ENDODONTIC ACCESS CAVITIES

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Introduction

- Access cavity preparation is defined as endodontic coronal preparation which enables unobstructed access to the canal orifices, a straight line access to apical foramen, complete control over-instrumentation and to accommodate obturation technique.

- It is a well established fact that success of endodontic therapy depends on the main three factors:

a. Cleaning and shaping

b. Disinfection

c. Three-dimensional obturation of the root canal system.

Objectives of Access Cavity Preparation

1. To gain direct straight line access to the apical foramen. This helps in achieving:

a. improved instrument control because of minimal instrument deflection and ease of introducing instrument in the canal

b. Improved obturation

c. Decreased incidence of iatrogenic errors.

2. Complete deroofing of pulp chamber. It helps in:

a. complete debridement of pulp chamber

b. improving visibility

c. locating canal orifices

d. permitting straight line access

e. preventing discoloration of teeth because of remaining pulpal tissue.

3.Conserve sound tooth structure as much as possible so as to avoid weakening of remaining tooth structure.

INSTRUMENTS FOR ACCESS CAVITY PREPARATION

- **Access Opening Burs**

  They are round burs with 16 mm bur shank (3 mm longer than standard burs).

- **Access Refining Burs**.

  These are coarse grit flame-shaped, tapered round and diamonds for refining the walls of access cavity preparation.

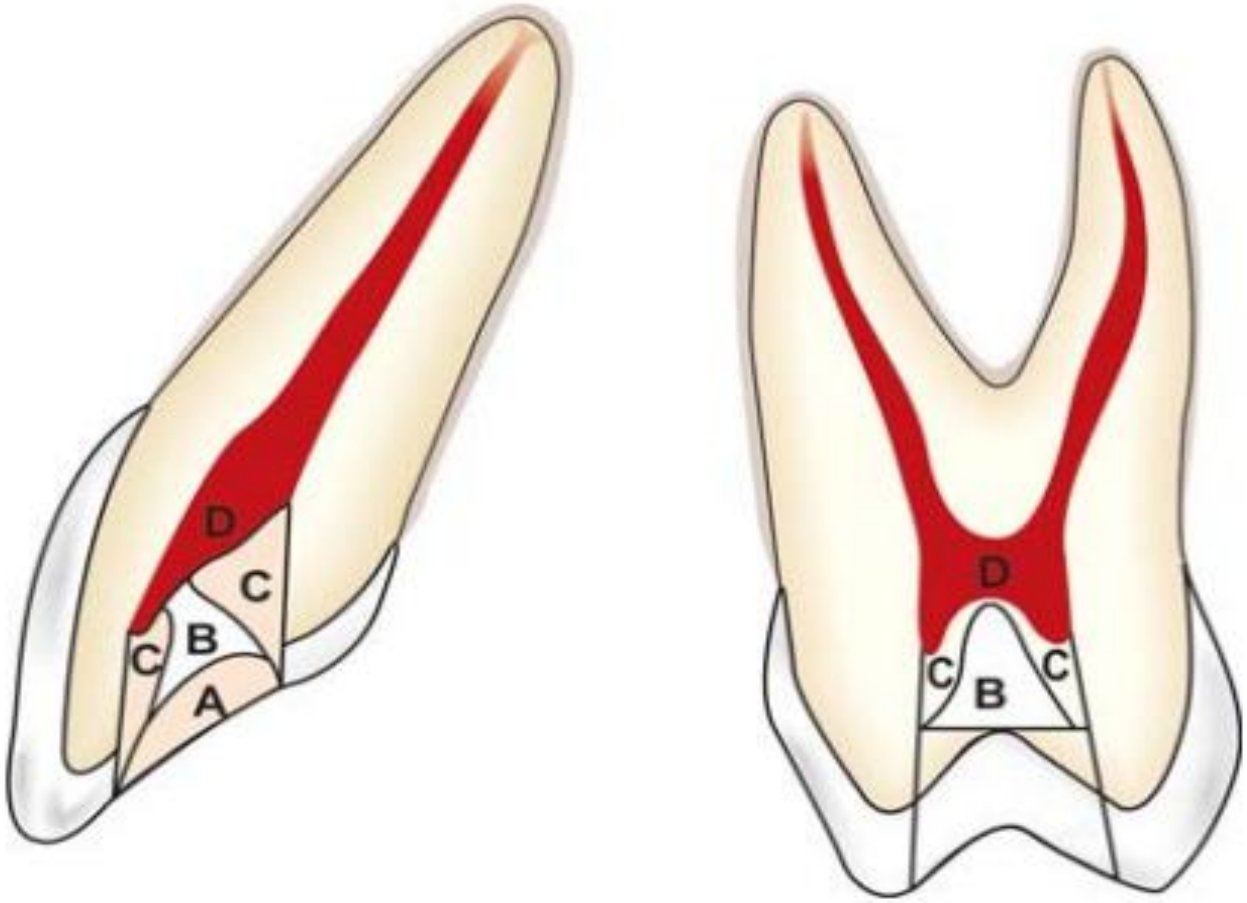
- **Surgical Length Burs.**
- **Munce Discovery (MD) Burs**


