

Pulp Capping Apexogenesis/Apexification

Donna Mattscheck, D.M.D.
Diplomate, American Board of Endodontics
Division of Endodontics
University of Minnesota

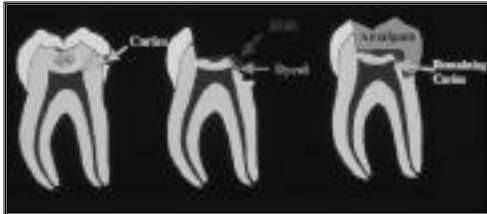
Always Have a Diagnosis

- 75% of necrotic pulps died a painless death.
» Dummer et al., 80
- 40% of patients with necrotic pulps and PARL never experienced pain. Patients over 53 yo experienced ‘painless pulpitis’ mor often than patients that were less than 33 years old.
» Michaelson and Holland
- Pulpal necrosis can occur prior to carious exposure of the pulp.
» Reeves and Stanley:000 '66

Types of Pulp Exposures

- *Carious*
 - Indirect pulp cap
 - Direct pulp cap
 - Pulpotomy
 - NSRCT
- Mechanical
- Trauma

Indirect Pulp Cap



“There are no longer any biological indications for indirect pulp capping on permanent teeth.”

AAE Appropriateness of Care and Quality Assurance Guidelines 1998

Direct Pulp Capping *Cariou Exposure*

- ...endodontic treatment should be initiated at this time or the patient scheduled for endodontic treatment.
- If the tooth has open apices and is vital, it is best to allow apexogenesis to occur by performing pulpotomy and placing $Ca(OH)_2$.

– Dr. Jorge Perdigao, Chair, Division of Operative Dentistry July 2000.

Pulp Capping Cariou Exposure *Indications:*

Endodontic treatment is ideal

- ★Treatment of choice for pulp exposures on developing teeth with open apices
- Overriding financial constraints
- Control bleeding, good restorative seal
- ⇒May preclude option of endodontic treatment in future.

Pulp Capping Carious Exposure

Prognosis: *Barthel '00*

- Asymptomatic, +s cold, -perc
- RDI, < 1mm², Ca(OH)₂, ZnPo₄ or GI, rest

37% @ 5 yrs 13% @ 10yrs

- Placement of a definitive restoration within the first 2 days after pulp exposure was the most influential factor.

Pulpotomy

- Carious exposures of teeth with immature apices
 - Apexogenesis
- Coronal portion of irreversibly damaged pulp is removed

Apexogenesis

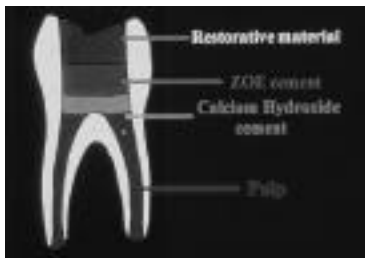
- "...physiological development and formation of the root end"
 - AAE glossary of terms
- Process in which vitality is preserved through pulp cap or pulpotomy allowing for natural closure of the tooth's apex

Goal of Apexogenesis

Procedures

- Maintaining pulp vitality...allowing for remaining odontoblasts to lay down dentin...more fracture resistance
- Promoting root end closure...natural constriction to obturate against.
- Possibility of dentin bridge formation at the site of treatment

