Alternative Restorative Technique (ART)

Children’s Oral Health Initiative
Health Canada - FNIH
2009
Agenda

• What is ART?
• ART Background
• What teeth are appropriate for ART?
• ART Technique
• Demonstration of ART
• Hands-on Session and Open Discussion
• Evaluation of the Session
Special thanks to …

- National Headquarters
- Dr. Steve Patterson, Consultant – Alberta Region
- FNIUni - NSDT
- Dr. Jim Tenant
- Dr. Herenia Lawrence
- Dr. Greg Jones, RDO Atlantic Region

…… for contributing resources and material for this presentation
Objectives

- Standardize the ART technique throughout the Regions
- Define ART
- Provide an overview of advantages, disadvantages and contraindications for use of ART
- Provide overview of suggested instrumentation and materials
- Provide review/instruction of technique and hands-on practice using tooth preparation methods
ART is a restorative technique developed to deliver non-traumatic treatment of carious teeth using hand instrumentation for caries removal and a chemically bonding material for tooth restoration.
ART Background

- ART a technique endorsed by WHO, the International Association for Dental Research and the American Academy of Pediatric Dentistry
- Was developed to provide dental treatment for people living in remote and isolated areas where access to dental care was poor or non-existent
- Is proven as an excellent means of caries control for a wide range of the population
- Is used in many countries world wide
- A new term for ART is Interim Therapeutic Restoration, or ITR, which is becoming common in the U.S.
ART in Canada - FNIH

• Identified a significant need to reduce ECC in FN and Inuit infants and young children

• Identified a trend in the use of GA’s to treat ECC on very young children

• ART is evidenced based procedure recognized internationally
Key Scientific Findings

Cavity Conditioning did not improve success of Class I restorations in primary teeth and one year success rate of Class I ART in primary molars are moderately successful. (Yassen 2009)

Six-year success rate of ART approach in anterior permanent teeth (Class III) was high (Prakki, 2008)

There was more remineralization of caries in the presence of GIC than composite resin (Lee, 2008)
Key Scientific Findings cont’d

GIC shows antibacterial surface properties against cariogenic bacteria for at least one week (Davidovich, 2007)

Multiple surface ART restorations were satisfactory after 12 months with a high success rate (Cefaly, 2007)

Proximal contact of ART restorations promotes disintegration of the GIC (Scholtanus, 2007)
Key Scientific Findings cont’d

ART in permanent teeth of children has a higher survival rate than traditional methods such as amalgam (Frencken, 2006)

Success rate of Class I and II ART in primary teeth was 94% after one year (Yilmaz, 2006)

Fluoride varnish can increase roughness of GIC (Salama, 2006)

GIC’s show more early wear than composites and need to be improved (Van Duinen 2005)
Key Scientific Findings cont’d

Retention of ART restorations in both primary and permanent teeth is good (Van’t Hof 2006, Smales 2002, Motsei 2001, Luo 1999)

Class I and V show better results than class II restorations (Yassen 2009, Smales 2000, Holmgren 2000, Mallow 1998)

Similar results to amalgam restorations over 3 years (Cole 2000)
ART approach is readily accepted by children and has resulted in retention of teeth that would have been extracted (Smales, 2000)

Newer materials showing better results than initial trials (Yassen 2009, Frencken 1999)

Patients reported less discomfort than traditional restorative procedures (van Amerongen 1999, Phantumvanit 1996)
Research indicated that:

Success rates of ART restorations are dependant upon:

• Material used

• Training of the operator

• Case selection
Characteristics of Restorative GIC Materials

Desirable characteristics:

• High viscosity
• Available in capsule and powder/liquid form
• Reasonable working time
• well researched

*Fuji IX and Ketac Molar have these features*

**NOTE:** This use of Fuji IX does not in any way constitute an endorsement of the product
Advantages of ART

- Control of caries
- Conserves sound tooth structure
- Delivered in clinical or field settings
- Does not require traditional dental equipment (drills) or local anaesthesia
- Non-threatening for patients
- Used on a wide range of population
- Is cost effective
- Patients accept material …it doesn’t taste bad
Advantages of GI Cement

• Biologically compatible with oral tissues
• Chemically bonds to enamel and dentin
• Slowly releases fluoride
• Promotes re-mineralization of vital dentin
• Inhibits secondary caries
• Provides a strong marginal seal
Disadvantages of ART

GI cement is:

- Best suited to one surface or small two surface restorations only
- Less successful in load bearing areas
- Sensitive to temperature, moisture and hand mixing technique (powder/liquid ratio)
Contraindications for ART

