

DR. DAN BOEHNE

Clean Sweep



As with agriculture, so with endodontics: Long-term success is predicated on smart use of irrigation.

AMERICA'S NUCLEAR TRIAD has received a little bit of candidate attention as the presidential election has gotten into full swing — but for endodontists, the most important triad has always been “shape, clean and fill.” The basic biologic goal is to treat or prevent apical periodontitis by eliminating microorganisms and their potential nutrient source from root-canal systems — to clean out the inside of teeth, in other words. Yet clinicians have lately recognized an addendum to that goal: *without thrashing teeth in the process.*

We shape, the first element of the triad, to facilitate cleaning and filling. The larger the hole we make in the root, the easier it is to irrigate and then obturate. Micro-CT observations have made clear that even with large shapes, much of the inner root surface is left non-instrumented — meaning we must rely heavily on irrigation to supplement filling with chemo-mechanical debridement.

Classic endodontic literature shows that larger root shapes significantly facilitate irrigation and reduction of bacterial load. If our goal ended simply with “shape, clean and fill,” the obvious strategy would therefore be to use large root shapes. Don't ignore the fact that shaping a canal can be done only at the expense of tooth structure, though — and excess removal of structure promotes future fracture and, ultimately, tooth loss that might otherwise have been avoidable. Catastrophic long-term failures have been prevalent enough to necessitate a sea change in the objectives of canal preparation.

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As such, classic endodontic concepts such as large shapes and continuous taper are slowly losing favor as new technology and treatment strategies emerge. It's now possible to effectively irrigate and obturate minimally invasive root shapes. The surgical operating microscope permits conservative access designs and coronal root shapes while still maintaining the doctor's ability to adequately inspect the pulpal system. Rotary file systems with superior metallurgy are available with maximum diameters of less than 1 millimeter; these can cut conservative coronal shapes while still creating apical shapes ideal for irrigation and obturation.

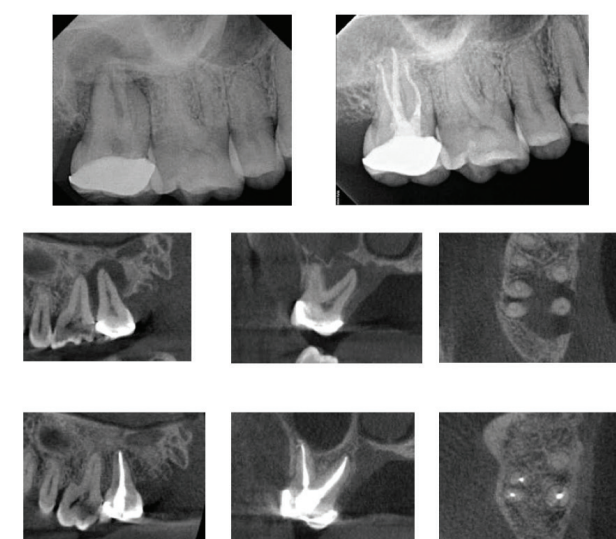
It's important to clean the entire pulpal system, of course, but the root apex might be the most important. The anatomy here is often complex with ramifications and accessory foramina. These portals of exit are what allow the noxious debris from within the canals to reach the periradicular tissues and stimulate the immune response we call apical periodontitis. Unfortunately, the apex has traditionally also been the hardest to clean. Not only must we often navigate down tortuous canals just to get there, but effectively exchanging sodium hypochlorite at the apex has always been difficult. Adequate needle penetration, risk of extrusion and apical vapor lock all contribute to the challenge. Cutting bigger root preparations is a common strategy to facilitate apical cleanliness, but not without consequence.

Apical negative pressure irrigation (EndoVac) is a safe and highly effective way to deliver a high volume of sodium

hypochlorite to the apex of a root. Contrary to popular belief, this can be done with conservative root shapes — in fact, it's the perfect complement to them. For the first time, effectively irrigating skinny root preparation is not only possible, but safe and predictable. The EndoVac microcannula is an evacuation tip with a 0.32-millimeter diameter that will reach the apical aspect of a minimally shaped canal. Here it can actively draw a high volume of irrigant to the apex at a high velocity without the risk of extrusion, while removing canal debris and biofilm. The result is a thoroughly cleaned, ready-to-fill canal, with minimal loss of precious dentin.

