

Minimally Invasive Management of Molar Incisor Hypomineralization

JEANETTE MACLEAN, DDS, DABPD, FAAPD

 @drmaclean  **YouTube**  
 @affiliatedchildrensdental  
 8.27K subscribers

 **Affiliated Children's Dental Specialists**  
 A specialty for toddlers, children, teens and special needs

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Jeanette MacLean, DDS

Diplomate, American Board of Pediatric Dentistry  
 Fellow, American Academy of Pediatric Dentistry  
 Owner, Affiliated Children's Dental Specialists

BS Chemistry, Northern Arizona University 1999  
 DDS University of Southern California 2003  
 Pediatric Dentist, University of Nevada School of Medicine/Sunrise Children's Hospital 2005

Disclosures: Neither myself nor my family members have any owner interest or stock in any of the products mentioned in this presentation, nor do I receive sales commission.

I have received speaking honoraria in the past from: Elevate Oral Care, Oral Science, GC America, DMG America, NuSmile, DryShield, P&G

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**dental town**

**Dr. Jeanette MacLean**

Four the pediatric practice of Greater Los Angeles

**THE FULL-ARCH FULL-LEAST REHABILITATION TECHNIQUE**  
 Dr. MacLean discusses the full-arch and full-arch least techniques to address each of them

**NEW! YOUR PORCELAIN BREAKS**  
 Dr. Leonard Kwon reveals the top reasons for crown complications and how to address each of them

**The New York Times**

Dr. MacLean said, "People assume that parents will reject it because of poor aesthetics." But "if it means preventing a child from having to be sedated or having their tooth drilled and filled, there are many parents who choose S.D.F.," she added.



After Dr. MacLean treated Knox, she gave him a sticker.

GATLON CHANG/ FOR THE NEW YORK TIMES

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### MIH Management:

- Background
  - Brief etiology
  - Clinical Challenges
- Clinical Management
  - Prevention & Home Care
    - Topical Fluorides
      - OTC Paste, Rx Paste, Varnish, SDF
      - Remineralization & Desensitization
    - Sealants
  - Restorative Options
    - ART/SMART
    - GIC Fillings
    - Band + GIC
    - Hall Technique
    - Extraction + 2nd Molar Substitution
  - Cosmetic Options (morning lecture)
    - MI Paste
    - Icon Resin Infiltration
    - Etch Bleach Seal

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### Molar Incisor Hypomineralization

- ▶ Prevalence 20 - 40%
- ▶ Can affect one or all permanent first molars, and/or permanent incisors and primary second molars
- ▶ Demarcated enamel opacities with varying discoloration (white, cream, yellow, or brown) bordered by sound enamel
- ▶ Hypersensitivity
- ▶ 10-fold higher risk of developing caries
- ▶ Unknown etiology of systemic origin




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### Dr. Jeremy Horst MIH Etiology Webinar




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### 6 year old

- History of SECC and extensive dental work
- Extreme dental phobia
- Molar Incisor Hypomineralization affecting all first permanent molars (later observed on permanent incisors as well)
- Referred to ortho & oral surgeon for consult re 2<sup>nd</sup> molar substitution
  - Mom option to remove upper 1<sup>st</sup> molars and retain the lower first molars due to questionable position of lower left 2<sup>nd</sup> molar
- Oral sedation for SSCs on mandibular permanent 1<sup>st</sup> molars
  - Cried throughout appointment

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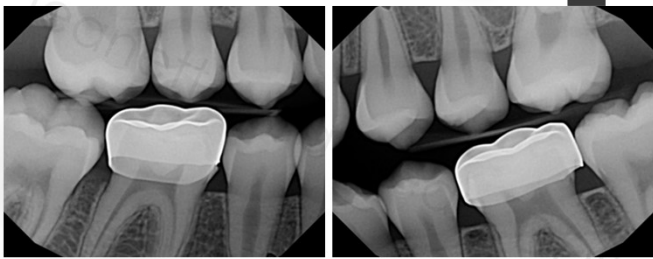
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### 12 years old



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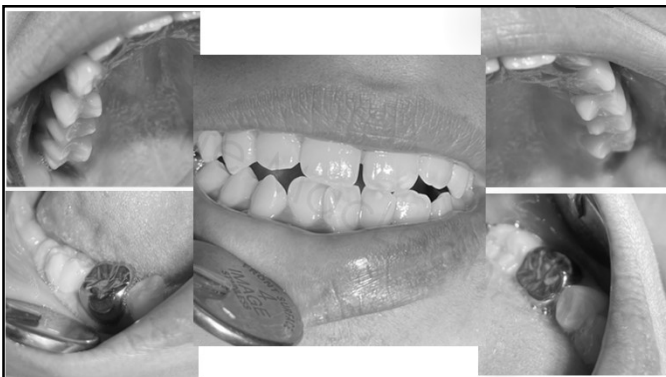
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Looking back...

This was stressful for me, the patient, and her mom, but that was the knowledge and the treatment options that I had at the time.

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Do the best you can until  
you know better.  
Then when you know better,  
do better.

-Maya Angelou

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A Whole New World



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# Prevention & Home Care

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## Kid's Crest Advanced Enamel + Cavity Protection



With stannous fluoride

- Caries
- Erosion
- Sensitivity

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## MI Paste and MI Paste Plus

- Topical crème
  - Reduce sensitivity
  - Remineralization
- Releases bioavailable calcium and phosphate in the saliva
- Contains RECALDENT™ (CPP-ACP)
  - Casein Phosphopeptide – Amorphous Calcium Phosphate
- MI Paste is fluoride free
  - For children 6 and under and pregnant women
- MI Paste Plus contains 900ppm fluoride (similar to OTC fluoride toothpaste)



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Show MI Paste ONE

- ▶ Full mouth desensitization and remineralization without stain



Jeanette MacLean, DDS

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SDF Review



Jeanette MacLean, DDS

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Basic application tutorial



Video link available at [Kidteethandbraces.com](http://Kidteethandbraces.com) 

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DRY  
APPLY  
AND SAY 'GOODBYE!'

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MIH  
Application  
Tips for SDF

- Be aware of hypersensitivity
- Use caution when cleaning and rinsing
- Isolate and dry with 2x2 gauze or a cotton roll instead of compressed air
- SDF may illicit discomfort upon application
- May require a 2<sup>nd</sup> application to desensitize

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Frequency of application

- Q6 months for unrestored caries lesions
- As needed for hypersensitivity

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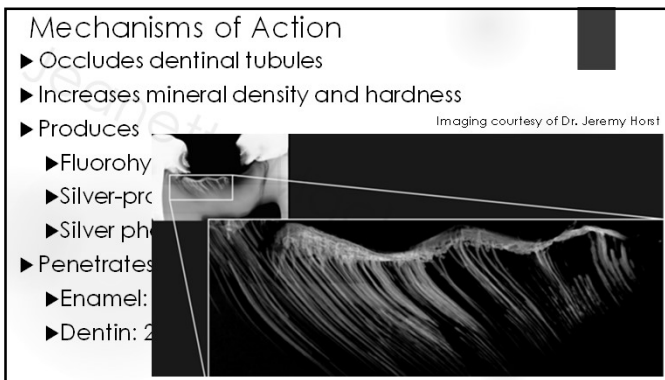
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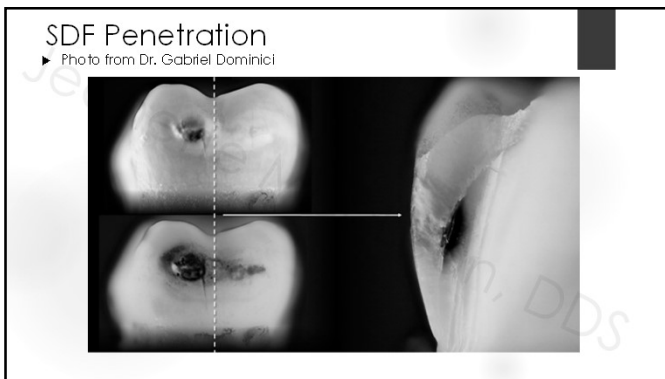
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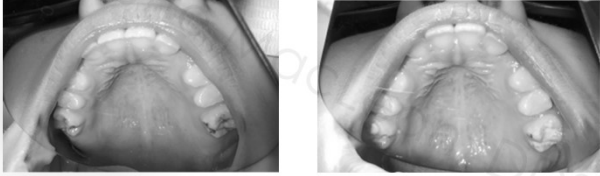
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SDF to treat hypersensitivity in mildly hypocalcified molars



SDF placed at recall exam to hypersensitive molars with failed resin sealants  
Coding and billing: D1354 + D1351 Sealant

2 weeks later, patient returns for Fuji triage GIC sealants. Reports dramatic decrease in hypersensitivity symptoms

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Mild to Moderate MIH with cold sensitivity



SDF applied to all surfaces. note minimal stain

Seals + #14 OL Fill 2 weeks later w/EQUIA Forte

Dr. Isabella Marlon Kirttoothawhrees.com

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MIH Resource



MOLAR INCISOR HYPOMINERALIZATION (MIH)

MIH Treatment Solutions

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## Individualized Care

**► IDENTIFY**  
**► PREVENT**  
**► RESTORE**

**INITIAL THERAPEUTIC INTERVENTION**

**A framework for patient centered treatment**

It is essential to tailor the treatment of MI to the individual patient's condition. The clinical data will allow a plan to be developed that is tailored to the individual patient's needs. GC is currently used for such individualized treatment plans.

**IDENTIFY**

- GC To Playe E-Gel<sup>®</sup> (MI) (Fluoride varnish)
- Fluoride varnish
- M Paste<sup>®</sup> Family

**PREVENT**

- GC Fuji TRIAGE<sup>®</sup> (MI) (Sealant)
- MI Paste<sup>®</sup> (MI) (Fluoride varnish)
- Dietary Information
- Fluoridated toothpaste
- M Paste<sup>®</sup> Family

**RESTORE**

- GC Fuji TRIAGE<sup>®</sup> (MI) (Sealant)
- MI Paste<sup>®</sup> (MI) (Fluoride varnish)
- M Paste<sup>®</sup> Family

**RECALL**

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## PREVENTION

**► PATIENT EDUCATION**  
**► MI PASTE**  
**► FLUORIDE VARNISH**

**INITIAL INTERVENTION**

**Empowering your patient is the first step**

- The tooth should be treated twice a day with a toothpaste containing at least 1000ppm fluoride. Fluoride concentration is also important for older patients with higher levels of fluoride in their diet.
- Using fluoride toothpaste with GC To Playe E-Gel<sup>®</sup> can help to identify and manage (prevent) erosion and give them the opportunity to explore their brushing technique.
- Prevent erosion of upper and lower front teeth (incisors).

**Strengthen and desensitize with the MI Paste<sup>®</sup> Family and MI Varnish<sup>®</sup>**

Recaldent's MI Paste<sup>®</sup> Family and MI Varnish<sup>®</sup> are designed to help strengthen and desensitize teeth. The application of RECALDENT<sup>®</sup> COM-ACCT<sup>®</sup> containing high fluoride levels, stabilizes enamel and provides the best chance for a lifetime of good oral health.

**MI Paste<sup>®</sup> Family (MI Paste<sup>®</sup> Family 5 MI Paste Plus<sup>®</sup> 1000ppm Fluoride)**

- Based on MI Paste<sup>®</sup> COM-ACCT<sup>®</sup> for daily or home application with the following instructions, do not use.

**MI Paste<sup>®</sup> ONE (1000ppm Fluoride) - potassium nitrate**

- Apply and use as directed with RECALDENT<sup>®</sup> COM-ACCT<sup>®</sup> to help strengthen and desensitize teeth.

**Choose the right MI Paste<sup>®</sup> product for your patients**

Products in the MI Paste<sup>®</sup> Family can be used for the same indications. MI Paste<sup>®</sup> is recommended for use in children under the age of 12 to avoid the risk of fluorosis and in some other cases. MI Paste<sup>®</sup> Family is recommended for use in children and adults. The average application of MI Paste<sup>®</sup> Family is recommended only for use in MI Paste<sup>®</sup> Family and MI Paste<sup>®</sup> ONE are not recommended for use in children under the age of 12.

**MI Varnish<sup>®</sup> COM-ACCT<sup>®</sup> 1000ppm Fluoride**

- Apply and use as directed with RECALDENT<sup>®</sup> COM-ACCT<sup>®</sup> to help strengthen and desensitize teeth.
- Apply and use as directed with RECALDENT<sup>®</sup> COM-ACCT<sup>®</sup> to help strengthen and desensitize teeth.
- Apply and use as directed with RECALDENT<sup>®</sup> COM-ACCT<sup>®</sup> to help strengthen and desensitize teeth.

For more use, carefully read the instructions for use.

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## SEAL & PROTECT

**► Protect partially erupted surfaces with a low viscosity GIC sealant**

**PROTECT SURFACES WITH GC FUJI TRIAGE<sup>®</sup>**

GC Fuji TRIAGE<sup>®</sup> is a low viscosity glass ionomer sealant that helps to protect the surface against caries formation and hypersensitivity.

- GC Fuji TRIAGE<sup>®</sup> can be used directly in a moist environment.
- Teeth can be protected even before they are fully erupted.
- The wetting of GC Fuji TRIAGE<sup>®</sup> onto the tooth can be enhanced with the dental curing light.

