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The Management of Aerosols with Airpolishing Delivery Systems

Caren M. Barnes
University of Nebraska Medical Center, cbarnes@unmc.edu

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The Management of Aerosols with Airpolishing Delivery Systems

By Caren M. Barnes, RDH, MS.

Introduction

Since the Prophy-Jet C-100 (Cavitron/Clev-Dent) was introduced in 1979,[1] airpolishers have become popular devices in dental and dental hygiene practices[2,3] —used for the removal of extrinsic stains, dental plaque, and soft debris. Numerous studies have supported the advantages of airpolishing in the oral prophylaxis; for use prior to bonding procedures, for use on orthodontically bracketed and banded teeth, for root detoxification and removal of chlorhexidine stain, and for polishing implant prostheses.[4-8]

Because airpolishers utilize air, water, and specially processed sodium bicarbonate particles that are propelled to the tooth surface under 43-58 psi,[9] the production of the aerosols into the dental environment is inherent.[10-12] This inherent aerosol production has caused concern among clinicians,[10-12] especially since guidelines for infection control practices have been established by the Occupational Safety and Health Administration and the Centers for Disease Control.[13,14]

Specific principles of technique that relate to aerosol control with airpolishers, when employed, significantly reduce the liberation of aerosol particles into the dental environment.

Handpiece Angulation and High-Speed Evacuation

Proper angulation of the airpolisher handpiece and use of high-velocity evacuation significantly minimize the generation and the liberation of the aerosol particles into the dental environment.[15,16] As can been seen in Figures 1 through 3, the handpiece nozzle should be held 3-4 mm from the tooth surface. The handpiece nozzle should be kept at a 60° angle toward the facial and lingual surfaces of the anterior teeth (Figure 1), and an 80° angle toward the buccal and lingual surfaces of the posterior teeth (Figure 2). Occlusal surfaces should be polished by directing the handpiece nozzle at a 90° angle to the occlusal surface (Figure 3). Incorrect angulation of the handpiece nozzle is probably the single most common cause of excess aerosol production. When clinicians direct the handpiece at a 90° angle toward facial, buccal, and some lingual surfaces, the result is an immediate reflux of the aerosolized spray back onto the operator (Figure 4). Changing the angle of incidence to the proper angulations of 60° and 80° will result in a change in the angle of reflection, thus reducing the amount of reflux of aerosolized spray.

Research shows that, in addition to utilizing correct angulations, high-velocity evacuation[15] significantly reduces patient and operator exposure to aerosolized particulates. The high-velocity evacuator should be held as close to the handpiece nozzle as possible, or parallel to it.

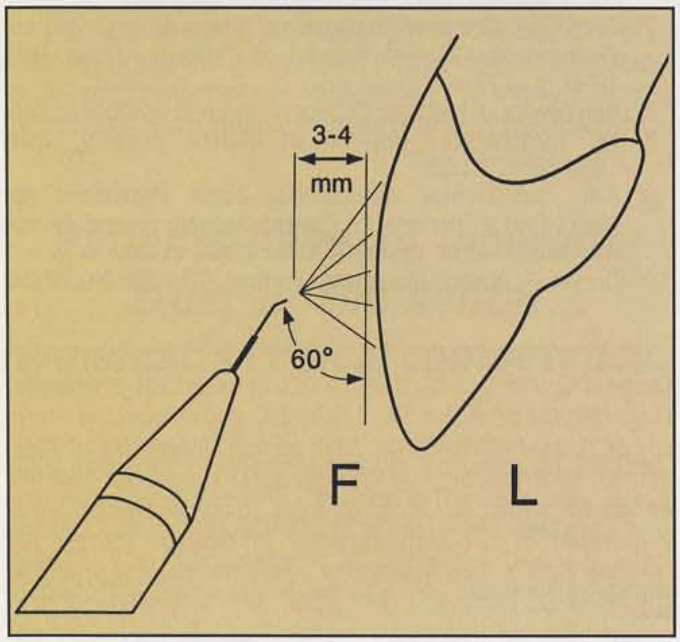

Figure 1. The airpolisher handpiece nozzle should be held 3-4 mm from the tooth surface and angled at 60° toward the facial and lingual surfaces of anterior teeth.

