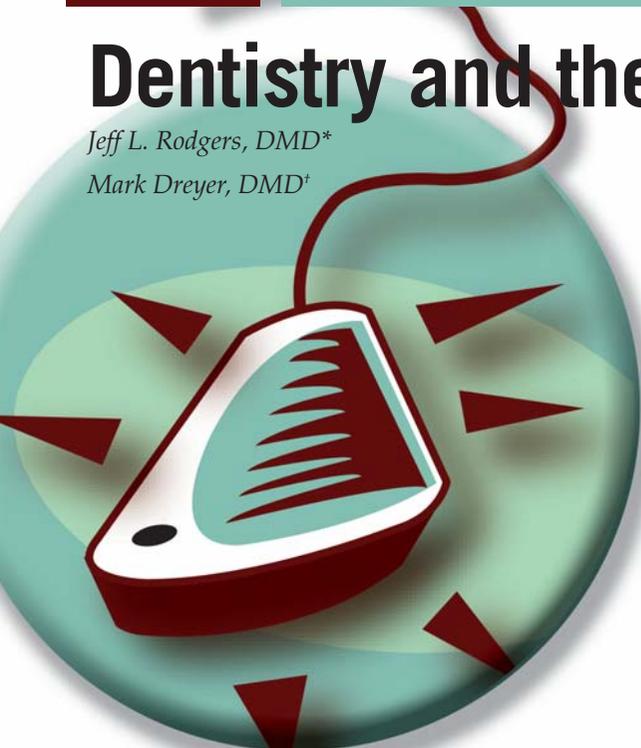


Dentistry and the Internet: A Nexus of Learning

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Traditionally, dentistry has consisted of unique and distinctive procedures performed by individual dentists for a particular patient. This type of practice has lent itself to tens of thousands of individual offices standing independently across the globe. The resulting disconnection between one office and the next has left dentists somewhat isolated from their colleagues. The Internet, however, has revolutionized dentistry, allowing clinicians to communicate across the ocean as easily as if they were down the street—sometimes easier.

The Internet provides virtually unparalleled access to vast amounts of information. Clinicians can log on and share their victories, difficulties, case reports, business ideas, and more with a diverse community of dental professionals that is unmatched in the physical world. The potential for learning in an environment like this is staggering. No longer must a dentist be an island unto himself or herself.

There are many tangible benefits associated with involvement in this intangible community. As a result of participation in various Internet forums (eg, Internet Dental Forum [IDF], ROOTS endodontic forum), clinicians have attained very real rewards.

ACCOUNTABILITY

World-class researchers, clinicians, and academicians are frequent participants in the Internet community and often donate their time and expertise to help fellow colleagues. When communicating with these professionals, a clinician may be asked to supply detailed

information (ie, photographs, radiographs, case notes) to further assist in problem solving. At this point, the entire on-line community can aid in consultation and treatment planning. This exchange of information has two major ramifications: 1) knowing that the community is looking over his or her shoulder, a clinician is inclined to pay more attention to detail; and 2) problems get solved. Given that 500 to 600 dentists will be reviewing the issue, the odds are good that one or more of them has already encountered and solved just such a problem. Additionally, when one describes a goal to the Internet community, the group helps hold the individual accountable for pursuing and achieving it. It may just be a simple matter of asking how things are going, but it does serve to keep the clinician on task.

CONTINUING EDUCATION

Why does a clinician make a given choice when providing patient care? Does he or she know the literature behind it? Is there evidence to support or detract from this choice? What empirical evidence is there for it? The vast amount of literature available is impossible to keep up with, even in only one specialty. How much harder is it for a general practitioner to keep up with every specialty? But the on-line group, *in total*, reads significantly more of the dental literature and shares these findings with site visitors. Clinically, the educational possibilities are limitless. A case consisting of radiographs, pictures, descriptions, and diagrams can be posted and discussed with some of the world's greatest clinicians; the gurus are just a mouse-click away.

