Fall 2020 Rounds

Evidence Based Dentistry Rounds

Pediatrics
Group 1A-4
10/14/2020

Rounds Team

- **Group Leader: Dr. Smithy**
- **Specialty Leader: Dr. Engibous**
- **Project Team Leader: Stefan**
- **Project Team Participants: Muhammad; Jordan; Aesha**

Patient

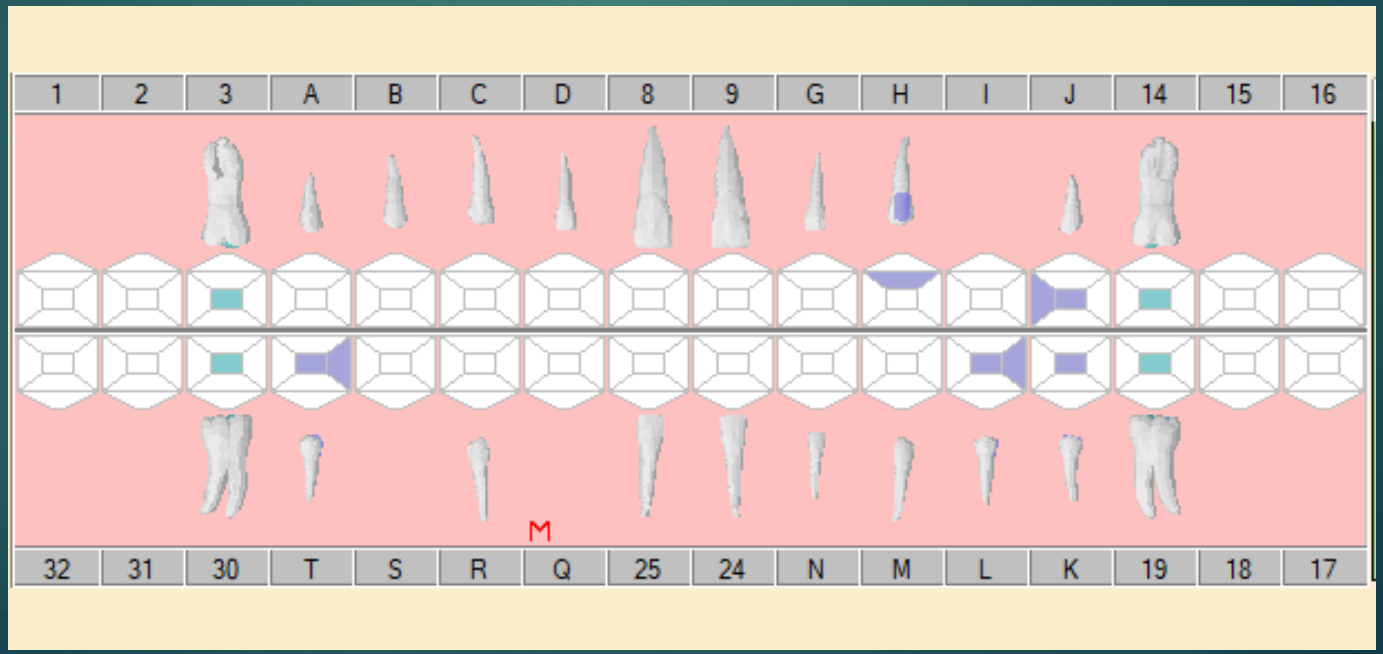
- 6-year-old Caucasian male
- Lives in rural Wisconsin
- High dental anxiety

