ACCESS CAVITY PREPARATION

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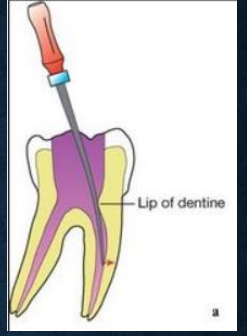
INTRODUCTION

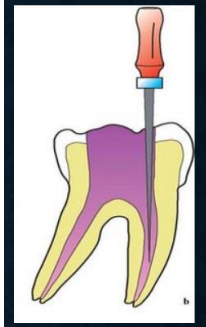
- Access is the first and most important phase of root canal treatment. A well designed access preparation is essential for a good endodontic result.
- The major factor involved in the development of the apical periodontitis are loss of integrity of coronal tooth substance and the entry of microorganisms into the dentine and pulp space.

DEFINITION

- “ Access cavity preparation is defined as an endodontic coronal preparation which enable unobstructed access to the canal orifices, a straight line access to apical foramen, complete control over instrumentation and accommodate obturation technique. “

OBJECTIVES





1 .remove all caries ,old restoration ,undermine tooth structure.

2. Conserve sound tooth structure.

3. Completely unroof the pulp chamber .

4. Remove all coronal pulp tissue and exposure of pulp horn.

5. locate all root canal orifices .

6. Achieve straight line access to the apical foramen.

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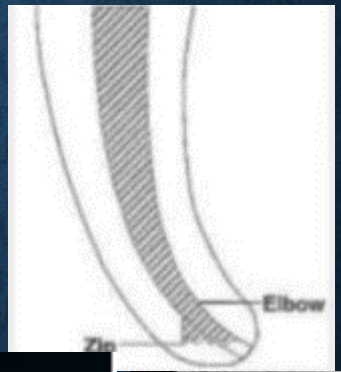
ACCORDING TO R.E. WALTON

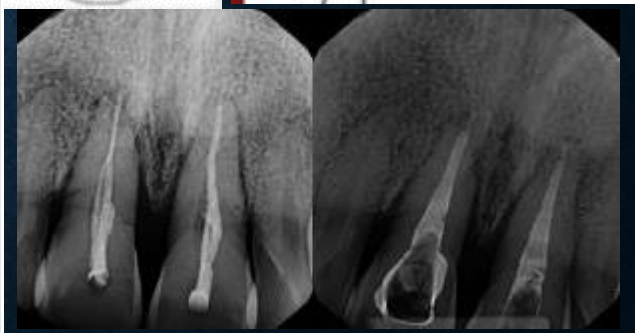
Straight line access : Helps in

a. Improved instrument control

b Decreased procedural errors

c Improved obturation





PRINCIPLES OF CAVITY PREPARATION

I. Outline Form

II. Convenience Form

III. Removal of the remaining carious dentin (and defective restorations)

IV. Toilet of the cavity

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I. Outline Form

- The outline form of the endodontic cavity must be correctly shaped and positioned
- Establish complete access for instrumentation, from cavity margin to apical foramen
- External outline form = internal anatomy of pulp

- **To achieve optimal preparation, three factors of internal anatomy must be considered:**
  - (1) the size of the pulp chamber,
  - (2) the shape of the pulp chamber,
  - (3) the number of individual root canals, their curvature, and their position.

II. Convenience Form

- Convenience form was conceived by Black as a modification of the cavity outline form to establish greater convenience in the placement of intracoronal restorations.
- In endodontic therapy, however, convenience form makes more convenient (and accurate) the preparation and filling of the root canal.

- **Four important benefits are gained through convenience form modifications:**
- (1) unobstructed access to the canal orifice,
- (2) direct access to the apical foramen,
- (3) cavity expansion to accommodate filling techniques,
- (4) complete authority over the enlarging instrument.

III. Removal of the remaining carious dentin (and defective restorations)

- Caries and defective restorations remaining in an endodontic cavity preparation must be removed for three reasons:
- (1) to eliminate mechanically as many bacteria as possible from the interior of the tooth,
- (2) to eliminate the discolored tooth structure, that may ultimately lead to staining of the crown,
- (3) to eliminate the possibility of any bacteria-laden saliva leaking into the prepared cavity.

IV. Toilet of the cavity

- All of the caries, debris, and necrotic material must be removed from the chamber before the radicular preparation is begun.
- If the calcified or metallic debris is left in the chamber and carried into the canal, it may act as an obstruction during canal enlargement.
- Soft debris carried from the chamber might increase the bacterial population in the canal. Coronal debris may also stain the crown, particularly in anterior teeth.

- Round burs are most helpful in cavity toilet. The long-blade, endodontic spoon excavator is ideal for debris removal.
- Irrigation with sodium hypochlorite is also an excellent measure for cleansing the chamber and canals of persistent debris.

GUIDELINES

1. Visualization of the likely internal anatomy

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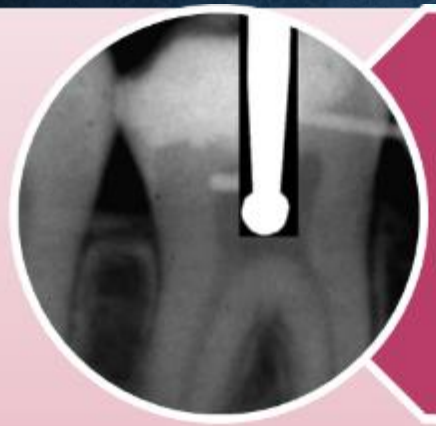


Radiograhic measurment of depth of pulp chamber roof from occlusal table

2. Evaluation of the cemento-enamel junction and occlusal anatomies

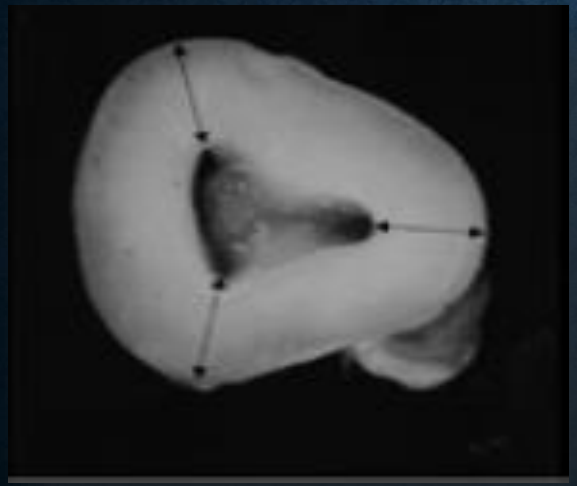
- **Krasner and Rankow**—(Study of 500 pulp chamber) found that the CEJ was the most important anatomic landmark for determining the location of pulp chambers and root canal orifices.

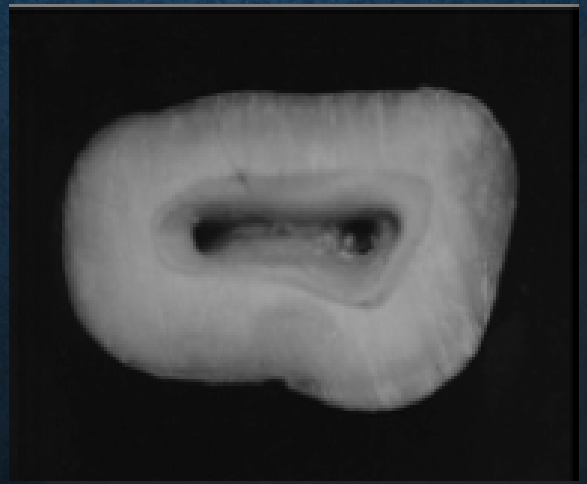
Centrality:

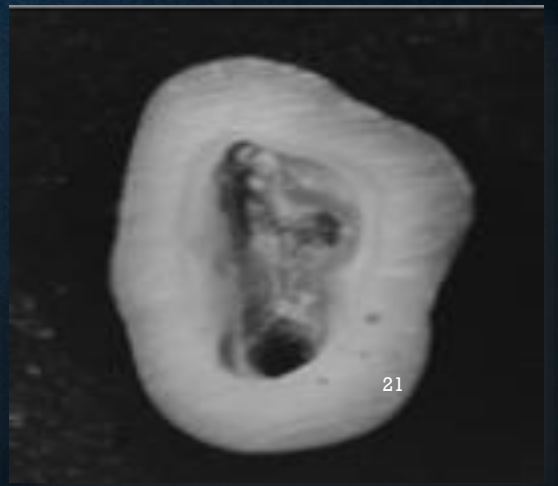
- The floor of the pulp chamber is always located in the center of the tooth at the level of the CEJ.

- ***Concentricity :***

The walls of the pulp chamber are always concentric to the external surface of the tooth at the level of the CEJ; that is, the external root surface anatomy reflects the internal pulp chamber anatomy.





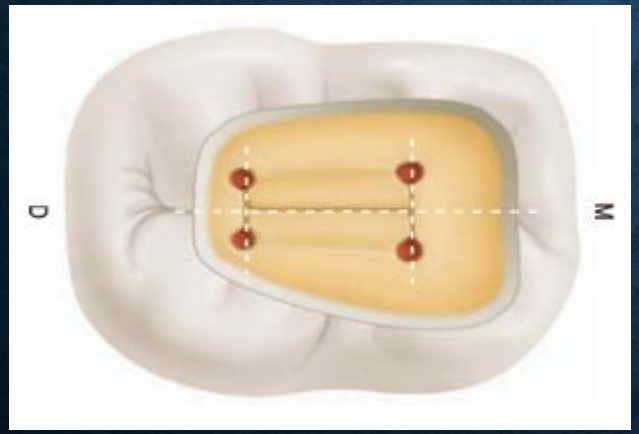


- ***Location of the CEJ:***

➢The distance from the external surface of the clinical crown to the wall of the pulp chamber is the same throughout the circumference of the tooth at the level of the CEJ, making the CEJ the most consistent repeatable landmark for locating the position of the pulp chamber.

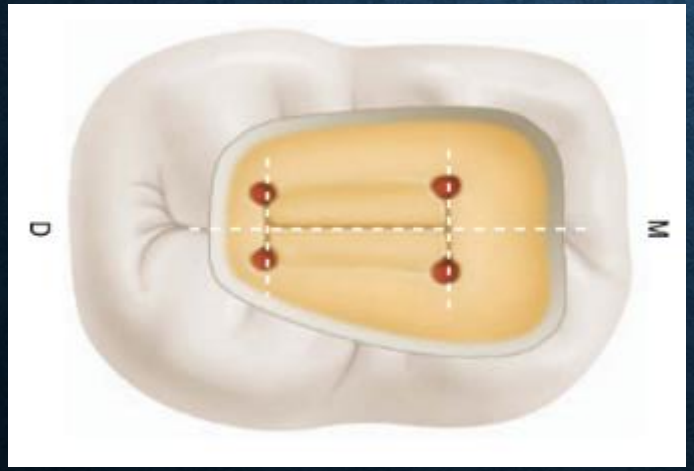
law of symmetry 1

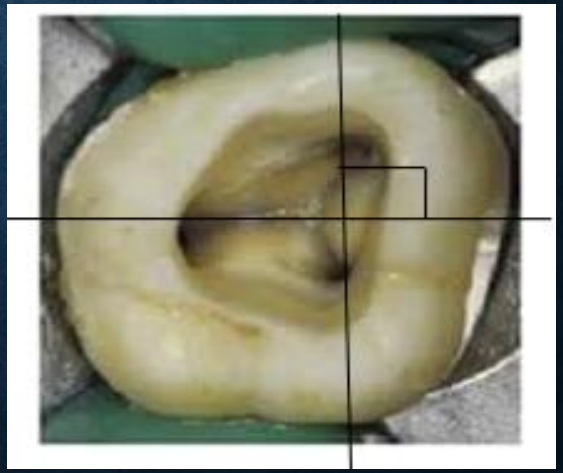
- Except for the maxillary molars, canal orifices are equidistance from a line drawn in a mesiodistal direction through the pulp chamber floor.



law of symmetry 2

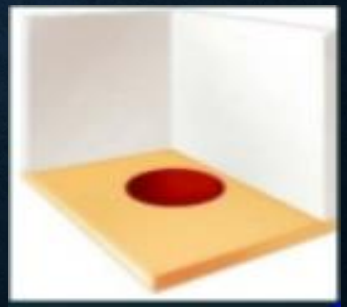
- Except for the maxillary molars, canal orifices lie on a line perpendicular to a line drawn in a mesio distal direction across the center of the pulp chamber floor.





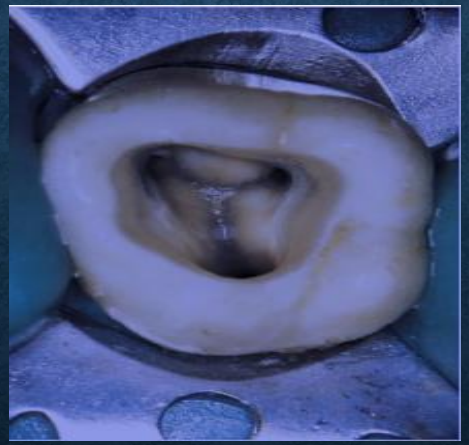
law of orifice location

- The orifices of the root canals are always located at the junction of the walls and the floor;
- the orifices of the root canals are always located at the angles in the floor-wall junction; and
- the orifices of the root canals are always located at the terminus of the roots' developmental fusion lines.



Law of color change

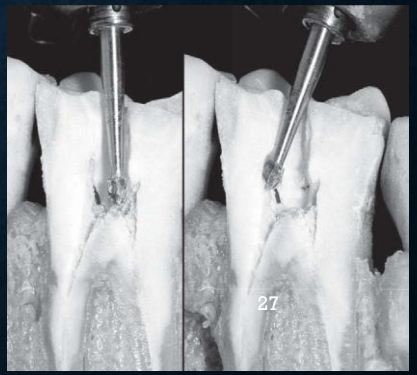
- The pulp chamber floor is always darker in color than the wall.



- **3. Preparation of the access cavity through the lingual and occlusal surface**

➢This is to achieve straight line access, diminishing esthetic and restorative concerns

➢Some authors recommends that access cavity in mandibular incisors be moved from lingual surface to incisal surface to allow better access to the lingual canal and improves canal debridement.



- 4. Removal of all defective restorations and caries before entry into the pulp chamber

- In open preparation, canals are much easier to locate, shaping, cleaning & obturation are much easier to perform.
- All carious dentin must be removed – prevents irrigating solutions leaking past the rubber dam and prevents carious dentin and its bacteria from entering the root canal system.

5. Removal of unsupported tooth structure

- Removal of central part of tooth structure during preparation reduces the tooth resistance to stress
- So after completing the preparation, clinician should remove all unsupported tooth structure to assess restorability and to prevent tooth fracture.

- **6. Preparation of Access Cavity Walls that do not restrict straight or direct line passage of instrument to the apical foramina or initial canal curvature**

- Following this guideline, minimizes the procedural errors and maximizes the effectiveness.
- Failure to this guideline result in root perforation, ledge formation, apical transportation, Instrument separation.

➢ 7. Delay of dental dam placement until difficult canals have been located and confirmed

- ➢Cases like crowded, rotated, fractured to gum line, calcified tooth - in such case prepare the initial part of the access cavity before placing dental dam –so inclination of root eminences can be visualized and palpated.
- ➢In these cases, dental dam placed after the pulp chamber penetration and the canal identified.

➢ 8. Location, flaring, and exploration of all root canal orifices

- A sharp endodontic explorer is used to locate canal orifices and to determine their angle of departure from the pulp chamber. Next, all canal orifices and the coronal portion of the canals are flared to make instrument placement easier.

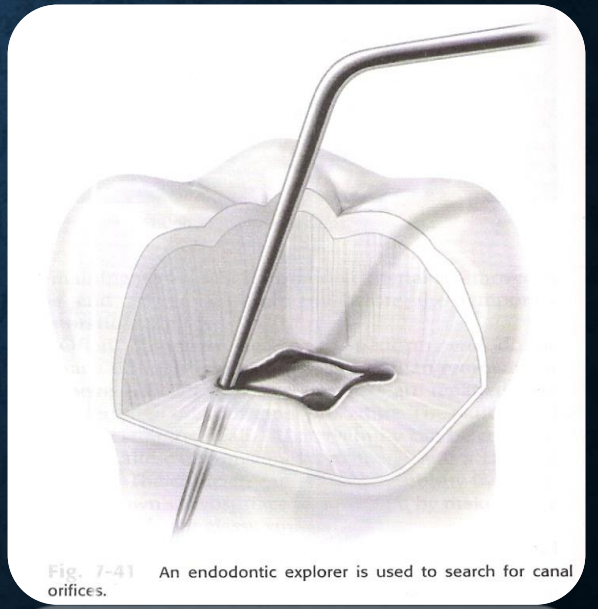


Fig. 7-41 An endodontic explorer is used to search for canal orifices.

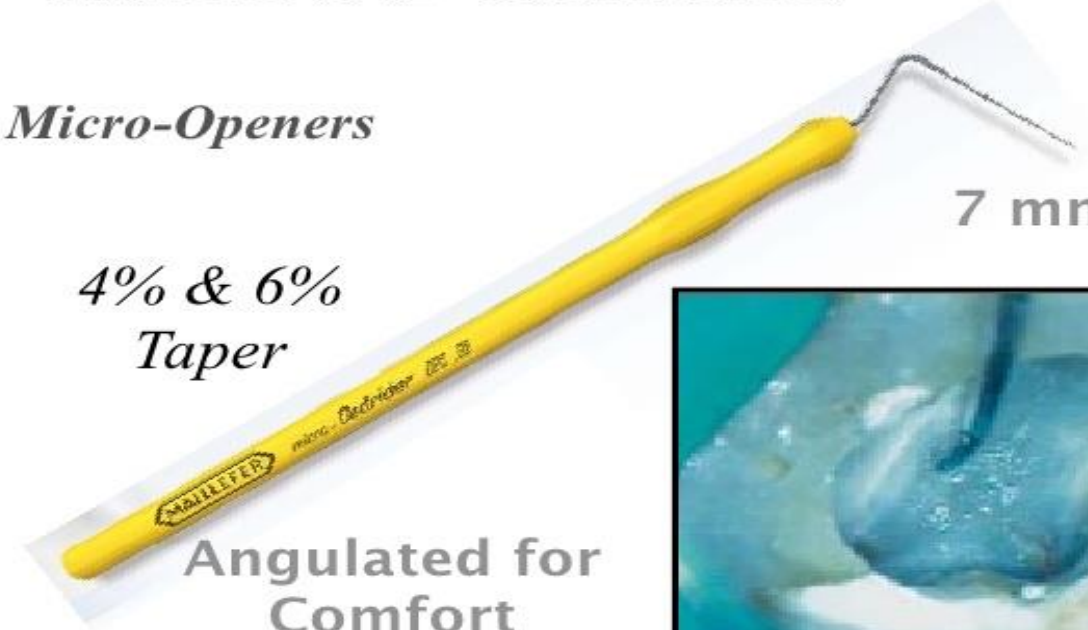
Finding Missed Canals

Size #10 & #15

Micro-Openers

7 mm

4% & 6% Taper



Angulated for Comfort

➢ 9. Inspection of the pulp chamber using magnification and adequate illumination

- Magnification and illumination are particularly important in root canal therapy, especially for determining the location of canals; negotiating constricted, curved, and calcified canals; and debriding and removing tissue and calcifications from the pulp chamber.
- Enhanced vision allows the clinician to see internal dentin color changes and landmarks that may not be visible to the unaided eye.

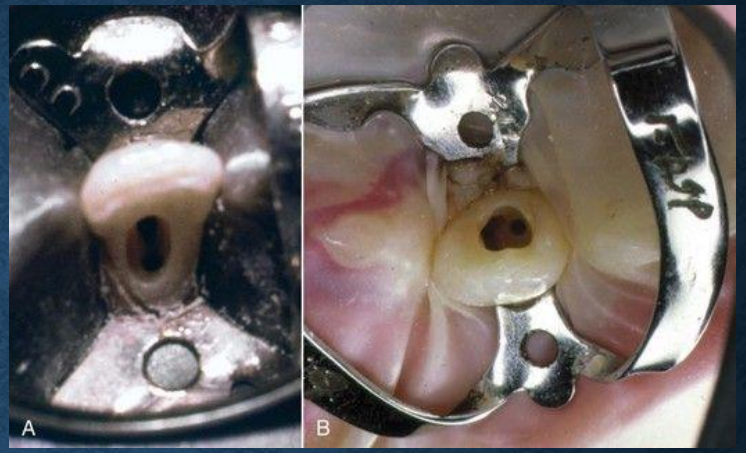
- Surgical loupes, endodontic endoscopes and the DOM are some of the commercially available instruments that can help the clinician accomplish these goals.
- A clinician trained in microscopic techniques has a better chance of locating and negotiating root canal systems.

