Learning Objectives

- State the principles of selective polish and discuss current practice trends.
- Compare current polishing methods: rubber cup versus airpolishing giving consideration to natural tooth and man-made restorative structures
- Compare safety & efficacy of several agents
- List a variety of coronal polishing ‘technique pearls’ which help to increase speed, decrease mess and preserve tooth structure

Evidence Based Approach

- Best available scientific evidence
- Clinician’s expertise/judgment
- Patient’s needs and preferences

ADHA Position Paper (has been pulled)

Polishing should not be considered a routine part of the oral prophylaxis. The licensed dental hygienist or dentist is the best qualified to determine the need for polishing. The ability to judge appropriately which patients/clients should or shouldn't be polished is compromised if a practitioner is not knowledgeable. ADHA believes that licensed dental hygienists and dentists are the best qualified to perform polishing procedures. (ADHA Position Statement on Polishing Procedures. www.adha.org, accessed 4/30/2012)

Polishing Agents:

Traditionally abrasive agents act by producing scratches in the surface or restoration created by the friction between the abrasive particle and the softer tooth or restorative surface. (Making a surface smooth)
“After treatment by scaling, root planing and other dental hygiene care, the teeth are assessed for the presence of remaining dental stains and dental biofilm. The use of cleaning and polishing agents for stain and dental biofilm is a ‘selective procedure.’ Polishing is ‘selective’ in that the teeth that need to be polished and the cleaning or polishing agent used must be selected based on the patient’s individual needs.

Wilkins 2013 11th ed (Caren Barnes)

Table 1: Summary of previous research on abrasive effects of polishing

<table>
<thead>
<tr>
<th>Date</th>
<th>Author Specimen</th>
<th>Time (sec)</th>
<th>Pressure (g)</th>
<th>Abrasive Agent</th>
<th>Number of Site</th>
<th>Quantity of Tissue Remained/Effect</th>
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</thead>
<tbody>
<tr>
<td>1967</td>
<td>Vola et al. Human in vitro</td>
<td>5 30 200 3000</td>
<td>3-4 pm emery</td>
<td>Coarse pumice</td>
<td>1</td>
<td>8-10 um</td>
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<td>1975</td>
<td>Koh et al. Human in vitro</td>
<td>9-10 30 200 3000</td>
<td>8-10 250 1500</td>
<td>Coarse pumice</td>
<td>1</td>
<td>8-10 um</td>
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<td>1979</td>
<td>Shockey Human in vitro</td>
<td>8 10 150 3000</td>
<td>1-2 pm emery</td>
<td>Coarse pumice</td>
<td>1</td>
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<td>1979</td>
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<td>8 10 250 1500</td>
<td>1-2 pm emery</td>
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<td>1</td>
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<td>Swan Human in vitro</td>
<td>1 140 3000 4000</td>
<td>1-2 pm emery</td>
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<td>1</td>
<td>8-10 um</td>
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<tr>
<td>1980</td>
<td>Buerl Human in vitro</td>
<td>12 30 4000</td>
<td>1-2 pm emery</td>
<td>Coarse pumice</td>
<td>1</td>
<td>8-10 um</td>
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<td>1981</td>
<td>Thompson and Way</td>
<td>40 30 500 2500</td>
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<td>1</td>
<td>8-10 um</td>
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<tr>
<td>1987</td>
<td>Craven Human in vitro</td>
<td>25 100 150 2500</td>
<td>1-2 pm emery</td>
<td>Coarse pumice</td>
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<td>8-10 um</td>
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<tr>
<td>2004</td>
<td>Kolding et al. Humans</td>
<td>3 15 250 2500</td>
<td>1-2 pm emery</td>
<td>Coarse pumice</td>
<td>1</td>
<td>8-10 um</td>
</tr>
<tr>
<td>Pence et al.</td>
<td>Repetitive coronal polishing yields minimal enamel loss. J Dent Hyg Fall 2011; 85(4): 348-357</td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

Enamel Loss from Polishing

- Up to 3-4 um of enamel removed (1 um = 0.001mm)
- Lab grade pumice not for clinical use
- 30 seconds
- 250 g pressure

Simulated 75 yrs of semi-annual polishing

- Pence et al. Repetitive coronal polishing yields minimal enamel loss. J Dent Hyg Fall 2011; 85(4): 348-357

Enamel removal as an argument for avoiding polishing is not supported by this study.

