Triage to Treatment

Jarod W. Johnson, D.D.S.

Disclosures

- Honorarium provided by *SDI North America*

COVID-19

- Incubation Period
  - Thought to extend 14 Days
  - Median time 4-5 Days
- One study shows 97.5% of COVID-19 patients with symptoms will develop them within 11.5 Days

Coronavirus

First Case

MARCH 5TH

ADA Recommends Emergent Care Only

MARCH 16TH

ADA Extends Recommendation

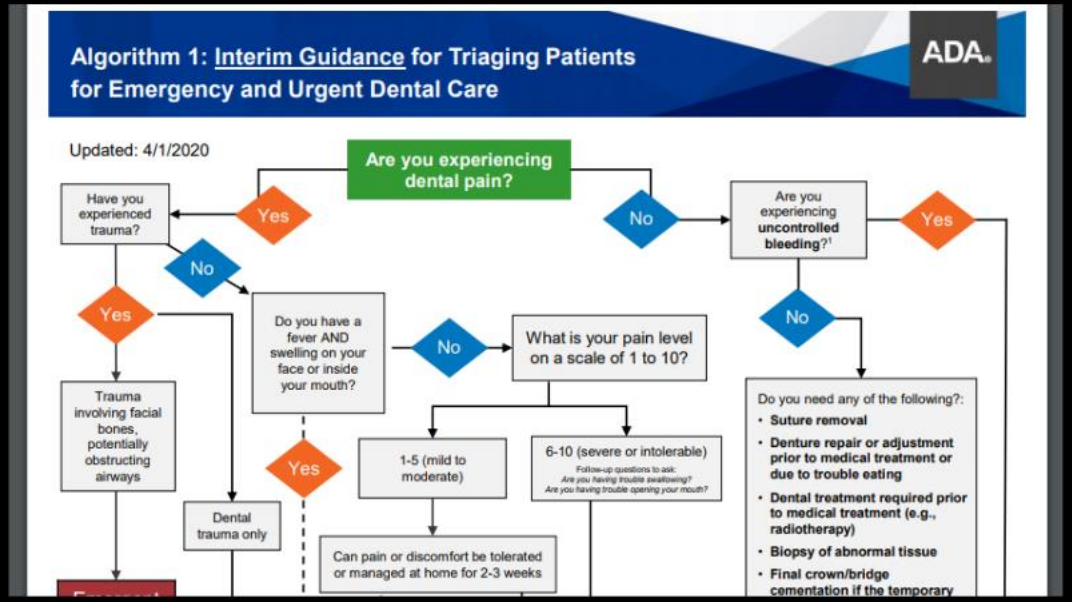
APRIL 1

Expected Date to Resume Routine Care

APRIL 30TH

ADA Website

- ADA Flow Chart



TEXT arctic to 31996

ADA Guidelines Emergency Care

- Emergencies
  - Uncontrolled Bleeding
  - Facial Trauma (Airway Risk)
  - Cellulitis or Swelling with Airway Risk

Urgent Care

- "to relieve severe pain and/or risk of infection and to alleviate the burden on hospital emergency departments. **These should be treated as minimally invasively as possible**."

ADA Guidelines Emergency Care

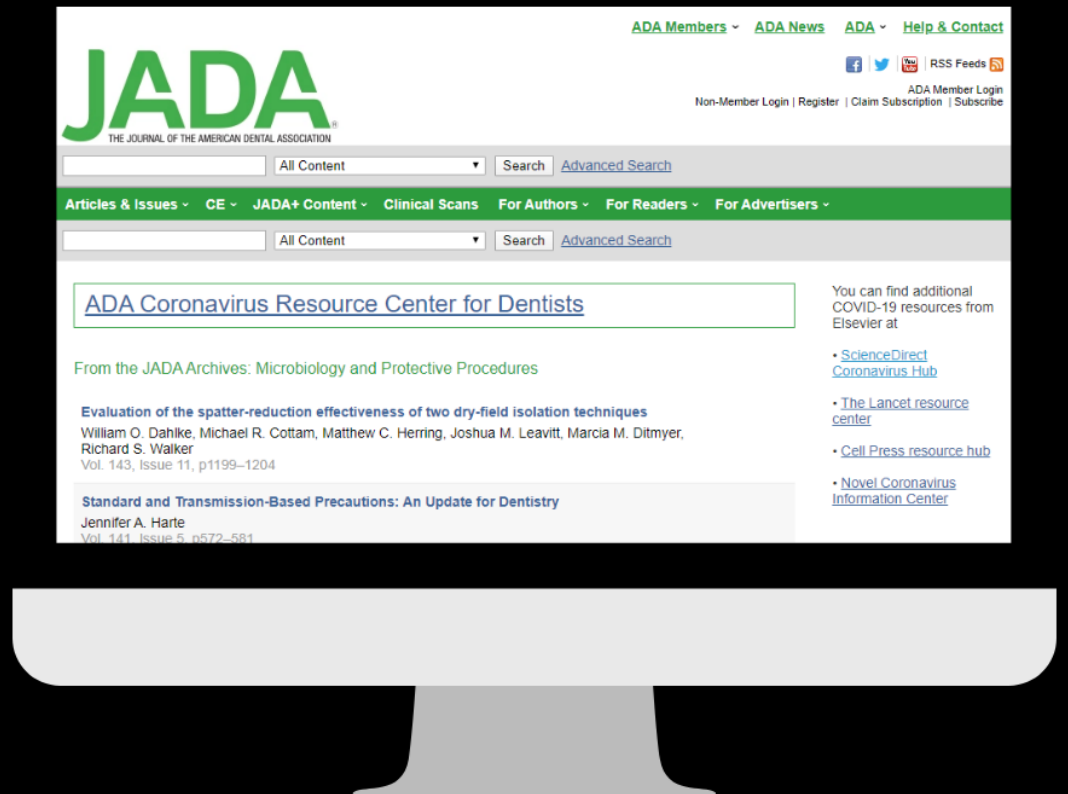
- Urgent Dental Care
  - Severe Pain
  - Pericoronitis or third molar pain
  - Surgical post op osteitis
  - Localized abscess, swelling resulting in pain
  - Tooth fracture resulting in pain or soft tissue damage
  - Dental trauma with avulsion/luxation
  - Dental treatment required prior to medical care
  - Final crown cementation (if temporary lost)
  - Biopsy of abnormal tissue

Other urgent care

- Deep caries
  - **Manage with interim restorative techniques (possible SDF/GI)**
- Suture removal
- Replacing temporary filling on endo access
- Adjustment of orthodontic appliances piercing or ulcerating the mucosa

Aerosols

- Journal of the America Dental Association
- jada.ada.org/cov19
- Link is in your handout.



J Am Dent Assoc. 2004 Apr;135(4):429-37.
Aerosols and splatter in dentistry: a brief review of the literature and infection control implications.
Harrel SK, Molinari J.

- "The aerosols and splatter generated during dental procedures have the potential to spread infection to dental personnel and other people in the dental office. While, as with all infection control procedures, it is impossible to completely eliminate the risk posed by dental aerosols, it is possible to minimize the risk with relatively simple and inexpensive precautions. We feel that the following procedures are appropriate as universal precautions whenever an aerosol is produced"

J Am Dent Assoc. 2004 Apr;135(4):429-37.
Aerosols and splatter in dentistry: a brief review of the literature and infection control implications.
Harrel SK, Molinari J.

- Universal barrier precautions should be followed
- A preprocedural rinse should be used before treatment
- A rubber dam should be used when possible
- An HVE should be use for all procedures

Rubber Dam Isolation

Advantages

- Isolation
- Visualization
- Retraction
- Material Properties
- Airway Protection
- Behavior Management
- Potentiates Sedatives (N2O/O2)
- Reduces Aerosols

Disadvantages

- Claustrophobia
- Possible Airway Restriction
  - Obligate Nose Breather
  - Nasal Congestion
- Gag Reflex

J Am Dent Assoc. 2012 Nov;143(11):1199-204.
Evaluation of the spatter-reduction effectiveness of two dry-field isolation techniques.
Dahlke WO, Cottam MR, Herring MC, Leavitt JM, Ditmyer MM, Walker RS.

- Our study findings indicate that when preparing a posterior tooth in the left mandibular arch, dentists can use either a dental dam with HVE or the Isolite system, because both dry-field techniques reduced spatter significantly compared with use of an HVE alone.

Isolation Options to Consider

- Rubber Dam
- Isolite*
- Dry Shield*
- Mr. Thirsty

*Kona Adapter

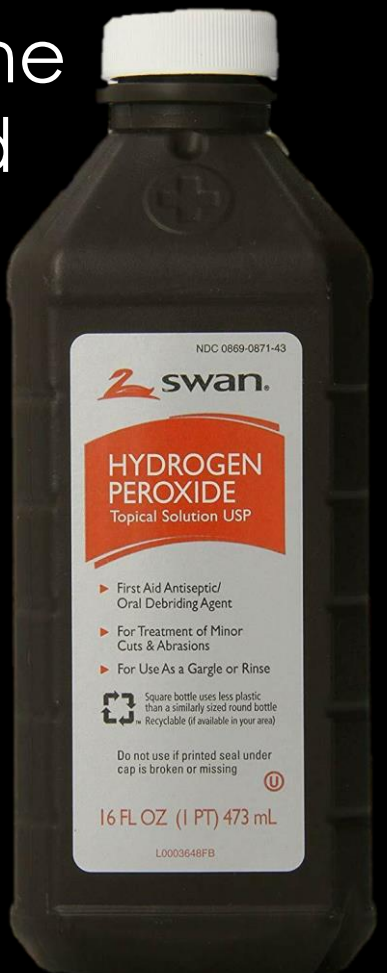
Mouth Rinses

- Previous studies have shown that SARS and MERS were highly susceptible to povidone mouth rinse. Therefore, preprocedural mouth rinse with 0.2% povidone-iodine might reduce the load of corona viruses in saliva

- Source: AAE

Vopr Virusol. 1977 Nov-Dec;(6):731-3.
Virus inactivation by hydrogen peroxide
Mentel' R, Shirrmakher R, Kevich A, Dreĭzin RS, Shmidt I.

- H2O2 in a 3 percent concentration inactivated all the viruses under study within 1--30 min. Coronavirus and influenza viruses were found to be most sensitive.
- [Article in Russian]



PPE

Personal Protective Equipment for COVID-19

Surgical Mask Only

Healthcare workers providing direct patient care in any ambulatory or inpatient location.

Face shield can be worn if available for mask preservation.

Surgical Mask and Eye Protection w/Gown and Gloves

Healthcare workers providing direct patient care or services within the room of a patient known or suspected to have COVID-19.

* Limit staff providing direct patient care and entering the room.

N95 Respirator and Eye Protection or PAPR/CAPR w/Gown and Glove

Healthcare workers performing aerosol- generating procedures on a patient known or suspected to have COVID-19.

* Limit staff to only those necessary for the procedure.

No PPE Needed

Team members in common areas or other areas of the hospital or ambulatory locations who are not providing direct patient care.

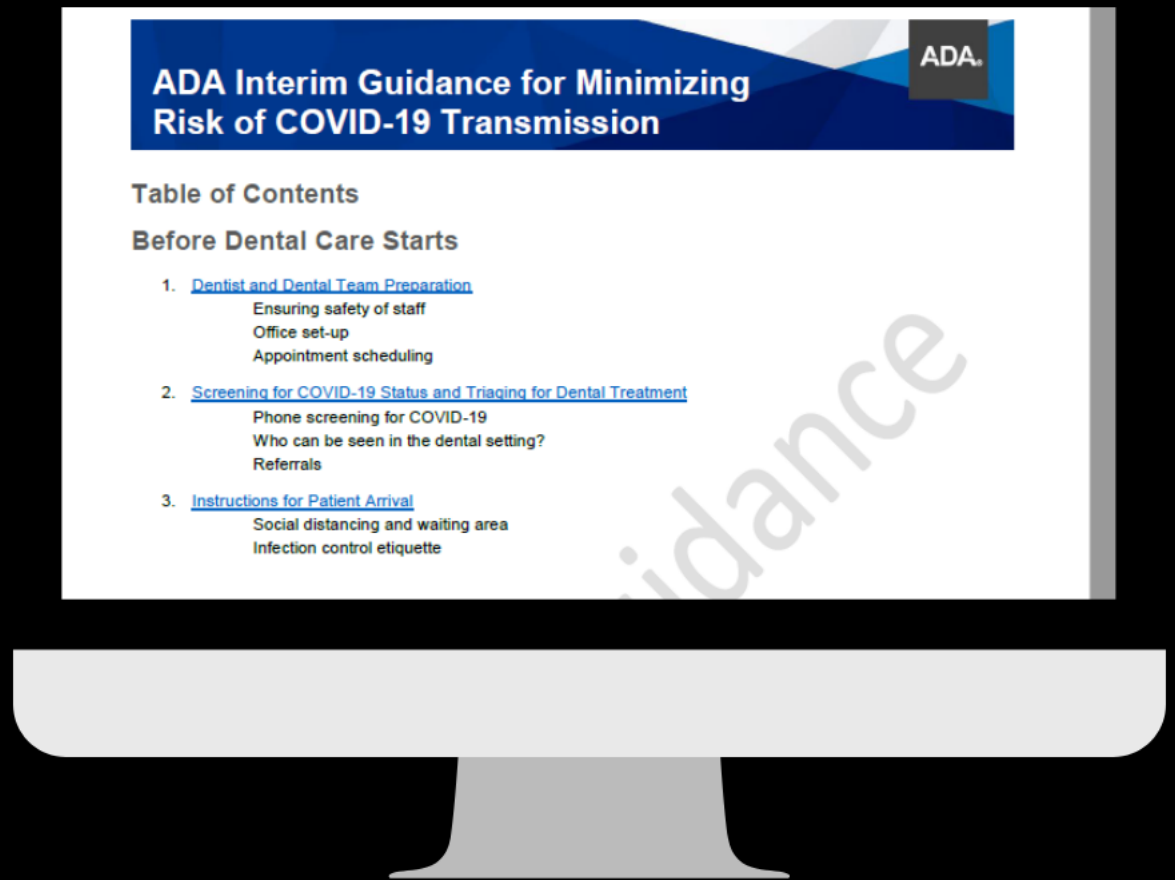
Please practice social distancing staying 6 feet away from others.

All team members should strictly adhere to hand hygiene, respiratory hygiene and cough etiquette (covering of the nose and mouth when coughing or sneezing) and continuously monitor themselves for signs and symptoms of infection (fever, cough, shortness of breath).

0039E2oo-4 E3/20 CS

ADA Interim Recommendations

- ADA Website
- Included in your Handout
- Likely will change over time



TEXT arctic to 31996

Triage to Treatment

- Triage
- Screen
- Diagnose
- Treatment

Triage

- Find out the category the patient falls under
  - Emergency
  - Urgency
  - Non-urgent
- Can the question be answered with Teledentistry?

Teledentistry

- Many options are available
  - Email
  - Text
  - Phone
  - Video
  - Third Party Applications

Easiest Setup

- Synchronous - Video Consult
- Asynchronous – Image sent to device followed prior to consult.

Screen Cases

- Does the patient have a fever?
- Does the patient have signs/symptoms of acute respiratory infection?

- **If the patient has acute respiratory symptoms advise them to go to the ER with dental consult available.**

Diagnosis

Pulpal Diagnosis

Diagnosis	Findings
Normal	Asymptomatic, normal response
Reversible Pulpitis	Inflammation is capable of healing
Asymptomatic Irreversible Pulpitis	Inflammation is incapable of healing; no clinical symptoms
Symptomatic Irreversible Pulpitis	Inflammation is incapable of healing; with clinical symptoms
Pulp Necrosis	Pulpal death; non-responsive to testing
Previously Treated	Endodontically treated tooth
Previously Initiated Therapy	Partial endodontic therapy has been started (pulpotomy/pulpectomy)

Periapical Diagnosis

Diagnosis	Findings
Normal Apical Tissues	Normal response to percussion and palpation, lamina dura intact and normal PDL
Asymptomatic Apical Periodontitis	Apical radiolucency without symptoms
Symptomatic Apical Periodontitis	Symptomatic to percussion and palpation, may or may not have apical radiolucency
Acute Apical Abscess	Symptomatic, swelling of tissues present
Chronic Apical Abscess	Minimal symptoms, sinus tract present
Condensing Osteitis	Diffuse radiopaque lesion around apex

Normal Pulp or Reversible Pulpitis

- Carious Lesion
- No Swelling/Sinus Tract
- No Spontaneous Pain
- No Mobility
- Positive to Vitality Testing (Not in Primary Teeth)
- No Apical Pathosis
  - Apical Lesion
  - Widened PDL
- No Calcifications?
- Adequate Remaining Dentin Thickness (RDT)*, for IPT

Deep Carious Lesion

Swelling

Sinus Tract

Spontaneous Pain, or History

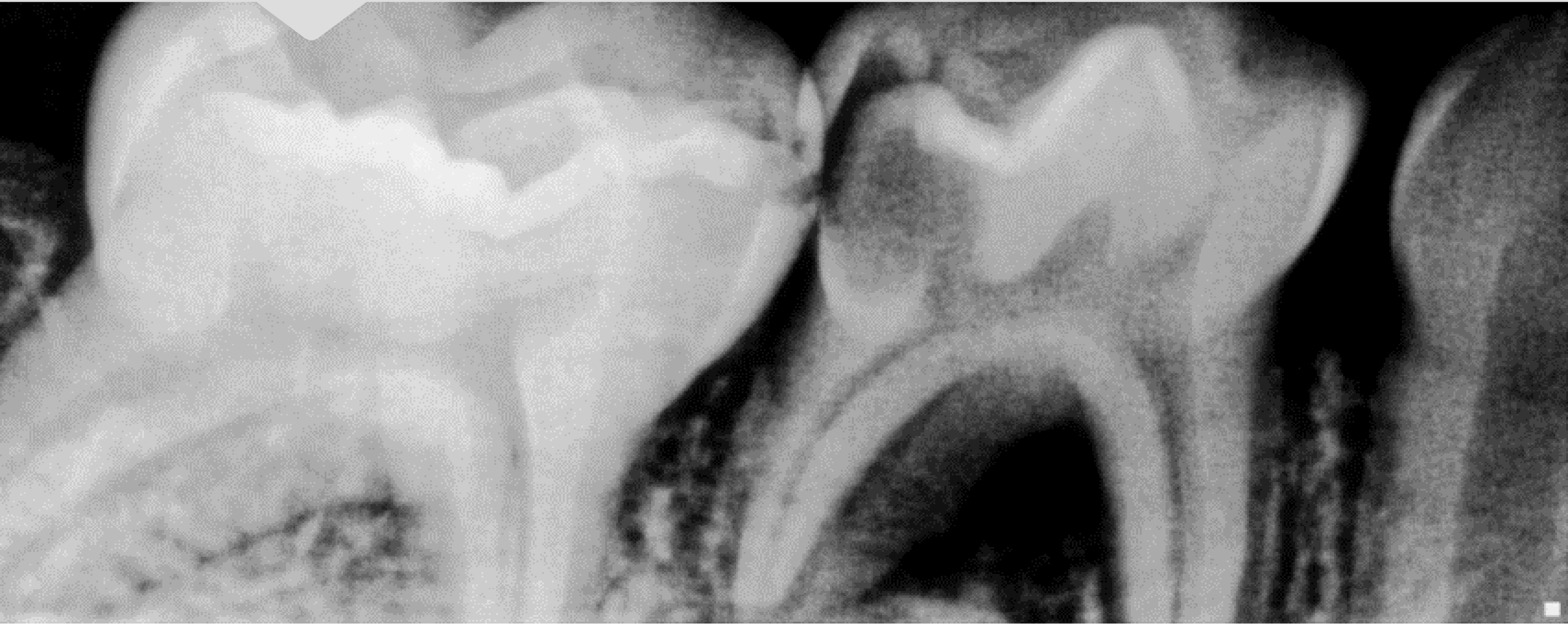
Mobility

Positive to Vitality Testing (Permanent Teeth)

Diagnostic Tests

- Cold (Not in primary Teeth)
- EPT (Not in primary Teeth)
- Percussion
- Palpation

No Apical Pathosis (Furcal/Apical Lesion)



No Apical Pathosis (Widened PDL)

No Calcifications

Adequate Remaining Dentin Thickness (RDT)

No Drill Dentistry for Children (*Minimally Invasive Dentistry)

- Silver Diamine Fluoride
- Glass Ionomer Sealant
- Glass Ionomer
- High Viscosity Glass Ionomer
- Resin Modified Glass Ionomer
- Glass Ionomer/RMGI Cement
- Strip Crown Forms
- Stainless Steel Crowns
- Local Anesthetic and Forceps
- N2O/O2 Therapy?

