Pulp Therapy in Primary and Young Permanent Teeth

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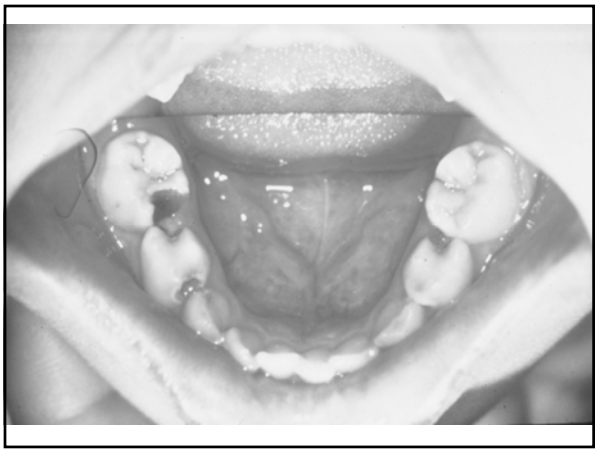
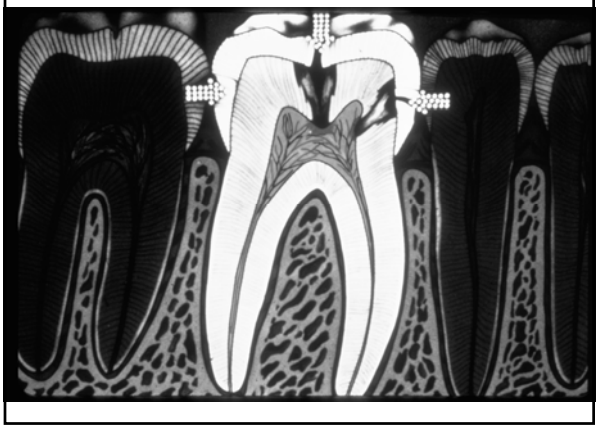
Primary Teeth

- Diagnosis and Treatment Planning





Primary Tooth Anatomy

- Smaller in all dimensions, but pulp relatively larger
- Enamel thinner
- Great variation in size and shape of pulp
- Pulp horns slender and closely follow external anatomy of tooth
- Pulp chambers shallow and easily perforated
- Apical foramina large and accessory canals may be large and numerous

Diagnosis

- History of pain
- Radiographic evaluation
- Clinical exam
- Evaluation of exposure site

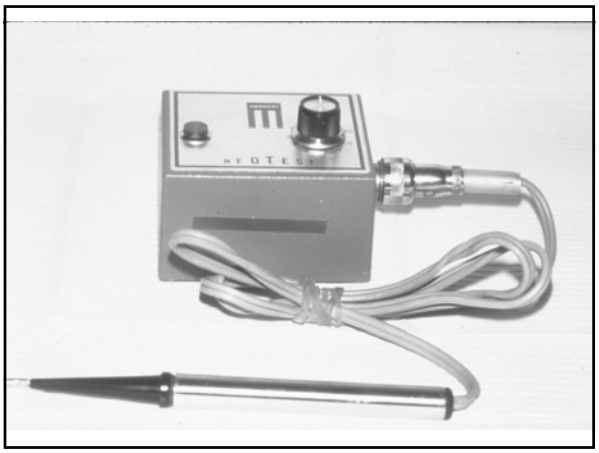
History of pain

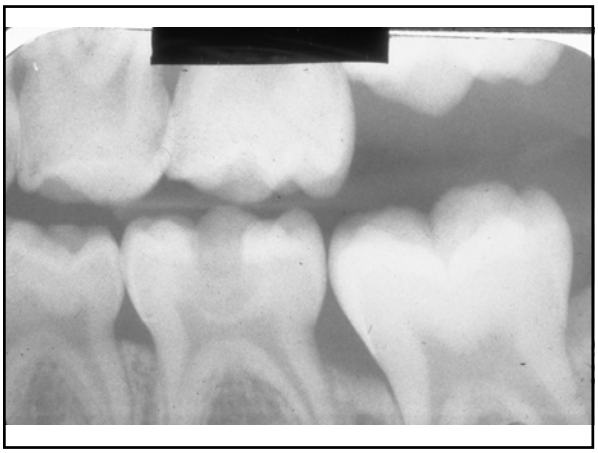
- Duration
  - Longer duration offers poorer prognosis
- Frequency
  - Spontaneous pain is sign of poorer prognosis
  - Related frequency of pain to specific stimuli
- Location
  - Localization often difficult in children

Pain and pulpal status

- Spontaneous
- Nocturnal → Irreversible → Nonvital
- Constant

- Thermal
- Chemical → Reversible → Vital
- Intermittent





Pulp therapy in primary teeth

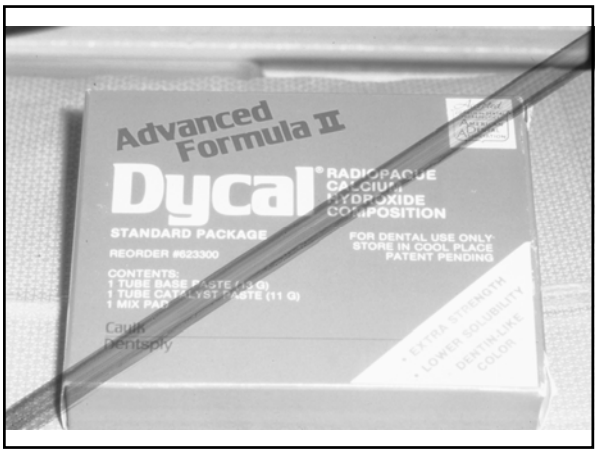
- Vital pulp therapy
  - Protective base
  - Indirect pulp therapy
  - Direct pulp cap
  - Pulpotomy
- Non-vital pulp therapy
  - Pulpectomy
  - Extraction

Vital pulp therapy

- Protective base
  - An appropriate material is placed to seal dentinal tubules and act as a protective barrier to minimize pulp injury and permit the pulp to heal

Protective base

- Objectives
  - Radiopaque base between restoration and dentin
  - Prevent adverse signs and symptoms
  - Preserve health and vitality of restored tooth

