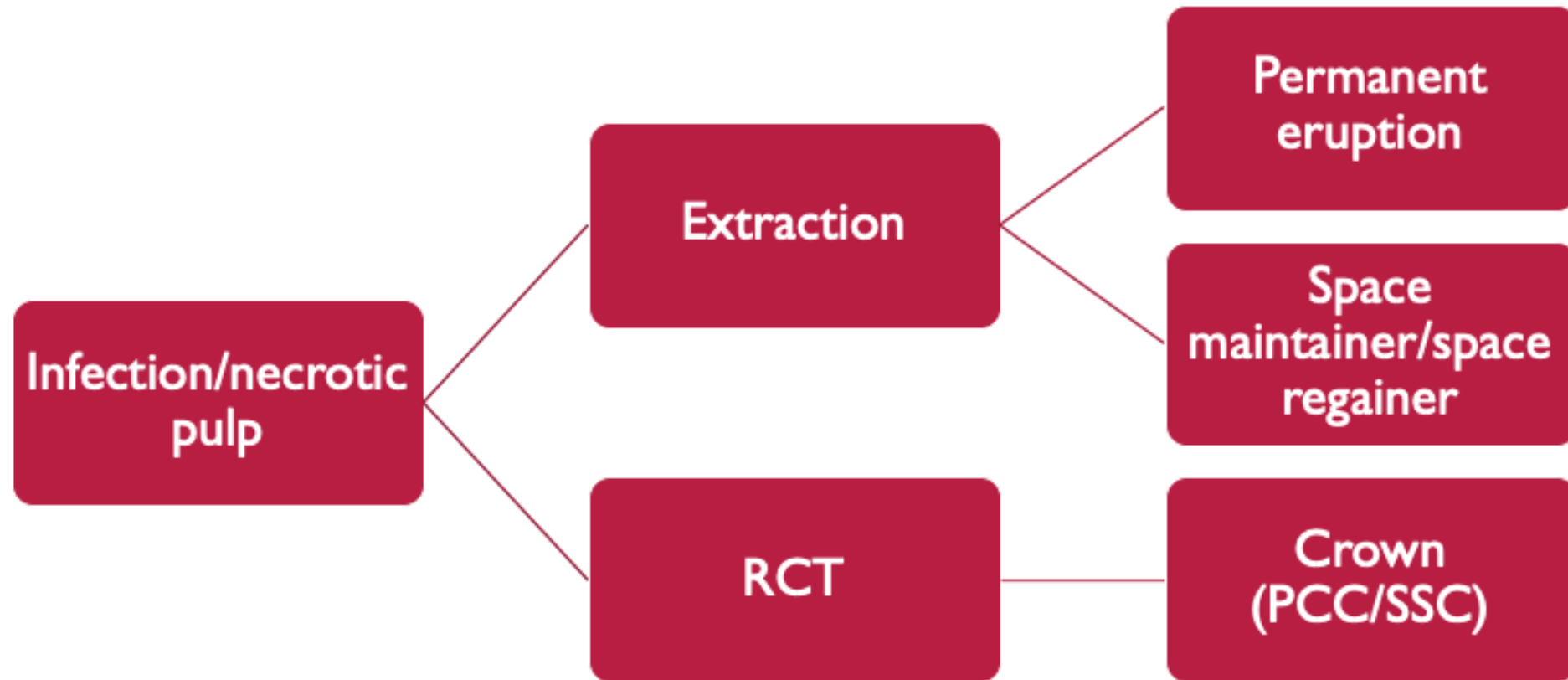




ROOT CANAL TREATMENT

DECIDUOS AND
PERMANENT TEETH

Treatment Primary Teeth



Difference In Primary and Permanent Tooth Morphology



Primary teeth are **smaller** in all dimension than permanent teeth

Primary Crowns are **wider in the mesial to distal** dimension compared with crown length than permanent crowns

Primary teeth have **narrower and longer roots** compared to crown length and width in permanent teeth

Primary molars **converge** occlusally, the occlusal surface is much narrower in the facio lingual than the cervical width

Primary teeth are **more constricted at the DEJ** than permanent teeth

The roots of primary molars are comparatively more **slender and longer** than permanent teeth

The roots of primary molars **flare out** from the cervical area than permanent teeth

