earn C.E. credit
Predictable apical microsurgery (Part 1)

case report
Retreatment of a lower molar

trends
Restoring endodontically treated teeth
AirLight Series
The Next Standard

NO Fiber Optic System, but you will get a LED powered handpiece

The truly innovative design of this handpiece incorporates Direct-LED Light powered by its own miniature built-in generator. This cutting edge technology allows the operator to have a clear illuminated operative field without the fiber optic systems. The drive air rotates the miniature generator. The electricity generated illuminates the LED that is optimally positioned on the face of the handpiece, providing daylight bright illumination. It is so efficient there is no loss of air pressure or torque, and the three coolant water ports provide the desired coolant spray pattern.

Built-in Generator: Generates electricity
No fiber optic system required from your dental delivery unit.
Fits 4, 5 and 6 hole tubing

Direct-LED
the LED Light is optimally positioned on the face of the handpiece to provide larger light pattern than the traditional power optic systems

Ceramic Ball Bearing
Ceramic bearings are 25% harder than conventional stainless steel bearings, but just half the weight. Lower friction results in quieter and heatless operation, especially at high speed, and longer turbine life.

Beyes LED technologies
Colour temperature: 5,500K
Light intensity: at least 25,000 lux.
BEYES LED delivers natural daylight quality light and assures clearer vision, which helps to reduce fatigue during operation.

BUY 3 GET 1 FREE during the CDA, ADA, GNYDM meetings!

<table>
<thead>
<tr>
<th>Specification</th>
<th>HP3006</th>
<th>HP3014</th>
<th>HP3018</th>
<th>HP3016</th>
</tr>
</thead>
<tbody>
<tr>
<td>M600-S Standard Head</td>
<td>$598</td>
<td>$798</td>
<td>$129</td>
<td>$998.50</td>
</tr>
<tr>
<td>M600-S Standard Head</td>
<td>$598</td>
<td>$798</td>
<td>$129</td>
<td>$998.50</td>
</tr>
<tr>
<td>EZ-Swivel Swivel Coupler</td>
<td>$129</td>
<td>$998.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HP3006 Standard Head</td>
<td>$598</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HP3014 Standard Head</td>
<td>$798</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HP3018 Swivel Coupler</td>
<td>$129</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Beyes Dental Canada Inc. • 9-595 Middletield Road, Toronto, Ontario, M1Y 3S2 Canada • 1-877-703-3562
Welcome to roots

The amount of new information available in the dental field about new products, techniques and research data is astounding. Running a practice and seeing patients leaves little time for catching up on the latest clinical news and product information. Thus, we hope roots will not only be a welcome respite for those rare chunks of time you can devote to leisurely reading, but one that provides a practical return on your investment by providing information that you can actually put to immediate use.

For the first issue of the U.S. edition of roots, we’ve assembled a collection of articles from some of the most respected names in endodontics. These expert clinicians are sharing their knowledge and expertise with you.

Within this issue, you can read a report from Dr. Nadim Z. Baba and Dr. Charles J. Goodacre about key principles that enhance success when restoring endodontically treated teeth; case studies by Dr. Konstantinos Kalogeropoulos on retreatment of a lower molar and by Dr. Rafaël Michiels on treating a calcified mandibular molar; plus thoughtful analysis by Dr. L. Stephen Buchanan on new additions to the armamentarium and by Dr. Ken Serota on the question of endodontics vs. implants.

But there’s more. Every issue of roots magazine also contains a C.E. component. So, by reading the article on predictable apical microsurgery by Dr. John J. Stropko, then taking a short online quiz about that article at www.DTStudyClub.com, you will gain one ADA CERP-certified C.E. credit. Keep in mind that because roots is a quarterly magazine, you can actually chisel four C.E. credits per year out of your already busy life without any lost revenue or time away from your practice.

To learn more about how you can take advantage of this C.E. opportunity, visit www.DTStudyClub.com. Annual subscribers to the magazine ($50) need only register at the Dental Tribune Study Club website to access these C.E. materials free of charge. Non-subscribers may take the C.E. quiz after registering on the DT Study Club website and paying a nominal fee.

I know that taking time away from your practice to pursue C.E. credits is costly in terms of lost revenue and time, and that is another reason roots is such a valuable publication.

I hope you enjoy this first issue and that you get the most out of it that you can.

Sincerely,

Torsten Oemus
Publisher
ANNUAL DENTAL TRIBUNE STUDY CLUB
SYMPOSIA AT THE GNYDM
NOVEMBER 27TH – 30TH, 2011, STARTING AT 10:00 AM DAILY

For the fourth year in a row, Dental Tribune Study Club hosts its annual C.E. Symposia at the GNYDM, offering four days of focused lectures in various areas of dentistry. Find us on the exhibition floor in aisle 6000!

Each day will feature a variety of presentations on topics, which will be led by experts in that field. Participants will earn CE credits for each lecture they attend. DTSC is the official online education partner of GNYDM.

PleASe see program details under www.dtstudyclub.com/gnydm

Register now: www.gnydm.com

Attendees must pre-register as GNYDM visitors for free.

SUNDAY, NOVEMBER 27
10:00 – 11:00 DR. HOWARD GLAZER // COURSE NO. 3780
GIOMERS: NEW GIANTS OF MI DENTISTRY

11:15 – 12:15 DR. SHAMSHUDEEN KHERANI // COURSE NO. 3750
COMPREHENSIVE DENTISTRY USING DIGITAL IMPRESSION TECHNOLOGY

12:45 – 1:45 DR. RON KAMNER // COURSE NO. 3900
MINIMALLY INVASIVE DENTISTRY: TIPS AND TRICKS TO MAXIMIZE SUCCESS

2:00 – 3:00 DR. LIUSS MALKACHER // COURSE NO. 3910
THE HOTTEST TOPICS IN DENTISTRY

3:15 – 4:15 TBA // COURSE NO. 3920
TECHNOLOGY TO IMPROVE YOUR CARIES MANAGEMENT

4:30 – 5:30 DR. GEORGE FREEDMAN // COURSE NO. 3830
EVOLVING CONSERVATIVE RESTORATIONS

MONDAY, NOVEMBER 28
10:00 – 11:00 DR. FAY GOLDEST // COURSE NO. 4670
WHAT PATIENTS WANT... WHAT DENTISTS WANT: EASY, HEALTHY DENTISTRY!

11:15 – 12:15 DR. DAMIEN MULVANY // COURSE NO. 4680
WHY VIEW YOUR 3D PATIENTS WITH 2D IMAGES? A COMMON SENSE APPROACH TO 3D IMAGING IN THE GENERAL PRACTICE

12:45 – 1:45 DR. LARRY FINTOTT // COURSE NO. 4690
REMEMBER WHEN "E" WAS JUST A LETTER USE SERVICES TO IMPROVE PATIENT CARE AND INCREASE PROFITABILITY

2:00 – 3:00 DR. GEORGE FREEDMAN AND DR. FAY GOLDEST // COURSE NO. 4700
DIODE LASERS AND RESTORATIVE DENTISTRY

3:15 – 4:15 DR. SHAMSHUDEEN KHERANI // COURSE NO. 4710
LASER DENTISTRY OVERVIEW WITH AN UPDATE ON CLOSED FLAP OSSSEOUS

4:30 – 5:30 DR. MARTY JABLOW // COURSE NO. 4720
UNDERSTANDING THE ADVANCES IN SELF-ADHESIVE TECHNOLOGY AND HOW TO INCORPORATE THEM INTO YOUR RESTORATIVE PRACTICE

TUESDAY, NOVEMBER 29
10:00 – 11:00 DR. GREGORI KURZMAN // COURSE NO. 5690
CORE BUILDUPS, POST & CORES AND UNDERSTANDING FERRUL

11:15 – 12:15 TBA // COURSE NO. 5700
THE IMPORTANCE OF THE FLAP DESIGN IN RELATION TO THE TYPE OF THE UNDERLYING BONE DEFECT

12:45 – 1:45 DR. GEORGE FREEDMAN AND DR. FAY GOLDEST // COURSE NO. 5710
THE DIODE LASER: THE ESSENTIAL SOFT TISSUE HANDPIECE

2:00 – 3:00 DR. SELMA CAMARGO // COURSE NO. 5720
LASERS IN ENDODONTICS

3:15 – 4:15 DR. STANLEY MADEL AND DR. MIC FALKES // COURSE NO. 5730
LOCAL ANESTHETIC PERFORMANCE, FICTION, FACT AND ADVANCEMENTS (PRECISION BUFFERING)

4:30 – 5:30 DR. MARCUS STEIGMANN // COURSE NO. 5730
MY FIRST ESTHETIC IMPLANT CASE - WHY, HOW, & WHEN?

WEDNESDAY, NOVEMBER 30
10:00 – 11:00 DR. MARCUS STEIGMANN // COURSE NO. 6680
MY FIRST ESTHETIC IMPLANT CASE - WHY, HOW, & WHEN?

11:15 – 12:15 DR. GEORGE FREEDMAN AND DR. PAT RICET // COURSE NO. 6680
CEMENTING ALUMINA AND ZIRCONIA RESTORATIONS

12:45 – 1:45 DR. RON KAMNER AND DR. ARMIN NEVAT
MINIMALLY INVASIVE IMPLANT DENTISTRY FOR THE GENERAL PRACTITIONER

3:15 – 4:15 DR. DAVID HOEXT // PLUS MANY MORE PREMIUM IMPLANTOLOGY LECTURES

For more information, please contact
Julie E. Wehkamp, C.E. Director, Dental Tribune Study Club
Phone: (416) 907-9836, Fax: (212) 244-7185
E-mail: jwehkamp@dtstudyclub.com

*This Program is subject to change.
CanalPro™
Endodontic Irrigation System

More efficacious solutions
CanalPro NaOCl EXTRA

- 2x wetter: Proprietary surface modifiers enable penetration into hard-to-reach areas
- 2x more digestive than regular Sodium Hypochlorite cuts tissue dissolution time in half

Innovative delivery
CanalPro Irrigator

- A disposable negative pressure, simultaneous irrigation and evacuation device

CanalPro Syringe Station

- No Mess! No Waste! Less Time!... A dedicated area for syringe filling

Color-coded for safety and convenience

The sodium hypochlorite product with added surface active agent was the most effective in tissue dissolution at all concentrations and temperatures.

Source: Journal of Endodontics, September 2014; Tjandra, J. et al. Quan W, Zhang H, Hariprasad M.
**c.e. article**

08 Predictable apical microsurgery (Part I)
   _John J. Stropko, DDS_

**instrumentation**

18 New additions to the NiTi rotary file market: What to bring in and what to leave out
   _L. Stephen Buchanan, DDS, FICD, FACD_

**case reports**

22 Retreatment of a lower molar
   _Konstantinos Kalogeropoulos, DDS_

26 Treating a calcified mandibular molar: A modern-day protocol
   _Rafaël Michiels, DDS, MS_

**trends**

30 Key principles that enhance success when restoring endodontically treated teeth
   _Nadim Z. Baba, DMD, and Charles J. Goodacre, DDS, MSD_

**opinion**

38 Endodontic parousia — Nullius in verba redux
   _Ken Serota, DDS_

**industry**

42 AirLight high-speed handpiece

44 HyFlex CM rotary endodontic files

**events**

45 AAE aims to ‘bridge the gap’
   _Sierra Rendon, Dental Tribune_

48 Get ready for Yankee Dental Congress 2012

**about the publisher**

49 _submissions_

50 _imprint_

---

**on the cover**

Cover image courtesy of Dr. Justin Kolnick
Dental Education Laboratories
Dr. Buchanan’s Premier Resource for Endodontic Training

Hands-on Courses
state of the art laboratory designed for endodontics
Offered monthly
Limited to 14 participants

OnLine Learning
www.endobuchanan.com
- Free articles, charts and technique usage materials
- Free CE Online courses
- 3D atlas of endodontic anatomy
- Answers to clinical questions
- Video downloads

Dynamic Tools and Information
- Expert Advice
- On Line Surveys
- Community Comment Boards
- Constantly updated learning resources

Featuring the best products in dentistry and the most comprehensive training on their use in endodontics

Upcoming 2-Day Laboratory Course Dates in Santa Barbara, CA:
Nov 10-11, Dec 8-9, Jan 19-20, Feb 16-17, Mar 15-16

Dental Education Laboratories
1515 State Street, Suite 16
Santa Barbara, CA 93101
toll-free: 800 528 1590
worldwide: 805 899 4529
www.endobuchanan.com

ADA CERP
Dental Education Laboratories is an ADA-CERP recognized provider.
ADA-Accredited Program Provider - FADDIMEDD Credit (Nov 2007 - Dec 2011)
Dr. Buchanan holds patents for some instruments used in these courses.
Predictable apical microsurgery (Part I)

Author: John J. Stropko, DDS

Surgery will never replace solid endodontic principles and should always be a last resort. Apical microsurgery consists of nine basic steps that must be completely performed in their proper order so we can achieve the desired result for our efforts.

The nine steps are as follows:
1. Instruments, supplies and equipment are ready.
2. Patient, doctor and assistants positioned ergonomically.
3. Anesthetic and hemostasis staging completed.
4. Incision and atraumatic flap elevation.
5. Atraumatic tissue retraction.
6. Access, root-end bevel (root-end resection, RER, and REB) and crypt management.
8. Root-end fill (REF) techniques and materials.
9. Sutures, healing and post-op care.

