RESTORING WITHOUT DRILLING: PARADIGM SHIFT IN DENTISTRY FOR CHILDREN

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NO DISCLOSURES

I have no competing or conflict of interest and not supporting any specific product
Dentistry is a dynamic profession, continually reshape by new science, devices, techniques and materials.

Numerous new treatment concepts have been suggested to arrest caries process in enamel and dentin including deep carious dentin.
The goal of restorative dentistry in the 21st century should be to delay and prevent placement of the initial restorations using non-operative management of caries.

Anusavice 1995
This presentation will give an overview of the developments in sealing caries without drilling as well as review recent emerging techniques in caries control.
The Caries Evolution

- Colonization & Diet
- De- & Re-mineralization
- White Spot
- Enamel Lesion
- Dentin Lesion
- Pulpal Lesion
- Revolving Old Idea
- No Cavity

Caries Process

Time

Cavity
Caries Control

Control all active carious lesions

Gross excavation

To arrest the caries process

Filling with ZOE

Aid in the sterilization of the remaining caries

Reduction in the number of oral microorganisms
Caries Control

A 10-year study evaluated bonded and sealed composite restorations placed directly over frank cavitated lesions extending into dentin arrested the clinical progress of these lesions.

Mertz-Fairhurst et al. 1998
Ecological Plaque Hypothesis

The effect of glucose and low pH on the stability of a microbial community

<table>
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<tr>
<th>Bacterium</th>
<th>Percentage of total viable count (%)</th>
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<tr>
<td></td>
<td>pH 7.0</td>
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<tr>
<td>Streptococcus</td>
<td></td>
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<td>mutans</td>
<td>1.0</td>
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Cariogenic bacteria, once isolated from their integrity, either die or remain inactive and thus, pose no risk to the health of the tooth.

Oong et al. 2008
Applications of Caries Control

- Pit and Fissure Sealants
- Resin Infiltration - Icon
- Atraumatic Restorative Treatment (ART)/Interim Therapeutic Restorations (ITR)
- Other Methods: IPC and Hall technique
Pit and Fissure Sealants

The ADA expert panel recommendation:

Pit-and-fissure sealants could be placed on early noncavitated carious lesions in children and adolescents to reduce the percentage of lesions that progress... therapeutic sealant.

ADA 2008; Ahovuo-Saloranta et al. 2004; Bravo et al. 2005; Hotuman et al. 1998; Hardison et al. 1987; Oong et al. 2008
Pit and Fissure Sealants

Evidence

Significant reduction in the percentage of noncavitated carious lesions that progress in children, adolescents and young adults for five years after sealant placement, compared with unsealed teeth.

There are no findings that bacteria increase under sealants. Sealants lower the number of viable bacteria by at least 100-fold and reduce the number of lesions with any viable bacteria by 50 percent.

ADA 2008; Ahovuo-Saloranta et al. 2004; Bravo et al. 2005; Hotuman et al. 1998; Hardison et al. 1987; Oong et al. 2008
Pit and Fissure Sealants

Less than 40 percent of U.S. dentists surveyed indicated that they sealed NCCLs in their practice i.e. 60 percent have not adopted evidence-based clinical recommendations regarding the sealing of NCCLs.
Past studies have shown that it takes an average of **17 years** to turn just **14%** of original research findings into changes in care that will benefit patients. (Balas & Boren 2000)
Pit and Fissure Sealants

The ADA expert panel recommendations:

- **Monitor and reapply** sealants as needed to maximize effectiveness

ADA 2008; Ahovuo-Saloranta et al. 2004; Bravo et al. 2005; Hotuman et al. 1998; Hardison et al. 1987; Oong et al. 2008
Pit and Fissure Sealants

- Overfilled fissures caused significant higher microleakage
- The fissure sealant quality may be improved by filling just to the border
- Overfilling of fissures should be avoided

Geiger et al. 2000
To arrest the progression of non-cavitated interproximal caries lesions by penetration of a low viscosity resin into the porous lesion body of enamel caries.

Prevent (Fluoride Therapy)  Infiltrate (Icon)  Restore (Drill & Fill)

Completed in one 15-minute visit
A systematic review and meta-analysis on the effectiveness of sealing non-cavitated proximal caries lesions in primary teeth concluded that the technique of sealing non-cavitated proximal caries seems to be effective in controlling proximal caries in the short and medium term.

Ammari et al. 2014
A randomized split-mouth placebo-controlled clinical trial reported that resin infiltration of proximal lesions was more effective in preventing caries progression than non-operative measures alone after 18 months.

Paris & Meyer-Lueckel 2010
Atraumatic Restorative Treatment (ART) Interim Therapeutic Restorations (ITR)

ART is recommended for use worldwide, not only in developing countries where resources are not readily available, but also in more industrialized countries.