Medical History

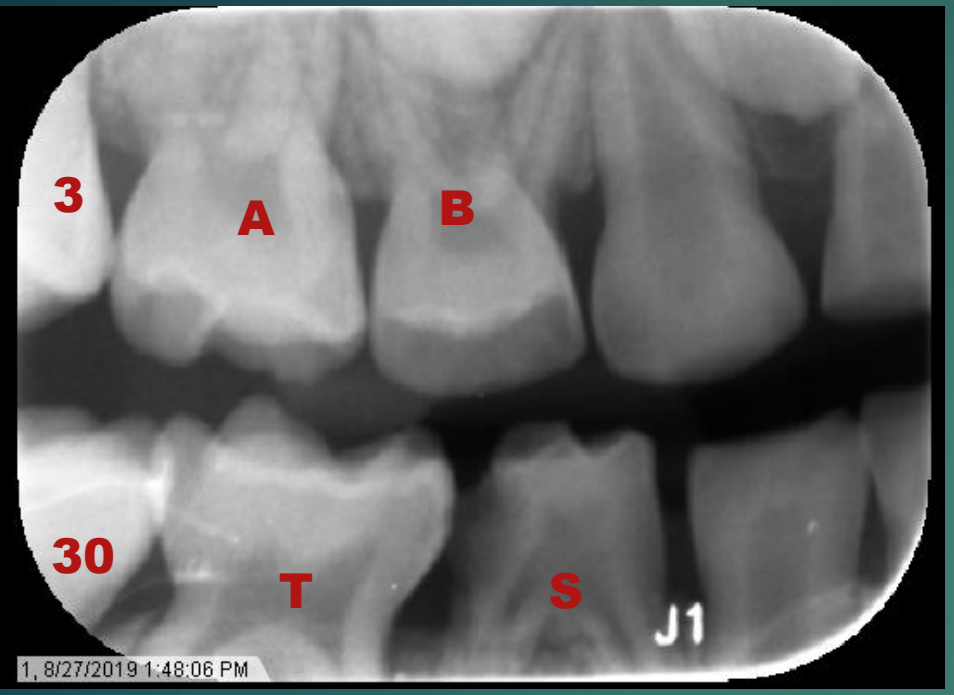
- No medications
- Seasonal allergies
- Parent reported no significant medical history
- No medical consults
- Dental anxiety

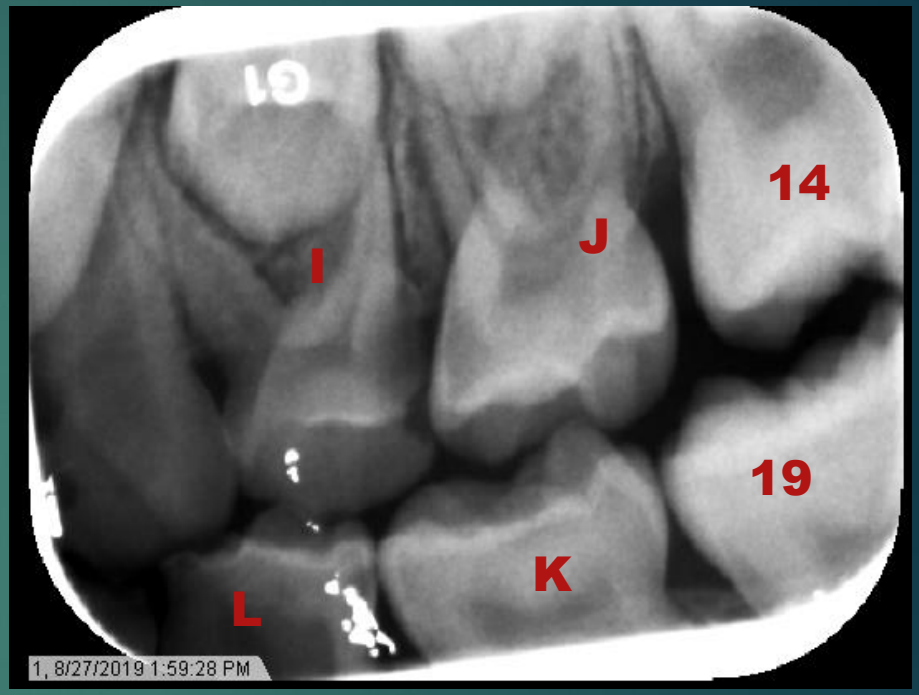
Dental History

- 1-2 years since last dental visit/exam/cleaning
- No dental pain or discomfort
- Brushes once a day and infrequent flossing
- Parent states that “at least one tooth is half gone”



