SHORE ENDODONTICS

NEWSLETTER WINTER ISSUE

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DR. MICHELE SCRIME, DR. STEVEN RYU
AND THE STAFF OF SHORE ENDODONTICS

WOULD LIKE TO WELCOME YOU TO THE FIRST EDITION OF OUR NEWSLETTER. WE WILL BE ISSUING ONE EACH QUARTER. WE ARE HOPING YOU WILL FIND THE ARTICLES BOTH INFORMATIVE AND INTERESTING.

Retreatments vs. Apicoectomy

Non surgical root canal treatment is a highly successful procedure but endodontic failures will happen even in the hands of most skilled practioners. Retreatment can correct most persistent endodontic pathosis. Furthermore, many advances in periradicular surgical techniques, instrumentation and materials have occurred over the past decade. Due to these advances, periradicular surgery (apicoectomy) can result in a predictable outcome where the previous root canal treatment was unsuccessful due to blockages, ledges, transportations and perforations of the root canal system.

Enhanced illumination and magnification provided by operating microscope is perhaps the most important advancement in endodontic surgery. Operating microscope can magnify up to 32 times which helps identifying minute canal openings, incipient fracture lines and other anatomical features of the root canal system.

Today's piezoelectric ultrasonic handpieces are nearly one-quarter the size of the microhead handpieces that were once used for surgical root end cavity preparation. These days diamond coated ultrasonic tips are used in ultrasonic handpieces to make apical preparations with precision.

A new root-end filling material Minceral Trioxide Aggregate (MTA) is proving to be an impressive material for both root-end filling and perforation repairs. MTA provides excellent sealing properties and is extremely biocompatible with perieradicular tissues.

Incorporating the above mentioned advances in our practice we are able to treat failing endodontic cases with excellent outcome and we are also able to treat certain teeth which would otherwise be extracted. Please find enclosed pre and post operative radiographs of a few of our recent cases. Please feel free to contact us to discuss.

Regards,
Rajeev Gupta D.D.S.
Michele Scrime D.M.D.
Steven Ryu D.M.D.

At the start of the New Year 2012, we gratefully pause to wish our referring Doctors and Staffs a year filled with Success, Good Times and Happiness.

Do New NiTi Instruments Resist Breakage?

The nickel–titanium (NiTi) file, introduced in 1988, revolutionized the way canals were shaped. The flexibility of NiTi files allowed practitioners to navigate curved canals with a motor-driven instrument without deviating from the long axis of the root or transporting the apical exit. However, NiTi files are subject to frequent and often unexpected breakage. Recently, manufacturers have begun marketing files made with a new generation of NiTi alloy—the M-wire. The first commercially available endodontic rotary systems using the new M-wire are the ProFile GT Series X (GTX; Dentsply, Tulsa Dental Specialties, Tulsa, Okla.) and the Twisted File (TF; Figure 1) with R-phase technology (Sybron Dental Specialties, Orange, Calif.). Both systems come with claims of greater flexibility, more resistance to cyclic fatigue and increased cutting efficiency.

Larsen et al from Baylor College of Dentistry, Texas, conducted an in vitro evaluation to compare cyclic fatigue in the GTX and TF with 2 commonly used NiTi rotary instruments: EndoSequence (ES; Brasseler, Savannah, Ga.) and ProFile (PF; Dentsply, Tulsa Dental Specialties). Fifteen .04 and .06 taper TF, ES, and PF NiTi instruments with size #25 tips and GTX files with size #20 tips (GTX files do not come with a #25 tip) were rotated in a simulated canal having a 60° angle of curvature and a 3-mm radius. The files were rotated by an NSK electric torque-controlled motor with a 10:1 reduction handpiece (Brasseler) at the manufacturers' recommended speeds (ES and TF, 500 rpm; GTX and PF, 300 rpm). The number of rotations to failure was recorded.

The 20/.04 GTX files performed significantly better than any of the 25/.04 files ($p < .001$). Among the 25/.04 files, TF was significantly more resistant to fracture than ES ($p < .05$); however, the difference between TF and PF was not statistically significant ($p > .05$). There was also no difference between PF and ES files ($p > .05$). Similarly, the .06 tapered GTX files with a smaller tip size (#20) had the highest number of cycles to failure than all the .06 tapered files with #25 tip size ($p < .001$). Both the 25/.06 TF and PF had statistically more cycles to failure than ES files ($p < .001$), although the 25/.06 TF was not statistically different from the 25/.06 PF ($p > .05$). In all files tested, the cyclic fatigue failure occurred between the levels of D4 and D6, which corresponded to the location of the curvature.

