

# Midwest Dental Conference

## Tricky Decisions & Treatment Techniques

Jane A. Soxman, DDS

Diplomate, American Board of Pediatric Dentistry

April 14, 2023. 2pm-5pm

### Philosophy is minimally invasive dentistry

Promote remineralization

Conserve tooth structure

Slow or arrest disease process with minimized surgical intervention

Crisp J, Mihas P, Sanders AE, et al. Influences on dentists' adoption of nonsurgical caries management techniques. *JADA* 2021;152(6), 463-470.

### Hall Technique

Preformed metal crown over carious primary molar without caries removal, local anesthesia or tooth preparation.

"Concept is caries control by managing the activity of biofilm."

Not widely used in the U.S.

Limited to individual circumstances where traditional methods of restoration can not be used.

American Academy of Pediatric Dentistry Reference Manual. Pediatric restorative dentistry. 2021-2022: 386-398.

# Nonsurgical Caries Management Techniques NSCMT

Soxman, JA, MacLean J, Haberland, C. Non-invasive and minimally invasive treatment of dental caries. *Handbook of Clinical Techniques in Pediatric Dentistry* 2nd ed. Jane A. Soxman, editor, Wiley Blackwell, 2022; pp. 1-20.

Populations - Pediatric, Geriatric, Infirmed, and limited access to oral care.

Clinical study showed no differences in pain or sepsis in primary teeth treated with Nonsurgical Caries Management Techniques versus surgical intervention.

Crisp J, Mihas P, Sanders AE, et al. Influences on dentists' adoption of nonsurgical caries management techniques. *JADA* 2021;152(6), 463-470.

Crisp J, Mihas P, Sanders AE, et al. Influences on dentists' adoption of nonsurgical caries management

### Contraindications

Clinical pulp exposure.

Radiographic pulpal involvement. Should see a clear band of dentin over the pulp chamber on the radiograph.

Symptoms of irreversible pulpitis.

Cannot manage the airway due to behavior.

Inadequate tooth structure to retain SSC.

Caries extended into dentin & no clinical or radiographic evidence of pulp pathology.

Food residues removed (spoon or wet microbrush) and crowns cemented with glass ionomer cement.

Hall technique was more cost effective and more successful than conventional restorations in primary molars.

Schwendicke F, Krois J cost-effectiveness of the Hall technique in a randomized trial. J Dent Res 2019;98:61-67.

No topical anesthetic necessary.

Margins should be well-adapted to tooth. Use crimping pliers if necessary.

Fill crown completely with cement.

May use bite stick or child's own biting force to seat. May still hear "snap" fit.

Open bite may result due to no occlusal reduction.

Occlusion adjusts to normal occluso-vertical dimension in 15-30 days.

van der Zee V, van Amerongen WE. Influence of pre-formed metal crowns (Hall technique) on the occlusal vertical dimension in the primary dentition. Eur Arch Paediatr Dent 2010;11:225-227.

## Airway Protection

Sit the child more upright.

Place open 2x2 in back of mouth.

May use athletic/sports tape to secure crown on gloved finger.

Can not do on a child who is moving!

May use orthodontic separators for a few days before procedure to open interproximal (size 2)

Crown filled with glass ionomer cement.

Finger pressure to seat and then child's own biting force.

Seale NS, Randall R. The use of stainless steel crowns: A systematic literature review. Pediatr Dent 2015;37:147-162.

## Hall Technique with SDF

Lesion progression and bacterial toxins could produce a pulpitis.

SDF application would kill the bacteria and deactivate the remaining nutrients.

Horst J, Frachella JC, Duffin S. Response to letter to the editor. Pediatr Dent 2016;38:462-463.

Hall stainless steel crowns (SSC's) showed similar success rates to conventionally placed SSC's.

Clark W, Geneser M et al. Success rates of Hall technique stainless steel crowns in primary molars: A retrospective study. *Gen Dent* 2017;65:32-35.

Stainless steel crowns (SSC's) have higher survival rate than other restorations for multisurface caries in primary molars.

SSC's should be restoration of choice for children under age 4 with multi surface caries.

Wu E, Yang Y-J, Munz SM et al. Restorations versus stainless steel crowns in primary molars: A retrospective study. *Pediatr Dent* 2021;43:290-295.

Both conventional and Hall technique SSC's had success rates of 95%.

The Handbook of Pediatric Dentistry. A J Nowak & PS Casamassimo, eds. p. 160. American Academy of Pediatric Dentistry, 2018.