At the end of the day, with the right treatment strategy and the right amount of care, a tooth with even a severe endodontic infection can almost always be saved, but a tooth with a split root will almost always require extraction. Yet new endodontic tactics and technologies are helping us save more teeth than ever — a result very much worth smiling about. ■

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Top row: Tooth #2 preoperative and two-year recall radiographs. #30 / 0.06 taper Tulsa GTX files with a maximum file diameter of 1 millimeter were used with apical negative pressure irrigation to the apex.
Middle row: Preoperative CBCT sagittal, frontal and axial slices showing a very large periapical lesion.
Bottom row: CBCT slices at two-year recall demonstrate complete osseous healing.

FIGURE 1

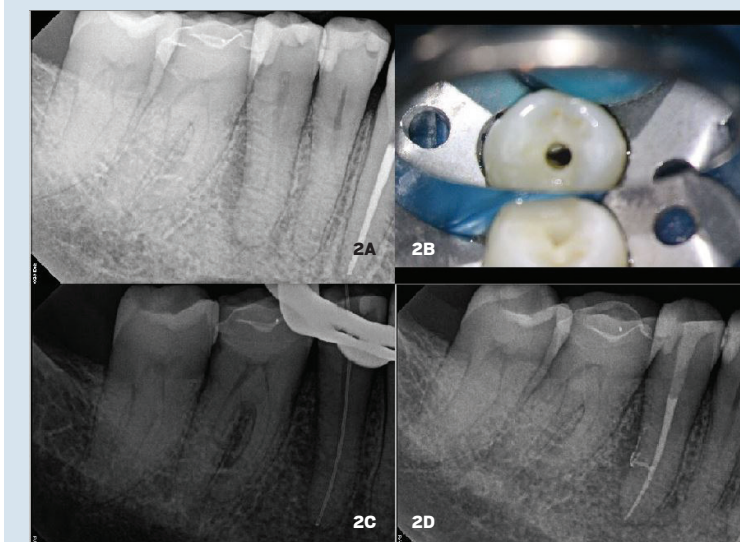
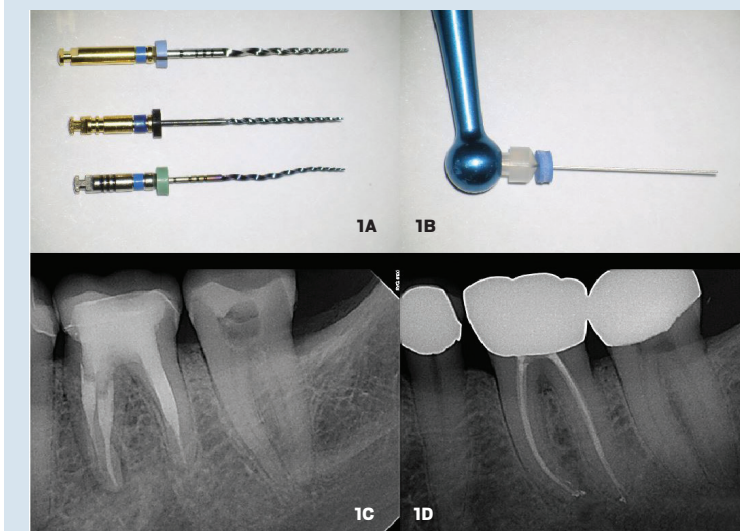


FIGURE 2

FIGURE 1:
1A (from top): Tulsa ProTaper endodontic file; SS White V-Taper; Tulsa TruShape. All are tip size 30, with maximum diameters of 1.2 millimeters, 0.8 millimeters and 0.8 millimeters, respectively.
1B: EndoVac microcannula, with 0.32-millimeter diameter, will fit just to the apex in a #30 shape of any taper.
1C: Tooth #19. Careless access and unnecessarily over-instrumented root preparations with reckless use of large Gates Glidden drills.
1D: Tooth #19 shaped with #30 / 0.06 taper SS White V-Taper files demonstrating conservative root shapes. Note the treated apical ramifications, even with minimal root preparations.

FIGURE 2:
2A: Tooth #29 preoperative periapical radiograph. Necrotic pulp with symptomatic apical periodontitis.
2B: Conservative 1.2-millimeter diameter access cavity.
2C: EndoVac microcannula shown fit to the apex of this canal prepared to a #30 Tulsa TruShape file.
2D: Complete 3D obturation after effectively irrigating this conservative root shape.