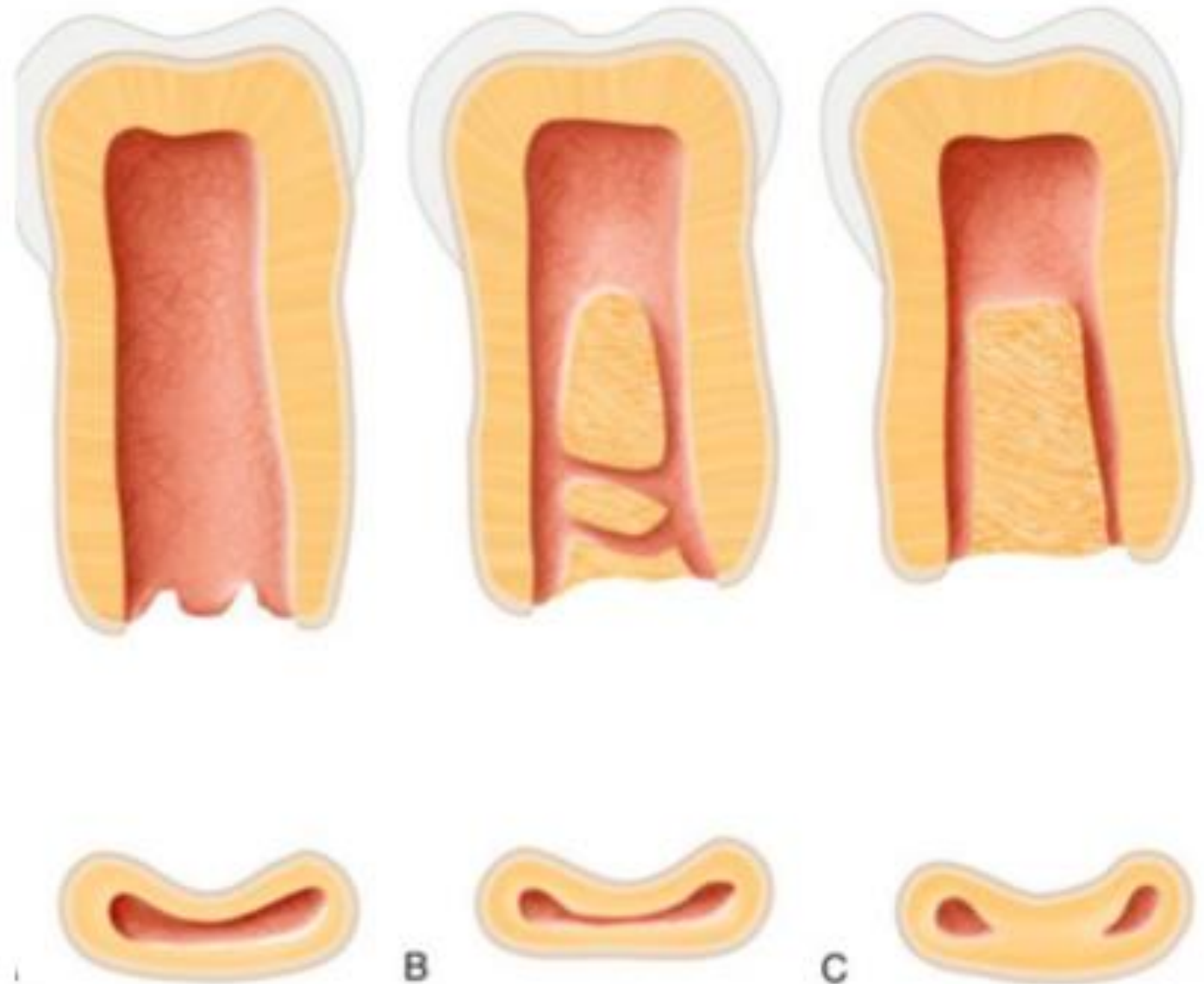
The enamel is **thinner** on primary teeth than on permanent teeth

The pulp chamber in primary teeth are **larger** than on permanent teeth

The pulp horns (mesial horns) are **higher** in primary molars than in permanent teeth

Root Formation

- q Root length is not completed until 1-4 years
- q Root length is completed in a shorter time period than in the permanent tooth (the shorter length of the primary roots)
- q The root to crown ratio of the primary teeth is greater than of the permanent teeth



I-2 Faciolingual cross section of the mesial root of a mandibular primary molar. **A**, Formation of the root; the time the root length is completed; only one canal is present. **B**, Differentiation of the root into separate canals; the continued, but incomplete deposition of dentin in central areas. Small fins and branches are present between the two canals. **C**, Canals are completely divided; root resorption has begun.