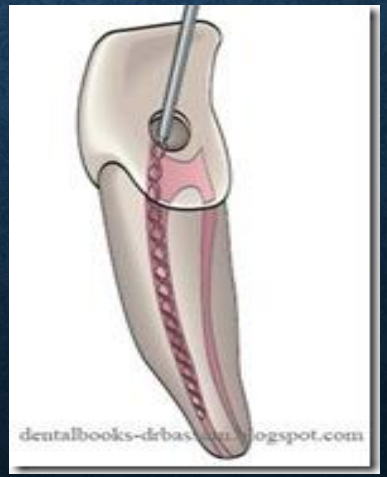
➢ 10. Tapering of cavity walls and evaluation of space adequacy for a coronal seal

- A proper access cavity has tapering walls and is widest at the occlusal surface - such case occlusal forces do not push the temporary restoration into the cavity.
- At least 3.5 mm of temporary filling material needed to provide an adequate coronal seal for a short time.

❑ METHODS TO LOCATE THE ORIFICE AND TYPE OF CANAL SYSTEM

- 1)Anatomic Studies: Thorough Knowledge of anatomy of each tooth.


A
B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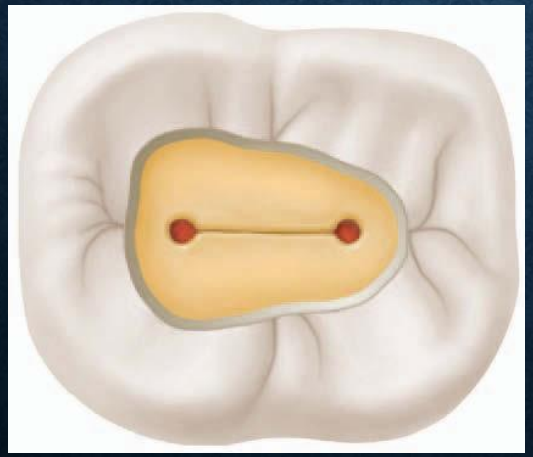
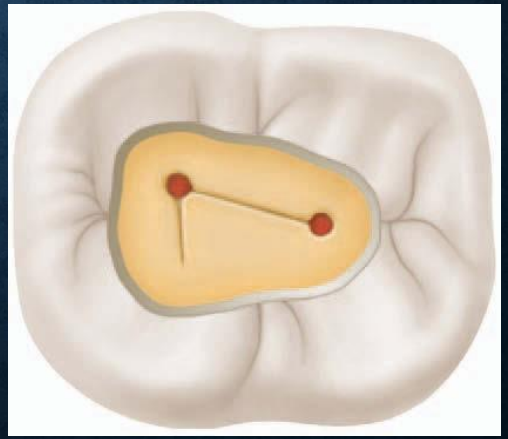
- In a mandibular second molar with two canal,both orifices are in the mesiodistal midline,if two orifices are not directly in the mesiodistal midline,a search should be made for another canal on the opposite side.





- An oval orifice must be explored with apically curved small instruments.
- The clinician should place the file tip in the orifice with the tip curved to the buccal side when trying to locate the buccal canal.
- A curved file tip is placed toward the palatal side to explore for the palatal canal.

- **IF TWO CANALS ARE PRESENT, THEY WILL BE SMALLER THAN A SINGLE CANAL**

- As the distance between orifices in a root increases the greater the chance is that the canals will remain separate.

- Mesial view of a mandibular premolar with a Vertucci type V canal configuration.
- The lingual canal separates from the main canal at nearly a right angle.
- This anatomy requires widening of access in a lingual direction to achieve straight-line access to the lingual canal. This should be done with the dental operating microscope.

2. CHAMPHAGNE BUBBLE TEST

Allowing sodium hypochlorite (NaOCl) to remain in the pulp chamber may help locate a calcified root canal orifice.
Tiny bubbles may appear in the solution, indicating the position of the orifice.

3. Root canal bleeding points

- ***4. Dyes:*** Methylene blue is a water-soluble dye that can be irrigated into a dry pulp chamber. The pulp chamber is subsequently rinsed with water, dried, and visualized. The dye is absorbed into orifices, fins, and isthmus areas. This technique serves to visually "map" hard-to-find orifices, fins and grooves, or certain coronal fractures.

➢ ***5. Transillumination:*** A fiber optic wand may be positioned cervically so that light is directed perpendicular to the long axis of a tooth. During transillumination, identifying an orifice is, at times, improved by turning off any overhead light source.

➢ ***6. White Line Test:*** When performing ultrasonic procedures without water in necrotic teeth, dentinal dust frequently settles into any available anatomical space. This dust can form a white dot within a hidden orifice or a white line within an anatomical fin, groove, or isthmus. This observation can provide a visible anatomical roadmap on the pulpal floor .

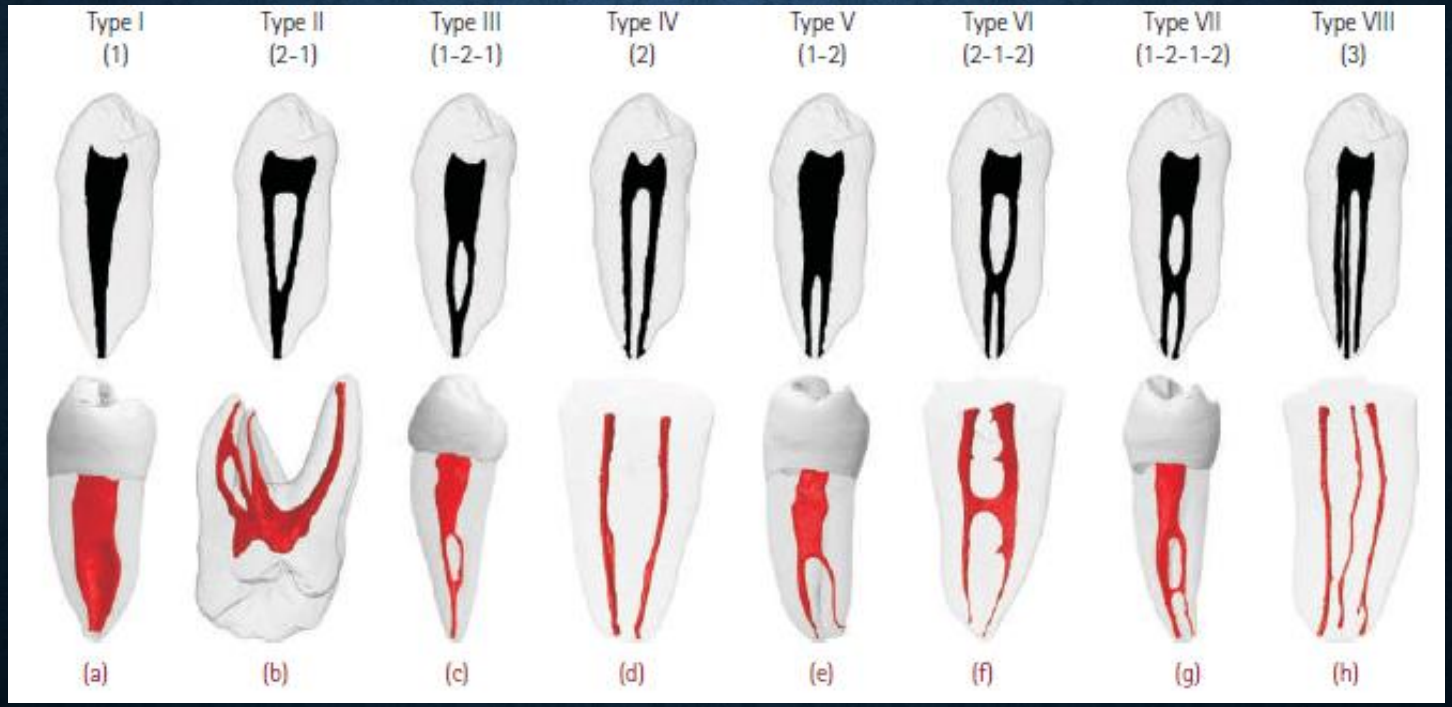
➢ ***7. Red Line Test:*** In vital teeth, blood frequently emanates from an orifice, fin, or an isthmus area. Like a dye, blood serves to map and visually aid in the identification of the underlying anatomy. At times, a red dot is noted on the lateral aspect of a paper point, which may be associated with an offshoot or secondary canal within a canal .

8. Perio-Probing: Circumferentially probing the sulcus of a tooth is another important strategy for locating canals. Intersulcular probing provides information as to the emergence profile of the clinical crown and the orientational alignment of the underlying root.

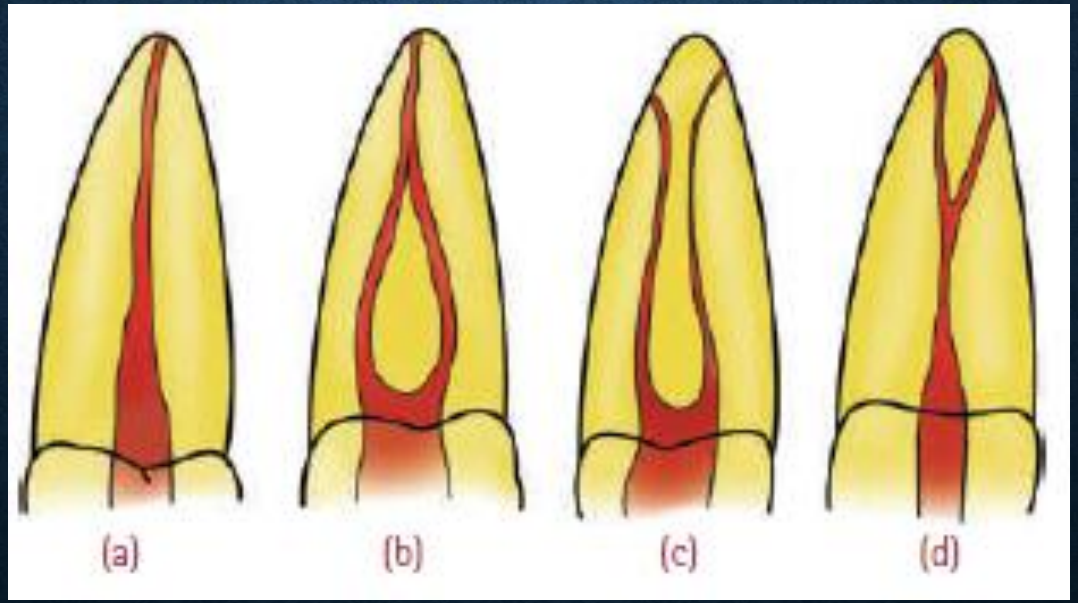
- **(9. Sequential application of 17% aqueous ethylenediaminetetraacetic Acid (EDTA) and 95% ethanol** using the stropk…uge notched irrigating needle)…r effective cleaning and dry…r before visual inspection o…

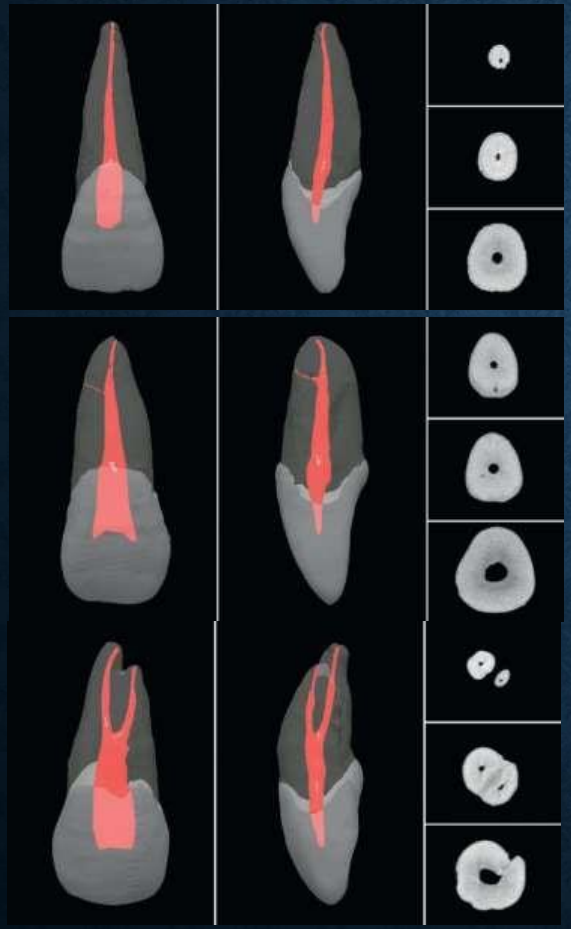
➢ CLASSIFICATION OF ROOT CANAL

- Vertucci's root canal configuration



➢ WEINE'S CLASSIFICATION OF ROOT CANAL ANATOMY:





CT SCANS OF MAXILLARY CENTRAL INCISORS

A. Common anatomic presentation
B. Central incisor with a lateral canal, which is common
C. Rare multiple-canal variation

All teeth are shown from both a buccal and a proximal perspective, along with the cross-sectional anatomy at the coronal, middle, and apical levels

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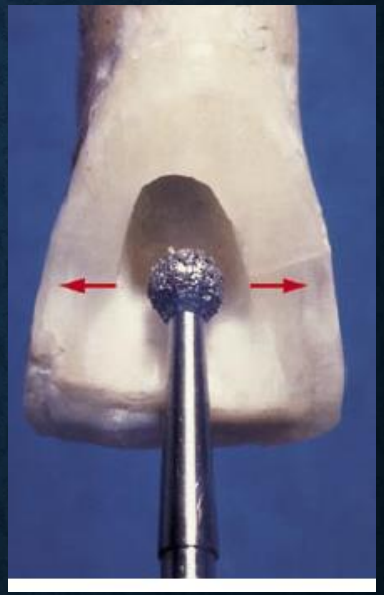
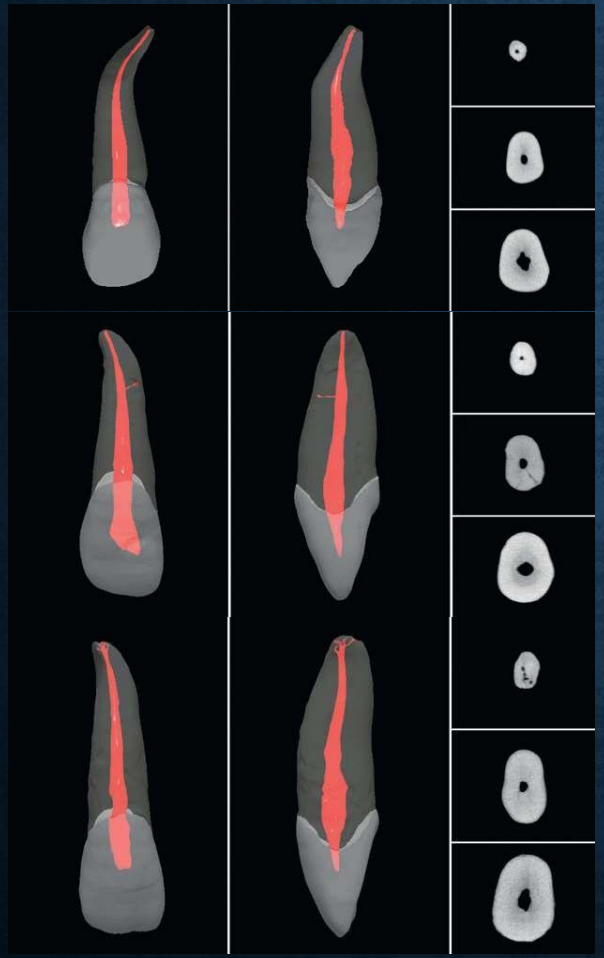
- **Out line form** –the inverted triangular shaped access cavity is cut with its base at the cingulum to give straight line access.



- **Width of base** depends on distance between mesial and distal pulp horns.

- **Shape** may change from triangular to slightly oval due to less prominent pulp hons in older individuals.



μCT scans of maxillary lateral incisors

A. Common anatomic presentation
B. Lateral incisor with a large lateral canal, which is common
C. Lateral incisor with an apical delta

All teeth are shown from both a buccal and a proximal perspective, along with the cross-sectional anatomy at the coronal, middle, and apical levels

- When pulp horns are present shape access cavity is rounded triangle

If pulp horns are missing ,shape is oval

μCT scans of maxillary canine

A. Common anatomic variations
B. Canine with two roots
C. Canine with significant deviations of the canal system in the apical third

All teeth are shown from both a buccal and proximal perspective ,along with the Cross sectional anatomy at the coronal ,middle and apical levels.

- **Shape of access cavity**

✓Access cavity is oval in shape with greater diameter labiopalatally

μCT scans of maxillary first premolar

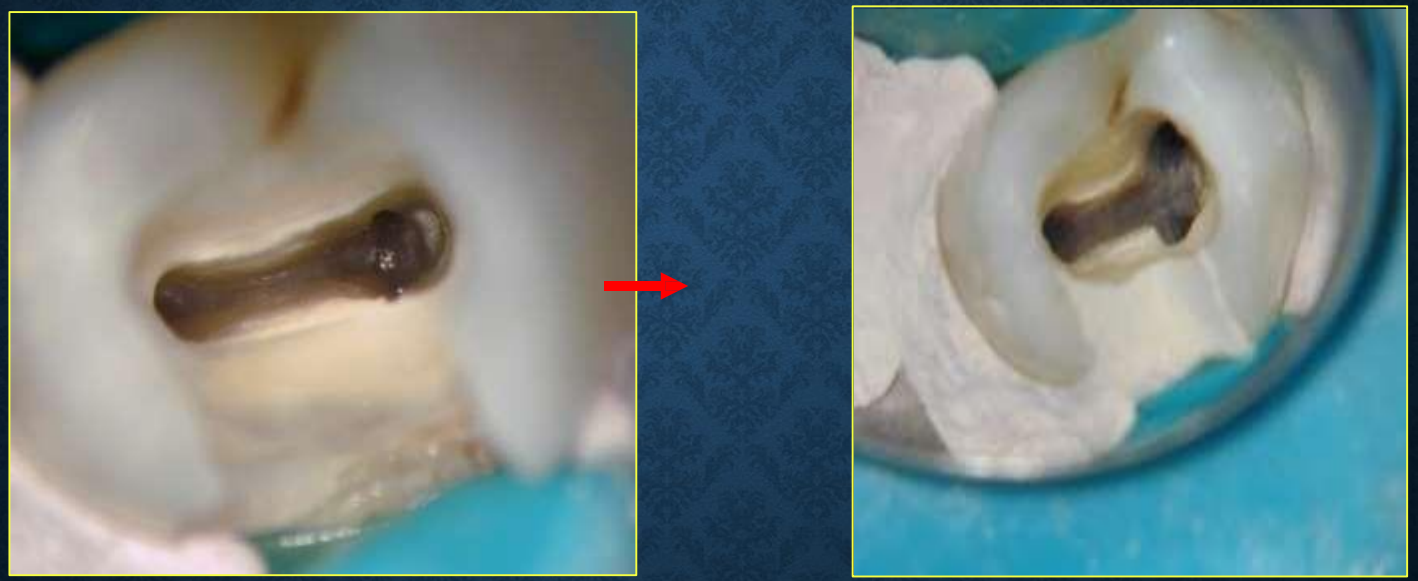
- A, common anatomic presentation of this tooth showing two roots
- B, premolar with only one canal
- C , premolar with three roots .