A
B
C

Guidelines for Access Cavity Preparation

- Before starting the access cavity preparation one should check the depth of preparation by aligning the bur and handpiece against the radiograph. This is done so as to note the position and depth of the pulp chamber

- Place a safe-ended bur in handpiece to complete the outline form. The bur is penetrated into the crown until the roof of pulp chamber is penetrated. Commonly recommended access opening bur is round bur, that is to penetrate the pulp chamber. It prevents the overpreparation. Once the "**drop in**" into the pulp chamber is obtained, round bur is replaced by tapered fissured bur



Guidelines for access cavity preparation

A. Penetration into enamel with No. 2 or No. 4 high speed round bur;
B. Exposure of pulp chamber with tapered fissure bur;
C. Refinement of the pulp chamber and removal of pulp chamber roof using round bur from inside to outside;
D. Complete debridement of pulp chamber space

Guidelines for Access Cavity Preparation

- When locating the canal orifices is difficult, one should not apply rubber dam until correct location has been confirmed.

- Remove all the unsupported tooth structure to prevent tooth fracture during treatment.

- Remove the chamber roof completely as this will allow the removal of all the pulp tissue, calcifications, caries or any residuals of previous fillings. If pulp chamber is not completely deroofed, it can result in:

  a. Contamination of the pulp space.

  b. Discoloration of endodontically treated tooth.

Guidelines for Access Cavity Preparation

- The walls of pulp chamber are flared and tapered to form a gentle funnel shape with larger diameter towards occlusal surface
- Endodontic access cavity is prepared through the occlusal or lingual surface, never through proximal or gingival surface. If access cavity is made through wrong entry, it will cause inadequate canal instrumentation resulting in iatrogenic errors.
- Inspect the pulp chamber for determining the location of canals, curvatures, calcifications using well magnification and illumination

Fig. 14.15: Once "drop in" into pulp chamber is obtained bur is moved inside to outside

