Prosthodontics (Crown & Bridge)

Lecture

Types of crowns and preparation

1-Full metal crown

- This provides better retention and resistance, because all the axial surfaces of the teeth are included in the preparation.
- **Indications:**
- 1. A patient with high caries index.
- 2. Posterior abutment teeth with excessive caries, or a tooth with extensive destruction due to caries or trauma in order to protect the remaining tooth structure from fracture.
- 3. A tooth with large amalgam restoration in order to protect the remaining tooth structure and amalgam from fracture.
- 4. Re-contouring of the tooth (posterior teeth) as in a tooth receiving a clasp for removable partial denture.
- 5. When maximum retention and resistance needed as in a tooth with short crown.

1-Full metal crown

- 6. Endodontically treated teeth.
- 7. As a bridge retainer.
- 8. Correction of minor inclination.
- 9. Correction of the occlusal plane.
- **Contraindications:**
- 1. Teeth located in the appearance zone.
- 2. Low caries index.
- 3. When less than maximum retention and resistance necessary.
- 4. When a more conservative crown could be used such as 3/4 crown as in a tooth with intact buccal surface and very short span bridge.

1-Full metal crown

- **Advantages:**
- 1. Strong (high resistance to deformation).
- 2. More conservative than other types of full crown such as porcelain fused to metal and all ceramic crowns, and it is easy to be prepared.
- 3. Provide more retention and resistance compared to partial veneer crowns.
- 4. Modification of axial tooth contour is possible.

1-Full metal crown

- **Disadvantages:**
- 1. Poor esthetic (display of metal).
- 2. Extensive tooth structure removal as compared with partial crown such as 3/4crown.
- 3. May interfere with taste.
- 4. Tarnish and corrosion, so it needs prophylactic measures.
- 5. Difficulty to test the vitality of the abutment teeth.

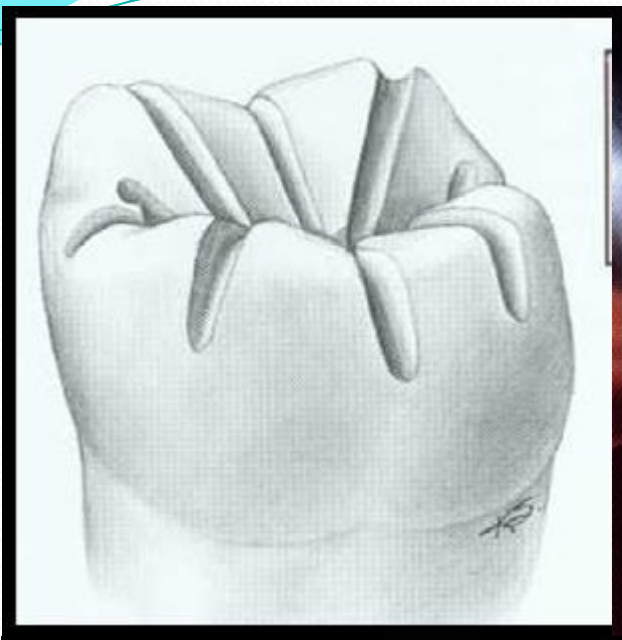
1-Full metal crown

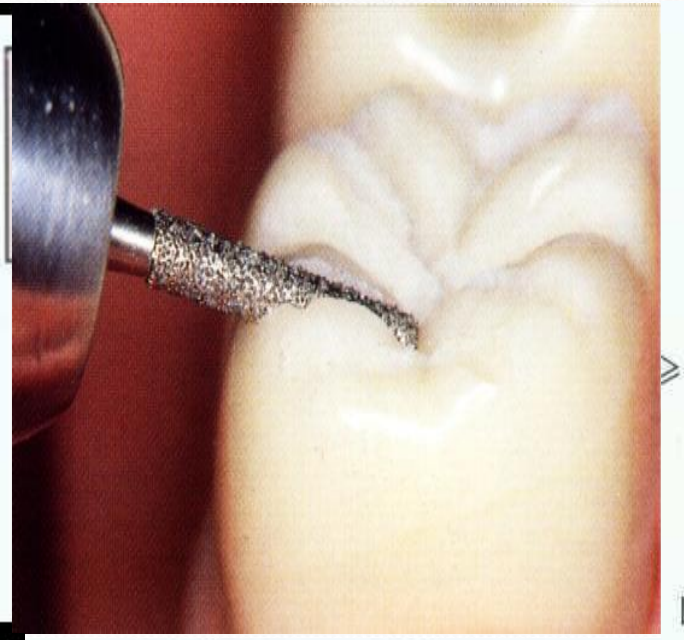
- **Types of metal alloys used for full metal crown**
- 1. High noble alloys (gold alloys).
- 2. Low noble alloys (silver-palladium and gold-palladium alloys).
- 3. Non-noble alloys (Nickle-chromium alloy).

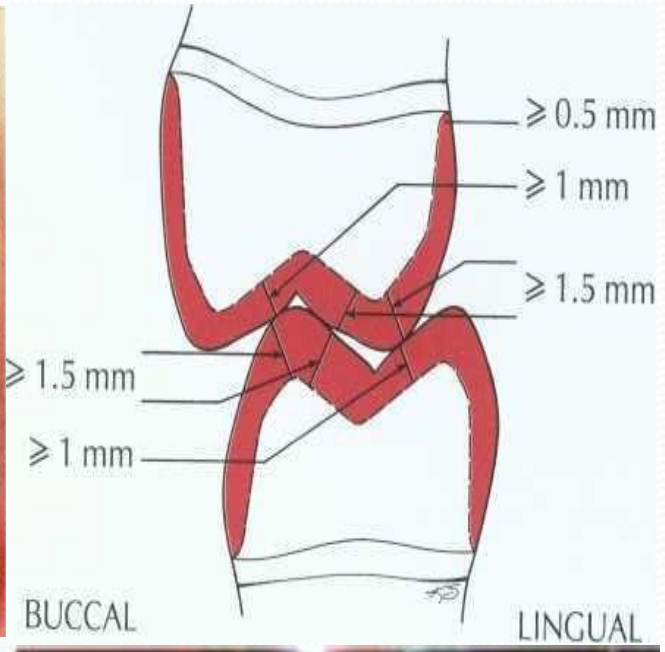
1-Full metal crown

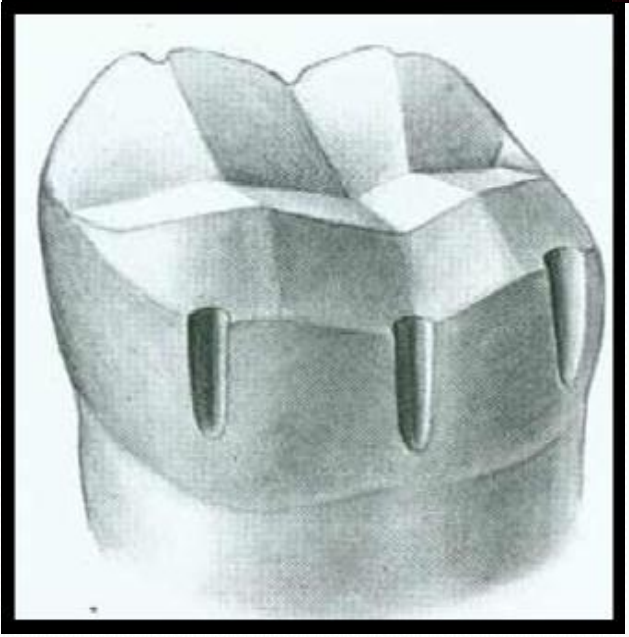
- **Steps of preparation:**
- Depth orientation grooves (DOG) must be prepared on the surface of the tooth to act as guide or reference to determine when enough tooth structure is removed, without these grooves we may remove much or less tooth structure or we lose time for repeated checking.
- The type of finishing line recommended for full metal crown is chamfer finishing line, therefore a round end tapered diamond fissure bur is used in the preparation. Knife edge finishing line, using pointed end tapered diamond fissure bur (long needle diamond fissure bur), may also be used.

