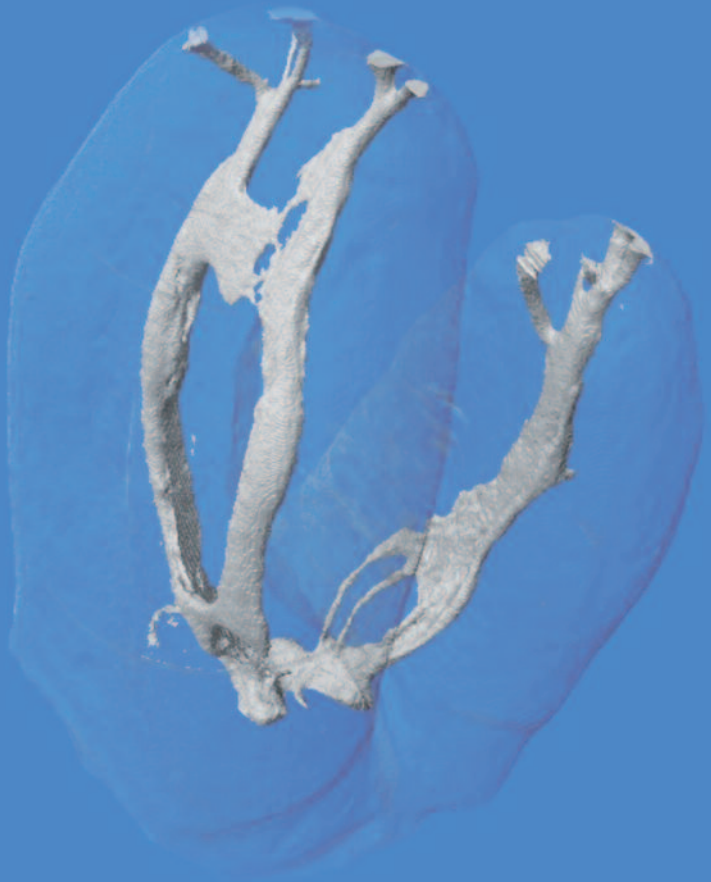
issn 2193-4673

Vol. 9 • Issue 2/2013

roots

international magazine of endodontology

2 2013



| CE article

Predictable Endo 102:
Why warm and soft is so good

| opinion

Raising the bar for endodontic success:
Where we were, where we are and
where we are going

