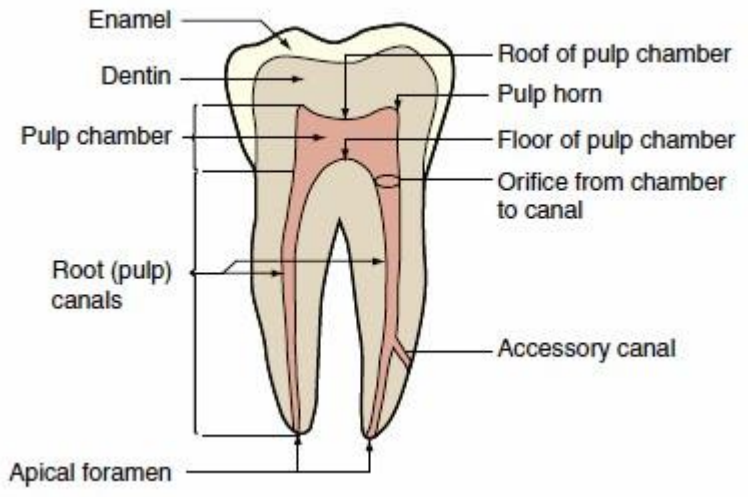
Lec:15 *Pulp Cavities* د. مآرب

The Pulp Cavity: is the cavity in the inner portion of the tooth containing the nerves and blood supply to the tooth. It is divided into the pulp chamber (more coronal) and the root canals (in the roots).

- Each pulp chamber has a roof at its incisal or occlusal border often with projections called **pulp horns** which are projections or prolongations of the pulp in the roof of the pulp chamber that correspond to the major cusps or lobes of the crown.
- The number of pulp horns found within each cusped tooth (molars, premolars, and canines) is normally one horn per functional cusp, and in young incisors, it is three (one horn in each of the three facial lobes, which is the same as one lobe per mamelon).

-The pulp chambers of **multirooted teeth** have a floor at the cervical portion with an opening (**orifice**) for each root canal.

Root canals (pulp canals): are the portions of the pulp cavity located within the root(s) of a tooth. Root canals connect to the pulp chamber through **canal orifices** on the floor of the pulp chamber, and pulp canals open to the outside of the tooth through openings called **apical foramin**.

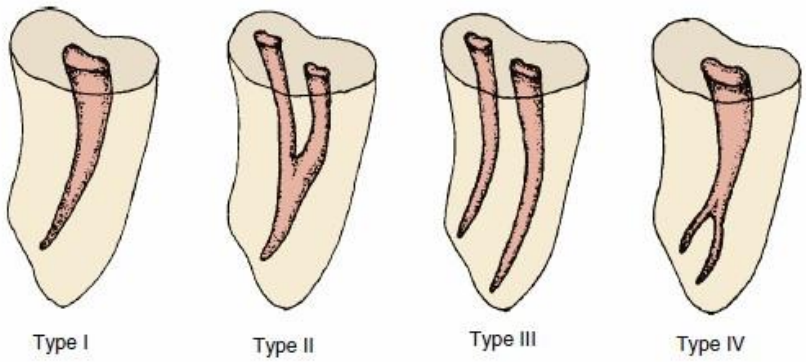


- Four canal types are defined as follows:

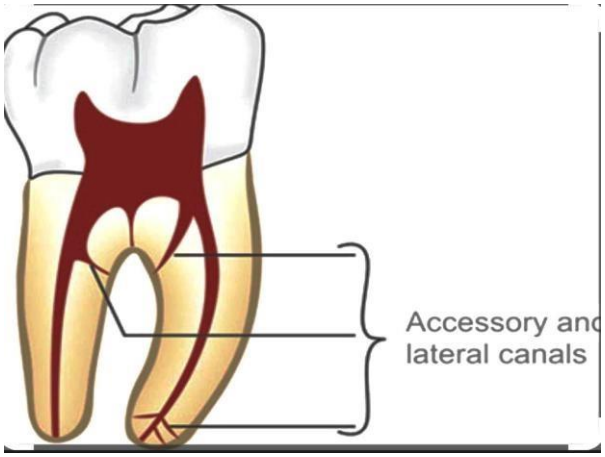
Type I—one canal extends from the pulp chamber to the apex. **Type II**—two separate canals leave the pulp chamber, but they join short of the apex to form one canal apically and one apical foramen.

Type III—two separate canals leave the pulp chamber and remain separate with two separate apical foramina.

Type IV—one canal leaves the pulp chamber but divides in the apical third of the root into two separate canals with two separate apical foramina.