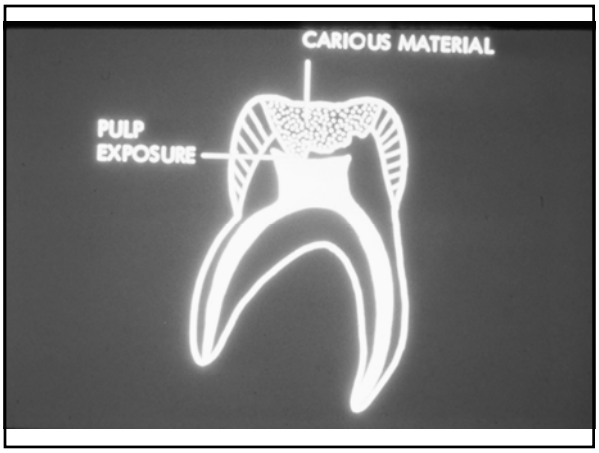


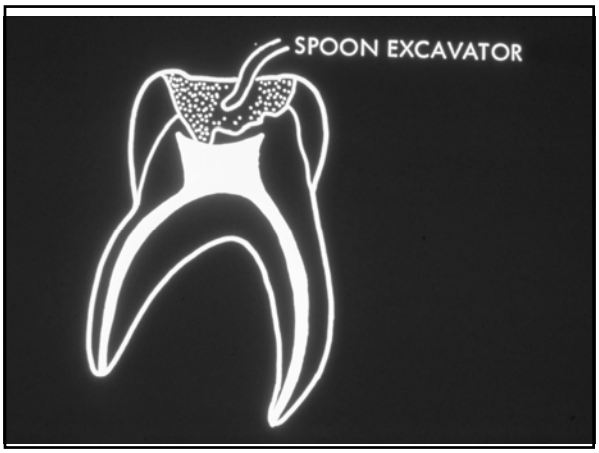
Vital pulp therapy

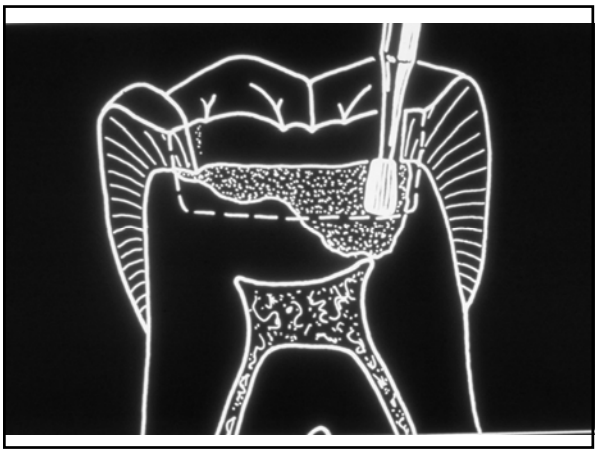
- Indirect pulp therapy
  - In a tooth with a deep carious lesion, carious dentin is not completely removed. The decay process is sealed with glass ionomer.

Indirect pulp therapy

- Objectives
  - Place a radiopaque base over the remaining affected dentin, but not in contact with the pulp
  - Halt the carious process and allow pulp healing and reparative dentin formation
  - Avoid internal resorption or other pathologic changes as determined by periodic clinical and radiographic evaluation







Indirect pulp therapy

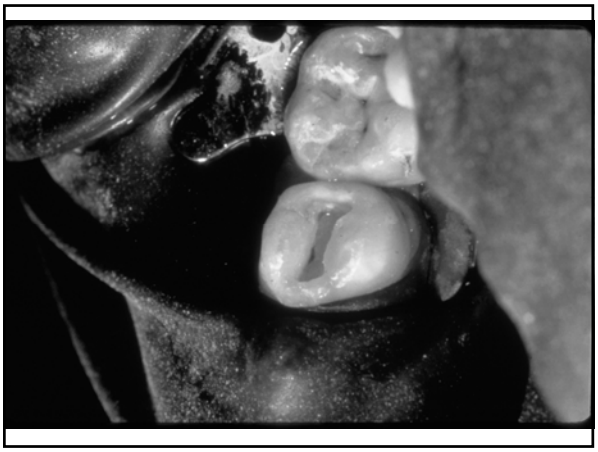
- The base that should be used for indirect pulp therapy in the primary dentition is glass ionomer.

Vital pulp therapy

- Direct pulp capping
  - Direct pulp capping is not recommended for carious exposures in primary teeth
  - Can be considered for a small mechanical or traumatic exposure
  - Material of choice for pulp capping in primary teeth is light-cured CaOH

Direct pulp capping

- Objectives
  - Atraumatically place radiopaque base over exposed pulpal tissue
  - Permit pulp healing and reparative dentin formation
  - Prevent further pulpal damage and avoid clinical signs and symptoms
  - Avoid pathologic changes as determined by periodic radiographic evaluation