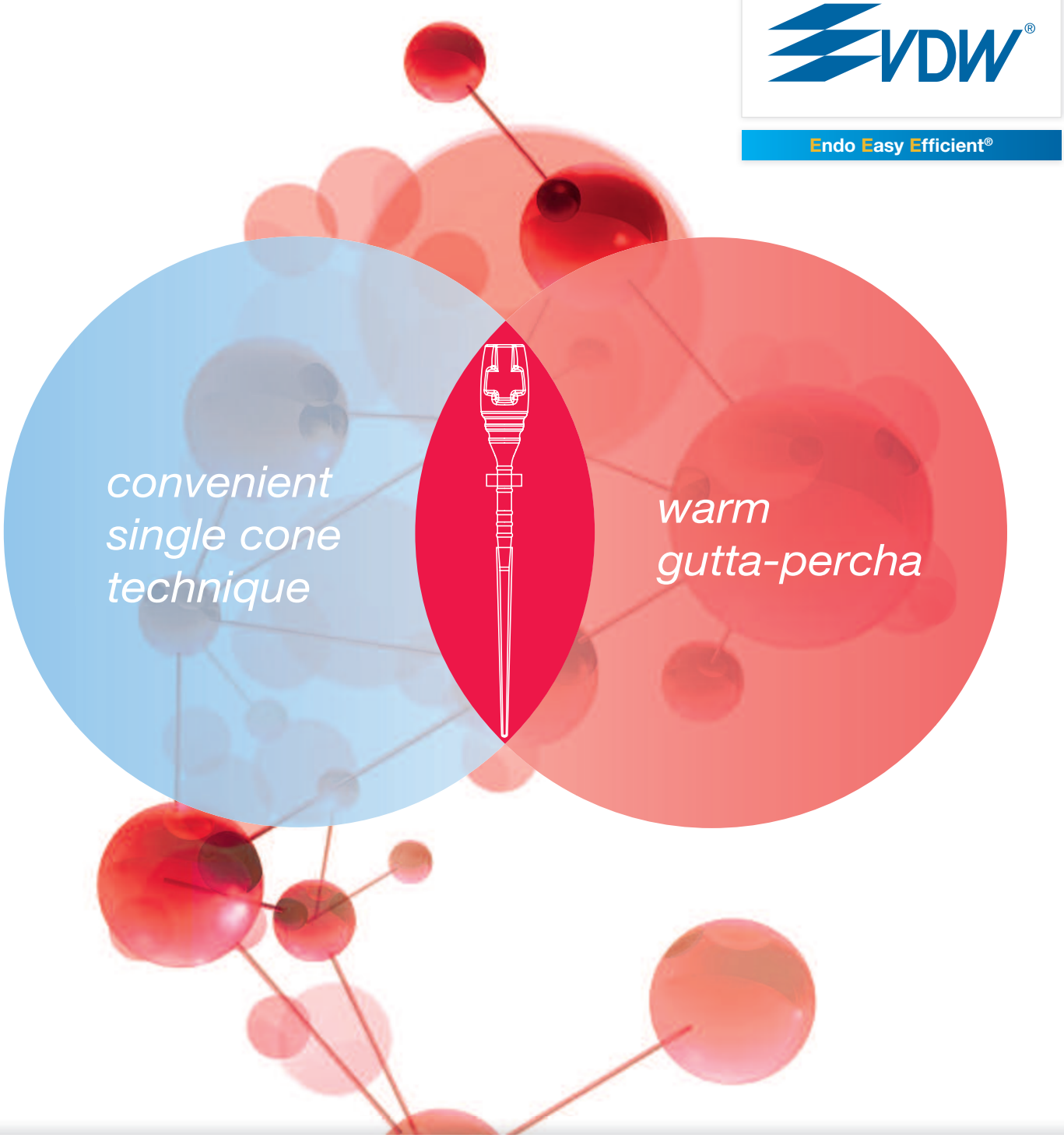
| research

Accuracy and consistency of four electronic
apex locators in the presence of different irrigants

oemus

VDW®

Endo Easy Efficient®



Innovation means **combining benefits**

3D root canal filling with an obturator entirely out of gutta-percha

- Separation of the handle without additional instruments
- Simplified post space preparation
- Precise placement of the obturator in the root canal with fingers or tweezers

www.vdw-dental.com

GUTTAFUSION®

Dear friends and colleagues,

Dr John J. Stropko

_What a great honour to have this opportunity to share over half a century of my private practice experience with all of you! My prayer, since the beginning of my dental career, was to know when it was time to put the handpiece down. In December 2011, I finished a treatment with an excellent result, but it took me twice as much time and effort to do it. I realised then that my hand–eye co-ordination was not what it used to be. That was not fair to me, nor to the patient, so I decided that the time had come. I may have put the handpiece down, but I have replaced it with a pen, and I am eager to share some of my sincere convictions and experiences with you, in the hope that your path to excellence can be made smoother and with more commitment.

I believe what I heard so long ago: "In any profession, or walk of life, there are 2 per cent masters. They are put on earth, by God, to show how the task is to be done. Then there are 8 per cent who have a 'God-given gift' for what they do. They are honest, conscientious, hardworking and continuous students. Then there are 36 per cent who have an average, or so, ability. They too are honest, conscientious, hardworking and continuous students. But then there are the remaining 54 per cent who 'don't give a damn!' They are doing what they are doing for all the wrong reasons: be it family pressure, peer pressure, money, recognition, power, etc., but not committed to their everyday task in life.It really does not make any difference what the person's task in life (job) is. He or she could be a plumber, a barber or a dentist."