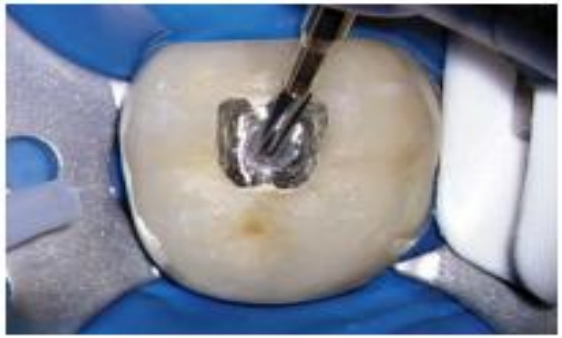


Fig. 14.16: Access preparation using tapered fissure burs

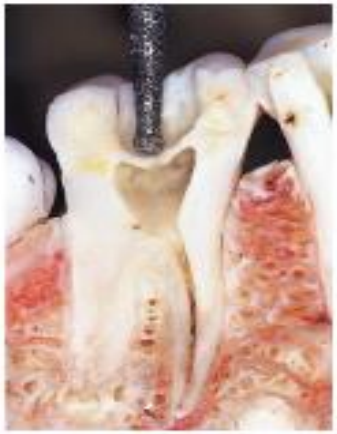


Fig. 14.17: Access preparation

Fig. 14.18: Access preparation continues

Fig. 14.19: Access refining

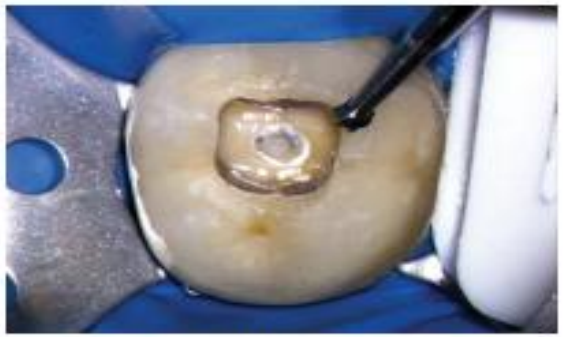


Fig. 14.20: Final access preparation

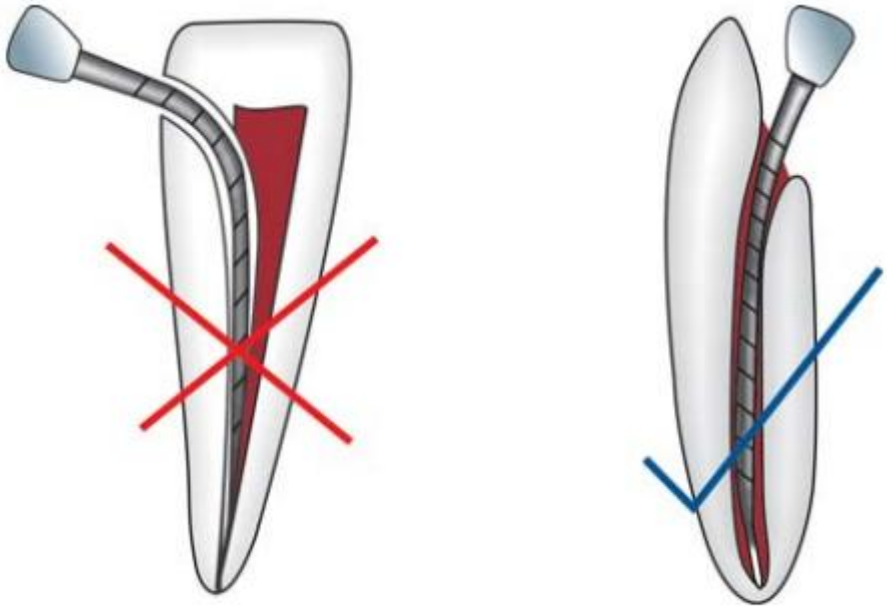
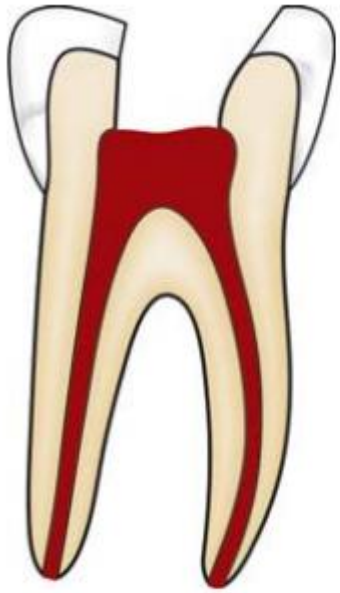


Fig. 14.23: Correct position for entering into the pulp cavity



Complete access cavity preparation

Laws of Access Cavity Preparation for Locating Canal Orifices

- ***Law of Centrality***-Floor of pulp chamber is always located in the center of tooth at the level of cementoenamel junction.
- ***Law of Cementoenamel Junction***-Distance from external surface of clinical crown to the wall of pulp chamber is same throughout the tooth circumference at the level of CEJ.
- ***Law of Concentricity***-Walls of pulp chamber are always concentric to external surface of tooth at the level of CEJ. This indicates anatomy of external tooth surface reflects the anatomy of pulp chamber.
- ***Law of Color Change-*** Color of pulp chamber floor is darker than the cavity walls.
- ***Law of Symmetry-*** Usually canal orifices are equidistant from a line drawn in mesial and distal direction through the floor of pulp chamber.
- ***Law of Orifice Location-*** Canal orifices are located at the junction of floor and walls, and at the terminus of root development fusion lines.

ACCESS CAVITY OF ANTERIOR TEETH

- Remove all the caries and any defective restorations so as to prevent contamination of pulp space as well as to have a straight line access into the canals.

- Access opening is started at center of the lingual surface. If it is made too small and too close to the cingulum the instrument tends to bind the canal walls and thus may not work optimally.

- Direct a round bur perpendicular to the lingual surface at its center to penetrate the enamel. Once enamel is penetrated, bur is directed parallel to the long axis of the tooth, until ‘a drop’ in effect is felt.