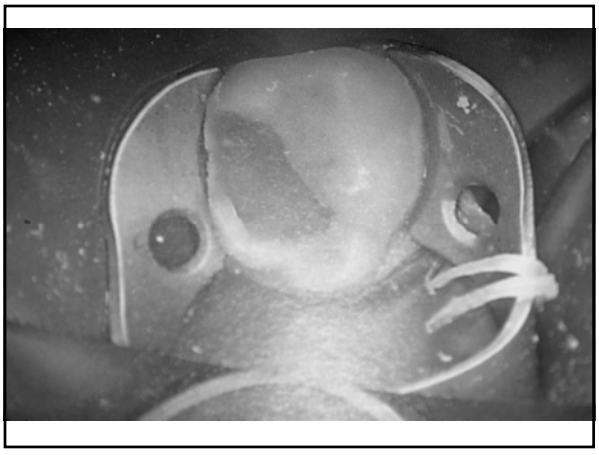


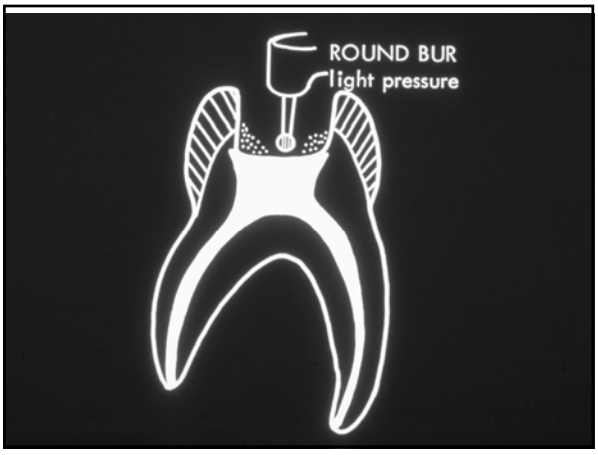
Pulpotomy

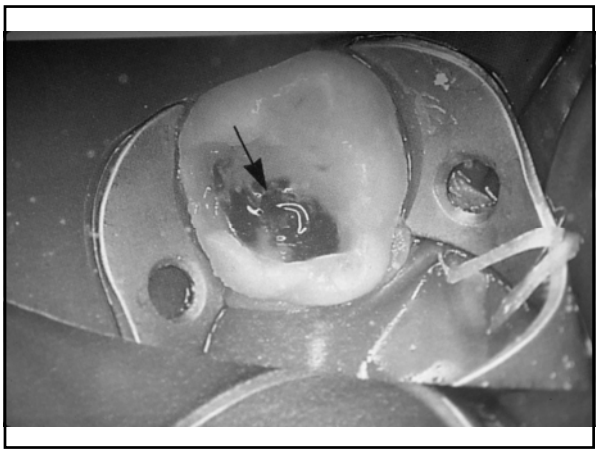
- Objectives
  - To eliminate or neutralize the effect of pulp involvement by caries or trauma
  - To avoid future adverse clinical signs and symptoms
  - There should be no sign of internal resorption, periradicular breakdown, or other pathology

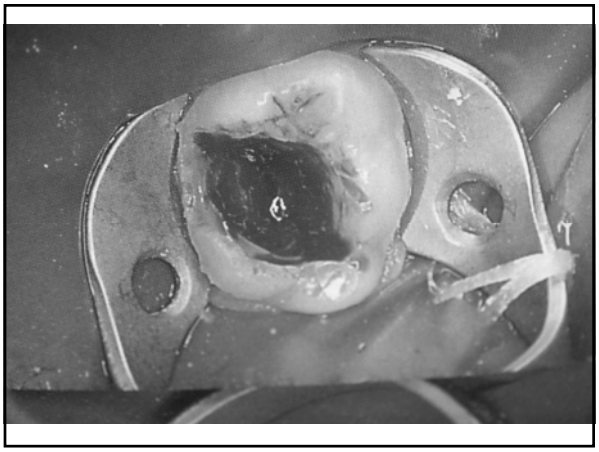
Vital pulp therapy

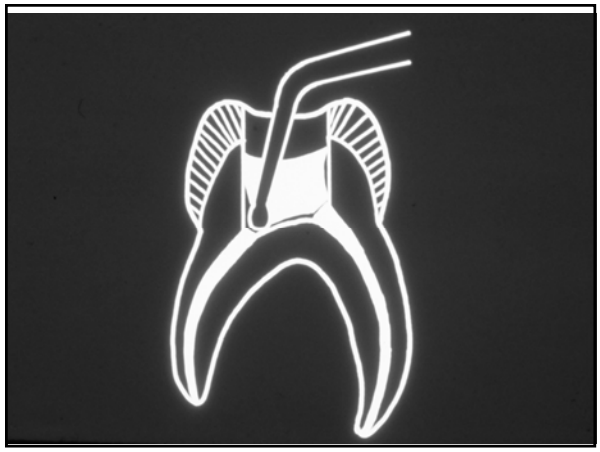
- Pulpotomy
  - Administer local
  - Isolate
  - Excavate caries
    - Remove roof of pulp chamber to gain access
  - Inspect pulp chamber
    - Hemostasis
    - No evidence of coronal tissue tags
  - Treatment of remaining radicular pulp