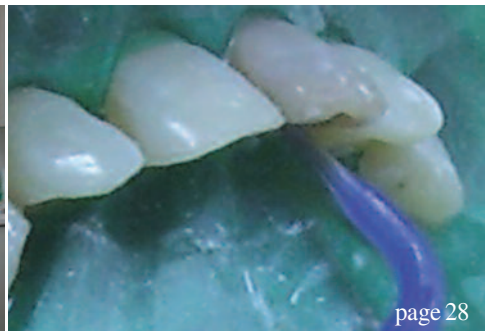
Continuing education permits us to view achievements of the past, appreciate the current potential of patient care, and create a more predictable treatment result in the future. It is essential to seek out and listen to those who have already experienced the incredible and increasingly rapid advancement of technology that has occurred in recent years. We all stand on the shoulders of the giants who preceded us. Today, the range of and convenient access to communication permit anyone to attain current knowledge, to pave a path for better results. Continuing education is the map for our journey to excellence and provides the fuel necessary to get there. If you embrace the concept of continuing education as essential to performing your task in life at a higher level, this issue of roots is just another small channel for achievement.

In the pursuit of perfection, be willing to accept excellence. Look at any failures as lessons for improvement, not failures. In today's wonderful world of technology and communication, it is all there for the taking, if you want it!

Dr John J. Stropko


page 6


page 18


page 28

Cover image courtesy of Dr Ronald Ordinola Zapata (blog: http://www.facebook.com/TheInternalAnatomyOfTheHumanTeeth and ibook: https://itunes.apple.com/es/book/internal-anatomy-human-teeth./id534097316?mt=11)


page 32


page 38


page 40

ESE 2013 LISBON 12-14 SEP

NAVIGATING CANAL SYSTEMS

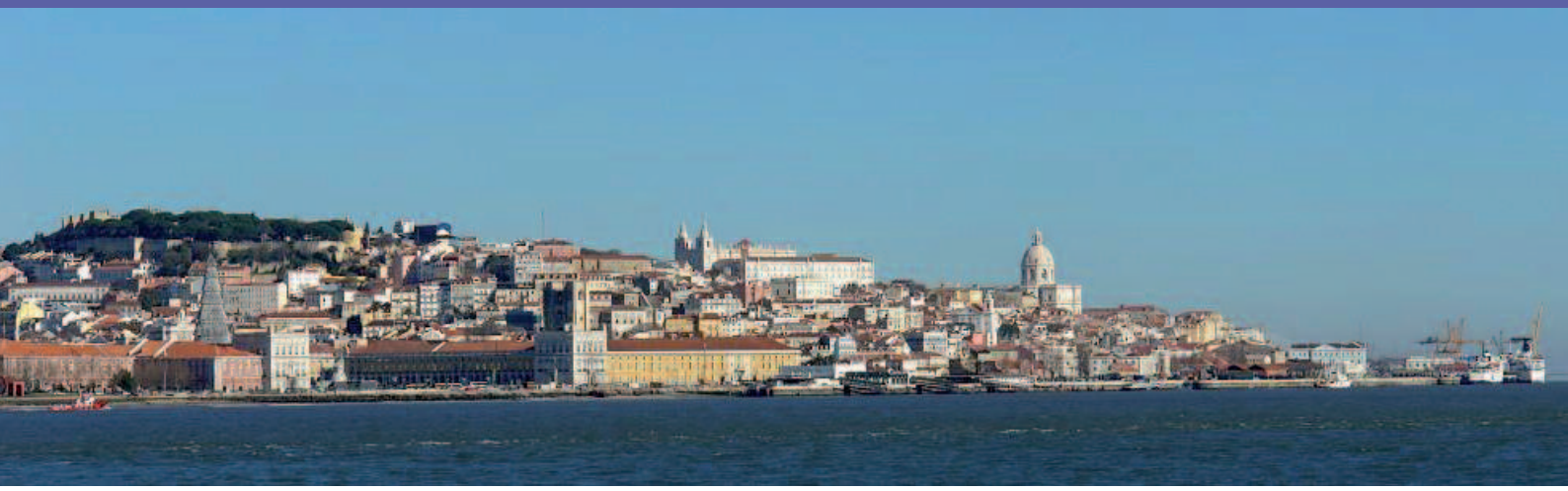
16TH CONGRESS OF THE EUROPEAN SOCIETY OF ENDODONTOLOGY

MAIN TOPICS

Pulp regeneration
Endodontic surgery
Retreatments
Updates on clinical techniques
Education

REGISTRATIONS & ABSTRACT SUBMISSION OPEN FROM 1 JANUARY 2013!

