

Power driven endodontics

History

- Stainless steel – no rotation, oscillation, translation, combination – risk of perforation, ledging.
- Nickel titanium alloy – rotation, reciprocation, oscillation

Ni Ti instruments

Controlled rotation



NiTi alloy

56 % Ni, 44% Ti,

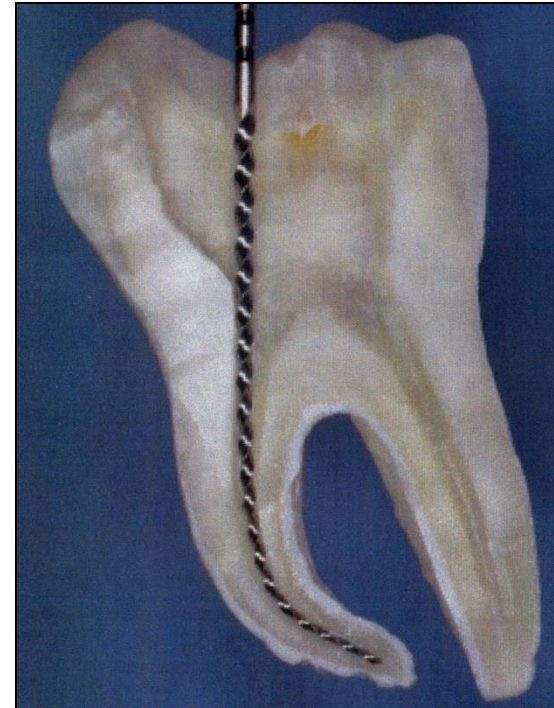
60%Ni, 40 % Ti

Flexibility

Memory effect

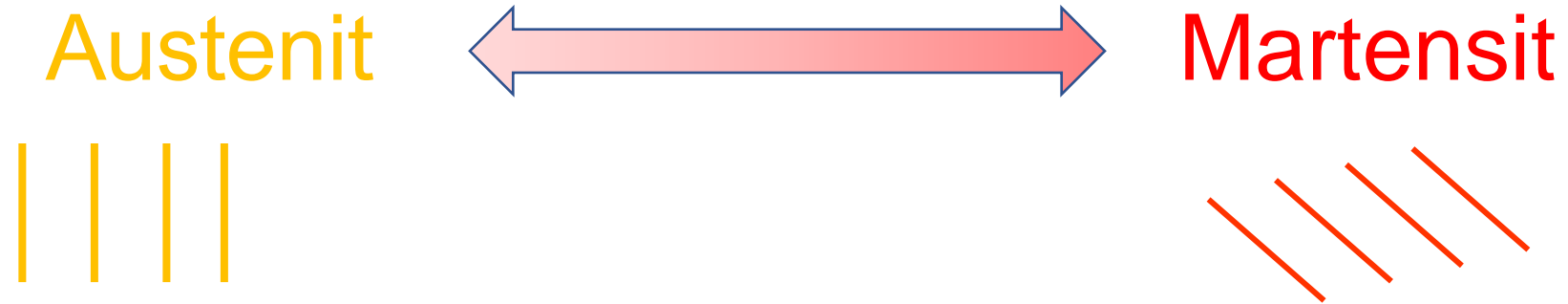
Effectiveness

Fractures ?





Martensitic transformation



Heating or releasing of bending stress –
back to austenit

Contemporary trends

- Treatment of the wire

- Heating

- Mechanical forming

Increasing: effectiveness

Decreasing: the risk of the fracture

- Design (taper, shape of the cutting part)

Controlled rotation

Low rpm

Torque control





Handpieces – no complete control

Gear

Electromotor: 128:1

Air motor: 64:1

Motors

- Controlled rotation
- Reciprocation
- More programmms
- Dr ś choice



Motors:

More programmes

Dr's choice





X-SMART™ **DUAL**



Motor &
Apex Locator

X-SMART *DUAL*: twice as SMART

3 MODES OF USE:

- Motor alone
- Apex locator alone
- *DUAL* mode - Motor and apex locator combined

SAFER with an Endo motor

- Torque control & auto reverse limit risk of file breakage
- Auto reverse / stop at the apex mode limits the risk of over-preparation*