Hall technique (HT) provides a cost-effective alternative for stainless steel crowns (SSC's).

No difference in failure rates between HT and conventionally placed SSC's.

Children who had SSC's placed with the HT had less post-operative anxiety.

Elamin F, Abdelazeem N, et al. A randomized clinical trial comparing Hall vs conventional technique in placing preformed metal crowns from Sudan. *PLoS One*; 2019; 14: e0217740.

## ITR Interim Therapeutic Restoration

American Academy of Pediatric Dentistry Reference Manual. Policy on Interim therapeutic restorations (ITR) p.74-75. Policy on early childhood caries (ECC): Unique challenges and treatment options. p. 85. 2021-2022.

### Interim Therapeutic Restoration

When traditional cavity preparation and restoration can not be performed due to behavior, young age or special needs.

Can buy some time if definitive treatment is not able to be performed or must await availability of anesthesiologist for office procedure or operating room time.

Not a definitive restoration. Follow-up planned with final restoration in future.

Glass ionomer caries control (GICC). Glass ionomer is the material of choice for restoration.

Procedure may take less than 5 minutes and can be performed at the initial visit for a child with one or more open, *asymptomatic* carious lesions confined to dentin.

No history of unprovoked/spontaneous pain.

Performed without a rubber dam & without local anesthesia.

Provides higher long-term success prior to or avoidance of vital pulpotomy treatment.

95-97% survival after one year.

## Glass Ionomer

Fluoride releasing

Coefficient of thermal expansion like tooth structure

Chemically adheres to tooth structure

Sets through acid-base reaction

Bonds to composite resin

Poor wear resistance

Glass ionomer is left in place until child can cooperate for final restoration or sedation/operating room is scheduled.

The bacterial counts significantly decrease within the carious lesion.

The dentin will remineralize and pulpotomy may be avoided.

Code D2941 Interim Therapeutic Restoration - primary dentition - "Placement of an adhesive restorative material following caries debridement by hand or other method for the management of early childhood caries. Not considered a definitive restoration."

Cotton pellet soaked with 1% chlorhexidine applied for one minute, air dried & glass ionomer placed in prep.

Cavity disinfection with chlorhexidine reduced microbial counts beneath the restoration.

Joshi JS, Roshan NM, Sakeenabi B et al. Inhibition of residual cariogenic bacteria in atraumatic restorative treatment by chlorhexidine disinfection or incorporation. *Pediatr Dent* 2017;39:308-312.

## Glass Ionomer

Capsules with rechargeable fluoride release.

Mix/triturate according to manufacturer's instructions and place immediately in prep .

Preparation should be "glistening" - not dry.

Working time varies with material, but usually about 2.5 - 3 minutes from start of mixing.

Finish (if you dare) after material's set time.

Capsule Applier/Capsule Extruder

Adequate access opening necessary. May be created with round carbide bur in slow speed.

Non-painful superficial decay is removed with a spoon excavator or slow speed with a #4 or #6 round carbide bur.

SmartBurs II SS WHITE- removes only soft carious dentin. Single use.

Glass ionomer is the preferred restorative material. Resin modified glass ionomer also recommended due to longer setting (working) time & more esthetic.

New lesions at the margins of composite restorations are the predominant cause for failure and replacement of restorations in primary teeth.

There is a moderate strength of evidence that glass ionomer cements may reduce the incidence of recurrent caries in the margins of occlusoproximal restorations in primary teeth.

Raggio DP, Tedesco TK, Calvo AFB et al. Do glass ionomer cements prevent caries lesions in margins of restorations in primary teeth? JADA 2016;147;177-185.

Non-invasive procedure w/o local anesthesia for asymptomatic caries.

Can be applied anywhere.

Simplicity of tx - Applied w. micro sponge.

Low cost (similar to fluoride varnish).

One drop treats 5 teeth - 250 drops/bottle

Evidence-based arrest of caries progression.

Twice the fluoride as fluoride varnish - 44,800ppm vs 22,600 ppm

Preventive effects greater with one application of SDF than 2-4 times with fluoride varnish or chlorhexidine varnish.

Horst JA. The use of silver diamine fluoride for early childhood caries. Oct. 30, 2016. Audio presentation. Oakstone Publications. Practical Reviews in Pediatric Dentistry. 2016; Vol. 30. No. 10.