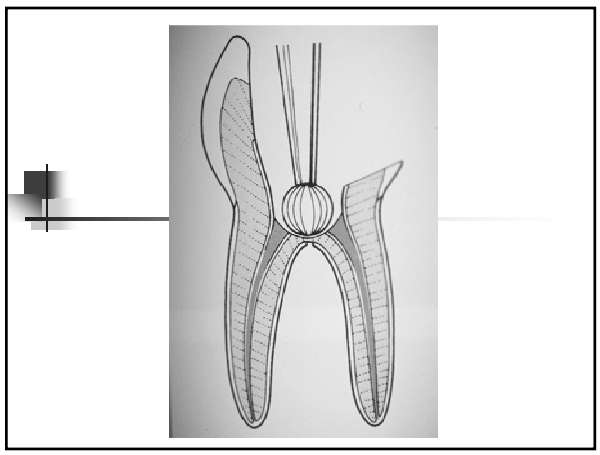


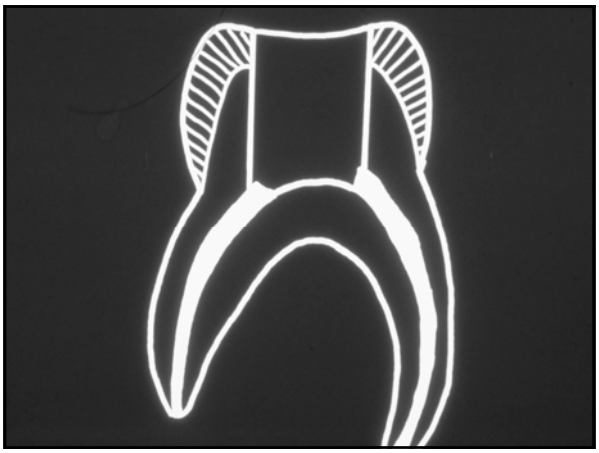


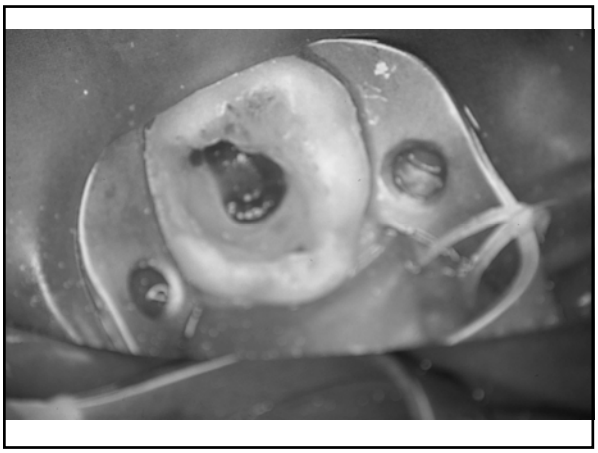


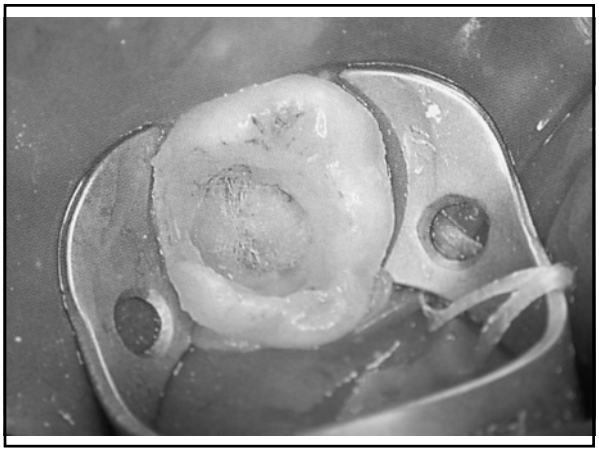


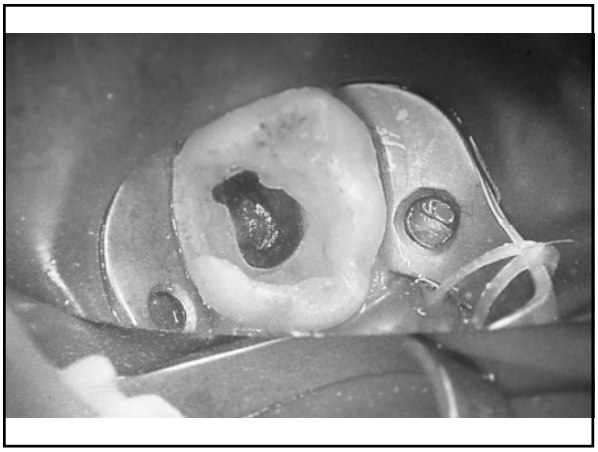






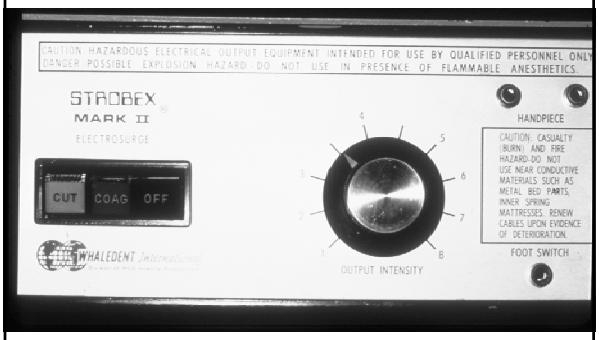






Pulpotomy

- Non-pharmacotherapeutic
  - Amputate infected or affected coronal pulp tissue
  - Treat remaining radicular pulp tissue with electrical or laser energy source in such a way as to reduce or eliminate the residual infectious process



Pulpotomy

- Pharmacotherapeutic
  - Inductive
    - Treatment of exposed radicular tissue in such a way as to induce reparative dentin and maintain vitality and function of the majority of remaining pulp tissue
  - Non- inductive
    - Treatment of exposed radicular tissue with a medication or fixative aimed to eliminate or neutralize any infectious process

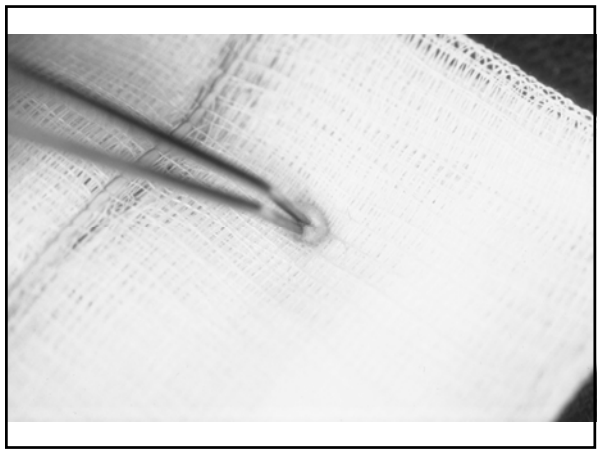
Pulpotomy

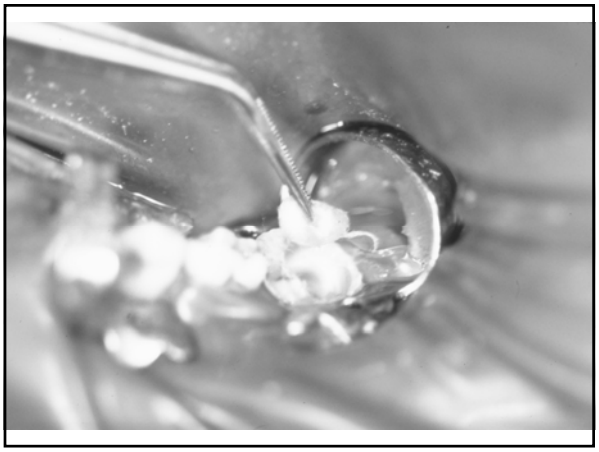
- Pharmacotherapeutic
  - Inductive
    - Calcium hydroxide
    - Glass ionomer
    - Ferric sulfate
  - Non- inductive
    - Formocresol
    - Gluteraldehyde

Ferric sulfate

- Topical hemostatic solution
- Astringedent®- 15%


ASTRINGEDENT
Topical Hemostatic Solution
Store at Room Temperature
30ml






3M Vitremer
Core Buildup/
Restorative
Liquid

Gluteraldehyde

- Powerful fixing agent
- Antibacterial
- Large molecules with less chance of systemic distribution
- Concentration 2-5%
  - Most success with 4%

Gluteraldehyde

- Binds to enzymes and proteins
- Suppresses cell activity
- Non diffusible and self limiting
- Non-immunologic, non-mutanogenic, non-carcinogenic
- Reported side effects include: radiographic changes, delayed tissue healing, enamel defects, tissue degeneration, autoantibody induction

Formocresol

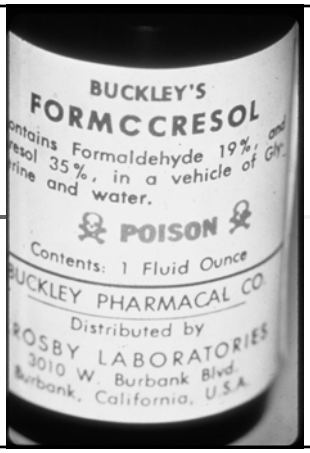
- Actions
  - Bactericidal
  - Fixation
  - Progressive fibrosis

