# **ENDODONTICS**

#### Lecture: 3

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### **Access Opening**

Access opening is the cavity that is prepared in the crown of a tooth to obtain adequate and direct access (straight line access) to the apical foramen to ensure free movement of the instruments during pulp extirpation. preparation and obturation of the root canal. Preparing the endodontic access cavity is a critical step in a series of procedures that potentially leads to the three-dimensional obturation of the root canal system. Access cavities should be cut so the pulpal roof, including all overlying dentin is removed.

#### **Objectives of Access Opening**

1) To facilitate visualization of all the root canal orifices by removing the pulp chamber and exposure of pulp horns.

2) To provide direct access (straight-line access) to the apical portion of the canal.

3) Conserve sound tooth structure as much as possible to avoid weakening of remaining tooth structure. The outline form of the access cavity must be correctly shaped and positioned according to:

1. The size of the pulp chamber.

II. The shape of the pulp chamber.

Ill. The number of individual root canals and their direction of curvature.

The outline form is affected by the size of the pulp chamber, so access opening for young patients is larger, because the pulp chamber is larger. while in old patients the pulp chamber is smaller. The finished outline should reflect accurately the shape of the pulp chamber. E.g. in premolars the pulp chamber is oval in cross section so the access opening is oval, elongated buccolingually than mesiodistally (following the pulp chamber shape). Sometimes a modification is needed to get the objective of access opening.

The number of individual root canals and their curvature modifies the outline of the access opening. Sometimes we have to remove part of a cusp of a molar or incisal ridge in order to facilitate better visualization to the root canals.

The dentist must be able to see, locate and reach by the instruments each root canal.

### Shape of access openings for each anterior tooth

1-<u>Maxillary Central Incisor</u>: The access opening is triangular. The root is straight, single, large, oval at the beginning, then tapered until it becomes rounded apically. Average tooth length=22.5mm

<u>2-Maxilla Lateral Incisor</u>: Similar in shape to the max. central incisor, but smaller in size with: disto-palatal curvature at the apex of the root. Average tooth Length = 21mm

<u>3-Maxillary canine</u>: the canal is big and it is wider buccolingually than mesiodistally. At the cervical third the orifice is oval, at the middle third: it is oval.. and in the apical third it is rounded. Average length=26.5mm

**<u>4-Mandibular Incisors</u>:** If we take an x-ray from buccal direction we will had small tiny root canal. But if we take an x-ray film from mesial or distal direction, we will fund large, wide pulp "labio-lingually" with a possibility of two canals one labially and the second one is located lingually, so we have to widen the root canal orifice "Labiolingually". Average length=21mm

In addition, in the lower incisor, sometimes we have slight curvature in the root apex "to the lingual side" so; there is a possibility of perforation during instrumentation.

<u>5-Mandibular Canine</u>: There is one canal, which is big, and oval in shape, Another root canal may be present lingually to the major root canal but this rarely happens. Average length=22.5mm

## Access opening of each posterior tooth

#### **<u>1-Maxilla first premolar</u>**

Access opening: ovoid and elongated buccopalatally. Average length=21mm

The canal shape is wide in buccopalatal direction at cervical portion slight ovoid at mid-root and rounded at apical third.

Canal Orifices: below and slightly central to cusps tips. Multiple canal possibilities

(i) 20% single canal in single root, elliptical or figure (8) in shape. wider buccopalatally than mesiodistally. It may be mistaken as two canals.

(ii) 80%: two canals, either single root with either one or two apical foramenae, or two canals with two separated roots "and the palatal one is longet".

(iii) Rarely there are (3) roots with (3) root canals.

#### 2-Maxillam Second Premolar

- Mostly it has a single root and the canal shape is ovoid and very wide in buccopalatal direction, ovoid in the mid root, and rounded in the apical area. Average Length=21.5mm

-Canal orifice is centrally located and often appears as a slot than as a single ovoid opening.

-Multiple canals possibilities: 40% = 2 canals, 60% = one canal.

#### **<u>3-Mandible First Premolar:</u>**

Mandibular first premolar has well developed buccal cusp and a small lingual cusp, the root is more rounded than mandibular second premolar and shorter. The pulp chamber is ovoid and buccal pulp horn higher. Average length=21.5mm

-Canal shape: At cervical level is wide in buccolingual dimension. At the mid-root area it is ovoid and at the apical third it is rounded.