Predictable microsurgery requires the use of an operating microscope (OM) and a team committed to operating at the highest level. The six-handed team approach optimizes the instruments, equipment, techniques and materials that today’s level of technology presents for the benefit of all — especially the patient!

Dr. Berman, an old retired general surgeon, and one of my senior-year dental school instructors, would begin each general surgery lecture by tapping the lectern with his pencil, and after getting our attention, he would say, “Treat the tissues with tender loving kindness and they will respond in a like manner.” I have heard those very words many times while performing apical microsurgery. It is truly a gentle technique when the steps are followed in the proper order.

Preparation of the patient

A thorough past medical history and dental examination, using as many diagnostic aids as possible, is a requirement for a predictable microsurgical event. Being thorough can also avoid un-
favorable experiences. For example, if the patient, or the physician, states he or she is sensitive or allergic to epinephrine, to any degree, the author highly recommends that apical microsurgery not be performed. One of my golden rules of thumb is, “No epi, no surgery ... Period!” If the doctor chooses to proceed with the microsurgical procedure, it will be exceptionally more difficult for both the doctor and the patient.

The technology that exists today presents us with so much more presurgical information than was available even a few years ago, and the recent advances should be included in the diagnostic process whenever possible. A good example of current technology is cone-beam computed tomography (CBCT). The radiological images we have been using for many years were the best we had, but were very limited. Now, CBCT enables the microsurgeon a view of all angles of areas of concern in the maxillofacial region and supplies much of what was missing in the field of dentistry.

The preparation of the patient not only takes the patient into consideration, but also the entire surgical team. The microsurgical protocol we teach involves four people: the doctor (pilot), the scope assistant with the co-observer oculars for evacuation and retraction (co-pilot), the surgical assistant using the monitor as a visual reference (flight director) and the patient (first-class passenger).

The medical history and all necessary premedications are reviewed with the patient to be sure that the latter are taken at the appropriate times before the surgery appointment. The patient is also instructed to rinse with Peridex and take an anti-inflammatory (preferably 600 mg of Motrin, if no allergies are present) the night before and also on the morning of the surgery. At the time of the appointment and before the patient is seated, he or she is once again asked to rinse with Peridex. The dental chair should allow the patient to recline comfortably and even allow the patient to turn to one side or another. Small Tempur pillows placed beneath the patient’s neck, small of the back or knees make a big difference when used.

After the patient is completely comfortable in the chair, he or she is coached on how to make slow and small movements of the head, if necessary during surgery. The patient is appropriately draped for the surgery. It is especially important to wrap a sterile surgical towel around the head and over the patient’s eyes for protection from the bright light of the microscope and any debris from the surgical procedure.

An important psychological point is being sure to not tell the patient he or she “can’t move”! To an already tense patient, saying “don’t move” would probably cause unnecessary apprehension, stress or panic. In more than 500 surgeries, I’ve only had one patient who didn’t hold nice and still during the procedure once he was relaxed and had profound anesthesia.

Now is the time for the surgical team to get comfortable with the position of the patient, the microscope, endoscope and associated equipment. Modern OMs have many features to enhance comfort and proficiency during their use. Accessories like beam splitters, inclinable optics, extenders, power focus and zoom, variable lighting and focal length, etc., all contribute to ease of use, ergonomics and proficiency for the entire surgical team. The mutual comfort of the patient, the surgical assistants and the doctor is of the utmost importance. The microsurgical technique may take an hour or more, so unnecessary movements or adjustments for comfort’s sake during the operation may cause considerable inconvenience.

The doctor’s surgical stool must have adjustable arms to allow the elbows to support the back and serve as a reference point, or fulcrum, if the doctor has to reach for an instrument during surgery.

---

Fig. 3. Smaller straight Tempur pillow can be used for the neck, lower back or knees to give added support for patient comfort.

Fig. 4. Patient’s head and chest are draped and the patient’s vital signs are constantly monitored using a Pulsoximeter.
the procedure. Ideally, neither the doctor nor the scope assistant have to remove their eyes from the oculars of the OM during the entire operation. The task of directing the whole operation belongs to the second surgical assistant. The second surgical assistant is the choreographer for the procedures that take place with the OM. He or she is in a position to observe, coach and/or pass instruments to either the doctor or the scope assistant. The second surgical assistant can see the entire surgical environment and is the only one on the team who has an overview, to keep track of everyone’s needs. It is important that all possible surgical instruments are organized for ease of access during the operation.

While the anesthesia is getting profound, this is a perfect time to modify the needles that will be placed into the tips of the Stropko Irrigators (www.stropko.com) for use during the surgery. The notched ends of 25 gauge Monoject Endodontic irrigating needles (SybronDental) are removed by bending with Howe Pliers and placed into the end of the Stropko Irrigators.

One tip is used with an air/water syringe and the other tip is used on the dedicated “air-only” syringe (DCI). The endodontic irrigating needles are then bent in the same configuration as the ultrasonic tip that is being used for the root-end preparation. After the needle is bent, the ergonomics of the bend can be verified quickly and easily because the patient is in the proper position and so is the doctor. Optimally, there are three Stropko Irrigators available for any surgical procedure: one three-way syringe fitted with a larger blue tip (SybronEndo) for more general flushing of the surgical area (we call it the “Big John”); another three-way syringe fitted with a modified 25-gauge needle for more precise cleaning and drying (“Little John”); and one with an “air-only” syringe, fitted with a modified 25-gauge needle, for precise and dependable drying of the specific area without worry of moisture contamination.

Also, because the lumen of the high-speed evacuator tips (Young’s Surgical) is small, be sure to have extra tips readily available if one should become clogged. A beaker of water should be available so the scope assistant can occasionally clear the evacuator system of blood and tissue debris from the evacuator tip.

After topical anesthetic is placed, local anesthesia is started using less than one carpule of warmed 2 percent lidocaine containing 1:50,000 epinephrine. This small amount is done to anesthetize the injection sites that will be used next for the blocks and infiltrations. The 1:50,000 lidocaine is used prior to the 0.5 percent bupivacaine (Marcaine) because the Marcaine tends to burn upon injection, whereas the lidocaine is much friendlier to the patient. This is then followed with one or two 1.8 cc carpules of warmed Marcaine for nerve blocks and/or infiltrations. All anesthetic is warmed and injected very slowly to avoid any unnecessary trauma to the tissue, which also creates much less discomfort for the patient.

After the completion of administering the local anesthetics, it is time to perform hemostasis staging using 2 percent lidocaine containing 1:50,000 epinephrine. It has been shown that 2 percent lidocaine containing 1:50,000 epinephrine produces more than a 50 percent improvement in hemostasis compared to 2 percent lidocaine containing 1:100,000 epinephrine.2

While keeping the bevel of the needle toward the bone and directed apically toward the root ends, small amounts of 2 percent lidocaine 1:50,000 are slowly injected into the free gingival tissue in two or three sites to the buccal of each tooth (MB, B, DB), approximately 3 mm apical to the muco-gingival line. Slow injection of just a few drops of the anesthetic causes a slight “ballooning” and blanching of the tissue in the immediate area. This is an important step because it causes the muco-gingival line to become more pronounced, allowing the operator to have better vision, resulting in more accuracy with the following hemostasis injections.
As the anatomy of the tissue unfolds during the injections, the operator should begin visualizing and planning the incision. The amount and nature of the attached gingiva is an important consideration whether a full sulcular or a mucogingival (Leubke-Oshenbein) flap is used. In general, a full thickness, sulcular flap is routinely used unless esthetics is a concern and there is an adequate zone of attached gingiva present. To ensure optimum hemostasis, the lingual tissues should also be infiltrated.

If doing surgery on the posterior quadrant of the mandible, special attention should be given to the apical region of the mandibular second molar. On occasion, a small foramen, called the foramen coli, may be present. The foramen coli, if present, contains an ascending branch of the mylohyoid nerve. This added step, "lingual hemostasis staging," can contribute to more profound anesthesia, enhance crypt management, and, as a result, contribute to a more predictable event with less stress for the entire team.

If the surgery is to be performed on the maxillary, the patient is instructed to close on approximately eight layers of sterile gauze, (four 2x2s folded over once) for stability of the jaws and to keep any debris from inadvertently entering the oral cavity. A single piece of a sterile 2x2 is also gently placed distal of the tooth/teeth to be operated on. If the surgical procedure is on the mandible, especially when a full sulcular flap is used, the operator may want to make the incision with the mouth slightly open before placing the gauze.

In either case, with the aid of the OM and using a pre-filled 3 ml syringe fitted with a 20-gauge needle, the entire surgical site is rinsed with Peridex to make sure the area is clean of debris and free of plaque before the incision is made. The surgical site is now ready for the next important step in the procedure: Flap design, the incision and atraumatic flap elevation.

The incision and atraumatic flap elevation

Using a disposable CK2 microsurgical blade (SybronEndo), the incision is made. With the smaller size of this blade, very accurate incisions can be made that have a cleaner cut than those of the much larger BP #15 or BP #15S blade. As the incision is being made, the operator needs to visualize the suturing process.

Sometimes just a small variation in the design of the incision can make a big difference in the ability to achieve easier and less traumatic closure of the surgical flap. In general, the surgeon is working with relatively healthy tissue and no attempt should be made to remove or alter the periodontium. This is especially applicable when making a full sulcular flap.

All flaps are full thickness and the incision must be complete, so there is no inadvertent tearing upon retraction of the flap. The split thickness flap is to be avoided, as it is the most traumatic and healing is compromised. The peristeme does not survive the flap reflection procedure. It has been postulated that depolymerized perioestal collagen plays a role in rapid reattachment of the flapped tissues to cortical bone. In general, all flaps should be extended, at a minimum, to the mesial of the second tooth anterior to the apex of the root being surgerized.

The flap design differs depending on the integrity of the bone over the roots, the amount and nature of the attached gingival tissue, the anatomy of the jaw and the absence or presence of fixed dental appliances.

Basically, there are two flap designs: triangular (one releasing incision) and rectangular (two releasing incisions). They are normally either a full sulcular flap, or a mucogingival flap, depending on the location and situation. In general, the longer

Fig. 6a. Due to the ballooning and blanching effect, the muco-gingival line becomes more pronounced during the hemostasis staging injections.

Fig. 6b. When the buccal portion of the hemostasis staging is complete, the operator can easily plan the incision.
the length of the flap, the easier it is to control, and it has no effect on the healing process.

The full sulcular flap:
This design is routinely used in all posterior quadrants. The full sulcular flap should be used in the anterior if there is a thin zone of attached gingival tissue or there is a concern about the possibility of a dehiscence over the root of the tooth being operated on.

The incision is made through the gingival crest, following the curvature around the cervical of the teeth involved in the surgical area. The operator should attempt to incise the tissue through the crest of gingival to the osseous crest of bone, leaving the healthy gingival attachment intact. The advantage of the full sulcular flap is the ability of the operator to easily visualize the "emergence form" of the involved teeth.

The Leubke-Ochsenbein or Mucogingival Flap:
This flap is used only when there is an adequate amount of attached gingival tissue present and the periodontal probing is within normal limits. The incision design should be scalloping in nature and generally follows the architecture of the teeth, which allows for easy repositioning upon completion of the apical microsurgical procedures.

All releasing incisions are made parallel to the long axis of the teeth. This is important because the blood supply to the area is also parallel to the long axis. If a "wide base" type flap is made, the blood supply to the tissue adjacent to the flap is compromised and healing may not be as predictable and uneventful. The reflection of the flap is accomplished using the Molt, or Ruddle R or Ruddle L (SybronEndo) periosteal elevators. The working end of the instrument is gently inserted into the releasing incision, line into the free gingival tissue apical to the mucogingival attachment, and as far apically as the incision and bony contours will gently permit.

The instrument is manipulated in a gentle apical-to-coronal movement within the unattached gingival portion of the flap. Maintaining the same motion, the instrument is moved slowly toward the same apical position at the more distal extent of the flap. The working end of the elevator should be sharp so the reflection will be a "dissecting" process, so crushing or tearing of the tissue is avoided. Occasionally, especially in the posterior quadrants of the mandible, the mucogingival line will clinically seem to be firmly attached to a microscopic boney ridge. The attached tissue must be gently dissected from it.

Once the mesial few millimeters are elevated, the rest will generally "peel away" without much effort at all and easily release from the osseous surface. The time spent initially, to gently free the attached gingiva, will be rewarded by a more uneventful healing process.

This atraumatic elevation and reflection of the flap is a major contributor to the rapid healing response routinely observed only 24 hours postoperatively. It is important the approximating surfaces of the flap are never touched after the incision is completed, so there are no crushing injuries to inhibit or retard the healing process. An instrument such as the old wax spatula-shaped periosteal elevator has no place in the armamentarium of the endodontic micro surgeon.

Once the flap is gently and cleanly reflected, any "tissue tags" should be left intact, as they will aid in the healing process. It is not necessary to clean the flap and exposed bone because these efforts are time consuming, could be traumatic to both the hard and soft tissue, and ultimately compromise the healing process.