## Silver Diamine Fluoride

Became available August 2015 for off-label use  
Marketed as Advantage Arrest by Elevate Oral Care LLC

Soxman JA. Noninvasive treatment for cavitated lesions in primary molars. Gen Dent 2016;64:8-9.  
American Academy of Pediatric Dentistry Reference Manual. Use of silver diamine fluoride for dental caries management in children and adolescents, including those with special needs. 2021/2022:183-192. & Chairside Guide 596-597.

Application of SDF at a proper distance from the pulp may stimulate repair of the pulp-dentin complex.

Application to deep carious lesions should be monitored both clinically and radiographically.

Application of SDF on exposed pulps results in severe inflammation necrosis.

Zaeneldin A, YU OY, Chu C-H. Effect of silver diamine fluoride on dental pulp: A systematic review. J Dent 2022;119:104066.

Reduces emergency visits for pain or acute infection while waiting for definitive treatment.

May be used to avoid repeated sedation or general anesthesia in very young children until all primary teeth have erupted.

May need to be periodically reapplied in cavitated lesions\*.

81% caries arrest rate.

Thomas ML, Magher K, Mugayar L, et al. Silver diamine fluoride helps prevent emergency visits in children with early childhood caries. Pediatric Dent 2020;42:217-220.

Silver ions lyse bacteria and fluoride promotes remineralization to strengthen the lesion.

SDF-arrested lesions are twice as hard as normal dentin.

SDF goes from a liquid to solid silver within the lesion.

Seto J, Horst J A, Parkinson DY, et al. Enhanced structure vis silver microwires following treatment with 38% silver diamine fluoride. *Pediatr Dent* 2020;42:226-229.

Recommendation is one drop per 10kg per treatment visit.

Smallest child with caries may be about 10kg.  
Average weight for 1-year old (22pds girl/23 boy)

One drop is 9.5mg Ag & treats 5 teeth.

Weekly intervals at most.

Horst JA, Ellenikiotis H, Milgrom PM. UCSF protocol for caries arrest using silver diamine fluoride: rationale, indications and consent. *PA Dent Jour* 2017; Jan/Feb: 14-26.

When dentin is dried, the SDF penetrates the porous body of the lesion (about 200 microns). The drier the lesion, the more penetration of the silver.

For example, think of a crack in cement that would be filled with cement, the liquid penetrates the dentinal tubules with a capillary-like action. Silver precipitates in the tubules and plugs.

After initial application, do second application in a week or two to check hardness.

*Hardness* of dentin shows lesion arrested. Silver is essential for the hardening of the lesion.

Hydroxyapatite is transformed to Fluoroapatite, which is less soluble in an acid environment.

Silver ions act on the bacterial cell wall and inhibit DNA replication, killing bacteria.

Cariou dentin is stained black.

Fung MHT, Wong MCM, Lo ECM, Chu CH. Arresting early childhood caries with silver diamine fluoride- A literature review. *Oral Hyg Health*. 2013;1:1-5

## D1354 Interim Caries Arresting Medicament Application

“When bacteria killed by silver, ions are added to living bacteria, the silver is re-activated so that effectively the dead bacteria kill the living bacteria in a “zombie effect”.”

This aids in explaining how the silver deposited on the bacteria and dentin proteins within the lesion provides sustained antimicrobial effects.

Apply one to two times per year until tooth exfoliates.

Horst JA, Ellenikiotis H, Milgrom PM. UCSF protocol for caries arrest using silver diamine fluoride. *From PA Dent Jour* 2017; Jan/Feb:14-27.

Protect tissues. Cotton roll isolation. Petroleum jelly on gingiva.

Clean & dry\* with compressed air.

Remove gross debris - no caries removal necessary.

Microsponge (2 sizes) to apply or microfiber brush, *rubbing* for at least one minute 😊(10 seconds). Do not dry with compressed air after application.

Dry 1-2 minutes/blot dry with micro sponge or cotton pellet. No light cure! Will cause immediate discoloration and not necessary.

Optional to apply fluoride varnish on top of SDF

Keep SDF in contact with carious surface as long as possible

Prevent saliva from diluting the SDF

Reduce risk of unwanted stain on adjacent teeth

Mask taste of SDF

If restoration to be placed same day, no need for varnish

Young DA, Quock RL, Horst J et al. Clinical instructions for using silver diamine fluoride (SDF) in dental caries management. *Compen* 2021;42:Issue 6.