For information please visit the congress website:
http://www.e-s-e.eu/ese-biennial-congress/lisbon2013/



AIM GROUP INTERNATIONAL - Lisbon Office
Av. Liberdade, 258 – 6°
1250-149 Lisboa
Tel. +351 21 3245054
Fax +351 21 3245051
eselisbon2013@aimgroup.eu

Diamond Sponsor
DENTSPLY
MAILLEFER

Predictable Endo 102:
Why warm and soft is so good

System 'S' for injectable or carrier-based GP

Author_ Dr John J. Stropko, USA

_ce credit | roots

By reading this article and then taking a short online quiz, you can gain ADA CERP CE credits. To take the CE quiz, visit www.dtstudyclub.com. The quiz is free for subscribers, who will be sent an access code. Please write support@dtstudyclub.com if you don't receive it. Non subscribers may take the quiz for a $20 fee.

"There's a difference between interest and commitment. When you're interested in something, you do it when it's convenient. When you're committed to something, you accept no excuses, only results."

—Ken Blanchard

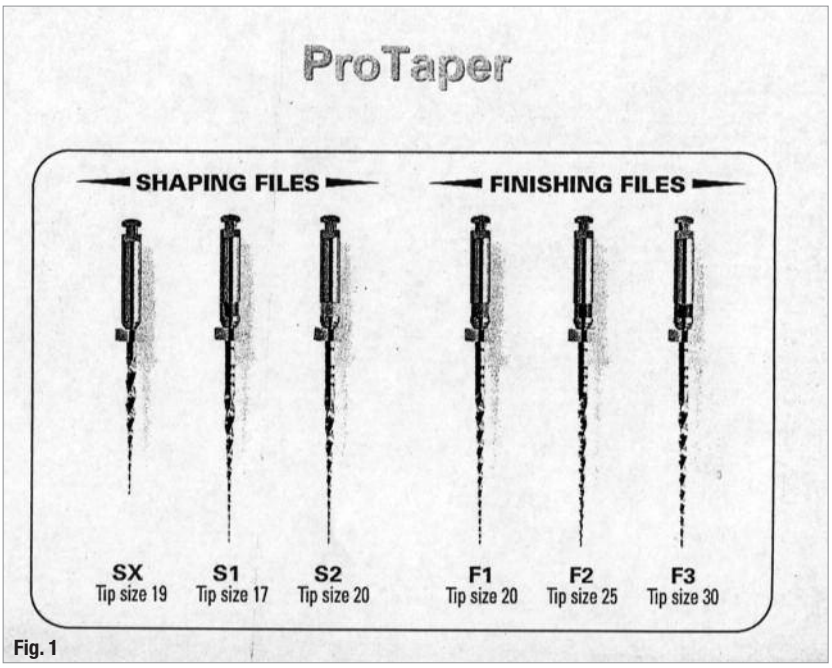


Fig. 1

Fig. 1_Typical rotaries, one of several popular brands. *(Photos/Provided by John J. Stropko, DDS, unless otherwise noted)*

_Abstract

The author has been in private practice and a continuing student for the past 50 years. The first half was spent practicing restorative dentistry, and the second half in a specialty practice limited to endodontics. On the road to predictability, it became apparent there was a definite relationship present between root canal treatment, periodontal status, prosthetics and/or subsequent restorative procedures. Each operator has to decide what steps for a more predictable outcome they are willing to trust another to do. This article is an attempt to share some "secrets of success" and perhaps serve as a checklist for a system that works in the attempt to achieve predictability of endodontic treatments.

During the earlier years of the past century, several techniques were devised for the obturation of the canal system after removal of the diseased pulp, or necrotic tissue. Some of the most popular were silver points, lateral condensation of gutta-percha (GP), Sargenti paste and chloropercha. Currently there are seven techniques that utilize gutta-percha as the obturation material of choice:

1) Single cone
2) Lateral condensation
3) Chloropercha technique
4) Vertical compaction of warm GP (Schilder, continuous wave, System "B", McSpadden, System "A")
5) Carrier-based (Thermafil)
6) Injection of thermo-plasticized GP (often referred to as "squirting" using a Calamus or Obtura unit)
7) Mechanically assisted compaction (Pac Mac).