No Drill Dentistry Options

- Silver Diamine Fluoride (SDF)
- ITR/ART
- SMART (Combination of the above)
- Hall Technique
- Extraction

Silver Diamine Fluoride

- Cleared by FDA as a dental hypersensitivity varnish
- Indicated for
  - Treatment of dentinal hypersensitivity
  - For use in adults over the age of 21

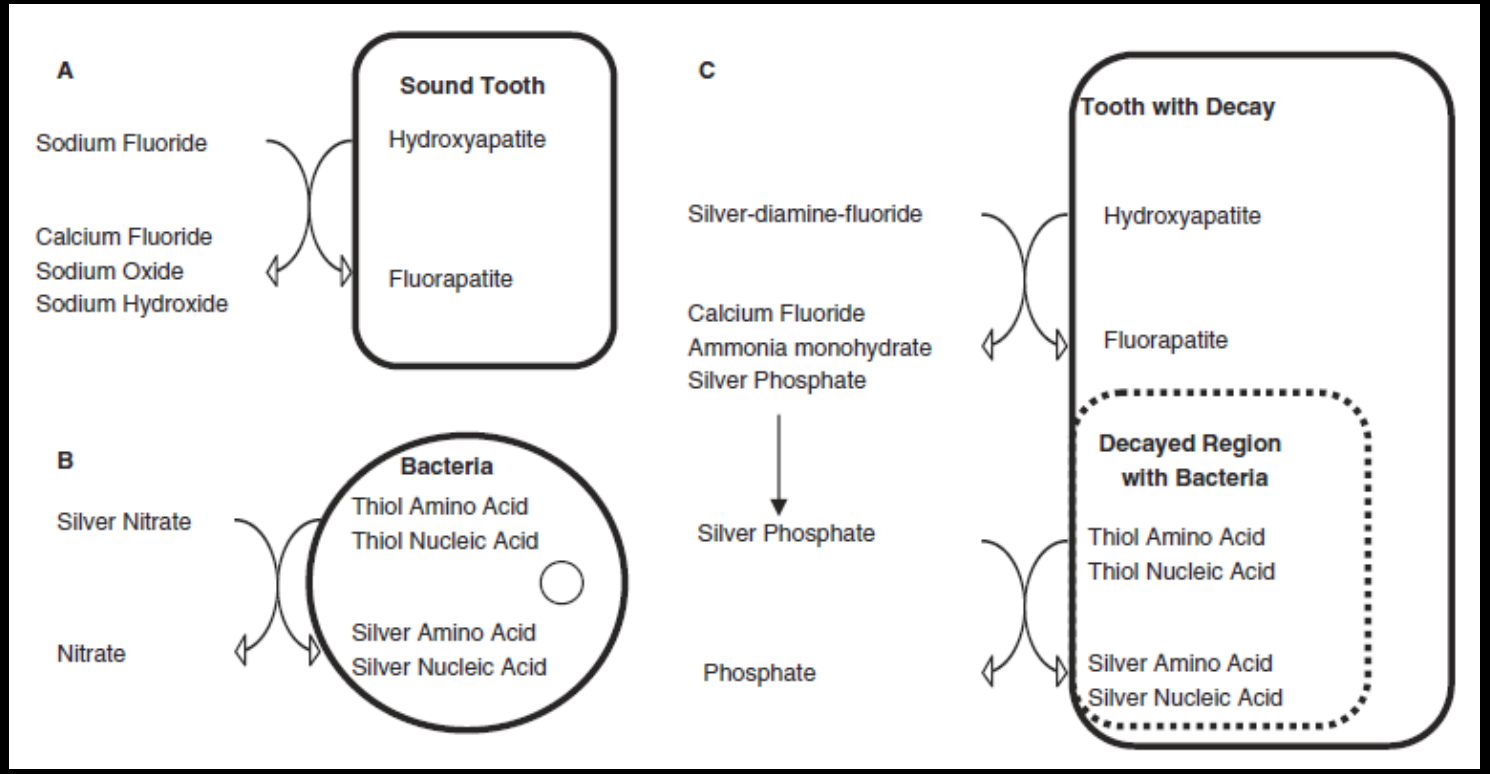
SDF Uses

- As Diagnostic Aid
- Arrest Incipient Caries
- Palliative Care
- Patients with Multiple Lesions
- Emergency Patients with Reversible Pulpitis
- Delay or Avoid Sedation/General Anesthesia
- Treat Dentin Hypersensitivity
- Improve Access to Care
- Pediatric and GeriatricPatients
- Patients with Special Healthcare Needs
- SMART Technique
- Indirect Pulp Therapy

Silver Diamine Fluoride

- Mechanism of Action
- Toxicity
- Consent
- Staining
- Application

Silver Fluoride Reactions



Silver Diamine Fluoride Toxicity

- Horst et al
  - 9.75 mg SDF per drop
  - Oral LD50 – 520 mg/kg
  - SubQ LD50 – 380 mg/kg
  - 400 fold safety factor
- Limited factor is Silver Content and Agryia

Toxicity

- 22 lbs (10kg)
- Probable Toxic Dose 50 mg F
- One Drop SDF
  - 1.12-1.5 mg
- 5% Fluoride Varnish Application
  - 9 mg-11.25 mg F
- Total Application
  - 10.12 to 12.76 mg F

Contraindications to SDF

- Allergies to heavy metal ions
- Presence of severe soft tissue inflammation or ulceration
- Pregnant or lactating women

- Adverse reactions to SDF are rare

- If SDF does come in contact with soft tissue, a temporary gingival whiteness or redness may occur

KI Contraindications

- KI (Radiation Therapy)
  - Iodine Allergy (?)
  - Thyroid Disease
  - Pregnancy
  - Breast-feeding
  - Asthma, bronchitis, sulfite sensitivity
  - Kidney Disease
  - TB
  - Acne

- Only two listed on UCSF contraindications

- UCSF Dental Center Consent Form
- Add Pictures
- Staining can be removed when routine dentistry is restored.

UCSF DENTAL CENTER INFORMED CONSENT FOR SILVER DIAMINE FLUORIDE

Facts for Consideration:

- Silver diamine fluoride (SDF) is an antibiotic liquid. We use SDF on cavities to help stop tooth decay. We also use it to treat tooth sensitivity. SDF application every six to 12 months is neccessary.
- The procedure: 1. Dry the affected area. 2. Place a small amount of SDF on the affected area. 3. Allow SDF to dry for one minute. 4. Rinse.
- **Treatment with SDF does not eliminate the need for dental fillings or crowns to repair function or esthetics. Additional procedures will incur a separate fee.**
- I should not be treated with SDF if: 1. I am allergic to silver. 2. There are painful sores or raw areas on my gums (i.e., ulcerative gingivitis) or anywhere in my mouth (i.e., stomatitis).

Benefits of receiving SDF:

- SDF can help stop tooth decay.
- SDF can help relieve sensitivity.

Risks related to SDF include, but are not limited to:

- The affected area will stain black permanently. Healthy tooth structure will not stain. Stained tooth structure can be replaced with a filling or a crown.
- Tooth-colored fillings and crowns may discolor if SDF is applied to them. Color changes on the surface can normally be polished off. The edge between a tooth and filing may keep the color.
- If accidentally applied to the skin or gums, a brown or white stain may appear that causes no harm, cannot be washed off and will disappear in one to three weeks.
- You may notice a metallic taste. This will go away rapidly.
- If tooth decay is not arrested, the decay will progress. In that case the tooth will require further treatment, such as repeat SDF, a filling or crown, root canal treatment or extraction.
- These side effects may not include all of the possible situations reported by the manufacturer. If you notice other effects, please contact your dental provider.
- Every reasonable effort will be made to ensure the success of SDF treatment. There is a risk that the procedure will not stop the decay and no guarantee of success is granted or implied.

Alternative to SDF, not limited to the following:

- No treatment, which may lead to continue deterioration of tooth structures and cosmetic appearance. Symptoms may increase in severity, with tooth nerve involvement.
- Depending on the location and extent of the tooth decay, other treatment may include placement of fluoride varnish, a filling or crown, extraction or referral for advanced treatment modalities.

I CERTIFY THAT I HAVE READ AND FULLY UNDERSTAND THIS DOCUMENT AND ALL MY QUESTIONS WERE ANSWERED:

_____ (signature of patient) _____ (date)

_____ (signature of witness) _____ (date)

Application

- Remove Debris
- Protective Coating (ie Vaseline Cocoa Butter)
- Caries Removal (Optional)
- Isolation
- Dry Tooth
- SDF Application (1 Minute)
- KI Application (1.5 Minutes, Optional)
- Remove excess SDF/KI PPT
- Keep Tooth Isolated for 3 minutes if possible

Isolation

- Isolite
- Rubber Dam
- Garmers
- Cotton Roll

Rinsing/Drying Teeth

- Without A/W
  - Gauze
  - Cotton Tip Applicator
  - Cotton Pellets on Locking Pliers (Caution if uncooperative)

Application of RivaStar

- Incorrect application of RivaStar *WILL* cause BLACK staining. It *WILL* darken the tooth.
- Correct application is difficult on pre-cooperative and uncooperative children, especially when treating multiple sites.

Incorrect application of RivaStar WILL cause BLACK staining


arctic
DENTAL
Riva Star
Advantage Arrest
Jarod Johnson DDS

Riva Star

Advantage Arrest

RivaStar Application

- Pre-cooperative or Uncooperative child
  - Informed Consent
    - Undersell and over deliver
    - Consider SMART as part of your treatment plan
  - Consider Multiple Visits (during time of routine care)
    - Focus on one or two teeth at a time
    - Increased number of visits and potential cost (if using single dose system)

Literature

- Quick Facts
  - SDF is desirable compared to sedation/anesthesia to some parents
  - 47-90% after one application
  - Reapplication may be necessary
  - More effective than fluoride varnish q3m
  - Addressing other caries risk factors is important

Table 3. SUMMARY OF FINDINGS: EVIDENCE FOR THE RELATIVE AND ABSOLUTE EFFICACY OF SDF APPLICATION COMPARED TO NO SDF FOR THE ARREST OF CAVITATED CARIES LESIONS ON PRIMARY TEETH*

Patient or population: Children and adolescents with cavitated caries lesions on primary teeth
Intervention: SDF (various periodicities)
Comparison: No SDF (various controls, including active agents and treatment)
Outcome: Caries arrest in primary teeth

Follow-up time; n surfaces (studies)	Relative efficacy, RR (95% CI)	Absolute estimates, % arrested lesions (95% CI) Ω		Quality assessment
		No SDF (other active controls or no treatment)	SDF	
24 months; 746 surfaces (2 RCTs: Yee et al., 2009 & Zhi et al., 2012) V	**RR 1.45** (0.79 to 2.66)	47.9% (3.8 to 95.6) A	**68.0%** (9.7 to 97.7)	⊕OOO VERY LOW a,b,c
≥ 24 months; 3313 surfaces (3 RCTs: Llodra et al., 2005, Yee et al., 2009 & Zhi et al., 2012., 1 CCT: Chu et al., 2002) Ϛ	**RR 1.42** (1.17 to 1.72)	49.6% (28.8 to 70.5) C	**72.4%** (48.0 to 88.1)	⊕OOO VERY LOW a,d,e
≥ 30 months; 2567 surfaces (1 CCT: Chu et al., 2002 & 1 RCT: Llodra et al., 2005.) Ξ	**RR 1.48** (1.32 to 1.66)	50.8% (32.5 to 69.0) B	**76.4%** (52.1 to 90.6)	⊕⊕OO LOW a,b
semi-annual application ≥ 24 months; 1784 surfaces (2 RCTs: Llodra et al., 2005 & Zhi et al., 2012)	**RR 1.25** (0.99 to 1.58)	72.4 % (47.2 to 88.5) A	**87.7%** (80.9 to 92.4)	⊕OOO VERY LOW a,d,e

CCT= Controlled clinical trials; CI= Confidence interval; RCTs= Randominzed control trials; RR= Relative risks.

* Rates of arrest on untreated groups may seem unusually high, and this may be due to background fluoride exposure. In one of the trials[7], all participants (i.e., both the SDF-treated and control children) received 0.2 percent NaF rinse every other week in school, while in other trials, children were either given fluoride toothpaste[13] or reported use of fluoride toothpaste[8].

V Yee is once a year application of SDF, and Zhi is once a year vs. twice a year.

Ϛ Chu is once a year application of SDF, Llodra is twice a year, Yee is once a year, and Zhi is once a year vs. twice a year.

Ξ Chu is once a year application of SDF, Llodra is twice a year.

Ω The pooled effect estimates and confidence intervals for the relative risk and absolute percentages were derived from random effect modeling.

A Comparisons included glass ionomer and no treatment.

B Comparisons included no treatment.

C Comparisons included both A and B.

a At least one domain had 'unclear' risk of bias assessment.

b High heterogeneity.

c Wide confidence interval of the relative risk.

d Very high heterogeneity.

e Wide confidence interval.

J Dent. 2012 Nov;40(11):962-7.
Randomized clinical trial on effectiveness of silver diamine fluoride and glass ionomer in arresting dentine caries in preschool children.
Zhi QH1, Lo EC, Lin HC.

- "It was also found that lesions in the anterior teeth and buccal/lingual surfaces had a higher chance to become arrested. This is probably because these teeth and surfaces are easier to be cleaned by young children"

- OR 5.55 A/P
- OR 15.6 B/L vs O/IP

Anterior Teeth

Smooth Surface Decay

Interproximal Decay

Posterior Teeth

Smooth Surface Decay

Pit and Fissure Decay

Interproximal Decay

Sticky Snacks

It is okay to indulge every now and then, but limit consumption of these sticky snacks to avoid cavities at your child's next dental check up.

1

Cookies

Cookies contain both starch and sugar; which can lead to high acid production by plaque in our mouth and more cavities.

2

Dried Fruit

Dried fruit may sound like a healthy snack, but the stickiness makes it linger longer than a healthier choice such as fresh fruit.

3

Crackers

Dried flour products such as crackers are an easy, go to, no mess snack. Just like chips they also contain high levels of starch.

4

Chips

Chips are really sticky, and while one wouldn't think they cause cavities, the starch eventually breaks down to sugar in our mouths.

5

Cereal

Most cereals that appeal to children contain high levels of sugar and starch. Try to limit snacking on this sticky food.

6

Fruit Snacks

Fruit snacks and gummy vitamins are loaded with sugar. They're also really sticky and more likely to remain in our mouth even with thorough brushing.

Randomized clinical trial on arresting dental root caries through silver diamine fluoride applications in community-dwelling elders. Br Dent J. 2016;221(7):409.
Li R, Lo ECM, Liu BY, Wong MCM, Chu CH

- Root Caries
- SDF/KI (93%), SDF (90%) are effective at arresting root caries
- No difference between the two ($p > 0.05$)
- No difference in darkening (X2 p 0.05)
- SDF 69% Black, 32% Dark Brown
- SDF/KI 62% Black, 25% Dark Brown
- Long term staining?

Quintessence Int. 2009 Feb;40(2):155-61.
Inability to form a biofilm of Streptococcus mutans on silver fluoride- and potassium iodide-treated demineralized dentin.
Knight GM, McIntyre JM, Craig GG, Mulyani, Zilm PS, Gully NJ.

- AgF (*not* SDF), KI, AgF/KI, Control
  - AgF, AgF/KI inhibited biofilm formation
  - AgF/KI and AgF had higher fluoride uptake
    - AgF/KI had higher uptake than AgF alone ($P < .05$)
  - Silver Uptake
    - AgF/KI had higher levels of precipitate at the surface
    - AgF had deeper penetration
- Will this mean anything clinically?

Quintessence Int. 2009 Feb;40(2):155-61.

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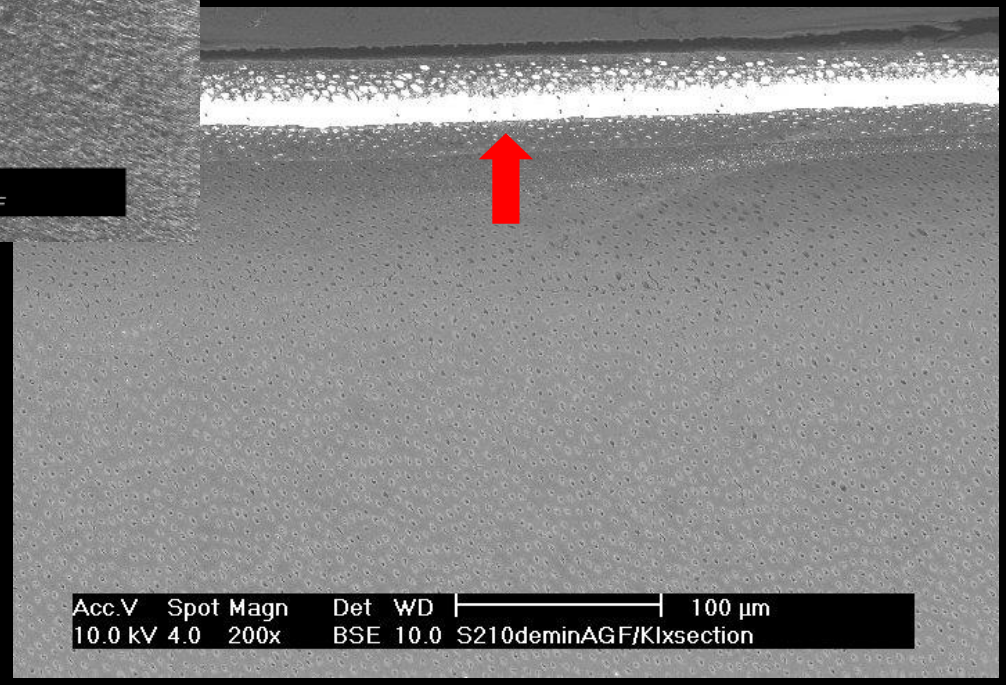
- with AgF, silver penetrates the tubules to the base of the caries
- with AgF/KI the silver salts are limited to the first 50 microns to form a sub surface bactericidal shield in the carious dentine.



