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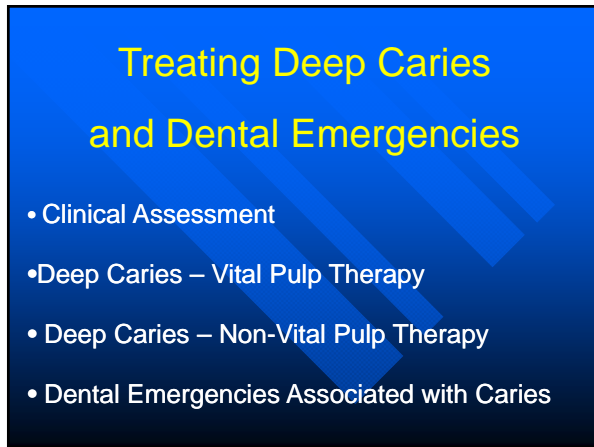
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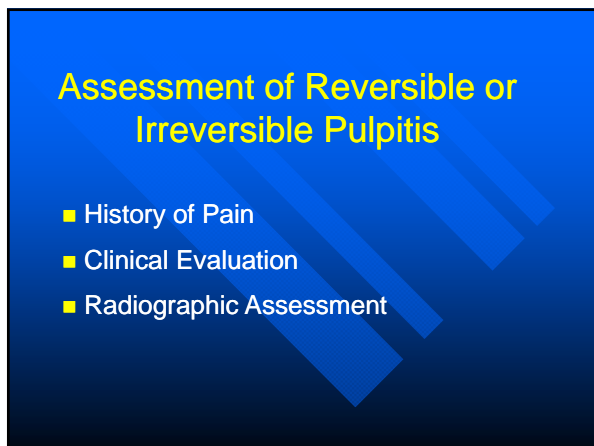
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## HISTORY OF PAIN

- Duration of Pain
  - Few seconds vs. minutes/hours
- Frequency of Pain
  - Intermittent, stimulated vs. spontaneous, nighttime
- Location of Pain
  - Children have difficulty localizing pain

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## CLINICAL EVALUATION

- Presence of abscess or fistula
- Mobility
  - Pathology
  - Normal exfoliation
- Percussion sensitivity
- Soft tissue swelling
- Lymphadenopathy
- Pulp Exposure
  - Hemorrhagic
  - Necrotic

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## RADIOGRAPHIC ASSESSMENT

- Proximity of caries to pulp is difficult to differentiate
- PDL- widening
- Furcation pathology vs. periapical
- Resorption-internal vs. external
- Pathology vs. normal exfoliation (check antemere)



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## Vital Pulp Therapy

- Caries Control
  - Indirect Pulp Cap
  - Pulpotomy

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### Caries Control – Arrest Progression and Aid in Diagnosis



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### Two Months Later – No Symptoms, Re-excavated and Restored



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## Caries Control

Preoperative



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## Caries Control

Postoperative



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## Caries Control –

Arrest Progression and Aid in Diagnosis



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One Month Later –  
No Symptoms, Re-excavated and Restored



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## Vital Pulp Therapy

- Caries Control
- **Indirect Pulp Cap**
- Pulpotomy

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## Indirect Pulp Cap -- Rationale

- A deep carious lesion that approaches the pulp, but no exposure.
- Minimizes the risk of pulp exposure.
- Preserves pulp vitality.