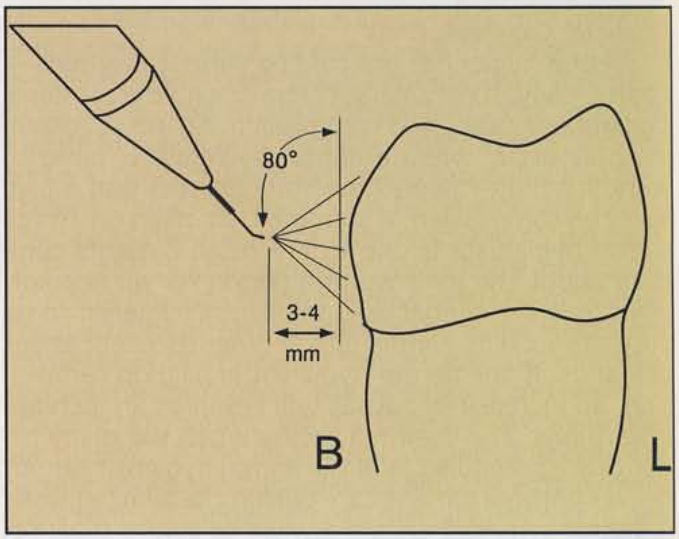

Figure 2. The airpolisher handpiece nozzle should be held at an 80° angle toward the buccal and lingual surfaces of posterior teeth, while being kept 3-4 mm from the tooth surface.

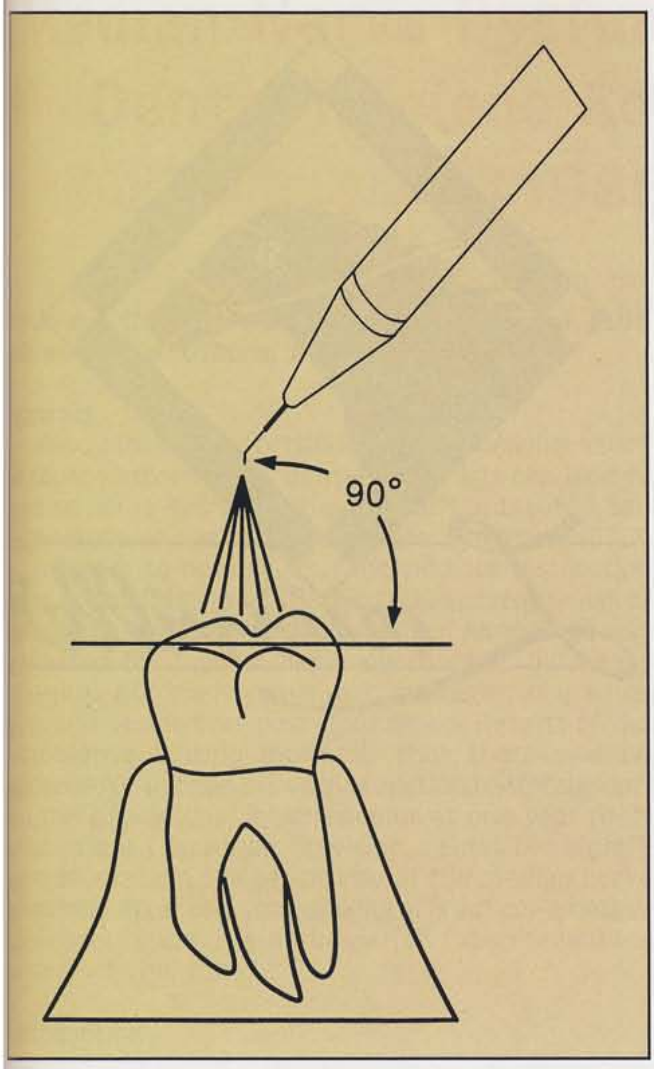

Figure 3. Occlusal surfaces should be polished by holding the airpolishing handpiece nozzle at a 90° angle toward the occlusal surface.