Pale blue liquid stains skin, clothes and all surfaces.

Wipe face/lips w. 2X2 dipped in salt water  
Mr. Clean Magic Easer with pumice and water for countertops

Skin exfoliates within 2 weeks. Stain must be drilled out of tooth.

Color change of dentin occurs over one week.

Anyone licensed to place topical fluoride can apply - depends on state law.

Concerns are: Lack of follow-up, SDF does not restore form and function and how long duration of caries arrest.

Written consent, which includes colored photographs of teeth post-application, should be obtained.

When applied twice annually, most effective in primary incisors and buccal/lingual smooth surfaces.

Nelson T, Scott JM, Crystal YO, Berg JH, Milgrom P. Silver diamine fluoride in pediatric dentistry training programs: survey of graduate program directors. *Pediatr Dent* 2016;38:212-217.

Application time between 31.2 & 83.5 seconds.

Patients checked at 2-3 weeks to determine need for reapplication. Efficacy evaluated by dentin color, texture and presence of any pain.

## Hardness

Most parents agreed or strongly agreed that is an easy, painless procedure and not concerned with dark color of teeth.

Clemens J, Gold J, Chaffin J. Effect and acceptance of silver diamine fluoride treatment on dental caries in primary teeth. *J Public Health Dent*. 2018;78:63-68.

SDF corrodes glass & metal - use plastic dappen dish

Do not permit saliva to touch

SDF "bleeds" and can discolor "pre-clinical" white spot lesions. This stain can be polished off with a finishing bur. - Include in consent.

Failures d/t:

Food impaction with large occlusal lesions (ITR)  
High cariogenic diet  
Low fluoride exposure  
Poor oral hygiene

Stain on primary molars more acceptable than incisors, but parents preferred stain to sedation/general anesthesia.

Crystal YO, Janal MN, Hamilton DS et al. Parental perceptions and acceptance of silver diamine fluoride staining. *JADA* 2017;148:510-518.

Apply petroleum jelly to lips and skin around oral cavity.

Place NeoDry on buccal & cotton roll ligated with floss on the lingual or palatal.

Thread woven floss through the contact.

Use micro brush or micro sponge to apply SDF to floss and saturate.

Rub floss into contact for one minute.

Apply fluoride varnish.

Pretreating dentin with SDF does not impede the bonding strength of composite resin to dentin.

BUT....

Must thoroughly rinse away residual SDF after 60 seconds before applying adhesive.

Esthetic concern d/t composite will be dark.

Wu DI, Velamakanni S, Denisson J, et al. Effect of silver diamine fluoride (SDF) application on microtensile bonding strength of dentin in primary teeth. *Pediatr Dent* 2016;38:148-153.

SDF application with woven floss showed interproximal caries arrest at 12-month follow-up in children with low caries risk.

Hammersmith KJ, DePaolo JR, Casamassimo PS et al. Silver diamine fluoride and fluoride varnish may halt caries progression in the primary dentition. *J Clin Pediatric Dent* 2020;44:79-83.

If light cure SDF in a dappen dish, entire dose will oxidize and become inactive.

If apply SDF to carious lesion, it immediately binds to the proteins in the lesion. After 60 seconds, most protein surfaces have bound with the silver and there is residual excess silver still in solution.

The silver that bound for 60 seconds prior to light cure will remain bound and effective.

The composite will be darker. Every surface that has SDF on it will stain but this can be removed with polishing or pumice.

## INDICATIONS/PROCEDURE

Silver diamine fluoride (SDF) is an antibiotic liquid. SDF is used on cavities to help stop tooth decay. SDF may need to be applied every 6-12 months and follow-up is necessary 2-3 weeks after application. In some cases, fluoride varnish may be alternated with SDF application every three months. Monitoring is essential and your child must be seen every three months to evaluate efficacy of the SDF.

The tooth or teeth to be treated are dried and cotton rolls and/or gauze are used to isolate the tooth or teeth. SDF is applied for one minute and dried. The tooth or teeth are then rinsed with water.

SDF does not eliminate the need for fillings or crowns. Form and function are not restored. Once behavior permits, if additional procedures can be performed, a fee for that treatment will be incurred. In some cases, SDF may not stop the decay.

## CONTRAINDICATIONS

SDF is contraindicated with an allergy to silver or if any irritation or ulcers are present in the oral cavity.

