

PRINCIPLES OF CAVITY PREPARATION:

Many improvements have been introduced regarding the principles of cavity preparation since the time of G.V.Black in 1860 who first established the rules or steps of cavity preparation. ►

The Biological Principles:

- ▶ 1- Removal of carious lesion
- ▶ 2- Preserving sound tooth structure.
- 3. Maintain pulpal integrity

The Mechanical principles: ►

- Establishing outline form.
- Convenience form.
- Resistance form.
- Retention form.
- Removing of remaining carious lesions.
- Finishing enamel walls & toilet of cavity.

1. Outline Form:

Outline form: is placing the cavity margins in the position they will occupy in the final preparation. ►

Generally the cavity outline must follow the following rules: ►

- a. All margins placed on sound tooth structure.
- b. All continuous, non-coalesced pit & fissure should be eliminated.
- c. Margins placed in the areas of less caries susceptibility.

"Extension for Prevention" is an important rule in operative dentistry which states that the cavity must include also non-carious sites of fissures & pits adjacent to the carious sites , this is to ensure that the caries will not return again causing breakdown of the restoration

Later, this rule is changed into "*Extension for Self-Cleansing*" due to development of dentistry and attempts to treat the teeth with maximum conservation of tooth structure. This means that we restore the tooth with an extent that the patient can easily reach it with teeth brushing. But however *Extension for Prevention* still have significant considerations in some clinical situations. ►

The concept of Enameloplasty: ►

In developed countries, enameloplasty is cosmetic term of dental procedure to remove ►
small amount of tooth enamel. Also *fissures sealants* may be used for prevention of
recurrent caries after restoration.

2. Convenience form :

It's the shape of the cavity that allows adequate observation, accessibility and ease of operation in preparing & restoring the cavity. ►

For example using $1/6$ intercuspal distance in the outline form of the cavity is more conservative for sound tooth structure; but we will face the problem of relatively large head of the amalgam plugger (condenser); therefore poor amalgam condensation may result in the failure of the restoration. ►

. *Resistance form* : ►



Primary resistance form may be defined as that shape and placement of the preparation walls that best enable both the restoration and the tooth to withstand, without fracture, masticatory forces delivered principally in the long axis of the tooth. ►

Principles: ►

1. Use the box shape with a relatively flat floor and avoiding a saucer shape cavity, which helps the tooth resist occlusal loading by virtue of being at right angles to those forces of mastication that are directed in the long axis of the tooth.
2. usually butt-joint (90 degree) cavosurface margins are advocated with cavities for amalgam restoration, this offer a maximum bulkiness for both enamel and amalgam as both are brittle materials.

- Restrict the extension of the external walls (keep as small as possible) to allow strong cusp and ridge areas to remain with sufficient dentin support. the optimum width is $\frac{1}{4}$ the intercuspal distance.
- Slightly rounding (coving) of internal line angles to reduce stress concentrations in tooth structure.
- Flat, smooth floors that run perpendicular to long axis of the tooth (that is to say parallel to occlusal plane of the tooth in order to ensure equal stress distribution and restoration stability under load.
- Provide enough thickness of restorative material to prevent its fracture under load. Since amalgam is brittle, so, it needs bulk of 1mm as a minimum. The optimum depth is (1.5-2 mm) in enamel surfaces (2 mm measure at prepared external walls while 1.5 mm at central groove depth). The proper extension into dentine is about (0.1-0.5 mm).

- Bond the material to tooth structure when appropriate. This provide retention in addition to increasing fracture resistance, that is to say its considered a resistance and retention form as well.
- Removal of any unsupported enamel that doesn't has dentine support.

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4. Retention form

Primary retention form is that shape or form of the conventional preparation that resists displacement or removal of the restoration from tipping or lifting forces. ►

sometimes, primary retention form and resistance form are accomplished in the same cutting procedure e.g. convergency of occlusal buccal and lingual walls in class I cavities (retentive feature) provides 90 degree cavosurface margin (resistance feature). ►

Generally, convergent and/or parallel walls, Dovetail on the occlusal surface, lesser occlusal outline area and flat pulpal floor of the cavity, all are considered primary retention forms. ►

In some cavity designs no or insufficient primary retention forms are present. So, secondary mechanical retention means must be added to retain the restoration in a form of secondary retention grooves, slots, coves, pins, amalgapins, adhesives, etc... ►

5. Management of Remaining Caries: ►

Removing of remaining carious lesions: caries are removed during steps of cavity ► preparation. If only one or two spots of caries are present on the pulpal floor, the level of the floor is not altered , we remove these spots with the aid of spoon excavator or with large round bur , although they may leave depressed areas but these are very small in compare to the entire surface area .

Finishing ▶

Purposes : ▶

▶ Have best smooth marginal seal between tooth & the restoration.

▶ Provides maximum strength for both enamel & restoration .

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Several considerations to be remembered to achieve these purpose : ►

- Direction of enamel rods .
- Support of enamel .
- Type of restoration .
- Location of margins .
- Degree of smoothness

finish ▶