After root-length completion, dentin deposition continues in the root canal



After root-length completion dentin deposited in a root canal change the number, size and shape of the root canal



Often root canal variations are not visible on clinical radiographic images



In anterior teeth one root canal is usually present although mandibular incisors occasionally have two



In anterior teeth, accessory and lateral canals and apical ramifications are rare

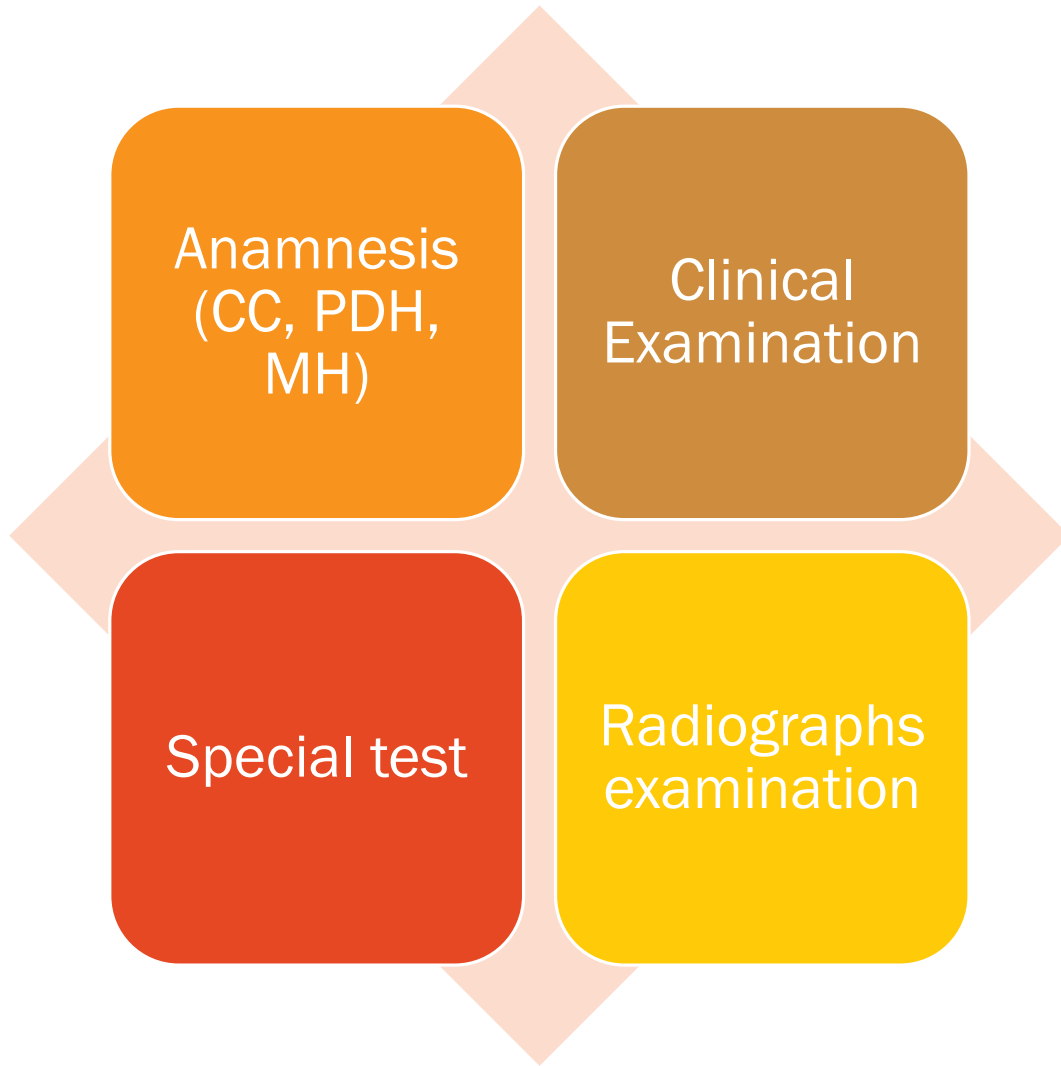
Root Canal Anatomy Considerations (Primary Teeth)

