

# TOOTH MORPHOLOGY & ACCESS CAVITY PREPARATION

Reference:

Phatways of the pulp, 10<sup>th</sup> edition  
Chapter 7

By: Dr. V Dolatkhah

DDS, MSD

Hormozgan university of medical science, Faculty of dentistry

August 25, 2013





# مرکز تخصصی پروتزهای دندانی های دندان

طراحی و ساخت انواع پروتزهای دندانی بویژه ایمپلنت

برگزار کننده دوره های آموزشی تخصصی و جامع دندانسازی و ...

با ما همراه باشید ...

[WWW.HIGHDENTlab.com](http://WWW.HIGHDENTlab.com)



# *Why we need Root Canal Treatment ?*

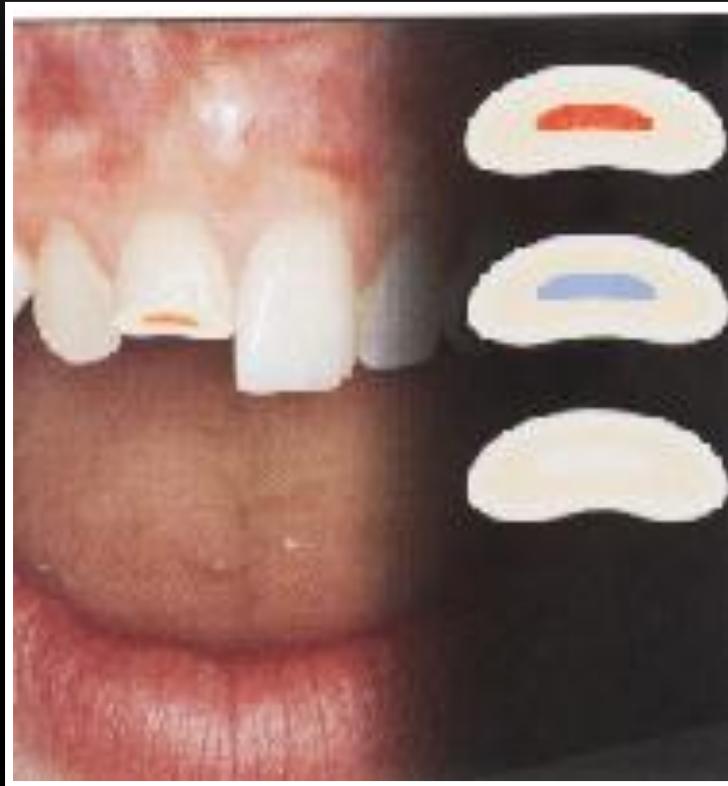
# 1- Due to deep Caries



## 2- *Due to Leaked Restoration*



### 3- *Due to Trauma*



## 4- *Excessive force during ortho. treatment*



# Components of Pulp System

Coronal (the pulp chamber)

Radicular portion (the root canal)

*Pulp horns*

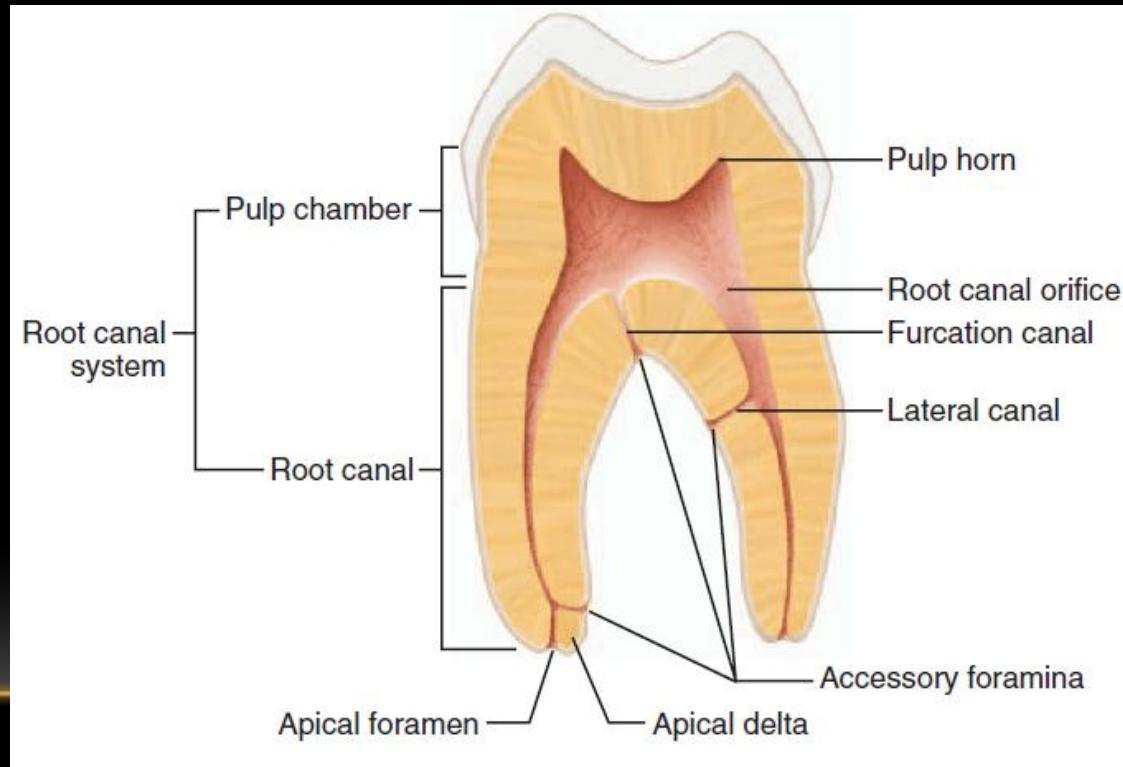
*Canal orifices*

*Accessory canals*

*Furcation canals*

*Apical foramen*

*isthmus*



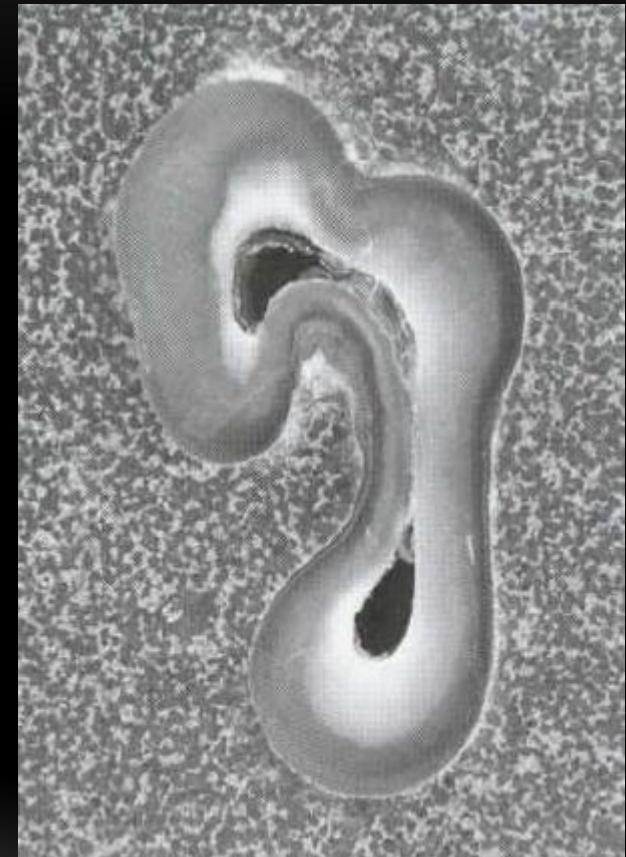
# COMPLEX ANATOMY

## Methods of Determining Pulp Anatomy

1-Textbook knowledge

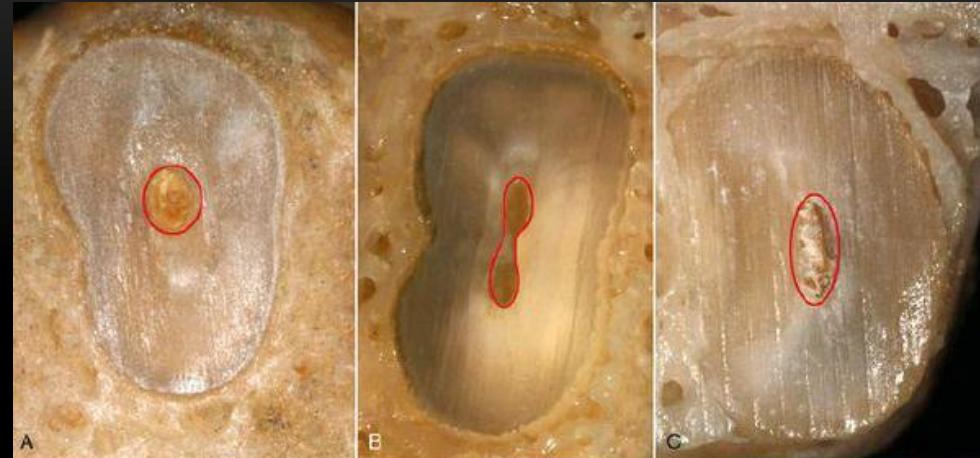
2- Radiographic Evidence

3- Clinical search



# Canal Morphologies

Round



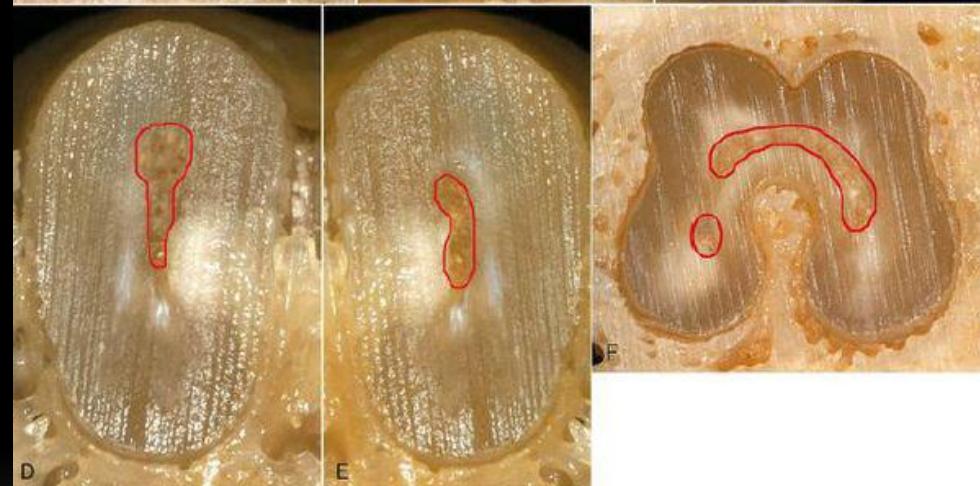
Ribbon

Ovoid

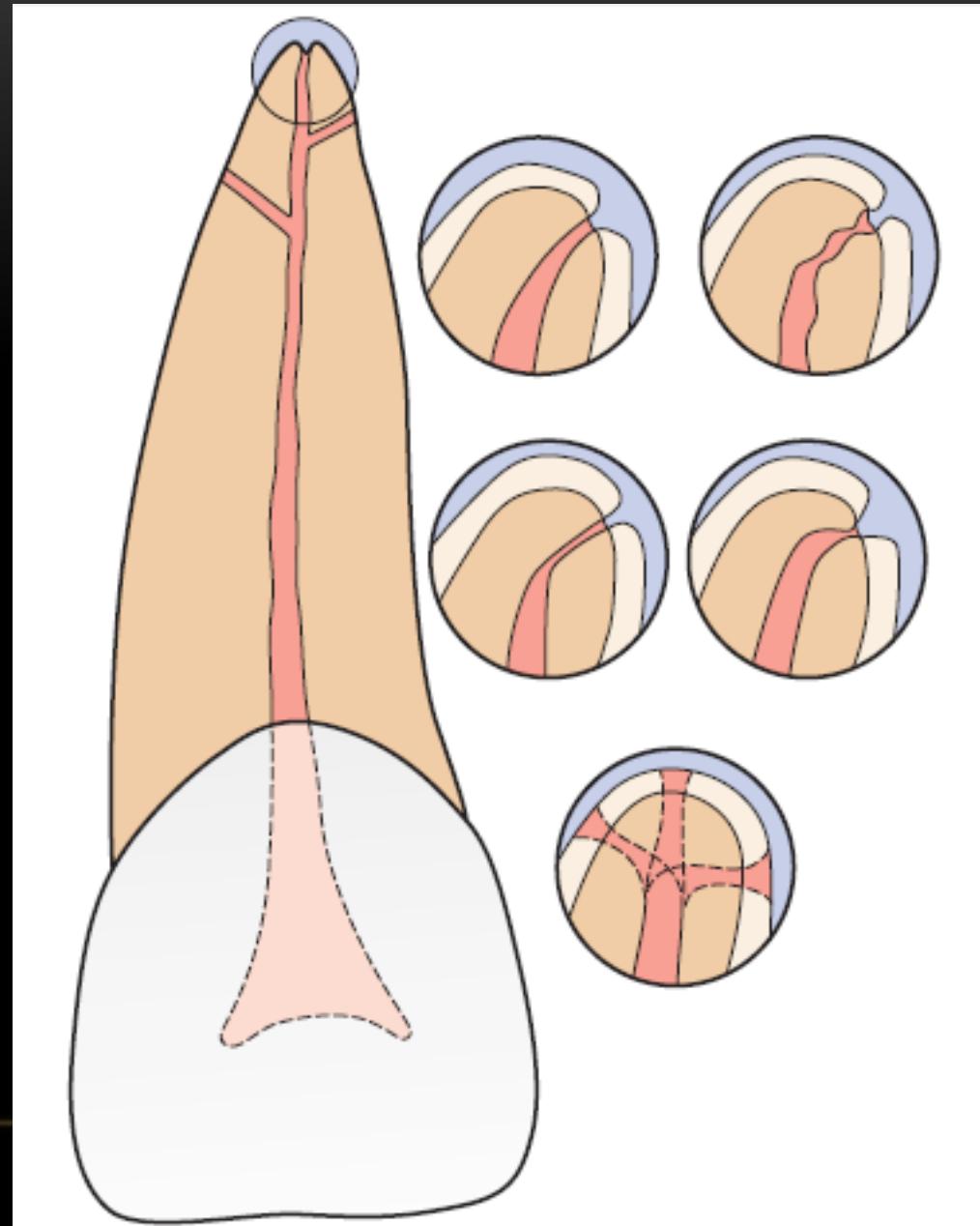
Bowling pin

kidney bean

C-shape



*The shape of the pulp system reflects the surface outline of the crown*



# Vertucci's canal configuration

Vertucci 1984

Type 1 1-1	Type 2 2-1	Type 3 1-2-1	Type 4 2-2	Type 5 1-2	Type 6 2-1-2	Type 7 1-2-1-2	Type 8 3-3
---------------	---------------	-----------------	---------------	---------------	-----------------	-------------------	---------------