Formocresol

- Buckley's formocresol usually used in 1:5 dilution
- Hemostasis of radicular pulp tissue should be obtained prior to applying formocresol
- Pellet should be blotted dry the placed in pulp chamber for 5 minutes
- A ZOE or glass ionomer base is then placed

Formocresol

- Reported undesirable effects
  - Leakage into hard and soft tissue
    - Mutanogenic and carcinogenic potential has been shown in animal studies
  - Enamel hypoplasia
  - Over retention
  - Ectopic eruption of permanent teeth
  - Hypomineralization



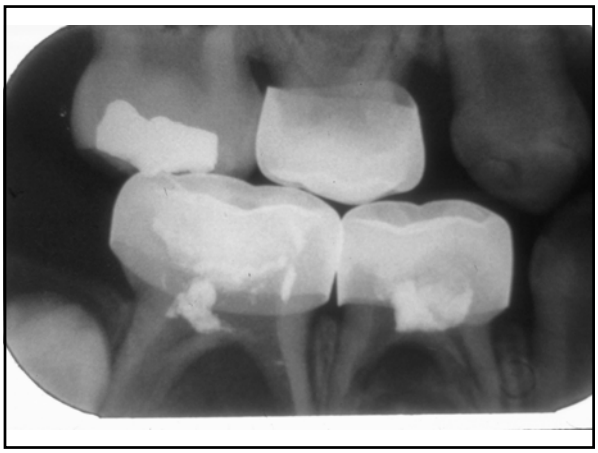

Sultan
FORMO CRESOL
FOR PROFESSIONAL USE ONLY
Contents: 30mL
Sultan
BUCKLEY'S
FORMO CRESOL
FOR PROFESSIONAL USE ONLY
Contents: 30mL
Product Number 10283


CRESOL
ELLETS


Sultan
ZINC OXIDE
U.S.P.
CAUTION: Do not take internally
NET WEIGHT
ONE POUND (453.6 GRAMS)
Manufactured
for
SULTAN CHEMISTS, INC.
Englewood, N.J. 07631
Healthco
4 oz
EUGENOL
U.S.P.


Caulk
Dentsply
IRM®
INTERMEDIATE
RESTORATIVE
MATERIAL
IVORY
POWDER
TYPE II, CLASS 1
38 G


3M Vitremer
Core Buildup/
Restoratives
Liquid
3303L



Nonvital pulp therapy

- Pulpectomy
- Extraction

Pulpectomy in primary teeth

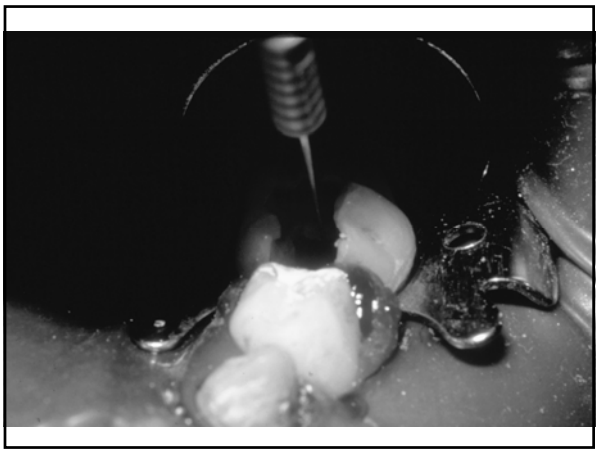
- Objectives
  - Remove as much necrotic pulp as possible in context of succedaneous tooth and root architecture
  - Reverse infectious process allowing periradicular tissue to heal
  - No adverse signs or symptoms
  - No further breakdown of supporting structures
  - Demonstrate evidence of successful fill
  - Resorption of filling material and tooth structure should occur normally

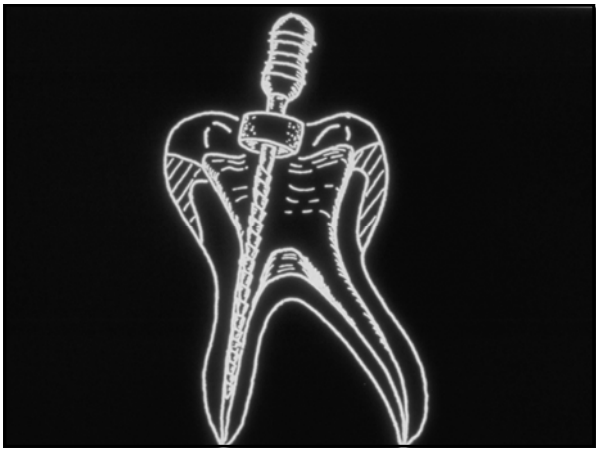
Pulpectomy procedure

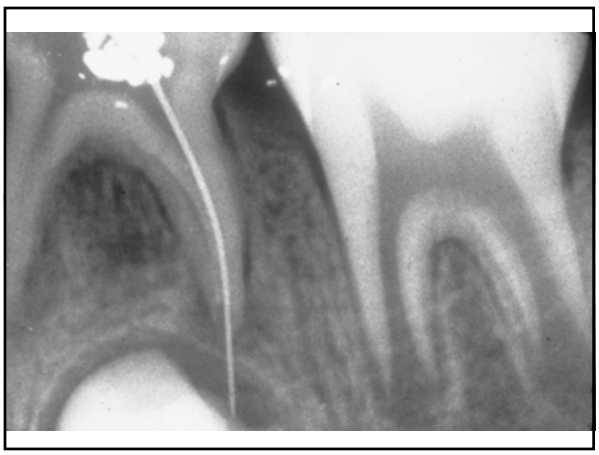
- Administer local
- Isolate
- Excavate caries
  - Remove as much caries as possible before entering pulp
- Remove entire roof of chamber to gain access
- Debride canals
  - Canals of primary teeth should not be enlarged