- Now when pulp chamber has been penetrated, the remainder of chamber roof is removed by working a round bur from inside to outside. This is done to remove all the obstructions of enamel and dentin overhangs that would entrap debris, tissues and other materials

ACCESS CAVITY OF ANTERIOR TEETH

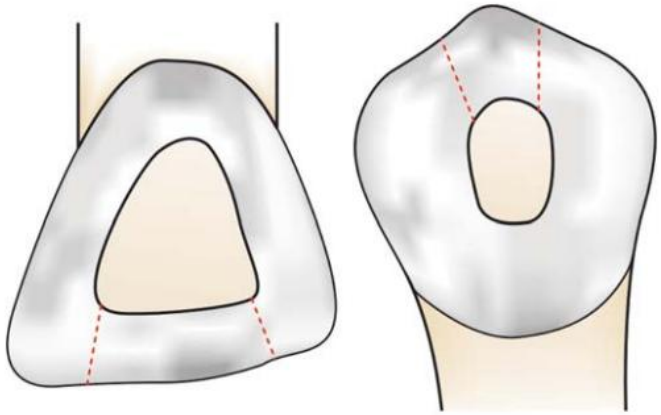
- Now locate the canal orifices using endodontic explorer. Sharp explorer tip is used to locate the canal orifices, to penetrate the calcific deposits if present, and also to evaluate the straight line access.

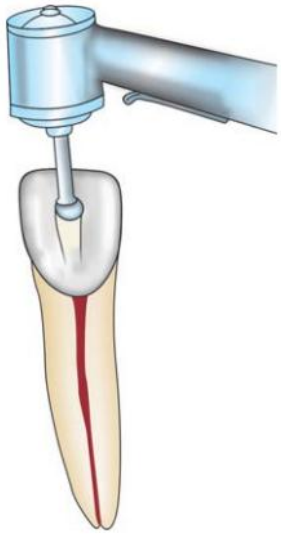
- Once the canal orifices are located, the lingual shoulder is removed using Gates-Glidden drills or safe tipped diamond or carbide burs. Lingual shoulder is basically a prominence of dentin formed by removal of lingual roof which extends from the cingulum to approximately 2 mm apical to the orifice

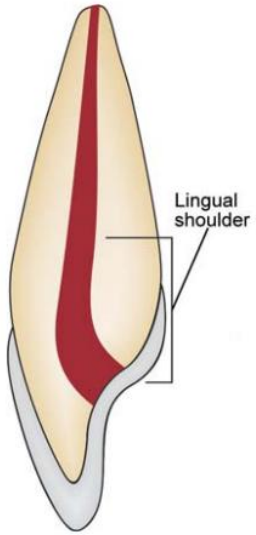
- After the straight line access of the canal is confirmed by passing a file passively into the canal, one should evaluate the access cavity using magnification and illumination.

- Finally smoothening of the cavosurface margins of access cavity is done because rough or irregular cavity margins can cause coronal leakage through restorations. Also smooth cavity margins allow better and précised placement of final composite restoration with minimal coronal leakage.

- Since the outline form of access cavity reflects the internal anatomy of the pulp space, though technique of the access opening of anterior teeth is the same, the shape may vary according to internal anatomy of each tooth.







ACCESS CAVITY PREPARATION FOR PREMOLARS

- The basic step of access cavity preparation is removal of the caries and any other permanent restoration material if present.

- Determine the site of access opening on the tooth. In premolars, it is in the center of occlusal surface between buccal and the lingual cusp tips.

- Slight variations exist between mandibular and maxillary premolars because of the lingual tilt of mandibular premolars.

- Penetrate the enamel with No. 4 round bur in high speed contra angle handpiece. The bur should be directed parallel to the long axis of tooth and perpendicular to the occlusal table. Generally the external outline form for premolars is oval in shape with greater dimensions of buccolingual side.