**Early prevention is important to avoid complications**

- Fluoride and early application of sealant for caries treatment.
- Highly adhesive and strong glass ionomer resin composite restorative.
- Since the protection is generally self-maintained by children, the risk of desquamation is decreased.
- Check evenly in 1000ppm.

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GIC Sealants

"GIC fissure sealants are as effective as resin-based fissure sealants in the prevention of dental caries in the permanent dentition of children"

JADA May 2011

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HYDROPHILIC

Comparison of caries prevention with glass ionomer and composite resin fissure sealants.

Aylin Akbay Ota, Turkan Duzgencil, S Sommez, Selih Dogan

Department of Pediatric Dentistry, School of Dentistry, University of Kırıkkale, Turkey.

Background/Purpose: Atraumatic restorative treatment (ART) was developed primarily for use in underserved areas of the world. This study was designed to compare caries prevention with high-viscosity glass ionomer cement (GIC) sealants placed according to the ART procedure and light-cured composite resin sealants after 3 years.

Methods: The study was conducted in a boarding school in the city of Kırıkkale. Four experienced dentists placed a total of 207 sealants (91 GIC and 116 composite resin), without chair-side assistance, on the school premises. Results: A total of 137 sealants were available after 3 years. 55.3% of the GIC and 93.8% of the composite resin sealants were lost completely, and the difference between the two groups was statistically significant. Only six of 56 teeth in the GIC group and eight of 81 in the composite resin group showed caries. Conclusion: Under field conditions in which moisture control was not effective, a high-viscosity and less technique-sensitive glass ionomer material can be used as an effective sealant material, rather than resin.

Keywords: sealant; gic; composite resin; resin; glass ionomer; ionomer; cavity; composite; fissure sealant; cavity prevention; glass; fissure; resin sealant; high-viscosity; art

GI Better in Wet Field

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Triage Pink

- ▶ Command set w/ curing light (absorbs heat)
- ▶ Visual/color indicator
- ▶ Great for partially erupted molars
- ▶ Interim restorations
- ▶ Toothbrush abrasion
- ▶ Exposed roots

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### Partially Erupted Molars

**Inside**

#### Preventing Caries in Partially Erupted Molars


*Close contact between partially erupted molar teeth and the gingiva*

**Jeanette MacLean, DDS**

**P**artially erupted molars are often associated with the development of caries. This is because the partially erupted molar teeth are often in close contact with the gingiva, which can lead to the development of caries. The partially erupted molar teeth are often in close contact with the gingiva, which can lead to the development of caries. The partially erupted molar teeth are often in close contact with the gingiva, which can lead to the development of caries.

**Key Points:**

- Partially erupted molars are often associated with the development of caries.
- This is because the partially erupted molar teeth are often in close contact with the gingiva, which can lead to the development of caries.
- The partially erupted molar teeth are often in close contact with the gingiva, which can lead to the development of caries.



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### Triage Pink tutorial

Application Technique with Dr. Jeanette MacLean



Adapt material to tooth surface with finger or microbrush

**YouTube**  
GC AmericaGCTV  
16.9K subscribers

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### Triage Sealant Application Video



Triage Sealant Application Tutorial for Low Viscosity...

6.5K views · 1 year ago

**YouTube**  
Affiliated Children's Dental Specialists  
3.11K subscribers

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I prefer to use EQUIA Forte to seal Molars with MIH



Jeanette MacLean, DDS

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Restorative Options



Jeanette MacLean, DDS

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Conventional Restorations

- Resin fillings, bondings, veneers, esthetic crowns
- Challenges
  - Age
  - Hypersensitivity
  - Difficult to numb
  - Poor bond strength to resin
  - Restoration failure
  - Recurrent caries
  - Cost

Jeanette MacLean, DDS

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# Atraumatic Restorative Treatment (ART/ITR)

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## Glass hybrid restorations as an alternative for restoring hypomineralized molars in the ART model

Grossi et al BMC Oral Health 2018

- Evaluated the success rate of restorations in MIH-affected teeth using HVGIC and the ART protocol
- Teeth were restored with Fuji EQUIA Forte, including GC cavity conditioner and Fuji Coat
- The success of restorations after 12 months of follow-up was 98%



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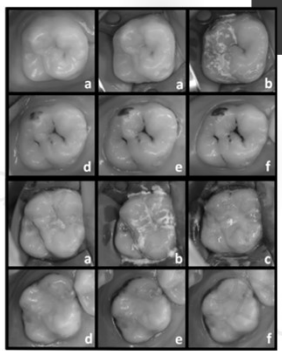
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## Findings:

- In hypomineralized molars, both SDF and SMART sealants showed favorable short-term prevention against dental caries while providing effective desensitization.
- Marginal discoloration was the most common side effect of the SMART sealants as a result of SDF application.
- Both SDF and SMART sealants showed similar short-term effectiveness as non-aerosol procedures in arresting enamel caries and reducing hypersensitivity in hypomineralized molars.



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### Basic Aesthetic SMART

- SDF applied at exam
- Patient returns in 2-4 weeks for re-eval
- Lesion is matte black and ideally has sound margins
  - Remove soft dentin with hand instruments or slow speed round bur if needed or tolerated, this is optional but it can improve long term retention and performance of the restoration



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2 year follow-up

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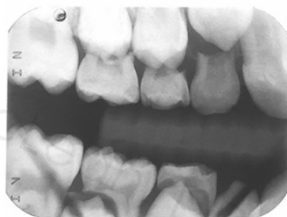
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### 3 year follow-up SMART

6/3/20 Ready to exfoliate



6/3/20

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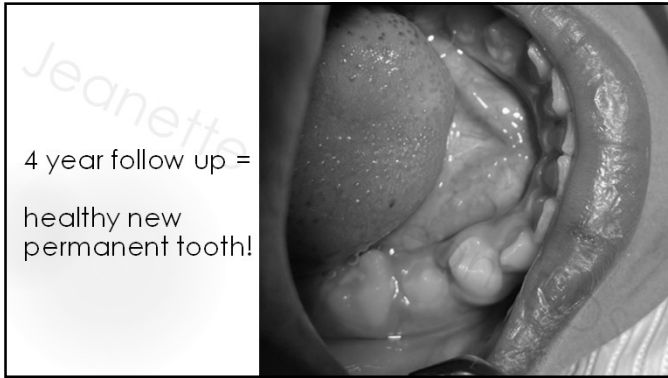
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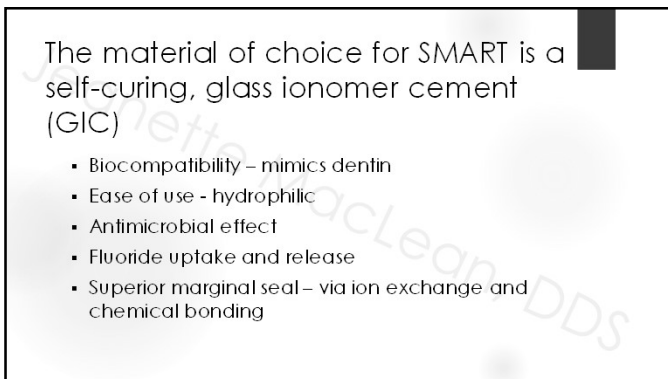
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**SDF + SMART for cavitated lesions on partially erupted molars**

1. SDF applied at exam
2. Re-eval in 2-4 weeks
3. Pumice
4. PAA cavity conditioner 10 seconds
5. Rinse and dab dry (do not desiccate)
6. SDF reapplication here (if needed)
7. HV GIC (EQUIA Forte in this case)

Coding and billing:

- D1354 caries arresting medicament
- D2391 one surface posterior composite

*Partially erupted 1st permanent molar hypo + occlusal caries*  
*SDF Applied*

*2 week Follow up, caries arrested not sensitive to air/water*

*Restored using PAA + Fuji EQUIA Forte*

*Dr. Jeanette MacLean kidsteethandbraces.com*

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**7 Year old with hypersensitive, severely hypoplastic first permanent molars**

March 29, 2017      1 month follow up

- SDF + GIC placed same day due to patient experiencing difficulty eating
- Tooth cleaned with tufted prophylaxis brush and plain pumice
- PAA cavity conditioner applied 10 seconds
- Rinse and dry and apply SDF for 1 minute, dab excess, but leave as the "moisture" to help set the GIC
- Restored with Fuji EQUIA Forte
- The patient returned for other treatment one month later and reports significant improvement in ability to eat and drink
- Great time buyer before a crown and/or extraction and 2<sup>nd</sup> molar substitution
- Coding and billing: caries arresting medicament (D1354) + interim therapeutic restoration (D2941)
- (other potential codes would be sedative filling (D2940) or unspecified restorative (D2999))

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**Decisions in Dentistry November 2018**

**Minimally Invasive Treatment for MOLAR INCISOR Hypomineralization**

CONSIDER THIS MINIMALLY INVASIVE APPROACH TO TREATING MOLAR INCISOR HYPOMINERALIZATION WITH STRIKE SHINE FLUORIDE AND HIGH-VISCOSITY GLASS IONOMER CEMENT

**M**olar incisor hypomineralization (MIH) is a developmental enamel defect characterized by enamel hypoplasia and hypomineralization. The condition is characterized by enamel defects on the permanent molars and incisors, which can lead to dental hypersensitivity, discoloration, and increased risk of caries and restorative failure. The article discusses a minimally invasive approach to treating MIH using a fluoride and high-viscosity glass ionomer cement (GIC) composite, Strike Shine. This approach aims to provide a protective and restorative treatment that is minimally invasive and can be performed in a single visit. The article highlights the benefits of this approach, including improved patient comfort, reduced risk of further enamel damage, and long-term protection of the teeth. The article also discusses the importance of proper coding and billing for this treatment.

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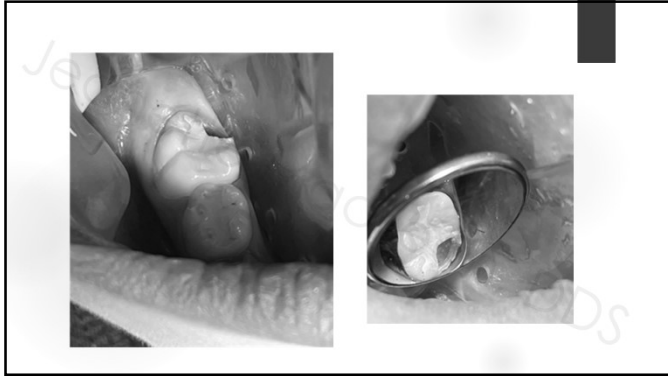
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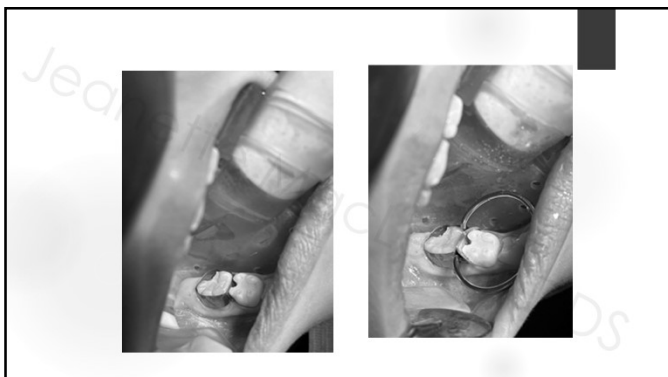
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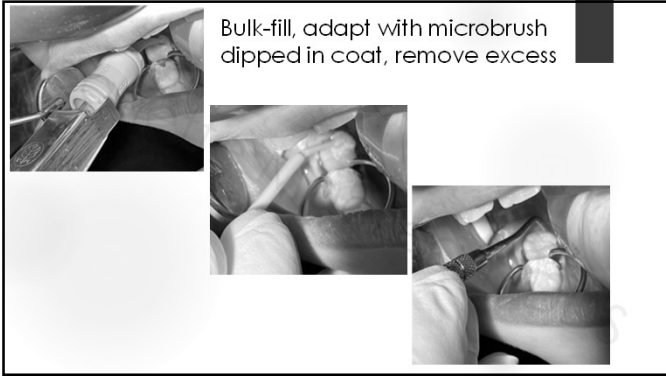
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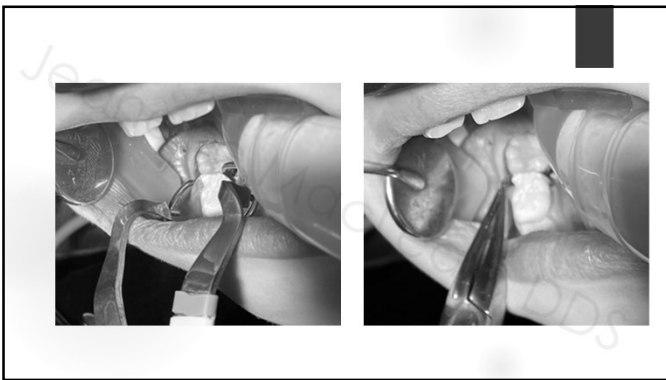
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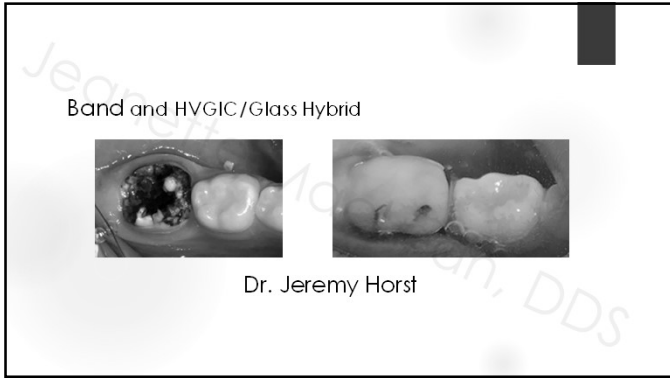
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Dentaltown

**The Hall Technique**

A minimally invasive method of treating caries in pediatric patients

The speaker of this 5 year old patient traveled 2,500 miles from the Northern Territory of Canada to Dr. Jeanette MacLean to avoid dental fees with the Hall technique in Adelaide, in lieu of general anesthesia.