Kartal & Cimilli  
1997

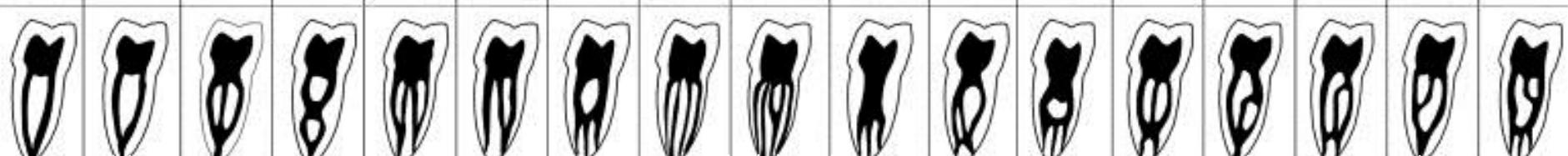
Gulavibala et al. 2001

Sert et al. 2004

Peiris et al. 2007

Al-Qudah &amp; Awawdeh 2009

Type 2a 2-1	Type 2b 2-1	Type 9 3-1	Type 10 2-1-2-1	Type 11 4-2	Type 12 3-2	Type 13 2-3	Type 14 4-4	Type 15 5-4	Type 16 1-3	Type 17 1-2-3-2	Type 18 1-2-3	Type 19 3-1-2	Type 20 2-3-1	Type 21 2-3-2	Type 22 3-2-1	Type 23 3-2-3
----------------	----------------	---------------	--------------------	----------------	----------------	----------------	----------------	----------------	----------------	--------------------	------------------	------------------	------------------	------------------	------------------	------------------



# Apex Anatomy

## Apical constriction:

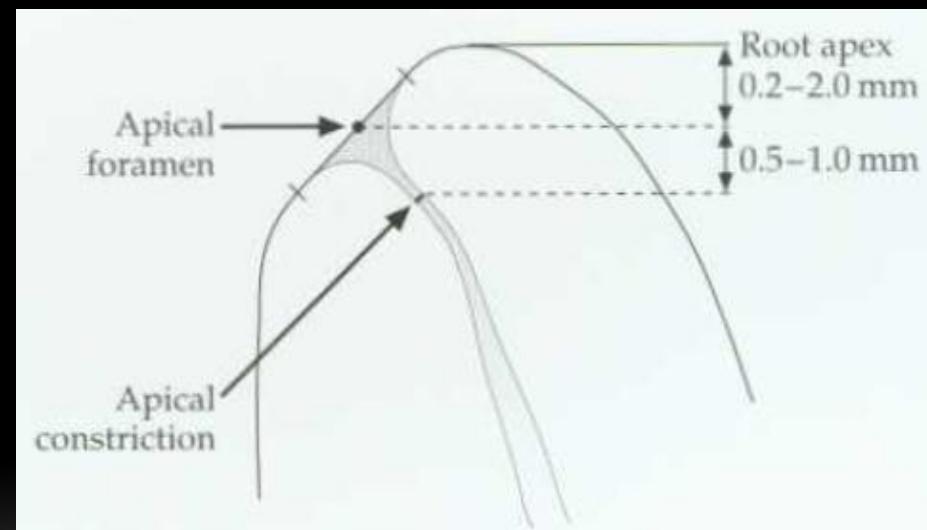
The part of the root canal with the smallest diameter

It is used most often as the apical termination of shaping, cleaning and obturation

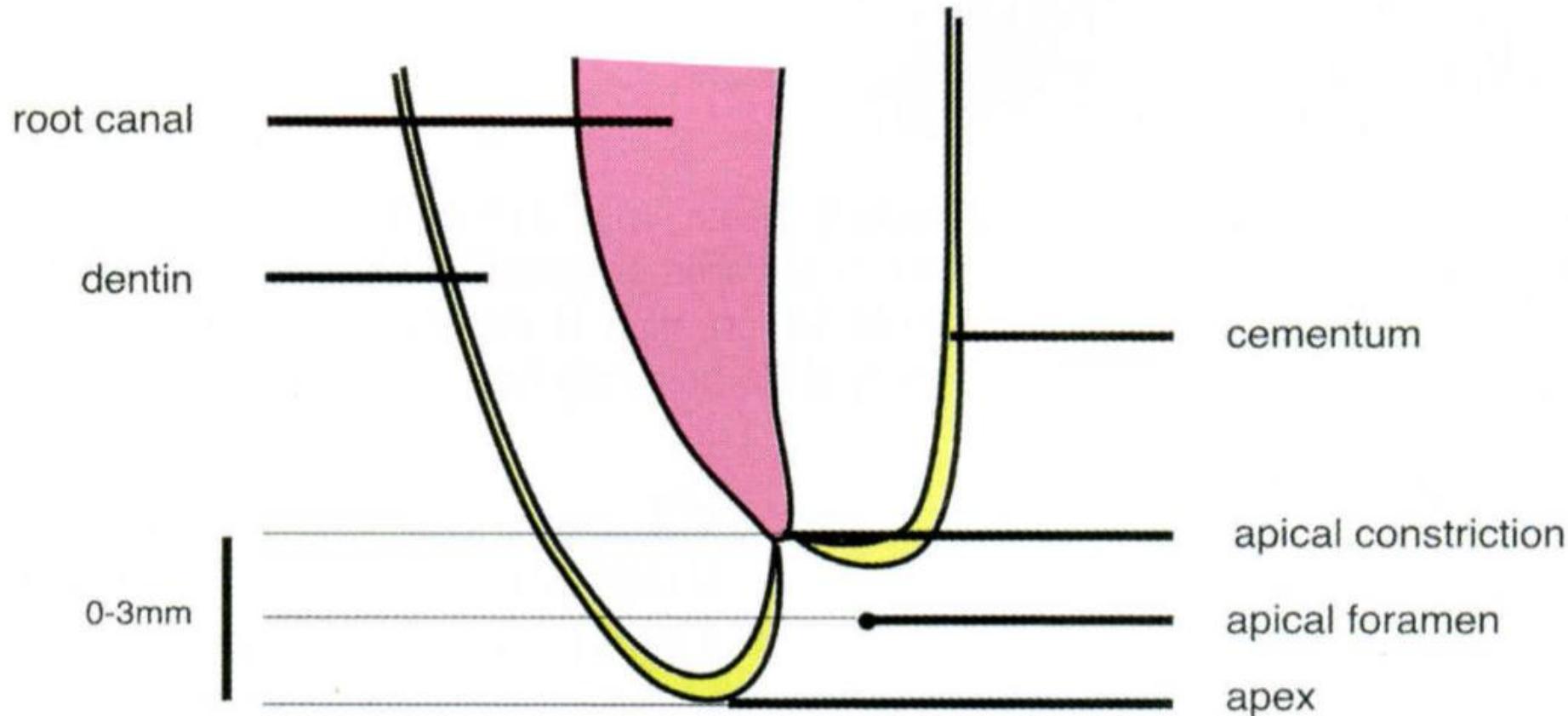
**CDJ:** the point where pulp tissue ends and periodontal tissue begin

**Anatomic apex**

**Radiographic apex**

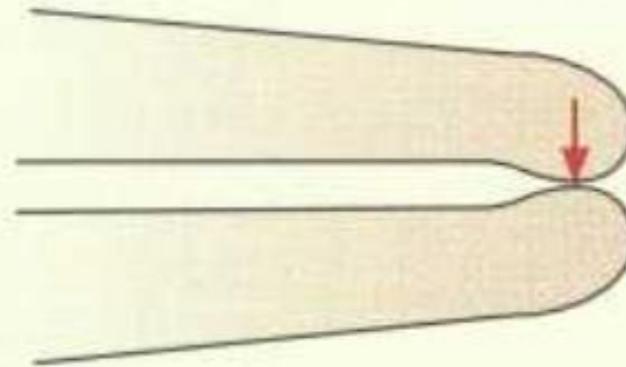


**Apical foramen opens onto the root surface at or within 3 mm from the center of the anatomic root apex**

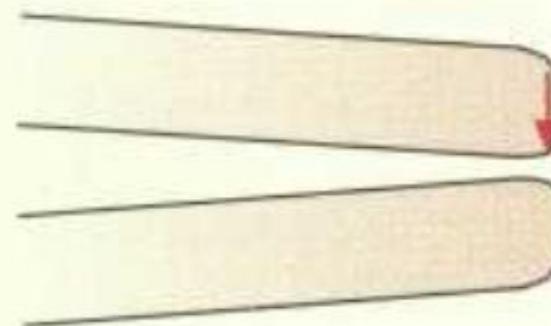


## Dummer's classifications of apical canal anatomy

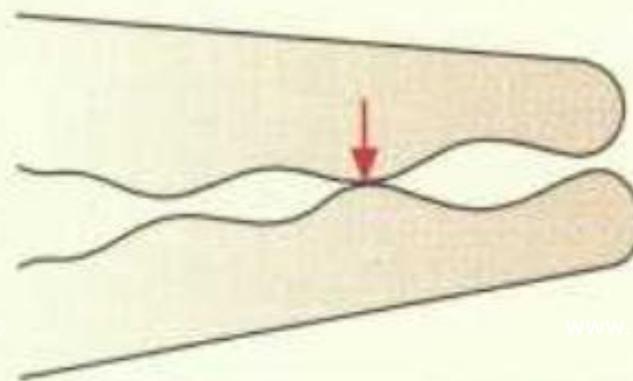
Type A: "Traditional" single constriction



