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Volume 99 Issue 6
June, 2009

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Bringing the science of polishing into the treatment room

Anne Guignon

October 14, 2003

By Anne Nugent Guignon, RDH, MPH

Patients expect polishing as part of a dental hygiene visit. Many view polishing as the most important part of the appointment. They like the look and feel of polished teeth. While this procedure does not have outstanding long-term therapeutic benefits, most patients want their teeth polished, especially those who have personal habits that create stained teeth.

Traditionally, polishing was performed by a hygienist or dentist; now a growing number of states allow dental assistants to perform this procedure. Some states allow assistants to polish only after the teeth have been scaled by a hygienist or dentist. Others limit polishing to specific procedures like sealant placement.

Even if the practice act in your state does not allow dental assistants to polish, many assistants are in charge of ordering supplies and often choose which products the hygienist and dentist will use. There is still a lot of information needed to make wise product selections.

While some may view tooth polishing as a simple, straightforward procedure that has a limited amount of risk, there are many factors that can affect the safety and comfort of the patient as well as the clinician. What are these risks? Polishing has the potential to destroy valuable tooth structure as well as damage cosmetic restorations. In addition, improper polishing can be uncomfortable and create unnecessary trauma to the soft tissue and pulp. Safe, effective polishing involves more than shoving a prophy angle onto a handpiece, dipping the spinning cup into a tub of paste, and running it over the tooth surface.

Obviously, not all polishing pastes are the same. Besides the obvious differences like flavor and consistency, it is important to know about abrasivity. The majority of prophy pastes are pumice-based products. Although there are differences in particle size between fine, medium, coarse, and extra coarse pastes, there is currently no industry standard defining the particle size used for a particular type of paste, so company A's medium paste could, in fact, be either more or less abrasive than company B's.

In addition to pumice-based products, the 3M ESPE Clinpro polish uses perlite as its abrasive agent. Since both pumice and perlite particles reduce in size when they are used in polishing procedures, the physical dimensions of perlite particles change during the process. Initially, the edges of perlite particles are sharp like pumice, but the particles quickly become smaller and smoother, resulting in a very fine polishing paste and reducing potential abrasion to tooth structure.

In 1978, Indiana University researchers modified the ADA testing methods to determine the relative dentin abrasion (RDA) and the relative enamel abrasion (REA) on tooth structures. Research has been conducted to evaluate the RDA and REA of some prophy pastes, as well as the RDA of some commercially available toothpastes. Recent research indicates that NUPRO fine is six times more abrasive on enamel than Crest toothpaste. However, one must remember that teeth are exposed to toothpastes on a daily basis while exposure to prophy paste may be several times a year at the most. In addition, because enamel is quite hard, it is much more difficult to abrade than dentin. It is, however, possible to compare the RDA of one prophy paste to another paste to determine which paste might be the most appropriate one to use.

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Handpiece comparison chart

Product	Weight (oz.)	DPA/Integrated	Design	Swivel
● AccuComfort	2.5	DPA	WB	FT
● KaVo-181K motor/ 29K contra angle/ 33K head	4.4	Component parts	WB	MB
● Midwest RDH	2.87	DPA	WB	FT
● Midwest RDH	3.39	Integrated	WB	FT
● NSK Wizard	3.0	DPA	WB Cordless	—
● NSK Wizard	3.5	Integrated	WB Cordless	—
● PHP-100	3.1	DPA	Straight	FT, HE
● PHP-120	3.6	Integrated	Straight	FT, HE
● Pirouette	2.5	DPA	WB	FT
● Proply Air-44	2.8	DPA	WB	HE
● Proply Air-64	3.35	Integrated	WB	HE
● Proply Star	3.2	DPA or metal angles	Straight	FT

DPA — takes a disposable prophyl angle; Integrated — body plus prophyl angle head
WB — wide body
FT — fingertip swivel; HE — hose end; MB — midbody

Manufacturer information (see corresponding numbers in products above)

- Accubite, (800) 248-2746, www.accubite.com
- KaVo USA, (800) 323-8029, www.kavousa.com
- Dentstly Professional, (800) 800-2888, www.midwestdental.com
- NSK America, (888) 675-1673, www.nskamerica.com
- Micro Motors, (800) 362-6294, www.micromotorsinc.com
- Benco, (800) Go-Benco, www.benco.com
- A-dec, (800) 457-1883, www.a-dec.com
- Star Dental, (800) 275-3320, www.dentalez.com

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Anyone who picks up a prophyl angle should be concerned about the potential to abrade both natural tooth structure as well as cosmetic restorations. While removing stain may be part of the goal, unnecessary removal of tooth structure or damage to restorations should be avoided. It also is important to limit the amount of polishing time to stain removal only, and to decrease the pressure applied to the tooth surface. Every time a tooth surface is subjected to prophyl paste, precious tooth structure is lost.