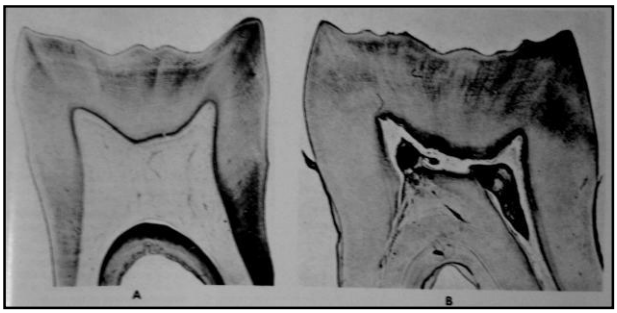


Accessory (or lateral) **canals** also occur, located most commonly in the apical third of the root and in maxillary and mandibular molars, are common in the furcation area.



-The size of the pulp cavity depends on the age of the tooth and its history of trauma.

-In a young tooth, the pulp chamber is large and resembles the shape of the crown surface. As teeth get older, the pulp chamber becomes smaller and is more apically located because of deposits of **secondary dentin** produced by specialized cells called **odontoblasts** lining the pulp chamber. Dentin formation normally continues as long as the pulp is intact or vital. As dentin forms on the walls of the pulp cavity, this making the pulp chamber smaller.

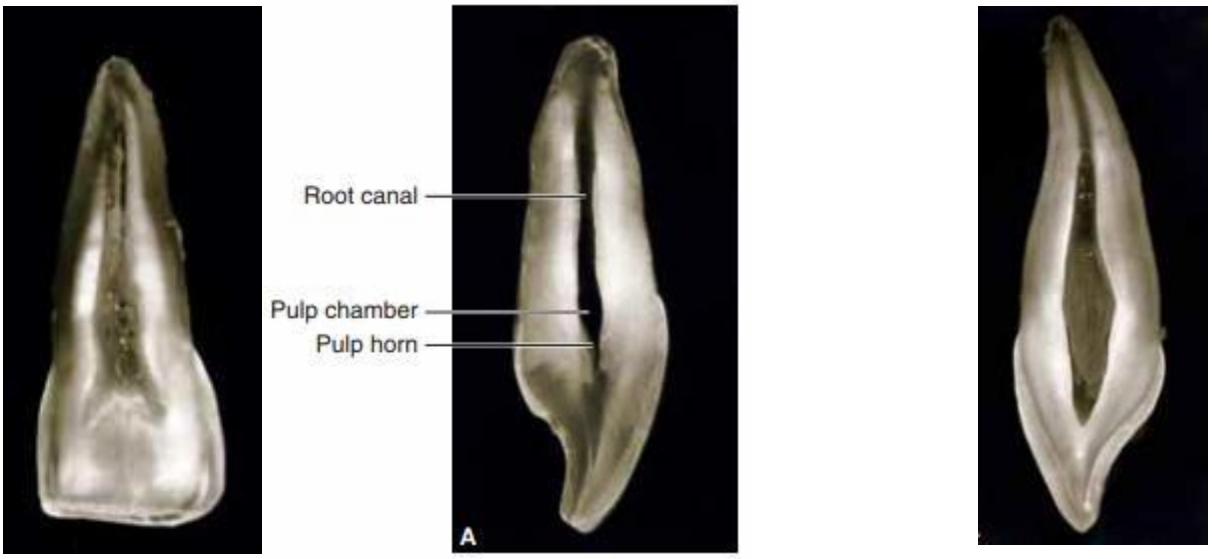


-The shape of the pulp cavities correspond to the external outline form of the tooth (the shape of the pulp chamber corresponds to the shape of the crown whereas the shape of the pulp canal corresponds to the shape of the root).

1. Pulp Shape in Anterior Teeth

a. Pulp Chamber and Pulp Horns of Anterior Teeth

When an incisor is cut mesiodistally, the pulp chambers are broad and may have two pulp horns can be seen. However, the roof of the chamber of a young tooth may show three mamelons, that is, has developed with three pulp horns. The unusual peg lateral incisor only has one pulp horn. When an anterior tooth is cut labio-lingually and viewed from the proximal, the pulp chambers taper to a point toward the incisal edge. In maxillary and mandibular canines, the roof of the pulp chamber is rounded (less pointed) and having only one pulp horn.



Incisor **Canine**

b. Root Canals of Anterior Teeth

Maxillary anterior teeth almost always have one canal, whereas mandibular anterior teeth, although most likely to have one canal (60%), may have two canals (one facial and one lingual) (40%). The mandibular canine is the anterior tooth may have two roots, one facial and one lingual, with two root canals one in each root.