In 1967, Dr Herb Schilder, often referred to as "the father of modern endodontics," introduced the concept of filling the root canals in three dimensions.[1] The Schilder Technique involved a new and different approach for obturation of the canal system and resulted in much controversy. Evidently, the controversy did create interest from some doctors, because

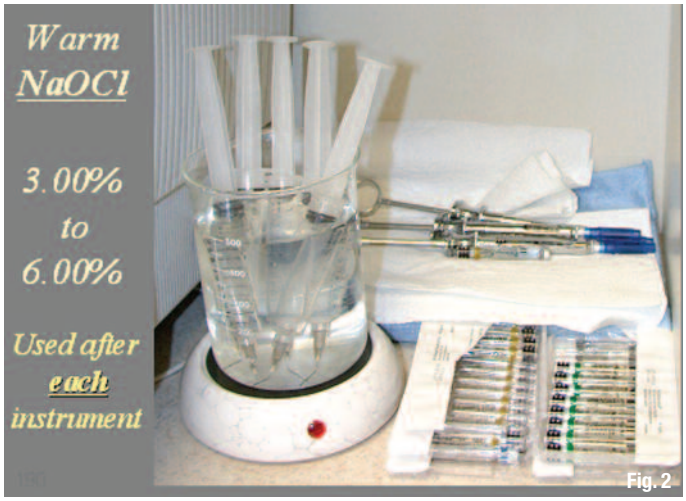


Fig. 2

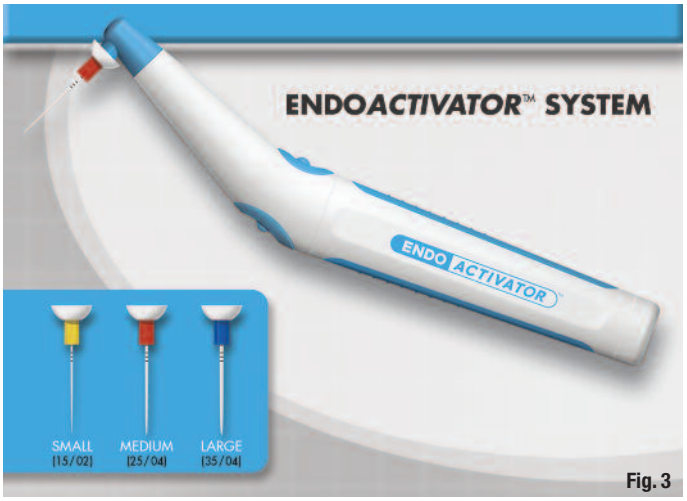


Fig. 3

in the mid 1970s new ideas and techniques evolved that became most of what are the currently accepted concepts of modern endodontic principles and techniques. Today, the numerous clinical reports, published research and the rapid advancements in technology have significantly changed the operator's obturation preferences. Ease of communication, along with modern marketing, has become a very important determinant when making a choice of techniques. More recent studies have discounted some previous obturation materials that were popular, but some form of GP still remains the most acceptable and widely used. The purpose of this article is to share a simple, six-step protocol (System "S") in a straightforward manner, to achieve predictability of endodontic treatment for the benefit of the patient.

There are six important components to the System "S" protocol:

1) Proper shaping with patency.
2) Adequate cleaning, disinfection and drying.
3) Delivery of pre-warmed GP to apex (Calamus/Obtura).
4) Coronal seal for the rest of the system.
5) Respect for the endo-pros relationship.
6) Use of the surgical operating microscope (SOM) for the entire endodontic treatment.

The author believes that as long as the gutta-percha is introduced to the apical third of the canal system, pre-warmed and pre-softened, the deformation and adaptation to the canal walls is more predictable, resulting in a better seal that is significantly less "sealer-dependent". It has been shown that the pre-warmed techniques (Obtura and Thermafil) produce a better seal than lateral condensation.[2] Due to the lack of deformity inherent at room temperature, the techniques utilizing non-softened GP are more "sealer-dependent". The two most popular thermoplastic obturation techniques are the "carrier-based" (e.g., Thermafil) and "direct injection" (e.g., Calamus/Obtura). The pros and cons of each will be discussed, but regardless of the technique used, the "shape" of the prepared canal system is of utmost importance and must be discussed.

