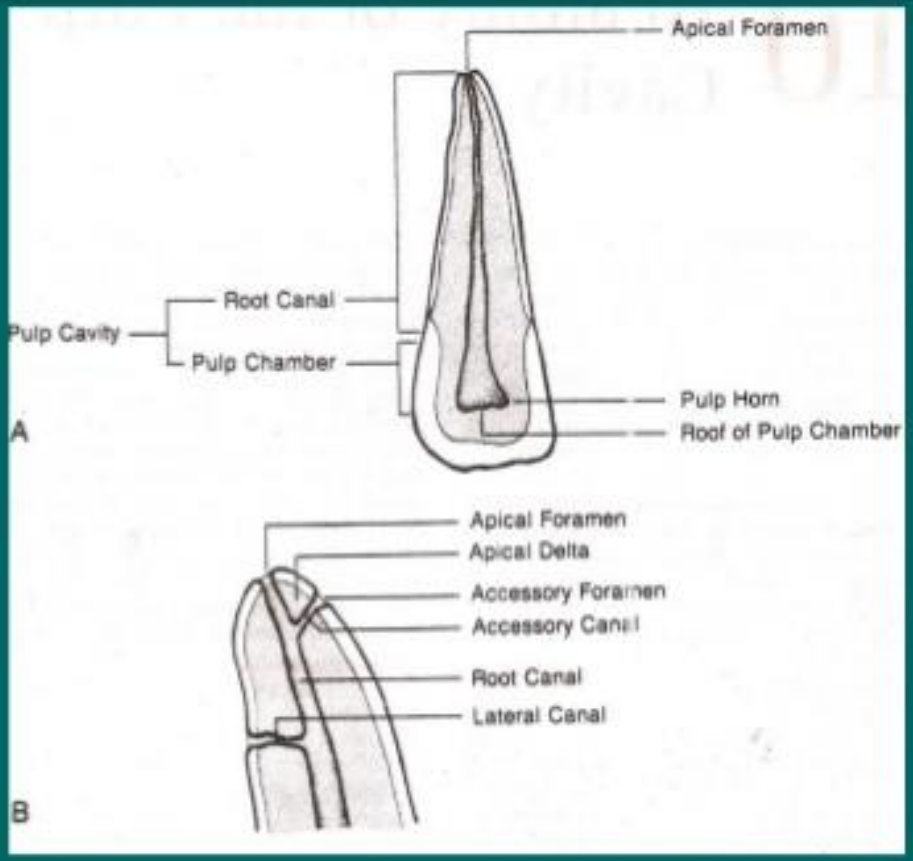
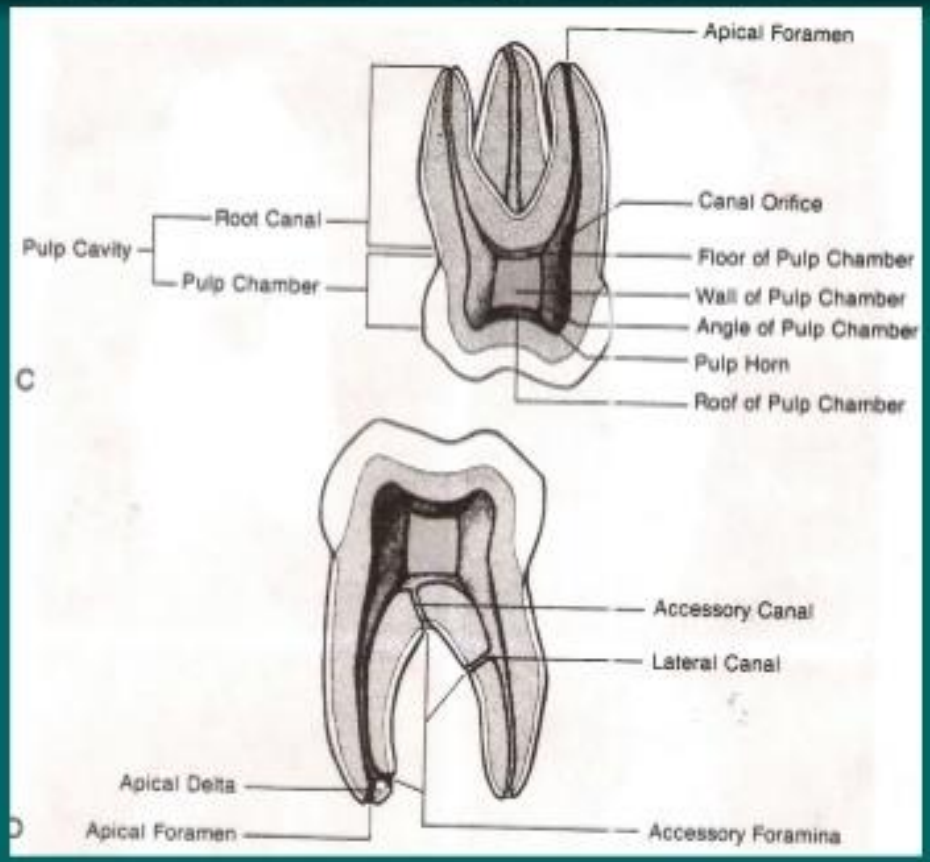
ACCESS CAVITY PREPARATION

