Morphology & Access cavity of anterior teeth

Restorative dentistry (Endodontics)

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BDS,MDSc,PhD

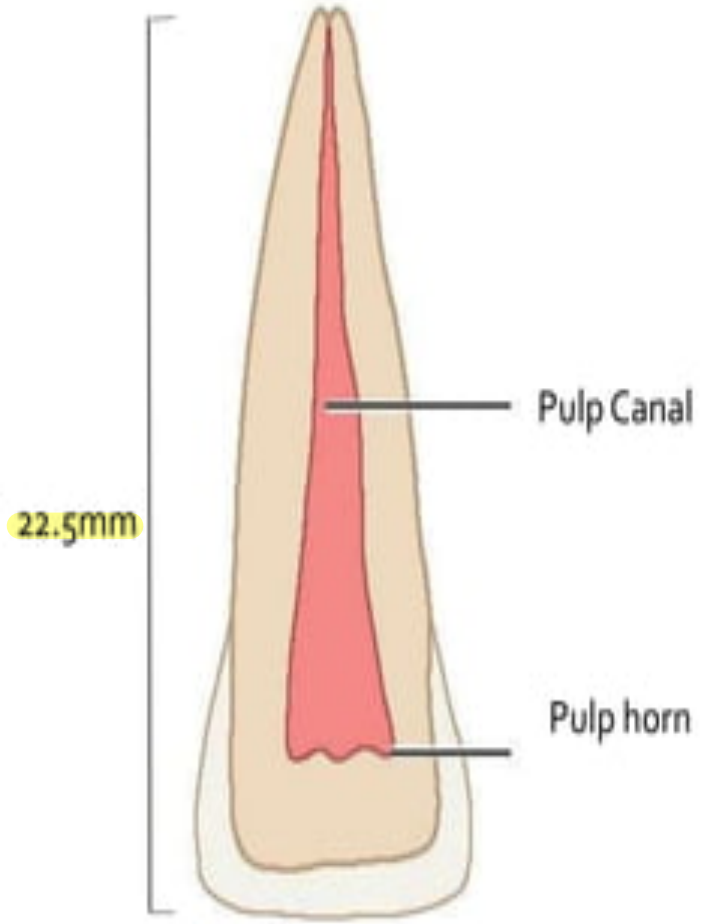
Year 3 – semester 1

third lecture

sixth week

Maxillary Central Incisor

Pulp Chamber

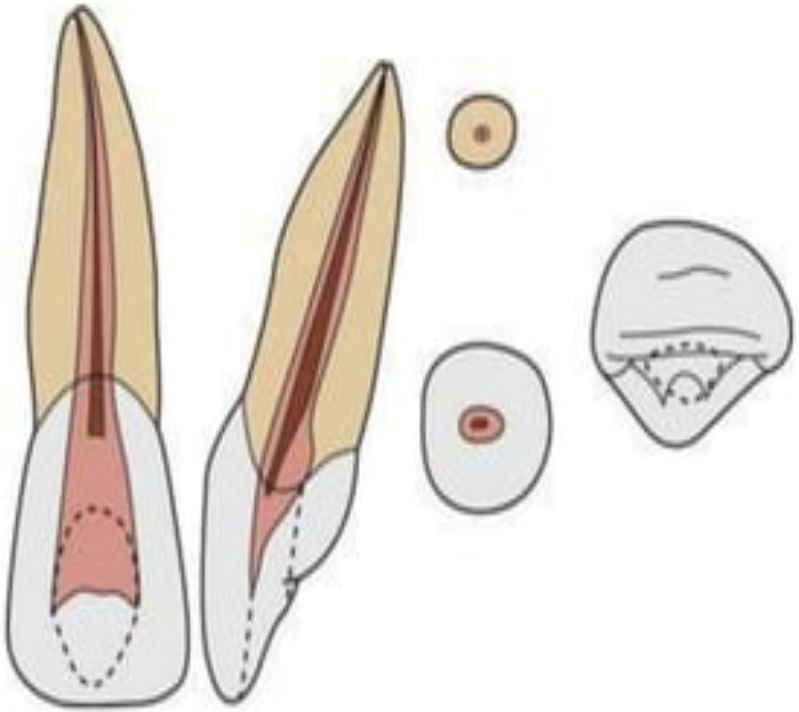


- Located in the center of the crown with equal distance from the dentinal walls
- Mesiodistally,The pulp chamber is ovoid in shape
- Buccopalatally, it is narrow
- In young patient, Central incisor has three pulp horns

Maxillary Central Incisor

Length of tooth (mm)	Canal	Lateral canals	Root Curvature (%)	
		* most lateral canals present at apical third of the root		
Average length 22.5	One canal 99.4%	24%	Straight	75
Maximum length 25.6	Two canals 0.6%		Distal curved	8
Minimum length 21.0			Mesial curved	4
Range 4.6			Labial curved	9
			Lingual curved	4

Root Canal

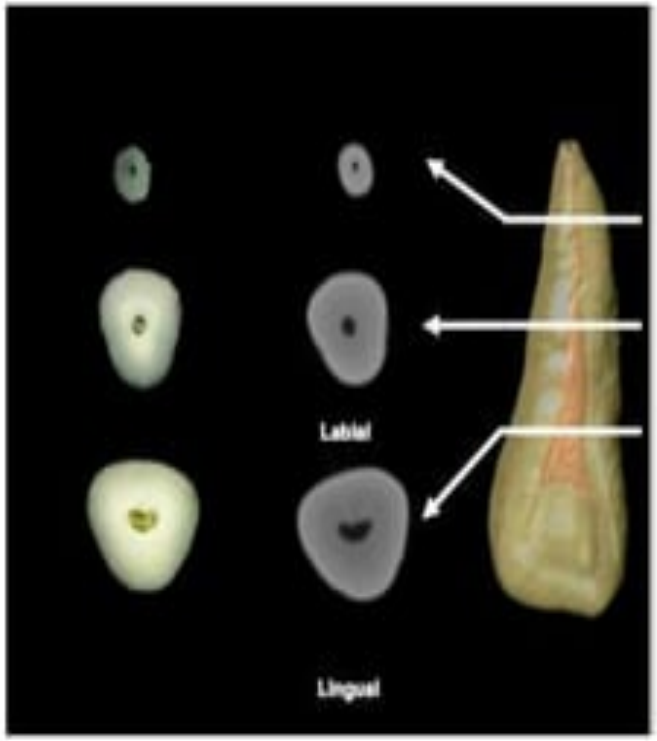


- It has one root with one root canal
- Root canal is broad labio-palatally, conical in shape and centrally located
- 17% cases show labial or palatal curvature of the root
- Lateral canals present in about 24%, usually in the apical third area

In cross-section,

- Cervical level: Canal is ovoid mesiodistally
- Middle root level: Canal is ovoid to round
- Apical third level: Canal is generally round in shape

in all canals apically

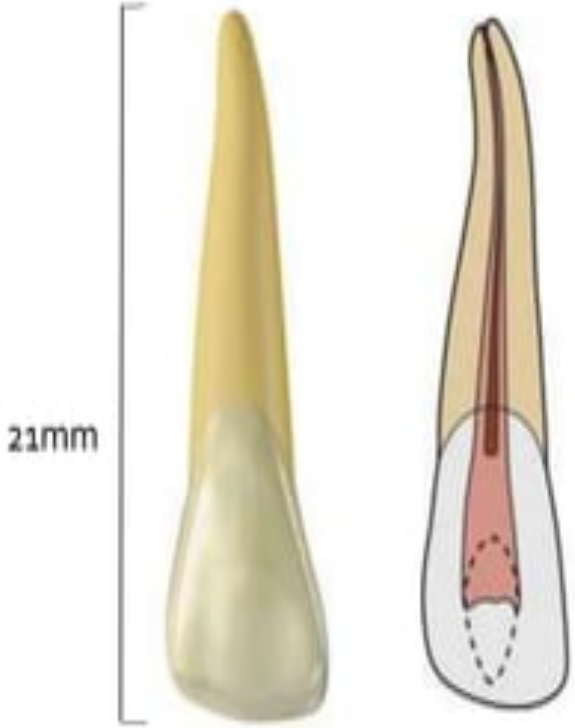


Maxillary Lateral Incisors

Length of tooth (mm)	Canal	Lateral canals	Root Curvature (%)
Average length 21	One canal 93.4%	10%	Straight 30
Maximum length 25.1	Two canals 6.6%		Distal curved 53
Minimum length 20.5	Labial Lingual		Mesial curved 3
Range 4.6			Labial curved 4
			Bayonet and gradual curve 6

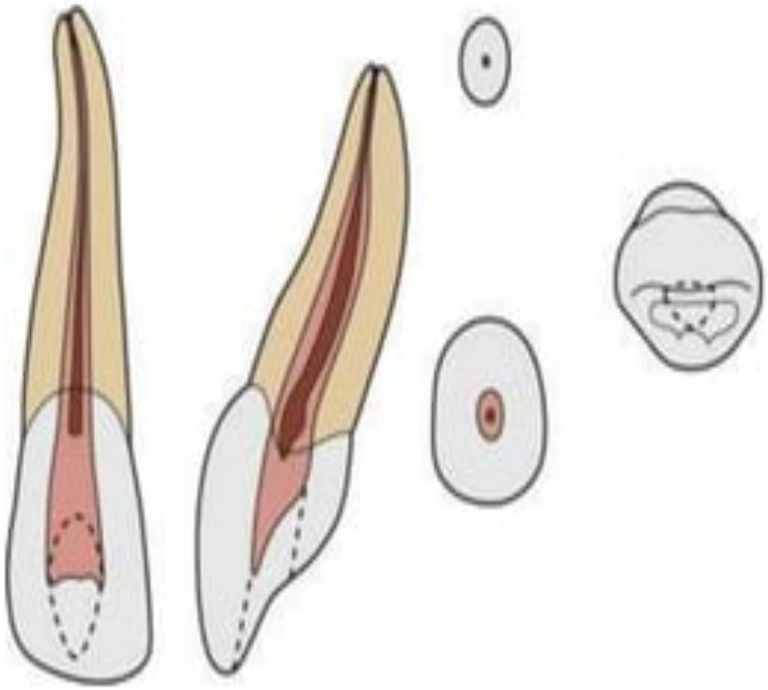
Maxillary Lateral Incisor

Pulp Chamber



- The shape of the pulp chamber is similar to the maxillary central incisor
- It has two pulp horns, corresponding to the development mammelons