Primary anterior teeth

Maxillary Incisors	<p>The root canals of maxillary primary incisors are almost <i>round</i> in cross section</p> <p>These teeth have only one canal</p> <p>Apical Ramifications are rare</p>
Mandibular Incisors	<p>The root canals primary mandibular incisors are <i>flattened</i> on the mesial and distal surface</p> <p>The presence of two canals is seen less than 10% of the time</p> <p>Lateral or accesory canals are observed</p>
Maxillary and Mandibular Canines	<p>The root canals shape of canines both maxillary and mandibular are <i>rounded, triangular</i></p> <p>The canines have the simplest root canal system</p>

Primary Molar Teeth

Maxillary primary molar	
Mandibular first primary molar	Showing the orifices of the three canals in the first molar
Mandibular second primary molar	The mandibular second primary molar may have two to five canals (three) The mesial root have two canals (85%) and distal roots contain more than one canal (25 %)



CLINICAL PULPAL DIAGNOSIS

Anamnesis



Kind of pain (provoked pain or spontaneous pain) :



a. Provoked pain, pain by thermal/osmotic stimulus (cold drink/eating candy)



b. Spontaneous pain, pain is not consistently associated with external stimulus and pain may arise at any time



c. Children may present without any complaint despite extensive carious lesions and a draining sinus tract

Clinical Examination

EO/IO	Tooth discoloration, Gross Caries, Redness, Swelling and Sinus Tract
Palpation, percussion and mobility	<ul style="list-style-type: none"> Swollen mucobuccal fold (<i>Acute dentoalveolar abscess</i>) Bone Destruction (<i>Chronic Dentoalveolar Abscess</i>) Inflammating bone loss (primary teeth mobile) Sensitivity of percussion (<i>Asymtomatic Periapical Periodontitis</i>)-----except " recently traumatized teeth" Recommendation : use <i>finger tip</i> than end of dental mirror (Percussion in primary teeth)
Pulp test	<ul style="list-style-type: none"> Young patient may give unreliaables responses (fear etc) The unreliability of EPT in immature teeth showed responses ranging from 11% (6-11years) completely open apices to 79 % in older children with complete root formation Thermal test (cold) more accurate than EPT in primary teeth Laser Doppler Flowmetry the most reliable for diagnosing pulpal vitality in immature teeth (side effect : Blood pigmentation of the crown)
Radiographic Examination	<ul style="list-style-type: none"> Interpretation of radiographs is complicated by physiologic root resorption of primary teeth Pathologic changes in the periapical tissue of primary teeth most often in the bifurcation/trifurcation than at the apices except primary anterior teeth Internal Resorption frequently in the primary teeth after pulpal involvement (furcation)

Internal Resorption

If a perforation of the root occurs in a primary teeth because of internal resorption (pulp therapy is contraindicated)

Observation (if the area of resorption is confined to the teeth)

Extraction (if the process has reached the bone)