Note: root surface abrasion

Pence et al. Repetitive coronal polishing yields minimal enamel loss. J Dent Hyg Fall 2011; 85(4): 348-357
Surface

Use of abrasive particle to produce intentional, selective, and controlled wear until surface eventually appears smooth and reflects light.

Barnes 2009

Rate of Abrasion

- Speed
- Pressure
- Quantity of paste applied
- Shape of abrasive particle
- Size of abrasive particle
- Hardness of abrasive particle

Increase in speed = increased abrasion

rpm = revolutions per min

Speed of Handpiece


Effective Polishing Parameters

Lateral Pressure

Increase in pressure = increased abrasion

- Light – moderate intermittent pressure
**How much paste do you use?**

**Shape of Abrasive**

- Sharper edges = increased abrasion

**Size of Abrasive**

- **“GRIT”**
  - Fine 0 to 10 µm
  - Medium 10 to 100 µm
  - Coarse 100 to 200 up to 500µm

**Which grit do you use?**

NUPRO 2014 sales:
- 60% of total sales: COARSE
- 30% of total sales: MEDIUM
- 10% of total sales: FINE

**Hardness of Abrasive**

- Harder particles = increased abrasion
- Mohs Hardness Scale
  - Measures material hardness
  - 1 (talc) to 10 (diamonds)

<table>
<thead>
<tr>
<th>Abrasive Agent</th>
<th>Mohs Hardness Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barite</td>
<td>9.3</td>
</tr>
<tr>
<td>Silicon Carbide</td>
<td>9.0</td>
</tr>
<tr>
<td>Garnet</td>
<td>8.0-9.0</td>
</tr>
<tr>
<td>Emary</td>
<td>7.0-9.0</td>
</tr>
<tr>
<td>Zirconium Silicate</td>
<td>7.5-8.0</td>
</tr>
<tr>
<td>Zirconium Oxide</td>
<td>7.0</td>
</tr>
<tr>
<td>Frit</td>
<td>6.0-7.0</td>
</tr>
<tr>
<td>Perlite</td>
<td>5.5</td>
</tr>
<tr>
<td>Aluminum Oxide</td>
<td>5.4</td>
</tr>
<tr>
<td>Calcium Carbonate</td>
<td>3.0</td>
</tr>
<tr>
<td>Sodium</td>
<td>6.5</td>
</tr>
<tr>
<td>Potassium</td>
<td>0.4</td>
</tr>
<tr>
<td>Dental Tissue</td>
<td>6.5</td>
</tr>
</tbody>
</table>

**Other considerations...**

- Powders or flours with no wetting agent
  - Provide the greatest quantity of abrasives
  - Create excessive heat
  - Uses are contraindicated
To produce the smoothest possible surface...
- Start with the most abrasive to the least abrasive approach
  - Same abrasive material but different grits
  - Different abrasive materials with different grits
- Prevent abrasive contamination
  - Change prophy cups or brushes before the next, less abrasive agent is being used
  - Rinse the surfaces being polishing before the next abrasive is used

Prophy Paste: Abrasives

- Silicon Dioxide
- Pumice
- Calcium Carbonate
- Feldspar
- Aluminum silicate
- Silicon carbide
- Zirconium oxide

- Garnet
- Carbide compounds
- Aluminum Oxide (Alumina)
- Emery
- Perlite
- Zirconium silicate

Prophy Paste Ingredients

- Abrasive (50-60%)
- Water (10-20%)
- Binders (1.5-2.0%)
- Humectants - retain moisture (20-25%)
- Preservatives
- Flavouring agents
- Colouring agents
- Therapeutic agents

Cleaning Agents

- May be used anytime polishing is indicated
  - Little to no stain
  - Type of restorative material is unknown
  - Appropriate polishing agent is unavailable
  - Produce a high luster