Radiographs





Radiographic Findings

- Decay on distal of tooth I leading to space loss, potential furcal radiolucency
- Decay on mesial of tooth J
- Decay on distal of tooth L
- Gross decay on tooth S leading to space loss
- Decay on mesial of tooth T

Clinical Findings

- Decay on distal of tooth I
- Gross decay on tooth S
- Decay on occlusal of tooth L
- Decay on occlusal of tooth K
- Decay on facial of tooth H
- No sealants on teeth 3,14,19,30

Specific Findings

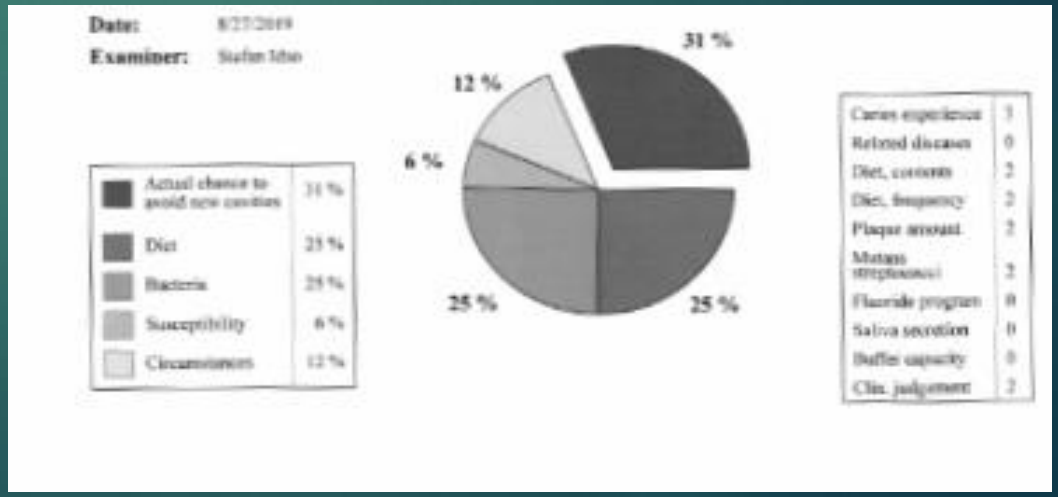
- Radiographically, the decay on tooth I and S was encroaching on the pulp chamber
- Planned for either pulpotomy and stainless-steel crown (SSC) or extraction and space maintainer

Diagnosis

- Caries

Problem List

- Caries
- Space loss
- Anxiety/behavior
  - Frankl score of 2 at all appointments
- Oral hygiene

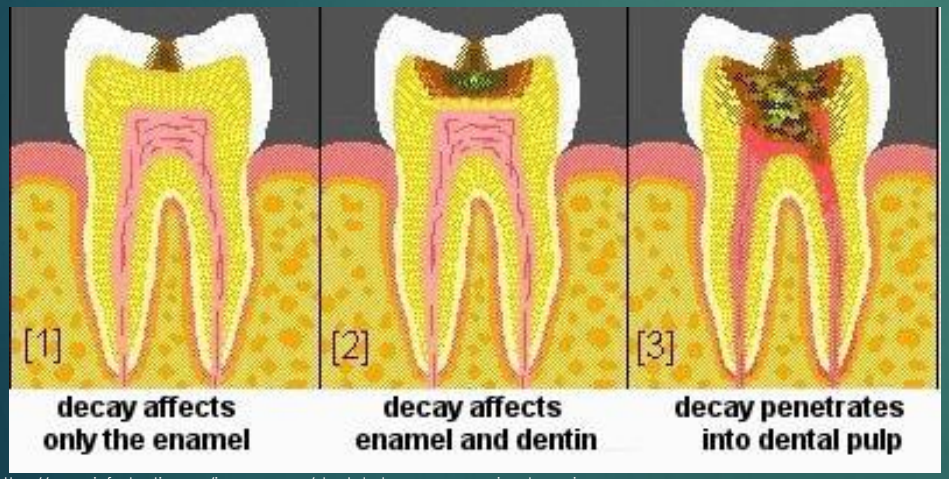


D1 Basic Science

MUHAMMAD SALAHUDDIN

Nitrous Oxide for Dental Anxiety

- Dental Anxiety
  - 42% of children in a study (105/250)
  - Injections #1, dentist drills #2
  - Can lead to long term effects if untreated



