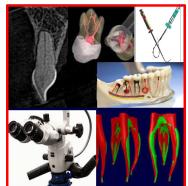


Latest advancements in Endodontics- II



Dr Saaid Al Shehadat

Year 4
15/10/2019

Tools

★ Root Canal Preparation

- Access cavity
- Irrigation
- Root canal preparation



Rotary Files

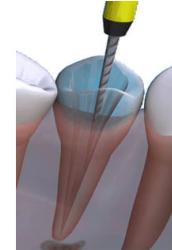
Patency

Shaping

Patency File

Root canal shaping:

- Rotary files (systems)



Manual

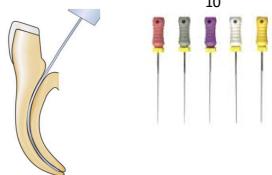
K-file
 $\leq \# 20$

Rotary

Master file

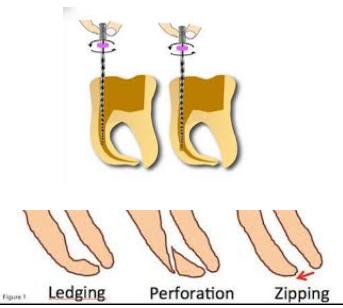
Patency File

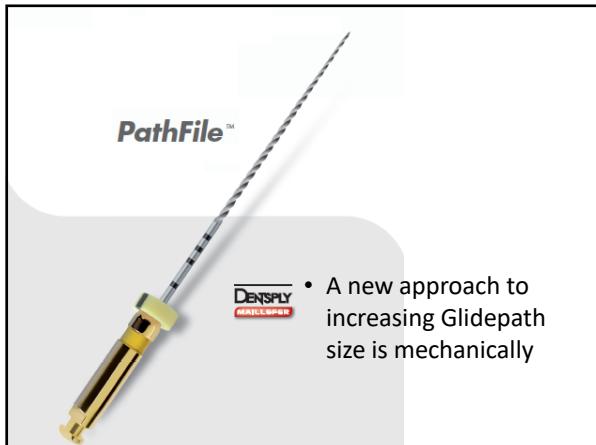
Use manual files up to 15 or 20 (ISO) k-file



Patency File

- Possible problems





Patency File



Patency File

Use of Nickel-Titanium Rotary PathFile to Create the Glide Path: Comparison With Manual Preflaring in Simulated Root Canals

Elio Berutti, MD, DDS, Giuseppe Cantatore, MD, DDS,† Arnaldo Castellucci, MD, DDS,‡ Giorgio Cbiandussi, MSc, PhD,§ Francesco Pera, DDS,* Giuseppe Migliaretti, MD,|| and Damiano Pasqualini, DDS**

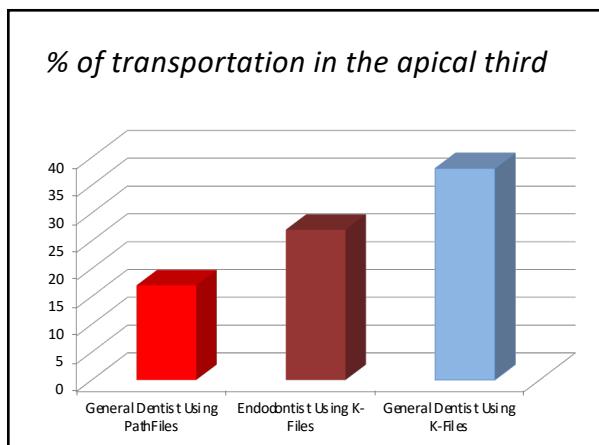
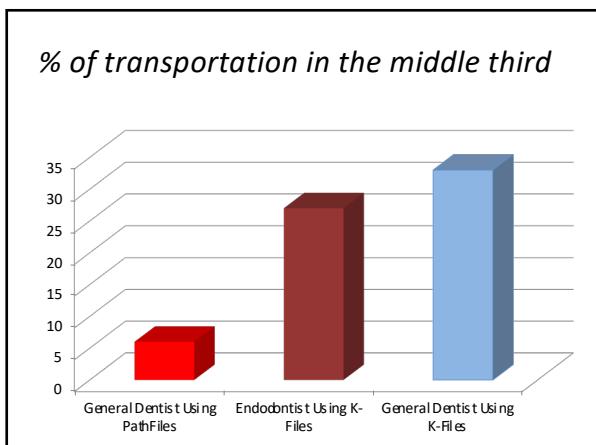
- K-file Vs pathfile
 - Short canals Vs long canals
 - Endodontists Vs General practitioner

