“THE FUNDAMENTALS OF AIR POLISHING”

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PRE AND POST TEST

1. Air polishers can safely and efficiently remove extrinsic stain. Air polishers are indicated for use on both natural tooth surfaces and composite resin restorations.
   a. both statements are TRUE
   b. both statement are FALSE
   c. the first statement is TRUE, the second is FALSE
   d. the first statement is FALSE, the second is TRUE

2. Air polishers use which one of the following to achieve stain removal?
   a. speed
   b. water
   c. friction
   b. pressure

3. The expanded use of air polishers includes each of the following EXCEPT one. Which one is the EXCEPTION?
   a. implant maintenance
   b. sealant and bonding preparation
   c. levels over contoured composite resin restorations
   d. plaque removal around orthodontic bands and brackets

4. Air polishers use a specially processed sodium bicarbonate agent to remove extrinsic stain. The agent is more abrasive than traditional rubber cup and polishing paste.
   a. both statements are TRUE
   b. both statement are FALSE
   c. the first statement is TRUE, the second is FALSE
   d. the first statement is FALSE, the second is TRUE

5. The correct air polishing instrumentation angulations are 60 degrees for anterior teeth; 80 degrees posterior; and 90 degrees for occlusal surfaces. Which of the following statements explain why using various angulations is recommended when removing stain from a tooth?
   a. reduces splatter
   b. results in decreased abrasion
   c. increases efficiency to remove stain
   d. lessens the incidence of carpal tunnel syndrome
COURSE DESCRIPTION
Have you tried air polishing in the past and hated it? Are you a current user and wish to enhance the use of your air polisher? This course is both for new, previous and current users who want concise and clinical knowledge about the use air polishers. Emphasis will be placed on the safety/efficacy of air polishers, indications for use and clinical instrumentation techniques to support the superiority and versatility of air polishers over traditional rubber cup polishing.

COURSE OBJECTIVES
At the completion of this course, the participant will be able to:
- Discuss the indications for use of an air polisher
- Discuss the various air polishing agents and their suggested use
- Describe the proper clinical technique when using an air polisher

BACKGROUND
1. DEFINITIONS
   - Polishing
     - achieves a smooth, mirror like enamel or material surface that reflects light and is characterized as having a high luster
     - accomplished with a fine grit abrasive agent so that the surface scratches are smaller than the wavelength of visible light (< 0.5μm)
     - coronal polishing: removal of plaque and extrinsic stain
   - Therapeutic polishing
     - polishing of the root surfaces that are exposed during surgery to reduce endotoxin and microflora on the cementum
     - therapeutic polishing may also use agents for the purposes of remineralization, hypersensitivity and inhibiting dental caries
   - Cleansing
     - removes plaque biofilm and extrinsic stain from tooth surfaces after scaling
     - accomplished by using a cup/bristle brush on a prophylaxis angle attached to a low speed handpiece or an air powder system
     - cleansing can also be accomplished by the patient with a toothbrush, dentifrice and interdental cleaning devices
   - Selective Polishing
     - optional and site specific
     - cleansing and polishing procedures are only provided when justified by tooth surfaces that have visible stains after scaling and oral debridement are complete
     - newly erupted teeth, crowns, and composite restorations are usually avoided to prevent damage to restored and natural teeth
     - stain removal is essentially done for aesthetic and not for health-based reasons

2. **COMMON DENTAL STAINS**
   
   **Brown**
   
   Causes: food, beverage, tobacco, CHX
   
   Removal: light scaling, polishing

   **Black**
   
   Causes: gram positive chromogenic bacteria characterized as a thin black line, which is firmly attached on the gingival third of the tooth
   
   Removal: moderate scaling

   **Yellow or Orange**
   
   Causes: poor oral hygiene
   
   Removal: toothbrush

3. **TRADITIONAL RUBBER CUP AND POLISHING PASTE – FACTORS CONTRIBUTING TO ABRASION**

   a. Type and amount of agent used (particle shape)
   b. Speed: rotations per minute (rpm) of the rubber cup polisher
   c. Rubber cup-to-tooth pressure or load
   d. Time spent polishing each stained area