ANATOMY OF THE PULP CAVITY

- Pulp cavity is the central cavity within the tooth and is entirely enclosed by dentin except at the apical foramen.
- Pulp cavity may be divided into a coronal portion, pulp chamber, radicular portion and root canal.
- In anterior teeth the pulp chamber gradually merges into root canal.
- In multirooted teeth, the pulp cavity consists of a single pulp chamber and usually three root canal.

- A pulp horn is an accentuation of the roof of the pulp chamber directly under a cusp or developmental lobe.
- Orifices are continuation with both pulp chamber and root canal.
- A root canal may be divided into three sections namely coronal, middle, apical third.
- Accessory canal or lateral canal is a lateral branch of main root canal, generally occur in the apical third or furcation area of a root.


Apical Foramen
Root Canal
Pulp Cavity
Pulp Chamber
Pulp Horn
Roof of Pulp Chamber
A
Apical Foramen
Apical Delta
Accessory Foramen
Accessory Canal
Root Canal
Lateral Canal
B


Apical Foramen
Canal Orifice
Root Canal
Pulp Cavity
Pulp Chamber
Floor of Pulp Chamber
Wall of Pulp Chamber
Angle of Pulp Chamber
Pulp Horn
Roof of Pulp Chamber
C
Accessory Canal
Lateral Canal
Apical Delta
Apical Foramen
Accessory Foramina
D

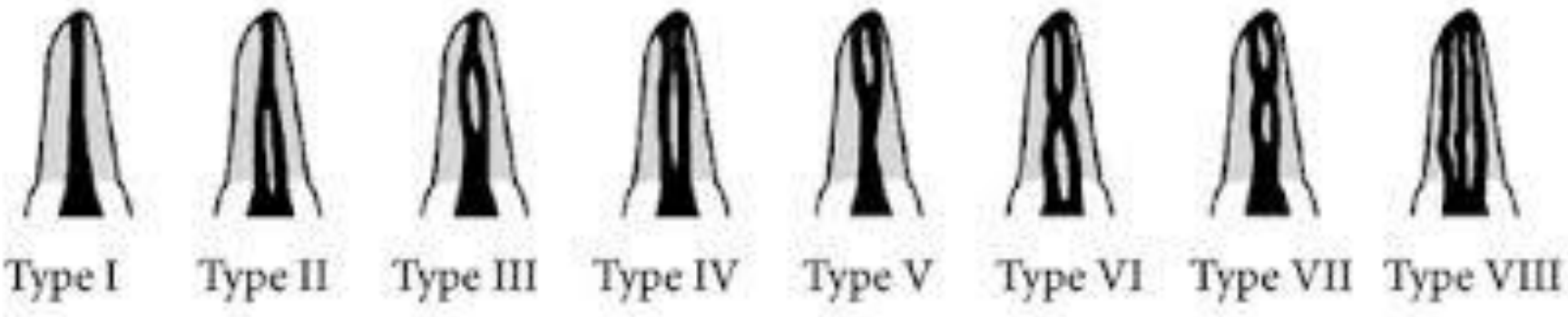
The root canal system is highly complex and canal may branch, divide and rejoin.