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Indirect Pulp Cap -- Initial Caries Removal



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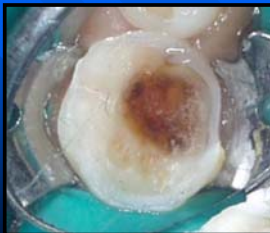
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Indirect Pulp Cap -- Final Caries Removal



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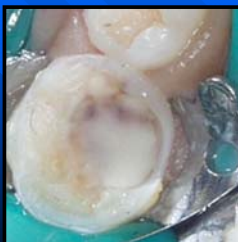
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Indirect Pulp Cap --  
Coverage with Glass Ionomer Cement



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**CLINICAL REVIEW**

F. Schwendicke\*, C.E. Dörfer, and S. Paris

Department for Conservative Dentistry and Periodontology, Christian-Albrechts-University, Arnold-Hecker-Str. 3, 24105 Kiel, Germany; \*corresponding author, schwendicke@kjp.uni-kiel.de

J Dent Res 92(4):306-314, 2013

## Incomplete Caries Removal: A Systematic Review and Meta-analysis

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Outcome	Study	Experimental		Control		Weight	Odds Ratio (95% CI)
		Events	Total	Events	Total		
Pulpal exposure	Magnusson 1977	6	36	0	36	10.4%	0.17 (0.04, 0.58)
	Hennrich 1991	7	48	12	48	14.7%	0.51 (0.18, 1.44)
	Leisath 1989	102	237	28	70	19.7%	0.52 (0.14, 2.17)
	Luft 2009	6	34	4	18	2.7%	0.20 (0.01, 1.78)
	Wimmer 2010	25	142	40	140	30.2%	0.49 (0.28, 0.90)
	Lohner 2012	7	96	12	94	10.4%	0.27 (0.10, 0.74)
	Phonhavanich 2012	0	88	2	82	3.2%	0.20 (0.01, 4.27)
<b>Total (95% CI)</b>		<b>68</b>	<b>608</b>	<b>491</b>	<b>108.8%</b>	<b>0.31 (0.18, 0.48)</b>	
Total events		70		130			

I<sup>2</sup> = 42% (overall effect: Z = 4.93, P < 0.0001)

0.01 0.1 1 10 100  
Favoring incomplete removal Favoring complete removal

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Outcome	Study	Experimental		Control		Weight	Odds Ratio (95% CI)
		Events	Total	Events	Total		
Failure	Hennrich 1991	3	36	6	36	7.0%	0.47 (0.06, 3.78)
	Leisath 1989	0	40	0	40	Not estimable	
	Meyer-Pflaum 1997	12	50	0	50	19.2%	1.08 (0.51, 2.30)
	Wimmer 1998	0	24	1	24	1.6%	1.02 (0.11, 8.23)
	Parky 2004*	10	40	8	40	19.4%	1.08 (0.50, 2.35)
	Luft 2009	0	16	2	16	1.8%	0.13 (0.01, 1.66)
	Wimmer 2010	12	118	19	108	24.7%	0.61 (0.39, 1.00)
Lohner 2012	7	92	2	82	8.2%	0.15 (0.04, 0.69)	
Phonhavanich 2012	14	80	12	88	20.9%	1.08 (0.61, 1.93)	
<b>Total (95% CI)</b>		<b>54</b>	<b>442</b>	<b>474</b>	<b>100%</b>	<b>0.87 (0.64, 1.18)</b>	
Total events		54		53			

I<sup>2</sup> = 47% (overall effect: Z = 4.19, P < 0.001)

\* coded because (incomplete) caries sealed amalgam (C311-2)  
\* ICC included

0.01 0.1 1 10 100  
Favoring incomplete removal Favoring complete removal

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Indirect Pulp Cap -- Initial



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Indirect Pulp Cap -- 6 years later



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Indirect Pulp Cap -- Failure



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### Indirect Pulp Cap - Failure



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## Vital Pulp Therapy

- Caries Control
- Indirect Pulp Cap
- **Pulpotomy**

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## Vital Pulpotomy -- Rationale

- Definitive treatment for a carious or mechanical exposure in a primary tooth.