4. **CONTRAINDICATIONS FOR USING TRADITIONAL RUBBER CUP AND POLISHING PASTE**

   1. Absence of extrinsic stains
   2. Acute gingival and periodontal infection
   3. Esthetic restorations
   4. Allergy to paste ingredients
   5. Dental caries
   6. Decalcification
   7. Enamel hypoplasia
   8. Exposed dentin or cementum
   9. Hypomineralization
   10. Newly erupted teeth
   11. Patients with respiratory problems
   12. Recessions
   13. Tooth sensitivity
   14. Xerostomia
AIR POLISHING

1. **DEFINITION**
   A stain removal system that uses a combination of compressed air, water and typically a specially processed sodium bicarbonate; and is used as an **alternative to traditional polishing**. A hand piece and unit designed for air polishing that propels expels an air-slurry mixture, which serves as the abrasive. The abrasive particles start out as relatively large granules, but as they combine with water, they soften and dissolve, becoming smaller and smaller.

2. **ADVANTAGES**
   Air polishers have been proven to remove extrinsic stain more rapidly and thoroughly than scalers, abrasives in rubber cups, strips, etc., without significant changes in surface appearance of enamel or dentin. In comparison to traditional polishing methods, air polishing is:
   - more efficient
   - less abrasive
   - more cost effective
   - more versatile
   - environmentally friendly

3. **DISADVANTAGES**
   - dispersed aerosols
   - incorrect use can traumatize soft tissue
   - highly polished restorations will result in a matte finish

4. **EXPANDED CLINICAL APPLICATIONS**
   - removal of plaque and soft debris
   - polishing for orthodontic patients
   - before placement of sealants and bonding
   - implant maintenance
   - prior to use of caries-detection devices (DIAGNOdent)

5. **AGENTS**
   - Sodium Bicarbonate
   - Aluminum Trihydroxide
   - Calcium sodium phosphosilicate
   - Calcium Carbonate
   - Glycine
   - Erythritol

6. **ABRASIVITY**
   - Mohs Scale of Mineral Hardness
     - Characterizes the scratch resistance of various minerals through the ability of a harder material to scratch a softer material.
7. **Medical Considerations**
   - Systemic steroid therapy
   - Patients taking diuretics
   - Compromised respiratory conditions
   - Communicable diseases
   - Sodium restricted diets
   - Hypertensive patients
   - Chronic end-stage kidney disease

8. **Dental Considerations**
   - Amalgam
   - Gold
   - Composite resins
   - Exposed root surfaces
   - Implants

9. **Clinical Preparation**
   - Unit
     - Adjust power indicator
     - Adjust water/powder ration
     - Foot control
     - Air nozzle
   - Patient
     - Patient positioned at a 45 degree angle
     - Head turned toward operator
     - Direct vision and external fulcrums
     - Position high volume evacuator and/or saliva ejector
     - Place mouthwash-soaked 2 x 2 gauze square/cotton roll on the floor of the mouth

10. **Instrumentation**
    - Use thumb and forefinger to grasp the patient’s lip and/or cheek to form a cup
    - Use hand to contain aerosols
    - Nozzle tip 3 to 4 mm from the tooth
    - Directed at the middle to incisal third of the tooth
    - Constant circular motion
    - Polish 1 to 2 teeth for 1 to 2 seconds
    - Rinse excess slurry often

11. **Angulation**
    - Anterior: 60 degree angulation
    - Posterior: 80 degree angulation
    - Occlusal: 90 degree angulation
12. **SUBGINGIVAL AIR POLISHING**

- **Purpose:** to remove subgingival biofilm and clean root surfaces
- **Agents:** Glycine powder air polishing (GPAP) Erythritol
- **Clinical Technique:**
  - Use specially designed nozzle that possesses multiple openings; are thin and tapered
  - Properly position high volume evacuation
  - Gently insert nozzle subgingivally until resistance felt; slightly withdraw the nozzle to allow for at least a 3mm distance from the base of the pocket to the tip of the nozzle
  - Activate the air polisher and instrument the entire subgingival root surface using a circular motion for 5 seconds per surface.