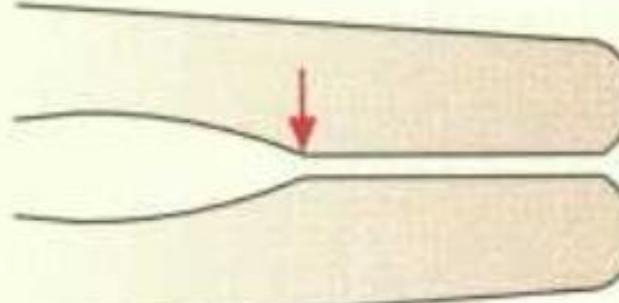
Type B: Tapering constriction



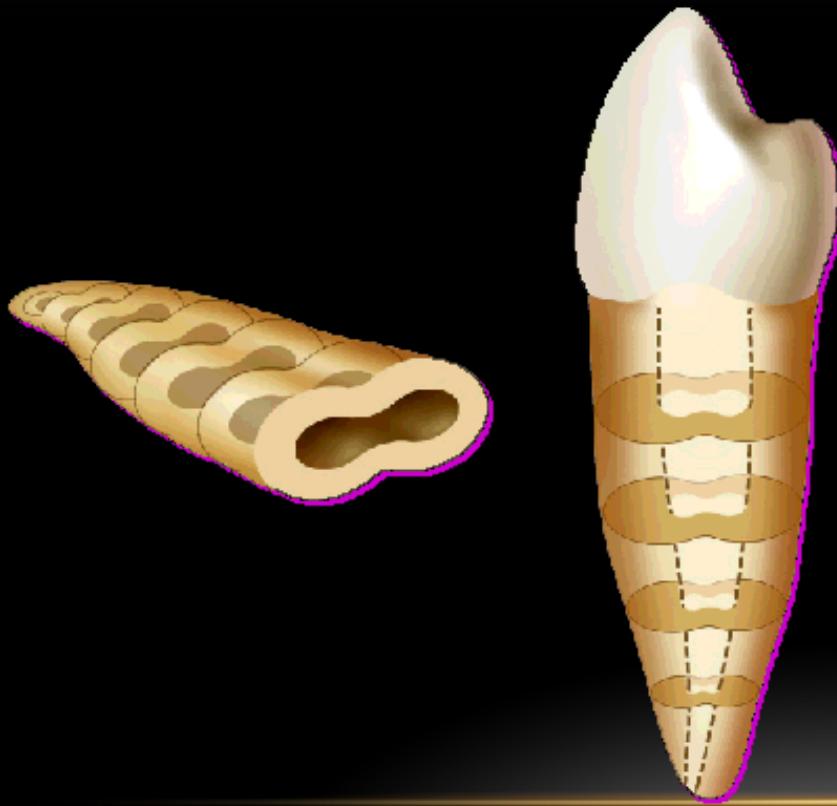
Type C: Multiconstricted



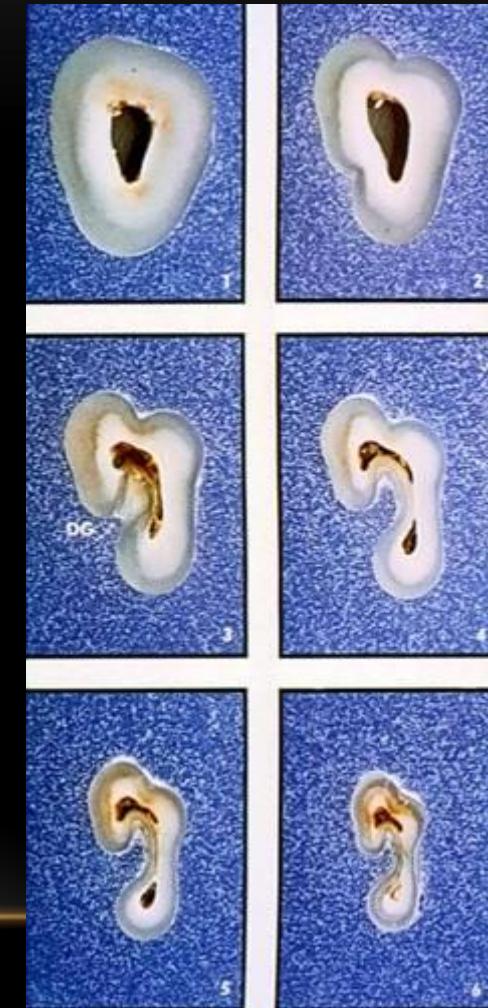
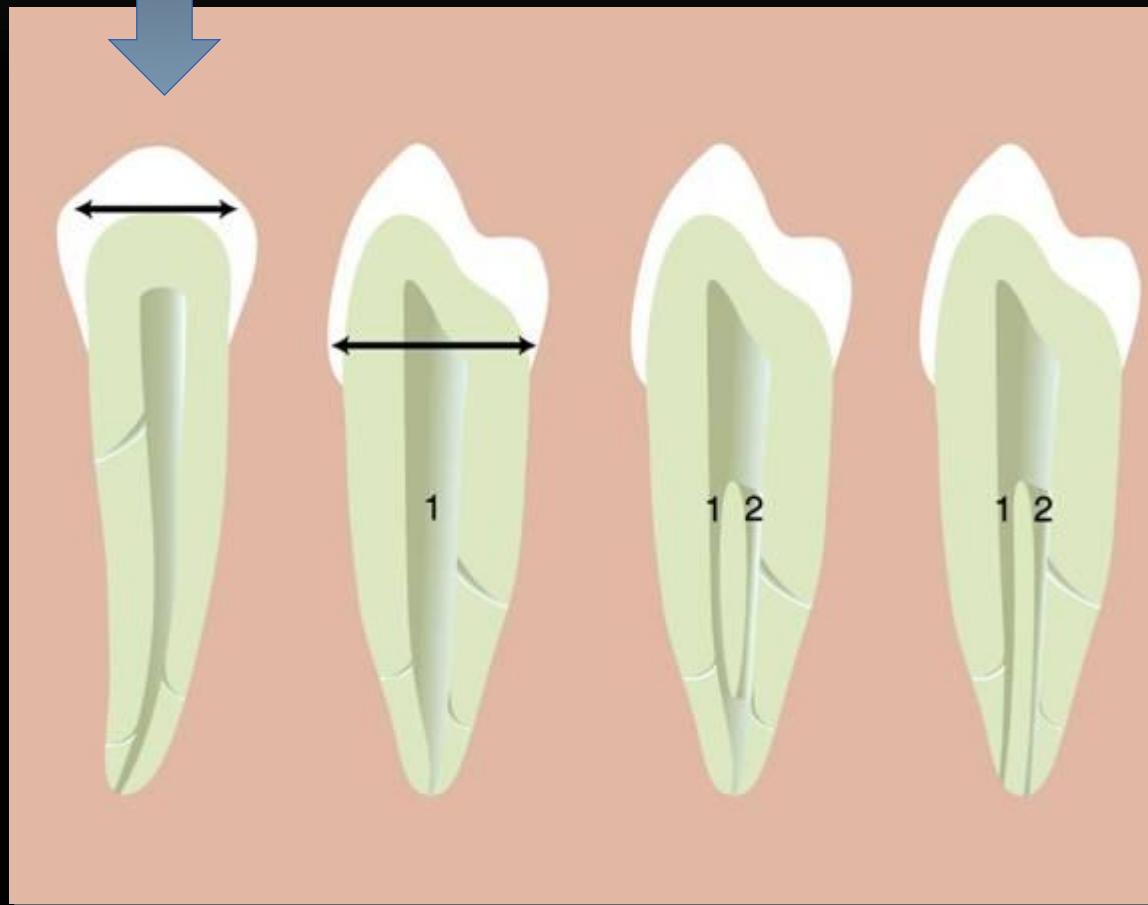
Type D: Parallel constriction



# ROOT CANAL SYSTEM



## THREE DIMENSIONS: X, Y, Z



Recommended termination points:

**1 mm** from the apex when **no bone or root resorption** occurred

**1.5 mm** from the apex when **only bone resorption** has occurred

**2 mm** from the apex when **both bone and root resorption** have occurred

# Alterations in Internal Anatomy

1-AGE

2-IRRITANTS

3-CALCIFICATIONS

4-INTERNAL RESORPTION

# Variations of Root and Pulp Anatomy

Extra canal or root



DENS INVAGINATUS (DENS IN DENTE)

DENS EVAGINATUS

HIGH PULP HORNS

LINGUAL GROOVE

DILACERATION

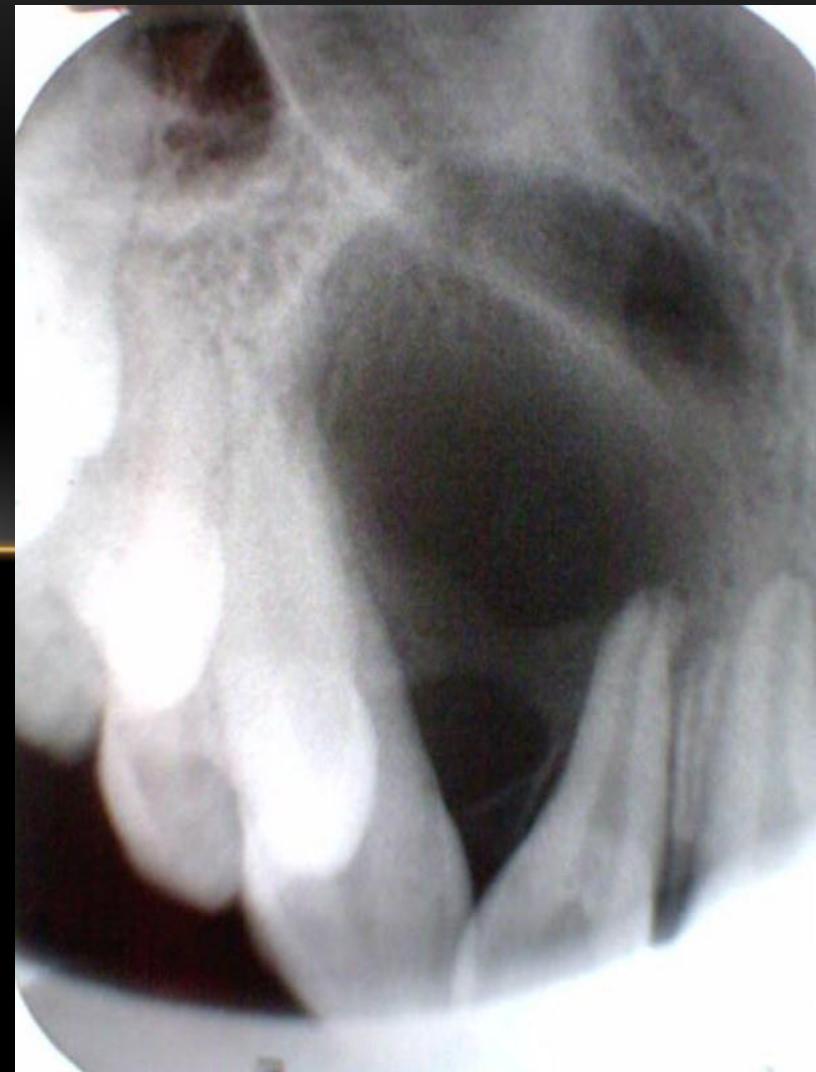
C-shaped canal



# Extra canal or root



# *Dens Invaginatus*



***Access preparation is the most important phase of root canal treatment***

## ACCESS PREPARATION GUIDELINES :

### (1) Locating all canals

(1) Unimpeded straight-line access of the instruments in the canals to the apical one third or the first curve

(3) Removal of the chamber roof and all coronal pulp tissue

(4) Conservation of tooth structure.

# General Principles

**1-Outline form:** Projection of the internal tooth anatomy onto the external root structure

**2-Convenience form:** Modification of the ideal outline form to facilitate unstrained instrument placement and manipulation

**3-Caries removal**

# Access cavity preparation

Removal of caries and permanent restorations

Initial external outline form

Penetration of pulp chamber floor

Complete roof removal

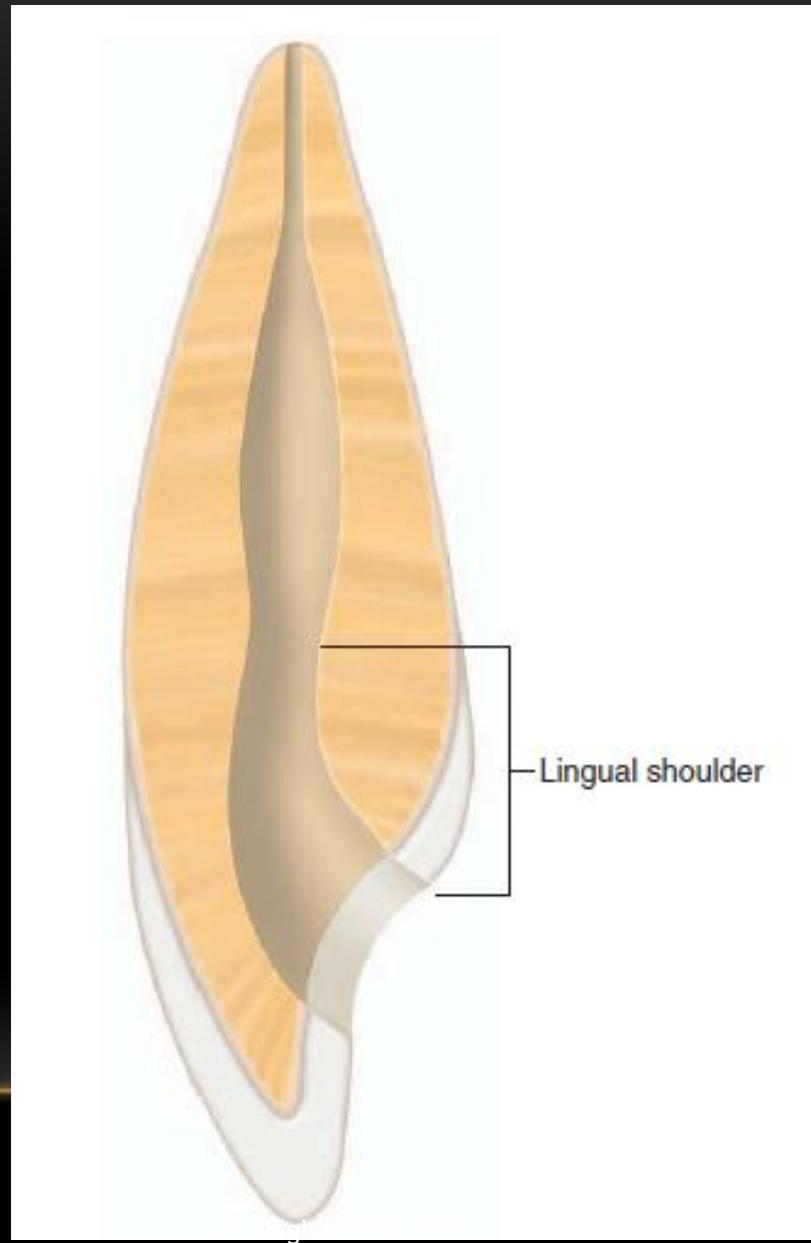
Identification of all canal orifices

Removal of lingual shoulder or cervical dentin bulges

Orifice and coronal flaring

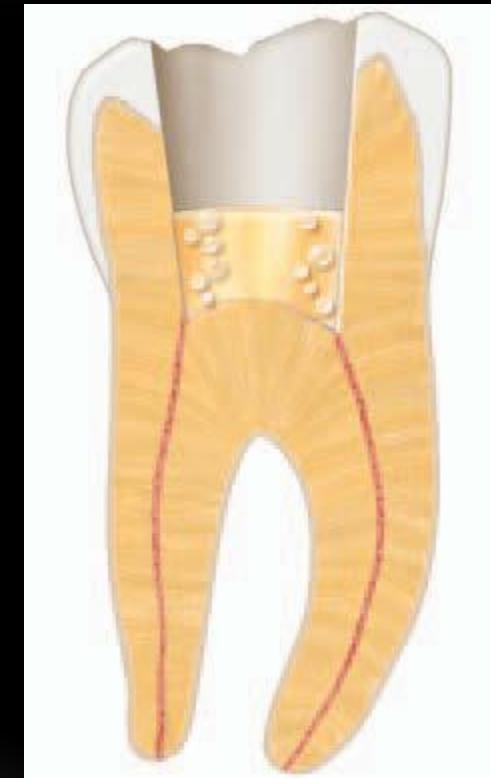
Straight line access determination

Refining and smoothing of restorative margins



## Aids in the location of root canal orifices :

- 1-Multiple pretreatment radiographs or cone beam CT
- 2-Sharp explorer
- 3-troughing grooves with ultrasonic tips
- 4-Staining the chamber
- 5-Champagne bubble test with naocl
- 6-visualize pulp chamber anatomy
- 7-Dental operating microscope
- 8- magnifying aids