Buccal and a proximal perspective ,along with the cross-sectional anatomy at the coronal, middle, and apical levels

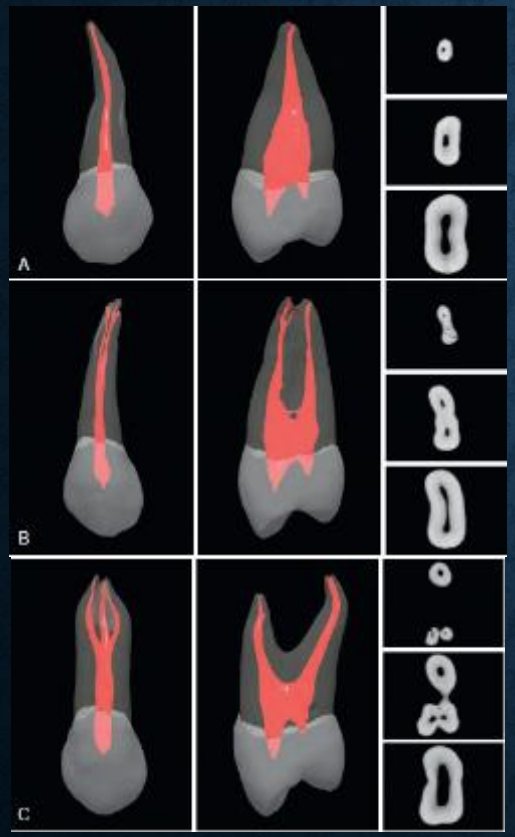
➢ External Outline Form of Maxillary First Premolar

- **Oval shaped**
- It is wide buccolingually, narrow mesiodistally, and centered mesiodistally between the cusp tips
- When 3 canals are present,
- outline form becomes triangular, with the base on the buccal aspect

MAXILLARY FIRST PREMOLAR



- Trough the isthmus
- Modify the traditional access to a “T”-shaped access

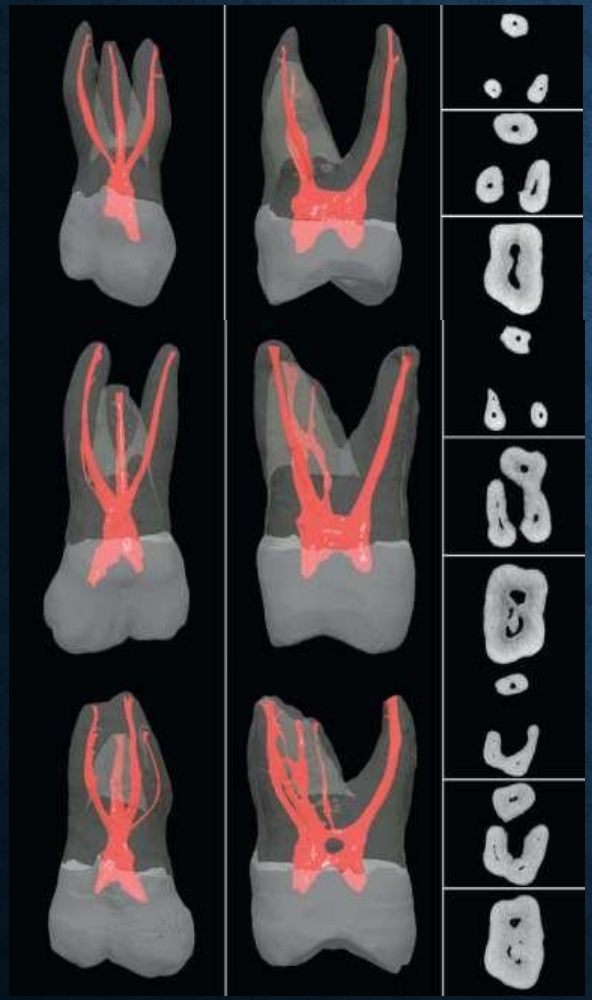


CT SCANS OF MAXILLARY SECOND PREMOLAR

- A common anatomic presentation showing one canal.
- B second premolar with two canals an apical delta
- C second premolar with three canals that divide at the junction of the middle and apical third of the main root. [63]

External Outline Form of Maxillary Second Premolar

- When 2 canals are present, nearly identical to that of maxillary first Premolar ,**Oval shaped**
- If only 1 canal is present, bucco-lingual extension is less



CT scans of maxillary first molar

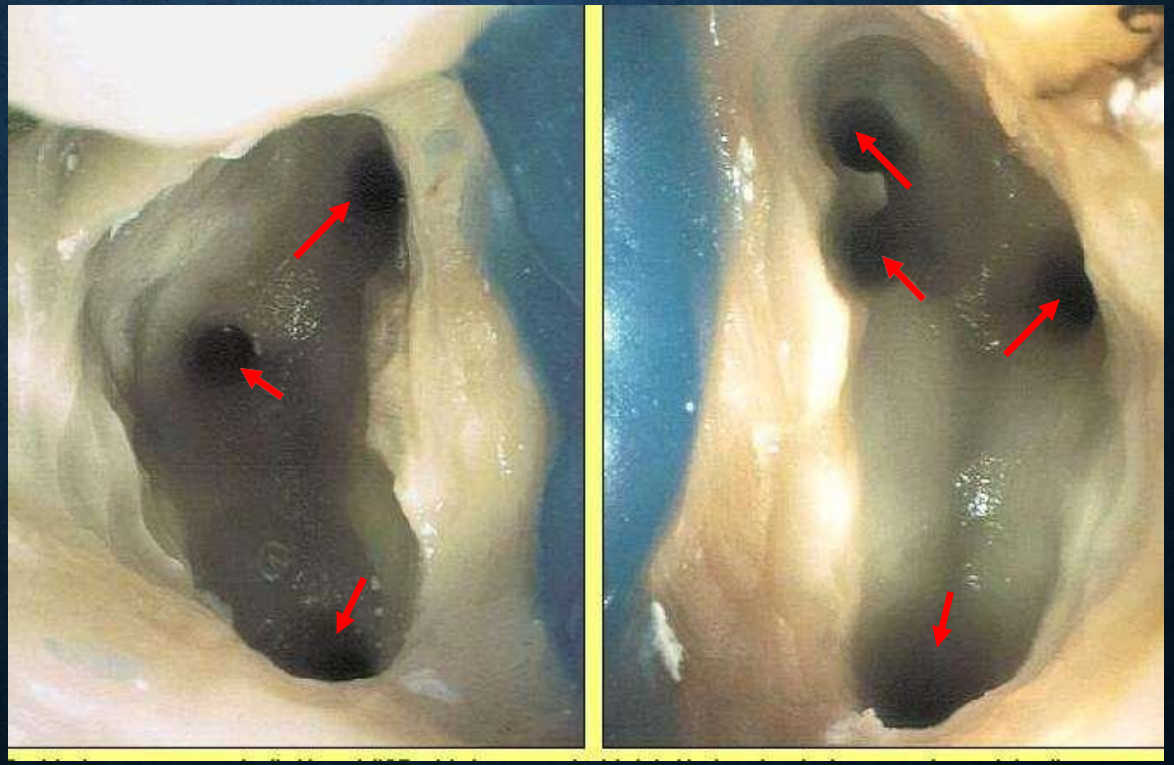
- A, common anatomic presentation showing accessory or lateral canals
- B, first molar with four canals ,with mesiobuccal and mesio palatal sharing an anastomosis in the midroot.
- C ,maxillary molar with four pulp horns,five canals , and significant anastomoses between the canals

EXTERNAL OUTLINE FORM OF MAXILLARY FIRST MOLAR

- most complex
- Because the maxillary first molar almost always has four canals, the access cavity has a **rhomboid shape**, with the corners corresponding to the four orifices

- Mesially, not extend into the mesial marginal ridge
- Distally, the preparation can invade the mesial portion of the oblique ridge, but it should not penetrate through the ridge

➢ PULP CHAMBER FLOOR AND CANAL ORIFICES OF maxillary molar



CT SCANS OF MAXILLARY SECOND MOLARS; (4) POSSIBLE VARIATIONS

A.Uncommon anatomic presentation of
this tooth with one canal
B. Second molar with two canals
C. Second molar with three canals
D.Second molar with four distinct canals

All teeth are shown from both a buccal and a proximal perspective, along with the crosssectional anatomy at the coronal, middle, and apical levels.

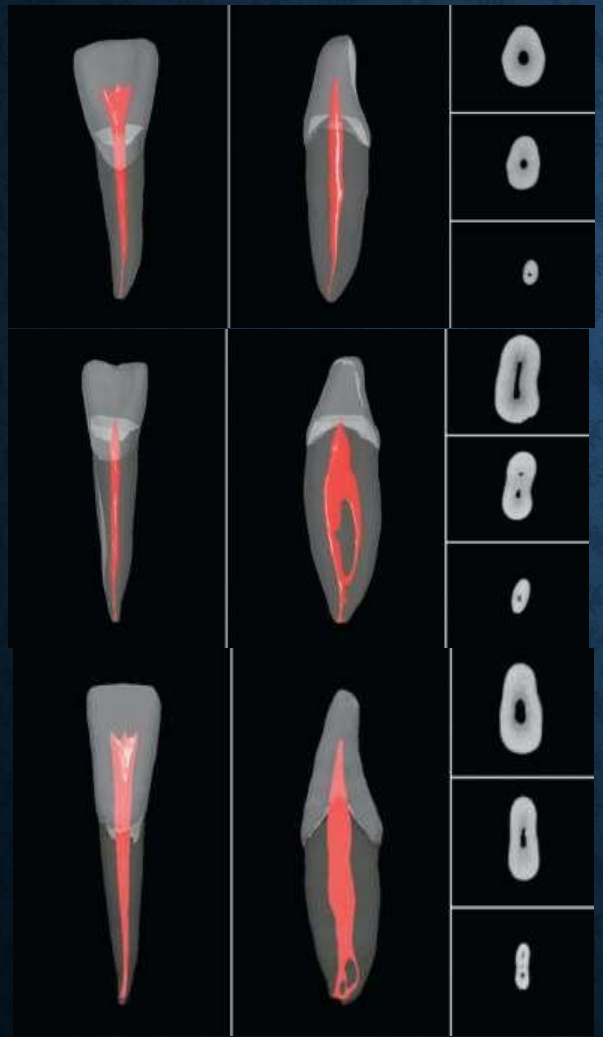
EXTERNAL OUTLINE FORM OF MAXILLARY SECOND MOLAR

- When 4 canals are present…..Rhomboid shape
- When 3 canals are present…..Rounded triangle
- When 2 canals are present…..Oval (widest in bucco-lingually)

MAXILLARY SECOND MOLAR

▪ MAXILLARY THIRD MOLAR

- The access cavity form for the 3rd molar can vary greatly.
- Because the tooth typically has one to three canals, the access preparation can be anything from an oval that is widest in the BL dimension to a rounded triangle similar to Maxillary 2nd Molar.



CT SCANS OF MANDIBULAR CENTRAL INCISIORS

- A , common anatomic presentation
- B, incisior with two canals ,
- C ,central incisior with an apical delta .

- All teeth are shown from both a buccal and proximal perspective ,along with the cross sectional anatomy at the coronal,middle,and apical levels.

- **External Outline Form of Mandibular Central and lateral Incisors**

- **Triangular** or **oval** depending on the promonence of mesial and distal pulp horns

- When 2 canals are present…..extended well into cingulum gingivally

Mandibular left central with two canals and one apex.

- Ingle

. Mandibular central incisor with two canals and two separate apical foramina

- Ingle

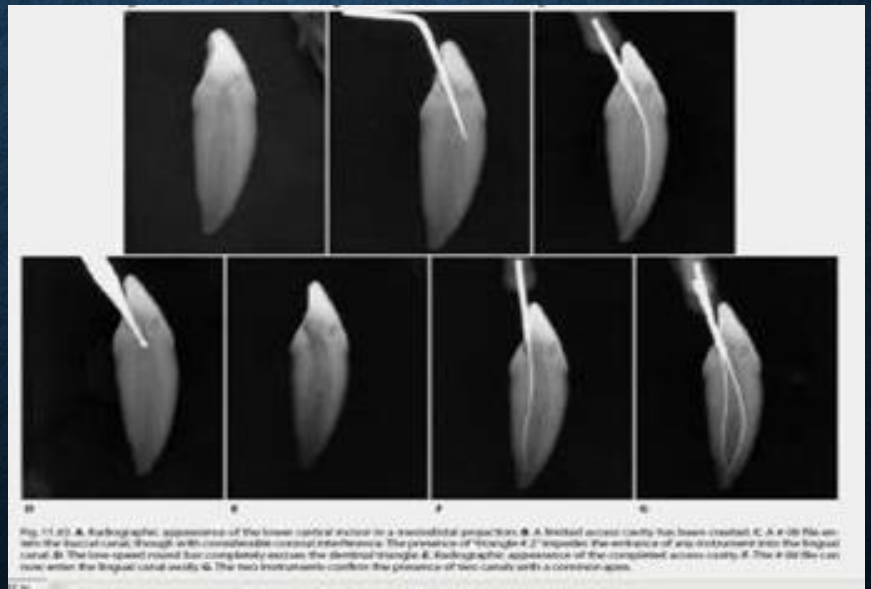
MANDIBULAR CENTRAL AND LATERAL INCISOR

MANDIBULAR INCISORS

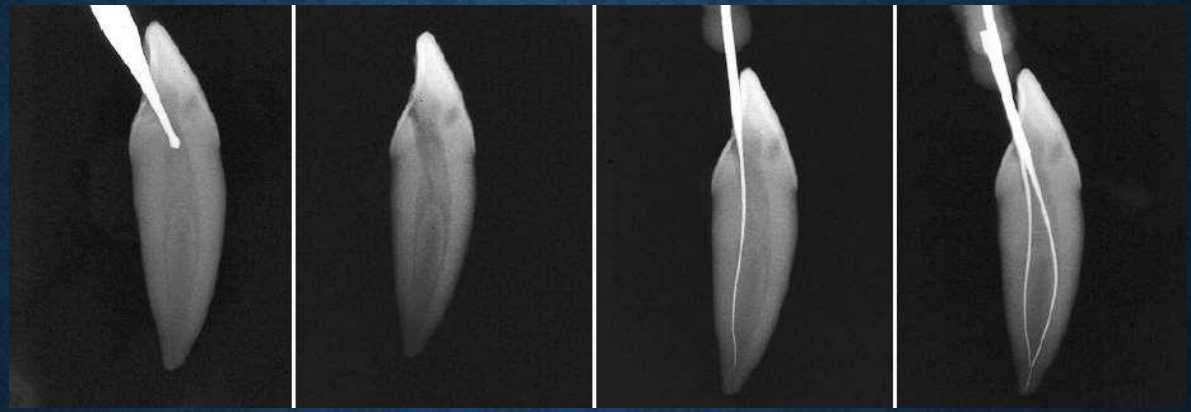
- Limited access will impede the instrument from getting into the lingual canal

Access for Mandibular Incisor

- A file can only enter the buccal canal with a considerable coronal interference in a limited access cavity



ACCESS FOR MANDIBULAR INCISOR



- Removal of coronal obstacles will create an adequate access cavity
- A file can now enter the lingual canal easily

CT SCANS OF MANDIBULAR CANINES

A.Common anatomic presentation
B. Canine with an extra apical canal
C.Canine that splits into two but returns to one canal apically

All teeth are shown from both a buccal and a proximal perspective, along with the cross-sectional anatomy at the

- External Outline Form of Mandibular Canine

- Very similar to maxillary canine
- **Oval shape**

CT SCANS OF MANDIBULAR FIRST PREMOLAR

A. Common anatomic presentation

B. First premolar with significant canal deviations in the middle to apical third before returning to a single large canal apically and a small deviating canal to the proximal

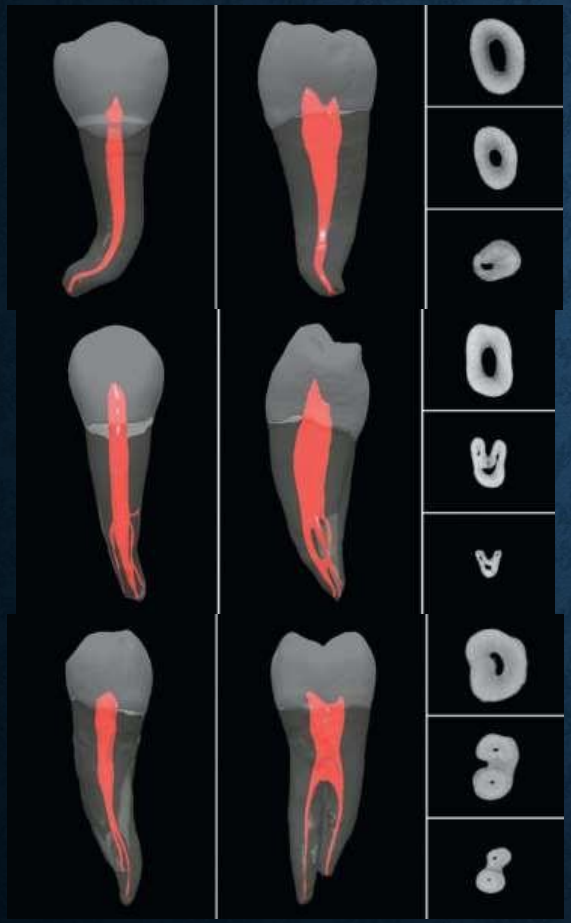
C. First premolar with a branching main canal lingually and multiple accessory canals

All teeth are shown from both a buccal and a proximal perspective, along with the cross-sectional

External Outline Form of Mandibular First Premolar

- **Oval**
  (typically wider mesio-distally than its maxillary counterpart)

- Mesio-distally the access preparation is centered between the cusp tips



CT SCANS OF MANDIBULAR SECOND PREMOLARS

A. Common anatomic presentation
B.Second premolar with significant canal deviations in the middle to apical third
C.Second premolar with fused root that exhibits two distinct canals

All teeth are shown from both a buccal and a proximal perspective, along with the cross-sectional anatomy at the coronal, middle, and apical levels

EXTERNAL OUTLINE FORM OF MANDIBULAR SECOND PREMOLAR

- Very similar to mandibular first premolar

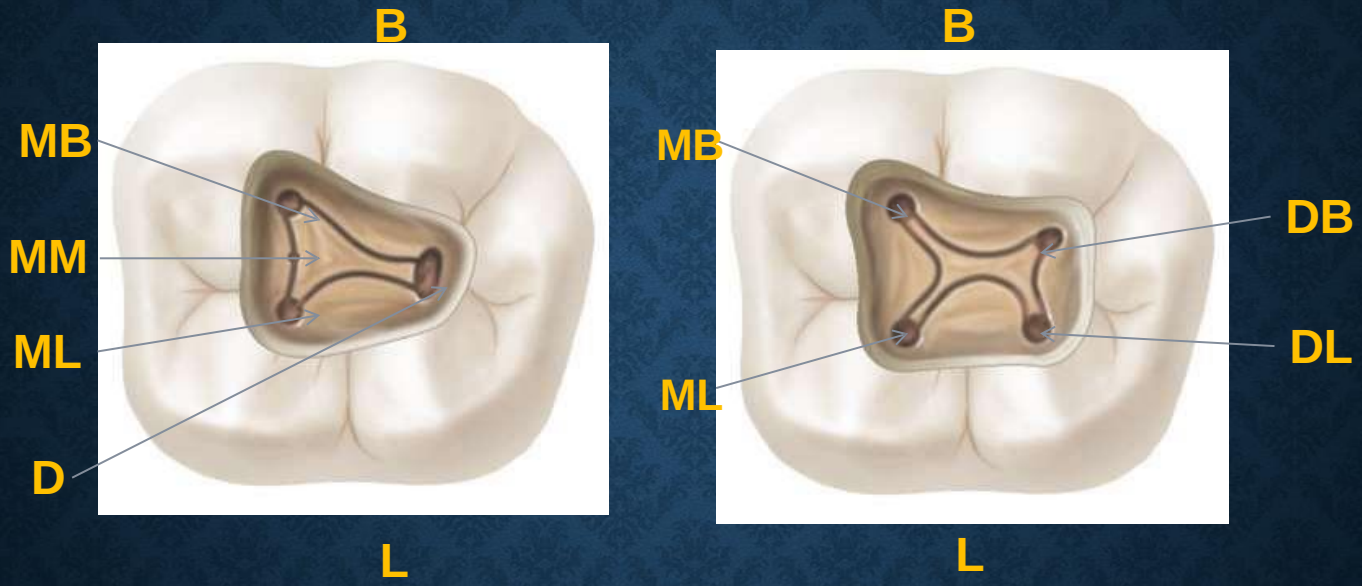
- **μCT scans of mandibular first molar**

A. Common anatomic presentation
B. First molar with three main canals and a deviant fourth canal
C. First molar with wide connections or anastomoses between the mesial canals, demonstrating multiple canal exits

All teeth are shown from both a buccal and a proximal perspective, along with the cross-sectional anatomy at the coronal, middle, and apical levels

External Outline Form of Mandibular First Molar

- The access cavity for the mandibular first molar typically is **tringle or trapezoid or rhomboid**, regardless of the number of canals present



I. 3 mesial canal orifices and 1 distal canal orifice
II. 2 mesial and 2 distal canal orifices

(B, Buccal; *D,* distal, distal orifice; *DB,* distobuccal orifice; *DL,* distolingual orifice; *L,* labial; *M,* mesial; *MB,* mesiobuccal orifice; *ML,* mesiolingual orifice; *MM,* middle mesial orifice)

MANDIBULAR FIRST MOLAR

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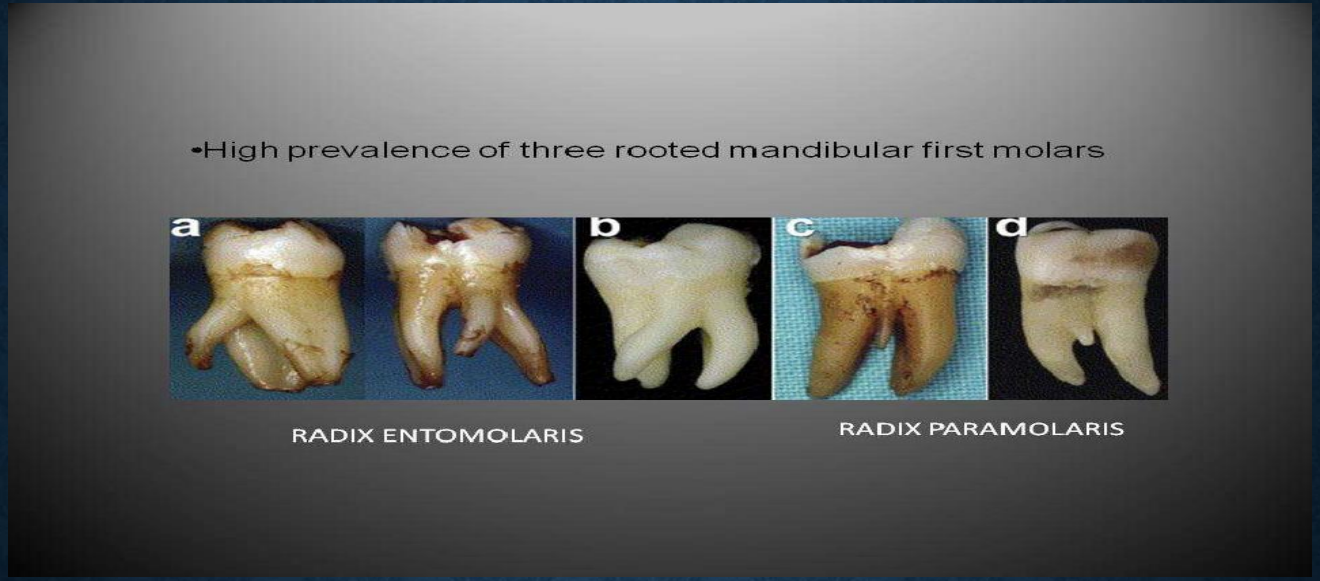
three canal in the mesial and one or two canal in the distal.