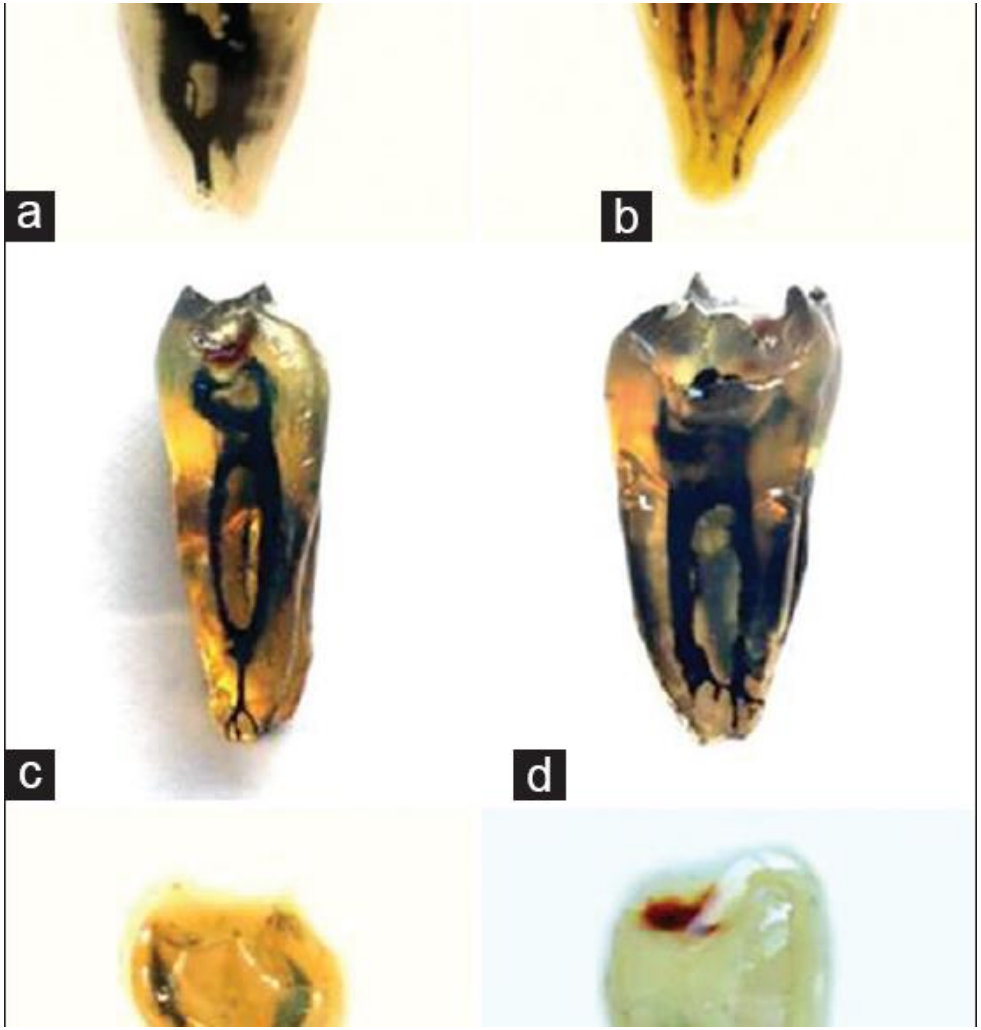
***Vertucci et al* identified and classified eight pulp space configuration which are following as -:**