This patient has Hall crowns on all four four primary teeth.

Because the Hall technique is usually performed on molars, the stainless steel crowns are not a big deal, particularly this patient has

**The Hall Technique For Excellent Pediatric Dentistry**

Home > Continuing Education > The Hall Technique For Excellent Pediatric Dentistry

Write a Review

Speaker: Dr. Jeanette MacLean  
 Category: Pediatric  
 CE Credits: 2.5    Format: MP4 Video

Hall Technique is a revolutionary, evidence based, no shot, no drill option for the placement of stainless steel crowns. This course will further explore atraumatic esthetic options for decayed primary teeth. [more](#)

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### The Hall Technique

University of Dundee  
Evans and Innes

- The Hall Technique is a method for managing carious primary molars where decay is sealed under preformed metal crowns (PMCs) without local anesthesia, tooth preparation or any caries removal.
- Clinical trials have shown the Hall Technique to be effective, and acceptable to the majority of children, their parents and clinicians.
- It is NOT, however, an easy, quick fix solution to the problem of the carious primary molar. Like all clinical interventions, for success the Hall Technique requires careful and appropriate case selection, a high level of clinical skill, excellent patient management and long term monitoring. In addition, it must always be provided with a full and effective caries preventive programme

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Study	Country & Study design	Age group (years)	Sample	Intervention	Followup time	Results (Success %)
Woolford et al. BMC Oral Health 2007;7:18	UK General Dentists in 14 practices (Leeds, Loughborough & Preston)	3-10 yrs Mean 7.48 yrs SD 1.38	44 children (132 teeth) by mouth (60%) WH-132 CK-132	HallTechnique	2 years 3 years	92% 92%
Woolford et al. J Dent Res 2011;90:405-410				Complete & selective removal & restoration (GDP preference)	2 years 3 years	39% 40%
Schmalz et al. J Dent Res 2014;93:100-105	Germany Specialists in hospital (single, conventional, prevention)	3-8 yrs Mean 5.4 yrs SD 1.5	167 children/teeth WH-32 WH-32 WH-32 CK-45	HallTechnique	1 year 2.5 years	96% 95%
Schmalz et al. Caries Res 2011;46:400-414				Complete caries removal & Composite restoration	1 year 2.5 years	77% 67%
Woolford et al. Caries Res 2011;46:415-423	UK Specialists in hospital (single, conventional, prevention)	3-8 yrs Mean 5.4 yrs SD 1.23	122 children/teeth WH-32 WH-32 WH-32 CK-45	HallTechnique	1 year 2.5 years	94% 95%
Woolford et al. Caries Res 2011;46:424-431				Complete caries removal & restoration according to GDP preference	1 year 2.5 years	73% 73%
Woolford et al. Caries Res 2011;46:432-439				Non-restorative cavity control	1 year 2.5 years	47% 47%
Archibald et al. BMC Oral Health 2011;11:20	UK Specialists in hospital (single, conventional, prevention)	3-10 yrs Mean 7.48 yrs SD 1.31	131 children/teeth WH-46 WH-46	HallTechnique	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:21				Composite restoration	1 year 3 years	39% 37%
Archibald et al. BMC Oral Health 2011;11:22				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:23				Non-restorative cavity control	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:24				Composite restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:25				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:26				Non-restorative cavity control	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:27				Composite restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:28				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:29				Non-restorative cavity control	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:30				Composite restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:31				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:32				Non-restorative cavity control	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:33				Composite restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:34				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:35				Non-restorative cavity control	1 year 3 years	95% 95%
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Archibald et al. BMC Oral Health 2011;11:41				Non-restorative cavity control	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:42				Composite restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:43				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:44				Non-restorative cavity control	1 year 3 years	95% 95%
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Archibald et al. BMC Oral Health 2011;11:50				Non-restorative cavity control	1 year 3 years	95% 95%
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Archibald et al. BMC Oral Health 2011;11:56				Non-restorative cavity control	1 year 3 years	95% 95%
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Archibald et al. BMC Oral Health 2011;11:58				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:59				Non-restorative cavity control	1 year 3 years	95% 95%
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Archibald et al. BMC Oral Health 2011;11:61				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:62				Non-restorative cavity control	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:63				Composite restoration	1 year 3 years	95% 95%
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Archibald et al. BMC Oral Health 2011;11:65				Non-restorative cavity control	1 year 3 years	95% 95%
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Archibald et al. BMC Oral Health 2011;11:68				Non-restorative cavity control	1 year 3 years	95% 95%
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Archibald et al. BMC Oral Health 2011;11:72				Composite restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:73				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:74				Non-restorative cavity control	1 year 3 years	95% 95%
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Archibald et al. BMC Oral Health 2011;11:80				Non-restorative cavity control	1 year 3 years	95% 95%
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Archibald et al. BMC Oral Health 2011;11:83				Non-restorative cavity control	1 year 3 years	95% 95%
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Archibald et al. BMC Oral Health 2011;11:86				Non-restorative cavity control	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:87				Composite restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:88				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:89				Non-restorative cavity control	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:90				Composite restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:91				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:92				Non-restorative cavity control	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:93				Composite restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:94				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:95				Non-restorative cavity control	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:96				Composite restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:97				Amalgam restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:98				Non-restorative cavity control	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:99				Composite restoration	1 year 3 years	95% 95%
Archibald et al. BMC Oral Health 2011;11:100				Amalgam restoration	1 year 3 years	95% 95%

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Graph courtesy of Dr. Nicola Innes  
CARDIFF UNIVERSITY  
PRIFYSGOL CWRDYD



The Hall Technique 10 years on: Questions and answers

Innes et al BJD 2017

"A Hall Crown is a predictably successful restoration. When a carious lesion is sealed into a tooth, the biofilm (the community of microbes, their products and extracellular polymeric matrix) is physically prevented from accessing nutrition from its main substrate, dietary carbohydrate. This means that the actively carious/cariogenic lesion becomes a non-cariogenic lesion. Like other treatments aimed at managing carious lesions by sealing them in, a Hall crown works by depriving the lesion of fuel and making the environment unfavourable for its progression. The dental pulp lays down reparative dentine, effectively retreating in response to the advancing carious lesion."



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Weakness of the current evidence for conventional SSC

"There are very few prospective RCTs comparing outcomes for preformed metal crowns to intra-coronal restorations. A Cochrane review and two systematic reviews conclude that the majority of clinical evidence for the use of preformed metal crowns has come from nonrandomized and retrospective studies."

The Reference Manual of Pediatric Dentistry  
2019-2020/ P. 340-352

Latest Revision 2019

AMERICA'S PEDIATRIC DENTISTS  
THE BIG AUTHORITY ON little teeth

**Pediatric Restorative Dentistry**

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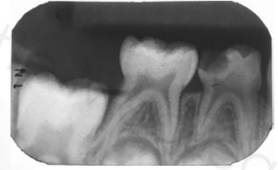
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The Hall Technique



Extensive crown destruction, particularly proximal lesions in the primary dentition, fares better long term with an SSC

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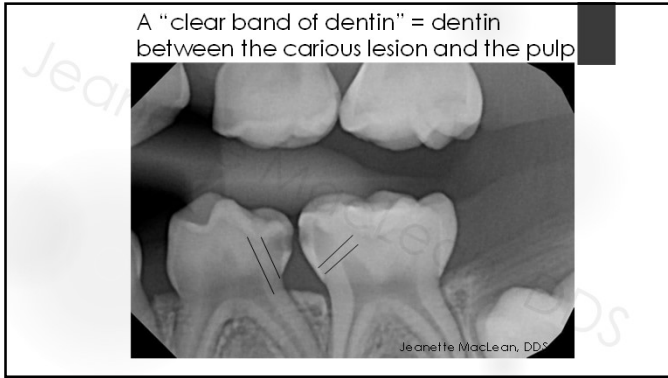
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**OBTAIN INFORMED CONSENT**

- RISKS
- BENEFITS
- AND ALTERNATIVES
  - INCLUDING NO TREATMENT

Jeannette MacLean, DDS

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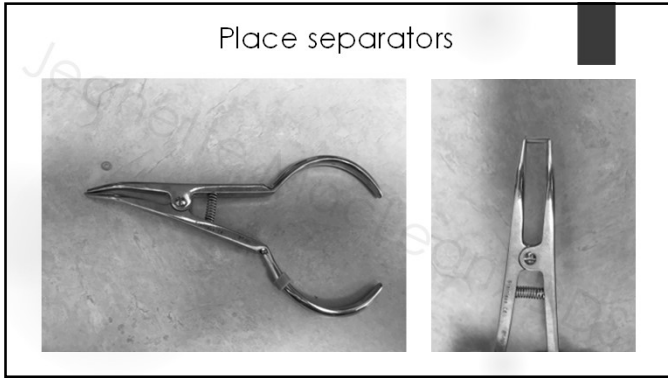
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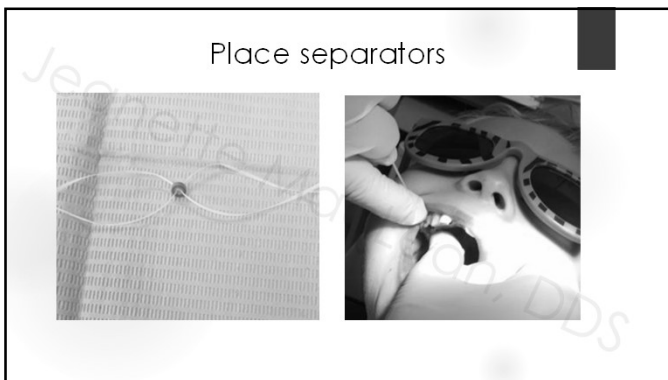
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Separators come in 2 sizes

- Small, 1/8"
- Large, 3/16"

**Tooth Separators (Radio Opaque)**  
Extruded and cut elastomeric material.

Blue	603-080	Small, 1/8" OD, .040 thickness	1,000ct
White	603-085	Small, 1/8" OD, .040 thickness	1,000ct
Blue	603-090	Large, 3/16" OD, .045 thickness	1,000ct
White	603-095	Large, 3/16" OD, .045 thickness	1,000ct

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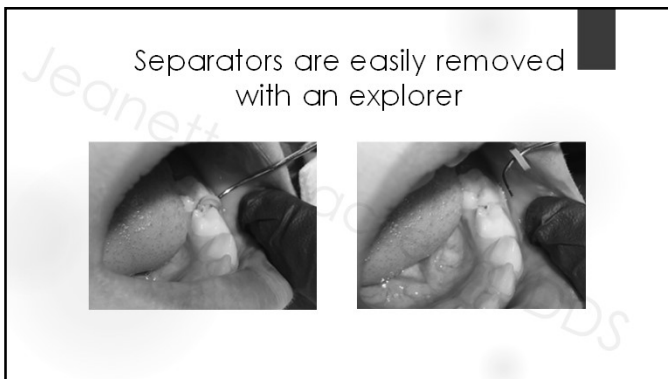
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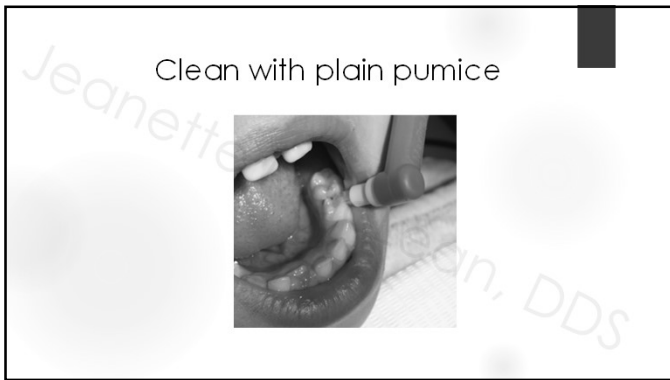
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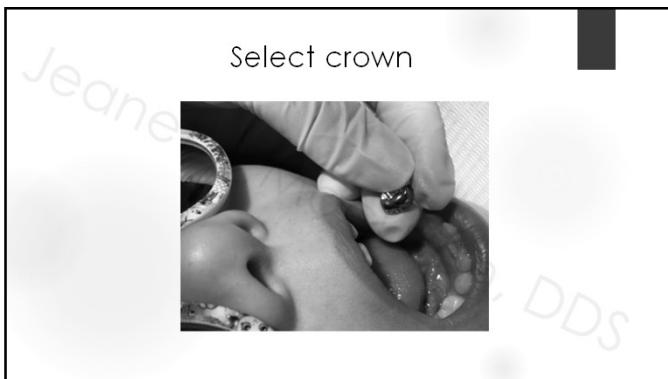
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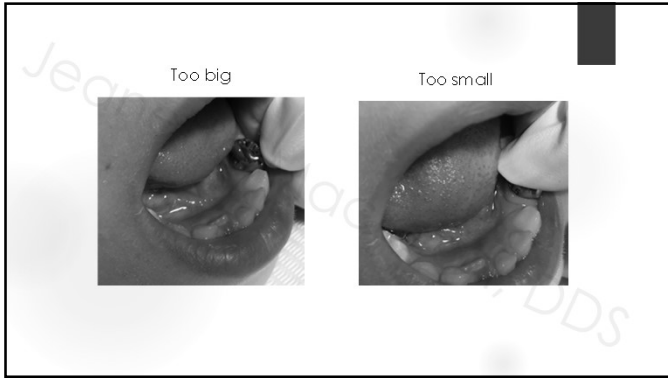
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Check margins with an explorer to ensure carious lesion is fully covered!  
Open margins can lead to failures!