Polishing Agents: Therapeutic Benefits

<table>
<thead>
<tr>
<th>Brand</th>
<th>Active Ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI Paste (GC America) - Paste</td>
<td>CPP-ACP (Recaldent™)</td>
</tr>
<tr>
<td>Enamel Pro (Premier) - Prophy Paste</td>
<td>ACP</td>
</tr>
<tr>
<td>Colgate ProRelief - Professional</td>
<td>ACC (Pro-Argin™)</td>
</tr>
<tr>
<td>Colgate ProRelief - Toothpaste</td>
<td>ACC (Pro-Argin™)</td>
</tr>
<tr>
<td>Close Pro 5000 (JM) - Professional Vanish</td>
<td>TCP</td>
</tr>
<tr>
<td>(JM) - White Varnish</td>
<td>TCP</td>
</tr>
<tr>
<td>Nupro Sensodyne – Prophy Paste</td>
<td>CSP (Novamin™)</td>
</tr>
<tr>
<td>(DENTSPLY)</td>
<td></td>
</tr>
<tr>
<td>Sensodyne Protect &amp; Repair – Toothpaste</td>
<td>CSP (Novamin™)</td>
</tr>
<tr>
<td>(GSK)</td>
<td></td>
</tr>
<tr>
<td>X-PUR Toothpaste (Oral Science)</td>
<td>CSP (Novamin™)</td>
</tr>
</tbody>
</table>
Calcium Phosphate Technologies

- Amorphous Calcium Phosphate
- Amorphous Calcium Phosphate – Casein PhosphoPeptide (Recaldent®)
- Calcium Sodium Phosphosilicate (Novamin®)
- Tri Calcium Phosphate (TCP)

Occlude tubules by forming a calcium phosphate precipitate or HCA-like layer

ACP

- Amorphous Calcium Phosphate
- Same minerals found in hydroxyapatite
- In the presence of F it aims to speed up remineralization
- When applied to surface calcium and phosphate ions form (deposition of new mineral)
- Highly soluble / low substantivity
- Not bioavailable after product is rinsed

CPP–ACP

- Casein phosphopeptides* + ACP
- Binding to plaque & tooth surface = a reservoir of bioavailable calcium and phosphate
- Calcium and phosphate are released during acid attack to enhance remineralization
- Tubule occluding
- FDA approved for sensitivity

- www.gcamerica.com

Calcium Sodium Phosphosilicate Novamin®

- Bioactive glass (silica) stabilizes calcium & phosphorous
- Directly forms hydroxycarbonate apatite-like layer (HCA)
- Nupro Sensodyne Prophy Paste

NovaMin® Availability: Professional Concentrations

- Prophy Paste (15% Novamin)
- Apply with rubber cup; wait 1 min before rinsing
- Immediate tubule occlusion
- Polish & stain removal grits

Dentin Block Testing NovaMin® prophy paste

<table>
<thead>
<tr>
<th>Control</th>
<th>After Polishing</th>
<th>After Acid Exposure</th>
</tr>
</thead>
</table>

*results after patching for 10 secs and waiting 1 min before rinsing
**results after 1 minute exposure to 5% citric acid

Image: Dentsply Professional
Desensitizing Paste
Indicated for dentin hypersensitivity
Pro-Argin Technology 8%
Silica as abrasive for stain removal
Toothpaste: Sensitive Pro Relief
Pro Relief Enamel Repair

DH Handpieces: Innovation
- Look for balance and light weight
- Consider ‘cord-free’ models

Cup Design
- Soft cup flexes with less force
- Ribbing/webbing retains paste & minimizes splatter
- Excessive paste = increased abrasion
- Explore quality and look for stability of rubber cup
- Natural rubber = more resilient; adapts readily
- Is latex free important?