- **Type I : A single canal extends from the pulp chamber to the apex.**
- **Type II : Two seprate canal leaves the pulp chamber and join short of the apex to form canal.**
- **Type III : One canal leaves the pulp chamber and divides into two in the root: the two then merge to exit as one canal.**

- **Type IV : Two separate, distinct canals extend from the pulp chamber to the apex.**
- **Type V : One canal leaves the pulp chamber and divides and divides short of the apex into two separate, distinct canals with separate apical foramina.**
- **Type VI : Two separate canals leave the pulp chamber, merge in the body of the root, and redivide short of the apex to exit as two distinct canals.**
- **Type VII : One canal leaves the pulp chamber, divides and then rejoins in the body of root, and finally redivides into two distinct canals short of the apex.**

- **Type VIII : Three separate, distinct canals extend from the pulp chamber to the apex.**




a
b
c
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INTRODUCTION

The major factor involved in the development of the apical periodontitis are loss of integrity of coronal tooth substance and the entry of microorganisms into the dentine and pulp space.

The chemo-mechanical removal of microorganisms, their substrate and products form the dentine and pulp space is primary aim of root canal treatment, with the second being the three dimensional obliteration and sealing of the pulp space to prevent bacterial recontamination.

According to Krasner and Rankow, five guidelines or laws, of pulp chamber anatomy to help clinicians determine the number and location of orifices on the chamber floor

- **First Law of Symmetry**

  It states that except for the maxillary molars, canal orifices are equidistant from a line drawn in mesio-distal direction through the pulp chamber floor.

- **Second Law of Symmetry**

  It state that except for the maxillary molars, canal orifices lie on line perpendicular to a line drawn in a mesio-distal direction across the center of the pulp chamber floor

- **The access cavity preparation generally refers to the part of the cavity from the occlusion table to the canal orifice. (according to Stephen Cohen)**

OBJECTIVES

Well designed access preparation is essential for a good endodontic result. Without adequate access, instruments and material becomes difficult to handle properly in the highly complex and variable canal system.

- **To achieve a straight or direct line access to the apical foramen.**
- **To locate all root canal orifice.**
- **To conserve sound tooth structure.**