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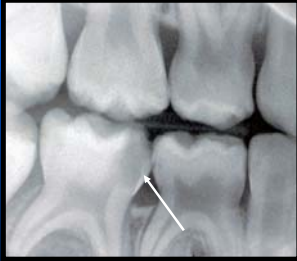
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Initial



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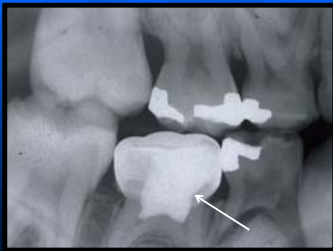
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Post-Op Pulpotomy -- 4 years later



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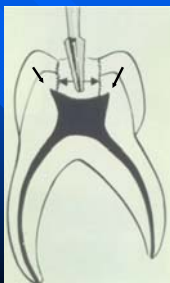
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Initial Opening –  
Wide Enough to Remove Entire Pulp Chamber



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View After Initial Opening



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View of Initial Opening



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Preparation Slightly into Orifices



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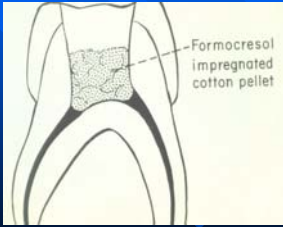
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### Formocresol for 5 Minutes



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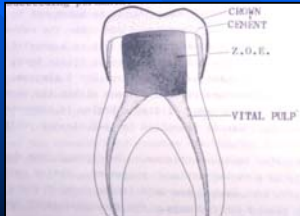
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### Crown over Pulpotomy



