

Endodontics

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Nickel Titanium Endodontic Instruments (Originally published in May 1998)

Question: What are some of the current trends regarding biomechanical instrumentation in endodontics?

Answer: The practice of endodontics is going through a period of change. While the basic principles of cleaning, shaping and obturating canals essentially remain the same, much of the instrumentation is changing. We are currently in a period of transition from stainless steel to nickel-titanium and from hand instruments to engine driven instruments. The development of nickel-titanium alloys has allowed the manufacture of very flexible endodontic instruments. With traditional stainless steel instruments, it was difficult to keep the larger files centered in a curved canal because of their lack of flexibility. This often resulted in transportation of the apical portion of the canal, ledging, and short obturation. The use of hand techniques with rotary motions, such as the balanced force technique, have partially overcome this problem. Engine-driven stainless steel instruments have been around for a number of years, but never gained widespread use because of breakage and other problems. Engine-driven nickel-titanium instruments are rapidly gaining acceptance and will soon surpass other types of files in use among endodontists. Three products currently dominate the rotary nickel-titanium market: Profile Series 29 (Tulsa Dental Products), Quantec (Tycom), and Lightspeed (Lightspeed Technologies). Rotary instruments are also marketed by Brassler, Union Broach, and others. They are available in tapers ranging from .02 mm/mm (the same as most hand instruments) to .08 mm/mm, depending on the manufacturer. Most feature non-cutting tips (Quantec is an exception). It is recommended that instruments with a U-file design be used. In cross section, the U-file has flat land areas and a 0° rake angle which helps prevent the instruments from "screwing into" the tooth. An electric handpiece is also recommended because it provides constant speed and torque. Rotary instruments offer several advantages for the instrumentation of root canals. They provide a pure rotary motion, which minimizes transportation and straightening of the canals. They stay well centered in the canal and make a smooth, round, and tapered preparation which is easy to obturate. Under magnification, a canal prepared with rotary instrumentation demonstrates dentin walls that are very smooth and clean. Rotary instruments are effective at maintaining curvatures and the position of the apical foramen. They also tend to prepare canals faster than hand instruments. Rotary instruments may be used effectively with a variety of techniques, but several general guidelines should be followed. Record each instrument use and follow the manufacturer's recommendations for maximum number of uses. The manufacturers also recommend a range of speeds. For example, the Profiles should be used between 150-350 RPM and the Lightspeed instruments are recommended between 750-2000 RPM. Many of the instruments (Lightspeed is an exception) work best with one of the "crown down" techniques. The "crown down" technique establishes working length with small files and the canal is then prepared starting from the pulp chamber with large files and working toward the apex with successively smaller files. Instruments should be used with light pressure and should never be forced. If these guidelines are followed, instrument breakage will be minimal. As with any new technique, there is a learning curve. There are a number of excellent hands-on courses given by the manufacturers and others to help you get started. It is advisable to prepare a number of extracted teeth before using the instruments on patients, and, if possible, work with someone who has experience with engine-driven instruments.

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Gutta Percha Test Date (Originally published in May 1998)

Question: Our clinic is getting ready for a Health Services Inspection. We have checked the expiration dates of various materials and noticed that our gutta percha (GP) points have only a manufactured date and an inspection test date. Is the inspection test date the same as an expiration date?

Answer: For most brands of GP points, there is no expiration date. GP does not change its properties over time in terms of function or patient safety. However, GP will change from a handling standpoint and become brittle. The inspection test date is the manufacturer's estimate as to the date at which this change in handling properties could occur. It is there to remind clinicians to check the GP points to ensure they are okay, and if not, either replace or "renew." Renewing means that you attempt to take brittle GP points and make them pliable again. There are a number of methods to achieve this. An example would be heating the points in warm water. However, it is preferable to replace the old GP with new points.

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You've Got to Heat It to Believe It! (Originally published in May 2003)

Question: Newly arriving dental officers have requested the purchase of Obtura II and System B gutta-percha systems. Do you have any information on this equipment?

Answer: Obtura II is an injectable gutta-percha system whereas System B uses a heated-tip to soften gutta-percha points placed in the canal. Two totally-different injectable thermoplasticized gutta-percha systems are currently available - Obtura II (Spartan Co., Fenton, MS) and Ultrafil (Hygienic Corp., Akron, OH). Obtura II is a heated-gun system, whereby gutta-percha sticks are placed within a chamber in the gun, and a plunger is used to express the heated, flowing gutta percha through replaceable injection tips. The flow of the gutta percha is controlled through the temperature of the unit - the higher the temperature, the easier the flow. By design, the system is considered a "high heat" system, because the gutta percha provided by Spartan flows best at about 200 degrees C. You can buy "low-heat" gutta percha from other companies, which allows the gutta percha to flow at a lower temperature. The system consists of a gun connected to a temperature-control unit. The unit requires high maintenance because you must clean it after every use by submerging the nose of the gun in solvent and using a brush to clean out the chamber/plunger assembly. The gun itself is hot to touch, and to minimize risk when contacting the patient lips, special plastic-protective sleeves are slipped over the end of the gun. Obtura II is primarily used for backfilling canals with apical plugs. Canals without some form of apical plug/constriction could result in overextrusion of the gutta percha. Most of the literature seems to show that the high temperature is not detrimental to the periodontal ligament as long as the heated tip is not left in the canal for extended periods. The gutta percha cools fairly quickly, and to counteract shrinkage, must be condensed during cooling. The system allows continuous heat, so the gutta percha stays soft as long as the unit remains active.