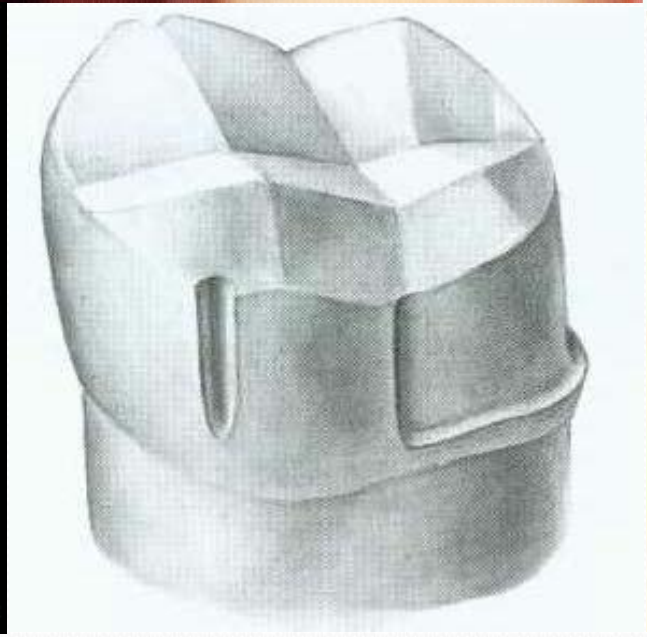
1-Full metal crown



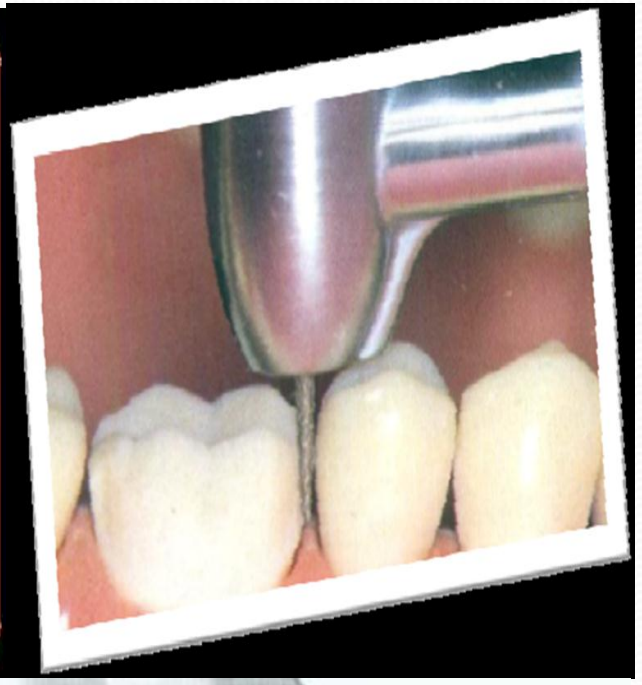


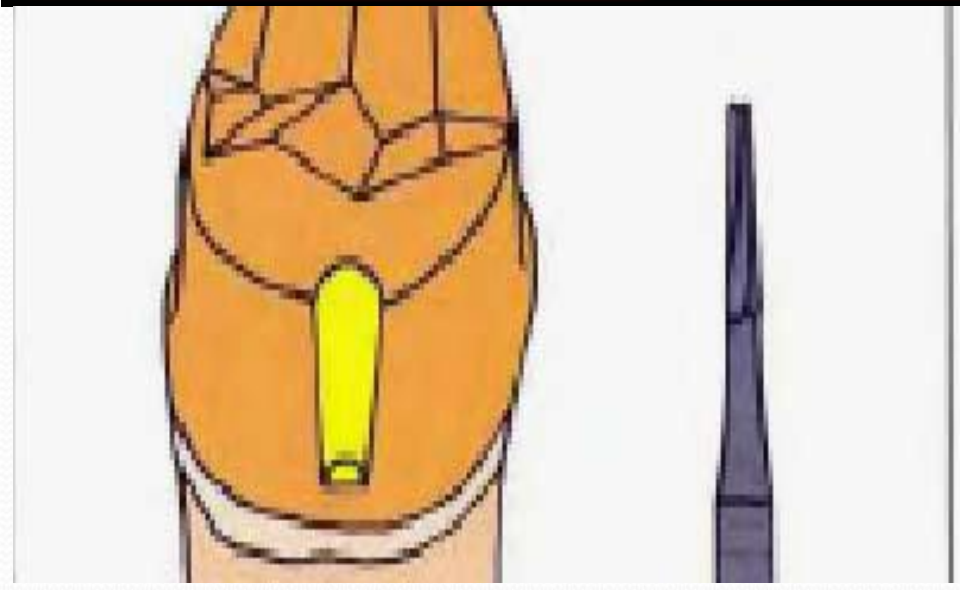


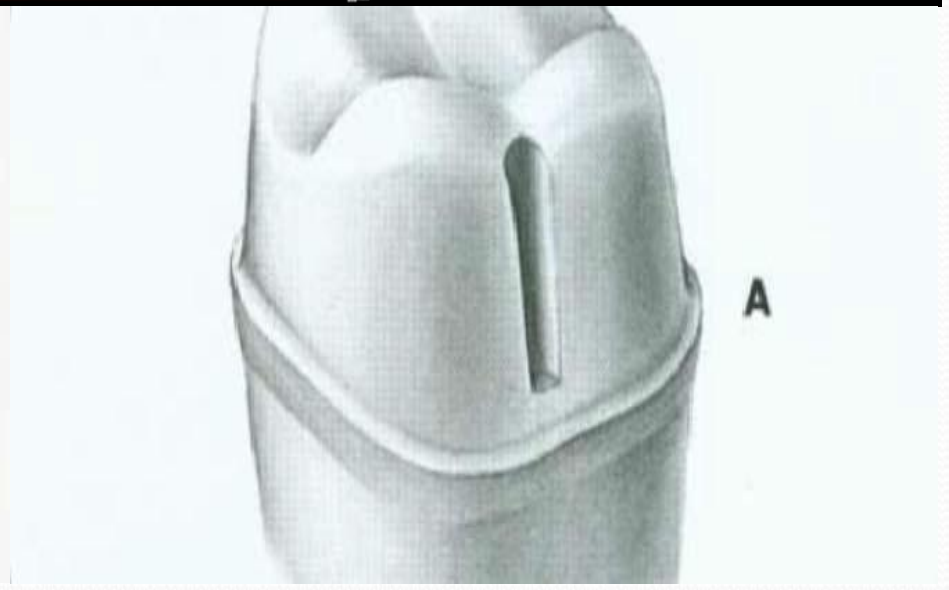




1-Full metal crown







1-Full metal crown

- **Steps of preparation:**
- **1. Occlusal surface preparation:** Planar occlusal reduction (anatomical reduction) following the geometric inclined planes of the occlusal surface should be done for the following objectives:
- -To provide a restoration with uniform thickness.
- -To preserve the tooth structure (axial wall length).
- -To improve the retention- resistance features of the preparation.

1-Full metal crown

- **Steps of preparation:**
- The aim of the occlusal surface preparation is to create 1.5mm occlusal clearance over the functional cusps and 1 mm over the non-functional cusps.
- The preparation for a full veneer crown usually begin with the occlusal reduction. By accomplishing this step first, the occlusso-gingival length of the preparation can be determined. The potential retention of the preparation can then be assessed, and auxiliary features can be added if necessary.
- A tapered fissure bur or a round-end tapered diamond fissure bur is used to create DOGs on the ridges and in the primary grooves of the occlusal surface.

1-Full metal crown

- **Steps of preparation:**
- Depth orientation grooves (DOGs) are prepared in the occlusal surface by a fissure bur to follow the inclines of the cusps. A DOG is prepared in each cusp extending from the cusp tip to the central groove, which represents the deepest part of the occlusal surface. The depth of each groove corresponds to the diameter of the fissure bur used. i.e. a fissure bur with 1.5 mm diameter is used to prepare DOG on the functional cusps, while a fissure bur with 1 mm diameter is used to prepare DOG on the non-functional cusps.

1-Full metal crown

- **Steps of preparation:**
- The remaining tooth structure between the DOGs is removed to accomplish the occlusal reduction, then smooth any roughness left by the grooves, keeping the occlusal surface in the configuration of the geometric inclines (following the normal contour of the cusps).
- After that, a wide bevel is placed on the functional cusp again using the round-end tapered diamond bur. The functional cusp bevel should be placed on the buccal inclines of mandibular buccal cusps and the palatal inclines of maxillary palatal cusps.
- After completion of the occlusal surface preparation, we should check the occlusion of the patient in centric and eccentric positions of jaw relationship.

1-Full metal crown

- **Steps of preparation:**
- **2. Buccal surface:** because of the anatomy of the buccal surface of the lower posterior teeth, this surface should be divided into two parts: gingival two thirds and occlusal one third. For the gingival two thirds we should place a DOG in the center of this surface parallel to the long axis of the tooth and by moving the bur mesially and distally following the inclination of the surface. For the occlusal one third a (DOG) is placed in the center of this area by placing the bur at 45 degrees with the long axis of the tooth and by moving the bur with the curvature of the surface to be prepared. This type of preparation is called ***two plane preparation*** or ***two steps preparation***. The two-plane preparation is needed on the buccal surface of the lower molar and the palatal surface of the upper molar.