1



- **Mandibular molars may sometimes have an additional root located lingually (the radix entomolaris) or buccally (the radix paramolaris).**

- **μCT scans of mandibular second molar**

A. Two-canal second molar with fused roots

B. Second molar with three initial canals ending in one canal apically in both roots

C. Second molar with four distinct canals

All teeth are shown from both a buccal and a proximal perspective, along with the cross-sectional anatomy at the coronal, middle, and apical levels

EXTERNAL OUTLINE FORM OF MANDIBULAR SECOND MOLAR

- When 3 canals are present….. similar to that for the mandibular first molar, although perhaps a bit **more triangular and less rhomboid**
- When 2 canals are present….. rectangular, wide mesiodistally and narrow buccolingually
- When single canal is present….. oval and is lined up in the center of the occlusal surface

TABLE 1-49 Summary Table of the Root Canal Systems of the Permanent Maxillary Teeth

	No. of Canals						No. of Studies	No. of Teeth
	Most Common	1	2	3	4	Other		
Central Incisors *2 or more canals	1 Canal	99.2	0.8*				8	2435
Lateral Incisors *2 or more canals	1 Canal	97.4	3.6*				8	2331
Canines *2 or more canals	1 Canal	95.3	4.7*				9	2615
Caucasian	2 Canals	10.4	86.3	1.6		1.6	17	3405
Asian and NA Native (Mongoloid)	2 Canals	34	63.2	0.4		2.4	4	1574

- Ingle

TABLE 1-49 Summary Table of the Root Canal Systems of the Permanent Maxillary Teeth

Second Premolar	1 Canal	51.8	46.2	0.8		2.0	16
First Molar (three roots) *2 or more canals							
MB	2 Canals	40.6	59.4*				71
DB	1 Canal	98.8	1.2*				26
Palatal	1 Canal	99.3	0.7*				26
Second Molar (three roots) *2 or more canals							
MB	1 Canal	54.8	45.2*				27
DB	1 Canal	99.6	0.4*				16
Palatal	1 Canal	99.8	0.2*				15
Third Molar	3 canals	6	9.2	60.1	24.3	2.5	3

TABLE 1-51 Summary Table of the Root Canal Systems of the Permanent Mandibular Teeth

Tooth Type	No. of Canals						No. of Studies	No. of Teeth
	Most Common	1	2	3	4	Other		
Central Incisors	1 Canal	81.1%	18.8%			0.2%	18	7455
Lateral Incisors	1 Canal	75.4%	24.6%			0.04%	18	7200
Canines	1 Canal	90.5%	9.7*				14	6081
* 2 or more canals								
First Premolar	1 Canal	77.3%	22.7*				29	8538
* 2 or more canals								
Second Premolar	1 Canal	91.3%	8.7*				19	5521
* 2 or more canals								

TABLE 1-51 Summary Table of the Root Canal Systems of the Permanent Mandibular Teeth

Tooth Type	Most Common	No. of Canals 1	2	3	4	Other	No. of Studies	No. of Teeth
First Molar (Two Roots)								
* 2 or more canals								
Mesial	2 Canals	3.2%	95.6%	1.1%		0.1%	20	5824
Distal	1 Canal	69.3%	30.7*				21	5865
First Molar (Three Roots)								
* 2 or more canals								
Mesial	2 Canals	2.2%	97.8*				5	724
Distobuccal	1 Canal	98.6%	1.4*				5	724
Distolingual	1 Canal	100					6	732
Second Molar (Two roots)								
* 2 or more canals								
Mesial	2 Canals	18.1%	81.9*				12	2061
Distal	1 Canal	84.6%	15.4%				12	2061
Third Molar	2-3 Canals	7.0%	43.2%	37.9%	7.7%	4.1%	3	414

▪ MECHANICAL PHASES

1. Armamentarium

- Magnification and illumination
- Handpiece
- Burs
- Endodontic explorer[DG-16,DE-17]
- Endodontic operative spoon
- No -17 explorer
- Ultrasonic unit and tips.

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Magnification and illumination

- The access cavity cannot be prepared adequately without the use of magnification and an appropriate light source.
- At the least, the clinician needs surgical loupes with an auxiliary light source.
- The DOM is the preferred means of magnification and illumination.

Handpieces

- An experienced clinician with good tactile awareness is likely to perform most phases of access preparation with a high- speed handpiece.
- After penetration of the dentin, a less experienced clinician may benefit from the increased tactile awareness offered by a slow-speed handpiece.

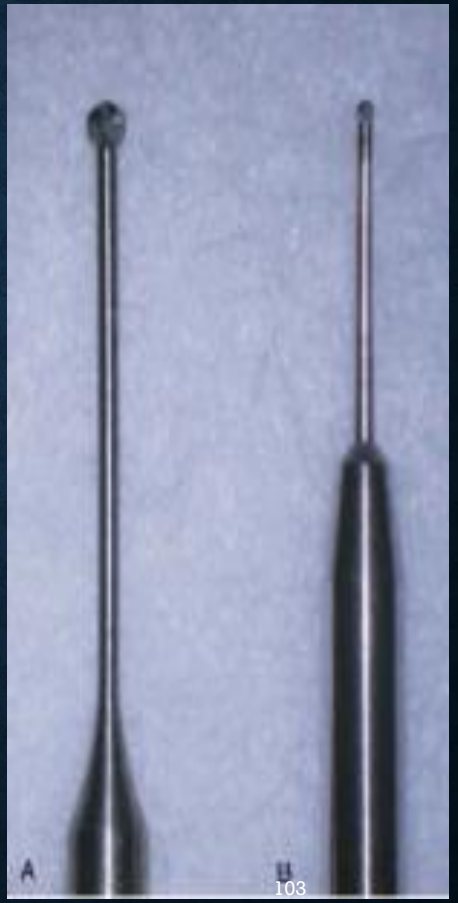
Burs

- Round carbide burs (sizes #2, #4, and #6) are used extensively in the preparation of access cavities.
- They are used to remove caries and to create the initial external outline shape.
- They also are useful for penetrating through the roof of the pulp chamber and for removing the roof.

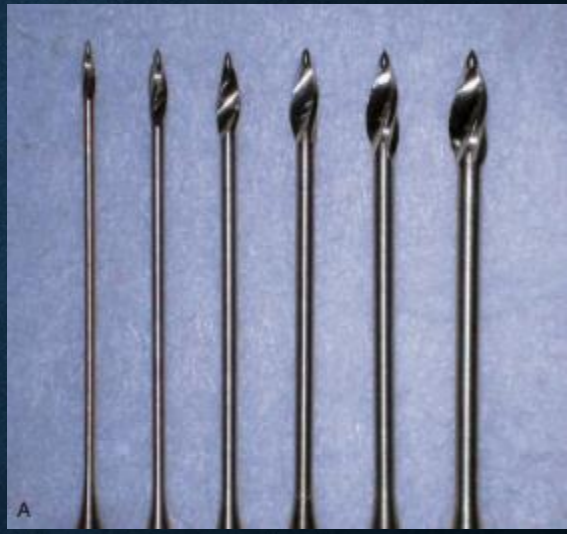
- Some clinicians prefer to use a fissure carbide bur or a diamond bur with a rounded cutting end to perform these procedures.
- The advantage of the fissure carbide and diamond round-end burs is that they also can be used for some of the axial wall extensions of the access cavity preparation.
- However, when these burs are used for this purpose by inexperienced clinicians, their cutting ends can gouge the pulp floor and axial walls.

- **Fissure carbide and diamond burs** with safety tips (i.e., noncutting ends) are safer choices for axial wall extensions. They can be used to extend and favorably orient the axial walls of the pulp chamber.

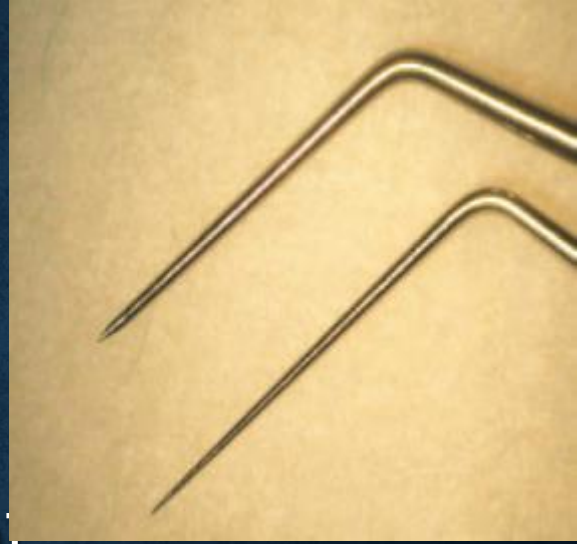
- If a tooth has a receded pulp chamber and calcified orifices, the clinician often must cut into the root to locate and identify the canal orifices.
- Extended-shank round burs, such as the Mueller bur and the LN bur, are useful for this purpose.



- Once the orifices have been located, they should be flared or enlarged and blended into the axial walls of the access cavity.
- This process permits the intracanal instruments used during shaping and cleaning to enter the canal(s) easily.
- Gates-Glidden burs can be used for this purpose.

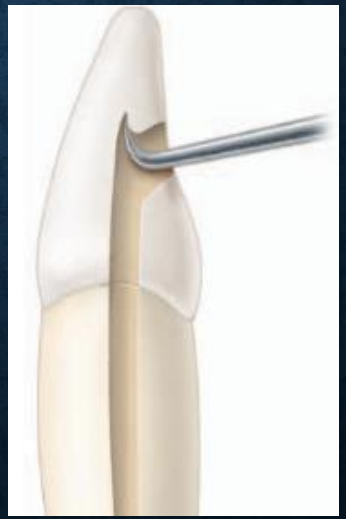


➢ *Endodontic Explorer, Endodontic Spoon, #17 Operative Explorer*



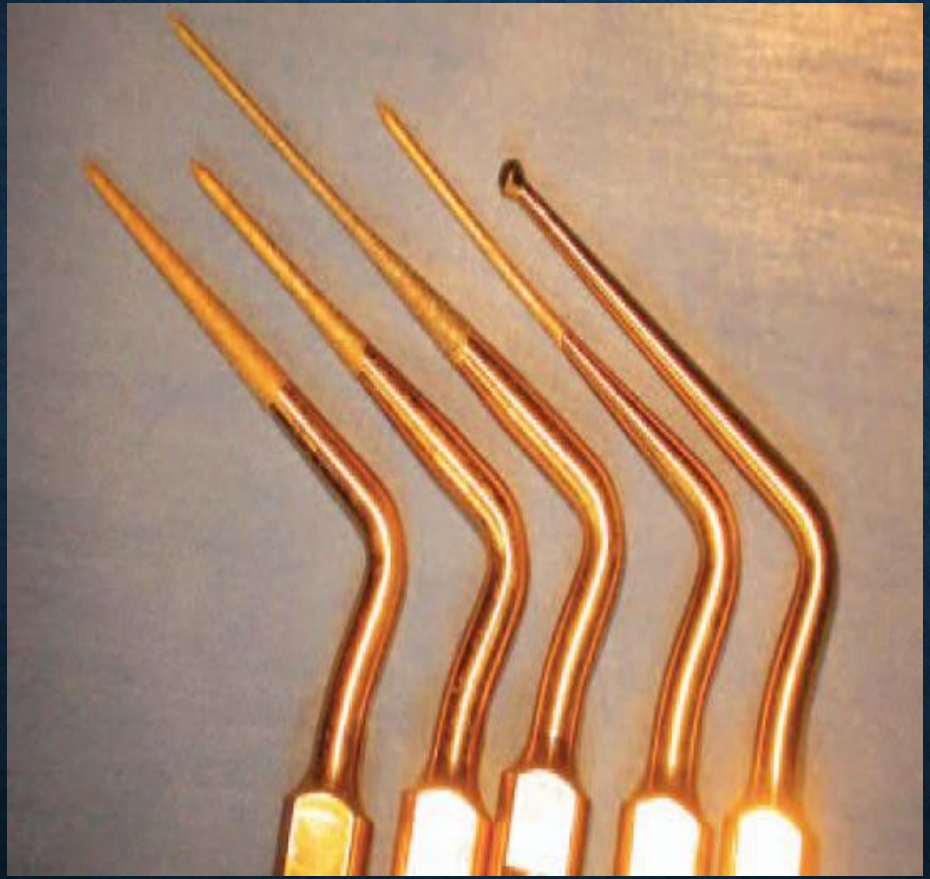
- Various hand instruments are useful for preparing access cavities. The DG-16 endodontic explorer is used to identify canal orifices and to determine canal angulation.
- The JW-17 endodontic explorer serves the same purpose, but its thinner, stiffer tip can be useful for identifying calcified canals.

- The endodontic spoon can be used to remove coronal pulp and carious dentin. A #17 operative explorer is useful for detecting any remaining pulp chamber roof, particularly in the area of a pulp horn.



Ultrasonic unit and tips

- Ultrasonic tips can be used to deepen developmental grooves to remove tissue and explore for canals.
- Ultrasonic systems provide outstanding visibility compared with conventional handpiece heads, which typically obstruct vision.
- Fine ultrasonic tips are smaller than conventional round burs, and their abrasive coatings allow clinicians to sand away dentin and calcifications conservatively when exploring for canal orifices.



EDS ultrasonic tips

1.Post Removal

2.Gross Shaping of Access Cavity

3.Access Refiner

4.MB2 Locator

5.Canal Scouting Opener and refiner

6. Smear Layer removal and activation of irrigants.

➢ Start X ultrasonic tips

One Tip - One Clinical Indication

Start-X™ # 1: Access cavity wall refinement

Start-X™ # 2: MB2 canal scouter

Start-X™ # 3: Canal opening scouter

Start-X™ # 4: Metal post removal

Start-X™ # 5: Reveals the original pulp chamber floor anatomy

BUC-1 and BUC-1A

- The BUC-1 and BUC-1A can be used for gross dentin removal, moving access line angles, cutting a groove in the mesial access wall to drop in to MB2 canals, and for unroofing pulp chambers. Helpful in finding reclusive MB2s.

➢ BUC-2 and BUC-2A

- The BUC-2, with its disk-like tip, can be used to plane attached pulp stones from the pulp chamber floor. In molars, it can be used to horizontally smooth the pulp chamber floor to get to the darker-colored dentin. Can be used for corners of molar access preparation and bicuspid access preparation.

➢ BUC-3 and BUC-3A

- The BUC-3 and BUC-3A are extremely active instruments with sharp tips. They are used for chasing canals halfway up a root or for digging around a post or carrier-based obturator to remove it. The water port is placed near the cutting surface of the tip. Use only at lowest power level.

➢ 2. Access cavity preparation

- Anterior access cavity preparation
- Posterior access cavity preparation

❑ ANTERIOR ACCESS CAVITY PREPARATION

1)Removal of caries and permanent restorations

2)Initial external outline form :

- **3.Penetration into the roof**

- The angle of penetration for the preliminary outline form is perpendicular to the lingual surface.
- The angle of penetration for initial entry into the pulp chamber is nearly parallel to the long axis of the root.

➢**4) Completion of removal of the pulp chamber roof;** a round carbide bur is used to engage the pulp horn, cutting on a lingual withdrawal stroke.

- Complete roof removal is confirmed with a #17 operative explorer if no "catches" are discovered as the explorer tip is withdrawn from the pulp chamber along the mesial, distal, and facial walls.

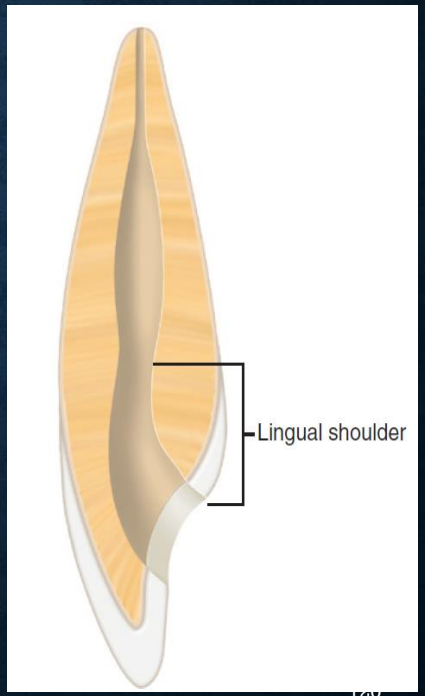
- Removal of the pulp horn is evaluated with a #17 operative explorer.

5)Identification of all Canal Orifices

With an endodontic explorer.
Dislodge any calcific deposits

▪6)Removal of the Lingual Shoulder and Orifice and Coronal Flaring

Lingual shoulder is a part of dentin, extending from the cingulum to 2 mm apical to the orifice.



➢Avoid placing bevel

Placing an incisal bevel on the lingual surface of a maxillary anterior tooth can lead to fracture of the permanent restoration during occlusal function.

➢ 7)Straight-Line Access Determination

Inadequate access preparation. The lingual shoulder was not removed, and incisal extension is incomplete. The file has begun to deviate from the canal in the apical region, creating a ledge.

If the lingual ledge of dentin remains, deflecting the file
toward the labial wall. As a result, portions of the lingual canal wall
will not be shaped and cleaned.
Removal of the lingual ledge results
in straight-line access.

➢8) Visual inspection of the access cavity

- Appropriate magnification and illumination should be used to inspect and evaluate the completed access cavity .

9) **Refinement and smoothening of the margins**

- The restorative margins are refined and smoothed to minimize the potential of coronal leakage.

➢ POSTERIOR ACCESS CAVITY PREPARATIONS

1) Removal of caries and permanent restoration

➢2) Initial external outline form

No 2 and no 4 round burs can be used for this purpose in premolar and no 4 and no 6 for molars.