The retraction of the flap must also be accomplished in a gentle and atraumatic manner. The
most common cause of postoperative pain and swelling arises from impingement of the tissue during the retraction process. The surgeon has to constantly monitor the end of the retractor to make sure there is no inadvertent impingement on the flap. This is when the “scope assistant” is most helpful because he or she is observing the surgical site with a different set of eyes! An effective way to achieve atraumatic retraction is to prepare a groove in the cortical plate of the bone, well apical to the anticipated access to the root-end. A surgical length #8 round bur, on a high speed Innovator handpiece (SybronEndo), is used to make the groove. A high-speed handpiece that has air escaping from the working end should never be used because of the danger of air embolism. The “groove” creates a definite place for the retractor instrument to seat into and is easily maintained in position, by either the doctor or the assistant, and eliminates the problem of inadvertently slipping during the surgery. Impingement of the tissue is also more predictably avoided by using a groove to hold the retractor.

Retraction can be accomplished using either the Carr or Rubinstein Retractors; however, there are many styles of retractors to choose from. The retractor is chosen that will best maintain clear visibility to the surgical area and is comfortable for the operator.

After the flap is retracted and if there is any tension on the flap, the vertical releasing incision can be extended, or an additional “releasing incision” at the opposite side of the flap can be considered. The releasing incision is usually very minimal, only 3–4 mm long, and many times does not require suturing.

It is imperative the operator keeps in mind there should be no tension or stretching of the tissues. One should not hesitate to extend or modify the incision to eliminate tension on the tissues. When there is tension, there is usually an opportunity for crushing or ischemia of the tissue and a resultant delay in the healing process. Generally speaking, the larger the flap, the easier it is to maintain atraumatically during the surgical procedure.

It is important the tissues and osseous surface must be kept as moist as possible during the entire procedure. This can be accomplished with a fine stream of water from the Stropko irrigator (www.stropko.com).

---

**Fig. 9** The incision ideally preserves the healthy periodontal attachment.

**Fig. 10** The Leubke-Ochsenbein Flap, or Mucogingival Flap, is used when cosmetics are a concern and there is an adequate zone of attached gingiva.

**Fig. 11** The Molt, or Ruddle elevators, are inserted into the vertical releasing incision to begin the atraumatic flap elevation.
As was mentioned earlier, it is of utmost importance that all steps are done completely before proceeding to the next step. If a step is omitted, or not done completely, the next step will be difficult, if not impossible, to do properly. The operation will develop into a stressful experience for the patient, the staff and the clinician with an end result not as desirable or predictable.

If all of the steps are completed as outlined, all procedures can be performed without stress, and a favorable post-operative result can be expected. I have completed hundreds of apical microsurgical operations and all results were the same with just a few exceptions. The technique is very gentle and predictable, if all of the steps are followed without compromise.

After the properly designed flap has beenatraumatically reflected and retracted, the access preparation is ready to begin. Some important considerations are:

**How much bone exists on the buccal aspect of the root undergoing surgery?**

If there is total dehiscence, guided tissue regeneration has to be considered. Ideally, there should be at least 3–4 mm of healthy, intact crestal buccal bone remaining after the access preparation is completed (Fig. 14).

**How much of the apex can be beveled or resected?**

Usually, there is an adequate amount of root length to work with. The shorter the root, the more conservative the operator will have to be when beveling, and the closer the bevel should be to 0 degrees so less removal of the root end is possible.

If an exceptionally long post is present, that is closer to the apical terminus than desired, not as much of the root end can be resected. Or, if the periodontal bone level is less than desired, a more conservative amount of apical root structure should be removed to preserve as much crown/root ratio as possible.

Fortunately, the operating microscope (OM), and/or the Endoscope (JedMed), allows the operator the luxury of being ultra-conservative when necessary.

The access to the root end is done most effectively with a high-speed handpiece that has no air exiting the working end (Fig. 15a). The usual air-driven handpiece does have air at the working end and using it could result in an air embolism. It is important to use as much water coolant as vision will permit to maintain the moisture in the tissues. Using a fine stream of water from the Stropko Irrigator fitted with a 27-gauge needle, the scope assistant can keep the area moist and evacuate excess fluids at the same time. The initial access and apiection can be accomplished with just three
surgical length burs: the Lindemann bone bur, a #6 round bur and an 1171 fissure bur (Fig. 15b).

There are basically two different ways to begin the access:

1. Estimate the amount of the apex to be resected and, with a Lindemann bone-cutting bur, remove the apex and prepare the access opening in one general step. If there is any portion of the apex remaining in the crypt, it is curetted out and the access is more or less complete.

2. A more accurate procedure is to estimate the location of the apex. Then, using a #6 surgical length, round bur, slowly and gently remove the bone overlying the buccal surface of the root. When the buccal surface of the apex is uncovered, bone is removed until the coronal limit of the crypt is established and the general outline of the apex is readily observed and can be apieced at this time. Often, especially with larger periapical involvement, the lesion can be curetted and the entire apex exposed. If the lesion is more palatal or lingual, the root apex may prevent the necessary access for curettage and will have to be partially beveled or resected as part of the access process.

A thorough curettage is important because it is the first stage of achieving hemostasis from within the crypt. In general, if all of the granulation tissue is removed, the amount of hemorrhage will be greatly reduced, the management of the crypt is easier to accomplish and good visibility can be restored. This technique takes more time but results in better visibility and the ability to be more precise with the initial apiection. The finished bevel will be discussed in detail later.

In general, a biopsy should be performed on all tissue removed from the body. We are usually quite confident of the pathological diagnosis of the LEO, but my feeling is even if the odds are 1 in 100,000 that we are incorrect, no chances should be taken and a biopsy should be taken on a routine basis. The final dimension of the access opening varies and is dependent on several factors:

- The size and position of the lesion. If the lesion is larger, the access will of necessity be larger in order to perform a complete curettage.
- The position of the apex determines the size of the access. The more lingual the apex, the more overlying bone has to be removed and the larger the access has to be for good visibility.
- The access has to be large enough to allow the instruments room to prepare the apical canal system without inhibiting their freedom of movement. The larger the instruments used, the larger the access must be.
- The thickness of overlying bone is also important. If the buccal plate is thick, a wider access is necessary to eliminate a “tunnel effect” so vision is not compromised.

The experience and ability of the surgeon, and equipment available, is a great determinant on how large the access will need to be. I use both an Endoscope and the OM when performing apical microsurgery. On some occasions, the Endoscope permits a better view of the surgical site due to increased lighting and magnification. It also increases the ability to view previously difficult, and sometimes impossible, areas to see with the OM. The extent of a defect or existing anatomical variations that are lingual to the involved root end are typical examples of the value of also having an Endoscope during microsurgical procedures.

The management of the crypt is one of the most important steps, and the operator should take as much time as necessary to achieve the desired result. The clean and well-managed crypt is essential for good visibility and proper use of the retrofill materials. Ferric subsulfate (Monsels Solution, Cutrol), calcium sulfate (Capset, SurgiPlaster), Telfa pads and epinephrine-soaked pellets (Epidry from Pascal) are the most com-
After all granulation tissue and other debris have been thoroughly removed from the crypt, hemostasis is often achieved as a result of proper “hemostasis staging injections” discussed previously. If that is the case, only an appropriately sized piece of Telfa pad lining the floor of the crypt is necessary to enhance lighting. However, this is not always the case and even slight bleeding must be addressed. If the crypt exhibits slight hemorrhaging, the tissue surface or piece of Telfa trimmed to the correct size to fit can be lightly streaked with Monsels Solution and pressed into the floor of the crypt for a short period of time until the hemorrhaging is controlled (Fig. 16).

If there is moderate hemorrhaging, the Monsels Solution is carefully applied with a micro applicator (Ultradent) directly to the problem area in the floor of the crypt for a short period of time until the hemorrhaging is controlled (Fig. 16).

If there is moderate hemorrhaging, the Monsels Solution is carefully applied with a micro applicator (Ultradent) directly to the problem area in the floor of the crypt. Keep in mind that only a small amount is necessary (Fig. 17).

When ferric sulfate is used to achieve hemostasis, a thick brownish-black coagulum will usually result (Fig. 18). The resultant coagulum can be easily removed from the crypt with a clean Micro-applicator (Ultradent), gently flushed with water using a larger tip on a Stropko Irrigator as the assistant is evacuating any debris during irrigation of the crypt. The process is repeated until the bleeding is controlled. As soon as there is complete control of all bleeding in the crypt, the Telfa should be removed and replaced with a fresh piece so there is as much "white" surface as possible to facilitate light reflection and enhance vision.

As long as the coagulum resulting from the use of Monsels Solution has been cleaned out of the crypt after the completion of the surgery, its use has not been shown to affect the healing process. Caution: All forms of ferric sulfate must be kept well within the confines of the crypt. It has an extremely low pH and will instantly chemically cauterize anything it touches. The buccal plate of bone, the periosteum, soft tissue and the Schneiderian membrane should always be avoided! It is important to keep in mind that "If a little bit is good, a lot is not better!" Use only small amounts on the end of an applicator because a small amount goes a long way (Fig. 17).

Note: There are two popular forms of ferric sulfate: Monsels Solution has a concentration of 72 percent and Cutrol is 53 percent. I like the Monsels Solution because it is very effective, readily available and less costly to use.

On a few occasions, severe hemorrhaging occurs. This can be a result of inflammation, a severed interdental artery or a compromised clotting mechanism.

At any rate, when the blood flows faster than the evacuator can remove it, there is good reason for a
little excitement and fast action! The first thing to do is to apply pressure over the crypt with a finger. This will stop the hemorrhaging long enough to calmly prepare the next few steps. In a low and controlled voice, instruct the assistant to insert a bigger tip into the evacuator and hold it close to the crypt. If after removing your finger, the hemorrhaging has not subsided, quickly replace your finger over the crypt as before.

It is a good idea at this time to take a radiograph and clinically re-evaluate the surgical area to make sure no unforeseen anatomical structures (mandibular canal, palatine artery, etc.) have been infringed upon.

Now have your assistant take a piece of sterile cotton roll and make a “cotton plug” large enough to completely fill the crypt, lightly streaking the tissue surface with Monsel’s Solution and insert into the crypt, holding it firmly in place with your finger for a minute or so.

After a few minutes, the cotton “plug” can be safely removed and you can proceed without undue concern. A gentle irrigation with the Stropko Irrigator will remove most of the dark-colored coagulum. The above technique has worked all three times I found myself in that situation. In two of my cases, an interdental artery was the cause and the other was highly inflamed granulation tissue remaining in the crypt.

If hemorrhaging occurs on the surface of the exposed buccal plate, a Touch and Heat (SybronEndo) can be used. The scope assistant can evacuate the “bleeder” with a small surgical tip, so its exact source can be determined, and the Touch and Heat can be used to effectively cauterize it. After the hemorrhaging is completely controlled and the crypt relatively cleansed of the coagulum, a fresh piece of Telfa should be placed over the internal surface of the crypt (Fig. 19). Keep in mind when using the OM that light and dryness are the most important factors for good visibility. Note: Never proceed to the next step until total crypt management has been accomplished.

Once the crypt management is completed, the clinician can proceed to refinement of the bevel and preparing the retropreps with confidence and good visibility. At the end of this step, all hemorrhaging should be controlled; the grossly resected apical end of the root should be easily seen; and the floor of the crypt should be covered with a clean, white piece of Telfa. An apical microsurgeon’s dream!

References


John J. Stropko received his DDS from Indiana University in 1964, and for 24 years he practiced restorative dentistry. In 1989, he received a certificate for endodontics from Boston University and recently retired from the private practice of endodontics in Scottsdale, Ariz. Stropko is an internationally recognized authority on micro-endodontics. He has been a visiting clinical instructor at the Pacific Endodontic Research Foundation (PERF), an adjunct assistant professor at Boston University and an assistant professor of graduate clinical endodontics at Loma Linda University. His research on “in-vivo root canal morphology” has been published in the Journal of Endodontics. He is the inventor of the Stropko Irrigator, has published in several journals and textbooks and is an internationally known speaker. Stropko has performed numerous live micro-endodontic and micro-surgical demonstrations.
Nickel titanium rotary shaping files fundamentally changed everything in endodontics; conceptually, procedurally and economically. The efficiencies gained offset the costs, and dental companies were loved for making files that cost four times more than SS hand files but delivered a tenfold improvement.

Those seeds of success have grown into today’s endo market, where we have come to expect another new file every six months. Granted, it’s a quality problem, but while some of these new instruments have significant improvements in tip and blade geometry or were made with improved metallurgical and forming processes, some have offered little advancement over existing technology.

Their introductions were just business moves proposed to benefit a dental company instead of dentists and their patients.

So how do we sort through the list of new, new instruments and decide whether any of them truly offer clinical advantages commensurate with the high cost of purchasing new instrument inventories, new handpieces and the retraining needed to become competent in their use?

To my mind, there are only a few reasons to change to a new rotary file system:

1. Improved safety and consistency of result.
2. Improved efficiency if the safety and outcomes imperatives have been met or exceeded.
3. Improved procedural simplicity and/or cost of providing endodontic services to patients.