# Champagne bubble test with NaOCl



# Dental operating microscope



# Loupe



# Krasner and Rankow's first laws of symmetry

1-law of centrality

2-law of concentricity

3-law of CEJ

4-first law of symmetry

5-second law of symmetry

6-law of color change

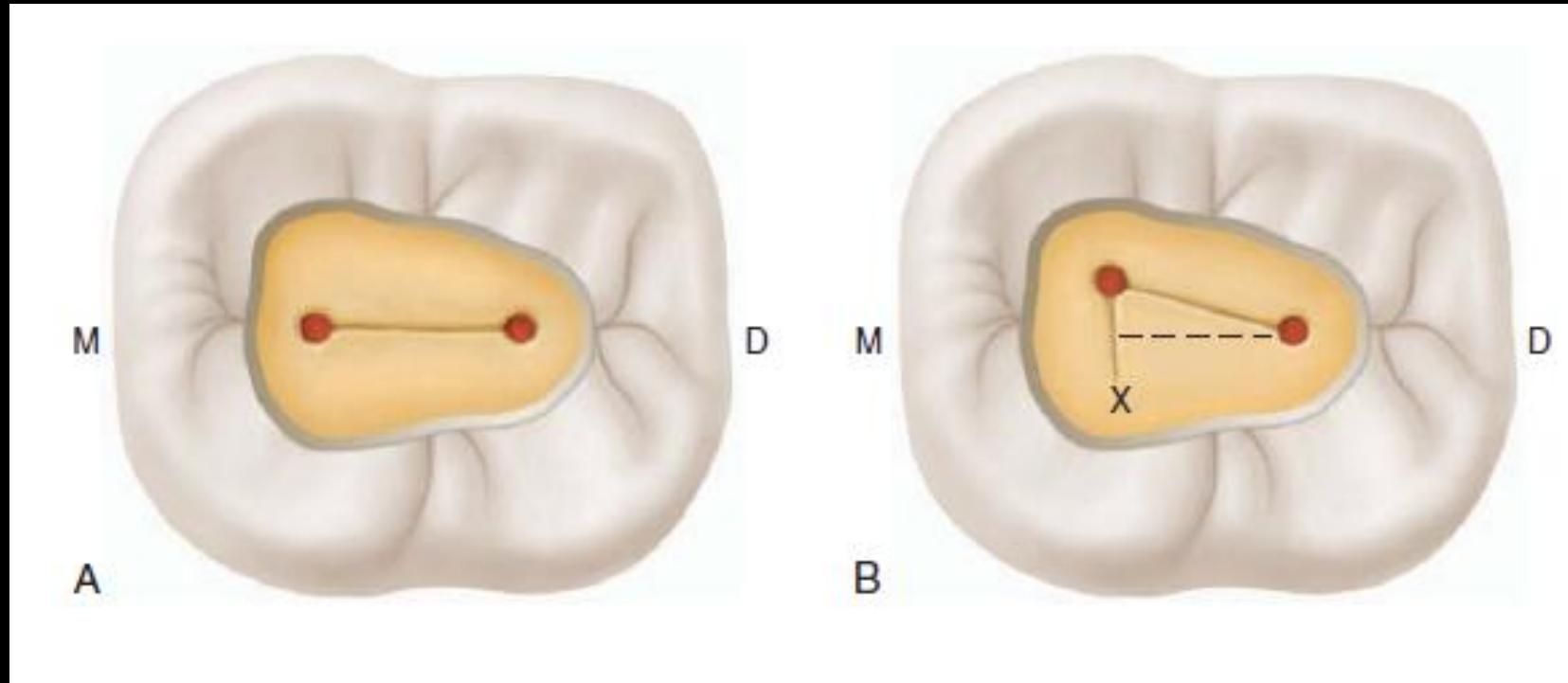
7-first law of orifice location

8-second law of orifice location

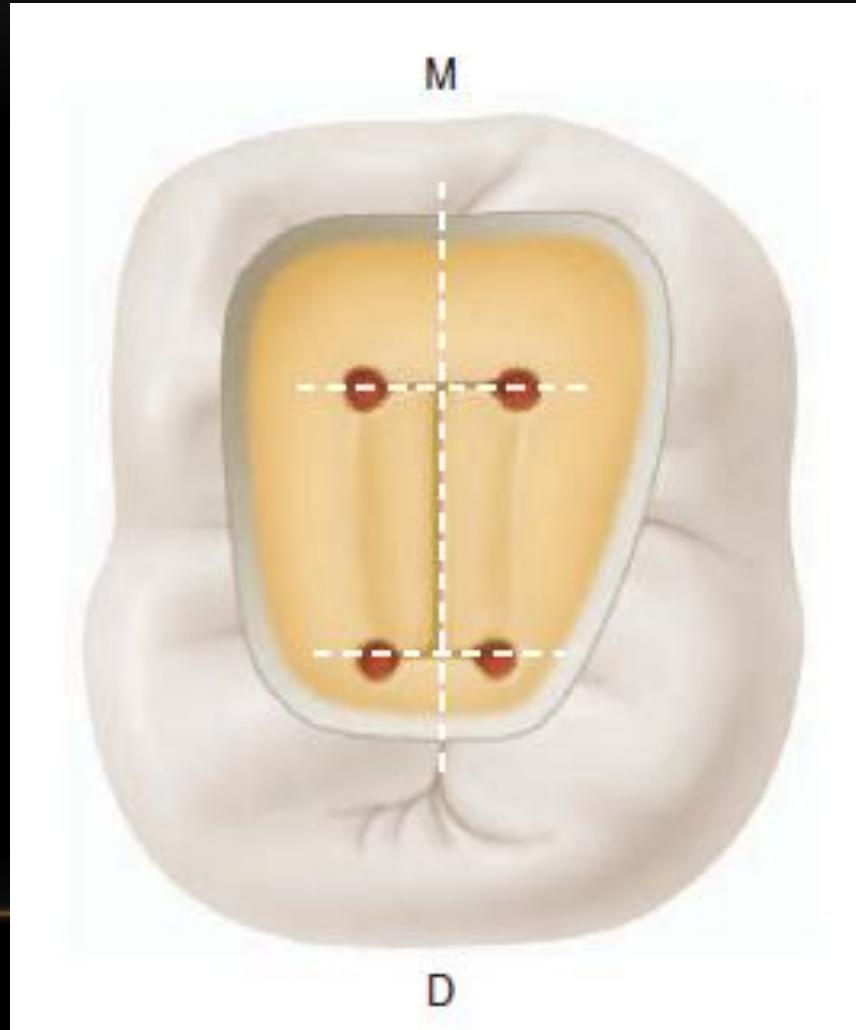
9-third law of orifice location

In a mandibular second molar with two canals, both orifices are in the mesiodistal midline.

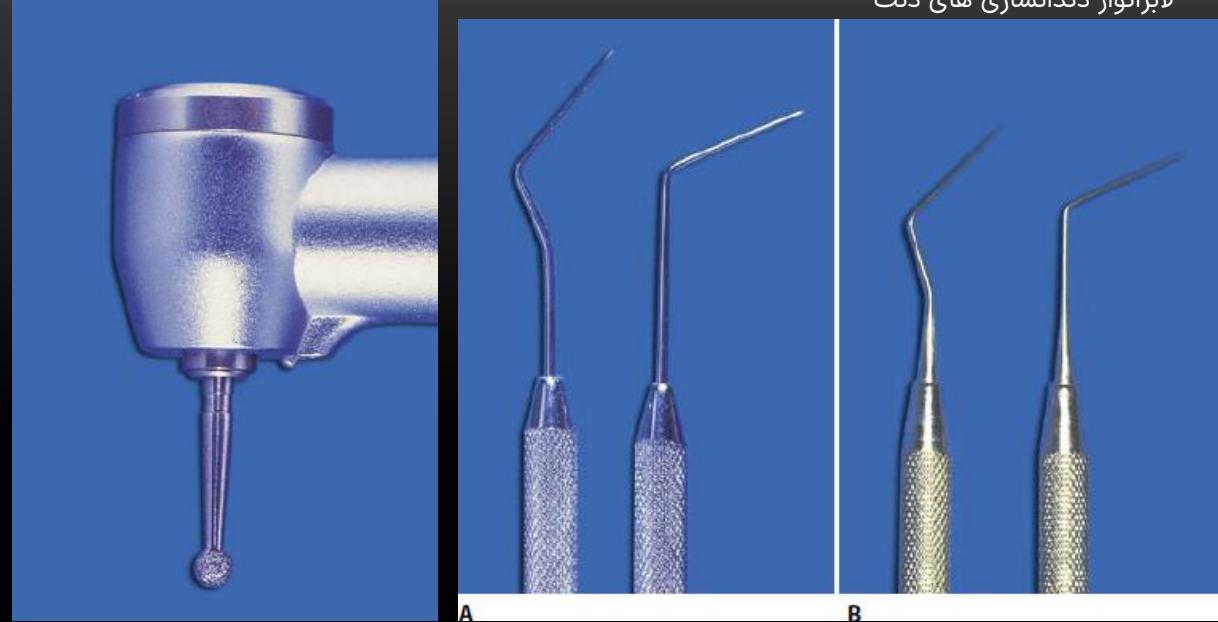
If two orifices are not directly in the mesiodistal midline, a search should be made for another canal on the opposite side, using Krasner and Rankow's laws of anatomy in the area of "X."



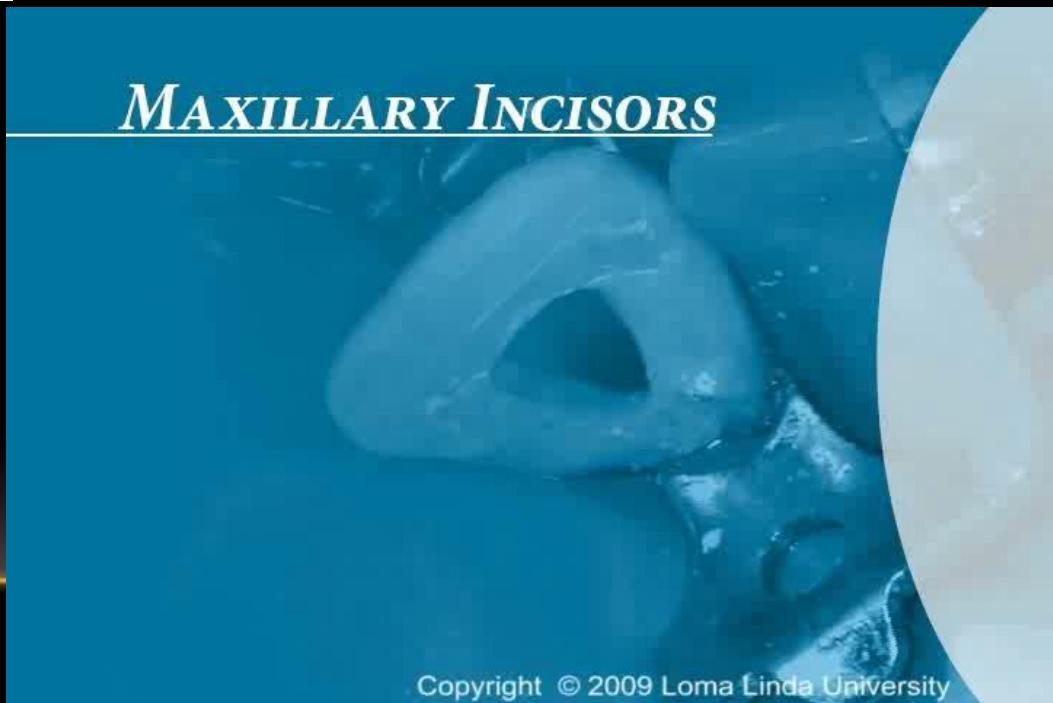
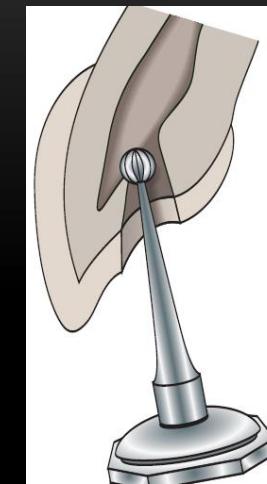
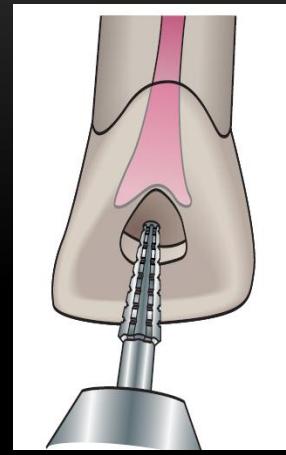
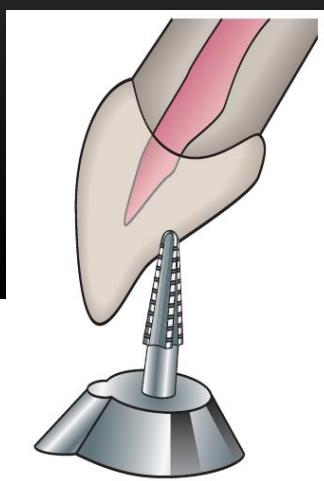
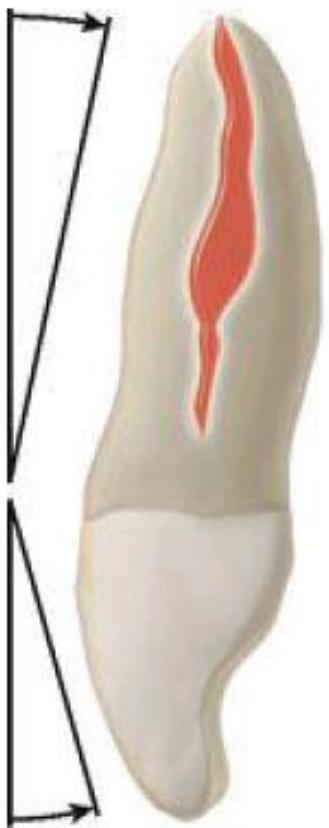
## Krasner and Rankow's first and second laws of symmetry and first through third laws of orifice location

