“From Access to Foramen......combining science & technology for Endodontic Success”

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Maxillary Molar Teeth

>60-90% have 4 canals
Ultrasonic – trough for MB2

- Mini Endo
- P5 unit
- BUC 1
- Carr tips
Move Mesial Wall
Trough the Line

MB

MB2
Cracks observed. Used Munce Discovery Burs to trough and extend prep. The “line” became visible.

Dr. Fred Barnett
Trough the “Line”

#6 ‘C’-file to explore the “line” for MB2

Dr. Fred Barnett
Trough the “Line”

After coronal shaping with K3 #25/.10 & #25/.08
Dr. Fred Barnett
When do you stop???
I needed to trough about 4mm to find MB2.

MB2: when do you stop??
Mandibular Molar Teeth

3 distal orifices
Middle Mesial Canals
Radicular Access

- Straight-line access
Apical Finishing

Apical 1/3 Preparation
Working Length
Am I too short??

Fred Barnett, DMD
Am I too short??

I don't think so!!
Check out the oval anatomy.

Fred Barnett, DMD
Foramina rarely at apex

Gutierrez and Aguayo, OS OM OP, June 1995
SybronEndo Mini Apex Locator

Accuracy = Root ZX

'0.0'
20 out of 24 were at 0.5 mm

Dr. J. Vera
Down to ‘0.0’: “patency”
Up to ‘0.5’: “WL”
22 out of 22 were at 0.5 mm

Dr. J. Vera
Radiographic Confirmation

- Confirm the length(s) with a radiograph
- #20 hand file to WL (glide path)!!!!!!!!!!!
Vital teeth: (n=25)

- **Success:** 1.22 +/- 0.14mm short
  - Failure: 0.20 +/- 0.20mm
  - Chugal et al, 2003
Obturation Level & Success

Vital teeth: (n=25)
- **Success:** 1.22 +/- 0.14mm short
- **Failure:** 0.20 +/- 0.20mm

Apical periodontitis: (n=98)
- **↑Success:** 0.56 +/- 0.13mm short
- **↑Failure:** 1.67 +/- 0.30mm
- For every mm loss of WL from RA, the odds of failure increase by 14%.
  - Chugal et al, 2003
The NiTi Revolution Needed an Evolution....really??
Why do Rotary Instruments Break?

Torque & Fatigue
Minimizing Fracture

- Never use a rotary where a hand file has not been first.
- “glide path”
  - coronal
  - apical
- hand file to WL to a size #20
Canals that come together at sharp angles

↑ pressure required***
Canal Anatomy

S-shaped canals

↑ pressure required***
Curved canals which change direction *abruptly* -short radius curves!

↑ pressure required***
NiTi Rotary

Guidelines for Rotary Instrumentation:

Electric motors:

- 500 RPM
- torque-controlled motor
New Torque Control Discovery
THE TWISTED FILE
A New Paradigm in Canal Enlargement
A Quantum Leap in File Design:

The first and only file made with three unique proprietary processes for unsurpassed strength and flexibility

1. R-phase heat treatment technology
   • Breaks less than ground files

2. Twisted design, not ground
   • Eliminates formation of micro-fractures

3. Advanced surface treatment
   • Maintains file hardness and cutting edges
Safe-ended Tip

- Minimizes canal transportation
- Follows the canal path easily
TF Strengths

- 3 files or less
- Simple sequence
- Any canal anatomy
- Exceptional cutting
- Minimizes transportation
- Reduces tx time
- Reduces tx costs
TF Technique
Confirm Apical Patency & Glide Path

- Straight line access to the coronal 1/3
- Patency to size #15 hand file
- Apical glide to a #20 hand file

* Use of the **M4** with the #10- #20 hand file is strongly recommended to ensure a smooth apical glide path before rotary instrumentation begins.
Step 1

- 500 rpm
- TF #25/.08 to engagement, then withdraw (x1-3)
- Wipe flutes, irrigate, recapitulate with #15 HF to patency
- Repeat with the same TF file until TWL is achieved