In that order! Any new instrument delivering improved efficiency at the cost of safety and predictability of outcome is a fool’s choice. So if we are choosing for excellent of outcome, we usually look at our failures and consider how we could eliminate those painful and expensive experiences from practice.

However, deconstructing endodontic failures can be nearly impossible, so it is imperative for dentists to choose for the right reasons.

One of the greatest challenges to dentists making these decisions wisely is the difficulty of deconstructing endodontic failures — the prime example being failures due to apical damage caused by aggressive tip and flute geometries.

Dentists who use rotary files have all suffered instrument separation when difficult anatomy is encountered and rotary files are allowed to rotate for too long. This is why dentists interpret a new rotary file that cuts effortlessly to length in such positive light, despite the reality that serious laceration will almost always result when aggressive tip and blade geometry intersects difficult apical anatomy.

The only evidence of the disastrous shaping outcome is the inevitable overfill that follows — a result seldom attributed to its true etiology but most commonly identified as a cone fit or condensation failure.

When a given file design always cuts to length, it is highly unlikely to exhibit fidelity to the original
The Ultimate in Patient Comfort

Crescent Headrest, Backrest, Knee Support and Bodyrest
Bring your patients comfort with memory foam cushions for their neck, back and entire body. The Knee Rest will provide your patients with pressure relief in the lower back and hips.

Crescent Child Booster Seat
The Crescent Child Booster Seat is the ultimate seat to have in your practice to assist in the positioning of children in the dental chair.

Crescent Osteo Headrest
The Osteo Pillow will gently cushion the head and neck and offer support to the patient who has difficulty bringing their head to a reclined position.

Available in Gray, Beige and Teal

Your Complete Source for Patient Comfort!

www.crescentproducts.com/dental.htm  To Order Call Toll-Free: (800) 989-8085
‘How do we sort through the list of new instruments and decide whether any of them truly offer clinical advantages commensurate with the high cost of purchasing new instrument inventories, new handpieces and the retraining needed to become competent in their use?’

canal path in apically curved canals. Combining that fact with the fact that at least half of all canal curvatures are hidden in our conventional radiographic imaging, it makes an incontrovertible case for safety above cutting efficiency if only one of these two attributes is designed into an instrument set.

That leaves us to consider new files introduced to solve mythical problems not proven to exist or to deliver efficiencies provided by already existing instruments that have been around for a decade.

The best example being the SAF (self-adjusting file) brought to market and abandoned less than a year later. This cardiac-stent-like file, truly a beautiful design as its hyper-flexible, cross-laced struts are laser-cut out of NiTi tube stock, was hailed as a transformational file, and that it is.

What it isn’t, though, is an instrument that cuts dentin but rather only sands it, thus creating no reproducible canal shape and catapulting us back to an era before system-based endodontics related obturation procedures to specific pre-defined shaping outcomes. Oh, and there was also the issue of needing to buy a proprietary handpiece/irrigation device and a $50 cost/instrument. So whose bottom line was in mind? Not yours.

Another example is the recently introduced reciprocating file.

What problem does this solve for you? Do you need to spend money on a new handpiece and learn an entirely different technique for shaping canals that won’t improve your results or your bottom line? And is the claim that you can cut a shape with one file entirely true or even new for that matter?

Single-file shaping is not a new or unique claim, as GT and later GTX Files have cut single-file shapes since 1996. And, as I have understood since I first proposed a single file concept and successfully designed a file line that could accomplish that outcome, there is no file design that can cut a single-file shape in all canals.

Two to three files to cut shape in a nasty root? Sure, but nobody gets a single file to length in that one. The large roots with huge apical canal diameters? Two should do it, but nobody is shaping that canal with a single file.

Small canals with significant curvature or constriction cannot be shaped with a single file without risk of instrument separation, and canals with larger apical diameters will usually require two instruments — one to cut an initial shape so that the terminal diameter of the canal can be accurately gauged and the second file to finish.

With GTX Files, 95 percent of canals can be shaped with one to two files in less than a minute, and half of all medium-sized canals (in large molar roots) are completed with just one 30-.08 GTX File. This is while using any existing rotary handpiece and a technique you are familiar with. So this new “single-file shaping” claim is neither new nor true.

So what do you bring in and what do you leave out? The biggest improvement happening in my clinical practice is the introduction of full rotary negotiation. And for this giant step forward, you don’t need a new handpiece; these files work well in the handpiece you are currently using.

So two things to keep in mind here: First, if it ain’t broke, don’t fix it; and second, be certain before you make the investment to buy into a new rotary shaping system that it solves a problem you actually have.

L. Stephen Buchanan, DDS, FICD, FACD is a diplomate of the American Board of Endodontics and an assistant clinical professor at the post-graduate endodontic programs at USC and UCLA. He maintains a private practice limited to endodontics and implant surgery in Santa Barbara, Calif., and is the founder of Dental Education Laboratories, a hands-on training center serving general dentists and endodontists upgrading their skills in new endodontic and implant technology. Buchanan can be reached through his business, Dental Education Laboratories, at www.endobuchanan.com or info@endobuchanan.com.
Introducing e-Foam Rotary HD

Our new e-Foam® Rotary HD inserts are specially designed for cleaning rotary instruments. A rotating file secured in a hand piece can be placed directly into the high density foam to assist in cleaning debris from rotary flutes. Our Rotary HD foam minimizes tearing or shearing of the foam while a file is in motion.

Precisely engineered to fit Jordco’s Endoring II organizer.

Jordco e-Foam Rotary HD, endodontic foam inserts,
REF: ERFYHDs (48 high density yellow inserts)

Joins the endodontic assistant you’ve come to trust.

The Endoring™ II organizer enables the clinician to directly place, store, measure and clean endodontic hand and rotary instruments within the operating field. It reduces the risk of cross-contamination and minimizes the passing of sharps between dentist and staff. Using the Endoring II organizer helps make endodontic procedures safer, faster and reduces patient chair time.

Endoring II, hand-held endodontic assistant,
REF: ERK2-s (Premium Kit), ER2SK-s (Starter Kit), ER2-s (with metal ruler)

Manufactured by Jordco, Inc. USA • www.jordco.com • TEL 800-752-2812 • FAX 503-531-3757

To order, please contact your dental supply dealer. Or visit us @ www.jordco.com or call 800-752-2812
Endodontics is all about preserving the natural dentition. There is no better implant than the natural tooth, given the fact that it can be treated and restored effectively and predictably. Many factors, such as root perforation, affect the prognosis of endodontic treatment.\(^1\)

Today, perforations can be managed predictably with the use of MTA cement as sealing material.\(^2\)

The purpose of this article is to illustrate the endodontic retreatment of a mandibular first molar with perforation in the coronal third of the mesiobuccal root canal, aided by the use of magnification provided by the dental operating microscope (OM).

**Case report**

A 61-year-old male patient, with a non-contributory medical history, was referred by a general dentist for retreatment of a mandibular first molar. The tooth was tender to percussion. Periapical radiolucency was evident in both roots and the furcation area.

A previous root canal treatment had been performed more than 10 years ago. The canal filling was short in length and the remains of a screw post were present in the mesiobuccal canal (Figs. 1, 2). The treatment plan was to restore the tooth with a cast dowel and porcelain-fused-to-metal (PFM) crown.

After local anesthesia had been administered, a rubber dam was placed and the temporary filling removed. The fragmented post was removed by means of ultrasonic tips under magnification (G6, Global Surgical). Owing to the vicinity of the post to the furcation, care was taken not to remove dentin distal to the post.

The root-filling material apical of the post and from the orifices of the other root canals was also removed with ultrasonic tips. Observation under high magnification revealed a small perforation of the root canal wall where the post was placed (Fig. 3). The patient and the referring dentist were informed that the tooth was to be retreated and the perforation defect sealed with MTA cement (DENTSPLY Maillefer).

A copious amount of irrigation (2.5 percent NaOCl) was used throughout the treatment. The root canals were flared with a combination of Gates-Glidden burs and rotary NiTi instruments. Under high magnification, an additional root canal space
was found in the distal root (Fig. 4). Remnants of the previous root canal filling material were removed with a combination of hand files and rotary instruments, and patency was achieved with small stainless-steel hand files. Working length was calculated with an apex locator (Root ZX mini, J. Morita) and PathFile (DENTSPLY Maillefer) rotary instruments were used for pre-flaring.

The mesial root canals were instrumented to 40/.04 and the distal to 50/.04 with rotary instruments (BioRace, FKG). The smear layer was removed through one-minute irrigation with 17 percent EDTA (Ultradent). Passive ultrasonic irrigation was performed with 2.5 percent NaClO and ESI needles (EMS), three times for one minute each in every canal.

The canals were dried and Ca(OH)2 was placed with a Lentulo spiral (DENTSPLY Maillefer) as an intra-canal medicament. Cavit-G (3M ESPE) was used as temporary filling material. The patient was given oral and written post-operative instructions and was told to return after 15 days.

At the second appointment, the anti-microbial irrigation regimen was repeated and the canals were dried with sterile paper points. Gutta-percha points were placed in the canals and a master-cone radiograph was taken (Fig. 5). The sealer used was AH Plus (DENTSPLY DeTrey). The continuous wave of condensation technique was applied during obturation with System B (SybronEndo) at 4 mm from the apical terminus of the canal, and back-filling was done with thermo-plasticised gutta-percha using the Obtura III Max (Obtura Spartan).

Care was taken not to accidentally push sealer into the perforation site. The mesiolingual root canal was back-filled to a level apical of the perforation (Fig. 6). After obturation, white MTA, delivered with the MTA gun (both DENTSPLY Maillefer), was used to seal the perforation site.

As requested by the referring dentist, no post space was left in the distal root canal, as he wished to create his own space to place an intra-radicular post (Fig. 7). Cavit-G was used as temporary filling material. The patient was referred back to the dentist for the final restoration and was told to return after a six-month period for a recall examination.

At the recall appointment seven months later, the radiograph showed no evident radiolucency in the
peri-radicular tissues of the tooth (Fig. 8). However, it also revealed that the new post had not been placed at the adequate length. The general dentist was contacted and reassured me that a new dowel and PFM crown would be placed.

**Conclusion**

Advances in technology and biomaterials have not yet been proven to enhance overall success rates in endodontics. Root perforations can affect prognosis in a negative way. Nevertheless, the OM allows clinicians to work with great precision even under the most demanding circumstances, and MTA greatly enhances success when treating perforations in the furcal area.

In addition, the use of ultrasonics under magnification facilitated the removal of the post despite its small size. Passive ultrasonic irrigation removed debris and necrotic tissue effectively from the mesial isthmus area, allowing obturation material to fill it, as can be observed in the final X-ray (Fig. 8).

A complete list of references is available from the publisher.
Under the patronage of
H. H. Sheikh Hamdan Bin Rashid Al Maktoum
Deputy Ruler of Dubai, Minister of Finance
President of the Dubai Health Authority

“Where Oral Health Professionals Meet”

“Delivering Science & Technology”

Supported by

FDI
FDI World Dental Federation

UAE INTERNATIONAL DENTAL CONFERENCE & ARAB DENTAL EXHIBITION
31 January - 2 February
Dubai International Convention & Exhibition Centre

- The Best in Education with the Newest Developments and Techniques in Dentistry Through a Series of Lectures and Specialized Courses
- Visit 26,000 sqm. of Exhibition Space and Explore the Latest Innovations and Business Practices
- Enjoy a Visit of Burj Khalifa, the World’s Tallest Tower

Organised by

Strategic Partner

Supported by

Strategic SportCup Partner

INDEX® Conferences & Exhibitions Organisation Est.
P.O. Box: 13836 I Ibin Sina Medical Complex #27 Block B, Office 203, Dubai Healthcare City
Dubai - United Arab Emirates | Tel: +971 4 3624717 | Fax: +971 4 3624718
E-mail: aeedc@index.ae | Website: www.index.ae

www.aeedc.com
Treating a calcified mandibular molar: A modern-day protocol

Endodontics has evolved enormously during the last few decades. However, the basic principles from the past still apply today. The following case report gives an example of the manner in which the old principles are applied with newer techniques, devices and materials.

_History and diagnosis_
A 37-year-old female patient was referred to our practice for a problem with her lower right second mandibular molar (tooth #31). She had no health issues and was given an ASA score of 1.

The referring dentist opened the tooth because of an acute pulpitis due to an extensive carious lesion disto-lingually. She had difficulty locating the mesial canals because the pulp chamber was heavily calcified. She had placed calcium hydroxide upon the orifices of the canals and sealed the tooth with a cotton pellet and a temporary restoration. The patient had no clinical symptoms when she presented to our office for treatment.

_Treatment and discussion_
A diagnostic radiograph (Fig. 1), which is essential in determining the treatment strategy, was taken to visualize the extent of the lesion and the anatomy of the roots. The patient was then anesthetized by a lower alveolar nerve block with 4 percent articaine, 0.01mg/ml epinephrine (Septanest Special, Septodont). The temporary filling and cotton pellet were removed, exposing a large carious lesion. In order to facilitate the temporary restoration after treatment,
an AutoMatrix (DENTSPLY Caulk) was placed. This also enabled better isolation. The tooth was then isolated with a rubber dam (Coltène/Whaledent; Fig. 2).