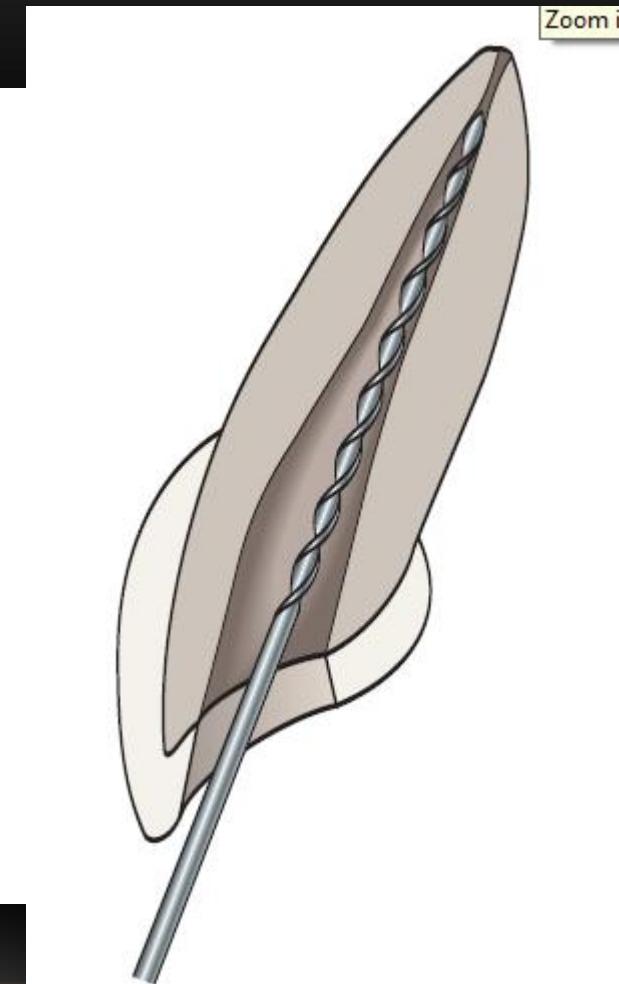
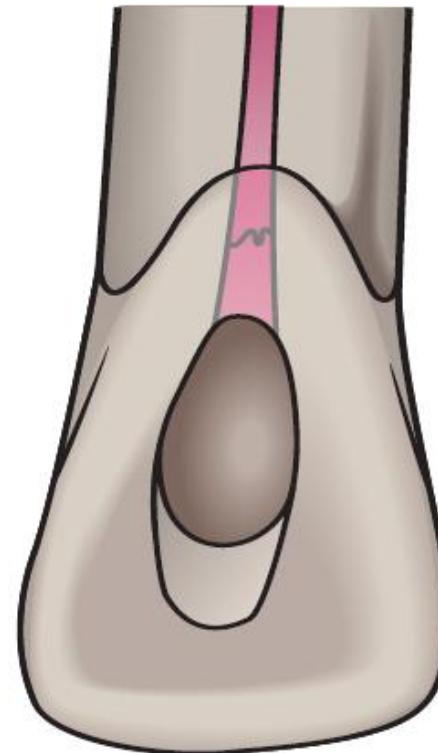
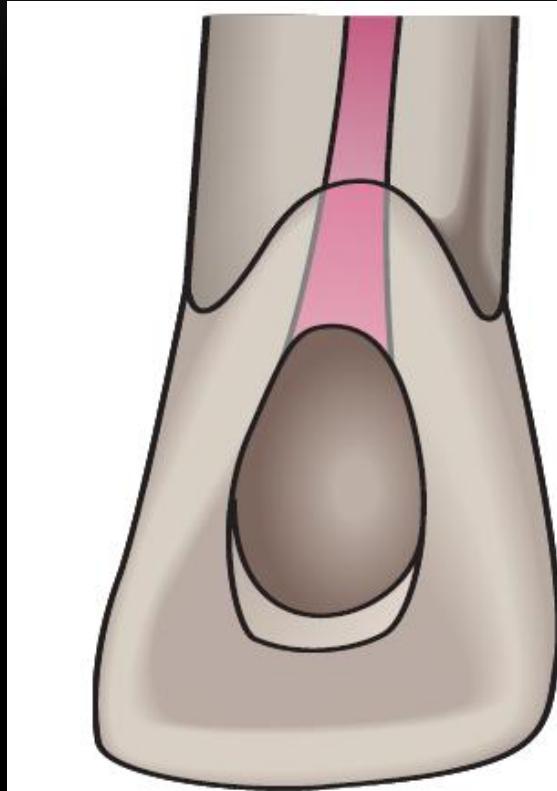


# Armamentaria:

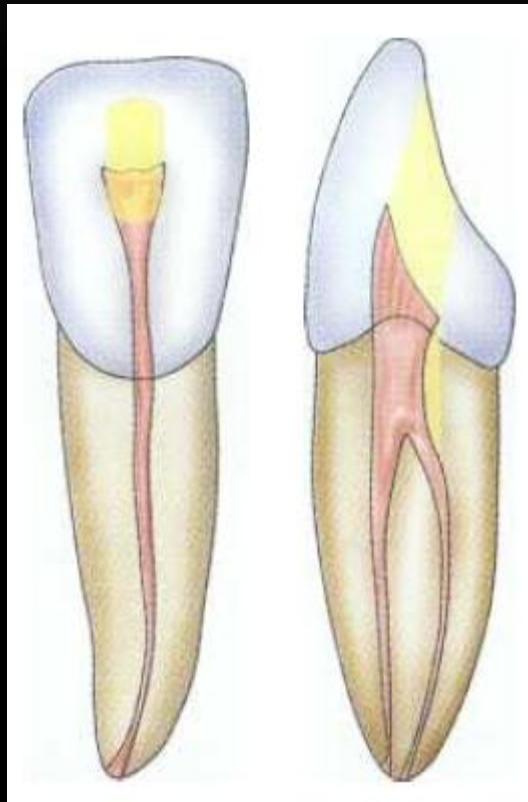


# Access Cavity Preparation in Maxillary Incisors and Cuspids



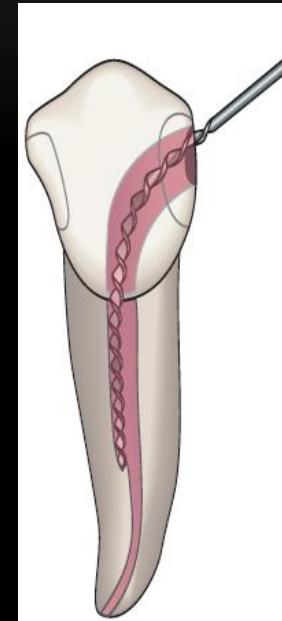
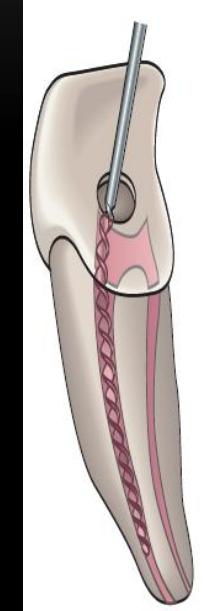
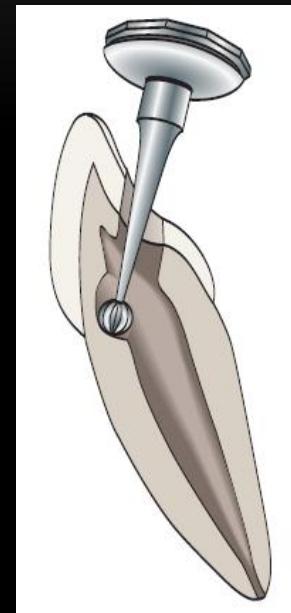
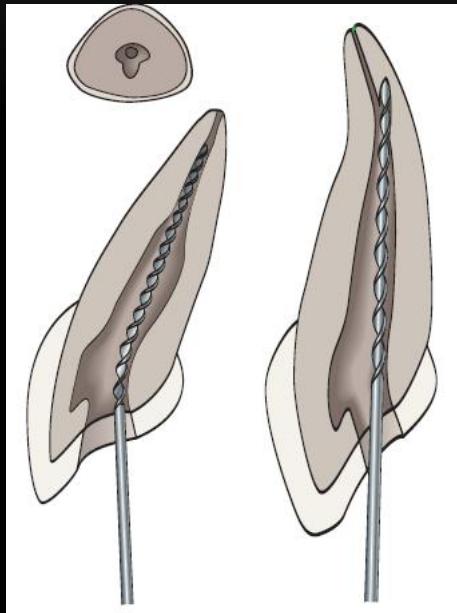
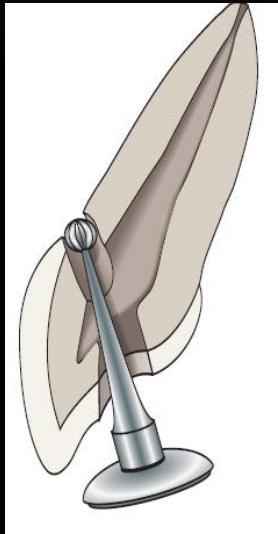