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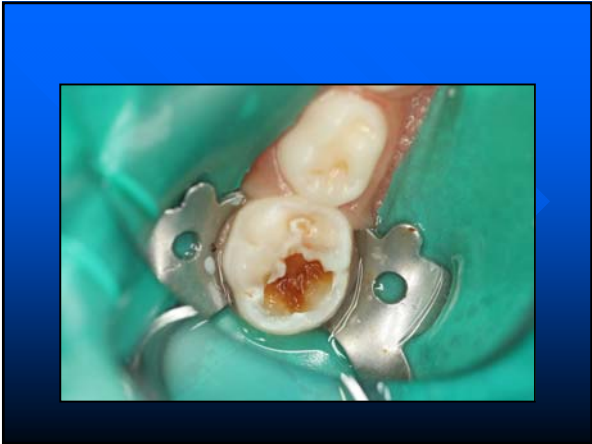
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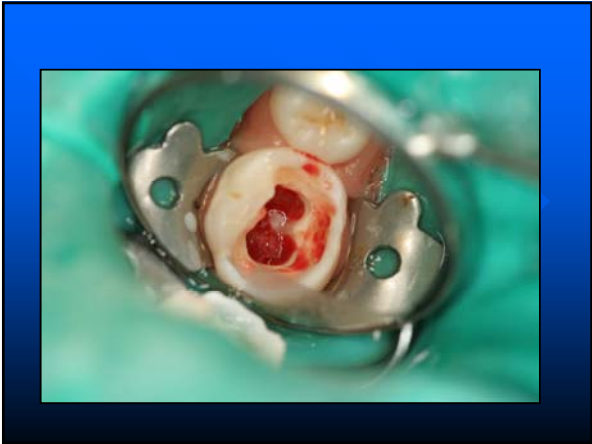
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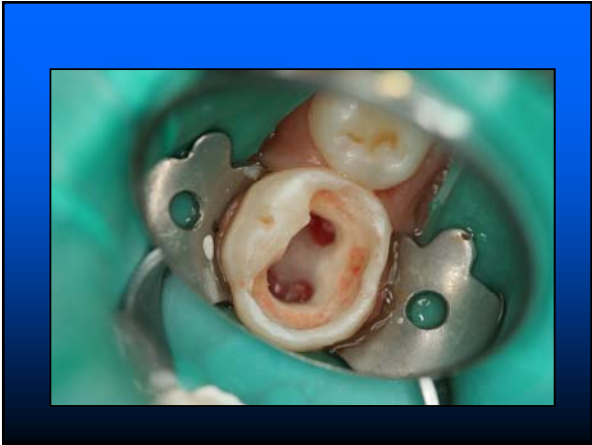
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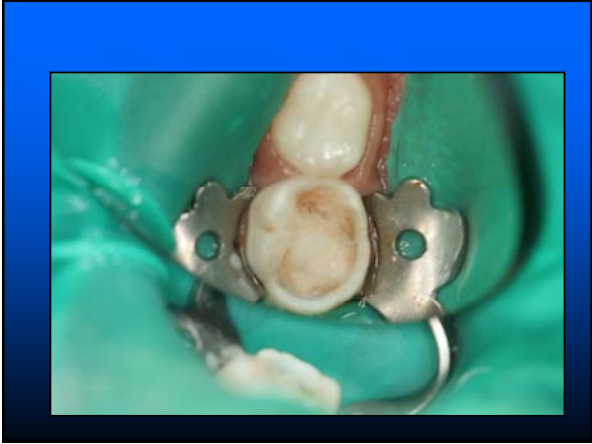
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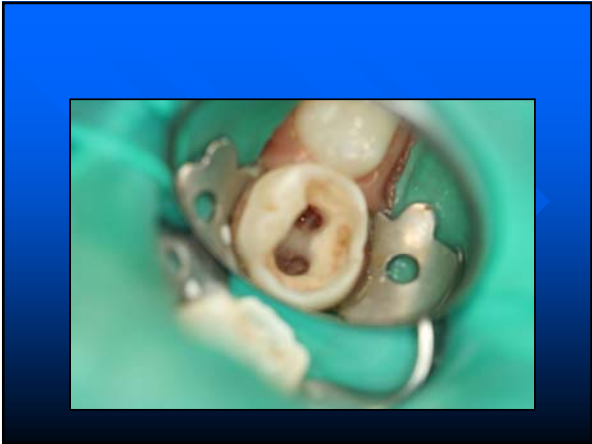
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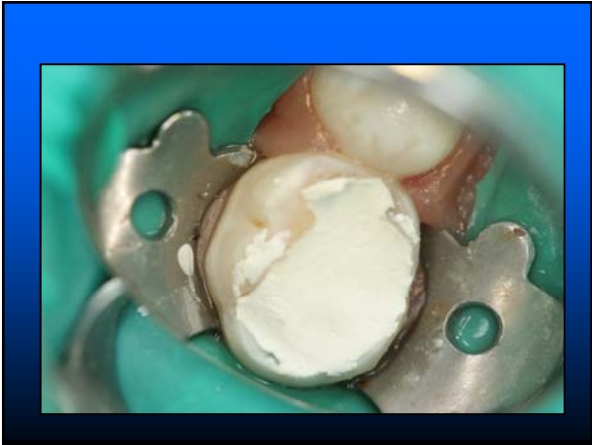