1-Full metal crown

- **Steps of preparation:**
- Three DOG with 1 mm depth are prepared in the buccal surface of the tooth, one placed in the center of the wall and one in each mesial and distal transitional line angles. These grooves are prepared parallel to the long axis of the tooth or to the proposed path of insertion of the restoration.
- Move the bur mesially and distally following the inclination of this surface to remove any islands of tooth structure between DOG.
- The gingival extent of the preparation will determine the position of the margin (whether to be placed supra-gingivally, which is preferable, or there is a need to extend the finishing line sub-gingivally. A round-end tapered fissure bur is used during axial reduction to obtain chamfer finishing line.

1-Full metal crown

- **Steps of preparation:**
- 3. **Lingual surface:** the DOG is placed in the middle parallel to the long axis of the tooth and by moving the bur mesially and distally we complete the reduction. This type of preparation is done in one plane as it is indicated for the lingual lower and buccal upper molar and premolar teeth.
- 4. **Proximal surfaces**: we start with a fine tapered diamond fissure bur (needle type) to open and remove the contact area carefully without touching the adjacent tooth, because we are going to create a rough surface. This is in addition to removing the outer layer of enamel which is saturated with fluoride which leads to high caries susceptibility. The bur should be rested on the prepared tooth itself and by moving the bur up and down the contact will be removed.

1-Full metal crown

- **Steps of preparation:**
- Once the contact is opened, a round-end tapered fissure bur is used to plane the wall, while forming a chamfer finishing line. Safe-sided disc can also be used during the proximal reduction in order to prevent any damage to the adjacent tooth. Placing a matrix band on the adjacent tooth can also help.
- Finally, any sharp angle should be removed to prevent fracture due to stress concentration.

1-Full metal crown

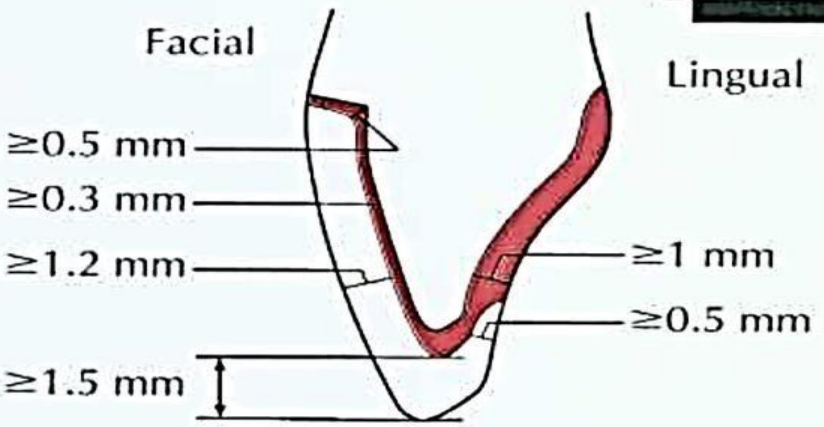
- **Steps of preparation:**
- Sometimes seating groove is placed in the buccal surface of the lower and the palatal surface of the upper molar teeth which act as a guide during placement of the crown. The advantages of these seating grooves are:
- • To prevent the rotation of the restoration.
- • Increase the surface area of preparation, so it enhances the retention and the resistance.
- • Improves the seating of crown as it enhances the escape of the excess cement during cementation.

2-Full metal crown with facing

- It is a full metal crown having the labial or buccal surface covered by a tooth colored materials (acrylic, porcelain). It combines the strength of full metal crown and the cosmetic effect of the tooth colored material.

2-Full metal crown with facing

To ensure good esthetics, substantial tooth reduction is necessary.



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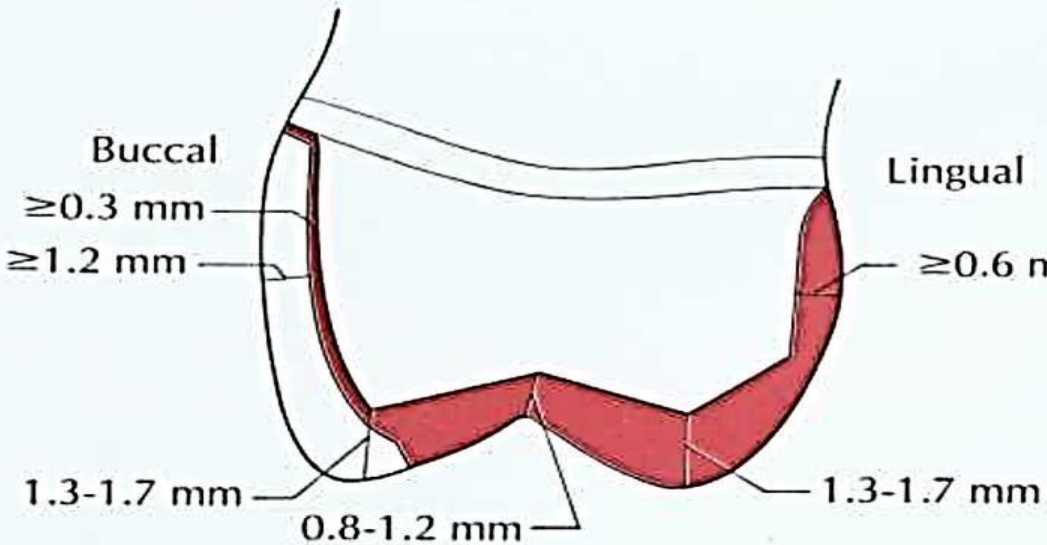