Airpolishing: Indications
- Removal of soft deposit and stain
- Use during ortho maintenance
- Sealant Preparation

Advantages of Air Polishing compared to traditional polishing

<table>
<thead>
<tr>
<th>Advantages of Air Polishing</th>
<th>More comfortable for patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can remove up to 100% of bacteria and endotoxins</td>
<td>No heat generated</td>
</tr>
<tr>
<td>Can be used on implants</td>
<td>No pressure against teeth</td>
</tr>
<tr>
<td>Creates uniformly smooth root surfaces</td>
<td>No tooth contact</td>
</tr>
<tr>
<td>Greater access for stain removal in pits and fissures</td>
<td>No tooth contact</td>
</tr>
<tr>
<td>Less abrasive</td>
<td>Reduce operator fatigue</td>
</tr>
<tr>
<td>Method of choice for plaque removal prior to placement of sealants or bonding procedures</td>
<td>Stain and dental plaque removed in less than half the time</td>
</tr>
<tr>
<td>Method of choice for stain and plaque removal from orthodontically bracketed and banded teeth</td>
<td>Temporarily relieves hypersensitivity.</td>
</tr>
</tbody>
</table>

Barnes, Dimensions of Dental Hygiene March 2010; 8(3): 32, 34-36, 40

Air Polishing Systems
- Self Contained
- Attached to Handpiece
- Combination Units
- Stand-alone
- Single-use
**Air Polishing Techniques**

- **Dry system, no air**
- **Single use**

**Air Polishing Agents**

<table>
<thead>
<tr>
<th>Brand</th>
<th>Active Ingredient &amp; Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prophy Jet Powder</td>
<td>Sodium Bicarbonate (2.5)</td>
</tr>
<tr>
<td>Jet Fresh</td>
<td>Aluminium Trihydroxide (3-4)</td>
</tr>
<tr>
<td>Pixie Pearls</td>
<td>Calcium Carbonate (3)</td>
</tr>
<tr>
<td>Syle (Oral Science)</td>
<td>CSP - Novamin (6)</td>
</tr>
<tr>
<td>Air Flow Soft/</td>
<td>Glycine (2)</td>
</tr>
<tr>
<td>Air Flow (EMS)</td>
<td>Calcium Carbonate (3)</td>
</tr>
<tr>
<td>Prophy Pearls (Kavo)</td>
<td>Calcium Carbonate (3)</td>
</tr>
<tr>
<td>Air Flow (EMS)</td>
<td>Sodium Bicarbonate (2.5)</td>
</tr>
</tbody>
</table>

**Air Polishing Abrasives**

<table>
<thead>
<tr>
<th>Mohs Hardness Scale</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumice</td>
<td>6.0 – 7.0</td>
</tr>
<tr>
<td>Enamel</td>
<td>5.0</td>
</tr>
<tr>
<td>Dentin</td>
<td>3.0 – 4.0</td>
</tr>
<tr>
<td>Sodium bicarbonate</td>
<td>2.5</td>
</tr>
<tr>
<td>Aluminium trihydroxide</td>
<td>2.5-4.0</td>
</tr>
</tbody>
</table>

**Calcium Carbonate**

- Naturally occurring
- Mohs hardness: 3
- Not very soluble

**Air Polishing Technique (supra-g)**

- 2-3 secs per surface
  - Rapid, sweeping strokes
  - Tip directed to surface at recommended angle, 3mm to 4mm away from surface
  - Alternate polishing/rinsing to minimize saline taste

**New Technology**

- Single tap activates or deactivates
- 3 prophyl mode autocycles
- Automatically cycles between air polish and rinse
Highly soluble
- 2 Mohs; smaller in size than SB
- Buzz about sub-g application

Glycine based powder

21st Century Smile
- Amalgam
- Gold
- Composite
- Glass Ionomer
- Compomer
- Porcelain
- Ceramic
- Titanium

RDHs need to ...
- Be familiar with the types of restorative materials used in their practices and practice communities
- Clinically distinguish between hard tissues of tooth and well placed esthetic restoration
- Modify treatment procedures to maintain the integrity of the esthetic restoration
- Avoid the “all tooth surfaces are maintained equally” approach

Bottom Line
- Polishing is a science; rethink you role as the ‘tribologist.’
- Avoid ‘Course Pumice Theory’
- Selective Polishing = selective surfaces & selective agents
- Patients deserve ‘Evidence Based Practice’ (Evidence Informed Practice)
  - Research
  - Clinician Expertise (knowledge/skill/judgment)
  - Patient Needs/Preferences

http://www.youtube.com/DENTSPLYAirPolishing/