-Canal configuration possibilities: Type I = 73.5%, Type II = 6.5%, Type III = 19.5% We may also see Type IV.

-Access opening: ovoid and made slightly buccally to the central groove and the final preparation should have a slightly lingual inclination.

#### 4-Mandibular second Premolar:

It has a well developed buccal cusp and much less formed lingual cusp. There is a one root canal, and the pulp chamber is gradually merging with root canal. **Average length=22.5mm** 

Canal orifice:

a-At cervical wide in buccolingual dimension.

b-Mid-root level > elongated ovoid.

c-Apical third level > generally round.

#### 5-Maxillaty 1st molar

-There are three roots, with three root canals mesiobuooal distobucoaLand palatal canal which IS the biggest one. Average length=21mm

-The final preparation of the access opening is triangular in shape and there are three canals:

a-Mesiobuccal canal: It is a tiny canal, difficult to tind. It is possible to fInd another mesiobuccal canal (70%) lingual to the main one.

b-Distobuccal canal: It is toward the distopalatal side.

c-The palatal canal: It is in between.

#### 6-Maxilla 2nd Molar

-Similar to max. 1"t molar but the distobuccal canal is located in between the mesiobuccal canal and palatal canal and slightly distally. Average length=20mm

-Variations: We may have two canals: one buccally and one palatally instead of three canal, in this case the two canals are large in size and opposite to each other.

#### 7-Mandibular1" Molar

-There are three canals, 2 mesially "mesiobuccal and mesiolingual" and one located distally. Average length=21mm

-We start preparation in mesial part of the tooth and access opening is triangular, rectangular in shape.

-There is a possibility of 2 canals located distally (33%) "and they may end with separate orifices or joined orifice so if the distal canal is tiny and more toward the buccal side then the possibility of 2 canals is high but if it is in the center buccolingually then the possibility of one canal is high.

#### 8-Mandibular 2nd Molar

-The access opening resembles that of the mand.1"molar with 3 root canals, 2 mesially and 1 distally. **Average length=20mm** 

-There is a possibility of 2 canals: mesial canal and distal canal with each canal opposite to other.

#### NOTE:

Currently, new concepts in endodontic access opening have been developed namely Ninja access opening in order to preserve the amount of tooth structure during root canal treatment procedure. Ninja access opening is one of the important steps towards improving the quality of root canal treatment as well as achieving "a minimally invasive endodontic" concept. <u>Minimal invasive endodontics</u>: is paramount, even for preparing endodontic access cavity, as removing as little tooth structure as possible allowing us to maintain as much tooth strength as possible. Thus, improving fracture resistance of endodontically treated teeth.

## **Access Opening Preparation**

#### **Guidelines for access cavity preparation:**

1) Study the preoperative radiograph: It gives information about the size, shape, number and curvature of the root canals and roots. One should check the depth of preparation by aligning the bur and handpiece against the radiograph.

Preoperative radiograph can help to note the position and depth of pulp chamber

2) Excavate all the carious lesions: No caries should be left in the tooth, because microorganisms of the carious lesion may be introduced inside the canal and infection might occur.

3) Replace any defective filling: The defective filling should be replaced before beginning the access opening because it will not ensure proper seal of the tooth.

4) Remove unsupported tooth structure: Any weak tooth structure might fracture that

causes loss of the seal of the tooth and the reference point which changes the length of the tooth.

#### Burs used for access cavity preparation

Access openings burs: they are round burs with 16mm bur shank.

Access refining burs: these are coarse flame-shaped, tapered round and diamonds for refining the walls of access cavity preparation

#### **Procedure of Access opening for Anterior Teeth:**

1) Entrance is always gained through the lingual surface of all anterior teeth. The initial penetration is prepared in the exact center of the tooth above the cingulum (in the center of the middle third).

2) The initial entry in the enamel is done by a round bur no. 4 operated at a right angle to the palatal surface of the tooth. The guide for enamel penetration is that only the head of the round bur no. 4 should enter the tooth.