The potential damage to the dentin on exposed root surfaces is much greater than that of enamel. Did you know that 20 times more tooth structure is lost when polishing the exposed root as compared to potential damage to enamel? It is even possible to create subgingival damage since the root surface is so much softer than enamel, especially if the prophyl cup is not perfectly flush with the tooth when the tooth is being polished.

The problem is further compounded if the paste is coarse or extra-coarse. While this may not seem remarkable, more and more patients are scheduled on a quarterly basis for hygiene appointments. This more than doubles the risk of destroying vulnerable tooth structure.

According to industry experts, 70 percent all prophyl paste sold in this country is coarse or extra-coarse; fine prophyl pastes only account for 6 percent of all sales. Where is the thought process in this? Yes, coarse pastes remove stain faster but they also have a greater potential to cause damage, especially to the root structure. Patients are not only losing stain that will be back in days if not weeks, they are also losing valuable, hard-to-replace tooth structure.

Many feel that it is a time-saver to use a coarse polish to remove stains. However, an interesting finding came to light during the REA/RDA testing of Young Dental's new D-Lish™ prophyl paste. Young's D-Lish medium prophyl paste removed stain as effectively and quickly as its coarse prophyl paste with much less abrasion to enamel or dentin. The clinical benefit is very important — less abrasion leaves a smoother surface that is less susceptible to new stain. The coarse paste removed stain as well as the medium, but also leaves a rougher tooth surface, which will now stain faster than ever. Time savings at the front end can have some less-than-desirable results for the patient over the long run.

In addition to damaging natural tooth structures, pumice-based prophyl pastes can have a negative effect on tooth-colored restorations by reducing the gloss on many restorative materials. Research has shown that Clinpro, the perlite-based paste, does not cause as much loss of gloss to microfill or nanofill composites as coarse pumice-based pastes. Also, Preventech's fine-grit Next paste is formulated with diatomaceous earth which can be safely used on these restorations. Manufacturers of both direct and indirect composite materials, commonly known as ceramers or polyglass restorations, are very concerned about the indiscriminate use of polishing pastes on these types of materials and are looking for ways to educate clinicians about this issue.

It is important to know exactly where these restorations are located in a patient's mouth before damaging the materials or reducing the gloss with a conventional prophyl paste. A number of specially formulated polishes, made from either aluminum or tin oxide, protect the integrity of composite and ceramic restorations as well as improve the luster. These specialty polishes, which are matched to fit specific brands of restorative materials, are designed to replenish, re-hydrate, and seal composite materials, but are not designed to remove stain. A recent entry to the market is NUPRO Shimmer. This paste, specifically developed to polish restorations during a



hygiene appointment, contains fluoride, has a pleasant flavor, and reduced splatter.

Some clinicians use over-the-counter toothpaste as a polishing agent. While the abrasivity of toothpastes can vary just like prophylaxis paste, dentifrices still do not have as deleterious of an effect on the dentin as prophylaxis paste. In addition, over-the-counter toothpastes were developed to be used at home on a daily basis, not to be used in professional polishing procedures. However, toothpaste can be an appropriate choice for those patients who want to have their teeth polished but exhibit little surface stain. There are studies that compare 10 or more commercially available toothpastes. Rembrandt pastes were consistently much less abrasive than other well-known dentifrices.

A new entry in the polishing arena is a specialty product called ProClude desensitizing prophylaxis paste. It is specifically formulated to occlude dentinal tubules and uses a fine-grit silica/calcium formula as the abrasive to remove surface stains. The desensitizing ingredient, based on salivary remineralization chemistry, is an arginine bicarbonate/calcium carbonate compound.

Some patients also are sensitive to the colors, flavorings, and additives, such as fluoride, that are found in most prophylaxis pastes. Gluten-intolerant patients can be sensitive to the flavorings found in conventional pastes. Until now, the only alternative was to mix pumice with water, which most clinicians find messy. However, Preventech has just introduced a new medium-grit paste called NADA, which means "nothing" in Spanish. NADA paste is simply pumice, water, and glycerol, but works like a typical prophylaxis paste and is appropriate to use on sensitive patients before etching, orthodontic bonding, or sealant placement.