Cannot be used in the presence of:

- Acute abscess
- Chronic abscess
- Pulpal exposure
- Chronic inflammation (history of pain)
Contraindications for ART

Cannot be used when:

• lesion is inaccessible to hand instruments
• tooth structure cannot retain a restoration
## ART Failure Prevention and Management

<table>
<thead>
<tr>
<th>Site</th>
<th>Size</th>
<th>Lesion w/o cavitation - can remineralize</th>
<th>Small Cavitation - cannot remineralize</th>
<th>Moderate cavity - no cuspal involvement</th>
<th>Enlarged cavity – one or more cusps undermined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pit and Fissure</td>
<td>STOP</td>
<td>GO!</td>
<td>GO!</td>
<td>CAUTION!</td>
<td>CAUTION!</td>
</tr>
<tr>
<td>Contact (occlusal or proximal)</td>
<td>STOP</td>
<td>CAUTION!</td>
<td>CAUTION!</td>
<td>CAUTION!</td>
<td>CAUTION!</td>
</tr>
<tr>
<td>Cervical</td>
<td>STOP</td>
<td>CAUTION!</td>
<td>CAUTION!</td>
<td>CAUTION!</td>
<td>CAUTION!</td>
</tr>
</tbody>
</table>
Supplies Include:

- mirror
- explorer
- cotton pliers
- hatchet
- margin trimmer
- spoon excavator(s) - S, M & L
- composite instrument
- carver
- plastic strips
- wedges
- floss
- articulating holder and paper
Supplies Include:

Adjunct products such as:

- gloves (and mask)
- cotton rolls
- dry angles
- gauze
- bib
- cotton roll holder
- cotton pellets
- applicators
Supplies Include:

Glass-Ionomer Cement
Powder and Liquid

Glass-Ionomer Cement Capsules
Supplies include:

IRM for management of accidental pulpal exposure
Which teeth are appropriate for ART?

The carious teeth in the following photos are not necessarily appropriate for ART, but are presented for discussion purposes.
Use Professional Judgement in Deciding which Teeth are Appropriate ...

For each case, consider the following:

• Does client have access to care?
• Is the family likely to follow through with referrals?
• Are there socioeconomic issues that prevent the family from obtaining treatment?
Managing the Oral Environment

Using cotton rolls, cotton pellets, dri-angles and/or gauze:

• **Isolate** tooth & maintain a dry environment

• **Clean** tooth of plaque and debris

• **Wash and dry** tooth

Be very careful not to desiccate the tooth
Gaining Access

To open into cavity:

• Place corner of hatchet into cavity opening

• Rotate in semi-circles until access to caries is gained

• Continue rotating hatchet until adequate access is acquired

• Remove enamel debris
Using hatchet to gain access to caries
Removing Carious Dentin

Start at the Dento-Enamel Junction (DEJ):

- Choose appropriate spoon excavator
- Ensure adequate access is available
- Employ circular scooping movements horizontally around DEJ
- Ensure DEJ is free from caries
- Remove only non-vital dentin
Removing Carious Dentin

- Finish with the caries closest to the pulp
- Keep cavity moist for ease of caries removal
- Continue using circular scooping movements with spoon excavator
- Remove only non-vital carious dentin that cannot be re-mineralized
- Take care not to expose the pulp of the tooth
Remove soft non-vital dentin
Remove debris
Wash and dry cavity
Removing Unsupported Enamel

• Using the blade of the dental hatchet or margin trimmer, fracture off any thin unsupported enamel

• Check the enamel of cavity outline

• Ensure the enamel is smooth and free of carious dentin

• Wash and dry the cavity using cotton pellets
Assessing Bite

• Using articulating paper, check the patients bite

• Note the relationship of the occluding teeth

• Use this as a reference when shaping filling material

**NOTE:** The patient’s occlusal contact should be minimal or non-existent in GI restorations
Mixing GIC

Powder and Liquid
Mixing GI Cement (P/L)

- **Lightly** tap the bottle of powder against your hand. Do not shake.
- Measure 1 level spoonful of powder & place onto mixing pad.
- Divide powder into **two equal parts**.
- Dispense **one full drop** of liquid onto glass mixing pad.
Mixing GI Cement (P/L cont’d)

- Mix 1st pile of powder using a folding and rolling action of the spatula

  - A smooth creamy mix is achieved in 10 seconds

- Fold in the 2nd pile and mix for approximately 5 - 20 seconds

- Close bottles tightly immediately after use
MIXING GIC

Capsules
Mixing GI Cement (Capsule)

- Shake or tap capsule to fluff powder
- Depress plunger on capsule using finger pressure or countertop
- Load the capsule into the GC Capsule Applier
- Click once on the GC Capsule Applier to activate
Mixing GI Cement (Capsule cont’d)

• Place capsule in the amalgamator

• Mix for 10 seconds

• Return capsule to GC Capsule Applier

• Click twice to prime and use immediately
PUSH, CLICK, MIX!