It is a cost-effective means of oral health care within a modern dental clinic.
Atraumatic Restorative Treatment (ART)
Interim Therapeutic Restorations (ITR)

Excavation of carious dentin

Isolating the caries process from the oral environment

Using a cariostatic filling material

A combination of all three contributes to the arrest of the caries process

Weerheijm & Groen 1999
Atraumatic Restorative Treatment (ART)  
Interim Therapeutic Restorations (ITR)

May be used to restore and prevent dental caries in

- Young patients
- Uncooperative patients
- SHCNS patients
- Situations in which traditional cavity preparation and/or placement of traditional dental restorations are not feasible
Hand instruments are effective for cleaning cavitated dentin lesions. However, the size of the opening of the cavity appears to have an effect on the level of cleanliness of the cavity in occlusal surfaces.

A cavity opening of at least 1.6 mm is necessary for ensuring adequate removal of infected dentin.

Topaloglu-Ak et al. 2009; Celiberti 2006; Bannerjee et al. 2000
Atraumatic Restorative Treatment (ART)  
Interim Therapeutic Restorations (ITR)

The operator is one of the main causes of failure.

It has the greatest success when applied to single surface or small 2 surface restorations.

Mandari et al. 2003; Louw et al. 2002; Lo ECM & Holmgren 2001
Atraumatic Restorative Treatment (ART)  
Interim Therapeutic Restorations (ITR)

A 6-year survival rate of the ART restorations in permanent teeth was 76% and 59% of the small and large restorations respectively and was related to the size of the restoration.

ECM et al. 2007
The 10-year survival rate in posterior permanent teeth of single- and multiple-surface ART restorations were 86.5% and 57.6%, respectively.

The primary causes of failure were total loss (9.3%) and marginal defects (5.4%).
The Hall Technique

The SSC is cemented in place without any tooth preparation or local anesthesia, and carious tooth tissue is not removed, but sealed into the tooth by the SSC and cement, thus isolating it from the rest of the mouth.

Fejerskov & Kidd 2003; Innes et al. 2007; Rosenblatt 2008
The Hall Technique

Occlusion corrected in 30 days!!!

There is inconclusive evidence to support use of this technique and it is controversial subject

Fejerskov & Kidd 2003; Innes et al. 2007; Rosenblatt 2008
A study reported that IPT performed in primary and permanent teeth of young patients may result in a high 3-year survival rate ... **96%** and **93%** respectively
Indirect Pulp Treatment

A systematic review compared the effect of incomplete versus complete caries removal on pulpal health demonstrated an overall benefit to pulpal health when caries was only partially removed.
Indirect Pulp Treatment

Glass ionomer used for caries control for **1 to 3 months**, before vital pulp therapy, improved the vital pulp therapy success .... **92%** success rate vs. a **79%** success rate in teeth not having a GIC CC restoration.
CARIES EXCAVATION
Paradigm Shift

Nonrestorative Caries Treatment (NRCT)

Traditional Way

NO CARIES REMOVAL + RESTORATION

(Bjorndal et al. 2010)
CARIES EXCAVATION

Partial vs. Complete Excavation

**PARTIAL EXCAVATION**

- Less Pulp Exposures
- Benefit to Pulpal Health
- Reduce Excavation Time
- Reduce Number of Remaining Bacteria
- Less Post-operative Pain

**COMPLETE EXCAVATION**

(Ricketts et al. 2013; Orhan et al. 2010; Lula et al., 2009)
CARIES EXCAVATION
Paradigm Shift

**YOUR CHOICES**

- **Complete Excavation - Conventional Restorations (CR)**
- **Non-restorative Caries Treatment (NRCT)**
- **Non-restorative Caries Treatment (NRCT) + Sealing**
- **Partial Excavation – One Step**
- **Stepwise Excavation - Two Steps**
Caries Management Strategies

ALWAYS CONSIDER OPTIONS FOR MANAGEMENT AND TREATMENT
Evidence Based Decision Making

- Scientific Evidence
- Clinical Circumstances
- Experience & Judgment
- Parent & Patient Preferences
SUMMARY
Key factors to clinical SUCCESS

Early recognition of caries and intervention which are critical

- Appropriate Procedure Selection
- Appropriate Patient Selection
SUMMARY

Dental caries is a preventable and reversible infectious disease

Be prepared and start thinking about caries management in the 21st century

It's what you learn after you know it all that counts

Attributed to Harry S. Truman

Building Better Oral Health for Children
Your Tools in Managing Caries

- Infant Oral Health
- Prevention
- Minimal ID
- Caries process
- Caries risk assessment
- Knowledge
- Missing Link
- Prenatal Counseling
- Instruments
- Conservative Treatment

Materials