# Access Cavity Preparation in Mandibular Incisors and Cuspids

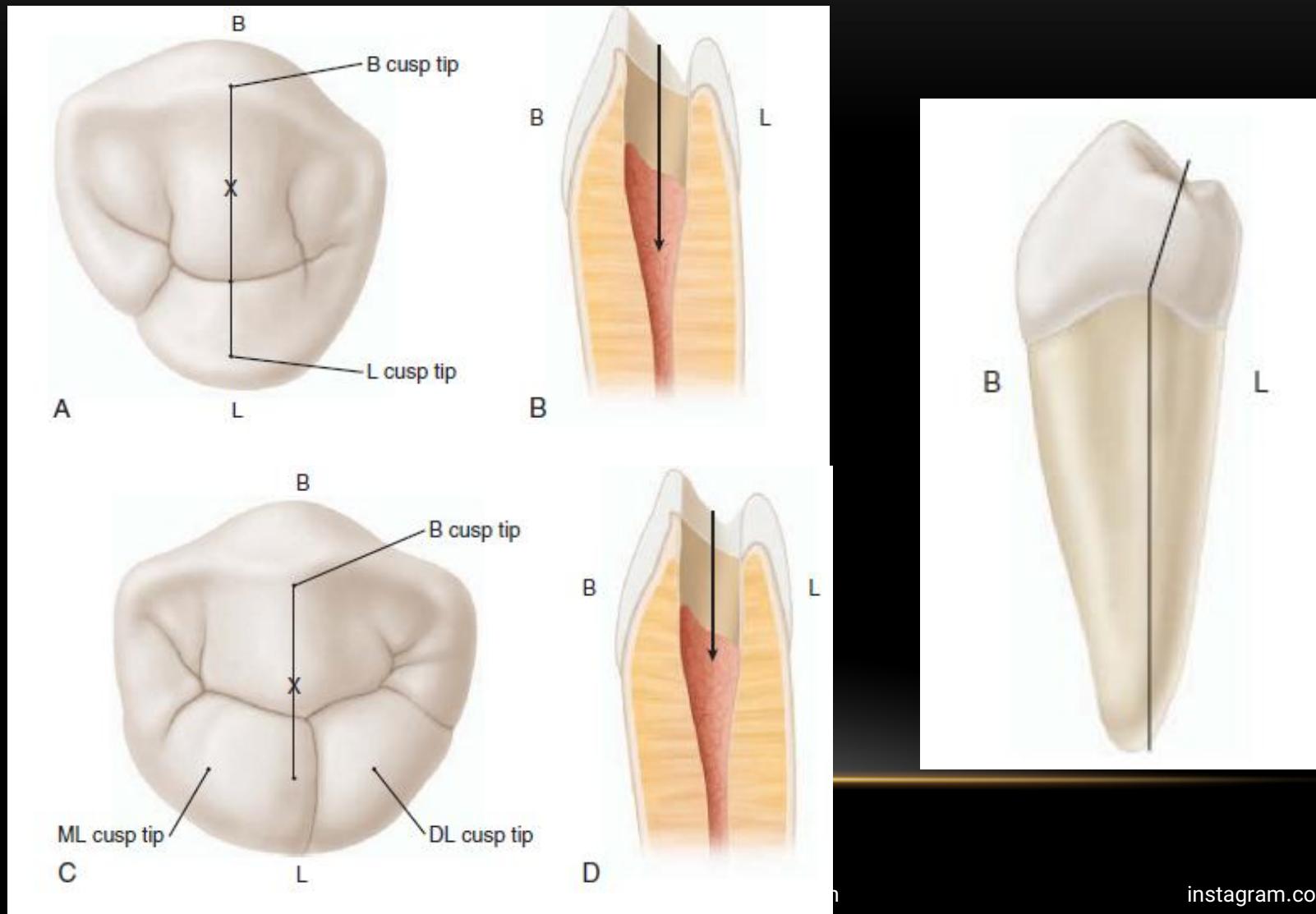


Copyright © 2009 Loma Linda University

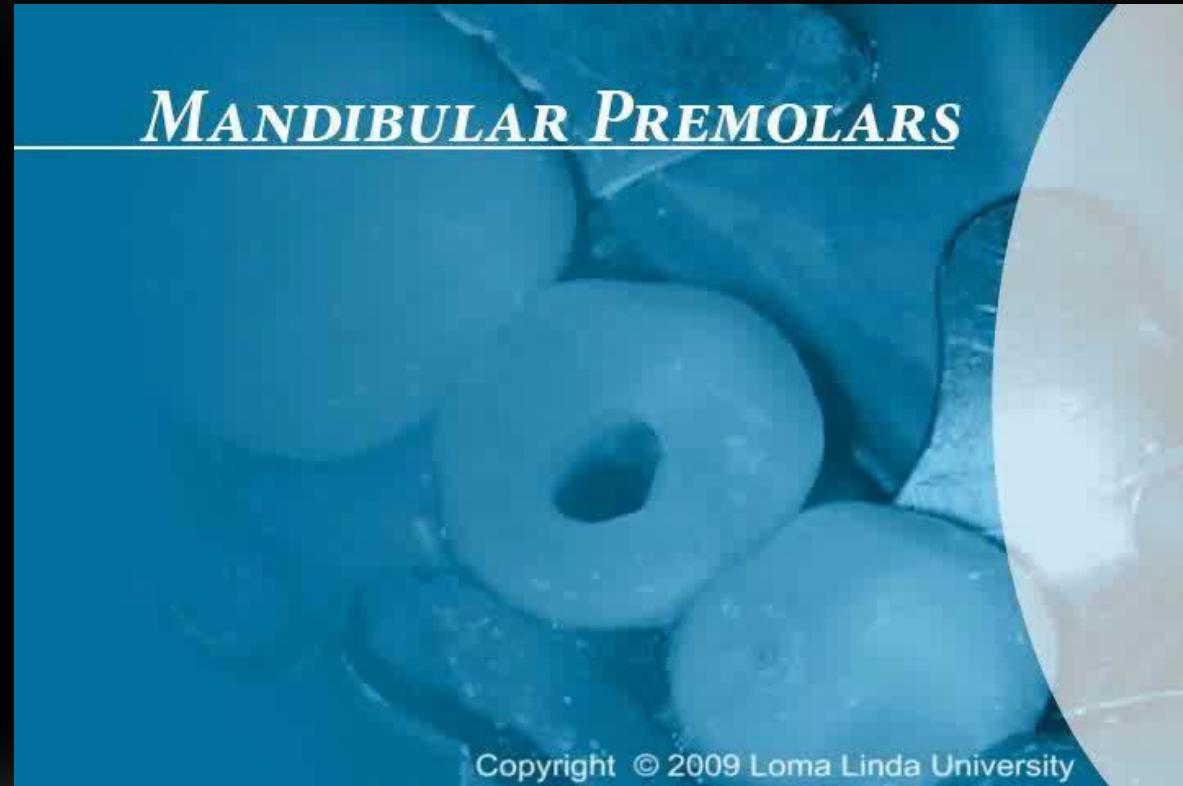
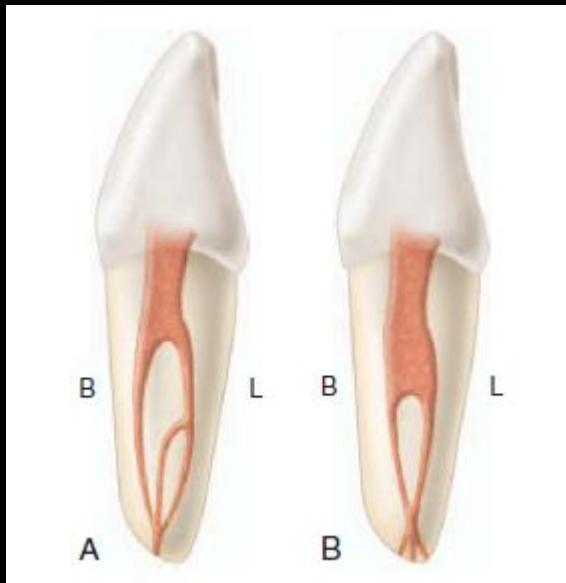
# Operative Errors



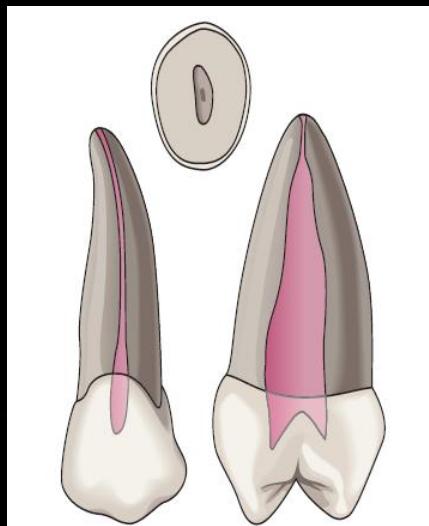
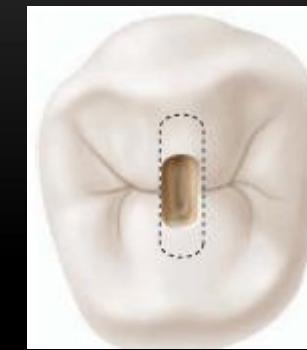
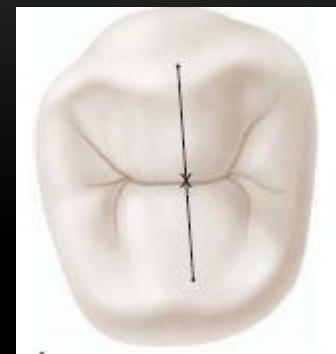
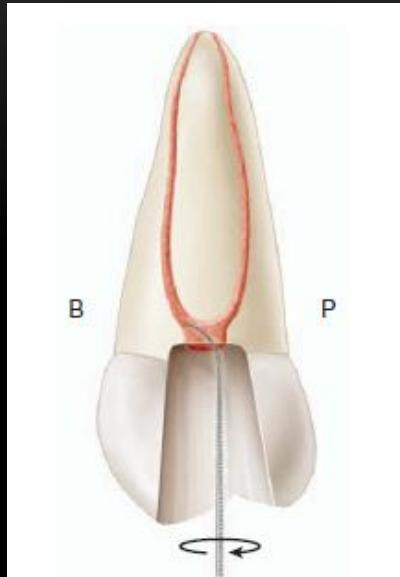
# Mandibular first and second premolar



# Access Cavity Preparation in Mandibular Premolars



# Access Cavity Preparation in Maxillary Premolars



# Quiz 1

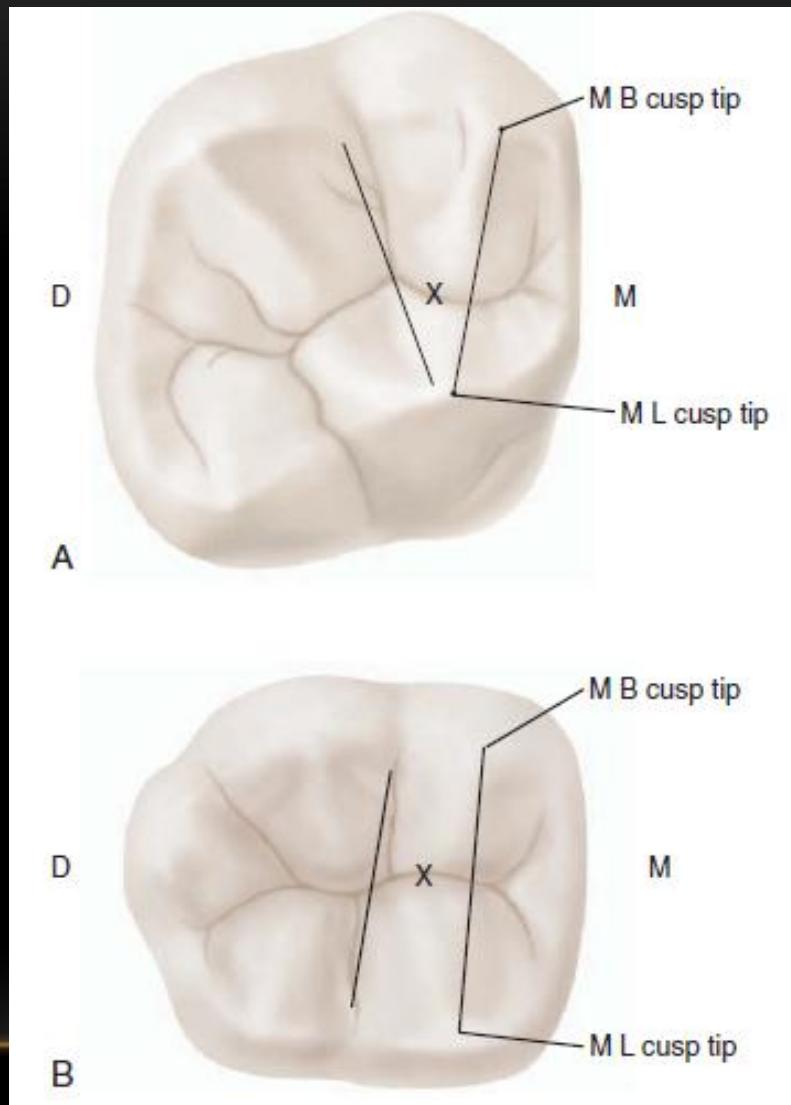
1-Why do we need root canal treatment?

2-What's the four main guidelines in access cavity preparation?

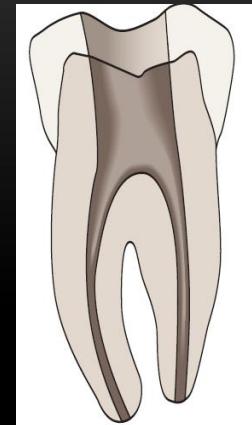
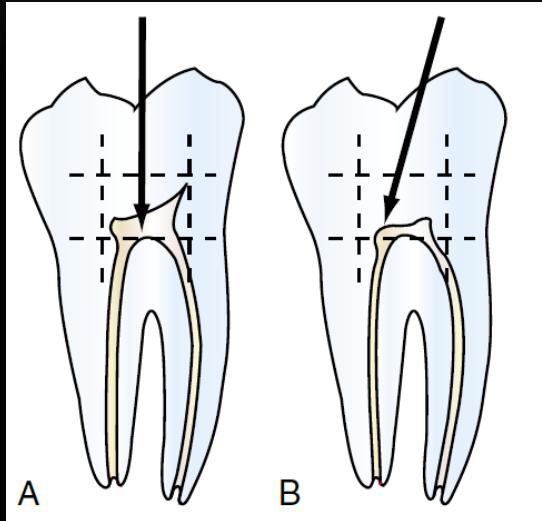
3-Define outline form and convenience form

4-What's 3 main way to control bleeding during access cavity preparation?

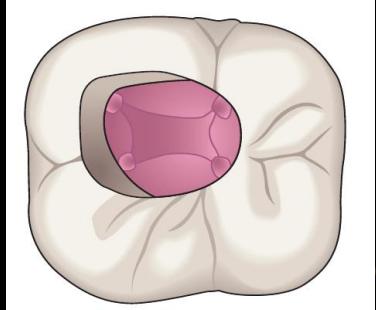
# Access Cavity Preparation in Maxillary and Mandibular Molars