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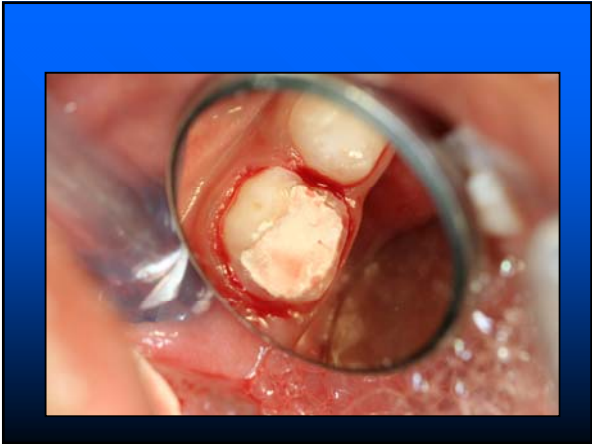
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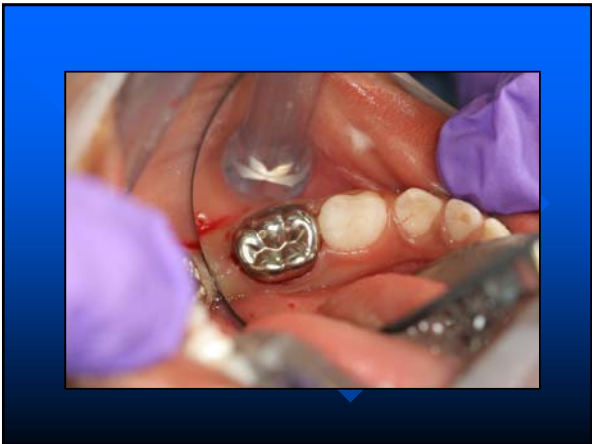
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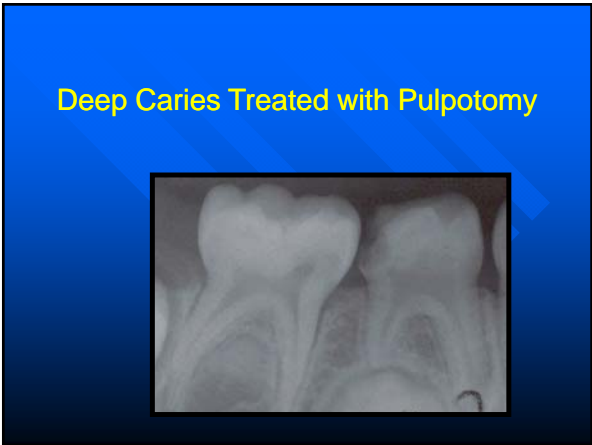
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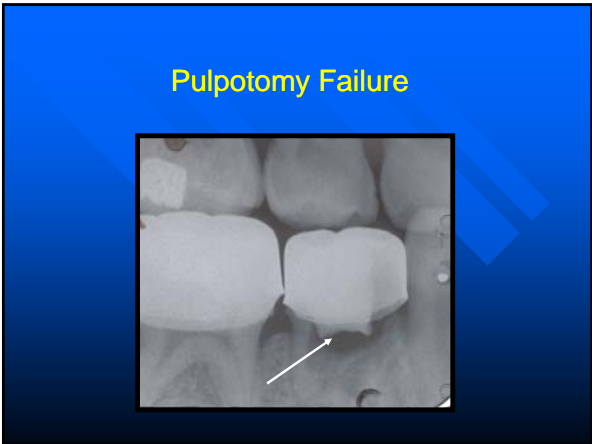
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### Indirect Pulp Cap vs. Pulpotomy for Treatment of Deep Caries in Primary Teeth