Note: If significant resistance is met before TWL is achieved, proceed with the TF .06/25 using the same steps.
Step 2

- Use the TF #30/.06 as in Step 1 (to WL)

* For #30 tip size apical shape, you can stop at this point and begin your obturation
For final apical shape larger than #30, use the following TF files:

- TF #35/.06
- TF #40/.04
Clinical Cases
Technic- “TF”

1. Patency to #15 HF
2. #20 HF to WL
3. TF #25/.08 to WL
   (TF #25/.06 if needed)
4. TF #30/.06 to WL
5. TF #35/.06 prn to WL
6. TF #40/.04 prn to WL
MINIMUM SIZES OF LAST APICAL INSTRUMENT IN ROOT CANAL INSTRUMENTATION

UPPER JAW

ISO 60 | ISO 55 |
ISO 45 (if curved) | ISO 60 |
B: ISO 40 | B: ISO 40 |
P: ISO 45 | P: ISO 45 |
1 canal: ISO 55 | 1 canal: ISO 55 |
MB: ISO 40 | DB: ISO 40

LOWER JAW

L: ISO 40 | L: ISO 45 | L: ISO 45 |
1 canal: ISO 55 | 1 canal: ISO 60 | 1 canal: ISO 60 |
MB: ISO 40 | ML: ISO 40

Department of Endodontics, UNC School of Dentistry, May 16, 2001
Based on morphometric analysis of human teeth...Kerekes & Tronstad 1970’s
Final Irrigation

- NaOCl
- EDTA
- 2% CHX (cone-fit)

Ultrasonic Activation w/Irri-Safe or File Holder (~30 sec/canal)

Sybron U/S
Satelac P5 U/S
Hand syringe (2.0 mm level)

U/S (2.0 mm level)

100um
Conclusion:

The addition of 1 minute of ultrasonic irrigation after instrumentation significantly enhanced debridement in the mesial roots of necrotic, human mandibular molars.

Burleson et al, 2007
“Cone fitting”

- check length (EAL)
- wet canal (CHX)
- X-ray
Technic

- Hand file to #15 to foramen (0.0)
- Hand file #20 to 0.5mm short
- TF #25/.08 to WL--RED
- TF #30/.06 to WL--BLUE
- TF #35/.06 to WL--GREEN
- TF #40/.04 to WL--BLACK
Instrumenting to RA and WVC (Schilder technic) gave ~15% higher success rate than Step-Back/Lateral in teeth w/ AP. Toronto Studies, 2003-2008
Obturation

- Modified Vertical Condensation
  - Elements Obturation Unit
  - System’B’ heat source
  - Touch n’ Heat
Depth of SystemB Tip and quality of root filling

• A significant difference in gutta-percha flow into the lateral grooves was seen at **3 mm** from WL.  Bowman et al, 2002

• Best results: plugger depth **3.5 to 4.5 mm** from the working length.  Guess et al, 2003
Pre-fit a plugger to its binding point (~ 4mm short of WL) and adjust the rubber stop to the reference point.
Obtain "tugback" at working length
• Apply a coating of Resilon sealer to the canal walls and coat master cone; slowly place cone.
The activated plugger is driven through the center of the Resilon cone in a single & slow motion to a point 2mm shy of its apical binding point.
✓ release the switch
✓ maintain light apical pressure on the heat carrier
✓ the plugger will slow its apical movement as it cools
Pressure is sustained on the carrier for \(~5\) seconds to minimize shrinkage on cooling.
The heat switch is activated for 1-2 seconds, then remove the plugger.
The surplus Resilon material will be removed, leaving a ‘mostly’ clean canal space.

Use a hand plugger to compact the apical mass.
- **Resilon** sealer is reapplied to the walls of the canal.
- The cartridge tip of the Elements Obturation Extruder is placed against the apical plug for ~10 seconds.
- Activate Extruder to back-fill to orifice level.
• Use large plugger to pack the RealSeal at the orifice level.