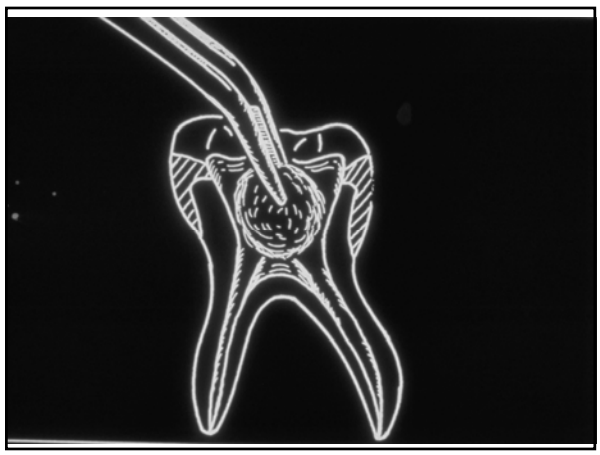
Pulpectomy procedure cont'd

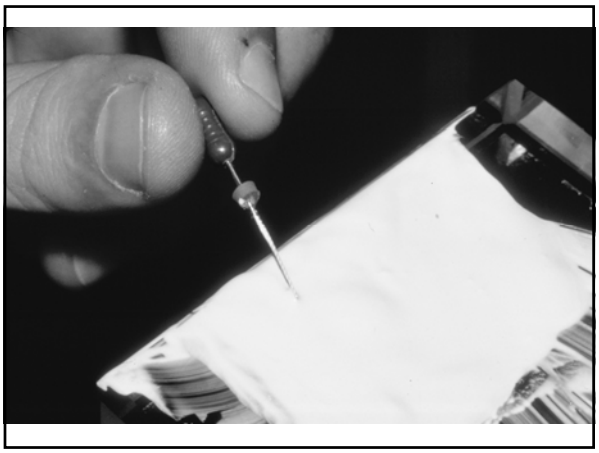
- Irrigate canals-carefully
  - Sterile saline
  - Local anesthesia
  - Sodium hypochlorite
- Obterate canals
  - ZOE or iodoform paste
  - Can be placed with hand condenser, syringe or lentulo spiral
- Radiographic evaluation
- Restore tooth

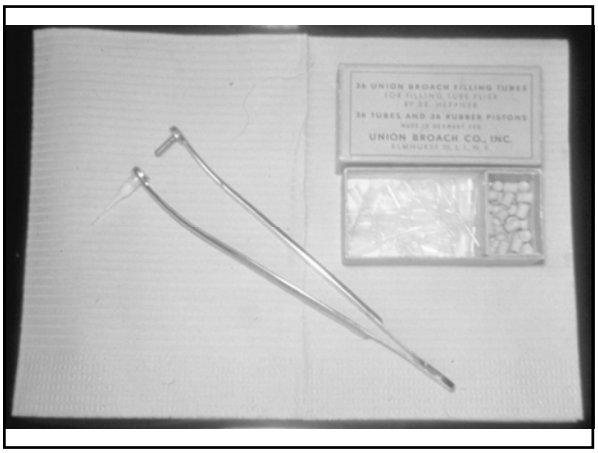








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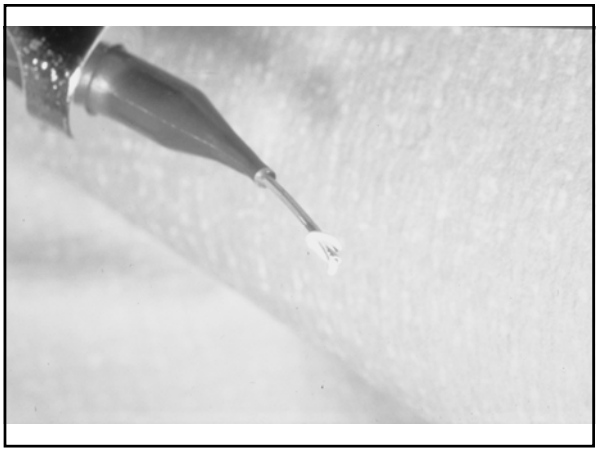
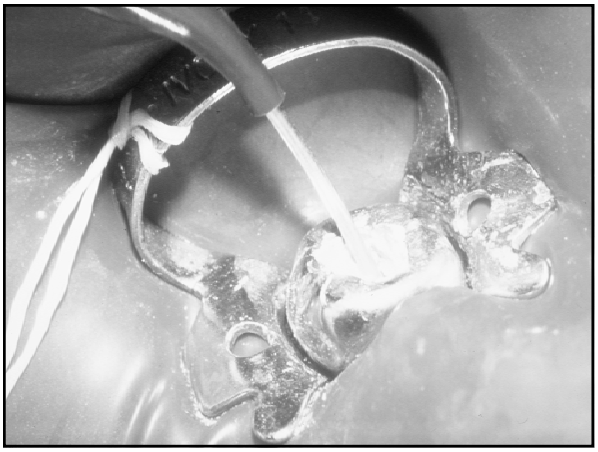
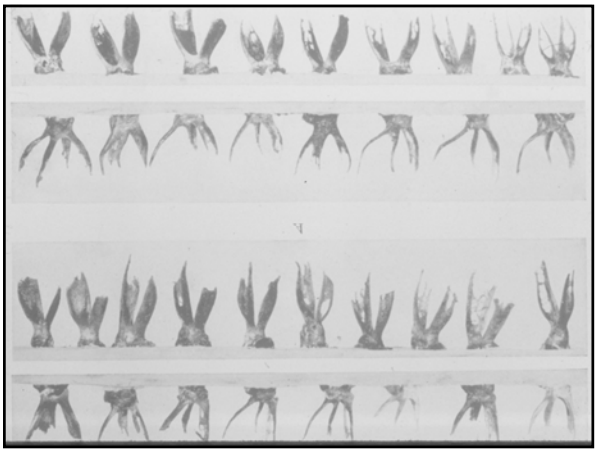
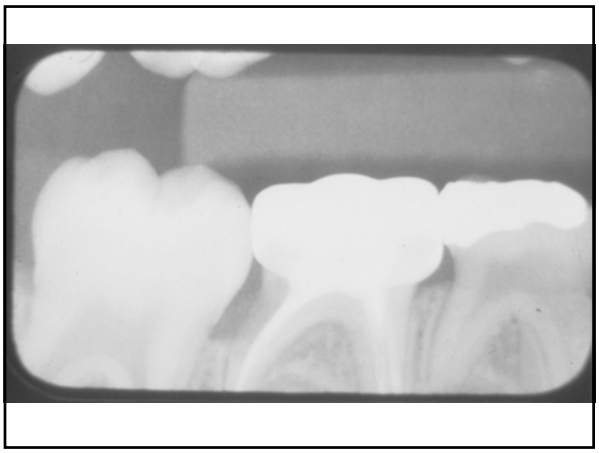
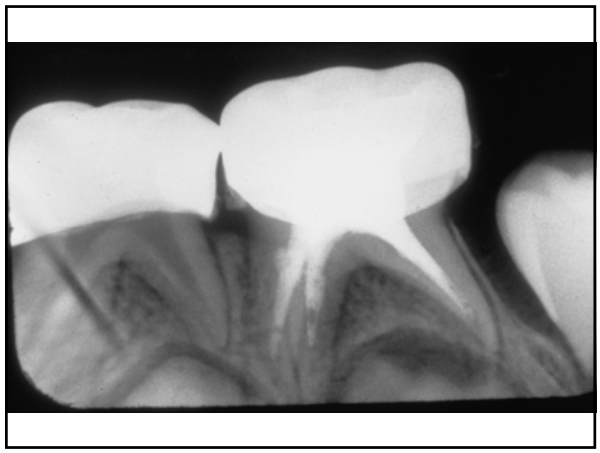
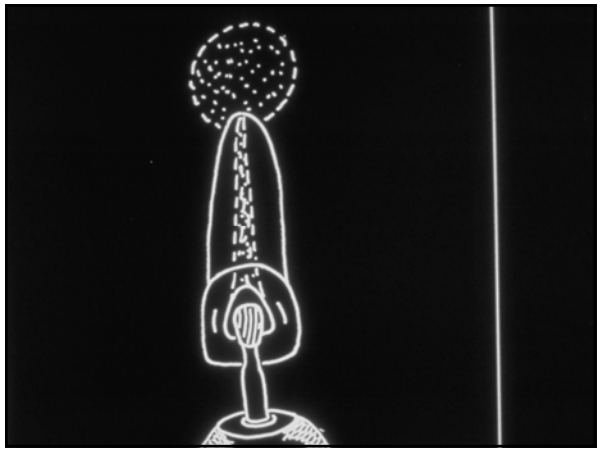