IOE - Volume 35, Number 3, March 2009

Patency File

Results

- The Original Canal Anatomy is Better Reserve in the PathFile groups
 - No apical foramen transport when the working length is too long or too short
 - The inexperienced clinician produced more conservative shaping with Pathfiles than did the expert with manual preflaring



Patency File



Patency File

DENTSPLY
MAILLEFER



Patency File

pro•glider™

M-WIRE NiTi Alloy

- Reduced cyclic fatigue
- Increase flexibility
- Can be used in highly curved canals



Patency File

pro•glider™

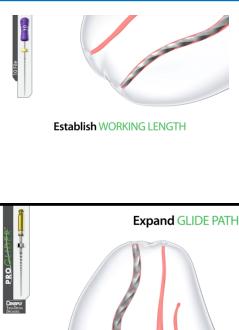
- Only One size: 016
- Progressive Taper: D8: .36, D16: .82
- Semi-Active Tip
- Square Cross Section



Patency File

Technique

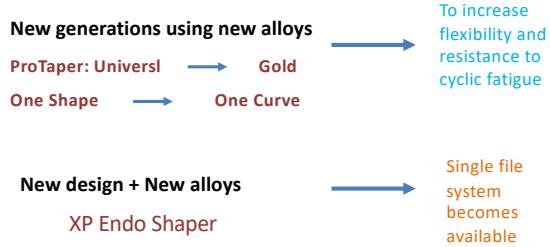
- Scout the canal up to a size 010 (K-file)
- Establish working length
- Use PROGLIDER to the full working length (continuous rotation 300 rpm/ 2Ncm)
- Reconfirm the working length before shaping the canal



Shaping files



Rotary Shaping Systems



Rotary Shaping Systems

Novel NiTi Alloys

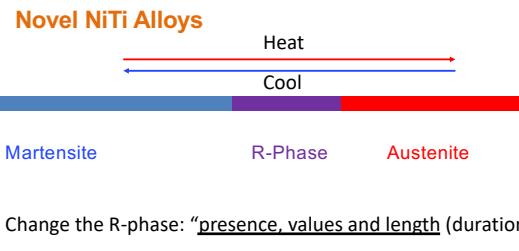
Martensite

- soft
- high flexibility
- high plasticity (can be easily deformed)
- has excellent fatigue resistance

Austenite

- strong and hard
- less flexible
- super-elastic (shape memory)
- has poor fatigue resistance
- great cutting efficiency
- edge fidelity
- torque resistance

Rotary Shaping Systems



Rotary Shaping Systems

Novel NiTi Alloys

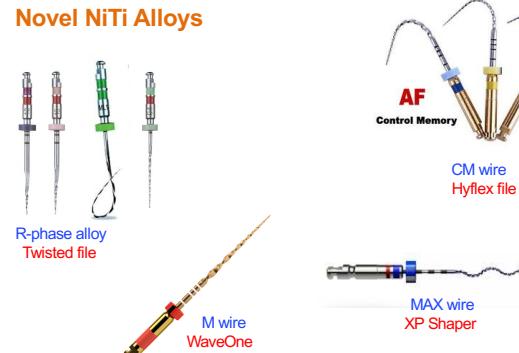
➤ M wire 2007 Increased fatigue resistance profile GT series , profile vortex

➤ R-phase alloy 2008 File is Extremely flexible Twisted file

➤ CM wire 2010 File is Extremely flexible but with no shape memory Hyflex file

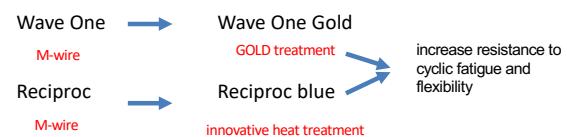
➤ MAX wire 2015 M phase at room temperature/ A phase at body Temperature XP Shaper file

Rotary Shaping Systems



Single File System

Reciprocating systems



Single File System

Full-rotation systems

- One Shape
- One Curve
- XP-Endo Shaper

Asymmetrical Cross section/ Rotation (2013)