https://www.infodentis.com/images-eng/dental_decay_progression_large.jpg

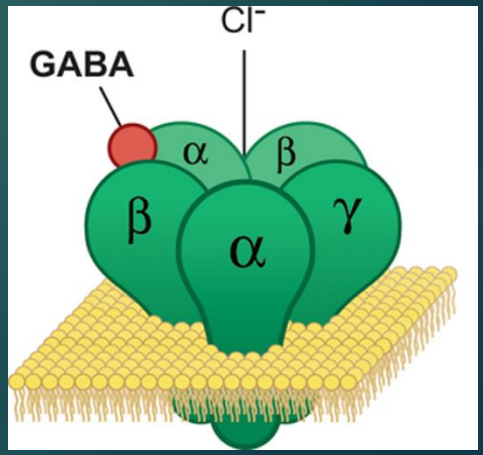
https://colleyvillepediatricdentist.com/wp-content/uploads/2019/10/scared-of-the-dentist.jpeg

Kakkar, Mayank, et al. "Prevalence of Dental Anxiety in 10-14 Years Old Children and Its Implications." *Journal of Dental Anesthesia and Pain Medicine*, 21 Sept. 2016, jdapm.org/search.php?where=aview.

Nitrous Oxide for Dental Anxiety

- Dental Anxiety
  - Increased neuronal activity
- Anxiolytic Effect
  - GABA (inhibitory neurotransmitter) binds to GABAA Receptor
  - Reduction in neuronal activity = reduction in anxiety
- Dopamine
  - Produces euphoric feeling