_Access and shaping the canal system

In the early '70s, Schilder clearly stated the requirements for the proper shape using GP to achieve three-dimensional obturation of the canal system:

1) The root canal preparation should develop a continuously tapering cone shape.
2) It should have decreasing cross-sectional diameters at every point apically and increasing at each point as the access cavity is approached.
3) It should have multiple planes, which introduces the concept of "flow".
4) The foramen should not be transported.
5) The apical opening should be kept as small as practical in all cases.

There were several other requirements more clinically definitive. Following are a few of them: After placement of the rubber dam, an appropriate access is made. Unless the access is large enough for adequate vision, appropriate instrumentation may be compromised and canals missed. A perfect example is a maxillary first molar; if the access is made as though there was an MB2, it is amazing how many times an MB2 is found. A general rule of thumb is, if you access for it, you are more likely to find it. A proper access will also facilitate the creation of the continuously tapering shape of the canal, necessary for the warm GP technique. Occasionally after caries or old restorations are removed, a "pre-endodontic" restoration may to be required to control and maintain a sterile environment until the endodontic treatment is complete. This can usually be accomplished using a bonded composite technique.

Shaping should be confined to the anatomy of canal system, following the natural curvatures. Instrumen-

Fig. 2_NaOCl irrigating syringes can be warmed in a beaker on a coffee warmer. Note the anesthetic syringes on a heating pad in the background.
Fig. 3_The Endo Activator is used for the 'tsunami effect' for cleaning canals.

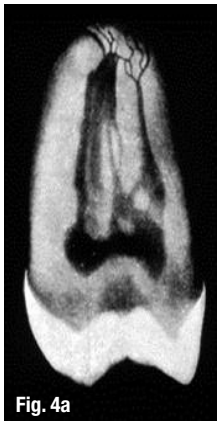


Fig. 4a


Fig. 4b

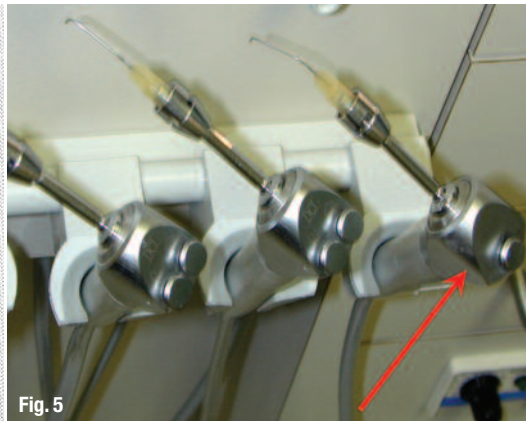


Fig. 5

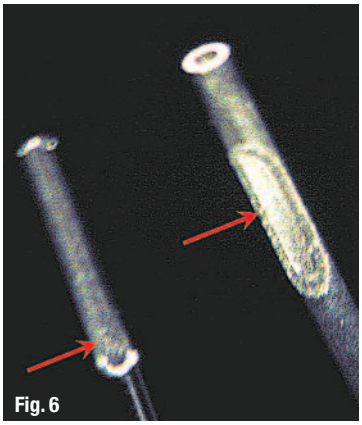


Fig. 6

Fig. 4a_The canal system can be very complicated.
Fig. 4b_The Walter Hess studies with vulcanite clearly demonstrated the complexity of canal systems.
Fig. 5_Set of three Stropko Irrigators with various 27-gauge tips bent for use. Arrow points to the dedicated 'air-only', single-button DCI syringe.
Fig. 6_When drying canals with air, needles must be notched or side-vented (arrows).

tation beyond the apex is unnecessary and may needlessly enlarge and deform the apical foramen.[3] Using the Schilder protocol to achieve the desired shape of the canal system was a time-consuming process. It involved the tedious use of pre-curved files and reamers to follow the anatomical curvatures of the canal. Other requirements that caused some controversy then (and still does), besides the size of the access opening, was the need to keep the apical foramen as small as possible, and to maintain patency throughout the entire process. The majority of more recent published research and clinical studies have confirmed the rational for an appropriate access and correct shaping.