Now that we've covered the prophylaxis paste issues, did you know that firm cups require clinicians to use more force during polishing which increases the risk of developing repetitive stress injuries? Soft cups that are thin at the edges flare more easily, adapting to the tooth structure more effectively. Significant abrasion of the tooth can occur if the spinning prophylaxis cup is held at an angle to the tooth surface. In order to avoid damaging the tooth, make sure the flared cup is flush with the surface that is being polished. This is especially important when polishing exposed root surfaces, so, in essence, use soft cups, lighten your touch, and reduce your pressure. The patients' teeth — and your hands — will thank you for this change.

Years ago, prophylaxis cups were pretty straightforward. They were all made out of natural rubber. Soft and firm cups have been available for years and, originally, all prophylaxis cups were long, but now short-cup designs account for 50 percent of all sales. Cups are designed with either a screw or snap-on connection, or as a mandrel-mounted cup that fits into a latch-type handpiece. Cups are configured with plain, rib, web, or turbo designs. The Waterpik prophylaxis cup has a small brush mounted inside the cup; however, care should be taken with this design since research has shown that brushes are much more abrasive than cups.

Screw-in cups maintain a more concentric shape during polishing and, as a result, tend to wobble less than snap-on cups. It is important that snap-on cups and their angles be dry and oil-free when the cup is placed on the knob to reduce cup slippage. Most disposable angles have snap-on cups, but all Young disposable angles use a screw cup.

Manufacturers are developing more and more latex-free products. Prophylaxis cups are no exception. Latex-free products now account for 40 percent of all sales. Since none of us know when or if we might become sensitive to natural rubber, wouldn't it make sense to convert to latex-free products to reduce your overall exposure as well as that of your patients to this potential allergen? If price has been a deterrent, check to see which manufacturers sell latex-free prophylaxis cups for the same price as traditional rubber cups.

Small, short cups are much easier to use when polishing children's teeth or patients with limited openings. The task is easier for you and more comfortable for them. A small occlusal brush is occasionally used for polishing, but brushes are much more abrasive than prophylaxis cups. It is important to use a soft brush and limit the use to cleaning an occlusal surface prior to sealant application.

Prophylaxis angles come in all different sizes, shapes, colors, and configurations. While the right-angle design has been popular for years, Young Dental was the first company to develop the Contra disposable prophylaxis angle that features a small bend in the body of the angle. This allows clinicians to maintain an ergonomically correct neutral wrist position. Smart Practice offers the Swangle, another disposable with a head that can be repositioned. This design is particularly beneficial if you use a non-swiveling handpiece.

The esa prophylaxis angle from Preventech is a hybrid right-angle design. It has an extended body that replaces the slow-speed straight attachment. This decreases the overall weight of the handpiece; however there is an uneven weight distribution due to the weight of the motor at the hose-end connection.

Disposable angles weigh less than metal angles and metal angles require time to maintain, so the perceived savings of using an autoclavable metal angle may be negated by ergonomic issues and time considerations.

Today, many clinicians use handpieces specifically designed for polishing. Hand fatigue and wrist positioning are serious concerns. Handpiece weight can vary dramatically. Thirty years ago, polishers weighed as much as 9.5 ounces, with much of the weight concentrated at the motor end, causing unnecessary strain on the user's wrist and forearm. Unfortunately, many of these devices are still being used even though today's models are well-balanced and weigh around 3 ounces.



Most contemporary handpieces feature swivel mechanisms that function with either a fingertip-activated swivel or a hose-end rotating coupler. Several companies also make handpieces that are wider at one end, resulting in a more relaxed hand position. NSK is the only company that markets a cordless multispeed rechargeable polishing device. This unique design eliminates the weight and torque of the air hoses as well as being completely portable.

Several of the newer handpieces have the prophy angle head integrated into the handpiece body. The Micro Motors PHP-120 and one model of the Midwest RDH handpiece are designed with removable right-angle heads. The new A-Dec Prophy Air 64 is designed as a fully integrated, contra-angled handpiece.

Polishing handpieces should be operated below 3,000 RPM. Faster is not better because it can result in gingival abrasion, cause patient discomfort, and result in excessive heat that may damage the pulp. Excessive speed also contributes to premature failure of disposable prophy angles. Gear mechanisms are designed to function most effectively at lower RPMs and become overheated if used at high rates of speed. In addition, handpieces operated at high speeds create prophy paste splatter more readily, causing an infection-control concern.

Polishing used to be a simple subject. Decades ago, there were very few choices for polishing pastes, angles, or handpieces. Many of us used pumice mixed with mouthwash. All of the polishing devices were heavy and attached to heavy coiled cords or, worse yet, belt-driven engines. Some of us even learned to polish by hand with a tool called a porte polisher.

Science and technology have given us wonderful products to work with that help us preserve our patients' dentition and cosmetic restorations, reduce the risk of workplace-related injuries, and give our patients the dazzling smiles that they all expect.

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