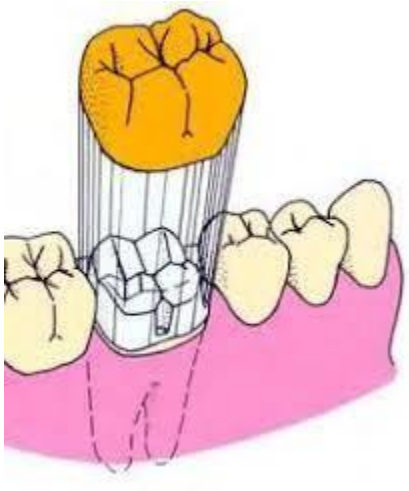
Mechanical consideration of tooth preparation

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.

Path of insertion:
An imaginary line along which the restoration can be inserted and removed without 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 of crown restorations is parallel to the long axis of the tooth except in ¾ crown for anterior teeth where the path of insertion should be parallel to the incisal 2/3 of the tooth crown (not to the long axis). By limiting the path of withdrawal, retention is improved.

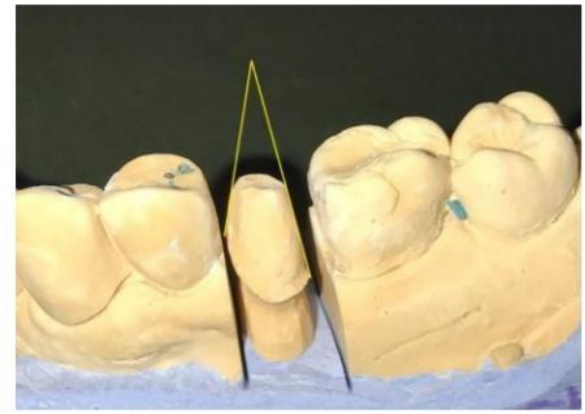


Factors affecting retention and resistance:

1- Taper of the preparation.
2- Surface area of the preparation,
3-Length and height of the preparation.
4- Diameter of the tooth (tooth width).
5-Texture of the preparation.
6- Accessary mean.

1-Taper of the preparation:

Convergence angle: is the angle that formed between opposing axial walls of a tooth prepared to receive crown restoration, it determines the convergence (taper) of the prepared tooth.
The magnitude of retention depends on the degree of this angle. The greater the taper the less the retention. The degree of the convergence angle is one of the factors that determine the amount of axial and non- axial forces which can be tolerated without leading to a loss of crown preparation.
(5-6) degree convergence angle is mostly used to provide the needed retention. The more nearly parallel the opposing walls of preparation the greater will be the retention. But parallel wall is difficult to be obtained in the patient mouth without undercuts, also parallel walls might lead to difficulty in seating of the crown restoration, thus (5-6) degree convergence angle is mostly used to provide the needed retention



Taper and Resistance: The more parallel the axial walls the more will be the resistance of crown restoration. The walls of a short wide preparation must be kept nearly parallel to achieve adequate resistance form.

1- Surface area of the preparation: Increasing the surface area increase retention. Factors that influence surface area are:

a) Size of the tooth: The larger the size of the tooth the more will be the surface area of the preparation, the more will be the retention thus full metal crown on molar tooth definitely more retentive than that on premolar tooth.

b) Extend of coverage by restoration: The more the area that will be covered by the crown restoration, the more will be the retention, thus full metal crown on molar is more retentive than 3/4 crown on the same tooth.

c) Accessory feature such as boxes, grooves and pin holes.

3. Length (height) of the preparation: Increasing the length increase retention and resistance and vice versa.

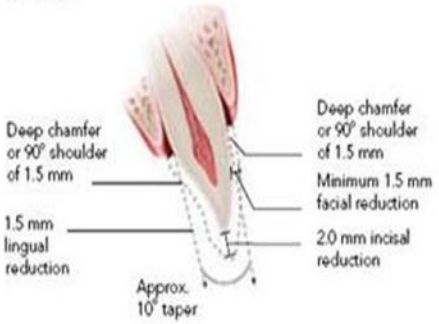
4. Diameter of the tooth (tooth width): Under some circumstances, crown on narrow tooth can have greater resistance to tipping than a crown on a wider tooth, this occur because the crown on the narrower tooth has shorter radius for rotation resulting in a lower tangent line and a larger resisting area.

5. Texture of the preparation. Depending on the type of cementation agent, texture of the preparation might effect on the retention of cast crown. Smooth surfaces are less retentive than rough (mechanical interlocking).

6. Extra retention means. The retention of a preparation can be greatly enhanced by the addition of grooves, pin holes or boxes.

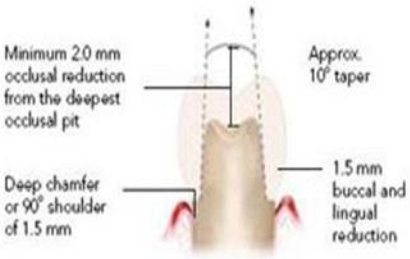
preparation: crown

anterior



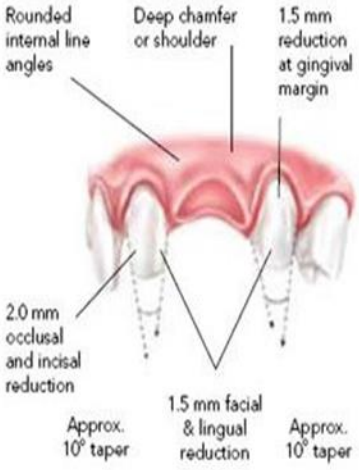
Rounded anterior incisal edge (1.0 mm in width)

posterior



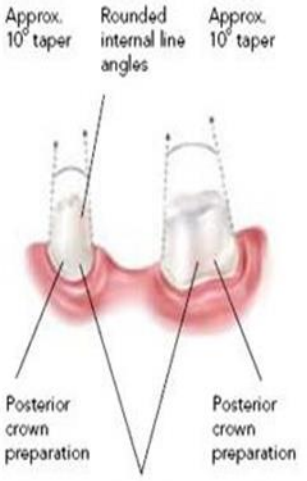
preparation: bridge

anterior



Rounded anterior incisal edge (1.0 mm in width)

posterior



1.5 mm buccal, lingual & margin reduction