Internet Forums

ROOTS:

www.rxroots.com

IDF:

www.internetdentalforum.org

Dental Town:

www.dentaltown.com

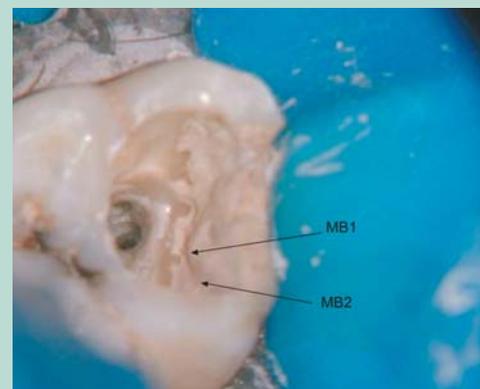


FIGURE 1. Microscopic view of the MB canal at low magnification demonstrates the MB1/MB2 canals branching off approximately 1/3 of the way down the root. Notice sealer in canals just prior to obturation.



FIGURE 2. Ceramic crown preparation performed under surgical operating microscope.

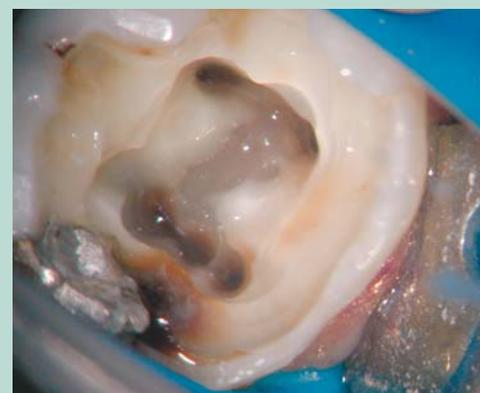


FIGURE 3. Occlusal view of a five-canal mandibular molar.



FIGURE 4. Sodium hypochlorite is present in a mandibular molar with 3 mesial canals.

SURGICAL OPERATING MICROSCOPE

In clinical dentistry, visibility is everything. A clinician cannot treat what he or she cannot see (Figure 1). This is true both literally and figuratively. Prior to joining ROOTS, the authors used various degrees of magnification, primarily loupes, with and without accessory lighting (ie, headlights). Having observed the additional possibilities and the quality of work that could be achieved with a surgical operating microscope (SOM), the authors elected to purchase and implement a microscope in their practice—and not just for endodontics (Figure 2). The SOM allows a clinician to find “hidden” anatomy and the more elusive canals, such as the MB2 on maxillary molars (Figure 1), the middle mesial of mandibular molars (Figures 3 and 4), and the third canal of premolar teeth (Figure 5). Since implementing a SOM, the

authors have found this extra anatomy present on a relatively high percentage of cases compared to what has been reported in the literature.¹⁻⁵ The microscope also allows for better debridement of the pulp space (Figures 6 and 7) and aids in the removal of pulp stones due to the increased level of magnification and the coaxial lighting available.

ULTRASONICS

With the implementation of the SOM has come the use of ultrasonic instruments. Without proper visibility, these tools can be very destructive to the natural dentition. With appropriate magnification, however, ultrasonics are invaluable for various reasons: 1) finding accessory anatomy, 2) troughing into isthmuses (Figures 7 and 8), and 3) clearing pulp stones or fins, for example, that will often open the orifice of a previously unseen canal. But again,

that which is not visible cannot be treated. Without proper visibility, the use of these instruments can lead to more perforations, ledging, and other iatrogenic canal damage.

Once the canal has been shaped, any one of a number of ultrasonic instruments can be used for the agitation of irrigants. Such agitation allows for better cleaning of the canal space and, ultimately, aids in a successful endodontic result.

“TWO-STEPPING” NECROTIC CASES

Prior to visiting an on-line community, the authors commonly used a one-visit root canal treatment modality on all teeth, which could stop drainage. Since joining ROOTS and reading the literature, the authors have learned that success rates increase significantly when necrotic cases (ie, periapical periodontitis) are treated in stages with an interim dressing of calcium hydroxide.^{6,8}



FIGURE 5. Radiograph demonstrates obturation of a 3-canal maxillary premolar.

