Crown and Bridge

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Principles of tooth preparation

Once the enamel or dentin of a tooth is lost as a result of caries, trauma, or wear, restorative materials must be used to reestablish form and function(because Teeth do not possess the regenerative ability found in most other tissues). Teeth require preparation to receive restorations, and these preparations must be based on fundamental principles

The principles of tooth preparation may be divided into three categories:

1. Biologic considerations, which affect the health of the oral tissues.

2. Mechanical considerations, which affect the integrity and durability of the restoration

3. Esthetic considerations, which affect the appearance of the patient.

Aim of Tooth Reduction:

- Not to enlarge the size of the tooth.
- To eliminate all the under cuts.
- To provide good esthetic.

This must be based on fundamental principles from which basic criteria can be developing that help to predict the success of the restoration. And these are: -

1-Preservation of the tooth structure:

The preparation of the tooth must be conservative, the minimal amount of the tooth structure must be removed, excessive amount of the tooth structure in addition to be destructive phenomenon it has many harmful effects: -

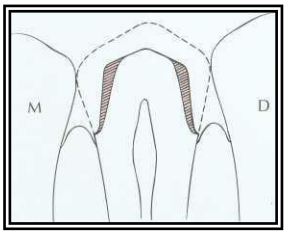
A- Excessive reduction leads to thermal hypersensitivity, pulpal inflammation and necrosis may result from approaching to the pulp closely.

B- The tooth might be over tapered or shortened and this might affect the retention and resistance of the prepared tooth.

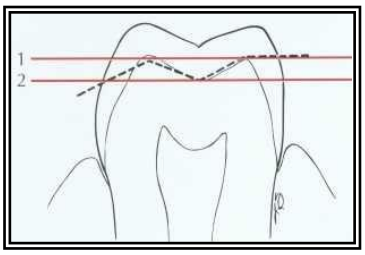
Tooth structure is conserved by using the following guidelines:

A. Use of partial-coverage rather than complete coverage Restorations

B.Preparation of teeth with the minimum practical convergence angle **(taper)** between axial walls, Excessive taper results in considerable loss of tooth structure.

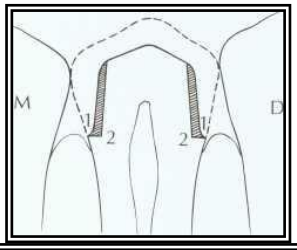


C. Preparation of the occlusal surface so reduction follows the anatomic planes to give uniform thickness in the restoration, An anatomically prepared occlusal surface results in adequate clearance without excessive tooth reduction. A flat occlusal preparation will result in either insufficient clearance or an excessive amount of reduction.

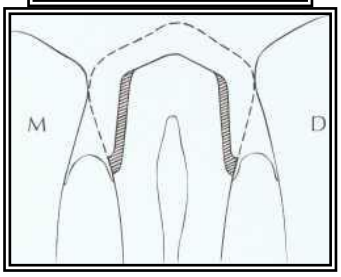


Preparation of the axial surfaces so that tooth structure is removed evenly;(if necessary, teeth should be orthodontically repositioned).

D. Selection of a conservative margin compatible with the other principles of tooth preparation.



E. Avoidance of unnecessary apical extension of the preparation.



2- Retention and resistance form:

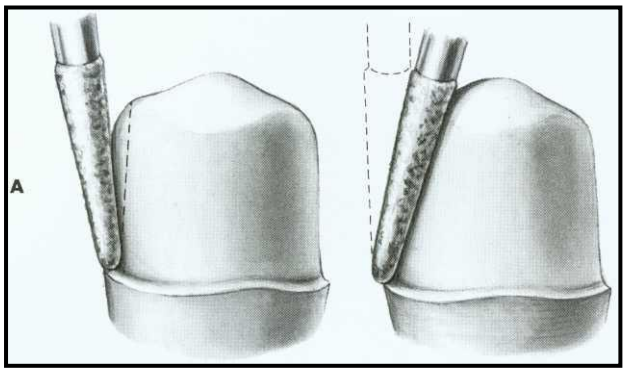
Retention: is the ability of the preparation to resist the crown restoration from removal along its path of insertion.

Resistance: is the ability of the preparation to resist the dislodgment of the restoration by forces directed obliquely or horizontally to the restoration. Rotation is prevented by any areas of the tooth preparation, called resistance areas.

Factors affecting retention and resistance:

1- Taper of the preparation (the most important factor). The more the parallel wall, the more is the retention. But parallel wall is difficult to be obtained in the patient mouth without undercuts so we do tapering.

The convergence angle: is the angle that determines the convergence of the prepared tooth. The magnitude of retention depends on the degree of this angle. The greater the taper the less the retention. *(5-6) degree convergence angle is the mostly used to provide the needed retention.



2- Surface area of the preparation (increasing the surface area increase retention).

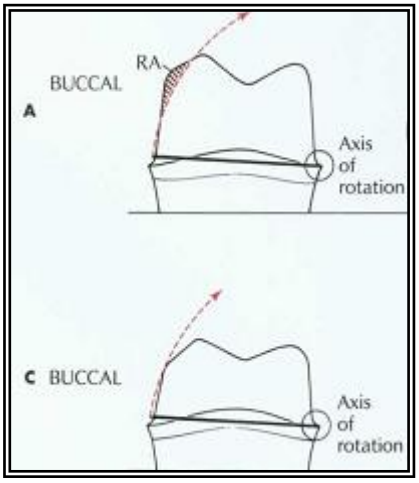
3- Length area of the preparation and height. Increasing the length increase retention.

4- Extra retention means.