Root Canal

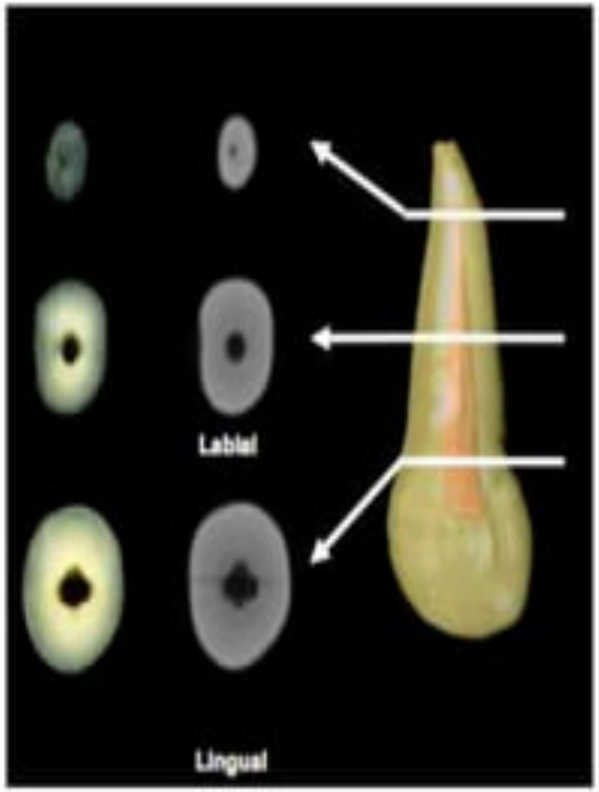


Mesiodistal

- Root canal has finer diameter than that of central incisor through shape is similar to that
- The canal is wider labiopalatally
- Apical region of the canal is usually curved in a palatal direction

In cross-section,

- Cervical level: Canal is ovoid labiopalatally
- Middle third level: Canal is ovoid
- Apical third level: Canal is generally round in shape



Variations

Developmental alterations which are commonly associated with maxillary lateral incisors are :

1. Microdontia (Peg lateral)

Defect in development

Teeth are smaller than normal size

Associated with:

- Down Syndrome
- Prenatal/Postnatal infection
- Radiation therapy

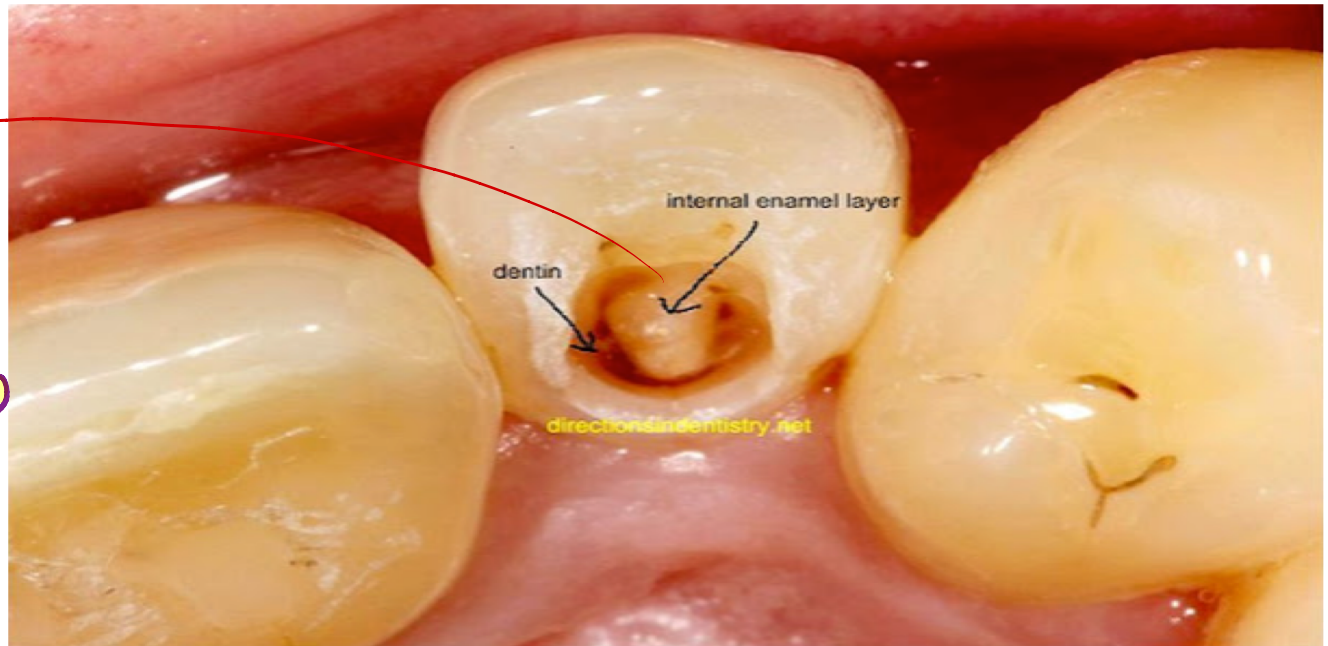
2. Hypodontia

*Most common cause :
- Hereditary (Parents to children)

- Developmentally missing one or more teeth
- Absence may be either unilateral or bilateral

3. Dens invaginatus

A developmental anomaly resulting in a deepening or invagination of the enamel organ into the dental papilla prior to calcification of the dental tissues.



This enhances bacterial accumulation and finaly dental caries

spreads to pulp

Complex anatomy

* Difficult mangement - so early detection is beneficial for prevention

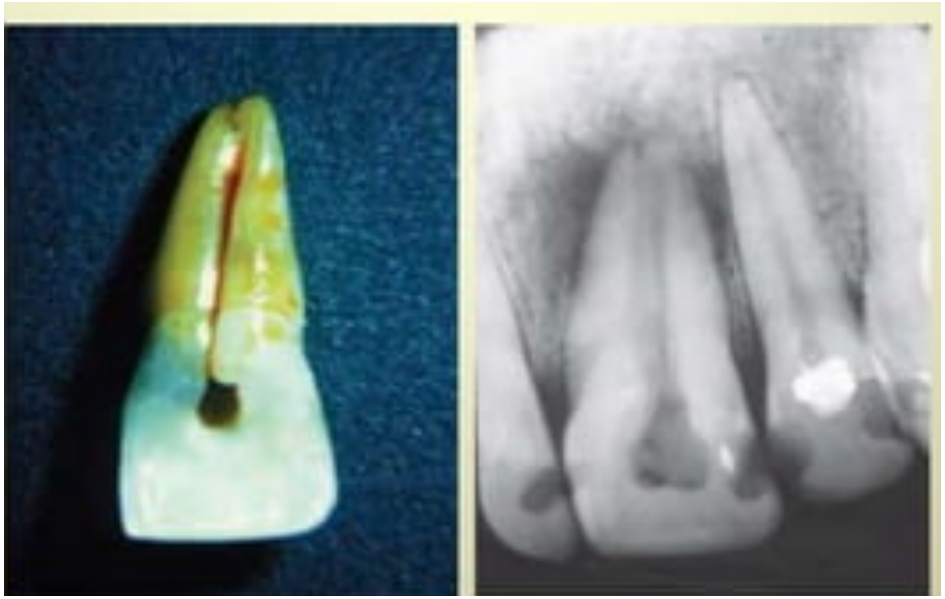
4. Talon's cusp (Dens evaginatus) like tooth structure

- Originates in the palatal cingulus
- Anomalous hyperplasia of the cingulum resulting in the formation of a supernumerary cusp
- Complications
- Caries
- Irritation of tongue during speech & mastication

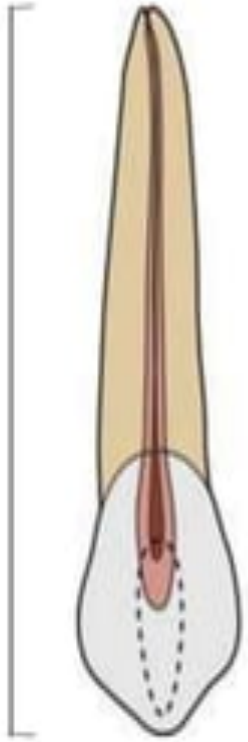
* fracture may expose the pulp → infection

5. Palatogingival groove

- **Infolding of enamel organ and epithelial shealth of Hertwig before calcification phase**



Maxillary Canines
Pulp Chamber



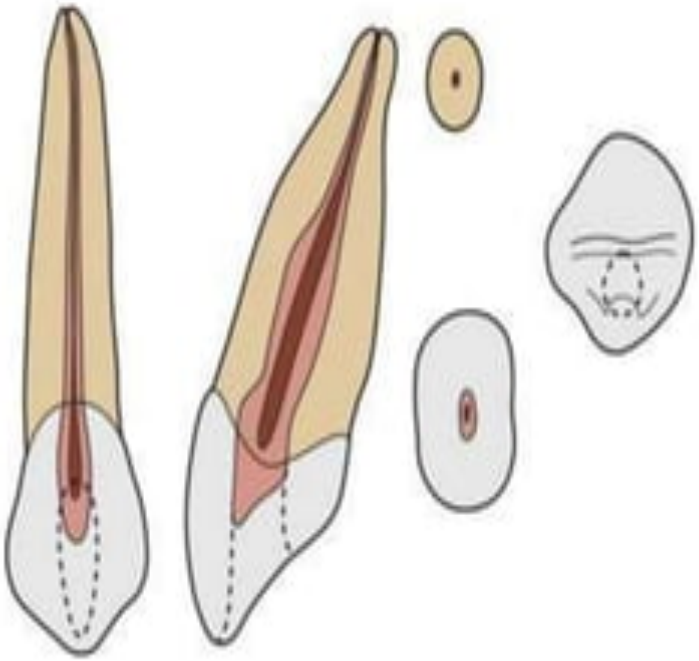
Longest

- Labiopalatally, the pulp chamber is almost triangular shape
- Mesiodistally, it is narrow
- Usually one pulp horn is present

Maxillary Canines

Length of tooth (mm)	Canal	Lateral canals	Root Curvature (%)
Average length 26.5	One canal 96.5%	24%	Straight 39
Maximum length 28.9	Two canals 3.5%		Distal curved 32
Minimum length 23.1			Mesial curved 0
Range 5.8			Labial curved 13
			Lingual curved 7
			Bayonet and gradual curve 7