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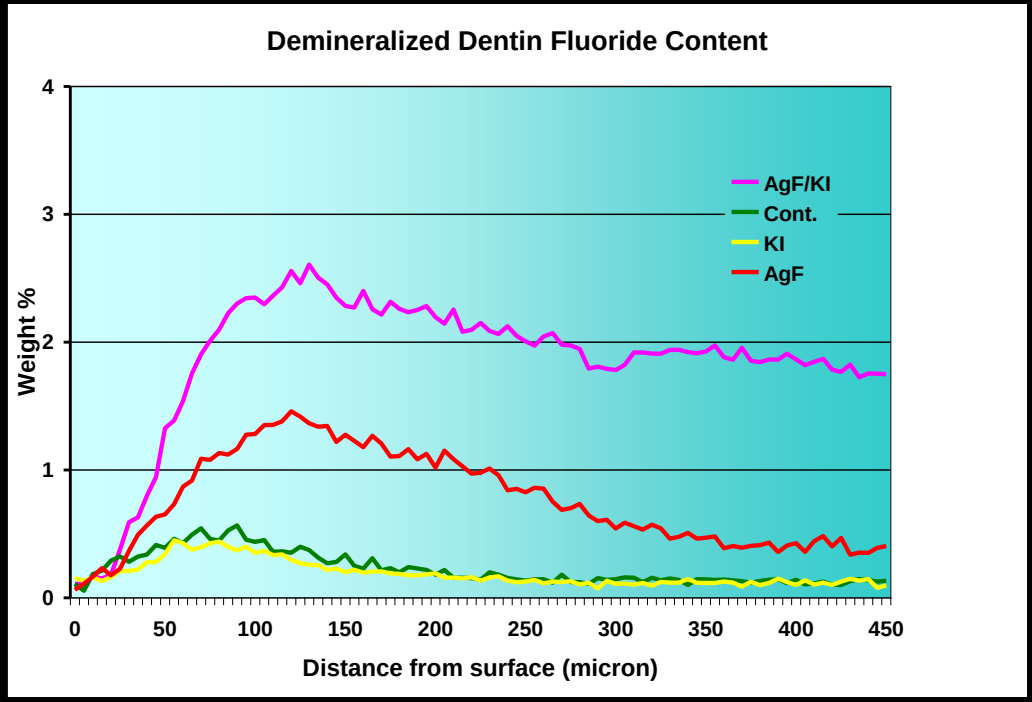
- The lethal dose of fluoride for S Mutans is about 2,000ppm
- AgF deposits fluoride into caries around 1% (5,000 ppm)
- AgF/KI deposits fluoride at around 2% (10,000 ppm) and beyond into sound dentine

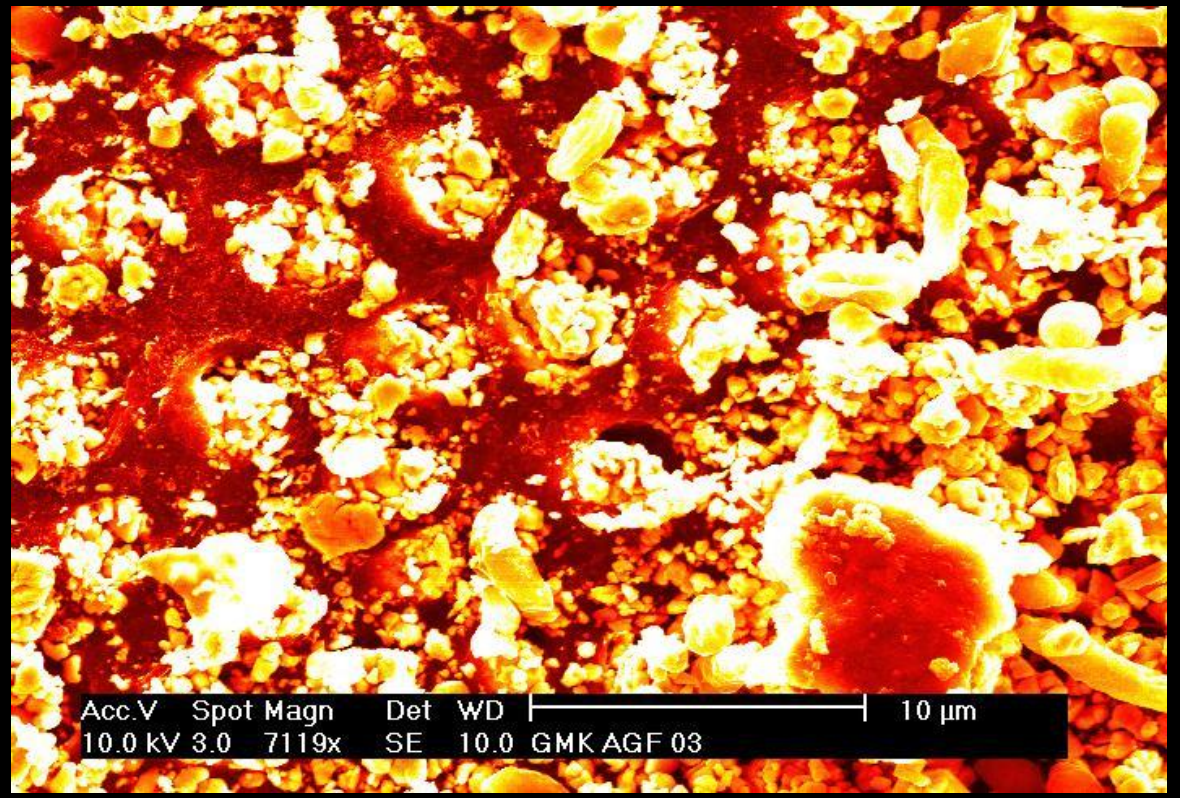


Aust Dent J 2012 Sep; 57:308 - 11

Clinical evaluation of diamine silver fluoride/potassium iodide as a dentine desensitizing agent. A pilot study.

Craig GC, Knight GM, McIntyre JM.

- In sound non-carious dentin, Riva Star uses AgF and KI to deposit Silver Iodide into the dentinal tubules, blocking them to prevent thermal and chemical hypersensitivity



SMART Technique

- SMART After SDF Therapy
  - After lesions are arrested it may be desirable for esthetics
  - Prevent food impaction
  - Restore function
    - Consider space loss of interproximal decay
  - As a temporary restoration
- SMART as IDPC

Properties of GI

- Chemical bond to enamel and dentin
- Releases fluoride
- Biocompatible
- Coefficient of thermal expansion is closest to dentin
- Requires moisture to set

Knight GM; McIntyre J, Craig G; The effect of silver fluoride and potassium iodide on the bond strength of auto cure glass ionomer cement to dentine. Australian Dental Journal 2006;51:42-45.

- Increasing bond strengths of GICs
- Pre-treating tooth surfaces is a great way to enhance bonding of auto cure glass ionomers to dentin

- Shear Bond Strength
  - No difference
    - Etch
    - Conditioner
  - *Difference if* KI PPT is *not* washed away

Remaining Dentin Thickness

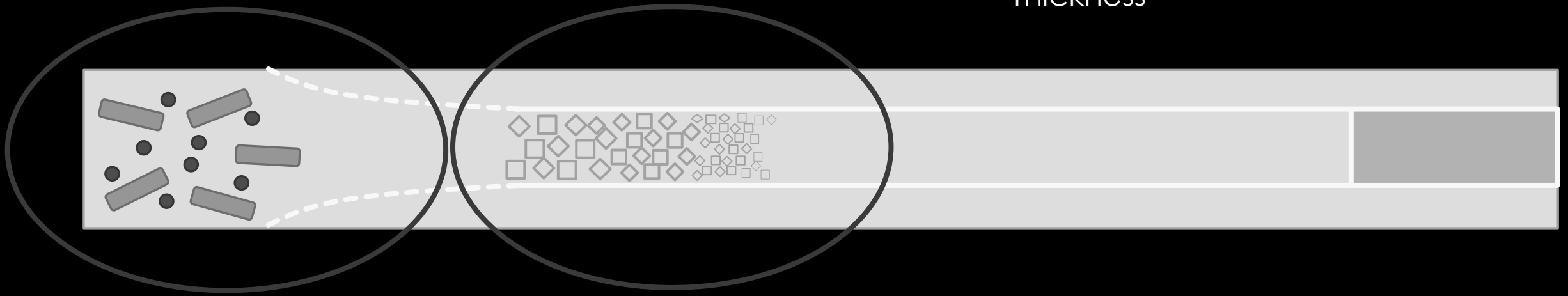
Preservation and Restoration of Tooth Structure. 2nd ed: Knowledge Books and Software; 2005.
Mount G, Hume W.

Infected Dentin

Affected Dentin

Remaining Dentin Thickness

Pulpal Response?



Dent Res J (Isfahan). 2014 Mar-Apr; 11(2): 199–203.
Histological evaluation of pulp tissue from second primary molars correlated with clinical and radiographic caries findings
Vellore Kannan Gopinath and Khurshid Anwar

- Remaining dentin thickness criteria for indirect pulp capping ***primary teeth**
  - >80% RDT
  - > 1mm RDT

Oral Surg Oral Med Oral Pathol. 1966 Jul;22(1):59-65.
The relationship of bacterial penetration and pulpal pathosis in carious teeth.
Reeves R, Stanley HR.

The relationship of bacterial penetration and pulpal pathosis in carious teeth.

- **Permanent Teeth**
- > 1.1 mm
  - No pathologic changes
- < 0.5 mm
  - Pathologic pulpal changes

J Ped Dent

Indirect Pulp Capping and Primary Teeth: Is the Primary Tooth Pulpotomy Out of Date?

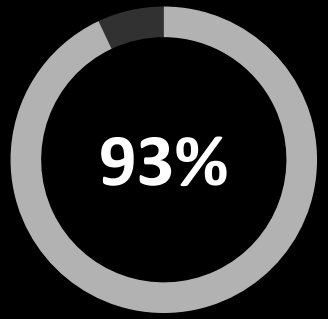
Coll JA

- "**Use glass ionomer caries control for deep cavitated lesions to diagnose the status of the pulp with or without history of pain to attain the highest success for vital pulp therapy.** Stay out of the pulp by using IPT for a higher long-term chance of success compared with formocresol and ferric sulfate pulpotomy."
- "**IPT has been shown to have** a lower cost, higher success long-term, better exfoliation pattern, and **better success treating reversible pulpitis than pulpotomy."** (FC/FS)

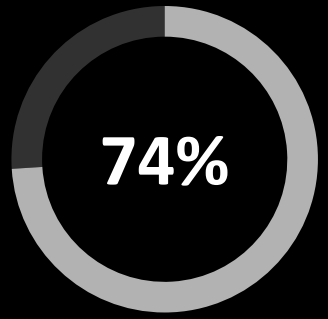
Pediatr Dent. 2000 Jul-Aug;22(4):278-86.

Success rates of formocresol pulpotomy and indirect pulp therapy in the treatment of deep dentinal caries in primary teeth.

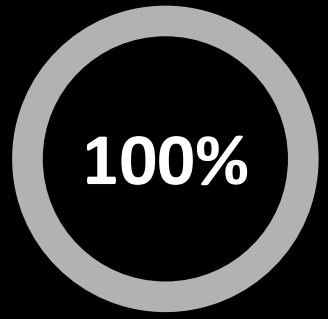
Farooq NS, Coll JA, Kuwabara A, Shelton P.



IPT



FC Pulpotomy



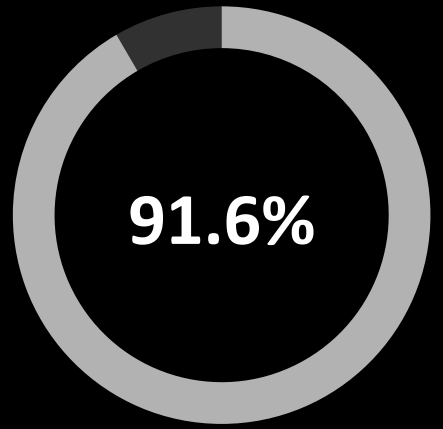
IPT Restored With SSCs

- IDPC was more successful than FC pulpotomy (P =0.01)
- FC pulpotomies had higher success with SSCs (P=0.01)

Indirect Pulp Therapy (Primary Teeth)

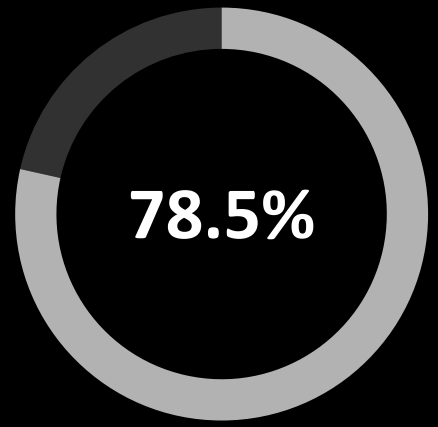
3 Studies

319 Teeth



3 Studies

81 Teeth

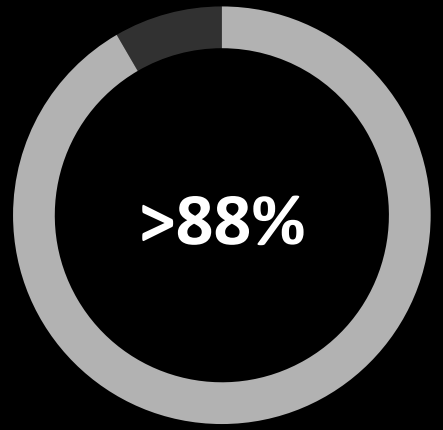


All liners equally successful (CH, Bonding Agents, RMGI)

Indirect Pulp Therapy (Permanent Teeth)

5 Studies

426 Teeth



J Dent. 2016 Nov;54:25-32.
Long-term survival and vitality outcomes of permanent teeth following deep caries treatment with step-wise and partial-caries-removal: A Systematic Review.
Hoefler V, Nagaoka H, Miller CS.

SMART Technique

Rubber Dam Isolation

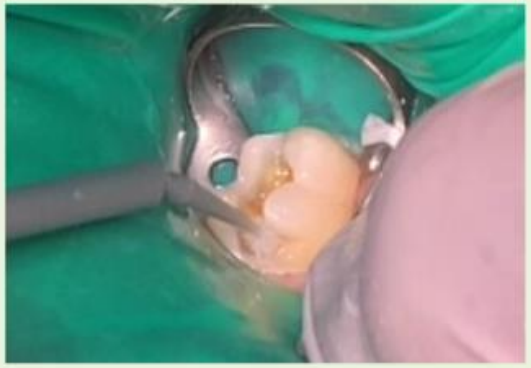
Isolate the tooth using rubber dam isolation.

Selective Caries Removal

Remove soft caries and ensure the dentin enamel junction is clean and free of demineralization.

Rinse and Etch

Thoroughly rinse the tooth, and apply the condtioner (etch).



Silver Diamine Fluoride

Apply Silver Diamine Fluoride for 60 seconds.

Potassium Iodide

Apply Potassium Iodide for 90 seconds to precipitate out the silver ions.

Restore

Place a Glass Ionomer Base and restore with desired composite.

Post Operative Photo

Final Restoration two weeks later showing an eshtetic outcome.

Minimally Invasive Dentistry:
Indirect Pulp Cap Protocol

Jarod W. Johnson, D.D.S.

SMART after SDF

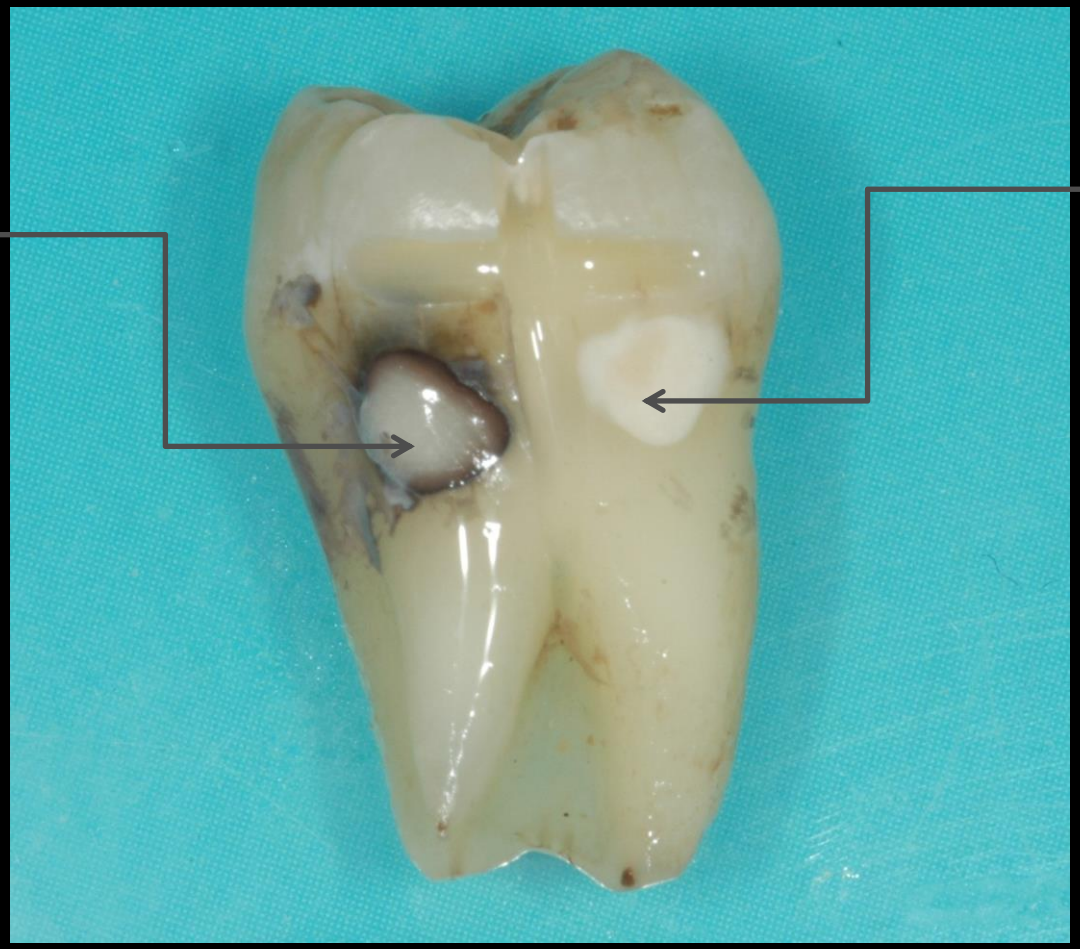
- Glass Ionomer
  - Riva Self Cure
  - Riva Self Cure HV
- Resin Modified Glass Ionomer
  - Riva Light Cure
  - Riva Light Cure HV
- D2940 – protective restoration/sedative restoration
- If it is intended to be your final restoration bill for the appropriate restorative code.