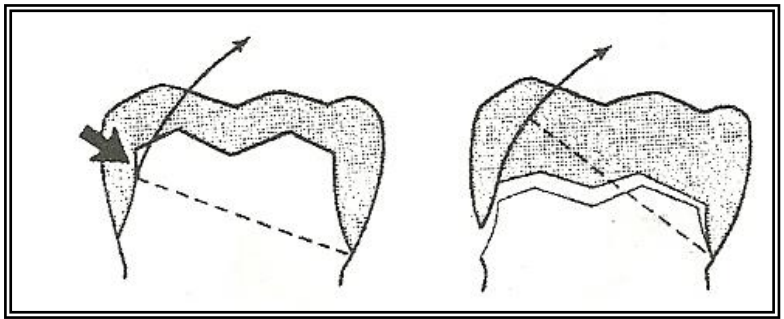
Short tooth preparations with large diameters were found to have very little resistance form. Resistance must be provided by boxes or grooves and will be greatest if they have walls that are perpendicular to the direction of the applied force.

Resistance form

For the restoration to succeed, the length must be great enough to interfere with the arc of the casting pivoting about a point on the margin on the opposite side of the restoration. The shorter wall does not afford this resistance. The shorter the wall, the more important its inclination.



The walls of shorter preparations should have as little taper as possible to increase the resistance. In general, molar teeth require more parallel preparation than premolar or anterior teeth to achieve adequate resistance form.



Lateral forces tend to displace the restoration by causing rotation around the gingival margin. Rotation is prevented by any areas of the tooth preparation that are placed in compression, called ***RESISTANCE AREAS.*** Multiple resistance areas cumulatively make up the resistance form of a tooth preparation.

Adequate resistance depends on the following:

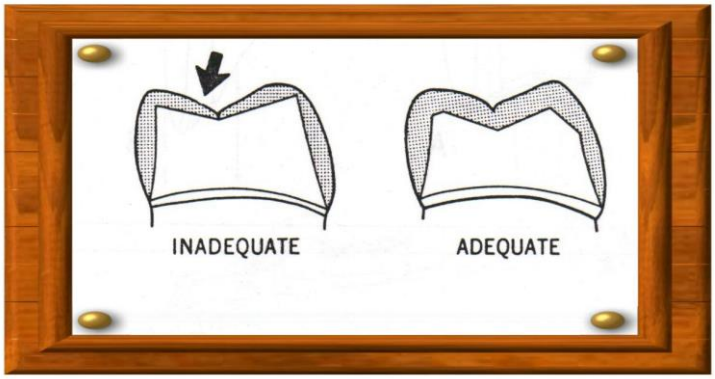
1. Magnitude and direction of the dislodging forces
2. Geometry of the tooth preparation
3. Physical properties of the luting agent

3- Structural Durability

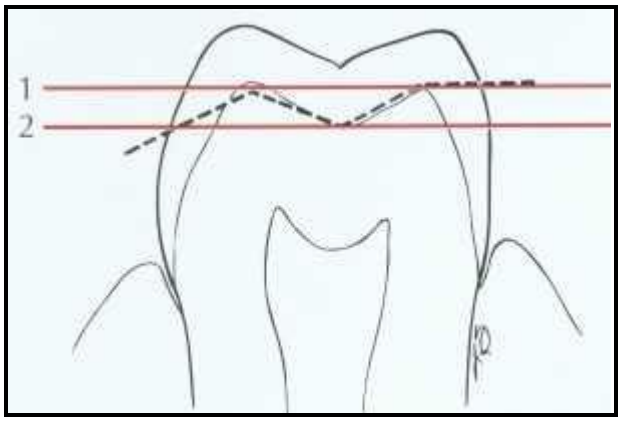
The preparation must be designed so that it will be possible to have an adequate bulk of metal to allow the restoration to withstand the forces of occlusion, prevent wearing holes in the gold and allow proper contouring and carving of anatomy in the restoration.

Preparation features related to S.D.:

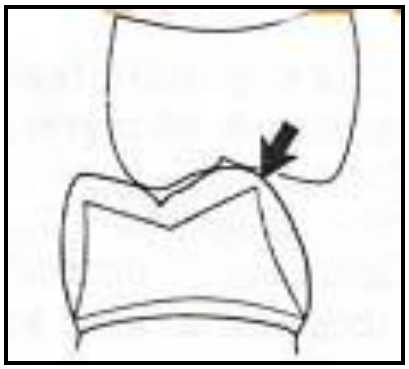
1- Occlusal reduction.
2- Axial reduction.



<u>Occlusal clearance: -</u> is the distance (space) between the occlusal surface of the prepared tooth and that of apposing tooth.
It should be evaluated in centric and eccentric relation.
It should follow the same tooth anatomy this will provide adequate clearance without excessive tooth reduction. A flat occlusal preparation will result in either **(1)** insufficient clearance or **(2)** an excessive amount of reduction.



<u>Functional cusps</u>: - the cusps that give centric stops of occlusion. (Palatal of upper posterior teeth and buccal of lower posterior teeth).



4- Marginal Integrity: -

The restoration margin should:

a- Fit as closely as possible against the finishing line of preparation.
b- Must be sufficient strength.
c- Should be placed in an area where the dentist can finish them properly and the patient cleans them properly.

5- Preservation of periodontal tissue: -

1- Whenever possible the margin of the preparation should be supragingival.
2- The casting should have proper contact, Embrasure form, Occlusion and a healthy occluso-gingival contour.

Path of insertion: An imaginary line along which the restoration can be inserted and removed with out causing lateral force on the abutment.

The crown restoration should have a single path of insertion to be retentive.

Most of the time the path of insertion is parallel to the long axis of the tooth, when posterior teeth are prepared to receive a full metal crown or ¾ crown the path of insertion is parallel to the long axis of the tooth while in the anterior teeth ¾ crown it is parallel to the incisal 2/3 (not to the long axis).