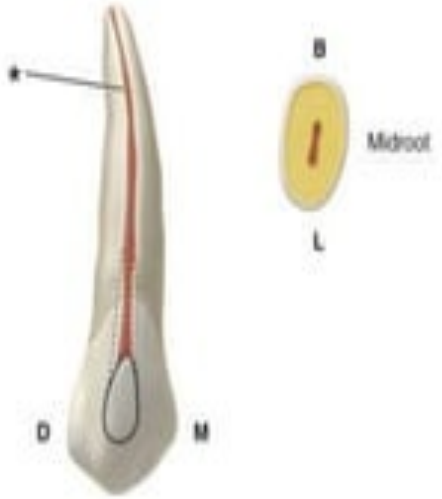
Root Canal



- There is single root canal which is wider labiopalatally than in mesiodistal aspect
- Canal is usually straight but may show a distal apical curvature

In cross-section,

- Cervical and middle third level: Canal is ovoid in shape
- Apical third level: At apex it becomes circular



Mandibular Teeth

Mandibular central incisor

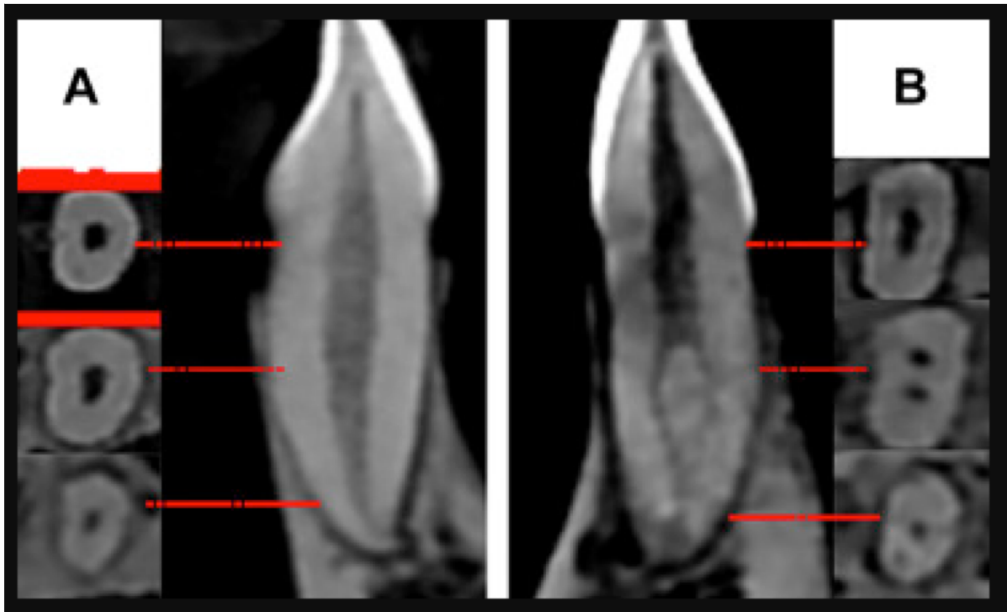
Pulp chamber

- Smallest tooth in the arch
- Pulp chamber is small and flat mesiodistally
- Three pulp horns present in a recently erupted tooth
- Pulp chamber is wide & ovoid in cross section in the cervical third of the crown and tapers incisally

- **Roots**
- Has 1 root , which is flat and narrow mesiodistally but wide labiolingually

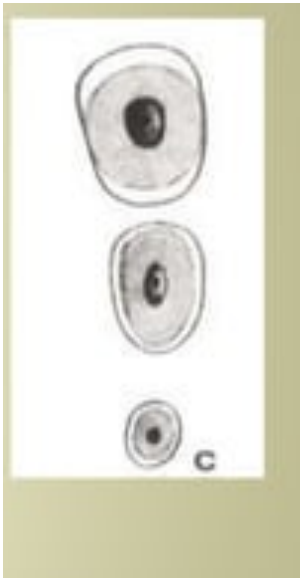
Root canals

A correlation between crown shape and canal configuration, short crowns had blunted roots usually with a split canal when 2 canals are present, the point of division was in the cervical third of root



Cross section

Cervical third : ovoid in labiolingual direction
Middle third : ribbon shape
Apical third : Round in shape



Mandibular lateral incisor

Pulp chamber

Similar to mandibular central incisor but lateral has larger dimensions

Root

- **Larger than that of central incisor**
- **The roots are straight or distally or labially curved**
- **It may has more than one root**


A
B
C
D
E
F
G
H

MANDIBULAR CENTRAL AND LATERAL INCISORS

Length of tooth	Central incisors (mm)	Lateral incisors (mm)	Canal	Central incisors (%)	Lateral incisors (%)	Root curvature	
Average length	21.5	22.4	One canal one foramen	73	56.9	Straight	60%
Maximum length	23.4	24.6	Two canals one foramen Type II Vertucci	26	14.7	Distal curve	23%
Minimum length	19.6	20.2	Two canals two foramens Type IV	6.5	29.4	Mesial curve	0%
Range	3.8	4.4	Lateral canals	5.2	13.9	Labial curve	13%
						Lingual curve	0%

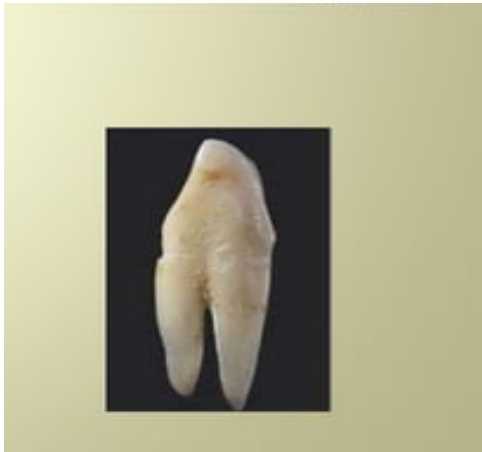
Mandibular cuspid

Pulp chamber

Resembles maxillary cuspid but it is smaller in all dimensions

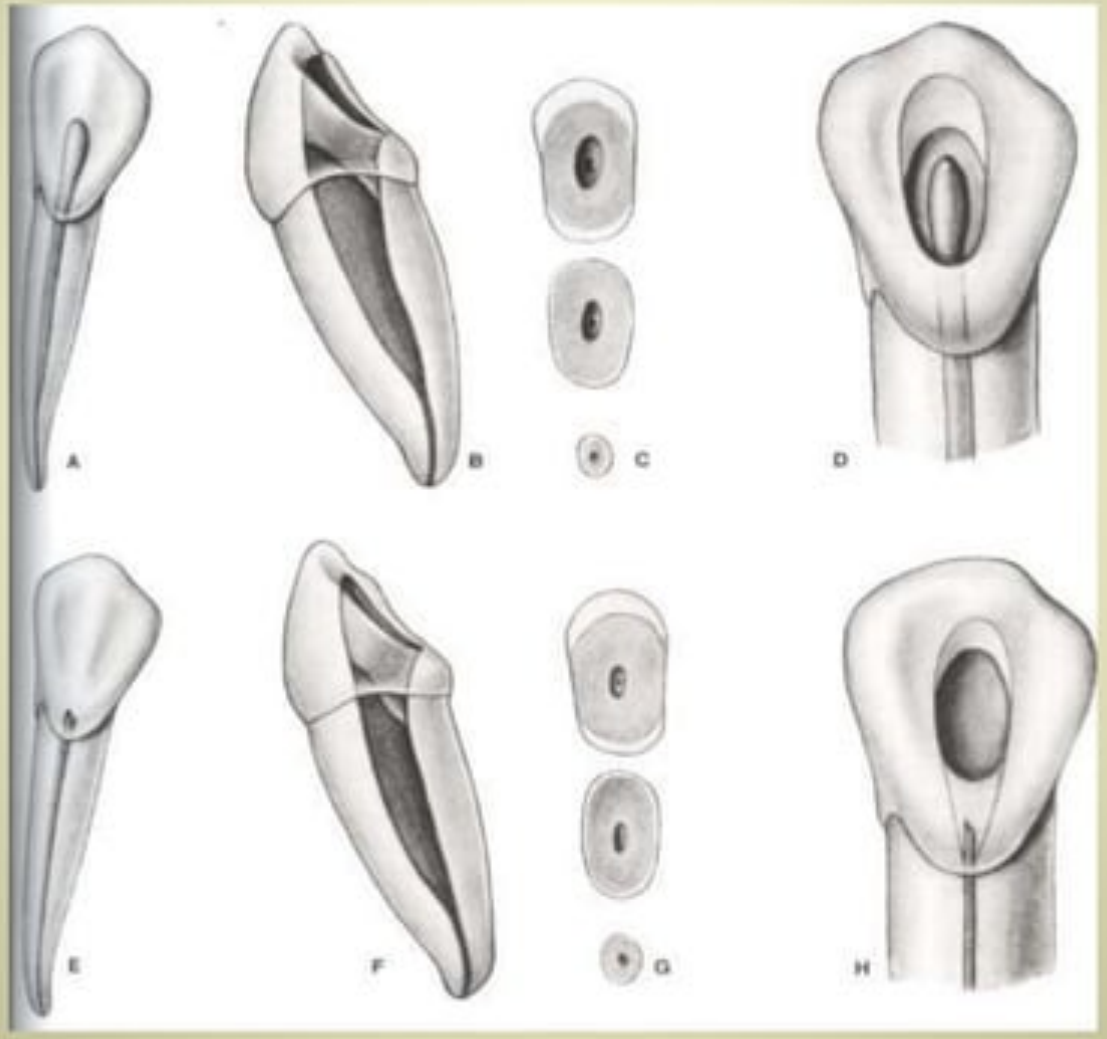
Root

- **This tooth has a slight labial axial inclination of the crown.**
- **Although it has a single root , it may has 2 in 25% of cases**
- **It may has separate roots, labially and lingually.**



Root canals:

- When one root canal is present, a labiolingual view of the root shows a canal that is broad in the middle third and tapers to a constriction in the apical third. It is ovoid in cross section in the cervical and middle thirds of the root and round in the apical third



Length of tooth (mm)		Canals		Lateral canals	Root curvature (%)	
Average length	25.2	One canal	94%	9.5%	Straight	68
		Two canals	6%			
		Two foramina				
Maximum length	27.5				Distal curve	20
Minimum length	22.9				Mesial curve	1
Range	4.6				Labial curve	7
					Lingual curve	0
					Bayonet curve	2

Type IV vertucci

Access cavity preparation


Obtur.
Clean-shap
Tooth length
Access Cavity

Endodontic Cavity Preparation (chemomechanical preperation)

facilitate cleaning and shaping, lubricant and dissolves organic and inorganic debris

Preperation of canals into proper design to accept proper obturation

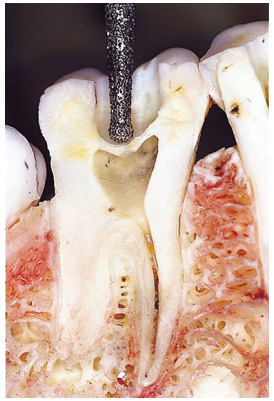
- through removal of pulp remenants and scraping dentinal walls.