Cavity pre-treated with Silver Diammine Fluoride and restored with conventional glass-ionomer cement (after 4 yrs) storage in water

Cavity pre-treated with Silver Diammine Fluoride / Potassium Iodide and resorted with conventional glass-ionomer cement (after 4 yrs) storage in water

Fig 1 & 2. Images courtesy of Dr G Knight

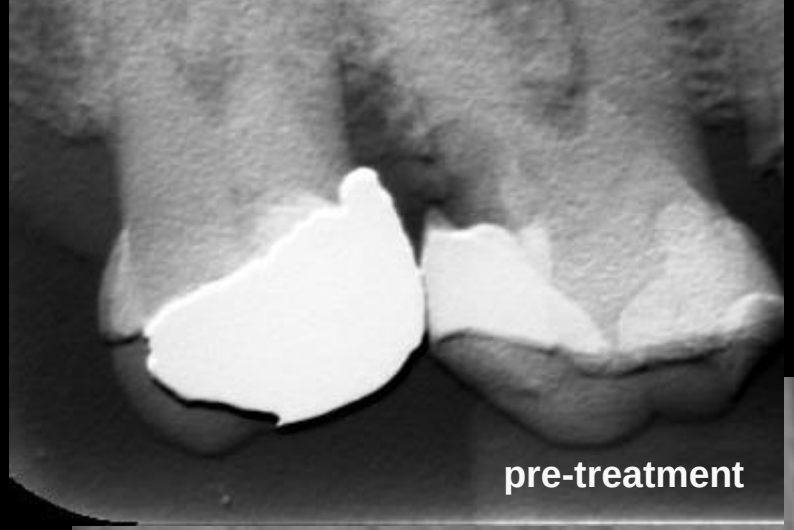
SDF & SC GIC

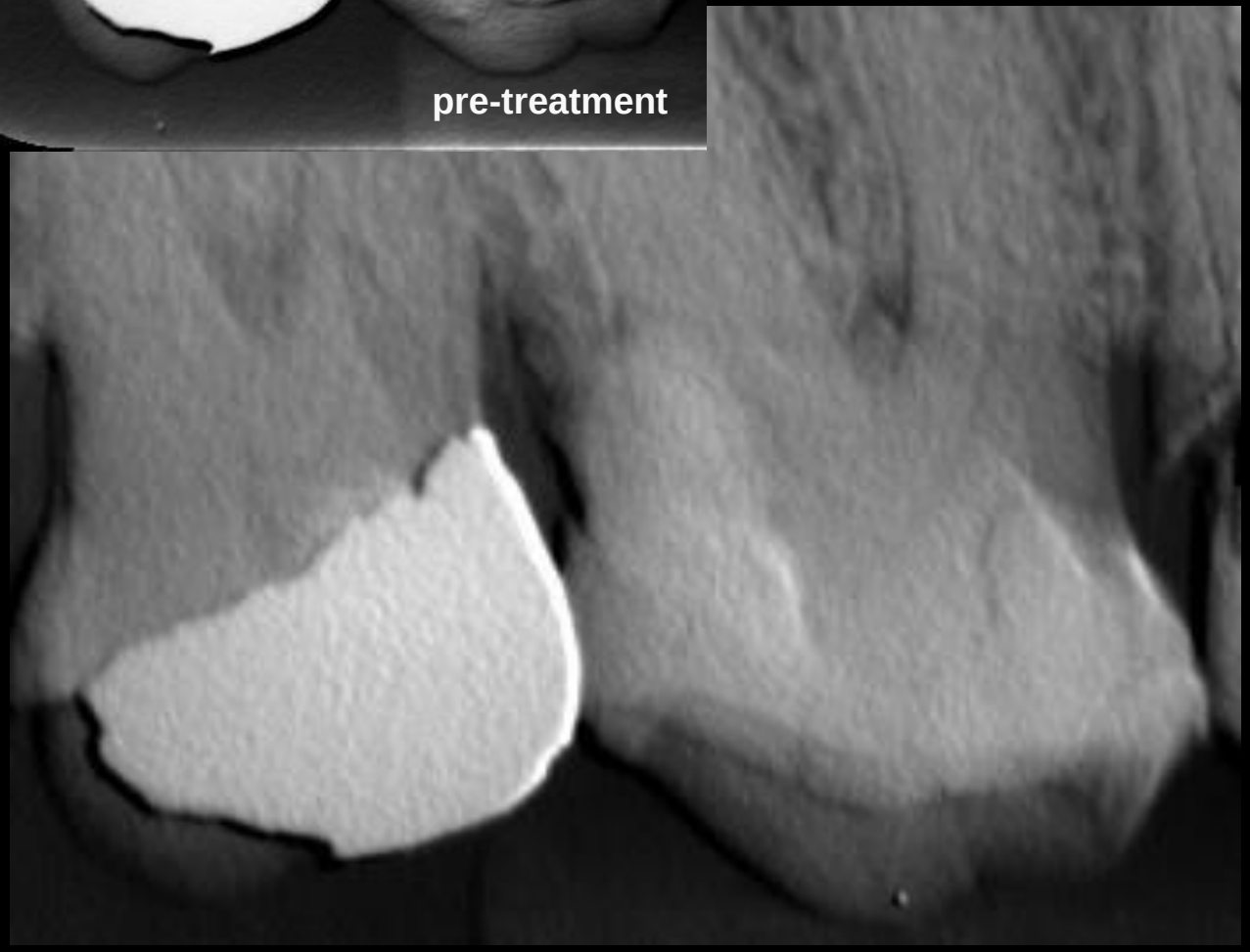


Riva Star & SC GIC

6 week submersion in water & in direct sunlight

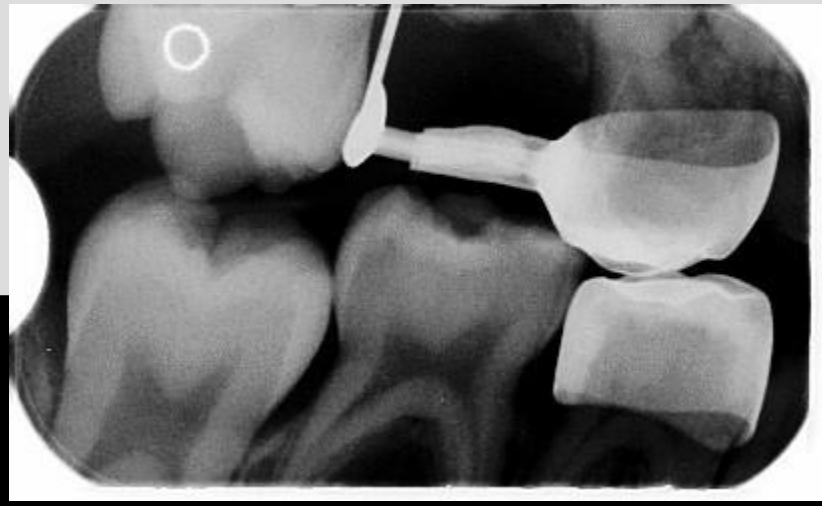
Courtesy of Dr Geoff Knight

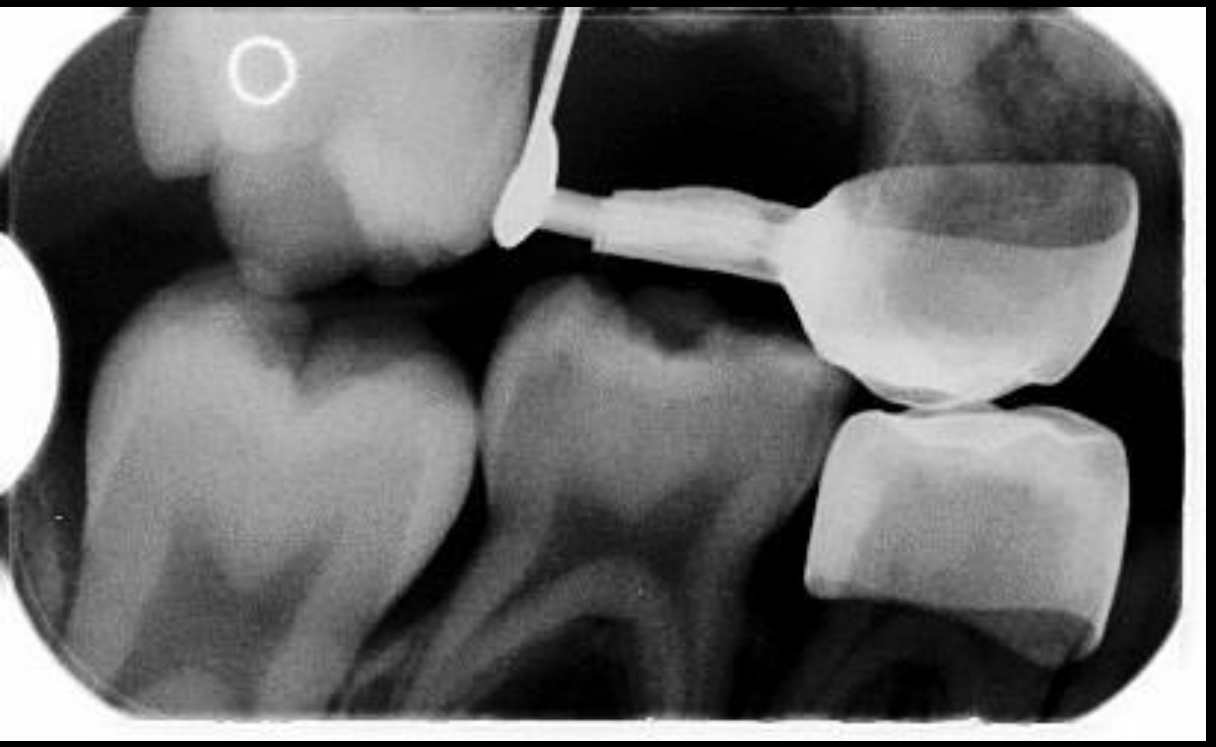




3 months after restoration placed

3-month clinical photograph





Hall Technique

- **Theodore P. Croll, D.D.S., Constance M. Killian, D.M.D., Richard J. Simonsen, D.D.S., M.S.**
- The Hall Method can be summarized in the following steps:
  - Take an oversized crown out of the box.
  - Fill with luting cement.
  - Position on the carious molar.
  - Press the crown form into place manually; or have the patient bite down until the crown seats.
  - Clean up excess cement.

Boyd Tower

- Restored in 1976


Dunphy Conference
Room

Hall Technique

Advantages

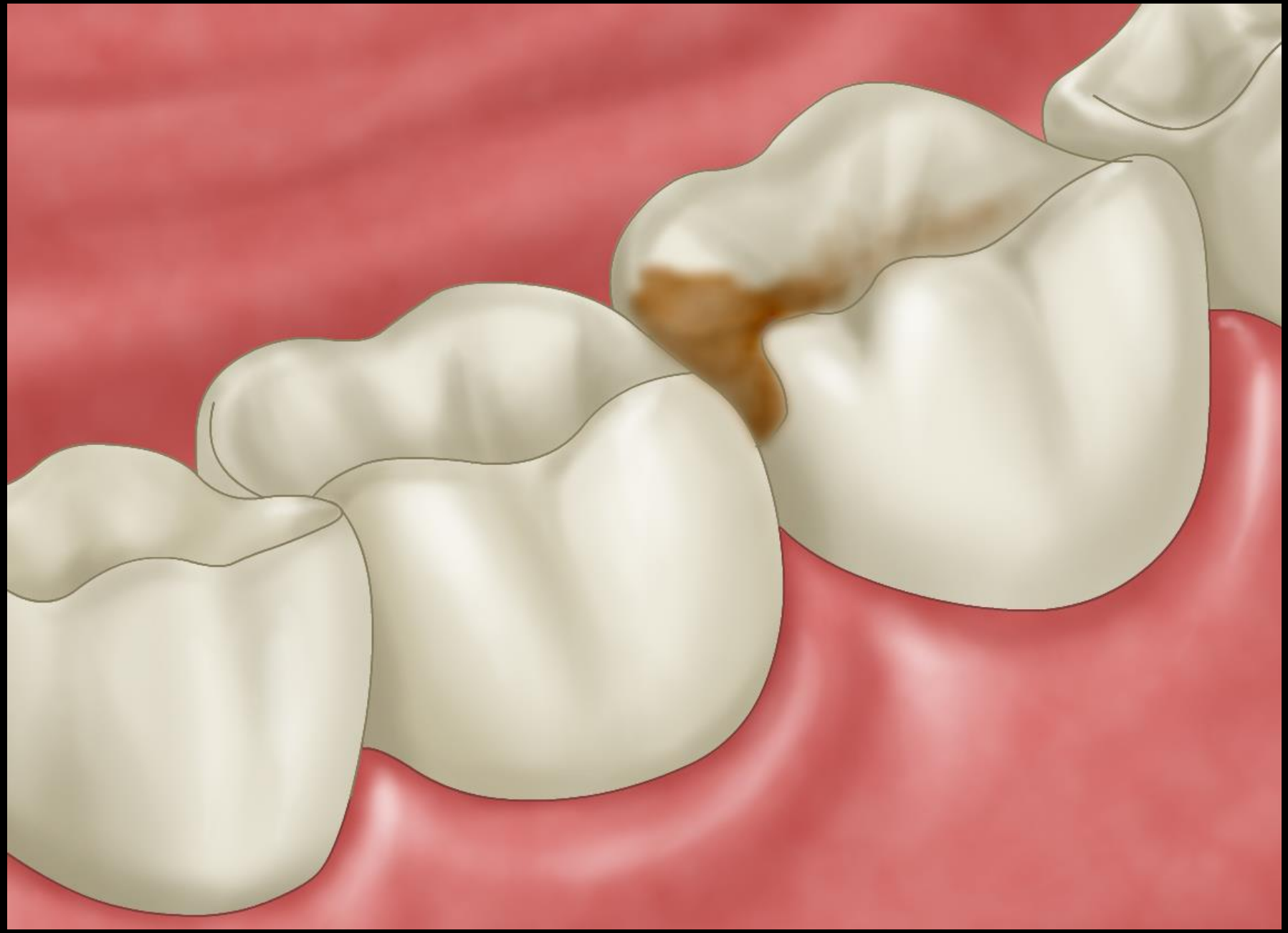
- No local anesthetic
- No, or minimal tooth reduction*
- Quick, Easy
- Reduces the need for sedation

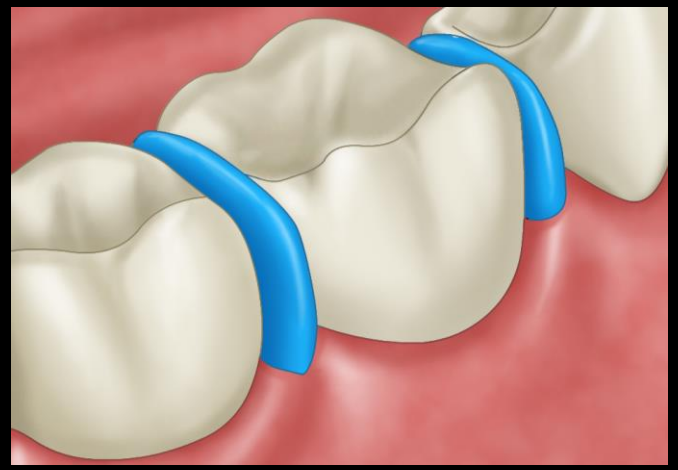
Disadvantages

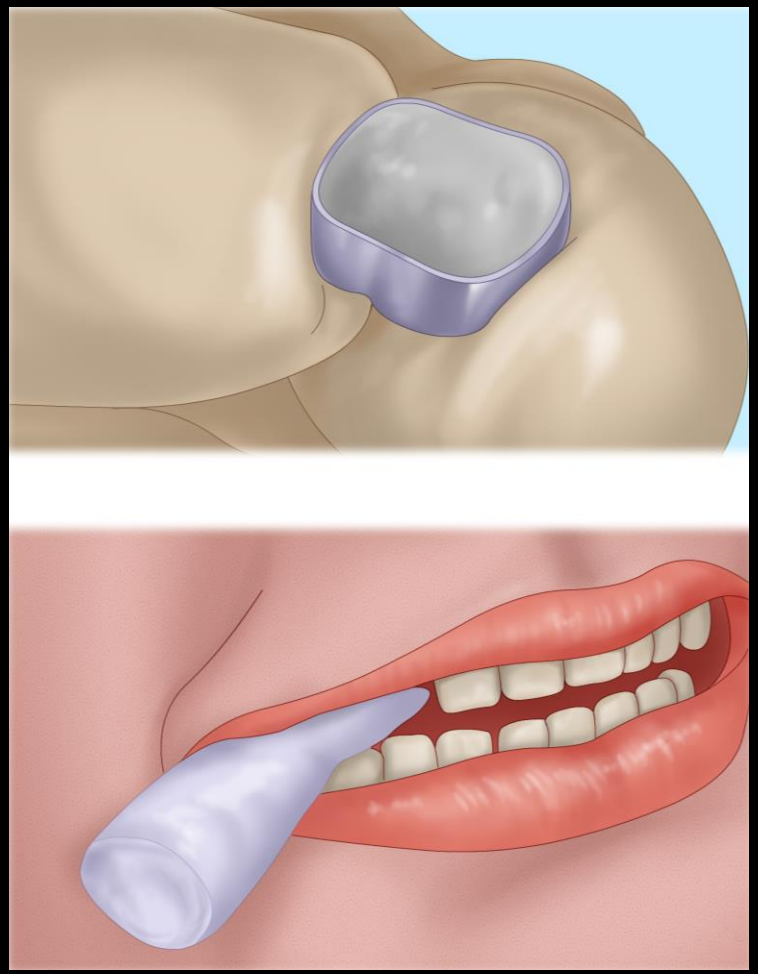
- Incomplete caries removal
- Increased risk of ectopic eruption
- Occlusion
- Aspiration Risk
- Transient discomfort^

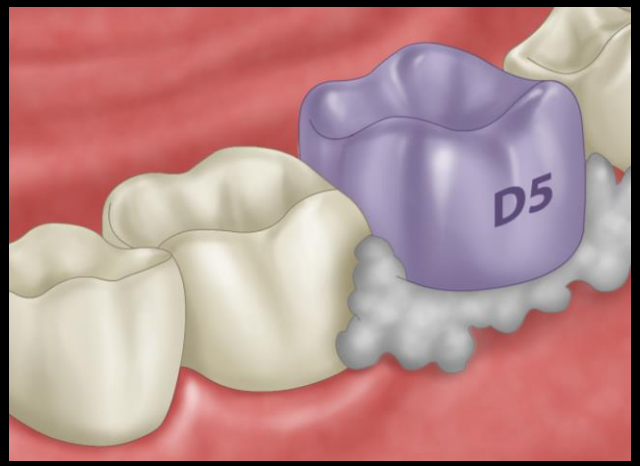
Hall Technique

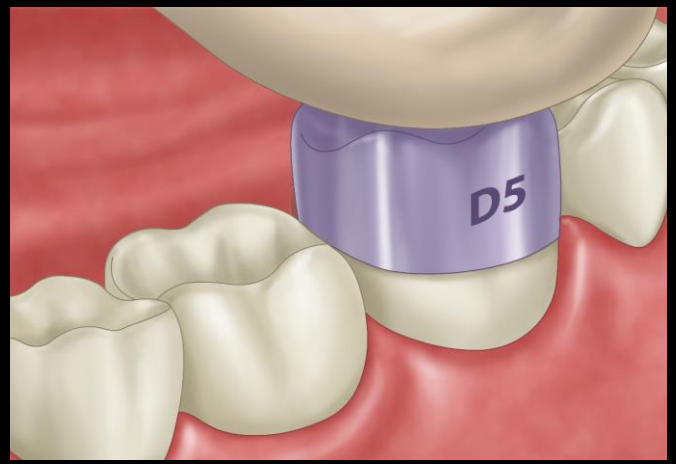
- The Hall Technique is *not* a simple and easy fix to the carious deciduous molar. It requires careful thought and consideration to reach an *accurate diagnosis*, and a proper discussion with parent or guardian of the risks, benefits, and alternatives to the child's treatment and behavior management plans.