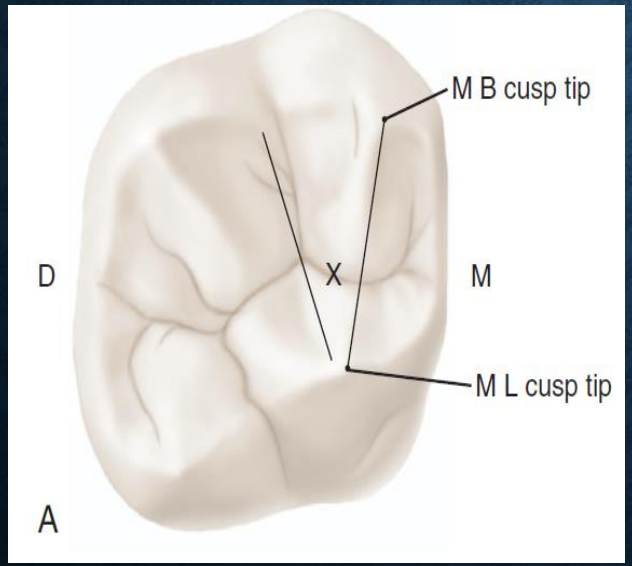
- The pulp chamber of posterior teeth is positioned in the center of the tooth at the level of CEJ
- Therefore, in maxillary premolar , the point of entry that determines the external outline form is on the central groove between the cusp tips.

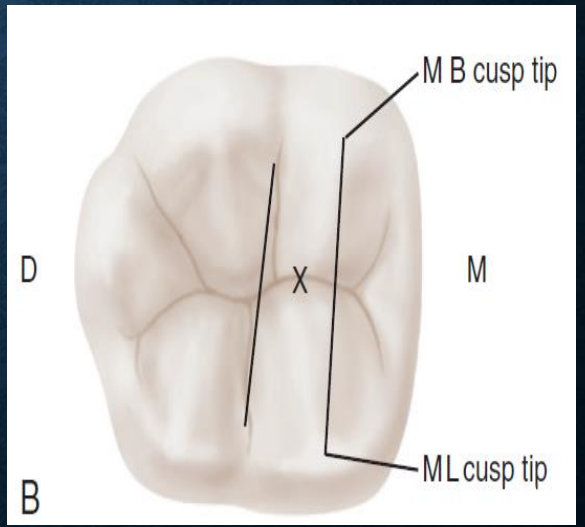
The crown of a mandibular premola
is tilted lingually
relative to the root.

- Therefore, the starting location must be adjusted to compensate for this tilt.in mandibular first premolar, the starting location is halfway up the lingual incline of the buccal cusp on a line connecting the cusp tips.
- Mandibular second premolar requires less of an adjustment because they have less lingual inclination.

- The starting location for this Is one third the way up the lingual incline of the buccal cusp on a line connecting the buccal cusp tip and lingual groove between the lingual cusp.

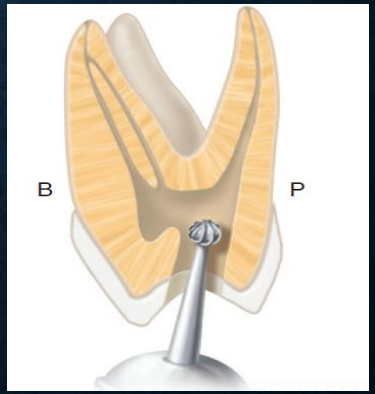
- For molars the correct starting location is on the central groove halfway between the mesial and distal boundaries





- Penetration through the enamel into the dentin is performed using a No 2 round bur for premolar and No 4 round bur for molar.
- The bur is directed perpendicular to the occlusal table and initial outline shape is created.
- The premolar and maxillary molar outline shape is oval and widest in bucco-lingual dimension and mesiodistal direction is widest in mandibular molar.
- The final outline shape of molar is triangular or rhomboidal.

- Continuing with a same round or tapered fissure bur and angle of bur is changed same as anterior teeth.
- In premolar its parallel to long axis
- Molar it is angulated to the largest canals



Complete Roof Removal

- Round or tapered fissure bur is passed between the orifices along the axial walls to remove the roof of pulp chamber with pulp horns and create the desired external outline shape simultaneously.

➢Identification of all Canal Orifices

➢Ideally the orifices are located at the corner of the final preparations to facilitate the root canal procedures.

▪Removal of the Cervical Dentin bulge and Orifices and Coronal flaring

- The cervical dentine bulge are shelves of dentin that overhang orifices in posterior teeth.
- These bulge can be removed with carbide bur or Gates-Glidden burs.
- #10 or #12 tapered engine driven Niti files can also be used for this purpose.

▪Straight Line Access preparation

- It is paramount to successful shaping.
- Files must have unimpeded access to the apical foramen or the first point of canal curvature.

- **Visual inspection of the pulp chamber floor**

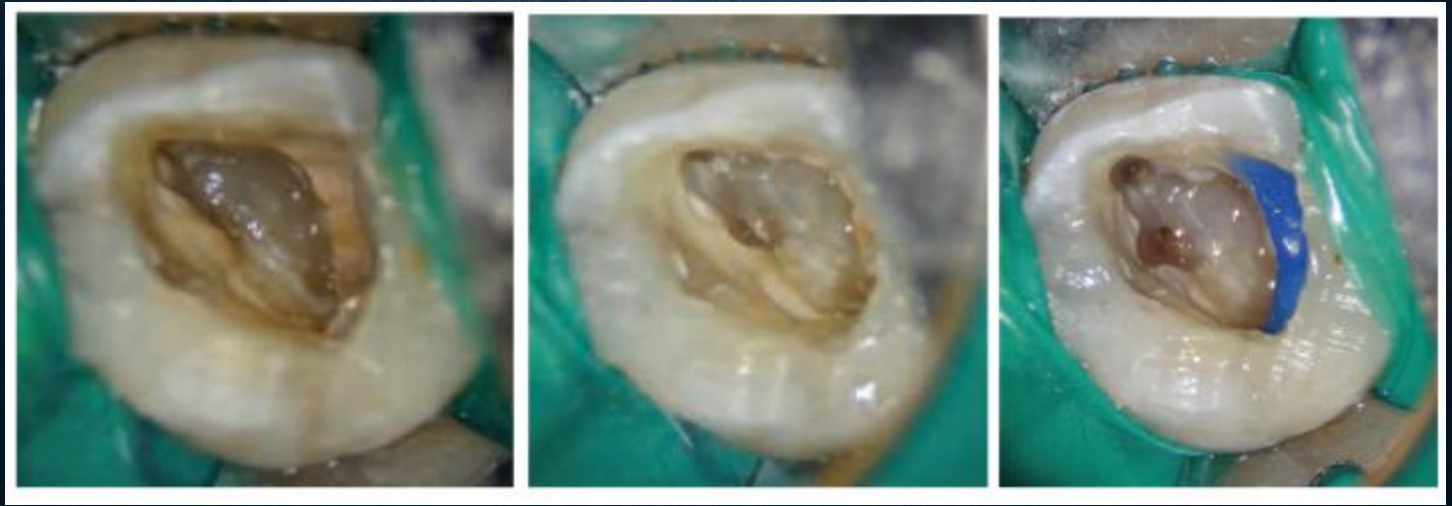
Same as anterior access cavity preparations.

- **Refinement and smoothing of the restorative**
- **Margins**

The restorative margins are refined and smoothed to minimize the potential of coronal leakage.

According to Nallapati, the following are the possible locations of the MB-2 canal in the maxillary first molar:

- Present on the developmental line that connects MB-1 and palatal canal



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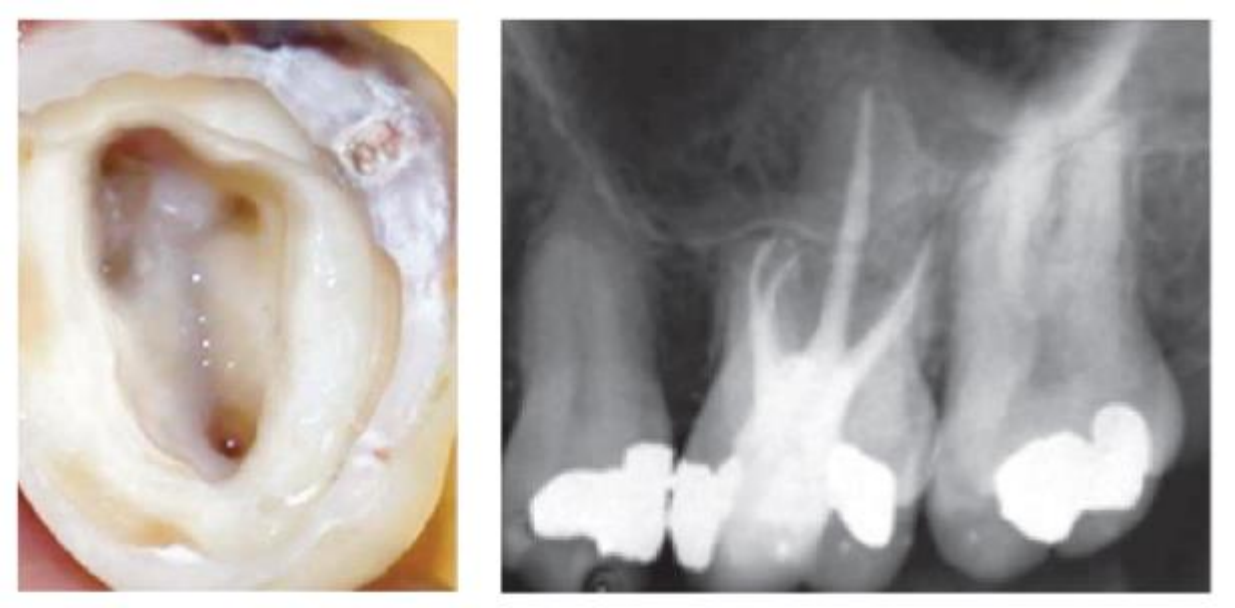
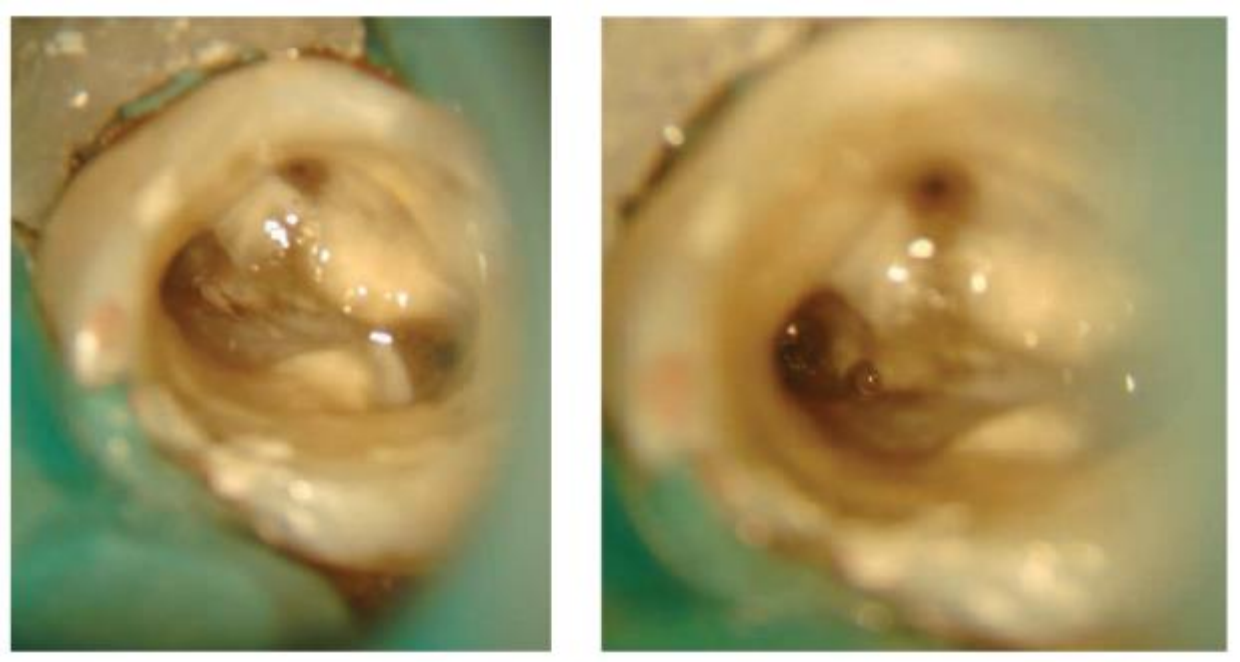
- Grossman 13th edition

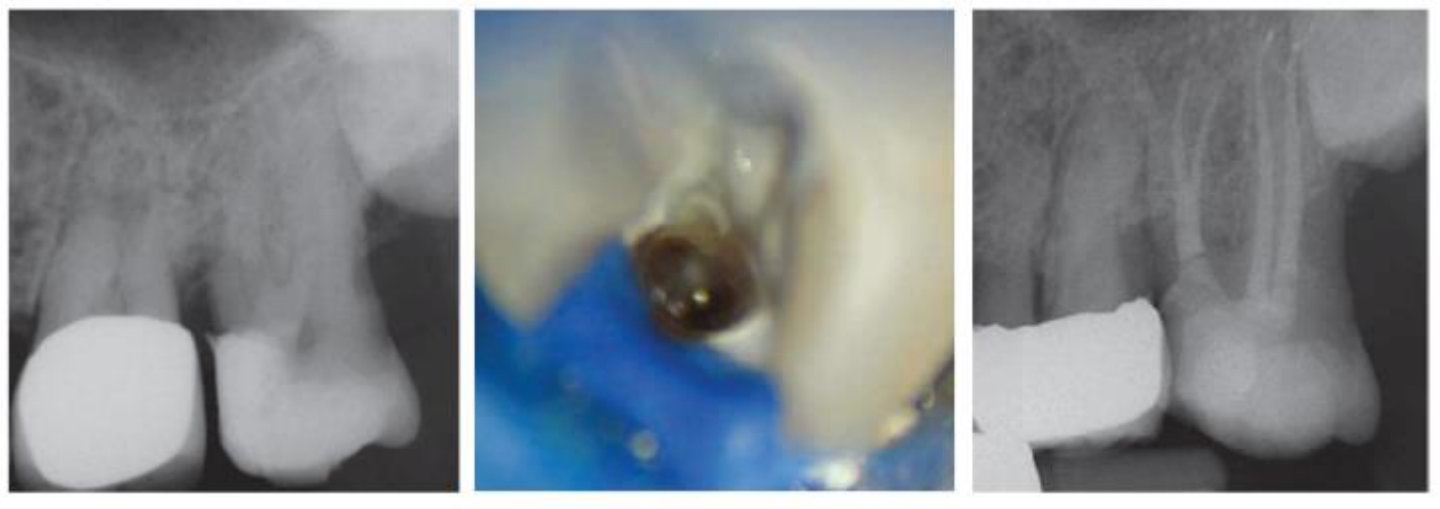
- -Present mesial to the developmental line that connects MB-1 and palatal canal



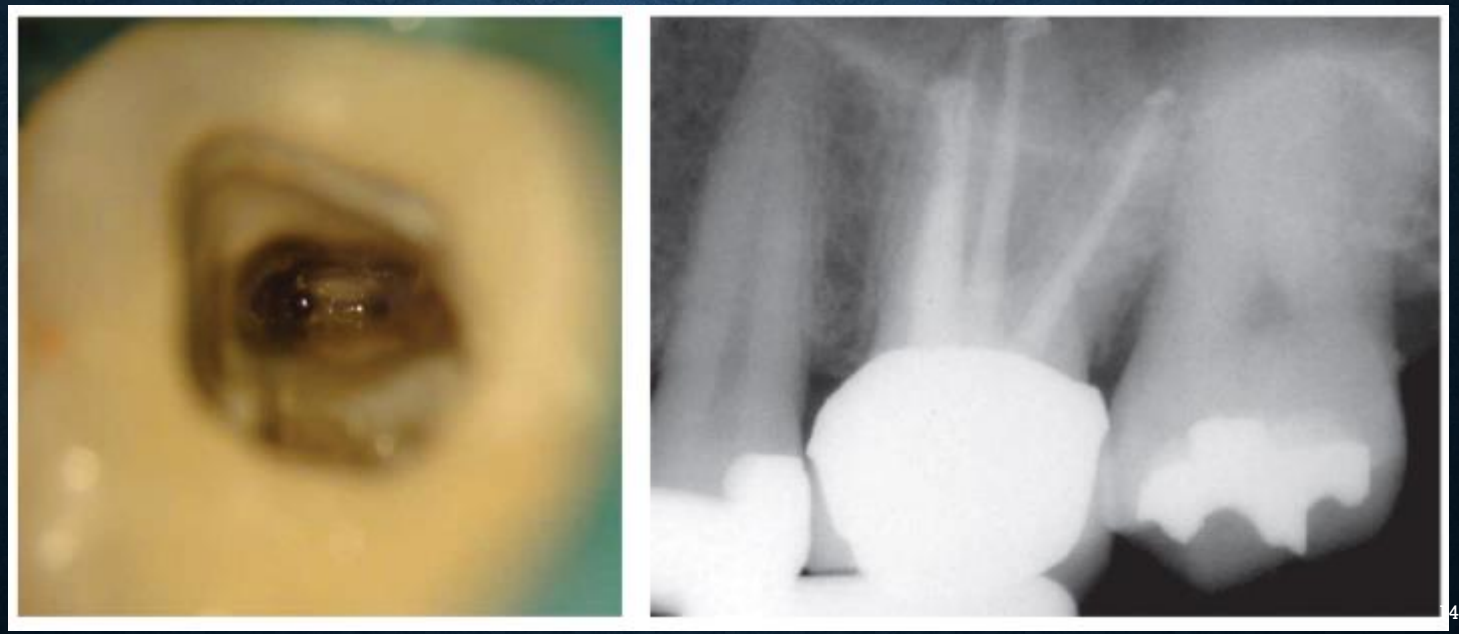
- Appears as a groove on the palatal wall of the MB-1 canal



- Splits off the MB-1 canal in the middle third of the canal



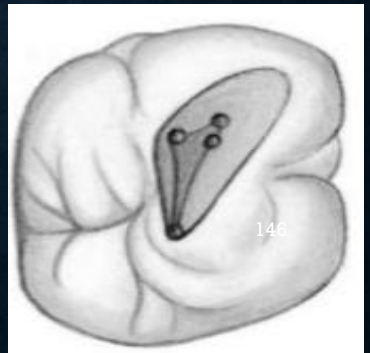
- Splits off the MB-1 canal in apical third of the canal



- Comes off the buccal wall of the palatal canal

- **Luebke** showed that an entire wall is not extended to search and facilitate cleaning, shaping and obturation of extracanal.

- He recommended extension of only that portion of the wall where an extracanal is present, and this may result in **"cloverleaf appearance"** in the outline form.
- Luebke referred this to as a **shamrock preparation**.

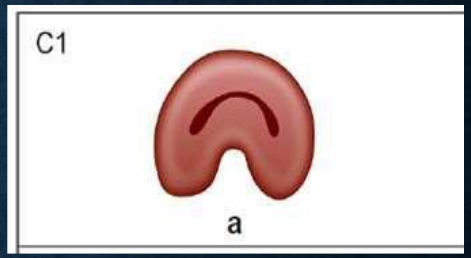


❑ C SHAPED CANALS

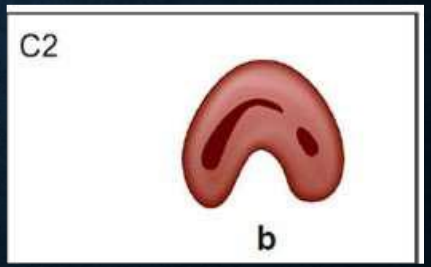
- The main cause for C-shaped roots and canals is the failure of Hertwig's epithelial root sheath to fuse on either the buccal or lingual root surface.

MELTON'S CLASSIFICATION

- **Category I:** continuous C-shaped canal running from the pulp chamber to the apex defines a C-shaped outline without any separation (i.e., C1 in Fig).



- **Category II:** the semicolon-shaped (;) orifice in which dentine separates a main C-shaped canal from one mesial distinct canal (i.e., C2 in Fig).