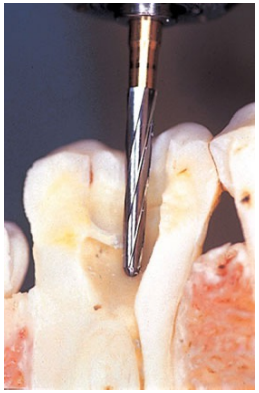
IntraCoronal cavity preparation (ACCESS Cavity Preparation)

IntraRadicular cavity preparation (Cleaning and Shaping)

What is Endodontic access?

Creation of an opening from the external surface of the tooth to the pulp chamber projecting out its side walls and internal anatomy to the outside





Laws for finding pulp canal orifices:

Law of Centrality

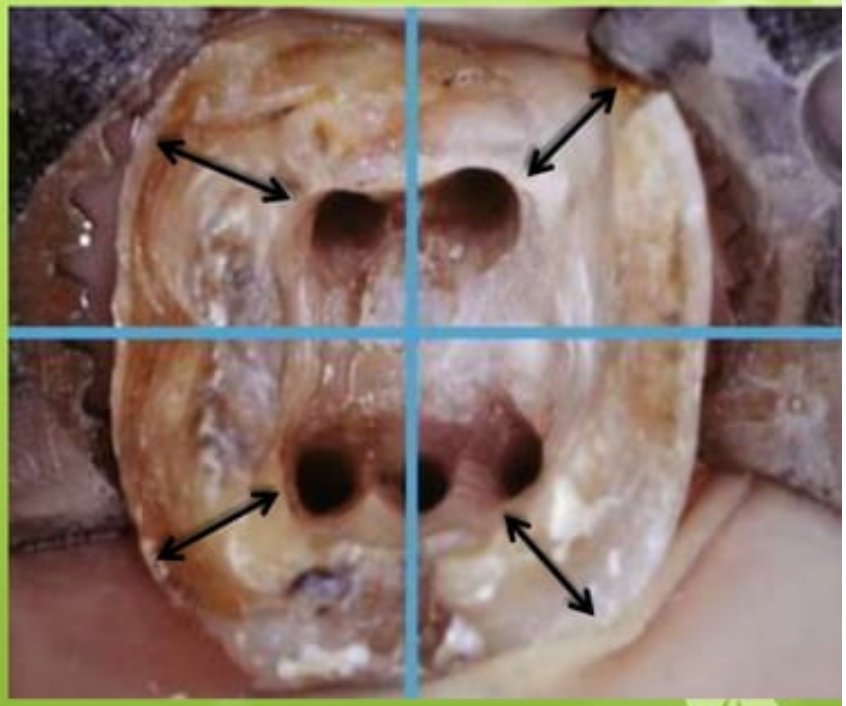
Majority of pulp chamber founds in center of the tooth

Law of Concentricity

Pulp coincidence External anatomy

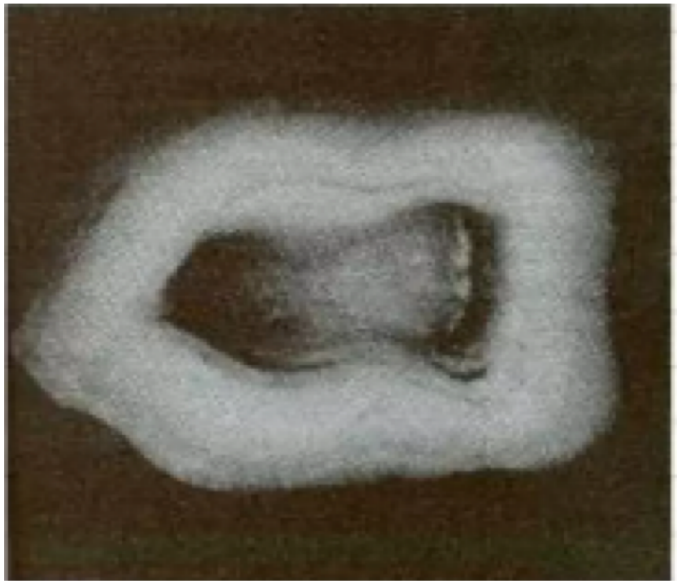
Law of CEJ

pulp orifices placed at level of CEJ



Law of concentricity

* pulp chamber coincide with external surface of the tooth.



appearnce of darker color means that you reach the floor of pulp chamber (stop your access cavity)

Darker

yellowish

Law of color change

Law of orifice location

- At junction between axial wall and the floor

PREOPERATIVE CLINICAL GUIDELINES

Assessment of complicating factors

- calcification
- curved canal

Determination of penetration point

- Conservative point of view

Assessment of occlusal and external root form

- Law of concentricity

Radiographic assessment

Instrument and armamentarium

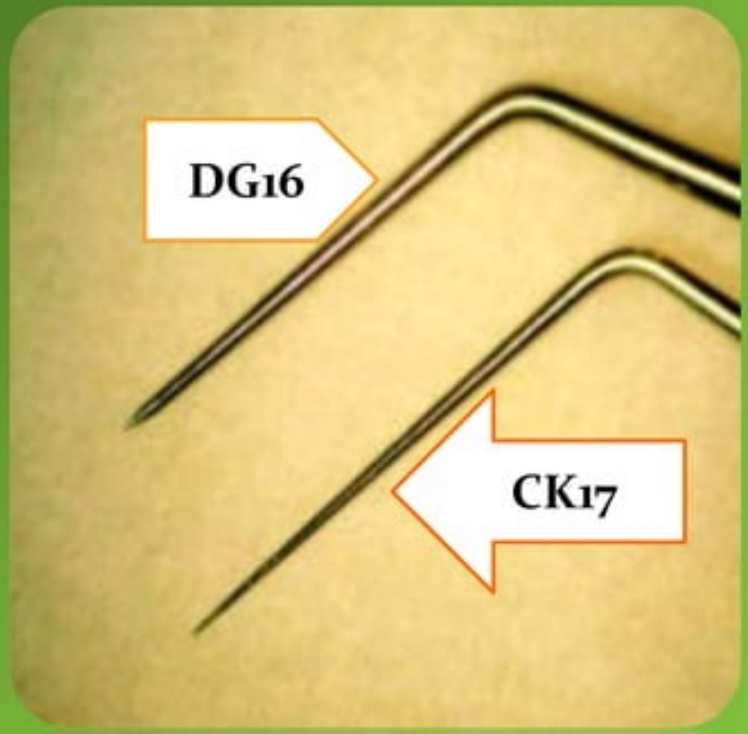
- Magnification and illumination.
- Rubber dam. – prevent contamination.
- Headpieces.
- Burs .
- Endodontic explorer (DG-16, DE-17).
- Endodontic operative spoon .
- #17 Explorer .
- Ultrasonic unit and tips

Magnification and illumination

Surgical telescopes (loupes)

Microscope(DOM)

explorers



Endodontic Explorer

Explore pulp orifices

A #17 operative explorer

catch any remenants of pulp chamber

Endodontic spoon excavator

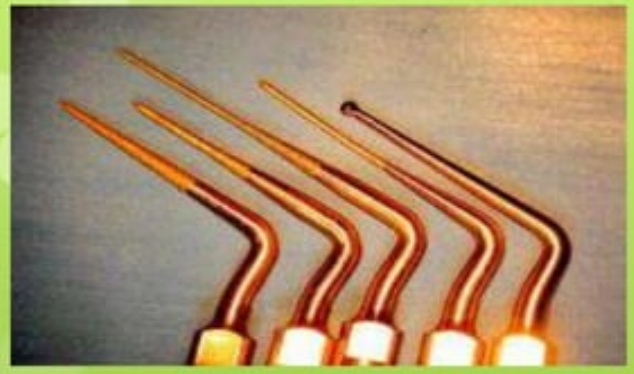
- Excavate pulp tissue and infected dentin from pulp chamber

*used for coronal flaring to facilitate root canal instrumentation.