D5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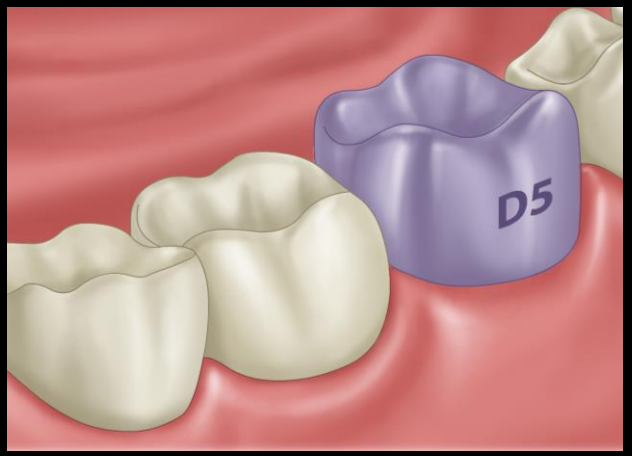

D5

Gen Dent. 2017 Sep-Oct;65(5):32-35.
Success rates of Hall technique crowns in primary molars: a retrospective pilot study.
Clark W, Geneser M, Owais A, Kanellis M, Qian F.

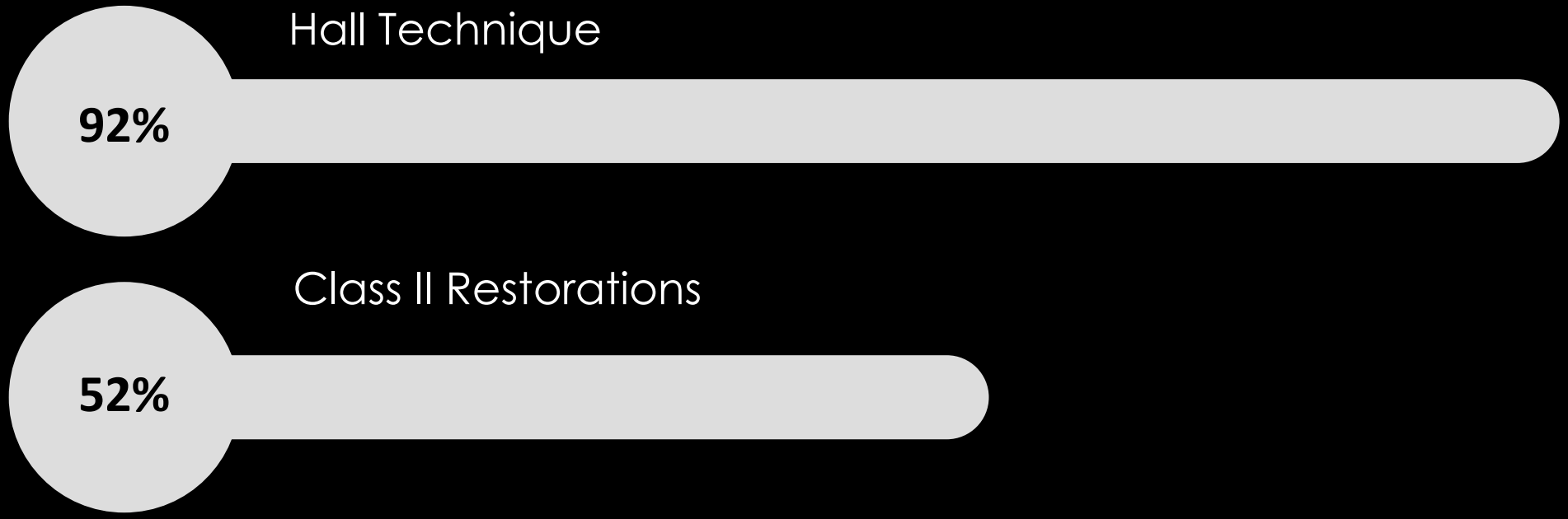
- Retrospective Study
- Success
  - Clinical 97.4%
    - Failures required extraction or pulp therapy
  - Radiographic 94.9%
    - Failures were ectopic eruption
- Geographical Success?

J Am Dent Assoc. 2014 Dec;145(12):1248-53
The success of stainless steel crowns placed with the Hall technique: a retrospective study.
Ludwig KH, Fontana M, Vinson LA, Platt JA, Dean JA.

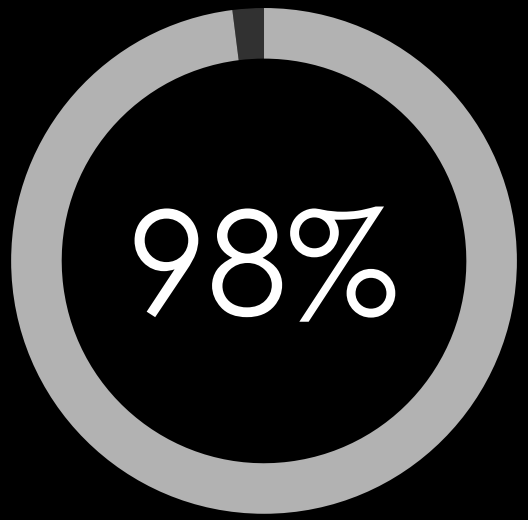
- Success
  - Hall Crown 97% (mean recall 15 months)
  - Conventional SSC 94% (mean recall 56 months)
- Time Period was different

J Dent Res. 2011 Dec;90(12):1405-10
Sealing caries in primary molars: randomized control trial, 5-year results.
Innes NP, Evans DJ, Stirrups DR.

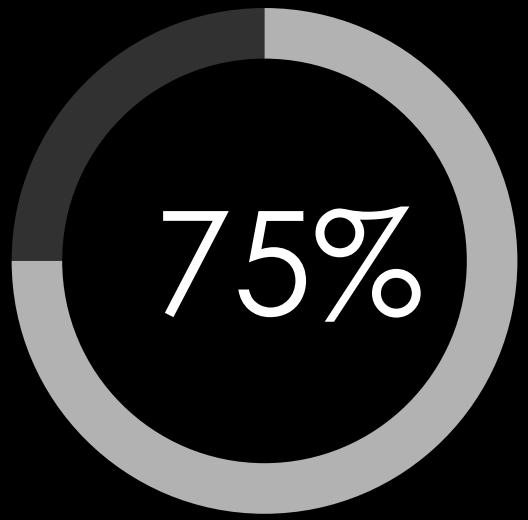
- Split Mouth RCT – 48 Months
- 264 Teeth



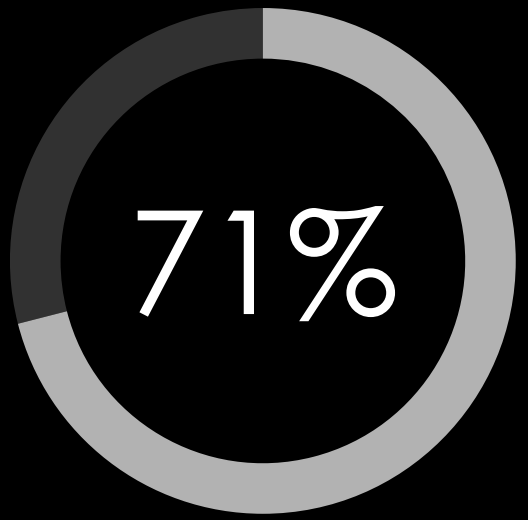
J Dent Res. 2014 Nov;93(11):1062-9.
Caries management strategies for primary molars: 1-yr randomized control trial results.
Santamaria RM, Innes NP, Machiulskiene V, Evans DJ, Splieth CH.