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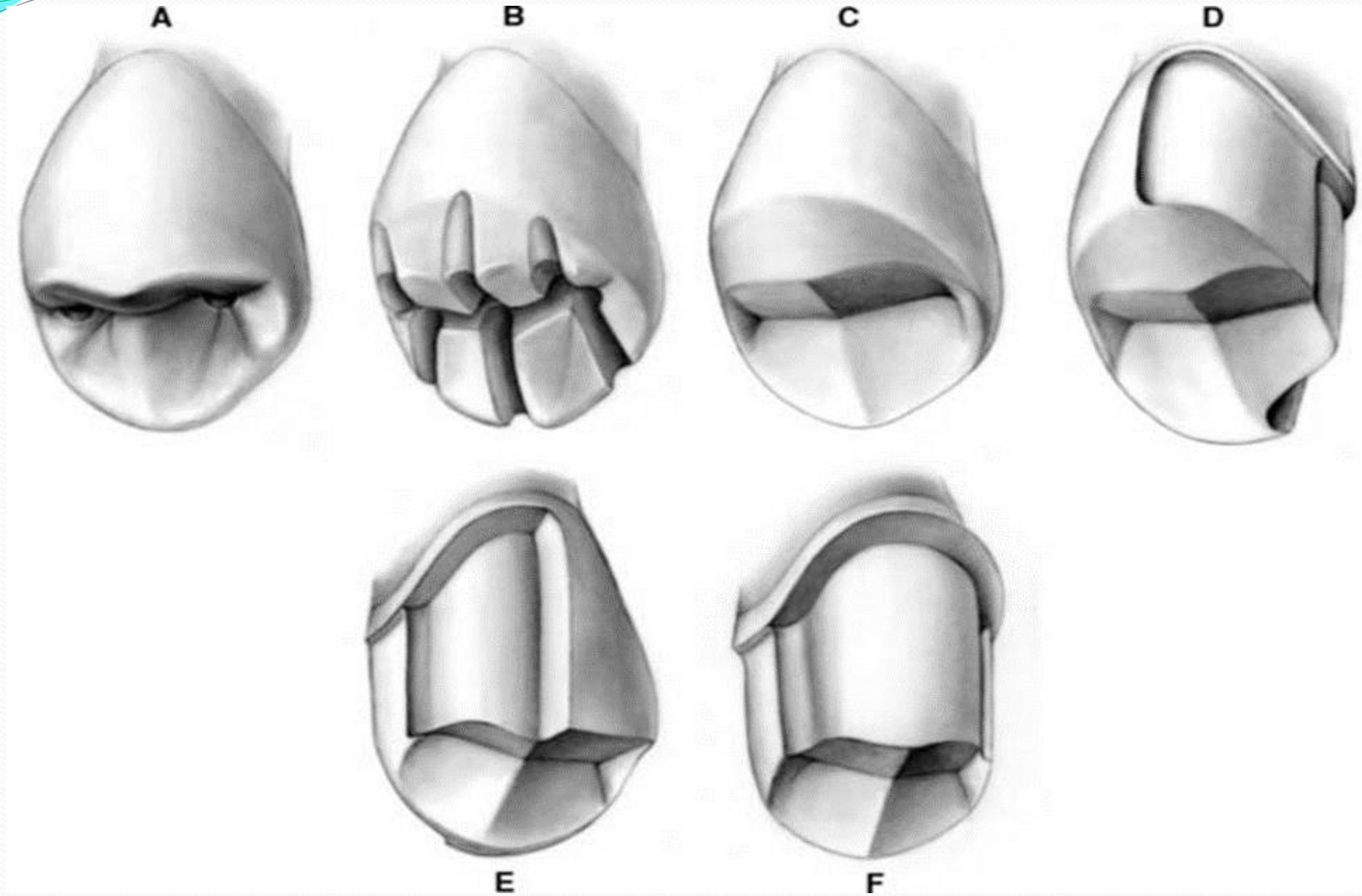
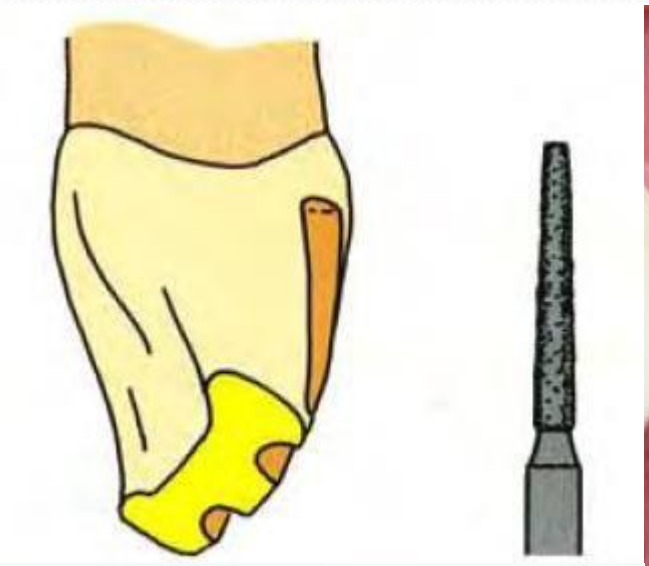
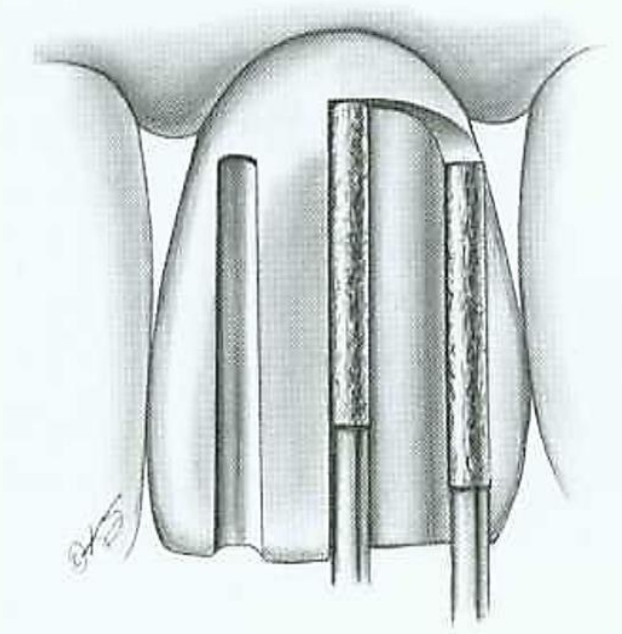
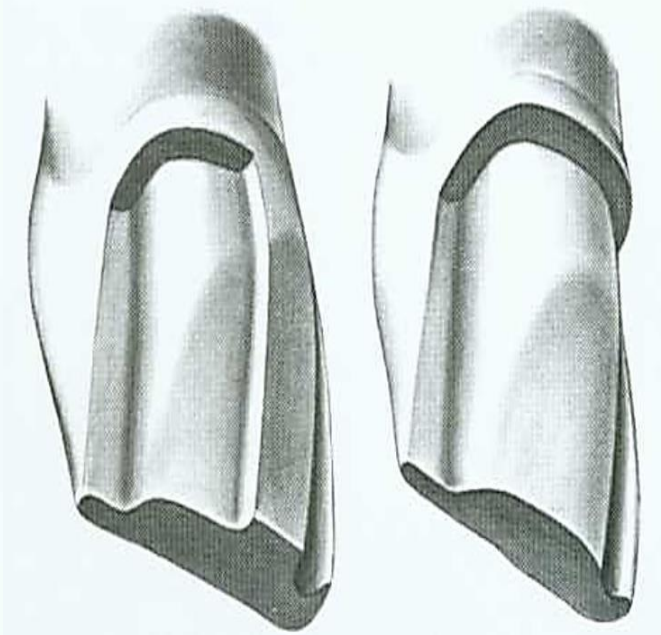
2-Full metal crown with facing



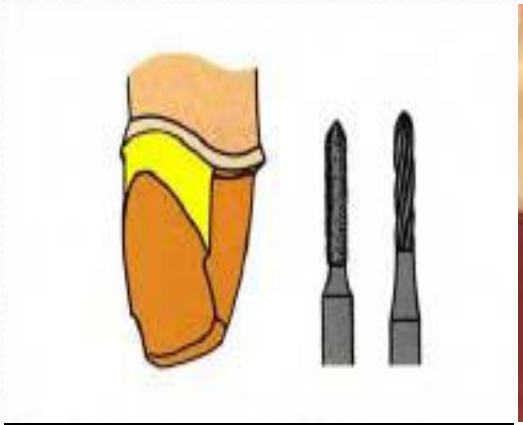
2-Full metal crown with facing

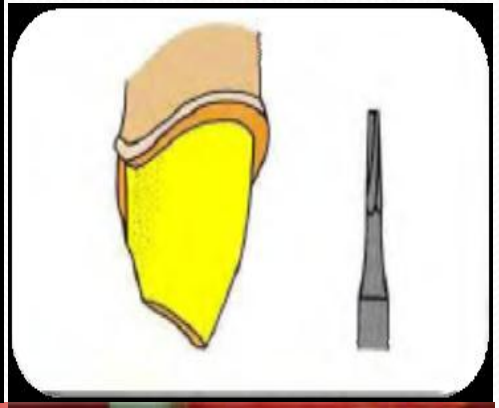






2-Full metal crown with facing





2-Full metal crown with facing

- **Indications** (similar to those of full metal crown).
- 1. Esthetics needs (carious teeth, malposed teeth, peg shaped lateral incisor, discolored teeth).
- 2. Fractured tooth without pulp exposure.
- 3. Teeth with large filling.
- 4. As a bridge retainer, especially for long span bridge.
- 5. Endodontically treated teeth with sufficient remaining tooth structure.
- **Contraindications**
- 1. Teeth with large pulp, because of the possibility of pulp exposure during preparation.
- 2. Teeth with short crown.
- 3. Patient with bad or poor oral hygiene.
- 4. Intact buccal wall where a more conservative retainer can be used.

2-Full metal crown with facing

- **Advantages:**
  - 1. It combines the strength of full metal crown and the cosmetic effect of the tooth colored material.
  - 2. Natural appearance can be closely matched by good technique and if desired through characterization of the restoration with internally or externally applied stains.

2-Full metal crown with facing

- **Disadvantages:**
  - 1. Requires significant tooth reduction facially to provide sufficient space for the restorative materials. So, it is not a conservative type of crown since it includes excessive tooth preparation to provide enough space for the metal and the facing material (removal of substantial amount of tooth structure).
  - 2. Increases the potential for periodontal disease, since there is excessive contact with the gingival tissue when the margin of the crown is placed close or below the gingival margin.
  - 3. Discoloration of the gingival margin may occur with time.
  - 4. Subject to fracture, because of the brittle nature of porcelain. Because of the glasslike nature of the veneering material, a metal-ceramic crown is brittle especially if poorly designed.
  - 5. Shade selection can be difficult.
  - 6. Inferior esthetic compared to porcelain jacket crown.
  - 7. More expensive.

2-Full metal crown with facing

- **Preparation**
- **1. Preparation for posterior teeth**
- We should follow the same principles as in full metal crown with one exception only, by doing a deep reduction on the buccal surface to provide enough space for the metal and the facing material and also to gain bulk for proper shade of the final crown. The finishing line is shoulder on the buccal surface and chamfer all around the remaining tooth aspects.