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Prepare a high quality glass ionomer or RMGI cement such as Fuji CEM 2, and load into the crown  
Fill to the top!



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Seat crown with firm finger pressure, ensure airway is protected



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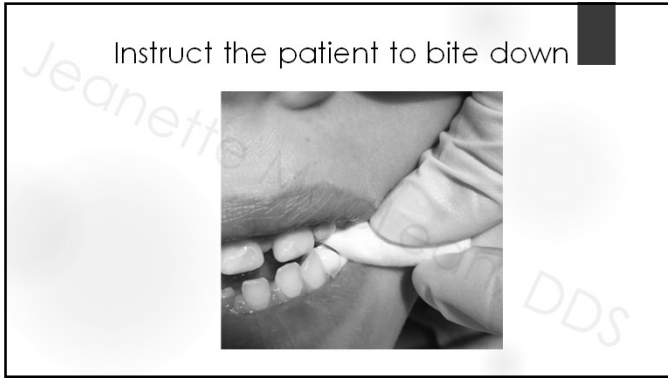
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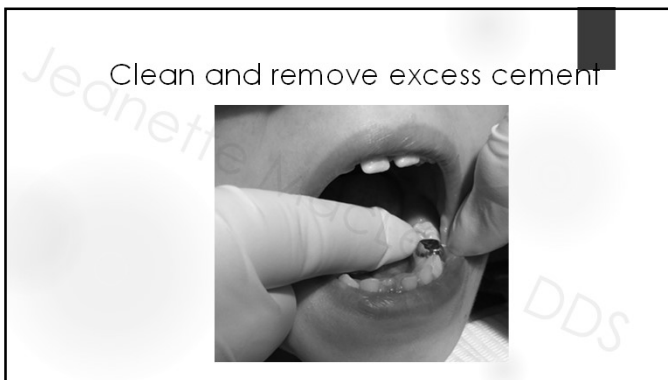
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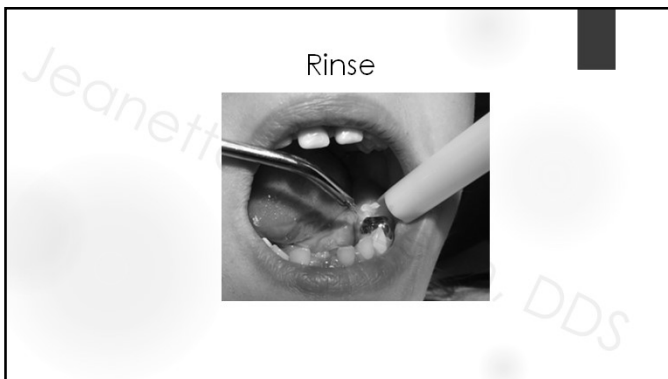
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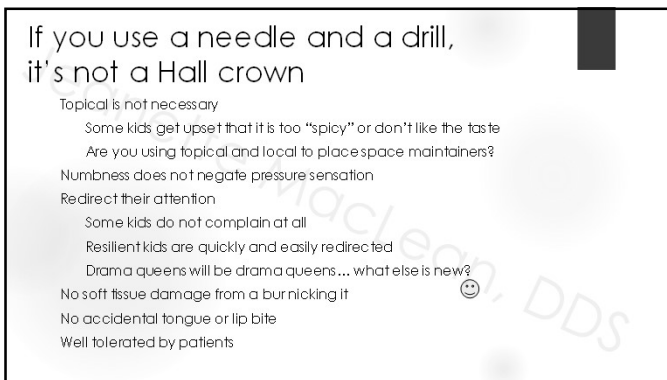
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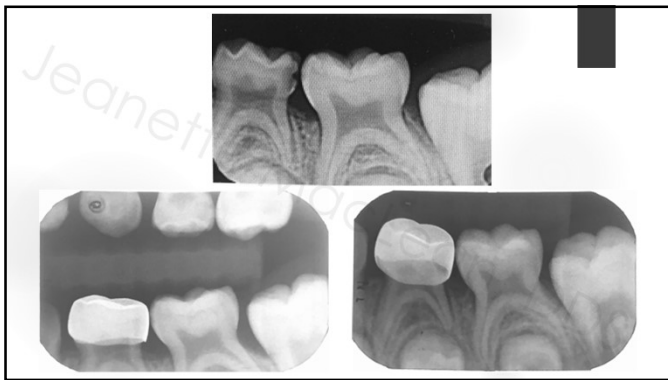
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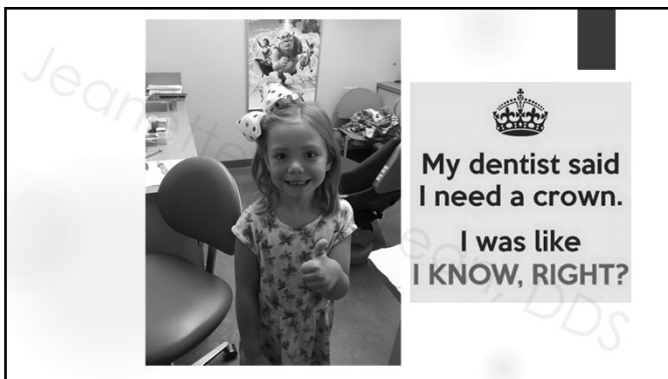
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## Occlusion

Influence of preformed metal crowns (Hall technique) on the occlusal vertical dimension in the primary dentition (van der Zee 2010)

"The reduction of the overbite seems to be caused by intrusion of the crowned molar and its antagonist."

Measurement of Occlusal Equilibration Following Hall Crown Placement (So D et al 2015)

(Occluso-vertical dimension) "OVD returns to before crown-fit levels within two weeks."

"Mainly but not completely from intrusion of the crowned tooth."

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## Digital occlusal analysis of vertical dimension and maximum intercuspal position after placement of stainless steel crown using hall technique in children

Nair, K. International Journal of Paediatric Dentistry April 2020



"The stainless steel crowns (SSCs) placed using the Hall technique disrupt the occlusion, but stabilization appears to occur within a short period post-placement."

"There was an occlusal re-equilibration attained after 1 month."

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## Ebrahimi M, et al. Success and Behavior During Atraumatic Restorative Treatment, the Hall Technique, and the Stainless Steel Crown Technique for Primary Molar Teeth. Pediatr Dent. 2020 May



"The Hall technique has acceptable clinical and radiographic results comparable to that of the stainless steel crown technique for treatment for carious primary molar teeth with multisurface lesions"

"A decrease of canine overbite occurs at the time of treatment in the HT group. However, alterations to overbite subside by six months after treatment."

"Considering acceptable clinical and radiographic results and other advantages of HT, including less treatment time, technique simplicity, and showing high parental satisfaction, HT offers a treatment option for treatment of multisurface caries of primary molars."

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### Occlusion changes with conventional SSC as well...

Unless you take a scan or impression and create a custom crown, the occlusion will be different with any prefabricated crown, conventional/surgical prep or no prep/Hall

Finally the crown is checked for occlusion. The primary dentition has great ability to adjust to a slightly opened bite of 1mm or so over a few days with no adverse effect. <sup>(12)</sup> The patient should be advised that there may be some temporary gingival discomfort when the local anesthetic wears off.

**3M ESPE**  
A comprehensive guide to achieving the best results with Prefabricated Crowns

**User Guide for**  
3M ESPE Polycarbonate Crowns  
3M ESPE Ice-Free Temporary Crowns for Molars and Premolars  
3M ESPE Stainless Steel Crowns for Primary and Permanent Molars

12. Duggal MS and Curzon MEJ. Restoration of the broken down primary molar: 2. Stainless steel crowns. Dent Update 1989;16:71-75.

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### NuSmile SSCs

- Flat \$3 per crown
  - Compared to 3M which averages \$5 - \$8, depending on your dealer
- 316 Surgical Grade SS
  - More malleable around the margins for easier placement
  - Holds up to bruxers better than 3M
- 3M uses 304 Food Grade SS
- Average prepped molar size is 4, so average unprepped, "Hall size" is 5



Sizes etched on lingual surface

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BETTER QUALITY AND BETTER VALUE  
**FOR HIGHER PRODUCTIVITY**



**NuSmile<sup>®</sup> ssc**  
PRE-CONTOURED

Use code: **JMBSSC2023** for **5% OFF**

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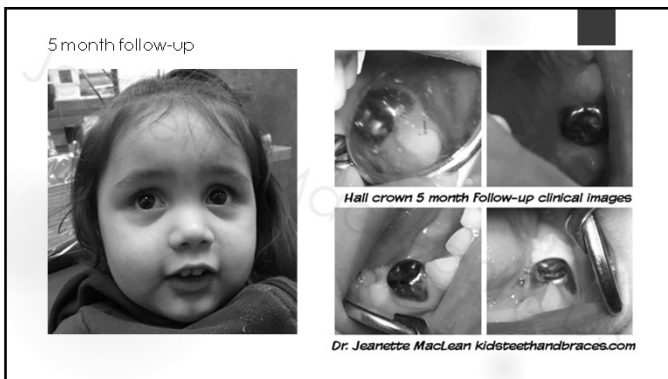
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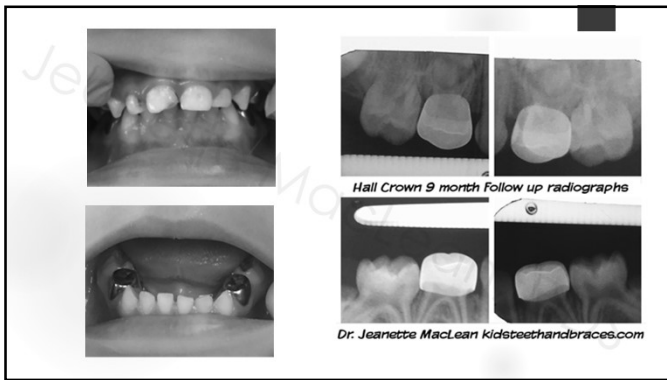
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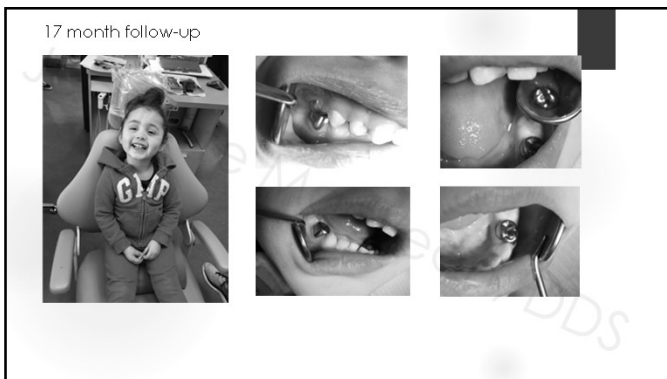
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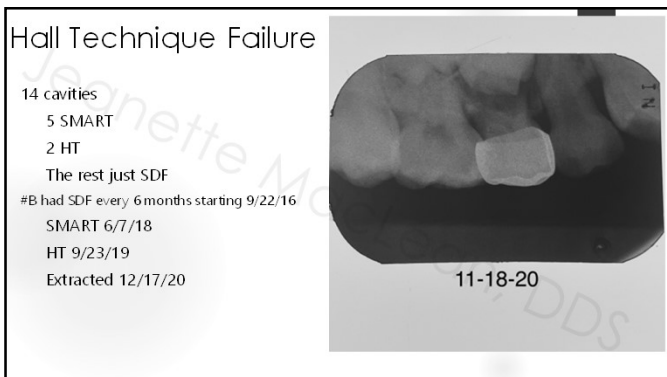
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**Failed Hall crown placed by another pediatric practice that was able to "get them in sooner"**

- I did extract this abscessed tooth
- SSC did not fully cover the carious lesion

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**FAQs**

<p><b>"SHOULD YOU APPLY SDF FIRST?"</b></p> <ul style="list-style-type: none"> <li>• SDF IS NOT NECESSARY FOR THE PROVEN EFFICIACY OF HALL TECHNIQUE</li> <li>• IT CAN BE A "TIME BUYER"</li> <li>• IT CAN HELP ASSESS PULP VITALITY</li> <li>• "BELT AND SUSPENDERS"</li> </ul>	<p><b>"IS THIS ONLY FOR THE BAD KIDS?"</b></p> <ul style="list-style-type: none"> <li>• NO. "GOOD" KIDS DESERVE NON-INVASIVE OPTIONS TOO</li> <li>• YOU MAY NOT BE ABLE TO DO THIS IF BEHAVIOR IS REALLY BAD AND YOU CAN'T PROTECT THE AIRWAY - THEY MAY WARRANT SEDATION OR ITR</li> </ul>	<p><b>"DO YOU ONLY DO HALL CROWNS NOW?"</b></p> <ul style="list-style-type: none"> <li>• NO</li> <li>• I DON'T HAVE AN EXACT PERCENTAGE BREAKDOWN, BUT I STILL DO BOTH CONVENTIONAL SURGICAL SSC AS WELL AS HT</li> </ul>
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**Back-to-Back Hall Crowns**

Seat the SSC on the worst tooth first (typically the 1<sup>st</sup> molar)  
Place separators again  
Bring the patient back to seat the adjacent crown

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"bill what you do"

- ▶ We do not charge by the hour, it's the procedure accomplished
- ▶ Warranty as you would any other conventionally placed restoration
- ▶ Clinical trial evidence demonstrates HT is equivalent if not superior to conventional SSC, so why value it any less ?