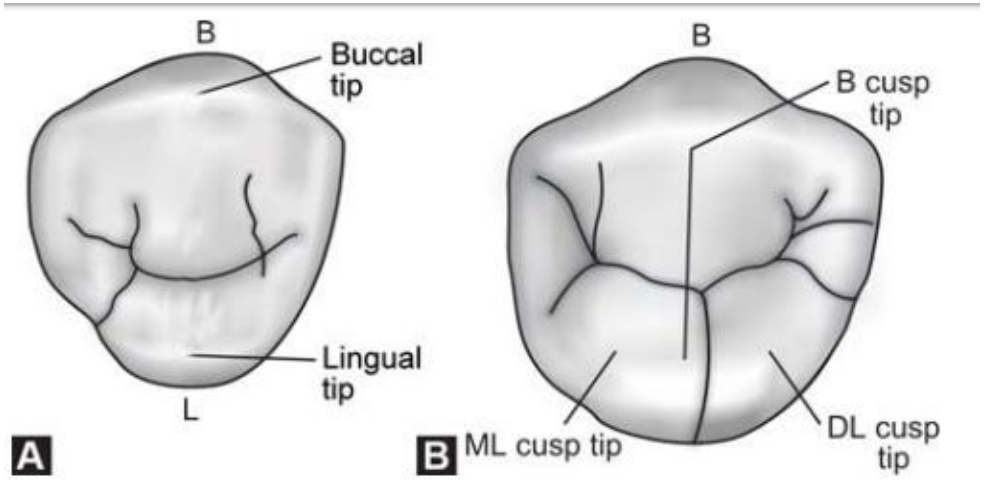
ACCESS CAVITY PREPARATION FOR PREMOLARS

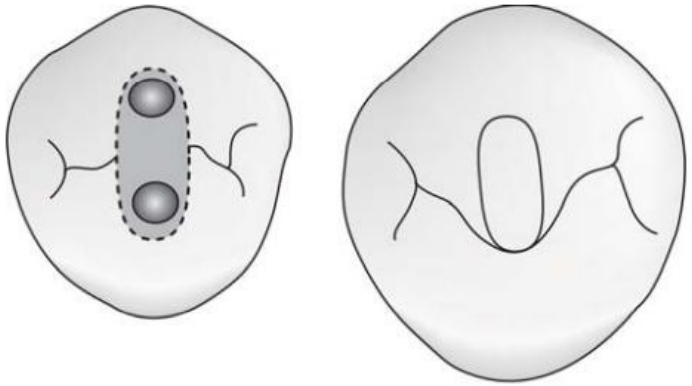
- Once the clinician feels “drop” into the pulp chamber, penetrate deep enough to remove the roof of pulp chamber without cutting the floor of pulp chamber. To remove the roof of pulp chamber and pulp horns, place the bur alongside the walls of pulp chamber and work from inside to outside. For removal of pulp chamber roof, round bur, a tapered fissure or a safety tip bur can be used.

- After removal of roof of pulp chamber, locate the canal orifices with the help of sharp endodontic explorer. Ideally the canal orifices should be located at the corners of final preparation. Extension of orifices to the axial walls results in **Mouse Hole Effect**. Mouse hole effect is caused because of under extension of the access cavity. This may result in hindrance to the straight line access which may further cause procedural errors.

- Remove any remaining cervical bulges or obstructions using safety tip burs or Gates-Glidden drills and obtain a straight line access to the canals. It can be confirmed by passing a file passively into the canal which should reach the apex or the first point of curvature without any deflection.

- The walls of access cavity are then smoothened and sloped slightly towards the occlusal surface. The divergence of access cavity walls creates a positive seat for temporary restorations.





ACCESS CAVITY PREPARATION FOR MAXILLARY MOLARS

- Though the technique of access cavity preparation of molar is similar to that of anterior teeth and premolar but because of anatomic differences, they are discussed separately.

- Remove all the carious portion or any restoration if present.

- Determine the shape and size of access opening by measuring the boundaries of pulp chamber mesially and distally and coronally on the radiograph.

- Determine the starting point of bur into the enamel. It is determined by mesial and distal boundary. Mesial boundary is a line joining the mesial cusps and the distal boundary is the oblique ridge. The starting point of bur penetration is on the central groove midway between mesial and distal boundaries.

ACCESS CAVITY PREPARATION FOR MAXILLARY MOLARS

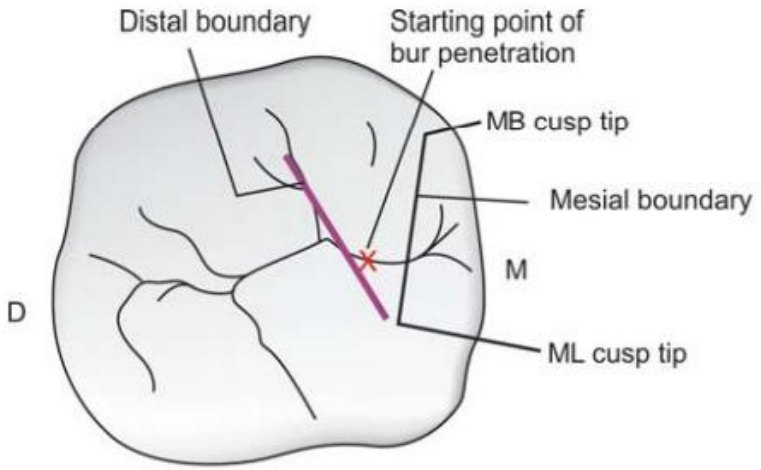
- Now penetrate the enamel with No. 4 round bur in the central groove directed palatally and prepare an external outline form.