2-Full metal crown with facing

- **2. Preparation for anterior teeth**
- A. Incisal edge reduction:
- We started by creating DOG of 2 mm in the center of the incisal edge and reducing the incisal edge with tapered bur. The 2mm reduction of the incisal edge is to provide a space for the facing material and metal to get a better translucency of the incisal edge and enhances the strength of brittle ceramic.

2-Full metal crown with facing

- B. Preparation of the labial surface:
- This surface should be divided into two parts, gingival and incisal, for the gingival part a DOG of 1.5 mm is created parallel to the longitudinal axis of the tooth and by moving the bur mesially and distally this part will be reduced. For the incisal reduction, we place a DOG with the inclination of this area, otherwise we may have pulp exposure.

2-Full metal crown with facing

- C. Lingual surface preparation:
- For the cingulum area, a DOG of 0.5 mm depth is placed in the center of the cingulum area parallel to the longitudinal axis of the tooth and reduction is accomplished by following the inclination of the tooth in this area. The remaining axial lingual surface should he reduced using a wheel diamond bur, pear-shaped or American football-like diamond bur. We must keep in mind not to remove or over reduce the area at the junction between the cingulum and the remaining part of the lingual axial surface, otherwise, we may create a conical shape preparation which will lead to lack of retention and resistance. Finally, we should smooth and round the line angles to facilitate the next steps of crown construction.

2-Full metal crown with facing

- **Why we do the two steps preparation on the lower buccal, upper palatal surfaces of the posterior and labial surfaces of anterior teeth:**
- 1. To follow the anatomy and the inclinations of the tooth and not to disturb the surface geometry.
- 2. To increase the surface area which will increase the retention and resistance of the final restoration.
- 3. To avoid exposing the pulp chamber during preparation.
- 4. To give enough space for the restorative material, which will enhance the structural durability, otherwise, we will have bulky restoration, bulky facing or poor shade of the tooth.

2-Full metal crown with facing

- **Full metal crown with acrylic facing**
- It is a full metal crown whose labial or buccal surface is covered with tooth colored acrylic resin. It has been widely used previously before the use of porcelain as a facing material, but it is still used nowadays due to its lower cost as compared to PFM.
- The finishing line is shoulder with bevel facially (labially or buccally) and chamfer or knife edge for the other surfaces. When esthetic is critical, sub-gingival positioning of the finish line is recommended.
- **Advantages:**
- It combines the strength and accuracy of full metal crown with the esthetics of tooth-colored acrylic resin.
- It is less expensive than PFM crown.

2-Full metal crown with facing

- **Full metal crown with acrylic facing**
- **Disadvantages:**
- 1. Requires significant tooth reduction facially to provide sufficient space for the restorative materials. So, it is not a conservative type of crown, since it includes excessive tooth preparation (facially) to provide enough space for the metal and the facing material.
- 2. Increases the potential for periodontal disease, since there is excessive contact with the gingival tissue when the margin of the crown is placed close or below the gingival margin.

The main disadvantages of this type of crown are related to the acrylic facing material, including discoloration with time, wearing, and poor compatibility of the acrylic resin with the gingival tissue.

3-Complete ceramic crown (porcelain jacket crown)

- The most esthetically pleasing fixed restoration, because there is no metal understructure to block light transmission. It can resemble natural tooth in terms of color and translucency than any other restoration.

3-Complete ceramic crown (porcelain jacket crown)

- **Indications:**
  - 1. High esthetic requirements.
  - 2. Considerable proximal caries.
  - 3. Endodontically treated teeth with post and core.
  - 4. Incisal edge reasonably intact.
  - 5. Favorable distribution of occlusal load.
- **Contra indications:**
  - 1. When superior strength is required and PFM crown is more appropriate.
  - 2. Thin teeth facio-lingually.
  - 3. Unfavorable distribution of occlusal load.
  - 4. Insufficient coronal tooth structure for support (very short teeth).
  - 5. Edge to edge occlusion.
  - 6. Bruxism.

3-Complete ceramic crown (porcelain jacket crown)

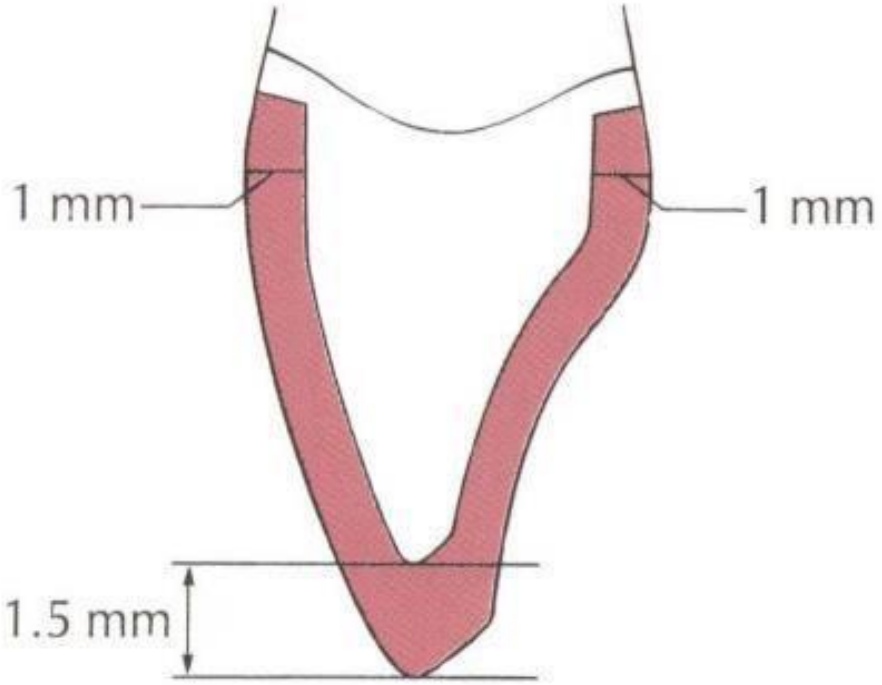
- **Advantages:**
  - 1. Superior esthetic.
  - 2. Good tissue response even with sub-gingival margins (biocompatible).
  - 3. High retention, since it can be etched and bonded.
  - 4. Slightly more conservative of facial wall.
- **Disadvantages:**
  - 1. Reduced strength compared to full metal and PFM crowns. Since, it is made entirely from ceramic substance (brittle nature of the material), it is the weakest type of crown restorations (more susceptible to fracture).
  - 2. Proper preparation is extremely critical.
  - 3. Among the least conservative preparations.
  - 4. Recommended as single restoration only (for example, on upper or lower incisors) or short span bridges.

3-Complete ceramic crown (porcelain jacket crown)

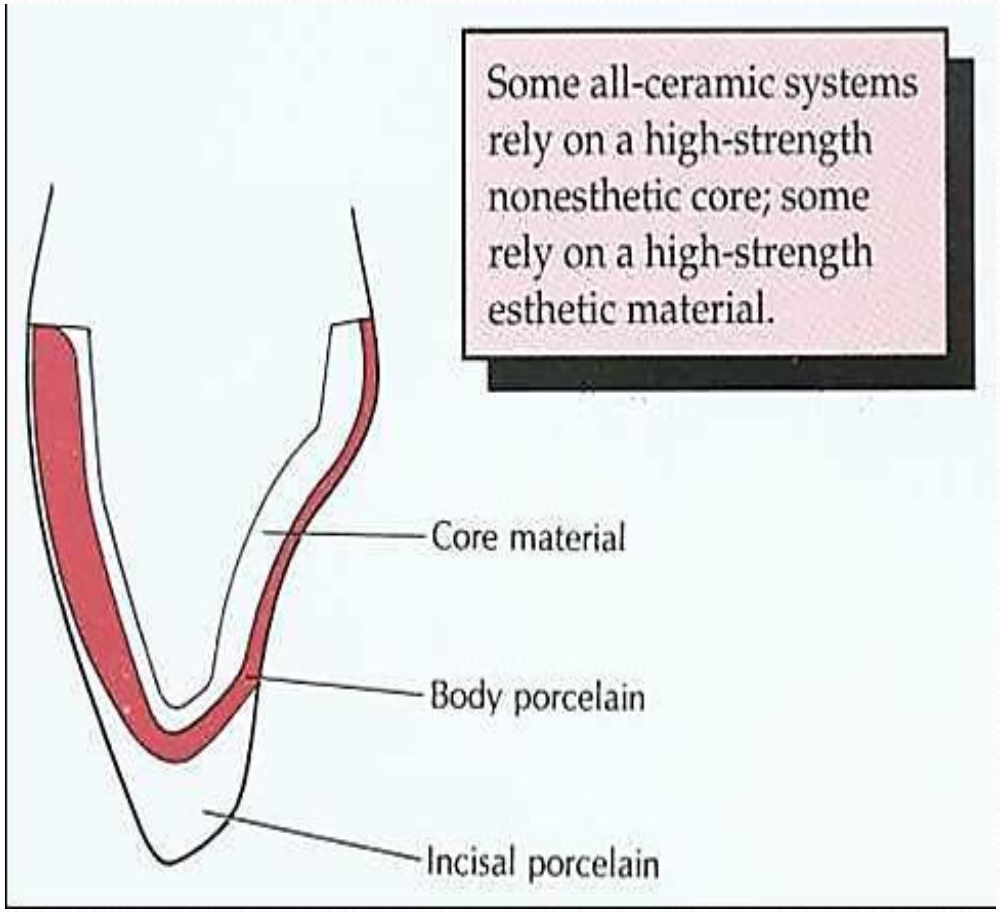
Preparation requirements:

