PRINCIPLES OF TOOTH PREPARATION

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PRINCIPLES OF TOOTH PREPARATION

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PRESERVATION OF TOOTH STRUCTURE

- Partial veneer versus Full veneer crown
- Supra-gingival margin versus sub-gingival
RETENTION AND RESISTANCE

• Retention prevents removal of the restoration along the path of insertion or long axis of the tooth preparation.

• Resistance prevents dislodgement of the restoration by forces directed in an apical or oblique direction and prevents any movement of the restoration under occlusal forces.

• Retention and resistance are interrelated and often inseparable qualities.
• The essential element of retention is two opposing vertical surfaces of the same preparation.

• These may be external surfaces such as the buccal and lingual walls of a full veneer crown (sleeve retention).
• The opposing surfaces can also be internal, such as the buccal and lingual walls of the proximal box of an inlay.

• An intracoronal restoration resists displacement by wedge retention.

• Many restorations are a combination of the two types.
RETENTION AND RESISTANCE

1. Taper
2. Freedom of displacement
3. Length
4. Substitution of internal features
5. Path of insertion
• The axial walls must taper slightly to permit the restoration to seat; i.e. the two opposing external walls must gradually converge or the opposing internal walls must gradually diverge occlusally.

• The terms angle of convergence and the angle of divergence can be used to describe the respective relationships between the two opposing walls of the preparation.
TAPER

• The relationship of one wall of a preparation to the long axis of that preparation is the inclination of that wall.

• The two opposing surfaces, each with a 3-degree inclination would give the preparation a total of 6-degree taper.
TAPER

- Theoretically, the more nearly parallel the opposing walls of a preparation, the greater is the retention.
Parallel are impossible to create in the mouth without producing preparation undercuts.

Why Tapered?

1. To visualize preparation walls
2. To prevent undercuts
3. To compensate for inaccuracies in the fabrication process
4. To permit complete seating of the restoration during cementation
• Tooth preparation taper should be kept minimum because of its adverse effect on retention.
TAPER

- Optimum taper or total convergence of 16 degrees achievable clinically while still affording adequate retention.

- Low as 10 degrees on anterior teeth and as high as 22 degrees on molar teeth.
STRUCTURAL DURABILITY

- Restoration must contain bulk of material that is adequate to withstand the forces of occlusion.
- This bulk must be confined to the space created by the tooth preparation.
- Only this way the occlusion will be harmonious and axial contours normal.
STRUCTURAL DURABILITY

1. Occlusal reduction
2. Functional cusp bevel
3. Axial reduction
• Occlusal reduction: One of the most important features for providing adequate bulk of metal and strength to the restoration is occlusal clearance.

• For gold alloys- 1.5 mm clearance on the functional cusp (lingual of maxillary molars and premolars and buccal of mandibular molars and premolars).

• 1mm clearance on the nonfunctional cusp.
Occlusal Reduction

- The basic inclined plane pattern of the occlusal surface duplicated to produce adequate clearance without over shortening the preparation.
- A flat occlusal surface may over shorten the preparation.
Inadequate Occlusal Reduction

- Makes the restoration weaker.
- will not provide adequate space to allow good functional morphology under the anatomical grooves.
- The restoration easily perforated by finishing procedures or by wear in the mouth.
FUNCTIONAL CUSP BEVEL

• An integral part of occlusal reduction is the functional cusp bevel.
• A wide bevel placed on the functional cusp provides space for an adequate bulk of metal in an area of heavy occlusal contact.
Functional Cusp Bevel

Lack of functional cusp bevel may produce several problems:

1. Can cause a thin area or perforation.
2. May result in over contouring and poor occlusion.
3. Over inclination of the buccal surface will destroy excessive tooth structure reducing retention.
AXIAL REDUCTION

- Plays an important role in securing space for an adequate thickness of the restorative material.
- Inadequate axial reduction will have thin walls subject to distortion or result in overcontouring the axial surface which could lead to periodontal problems.
STRUCTURAL DURABILITY

- There are other features that serve to provide space for metal that will improve the rigidity and durability of the restoration:
  1. Offset
  2. Occlusal shoulder
  3. Isthmus
  4. Proximal groove
  5. Box
MARGINAL INTEGRITY

