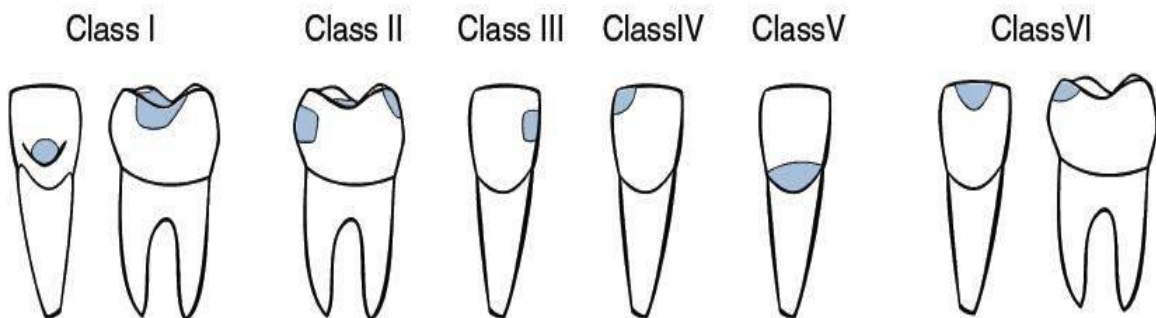
Types of cavity preparation:

1. Simple cavity: It is a cavity that involves only one surface of the tooth (a).
2. Compound cavity: It is a cavity that involves two surfaces of the tooth (b).
3. Complex cavity: It is a cavity that involves more than two surfaces of the tooth (c).



Classification of cavity preparation

Cavity preparations were classified by G.V. Black according to frequency of caries in various tooth surfaces. These classifications are; Class I, Class II, Class III, Class IV, and Class V. recently, Class VI was added to the G.V. Black's classification. These classes are used to diagnosis of caries (e.g., Class I Caries), cavity preparation (e.g., a Class I amalgam preparation) and restoration (e.g., Class I amalgam restoration).



Terminology related to tooth Preparation:

In each prepared cavity there are anatomical terms that should be known to the dentists. These terms include; surfaces, walls, line angles, point angles and cavusurface angle and margins.

Cavity preparation walls:

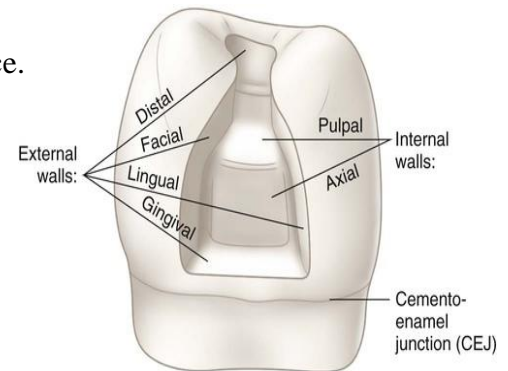
The process of creating a preparation in a tooth results in the formation of preparation walls or floors. We there are two types of cavity preparation walls at which they are:

1. Internal walls:

It is a prepared surface that does not extend to the external tooth surface.

a. Pulpal wall: is an internal wall that is oriented perpendicular to the long axis of the tooth and is located occlusal to the pulp.

b. Axial wall: is an internal wall that is oriented parallel to the long axis of the tooth.



2. External walls:

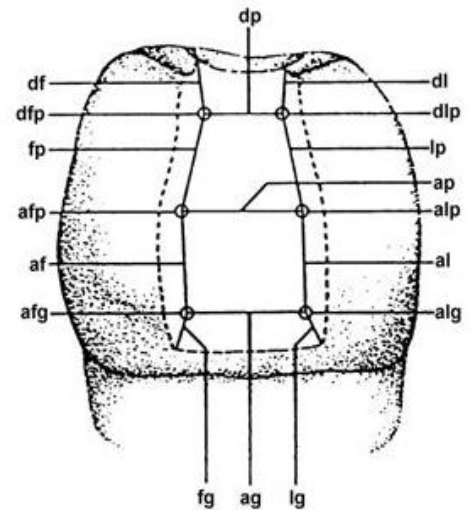
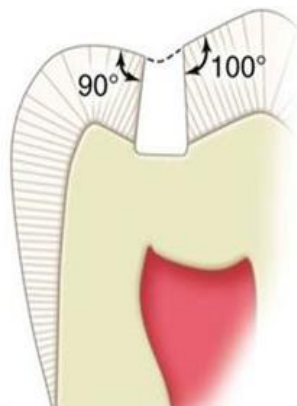
It is a prepared surface that extends to the external tooth surface.

Such a wall takes the name of the tooth surface that the wall is adjacent such as; facial, lingual, distal and mesial external walls.

Cavity preparation angles:

It is a junction of two or more prepared surfaces.

1. Line angle: is the junction of two planar surfaces of different orientation along a line.
2. Point angle: he point angle is the junction of three planar surfaces of different orientation.
3. Cavusurface angle and margin: Is the angle of tooth structure formed by the junction of a prepared wall and the external surface of the tooth. The actual junction is referred to as cavosurface margin.



Schematic representation illustrating cavity preparation **line angles and point angles.**

Line angles are:

axial-facial (af) axial-lingual (al) axial-pulpal (ap) distal-facial (df) distal-pulpal (dp) distal-lingual (dl) facial-gingival (fg) facial-pulpal (fp) lingual-gingival (lg) lingual-pulpal (lp)

Point angles are:

axial-facial-gingival (afg) axial-facial-pulpal (afp) axial-lingual-gingival (alg) axial-lingual-pulpal (alp) distal-facial-pulpal (dfp) distal-lingual-pulpal (dlp)

Principles of cavity preparation:

The preparation of a cavity should be carried out in an orderly sequence, following certain principles. *Dr. G.V. Black* suggested seven principles for cavity preparation, which by and large are followed, though each principle has been modified keeping in view the advancement in restorative materials. These principles are as follows:

1. Outline form

- a. Based primarily on the location and extent of the caries.
- b. 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

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

5. Removal of the remaining caries

- a. 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 cavity preparation.

References:

1. Sturdevant's art & science of operative dentistry. Seventh edition (2015).
2. Textbook of Operative Dentistry. Vimal K Sikri. Fourth edition (2014).