# Access Cavity Preparation in Mandibular Molars



**MANDIBULAR MOLARS**



# Maxillary Molars

One of the most complex in root and canal anatomy

The palatal canal orifice is centered palatally

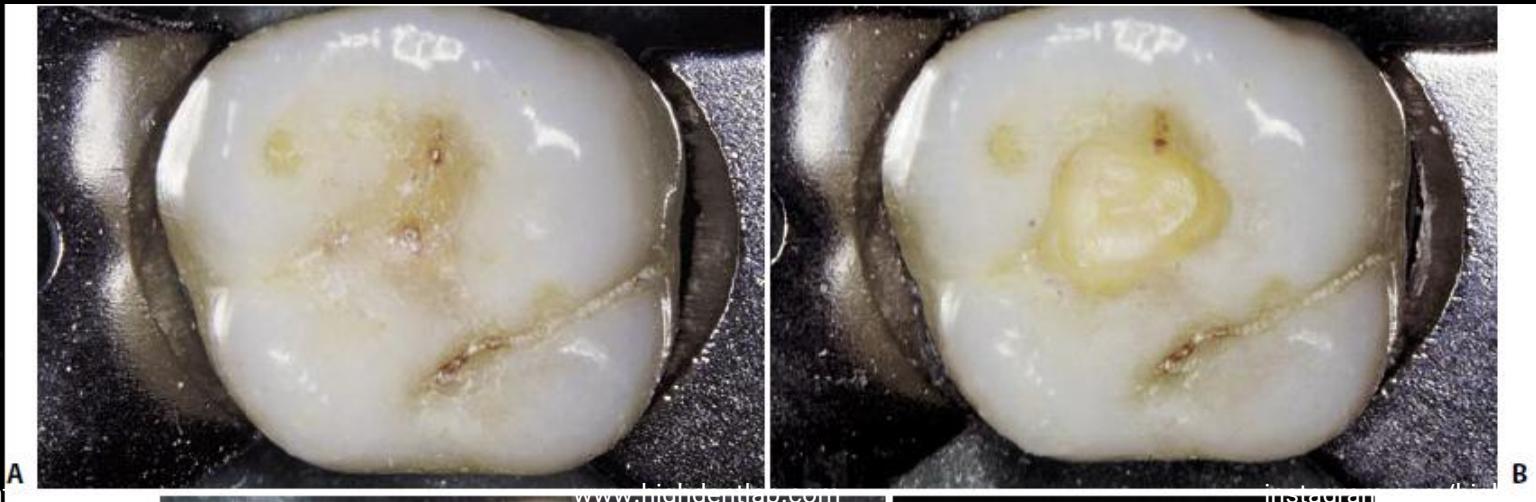
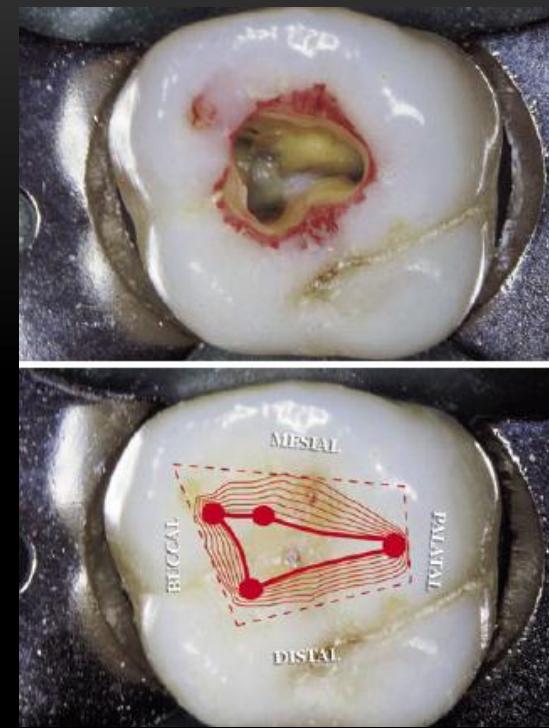
The distobuccal orifice is near the obtuse angle of the pulp chamber floor

The main mesiobuccal canal orifice (MB-1) is buccal and mesial to the distobuccal orifice and is positioned within the acute angle of the pulp chamber floor

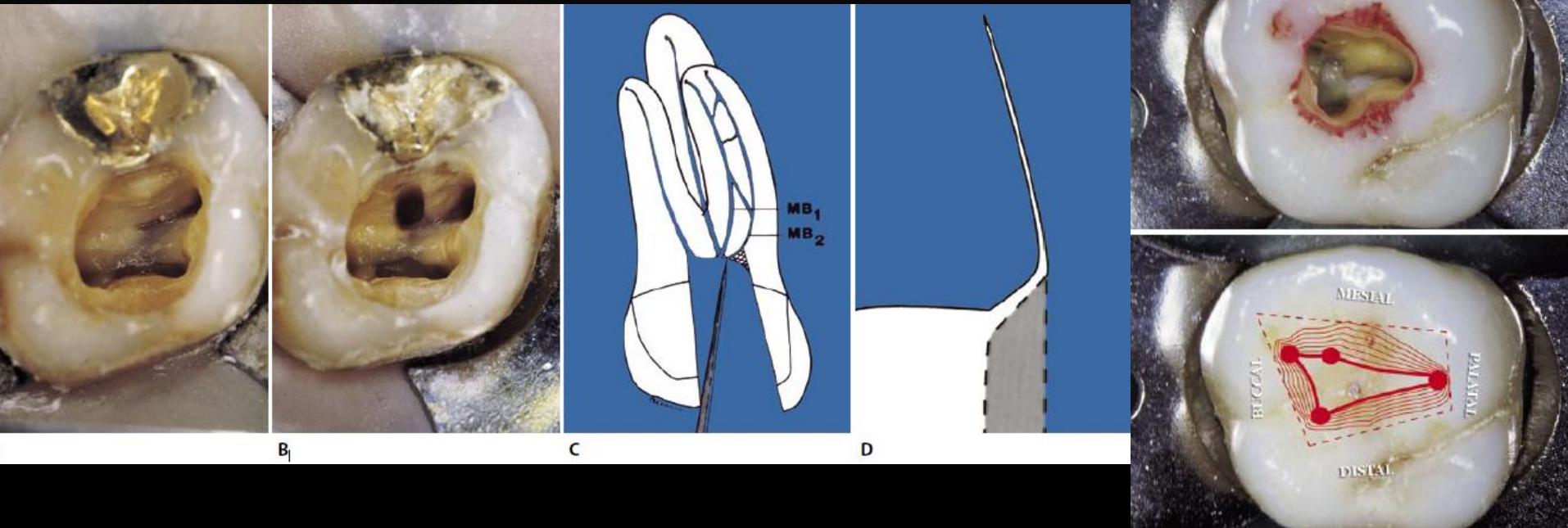
The second mesiobuccal canal orifice (MB-2) is located palatal and mesial to MB-1. mesial to or directly on a line between the MB-1 and palatal orifices, within 3.5 mm palatally and 2 mm mesially of the MB-1 orifice

# MAXILLARY MOLARS

Copyright © 2009 Loma Linda University

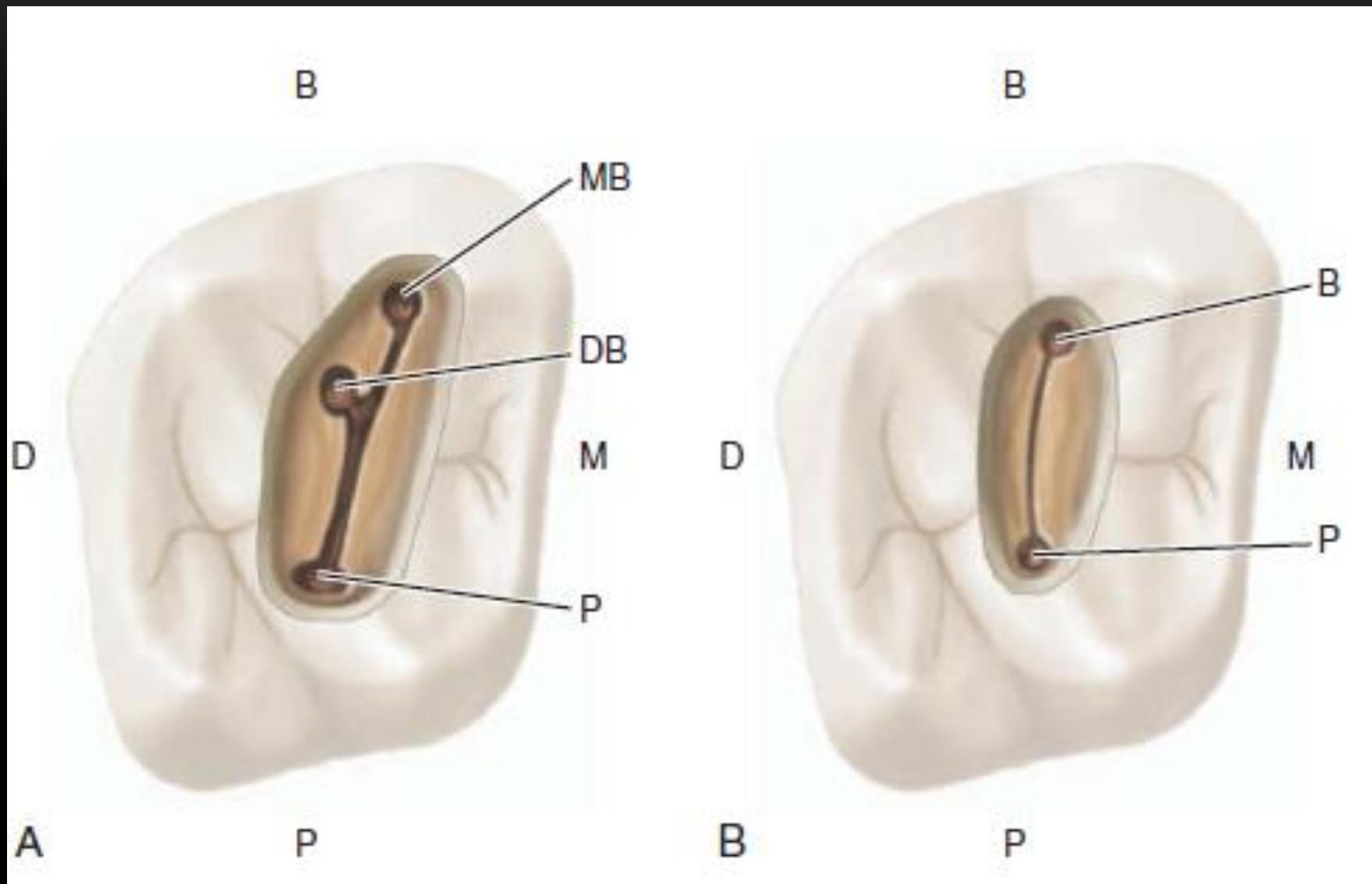


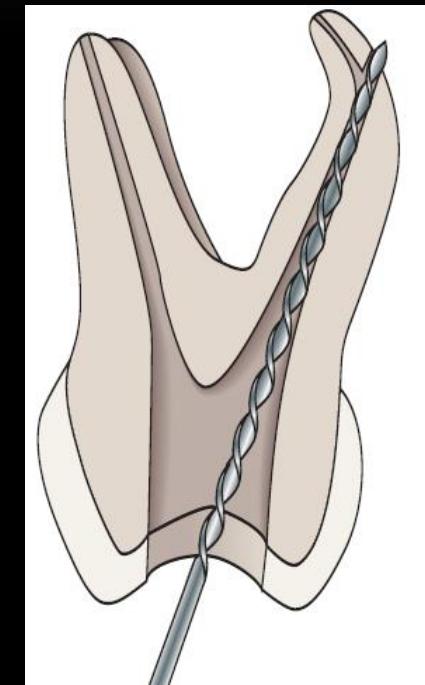
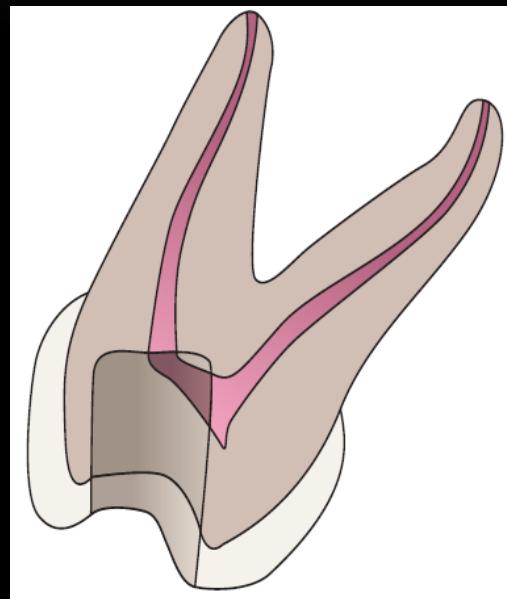
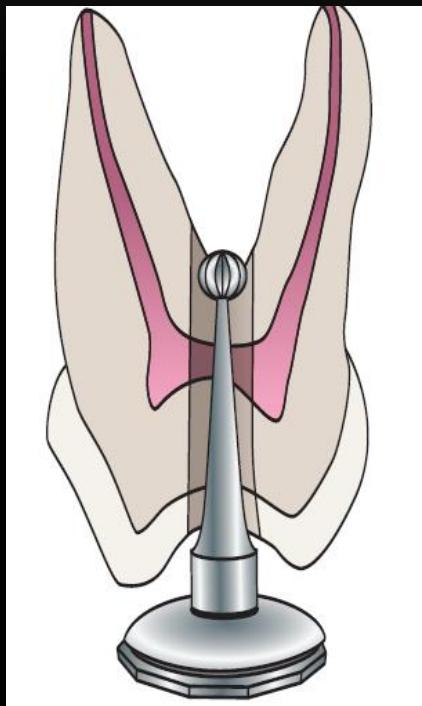
# Locating MB2 canal in maxillary molars