In contrast, Ultrafil uses a pre-dosed cannula system. Cannulas containing various types of gutta percha are placed in a heating unit. When needed they are loaded into a gun (similar to a periodontal ligament injection unit), which expresses gutta percha from the cannula. The system is characterized as a "low-heat" unit, since the temperature needed to plasticize the gutta percha is much lower than the Obtura II system. Ultrafil has several advantages. The cannulas are disposable, the injection gun may be sterilized, and the heating unit is easily cleaned. Three types of gutta percha are available, which vary by firmness and length of working time, allowing the practitioner to tailor the type of gutta percha for a specific procedure. A disadvantage of the Ultrafil system is that it takes about fifteen minutes to get the cannulas to temperature, compared to the Obtura system, which only takes about one minute. Overall, the versatile Ultrafil system requires less counter space and the various types of unit-dose gutta-percha cannulas allows for better infection control. However, the cannula system is more expensive and if you are performing extensive backfilling, the Obtura II may be more cost effective.

System B (SybronEndo, Orange, CA) is not a injection technique, but rather a heated tip used to soften gutta-percha points placed in the canal. It follows the "continuous-wave" concept advocated by Steve Buchanan. In principle, you take a plugger tip and insert it in your prepared canal. The plugger tip needs to bind about 5-mm from your working length. A gutta-percha cone is then fit to length in the canal. The plugger tip with the System B is heated to a high temperature. Temperature and power is controlled digitally on the unit. The heated plugger is then inserted into the canal, melting the gutta-percha cone on insertion and creating a leading front (or wave) of heated gutta percha. When you get close to your binding point, the heat is discontinued, but apical pressure is continued to condense the now softened gutta percha and coneract any contraction during cooling. After a few seconds, the tip is activated for one second (high heat, short burst) and pulled back to remove excess gutta percha. The coronal space is then usually backfilled with a softened gutta-percha system.

Unless you have excellent apical control, these systems will lead to overfill of material past the apex and potential problems of apical periodontitis. In skilled hands, it is another tool for obturation. Practice on extracted teeth first before attempting the technique on patients. Be careful in canals which have apical lesions, resorptions, or open apices, as these clinical situations are not good candidates.

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I Can't Wait 'till You Obturate! (Originally published in May 2003)

Question: Do you have any information on the Thermafil Plus system? Our clinic is considering its purchase.

Answer: Thermafil Plus (Dentsply Tulsa Dental, Milford, DE) is a system where plastic carriers are coated with alpha-phase gutta percha. The carrier/gutta percha is heated in an oven to plasticize the outer gutta perch, then inserted in the canal to length. During the insertion, the warm outer gutta percha flows into all the anatomic variances of the canal. An entire system is devoted to this method of obturation, to include size verifiers, obturators, an oven, and an epoxy endodontic sealer. The plastic carrier core has a groove to promote backflow of excess gutta percha during insertion, and to facilitate retreatment by providing an area for instrument insertion to loosen and remove the carrier.

Advantages of the system are ease of use, good three-dimensional fill, and quick obturation. Disadvantages are questionable apical seal, difficulty in retreatment and problematic post-space preparation. Sometimes the gutta percha will strip off the carrier to bare plastic by the time the carrier is at working length. However, the clinical significance of this remains unknown. Also, if you have a patent apical foramen, there is a good chance you will extrude softened gutta percha, sealer, or both. The carrier may be difficult to remove during retreatment. Also, creating post space is technique sensitive. You have to remove gutta percha and carrier for post space without disturbing the apical seal, which may be very difficult with this system.

The Thermafil Plus system is an acceptable method of obturation, but may not offer any big advantage over conventional lateral condensation. The system is more expensive when including the cost of the oven, carriers and nickel-titanium sizers. Whether a three-dimensional gutta percha fill is clinically superior to lateral condensation with sealer fill has yet to be proven. If stationed overseas, getting supplies in a timely manner is an additional concern. Once you have purchased the system, you are obligated to use the system's gutta-percha carriers and products, whereas standard gutta-percha cones with eugenol sealer can be purchased anywhere fairly quickly.

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Is Chloroform Permissible? (Originally published in May 2003)

Question: I am a supply NCO and I have dentists requesting that I order chloroform for them because they say that halothane does not work. Is chloroform permissible in endodontic therapy or retreatment?

Answer: Chloroform is permissible. The FDA ban on the material was lifted. The literature has shown that the amount of chloroform used in retreatment is unlikely to cause any systemic effects, and the amount entering the system from extrusion is negligible. The bottom line is that all currently used solvents (xylene, halothane, rectified turpentine, chloroform, eucalyptol, etc.) are cytotoxic when in contact with cells, but when confined to a canal space, they probably pose only a minimal risk.

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Microscopes for Endodontics: A Steep Learning Curve (Originally published in September 2003)

Question: Do you have any information on microscopes for use by general dentists to perform endodontic procedures.

Answer: The two main microscope dealers used primarily by endodontists are Carl Zeiss (Thornwood, NY) or Global (St Louis, MO). Global is typically less expensive and has a government contract. I have used Global with great results. I use it on every patient and perform much higher quality work with it. Unfortunately there is a steep learning curve to using a microscope. If you are not trained properly, it is extremely easy to get disoriented and you could actually do the patient more harm than good. Without having someone available for training it may lead to perforations and misdirection. It may take several months before you can become comfortable and proficient with the instrument. You have to relearn internal anatomy and orientation when using the scope, and delineate between primary/secondary dentin and bone. At first, providers may get frustrated, and go back to loupes because it will initially take much longer to perform procedures until you develop a comfort level. So, if a clinic is looking to purchase the microscope so that a general dentist can try to use the equipment for endodontic procedures and learn as he or she goes along, frustration may set in, and the scope may be put aside. If the clinic has an endodontist, then he or she should have a good knowledge of what they want to purchase and the expertise to train providers interested in using the microscope.

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