Management of ECC and Minimally Invasive Dentistry

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ECC Management

- Management of dental caries includes identification of an individual's risk for caries progression
- Understanding the disease process for the individual
- Active surveillance to assess disease progression

  -this disease progression should be managed with appropriate preventive services, supplemented by restorative and medical management when needed.

Where to start

- Evaluate the patient's behavior
- Existing restorations
- Radiographs
- Presence of white spot lesions
- Are the caries localized or generalized

White Spot Lesions

Surgical Management vs. Medical Management

- Surgical Management is the removal of infected enamel, along with surrounding tooth structure and then restored with a synthetic plastic restorative material.
- Medical management is the application of a medicament over the carious lesions to arrest the caries or remineralize carious lesions that are localized to enamel.

Patient Behavior

- Frankl 1: total lack of cooperation
- Frankl 2: signs lack of cooperation
- Frankl 3: accepts treatment with caution
- Frankl 4: no signs of resistance, very cooperative

Current Ideology

- Widespread acceptance of remineralization
- Minimally invasive dentistry→ less traumatic experience for patient.
- Establish a dental home for a patient by 6 to 12 months of age

Remineralization

- A natural process in which salivary proteins, enzymes and cellular components promote ion deposition into demineralized enamel to strengthen the affected enamel from and prevent cavitation.

Fluoride

- Safe and effective preventive method advocated by the AAPD.
- decrease in caries of 55-60% within the last 50 years with water fluoridation.
- The long-term use of fluoride has reduced oral healthcare costs for children up to 50%

Fluoride

- When communal water fluoridation is not an option, systemic fluoride supplements can be taken to achieve similar affects.
- Review dietary sources of fluoride for the patient prior to prescribing supplements.
- Fluoride varnish for in-office application

Fluoride

- Over the counter products are available in the form of toothpastes, gels and rinses which provide significant cariostatic benefits
- Children should be monitored with these products
- The products available:

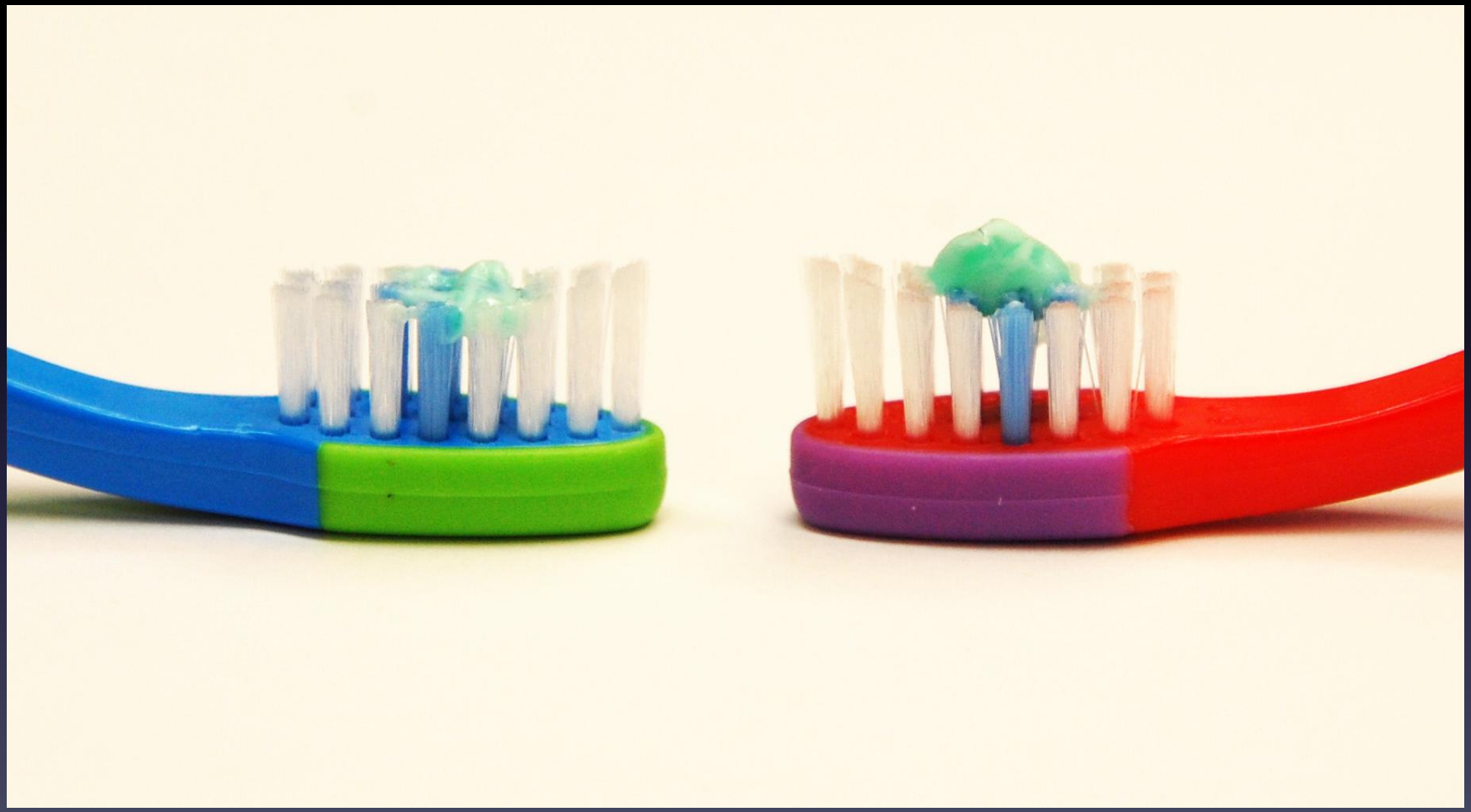
  -1.23% acidulated phosphate fluoride

  -5% neutral sodium fluoride fluoride varnish

  -0.09% fluoride mouth rinse

  -0.5% fluoride gel/paste

Fluoride



Casein Phosphopeptide amorphous calcium phosphate (CPP-ACP)

- Slows the progression of caries and remineralizes enamel subsurface lesions
- Gets incorporated into plaque, saliva and enamel pellicle to inhibit further colonization of S. mutans
- The calcium and phosphate supersaturate the saliva and plaque, buffer the pH and therefore aid in remineralization

CPP-ACP Indications

- Remineralization of early carious lesions
- Prophylactic agent prior to bonding orthodontic brackets
- Reduced dentinal sensitivity
- Can be delivered in the form of tooth mousse, chewing gum, mouth rinse and toothpaste

CPP-ACP


Recaldent
GC
Tooth
Mousse
Recaldent
キシリトール
CPP-ACP
リカルデント


BIG
Recaldent

ITR

- Interim Therapeutic Restoration
- When circumstances do not permit for traditional cavity preparations
- Used to stabilize caries prior to definitive restorations
- Beneficial for step-wise caries excavation in children with multiple open carious lesions prior to definitive restorations
- Reduces the overall cariogenic levels in the oral cavity

ITR

- Caries removal can be done using hand or rotary instruments without pulp exposure.
- Removing maximum peripheral caries minimizes leakage.
- The preparation can be restored with a glass ionomer or resin modified glass ionomer cement
- Follow-up care with topical fluoride is beneficial in high caries risk dental populations

ITR

ART

- Atraumatic/Alternative restorative technique
- Endorsed by the World Health Organization (WHO) in populations that have limited access to dental care.
- Treatment can be provided in non-traditional settings to provide provisional restorations.
- Given the circumstances that ART does not require follow-up care, it can be misinterpreted as a final restoration

ITR vs. ART

- ITR utilizes similar techniques of ART but it has different therapeutic goals.
- ITR is used to restore and prevent carious lesions in young patients, uncooperative patients, or patients with special needs.

Silver Diamine Fluoride (SDF)

- A newly recognized product used in the medical management of Dental Caries and to reduce dentin hypersensitivity.
- A medicament that is composed of silver ions, ammonia and fluoride in aqueous solution.
- An antimicrobial liquid that functions to arrest caries and prevents the further progression of the disease

SDF-mechanism of action

- Reduce dentin hypersensitivity

  -High concentrations of aqueous silver creates a protective squamous layer over the exposed dentin

  -This protective layer will partially plug the dentinal tubules and thus lead to decreased sensitivity

- Caries Arrest

  -once applied to a decayed surface, a squamous layer of silver conjugate proteins forms which leads to increased resistance to acid degradation.