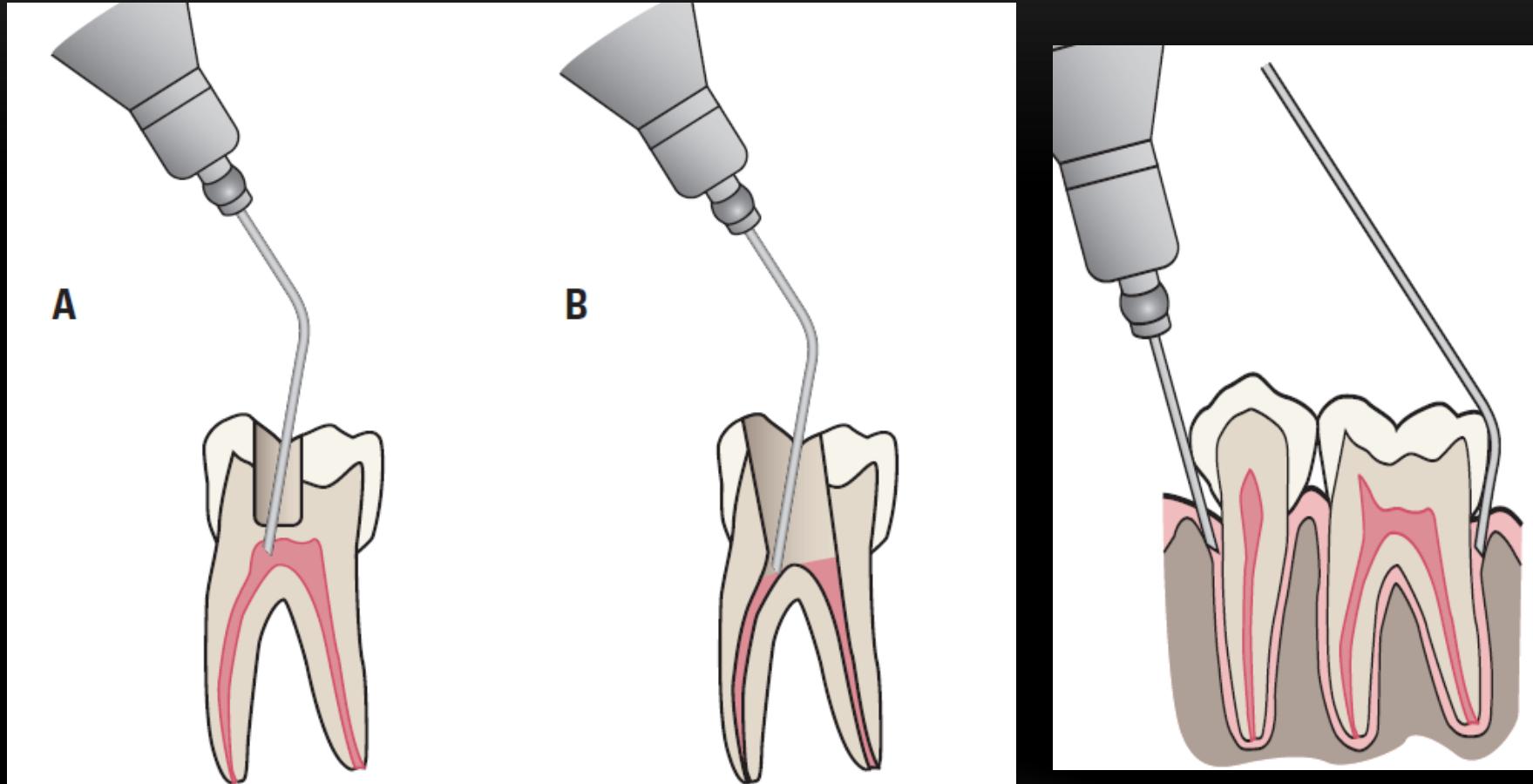


After the three primary canals have been located, the orifice of the second mesiobuccal canal can be located by troughing 0.5 to 5.0 mm toward the palatal canal orifice. Most second canals will be found 1 to 3 mm from the primary mesial buccal canal orifice

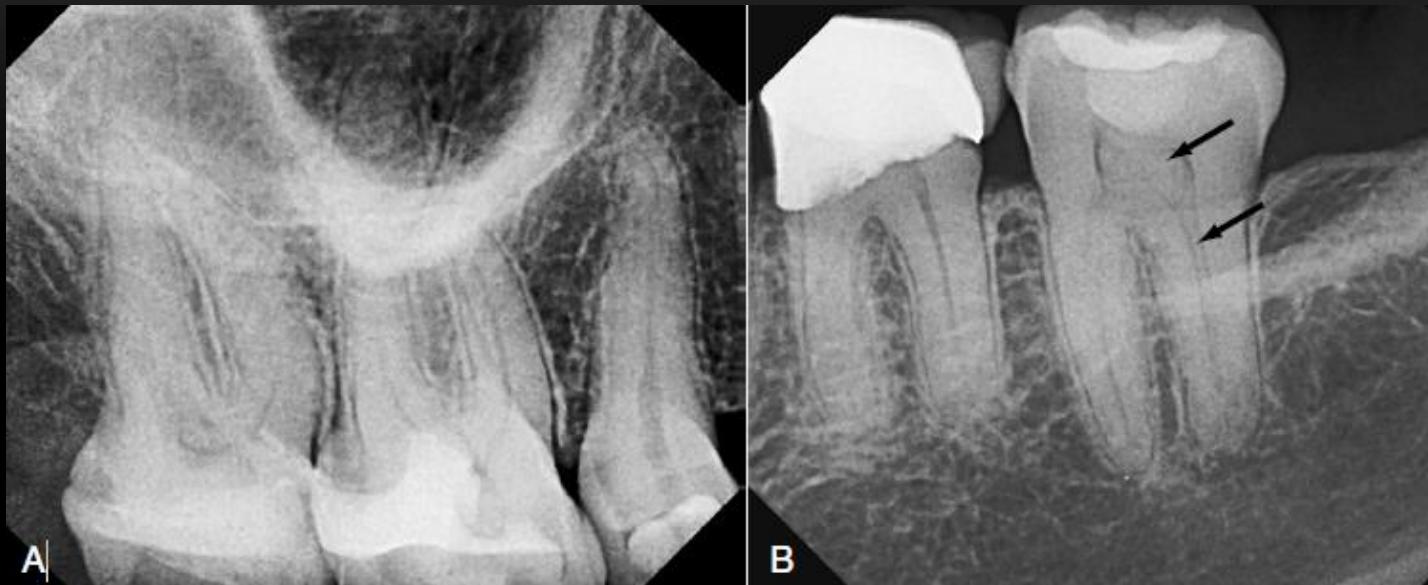
# Maxillary Second Molar

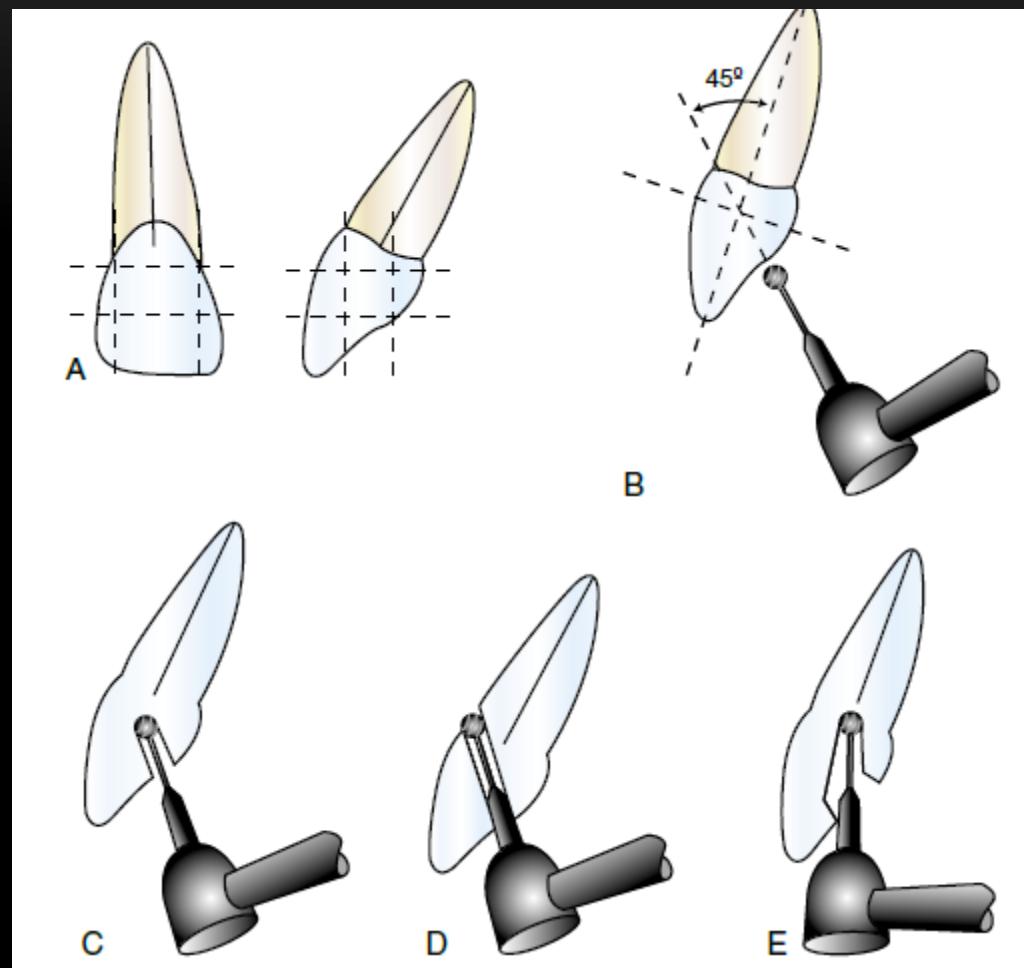






# CALCIFIED CANALS





## METHODS OF LOCATING CALCIFIED CANALS

Canals become less calcified as they approach the root apex

Bite-wing radiographs are excellent aids in determining vertical depth

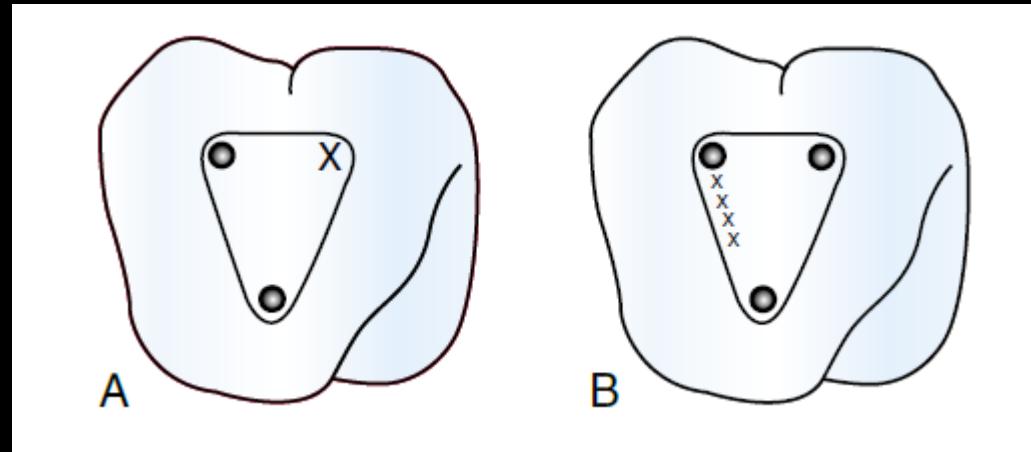
All caries, cements, and discolored dentin should be removed

Use of Magnification, loupe or microscope

The endodontic explorer is used to explore the region of the pulpal floor

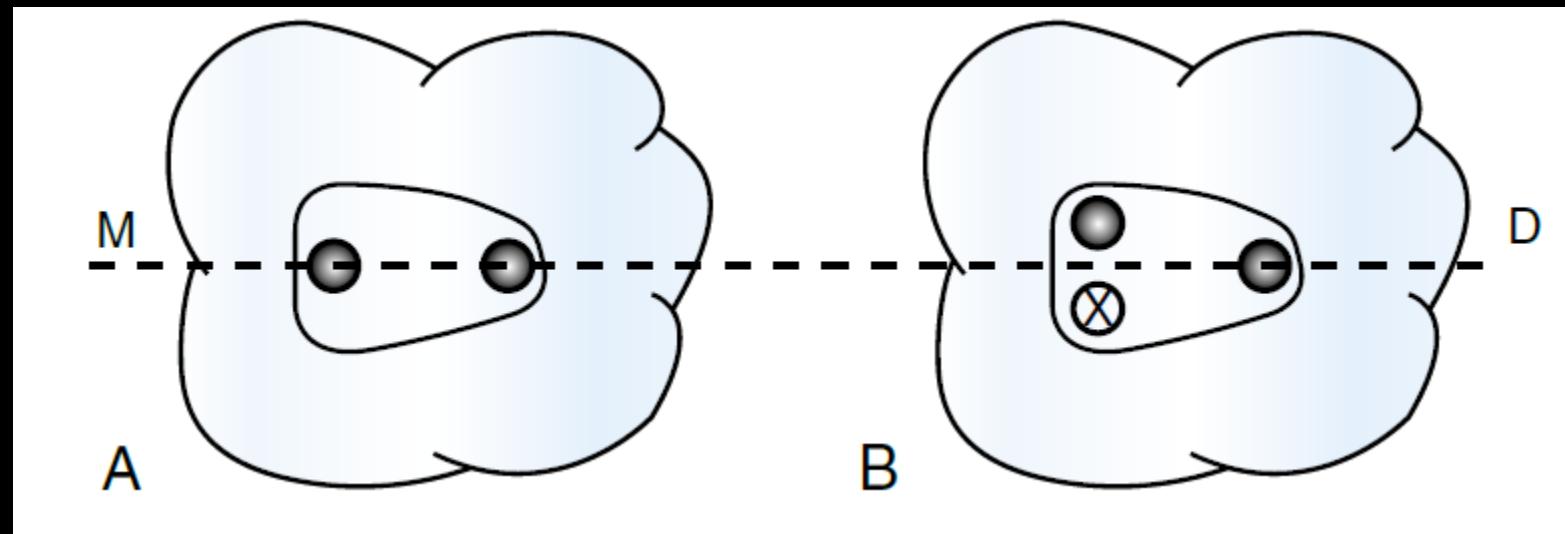
Using a long-shanked no. 4 or no. 6 round bur

By locating and flaring the orifices of two canals, the location of the third canal *is consistently and accurately determined*



**A, Mandibular molar with a two-canal morphology will have both orifices on the mesial distal midline.**

**B, If two canals are located in a mandibular molar, and the mesial orifice is distinctly buccal or lingual to the mesial distal midline, a second canal in the mesial root is probable.**



A group of hikers in red and black winter gear are walking through a deep, snow-covered mountain valley. The terrain is rocky and partially obscured by snow. The sky is overcast and grey.

Difficult things takes time ,  
Impossible ones a bit more !



*Thanks for your nice attention*