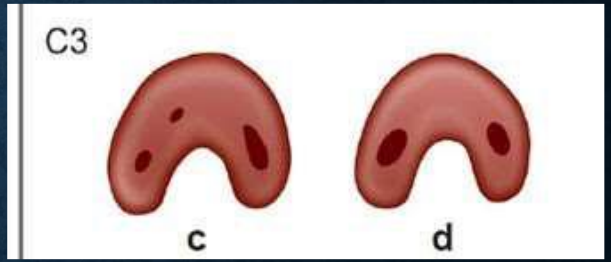


- Category III: refers to those with two or more discrete and separate canals(i.e., C3 in Fig):

Subdivision I, C-shaped orifice in the coronal third that divides into two or more discrete and separate canals that join apically;

Subdivision II, C-shaped orifice in the coronal third that divides into two or more discrete and separate canals in the midroot to the apex;

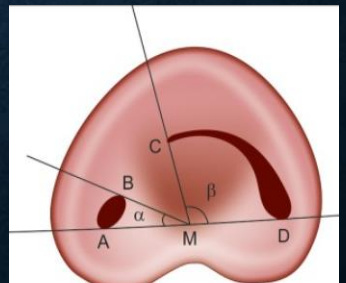
Subdivision III, C-shaped orifice that divides into two or more discrete and separate canals in the coronal third to the apex .



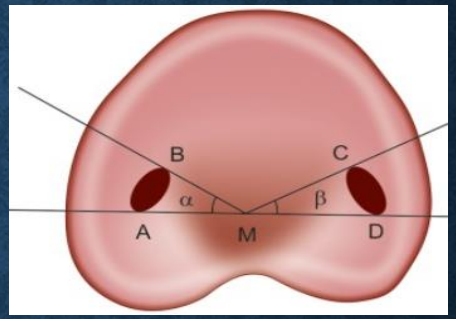
- **Fan et al.** modified Melton's method into the following categories:

- Category I (C1): The shape was an interrupted "C" with no separation or division

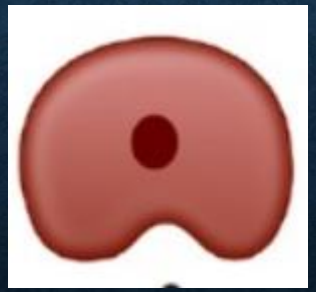
- Category II (C2): The canal shape resembled a semicolon resulting from a discontinuation of the "C" outline, but either angle α or β should be no less than 60°.



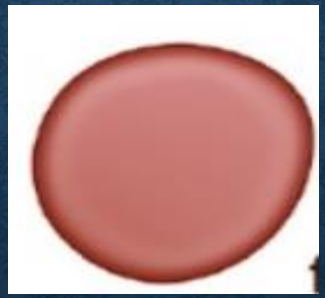
- Category III (C3): 2 or 3 separate canals and both angles, α an β, less than 60.



- Category IV (C4): Only one round or oval canal in the cross-section.

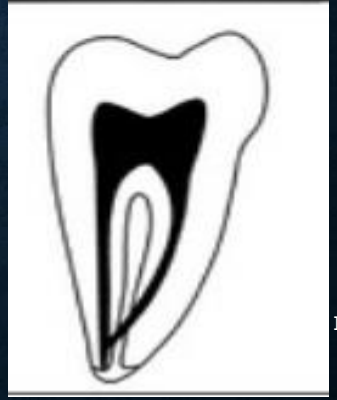


- Category V (C5): No canal lumen could be observed (which is usually seen near the apex only)

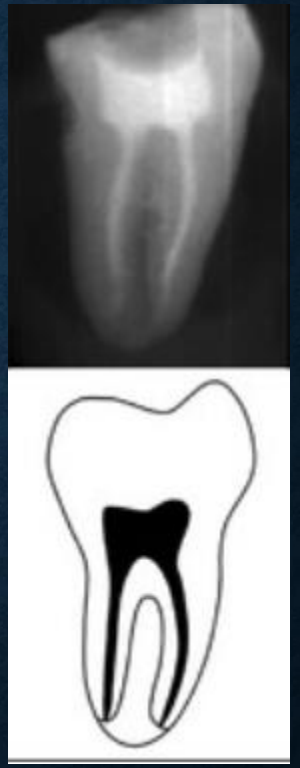


- **Fan et al** classified C-shaped roots according to their radio-graphic appearance into three types

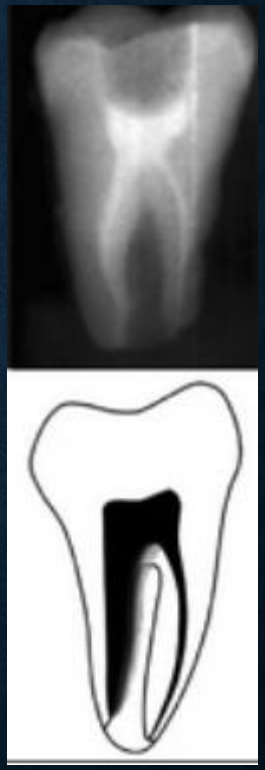
Type I: a mesial and a distal canal merge into one before exiting at the apical foramen.



- **Type II:** there are a mesial and a distal canal; the two canals appeared to continue on their own pathways to the apex.



- **Type III:** there are a mesial and a distal canal; one canal curves to and superimposes on the radiolucent line when running towards the apex, and the other canal appears to continue on its own pathway to the apex.



3-D CLASSIFICATION OF C-SHAPED CANAL SYSTEM

*According to **Yuan Gao et al** in 2006*

- Type I (Merging type): Canals merged into one major canal before exiting at the apical foramen; partial dentin fusion area may appear in the coronal and (or) middle portion of the canal system

- **Type II (Symmetrical type):** separated mesial canal and distal canal located at the mesial part and distal part of the root, respectively. From the buccal-lingual view, symmetry of the mesial canal and distal canal was present along the longitudinal axis of the root.

- **Type III (Asymmetrical type):** Separate mesial and distal canals were evident. From a buccal-lingual view, the distal canal may have a large isthmus across the furcation area, which commonly made the mesial and distal canal asymmetrical

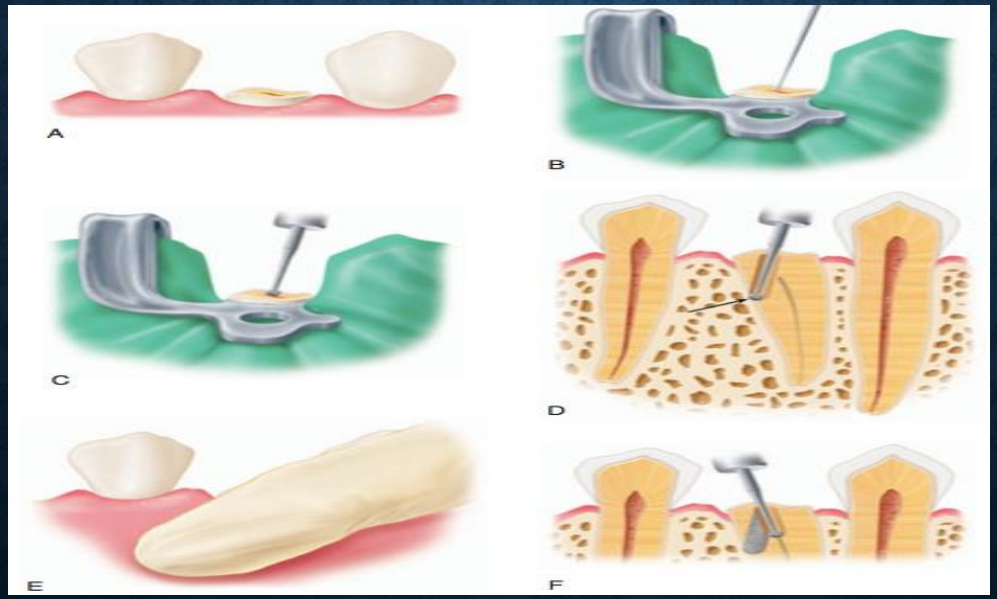
- There are several radiographic hints that can help the operator diagnose C-shaped canals prior to accessing the pulp chamber.
- **Simon** suggested the following:

1. The root appears conical and as if representing one root with a furcation. This is usually in contrast to adjacent molars (especially the first molar), that have two distinct roots with a normal furcation.
2. The pulp chamber appears longer than that of the adjacent molars.

3. The pulp chamber becomes indistinct apically. The pulp chamber's floor is not usually visible and little or no furca is apparent on the radiograph.
4. At the apex, the periodontal ligament is indistinct or indiscernible. Canals cannot be followed in the apical third portion of the tooth. The exit of the apical foramina are not clearly observed.

CHALLENGING ACCESS PREPARATION

- Teeth with minimal or no clinical crown



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- Creating an access cavity on a tooth with little or no clinical crown might seem to be a simple procedure.
- In young teeth, traumatic fractures often expose the pulp chamber, making preparation easy.
- However, in older teeth that have had caries or large restorations, the pulp chambers typically have receded or calcified. Loss of significant coronal anatomy to guide penetration angles can make access quite difficult.

- Before beginning an access cavity on these teeth, study their root angulation on pretreatment radiographs and examine the cervical crown anatomy with an explorer.
- Pulp chambers are located at the center of the crown at the level of the CEJ. Access often is started without a dental dam in place

- The depth of penetration needed to reach the pulp canal is measured on a pretreatment radiograph.
- If reaches this depth without locating the canal, two radiographs should be taken before the process proceeds.

- **Heavily restored teeth**
  - Restorative materials often alter the external anatomic landmarks on the crown of a tooth, making access preparation difficult.
  - Restorative materials and full crowns rarely reproduce the original tooth anatomy in the exact same position.
  - Most restorative materials block the passage of light into the internal aspects of the tooth, resulting in poor visibility during preparation of the access cavity.

- In most cases, complete removal of large restorations is the wisest course.
- These restorations often have leaky, defective margins or recurrent caries or both.
- Removing the restoration allows the clinician better visibility of the internal anatomic structures through direct visualization and increased light penetration.

- Prevent pieces of the restorative material from falling into the root canal and….
- Instruments can rub against restoration fragments during shaping and cleaning, creating filings that can be carried into the canal system. Complete removal prevents these problems.

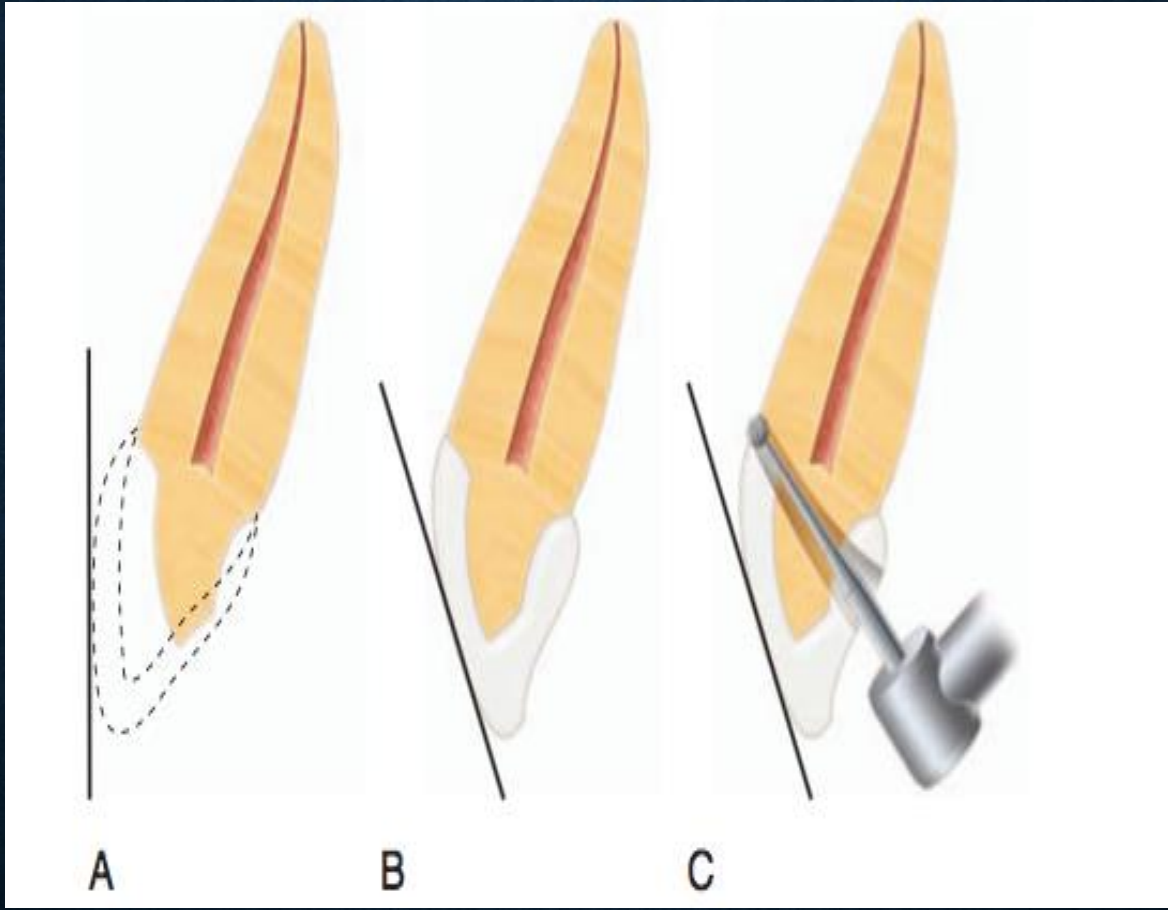
Access through crown

- When an extensive restoration is a full or partial veneer crown, the restoration must be evaluated thoroughly.
- If any recurrent decay or leaky margins, the crown should be removed before the access cavity is prepared.

- Creation of an access through an intact full or partial veneer crown should be done with caution.
- When such restorations are placed, they often change the crown-to-root angulation to correct preexisting occlusal discrepancies. Full veneer crowns also can alter tooth rotation.
- Pretreatment radiographs can be helpful, but the metal in the full veneer crown often masks the underlying pulp chamber. In these situations the clinicians best approach is to stay as centered in the tooth as possible, using all available clinical and radiographic information.

- Metal veneer crowns are best penetrated with new, sharp carbide burs. Round burs work well, but tungsten carbide transmetal burs are more efficient. These crosscut fissure burs are specifically designed to cut through metal restorative materials.
- Porcelain restorations must be handled delicately to minimize the potential for fracture. The clinician should use a round diamond bur and copious water spray to penetrate the porcelain.

- After porcelain penetration, a transmetal bur and copious water spray should be used to penetrate the metal coping; the water spray minimizes heat buildup, which could fracture the porcelain.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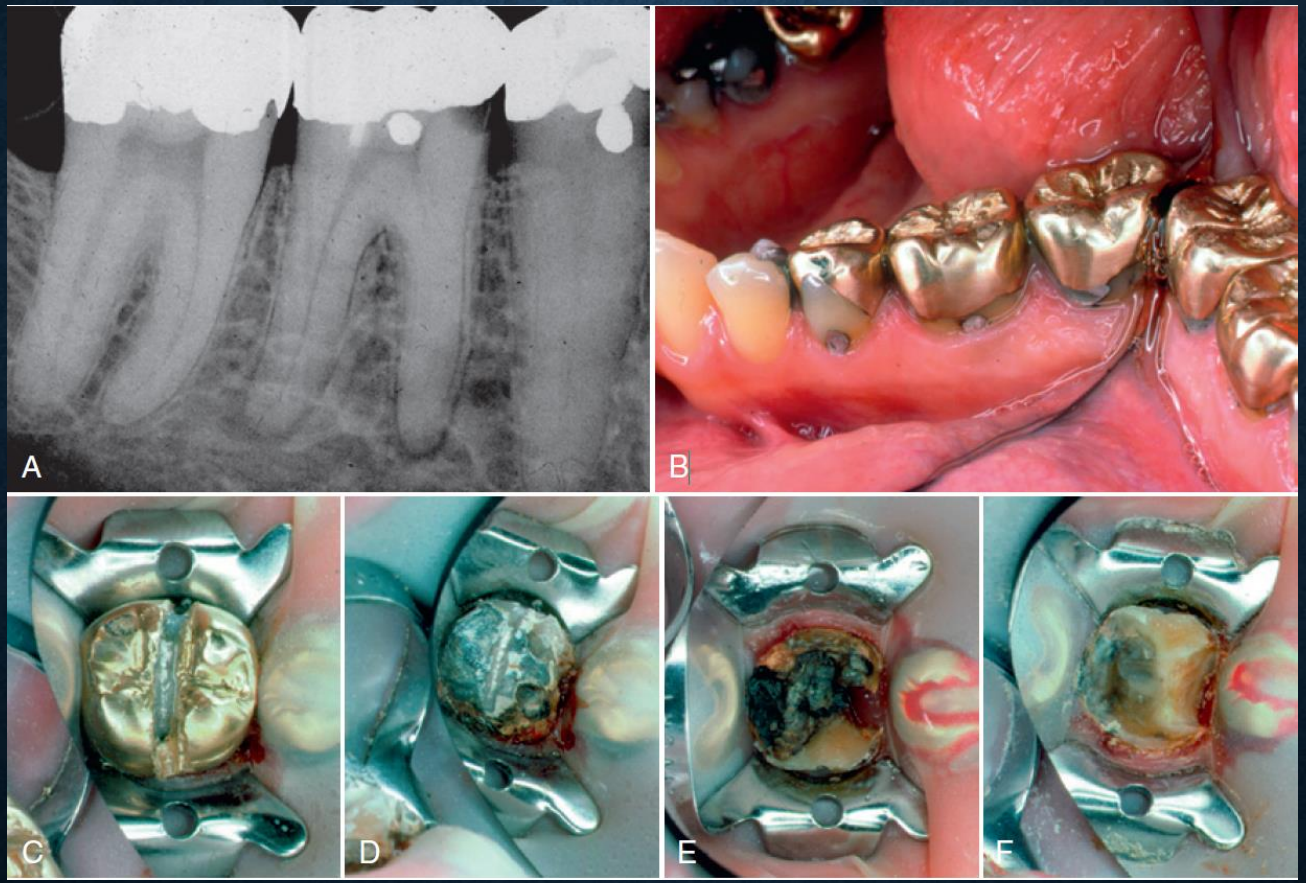
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Teeth with calcified canals

- Teeth with severe pulp calcification may present problems with locating and negotiating root canals.
- The use of magnification and transillumination, as well as careful examination of color changes and pulp chamber shapes, can help the clinician safely locate canals.

- A fiberoptic light directed through the CEJ can reveal landmarks and color changes that may not otherwise be visible.
- The chamber floor is darker in color than its walls, and developmental grooves connecting orifices are lighter in color than the chamber floor.
- staining the pulp chamber floor with 1% methylene blue dye, performing the sodium hypochlorite "champagne bubble" test and searching for canal bleeding points.