## RISKS

Permanent black stain will occur on the tooth or teeth that are treated with SDF. SDF can shed into the saliva and cause stain on the other teeth. If the SDF accidentally touches the gums, stain may occur but should be gone within a few weeks.



## ALTERNATIVES

No treatment, but decay will likely progress resulting in pain or abscess requiring an extraction.

Restoration with tooth-colored fillings or crowns if behavior permits.

Referral for sedation or general anesthesia for definitive treatment.

I have read the indications/procedure, contraindications, risks and alternatives to treatment. I have seen a photograph of stained teeth treated with SDF.

All questions have been answered to my satisfaction.

I understand the treated teeth will be permanently stained black.

I understand that SDF does not restore form or function but slows the decay process and that decay can still progress especially in cavitated areas (areas with holes in the chewing surface).

SDF does not impair bonding of glass ionomer cement to dentin. (Ideally *wait a week* before place glass ionomer.)

Glass ionomer placed prior to composite may mask discoloration.

Frohlich TT, Rocha RO, Botton G. Does previous application of silver diamine fluoride influence the bond strength of glass ionomer cement and adhesive systems to dentin? Systematic review and meta-analysis. *Int J Paediatr Dent* 2020;30: 85-95.

SDF applied to the carious lesion(s) at the diagnostic visit - Can desensitize both the child and the tooth.

Patient returns in 2-4 weeks for placement of glass ionomer restoration.

Light cure same day causes gray discoloration due to reacting with free silver ions. The light precipitates the silver out of solution. Color change will occur even when using a self-cure GI restorative if placed the same day as SDF.

Cavity conditioner (20% poly acrylic acid) does not improve bond strength of GI to SDF-treated demineralized dentin.

Ng E, Saini S, Schulze KA, et al. Shear bond strength of glass ionomer cement to silver diamine fluoride-treated artificial dentinal caries. *Pediatric Dent* 2020;42:221-225.

SDF can be applied to cavitated lesions in conjunction with glass ionomer cement (GIC) which combines the benefits of caries arrest and a restoration.

Bond strength is reduced by 62% if apply GIC immediately after SDF.

Wait at least one week.

Ng E, Saini S, Schulze KA, et al. Shear bond strength of glass ionomer cement to silver diamine fluoride-treated artificial dentinal caries. *Pediatric Dent* 2020;42:221-225.

Hall Technique resulted in long-term lower risk of failure or pain compared to amalgam, glass ionomer or composite.

ART has high success rates for single-surface carious lesions in primary teeth but decreases significantly for multi-surface lesions.

38% SDF applied twice a year is more effective for caries arrest than once a year.

BaniHani A, Santamaria RM et al. Minimal intervention dentistry for managing carious lesions into dentine primary teeth. *Eur Arch Paediatr Dent* 2022;23:667-693.

# Mandibular Incisor Crowding

Unraveling crowding from front to back with canines and premolars toward a more distal positioning using the leeway space.

Provides greater intercanine dimension for relief of incisor crowding.

Bell RA. Lower anterior crowding and "driftodontics". Guest Presentation Educational Reviews April/May 2006.

Prevents the permanent first molars from drifting forward into the leeway space (about 2.5mm per side).

Rubin RL, Baccetti T, McNamara JA Jr. Mandibular second molar eruption difficulties related to the maintenance of arch perimeter in the mixed dentition. Am J Orthod Dentofacial Orthop 2012;141:146-152.

Lower Lingual Holding Arch - Fixed Appliance Therapy Ortho Code D8220

Leeway space 4.8-5.15mm in the mandible.

A lower lingual holding arch wire can be used to correct 4-5 mm of crowding in the majority of patients, maintaining the leeway space by inhibiting the late mesial shift of the first permanent molars. (mandibular suture closes age 1)

The permanent canines drift distally into the wider portion of the arch.

Brennan MM, Gianelly AA. The use of the lingual arch in the mixed dentition to resolve incisor crowding. Am J Orthod Dentofacial Orthop 2000;117:81-85.

Maintain leeway space for incisor alignment.

Mixed dentition preservation of leeway space seems to be successful in prevention of post-retention relapse.

\*\*\*\*\*Sinclair PM, Little RM. Clinical Implications of the University of Washington post-retention studies. J Clin Orthod 2009;XLIII: 645-651.

Mandibular second molars should be evaluated during eruption.

Initial molar angulation, space-width ratio, age, sex of patient not significant factors in prediction of eruption disturbances.