13. **EQUIPMENT MAINTENANCE**

- **End of Day**
  - Empty powder chamber at the end of the day
  - Store powder in a cup that has a tightly secured cap
  - Flush system and use high volume evacuator to remove any residual powder
  - Secure powder chamber cap on the unit
- **Start of Day**
  - Fluff powder before re-filling powder chamber
  - Ensure that excessive powder does not fill the air flow tube

**ALTERNATE STRATEGIES FOR EXTRINSIC STAIN REMOVAL**

- **Rubber Cup and Prophylaxis Paste Technique**
  - Select appropriate grit paste based on oral assessment
  - Change cups or brushes in between use
  - Use in progression
    - Coarse – Medium - Fine
  - Rinse area thoroughly before applying the next agent
- **Substitute Agents**

<table>
<thead>
<tr>
<th>Restoration</th>
<th>Abrasive Agent</th>
<th>Vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Resins</td>
<td>Aluminum Oxide</td>
<td>Paste, Rubberized Polishers</td>
</tr>
<tr>
<td>Diamond Abrasives</td>
<td></td>
<td>Paste, Rubberized Polishers</td>
</tr>
<tr>
<td>Silicon Dioxide</td>
<td></td>
<td>Rubberized Polishers</td>
</tr>
<tr>
<td>Zirconium Oxide</td>
<td></td>
<td>Rubberized Polishers</td>
</tr>
<tr>
<td>Zirconium Silicate</td>
<td></td>
<td>Paste, Disks, Strips</td>
</tr>
<tr>
<td>Porcelain</td>
<td>Aluminum Oxide</td>
<td>Paste, Rubberized Polishers</td>
</tr>
<tr>
<td>Ceramics</td>
<td>Aluminum Oxide</td>
<td>Paste, Rubberized Polishers</td>
</tr>
<tr>
<td>Carbide Compounds</td>
<td></td>
<td>Paste, Multifluted Finishing Polishers</td>
</tr>
<tr>
<td>Diamond Paste</td>
<td></td>
<td>Paste</td>
</tr>
<tr>
<td>Microfilled Composite</td>
<td>Carbide Compounds</td>
<td>Multifluted Finishing Polishers</td>
</tr>
<tr>
<td>Glass Ionomer Composite</td>
<td>Glass ionomer products</td>
<td>Paste</td>
</tr>
<tr>
<td>Gold</td>
<td>Brown, Green</td>
<td>Cups and Points</td>
</tr>
<tr>
<td></td>
<td>Silex, Tin Oxide, Submicron aluminum oxide</td>
<td>Rubber cup</td>
</tr>
</tbody>
</table>
- **Cleaning Agents**
  - Flat, round particles that produces a high luster
  - Active ingredient: feldspar (alkali: sodium, potassium and calcium aluminosilicates)
  - Formulated into a powder
  - Mix with sodium fluoride or water; apply as a paste
  - Examples:
    - ProCare® Prophylaxis Paste Mix
    - Polishing Paste (Shimmer™)
    - CPR™ Cosmetic Polishing Restorative Sapphire Paste (Premier)
    - Diamond Micro-polisher Disc (PoGo™)

**Patient Self Care**
- Use the least abrasive toothpaste
  - May be equal to prophylaxis paste
- Hardness of esthetic restorative materials rivals the hardness of cementum and dentin, not enamel
- Hardness of abrasive agents used in toothpastes are hundreds of times harder than natural tooth structures and even more so than esthetic restorative materials.
- Use a soft bristle toothbrush
- Focus on pressure applied during tooth brushing
### APPENDIX 1: TYPES AND USES OF ABRASIVES