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"Interim"  MIH in phobic 7 yo treated with SDF + HVGIC = 2940 Protective Restoration

"Definitive"  SDF + HVGIC ART = 2391 occlusal comp (2 year post-op)

"Definitive"  SDF + SSC = 2930 Hall Technique (2 year post-op)

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### Minimally invasive cosmetic treatment options for MIH

- ▶ Remineralization
  - ▶ Recaldent CPP-ACP
  - ▶ Etch + MI Paste and MI Paste Plus
- ▶ Resin Infiltration
  - ▶ ICON
- ▶ Etch Bleach Seal
- ▶ Combination Therapy

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### Pros and Cons of Options

	PROS	CONS
Etch + MI Paste	<ul style="list-style-type: none"> <li>• Remineralization</li> <li>• Least invasive option</li> <li>• Inexpensive materials</li> <li>• RDH or RDA can apply</li> <li>• Good for patients with more time than money</li> </ul>	<ul style="list-style-type: none"> <li>• Relies on patient compliance</li> <li>• Will not work on every lesion</li> <li>• Time consuming for the patient</li> <li>• Mouth breathers/dehydrated lesions tend to regress</li> </ul>
ICON	<ul style="list-style-type: none"> <li>• One appointment</li> <li>• No compliance needed</li> <li>• Superior esthetics</li> <li>• Results stable after whitening</li> <li>• Less invasive than microabrasion</li> <li>• Arrests incipient lesions</li> </ul>	<ul style="list-style-type: none"> <li>• Cost of materials</li> <li>• Will not work on every lesion</li> <li>• Blocks natural remineralization</li> </ul>
Etch Bleach Seal	<ul style="list-style-type: none"> <li>• Inexpensive materials</li> <li>• One appointment</li> <li>• No compliance needed</li> <li>• Good on brown stains</li> </ul>	<ul style="list-style-type: none"> <li>• Will not work on every lesion</li> <li>• Less esthetic than ICON</li> <li>• Sealant will not penetrate the lesion as thoroughly as Icon-infiltrant</li> <li>• Blocks natural remineralization</li> </ul>

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### MI Paste and MI Paste Plus

- ▶ Topical crème
- ▶ Releases bioavailable calcium and phosphate in the saliva
- ▶ Contains RECALDENT™ (CPP-ACP)
  - Casein Phosphopeptide – Amorphous Calcium Phosphate
- ▶ MI Paste is fluoride free
  - ▶ For children 6 and under and pregnant women
- ▶ MI Paste Plus contains 900ppm fluoride (similar to OTC fluoride toothpaste)



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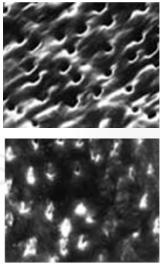
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### MI Paste and MI Paste Plus

- ▶ Benefits
  - ▶ Relief of sensitivity
    - ▶ CPP-ACP occludes dentinal tubules
  - ▶ Prevention
    - ▶ Remineralization
- ▶ Non-irritating for xerostomic patients
- ▶ Safe for lactose intolerant patients
- ▶ Contraindicated for patients with a casein (milk protein) allergy
- ▶ Kosher and Gluten Free



SEM by Prof E. Reynolds

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### MI Paste and MI Paste Plus



We carry both

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**Controversy;**  
**Use of high fluoride concentration products in the presence of WSLs**

- ▶ "For WSLs on the visible labial surface of teeth following orthodontic treatment, the use of concentrated fluoride agents is not recommended. Such use will limit the possibility of remineralization and the resulting white spot will not naturally reduce in size and may become unsightly through staining." (Willmot Seminars in Ortho2008)
- ▶ Concentrated fluoride agents arrest demineralization and remineralization in the lesion by surface hypemineralization, plugging diffusion pathways, and preventing the subsequent natural remineralization by saliva
- ▶ Arrested lesions stay the same size and frequently become unsightly and stained by organic debris
- ▶ Consider instead:
  - ▶ Low-dose fluoride in the presence of WSL
  - ▶ "Acid-etching of fluoride treated lesions could facilitate remineralization of the lesion" (the concept behind Etch + MI Paste, and potential explanation for those lesions which are more resistant to ICON treatment if the patient has been on 5000 ppm toothpaste and/or had a recent professional fluoride application)

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**Etch + MI Paste Protocol Armamentarium**

- MI Paste (Plain or Plus)
- Plain pumice
- Prophyl angle
- 37% Phosphoric acid etch
- Timer
- 2x2 Gauze
- Protective glasses
- Cotton rolls
- Camera for before/after photos
- Optional; towel, OptraGate, liquid dam, rubber dam



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**Basic Etch + MI Paste Protocol**

- ▶ Congenital enamel defects on maxillary permanent central incisors



Jeannette MacLean, DDS

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Etch + MI Paste Protocol

- ▶ 1. Clean teeth with plain pumice using a prophy cup



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Etch + MI Paste Protocol

- ▶ 2. Isolate with cotton rolls and a towel  
(optional; OptraGate, Liquid dam, rubber dam)



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Etch + MI Paste Protocol

- ▶ 3. Apply 37% Phosphoric acid etch to the white spot only for 1-2 minutes



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Etch + MI Paste Protocol

- ▶ 4. Rinse thoroughly



A close-up photograph showing a dental professional using a syringe to rinse a patient's teeth. The patient's mouth is open, and the syringe is positioned to deliver fluid into the oral cavity. A white towel is draped over the patient's chin.

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Etch + MI Paste Protocol

- ▶ 5. Apply MI Paste to the entire facial surface



A close-up photograph showing a dental professional applying MI Paste to a patient's teeth. The patient's mouth is open, and the dental professional is using a syringe to apply the paste to the facial surface of the teeth. A white towel is draped over the patient's chin.

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Etch + MI Paste Protocol

- ▶ 6. Optional - rub in the MI Paste with the prophy cup, add pumice for stubborn lesions



A close-up photograph showing a dental professional using a prophy cup to rub MI Paste into a patient's teeth. The patient's mouth is open, and the dental professional is using a prophy cup to apply the paste to the teeth. A white towel is draped over the patient's chin.

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**Etch + MI Paste Protocol**

- ▶ 7. Let the MI Paste sit for 5 minutes



DDS

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**Etch + MI Paste Protocol**

- ▶ 8. Wipe MI Paste off with wet 2x2 gauze and inspect the teeth



DDS

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**Etch + MI Paste Protocol**

- ▶ This was immediately the first in-office treatment
- ▶ I highly recommend taking before and after photos, patients will forget what their teeth looked like, and so will you!



Dr. Jeanette MacLean [kids-teeth-and-braces.com](http://kids-teeth-and-braces.com)

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### Etch + MI Paste Protocol

- ▶ Results after 5 appointments



Dr. Jeanette MacLean kidsteethandbraces.com

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### Etch + MI Paste Protocol

- ▶ 9. If possible, reapply MI Paste before they leave



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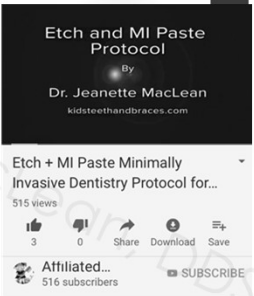
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### Etch + MI Paste Video



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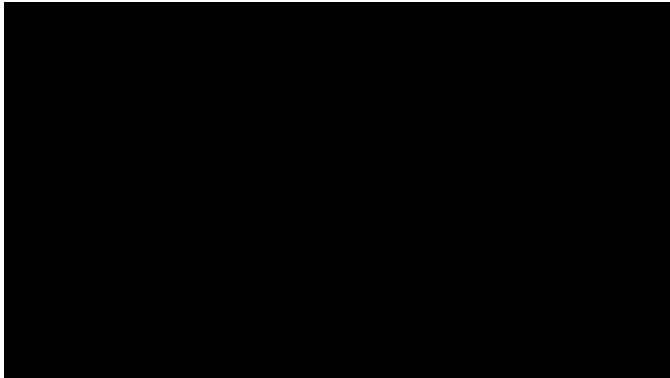
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**Post Op Instructions**  
Etch + MI Paste Protocol

- ▶ 10. Review home instructions;
  - ▶ Brush and floss as usual with a fluoride toothpaste
  - ▶ Using a finger, apply MI Paste “like a lotion” to all of the teeth at bedtime
  - ▶ Custom trays are optional, not mandatory
  - ▶ If possible, also apply MI Paste in the morning
  - ▶ Avoid dark colored drinks or foods containing dyes

Free download at [Kidsteehandbraces.com](http://Kidsteehandbraces.com)

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**Home Care Instructions**  
General MI Paste Use

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download at [Kidsteehandbraces.com](http://Kidsteehandbraces.com)

MI Paste™/MI Paste Plus provides the ultimate preventive care

- Nightly application is recommended
- For high risk patients, use morning and night & throughout the day
- Apply using a clean finger, cotton tip/swab or custom tray
- Spread around the mouth with your tongue
- Leave undisturbed for at least three minutes
- Advise patients not to rinse
- Avoid food or drink for 30 minutes

Key to MI Paste™ is SUBSTANTIVITY, the ability to "hang around", has a 3 hour half life in the mouth

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6 Month Follow-up

6 Month Post-op of Etch + MI Paste

Dr. Jeanette MacLean [Kidsteehandbraces.com](http://Kidsteehandbraces.com)

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6 Month Post-op of Etch + MI Paste

Dr. Jeanette MacLean [Kidsteehandbraces.com](http://Kidsteehandbraces.com)

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In Australia, MI Paste is called "Tooth Mousse"



I love to tell patients this to get them to better understand this is a special treatment, not simply a toothpaste

"Put it on your teeth like a lotion before you go to bed"

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Coding and Billing  
Etch + MI Paste Protocol

- ▶ D2999 Unspecified Restorative Procedure, by Report
- ▶ D9970 Enamel Microabrasion
- ▶ D9910 Application of Desensitizing Medicament
- ▶ D9630 Other Drugs and/or Medicaments, by Report (for the MI Paste)

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Fee Schedule Example  
Etch + MI Paste Protocol

- ▶ Option 1: Number of teeth x \$10 x number of sessions
  - ▶ Example: 10 teeth x \$10 = \$100 x 4 sessions = \$400
  - ▶ office chooses fee value per tooth
  - ▶ Patient buys tube of MI Paste/MI Paste Plus separately
- ▶ Option 2: One fee for initial visit (\$150-\$250)
  - ▶ includes the treatment, custom tray, and a tube of MI Paste/MI Paste Plus
  - ▶ Each visit thereafter charge \$75-\$175
- ▶ Option 3: Charge one fee (example \$350)
  - ▶ includes the complete treatment up to 4-5 visits
  - ▶ This may or may not include the cost of the MI Paste for the initial treatment

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### Scheduling

#### Etch + MI Paste Protocol

- ▶ Book approximately 15 minute appointments
- ▶ 10 days - 2 weeks apart
- ▶ Can take 4-6 appointments, but may take more
- ▶ Delegate - dental assistants and hygienists can do this procedure

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### For more information on MI Paste

▶ Download at [Kidsteethandbraces.com](http://Kidsteethandbraces.com)



MI Paste Success Case for Hypoplastic Enamel / 'GC'

Dr. Rutkin and Dr. Peres, Pediatric Dentists, Cincinnati, OH

Procedure:

1. Etch with 37% phosphoric acid (30 sec)
2. Rinse
3. Apply MI Paste

MI Paste Plus

Keep Your Smile Vibrant for a Lifetime with...