Gates glidden bur

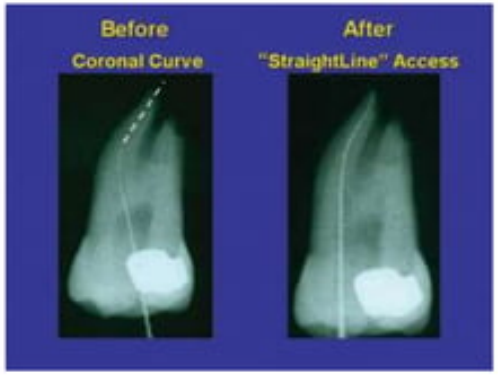
Ultrasonic Unit and Tips

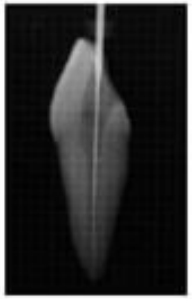
Refining access cavity → Conservative (unlike dental Bur)
to detect any hidden canal



Finding and Breaking Into Hidden Canals

Objectives of access cavity preparation:

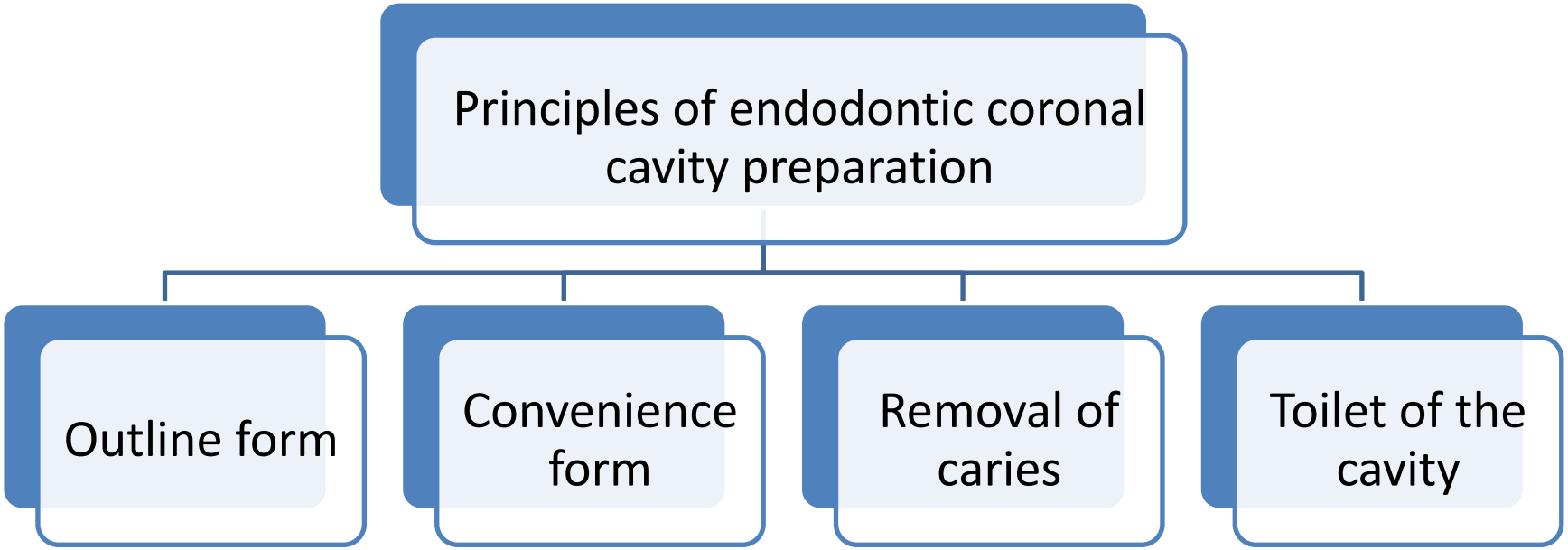




1- Straight line access to apical foramen or to the initial curvature of the canal.

2- To locate all root canal orifices.

3- To conserve sound tooth structure.
- increase tooth longavity
- Better prognosis

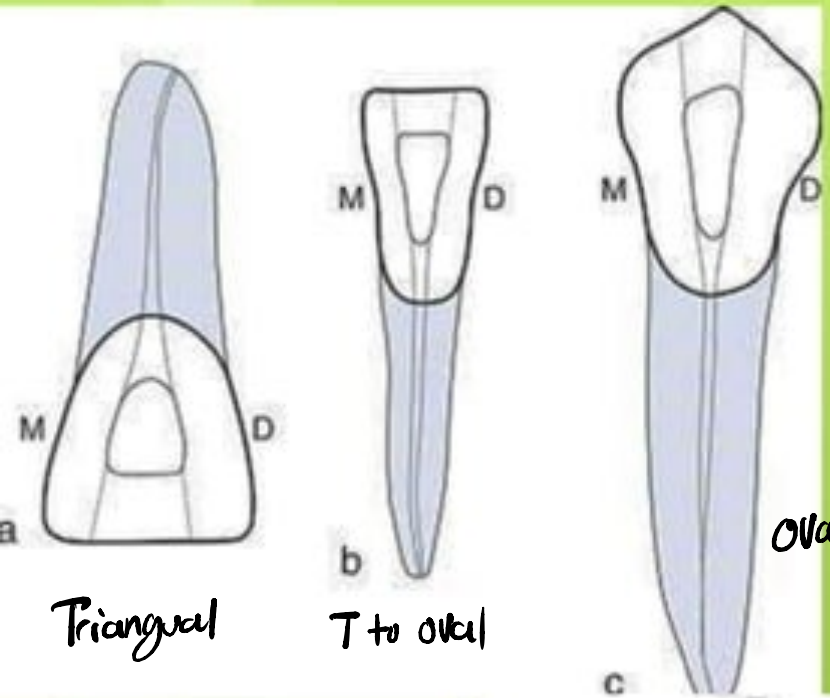

Principles of endodontic coronal cavity preparation
Outline form
Convenience form
Removal of caries
Toilet of the cavity