SPACE SAVING & CONVENIENCE

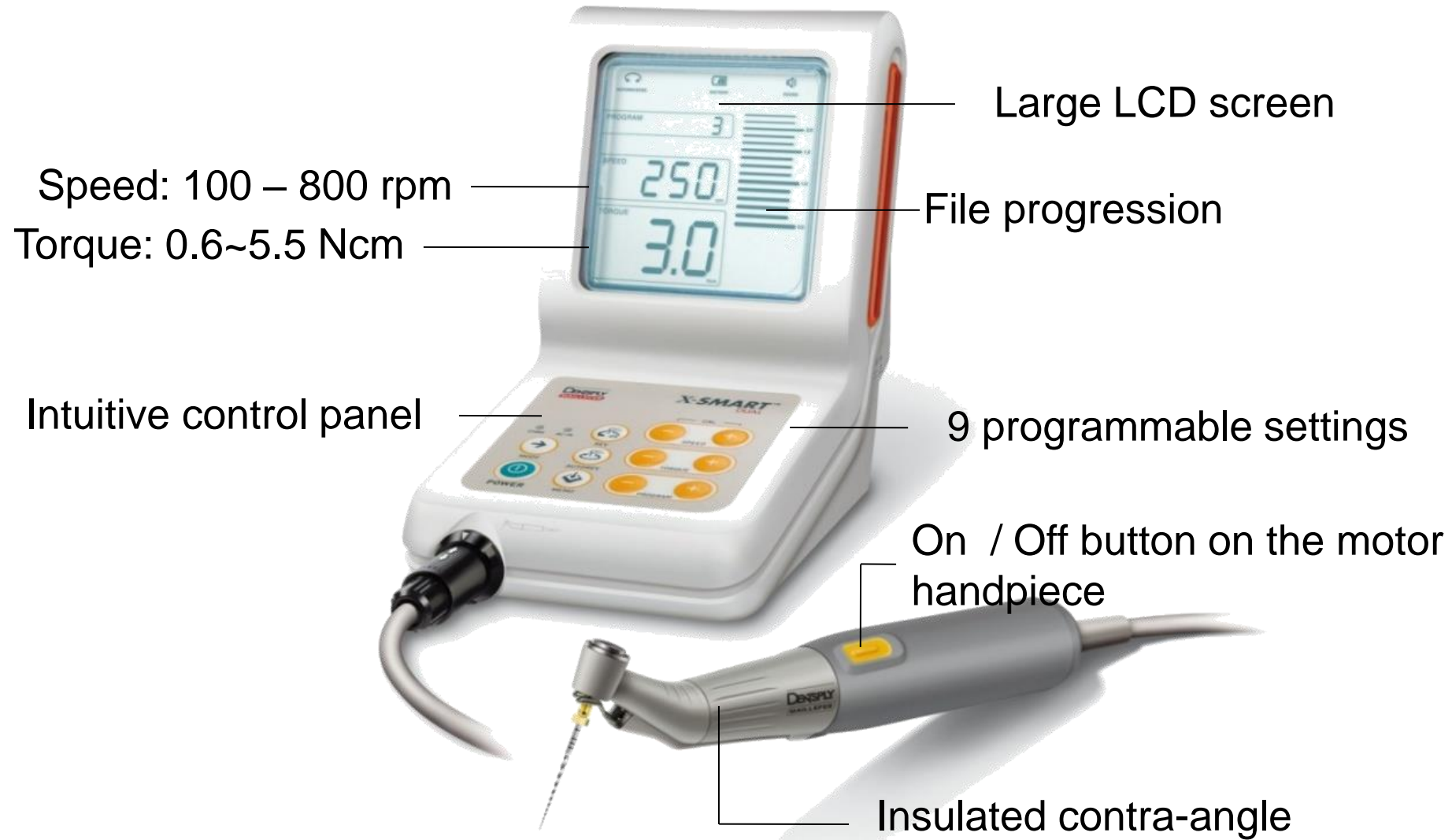
Endo motor and apex Locator in one device

SIMPLE TO USE

- Automatic start / stop when the file enters / is withdrawn from the canal
- Programmable
- Intuitive keyboard
- Large LCD screen

* Follow the recommended clinical sequence

X-SMART DUAL: twice as SMART



X-SMART EASY :: cordless and user friendly

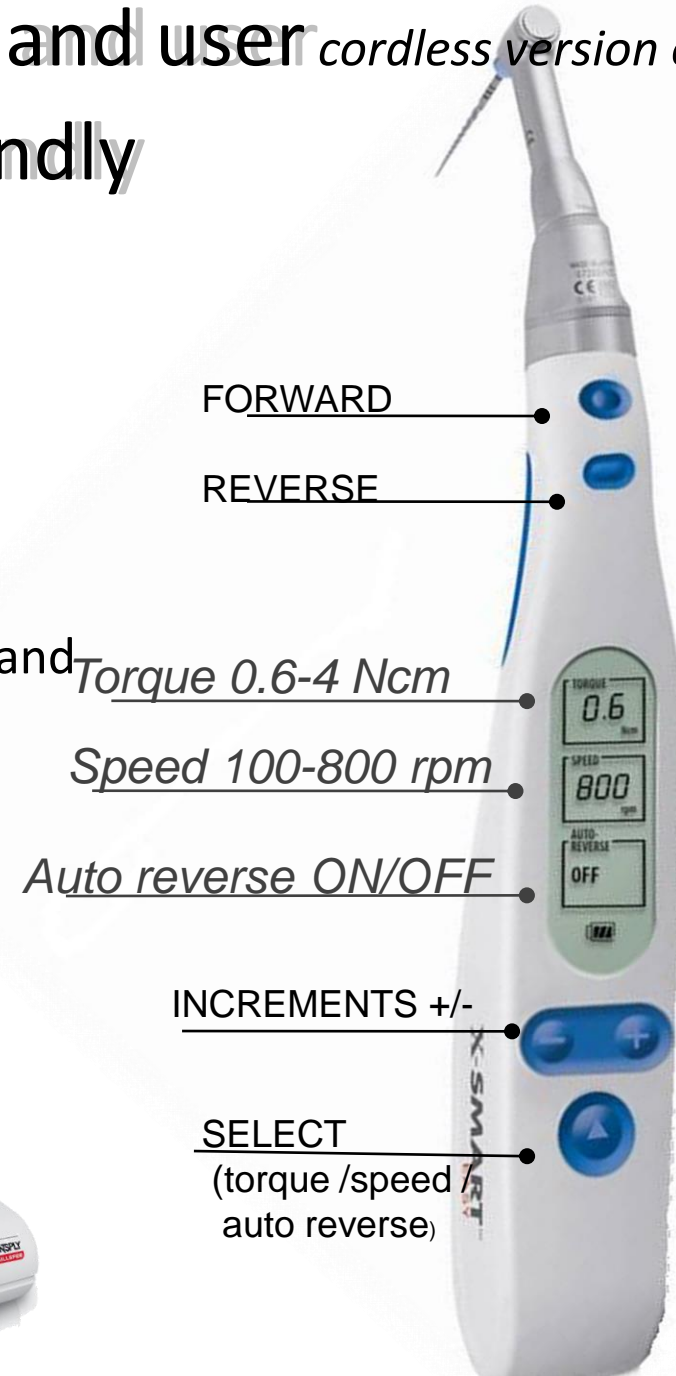
The cordless version of X-SMART

- freedom of movement
- Safe – torque control, auto
- Miniature contra-angle as X-SMART
- User friendly – featuring LCD display + very explicit and intuitive control panel
- Ergonomic fits well in the hand, anti-slip grip