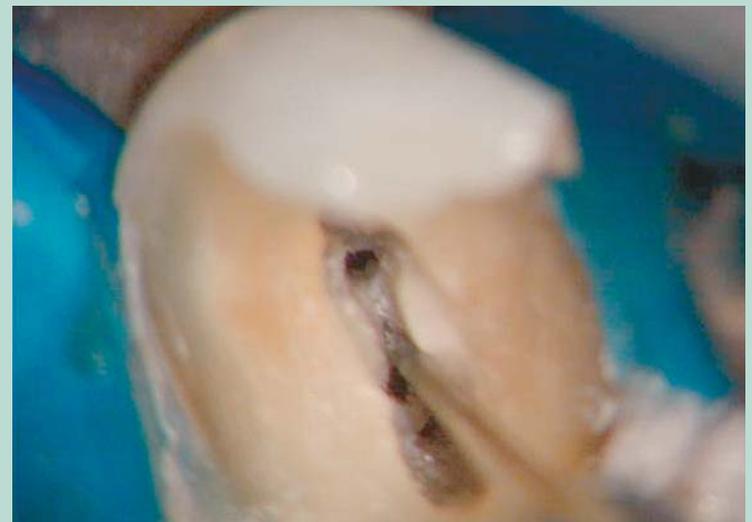


FIGURE 7. A Carr 'Slim-Jim' ultrasonic tip at low power is used to remove the tissue from the isthmus



FIGURE 6. Note tissue remaining in isthmus between canals. Leaving this tissue can compromise the outcome of the treatment.



FIGURE 8. Troughing of the isthmus is conducted utilizing a Carr 'Slim-Jim' ultrasonic tip to remove tissue and search for extra canals.

APICAL CAPTURE ZONE

Many clinicians were taught in dental school to utilize the Grossman criterion of increasing the size of the canal 3 ISO file sizes larger than the initial file that bound at length and then to start the step-back shaping. This would mean that if a #10 was the k-file that achieved length initially, then the master apical file would only be a #25 k-file.

Through the ROOTS community, the authors have found that the literature shows a generally much larger apical diameter than originally thought.^{9,10} If the traditional method of canal shaping were used, the clinician would be likely to leave debris (eg, dentinal mud, necrotic tissue) in this critical area, and, consequently, achieve a lower success rate.

IRRIGANTS

For some time, irrigants have been an area of confusion in endodontics. In dental school, some students were instructed to irrigate with a sterile solution (eg, saline, anesthetic) and only to dip files in sodium hypochlorite prior to introduction into the canal so as to avoid a hypochlorite accident. This is not, however, a current standard of care as put forth by the ROOTS community.

There are five primary irrigants suggested by the community to be used in root canal treatment: 1) aqueous 17% ethylenediamine tetraacetic acid (EDTA); 2) viscous EDTA (RC Prep, Premier, Philadelphia, PA; Glyde, Dentsply, Konstanz, Germany); 3) ethyl alcohol (Everclear, David Sherman Corp, St. Louis, MO); 4) sodium hypochlorite (full strength 5.25%); and 5) chlorhexidine (2%). The literature has shown that root canal treatments will have less leakage if the smear layer is removed.¹¹⁻¹³ The aqueous EDTA serves not only to remove the smear layer but also as a lubricant. Many clinicians have found that this allows for more accurate readings of an apex locator. The ethanol works as a drying agent prior to obturation and also as a surfactant for the sodium hypochlorite, allowing better penetration into hard-to-reach fins and accessory anatomy of the tooth. The sodium hypochlorite operates as a tissue-dissolving, bactericidal agent and aids in finding missed canals through the “champagne effect.”^{14,15} This is one of the primary means by which the pulp space is cleaned. Chlorhexidine is relatively new to

the list and would not be in many of the author’s offices if it were not for the Internet community. New research is showing that high concentrations (2%) of chlorhexidine are more effective at removing *Enterococcus faecalis* (ie, a principal bacteria involved in failing endodontic cases) than sodium hypochlorite.¹⁶⁻¹⁸ A new solution, MTAD (a mixture of a tetracycline isomer [doxycycline], citric acid, and a detergent [Tween 80] and phosphoric acid), has also been introduced for smear layer removal.^{19,20}

DIAGNOSIS

Diagnosis may be one of the most important areas where the Internet community can help. What should a dentist do if he or she is located in a rural town where the closest endodontist is two hours away, and the patient would rather have a tooth extracted than travel to the endodontist for an evaluation? The clinician should document the case and then post it to the on-line forum. Within minutes, he or she may have reliable information on how to diagnose and treat the problem. This is truly the most elegant part of the community. Imagine that with the click of a button, a tricky case can be forwarded to hundreds of respected members of the endodontic community who freely offer helpful information and solutions.