In general, the .04 tapered files were more resistant to cyclical fracture when compared with the 06 tapered files of the same system. Because the GTX files tested had a smaller tip size, they had less metal at each increment that was being fatigued, a difference that created a favorable bias toward the GTX system in this study. Notwithstanding this problem with the study, the report demonstrated the great potential of the new M-wire technology.

Figure 1. Images of TF files. (Images provided courtesy of Sybron Endo.)
Larsen CM, Watanabe I, Glickman GN, He J. Cyclic fatigue analysis of a new generation of nickel titanium rotary instruments. J Endod *2009;35: 401-403*

Will Fiber Composites Improve Fracture Resistance?

Endodontically treated teeth are structurally weakened by the loss of enamel and dentin prior to or immediately after accessing the pulp chamber. To protect the treated tooth against fracture, the practitioner must fabricate a restoration that reinforces the remaining tooth structure and is strong enough withstand occlusal forces. Though full coverage crowns are the usual and customary restoration following root-canal therapy, manufacturers are currently offering a new and improved generation of composites with claims of being strong enough to resist normal biting forces. One such design calls for the placement of a flowable resin with low viscosity and modulus of elasticity beneath a harder, more durable, more flexible, stronger and more esthetic fiber-reinforced composite (FRC). This in vitro study by Oskoee et al from Tabriz University of Medical Sciences, Iran, evaluated the fracture resistance of 3 composite restoration techniques on endodontically treated maxillary premolars.

The canals of 60 intact, caries-free human maxillary premolars were prepared in a step-back fashion until a size #30 K-file fit loosely at the working length. The canals were dried with paper points and filled with laterally condensed gutta-percha and AH26 root-canal sealer. Mesio-occluso-distal (MOD) cavities were prepared in the crowns in such a manner that the thickness of remaining lingual and buccal walls measured 2.5 ± 0.2 mm from the height of contour of each surface, and the gingival cavosurface margin was 1.5 mm coronal to the cemento-enamel junction (CEJ). The teeth were then divided into groups of 15. All teeth were etched with 35% phosphoric acid (Scotch Bond Etchant; 3M ESPE, St Paul, Minn.) for 15 seconds, rinsed for 10 seconds and gently dried, then bonded with adhesive (Single Bond; 3M ESPE). After curing, the cavity was filled with composite.

■In the middle fiber group, the cavity was filled with composite resin up to the middle third. Flowable composite was added, and glass fiber was placed to cover the middle third (to the height of the buccal to the lingual walls). After curing for 40 seconds, the balance of the cavity was restored with composite.

■ In the occlusal fiber group, after restoring the cavity as described for the no-fiber group, a groove 2 mm wide and 1 mm deep was cut buccolingually on the cusp tips. Flowable composite and glass fiber were added to the floor of the groove, the combination was cured for 40 seconds and the exposed fiber surface was filled with composite.

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All teeth received a compressive force parallel to the long axis of the teeth at a strain rate of 0.5 mm/minute until fracture. Fractures were divided into 2 groups: **1**favorable fractures (fractures stopping higher than 1 mm below the CEJ) and **2** unfavorable fractures (fractures stopping lower than 1 mm below the CEJ).

Fracture resistance was significantly higher in the occlusal fiber group ($p < .0005$). In the other groups, fiber placement did not significantly affect fracture resistance ($p > .05$). The majority of fractures in the present study (81.7%) were unfavorable, unlike the results of a study by Fennis et al (*Dent Mater* 2005) that showed
reinforcement by glass fibers had a positive influence on failure mode. Inconsistency in the results of different studies seems to be related to the differences in chemical and physical properties of the fibers used, as well as to the type of teeth investigated. It would appear that further testing is needed before a positive recommendation can be made.

Oskoee PA, Ajami AA, Navimipour EJ, et al. The effect of three composite fiber insertion techniques on fracture resistance of root-filled teeth. J Endod *2009;35:413-416.*

Removal of Fractured NiTi Endodontic Instruments

Rotary nickel–titanium (NiTi) endodontic instruments are known to produce smooth canals with minimal deviation from their central position or transportation of the apical exit. Unfortunately, NiTi files also fracture at a high rate (estimated to be between 0.4% and 4.6%) due to tensile stress when the instrument tip binds in a canal (torsional
fatigue) or from metallic stress after repeated cycles of tension and compression (cyclic fatigue). Clinicians must accept the problem as a risk of using rotating instruments and prepare themselves to be proficient in various options to deal with broken files. The advent of the surgical microscope and new ultrasonic devices have exponentially