  -hydroxyapatite and fluoroapatite form on the exposed dentin matrix

Clinical Evidence of SDF

- Caries arrest is significantly increased with the application of SDF twice a year.
- Darkening of the entire lesion is a clinical indication of caries arrest
- SDF has greatly outperformed fluoride varnish for caries arrest, and is equivalent or better than some glass ionomer cements

Indications for SDF

- Severe early childhood caries
- Restorative treatment challenged by behavioral or medical management.
- Patients with carious lesions that may not all be treated in one visit
- Difficult to treat carious lesions

Indications for SDF

Clinical Application of SDF

- Thoroughly air dry the lesion or use gauze and cotton rolls
- A thin layer of vasoline may be applied to the surrounding soft tissue to prevent from tissue staining.
- Apply one drop of the SDF to the lesion and allow for it to soak for 1-3 minutes
- The excess can be removed with the same cotton roll used to isolate.
- Advise the patient to refrain from food and water intake for one hour after application

Clinical Application of SDF Pre-treatment

Clinical Application

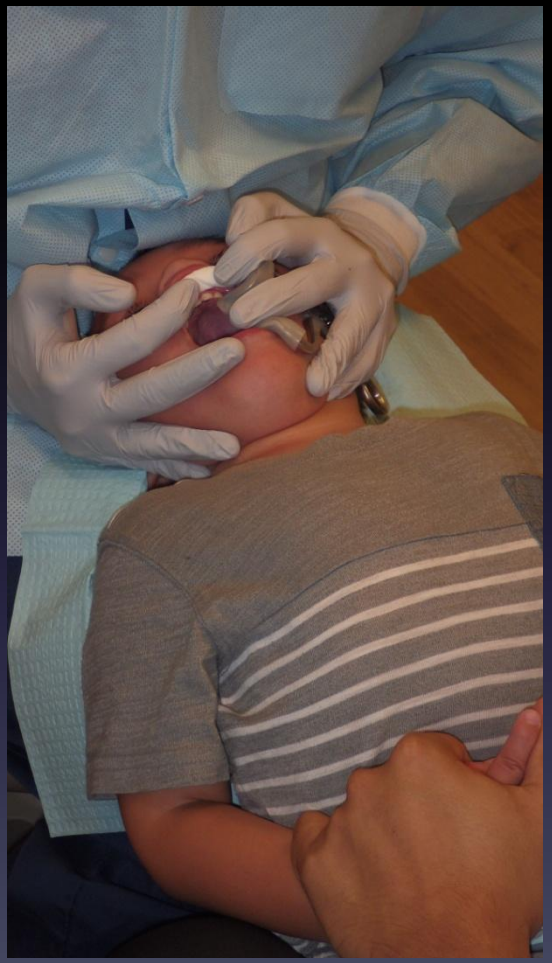
Clinical Application

Vaseline on Soft Tissue

Cotton Roll Isolation

Clinical Application of SDF

1-3 minute waiting time



SDF Recall appointments

- Apply SDF twice annually for optimal results
- SDF can also be applied once a month for three months initially and then evaluated at 6 months.

SDF Side effects

- No adverse effects have been reported with the use of SDF
- Darkening of the carious lesion after application
- SDF is contraindicated in patients with a silver allergy, patients with desquamative gingivitis like ANUG.

Silver Diamine Fluoride

Silver Diamine Fluoride

Figure 1. Primary Incisors Before SDF Treatment.

Figure 2. Primary Incisors After SDF Treatment.

Hall Technique

- A non-invasive technique for the treatment of carious primary molars
- The caries is sealed under the prefabricated stainless steel crown.
- Sealing the caries from the external environment prevents it progression further to the pulp

Hall Technique

Hall Technique

- No need for drilling and anesthesia.
- Developing areas→ limited access to dental care.
- Relatively new treatment, research still underway to validate widespread clinical success of this procedure.

When to Restore/Advantages

- Removing cavitations before the caries progresses to the pulp
- Stopping the progression of tooth demineralization
- Restoring the integrity of tooth structure
- Preventing tooth movement due to loss of tooth structure

Risk Factors of Restorative Dentistry

- Decreased longevity by making the teeth more prone to fracture
- Increased incidence of recurrent caries
- Restoration failure
- Pulp exposure during caries removal

Amalgam

- A commonly used restorative material for over 150 years
- Strong clinical evidence suggests the survival rate of amalgam of 3.5-7 years in primary molars.
- Treatment is highly efficacious in class I and class II restorations

Amalgam

- Does not bond to tooth structure→ still less microleakage
- Clinical failure attributed to manipulation and preparation
- Bulk fractures occur with premature loading.
- Rapid setting amalgam recommended for pediatric patients