• The restoration margin should closely adapt to the cavosurface finish line of the preparation to survive in the oral cavity.
FINISH LINE CONFIGURATION

1. Chamfer
2. Heavy chamfer
3. Shoulder
4. Radial shoulder
5. Shoulder with bevel
6. Knife edge
CHAMFER

• The preferred gingival finish line for full veneer metal restoration.
• This finish line exhibit least stress to the underlying cement.
• It can be cut with round-end tapered diamond.
• Conservative type when compared with shoulder finish line.
MARGINAL INTEGRITY

• TO BEVEL,
  OR ....
NOT TO BEVEL
PRESERVATION OF THE PERIODONTIUM

- The placement of finish lines has a direct bearing on the ease of fabrication and the ultimate success of the restoration.
- The best results can be expected from margins that are as smooth as possible and are fully exposed to cleansing action.
MARGIN PLACEMENT

- Whenever possible the finish line should be placed in an area where the margins can be finished by the dentist easily and kept clean by the patient.
- In addition, finish lines must be placed so that they can be duplicated by the impression without tearing or deformation.
MARGIN PLACEMENT

• Finish line should be placed in enamel whenever possible.
• Supra-gingival versus sub-gingival margin.
• Many situations in which sub-gingival margins are unavoidable:
  1. Caries
  2. Trauma
  3. To increase retention
  4. Esthetics
  5. Extension of previous restoration
PREPARATION FOR FULL VENEER CROWN

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PREPARATION FOR FULL VENEER CROWNS

SELECTION

Full veneer crown exhibits superior retention and resistance when compared with partial veneer crown.

Selection becomes mandatory when the abutment tooth is small and the edentulous span is long.
FULL VENEER CROWN

Variations of the full veneer crown are:

1. Metal-ceramic crown
2. All-ceramic crown
FULL VENEER CROWN

INDICATIONS:
1. Extensive coronal destruction due to caries or trauma.
2. Endodontically treated tooth.
3. Necessity for maximum retention and strength.
4. To correct minor malinclination.
5. To correct occlusal plane.
FULL VENEER CROWN

CONTRA-INDICATIONS:

Full coverage should not be used in mouths with uncontrolled caries.
It does not protect the tooth against the biological causes of caries.
Caries must be controlled by other means before any restoration can be successful.
FULL METAL CROWN PREPARATION

ARMAMENTARIUM:
1. Hand piece
2. No : 171L bur
3. Round-end tapered diamond
4. Short needle diamond
5. Torpedo diamond
6. Torpedo bur
7. Red utility wax
FULL METAL CROWN PREPARATION

STEP NO 1:

OCCLUSAL REDUCTION

1.5 mm of clearance of functional cusp and 1mm on the nonfunctional cusp.

Depth orientation grooves are placed on the occlusal surface with round end tapered diamond.
Full metal crown preparation

- **Occlusal reduction:**

A round-end tapered diamond is used to place the grooves on the ridges and the primary grooves of the occlusal surface.

If there is already some clearance with the opposing tooth because of malposition, grooves should not be made as deep.
OCCLUSAL REDUCTION:
The occlusal reduction should follow the configuration of the geometric inclines that make the occlusal surface of any posterior teeth.
STEP NO 2: Functional cusp bevel with round-end tapered diamond.

A wide bevel is placed on the functional cusp-depth orientation grooves are also helpful in this reduction.

Functional cusp bevel is integral part of occlusal reduction.

Failure to place this bevel can produce thin casting or poor morphology.
**Full Metal Crown Preparation**

**OCCLUSAL CLEARANCE:**

Is checked by having the patient to close on red utility wax held over the preparation.
Full Metal Crown Preparation

**STEP NO 3:**
Buccal and lingual walls are reduced with the round-end tapered diamond. The sides of the diamond will produce the desired axial reduction while the tip forms the chamfer.
Full Metal Crown Preparation

STEP NO 4: Initial proximal axial reduction with short needle diamond followed by the round-end tapered diamond.
**Full Veneer Crown Preparation**

**STEP NO 5:**

Axial finishing - round-end tapered diamond.

All axial surfaces are smoothed including all point angles. The finish line should be smooth and continuous.
Full Metal Crown Preparation

STEP NO 6:
Seating groove with 171L bur.
Full Veneer Crown Preparation
QUESTIONS