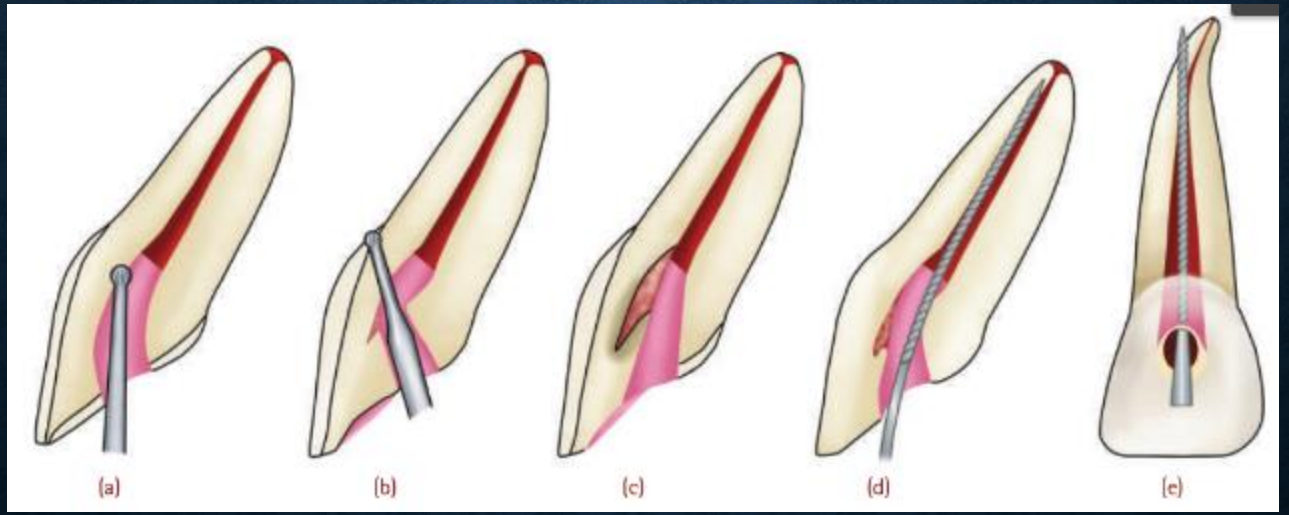
- Crowded teeth

➢Conventional access preparations m
in patients with crowded teeth. The c
an alternative approach must be bas
access principles and conservation

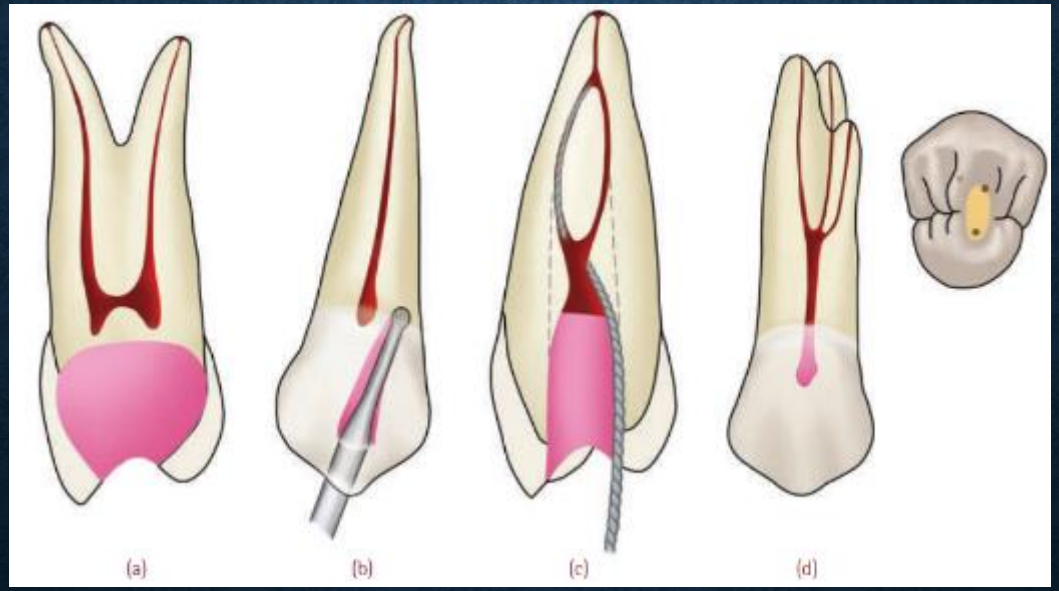
➢In certain circumstances a buccal a
may be the treatment of choice .

COMMON ERRORS

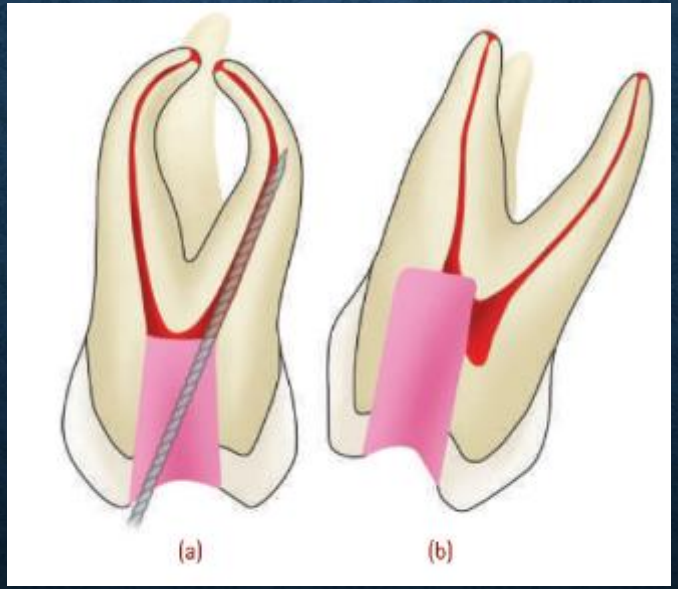
- Common errors in access openings of maxillary anterior teeth



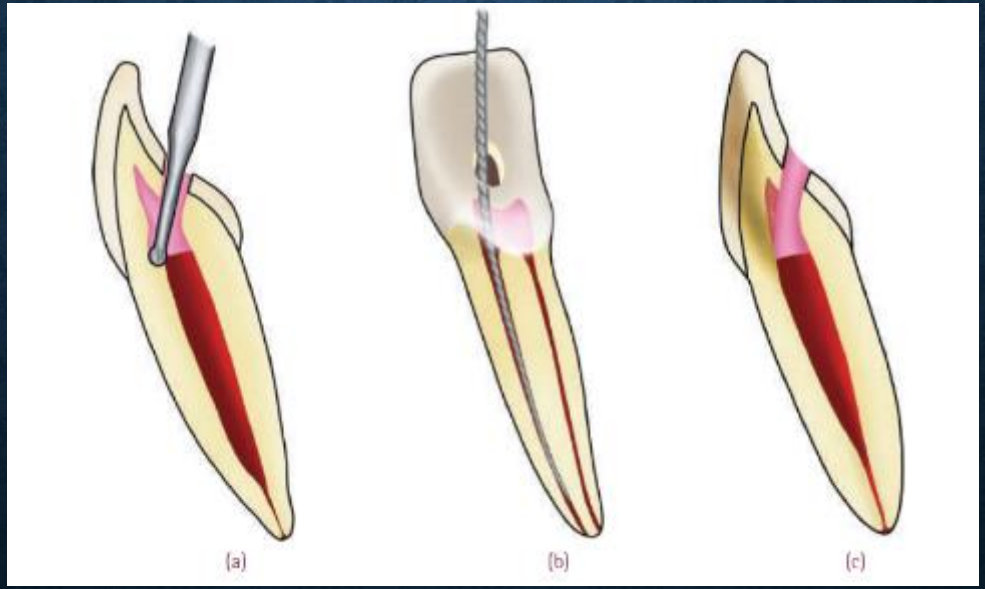
COMMON ERRORS IN ACCESS OPENING OF MAXILLARY PREMOLAR



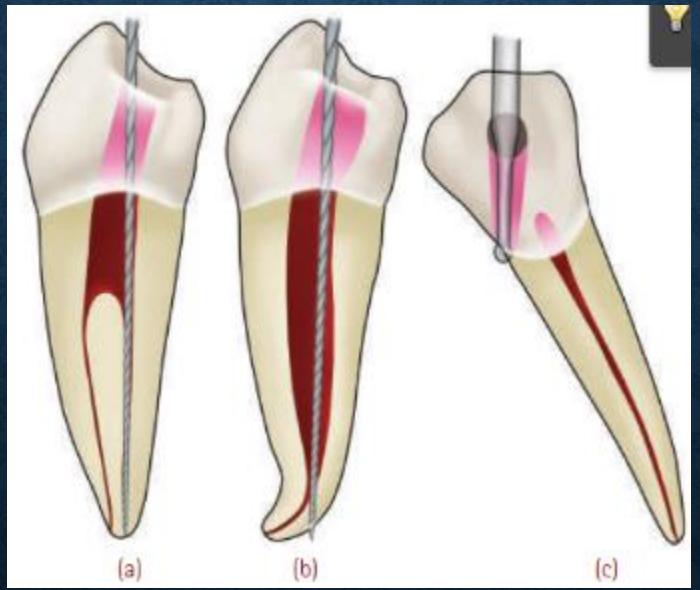
COMMON ERRORS IN ACCESS OPENINGS OF MAXILLARY MOLAR



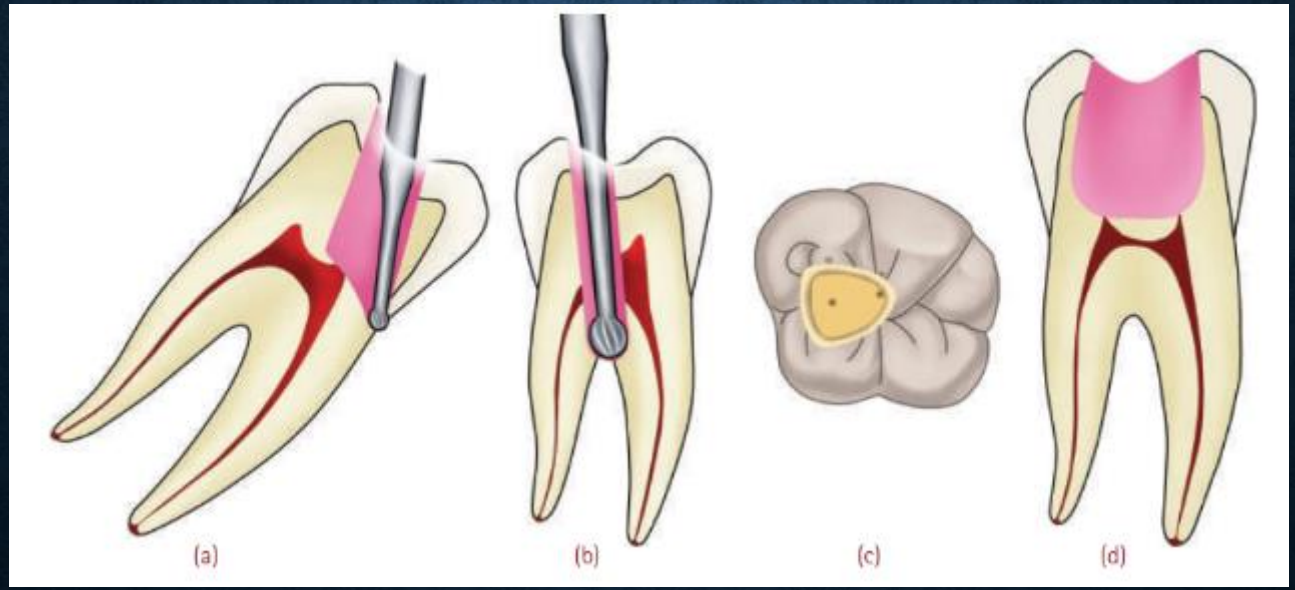
COMMON ERRORS IN ACCESS OPENINGS OF MANDIBULAR ANTERIOR TEETH



COMMON ERRORS IN ACCESS OPENINGS OF MANDIBULAR PREMOLARS



COMMON ERRORS IN ACCESS OPENINGS OF LOWER MOLARS



➢ CURRENT CONCEPTS IN ACCESS CAVITY

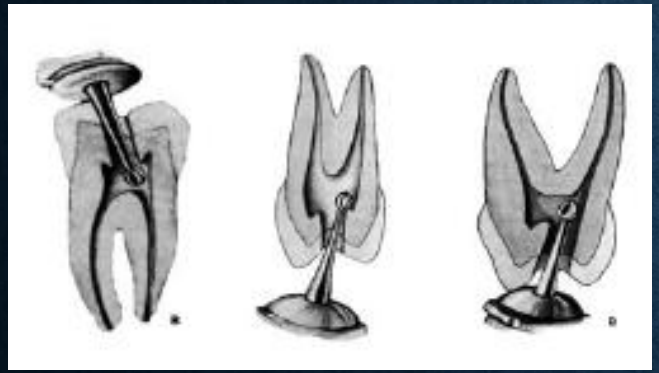
WHY DO ENDODONTICALLY TREATED TEETH FAIL?

- The degree of stress experienced by the tooth under load.
- The inherent biomechanical properties of the remaining structure responsible for resisting fracture.

PROBLEMS ASSOCIATED WITH TRADITIONAL ACCESS

- Use of large round burs
- Use of gates glidden drill
- De-roofing

WHY ARE ROUND BURS SO DESTRUCTIVE?



- Text after text shows the same round bur technique relying on tactile feedback as the round bur drops in to the pulp chamber.
- If the pulp chamber is sufficiently large enough, then a round bur can truly"drop in"to the pulp chamber.
- Much more representative of the spectrum of cases typically presenting for endodontic treatment.

- Clearly, trying to round bur in to the scant or nonexistent chamber is not going to lead to the desired outcome even for a skilled clinician.

WHY ARE GATES GLIDDEN BURS SO PROBLEMATIC?

Extensive coronal flaring results in extrusion of obturation material
in the furcation. The furcal strip perforation is a perfect example of the
dangers of “Blind Funneling” with Gates glidden burs.

- Since the introduction of rotary files, GG burs have been used more aggressively and with more reliance on larger sizes (4, 5, and 6) to reduce binding and fracture of rotary files.
- GG burs have always been considered “safe” because they do not end cut and are self-centering. There is a significant problem here, which is “cervical self-centering.”
- Because the shank of the GG is so thin, it is difficult to “steer” the GG bur away from high-risk anatomy.

- As the GG bur straightens the coronal, or “high-curve,” it can shortcut across a fluting or furcation, and weaken and/or create strip perforations.

WHY IS COMPLETE DE –ROOFING SO DANGEROUS?

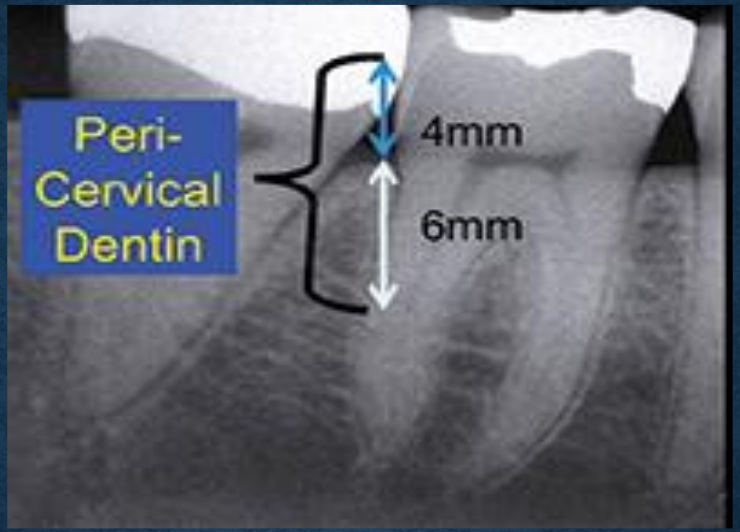
- Entire roof removed.
- Tend to touch lateral walls leading to gouging which is a serious problem.
- Create surface irregularities on lateral walls of access cavity.
- Ultimately leads to loss of dentine and compromises integrity of PCD.
- Round burs point cut , when instead what is needed is planning.

- The new vision based mental model is look , groom, follow. the new burs are all rounded-ended tapers.
- The tip size of these burs is less than half as wide as the corresponding round bur.

MODERN ENDODONTIC ACCESS CAVITY PREPARATION

➢**Access**: The pendulum swing from Schilderian to "ninja" access reflect the need to readdress our understanding of the discovery of the complexity of the root canal system. MicroCT images and CBCT planar geometrical orientation have made access a restorative driven application.

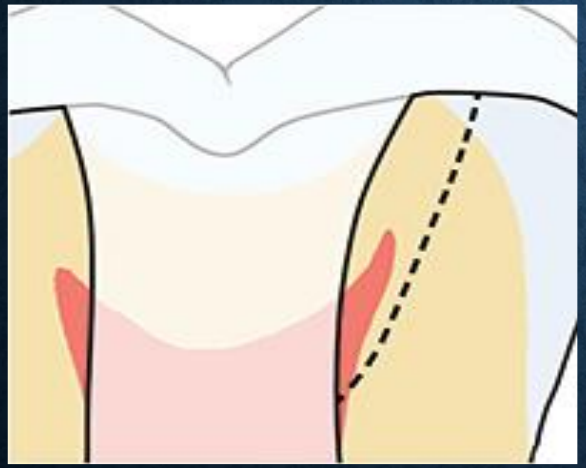
➢ An evidence based understanding of "as small as necessary" will ensure not only access to the root canal system, but prevent unnecessary dentinal girth removal and the prevention of inadvertent structural collapse.



Pericervical dentin is an area roughly 4 mm coronal to crestal bone and 6 mm apical to crestal bone . It acts as the “neck” of the tooth and is key because it transfers occlusal forces to the root. In the end, strong, unmarred PCD trumps just about everything else in long-term retention of the tooth.

Plotino G, Grande NM, Isufi A. Fracture Strength of Endodontically Treated Teeth. JOE 2017; 43(6).

- A soffit is described as the underside of a ceiling, at the corner of the ceiling and wall.



Dotted line shows the typical cut made to remove the entire pulp horn. Area between the lines is referred to as the soffit.

Clark D., Khademi J. The New Science of Strong Endo teeth. April 2013 13:51.

THE PULP CHAMBER SOFFIT

Traditional beliefs

1. Complete roof removal is required to visualize the orifices of the canals.
2. Complete removal of the roof allows complete pulp removal, especially of pulp horn tissue
3. Complete roof removal is required for safe straight-line access.

Just put a crown on the tooth after endo to make the tooth strong.Most of the dentin is expendable.

Modern understandings

1. Orifices are arranged along the periphery of the floor at the floor-floor interface, not hiding along the roof-wall interface.
2. Complete roof removal invariably leads to gouging of the chamber walls, in fact requires removal of wall of dentin.
3. Straight-line access is itself being redefined as we form this new model of access, but even in its old fashioned sense has no need for complete roof removal per se.
4. The roof wall interface likely provides natural strength and stiffness to the tooth. Future studies and finite analysis are indicated

Clark D., Khademi J. The New Science of Strong Endo teeth. April 2013 13:51.

- Minimally invasive dentistry (MID) is the application of "a systematic respect for the original tissue."

- The world congress of MID defines minimally invasive dentistry as those techniques, which respect health, function and esthetics of oral tissue by preventing disease from occurring, or intercepting its progress with minimal tissue loss (Nový and Fuller 2008)

Gutmann JL. Minimally invasive dentistry (Endodontics). J Conserv Dent 2013;16:282-3

- With regards to endodontic procedures, it can range anywhere from diagnosis to making a decision not to treat to a minimally but purposefully crafted access openings based on anatomical challenges, to minimal removal of dentin during access opening, enlarging and shaping of the root canal to retain as much sound dentin as possible, to retention of tooth structure during disassembly and retreatment or considering apical surgical intervention, to performing a crown lengthening procedure to establish sound tooth margins for core/crown restorations as opposed to tooth extraction and implant or bridge placement.

Gutmann JL. Minimally invasive dentistry (Endodontics). J Conserv Dent 2013;16:282-3

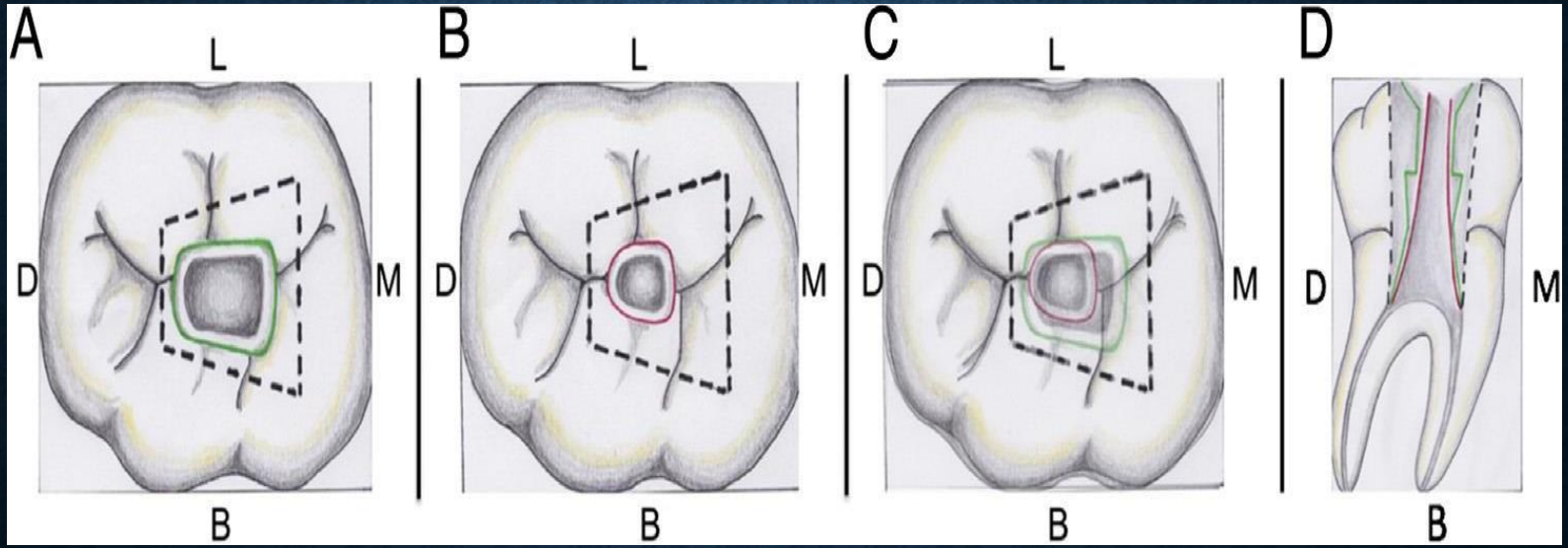
- Clark and Khademi modified the endodontic cavity design to minimize tooth structure removal.
- In departure from the completely unroofed, coronally divergent, straight-line access to canal curvatures, the conservative endodontic cavity (CEC) preserves some of the chamber roof and pericervical dentin .