Isolation, which is one of the fundamental principles in endodontics, is more than 100 years old. In 1864, Sanford C. Barnum developed the rubber dam, which was generally accepted as a necessity in achieving good isolation and better prognosis.1

“The first step in the treatment of a tooth ... is the adjustment of rubber dam over the diseased tooth to preclude the possibility of the entrance of germs in the oral secretions into the pulp chamber. This should be the invariable rule.”2

However, a recent survey found that only 3.4 percent of general dental practitioners use the rubber dam in their endodontic routine.3 Visualization and magnification can help clinicians greatly in cases like the one presented here. Without the use of a surgical operating microscope (OM), it is very difficult to locate canals in the presence of a great deal of calcification.

“You cannot treat what you cannot see” is a quote that is regularly heard and that hits the nail right on the head. In this case, visualization and magnification were obtained through the OM (OPMI pico, Carl Zeiss).

Photographs were taken with a Canon PowerShot A650 IS mounted on the FlexioStill adapter (Carl Zeiss).

I removed the carious dentine with LN burs (DENTSPLY Maillefer). There was a great deal of calcified tissue in the pulp chamber (Fig. 3), which I also removed with LN burs. The calcium hydroxide was easily removed with 10 percent citric acid.

After a clean opening cavity had been created, the actual root-canal treatment was begun. Two mesial canals were located and coronally pre-flared with ProTaper SX (DENTSPLY Maillefer; Fig. 4).

Working length was determined with an ISO size 10 K-file (DENTSPLY Maillefer) and the Root ZX mini apex locator (J. Morita Europe). A glide path was then established with K-Flexofiles sizes 15 and 20.

Cleaning was performed with 3 percent NaOCl, which was ultrasonically activated with an Irrisafe tip (Satelec) several times throughout the procedure. The ultrasonic activation of the irrigating solution results in more effective removal of organic tissue, debris and planktonic bacteria.4 It is a very easy and inexpensive procedure and should be incorporated in every endodontic routine.

Fig. 4. Locating the mesial canals.
Fig. 5. Fractured Irrisafe tip.
Fig. 6. Removed Irrisafe tip.
Fig. 7. Confirmation radiograph.
Shaping was done with ProTaper files S1, S2 and F1 in the mesial canals and ProTaper file F2 in the distal canal, giving the canal sufficient taper but a small apical diameter. Many controversies exist about shaping the apical diameter. I prefer an apical diameter of at least a size 30 because I rinse with a 30-gauge irrigation needle. That way, the NaOCl comes into direct contact with the apical dentine. This results in significantly better removal of debris from the apical part of the root. In order to achieve a bigger apical diameter, a ProFile size 30.06 (DENTSPLY Maillefer) was taken to working length in the mesial canals and a ProFile size 35.06 in the distal canal. Utilizing an ISO size 10 K-file, patency was maintained in all three canals throughout the entire treatment.

After the canals had been shaped, they were rinsed with 10 percent citric acid, which was ultrasonically activated three times for 20 seconds with an Irrisafe tip. During the third activation, the tip fractured and became stuck in the isthmus between the mesial canals. Cotton pellets were placed in the mesio-lingual and distal canal to prevent the instrument from falling into the canals during its retrieval (Fig. 5).

Retrieval was done with another Irrisafe tip (Fig. 6). A final rinse was performed with 3 percent NaOCl, which was heated with a few bursts with System B (SybronEndo). Finally, cone pumping was performed with size 06 tapered gutta-percha cones. The literature refers to cone pumping as manual dynamic irrigation that has proven to be more effective than regular irrigation.

A confirmation radiograph was then taken with gutta-percha master cones (DENTSPLY Maillefer) in place (Fig. 7). The canals were dried with paper points (Roeko).

Obturation was performed with a hybrid technique in which cold lateral condensation was used to fill the apical 4 mm.

Thereafter, the System B needle was taken 4 mm short of working length into the canal. Backfill was performed with the Elements Extruder in small increments of 2 mm each time to reduce shrinkage. TopSeal (DENTSPLY Maillefer) was used as a sealer. During the backfill, I could see the isthmus being obturated with gutta-percha (Fig. 8), which is a desirable result. Were tissue to have been left in the isthmus, it may have led to failure.

After obturation, excess sealer in the pulp chamber was removed with 96 percent alcohol (Fig. 9). A temporary restoration was then placed with Fuji IX GP Fast A2 (GC Europe).

Final radiographs (Figs. 10 and 11) were taken and the patient was sent home with instructions regarding possible postoperative discomfort and a prescription for 400 mg of ibuprofen.

_**Conclusion**_

In the past, there were several revolutions in the field of endodontics, such as isolating with the rubber dam, cleaning with NaOCl and shaping with rotary instruments.

Today, we still make use of these principles and are developing them further in order to make treatment easier and safer, and to gain more favorable outcomes._

Editorial note: A list of references is available from the publisher.
Endodontic Instruments

NICKEL TITANIUM ENDO FILES
NiTi instruments are made of a special Nickel-Titanium alloy. This makes these instruments extremely strong and flexible. NiTi instruments are able to negotiate extremely curved canals with essentially no transfer of the central axis of the canal. Ledging and zipping of the canal is virtually eliminated.

STAINLESS STEEL ENDO FILES
For canal preparation, JS Dental line of endodontic instruments have a superior cutting efficiency, flexibility and durability. Contoured hourglass handle for slip-free tactile control, with identification number on handle. All instruments are color coded to ISO/ADA specifications and can be sterilized by all methods.

Available in K-File, Hedstrom and Turbo Files. 21mm, 25mm and 31mm.

The Mity Roto 360° is the endodontic instrument specifically designed for use in a rotary handpiece. The unique U-File design with flat edged flutes prevents the instrument from getting caught on the canal walls. The Mity Roto 360° can be used in a slow speed handpiece with a reduction gear. Do Not Exceed 350 rpm.
Available in 21mm and 25mm. Sizes 15-40

CALASEPT® Plus
Calcium Hydroxide
“The most effective calcium hydroxide thanks to high concentration and optimal consistency”

MAC-TIP
MAC-TIP/autoclavable in combination with the smooth consistency allows precise and deep application.

CALASEPT® EDTA
Irrigation agent for root canal walls chelating and smear layer removal
EDTA Solution 17%
Chemical and mechanical root canal preparation
Removal of smear layer and inorganic substances

CALASEPT® CHX
For irrigation during endodontic treatment
Chlorhexidine Solution 2%
Final irrigation after EDTA and sodium hypochlorite

We Care About How You Practice Dentistry
Brought to you by: JS DENTAL MANUFACTURING, INC.
Visit Us at www.jsdental.com - P.O. Box 904 - RIDGEFIELD, CT 06877 - 203-438-8832 - 1-800-284-3368 - FAX 203-431-8485
Key principles that enhance success when restoring endodontically treated teeth

Authors_Nadim Z. Baba, DMD, and Charles J. Goodacre, DDS, MSD

Restoring endodontically treated teeth and retaining them throughout life remains a challenge. Several factors play a key role in the long-term survival of endodontically treated teeth and associated restorations. The purpose of this article is to identify the key principles that affect tooth and restoration survival.

Principle No. 1

Most endodontically treated posterior teeth should be restored with crowns to enhance their longevity.

Clinicians have observed a difference between endodontically treated teeth and vital teeth. Endodontically treated teeth fracture more often than vital teeth: They tend to break during extraction, and pulpless molars without crowns can fracture.1,2 Multiple studies have shown that endodontically treated teeth benefit from the placement of crowns. One study determined that endodontically treated teeth without crowns were lost at six times the rate of those with crowns.3 Another study demonstrated that endodontically treated teeth without crowns were lost after an average time of 50 months, whereas endodontically treated teeth with crowns were lost after an average time of 87 months.4

Fixed partial dentures have increased clinical failure when supported by endodontically treated abutment teeth compared with vital abutment teeth.1,5–8 However, while crowns significantly improved the success of endodontically treated posterior teeth, it has not been shown that they improve the success of anterior teeth.9 Therefore, intact or minimally restored endodontically treated anterior teeth do not need complete coverage by a crown. They only need a crown when they are weakened by large and/or multiple coronal restorations or when they require significant color/form changes that cannot be managed by a more conservative treatment.10

In contrast with the above studies, a group of researchers11 found similar success rates when they evaluated endodontically treated premolars restored with a post and direct composite resin restorations both with and without complete coverage. Similarly, a retrospective cohort study12 indicated that endodontically treated molars that are intact, except for the access opening, could be restored successfully using composite resin restorations.

After considering the available data, we recognize the potential benefits of using composite resin to restore posterior teeth that are intact except for a conservative access opening. However, more clinical data is needed that identifies the long-term success of these teeth when occlusal wear and heavy forces or parafunctional habits are present.

For this reason, we recommend that endodontically treated teeth that have been previously restored receive...
crowns that encompass the cusps because of the occlusal forces that will be applied to cusps that have been weakened by previous tooth structure removal. Conversely, it may be possible to avoid crowns on some previously restored posterior teeth with only conservative access openings and little to no wear visible that would indicate the presence of detrimental occlusal forces.

Another example of a tooth that may not need a crown is a mandibular first premolar, which typically has a small, poorly developed lingual cusp and a lack of occlusal interdigitation that might spread the cusps apart and induce fracture.13

Principle No. 2

Posts do not reinforce endodontically treated teeth. Their only purpose is to retain the core.

Historically, the use of posts was based on the concept that they reinforce teeth. Virtually every laboratory study has shown that either posts do not reinforce teeth or they decrease the fracture strength resistance of the tooth when a force is applied via a mechanical testing machine.14–24 Additionally, studies have compared the fracture resistance of endodontically treated extracted teeth without posts or crowns with the fracture resistance of teeth restored with posts, cores and crowns.

Maxillary incisors, without posts, resisted higher failure loads than the other groups with posts and crowns,16 and mandibular incisors with intact natural crowns exhibited greater resistance to transverse loads than teeth with posts and cores.17 These studies show no evidence that posts have a strengthening reinforcement effect (Fig. 1).

Clinical studies have also failed to provide definitive support for the concept that posts strengthen endodontically treated teeth.3,13,25 Moreover, when the radiographs of 200 consecutively treated patients were examined several years after endodontic treatment, it was determined that teeth with posts had significantly more apical periodontitis.2

An analysis of data from multiple clinical studies noted that 3 percent of teeth with posts fractured and found no evidence that posts enhanced the survival of teeth.26 Posts have had little enhancing effect on the clinical success of fixed partial denture abutments, but they have improved the clinical success of removable partial denture abutments compared with endodontically treated abutments where no posts were used.10

Since clinical and laboratory data indicate that teeth are not strengthened by posts, their purpose is the retention of a core that will provide adequate retention and support for the definitive crown or prosthesis. Unfortunately, this primary purpose has not been completely recognized. A survey demonstrated that 24 percent of general dental practitioners felt that posts strengthen the teeth.27 Another survey found that 62 percent of dentists over the age of 50 believed that posts reinforce the teeth (39 percent of part-time faculty, 41 percent of full-time faculty and 56 percent of non-faculty practitioners), whereas only 41 percent of dentists under the age of 41 did not believe this.28

Since posts do not reinforce a tooth, they should only be used when the core cannot be retained by some other means.

Principle No. 3

The radiographic minimal length of gutta-percha should be 5 mm to ensure an adequate apical seal.

After the preparation of an endodontically treated tooth to receive a post, the remaining gutta-percha at the apex is a barrier against the passage of bacteria to
trends

Tooth and Restoration Survival

Several studies have found that there is greater leakage when only 2 to 3 mm of gutta-percha is present, but that the preservation of 4 to 5 mm of gutta-percha ensures an adequate seal. Although multiple studies have indicated that 4 mm produces an adequate seal, stopping precisely at 4 mm is difficult, and radiographic variations in angulation could lead to retention of less than 4 mm. Therefore, 5 mm appears to be a safer minimal radiographic length than 4 mm (Fig. 2).

The best method of preserving the apical seal during preparation of a post space is the use of the working length determined during endodontic treatment. The same reference point on the tooth used during endodontic therapy should be used during the post preparation. Additionally, a canal preparation instrument with an appropriate diameter should be used in conjunction with a rubber stopper placed around the instrument at the proper location to help ensure that an adequate amount of gutta-percha is retained apically.

Three methods have been advocated for removal of gutta-percha during preparation of a post space without disturbing the apical seal: chemical, thermal, and mechanical. It has been determined that both hot hand instruments and rotary instruments can be safely used to remove condensed gutta-percha adequately when 5 mm is retained apically.

The immediate removal of gutta-percha after endodontic treatment has also been studied for its effect on the apical seal. Several studies have determined that the removal of gutta-percha immediately after root-canal treatment has no detrimental effect on the apical seal.

Principle No. 4

The optimal post length for all teeth, except molars, is determined by retaining 5 mm of apical gutta-percha and extending the post to the gutta-percha. For molars, only the primary root should be used and it should not extend more than 7 mm into that root. Short posts should be avoided.

The appropriate length for a post should be based on minimizing the potential for damage to the tooth, optimizing post retention and maintaining an appropriate apical seal for the root-canal filling. Several length guidelines have been proposed. A review of scientific data provides the basis for differentiating between these varied guidelines.