Rubin RL, Baccetti T, McNamara JA Jr. Mandibular second molar eruption difficulties related to the maintenance of arch perimeter in the mixed dentition. Am J Orthod Dentofacial Orthop 2012;141:146-152.

Mandibular incisor crowding less than 2mm with intercanine width at least 28mm will probably resolve without intervention.

Crowding of 3-4mm - disc primary canine.

Crowding of 5-9mm - extract primary canine (or first primary molar) and probably place lingual arch wire.

Foley TF, Wright GZ, Weinberger SJ. Management of lower incisor crowding in the early mixed dentition. ASDC J Dent Child 1996;63:169-174.

Premature loss of a primary canine due to crowding will result in a midline shift to the side of the loss.

Extraction of the contralateral primary canine will prevent the midline shift.

Fricker J, Kharbanda OP, Dando J. Orthodontic diagnosis and treatment in the mixed dentition. In: Cameron, AC & Widmer, RP. Handbook of Pediatric Dentistry 3rd ed. Mosby Elsevier, London, 2008; p 351

## 5-9mm of lower incisor crowding

The premature loss of a primary canine is evidence of inadequate arch space.

If one of the four mandibular permanent incisors is completely blocked out, extraction of both mandibular primary canines is indicated.

Lindsten R, Ogaard B, Larsson E. Anterior space relations and lower incisor alignment in 9-year-old children born in the 1960's and 1080's. Angle Orthod 2001;71:36-43.

Premature unilateral loss of a mandibular primary canine may not result in a significant mandibular midline deviation persisting in the permanent dentition.

Christensen RT, Fields HW, Christensen JR et al. The effects of primary canine loss on permanent lower dental midline stability. Pediatr Dent 2018;40:279-284.

At age 8 extract the mandibular first primary molars.

Place lower lingual arch wire at the incisal one-third of the mandibular incisors to control the rotation of the mandibular incisors.

Dr. Stephen Dugoni-University of the Pacific  
Age-Appropriate Treatment of the Developing Occlusion.  
Joint AAO/AAPD Conference January 27, 2012.

As the permanent canines erupt, it may be necessary to disk or reduce the mesial of the first primary molars.

As the first premolar erupts, the mesial of the second primary molar may be disked.

Fricker J, Kharbanda OP, Dando J. Orthodontic diagnosis and treatment in the mixed dentition. In: Cameron, AC & Widmer, RP. Handbook of Pediatric Dentistry 3rd ed. Mosby Elsevier, London, 2008; p 351

A fixed lingual arch to support the incisors and prevent lingual tipping is placed.

Fricker J, Kharbanda OP, Dando J. Orthodontic diagnosis and treatment in the mixed dentition. In: Cameron, AC & Widmer, RP. Handbook of Pediatric Dentistry 3rd ed. Mosby Elsevier, London, 2008; p 351

## Space Maintenance

If the first permanent molar is *fully erupted* and in occlusion.

A space maintainer is usually not indicated for premature loss of a maxillary or mandibular *first* primary molar. (safer in mandible)

Early loss of the maxillary first primary molar may be accompanied by distal drift of the primary canine toward the extraction space and palatal migration of the maxillary incisors.

Yai-Tin L, Wen-Hsien L, Yng-Tzer JL. Immediate and six-month space changes after premature loss of a primary maxillary first molar. JADA 2007;138:362-368.

Early loss of *mandibular* first primary molar results in distal drift of mandibular primary canine.

Tunison W, Flores-Mir C, ElBadrawy H, Nassar U, El-Bialy T. Dental arch space changes following premature loss of primary first molars: a systemic review. Pediatr Dent 2008;30:297-302.

## First permanent molar unerupted or partially erupted

Space maintainer *necessary* to avoid mesial drift of second primary molar into the extraction site and premolar blocked out by first permanent molar.

Tunison W, Flores-Mir C, ElBadrawy H, Nassar U, El-Bialy T. Dental arch space changes following premature loss of primary first molars: a systemic review. *Pediatr Dent* 2008; 30:297-302.

Loss of the First Primary Molar  
first permanent molar unerupted

## Band & Loop

Band the second primary molar.

The loop extends to the distal of the primary canine just below its contact point.

Loop is wide enough to permit unobstructed eruption of the premolar.

Consider dental age when deciding when to place the band & loop.

Loss of the First Primary Molar  
first permanent molar partially erupted

## Band & Loop

The loop extends to the distal of the primary canine just below its contact point.

