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1 2013

_c.e. article
Air polishing

_c.e. article
Should caries management be a mystery?

_c.e. article
Continuous care strategy to manage dentinal hypersensitivity

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Celebrating 100 years of dental hygiene

JoAnn R. Gurenlian, RDH, PhD
President-Elect, International
Federation of Dental Hygiene

_How often do we get to celebrate a historical moment such as the 100th anniversary of dental hygiene? 2013 is truly a special year for those individuals who are dedicated to the prevention of oral disease. While gains have been made in some areas, there is still room for improving the oral and general health of the public.

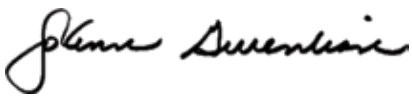
What might the next 100 years hold for this profession? Just as there are new technologies to be heralded as presented in this publication, dental hygiene needs to continue to develop new ways of meeting the health needs of the public. Looking back, Alfred C. Fones conceptualized a hygienist as someone who would work in school systems to help children learn how to brush their teeth, reduce plaque and minimize oral disease. Looking ahead, we find ourselves wanting to reach beyond the classroom and the clinical operatory to an arena of settings that expand the concept of health homes.

Inter-professional or collaborative models of care may be the closest we can come to creating health homes for those in need. Being inclusive and capitalizing on the expertise of a group of health care professionals may help all providers bring the best to patient/client care. Working toward achieving health for individuals, families and communities can change the narrative about the health of America from one that's defined by worries about how to obtain health resources to one that reflects a commitment to improved health for all.

Remarkable as it may seem, the time arrived long ago when oral health professionals had to become advocates for health care by first capturing the interest of policymakers who neither fully understand nor feel the need to change the health care system. Despite the many reports that reflect the less than terrific health of the nation, if oral health care providers do not advocate for change, policymakers will not either.

To improve the oral health of the country, we need to look beyond today – far into the future. We must create an educational experience that changes the culture of dental hygiene science and practice. We must strive for creating and testing new models of health care, looking at outcomes as a means to an end. We must teach the dental hygienists of the future to be accountable for achieving prevention. To do that, hygienists will need to be flexible, alert for opportunities and willing to chart new territory.

When we get to 2113, let's hope those looking back at us see us as the pioneers who were able to eradicate oral diseases – and enable the public to enjoy a lifetime of health.



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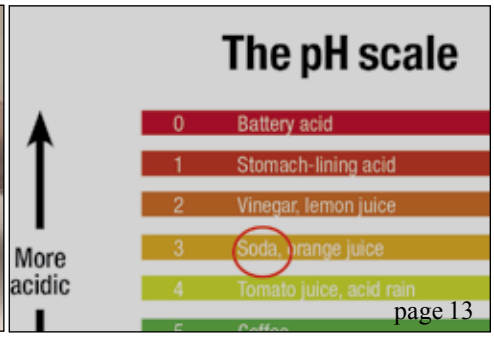
page 07


page 07



page 13

C.E. articles

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page 17


page 21


page 21

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Air polishing

Authors_Salim Rayman, RDH, MPA, and Elvir Dincer, DDS

_The concept of air polishing 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 highly abrasive powder to eliminate pain from cavity preparation, making anesthesia unnecessary.

While the Air Dent presented many problems, the technology represented the first step in air-polishing devices. Air polishing was first marketed in 1976, and from that time forward it became widely available.

Air-powder polishing is accomplished by the propulsion of abrasive particles through a mixture of compressed air and water through a handpiece nozzle. The handpiece nozzle through which the slurry is propelled is activated with a foot control. The air pressure produced, measured in pounds per square inch (psi), depends on the type of air-powder polisher being used.

Air-powder polishers are manufactured as separate handpiece units that attach directly to the air/water connector on the dental unit as a separate device or in combination with an ultrasonic scaler.

_Indications for use

Coronal polishing is a cosmetic procedure designed to remove extrinsic stains from the enamel surfaces of the teeth. This can be accomplished by abrasion and erosion of the extrinsic stain. The most common technique for stain removal is rubber cup polishing. This technique uses an abrasive polishing agent and a slowly revolving polishing cup to abrade stain from the tooth surface. Air-powder polishing is accomplished by erosion of extrinsic stains by suspended abrasive particles within a moving fluid. Kinetic energy propels the air-powder polishing slurry particles against the tooth surface, thus removing stain (Figs. 1a, b).

The air-powder polisher is shown to be efficient, safe and effective in removing extrinsic stain and plaque biofilm from tooth surfaces. It is equally effective in decreasing root surface roughness after instrumentation. It is also reported to remove plaque biofilm and staining as effectively as a rubber cup and does so in less time.[2] Patients often exhibit extensive

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Fig. 1a


Fig. 1b

Figs. 1a, b_Removal of extrinsic stains. (Photo/Provided by Yosi Behroozan, DDS, DENTSPLY Professional)

Fig. 2

Fig. 3

Fig. 4

Fig. 2_Jet Fresh prophy powder. (Photos/Provided DENTSPLY Professional unless otherwise noted)

Fig. 3_Fill the powder chamber with an abrasive recommended by the manufacturer.