Hall Technique

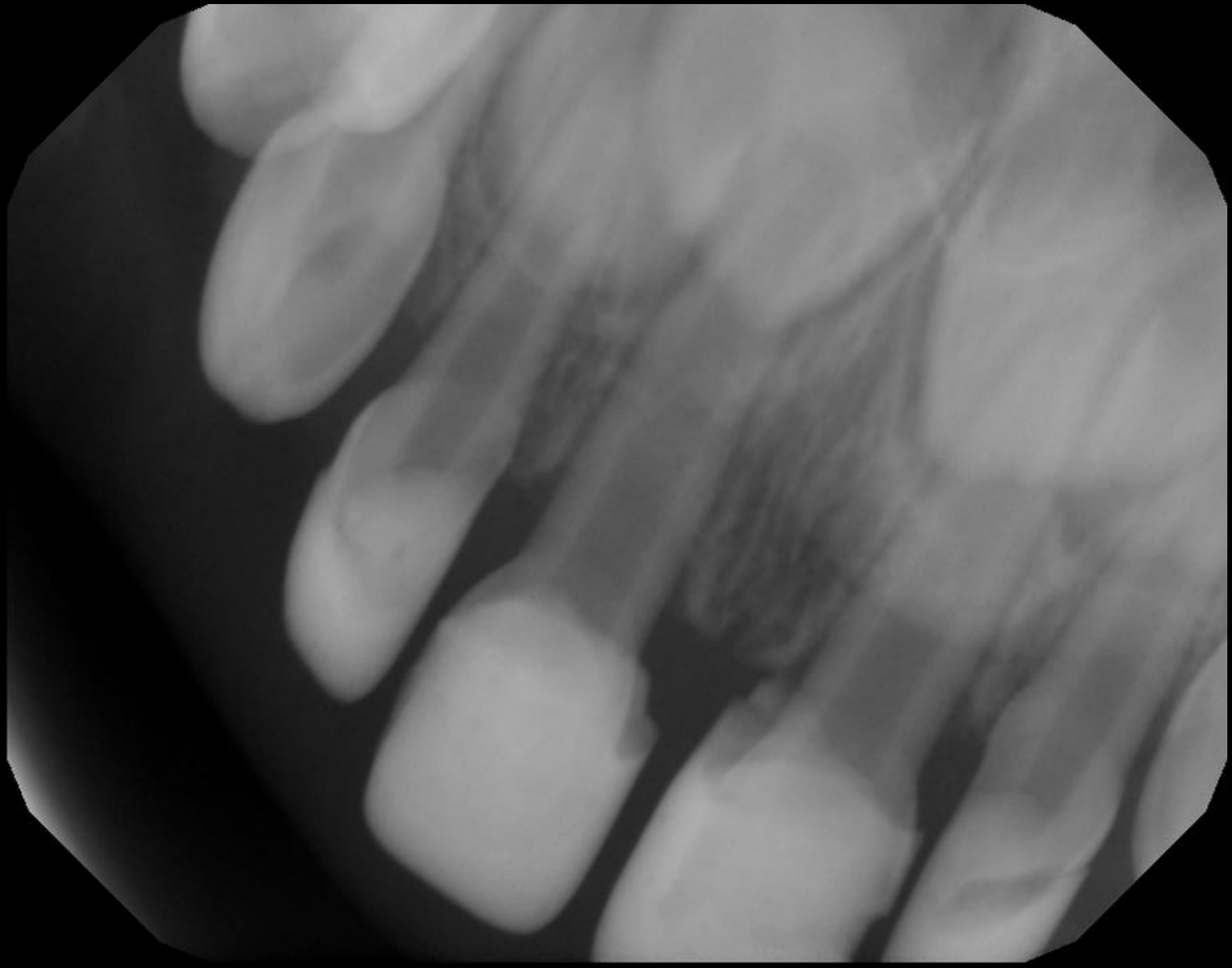


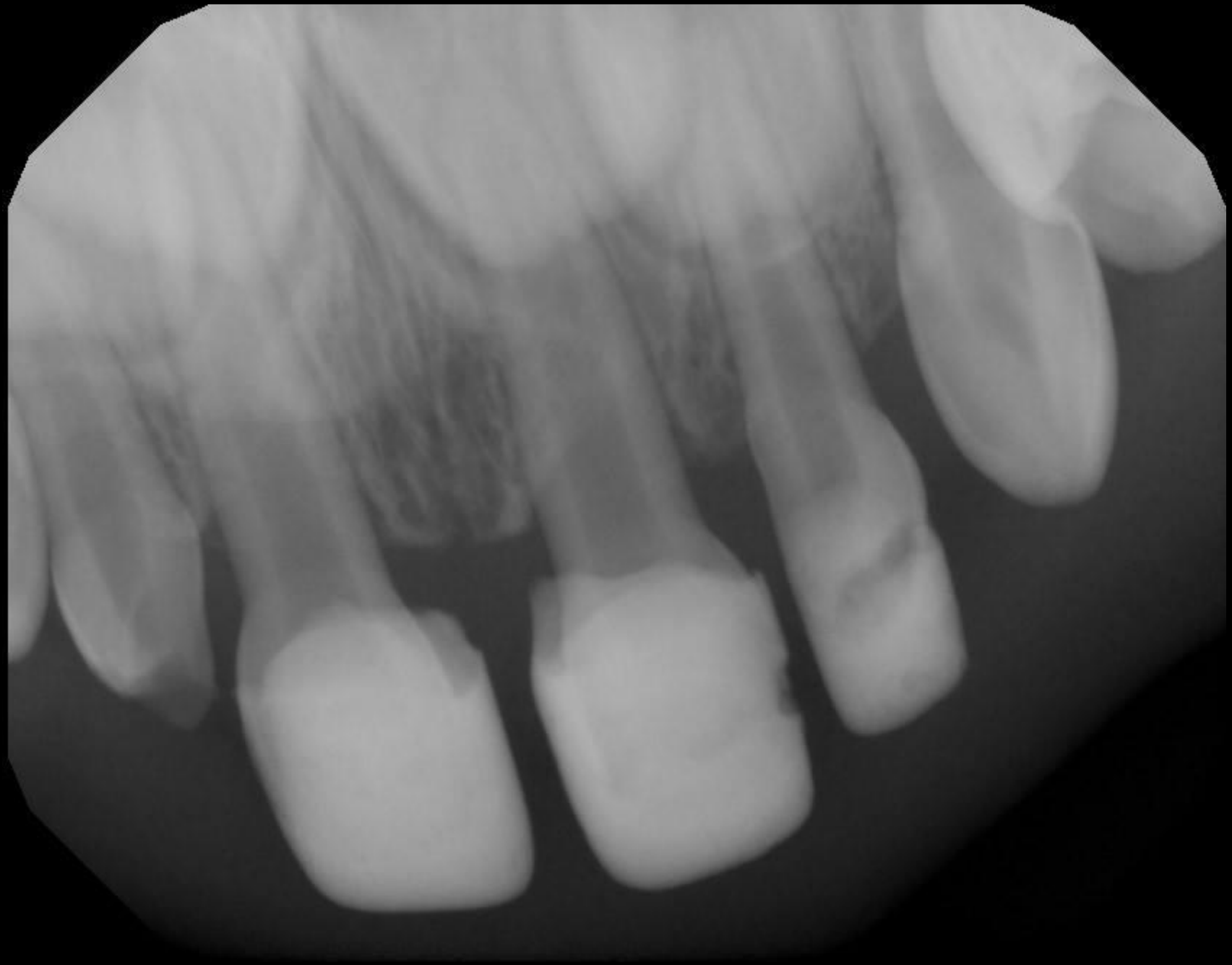
Non Restorative Caries Treatment

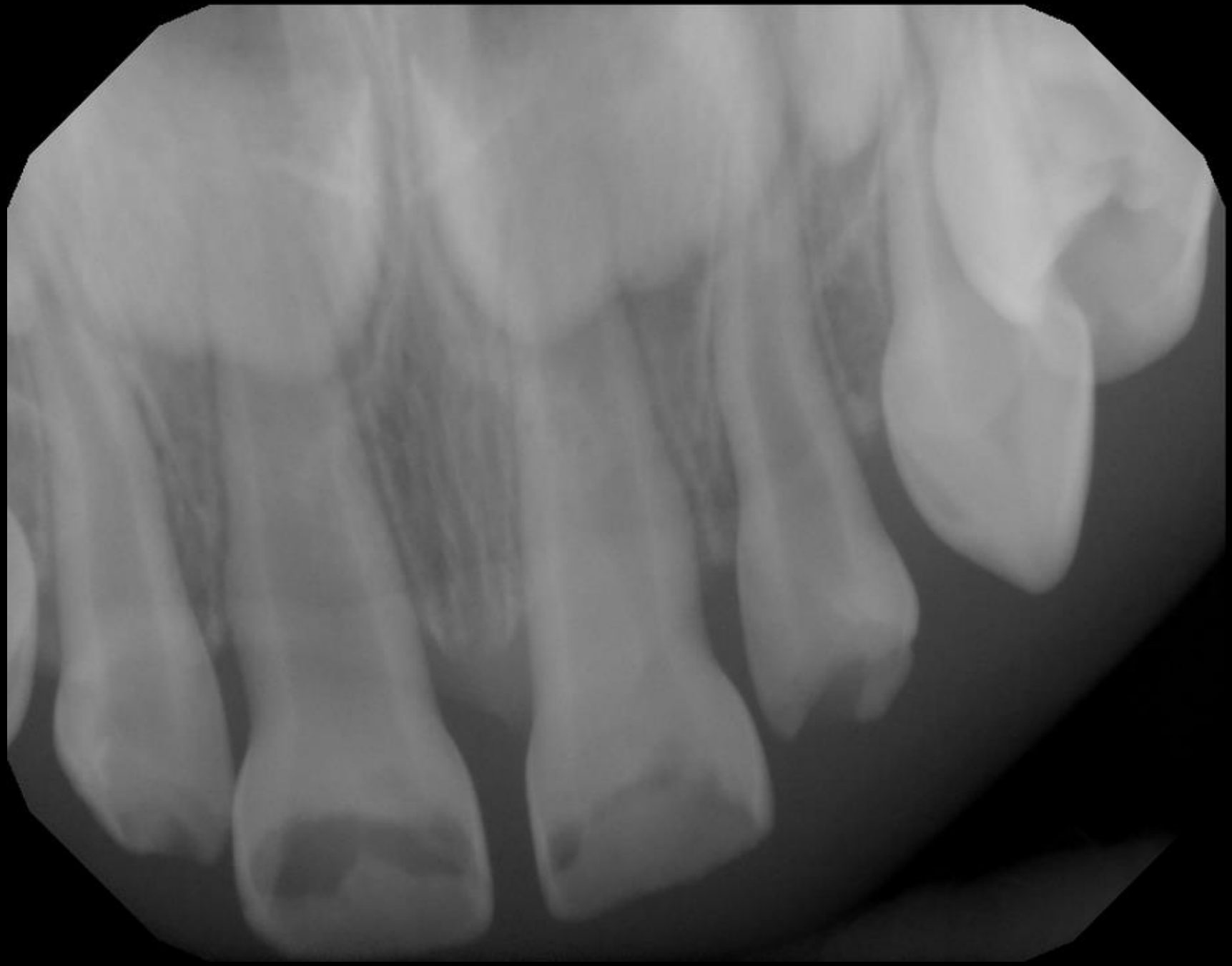


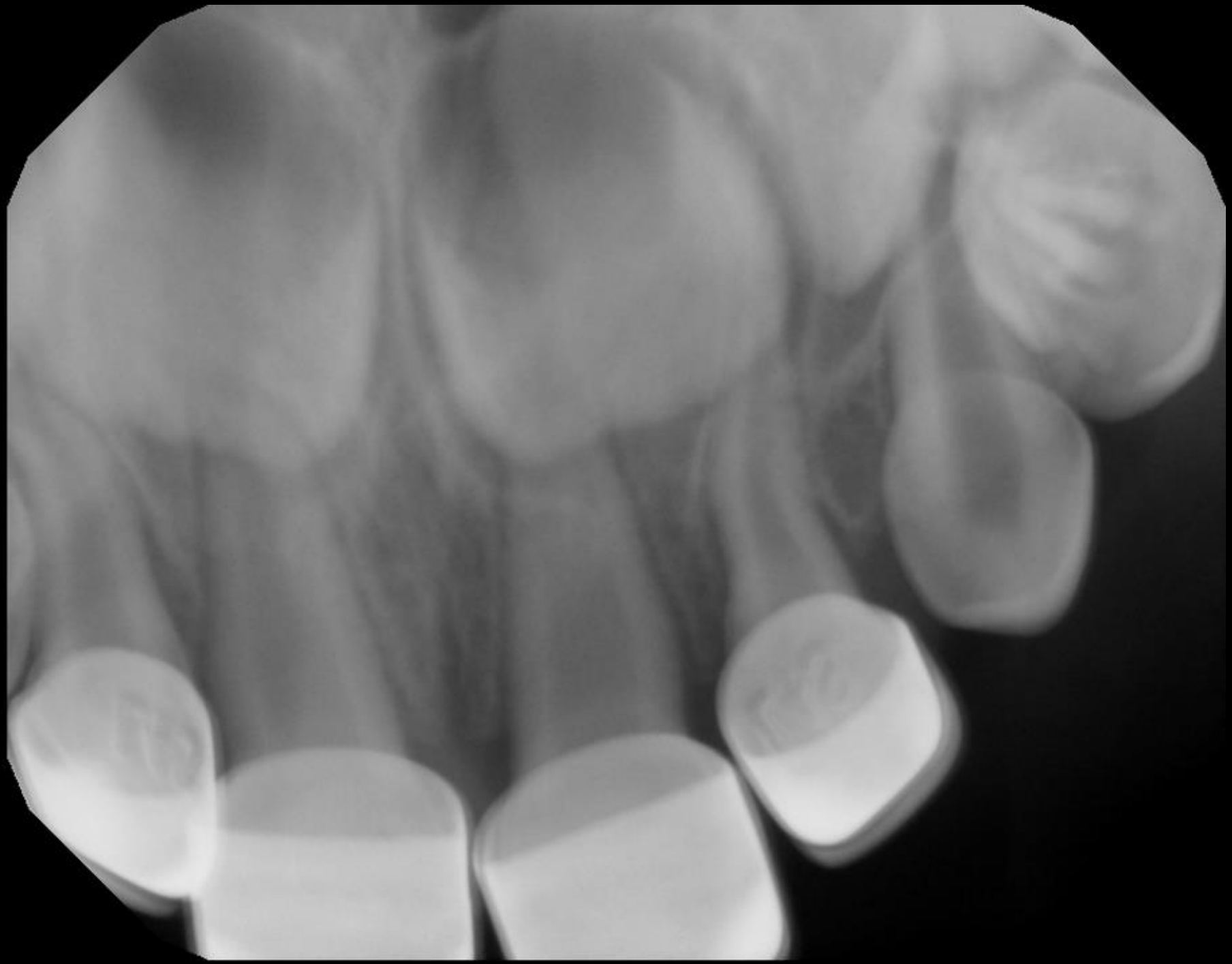
Conventional Restoration

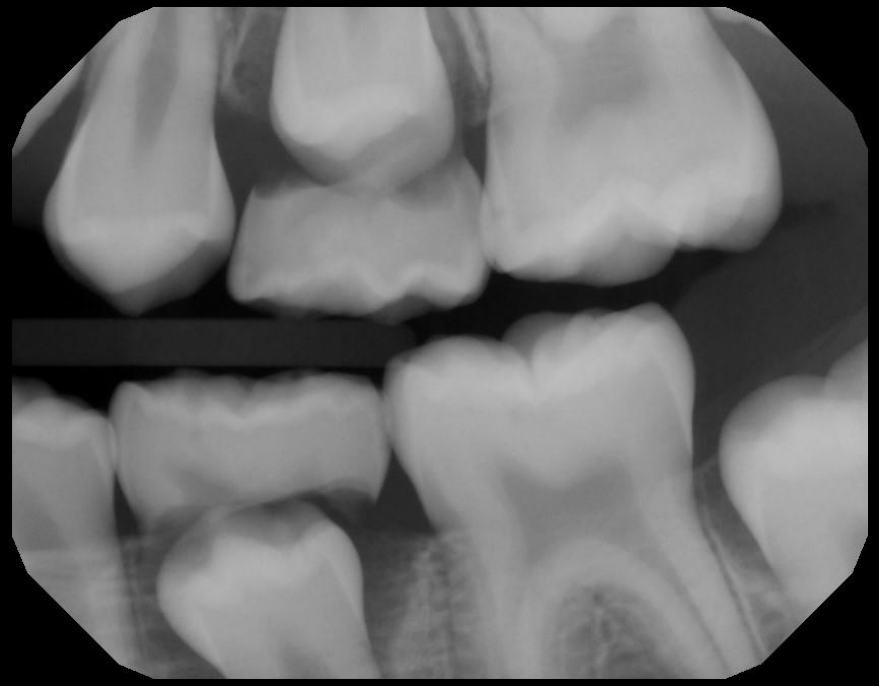
p= .002



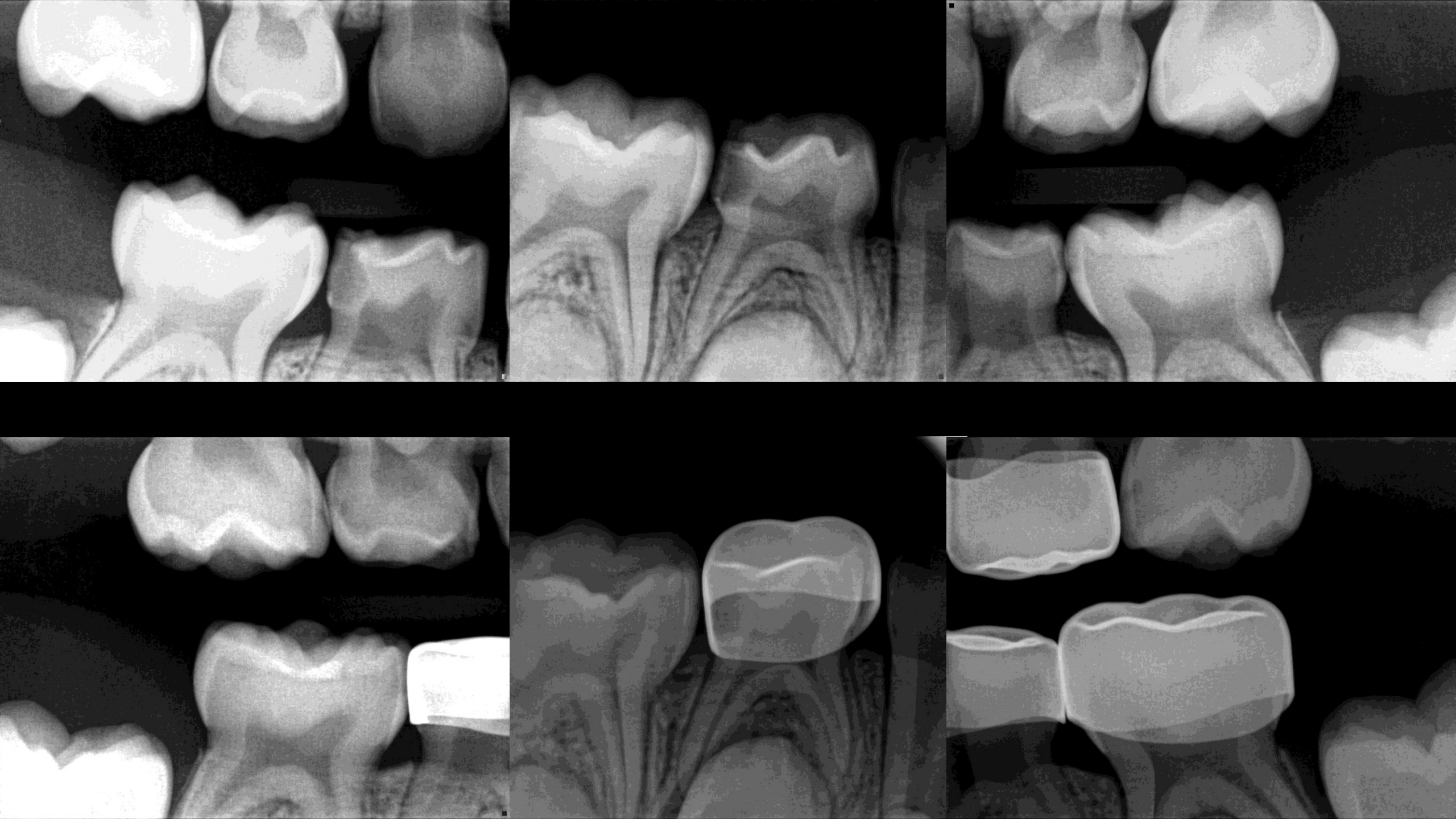


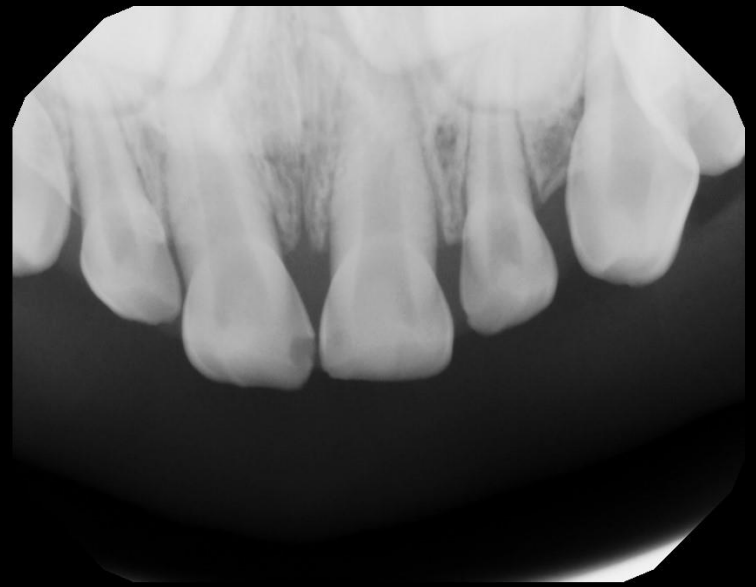
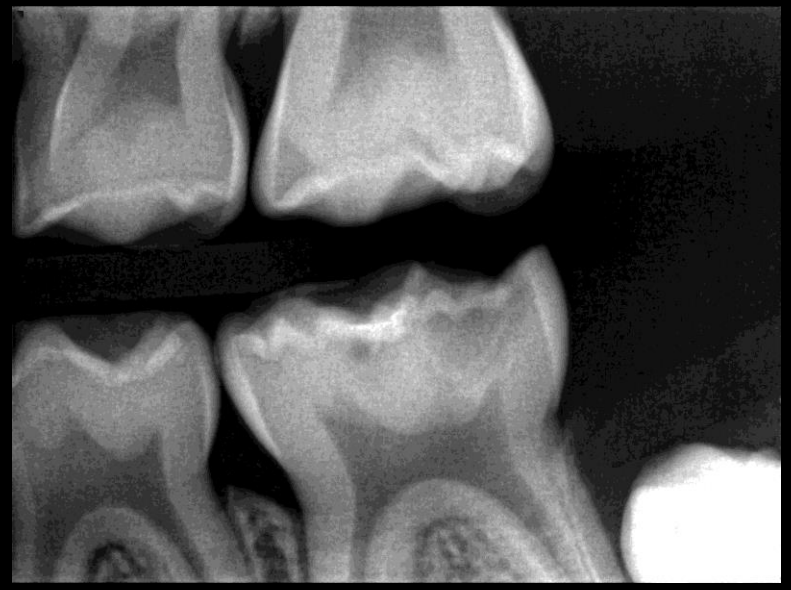
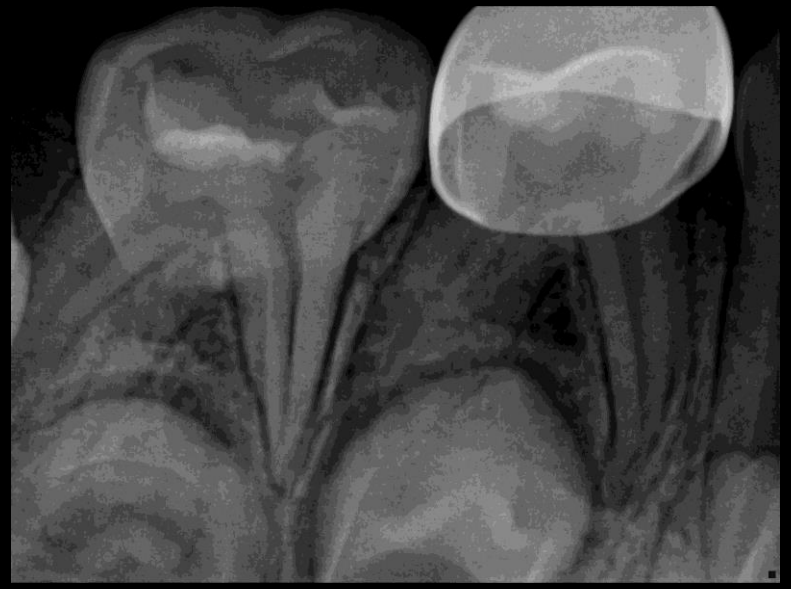
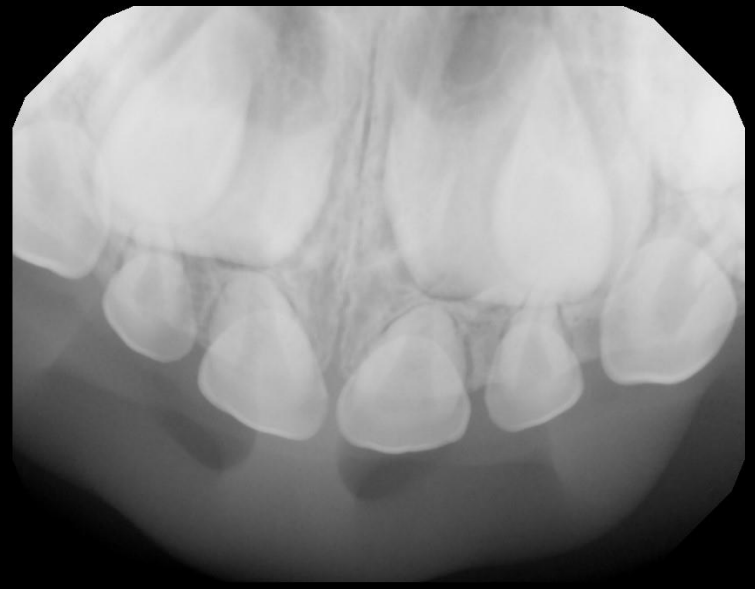
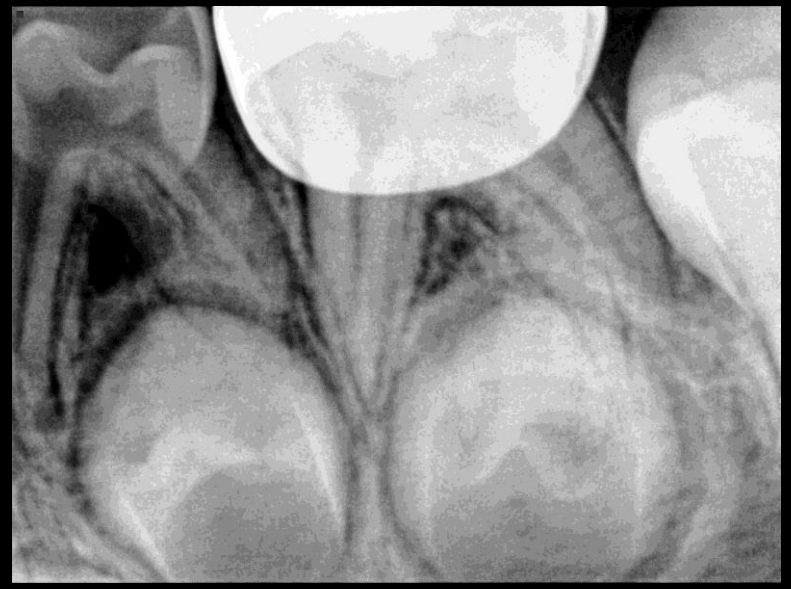


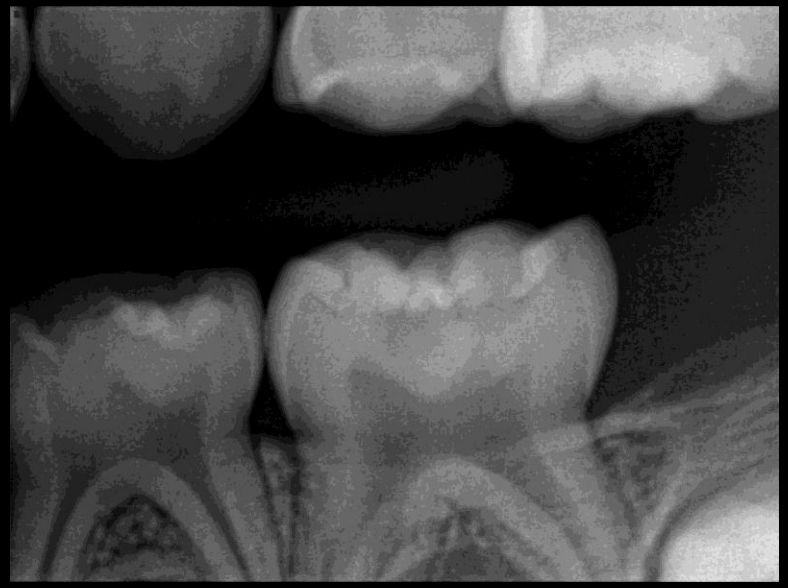


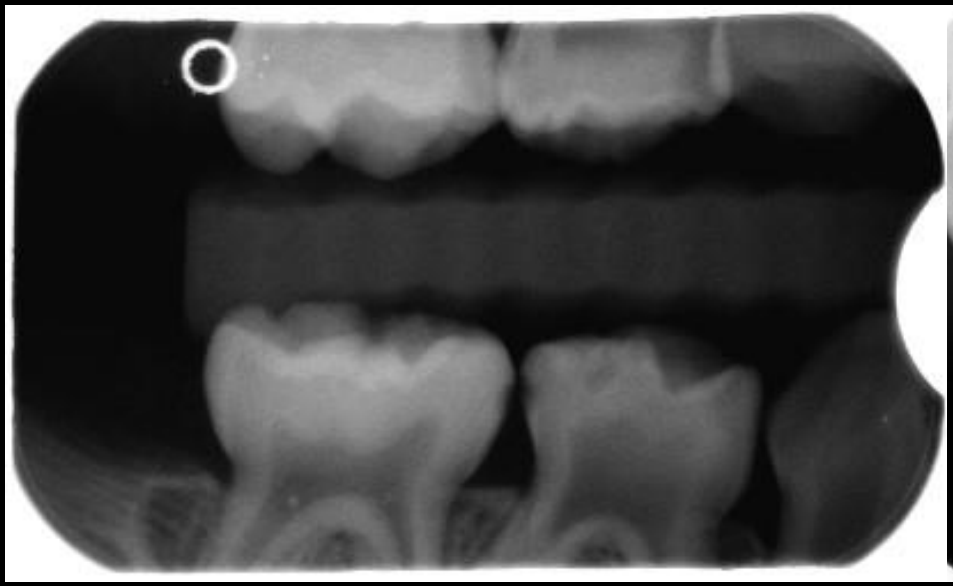


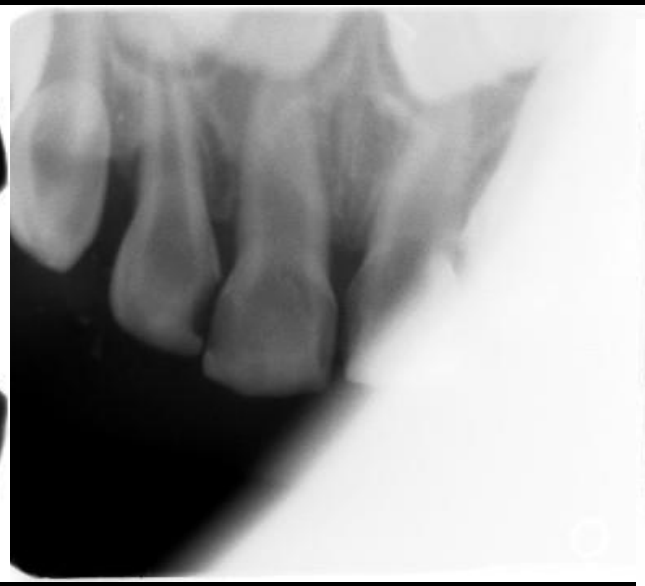
Failed OCS #L
Hall Crown
1 year recall
2 year recall