Loop is wide enough to permit unobstructed eruption of the premolar.

Loss of the Second Primary Molar  
With partial eruption of the first permanent molar

## Band & Loop

Band the first primary molar as soon as the mesial of first permanent molar is adequately erupted for the loop to contact.

Delivery at the time of extraction is the better choice.

With digital radiograph, can place a point just distal to the first primary molar and mesial to the first permanent molar. Connect points with a line and can get an exact measurement.

Traditional radiographs may not be accurate for measurement.

Send PA with pre-extraction model.

## Distal Shoe

Compound impression.

Appliance can be fabricated on the model *prior to extraction* of the second primary molar and delivered at the time of the extraction.

## Chairside Fabrication

for Band & Loop or Distal Shoe

Pre-formed bands

Pre-crimped/pre-contoured crowns

Adjustable

## Second Primary Molar Premature Loss After Eruption of First Permanent Molar

Preferable to band the first primary molar and extend the loop distal to the first permanent molar.

Or band the first permanent molar and extend loop mesially to the distal of the first primary molar. Consider OH/hypoplasia.

## Lower Lingual Arch Wire

Mixed dentition with loss of one or both second primary molars in the mandibular arch.

.036 or .040 wire contacts the lingual of the incisors with bands on the mandibular first permanent molars.

After eruption of the mandibular incisors.

## Transpalatal Arch Bar

.036 or .040 in wire contoured to the posterior hard palate that crosses to the palatal of the banded first permanent molars.

Omega loop applies light distal force to assist in prevention of the rotation or tipping of the permanent molars.

For use when only *one* second primary molar is prematurely lost.

The contralateral remaining second primary molar helps to stabilize the permanent molars.

## Nance

Permanent maxillary molars are banded and an acrylic button is placed on the palatal rugae.

Monitor for soft tissue irritation.

For premature loss of *one or both* second primary molars.

Band and loop failure usually due to cement loss, crown and loop due to solder breakage.

Mean survival time B & L 18.8 months, C & L 40.4 months.

Qudeimat MA, Sasa IS. Clinical success and longevity of band and loop compared to crown and loop space maintainers. Eur Arch Paediatr Dent 2015;16:391-396.

## Extraction of Primary Dentition

Soxman JA. Extraction of primary dentition. Handbook of Clinical Techniques in Pediatric Dentistry 2nd ed. Jane A. Soxman, editor, Wiley Blackwell, 2022; pp. 159-165.

### Elevation, Elevation, Elevation

The contacts of the primary molars are broad and flat, making interproximal access for elevation difficult.

Roots of primary molars flare, extending out beyond the projected outline of the crowns.

Roots of primary molars are very slender and root fracture can occur with inadequate elevation.

The neck of the primary molar is more constricted than the cervical of the permanent molar.

The thin, curved tip of the elevator fits interproximally and wraps around the primary molar/canine.

### Submerged Primary Molar

Serrated split beak forceps

Capture forceps

Ectopic eruption of premolar

Congenitally absent premolar

Ankylosis of primary molar



In this Happy Tooth Chest you will find  
a teeny, tiny tooth of mine.  
And while I lay where dreams are made,  
maybe we can make a trade.

Seeing the syringe is the most anxiety  
producing stimulus followed by feeling  
the injection and extraction.

Vanhee T, Mourali S, et al. Stimuli involved in dental  
anxiety: What are patients afraid of? *Int J Paediatr Dent*  
2020; 30:276-285.

## Dosage

Lidocaine 2% + 1:100,000 epinephrine  
- 2mg/lb or 4.4mg/kg

Mepivacaine 3% plain  
- 2mg/lb or 4.4mg/kg

Articaine 4% + 1:100,000 epinephrine  
- 3.2mg/lb or 7.0mg/kg (5.0mg/kg)

Total dosage should be based on child's weight and never  
exceed maximum dosage.

American Academy of Pediatric Dentistry Reference Manual. Use  
of Local Anesthesia for Pediatric Dental Patients. 2021-2022 p.  
332-337.

# Local Anesthesia

Townsend, JA, Soxman JA, Malamed SF. Local anesthesia for the  
pediatric patient. *Handbook of Clinical Techniques in Pediatric  
Dentistry* 2nd ed. Jane A. Soxman, editor, Wiley Blackwell, 2022;  
pp. 29-39.

## Topical Anesthesia

Temporary loss of sensation 2-3mm in depth.

Contact for minimal duration of 2 minutes.