Composite

- An esthetic restorative material used in the place of amalgam.
- Consists of a resin matrix and chemically bonded fillers
- Large filler size provides strength to restoration
- Small filler size allows for greater polishability and esthetics

Composite

- Technique sensitive→ Dry working field
- Increased incidence of micro leakage
- Dental adhesives necessary for proper resin bonding

Composite AAPD Recommendations

- Strong clinical evidence of success for class I and class II composite restorations in primary and permanent molars
- Enamel and dentin bonding agents decrease marginal staining and detectable margins of various composites

Glass Ionomers

- Used in dentistry as restorative cements, liners, and luting cements
- Favorable properties: chemical bonding to enamel and dentin, thermal expansion similar to tooth structure, biocompatibility, fluoride release, moisture insensitivity

Glass Ionomers

Glass Ionomers

- Fluoride released is taken up by surrounding tooth structure→ increased resistance to bacterial infiltration.
- Fluoride release is beneficial in patients with high caries risk.
- Glass ionomer restorations have shown success rates for up to 1.2 years after placement

Resin Modified Glass Ionomers

- Improved material from traditional Glass Ionomer cements with better handling, decreased setting time, increased strength, improved wear resistance.
- Excellent for long term temporary restorations such as ITR and ART.
- High success rate as Class I and Class II restorations.

Resin Modified Glass Ionomers

Full Coverage Restorations

- Indicated for multiple carious surfaces
- Extensive cervical decalcification
- Existing large single surface restorations
- Pulp therapy
- Patient behavior→ difficult moisture control and precision in prepping tooth.

Stainless Steel Crowns

- Full coverage preformed crowns
- Primary molars where two or more surfaces are carious
- Restoration of choice for a primary fractured molars
- Patients who have partially missing tooth structure due to caries or submersion
- Greater longevity versus amalgam restorations

Stainless Steel Crown Preparation

- Occlusal reduction of 1.25mm-2mm
- Interproximal reduction to remove contact completely
- Facial and lingual line angles should be rounded.
- Crown size should be chosen and tried on to the prepared tooth to evaluate for marginal seal, occlusion, and arch relationship.
- The crown should be cemented on with a GI or RMGI luting cement.
- Bite stick can be used to aid in fully seating the crown.

Zirconia Crowns

- Based on a recent publication this is restoration of choice in among 46% of pediatric dentists for primary incisors
- Provides superior esthetics and option for multiple shade selection
- Retention found to be a 80% after 24-36 months

Zirconia Crowns

- Precision in preparation of tooth
- More tooth structure is removed as opposed to a SSC or ASC.
- Greater chance of pulp exposure and pulp treatment
- Treatment based on patient behavior and parental choice

Anterior Strip Crowns

- Technique sensitive but highly esthetic restorations for primary incisors
- Caries removed, interproximal space created, celluloid crown form placed for fit
- Typically bonded with resin or RMGI. Restorative material fills the crown form and placed onto the preparation
- After polymerization, crown form is removed.

Anterior Strip Crowns

Resin Infiltration

- Arrest the progression of non-cavitated interproximal carious lesions.
- Low viscosity resin penetrates into the porous lesion body of enamel caries.
- Evidence shows that it slows or reverses the progression of non-cavitated lesions .
- Indicated to restore white spot lesions

Sealants


DENTAL SEALANTS
BEFORE
Deep, Unprotected
Grooves
AFTER
Grooves Protected
By Dental Sealant

Sealants

- Pit and fissure caries account for 44% of caries in primary teeth.
- Literature suggests success is 86% after one year and 57% at 48-54 months.
- Sealed teeth that are missing a part of sealant material have the same caries risk as teeth that have never been sealed before.

AAPD Guidelines for Sealants

- Should be placed on pits and fissures judged to be at risk for dental caries or with incipient lesions
- Carefully clean pits and fissures without mechanical preparation
- Resin based sealants require a moisture controlled environment.
- Glass ionomer sealants can be used as transitional sealants where moisture control is not possible

Closing Remarks

- Know your patient!!
- Management techniques of ECC are determined on a case by case basis
- Minimally invasive dentistry is ideal for prevention and treatment of ECC in the uncooperative child.

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Acknowledgements

- Dr. David Okuji
- Dr. Sheila Rao
- Dr. Shreekrishna Akilesh

Questions??

Thank you