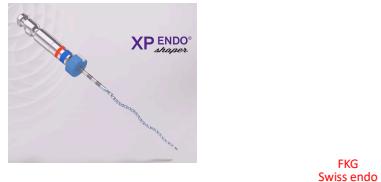
- **Offset mass of rotation:** at any given cross-section, the file only contacts the wall at 2 points
- Produce a wave motion along the active part of the files
- **REVO-S** (Micro-Mega) and **PROTAPER NEXT** (Dentsply)



XP-Endo Shaper

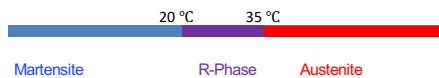
Full rotation, Single File systems

MaxWire Technology



MaxWire® Technology

- Was patented and introduced by FKG (2015)
- Mixed phase technology: M-phase: at room temperature
A-phase: at body temperature



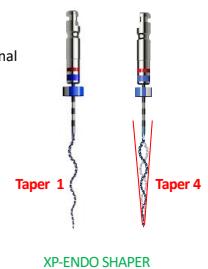
James Richard,
The 9th Dental Facial Cosmetic International Conference

XP-ENDO SHAPER

Single File System

One file for all cases regardless the initial size of the canal

15/.02 → 30/.04 (minimum)



Self adjusting file (SAF)

- file is built as a lattice-walled cylinder
- Hollow core
- More flexible
- Adapt themselves 3D to the shape of the root canal
- No crown-down, nor step-back
- Continuous irrigation during instrumentation



ReDent-Nova

★ New concepts in Endodontics

- Microscopic Endodontics
- Minimal invasive Endodontics
- Regenerative Endodontics



Minimal Invasive Endodontics

- Modern access cavity
- Gentle wave system

Modern Access Cavity

- No complete removal of pulp chamber roof
- No straight line access
- No crown after treatment



Moh'd Hammam

GentleWave System

Non-instrumented technique

Gentle wave system

- Developed by Sonendo Inc.
- introduced in the US market
- Multisonic cleaning technology
- Only requires pulp chamber access
- Have the potential to reach inaccessible canal areas



Sigurdsson et al., 2016

Gentle wave system

Aims to improve treatment outcomes while **maintaining the integrity of the tooth**



[Sigurdsson, et al., 2016](#)

Gentle wave system

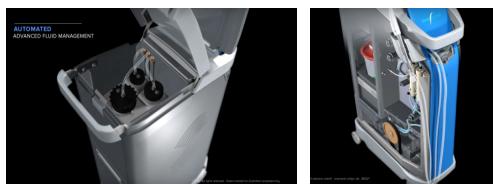
a portable treatment unit that has two main components:

- a single-use sterile handpiece
- a console



Gentle wave system

Irrigant solutions of NaOCl, distilled water and EDTA are included in this cleaning system



Gentle wave system

Technique

- Size of the canal 15/04
- Select the irrigant and time



Gentle wave system

Technique

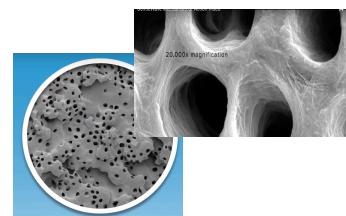
- Power vortex of treatment fluids
- Broad spectrum of acoustic energy



Gentle wave system

Advantages

- ❖ Minimal instrumentation e.g.: size 15/04
- ❖ Better cleaning and less invasive



Gentle wave system

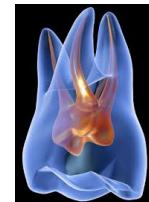
Advantages

- ❖ No extrusion at the apex due to negative pressure
- ❖ Success rate 97.3% (89 molars/ 12 months study)
and only 3% of the patients experience moderate post-treatment pain



concepts

Regenerative endodontics



Immature Teeth

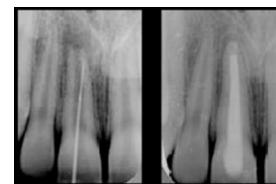
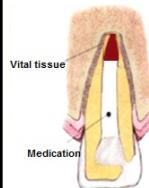
- * Difficult to debride and filled
- * Increased risk of a subsequent cervical fracture
- * Restorative problem: implants are contraindicated
 - Apexogenesis
 - Apexification