MI Paste™ & MI Paste Plus™

A Collection of Submitted Clinical White Spot Success Cases

'GC'

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### ICON Resin Infiltration

- "Infiltration Concept"
- Minimally invasive treatment via micro-invasive technology
- Treats decalcification and incipient decay in up to 1/3 of outer dentin
- Reinforces demineralized areas via capillary action uptake of a highly fluid resin which seals enamel porosities and creates a diffusion barrier which prevents further cavitation or breakdown of the tooth
- Infiltration of resin impregnates the voids left by decalcification and has the same refractive index as enamel, so it restores the optical nature of the treated surface to its natural esthetics without tooth removal



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### Minimally invasive resin infiltration of arrested white-spot lesions

Senestraro et al, JADA 2013

- 72.9% of orthodontic patients develop a WSL during treatment
- With time, remineralization at the outer surface of the lesion decreases access of calcium and other ions into deeper portions of the lesion, resulting in an arrest of the remineralization process
- The lesion's opaque white appearance is due to scattering of light at the subsurface demineralized enamel



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Senestraro et al JADA 2013

- Microabrasion has the potential to remove large amounts of enamel
- Bleaching results in limited esthetic improvement and has been associated with sensitivity and reduced enamel microhardness
- "Because orthodontic WSLs predominantly affect a young patient population, long-term prognosis of the restored teeth is a significant concern. Considering the invasiveness of microabrasion or traditional restorations compared with the relatively small amount of demineralized enamel in WSLs, a less invasive restorative technique would be preferable."



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### Microabrasion

- Developed in the 1960s
- Popular for fluorosis
- Hydrochloric acid has been used in dentistry for microabrasion in concentrations up to 18% combined with pumice or silica particles
- Microabrasion eroded and abraded up to  $360 \pm 130 \mu\text{m}$  of enamel within 100 seconds, and needed to be applied repeatedly up to total of 9 minutes
- Etching for resin infiltration using a 15% hydrochloric acid gel for 2 min removed less than  $30 \mu\text{m}$  of demineralized and sound enamel

(Phark et al Compendium 2009)



- Unfortunately, with this technique, substantial amounts of enamel often have to be eroded to improve appearance. The inherent danger of using a strong acid intraorally, and the inconvenience and time required for application have led to the search for a safer, quicker, easier method

(Munoz et al J Esthet Restor Dent 2013)

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Influences on bond strength of orthodontic brackets  
Phark et al J Dent Res 1989

- ▶ "Resin infiltration of demineralized enamel does not affect the bond strength of orthodontic brackets"

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Penetration Coefficients (PCs)

- ▶ Resin mixtures with high TEGDMA (triethylene glycol dimethacrylate) concentrations tended to show better inhibition of lesion progression than those with high concentration of BISGMA (bisphenol A glycidyl methacrylate), which was due to better penetration capabilities after application of ethanol
- ▶ Resins with higher PCs (infiltrants) show superior ability to penetrate natural lesions compared with resins with lower PCs  
(Meyer-Lueckel et al J Dent Res 2008)
  - ▶ Adhesive (PC: 31 cm/sec)
  - ▶ Infiltrant (PC: 273 cm/sec)
- ▶ Etching with 15% hydrochloric acid gel is more suitable than 37% phosphoric acid gel as a pre-treatment for caries lesions intended to be infiltrated  
(Paris et al J Dent Res 2007)
- ▶ This is the scientific rationale behind the superiority of ICON over Etch Bleach Seal

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Surface layer erosion of natural caries lesions with phosphoric and hydrochloric acid gels in preparation for resin infiltration  
Meyer-Lueckel, Paris, Kielbassa Caries Res 2007

**Illustration 1:** CLSM image of acid-etched and protected lesion surfaces. The surface layer thickness was measured in the etched (SL<sub>c</sub>) lesion surfaces as well as in the unetched control (SL<sub>c</sub>). In lesions etched with 15% HCl gel for 120 s, a complete erosion of the surface layer (EL) was accomplished.

**Illustration 2:** CLSM image of acid-etched and protected lesion surfaces. The surface layer thickness was measured in the etched (SL<sub>c</sub>) lesion surfaces as well as in the unetched control (SL<sub>c</sub>). In lesions etched with 37% H<sub>3</sub>PO<sub>4</sub> for 30 s, only slight erosions of the surface layers (EL) could be observed.

Drilling-no-thanks.info

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### ICON Resin Infiltration

"Pathogenic bacteria have breached the enamel layer, and organic acids produced by the bacteria have leached out a certain amount of calcium and phosphate ions that fails to replace naturally by the remineralisation process. This loss of mineralized layer creates porosities that change the refractive index of usually translucent enamel!"  
 Shivanna V, Shivakumar B. J Conserv Dent 2011

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### Improved resin infiltration of natural caries lesions

Meyer-Lüeckel, Paris J Dent Res 2008

Drilling-no-thanks.info

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### NEW Information!

- ▶ Increasing infiltration time beyond 3 minutes (i.e. allowing more time for capillary action and absorption) may improve the ability of the Icon resin infiltrant to penetrate the full lesion body and improve esthetics in more challenging congenital cases such as MIH

Credit = Dra. Vera Soviero  
 Professora Associada - FO-UERJ  
 Coordenadora do Curso de Doutorado em Odontologia (Odontopediatria)  
 Brazil

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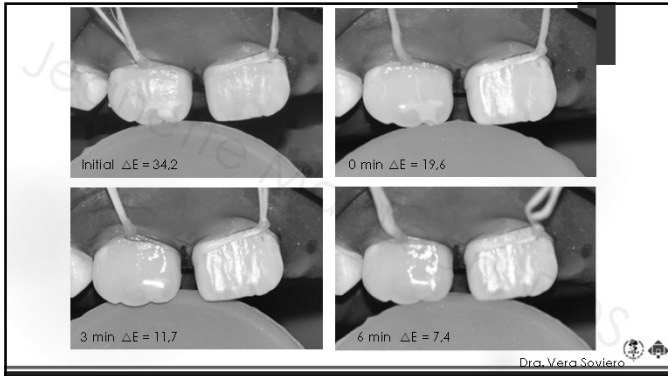
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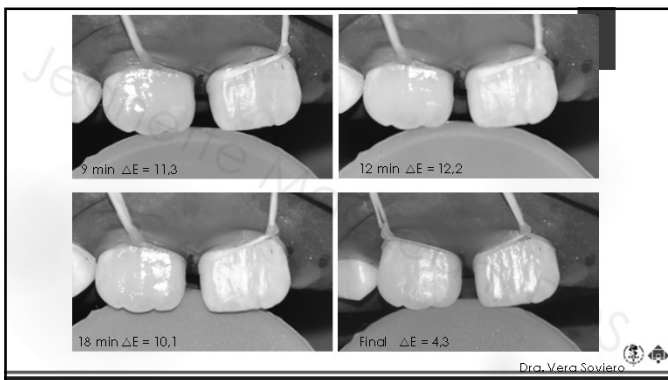
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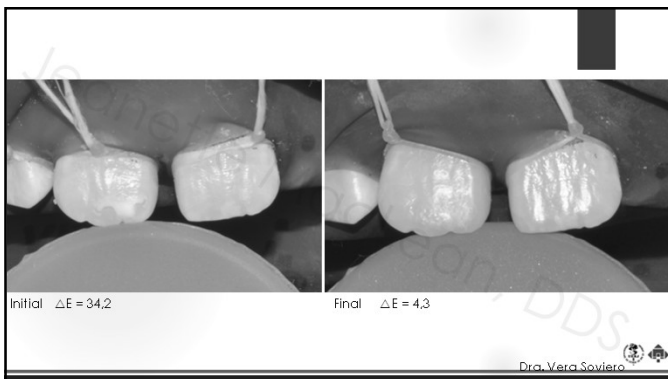
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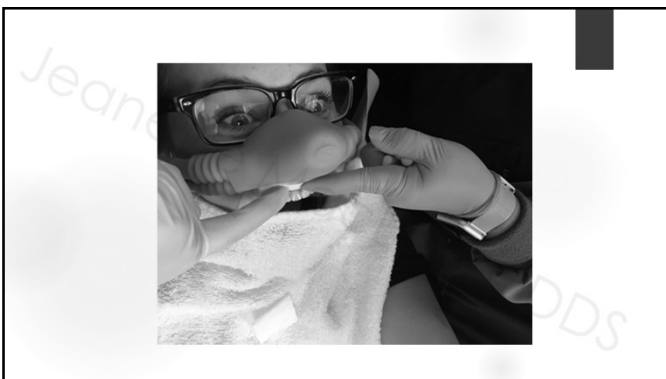
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### Refractive Index (RI)

- ▶ The degree light bends when it travels from one medium to another
- ▶ Enamel has a refractive index of 1.62 (Kidd and Fejerskaro J Dent Res 2004)
- ▶ The difference in refractive index between the water and the enamel affects light scattering and makes the lesion look opaque.
- ▶ Microporosities of the enamel caries lesion are filled with either a watery medium (R.I. of 1.33) or air (R.I of 1.0).
- ▶ The microporosities of infiltrated lesions are filled with resin (R.I. of 1.46), which, in contrast to the watery medium, cannot evaporate. Therefore, the difference in refractive indices between the porosities and enamel is negligible and lesions appear similar to the surrounding sound enamel. (Munoz et al J Esthet Restor Dent 2013)

\* This is why dehydrated lesions/mouth breathers look even worse\*

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### ICON Resin Infiltration

Patient packs sold as minikit (2) or cube (7)




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### Isolation options for anterior ICON

- ▶ Rubber dam
- ▶ Cotton rolls
- ▶ Towel
- ▶ OptraGate
- ▶ Liquid dam
- ▶ NOLA Dry Field System
- ▶ Isolite

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**OptraGate**

- ▶ By Ivoclar Vivadent
- ▶ Latex free



Jeanette MacLean, DDS  
Endodontics and Laser Dentistry

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**The NOLA Dry Field System**

A great isolation option when treating multiple post-ortho WSLs



Jeanette MacLean, DDS  
Endodontics and Laser Dentistry

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**Liquid dam**



Jeanette MacLean, DDS  
Endodontics and Laser Dentistry

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### NOLA Dry Field + Kool-Dam



▶ An excellent isolation technique for multi-quadrant Ion Resin Infiltration System treatment of post-ortho WSLs which reduces bleeding and post-op soft tissue irritation

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### DryShield



\* Autoclavable

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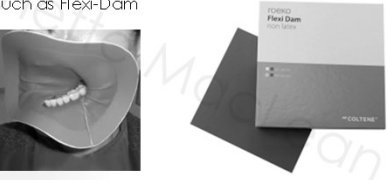
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### DO NOT USE:

- ▶ Rubber dams made from thermoplastic elastomers
  - ▶ Such as Flexi-Dam



▶ Use caution with non-latex rubber dams, ensure it is a compatible brand or the material could dissolve

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### ICON Compatible Rubber Dams;

- ▶ Hygienic "Dental Dam Latex" Heavy and Medium
- ▶ Roeko "Dental Dam Silicone Non Latex"
- ▶ Ivoclar Vivadent "Optra Dam"
- ▶ SDS "Isodam Latexfree"
- ▶ SDS "Ivory Kofferdam"
- ▶ Dental Dam von Crosstex non latex (F-130779)
- ▶ Zirc Company "Latex Free Insti-Dam"
- ▶ Aseptico "Handi Dam - LF"

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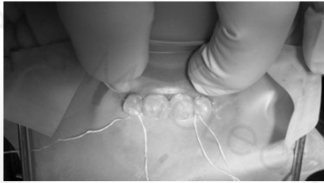
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### Rubber dam for ortho WSLs



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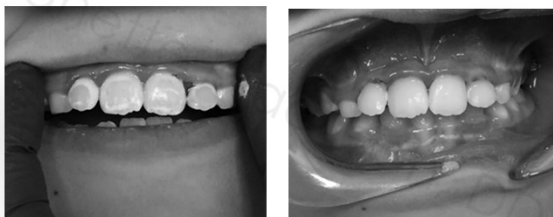
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### Gingival irritation



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### Basic ICON Protocol

- ▶ Congenital enamel defect on maxillary right permanent central incisor



Jeanette MacLean, DDS

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### ICON Protocol

- ▶ 1. Clean teeth with plain pumice using a prophy cup



Jeanette MacLean, DDS

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### ICON Protocol

- ▶ 2. Isolate as needed
- ▶ 3. Apply Icon-etch to the entire facial surface area for 2 minutes
  - \* or at least 2mm beyond the lesion



Jeanette MacLean, DDS

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### From the manufacturer:

- ▶ "At the discretion of the dentist the entire smooth surface area ought to be etched and infiltrated in case of large area white spots as they occur after bracket removal."