Miniature contra-angle head



The X-SMART EASY on its charging base



- Niti alloy enables using of higher taper
(4%, 6%)



d_1

d_2

$$d_2 = d_1 + 0,32$$

0,02 mm / 1mm

Taper 2%



d_2

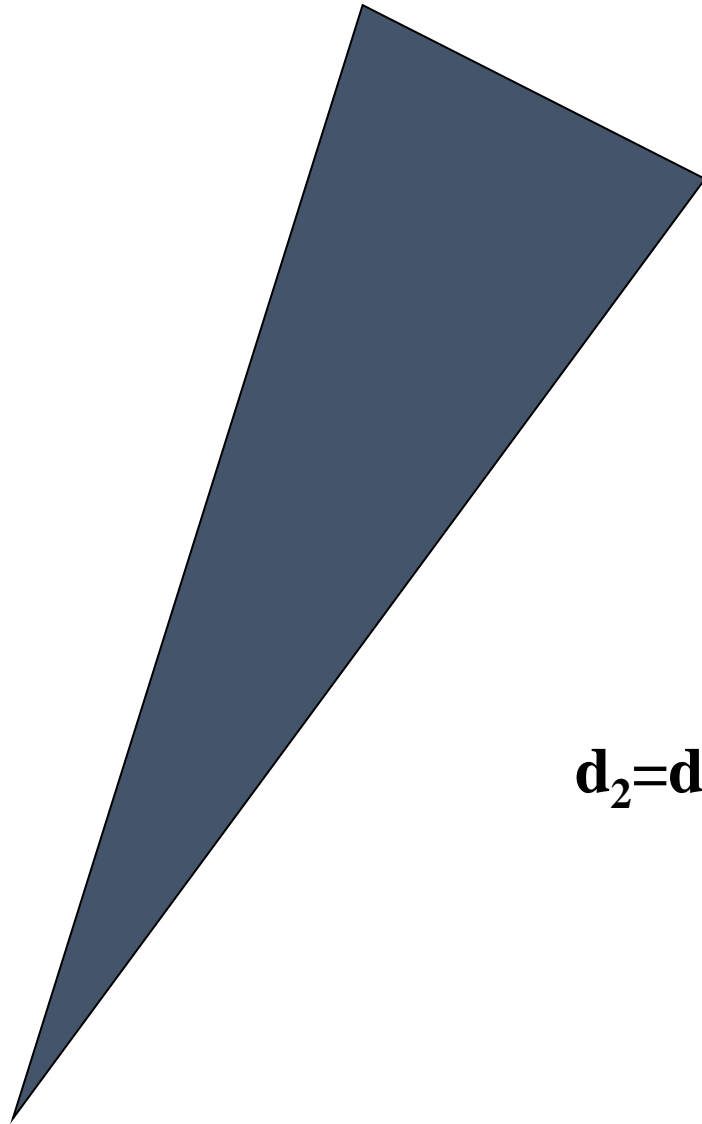
$d_2 + 0,64$

d_1

Taper 4%

0,04mm / 1 mm

Taper 6%



d_2

$$d_2 = d_1 + 0,96$$

d_1

0,06mm / 1 mm

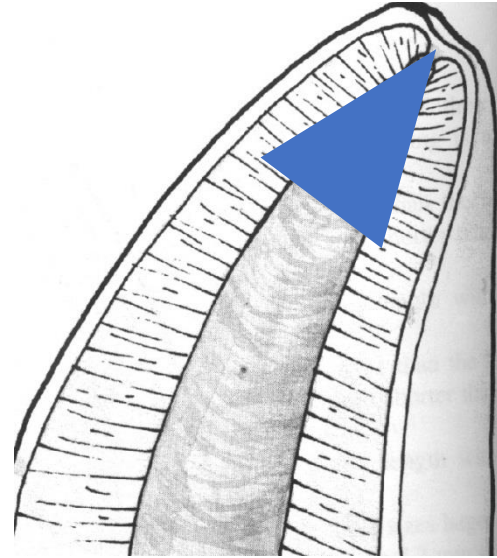
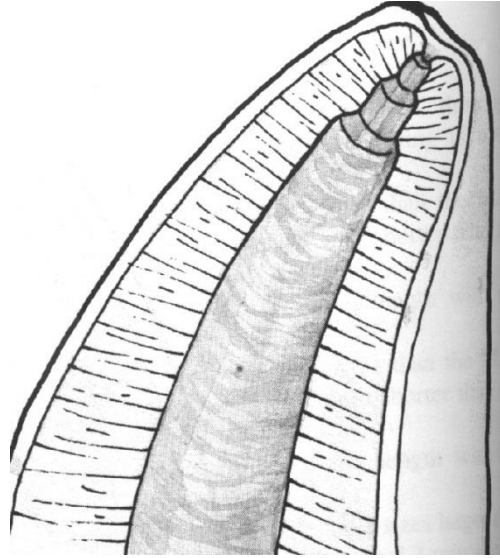
Higher taper

Coronal flaring

Higher effect of irrigation

Good approach to apical part

**Good conditions for 3D
filling**



2% taper

30	at the apex	0,30 mm
35	1 mm from the apex	0,35 mm
40	2 mm from the apex	0,40 mm
45	3 mm from the apex	0,45 mm

6% taper

30	at the apex	0,30 mm
30	1 from the apex	0,36 mm
30	2 from the apex	0,42 mm
30	3 mm from the apex	0,48 mm