While short posts have never been advocated, studies have shown that they are frequently observed on radiographs (Fig. 3). It was found that only 34 percent of 327 posts were as long as the inciso-cervical length of the crown. An evaluation of 200 endodontically treated teeth determined that only 14 percent of posts were two-thirds or more of the root length. Another radiographic study of 217 posts determined that only 5 percent of the posts were two-thirds to three-fourths of the root length. Root fractures caused by high stresses occur more frequently when short posts are used, whereas increasing the length of a post increases the root fracture resistance.

It was determined that posts that are three-fourths of the root length offered the greatest rigidity and produced the least root deflection. However, use of this apparently optimal post length is difficult with many teeth. When a tooth has an average or below average root length and the post occupies two-thirds or more of the root length, it is not possible to retain 5 mm of gutta-percha at the apex. Therefore, optimal post length is determined by retaining 5 mm of apical gutta-percha and extending the post to that depth.

The use of this post length guideline is appropriate for all teeth, except molars. A study of 150 extracted maxillary and mandibular molars determined that molar post spaces should not be prepared more than 7 mm apical to the orifice of the root canal in the primary roots (the distal root of mandibular molars and the palatal root of maxillary molars) because of the increased likeli-
ENDODONTIC MICROSCOPES

— New Design —
— Fluid Movement —
— All Apochromatic Lenses —

Ask about our new Dual Iris Diaphragm. Ideal for viewing deeper into canals.

"Seiler microscopes provide the best bang for the buck! They produce a high quality product that fully meets our needs without wasting money on sizzle not backed by superior substance. My philosophy is to employ logical, well thought out, products that improve our final results without spending one more penny than is necessary."

— Barry Mustani, DDS — New York, NY

SEILER
PRECISION MICROSCOPES
800-489-2282 • www.seilermicro.com
Figs. 6a, 6b. Post and crown loosened from maxillary canine a few months after placement. Both the core/prefabricated post and the crown came off (a). Clinical photograph shows the absence of cervical tooth structure (ferrule) for retention of the crown (b).

Table 1. Suggested maximum diameter based on root dimensions and pulp morphology for maxillary teeth.

<table>
<thead>
<tr>
<th>Maxillary teeth</th>
<th>Central incisor</th>
<th>Lateral incisor</th>
<th>Canine</th>
<th>First premolar</th>
<th>Second premolar</th>
<th>First molar</th>
<th>Second molar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of canals*</td>
<td>100 %: 1 canal</td>
<td>83 %: 2 canals</td>
<td>48 %: 1 canal</td>
<td>mesiobuccal root</td>
<td>59.2 %: 2 or more canals</td>
<td>mesiobuccal root</td>
<td>51.5 %: 1 canal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 %: 1 canal</td>
<td>43 %: 2 canals</td>
<td>distobuccal root</td>
<td>98.3 %: 1 canal</td>
<td>distobuccal root</td>
<td>99.7 %: 1 canal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 %: 3 canals</td>
<td>0.6 %: 3 canals</td>
<td>palatal root</td>
<td>99 %: 1 canal</td>
<td>palatal root</td>
<td>99.9 %: 1 canal</td>
</tr>
<tr>
<td>Number of roots*</td>
<td>1 root</td>
<td>75 %: 2 roots</td>
<td>90.7 %: 1 root</td>
<td>mesiobuccal root</td>
<td>95.9 %: 3 roots</td>
<td>mesiobuccal root</td>
<td>88.6 %: 3 roots</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23 %: 1 root</td>
<td>9 %: 2 roots</td>
<td>47 %: 1 canal</td>
<td>3.9 %: 2 roots</td>
<td>7.8 %: 2 roots</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 %: 3 roots</td>
<td>0.3 %: 3 roots</td>
<td>4 %: 2 roots</td>
<td>2.8 %: 1 root</td>
<td>0.4 %: 4 roots</td>
<td></td>
</tr>
<tr>
<td>Suggested post diameter in mm**</td>
<td>1–1.7</td>
<td>0.8</td>
<td>1–1.5</td>
<td>0.8–1 in the palatal root</td>
<td>1 in the palatal root</td>
<td>1 in the palatal root</td>
<td>1 in the palatal root</td>
</tr>
</tbody>
</table>
We search for the best worldwide!

The GLOBAL DENTAL TRIBUNE AWARDS will celebrate excellence in dentistry. We will recognise outstanding individuals and teams that have made a unique and substantial contribution to improving dental care, whether in clinical practice, health policy, dental education, dental research or the dental industry.

Nominees will be chosen by a global audience of over 650,000 dental professionals, all readers of the Dental Tribune newspapers, which are published in more than 25 languages worldwide.

All dental professionals are invited to submit their applications, which will be taken to online voting by their peers. Shortlisted candidates will be judged by a jury of the most renowned opinion leaders in their respective categories. The awards ceremony will be held in New York City at the end of this year, filled with all the glitz and glamour of a red carpet event.

For preregistrations and more information please go to:

awards.dental-tribune.com
A good understanding of dental anatomy, the configuration of the roots and their variations, and use of an appropriate instrument angulation help in avoiding root thinning and perforation. Instruments should be angled so that they follow the canal (Fig. 5).

When posts are needed in premolars, they are best placed in the palatal root of the maxillary premolar and the straightest root of any mandibular premolar with multiple roots. Root taper, curvature and depressions should be reviewed prior to post preparation. When posts are needed in molars, they should be placed in roots that have the greatest dentine thickness.

These roots are known as the primary roots and they are the palatal roots of maxillary molars and the distal roots of mandibular molars. However, it is important to remember that extension of a post more than 7 mm apical to the root-canal orifice in primary canals increases the risk of perforation. The mesial roots of mandibular molars and the facial roots of maxillary molars should be avoided if at all possible. Attention should also be given to avoiding instrument pressure on the root surface towards the furcation, as this surface is thinned more easily than the outer surface owing to root curvature.

With all teeth, the apical 5 mm of the roots should be avoided because most root curvatures occur within 5 mm of the root apex and entrance into this area increases the risk of excessive root thinning or perforation.

_Principle No. 6_

A cervical ferrule should engage 2 mm of tooth structure to prevent root fracture.

Ferrules can be established by the core engaging tooth structure (core ferrule) or by the crown overlying/encircling sound tooth structure apical to the core (crown ferrule). The data indicate that crown ferrules are more effective than core ferrules and crown ferrules increase the tooth’s resistance to fracture. In spite of the data supporting the benefit of crown ferrules, not all practitioners recognize their value. A survey published by Morgano et al. evaluated the percentage of respondents who felt a ferrule increased a tooth’s resistance to fracture: 56 percent of general dentists, 67 percent of prosthodontists and 73 percent of board-certified prosthodontists felt that core ferrules increased a tooth’s fracture resistance.

Different lengths and forms of the ferrule have been studied. The length and form are essential to the success of the “ferrule effect.” When possible, encompassing 2 mm of intact tooth structure around the entire circumference of a core creates an optimally effective crown ferrule. Ferrule effectiveness is enhanced by grasping larger amounts of tooth structure. The amount of tooth structure engaged by the overlying crown appears to be more important than the length of the post in increasing a tooth’s resistance to fracture (Fig. 6).

If insufficient cervical tooth structure remains to develop a ferrule, surgical crown lengthening or orthodontic extrusion should be considered to expose more tooth structure. In some situations, it may be prudent to extract a tooth and replace it with an implant and crown when one or more of the following conditions is present: a ferrule cannot be developed; crown lengthening would create an unacceptable esthetic environment.
or produce a furcation defect; or a short root is present that would not permit appropriate post length to be developed.

**Principle No. 7**

Until more long-term data is available, fiber-reinforced resin posts should be used with caution.

For many years, the standard method of restoring endodontically treated teeth has been either a custom cast post and core or a prefabricated metal post with a restorative material core.41,32,83 A nationwide survey of dentists in 1994 reported that 40 percent of general practitioners used prefabricated posts, and the most popular post was the parallel-sided serrated metal post.24 The usage of prefabricated posts has undoubtedly increased even more substantially since the 1994 survey. The high demand for aesthetic restorations and all-ceramic crowns led to the development of a variety of non-metallic prefabricated post systems as alternatives to metal posts.84–87

In addition to the esthetic advantages of non-metallic posts, laboratory studies have shown that the resin-based alternative posts have favorable physical and mechanical properties and there is less root fracture with fiber-reinforced resin posts than with metal posts.58–92 However, clinical studies of fiber-reinforced posts have produced a wide range of reported failure percentages, ranging from 0.0 percent after a mean of 2.3 years to 11.4 percent after two years.9,58–61,93–96 Post loosening and root fracture have been the most commonly reported complications (Fig. 7).58–62,93,97,98 Because the core depends on the retentive capacity of the post, the prognosis of the final restoration is highly dependent on the retention of the post.99 Given the wide range of reported failure percentages, it appears that additional long-term clinical data is needed to determine the efficacy of fiber-reinforced posts.

**Conclusion**

Based on this review of available research, the following clinical recommendations are made:

1. Crowns are not needed for intact or minimally restored anterior teeth except when substantial color or form changes cannot be accomplished by more-conservative means.

2. Crowns should be placed on most endodontically treated posterior teeth to enhance their long-term survival. There are some data that indicates posterior teeth that are intact, except for the access opening, can be satisfactorily restored with composite resin rather than a crown. However, the long-term success of this more conservative treatment in the presence of heavy occlusal forces is not known.

3. Posts weaken teeth and they should only be used when the core cannot be adequately retained by some other means.

4. An adequate apical seal is retained by preserving 5 mm of gutta-percha.

5. Short posts should be avoided, as they increase the potential for root fracture. For all teeth except molars, optimal post length is determined by retaining 5 mm of apical gutta-percha and extending the post to that depth. For molars, posts should only be placed in the primary roots (palatal roots or maxillary molars and distal roots of mandibular molars) and they should not be extended more than 7 mm apical to the orifice of the root canal owing to the possibility of root thinning or perforation.

6. The diameter of posts should not exceed one-third of the root diameter to minimize root thinning and the potential for root fracture. Post preparation instrument diameter should be matched to root diameters.

7. When crowns are placed on endodontically treated teeth, they should encompass 2 mm of tooth structure apical to the core whenever possible, since crown ferrules increase the resistance of teeth to fracture.

8. Until more long-term clinical data becomes available, fiber-reinforced resin posts should be used with caution owing to the wide range of reported failure rates in clinical studies.

*Editorial note: A complete list of references is available from the publisher.*

**Table notes:**

* Adapted from data present in Dental Anatomy & Interactive 3-D Atlas and provided by Dr. Blaine Cleg-horn, Dalhousie University, Canada, November 2007.

** Adapted from data published by Shillingburg, 1982 and Tilik, 1979.
The intent of this article is to see whether I can finally shake up those of you who read my blog (on www.oralhealthjournal.com), spend time on it and yet do not post. The point of this “mashup” is to engender “discovery” of information, trends, likes, dislikes, etc., and to dialogue in the truest manner and context of social networking within this profession. Read away McDentist and offer your commentary — good, bad or indifferent — but never overlook the opportunity to make your voice heard.

Every era lives with contradictions that it manages to ignore: the Greeks talked of justice and kept slaves, the Crusaders preached the gospel of the Prince of Peace and rode off to annihilate the infidels, and the 17th century believed in a universe that ran like clockwork, entirely in accord with natural law, and also in a God who reached down into the world to perform miracles and punish sinners.1

Historically, the decision to perform endodontic therapy and restore a tooth or to extract and replace it in some manner was a relatively “straight-line” decision; however, in the implant-driven treatment planning era of the new millennium, dentists face a multitude of complicating factors, most notably the irrefutable success of dental implant therapy and the relative ease and facility of “nuts and bolts” restoration, provided the foundational aspects of surgical placement are met.2

As a discipline specifically and as a profession in general, we must ensure that our process does not engender “rearranging the deck chairs on the Titanic.”3 The identification and quantification of specific factors that affect rehabilitative prognosis in individual patients are essential to formulating standardized treatment protocols and individual treatment plans. Such factors include bone quantity and quality, caries and periodontal disease risk, as well as the critically important factor of the amount of remaining tooth structure.

Minor or even moderate differences in overall treatment outcomes or costs must not affect clinical decisions and must not sway critical thinking.4 Endodontics mandates, as does any discipline, the aggregation and verification of scientific knowledge and proof in order to create the proficiency inherent in the desired positive treatment outcomes; it does not manifest as a paint-by-numbers technical approach whereby the illusion of science is discernible only in the design and perceived innovation of the equipment or product brought to market without retrospective studies or meta-analyses of multivariate, multicentre treatment outcomes.

In a Madoffian world, it is lunacy to be driven by guru-centric claims and pronouncements. It would be disingenuous and gratuitous to suggest that condemnation of salvageable and healthy teeth has not reached epidemic proportions. Yet, the treatment outcome studies on implant survival for the most part report survival as a binary outcome rather than using the Kaplan–Meier survival analysis, which is a far more accurate reflection of the percentage of success.5 It is because binary outcome has been the benchmark to justify removal of salvageable teeth that the pendulum swung too far too fast.