• Seal access chamber...NO cotton!
Resilon: Clinical Realities
• Synthetic polyester polymers (~35%)

• Fillers (~65%):
  ▪ Bioactive glass
  ▪ Ca(OH)2
  ▪ Radiopaque fillers
• Self-etch sealer and resin cones; obturate with using any filling technic!!

• Light cure, immediate coronal seal

• Total cure: 1 hour

Slower set = less contraction

Sealer: 2% contraction- initial evaluations

0.2% expansion- Gambarini, 2005
Resilon
Follow - Up Radiographs.....
Does it work in the Real World?
Pre-op  Post-op  6 month follow-up
Resilon™

Dr. Joseph D Maggio

12-9-03

7-15-04; 7m recall
Tooth fractured in 05
Temporary in place for 4 years, Tooth broke 1 year previously
Temporary for 3.5 years, unknown when tooth fractured
Fractured “almost immediately after RCT”
Treatment Outcome of Teeth with an Evidenced-Based Disinfection Protocol and Filled with Resilon™

G. Debelian
Bekkestua, Norway
Results

• vital teeth- 1 visit
• AP- 2 visit
• Recall rate: 90%

• 101/108 teeth (93.5%) were scored as success at 2 years
Follow-up, 2-4 years

120 cases; 108 followed
60 vital (1 step)
48 non vital (2 steps)

<table>
<thead>
<tr>
<th></th>
<th>Vital</th>
<th>Non-vital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healed</td>
<td>2y: 95%</td>
<td>2y: 91.6%</td>
</tr>
<tr>
<td></td>
<td>4y: 94%</td>
<td>4y: 90.4%</td>
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RealSeal 1: Bonded Obturator
No Need For Stops

• Stripes are very visible
  • No stop =
  • Better visibility for insertion into canal
  • Clear shot for light curing sealer
• Each stripe is 1mm wide
• Each gap is 1mm wide

17 mm
20 mm
22 mm
24 mm
18 mm
17 mm
RealSeal 1
Bonded Obturator

Features:
• Resilon adheres to the core
• Sealer adheres to the core
• Resilon bonds to the RealSeal sealer
• RealSeal sealer bonds to the dentin
• Obturators are injection molded
• Core has contrasting radiopacity
• Readily retreatable
• Same technique as ‘carrier-based’ systems
RealSeal 1
Bonded Obturator

Dipped (Thermafil) vs Molded, Quality You Can See...
Thermafil
1mm from apex

- No bonding
- Multiple entryways for leakage
RealSeal 1 Bonded Obturator
1mm from apex

- Bonding (in apical 3rd!)
- No entryways for leakage
RealSeal 1
Bonded Obturator

Readily retreatable

Benefits:
• Easier to remove
  – Fewer unhappy specialists ;-(
  – Peace of mind for the GP
  – Easier on the patient
Thermafil

No change with thermafil carrier
RealSeal 1
Bonded Obturator

No agitation until 15 min
Results:
periapical inflammation
29% of the Thermafil
9% of the RS-1
bacterial penetration
9% of the RS-1
70% of the Thermafil

Conclusions: RS-1 appeared to resist bacterial penetration more effectively than Thermafil under the conditions of this study.

(J Endod 2009;35:852–857)
The RealSeal 1 Technique
Step One

Make sure you have an adequate access opening to facilitate obturation
Step Two

1. Insert verifier to size the apical canal.
2. Size verifier must fit loosely in the canal.
3. If the verifier is too snug, go one size smaller.
Step Three

Coat the canal with RealSeal Self Etch Sealer.
Step Four

Place obturators in oven.
Step Five

• Insert the Bonded Obturator into the root canal within 5-10 seconds of removing it from the oven.
  • Sear off at orifice.
The future looks great for Endodontics
What do I need?

- U/S unit- MiniEndo
- Buc 1 U/S tips
- Mini Apex Locator
- Electric motor
- M4 handpiece
- TF #25/.08, #30/.06, #35/.06, #40/.04
- Resilon RS-1 oven & kits