This situation is not, however, take-all; the assisted clinician is expected to give as well. In the endodontic forums, the authors routinely help with restorative questions from the endodontists. The endodontists value a general practitioner’s opinion because their primary referral source is from general practitioners in their geographic area. Clinicians can help with questions about many topics, such as how to handle referrals or how to handle restorative issues.

CONCLUSION

The benefits of Internet forums to a general practitioner are many: increased enjoyment of his or her profession, a closer dental community, and, most importantly, better patient care. The exchange of knowledge, ideas, and the occasional barb to keep the clinician on his or her toes is fantastic. The authors would encourage every practitioner with access to the Internet to log on and participate in this exchange of ideas and expertise. ■

REFERENCES

- Schwarze T, Baethge C, Stecher T, Geurtsen W. Identification of second canals in the mesiobuccal root of maxillary first and second molars using magnifying loupes or an operating microscope. *Aust Endod J* 2002;28(2):57-60.
- Gorduysus MO, Gorduysus M, Friedman S. Operating microscope improves negotiation of second mesiobuccal canals in maxillary molars. *J Endod* 2001;27(11):683-686.
- de Carvalho MC, Zuolo ML. Orifice locating with a microscope. *J Endod* 2000;26(9):532-534.
- Buhrely LJ, Barrows MJ, BeGole EA, Wenckus CD. Effects of magnification on locating the MB2 canal in maxillary molars. *J Endod* 2002;28(4):324-327.
- Stropko, JJ. Canal morphology of maxillary molars: Clinical observations of canal configurations. *J Endod* 1999;25(6):446-450.
- Papworth B. Comparing the outcome of necrotic cases using two different treatment methods. *NM Dent J* 1999;49(3):14-15.
- Holland R, Otoboni Filho JA, deSouza V, et al. A comparison of one versus two appointment endodontic therapy in dogs’ teeth with apical periodontitis. *J Endod* 2003;29(2):121-124.
- Tanomaru Filho M, Leonardo MR, da Silva LA. Effects of irrigating solution and calcium hydroxide root canal dressing on the repair of apical and periapical tissues of teeth with periapical lesion. *J Endod* 2002;28(4):295-299.
- Card SJ, Sigurdsson A, Orstavik D, Trope M. The effectiveness of increased apical enlargement in reducing intracanal bacteria. *J Endod* 2002;28(11):779-783.
- Tan BT, Messer HH. The quality of apical canal preparation using hand and rotary instruments with specific criteria for enlargement based on initial apical file size. *J Endod* 2002;28(9):658-664.
- Clark-Holke D, Drake D, Walton R, et al. Bacterial penetration through canals of endodontically treated teeth in the presence or absence of the smear layer. *J Dent* 2003;31(4):275-281.
- Serper A, Calt S. The demineralizing effects of EDTA at different concentrations and pH. *J Endod* 2002;28(7):501-502.
- Yoshida T, Shibata T, Shinohara T, et al. Clinical evaluation of the efficacy of EDTA solution as an endodontic irrigant. *J Endod* 1996;21(12):592-593.
- Ruddle C. Retreatment. In Cohen S, Burns RC, eds. *Pathways of the Pulp*. 8th ed. St. Louis, MO: Mosby;2002.
- Spangberg L. Instruments, materials, and devices. In: Cohen S, Burns RC, ed. *Pathways of the Pulp*. 8th ed. St. Louis, MO: Mosby;2002.
- Evans MD, Baumgartner JC, Khemalelakul SU, Xia T. Efficacy of calcium hydroxide: Chlorhexidine paste as an intracanal medication in bovine dentin. *J Endod* 2003;29(5):338-339.
- Basrani B, Santos JM, Tja derhane L, et al. Substantive antimicrobial activity in chlorhexidine-treated human root dentin. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2002;94(2):240-245.
- Oncag O, Hosgor M., Hilmioğlu S, et al. Comparison of antibacterial and toxic effects of various root canal irrigants. *Int Endod J* 2003;36(6):423-432.
- Torabinejad M, Khademi AA, Babagoli J, et al. A new solution for removal of the smear layer. *J Endod* 2003;29(3):170-175.
- Beltz RE, Torabinejad M, Poursmail M. Quantitative analysis of the solubilizing action of MTAD, sodium hypochlorite, and EDTA on bovine pulp and dentin. *J Endod* 2003;29(5):334-337.

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