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### ICON Protocol

- ▶ 4. You will notice small bubbles in the etch, agitate/move around the etch with a microbrush or the syringe tip



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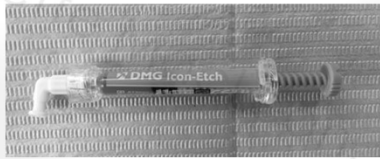
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### ICON Protocol

- ▶ Fuzzy applicator tips – my personal preference is a syringe tip because I feel like I have more control



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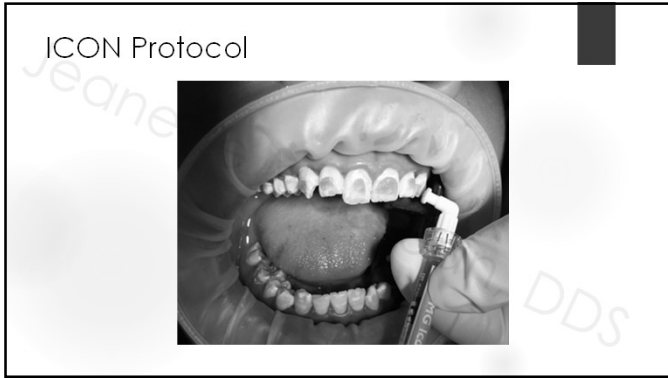
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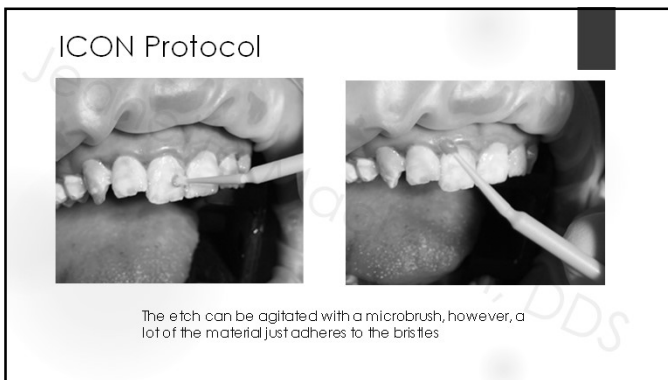
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**ICON Protocol**

- ▶ 5. Suction then rinse thoroughly with water for 30 seconds
- ▶ 6. Dry with oil-free air



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**ICON Protocol**

- ▶ 7. For anterior teeth, apply Icon-etch at least twice for 2 minutes to sufficiently remove the thicker surface inhibiting zone (pseudo-intact-layer) \*
- ▶ 8. Suction, rinse, and dry again



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**ICON Protocol**

- ▶ 9. Inspect the surface to see if it appears "chalky white"



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ICON Protocol

- ▶ 10. Apply Icon-dry for 30 seconds, watching closely within the first few seconds to see if the lesion disappears before the ethanol evaporates



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ICON Protocol

- ▶ 11. If it does not disappear, you need to etch again for 2 minutes



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ICON Protocol

- ▶ 12. For stubborn lesions, if no improvement is seen after the 3<sup>rd</sup> etch, you may lightly abrade the surface with a bur or disk



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### ICON Protocol

- ▶ 13. Repeat 2 minute Icon-etch, suction, rinse, dry, and Icon-dry as needed to eliminate the lesion



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### Etching beyond 3 times is considered "off label"

Jeanette MacLean, DDS

- ▶ While you may do additional rounds of etch, use **EXTREME** caution and monitor closely so as not to create an enamel defect or ledge
- ▶ Don't gamble with hydrochloric acid and enamel
- ▶ "You gotta know when to hold 'em, know when to fold 'em, know when to walk away"



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### Icon Protocol

- ▶ 15. Switch overhead light OFF



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**ICON Protocol**

- ▶ 14. Apply the Icon-infiltrant, flooding the entire facial surface of the tooth, and allow to soak for 3 minutes
- ▶ NOTE – Consider increasing absorption time for deeper lesions



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**ICON Protocol**

- ▶ 16. Apply additional Icon-infiltrant as needed and as it absorbs into the tooth via capillary action, maintaining a surface "wet" with the infiltrant



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**ICON Protocol**

- ▶ 17. After 3 minutes, remove the excess Icon-infiltrant
- ▶ I like to use clean, dry cotton rolls, rubbing until it "squeaks"



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ICON Protocol

- ▶ 18. Use clean, dry microbrushes to remove excess Icon-infiltrant from contacts and embrasures



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ICON Protocol

- ▶ 19. Floss to remove any excess Icon-infiltrant from the contacts



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ICON Protocol

- ▶ 20. Light cure for 40 seconds



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### Plasma ARC Curing lights



- ▶ Concern for over-heating tooth
- ▶ Adjust curing time to equivalent of what you would use for resin
- ▶ Use fanning motion

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### ICON Protocol

- ▶ 21. Reapply the Icon-infiltrant, this time allowing it to soak for 1 minute (polymerization shrinkage)



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### ICON Protocol

- ▶ 22. After 1 minute, repeat steps for removal of any excess Icon-infiltrants



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ICON Protocol

- ▶ 23. Light cure again for 40 seconds



DDS

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ICON Protocol

- ▶ 24. Smooth and polish with finishing burs, disks, and/or strips



DDS

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ICON Protocol



DDS

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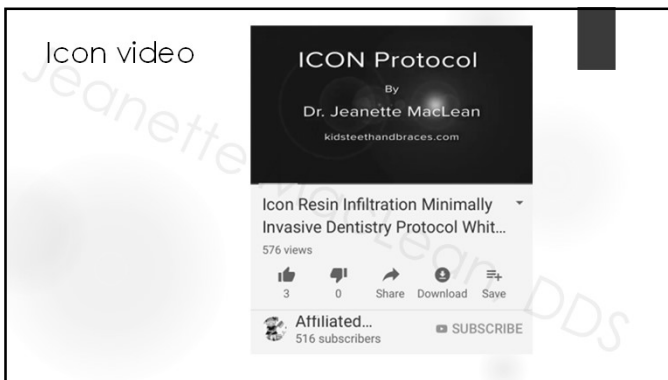
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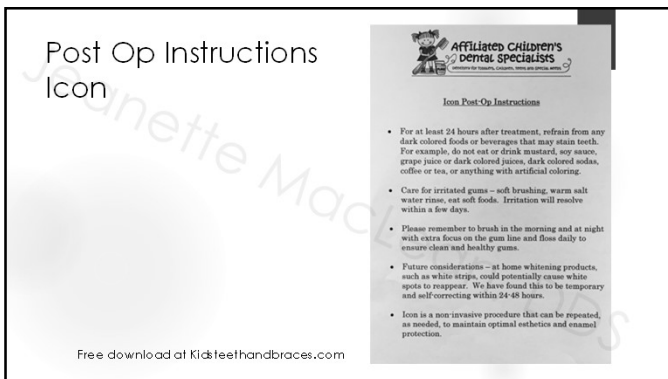
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### Icon Tips from Jeanette MacLean, DDS

- ▶ Case selection, Icon will not work on every lesion
- ▶ Discontinue 5000 ppm toothpaste 2 weeks prior to procedure
- ▶ Wait 2 weeks after professional fluoride treatment
- ▶ If whiter teeth are desired, ideally whiten prior to Icon. However, you can whiten after Icon and results will be stable w/minor temporary relapse that self-corrects
- ▶ Wait a minimum of 2 weeks after a peroxide based whitening system
- ▶ Agitate etch around
- ▶ Sand/abrade stubborn spots after 3<sup>rd</sup> etch
- ▶ Etching beyond 3 times is considered "off label" (IGNORE anecdotal suggestions of automatic 8-10 or you may cause ditching/ledging that you will have to repair with resin!!!)
- ▶ Turn overhead light off
- ▶ Consider longer infiltrant absorption time
- ▶ Make sure you thoroughly cure the infiltrant
- ▶ Failure to adequately remove excess infiltrant may give a yellow look
- ▶ Polish with finishing disks or burs after for smoother texture
- ▶ Often looks even better the next day (dehydration)

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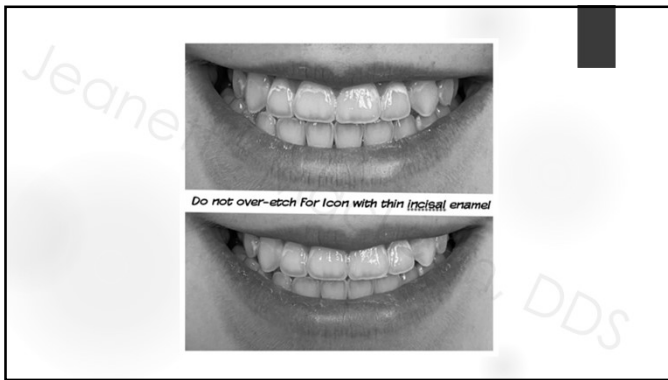
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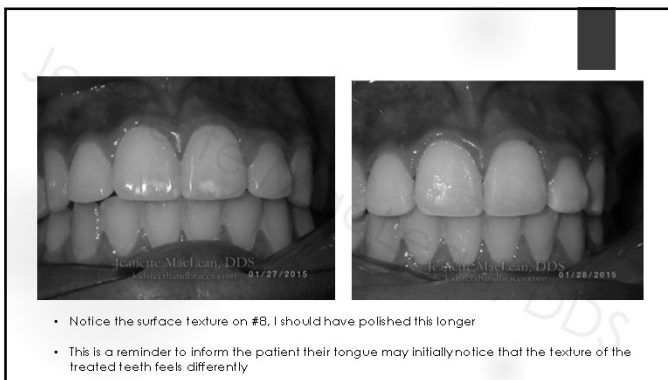
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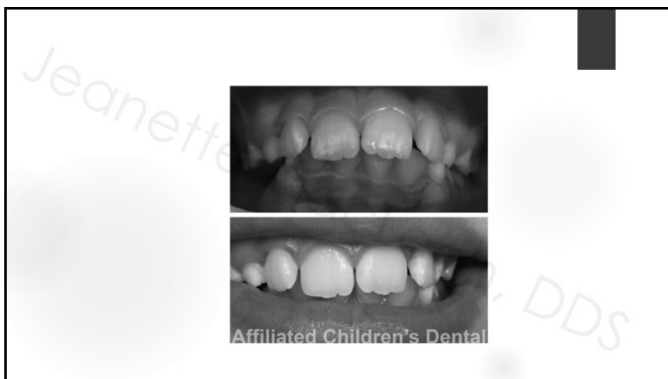
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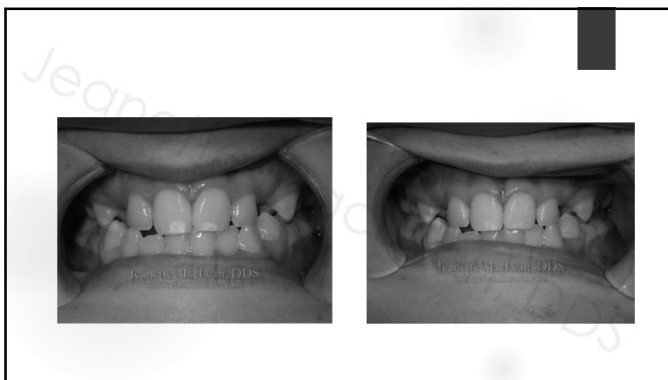
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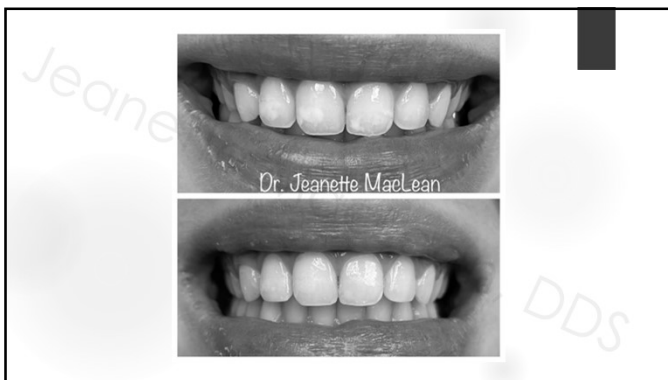
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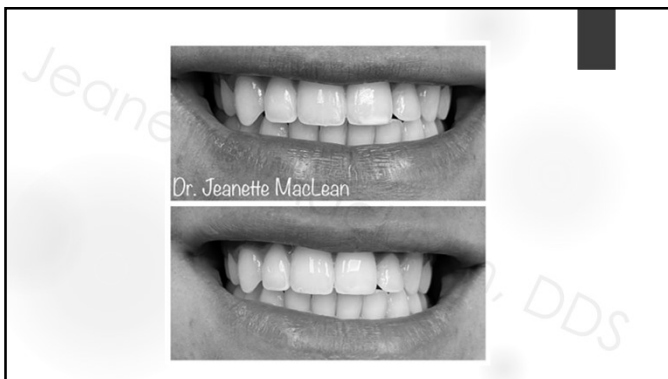
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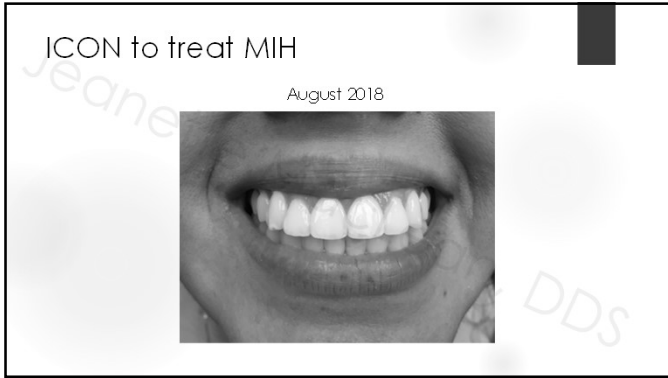
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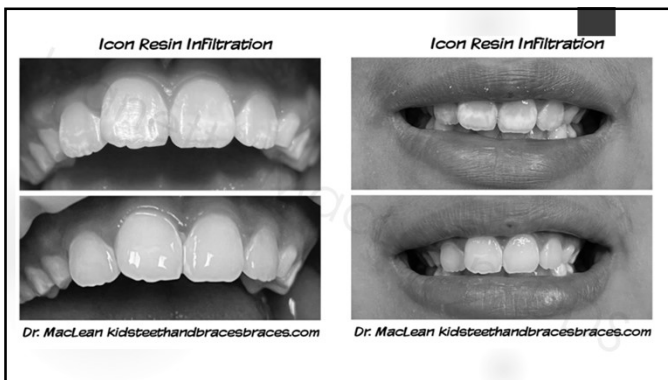
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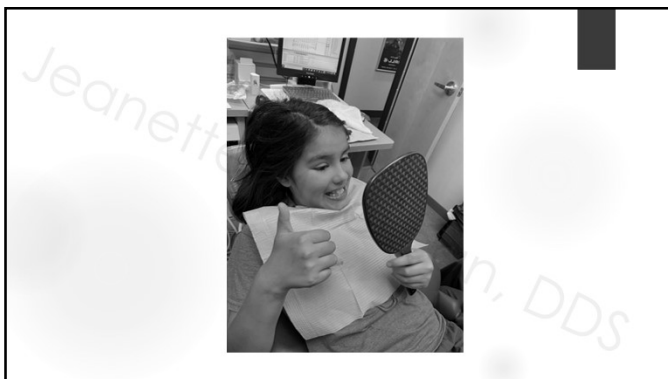
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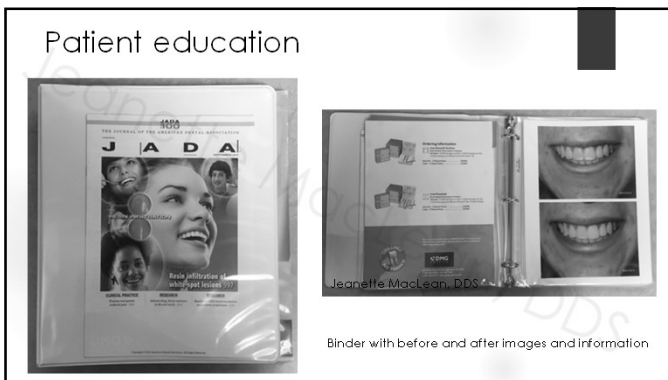
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Can't change your spots?  
Icon can.



