**Air Polishing**

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By Salim Rayeman, RDH, MPA, and Elvir Dincer, DDS

The concept of air-polishing units is based on a technology developed by Dr. Robert Black in 1945. Black invented a device called the Air Dent, which used compressed air, water and a high-speed abrasive for the removal of intra- and extra-oral hard deposits from the oral cavity. While the Air Dent presented many problems, the technology represented the first step in air-polishing devices. Air-polishing units were first introduced in 1976, and from that time forward it became widely available. Air-polishing units are accomplished by the utilization of abrasive particles through a high-speed air stream directed at a tissue or surface, such as a tooth or the mucosa. The abrasive particles impact the tooth surface and remove stains and plaque biofilm from tooth surfaces. It is equally effective in removing root surfaces, specifically on subgingival areas more uniformly than polishing or the use of curets. Other research has shown that air-powder polishing can render cementum surfaces more uniformly smooth, compared with traditional polishing or the use of curets. The air-powder polisher can remove subgingival bacteria through the Venturi effect. This occurs when the air/water/powder mixture is directed at a 90-degree angle to the interproximal spaces so that a vacuum is created that extracts tissue fluids, including subgingival bacteria from the subgingival space. The air-powder polisher has been used for debondment of Class V shaded areas before placement of glass ionomer cements. When compared with cleaning the area with a rubber-cup polisher, the air-powder polished tooth had less microleakage around the enamel-cement interface. Similar results were noted when using the air-powder polisher before sealant application. It was reported to be superior to rubber-cup polishing in preparing enamel for sealants and sealing. Deep proximal penetration into enamel and increased sealant bond strength was also reported in comparison with traditional polishing with pumice and water. In addition, clinicians prefer using the air-powder polisher on orthodontic patients, and research has shown that it does not affect the bracket adhesive system.

**Types of powder**

The most common type of abrasive particle used with the air-powder polisher is sodium bicarbonate, which is treated to be free-flowing with calcium phosphate and silica. Sodium bicarbonate is a food grade material, and each particle is approximately 74 microns in size. The Mohs scale hardness number for sodium bicarbonate is 2.5. In comparison, Pumice has a Mohs hardness number of 6.

Sodium bicarbonate is safe for use on enamel, amalgam, gold, porcelain, implants (titanium) and orthodontic materials. However, its use should be avoided on all types of composite, glass ionomers and luting agents (cements). When used on implants, air-polishing with sodium bicarbonate may not be detected subgingivally, thus it is the method of choice for decontamination of implants.

A sodium-free air-powder for air-powder polisher also includes patients taking potassium, anti-diuretics or steroid therapy—all of which can disrupt the acid-base balance. Contraindications for use of the air-powder polisher also extend to the hard and soft tissues; therefore, the dental history assessment is paramount. Hard tissue presents that with any composite resins, sealants or glass ionomers should be avoided. The susceptibility of these materials to surface roughness or pitting.

Porcelain margins and margins of all restorations can be air-polished which will be effective in controlling surface roughness. However, it is necessary to avoid using air polishing in areas of the occlusion, such as the contact points; otherwise, it may cause excessive abrasion. In addition, patients who present with active periodontal conditions with soft and connective tissues are considered a contraindication because the air-powder polisher can cause enamel erosion or small bleeds. Lastly, pediatric patients with deciduous teeth or newly erupted permanent teeth are also contraindicated.

**Air-powder polishing unit and operator preparation**

The clinician should be properly prepped according to the manufacturer’s indications prior to using the air-powder polishing unit and abrasive powder, according to patient specific contraindications for use of the air-polishing device. The unit and handpiece nozzle is prepared according to manufacturer’s directions, the patient is positioned and the oral cavity is retracted by the use of a high-speed evacuation system used with the air-polishing device. The patient preparation device used in this procedure has been shown to be effective in controlling and reducing aerosol exposure, thus decreasing the potential for disease transmission. The aerosol-reduction device is used in conjunction with a high-speed handpiece and the visible aerosols normally produced during air-powder polishing. Additionally, the aerosol reduction device (Fig. 4) eliminates the need for exact patient positioning, such as the gains, hand cupping and patient positioning.

Another advantage to the aerosol-reduction device is the possibility of tooth abrasion because the cup is placed directly in the patient’s mouth, which gives the manufacturer’s instructions for assembly and disassembly. The aerosol-reduction device contains two...
The patient assessment process should include an in-depth health and risk assessment to identify and possibly rule out patients who have hypertension and/or are on a physician-directed, coloration-restricted diet.

Clinical technique

There is a universal air-powder polishing indication that can be used with all types of systems, however manufacturers may have different instructions for use of their equipment. The recommended technique prevents undulation from deflecting back to the clinician or being directed into the patient soft tissues. The use of high-speed evacuation or the saliva ejector is the most efficient way to control the aerosol spray. While positioning of the patient and operator are basically unchanged, direct vision and access become increasingly important as the polisher is active.

Positioning the patient slightly up-right at 45 degrees with the patient’s head toward the operator to access areas and reclining to treat maxillary lingual surfaces provides a better field of vision and increase patient comfort. Placing moistened 2-by-2-inch gauze squares over the tongue or on the patient’s lip near the work area will help reduce burning and stinging experienced by some patients. The clinician has two compromises levels. Full-compression release releases the aerosol powder-abrasive from the tip, and halfway compression produces a stream of water for rinsing and cleaning. Before the polisher is activated in the patient’s mouth, it is recommended that the clinician check the amount of water and powder coming from the unit, test the sensitivity of the alternating cycles and confirm the powder-abrasive type.

The clinician should establish and maintain an aseptic system when using the air-powder polisher. The nozzle tip should always maintain an appropriate distance from the tooth surface (approximately 3 to 4 mm). Holding the nozzle farther away from the tooth surface is not recommended because the powder action is reduced. Reducing the spray angle and increases aerosol production. Cupping the lip with the index finger helps to push the patient’s saliva into the unit. Air-powder abrasives are exposed to slurry for even less time or exposed to slurry for even less time or cleaned for approximately 15 seconds to clear any powder remaining in the chamber.

At the end of the workday, the unit should be turned off, powder removed from chamber and used powder discarded to prevent clogging of lines. Also, keep the powder chamber and air lines free of moisture, which can cause the system to fail. The clinician then needs to remove any residual powder from the chamber with a HVE and activate the unit for approximately 15 seconds to clear any powder remaining in the chamber.

Conclusion
Therapeutic polishing is the removal of stains from the unexposed root surfaces, which results in a decrease in disease parameters. Polishing root surfaces is possible with both the rubber-cup and airpowder polisher; however, the rationale for selecting the air-powder polisher is for its effectiveness and efficiency.

The clinician should follow the precautions and considerations present when polishing for therapeutic benefits with the air-powder polisher. The clinician should be aware to direct the air-powder spray against the tooth surface, not the exposed soft tissues. Most importantly the clinician must consider all options — aesthetic, therapeutic and patient goals when designing a treatment plan.

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Molds can be disposed of and the nozzle should be cleaned with a wire cleaning tool to prevent clogging. Nozzle tips must be autoclaved after each use, and the entire unit should be disinfected with an EPA-approved disinfectant. Using a disposable barrier will help minimize disinfecting time.

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