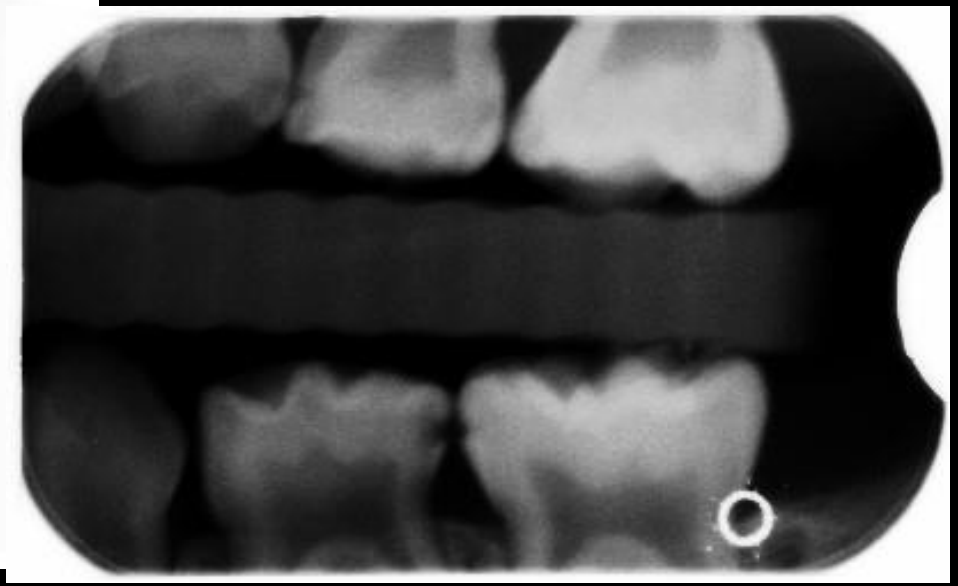


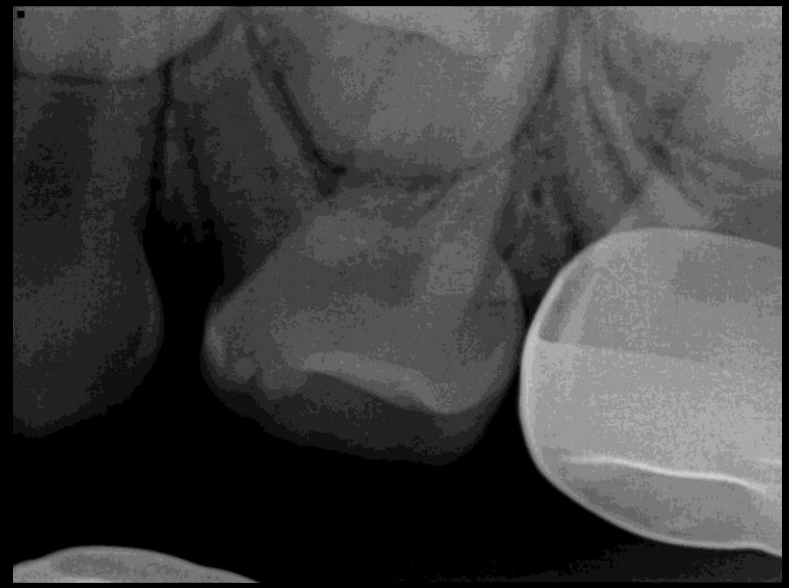


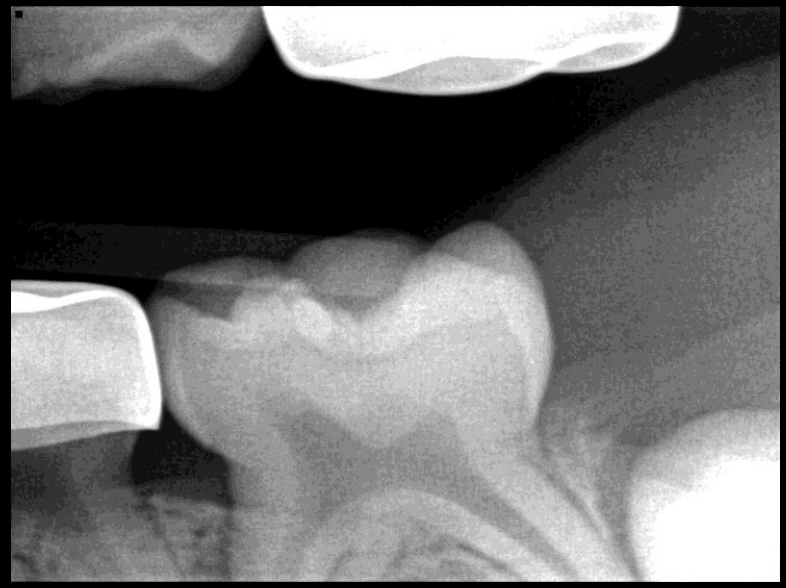




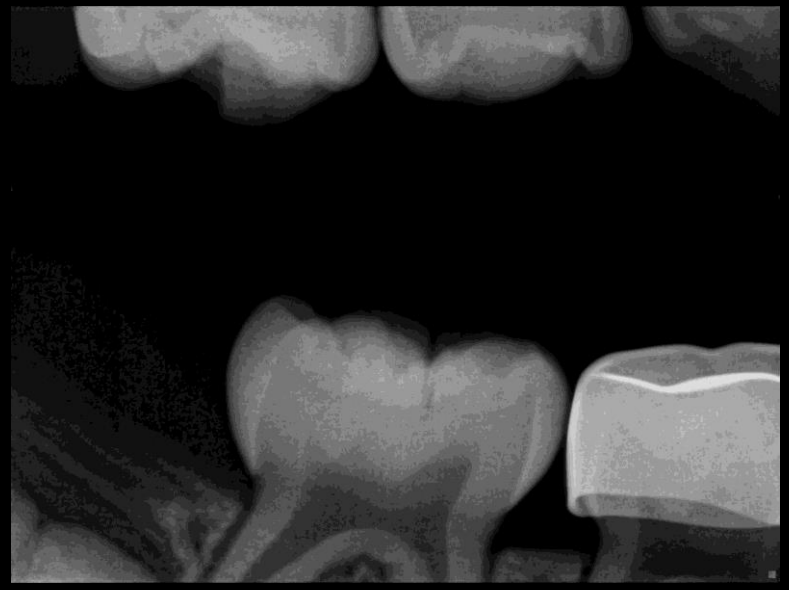


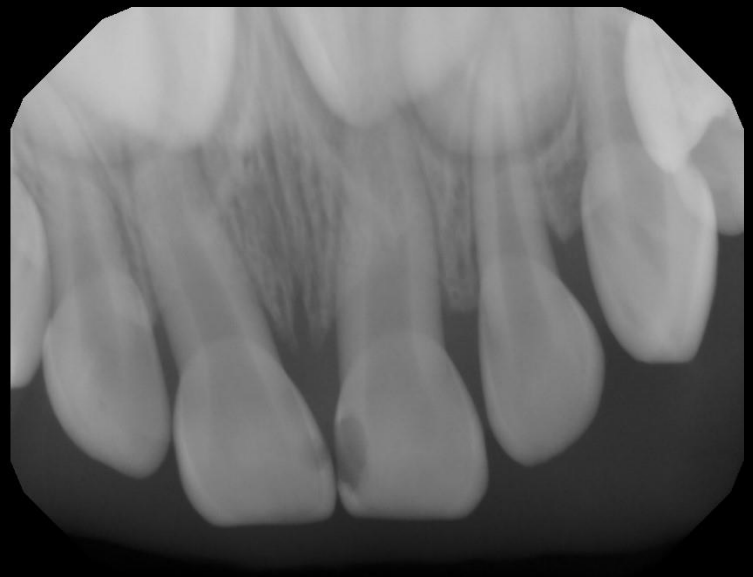




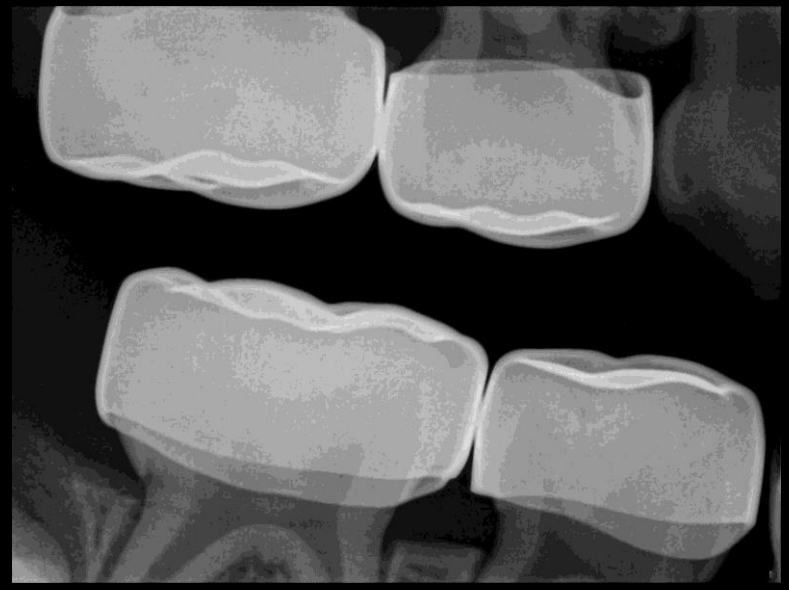



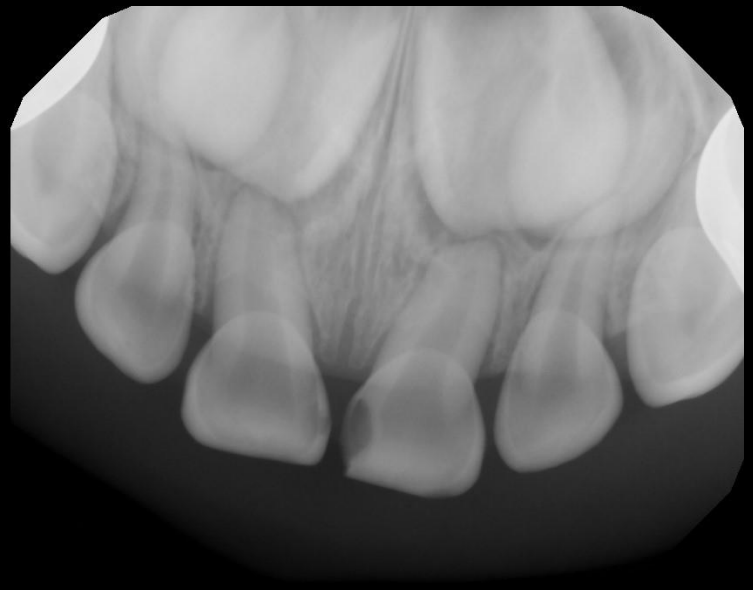
Hall Crown
2 Year Recall

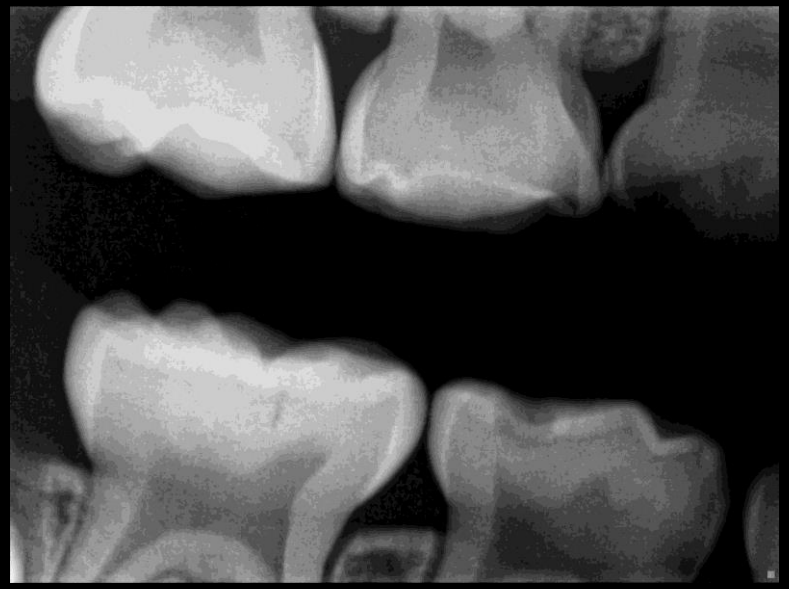




Hall Crown
1 year recall #S, 6 month recall

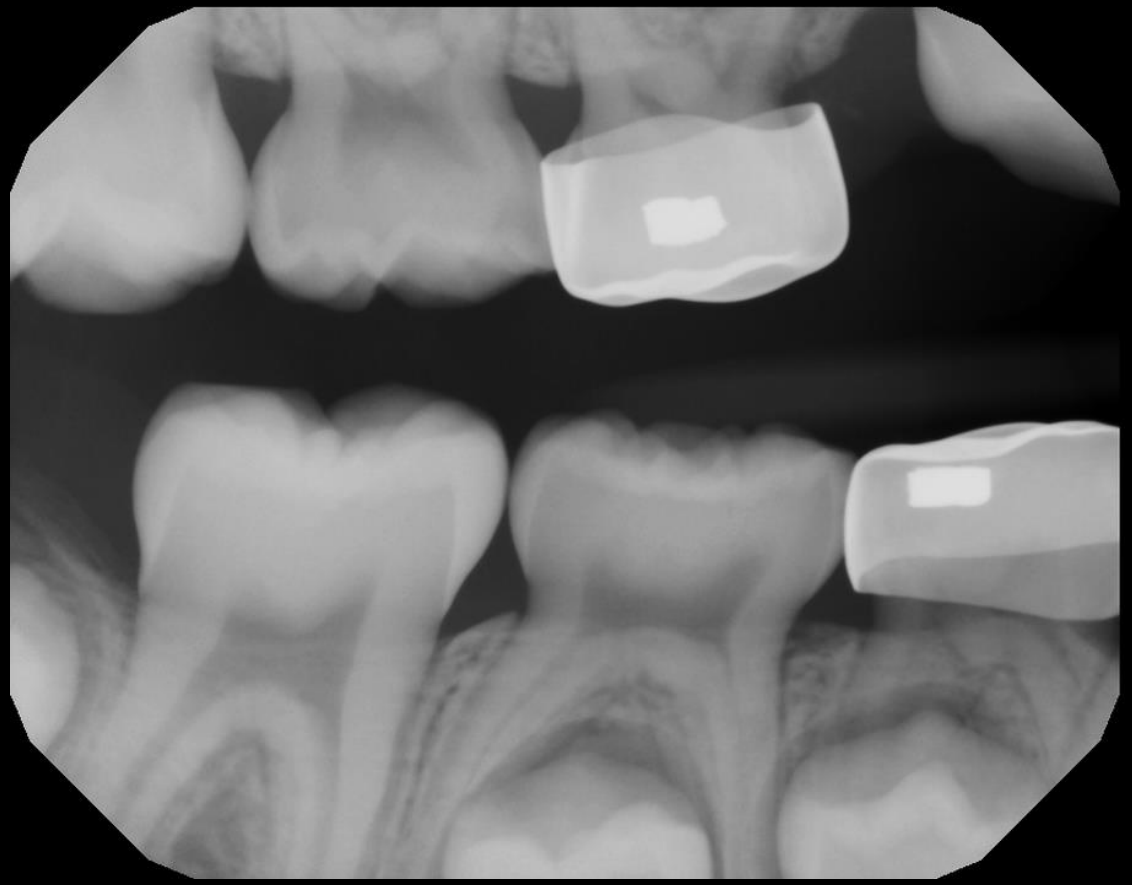






Hall Crown
18 month recall #S, 6 month recall #L was treated with DO RMGI

Hall Crown
1 year 4 month recall
2 year recall



Let’s Triage Some Cases

9 year old Female

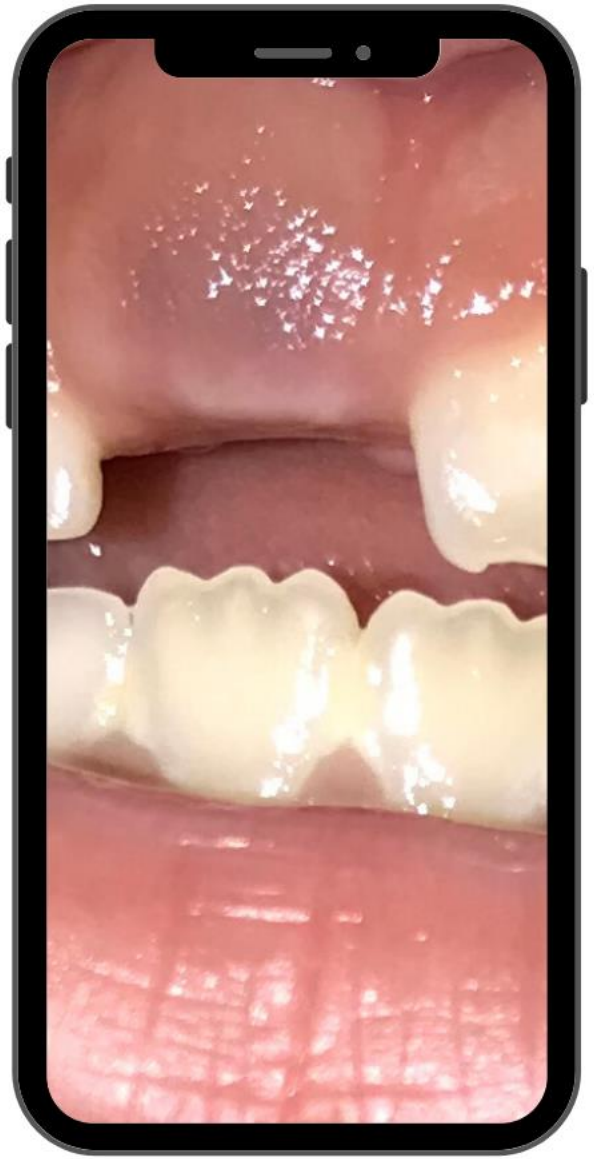
Chief Complaint: "I was wondering on what i should do my child _____has a tooth coming in which should have been out by now but the area where it is has been swollen for two days now and mouth wash helps the pain a little bit here is a picture of it. thanks for your time stay well!"