https://northsidedent.com/wp-content/uploads/2018/10/shutterstock_1573121599.jpg

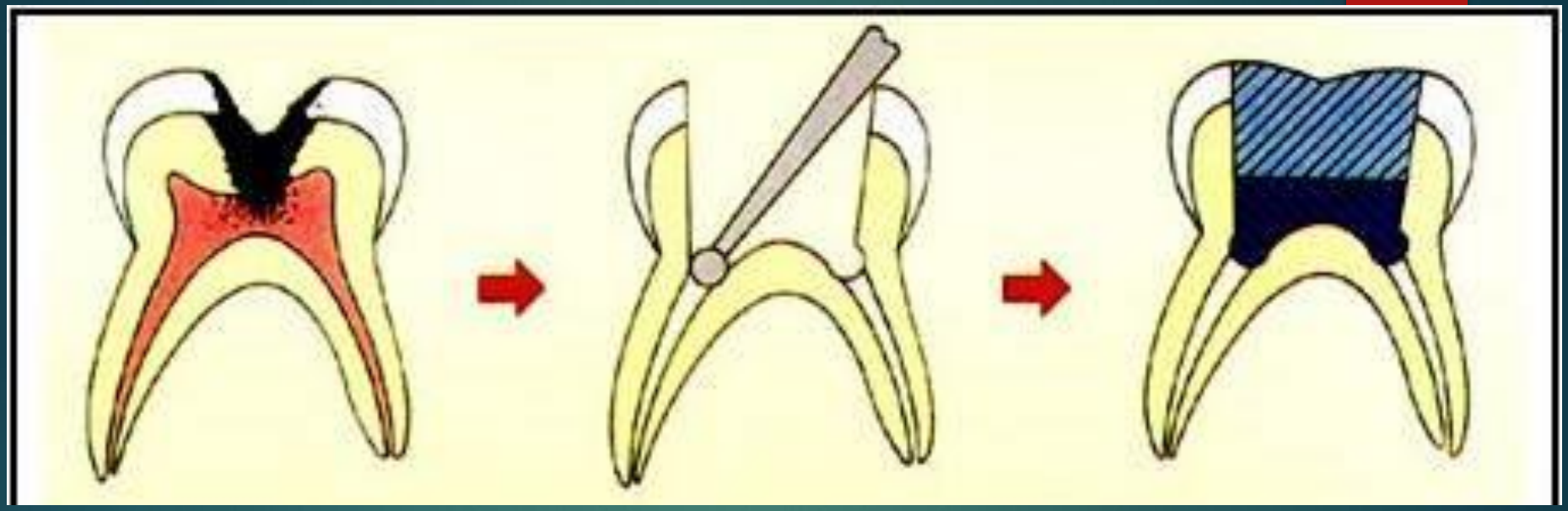


https://www.hussmanautism.org/wp-content/uploads/2016/02/GABA-receptor_mod.png

Use of Nitrous Oxide for Pediatric Dental Patients. American Academy of Pediatric Dentistry, 2018, www.aapd.org/research/oral-health-policies--recommendations/use-of-nitrous-oxide-for-pediatric-dental-patients/

D2 Pathology

JORDAN DIETRICH



What is a Pulpotomy and What Leads to a Pulpotomy Being Indicated?

Pulpotomy

- **What is it?**
  - Most often done in primary teeth
  - Pulp is removed in the crown of the tooth
  - Remaining pulp is then capped and sealed
  - A crown is most favorable, however depending on the extent of caries and esthetics other options may be used
- **Indications**
  - Vital tooth
  - No abscess or pain near root
  - Damaged pulp or irreversible pulpitis

Pediatric Restorative Dentistry / American Academy of Pediatric Dentistry. Pediatric Dentistry, Number 6, Reference Manual 2018, pp. 330-342(13)

Winters, J., Cameron, A. C., & Widmer, R. P. (2014). Pulp therapy for primary and immature permanent teeth. *Handbook of Pediatric Dentistry*, 103-122. doi:10.1016/b978-0-7234-3695-9.00007-9

D3 PICO

- **Clinical Question:**

- What conditions are optimal for a stainless-steel crown to be successful when contemplating SSC versus extraction and placement of space maintainer?

PICO Format

P: Pediatric Patients with compromised teeth

I: Stainless Steel Crowns

C: Extraction and space maintainer

O: Removal of disease with adequate space maintenance

PICO Formatted Question

- In pediatric patients with severely compromised teeth, do SCC crowns have comparable success rates to extraction with adequate space maintenance?

Clinical Bottom Line

- **The evidence found should provide guidance on the definitive treatment plan.**

Search Background

- **Date(s) of Search:** 09/14/2020
- **Database(s) Used: Pubmed**
- **Search Strategy/Keywords:** Space maintenance, stainless steel crown, children

Search Background

- **MESH terms used:**

((((space maintenance) AND (child)) AND (stainless steel)) AND (crown)) AND (appliance)

Article 1

- Citation: Dental Space Maintainers for the Management of Premature Loss of Deciduous Molars: A Review of the Clinical Effectiveness, Cost-effectiveness and Guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2016 Oct 20.
- Study Design: Systematic Review of case control studies
- Purpose: To examine the clinical effectiveness, cost-effectiveness, and guideline recommendations surrounding the types and use of space maintainers (SMs).

Article 1 Synopsis

- Method
  - Limited literature search
  - Databases used: Cochrane, PubMed, CRD
  - 2006-2016
  - PICO:

Population	Pediatric patients (age 0–18) with primary or mixed dentition, with premature loss of deciduous molars (primary teeth)
Intervention	Dental space maintainers
Comparator	No space maintainer; different types of space maintainers
Outcomes	Clinical effectiveness (e.g. prevention of change in the arch length/space, prevention malocclusion (e.g. ectopic eruptions, rotations, crowding, spacing, crossbite, overbite, overjet, impactions, midline shifts), cost-effectiveness, guidelines (including indications, recommendations on type of space maintainer, and type of practitioner)
Study Designs	HTA/Systematic Reviews/Meta-Analyses Randomized Controlled Trials Economic Evaluations Non-Randomized Studies Guidelines

Dental Space Maintainers for the Management of Premature Loss of Deciduous Molars: A Review of the Clinical Effectiveness, Cost-effectiveness and Guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2016 Oct 20.