Dentistry needs a “Sputnik” moment to reinvigorate our basic tenets and grounding fundamentals. Sadly, endodontists are infrequent visitors to the critical-thinking, treatment-planning loop, as the technological simplification of the discipline is negating its biological contribution to the interdisciplinary team approach.

This article serves to determine whether endodontics as a specialty has made a case for true partnership in the landscape of foundational, interdisciplinary dentistry. Its intent is to assess the innovations and iterations in the toolbox of the endodontic discipline and ensure that retention of natural teeth is keeping pace with biological reality and not marketing budget-driven science.

There are two historic milestones that bracket our understanding of the myriad complexities of the root-canal system; the first, the work of Hess was woven...
into the fabric of the era of Focal Infection Theory and stimulated the annihilation of millions of salvageable teeth and put dentistry firmly back in the Dark Ages of science (Fig. 1).

The second, the use of micro-CT technology to map the inner space of teeth, replicated the Hess studies using digital tools (Fig. 2). Unfortunately, the outcome of this renewed awareness has not resulted in a more sophisticated approach to preservation of natural teeth using a century of evolutionary advances in material and technique, but has fostered a "simpler is better" mentality, which will inevitably be as devastating to retention of the natural dentition as Dr. Hunter’s egregious dental witch hunt of the early 1900s.

The hard-tissue repository of the human dental pulp takes on numerous configurations and shapes. A thorough knowledge of tooth morphology, careful interpretation of angled radiographs, use of small FOV CBT, proper access preparation and detailed exploration of the interior of the tooth are essential prerequisites for a successful treatment outcome.

A thorough understanding of the complexity of the root-canal system is essential for understanding the principles and problems of debridement, disinfection and root filling for determining the apical limits and dimensions of canal preparations and for performing successful microsurgical procedures when necessary.

And yet, the past few decades have been entombed in the most egregious nihilistic "Mad Men" description of the technological wizardry and biological understanding necessary to ensure long-term predictable prognosis of the endodontically treated tooth: “clean, shape, pack.” This has produced a plethora of product launches that has now reached its crescendo with the arrival of a "single file that does all."

From a metamorphosis of instruments borne of angioplasty materials to the enhanced elasticity of NiTi and its reformulation in newly ground shapes and its use in reciprocating rather than rotary feed rates, the market is once again driving science, and our patients and ultimately our profession will pay the price for the oversimplification and obtuse denial of the reality we know for the expediency we are being trained to crave.

Sealers based on restorative fundamentals were to be the *sine qua non* of monobloc creation in the root-canal space. Unfortunately, one of the most exhaustive studies done to evaluate evidence-based support on the merits of their clinical use concluded that "on the basis of the in vitro and in vivo data available to date, there appears to be no clear benefit with the use of methacrylate resin-based sealers in conjunction with adhesive root filling materials at this point in their development.

Science has shown that the direction for eradication of refractory and chronic disease related to biofilm elimination lies in photodynamic therapy, which has provided clear evidence of clinical efficacy, and applicability continues to be demonstrated. And yet, an array of sonic and ultrasonic products have infused the market with spurious claims to optimize microbial control through innovations in irrigation protocols designed to disinfect and remove the smear layer of the prepared root-canal space in spite of the
fact that their ability to remove mixed-species biofilm remains unproven.

The great virtue of mathematics is that its truths alone are certain and inevitable; in any universe, the shortest distance between two points is a straight line. And yet, the pundits of the new wave in endodontics would have us believe that single files — regardless of their envelope of motion, be it reciprocating, rotary or piston-like — can effectively debride the negative space of the root-canal system in defiance of the morphometrics and myriad complexities of the inner world of teeth.

Similarly, insubordinate to the science of rheology, carrier-based obturation is deemed equivalent to the force generation and resultant gravitometrics of injection-moulded, warm thermolabile techniques as described initially by Blaney and made mainstream by Schilder.

And yet, we have a new wave of carrier-based obturation devices that, in concert with simplified instrumentation protocols, are being marketed by their developers in the context that, “I have read this argument about making root-canal treatment simple. Many colleagues struggle with the complexities of root-canal treatments, and I do not see why we can’t make it simpler. Any competent dentist has good manual skills. If we can simplify the treatment procedure for the general dentists and thereby improve their skills in completing more root-canal treatments to a higher standard, our patients will surely benefit.”

For those who would suggest that this article is self-serving, I would suggest that you simply replace the discipline cited with any other. Perhaps we have reached the point that we no longer wish to advance and support the art and science of ________ (fill in the blank) with definitive research that will refute the nattering nabobs of nihilism on the other side of that proverbial line in the sand. It is time for dentists to acknowledge the gravity of the problem where industry is the driver and the profession the passenger. We need leadership to regenerate the science of dentistry before the artistry truly becomes pre-planned and pre-programmed by those outside the profession, whose vested interests lie in profit and loss statements and not in the eradication of oral disease.

Editorial note: A complete list of references is available from the publisher. Send comments on this article to c.salwiczek@oemus-media.de.

Kenneth S. Serota, DDS, graduated from the University of Toronto in 1973 and was awarded the George W. Switzer Memorial Key for Excellence in Prosthodontics. He received his certificate in endodontics and master of medical sciences degree from the Harvard-Forsyth Dental Center in Boston. A recipient of the American Association of Endodontics Memorial Research Award for his work in nuclear medicine screening procedures related to dental pathology, his passion is education and, most recently, e-learning and rich media. Serota provided an interactive endodontic program for the Ontario Dental Association (ODA) from 1983 to 1997 and was awarded the ODA Award of Merit for his efforts in the provision of continuing education. The author of more than 60 publications, Serota is on the editorial board of Endodontic Practice, Endo Tribune and Implant Tribune. He founded ROOTS, an online educational forum for dentists from around the world who wish to learn cutting-edge endodontic therapy, and recently launched IMPLANTS (www.rximplants.com) and www.tdsonline.org in order to provide dentists with a clear understanding of the
YANKEE Dental Congress® 2012
Boston Convention & Exhibition Center

Ride the Wave of SAVINGS
Register 4 Dental Professionals from the same office and the 5th goes FREE*  
(*some restrictions apply)

Registration and Housing Open September 21, 2011 at Noon

LIVE DENTISTRY  Friday, January 27, 2012

530RW  10:00 am - 1:00 pm
LIVE GUIDED SURGERY
Michael Boschetti, DMD  Lawrence Miller, DMD
- Review the benefits of CBCT 3D Imaging
- Observe guided implant surgery
- Understand general CAD/CAM restorations
- Gain an overview of CAD/CAM materials

“Scottsdale of the East”
Yankee Dental Congress and the famous Scottsdale Center for Dentistry are teaming up to bring you an all-star line-up of speakers covering esthetic, restorative, and CAD/CAM dentistry.

Introducing The Madow Brothers, the Rock and Roll Dentists straight from Las Vegas and The Best Seminar Ever (TBSE)
Topics will include:
- How to Love Dentistry, Have Fun, and Prosper!
- Grow Your Practice with Social Media
 It’s Fun, Fast, Free and it Works!

Disney Institute
Disney Institute was created to showcase Disney best practices and as one of the most recognized names in professional development, Disney Institute travels the world offering engaging lectures.

Topics will include:
- Building a Culture of Health Care Excellence
- Disney’s Approach to Quality Service

DISNEY INSTITUTE

COURSE HIGHLIGHTS

Thursday, January 26, 2012
TIPS AND TRICKS FOR CEREC USERS
Richard Rosenblatt, DMD

SIMPLE STEPS TO CHARACTERIZE YOUR CAD/CAM RESTORATIONS
Richard Rosenblatt, DMD

Friday, January 27, 2012
ESTHETIC ENHANCEMENT FOR CAD/CAM RESTORATIONS—STAIN AND GLAZE
Michael Skramstad, DDS

INTRAORAL IMPRESSION SCANNING DEVICES AND CAD/CAM
Paul Feuerstein, DMD

Saturday, January 28, 2012
IMPLANT PLACEMENT UTILIZING GUIDED SURGERY WITH CAT SCAN AND CAD/CAM TECHNOLOGY
Carl Bosckettie, DMD

yankeedental.com  •  877.515.9071
Beyes Dental Canada introduces **AirLight** high-speed handpiece

For 10 years, Beyes Dental Canada has designed, engineered, manufactured and distributed precision dental devices. The combination of quality manufacturing and innovation in the company’s dental handpiece line brings dynamic instrumentation to the dental field at prices that have been out of economic reach for years.

The new and exciting AirLight high-speed handpiece series offers uncompromised quality with a unique, dependable approach to LED illumination. Dental delivery systems no longer require special handpiece tubings, electronic controllers, transformers and expensive power optic bulbs to illuminate the oral cavity.

The built-in generator in the AirLight handpiece is an innovative new approach to fiber optic illumination. The Direct-LED light gives a much larger light pattern with daylight color correction. For less than the cost of most single handpiece power optic kits, you can have a quality highspeed with LED optics that provide their own power.

There is no installation expense. Any four-, five- or six-pin ISO handpiece connector allows the dentist to simply attach this precision handpiece to the tubing and have the benefit of direct LED illumination immediately available.

In addition to this unique Direct-LED illumination system, the AirLight handpiece is a light, well-balanced instrument that minimizes hand fatigue even in the longest procedures. The balanced turbine uses precision sealed ceramic bearings and a firm but positive automatic chuck. All of this, with a focused coolant spray pattern provides unsurpassed performance.

The full complement of the Beyes Dental Canada product line allows any dental office to upgrade to the latest technology at the most competitive pricing in the market today.

Quality without compromise. Beyes, the next standard.

More information is available at [www.beyes.ca](http://www.beyes.ca) or by calling (877) 703-3562 or (416) 293-2868.
Greater New York Dental Meeting™

Scientific Meeting:
Friday, November 25 - Wednesday, November 30

Exhibits:
Sunday, November 27 - Wednesday, November 30

The Largest Dental Meeting/Exhibition/Congress in the United States
HyFlex CM rotary endodontic files

HyFlex®CM™ (controlled memory) rotary files, available from Coltène/Whaledent, are “changing the DNA of NiTi files.” This endodontic file system is a unique breakthrough in NiTi rotary files with a “Controlled Memory” (CM) effect. The files are manufactured utilizing a unique process that controls the material’s memory, making the files extremely flexible, without the shape memory of other NiTi files. This enhancement in NiTi file production technology gives the file the ability to more closely follow the anatomy of the canal, reducing the risk of file separation, binding and complications such as ledging, transportation and perforation.

This new technology yields an improvement of up to 339 percent in cyclical fatigue compared to standard NiTi files*, reducing the incidence of file separation — the endodontist’s “worst nightmare.” Clinicians are able to re-use HyFlex CM files because the shape of bent files or with straightened spirals is restored during autoclaving.

To obtain a free sample of HyFlex CM Files, visit www.hyflexcm.com.

Coltène/Whaledent has a long history of manufacturing and selling Endodontic products under the Roeko, Hygenic, and Whaledent brands. The ParaPost® system from Coltène/Whaledent has been dominating the market for more than 50 years. Well known for its product line that includes gutta-percha and paper points as well as the invention of the first silicone based sealer RoekoSeal™, Roeko has just celebrated its 100th birthday. Additionally, Roeko is known for manufacturing the first cold filling system, GuttaFlow™. A global leader in dental dam, Hygenic also offers a well-established product line that includes gutta-percha and paper points.

Now, Coltène/Whaledent has decided to join all of the brands under one new business unit — COLTENE®ENDO. This merger of brands enables the team to focus on the endodontic field, thereby enhancing customer service and expediting innovation forces.

For more information, contact ColtèneEndo at (855) COL-ENDO, (855) 265-3636 or visit www.hyflexcm.com.

*Source: In-house tests, at 300 rpm simulated 30-degree root canal.
The American Association of Endodontists (AAE) held its 2011 annual session April 13 to 16 at the Henry B. Gonzalez Convention Center in San Antonio. The theme of the meeting, which offered attendees the chance to earn up to 31 continuing education credits, was "Bridging the Gap: Partners in Interdisciplinary Care." The focus of the meeting was on collaboration among dental professionals for optimal patient care. "The AAE emphasizes the importance of working with general dentists and other specialists to improve patient outcomes," said AAE President Dr. Clara M. Spatafore.

Author: Sierra Rendon, Dental Tribune

Fig. 1. Attendees file into the exhibit hall. (Photos/Sierra Rendon, Dental Tribune)
Fig. 2. Dr. James Johnsen, president of Jordco, displays a selection of products designed to perform an easier root-canal procedure.
Fig. 3. The poster research and table clinics offered new information.
Fig. 4. The exhibit hall floor.
The meeting commenced with a keynote presentation by Christopher Gardner, an acclaimed motivational speaker and author of the bestselling autobiography, The Pursuit of Happiness. Gardner shared the important steps to creating a successful and fulfilling life while telling his personal story of seemingly never-ending obstacles and the ways he overcame them. Other special guests included comedians John Pinette and Kathleen Madigan, who entertained attendees the last evening of the annual session during the President’s Dinner.

To further enhance communication and strengthen relationships among dental practitioners, the AAE 2011 annual session included two new events promoting networking and the sharing of ideas and experiences. A “Lunch-n-Learn” event and roundtable discussions allowed attendees the opportunity to share professional opinions and questions in a less structured environment.