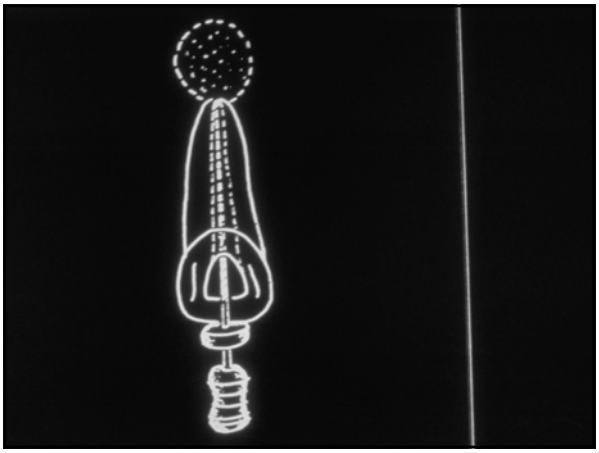


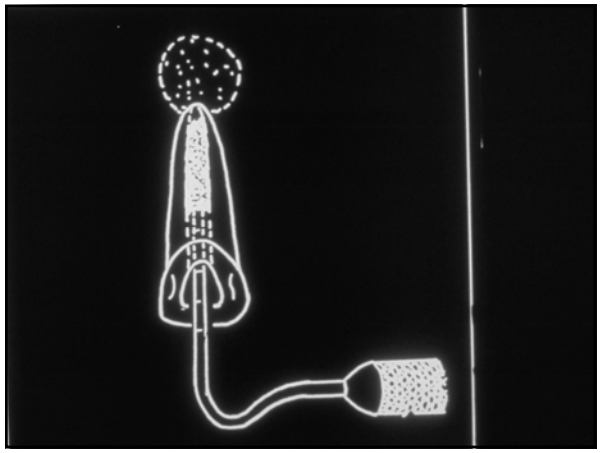






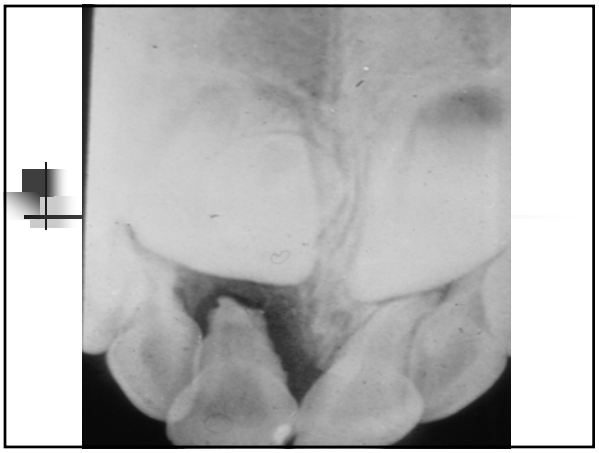


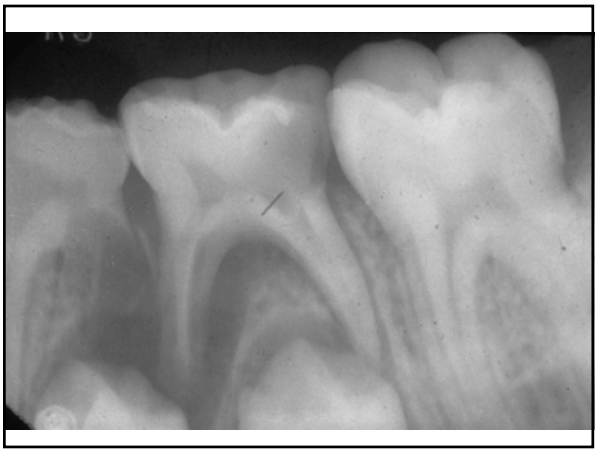




Pulpectomy

- One step versus two step procedure
- Should be strategic tooth
- More signs and symptoms=less chance for success
- Consider medical history
  - Immunocompromised?
  - Cardiac problems?
  - Bleeding problems?
- Fistula is not a contraindication, but make prognosis poorer





Success rates

- Indirect pulp treatment
- Pulpotomy
- Pulpectomy

Extraction

- Indications
  - Infectious process cannot be arrested
  - Bony support cannot be maintained
  - Inadequate tooth structure remaining for restoration
  - Remaining root structure will not support crown

Permanent teeth

- Vital pulp therapy
  - Protective base
  - Indirect pulp therapy
  - Direct pulp capping
  - Pulpotomy
  - Apexogenesis
- Non-vital pulp therapy
  - Apexification
  - Pulpectomy
  - Extraction

Vital pulp therapy

- Protective base
  - An appropriate material is placed to seal dentinal tubules and act as a protective barrier to minimize pulp injury and permit the pulp to heal

Protective base

- Objectives
  - Radiopaque base between restoration and dentin
  - Prevent adverse signs and symptoms
  - Preserve health and vitality of restored tooth

Vital pulp therapy

- Indirect pulp therapy
  - In a tooth with a deep carious lesion, carious dentin is not completely removed. The decay process is sealed with glass ionomer.