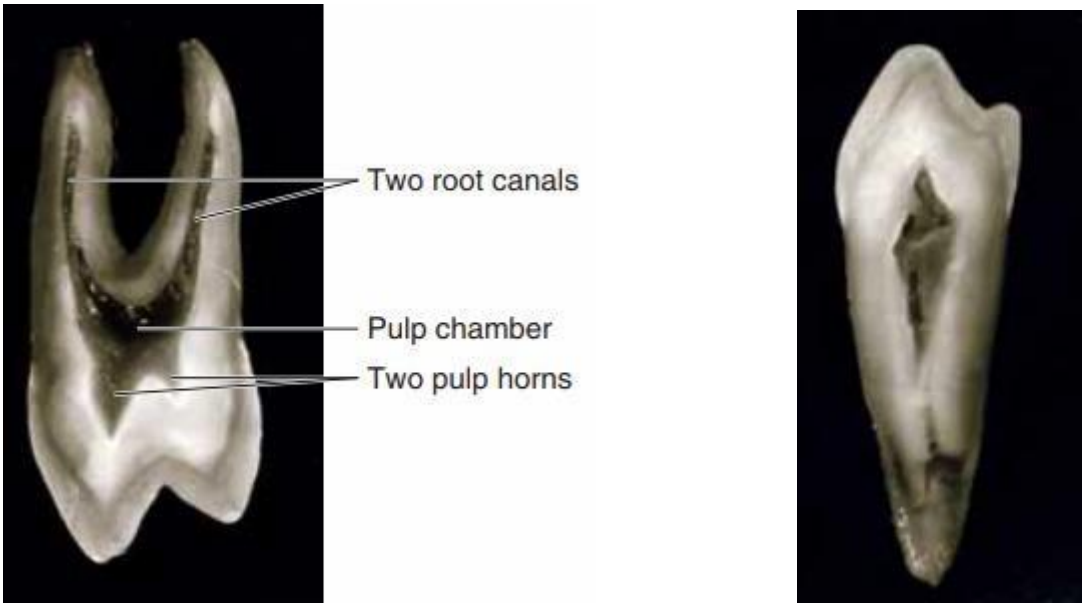
Pulp chambers of anterior teeth don't have floors, but only have roofs.

2. Pulp Shape in Premolars

a. Pulp Chambers and Pulp Horns in Premolars

When premolars are cut bucco-lingually and viewed from the proximal side, the pulp horns on the roof are visible beneath each cusp, and their relative lengths are similar to the relative heights of the cusps.

Thus, the buccal horns are longer than the lingual horns. Premolars have one pulp horn per functional cusp, but the mandibular first premolars that have a functionless lingual cusp may have only one pulp horn similar to a canine.



Maxillary first premolar **Mandibular first premolar**

b. Root Canals and Orifices of Premolars

Maxillary first premolars most often have two roots (one buccal and one lingual) and two canals. Even maxillary first premolars with a single root almost always have two canals. The incidence of two canals is 90%. Maxillary second premolars most have one root, but may have one or two canals. The incidence of two canals is about 59%. Mandibular first and second premolars most frequently have one root and one root canal about 70% in first premolars and 98% in second premolars.

3. Pulp Shape in Molars

a. Pulp Chambers and Pulp Horns in Molars

Molars have one pulp horn per functional cusp, and they are located in the roof of the pulp chamber well beneath each cusp. The cusps of Carabelli are functionless. So all molars have four pulp horns, but the mandibular first molar with five cusps is the only type of molar to have five pulp horns.

