# *Innovations in Endodontic Instruments and Techniques*

## How They Simplify Treatment

*After a relatively static 30-year period—from the 1950's to the 1980's—endodontic practitioners grew accustomed to a slow rate of change in their field. But that was OK, we were happy to be allowed to save necrotic teeth with endodontic therapy, as opposed to the wholesale extractions that occurred during the preceding thirty-year "focal infection" era.*

L. STEPHEN BUCHANAN, DDS, FICD, FACD/SANTA BARBARA, KALIFORNIEN

In sharp contrast, the last 20 years have seen an accelerating rate of change in the field, to the point where we find ourselves inundated with new techniques and tools on a monthly basis. While separating the gimmicks from the genuine breakthroughs can be daunting and bewildering to clinicians (including specialists) finding technological and procedural advances that actually improve the practice of dentistry makes it worth the effort. Having been involved in some of the advances described here, I can offer some observations on their use and effectiveness, based on my own clinical experience. Obviously, as a design engineer, I am biased by my involvement in the products I have developed. However, my reputation as a clinical educator has survived my product development career because I have taught the best instruments and techniques to accomplish a given clinical result, regardless of who developed the instrument. Specifically, I'll describe innovations that address three of the major procedural challenges in conventional endodontics: access, shaping, and obturation.

### *Access*

After 22 years of practicing endodontics, I still find access procedures to be the most challenging part of the process. Every access preparation in a calcified tooth is an opportunity to perforate and destroy that tooth. Every incorrectly performed access preparation makes each subsequent procedure all the more difficult. Fortunately, new tools and procedures have dramatically improved the predictability of successful access outcomes. The biggest advances have come from microscopes, access burs, and ultrasonics.

### *Microscopes*

While microscopes (Fig. 1) have been rapidly embraced by the majority of endodontists over the last 12 years, their rate of introduction into general dentist's office has been considerably slower. The initial appeal of microscopes to endodontists was their potential to enhance surgical outcomes. We found, ironically, that using a microscope reduced the need for surgery in our practices because it significantly improved our conventional endodontic capabilities. Just ask your local endodontist who works with microscopes how he or she would experience re-treatment or surgery cases without a scope, and you'll see a look of horror cross their face. Without a microscope it is impossible to accurately assess the apical extent of vertical fractures. There is no way to look in the eyes of a patient when a tooth that has recently had root canal therapy and a crown is then found to be root-fractured and must be extracted. For this assessment loupes are inadequate, as 12× magnification is needed to definitively rule out the presence of root fracture in cracked teeth. Microscopes also aid access procedures when clinicians are looking for MB2 canals in upper molars or removing posts or broken files. Last, but worst, microscopes are your best friend when you are repairing an access perforation with ProRoot MTA. Like our experience in the specialty, general dentists have been bringing microscopes into their operatories to do root canal therapy and have subsequently found them to be indispensable in their restorative practices. Porcelain veneers require meticulous preparation and cementation, tunneling preparations in interproximal areas are really small, and even simple pit and fissure caries cannot be cut out and restored with the same conservative precision that serious magnification provides. While loupes are a big improvement over standard vision, their magnification capabilities are primitive compared to the microscope's advantages of a perfect light source and multiple steps of magnification beyond the capabilities of loupes. Add the improved posture of dentists using them, and microscopes are much more than just an aid to access procedures.

### *Access Burs*

The most common mistake made in access procedures is the improper selection of burs. Particularly problematic is the choice of flat-ended fissure burs for initial entry and/or access refinement. These burs will create innumerable ledges in access walls, making it difficult to introduce instruments and materials into canals. Even when the access walls are smoothed out later with a round-ended tapered diamond bur, these nicks and dings will often remain. Therefore, access burs with radiused tips work best. Another common bur selection error is to choose a cutting instrument that is too large. All access entry paths vary in accuracy as the clinician cuts his or her way to the pulp chamber. If you choose a huge initial entry bur, these small mis-directions become grossly over-enlarged access