- 1. A shoulder of uniform width (1.5 mm) is used as gingival FL to provide a flat seat to resist the force directed from incisal.
- 2. Incisal edge should be flat and prepared with slight inclination lingually.
- 3. All sharp angles of preparation should be slightly rounded to reduce the danger of stress concentration and fracture.
- 4. It should be avoided on teeth with edge to edge occlusal relation.

3-Complete ceramic crown (porcelain jacket crown)



Recommended reduction for the all-ceramic crown



3-Complete ceramic crown (porcelain jacket crown)

Steps in preparation

- **A. Incisal Reduction**
- • The aim of this step is the complete reduction of incisal edge that should provide 1.5–2 mm of clearance for porcelain in all masticatory movements, this step is extremely important to get cosmetically pleasing restoration with adequate strength.
- • Flat end taper diamond bur is used, placed parallel to the incisal inclination (for posterior teeth 2mm occlusal clearance is needed for all cusps).

3-Complete ceramic crown (porcelain jacket crown)

Steps in preparation

- **A. Incisal reduction**
- • DOGs 1.3mm in depth are made on the incisal edge using a flat-end tapered fissure bur, parallel to the incisal inclination of the prepared incisal edge.
- • Any tooth structure between DOGs should be removed using the same bur at the same angle (1.5 mm).
- • Check in centric and eccentric occlusal relations.
- **B. Labial (facial) reduction**
- **Two planes reduction**
- Whenever needed, reduction should be done in 2 plans corresponding to the 2 geometric plans of the surface: incisal plan and gingival plan.

3-Complete ceramic crown (porcelain jacket crown)

Steps in preparation

- **B. Labial (facial) reduction**
- **Incisal plan**
- • Three DOGs (1mm) are placed, these grooves should be parallel to the inclination of this area.
- • Any tooth structure between DOGs is then removed following the contour of the tooth (keep the bur at the same angle).
- **Gingival plan**
- • DOGs (1mm) are placed in gingival part of facial surface parallel to the long axis of the tooth.
- • Any tooth structure between DOGs should be removed using flat-end tapered fissure bur to create shoulder FL.

3-Complete ceramic crown (porcelain jacket crown)

- **C. lingual reduction:**
- As for PFM but with deeper reduction (1 mm).
- **a. Cingulum area reduction:**
- • DOG of 0.8 mm placed in the center.
- • Small wheel or pear shaped diamond bur is used (following the inclination of the tooth) to reduce this area.
- **b. Lingual axial reduction;**
- • DOG of 0.8 mm placed parallel to the long axis of the tooth.
- • Flat-end tapered fissure bur is used to reduce this area using the same angle (to create shoulder FL).

3-Complete ceramic crown (porcelain jacket crown)

- **Types of finishing lines used for all ceramic crown**
- Shoulder all around has been advocated as gingival finishing line to be use with this crown. The depth and contour of shoulder is established with the tip of flat end tapered fissure bur. Sharp angles should be rounded to avoid creation of point of stress concentration.
- **Acrylic Jacket Crown**
- AJC is totally made from tooth colored acrylic resin, it can be near perfect in appearance when fitted, but it suffers from discoloration and loss of contour later on. The poor adaptation is great disadvantages of acrylic crowns.
- AJC is used in treatment of carefully selected patient such as young patient as a temporary crown until the final restoration made.

3-Complete ceramic crown (porcelain jacket crown)

- The preparation of the tooth is basically the same as that for PJC .
- **Disadvantages**
- 1. Poor marginal fitness.
- 2. Poor tissue response.
- 3. Discoloration with time.
- 4. Loss of contour (wear easily).
- 5. Unhygienic.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- It is a cast metal crown restoration that cover only a part of the clinical crown.
- **Three quarter (¾) crown** is the most commonly used partial veneer crown restoration. Generally, it covers all the tooth surfaces except the buccal or the labial surface.
- **Uses:**
- • A retainer for short span bridge.
- • A single restoration. It can be used for anterior or posterior teeth, as single restoration.
- • A splint in anterior teeth.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **Indications:**
- **For anterior teeth:**
- 1. Loss of moderate amount of tooth structure with intact and well supported labial surface.
- 2. Retainer for fixed partial denture.
- **For posterior teeth:**
- 1. Suitable for teeth with a sufficient bulk and intact buccal surface.
- 2. Retainer for FPD or splinting of anterior teeth.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **Contraindications:**
- 1. Short clinical crown.
- 2. High carries index.
- 3. Extensive destruction.
- 4. Poor alignment.
- 5. Thin teeth.
- 6. Long span bridge.
- 7. Non-vital teeth.

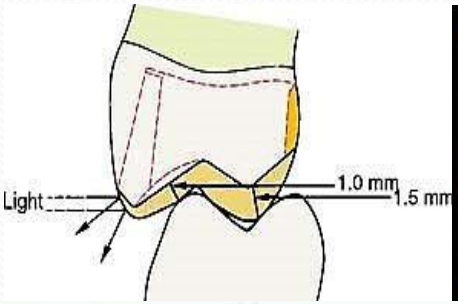
4-Partial Veneer Crown (3/4 crown, 7/8 crown)

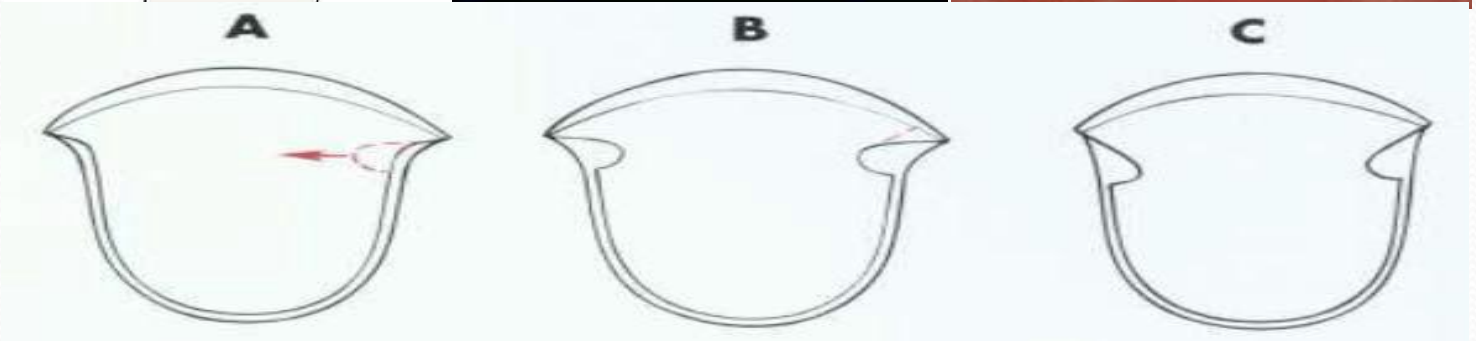
- **Advantages:**
- 1. Conservative.
- 2. Easy access of margins.
- 3. Less gingival involvement (irritation) than complete crown.
- 4. Easy escape of cement and good seating.
- 5. Electrical pulp test is possible.
- 6. Complete seating of the crown can be easily seen by direct observation.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **Disadvantages:**
- 1. Less retention and resistance than complete cast crown (full veneer crown), since it doesn't cover the entire axial coronal surfaces.
- 2. Limited adjustment can be done in the path of withdrawal.
- 3. Possibility of showing metal especially in the lower anterior and posterior teeth.
- 4. Possibility of recurrent caries along the cavo-surface line angle (CSL angle).
- 5. Difficult in preparation compared to other types of crown restorations.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)