Tooth survival is threatened after conventional RCT

Immature Teeth Treatments

Apexogenesis

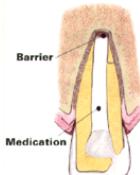


<http://www.southfloridaendodontics.com/et.trauma.html>

<http://endobarzuna.com/content/>

Immature Teeth Treatments

Apexification

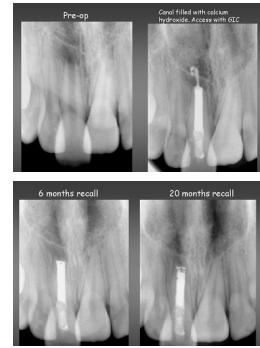
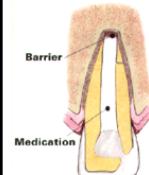


<http://www.southfloridaendodontics.com/et.trauma.html>

<http://drsjju.blogspot.com/2008/10/classical-traditional-apexification.html>

Immature Teeth Treatments

Apexification



<http://www.southfloridaendodontics.com/et.trauma.html>

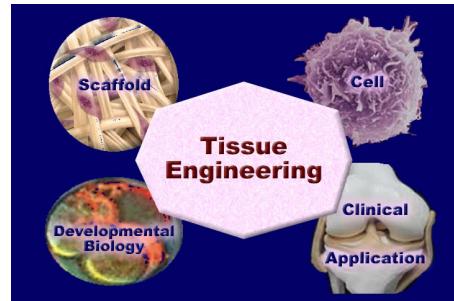
<http://drsjju.blogspot.com/2008/10/classical-traditional-apexification.html>

Immature Teeth Treatments



<http://thetoothofthematter.org/>

Tissue Engineering



Regenerative Endodontics

In January 2007 a new standing committee called the **Regenerative Endodontics Committee** was created by the AAE Board of Directors



Regenerative Endodontics

Journal of endodontics 33.4 (2007): 377-390



Regenerative Endodontics: A Review of Current Status and a Call for Action

(Murray *et al.*, 2007)

Possible Techniques for Pulp Tissue Regeneration

- (1) Root canal revascularization via blood clotting
- (2) Injectable scaffold delivery
- (3) Scaffold implantation
- (4) Pulp implantation
- (5) Postnatal stem cell therapy
- (6) Three-dimensional cell printing
- (7) Gene delivery

(Murray *et al.*, 2007)

Root Canal Revascularization via Blood Clotting

- In January 2011, the **American Dental Association** adopted a new procedure code to allow practitioners to induce apical bleeding into the root canal in **immature permanent teeth with necrotic pulps** that have been extirpated

Root Canal Revascularization via Blood Clotting

Banchs & Trope (2004)

Tooth 45 (11 years old boy)

- Closure of the apex
- Thickening of dentinal walls
- The tooth **responded positively** to the cold test

2-year follow-up

Root Canal Revascularization via Blood Clotting

Banchs & Trope (2004)

Root Canal Revascularization via Blood Clotting

Banchs & Trope (2004)

Revascularization Technique

- Irrigants: NaOCl, chlorhexidine
- Antibiotics: Ciprofloxacin, Metronidazole, Minocycline
- Bleeding: Overinstrumentation (15 min)

3-4 weeks

Root Canal Revascularization via Blood Clotting

Advantages

- ❖ This approach is technically **simple** and can be completed using currently **available instruments** and medicaments without expensive biotechnology
- ❖ No immune rejection
- ❖ Lowest risk of pathogen transmission

Root Canal Revascularization via Blood Clotting

The formation of a blood clot yields a **matrix** (e.g., fibrin) that **traps cells** capable of initiating new tissue formation

Fibrin Clot

Scaffold delivery

PRP
PRF
CGF

Scaffold delivery

Pt age: 30
Date: 12/112/2016



+ response to
electric and
cold tests

Scaffold delivery

Pt age: 17
Date: 8/10/2017



References

- Hargreaves, Kenneth M., and Louis H. Berman. Cohen's pathways of the pulp expert consult. Elsevier Health Sciences, 2015.
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- Sigurdsson A., DDS, Garland R. W., Le K.T., Woo S.M. "12-month Healing Rates after Endodontic Therapy Using the Novel GentleWave System: A Prospective Multicenter Clinical Study" JOE, July 2016 Volume 42, Issue 7, Pages 1040-1048
- Cotton, T.P., Geisler, T.M., Holden, D.T., Schwartz, S.A. and Schindler, W.G., 2007. Endodontic applications of cone-beam volumetric tomography. Journal of endodontics, 33(9), pp.1121-1132.

Thank you

Penang, Malaysia
2014