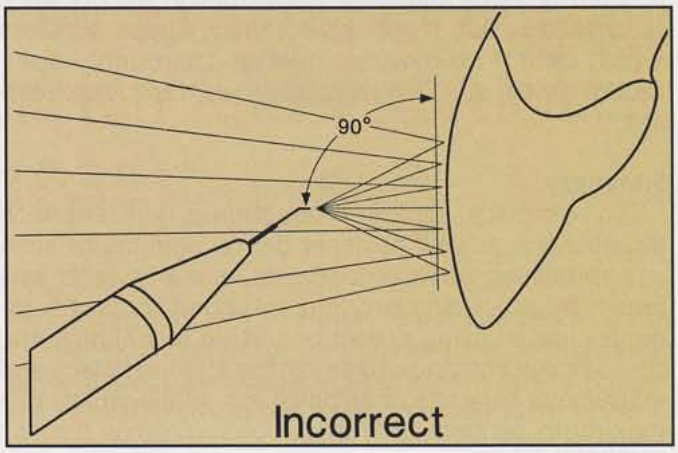

Figure 4. Incorrect angulation of the handpiece nozzle causes reflux spray, resulting in excessive aerosol production.

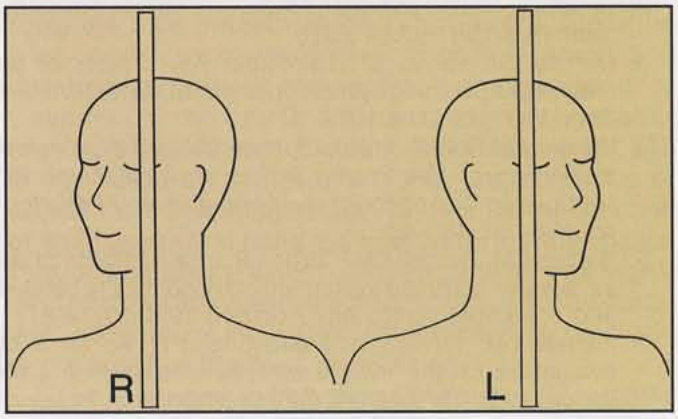

Figure 5. The patient should have his/her head turned to the extreme right or left, depending on which side is being polished. This positioning permits maximum evacuation while allowing for retraction of the buccal mucosa and simultaneous evacuation of the aerosol spray.

Patient Positioning and Water-Powder Ratio

Also related to technique is patient positioning. When using an airpolisher on the right side of the patient's mouth, the operator should have the patient turn his/her head as far to the right as possible (Figure 5); and likewise, when treating the left side of the patient's mouth, the operator should have the patient turn the head as far to the left as possible. This positioning permits maximum evacuation while at the same time allowing the operator to retract the buccal mucosa and contain a significant portion of the aerosol spray.

Research of aerosol containment also has ascertained that increasing the amount of water[15] in the water-powder spray will aid in containing the amount of particles that will be aerosolized, and will thus reduce patient and operator exposure to the particles.

Barrier Techniques, Patient Pre-Operative Rinsing, and Surface Disinfection

Simple infection control practices that include preoperative rinsing with an antimicrobial mouthrinse by the patient, using barrier techniques, and careful surface disinfection, also will assist the practitioner in providing a safer environment.

It has been demonstrated that having patients rinse preoperatively with a mouthwash[11,16] such as chlorhexidine (Peridex, Procter & Gamble, Cincinnati, OH), or Listerine (Warner-Lambert, Morris Plains, NJ) can reduce bacterial counts by 98%. While it may appear mundane, rinsing preoperatively with water alone can reduce bacterial counts in aerosols by as much as 75%.[16]

Barrier techniques for the patient and the operator present the most important protection for preventing patient and operator exposure to aerosolized particles. The operator should wear a high-filtration face mask and eye protection.[10] Face shields and disposable hair covers can provide additional protection, as can isolation gowns. The patient should wear eye protection also.[10] And it should be emphasized that airpolishers should not be used for patients with known infectious or chronic respiratory diseases.

Finally, surface covers for operatory equipment can efficiently assist in disease prevention in the presence of aerosols. But more importantly, those surfaces which cannot be covered must be thoroughly disinfected with an EPA-registered surface disinfectant.[11,13,14]

Summary

In summary, aerosol production is inherent with airpolishers, as well as other dental equipment such as handpieces, ultrasonic scalers, and air/water syringes. By practicing prudent infection control techniques and utilizing proper operating techniques, the clinician can continue to enjoy the time-efficient and efficacious benefits of airpolishers, while ensuring a maximum protection from aerosols for the patient and the operator.

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Caren M. Barnes, RDH, MS, is associate professor at the University of Alabama School of Dentistry in Birmingham, Alabama.