Presented by: Dani Botbyl, RDH, Clinical Educator

TO POLISH OR NOT TO POLISH?
THAT IS THE QUESTION

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.

ADHA Position Paper

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)

Evidence Based Approach

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

…when I graduated…

Wilkins 6th edition…no Darby and Walsh
‘Extrinsic Stain Removal’
‘Selective’ Polishing
Rubber cup for stain removal
No mention of biofilm
‘Self’ Polishing

Concept of Selective Polishing

Is the practice of omitting tooth polishing in areas where there is not stain and when tooth polishing could cause damage.

Darby & Walsh
2nd Edition 2003
Limit polishing to areas of stain that cannot be removed by other methods.

ADHA Position Paper

**Concept of Selective Polishing**

- Loss of tooth structure during polishing procedure
- Loss of fluoride-rich surface enamel
- Thorough brushing/flossing removes plaque as effectively as polishing

No additional benefit to patient

**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

**Research**

**Repetitive Coronal Polishing Yields Minimal Enamel Loss**

Sandra D. Pence, MS, RDH; Doyle A. Chambers, DMD; Jan G. van Ters, PhD, Randall C. Wallet, DDS; David C. Pieffe, PhD

**Abstract**

Many dental offices provide routine, traditional dental polishing as part of their preventive protocols. As procedure sequence protocols are altered to include coronal polishing, it is important to consider the effect of polishing on enamel thickness and integrity. Limited research has evaluated the effects of cortical polishing on enamel thickness. This study examines the effects of simulated lifetime polishing on enamel thickness. Enamel loss from polishing is compared to the enamel thickness just coronal to the cementoenamel junction (CEJ) to relate results to clinical application.

Pence et al The Journal of DH Vol. 85 No. 4 Fall 2011

**Simulated 75 yrs of semi-annual polishing**

- 5 secs
- Coarse paste NUPRO®
- 150 g
- 2500 rpm

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.

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

“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)

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)

Cleaning Agents:
Non abrasive particles that do not scratch and can be used on any tooth surface, restorative surface or implant surface without fear of creating deep scratches. (Removing debris)

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

Barnes 2009
Mechanism of Polishing

- Lowest speed possible
- Even speed
- Apply cup at 90° for 1-2 seconds
- Bristle brushes for occlusal surfaces only
- Irrigate teeth and interdental areas with water
- Avoid heavy water pressure.

Wilkins 2013

Rate of Abrasion

<table>
<thead>
<tr>
<th>Speed</th>
<th>Pressure</th>
<th>Quantity of paste applied</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Shape of abrasive particle
Size of abrasive particle
Hardness of abrasive particle

Effective Polishing Parameters

- 2500 rpm
- 5 seconds

Increase in speed = increased abrasion

rpm = revolutions per min

TABLE 2: INFLUENCE OF CUP SPEED UPON RELATIVE ENAMEL AND DENTIN ABRASION

<table>
<thead>
<tr>
<th>Cup Speed (rpm)</th>
<th>Relative Enamel Abrasion (REA)</th>
<th>Relative Dentin Abrasion (RDA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>6.20 ± 0.68*</td>
<td>559 ± 48</td>
</tr>
<tr>
<td>1500</td>
<td>10.00**</td>
<td>1000**</td>
</tr>
<tr>
<td>2000</td>
<td>12.23 ± 0.79</td>
<td>1301 ± 85</td>
</tr>
</tbody>
</table>

* Standard deviation
** Arbitrarily assigned reference values


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

Increase in pressure = increased abrasion

- Light – moderate intermittent pressure
- Avg: 150g of pressure *

Lateral Pressure

How much paste do you use?

- Affects abrasivity
- "Adequate" amount
- Empty cup creates frictional heat
- Near empty cup creates dryness
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

No standardization of grit size

Which grit do you use?

NUPRO 2012 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: Barnes CM. The science of polishing. Dimensions of Dentistry. Issue 2009

Other considerations...

- Powders or flours with no wetting agent
  - Provide the greatest quantity of abrasives
  - Create excessive heat
  - Uses are contraindicated
Polishing with Abrasives

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

Commonly used...
- 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

Equipment Notables

Do you use a DH Handpiece?
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?