	Success	Mean Follow-up (yrs)	Range (yrs)	No. of Teeth
IPC	93%	4.2	1.9-7.5	55
Pulpotomy	74%	3.9	1.9-6.9	78

Farooq, Coll, Kuwabara, Shelton Ped Dent 22: 278-86, 2000

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### Signs of Reversible Pulpitis

- Provoked pain (by some food/drink)
- Pain can be relieved
- Soft tissue within normal limits
- No tooth mobility/sensitivity to pressure
- No history of fever
- No abscess or fistula
- No internal/external root resorption or bifurcation radiolucency

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### Signs of Irreversible Pulpitis

- Pain is spontaneous, especially at night
- Soft tissue swelling
- Tooth mobility/sensitivity to pressure
- Lymphadenopathy
- History of fever
- Abscess or fistula
- Internal/external root resorption or bifurcation radiolucency

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## Non-Vital Pulp Therapy

- **Pulpectomy**
- Extraction

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## Indications for Pulpectomy

- Spontaneous pain
- Small abscess
- Limited mobility
- No root resorption
- Age of patient

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## Pulp Canal Anatomy of Primary Teeth



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### Accessory Foramens



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### Caries with Intra-Radicular Radiolucency



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### Pulpectomy with Zinc Oxide Filling



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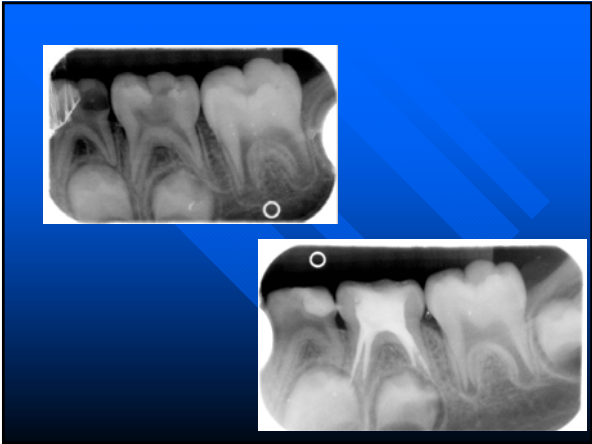
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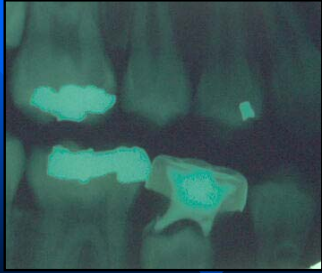
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## Pulpectomy – 8 Years Later



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## Deep Caries – Non-Vital Pulp Therapy

- Pulpectomy
- Extraction

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## Summary -- Deep Caries in Primary Teeth

- **Vital Pulp Therapy**
  - Caries Control
  - Indirect Pulp Cap
  - Pulpotomy
- **Non-Vital Pulp Therapy**
  - Pulpectomy
  - Extraction

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## Dental Emergencies Associated with Caries

- Reversible pulpitis
  - intermittent pain associated with eating
- Irreversible pulpitis
  - spontaneous pain, especially at night
- Abscess
  - Fistula, swelling
  - Fever, lymphadenopathy, cellulitis

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## Dental Emergencies

- Reversible pulpitis
  - caries excavation and sealing dentin
  - If pulp is exposed – vital pulpotomy

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## Dental Emergencies

- Irreversible pulpitis
  - pulpectomy or extraction

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## Dental Emergencies

### ■ Abscess

- Immediate treatment depends on whether abscess will interfere with being able to anesthetize the tooth
- If need to delay, prescribe antibiotic and analgesics (4-7 days)
  - Oral penicillin -- 50mg/kg in 3-4 divided dosages
  - Ibuprofen -- 10 mg/kg q6-8 hr
- Cellulitis spreading to facial triangle or submandibular space
  - Parenteral antibiotics and hospitalization

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Abscess of mandibular first molar that can be anesthetized with mandibular block



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Abscess of a maxillary first molar that may be difficult to anesthetized due to infection in the area



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## Dental Emergencies

### ■ Abscess

- Immediate treatment depends on whether abscess will interfere with being able to anesthetize the tooth
- If need to delay, prescribe antibiotic and analgesics (4-7days)
  - Oral penicillin -- 50mg/kg/d in 3-4 divided dosages
  - (Clindymcin -- 30mg/kg/d in 3-4 divided dosages)
  - Ibuprofen -- 10 mg/kg q6-8 hr
- Cellulitis spreading to facial triangle or submandibular space
  - Parenteral antibiotics and hospitalization

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## Dental Emergencies

### ■ Abscess

- Immediate treatment depends on whether abscess will interfere with being able to anesthetize the tooth
- If need to delay, prescribe antibiotic and analgesics (4-7days)
  - Oral penicillin -- 50mg/kg in 3-4 divided dosages
  - Ibuprofen -- 10 mg/kg q6-8 hr
- Cellulitis spreading to facial triangle or submandibular space
  - Parenteral antibiotics and hospitalization

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## Cellulitis affecting the maxillary triangle



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## Summary of Dental Emergencies

- Reversible pulpitis
  - caries control/temporization
- Irreversible pulpitis
  - pulpectomy or extraction
- Abscess
  - immediate or postponed pulp treatment/extraction
  - antibiotics

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