Fig. 4_Powder control knob.

staining on root surfaces, specifically on areas of recession and at the cementoenamel junction. Removing these stains with a curet has been shown to reduce root structure. However, when stain removal is for esthetic reasons, the air-powder polisher is preferable to the curet. The air-powder polisher removes less root structure than the curet in simulated three-month recalls for three years. The stain was also removed more than three times faster with the air-powder polisher.[5]

Using the air-powder polisher also creates less discomfort for patients who have dentinal hypersensitivity because the sodium bicarbonate particles embed in the dentinal tubules, lessening dentinal hypersensitivity discomfort almost immediately. In vitro, research has shown that there is little or no disruption of enamel, cementum and dentin surfaces with air-powder polishing.

Other research has shown that air-powder polishing can render cementum surfaces more uniformly smooth, compared with traditional polishing or the use of curets.[5]

The air-powder polisher can remove subgingival bacteria through the Venturi effect. This occurs when the air/water/powder spray 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 debridement of Class V abraded 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 etching and sealants.

Deeper resin 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 mcm 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 composites, glass ionomers and luting agents (cements).[13] When used on implants, air polishing with sodium bicarbonate, should not be directed subgingivally, thus it is the method of choice for decontamination of implants.

A sodium-free powder for air-powder polishing is available (Fig. 2) (Jet Fresh from DENTSPLY Professional, York, Pa.). Developed for patients who are sodium intolerant, this powder is made of aluminum trihydroxide, which has a Mohs' hardness number of 2.5 to 3.5 and a particle range in mesh size from 80 mcm to 325 mcm.

Aluminum trihydroxide powder is safe for enamel; however, it is too abrasive for use on other tooth structures, and its use should be avoided on all dental materials. While using aluminum trihydroxide does not cause surface disruption to porcelain, its use can remove the luting agent, causing a compromise in the margin integrity that can quickly lead to decay.[4]

Fig. 5

Fig. 5_Aerosol-reduction device. (Photo/Provided by DENTSPLY/ Raintree Essix)

_Patient assessment

Because of the various indications and contraindications associated with use of the air-powder polisher, patient assessment and treatment planning are critical prior to use. The patient assessment process should include a thorough health history evaluation to identify and possibly rule out patients who have hypertension and/or are on a physician-directed, sodium-restricted diet. However, the amount of sodium bicarbonate ingested during air polishing is not sufficient to cause alkalosis or an increase in blood pressure or sodium levels in the blood.

Other patients who are contraindicated include those who have end-stage renal disease, are immunocompromised, have a communicable infection or have Addison's or Cushing's disease. In addition, patients with respiratory problems, such as chronic obstructive pulmonary disease or any condition that interferes with breathing or swallowing, should be treated with an alternative approach. Such patients could be compromised by the aerosols created by air-powder polishing, and they are also vulnerable to the development of pneumonia.[4] Contraindications for using the air-powder polisher also include 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 that presents with any composite resins, sealants or glass ionomers should be avoided because of susceptibility of those materials to surface roughness or pitting.

Porcelain margins and margins of all restorations can be altered by extensive exposure of the air-powder polisher, and this can lead to loss of marginal integrity, surface roughness, staining and pitting.[1] Exposed cementum or dentin, because they are not as mineralized as enamel, are more susceptible to abrasion. In addition, patients who present with active periodontal conditions with soft and spongy tissue are contraindicated because the air-powder polisher can cause air embolism or small blood clots. Lastly, pediatric patients with deciduous teeth or newly erupted permanent teeth are contraindicated.

_Patient preparation

It is with utmost importance that before using the air-powder polisher, clinicians must prepare themselves *and* their patients. Patient preparation would include a thorough explanation of the procedure, review of medical history and taking of blood pressure. The clinician should place a disposable or plastic drape over the patient's clothing, provide the patient with safety glasses and confirm removal of contact lenses. The clinician should make sure the patient is in a more upright position. A non-petroleum lubricant should be applied to the patient's lips to protect them from the abrasive spray, which can dry the lips.

Research has confirmed that when the clinician performs air-powder polishing, aerosols of microorganisms can contaminate surfaces several feet from the operative site. Instructing the patient to use an antimicrobial preprocedural rinse, such as 0.12 percent chlorhexidine, can reduce risk of bacterial contamination from these aerosols.

_Air-powder polishing unit and operator preparation

The clinician should be properly protected when performing air-powder polishing. Standard precautions include wearing fluid-resistant protective apparel, using a face shield or protective safety glasses with side shield and wearing gloves and a well-fitting mask with high filtration capabilities. In addition, because of the risk of contamination from the aerosols, the use of a high-speed evacuation system is recommended. Clinicians should always follow the manufacturer's user directions that are specific to the air-polishing unit being used.

Unit preparation includes obtaining all necessary equipment, such as the air-powder polishing unit and abrasive powder, according to patient selection. The unit and handpiece nozzle is prepared according to manufacturer's directions, and the powder compartment is filled with the appropriate abrasive recommended for the machine being used (Fig. 3).

The unit should be turned on for at least 15 seconds to eliminate residual powder or moisture in the lines. Also, water lines need to be flushed before use,