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 effects.
- 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
• 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.
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

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.
References


References

- AAPD Guideline on Restorative Dentistry

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