No direct proportional relationship between  
duration of contact and clinical effectiveness.

Decreases discomfort for needle penetration &  
rubber dam clamp placement.

Priyatham S, Nuvvula S. Intraoral topical anesthesia in  
pediatric dentistry. *Int J Pharm Bio Sci* 2016;7:346-353

Mandibular cortical bone has reduced density

Bone is very porous with rapid uptake

Inject slowly

Buccal infiltration usually adequate in mandible  
rather than block under age 8



## Buffering

Lidocaine 2% with 1:100,000 epinephrine was compared to articaine 4% with 1:100,000 epinephrine in terms of efficacy.

Infiltration with articaine was as effective as inferior alveolar nerve block with lidocaine in primary mandibular molars.

Zhang IL, Kratunova E, Marion I et al. Articaine infiltration versus lidocaine inferior alveolar nerve block for anesthetizing primary mandibular molars: A randomized, controlled, double-blind pilot study. *Pediatr Dent* 2021;43:344-348.

One percent buffered lidocaine was compared to two percent unbuffered lidocaine- both with 1:100,000 epinephrine.

Buffering system. Each ml of local is individually buffered as drawn into a syringe.

Blood lidocaine level was 63% lower with buffered lidocaine.

Baker SD, Lee JY, White RP et al. Double-blind, randomized clinical trial comparing one percent buffered versus two percent unbuffered lidocaine injections in children. *Pediatr Dent* 2021;43:88-94.

Place index or middle finger extra-orally on posterior border of ramus and thumb in the coronoid notch, the deepest depression on the anterior border of the ramus.

Barrel of syringe on opposite corner of mouth.

Short 27 gauge needle for young pediatric patient. Usually do not need block under 8 years of age.

Buffered local anesthesia did not improve rapidity of onset or decrease pain in children 7-11 years of age.

Meincken M, Norman C, Arevalo O. Anesthesia onset time and injection pain between buffered and unbuffered lidocaine used as local anesthetic for dental care in children. *Pediatric Dent* 2019;41:354-357.

Mandibular foramen lies 1/2 to 2/3 of the total width of the width of the ramus measured from the anterior border.

Epars J-F, Mavropoulos A, Kiliaridis S. Influence of age and vertical facial type on the location of the mandibular foramen. *Pediatr Dent* 2013;35:369-373

In younger patients the mandibular foramen is located below the occlusal plane and in older patients, above. Foramen is usually level with occlusal plane at age 8

The most common adverse event in pediatric practices is soft tissue trauma &/or lip biting after use of local anesthesia.

Calvo JM, Obadan-Udoh E, Walji M et al. Adverse events in pediatric dentistry: An exploration study. *Pediatric Dent* 2019;41:455-461.

# Reattachment of Enamel Fragments

- Natural translucency and surface finish.
- Preserves original shape, texture, color of the original incisor.
- Incisal edges wear at the same rate as adjacent teeth.
- 4-year follow-up

Martos J, Pinto KVA, Miguelis TMF, et al. Management of an uncomplicated crown fracture by re-attaching the fractured fragment - case report. Dent Traumatol 2017;33:485-489.

- Rehydration of tooth fragments after dry time of 24 hours was performed with soaking in water for 15 minutes & 1 hour and 45 minutes.
- Reattachment strength was significantly improved. (Universal single bond to both sections)
- There was no difference in reattachment strength with rehydration for 15 minutes vs 1 hour vs 45 minutes.

Poubel, DLN, Almeida JCF, Ruberio, D. et al. Effect of dehydration and rehydration intervals on fracture resistance of reattached tooth fragments using a multimode adhesive. Dent Traumatol; 2017; 33(6): 451-457.

## Parental Presence

“It is important to understand the changing emotional needs of parents because of the growth of a latent but natural sense to be protective of their children.”

The Reference Manual of Pediatric Dentistry. Behavior guidance for the pediatric dental patient. 2020/21:292-310.

Parents most often want to remain in the dental operatory during treatment.

A systematic review found that parental presence does little to modify the innate behavior of a child.

DeLuca MP, Massignan C et al. Does the presence of parents in the dental operatory room influence children's behavior, anxiety and fear during their dental treatment? Int J Paediatr Dent 2021;31:318-336.

We find that children do much better if the parent is not present for treatment.

The child's attention is divided between dentist and parent.

The dentist's attention is divided between child and parent.

We want to give your child our undivided attention.