Indirect pulp therapy

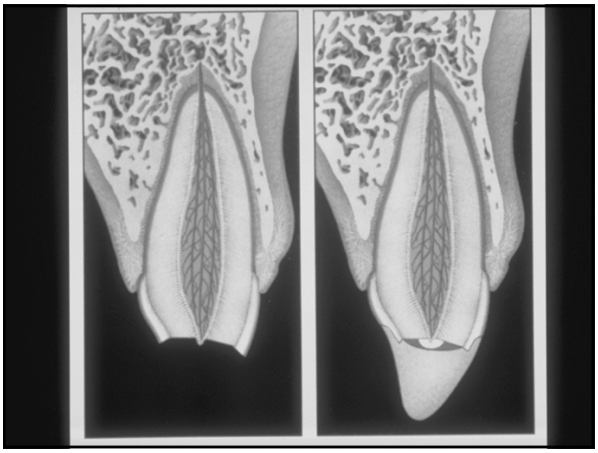
- Objectives
  - Place a radiopaque base over the remaining affected dentin, but not in contact with the pulp
  - Halt the carious process and allow pulp healing and reparative dentin formation
  - Avoid internal resorption or other pathologic changes as determined by periodic clinical and radiographic evaluation
  - Restore tooth and observe, reentering only if symptoms arise

Direct pulp capping

- Objectives
  - Atraumatically place radiopaque base over exposed pulpal tissue
  - Permit pulp healing and reparative dentin formation
  - Prevent further pulpal damage and avoid clinical signs and symptoms
  - Avoid pathologic changes as determined by periodic radiographic evaluation

Direct pulp capping

- Indications
  - Small carious exposure
  - Short standing mechanical or traumatic exposure
- Light cured calcium hydroxide

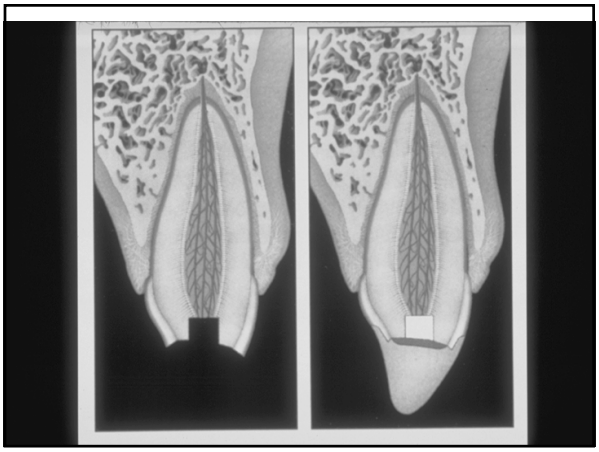


Partial (Cvek) Pulpotomy

- Preserves cell rich coronal pulp
- Increased healing potential
- Physiologic apposition of tertiary dentin
- Obviate need for RCT
- Natural color and translucency preserved

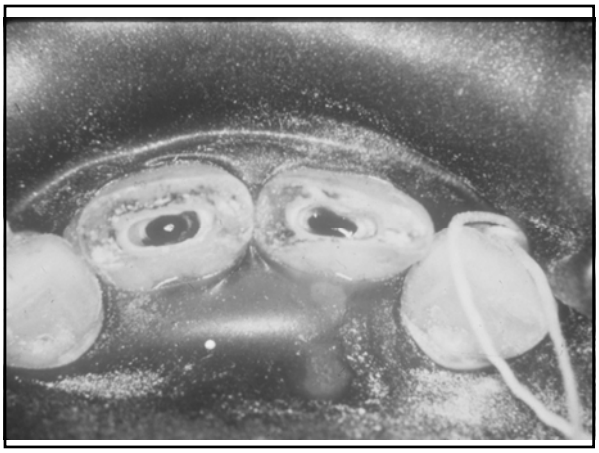
Partial Pulpotomy

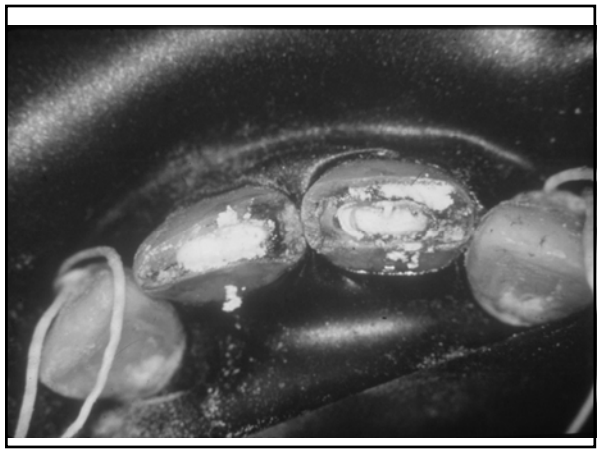
- Conservatively enlarge exposure site
- Remove 1-2 mm of pulp tissue
- Irrigate
- Evaluate health of pulp tissue
- Gently apply calcium hydroxide dressing



Pulpotomy

- Inductive Pharmacotherapeutic
  - Treatment of exposed radicular tissue in such a way as to induce reparative dentin and maintain vitality and function of the majority of remaining pulp tissue
- Objectives
  - To eliminate or neutralize the effect of pulp involvement by caries or trauma
  - To avoid future adverse clinical signs and symptoms
  - There should be no sign of internal resorption, periradicular breakdown, or other pathology





Apexogenesis

- Goal-continued root development
- Remove coronal portion of pulp
- Place agent to preserve radicular vitality
- Monitor
- RCT?

Apexification

- Goal-apical closure
- Remove necrotic tissue short of apexification site
- Irrigate
- Dry well
- Place thick paste of calcium hydroxide

Apexification

- Leave treatment paste for about 6 months
- Evaluate for “positive stop” in apical area
- RCT or retreat with CaOH
- Long term prognosis

Calcium Hydroxide

- Bactericidal
- Low grade irritation inducing hard tissue barrier formation
- Dissolve necrotic debris