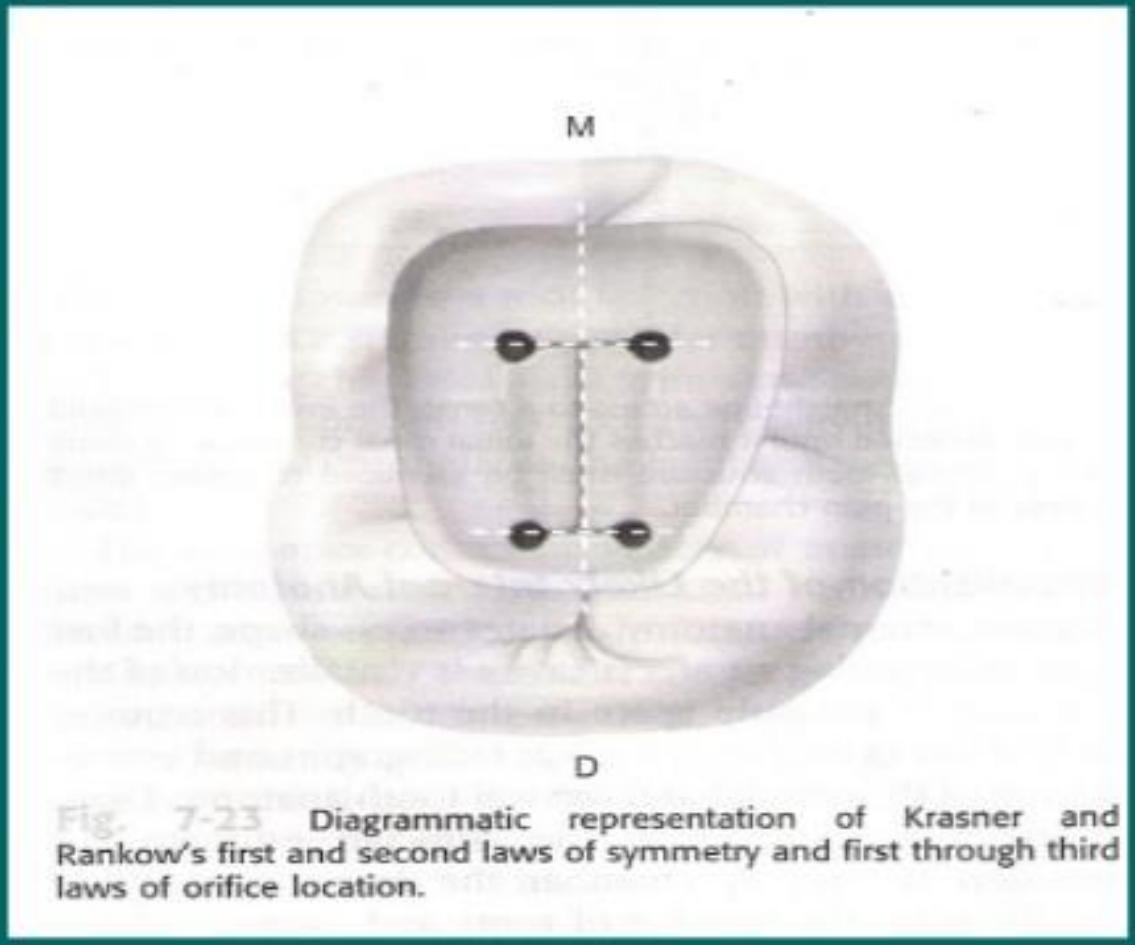

Fig. 7-23 Diagrammatic representation of Krasner and Rankow's first and second laws of symmetry and first through third laws of orifice location.

- **First Law of Orifice Location**

  It states that the orifices of the root canal are always located at the junction of the walls and the floor.

- **Second Law of Orifice Location**

  It states that the orifices of the root canals are always located at the angles in the floor-walls junction.

- **Third Law of Orifice Location**

  It states that the orifices of the root canals are always located at the terminus of the root's developmental fusion lines.

- **Law of Color Change**

  It states that the pulp chamber floor is always darker in color than the walls.

3. Preparation of the access cavity is through lingual in anterior teeth and on the posterior teeth through occlusal surface.

4. Removal of unsupported tooth structure.This reduce the tooth's resistance to stress.

5. Creation of access cavity walls. So that sufficient tooth structure must be removed to allow instrument to be placed in a straight line and easily into canal orifice.

6. Location, flaring and exploration of all root canals orifices. A sharp endodontic explorer used to locate the canal orifice and to determine their angle of departure from the pulp chamber.

7. Magnification and illumination. These are important in root canal therapy, especially for determining the location of canal, curved and calcified canal and debriding and removing tissue from the pulp chamber.

An endodontic explorer is used to search for canal orifices.

8. Tapering of cavity walls and evaluation of space adequacy for a coronal seal. A proper access cavity has tapering walls and is widest at occlusal surface. At least 3.5 mm of temporary filling material is needed to provide an adequate coronal seal for a short period.

- In most cases number of root canal depends upon the number of roots of the tooth.
- In young age, apical foramen is funnel shaped in a incompletely developed teeth.
- With the development of the root, the apical foramen becomes narrower.
- The shape and size of pulp cavity is influenced by age.
- In young people, pulp chamber is large and with increase of age, it gets smaller.

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Access Cavity Preparations

Anterior access cavity preparations

Many of the same steps are used in similar tooth types to prepare an access cavity.

The following discussion outlines the steps for maxillary and mandibular anterior teeth.

1. Removal of Caries and Permanent Restorations

- **Caries is typically removed early, before the pulp chamber is entered.**
- **This minimizes the risk of contamination of the pulp chamber or root canal with bacteria.**

Endodontic Preparation of Maxillary Anterior Teeth

- Removal of defective permanent restorations also permits straight line access and prevents the restorative fragments from becoming lodged in the root canal system.
- If recurrent decay is detected or suspected, the permanent restoration must be removed entirely to prevent coronal contamination of pulp chamber.