Maxillary first molar

Mandibular first molar

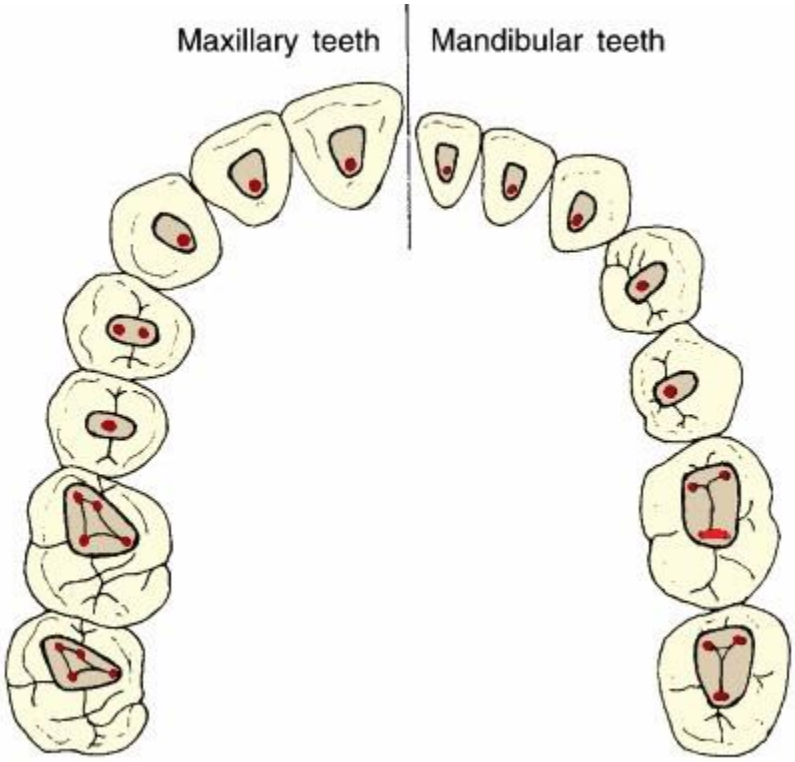
b. Root Canals and Orifices of Molars

Maxillary first molars most have three roots (mesiobuccal, distobuccal, and palatal) with three canals (one canal in each root), but four canals may be seen: two in the mesiobuccal root (mesiobuccal and mesiolingual canals).

Maxillary second molars, like maxillary first molars, most frequently have three roots and three canals.

Both mandibular first and second molars most frequently have two roots (mesial and distal) and three canals. The wider mesial roots have two canals: mesiobuccal and mesiolingual. The distal roots have only one canal.

Maxillary third molars usually have three roots with three root canals, and mandibular third molars usually have two roots with two root canals.



Pulp Cavities Shapes in Cross-Section of Teeth

Maxillary Central Incisor

The pulp chamber is very narrow labiolingually, while it is wide mesiodistally.

In cross-section, the pulp chamber is triangular in outline with the base of the triangle at the labial aspect.

Maxillary Lateral Incisor

The pulp chamber anatomy is similar to that of the central incisor. In cross-section, it may be triangular, oval, or round.

Maxillary Canine

The pulp cavity is much narrower mesiodistally than labiolingually.

In cross-section, the shape of the pulp space is oval.

Maxillary First Premolar

In cross-section, the pulp chamber is kidney-shaped outline form.

Maxillary Second Premolar

In cross-section, the pulp chamber is oval in shape.

Maxillary First Molar

In cross-section, the pulp chamber is rhomboidal in shape.

Maxillary Second Molar

The pulp chamber anatomy is similar to that of the maxillary first molar but the chamber is much smaller in mesiodistal section.

Mandibular Central Incisor

The pulp cavity is narrow mesiodistally and wide labiolingually. In cross-section, the pulp chamber may be round, oval, or elliptical in shape.

Mandibular Lateral Incisor

Similar to the central but larger in size.

Mandibular Canine

The pulp cavity is similar in size and shape to that of the maxillary canine but tends to be a little shorter. In cross-section, it is oval in shape.

Mandibular First Premolar

In cross-section, the pulp cavity may be round or elliptical.