Pulpotomy/Apexogenesis



Types of Pulp Exposures

- Carious
- **Mechanical**
 - Direct pulp cap
 - NSRCT
- Trauma

Direct Pulp Cap



Direct Pulp Cap

Materials

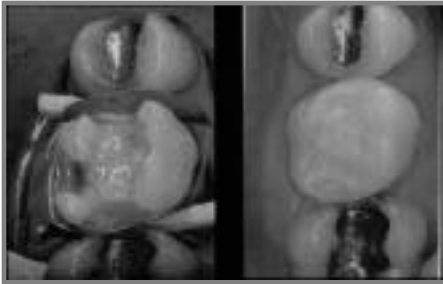


Ca(OH)₂

MTA

Emdogain

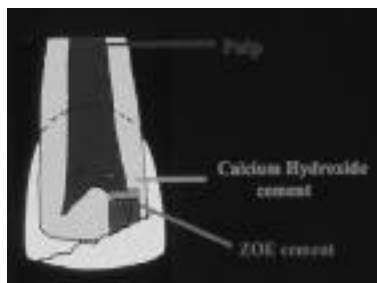
Direct Pulp Cap



Types of Pulp Exposures

- Carious
- Mechanical
- ***Traumatic***
 - Cvek pulpotomy
 - NSRCT

Cvek Pulpotomy



Management of the Open Apex

- Apexogenesis -vital pulp
- Apexification - necrotic pulp

© Big time board stuff

Apexification

- “a method of inducing a calcified apical barrier or the continued apical development of an incompletely formed root in which the pulp is necrotic”
– AAE glossary of terms

Treatment of Open Apex with a Necrotic Pulp

- Apexification
- Custom cone

Apexification Technique



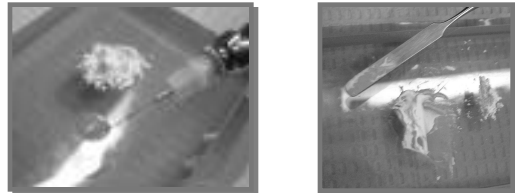
CWL & Debridement

Pre-mixed Ca(OH)_2 Powder



Calcium Hydroxide

- 9:1 ratio with Barium sulfate
 - Liquid



Calcium Hydroxide

- Lentulo spiral and glycerin

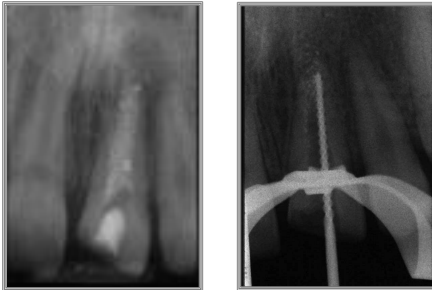
Rivera and Williams JOE 94



Properties of Ca(OH)₂

- Alkaline pH
- Anti bacterial
- Potentiates tissue dissolving properties of NaOCl

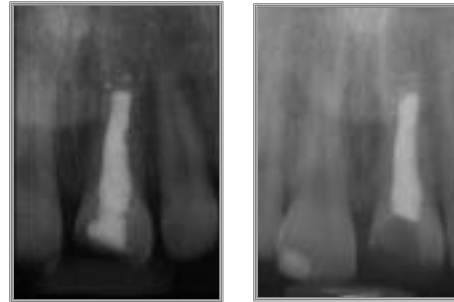
Apexification Technique



Place Ca(OH)₂

4-6 week recalls

Apexification Technique



Obturate and restore

Recall

Apical closure can take various forms during apexification...

- The mineralized tissue can be composed of osteocementum osteodentin, bone or a combination of the three.
- In most cases, it takes an irregular and aberrant form
- Root development or lengthening may or may not occur

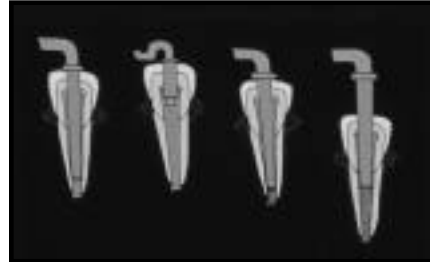
Cause of Failure

- Usually a common cause...
 - Coronal leakage
 - Lack of apical seal
 - VRF

One-Visit Apexification

- Non-surgical compaction of biocompatible material into the apical end of the root canal...APICAL PLUG

Placement of Apical Plug



Apical Plugs

- Placement of dry $\text{Ca}(\text{OH})_2$ or MTA powder to WL
- Create a firm stop to condense gutta percha
- No waiting for a biological apical barrier
- Great idea because a good seal is the goal
- No long term prognosis studies



Benefits to One-Step Apexification

- Factor patient compliance is reduced
- Reduced office time
- No disturbance of apexification process on reopening the root canal (Ghose 1987)



U of M Endo in New Orleans