Article 1 Synopsis

Results:

- Eight out of 250 publications met the inclusion criteria
  - one study found that space maintainers were associated with greater odds of eruption difficulty after
  - No significant higher caries risk with SM
  - No statistical differences in the proportion of patients with poor gingival health

- Conclusions: "…several methodological limitations and uncertain generalizability of the studies preclude robust conclusions about the use of SMs" = Inconclusive.
- Limitations: Populations were not clearly described and sample sizes were small. No RCTs, systematic reviews, economic evaluations, or evidence-based guidelines were retrieved.

Dental Space Maintainers for the Management of Premature Loss of Deciduous Molars: A Review of the Clinical Effectiveness, Cost-effectiveness and Guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2016 Oct 20.

Article 1 Selection

- Addresses PICO – specifically the effectiveness of Space maintainers

Article 2

- Citation: Brill WA. The distal shoe space maintainer chairside fabrication and clinical performance. Pediatr Dent. 2002 Nov-Dec;24(6):561-5. PMID: 12528949.
- Study Design: Case Report
- Purpose: To describe the chairside fabrication of the distal shoe appliance with a SCC as the retainer and describe the clinical management, including problems requiring intervention and the effect they have on clinical efficacy.

Article 2 Synopsis

- Method
  - Observational study of 190 distal shoe appliances with stainless steel crown as retainer. This was done to protect the eruption position of the first permanent molar.
  - Children were recalled for observation every other month (any adjustments, corrections, or repairs were noted)
  - In case of broken appliance: distal shoe appliance with orthodontic band (DSB) was place. This means the DS SM failed.

Brill WA. The distal shoe space maintainer chairside fabrication and clinical performance. Pediatr Dent. 2002 Nov-Dec;24(6):561-5. PMID: 12528949.

May 1995- Sept 2001

Article 2 Synopsis

- Results
  - 2 end points end points:
    - 1) the eruption of the first permanent molar
    - 2) conversion of the DS to a distal shoe appliance with an ortho band as an abutment after the appliance separated from the crown.
  - 190 DS placed
    - 86 successful DS appliances
    - 82 still under observation at the end of the study
    - 22 DS converted to DSB (failed DS)
- Conclusion: the chairside-fabricated distal shoe appliance with a SSC as the retainer can be considered a successful appliance (does require supervision and periodic service)
- Limitations: Sample size, did not state what tooth conditions were that led to choice of using DS

Brill WA. The distal shoe space maintainer chairside fabrication and clinical performance. Pediatr Dent. 2002 Nov-Dec;24(6):561-5. PMID: 12528949.

Article 2 Selection

- Addresses PICO – specifically effectiveness of space maintainers after ext
- Implications: viable treatment option for patient

Article 3

- Citation: American Academy of Pediatric Dentistry. Guidelines for pediatric restorative dentistry 1991. In: American Academy of Pediatric Dentistry Reference Manual 1991-1992. Chicago, Ill.: American Academy of Pediatric Dentistry; 1991:57-9. Revision: American Academy of Pediatric Dentistry. Guideline on restorative dentistry. Pediatr Dent 2016;38(special issue): 250-62.
- Study Design: Clinical Practice Guidelines/Meta Analysis
- Purpose: To help dentists make decisions regarding restorative dentistry in pediatric dentistry (when it is necessary to treat and what the appropriate materials and techniques are for restorative dentistry in children).

Article 3 Synopsis

- Method: Review of articles using online databases and hand searches (2009-2019). Mesh Terms: dental caries, ART, SSC, Hall Technique, pulpectomies, etc. with the parameters of clinical trials and randomized controlled trials.
- Results:
  - Five studies retrospectively showed an average five-year failure rate of 26 percent for amalgam and 7 percent for preformed metal crowns.
  - systematic review: no strong evidence that preformed metal crowns were superior over other restorations for pulpotomized teeth.
  - Case reports and one RCT: supports SSCs for permanent teeth as a semi-permanent restoration for the treatment of severe enamel defects or grossly carious teeth.
  - Retrospective study: greater longevity of preformed metal crown restorations compared to amalgam or resin-based restorations for the treatment of caries lesions in primary teeth

American Academy of Pediatric Dentistry. Guidelines for pediatric restorative dentistry 1991. In: American Academy of Pediatric Dentistry Reference Manual 1991-1992. Chicago, Ill.: American Academy of Pediatric Dentistry; 1991:57-9. Revision: American Academy of Pediatric Dentistry. Guideline on restorative dentistry. Pediatr Dent 2016;38(special issue): 250-62.