Mandibular Second Premolar

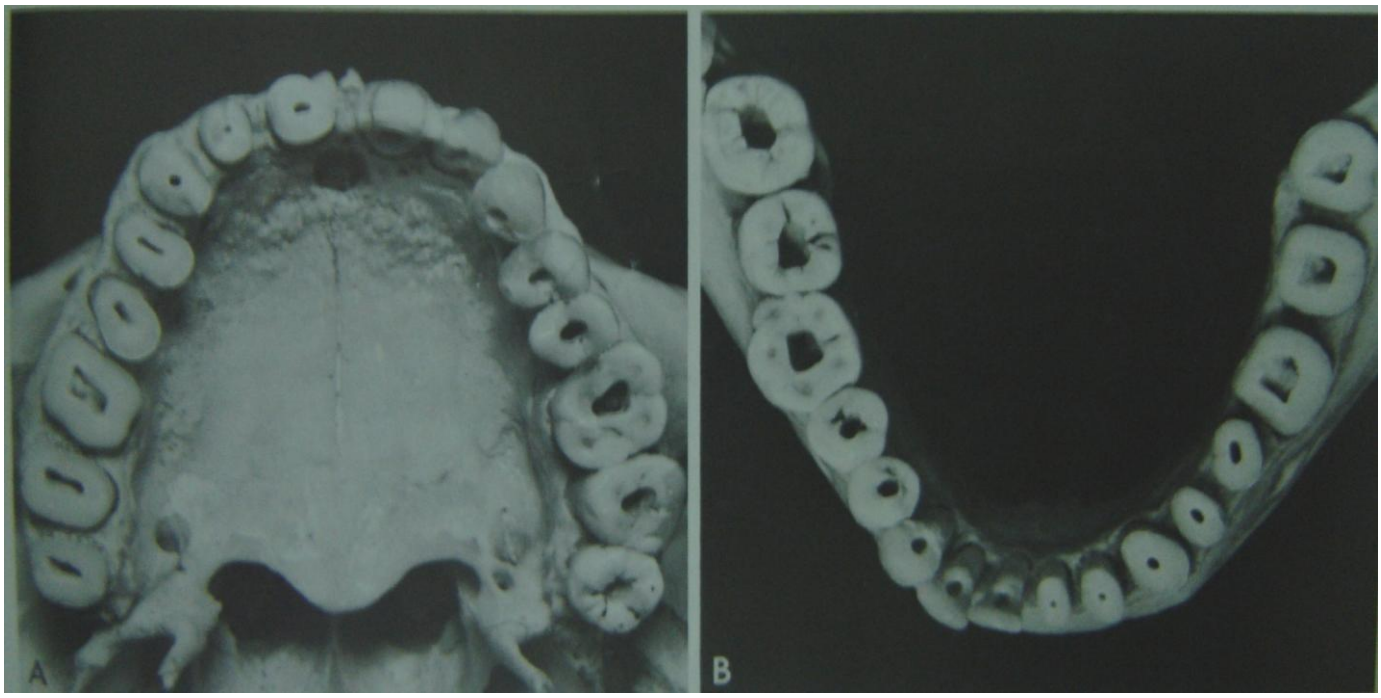
In cross-section, the pulp cavity may be rectangular or oval.

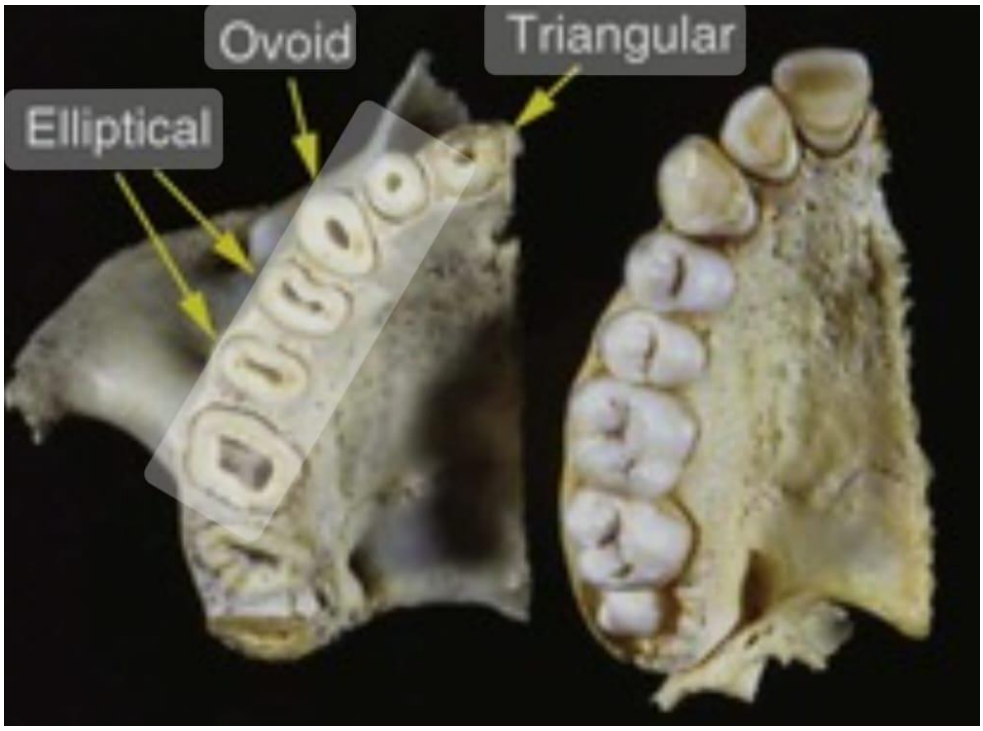
Mandibular First Molar

In cross-section, the pulp cavity is quadrilateral in form.

Mandibular Second Molar

The pulp chamber anatomy is similar to that of the mandibular first molar.


A
B


Ovoid
Triangular
Elliptical