Bóveda, C., & Kishen, A. (2015). *Contracted endodontic cavities: the foundation for less invasive alternatives in the management of apical periodontitis. Endodontic Topics, 33(1), 169–186.*

NINJA ACCESS PREPARATION

- Recently, conservative endodontic cavity (CEC) preparation to minimize tooth structure removal and preserve some of the chamber roof and peri cervical dentin was reported in the literature.
- An extreme conservative approach has recently been proposed, which is conventionally known as “Ninja.”
- This technique may improve the fracture strength of endodontically treated teeth.

An access with a ‘Ninja’ outline, the oblique projection is towards the central fossa of the root orifices in an occlusal plane. It is parallel with the enamel cut of 90^0 or more to the occlusal plane, making it easier to trace the root canal orifices from the varying visual angulations.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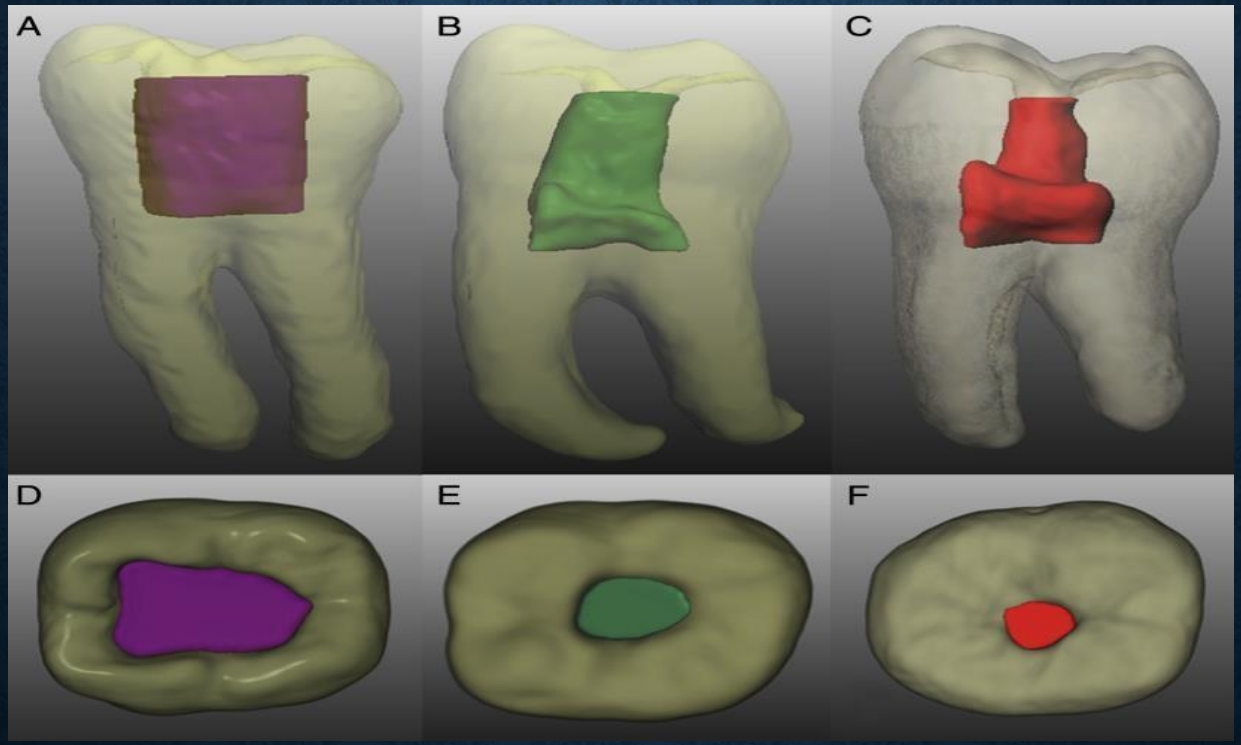
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TRUSS ACCESS / ORIFICE-DIRECTED DENTIN CONSERVATION ACCESS CAVITY

- A new way of thinking is needed to preserve these teeth requiring root canal treatment and one such way is to create Truss access.
- Truss access simply means that cavities are created strategically using CBCT information of the tooth and magnification.
- These accesses are placed above the respective root canals and the instrumentation of the canals are done via these holes.

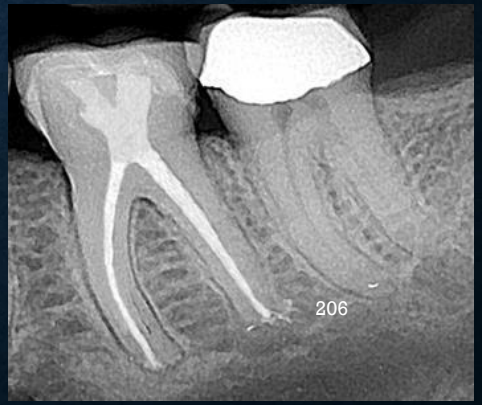
Minimally Invasive Endodontics - A Review Journal of Dental & Oro-facial Research Vol. 15 Issue 02 Aug. 2019

Purpose of this design is to preserve the dentin ie. Leaving a truss of dentin between the two cavities that has been prepared. Separate cavities are made to approach the canals.15 Mandibular molars, two separate cavities are made to approach the mesial and the distal canals where as in maxillary molars, the mesiobuccal and the distobuccal cavities is approached in one cavity and a separate cavity for the palatal canal is made.

A schematic representation of the (A) TEC access (black dotted line) and (B) DDC access (red dotted line) cavity in a mandibular molar

X entry Access opening:

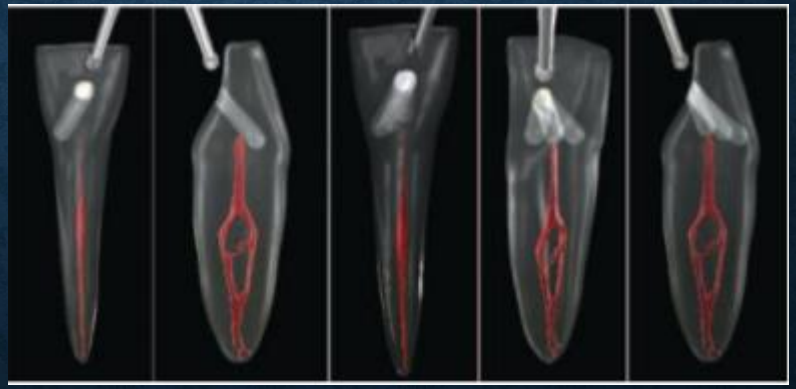
There is one drawback of truss access opening that it only fulfills the conservation form, not convenience form so, Buchanun suggested an alternative to the truss configuration – an "X-entry" access cavity – a design that fulfills both conservative and convenience form of tooth structure in the critical trunk of the tooth.



Cutting Endodontic Access Cavities for Long-Term Outcomes
by L. Stephen Buchanan, May 1, 2018

▪ INCISAL ACCESS

- **Blind Tunnelling:** Gouging commonly observed with round burs which are aggressive in nature and cingulum access. Buccal-lingual gouging (not easily seen in x-rays) occurs in nearly every traditionally-accessed case.



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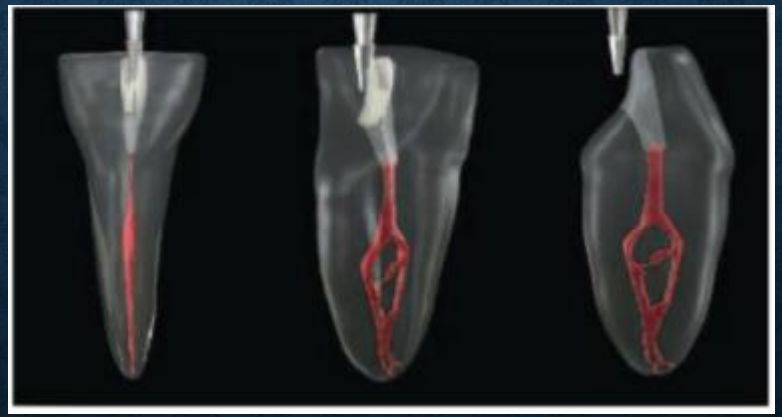
- **The Inverse Funnel:** As the access grows internally, an inverse funnel is created. Precious peri-cervical dentin is not lost each time the bur enters the tooth.



CALA LILLY ENAMEL PREPARATION

- Traditional parallel-sided access compared with the Cala Lilly enamel preparation.
- Unfavourable C factor and poor enamel rod engagement are typically present when removing old amalgam or composite restorations or with traditional endodontic access 90 degree to the occlusal table.
- The enamel is cut back at 45 with the Cala Lilly shape.
- This modified preparation will now allow engagement of nearly the entire occlusal surface

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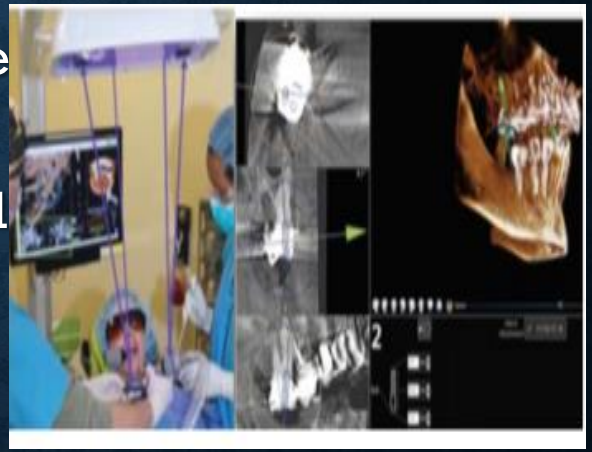
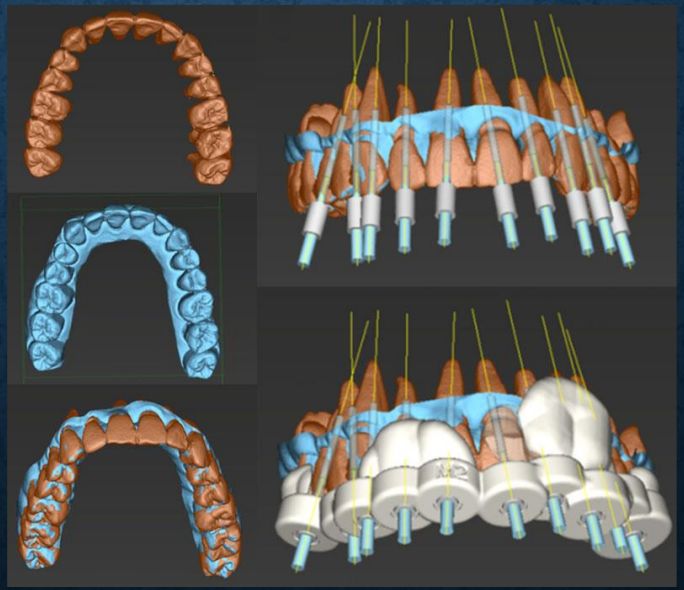
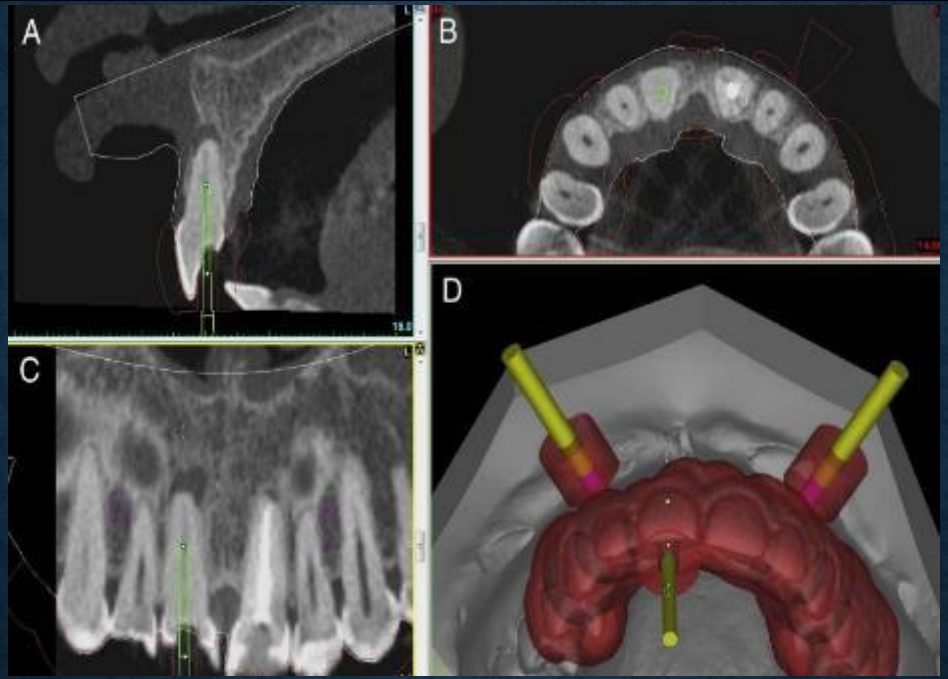
DYNAMICALLY GUIDED ACCESS

- Dynamic guidance used for dental implants. In endodontics - first introduced by Dr. Charles M.
- It uses information from the patient's CBCT volume to plan an access cavity. Overhead tracking cameras relate the position of the patient's jaw and the clinician's bur in 3- dimensional space.
- The clinician, by looking at the software interface, gets immediate feedback about the position of the bur as it relates to the position of the planned access and the tooth.

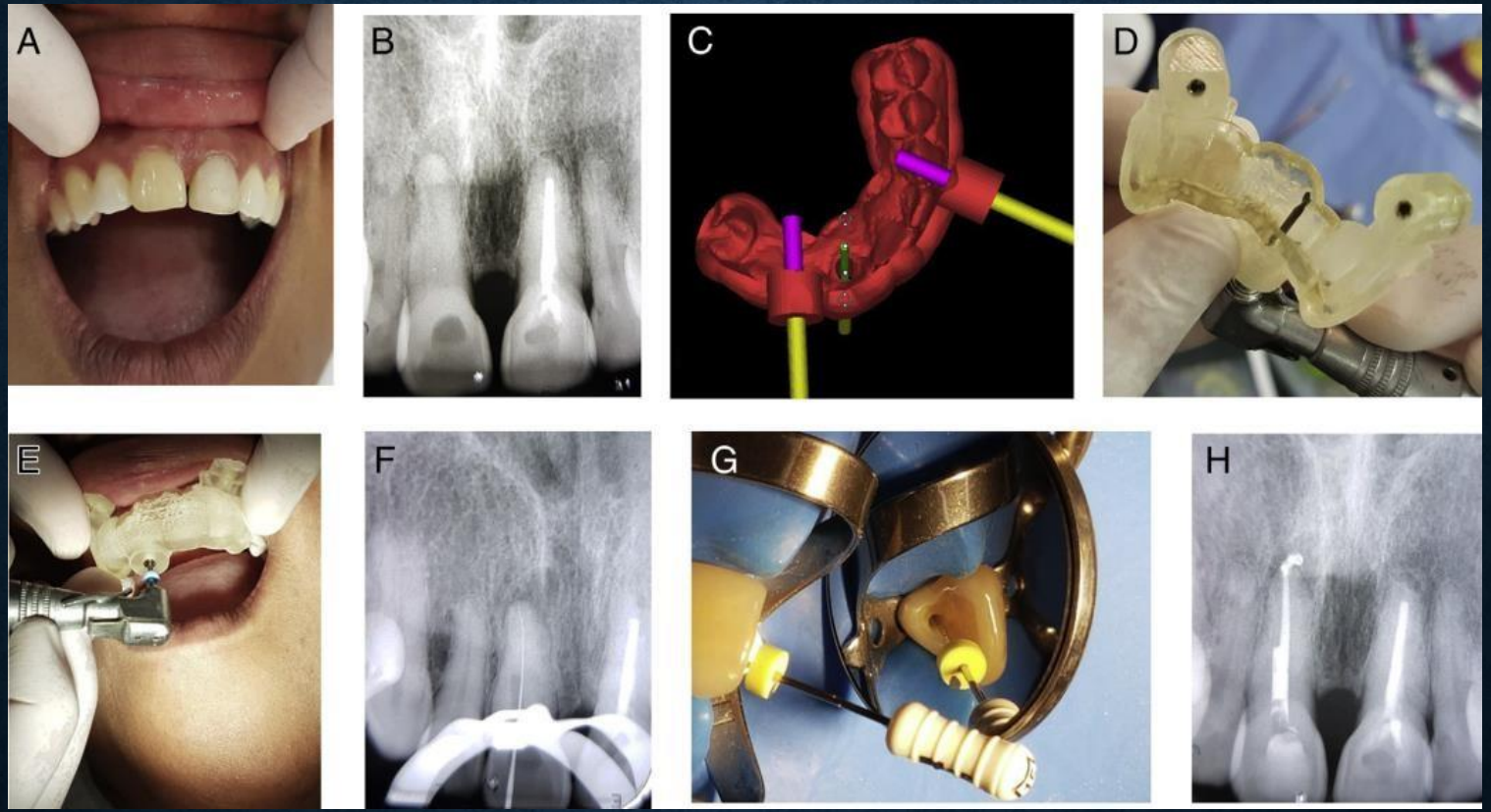


THE ‘GUIDED ENDODONTICS’ TECHNIQUE ALLOWED ACCURATE ACCESS CAVITY PREPARATION UTILIZING PRINTED TEMPLATES BY MATCHING CBCT DATA WITH AN INTRA-ORAL SCAN. IT WAS POSSIBLE TO LOCATE ALL ROOT CANALS IN THE APICAL THIRD.





Warley LF, Ana CV, Machado VC. Guided Endodontic Access Of Calcified Anterior Teeth. Endodontic Access Of Calcified Anterior Teeth 2018; 4(7).



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Impacts of Conservative Endodontic Cavity on Root Canal Instrumentation Efficacy and Resistance to Fracture Assessed in Incisors, Premolars, and Molars

RAJESH KRISHAN, FRANK PAQUE, AREZOU OSSAREH, ANIL KISHEN, THUAN DAO AND SHIMON FRIEDMAN

J ENDOD. 2014

- CEC afforded conservation of coronal dentin in incisors, premolars, and molars and increased resistance to fracture in molars and premolars, but it compromised the efficacy of canal instrumentation in the distal canals of molars.
- These results appeared to support the rationale for the revision of the guidelines for endodontic cavity design in premolars and molars focused on the conservation of coronal dentin.

Impacts of 3 Different Endodontic Access Cavity Designs on Dentin Removal and Point of Entry in 3-dimensional Digital Models

Chih-Yu Lin , Dan Lin , Wei-Hung He

J Endod. 2020 Apr

Conclusions: The amount of deviation of the center of the access cavity from the central fossa in all test groups was less than 1 mm.The central fossa could serve as good starting points in all access preparations in both maxillary and mandibular molars.

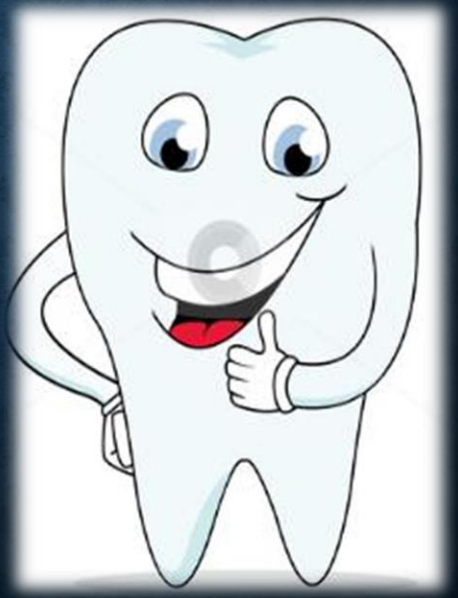
Dentin removal in the coronal and cervical regions was the greatest in the TS design followed by the MS and MI designs.

When comparing different canals in the same access form, less cervical dentin was sacrificed in the palatal canals of maxillary molars and the distal canals of mandibular molars.

CONCLUSION

ACCESS

IS



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Thank You