In the early 1990s, technology brought about the introduction of rotary instruments, relieving the operator of considerable time spent creating an acceptable shape. The ProFile rotary bur (Tulsa Dental) with 0.04 and 0.06 taper, was introduced to the profession. Creating the shape necessary for the successful use of the warm obturation techniques was made easier and faster. By the beginning of this century, numerous designs gradually evolved utilizing varying tapers, active or passive cutting blades, etc. (Fig. 1). At first, the biggest problem with the rotary files was breakage during use. But modern nickel titanium (NiTi) metallurgy technology has developed more, and more dependable, rotary files. As a result, today the separation of a rotary instrument during use is of virtually little or no concern.

It has also been shown that proper shape permits more thorough irrigation and the removal of significantly more debris from the prepared canal system. Disinfecting irrigation should be used between each instrument during the entire shaping process and patency continually maintained with a #10 file. Note: The quantity of irritants used is not as important as the frequency of use. The irrigation protocol, instruments, fluids, etc., are in constant evolution and becoming more effective. However, a clean and sterile environment of the canal system prior to obturation is still the objective.

_Irrigation for cleaning the canal system

After shaping is completed, final cleaning can be effectively accomplished by the alternative use of:
1) Warm 3- to 6-per cent NaOCl.
2) 17 per cent aqueous EDTA for approximately 30 seconds (smear layer removal).
3) Warm 3- to 6-per cent NaOCl (further disinfect and stop action of the EDTA).

The NaOCl can be effectively warmed by placing the irrigating syringes in a beaker of water set on a small coffee warmer (Fig. 2). The canal(s) are completely flooded with the desired solution; an Endo Activator (DENTSPLY) is appropriately used for the "tsunami effect", then re-irrigated with the same solution for flushing of debris (Fig. 3). The NaOCl is then effectively removed with a capillary tip (Ultradent) attached to a high-speed evacuator. Other solutions (hydrogen perozide, chlorhexidine, 17 per cent aqueous EDTA, MTAD, etc.) can also be used alternately, depending on operator preference.

Close observation with an SOM will clearly indicate complete cleaning of the canal system when no debris is flushed out during the irrigation process. During the evacuation with the capillary tip, it becomes apparent if there is a joining of the canal systems within the root. For example, if using the SOM as the MB1 canal is being evacuated and it is noted that fluid is simultaneously being drawn from the MB2 canal, there is a good indication that the system is complicated and does join at some point (Figs. 4a & b). There are occasions, especially in lower molars, where the mesial root canal system unexpectedly joins with the distal root canal system. On occasion, the maxillary canal system will have the DB or MB canal system connected to the palatal system. These "surprises" are important to be aware of, before obturation of the canal system, especially when using either carriers or injectable GP.

_Drying canals with F•I•R•E

The canal(s) are **F**looded with 95 per cent ethanol (Everclear, available at local liquor store), agitation of the fluids are **I**nitiated with an activator for the tsunami effect, then **R**e-irrigated with the 95 per cent ethanol, and then **E**vacuated with the capillary tip. The canal(s) are then best dried by using a Stropko Irrigator on a dedicated, air-only syringe (DCI), but if a three-way syringe is used, be sure to express all water from the line first (Fig. 5). Next, with a 27- or 30-gauge notched or side-vented needle (Monoject), fitted to the tip of the Stropko Irrigator and bent as necessary, to easily dry the canal system (Fig. 6). Important note: It is essential to regulate the air pressure to the syringe at 1 to 3 psi and use a side-vented or notched needle, to prevent any possibility of inadvertently forcing air through the apical foramen. This is easily achieved with an in-line regulator, the Chapman-Huffman Regulator & Gauge, Part #17-050-00 (Fig. 7).