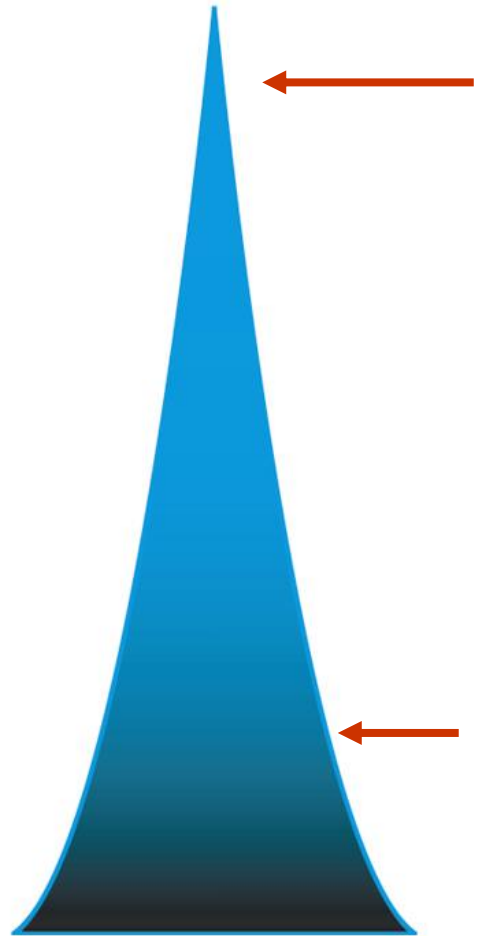
Shape of the apical

Classification of instruments acc. to the taper

- Fixed taper

- Variable taper
 - Progressive
 - Regressive

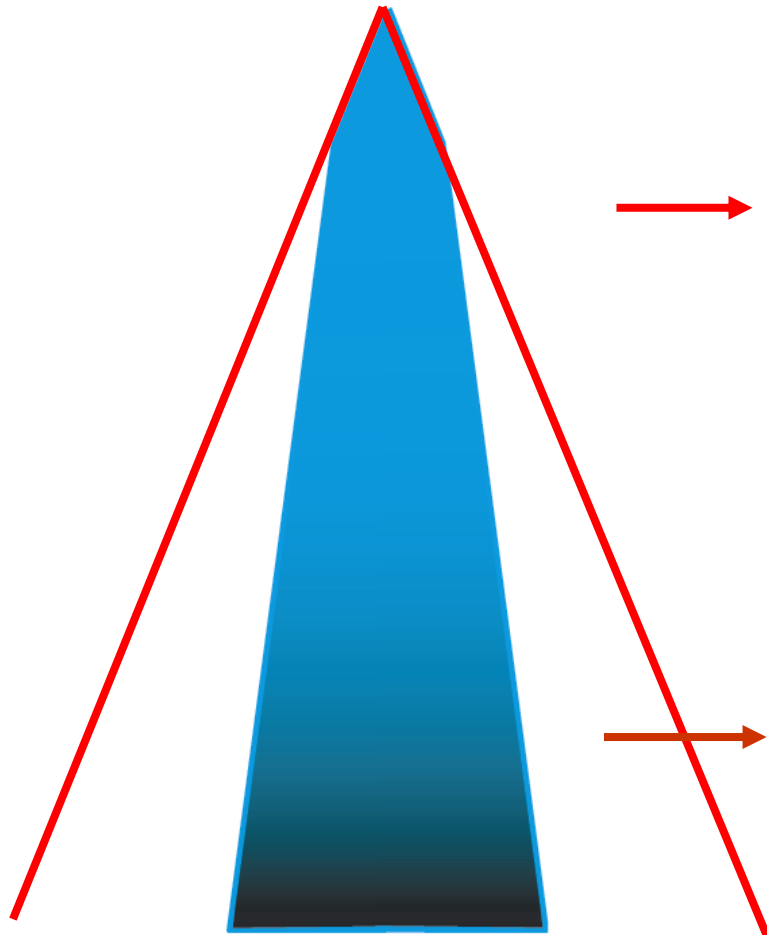
Progressive taper



Flexibility, penetration,
small shaping

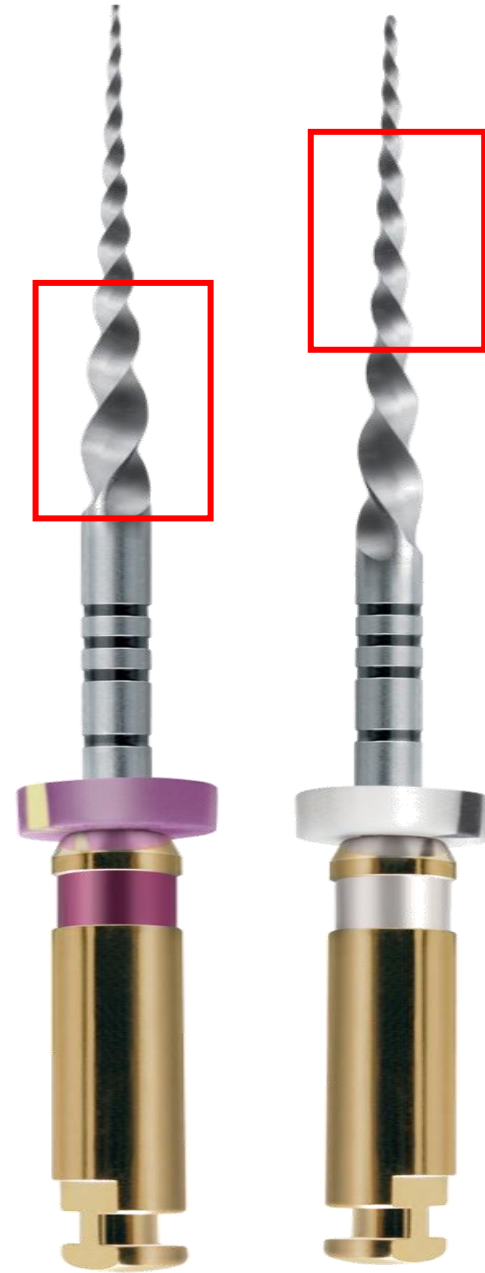
Resistance maximal
opening of the root canal,
approach to the apical part