4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **Recommended dimensions**
- 1.5 mm on functional cusp (lingual).
- 1.0 mm on non-functional cusp (facial).
- Less than 0.5 mm on facial cusp tip if sufficient horizontal overlap.
- 1.5 mm clearance.
- Follow contours of opposing tooth.
- Maintain contours of tooth being prepared.
- Extend bevel into lingual embrasure.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **Steps in preparation on maxillary posterior teeth**
- **1.Occlusal surface preparation**
- 1. DOG is placed on the anatomic ridge and grooves of occlusal surface using round end taper fissure bur, the grooves should extend through occluso-buccal line angle but only with 0.5mm deep to prevent metal display.
- 2. Occlusal reduction is then completed by removing tooth structure between grooves reproducing the geometric inclined plan pattern of cusps. The depth of reduction should be decreased at the occluso-buccal line angle with 0.5mm deep to prevent metal display.
- 3. A wide bevel is placed on the functional cusps using the same bur.
- 4. Occlusal clearance were then checked in centric and eccentric mandibular relations.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **Steps in preparation on maxillary posterior teeth**
- **2.Lingual surface preparation;**
- It is done similar to other types of crown:
- - DOG are placed using the same bur, they should be placed parallel to the long axis of the tooth.
- -Reaming tooth structure between grooves were then removed following the contour of the tooth holding the bur parallel to the long axis at the tooth
- -A round-end tapered fissure bur is used to obtain chamfer finish line 0.5 mm supra-gingival.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **Steps in preparation on maxillary posterior teeth**
- **3.Interproximal Reduction**
- Proximal access is gained by short needle diamond bur, up and down movement, this continue until contact with adjacent tooth is broken and access for larger bur is produced.
- Extend facially and gingivally to break contact with adjacent tooth.
- Avoid damage to adjacent tooth and excessive axial reduction.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **Steps in preparation on maxillary posterior teeth**
- **Proximal grooves:**
- As a part of proximal reduction and in order to improve retention feature of the preparation and as a substitution for the uncover wall, proximal grooves (mesial and distal) should be placed on each proximal wall. It should be parallel to the long axis of the tooth or path of insertion or withdrawal and parallel to each other. Carbide fissure bur is used to place these grooves. Normally, unsupported tooth structure will remain on the buccal side, and this side is flared to remove it.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **Steps in preparation on maxillary posterior teeth**
- **Requirements:**
- 1.It should cut to full diameter of carbide bur No.171 (0.5 mm) to create defiant lingual wall.
- 2.It should extend to the full length of proximal wall (ending about 0.5 mm to the chamfer).
- 3.It should be placed as far as facially as possible without undermine facial surface (between middle and labial third).
- 4.It should be parallel to the long axis of the tooth.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **Steps in preparation on maxillary posterior teeth**
- **Advantages of Proximal grooves:**
- 1.Increase retention.
- 2.Prevent rotation (resistance).
- 3.Reinforce the margin of restoration at this area.
- 4.They act as a guide during placement.
- **Occlusal offset:**
- 1 mm wide groove made on the lingual incline of the facial cusp, it is V-shape inverted lie at uniform distance from occlusal finish line.
- **Advantages:**
- 1. Improve the strength of the casting.
- 2. Reinforce the margin of the restoration at this area.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **Steps in preparation on maxillary posterior teeth**
- **Finishing line:**
- Chamfer is used as gingival finish line on lingual and proximal surfaces.
- 45 degree bevel FL is used on proximo-facial and occluso-facial margins.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **Steps in preparation on maxillary posterior teeth**
- **Mandibular posterior 3/4 Crown**
- **Differences between upper and lower posterior ¾ crown preparation:**
- 1. Big difference is the position of FL on facial surface. For maxillary posterior teeth it terminate near the bucco-occlusal line angle, while in mandibular posterior teeth the occlusal FL is 1 mm gingival to the lower occlusal contact with the upper teeth. This is because the buccal cusps in lower are the functional cusp.
- 2. In upper, there should be occlusal offset, however for the lower there is no offset. There is a bucco-occlusal shoulder (occlusal shoulder on the buccal aspect of the buccal surface), it serve the same purpose as the offset.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **3/4 Crown maxillary anterior**
- **1-lingual reduction: t**his is done by two steps similar to other types of crowns.
- a. Cingulum area reduction.
- b. Lingual axial reduction.
- **2.Incisal termination:**
- For maxillary anterior teeth lingo-incisal bevel is placed using diamond bur at 45°to the path of insertion, this termination should not be extended labially to prevent showing of metal, however, for lower anterior a reverse bevel is placed on the labial surface . This means that, the metal will extend to cover the incisal edge in order to:
- **1**. Protect the area of unsupported enamel from fracture.
- **2**. To prevent the dislodgment of the crown in lingual direction.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **3/4 Crown maxillary anterior**
- **3.Proximal reduction:**
- The area is prepared similar to the full veneer crown except that the preparation should have a path of insertion parallel to the incisal 2/3 of the labial surface (not to the long axis of the tooth).
- **Two proximal grooves** should be placed, at the junction between the labial and middle third of the proximal surface, parallel to the incisal 2/3 of the labial surface (path of insertion) using a carbide fissure bur, this is because:
- **1.** We can place the longest groove in this direction (better retention).
- **2.** To avoid over cutting to the labial surface (if we do it parallel to the long axis) that effect on esthetic.

4-Partial Veneer Crown (3/4 crown, 7/8 crown)

- **3/4 Crown Maxillary Anterior**
- **3.Proximal reduction:**
- The mesial and distal grooves should be connected with V shape groove incisal offset. The advantage of the incisal offset are:
- **1.** Improvement of the strength of casting at this area.
- **2.**Reinforcement of margin by connecting the two proximal grooves together.
- **Differences between anterior and posterior teeth preparation**
- In the anterior teeth, the retentive proximal groove should be parallel to the incisal 2/3 of the labial surface, while in the posterior teeth it is parallel to long axis to get the longest groove for better retention of crown.

5-Post crown

- It is a fixed artificial cast restoration which replaces the coronal part (portion) of the natural tooth completely.
- It is retained by means of post (dowel) extended and cemented into the root canal space of endodontically treated tooth.
- The post crown will reinforce the remaining tooth structure against forces by distributing these forces to the surrounding tooth structure.

5-Post crown

- **The dowel post serves two functions:**
- 1) Intra-canal retentive mean for the coronal restoration.
- 2) It increases the horizontal fracture resistance of the remaining tooth structure.

5-Post crown

- **Indications**
- 1. It is mainly indicated for endodontically treated teeth that have:
  - a) Remaining tooth structure unsuitable for any other mean of restoration.
  - b) Core re-construction is needed.
  - c) Intra-canal retention is the only mean for possible retention for the coronal restoration.
- 2. Re-alignment of malposed tooth.
- 3. As a bridge retainer (short span bridge).
- 4. Tooth with short clinical crown.

5-Post crown

- **Contraindications (custom cast dowel core)**
- 1. Unsuccessful endedontic treatment.
- 2. Significant coronal tooth structure remain.
- 3. In-adequate root length.
- 4. Caries on root or in canal.

5-Post crown

- **Factors to be considered in selection of a tooth for post crown:**
  - 1. Mobility of the tooth.
  - 2. Periodontal condition.
  - 3. Occlusal relationship should be evaluated.
  - 4. The root should be of uniform shape and of sufficient length and width.
  - 5. The root should be without internal or external root resorption.
  - 6. The root should have proper alignment, because any abnormality in the alignment of the root in relation to the adjacent teeth make the construction of post crown difficult.
  - 7. Quality of the root filling: In general, there are two major types of root canal filling material; gutta-percha and silver cone. The canal should be filled with a well-condensed gutta-percha filling material especially in apical third. While, with the silver cone technique, we should remove it and then we refill the canal with gutta-percha then we do preparation.