Health Summary:

ASA I

Subjective Findings:

Thermal Stimulus:	**None**	Short	Continuous
Mastication:	None	**Mild/Moderate**	Severe
Nature of Pain:	None	Spontaneous	Diffuse
	Localized		
Duration of Pain:	None	**Short**	Prolonged



Possible Diagnosis

- Eruption Cyst
- Eruption Hematoma
- Granuloma
- Hereditary Pigmentation
- Amalgam Tattoo

Treatment Plan

- Not Urgent
  - OTC analgesics
  - Re-evaluation if necessary

5 year old Female

Chief Complaint: Bump by her tooth

Health Summary:

ASA I

Subjective Findings:

Thermal Stimulus:	**None**	Short	Continuous	
Mastication:	None	**Mild/Moderate**	Severe	
Nature of Pain:	None	Spontaneous	Diffuse	**Localized**
Duration of Pain:	None	**Short**	Prolonged	

Possible Diagnosis

- Necrosis
- Periodontal Abscess
- Soft Tissue Pathology
- Treatment Plan (Urgent Care)
  - Screen Patient
  - Determine Etiology

Screening

- Has the patient had a fever?
  - Yes
- Does the patient have a cough?
  - Yes
- Plan:
  - Send to ER with Dental Consult
  - Consider Prescribing Antibiotics until patient is able to be treated

12 year old Female

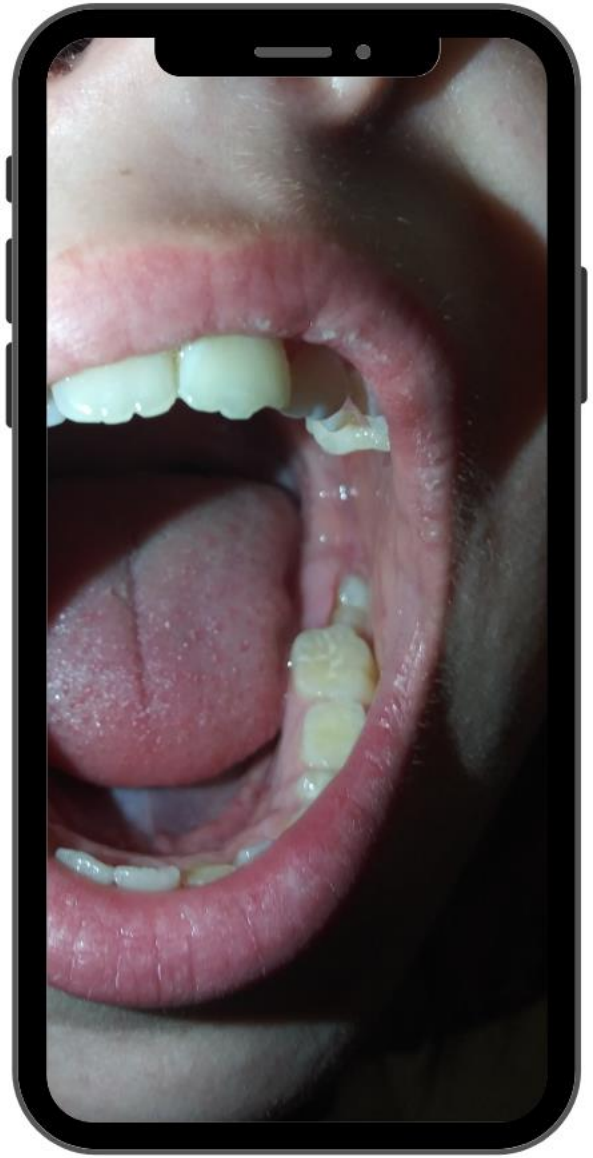
Chief Complaint: She has gum covering half her tooth and it hurts.

Health Summary:

ASA I

Subjective Findings:

Thermal Stimulus:	**None**	Short	Continuous	
Mastication:	None	**Mild/Moderate**	Severe	
Nature of Pain:	None	Spontaneous	Diffuse	**Localized**
Duration of Pain:	None	**Short**	Prolonged	



Possible Diagnosis

- Pain associated with an erupting molar
- Reversible pulpitis (Interproximal Decay)
- Treatment Plan (Not Urgent)
  - Oral Hygiene Instructions
  - OTC analgesics
  - Re-evaluation if necessary

5 year old Male

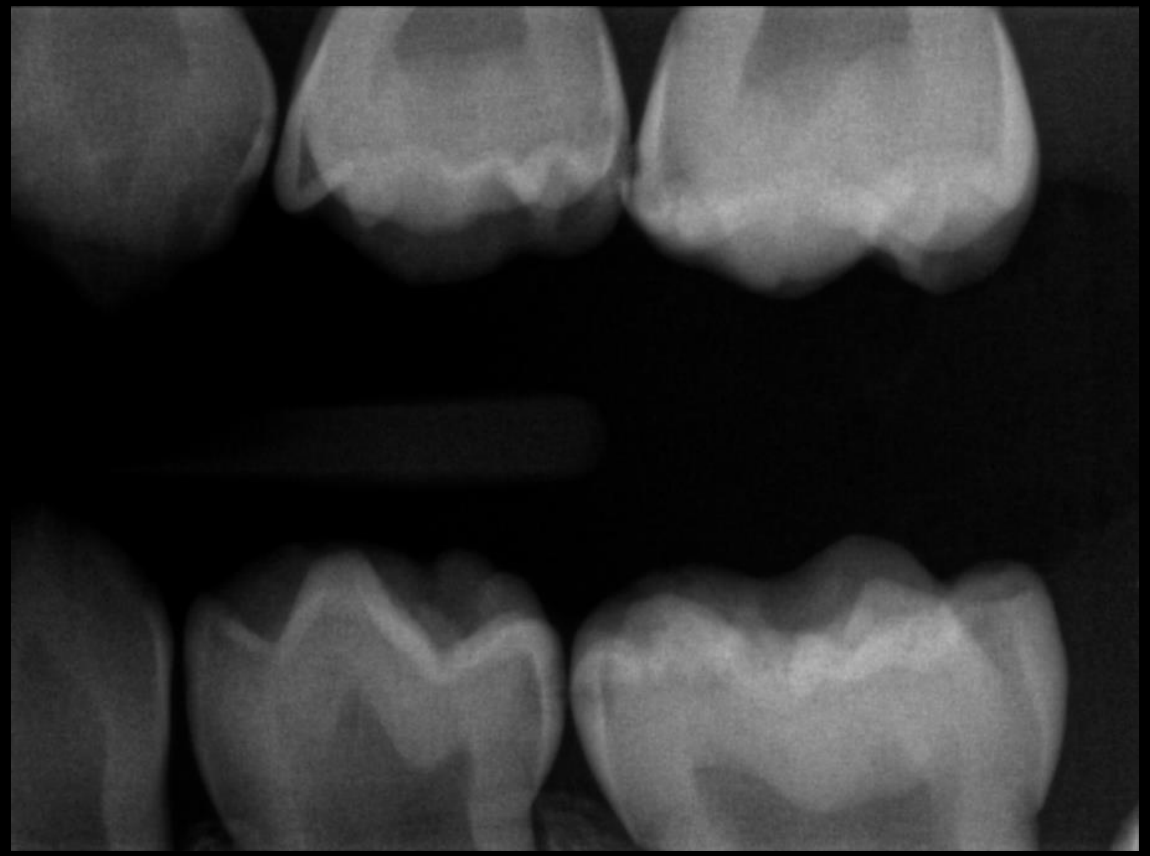
Chief Complaint: Toothache in the upper left

Health Summary:

ASA I

Subjective Findings:

Thermal Stimulus:	None	**Short**	Continuous	
Mastication:	None	**Mild/Moderate**	Severe	
Nature of Pain:	None	Spontaneous	Diffuse	**Localized**
Duration of Pain:	None	**Short**	Prolonged	



Objective Findings:

- **Caries: #A, #B, #C, #I, #J**
- **Adequate Remaining Dentin Thickness**

Diagnosis

- Reversible Pulpitis
- Treatment Plan
  - **Hall Crown**
  - SDF
  - SMART

5 year old Male

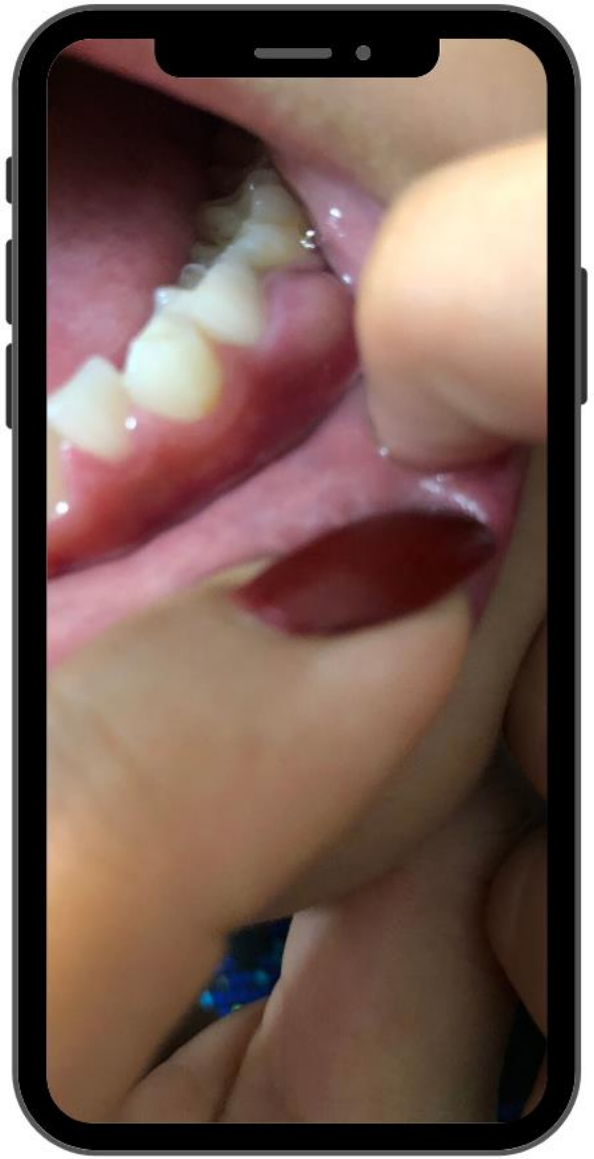
Chief Complaint: He has swelling

Health Summary:

ASA I

Subjective Findings:

Thermal Stimulus:	**None**	Short	Continuous	
Mastication:	None	**Mild/Moderate**	Severe	
Nature of Pain:	None	Spontaneous	Diffuse	**Localized**
Duration of Pain:	None	**Short**	Prolonged	



Possible Diagnosis

- Necrosis
- Periodontal Abscess
- Soft Tissue Pathology
- Treatment Plan (Urgent Care)
  - Screen Patient
  - Determine Etiology

7 year old Male

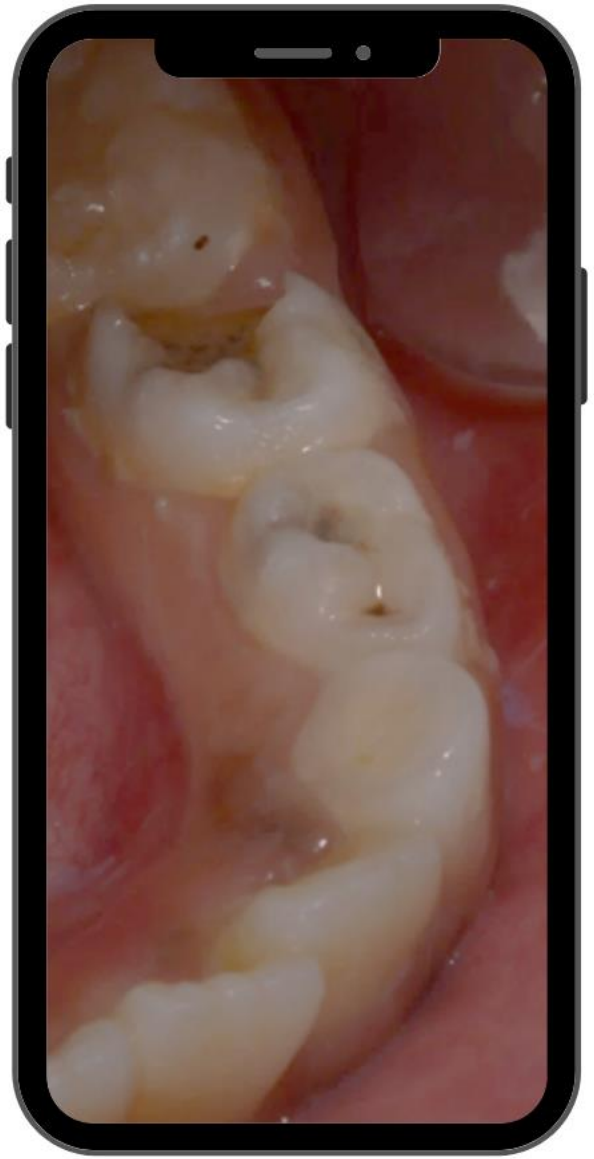
Chief Complaint: He has been up all night

Health Summary:

ASA II

Subjective Findings:

Thermal Stimulus:	None	Short	**Continuous**
Mastication:	**None**	Mild/Moderate	Severe
Nature of Pain: None	**Spontaneous**	Diffuse	Localized
Duration of Pain:	None	Short	**Prolonged**



Possible Diagnosis

- Irreversible pulpitis #K
- Reversible pulpitis #L
- Treatment Plan (Urgent)
  - Extraction #K
  - Hall Crown #L
- Future: Space Maintainer (Reverse band and loop or LLHA)

12 year old Male

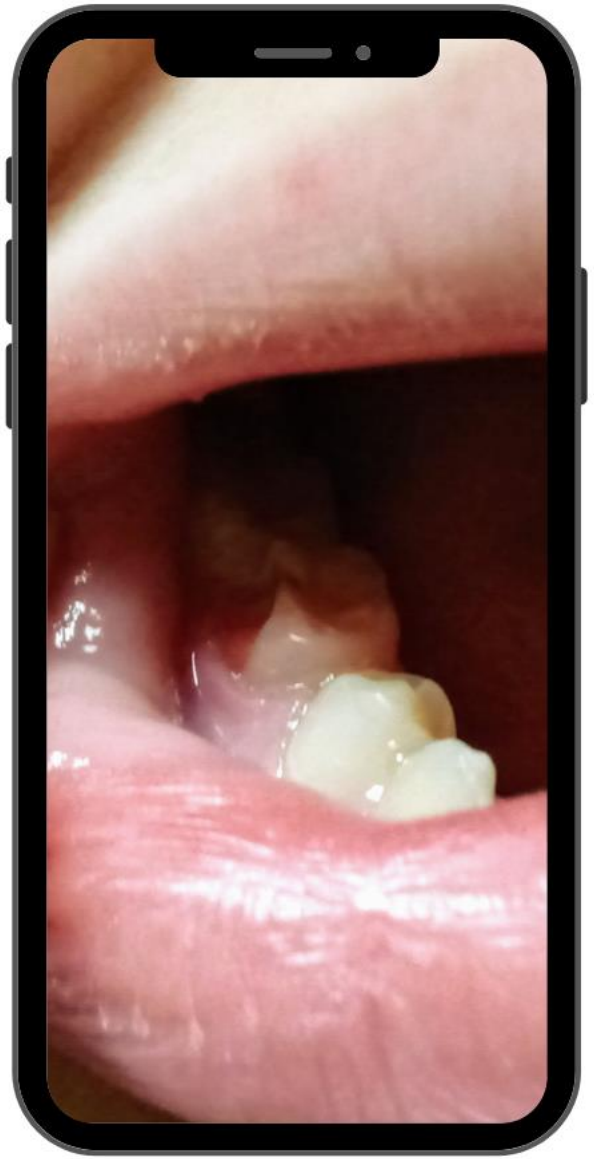
Chief Complaint: He broke his tooth

Health Summary:

ASA I

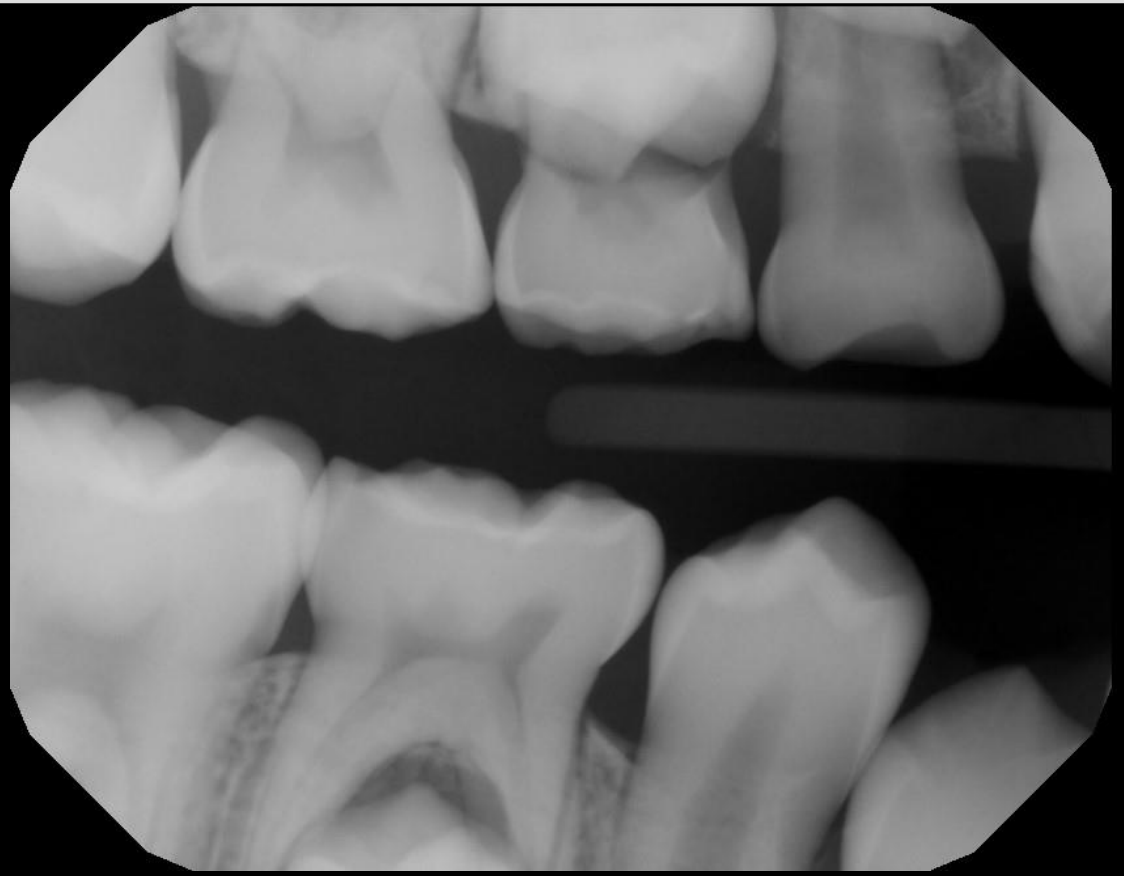
Subjective Findings:

Thermal Stimulus:	**None**	Short	Continuous	
Mastication:	None	**Mild/Moderate**	Severe	
Nature of Pain:	None	Spontaneous	Diffuse	**Localized**
Duration of Pain:	None	**Short**	Prolonged	



Possible Diagnosis

- Fractured Molar
- Reversible pulpitis
- Exfoliating Primary Tooth
- Urgent



Radiograph 2 Years Ago

Diagnosis

- Loose Primary Tooth