Regressive Taper



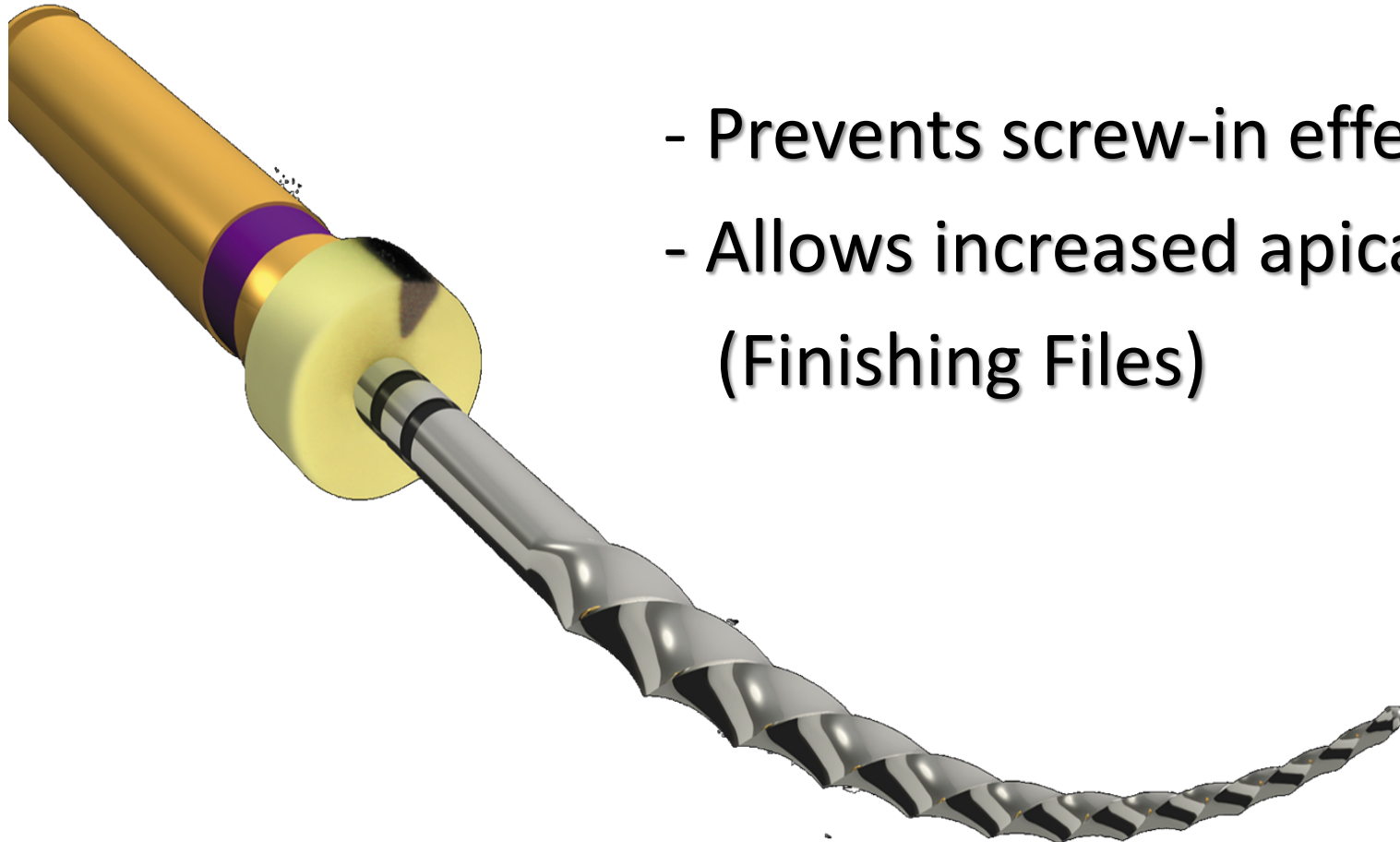
→ Stability in the apical part

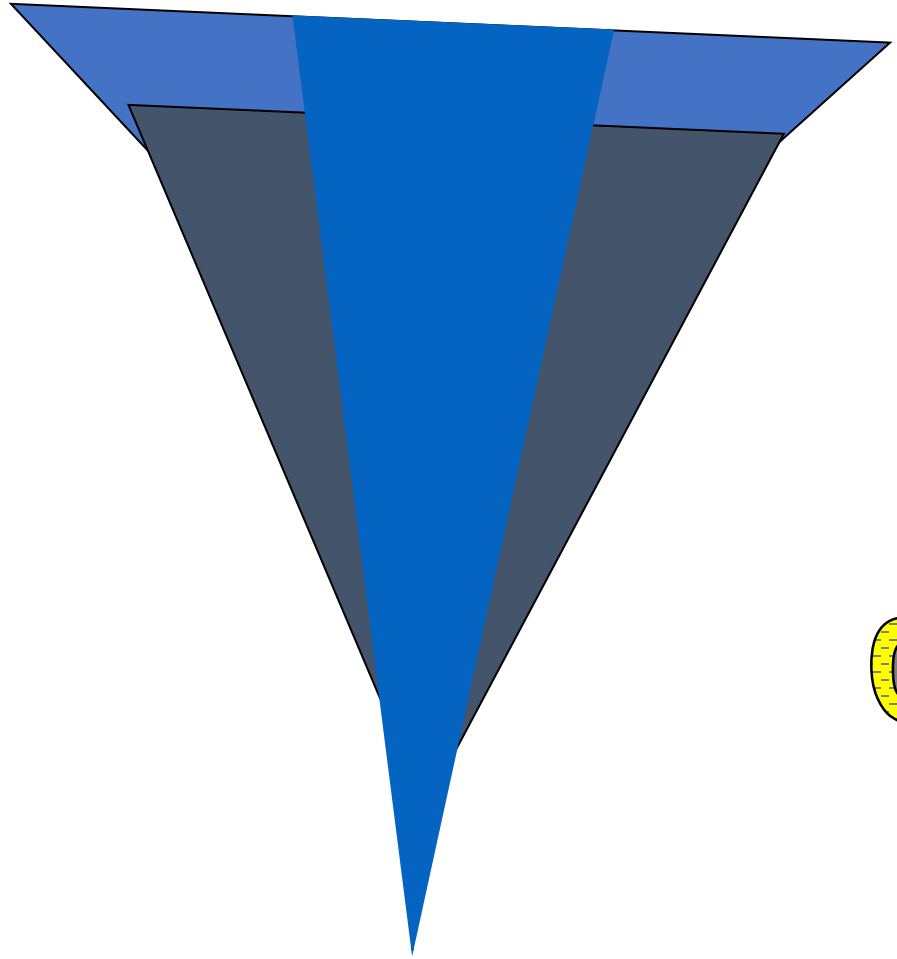
Finishing Files



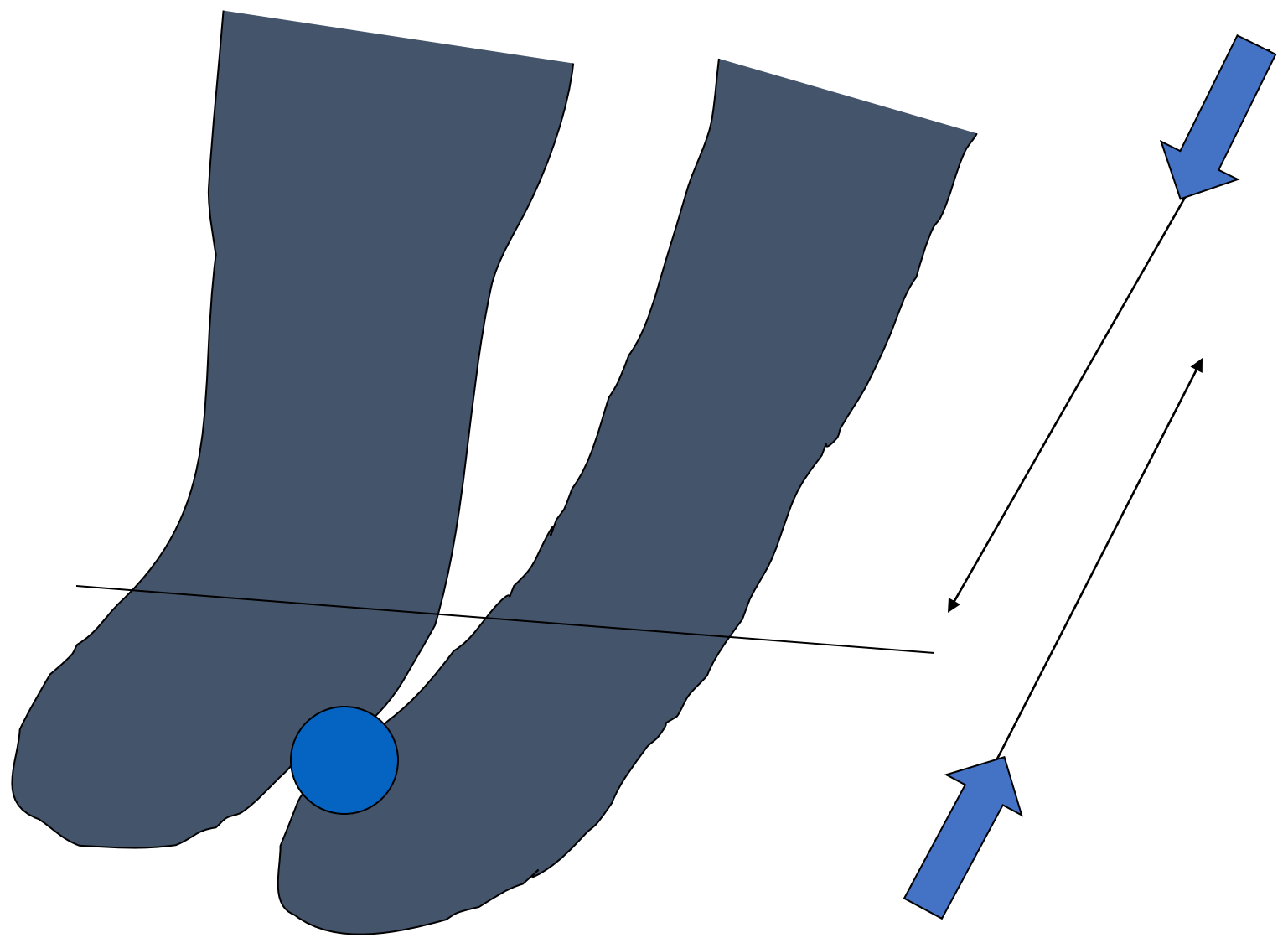
VARIABLE TAPERED INSTRUMENTS

- Variable Taper:
 - Prevents screw-in effect
 - Allows increased apical tapers
(Finishing Files)





Crown down



Flex Master organizér

Crown down:

Modrá

Červená sekvence

Žlutá

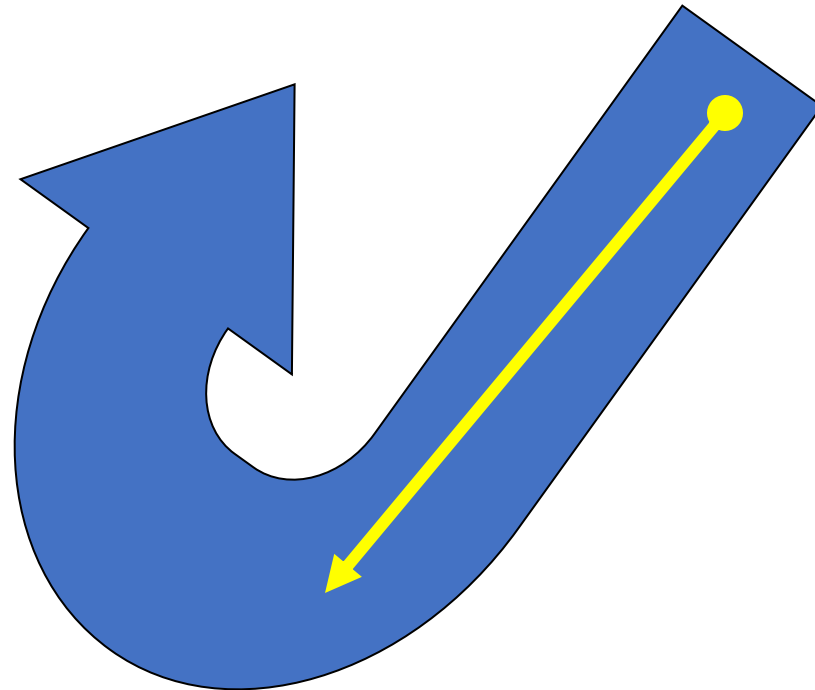
Apikální

preparace:

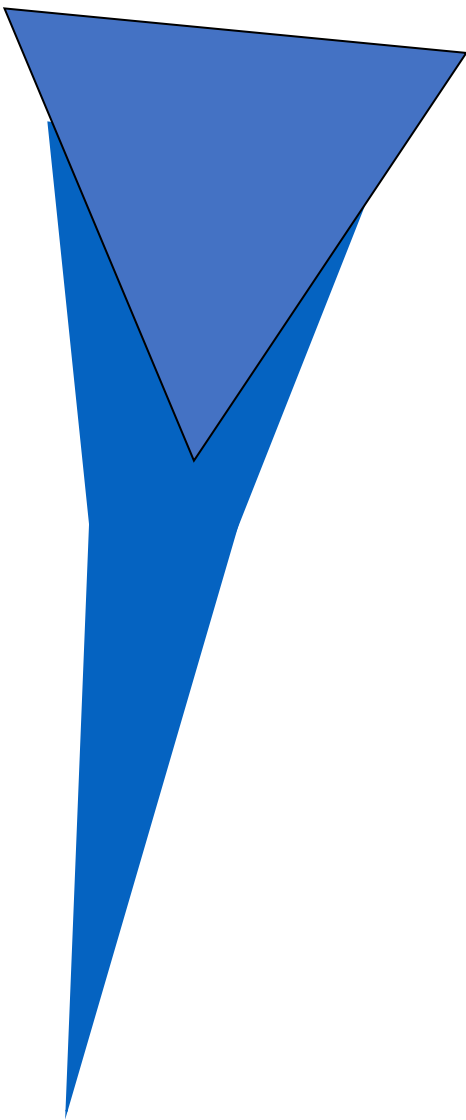
Zelená sekvence

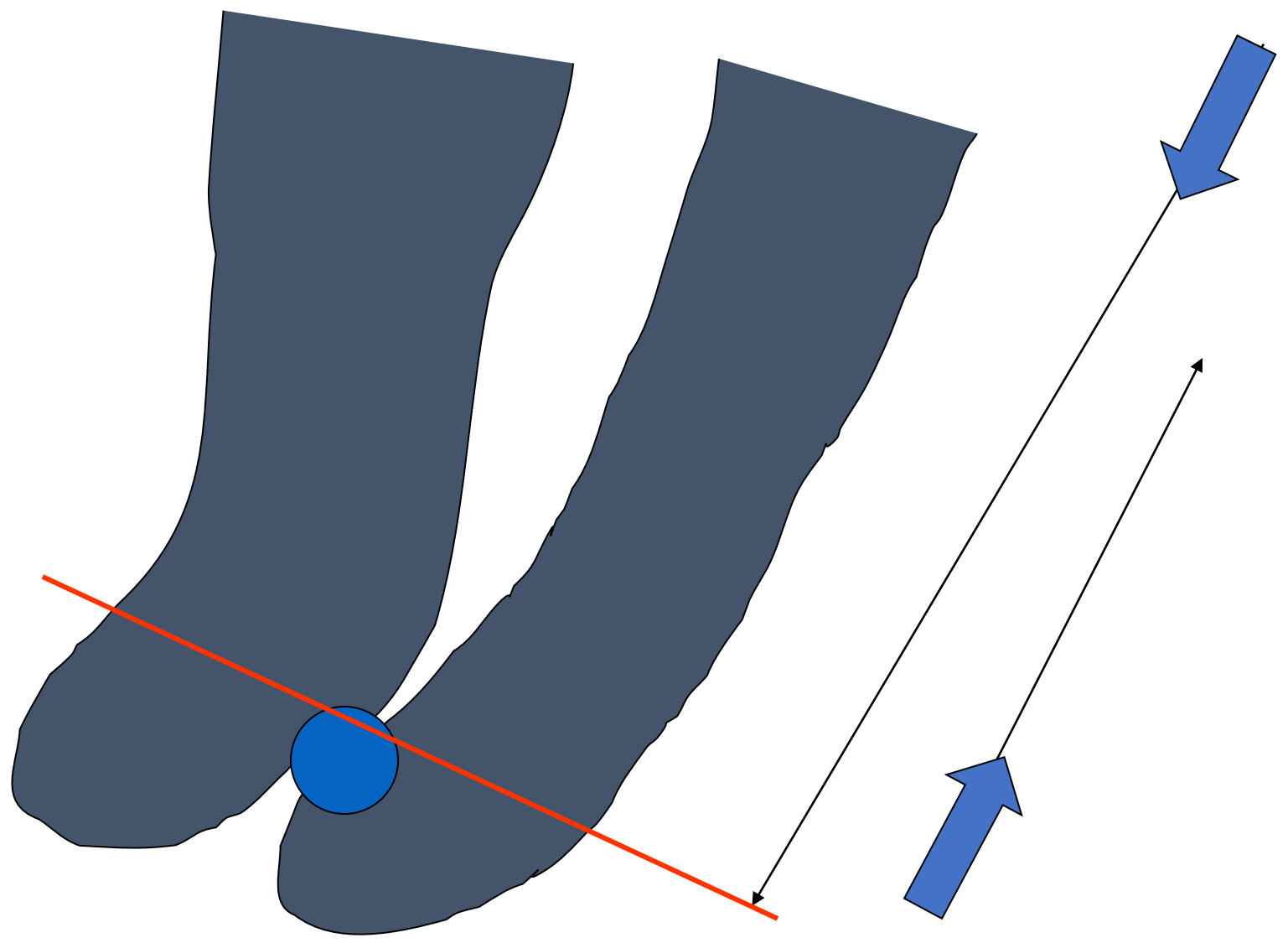


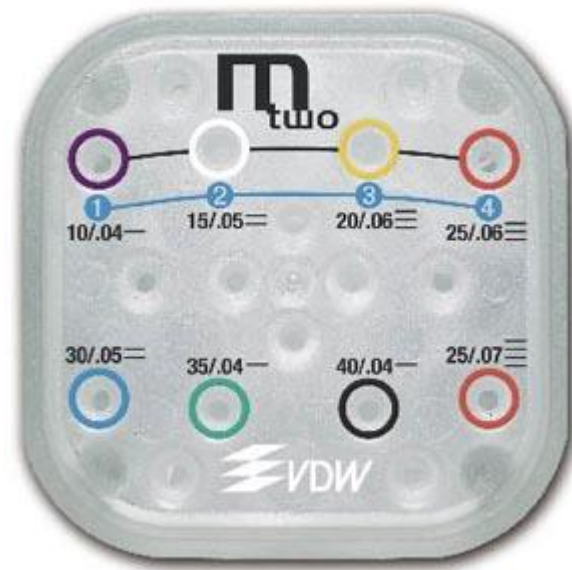
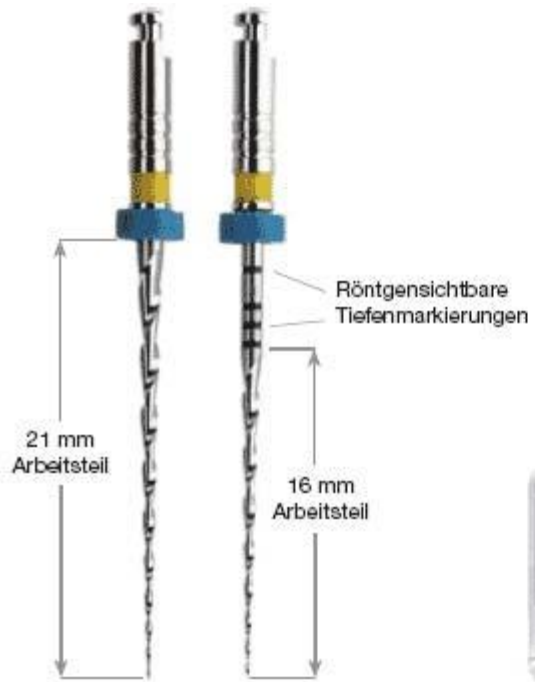
Apical - coronal



Step back

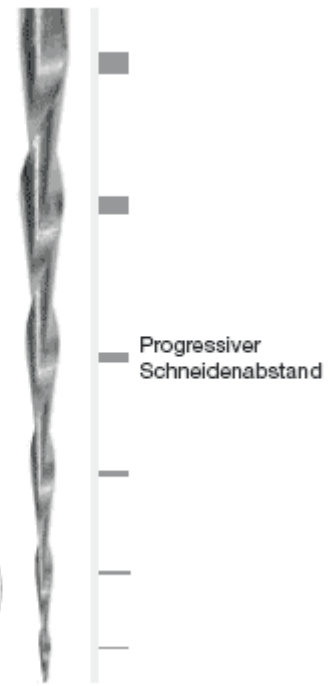








Nicht schneidende Spitze