As dentists, we are accustomed to a "blast" of air while using the usual air/water syringe tip and high air pressure to the A/W syringes. With a properly regulated Stropko Irrigator fitted with an appropriate small gauge needle, only a "kiss" of air is necessary to create the flow necessary for thorough air drying of the canal. On occasion, one has to direct the air to a sensitive area on himself or herself to be sure the air is even flowing. Just watching the evaporation that occurs within the canal, while using the SOM, is enough to convince any operator that there is indeed a flow of air. There is enough physiologic back pressure of the apical environment (1.5 mm Hg) to prevent movement of the air past the terminus in the correctly shaped canal. In almost 20 years, with many different doctors using the Stropko Irrigator to "air dry" canals, the author has only heard of one unfavorable incident. In that one case, the doctor did not use a side-vented needle and did not regulate the air pressure to the air syringe. To repeat, when the Stropko Irrigator is used with the properly regulated air pressure (1 to 3 psi) and the appropriate 27- to 30-gauge, side-vented/notched needle is used, there is no fear of forcing air into apical tissues.

_Sealer application

To the SOM user, the ineffectiveness of drying the canal with a paper point is soon realized. It is also easy to observe how differently the Kerr Pulp Canal Sealer EWT (SybronEndo) acts when the canal is in fact dry, not just blotted. After blotting with a paper point, the sealer tends to act like a drop of oil when placed on the canal wall. But when the surface is dried, using alcohol and air as described above, the sealer readily spreads onto the canal wall, much like a coat of paint.

The complete dryness of the canal to the desired working length is checked with a clean absorbent point that fits to length. This also gives the operator an excellent chance to recheck the working length and dryness of the canal. Any sealer (Kerr EWT, Roth, AH Plus, etc.) can be used as long as the heat of the warm GP does not cause a "flash set." The end 3 mm of a sterile paper point is coated with the sealer of choice and placed into the canal to the working length. The author uses Kerr Pulp Canal Sealer EWT, mixed per usual directions, but a little "on the thin side". Using short, rapid apical-coronal movements, the walls of the canal are completely coated with sealer. The use of the SOM is a great aid for observing when the coating of the canal wall by the sealer is complete. Then, a sterile absorbent point is used, in the same manner, to remove any excess sealer that may remain. Depending on the amount of sealer placed at the beginning, more than one absorbent point may be necessary to get the "blotchy appearance" on the final point (Fig. 8). Only a thin coat of sealer is necessary for lubrication, so very little remains on the walls of the canal (Fig. 9). One of the most common mistakes, made at first, is using too much sealer. When this happens, the excess sealer will be extruded back into the chamber, or apically when the warm GP is placed. In some cases, the GP may be prevented from completing the desired "flow" apically. Typically, only one or two points are normally needed once the operator achieves proficiency at applying the correct amount of sealer to begin with. Thermoplastic GP techniques are not sealer-dependent and depend more on the sealer as a lubricant and facilitate the flow of the thermoplastic GP.

Fig. 7

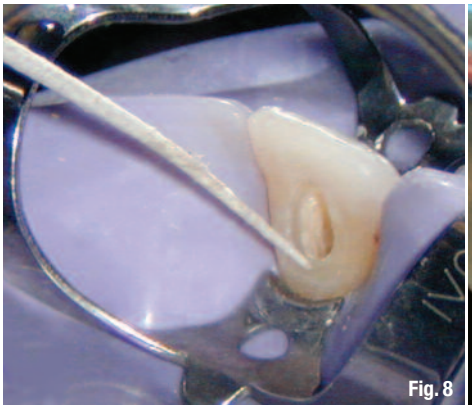


Fig. 8

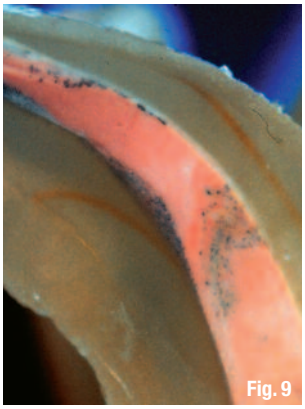


Fig. 9

Fig. 7_The Chapman Huffman in-line air regulator and 0-15 psi gauge works well.
Fig. 8_Fresh absorbent points are used to remove excess sealer until 'blotchy'.
Fig. 9_Only a very thin layer of sealer needs to coat the walls for lubrication. *(Photo/Courtesy of Bob Sharp, Sacramento, CA)*