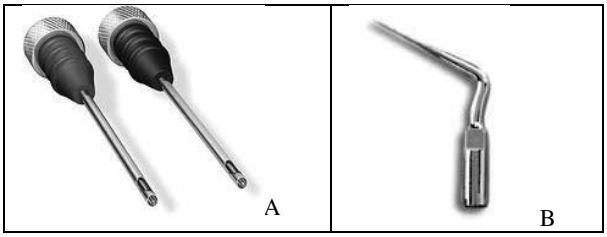

Figure 2. (A) iRS and (B) ProUltra ultrasonic tip. (Images provided courtesy of DENTSPLY Tulsa Dental Specialties.)

improved the success rate of removing broken instruments.
The purpose of this study by Alomairy from the Karolinska Institute, Sweden, was to evaluate the effectiveness of an ultrasonic (US; Figure 2B) device used in conjunction with a microscope and an instrument removal system (iRS; Figure 2A) at removing fractured instrument fragments.

The mesial canals of 30 extracted human first and second molars were selected for this study. Canals were conventionally probed, the orifices widened and the canals negotiated to patency length with ISO size #15 K rotary files (Dentsply Maillefer, Ballaigues, Switzerland). To facilitate instrument fracture in the curve of the canal, Profile #30 .06 taper rotary endodontic instruments (25-mm long, International Organization for Standardization size #25; Dentsply Maillefer) were notched to a depth of half the instrument's thickness with a high-speed diamond disc at a 4-mm distance. These reference lines were drawn on the

Digial radiograph and angles and radii of curvature were classified shaped in a step-back fashion to working length (1mm shoret of patency length). After the angles of curvature for all teeth samples were measured, the teeth were distributed into 3 groups according to measured angles and radii.

Fifteen canals were assigned to each removal technique. US was performed using ProUltra ENDO (size 3, 4 and 5) zirconium nitride-coated stainless steel tips (Dentsply Tulsa Dental, Tulsa, Okla.) mounted on an US handpiece connected to a US unit (EMS SA, Nyon, Switzerland). The iRS (Dentsply Tulsa Dental) uses a microtube to engage the exposed coronal part of the separated instrument and remove it.

The overall success rate for the removal of fractured instrument fragments was 70% ($n = 21$). Twelve fragments (80%) were removed by the US technique, and 9 fragments (60%) were removed with iRS. Nine fragments could not be removed because perforation occurred in 4 teeth (1 tooth using the US technique and 3 teeth using iRS system). The
thickness with a high-speed diamond disc at a 4-mm distance. These reference lines were drawn on the digital radiograph and angles and radii of curvature were classified
shaped in a step-back fashion to working length (1 mm short
of patency length). After the angles of curvature for all teeth samples were measured, the teeth were distributed into 3 groups according to measured angles and radii. difference between the 2 techniques in terms of the success rate was not statistically significant ($p = .42$). There was a significant association between curvature and success rate ($p = .0377$) and between the radius of curvature and success rate ($p = .021$). The median time for retrieval was 40 minutes with the US technique, 55 minutes with the iRS system.

This study confirms the results of other studies: less curved canals and longer radii of curvature lead to greater success. No significant difference exists between results with US technique and iRS system.

Alomairy KH. Evaluating two techniques on removal of fractured rotary nickel–titanium endodontic instruments from root canals: an in vitro study. J Endod *2009;35:559-562*

our little corner of the world

We want to thank all the offices that participated in our Summer contest. It was a great success. We found out so many new places to visit during the summer at the shore.

Our next contest is running now!!!!

Would you like to walk the "red carpet" and accept the "Oscar"?
Check out our contest page.

If lawyers are disbarred and clergymen defrocked, doesn't it follow that electricians can be delighted, musicians denoted, cowboys deranged, models deposed, tree surgeons debarked and dry cleaners depressed?

If you mixed vodka with orange juice and milk of magnesia, would you get a Philip's Screwdriver?

"I am" is reportedly the shortest sentence in the English language. Could it be that "I do" is the longest sentence?

May the path you take during 2012 be one that takes you further than ever before.

We certainly don't want to send unsolicited mail, so please let us know if you'd prefer to be removed from the list. On the other hand, if you have some friends, family, or coworkers that you think might be interested in receiving this newsletter, please forward it on to them and encourage them to contact us and we will be happy to add them to the list.

And if you have any other ideas or topics that you'd like to see us cover in a future newsletter, don't hesitate to let us know.