<table>
<thead>
<tr>
<th>TYPE OF ABRASIVE</th>
<th>EXAMPLE OF DEVICE</th>
<th>TYPE OF RESTORATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Oxide</td>
<td>Paste, polymer discs, strips, rubber wheels and points, white stone</td>
<td>Porcelain, ceramics, composite resins</td>
</tr>
<tr>
<td>Carbide Compounds</td>
<td>Multifluted finishing burs, discs, cups, points or wheels (slow speed handpiece)</td>
<td>Microfilled composites, ceramics</td>
</tr>
<tr>
<td>Diamond Abrasives</td>
<td>Diamond finishing burs, rubberized polishers, discs, brushes, paste</td>
<td>Composite resins</td>
</tr>
<tr>
<td>Silicon Dioxide</td>
<td>Rubberized cups or points, finishing and polishing</td>
<td>Composite resins</td>
</tr>
<tr>
<td>Zirconium Oxide</td>
<td>Rubberized finishing and polishing rotary shapes</td>
<td>Composite resins</td>
</tr>
<tr>
<td>Zirconium Silicate</td>
<td>Strips, disks and prophy pastes</td>
<td>Composite resins</td>
</tr>
</tbody>
</table>

### APPENDIX 2: EXAMPLES OF POLISHING PASTES
(Adapted from Jones T. Polishing techniques for beauty and longevity. Dentistry Today 2009)

<table>
<thead>
<tr>
<th>POLISHING AGENT</th>
<th>PRODUCT EXAMPLE</th>
<th>RATIONALE FOR USE</th>
<th>MANUFACTURER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon dioxide</td>
<td>Proxyl Coarse</td>
<td>Removal of stains on porcelain and composite materials</td>
<td>Ivoclar Vivadent</td>
</tr>
<tr>
<td>Silicon dioxide</td>
<td>Proxyl Medium</td>
<td>Plaque removal, polishing on porcelain and composite materials</td>
<td>Ivoclar Vivadent</td>
</tr>
<tr>
<td>Silicon dioxide</td>
<td>Proxyl Fine</td>
<td>Removal of stain, plaque removal on porcelain and composite, starts out course and breaks down to fine</td>
<td>3M ESPE</td>
</tr>
<tr>
<td>Perlite</td>
<td>Clinpro</td>
<td>Removal of stain, plaque removal on porcelain and composite, starts out course and breaks down to fine</td>
<td>3M ESPE</td>
</tr>
<tr>
<td>Aluminum oxide</td>
<td>Nupro Shimmer</td>
<td>Improve luster, shine, polish on composites</td>
<td>DENTSPLY COSMEDENT</td>
</tr>
<tr>
<td>White sapphire</td>
<td>CRP</td>
<td>Gentle stain removal and restoration of luster on porcelain and composite materials. Gentle stain removal without pumice, reduces sensitivity, safe for porcelain and composite materials. Pumice free.</td>
<td>ICCare Waterpik Sunstar Butler</td>
</tr>
<tr>
<td>Novamin</td>
<td>Softshine</td>
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<tr>
<td></td>
<td>NuCare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diamond paste</td>
<td>Diamond Polish</td>
<td>Improves shine, luster, high gloss on porcelain</td>
<td>Ultradent Premier Dental</td>
</tr>
<tr>
<td></td>
<td>Luminescence Plus</td>
<td></td>
<td>Sultan Dental Products</td>
</tr>
<tr>
<td></td>
<td>Topex Brilliance</td>
<td></td>
<td>Shofu Dental</td>
</tr>
<tr>
<td></td>
<td>Micrograin Paste</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>DirectDia Paste</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recaldent (CPP-ACP)</td>
<td>MI Paste</td>
<td>Final/Post polishing to decrease sensitivity</td>
<td>GC America</td>
</tr>
<tr>
<td>(No abrasive present)</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>