Principle I **Outline Form**

1.Size of Pulp Chamber: → affects outline form

* Receded pulp chamber in older patients → bcz of continous dentin deposition

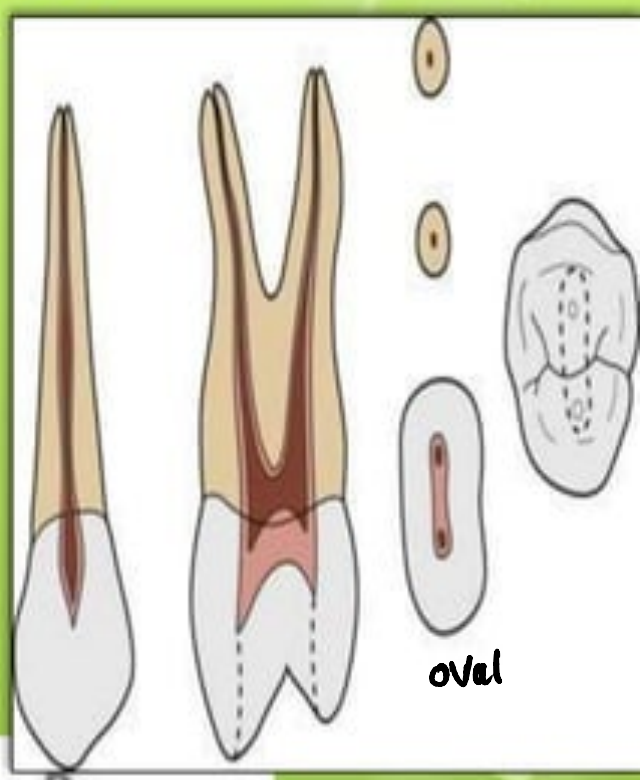
2.Shape of Pulp Chamber



Triangular

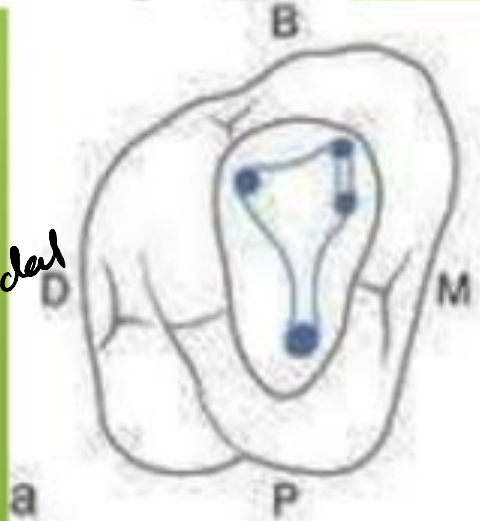
T to oval

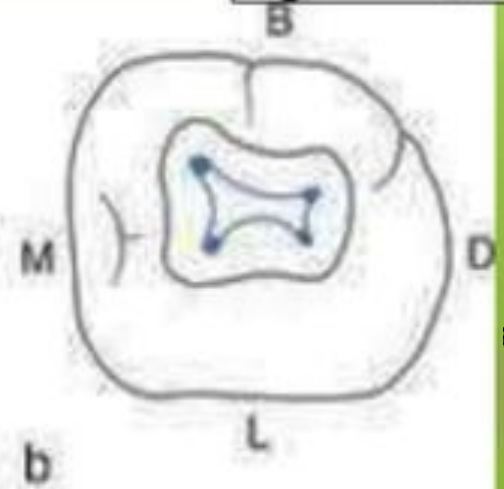
oval



oval

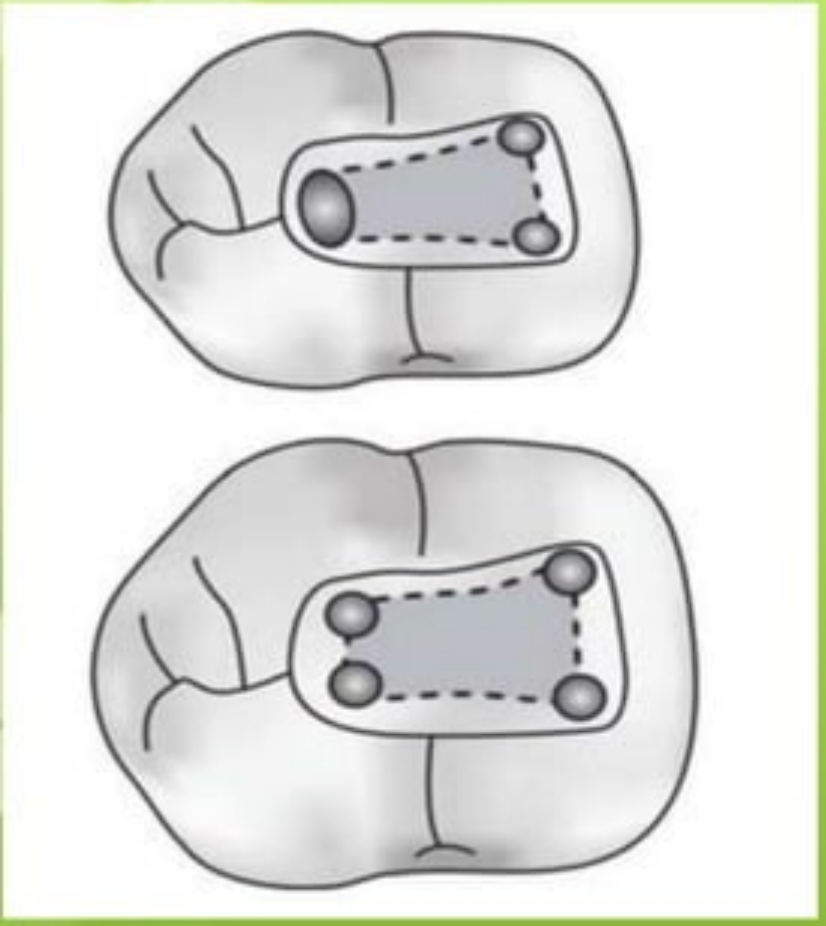
Rhomboidal

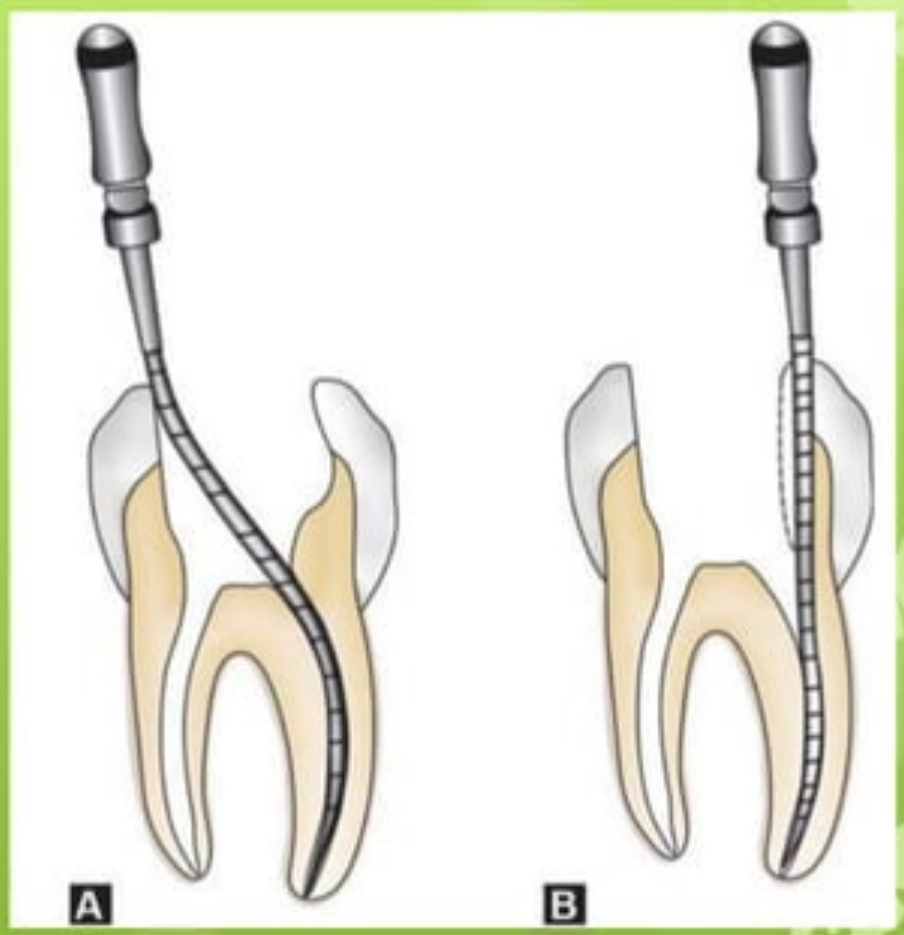




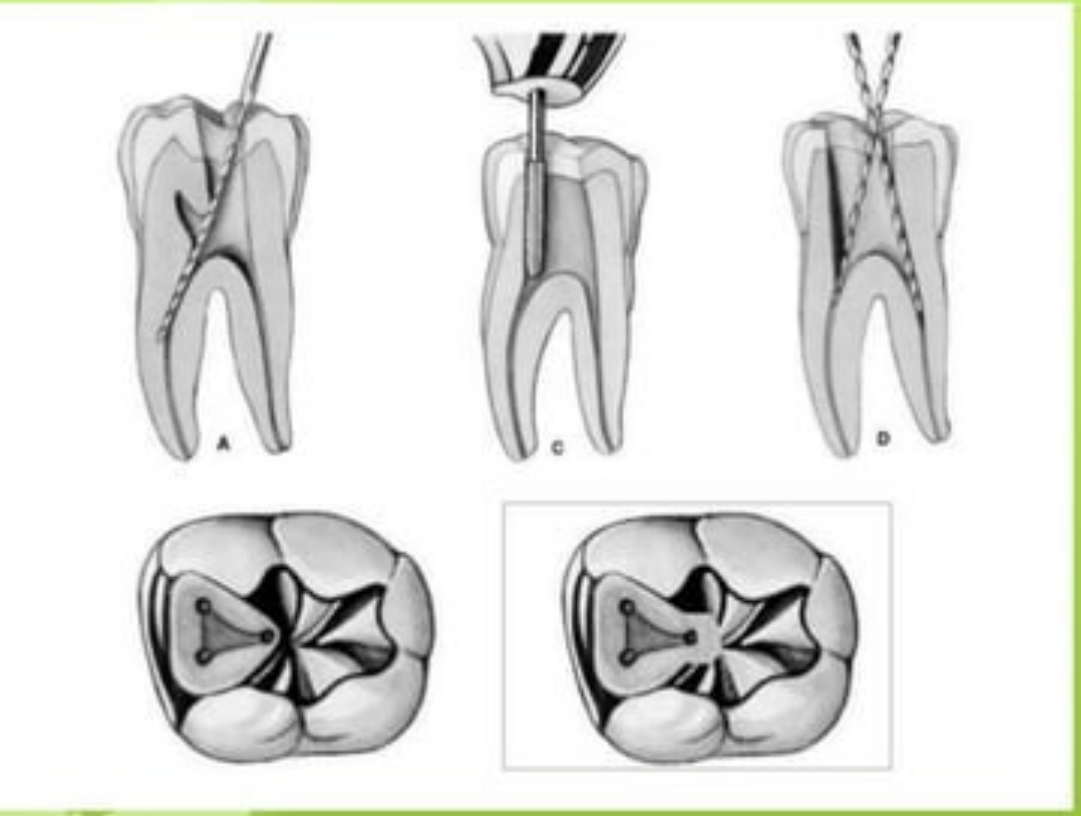
Rectangular

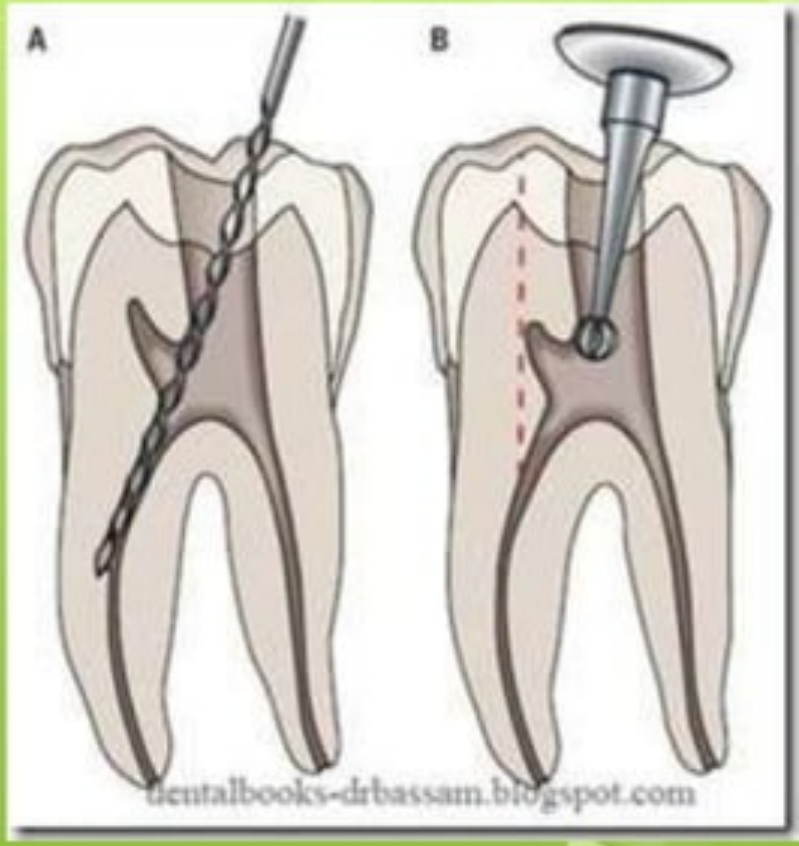
3.Number, Position, and Curvature of Root Canal