<http://drilling-no-thanks.info/>

**Icon Smooth Surface**  
Effective treatment for white spots



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Articles for patient education  
available from DMG or my website




**A Minimally Invasive Treatment Option For Pulp Chamber White Spot Lesions**

By Jeanette M. Adams, DDS, MSD, FAGD, FAEDD

White spots are a common dental problem. They are caused by a variety of factors, including poor oral hygiene, orthodontic treatment, and trauma. They can be unsightly and can affect a patient's self-esteem. This article discusses a minimally invasive treatment option for pulp chamber white spot lesions.










**Icon Resin Infiltration: A Minimally Invasive Treatment Option for Congenital Enamel Defects**

By Jeanette M. Adams, DDS, MSD, FAGD, FAEDD

Congenital enamel defects (CEDs) are a common dental problem. They are caused by a variety of factors, including genetic factors and trauma. They can be unsightly and can affect a patient's self-esteem. This article discusses a minimally invasive treatment option for congenital enamel defects.

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**Coding and Billing**  
Icon Resin Infiltration

- ▶ CDT Code
  - ▶ D2990 Resin infiltration of incipient smooth surface lesions
- ▶ My fee is similar to a one surface resin
- ▶ Some do up to 4 surface resin
- ▶ Most insurances do not cover, but many are happy to pay out of pocket for this service

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### Scheduling

- ▶ One appointment
- ▶ Consider nitrous, especially if they're apprehensive or wiggly
- ▶ Depends number of teeth, location, behavior
  - ▶ Central incisors – 30 minutes
  - ▶ Multiple quadrants of gumline decalcification – 60-75 minutes
- ▶ Late AM prior to lunch is a great time, in case you have to run over
- ▶ Who can do this procedure?
  - ▶ Depends on your state law
  - ▶ I personally do this with an assistant

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### Etch Bleach Seal




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### The etch-bleach-seal technique for managing stained enamel defects in young permanent incisors

Wright Ped Dent 2002

- ▶ Sodium hypochlorite 5% removes organic material from teeth by oxidizing it and allowing the smaller degraded molecules to be washed away.
- ▶ Applying sodium hypochlorite to bleach discolored, hypomineralized enamel lesions can degrade and remove the chromogenic organic material that is located in the enamel.
- ▶ The second critical step in this bleaching approach lies in the resin perfusion of the hypomineralized lesion to prevent future chromogens from entering the porous enamel causing a re-staining of the lesion.




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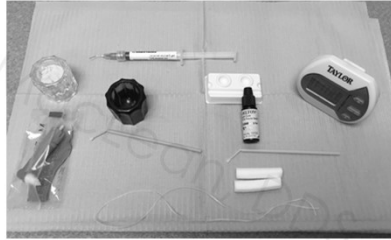
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### Etch Bleach Seal Protocol Armamentarium

- Plain pumice
- Prophyl angle
- 37% Phosphoric acid etch
- Timer
- Protective glasses
- NaOCl 5% (Clorox 6%)
- Clear Delfon Sealant
- Microbrushes
- Cotton rolls
- Floss
- Curing light
- Camera for before/after photos
- Isolation: towel, OptraGate, liquid dam, rubber dam



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### Etch Bleach Seal Protocol

► BEFORE



Jeanette MacLean, DDS

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### Etch Bleach Seal Protocol

► 1. Isolate the teeth



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### Etch Bleach Seal Protocol

- ▶ 2. Clean teeth with plain pumice then rinse



DDS

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### Etch Bleach Seal Protocol

- ▶ 3. Apply 37% phosphoric acid etch



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### Etch Bleach Seal Protocol

- ▶ 4. Allow etch to sit for 2 minutes



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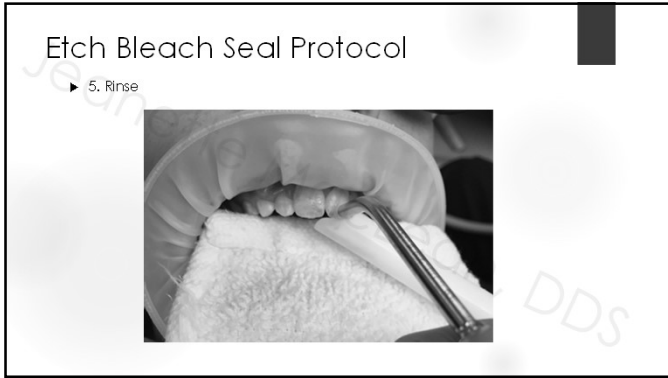
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Etch Bleach Seal Protocol

- ▶ 7. Rinse and dry



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Etch Bleach Seal Protocol

- ▶ 8. Inspect the teeth



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Etch Bleach Seal Protocol

- ▶ 9. Apply clear Delton sealant



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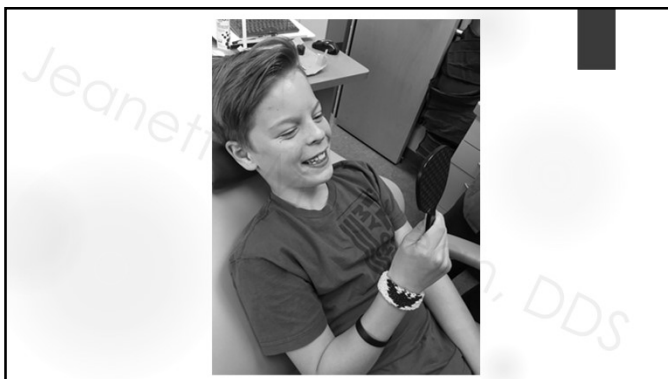
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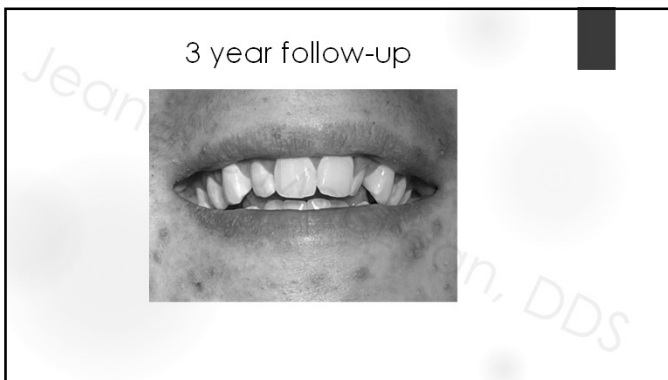
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Etch Bleach Seal video

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Post Op Instructions = Same as Icon

Free download at [Kidsteethandbraces.com](http://Kidsteethandbraces.com)

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Coding and Billing  
Etch Bleach Seal Protocol

- ▶ D2999 Unspecified Restorative Procedure, by Report
- ▶ D9970 Enamel Microabrasion
- ▶ A reasonable fee would be similar to a one surface resin

Jeanette MacLean, DDS

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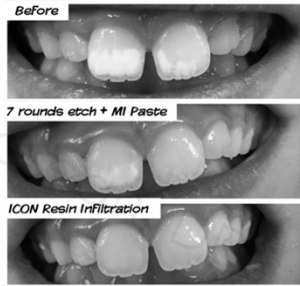
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### Combination Therapy

- ▶ Not every lesion will respond to one therapy or the other
- ▶ You can sometimes get the "best of both worlds" by combing treatment approaches
- ▶ For example, in the following case, MI Paste was initially used to naturally remineralize as much of the defects as possible, but 100% reversal was not achieved, complicated by the patient's mouth breathing. Icon was used to finish the maxillary right permanent central incisor and achieve optimal esthetics
- ▶ Combination therapy can enhance the conservative nature of your approach



Dr. Jeanette MacLean kidsteethandbraces.com

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10 month follow-up



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### Combination therapy

- ▶ Combination of ICON with bleach to remove brown stains
- ▶ Sodium hypochlorite "bleach" is done after etching and before the infiltrant is applied
- ▶ Do NOT use a peroxide based bleach



Dr. Jeanette MacLean kidsteethandbraces.com

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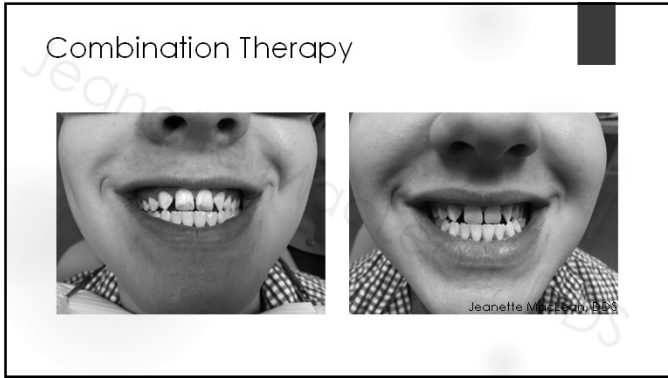
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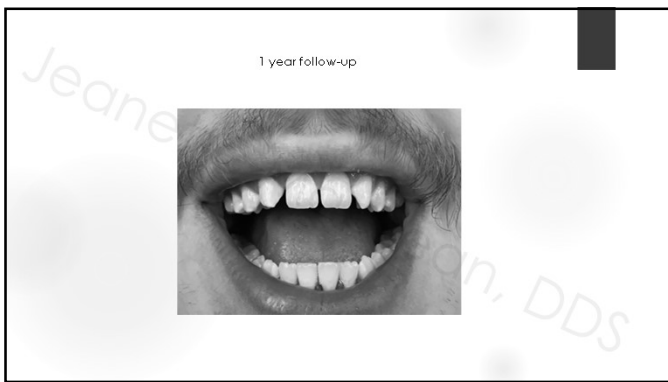
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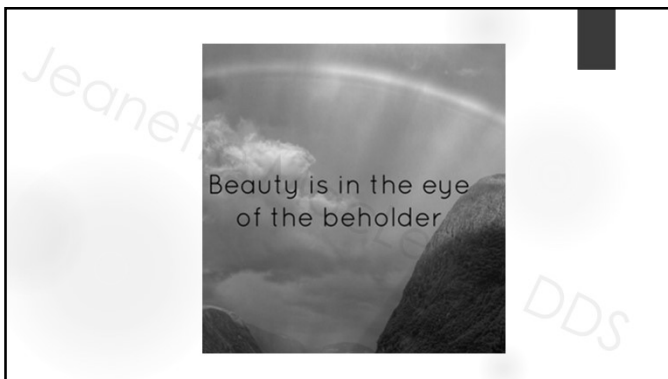
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### ICON to treat MIH

- ▶ 16 year old female
- ▶ Interesting case where the patient had to be debanded from ortho due to a systemic allergic reaction to the metal
- ▶ Patient remained very self-conscious about the appearance of her teeth
- ▶ I treated her with ICON prior to her senior pictures, and even though they weren't "perfect" and didn't remove the stain entirely, she was so happy with the result, she cried tears of joy

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### ICON to treat MIH

- ▶ 4 years later
- ▶ Patient is now 20

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### Icon Provider Directory

▶ <http://drilling-no-thanks.info>

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For more information: @drmaclean

info@kidsteelhandbraces.com

**YouTube** Affiliated Children's Dental Specialists

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Icon, MI Paste, Etch Bleach Seal Webinar

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