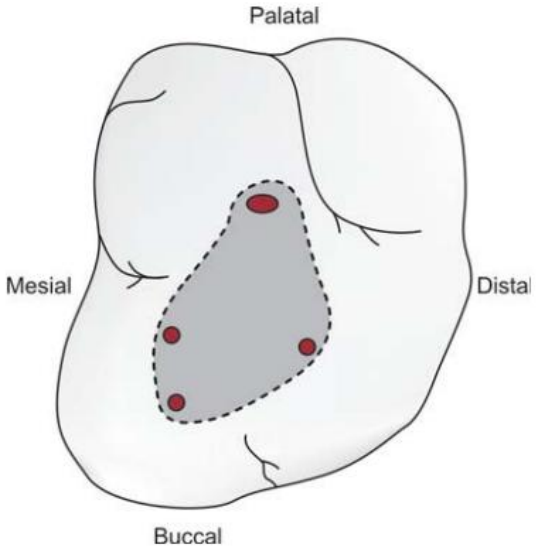
- Penetrate the bur deep into the dentin until the clinician feels “drop” into the pulp chamber. Now remove the complete roof of pulp chamber using tapered fissure, round bur or safety tip diamond or the carbide bur working from inside to outside. The shape and size of the internal anatomy of pulp chamber guides the cutting

- Explore the canal orifices with sharp endodontic explorer. All the canal orifices should be positioned entirely on the pulp floor and should not extend to the axial walls.

- After the canal orifices have been located, remove any cervical bulges, ledges or obstruction if present.

- Smoothen and finish the access cavity walls so as to make them confluent within the wall of pulp chamber and slightly divergent towards the occlusal surface





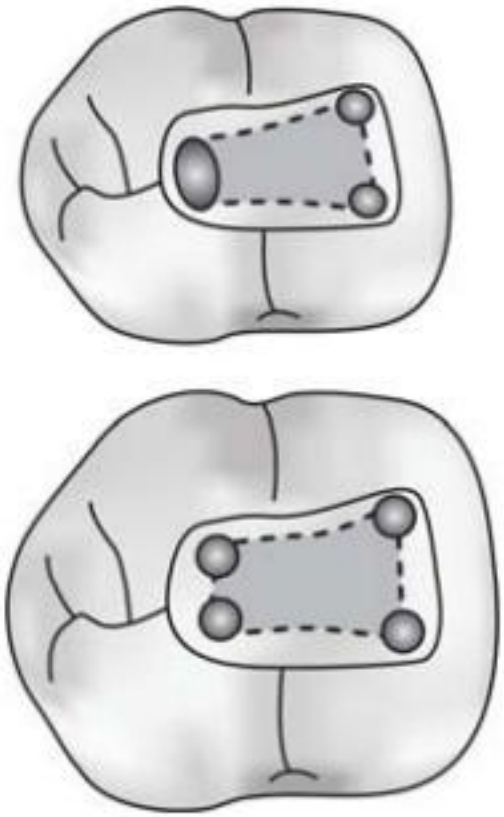
ACCESS CAVITY PREPARATION FOR MANDIBULAR MOLARS

- It is similar to that of any other access cavity preparation in removal of caries and any restorative material if present.

- The enamel is penetrated with No. 4 round bur on the central fossa midway between the mesial and distal boundaries. The mesial boundary is a line joining the mesial cusp tips and the distal boundary is the line joining buccal and the lingual grooves.

- Bur is penetrated in the central fossa directed towards the distal root. Once the “drop” into pulp chamber is felt, remove whole of the roof of pulp chamber working from inside to outside with the help of round bur, tapered fissure bur or the safety tip diamond or the carbide bur as it was done in maxillary molars.

•Explore the canal orifices with sharp endodontic explorer and finally finish and smoothen the cavity with slight divergence towards the occlusal surface.



• Second molars with fused roots usually have two canals, buccal and palatal though the number, type, shape and form of canals may vary.

• When four canals are present, the shape of access cavity is rhomboid but when two canals are present, access cavity is oval in shape with wider dimensions buccolingually.

• Shape and size of the access cavity may vary according to the size, shape and location of the canal orifices.