2. Initial External Outline Form

- Once caries and restoration have addressed, the clinician create an initial external outline opening on the lingual surface of the anterior teeth

- For an intact tooth, the clinician should begin in the center of lingual surface of anatomic crown.
- No 2 or 4 round bur or tapered fissure bur is used to penetrate the enamel and slightly into the dentine with a high speed hand piece.

- The bur is directed perpendicular to the lingual surface as the external outline opening is created.

3. **Penetration of the Pulp Chamber Roof**

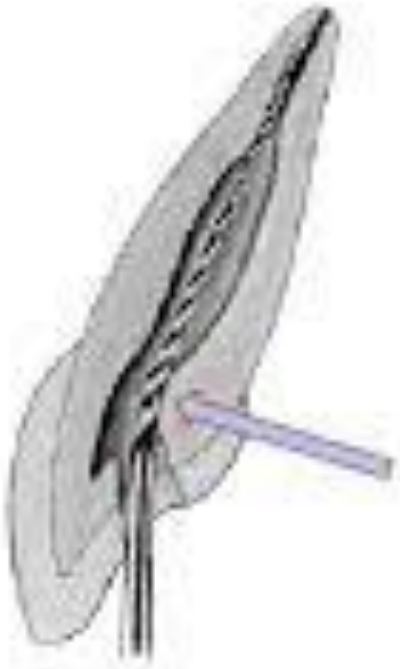
- Penetration of the pulp chamber roof is continuing with the same round or tapered fissure bur, we change the angle of the bur from perpendicular to the lingual surface to parallel to the long axis of the tooth.
- Penetration into the tooth is accomplished along this roots long axis until the roof of the pulp chamber is penetrated, frequently a drop-in effect is felt when the penetration occurs.

Complete Roof Removal

- Once the pulp chamber has been penetrated, the remaining roof is removed by catching the end of a round bur under the lip of the dentin roof and cutting on the bur ‘s removal stroke.
- Each tooth has a unique pulp chamber anatomy, working in this manner allow the internal pulp anatomy to dictate the external outline form of the access opening.
- In vital cases pulp tissue hemorrhage can impair the clinician”s ability to see the internal anatomy.
- In such cases, as soon as enough roof has been removed to allow instrument access,

Clinical Tips When Accessing Anterior Teeth

- Remove the lingual shoulder to provide proper SLA
- Maxillary incisors are tilted
- The mandibubar incisors may have 2nd canals



- The coronal pulp should be amputated at the orifice level an endodontic spoon or round bur and the chamber irrigated copiously with sodium hypo chlorite.
- After hemorrhage has been controlled, allowing visibility, all of the pulp chamber roof, with pulp horns, must be removed and all internal walls must be flared to lingual surface of the tooth.

Identification of All Canal Orifices

- After the pulp chamber has been unroofed, the canal orifice are located with an endodontic explorer
- Positioning the explorer in an orifices allows the clinician to check the shaft for clearance from the axial walls an d determine the angle at which a canal depart the main chamber.

Removal of lingual shoulder, orifice and coronal flaring

- Once the orifice has been identified, the lingual shoulder is removed.
- Lingual Shoulder-: this is the lingual shelf of dentin that extends from the cingulum to a point approximately 2mm apical to the orifice.

Straight line access determination

- After the lingual shoulder has been removed and the orifice, the clinician must determine whether straight line has been achieved.
- Ideally, an endodontic file can approach the apical foramen or the first point of the canal curvature.

Visual inspection of the access cavity

- The clinician should inspect and evaluate the access cavity using appropriate magnification and illumination.

Refinement and smoothing of restorating margins

- The final step in the preparation of an access cavity is to refine and smooth cavosurface margin.
- Rough margins can cause of coronal leakage.
- Proper restorative margins are important because anterior teeth may not require a crown as a final restoration