For exposure to endodontic techniques, the AAE’s popular Master Clinician Series showcased live surgeries by leading experts in the field. Master clinicians included Drs. Dan B. Ang, Todd M. Geisler, James L. Gutmann, James C. Kullid, Stephanie L. Mullins, Richard A. Rubinstein and Fabricio B. Teixeira. Attendees were able to witness implant placement, molar surgeries and a demonstration of regenerative endodontic procedures.

The AAE also hosted its Access to Care Project during the annual session. Through a partnership with the San Antonio Christian Dental Clinic and Henry Schein Dental/Henry Schein Cares, pre-screened patients received care from licensed Texas endodontists and endodontic residents from dental schools throughout the state.

“We wanted to give our members and all attendees an intimate look at the best technique for performing endodontic procedures,” Spatafore said. “Participants were able to return to their own practices with a new appreciation for the spectrum and efficacy of the endodontist’s armamentarium.”

Headquartered in Chicago, the AAE represents more than 7,200 members worldwide. The AAE was founded in 1943 and is dedicated to excellence in the art and science of endodontics and to the highest standard of patient care.

The association inspires its members to pursue professional advancement and personal fulfillment through education, research, advocacy, leadership, communication and service.

The next AAE meeting will be held April 18-21, 2012, in Boston.
MONTREAL CANADA

CANADA’S LARGEST ANNUAL SCIENTIFIC AND DENTAL EXHIBITION
MAY 25TH TO 29TH 2012
Palais des congrès de Montréal

FEATURES

- Over 95 scientific sessions in English and in French presented by top clinicians from around the world
- Over 240 exhibitors occupying more than 500 booths representing Canada’s largest dental trade event
- Hands-on workshops and seminars covering all aspects of dentistry
- All scientific sessions and access to the exhibit floor included in one low registration fee
- CERP approved continuing dental education credits for all sessions
- Dental Tribune Study Club C.E. Symposia featuring leading experts lecturing in various dental specialties

FOR MORE INFORMATION, PLEASE CONTACT:
Journées dentaires internationales du Québec
625, boul. René-Lévesque Ouest, 15e étage, Montréal, QC H3B 1R2
Tel.: 514 875-9511 • Fax: 514 875-1561
E-mail: congres@odq.qc.ca • Website: www.odq.qc.ca

ANNUAL CONVENTION
ORDRE DES DENTISTES DU QUÉBEC
AN ADA CERP RECOGNIZED PROVIDER

PLEASE SEND ME MORE INFORMATION

Name
Address
City
State
Zip Code, Country
Telephone
E-mail
Get ready for **Yankee Dental Congress 2012**

---

Do you have plans for Jan. 25–29, 2012? Well you will after reading what Yankee Dental Congress has to offer next January at the Boston Convention and Exhibition Center. With more than 300 educational courses and 450 exhibitors, all of your needs for dental education will be met as you “Ride the Wave to Success in Dentistry.”

Highlights of the meeting include:

- **Madow Brothers** — Rock ‘n’ roll dentists David and Richard Madow will give their high-powered, Las Vegas-style presentation for the first time at Yankee.
- **Disney Institute** — Chris Caracci, a lead health care consultant from the Disney Institute, will present practice management and real customer service, the Disney way.
- **Opening keynote speaker** — Come be inspired by the words of Dick Hoyt, who has competed in road races worldwide, including 30 Boston Marathons, with his wheelchair-bound son, Rick. Join him for a presentation Thursday morning followed by breakfast on the show floor. Admission to this event is free to all.
- **Face transplant pioneer** — Dr. Daniel Alam, chief of facial esthetics and reconstructive surgery at the Cleveland Clinic, will present a behind-the-scenes look and follow-up of the first ever successful face transplantation performed in the United States.
- **Team development day** — A new twist to this program will feature working through a day of not-so-typical patients, highlighting varied medical histories, emergency situations and unique clinical challenges, all with the guidance and help of experts in each field.

The following will also be back.

- **Live Dentistry** — See all-new, cutting-edge procedures performed on live patients.
- **Expanded High-Tech Playground** — Touch and try all the new gadgets at your pace without any sales pressure.
- **Free lunch on the Exhibit Hall Floor** — Now on Saturday, Jan. 28. Have a bite to eat while talking shop with 450-plus exhibitors.

Registration and housing will open on Sept. 21. Be sure to register early; more than 40 percent of the educational courses sold out last year. If you register four or more dental professionals from your office, the fifth person will go for free (some restrictions apply). Visit www.yankeedental.com for details.

---

Top  The exhibit hall floor at Yankee Dental Congress. (Photo/Fred Michmershuizen/Dental Tribune)

Bottom  A view of downtown Boston. (Photo/Provided by Greater Boston Convention & Visitors Bureau)
submissions: formatting requirements

Please note that all the textual elements of your submission:

- the complete article,
- all the figure captions,
- the complete literature list and
- contact info (bio, mailing address, e-mail address, etc.)
must be combined into one text document. Please do not submit multiple files for each of these items.

In addition, images (tables, charts, photographs, etc.) must not be embedded in the text document. All images must be submitted separately, and details about how to do this appear below.

If you are interested in submitting a C.E. article, contact us for additional instructions before you make your submission.

_text length_

Article lengths can vary greatly — from 1,500 to 5,500 words — depending on the subject matter. Our approach is that if you need more or less words to do the topic justice then please make the article as long or as short as necessary.

We can run an extra long article in multiple parts, but this is usually discussing a subject matter where each part can stand alone because it contains so much information. In addition, we do run multi-part series on various topics.

In short, we do not want to limit you in terms of article length, so please use the word count above as a general guideline and if you have specific questions, please do not hesitate to contact us.

_text formatting_

Please use single spacing and un-indented paragraphs for your text. Please do not put a blank line between paragraphs.

We also ask that you forego any special formatting beyond the use of italics and boldface, and make sure that all text is left justified.

If you would like to emphasize certain words within the text, please only use italics (do not use underlining or a larger font size). Boldface is reserved for article headers.

Please do not "center" text on the page, add special tab stops, or use underlines, as all of this must be removed before layout. If you require a special layout, please let the word processing program you are using help you to do this formatting rather than doing it by hand on your own.

If you need to make a list or add footnotes or endnotes, please let the word processing program do it for you automatically. There are menus in every program that will help you to do this.

The fact is that no matter how careful one might be, errors have a way of creeping in when you try to hand number footnotes and literature lists.

_image requirements_

Please number images consecutively throughout the article by using a new number for each image. It is imperative that certain images are grouped together, then use lowercase letters to designate the images in a group (i.e., Fig. 2a, Fig. 2b, Fig. 2c).

Please put figure references in your article wherever they are appropriate, whether that is in the middle or end of a sentence but before the period.

If you are not directly mentioning the figure in the body of your article, when it appears at the end of the sentence the figure reference should be enclosed within parenthesis and appear before the final period.

In addition, please note:

- We require images in Tiff or JPEG format.
- These images must be no smaller than 4 x 4 inches in size at 300 DPLc.
- Images cannot be any smaller than 80 KB in size (or they will print the size of a postage stamp).

Larger images are always better, and something on the order of 1 MB is best. Thus, if you have an image that is greater than 1 MB, please do not bother "sizing it down" to meet our requirements, but send us the largest file size available.

The larger the starting image is in terms of bytes, the more leeway the designer has in terms of resizing the image to fill up more space should there be room available.

Also, please remember that you should not embed the images into the body of the text document you submit. Images must be submitted separately from the textual submission.

You may submit images through a zipped file via e-mail, unzipped individual files via e-mail or post a CD containing your images directly to us (please contact us for the mailing address as this will depend upon where in the world you will be mailing them from).

Please do not forget to send us a head shot photo of yourself that also fits the parameters above so that it can be printed along with your article.

_abstracts_

An abstract of your article is not required. However, if you choose to provide us with one, we will print it in a separate box.

_contact info_

At the end of every article is a contact info box with contact information along with a head shot of the author.

Please note at the end of your article the exact information you would like to appear in this box and format it according to the previously mentioned standards.

A short bio (60 words or less) may precede the contact info if you provide us with the necessary information.

_QUESTIONS? COMMENTS?_

Please do not hesitate to contact us for our International C.E. Magazine Author Kit or if you have other questions/comments about the article submission process:

Group Editor Robin Goodman
r.goodman@dental-tribune.com

Managing Editor Fred Michmershuizen
f.michmershuizen@dental-tribune.com
roots

the international C.E. magazine of endodontics

U.S. Headquarters
Dental Tribune America
116 West 23rd Street, Ste. 500
New York, NY 10011
Tel.: (212) 244-7181
Fax: (212) 244-7185
feedback@dental-tribune.com
www.dental-tribune.com

Publisher
Torsten R. Oemus
t.oemus@dental-tribune.com

Chief Operating Officer
Eric Seid
e.seid@dental-tribune.com

Group Editor
Robin Goodman
r.goodman@dental-tribune.com

Managing Editor
Fred Michmershuizen
f.michmershuizen@dental-tribune.com

Designer
Kristine Colker
k.colker@dental-tribune.com

C.E. Director
Julia Wehkamp
j.wehkamp@dtstudyclub.com

C.E. International Sales Manager
Christiane Ferret
C.ferret@dtstudyclub.com

Marketing Manager
Anna Wlodarczyk-Kataoka
a.wlodarczyk@dental-tribune.com

Marketing Assistant
Lorrie Young
l.young@dental-tribune.com

Accounting
Melissa Chan
m.chan@dental-tribune.com

List Manager
Christopher Ceparano
database@dental-tribune.com

Product/Account Manager
Mark Eisen
m.eisen@dental-tribune.com

Product/Account Manager & Interactive
Gina Davison
g.davison@dental-tribune.com

International Product/Account Manager
Jan Agostaro
j.agostaro@dental-tribune.com

Dental Tribune America is the official media partner of:

roots_Copyright Regulations

The international C.E. magazine of roots published by Dental Tribune America is printed quarterly. The magazine’s articles and illustrations are protected by copyright. Reprints of any kind, including digital mediums, without the prior consent of the publisher are inadmissible and liable to prosecution. This also applies to duplicate copies, translations, microfilms and storage and processing in electronic systems. Reproductions, including excerpts, may only be made with the permission of the publisher.

All submissions to the editorial department are understood to be the original work of the author, meaning that he or she is the sole copyright holder and no other individual(s) or publisher(s) holds the copyright to the material. The editorial department reserves the right to review all editorial submissions for factual errors and to make amendments if necessary.

Dental Tribune America does not accept the submission of unsolicited books and manuscripts in printed or electronic form and such items will be disposed of unread should they be accepted.

Dental Tribune strives to maintain the utmost accuracy in its clinical articles. If you find a factual error or content that requires clarification, please contact Group Editor Robin Goodman at r.goodman@dental-tribune.com. Opinions expressed by authors are their own and may not reflect those of Dental Tribune America and its employees.

Dental Tribune cannot assume responsibility for the validity of product claims or for typographical errors. The publisher also does not assume responsibility for product names or statements made by advertisers.

The responsibility for advertisements and other specially labeled items shall not be borne by the editorial department. Likewise, no responsibility shall be assumed for information published about associations, companies and commercial markets. All cases of consequential liability arising from inaccurate or faulty representation are excluded. General terms and conditions apply, and the legal venue is New York, New York.
Pacific Dental Conference

March 8–10, 2012  Vancouver, BC

Join us in Vancouver for Canada’s premier dental conference!

- Earn up to 15 hours of CE credits during three days of lectures and hands-on courses
- Over 100 speakers and 150 open sessions and hands-on courses to choose from, as well as the Live Dentistry Stage in the Exhibit Hall
- Enjoy the largest two day dental tradeshow in Canada featuring all the newest equipment and products at over 500 exhibitor booths in the spacious PDC Exhibit Hall
- Lunches and Exhibit Hall Receptions included in the registration fee
- Online hotel reservations now available
- Shopping, hotels, restaurants and breathtaking Stanley Park are all within blocks of the spectacular Vancouver Convention Centre
- Scenic two hour drive to world famous Whistler Mountain for spring skiing and snowboarding

Easy online registration opens October 14th, 2011 at...

www.pdconf.com
Less leaves more to smile about.

When it comes to conservative dentistry, SS White’s® Fissurometry®, EndoGuide® and SmartBurs® II help preserve more healthy dentin and enamel with ultimate efficiency. Designing precision tools for your skilled hands, together we are on the cutting edge of dental procedures that set a new level of excellence. Because the less healthy dentin you cut out can add years to your patients’ smiles.

“EndoGuide® Burs conserve vital peri-apical dentin, creating longevity restoration success.”
- Dr. Eric Herbranson

ENDOGUIDE
PRECISION MICRO ENDODONTIC BURS

Healthy dentin conservation strengthens the foundation for subsequent tooth restoration. EndoGuide® Burs are designed to allow clinicians to preserve the inherent strength of the tooth to help support subsequent tooth restoration and improve final treatment outcomes for the patient.

PRACTICE INSPIRATION
SS WHITE®

800-535-2877 | www.sswhiteburs.com
1145 Towson Avenue Lakewood, New Jersey 08701