Principle II *Convenience Form*

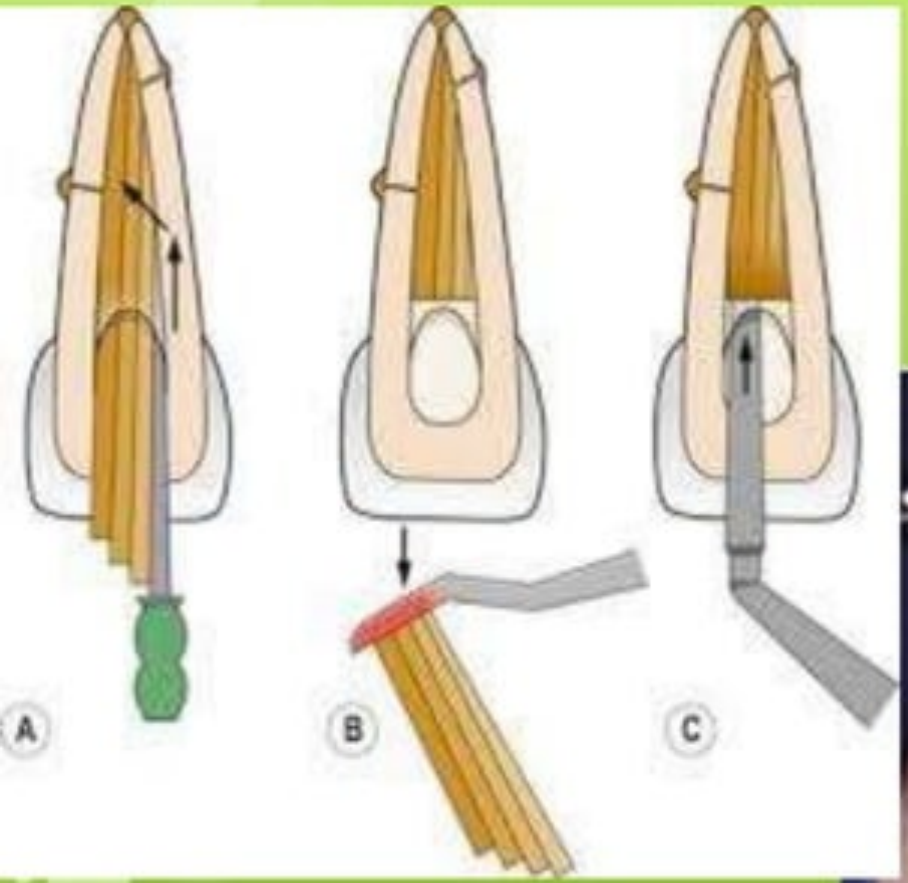


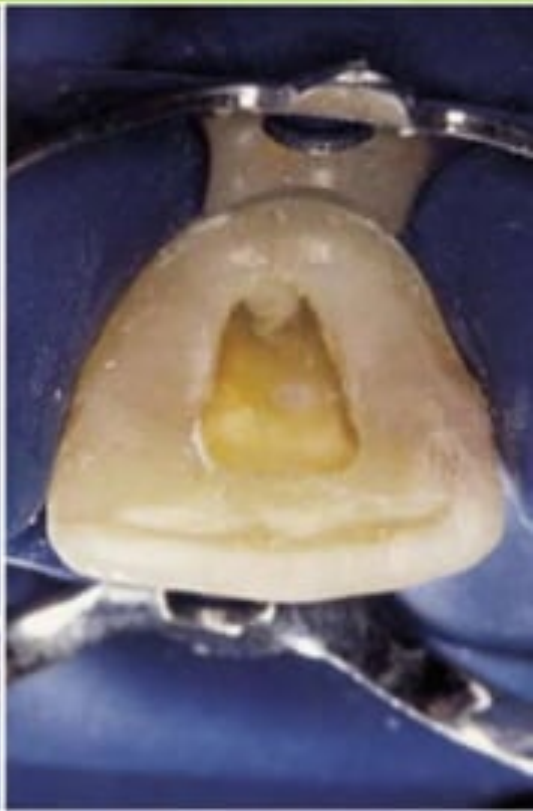


1.Unobstructed Access to the Canal Orifice

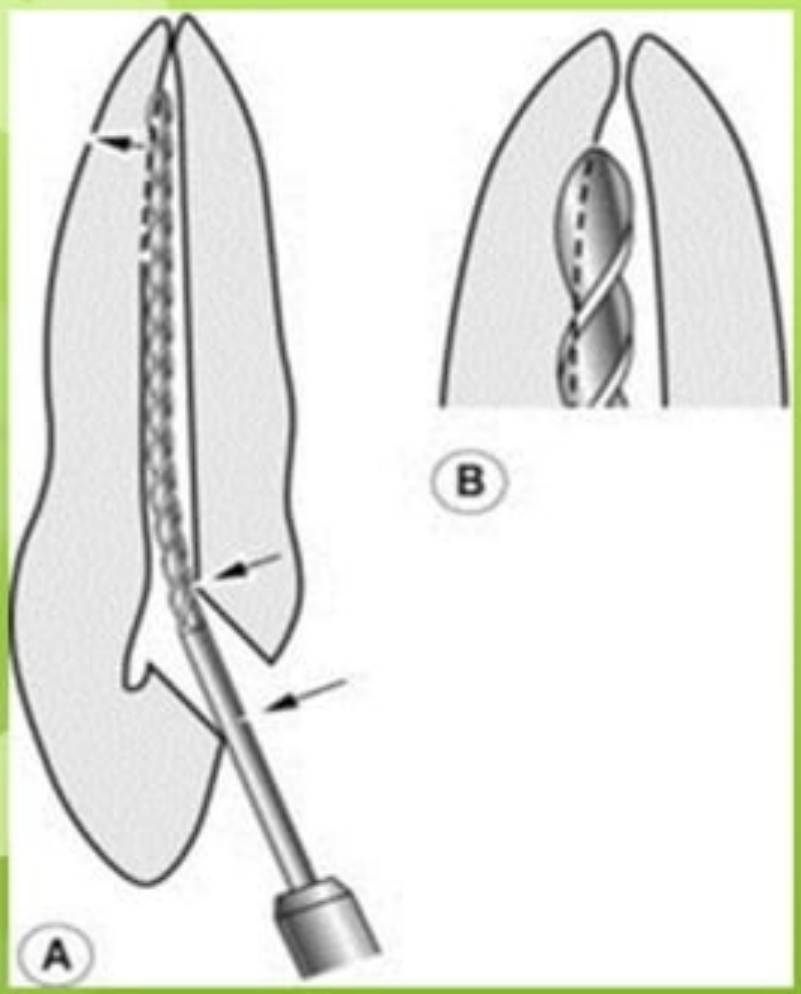
2.Direct Access to the Apical Foramen.

3.Extension to Accommodate Filling Techniques



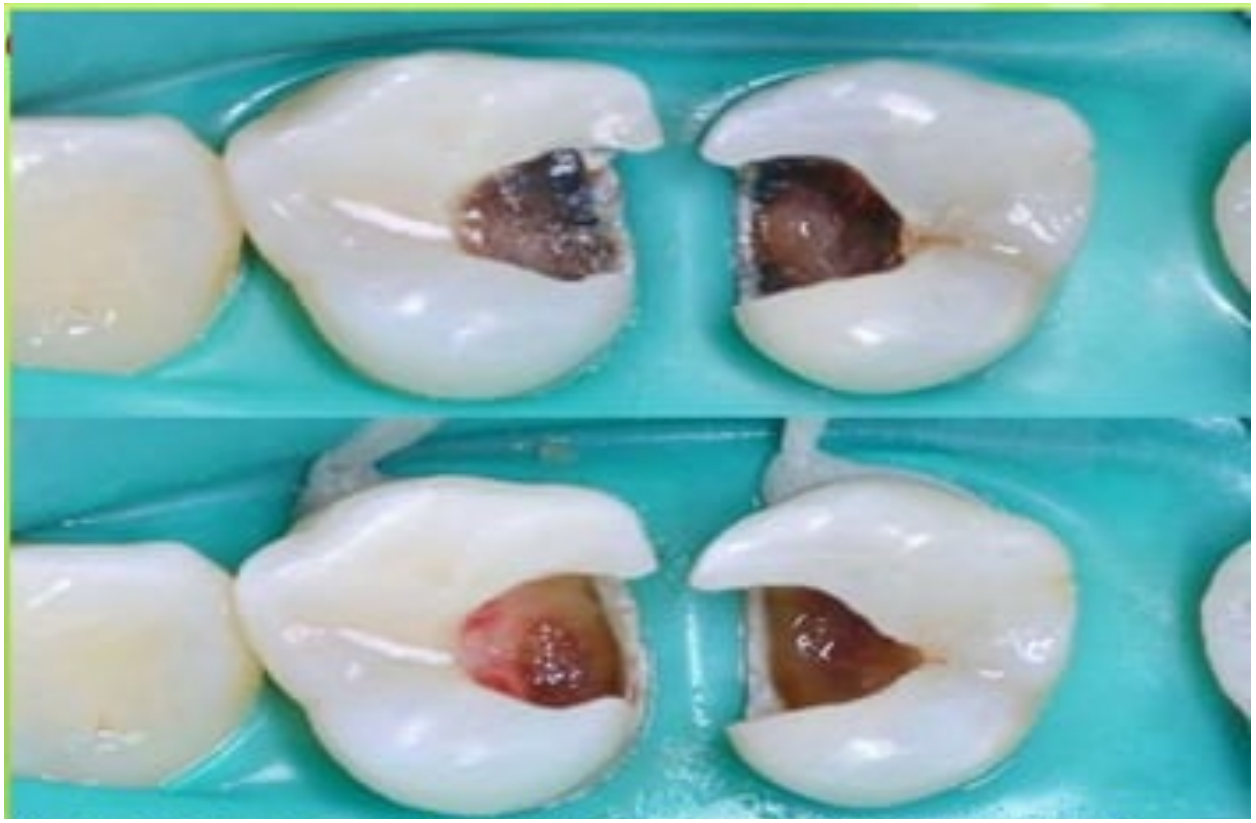


4.Complete Authority over the Enlarging Instrument



Principle III Removal of the Remaining Carious Dentin

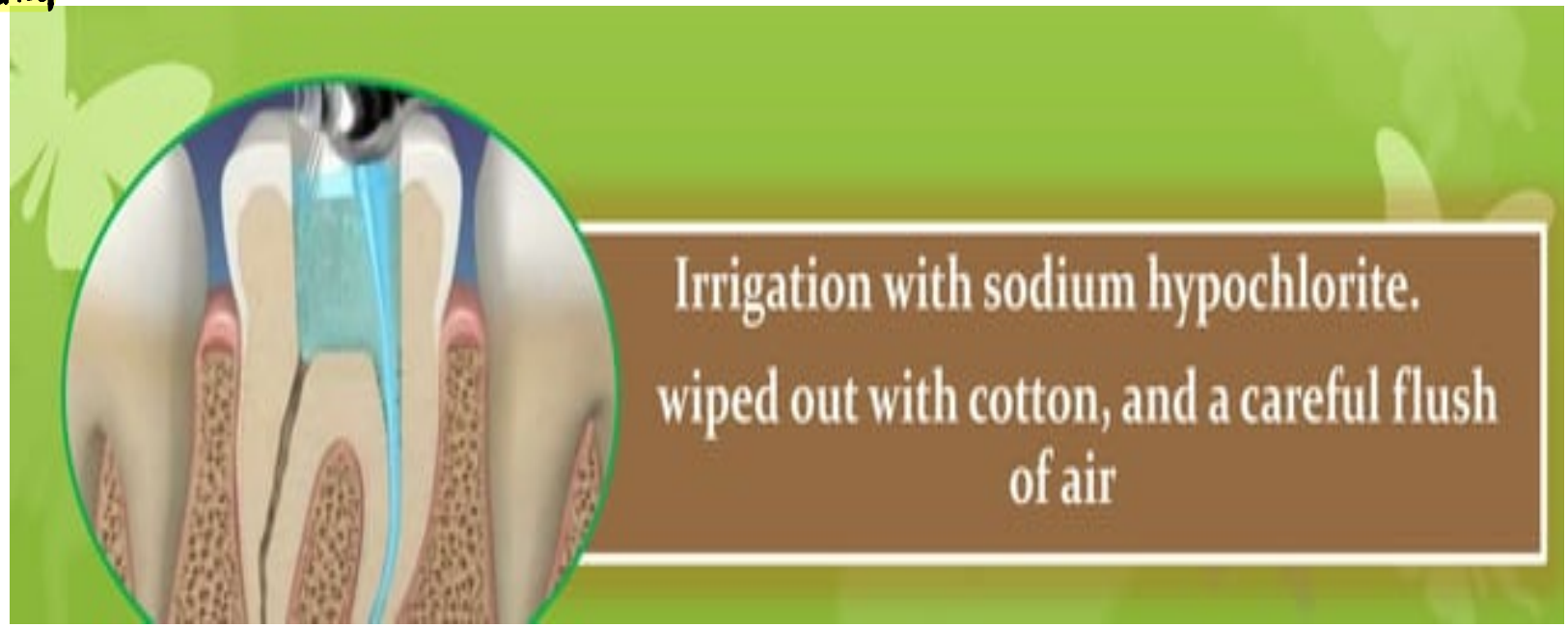
- Eliminate as much as possible of microorganism to prevent its invasion inside root canals
- Assess restorability of the remaining tooth structure.