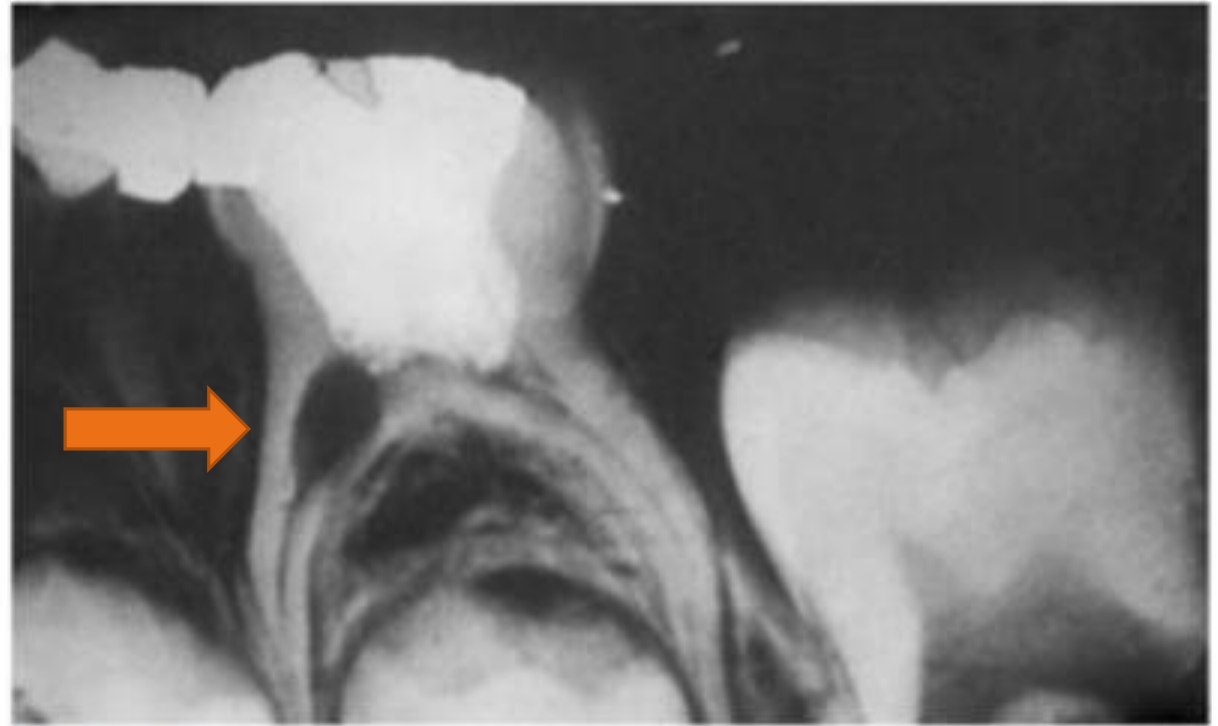


FIG. 24-8 Pulpotomy failure. Note the internal resorption, which has perforated the pulp chamber floor and resulted in a furcal radiolucency.

RCT PRIMARY TOOTH

Indication

- Ø Root canal treatment in primary teeth is indicated when the radicular pulp exhibits clinical signs of irreversible pulpitis or pulp necrosis,
- Ø the roots show minimal or no resorption

Contraindication

- Ø with non-restorable crowns
- Ø perforation to the pulpal floor
- Ø serious reduction in bone support and/or extreme tooth mobility
- Ø radiographic indication of extensive internal or external root resorption
- Ø periradicular radiolucency involving the follicle of the permanent tooth
- Ø underlying dentigerous or follicular cysts and of medically compromised children

Root Canal Treatment (RCT) Techniques



Access and
Debridement

Irrigation

Filling the
Canal(s)

ACCESS AND DEBRIDEMENT



Access preparation is refined to make sure that entrance to all of the canals is possible and clearly visible



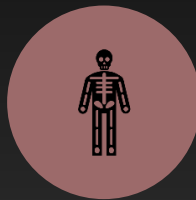
Primary molar roots are usually curved to allow for the development of the succedaneous tooth



The curves of root increase the chance of perforation of the apical portion of the root or the coronal one-third of the canal into the furcation



The instruments should be slightly bent to adjust to the curvature of the canals



Endodontic files are selected (file 30/35) and adjusted to stop 1–2 mm short of the radiographic apex



Avoid unnecessary shaping of the canal

IRRIGATION

- ✓ The root canals are irrigated with either 0.2 % up to 2 % chlorhexidine solution or with 1 % up to 5 % sodium hypochlorite (AAPD : 1%)
- ✓ Irrigation with normal saline before drying with appropriately sized sterile paper points is also recommended

FILLING

- Thick paste such as ZOE is inserted and condensed with root canal pluggers, while thinner pastes like iodoform and calcium hydroxide-based materials are inserted with a spiral lentulo mounted on a slow-speed engine
- Other materials are inserted with plastic syringes and tips

Root Canal Filling Materials

Zinc oxide-eugenol paste

- ✓ ZOE tends to resorb at a slower rate than the roots of the primary teeth
- ✓ Remnants of ZOE may cause a mild foreign body reaction

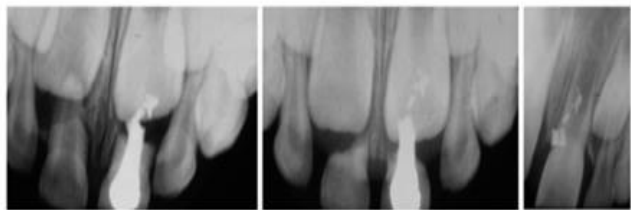


Fig. 6.13 ZOE extruded beyond the apices set into a hard cement that resists resorption (*left and center*). The remnants of the ZOE are still present after the eruption of the permanent central incisor

Calcium hydroxide pastes with iodoform

- ✓ The antimicrobial action of calcium hydroxide is associated with its *ionic dissociation*
- ✓ The aqueous, viscous, or oily vehicle impacts the speed of *ionic dissociation*
- ✓ **As aqueous** vehicles favor a **high** degree of solubility
- ✓ **Oily vehicles** have the **lowest** solubility
- ✓ Vitapex is a combination of **30 % calcium hydroxide**, **40.4 % iodoform**, and **22.4 % silicone oil**