Polishing Agents with Therapeutic Benefits

- MI Paste (GC America) - Paste
- Enamel Pro (Premier) - Prophy Paste
- Colgate ProRelief - Professional
- Colgate ProRelief - Toothpaste
- ClinPro 5000 (3M) - Professional
- Colgate ProRelief – Toothpaste
- ClinPro 5000 (3M) – White Vanish
- Nupro Sensodyne – Prophy Paste
- Sensodyne Protect & Repair – Toothpaste
- X-PUR Toothpaste (Oral Science)

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>ClinPro 5000 (3M) - Professional</td>
<td>TCP</td>
</tr>
<tr>
<td>ClinPro 5000 (3M) – White Vanish</td>
<td>TCP</td>
</tr>
<tr>
<td>Nupro Sensodyne – Prophy Paste (DENTSPLY)</td>
<td>CSP (Novamin®)</td>
</tr>
<tr>
<td>Sensodyne Protect &amp; Repair – Toothpaste (GSK)</td>
<td>CSP (Novamin®)</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)

Oclude 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 = 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

How NovaMin® works

- NovaMin reacts with saliva allowing sodium ions to exchange with hydrogen ions, raising pH
- At this elevated pH, calcium and phosphate precipitate as calcium phosphate
- Calcium phosphate crystallizes to build a new hydroxyapatite-like layer over exposed dentin and within the dentinal tubules


NovaMin® availability

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

- Results after polishing for 30 sec and waiting 1 min before rinsing
- Images show before and after exposure to dilute acid

Magnification x2000  Image: Dentistry Professionally

Desensitizing Paste

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

Air Polishing
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></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>

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

Rate of Abrasion

<table>
<thead>
<tr>
<th>Speed</th>
<th>Pressure</th>
<th>Quantity of paste applied</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Shape of abrasive particle | Size of abrasive particle | Hardness of abrasive particle

Air Polishing Agents

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

Air Polishing Abrasives

Sodium Bicarbonate - soluble

Mohs Hardness Scale

<table>
<thead>
<tr>
<th>Material</th>
<th>Mohs Hardness</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>
</tbody>
</table>

Comparison of Moh’s Hardness Values

<table>
<thead>
<tr>
<th>Material</th>
<th>Mohs Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentine</td>
<td>2.0 - 2.5</td>
</tr>
<tr>
<td>Enamel</td>
<td>4.0</td>
</tr>
<tr>
<td>Sodium bicarbonate</td>
<td>2.5</td>
</tr>
<tr>
<td>Dicalcium phosphate dihydrate dextrose</td>
<td>2.5</td>
</tr>
<tr>
<td>Calcium carbonate dextrose</td>
<td>3.0</td>
</tr>
<tr>
<td>Acrylic acid-tricalcium phosphate dextrose</td>
<td>3.5</td>
</tr>
<tr>
<td>Tetraacetic acid phosphate dextrose</td>
<td>5.0</td>
</tr>
</tbody>
</table>


Air Polishing Abrasives

Aluminum Trihydroxide

*Sodium-free/non-soluble

Mohs Hardness Scale

<table>
<thead>
<tr>
<th>Material</th>
<th>Mohs Hardness</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>Aluminum trihydroxide</td>
<td>2.5-4.0</td>
</tr>
</tbody>
</table>

250 um
**Air Polishing Abrasives**

**Calcium Carbonate**

- Sodium-free/non-soluble

<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>Calcium Carbonate</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Airpolishing: Indications**

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

**Self Contained**

- Attach to compressed air and water line
- Require electric outlet

**Attached to Handpiece**

- Obtains compressed air and water from handpiece lines
- No electrical connection

**Single use**

- Dry system, no air
- Single use
What’s new in air polishing powders?

- Air Polishing Powder
  - Removes stain/biofilm
  - Immediately desensitizes
    - Before/after perio therapy
    - Before/after whitening
  - 6 mohs
  - Dry recommendation???

Calcium Sodium Phosphosilicate

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

Glycine based powder

- Highly soluble
- 2 Mobs; smaller in size than SB
- Buzz about subg application

Air Polishing Technique

- 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

Anterior: 60° with tip aimed at middle 1/3 of surface

Posterior: 80° with tip aimed slightly distally

Occlusal: 90° to occlusal surface

Enjoy the Conference!

Thank you

dani.botbyl@dentsply.com

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)
  - Patient Needs/Preferences