Principle IV : Toilet of the cavity

Sodium hypochlorite has dual function : Antimicrobial and dissolves organic material

* Steralization through antimicrobial sodium hypochlorite
* Removal of organic tissue inside pulp chamber and canals



Endodontic Access Cavity Preparation of Anterior Teeth

Entrance through the lingual surface.

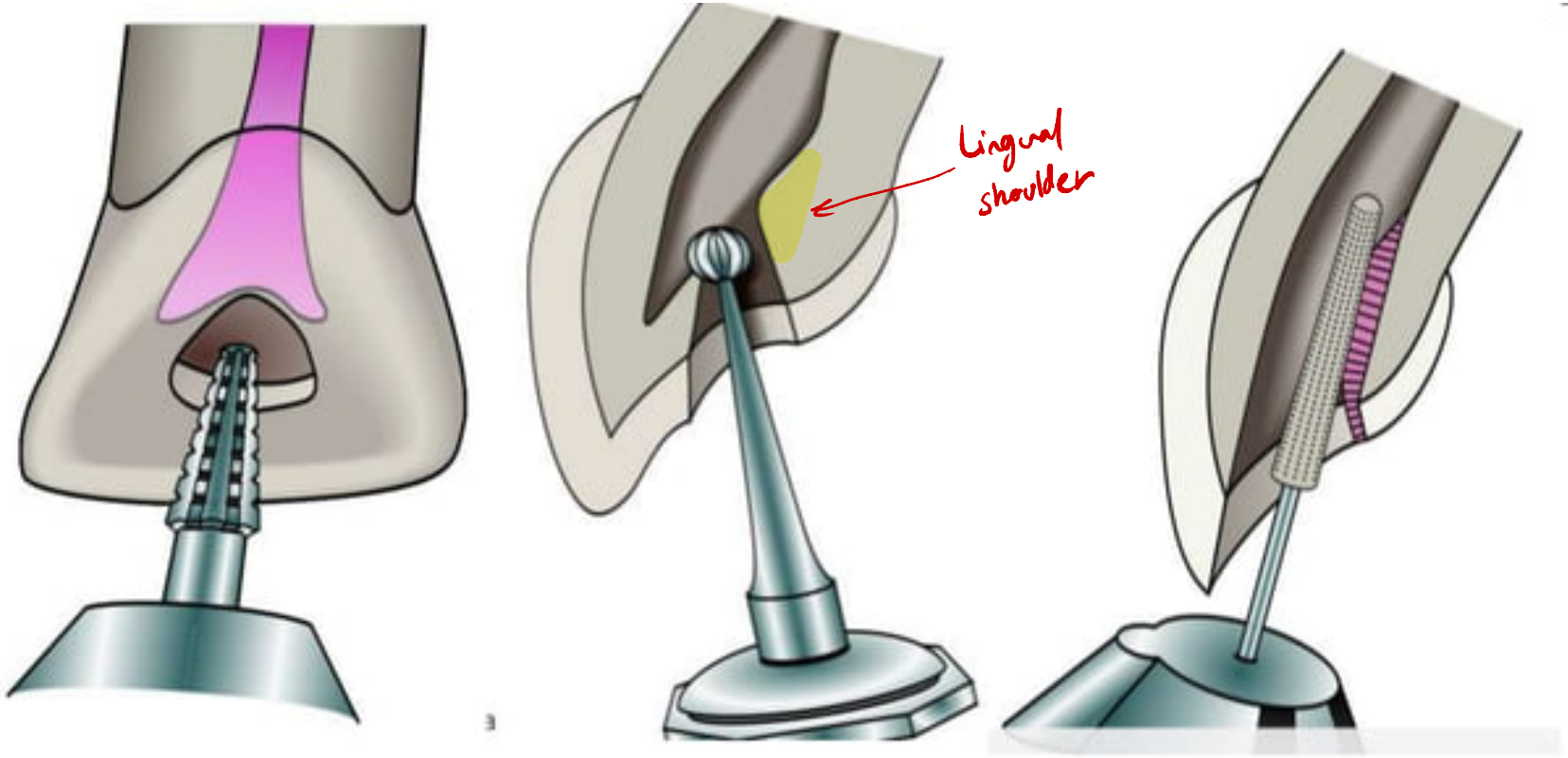
(Asthetic concern)

Penetration into enamel with

No. 2 or No. 4 in an accelerated-speed

handpiece , at a right angle

Convenience extension toward the incisal .



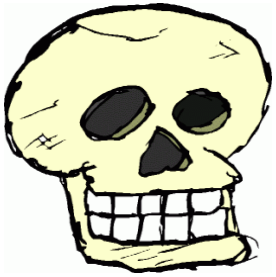
*cavity outline is funneled and fanned incisally with a fissure bur.

Penetrate(drop) the pulp chamber with surgical-length No. 2 or 4 round bur in aslow-speed .

*remove the lingual and labial walls of the pulp chamber.

*the lingual "shoulder" is removed

ERRORS
in Access cavity preparation



Errors of access cavity preparation

Correctable

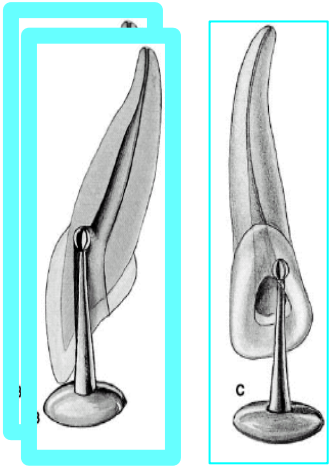
1.Underextended (Too constricted) cavity - you didn't remove the whole chamber
2 .Pulp horn remains
3.Lingual shoulder remains
4. Incomplete deroofing
5.Rough margins

Non-correctable

1 Overextended cavity
2 Gouging
3 Perforation
4 Long Bevel (anterior)

Non correctable error

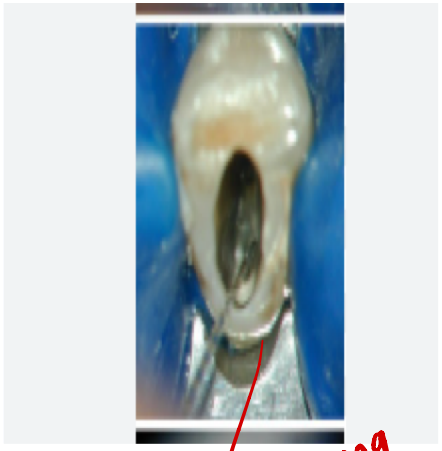
Gouging



- cutting of non interested area

* May leads to perforation

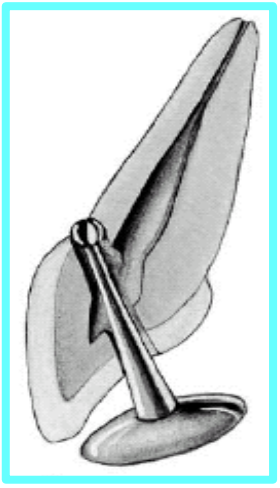
Overextended



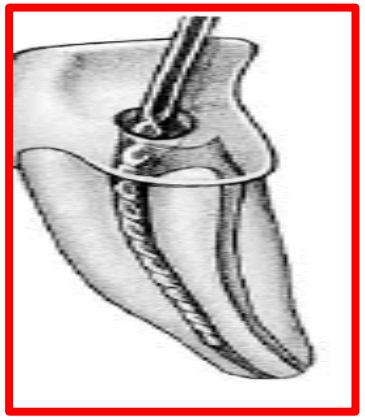
over cutting
- weaker tooth.

Incisal bevel

Perforation

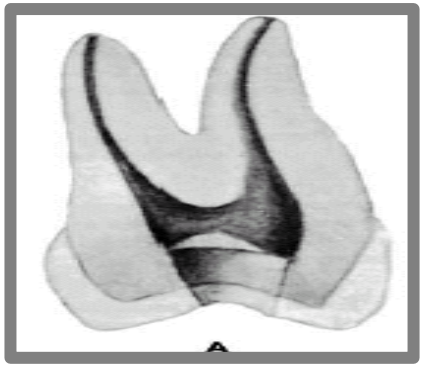


Correctable errors



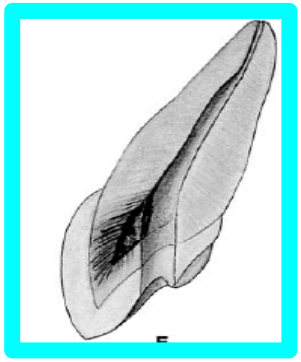
Underextended

- Pay attention during correction not to extend your access to much incisaly



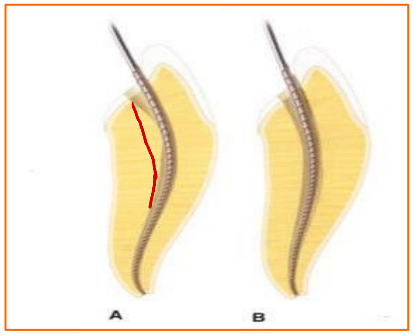
Incomplete deroofing

- missed canals
- Difficulty in canal Preperation
- Pulp chamber remanets



Pulp horn remains

- Resrvoir for re-infection.
- Dark Discoloration



Lingual shoulder remains

- Difficult access
- high stress on instrument (fracture)
- pulp remanets

Thank you for your patience