A. Tap or shake to loosen powder.
B. Depress plunger.
C. Click once in capsule applier to activate.
D. Mix for 10 seconds.
E. Two clicks to prime capsule then syringe slowly.

GC CAPSULE ACTIVATION INSTRUCTIONS
Inserting the GIC
Tooth Conditioning

• Dispense one drop of GC Cavity Conditioner or GC Dentin Conditioner onto pad

• Dip cotton pellet or brush into the liquid

• Apply to bonding surfaces of cavity and adjacent fissures
  • GC Cavity Conditioner - apply for 10 seconds
  • GC Dentin Conditioner - apply for 20 seconds

• Wash and dry cavity and fissures thoroughly.
Issues Around Using Conditioner …

• Tastes terrible … should it be used on very young clients?
• In the field, it is often difficult to wash adequately
• Professional judgement required
• Using ART in the field is different than in a clinical setting
Inserting GI Cement (Powder/Liquid)

**Single surface restorations:**

- Insert small increments of cement using composite instrument
- Condense
- Ensure no air bubbles are incorporated
- Overfill slightly
Inserting GI Cement (Powder/Liquid cont’d)

- When the glossy surface of cement starts to lose its shine compress it further into cavity using the Press-finger Technique

Compress material into place

Remove finger sideways
Press-finger Technique

Contour Filling
Inserting GI Cement (P/L cont’d)

Multiple surfaces:

• Place plastic strip and insert wedge if required
• Insert small increments of cement using composite instrument
• Condense
• Ensure no air bubbles are incorporated
• Overfill slightly
Inserting GI Cement (contd)

Multiple Surfaces:

- Place a small amount into pits and fissures
- Wrap plastic strip firmly around tooth
- Contour filling, assess bite and remove excess cement
- Hold plastic strip firmly
- Remove when cement has set
GC Fuji IX GP FAST APPLICATION TECHNIQUE

Apply GC CAVITY CONDITIONER for 10 secs.
Wash and gently dry.
Activate GC Fuji IX GP FAST capsule. Mix for 10 secs.
Dispense directly into cavity. Pack and contour to shape.
Apply GC Fuji COAT LC. Light cure for 10 secs.
At 3 mins. start final finishing and polishing under water spray.
Apply GC Fuji COAT LC. Light cure for 10 secs.

STORAGE RECOMMENDATION
Capsules should be stored in a cool, dark place (4-25°C/39.2-77.0°F). Avoid moisture contamination.

GC CORPORATION
TOKYO, JAPAN
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Inserting GI Cement (Capsule)

Single surface:

• Dispense cement into cavity slowly starting with hard to reach areas

• Continue dispensing cement until the cavity is full and no air bubbles are present

• Overfill slightly
Inserting Cement (Capsule cont’d)
Finishing the Restoration
Finishing

- Paint/coat surface of restoration with Fuji IX Varnish, petroleum jelly or Fuji Coat LC
- Light cure if necessary
- Check bite using articulating paper
- Adjust if necessary
- Repeat Fuji IX Varnish, Petroleum Jelly or Fuji Coat LC
- (keep in mind varnish tastes terrible … petroleum jelly may be a better idea)
Finishing:
Apply varnish
IRM for Accidental Pulp Exposure

In event of pulp exposure:

• Apply pressure to exposure site using cotton pliers and cotton pellet for a minimum of one minute to stop haemorrhage
• Insert IRM according to manufacturer’s directions
ART Demonstration

Extracted permanent teeth set in stone will be used to demonstrate:

• Cavity preparation
• Caries removal
• Tooth conditioning, and
• Insertion of GI cement

GC Fuji IX powder/liquid and capsules will be used to demonstrate mixing technique
Hands-On Session

• Every participant will be provided with teeth to work on

• All techniques discussed will be practiced

• Each participant will have the opportunity to mix Fuji IX Liquid/Powder and Fuji IX Capsules

• Extra time will be provided for those desiring more practice
Evaluation of ART Training Session

• Constructive criticism aimed at the improvement of the document and presentation is encouraged

• Completion of the evaluation form following the session would be greatly appreciated
Questions...