5-Post crown

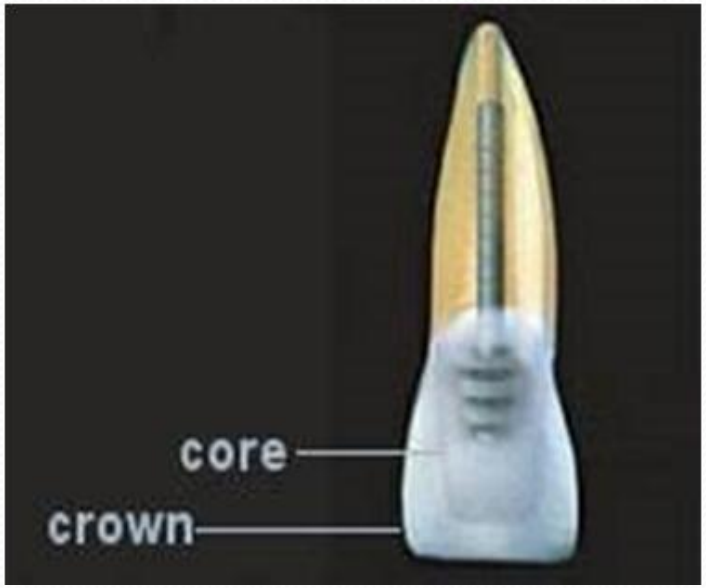
- **Parts of post crown (basic components of post crown)**
- **1. The post (dowel):** It is the part of crown which is inserted into the prepared part of the root canal system it should be 1/2 to 2/3 of the total root length. It gives support and retention for the coronal restoration.
- **2. The core:** It is the coronal part of the post-crown, and it replaces the destructed part of the crown to which the final restoration is attached (it is the coronal extension or addition to the dowel post necessary to provide the desire retention for the final crown restoration).
- **3. The crown or the final restoration:** It is the final restoration that placed over the core, it could be a full metal, full veneer, full metal with facing (porcelain fused to metal) or jacket crown.

5-Post crown

- **Types of post crown**
- 1. **One-unit post-crown:** It is the poorest design and can be used with full metal or full metal with facing.
- 2. **Two-units post-crown:** The post and core are in one peace and the crown is the another peace. It is the most preferred design, can be used with full metal, full metal with facing (porcelain fused to metal) and full ceramic crown.
- 3. **Three-units post-crown:** The post or the dowel in one peace, the core is the second peace and inserted in the post part, the third segment is the veneer restoration. Can be used with the same types of restorations mentioned in two-unit post-crown.

5-Post crown

- **One unit post-crown**
- The final crown restoration is direct extension of the dowel post. It indicated in some cases , for example tooth with very short clinical crown (as with lower incisor). In such a case, there is in-sufficient space within the crown of the tooth to make both retentive core and separated crown, so one piece post crown often the solution.



5-Post crown

- **Two unit post-crown (the most common type)**
- **Advantages and indications**
  - 1. We can do repair for the crown only when any damage happens to it. So, crown restoration can replaced at some future time, if necessary, without disturbing the dowel core part of restoration. That is why two units post crown indicated in young patient (under 18 year age).
  - 2. In the adolescent and young patients under 18 years old, the gingival-tooth relationship will change with time as the patient grow, so with two-unit post-crown we can repeat the core much easier than in one unit restoration.
  - 3. When the endodontically treated tooth is to be used as abutment for fixed bridge (bridge retainer), it is not necessary to make the post crown preparation parallel to the 2nd abutment.
  - 4. Marginal adaptation and fit of the crown restoration are independent of any dowel that must be used.

5-Post crown

- **Post classification**
- **1) Prefabricate (ready-made) dowel post**
- One advantage of using prefabricated posts is the simplicity of the technique that it doesn't need a negative reproduction of the prepared canal.
- Stainless steel, carbon fiber or fibro glass material might be used in its construction.
- It comes in different size, design (for example, parallel side, taper, parallel with taper end).
- A post is selected to match the dimensions of the canal, and only minimum adjustment is needed for seating it to the full depth of the post-space.

5-Post crown

- **Post classification**
- **2) Customized cast post :**
- The main advantage of this type that is it conform closely to the configuration of the prepared canal. It indicated on avoid canal and contraindicated in narrow and severely curved canal.
- It is fabricated from a negative reproduction of the prepared canal, it is constructed from metal alloy.

5-Post crown

- **Preparation**
- **1. Preparation of the coronal portion**
- 1. We should remove any undercut, unsupported enamel, previous filling, cement base and any weak part of the tooth which may fracture later on (remove any existing restoration, caries, and any thin or unsupported wall of tooth structure). Most of the time, this will end with leaving about 2-3 mm sound tooth structure supra-gingivally.
- 2. The coronal portion (remaining) were then prepared according to the type of the final crown restoration. For example, if the final restoration is jacket crown, butt shoulder finishing line should be created all around (the type of the finishing line used will depend on the type of the crown).

5-Post crown

- **2. Preparation of the canal**
- The bur which is used in root preparation is called pesso reamer or pesso bur (the instrument of choice for removing gutta-percha).
- It is available in different sizes depending on the size of the root canal (ranging from 0.7—1.7mm).
- The advantage of it that has a blunt non cutting end which will follow the area of less resistance through gutta-percha without perforating the root.

5-Post crown

- **2. Preparation of the canal**
- 1. The first step begin with taking a radiograph to assess the length, width and shape of the canal in addition to the type and quality of the filling material specially in the apical third of the root.
- 2. Then with a pesso bur (or hot instrument) the gutta-percha remove up to 2\3 of the root length leaving 3-5 mm filling at the apex. So, the length of the dowel should be equal to 2/3 of root length or equal to the crown length, whichever is greater, keeping in your mind you should have at least 3-5 mm filling at the apex. So, this is to get the maximum retention and support for the post, and to prevent the dislodgment of the apical filling material (if this happen will lead to the leakage followed by failure of the case).

5-Post crown

- **2. Preparation of the canal**
- 3. The canal sides must be made parallel to each other with slight flaring toward the outside.
- 4. In case of short teeth (teeth with short root), accessory retention means may be used such as a pin to increase the retention of the post, keeping in mind that the pinhole should be placed parallel to the post canal preparation. Diameter of the prepared canal should be no more than one third the root diameter at C.E.J. and should be at least 2mm less than root diameter at mid root area.

5-Post crown

- **2. Preparation of the canal**
- 5. Sometimes a key way is done about 1 mm width and 4 mm depth extended into the canal using a flat-ended fissure bur, it should be placed in the area of the greatest bulk.
- In the multi-rooted posterior teeth, we can place the post in one canal and the key way in the other canal.
- For the multi-rooted posterior teeth, we should place the post in the largest canal which is the palatal canal in the upper molar teeth and the distal canal of the lower molar teeth. For the maxillary premolar we place the post in the buccal canal, and the other canal used for the keyway.
- Multi-post should be avoided whenever possible in order not to weaken the tooth.

5-Post crown

- **2. Preparation of the canal**
- **Advantages of Key way:**
  - **1.** It acts as a guide during insertion of the dowel post restoration.
  - **2.** It will prevent the rotation of the post especially in teeth with rounded cross section of the canal.
  - **3.** Improve the retention.

5-Post crown

- **Contra bevel:**
- If there is supra gingival tooth structure a flame bur is used to place contra bevel.
- It is a bevel placed around the occlusal external surface of the periphery of the preparation, this will provide a good collar around the occlusal surface periphery of the preparation, which will help in holding the tooth structure together and preventing the fracture of the remaining tooth structure.

5-Post crown

- **Anti-rotation devices:**
- 1. Key way.
- 2. Triangular shape of incisors and elliptical shape of upper canines.
- 3. Pins.
- 4. Post surface texture: Post with rough surface is more retentive than post with smooth surface.

5-Post crown

- **Factors affecting on retention of post-crown**
- The retention of the post-crown depends on:
- 1. Length of the dowel post (2/3 length of root, equal to length of clinical crown, 4-5 mm from apex, 8 mm deep from CEJ).
- 2. Diameter of dowel post (no more than one third the root diameter at C.E.J., and should be at least 2mm less than root diameter at mid root area)
- 3. Shape of the prepared canal (for the preparation, the parallel-sided preparation type is more retentive than tapered preparation).
- 4. Accessory means (pin, groove, keyway).
- 5. Post surface texture (a post with rough surface is more retentive than post with smooth surface).

5-Post crown

- **Post preparation requirements**
- 1) The length of post should be the greatest length provided that the apical seal not to be jeopardised.
- 2) Whenever possible the occlusal surface of the tooth is prepared with contra bevel.
- 3) Diameter of the prepared canal should be no more than one third the root diameter at C.E.J., and should be at least 2mm less than root diameter at mid root area .
- 4) Leaving 1 mm vertical wall between core margin and the shoulder of the preparation to provide sufficient support and prevent the root fracture.
- 5) Avoid using of burs in canal preparations which may penetrate dentine causing undesirable undercut.

Thank you