Iodoform-based pastes

- ✓ Maisto's paste (1967) includes both zinc oxide and iodoform, with parachlorophenol camphor, lanolin, and thymol
- ✓ it was reported to have significantly **higher success rates (100 %)** compared to ZOE alone
- ✓ KRI paste (Pharmachemie, Zurich) is a mixture of iodoform (80.8 %), camphor, parachlorophenol, and menthol
- ✓ KRI paste showed **stronger antibacterial effectiveness** than did ZOE against pure cultures of **obligate anaerobes** (currently *Porphyromonas Prevotella*) and **anaerobic streptococci** isolated from non-vital root canals of primary teeth

Evaluation of RCT

Is not mobile

Remains in function without pain, discomfort, or infection until the permanent successor is ready to erupt

Undergoes physiologic resorption

Radiographically the tooth should present absence or reduction in size of preexisting pathologic radiolucent defects and no new lesions.

The treatment should permit resorption of the roots of the primary tooth and filling material and allow normal eruption of the succedaneous tooth.

APEXIFICATION

01

a method of inducing a calcified barrier in a root with an open apex or the continued apical development of an incompletely formed root in teeth with necrotic pulp

02

The young pulpless tooth frequently has thin, fragile walls, which makes it difficult to adequately clean and to obtain the necessary apical seal.

03

Completion of endodontic therapy was typically delayed until completion of root-end closure through apexification.

PULPOTOMY / APEXOGENESIS



Maintenance of pulp vitality by using apexogenesis will allow continued root development along the entire root length.



Depending on the extent of inflammation, pulp capping, shallow pulpotomy, or conventional pulpotomy may be indicated.

Apexogenesis/ Pulpotomy

Apexogenesis: A vital pulp therapy procedure performed to enable continued physiologic development and formation of the root end; the term frequently used to describe vital pulp therapy that encourages the continuation of this process.

Pulpotomy : Surgical removal of the coronal portion of a vital pulp as a means of preserving vitality of the remaining radicular portion; pulpotomy usually is performed as an emergency procedure for temporary relief of symptoms or as a therapeutic measure.

Kind of Pulpotomy

Full pulpotomy involves the removal of the coronal portion of the vital pulp as a means of preserving the vitality of the remaining radicular portion

Cvek pulpotomy/superficial pulpotomy/partial pulpotomy involves the partial removal of the coronal portion of the vital pulp



Hargreaves, K.M., Berman, L.H., 2015.
Cohen's Pathways of the Pulp Expert Consult - E-Book. Elsevier Health Sciences.



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Walton, R.E., Torabinejad, M., 2015.
Endodontics: principles and practice, Fifth edition. ed. Elsevier, St. Louis, Missouri.

References

— Traumatic exposure



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graph TD; A[— Traumatic exposure] --> B[— Pulp exposure due to caries]; B --> C[— No clinical or radiographic signs of pathology]; C --> D[— Procedure : removal of only the most superficial (1-2 mm) part of the coronal pulp tissue adjacent to the pulp exposure]; D --> E[— Pulp exposure occur in deciduous and young permanent teeth];
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— Pulp exposure due to caries

— No clinical or radiographic signs of pathology

— Procedure : removal of only the most superficial (1-2 mm) part of the coronal pulp tissue adjacent to the pulp exposure

— Pulp exposure occur in deciduous and young permanent teeth

Indication pulpotomy

Pulpotomy Calcium Hydroxide	Local anesthesia—coronal pulp is removed—irrigated with saline/water—slight pressure stops bleeding—after hemostasis—covered calcium hydroxide—double seal—cavity is restored
Pulpotomy ferric sulfate (FS)	Local anesthesia—coronal pulp is removed—amount of FS is applied, for 10-15s—blood clot formation—flushed with distilled water—drying—double seal—cavity is restored
Pulpotomy formocresol	Local anesthesia—coronal pulp is removed—irrigated with saline/water—slight pressure stops bleeding—after hemostasis—FC is applied for 3-5 minute (19%formaldehyde)—mixed FC and zinc oxide-eugenol—placed on the wound—double seal—cavity is restored
Pulpotomy glutaraldehyde	Local anesthesia—coronal pulp is removed—irrigated with saline/water—slight pressure stops bleeding—after hemostasis—2% glutaraldehyde solution is applied for 3-5 minute—double seal—cavity is restored

Pulpotomy