Article 3 Synopsis

- Conclusions:
  - Preformed SSCs indicated for "extensive caries, cervical decalcification, and developmental defects… following pulpotomy or pulpectomy, for restoring a primary tooth that is to be used as an abutment for a space maintainer, for the intermediate restoration of fractured teeth, and for definitive restorative treatment for high caries-risk children."
  - The indications for SSCs
    - severe genetic/developmental defects,
    - grossly carious teeth
    - traumatized teeth
    - tooth developmental stage or financial considerations that require semi-permanent restoration instead of a permanent cast restoration.
    - high-risk children with large or multi-surface cavitated or non-cavitated lesions on primary molars,
    - children that require advanced behavioral guidance techniques including general anesthesia
- Limitations: Focus was on retention of teeth, therefore no recommendations for extraction and space maintainers.

American Academy of Pediatric Dentistry. Guidelines for pediatric restorative dentistry 1991. In: American Academy of Pediatric Dentistry Reference Manual 1991-1992. Chicago, Ill.: American Academy of Pediatric Dentistry; 1991:57-9. Revision: American Academy of Pediatric Dentistry. Guideline on restorative dentistry. Pediatr Dent 2016;38(special issue): 250-62.

Article 3 Selection

- Addresses PICO – specifically effectiveness of SSCs
- Applicable to current case

Levels of Evidence

- ☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
- ☐ **1b** – Individual RCT
- ☐ **2a** – Systematic Review of Cohort Studies
- ☐ **2b** – Individual Cohort Study
- ☐ **3** – Cross-sectional Studies, Ecologic Studies, "Outcomes" Research
- ☐ **4a** – Systematic Review of Case Control Studies
- ☐ **4b** – Individual Case Control Study
- ☐ **5** – Case Series, Case Reports
- ☐ **6** – Expert Opinion without explicit critical appraisal, Narrative Review
- ☐ **7** – Animal Research
- ☐ **8** – In Vitro Research

Strength of Recommendation Taxonomy (SORT)

☒	**A** – Consistent, good quality patient oriented evidence
☒	**B** – Inconsistent or limited quality patient oriented evidence
☐	**C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening

Conclusions: D3

- Definitive treatment should be made based on an assessment of the following: behavior/compliance, extent/location of decay, restorability, mobility, esthetic concerns, stage of development/eruption, radiolucencies and root resorptions.
- Positive outcomes are possible for both SSCs and space maintainers, however, in order to achieve ideal outcomes it is essential to weigh all essential factors.

SSC would be a viable option as it is an indication for multi-surface caries, grossly carious teeth and children at high caries risk.

- esthetic concerns – open-faced or pre-veneered SSCs
- ART for single surface lesions in non-occluding areas

Conclusions: D4

- Based on your D3's bottom line recommendations, how will you ***advise*** your patient?
  - Caries excavation on tooth I and S
  - Indirect pulp cap as needed
  - SSC, due to high success rate based on the evidence

- In reality:
  - At first operative appointment, patient presented with swelling in buccal vestibule adjacent to tooth I.
  - Caries excavated tooth S, decay went sub-gingival and into pulp chamber—tooth deemed non-restorable and extracted
  - Additionally, patient's non-compliant behavior was a factor in treatment decision.

Discussion Questions

- At what point is an SSC not a viable option for a pediatric patient?
- How does the success rate vary between using SSCs in primary vs permanent teeth? Are there indications for using a SSC in a permanent tooth?
- How does patient age play a role in deciding between SCC or extraction and space maintainer?
- Does extraction vs. stainless steel crown placement affect patient anxiety?
- Are there any risks to placing a SCC on a severely compromised tooth?