The direction of the bur is changed to be parallel to the long axis of the tooth, and drill until the entrance to the pulp chamber. We can know that we reached the pulp chamber when we feel a fall in the resistance to the bur, the bur falls into a space, which is the pulp.

3) Remove the roof of the pulp chamber by working from inside the chamber towards the outside of the chamber (pulling motion).

4) Lingual shoulder is removed by moving the bur from inside towards the outside to give a continuous smooth flaring preparation. Lingual shoulder is a convexity inside the pulp chamber.

5) Finishing and funneling with a fissure bur. The final shape funnels down to the orifice of the canal and flare outwards.

6) Extirpate the pulp by introducing an instrument called the barbed broach in the root canal and by outward movement the barbed broach will catch the pulp and remove it from the root canal.

7) Irrigation of the pulp chamber.

The pulp horns should be eliminated with a round bur no. 2 used laterally and incisally, because if they remain, remnants of necrotic tissue would cause discoloration to the anterior teeth.

#### **Procedure of Access Opening for Premolars:**

1) Access is always gained through occlusal surface of all posterior teeth at the center of the central groove. Initial penetration is made parallel to the long axis of the tooth into the exact center of the central groove.

2) A round bur no. 2 or 4 is used to open into the pulp chamber.

3) The bur will be felt to drop it the pulp is reached.

4) We extend into the cavity bucco-lingually by removing the roof of the pulp chamber, working from inside the cavity to the outside (pulling motion).

5) Finishing the cavity walls is done with a fissure bur. The final access opening would be ovoid in shape buccolingually which reflects the anatomy of the pulp chamber and position of the buccal and lingual canal orifices. The pulp chamber of the lower premolars is buccally located rather than lingually so we start access opening and push more buccally.

Access for upper premolars: There are 2 canals, the buccal canal is approached palatally and the palatal canal buccally.

\* Floor of the pulp chamber should not be reached.

#### Anomalies of pulp cavities:

We have certain anomalies which interfere with root canal treatment ex: calcification or complete obliteration of root canal, open apecies, pulp chamber with root canal etc...

1-Dentinogenesls imperfecta: There is a small pulp chamber with root canal obstruction.

2-Hyperparathyroidism: There is a calcafied pulp chamber and loss dura.

3-Hypofunction of pituitary gland: There is a retarded eruption of the teeth and the apecies of the root will be opened.

4-Dentinal dysplasia: There is an obliteration of the pulp chamber and the root formation is defected.

5-Shell teeth: The pulp chamber is quite big with short root.

6-Dense invagination: There is an improper shape of root canal.

### Errors in Access Ogening:

**<u>1-Perforation</u>**: It is common when drilling is continued apically or laterally after we reach the pulp chamber. it is mostly see in

a) Old patients. It is due to pulp recession.

b) Teeth restored by crowns, inlays or big restorations. It is difficult to know the long axis of the tooth so it is better to remove the restoration and work.

d) Tilted teeth. Failure to complete a convenient extension.

<u>2-Cutting more apically:</u> it will lead to flattening of the floor of the pulp chamber and this will weaken the tooth structure which will cause

a) Losing the tunneling shape of the canal orifice.

b) Perforation into the lam.

c) Gauging: Going laterally in the access opening.so the wall of the cavity will not continue with the wall of the root canal.

<u>**3-Narrow access opening.</u>** This will cause incomplete pulp extirpation and instrumentation through the pulp chamber or pulp horn. This is identified by:</u>

a) Sever bleeding.

b) Change of the color of the floor dentin, to dark blue.

c) Anatomical land marks of the floor of pulp chamber, which are convex floor and presence of grooves connecting the canal orifices, are not seen clearly.

d) If a probe is placed in the pulp chamber and pulled against the walls and it catches in the pulp chamber then there is still roof of the pulp chamber, therefore indicating presence of remnants of pulp tissue.

**<u>4</u>**) Entrance through labial surface. This is sometimes performed due to severe crowding or caries in labial surface. or proximal surface if the adjacent tooth is missing. This type of access opening causes incomplete pulp extirpation.

<u>5) Extended access opening preparation:</u> This access opening causes undermining and weakening of the enamel walls.

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