System ProTaper

- Universal
- Gold
- Next

System ProTaper

- Universal

- Gold

Shaping Files

(S1 & S2 – Accessory Sx)

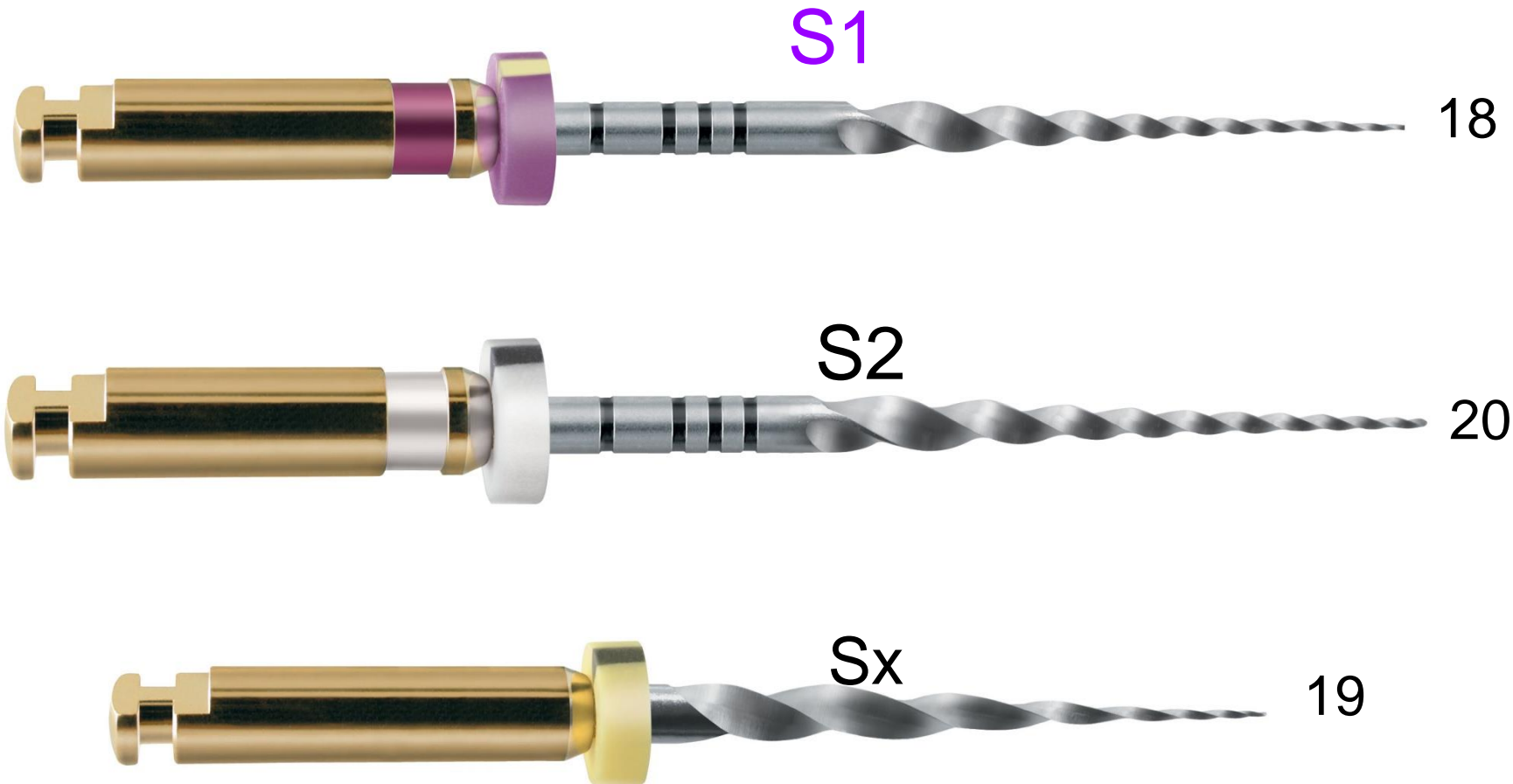


Shape the coronal and
the middle third of the canal



Shaping Files

Variable Increasing Taper (Eiffel Tower shape)





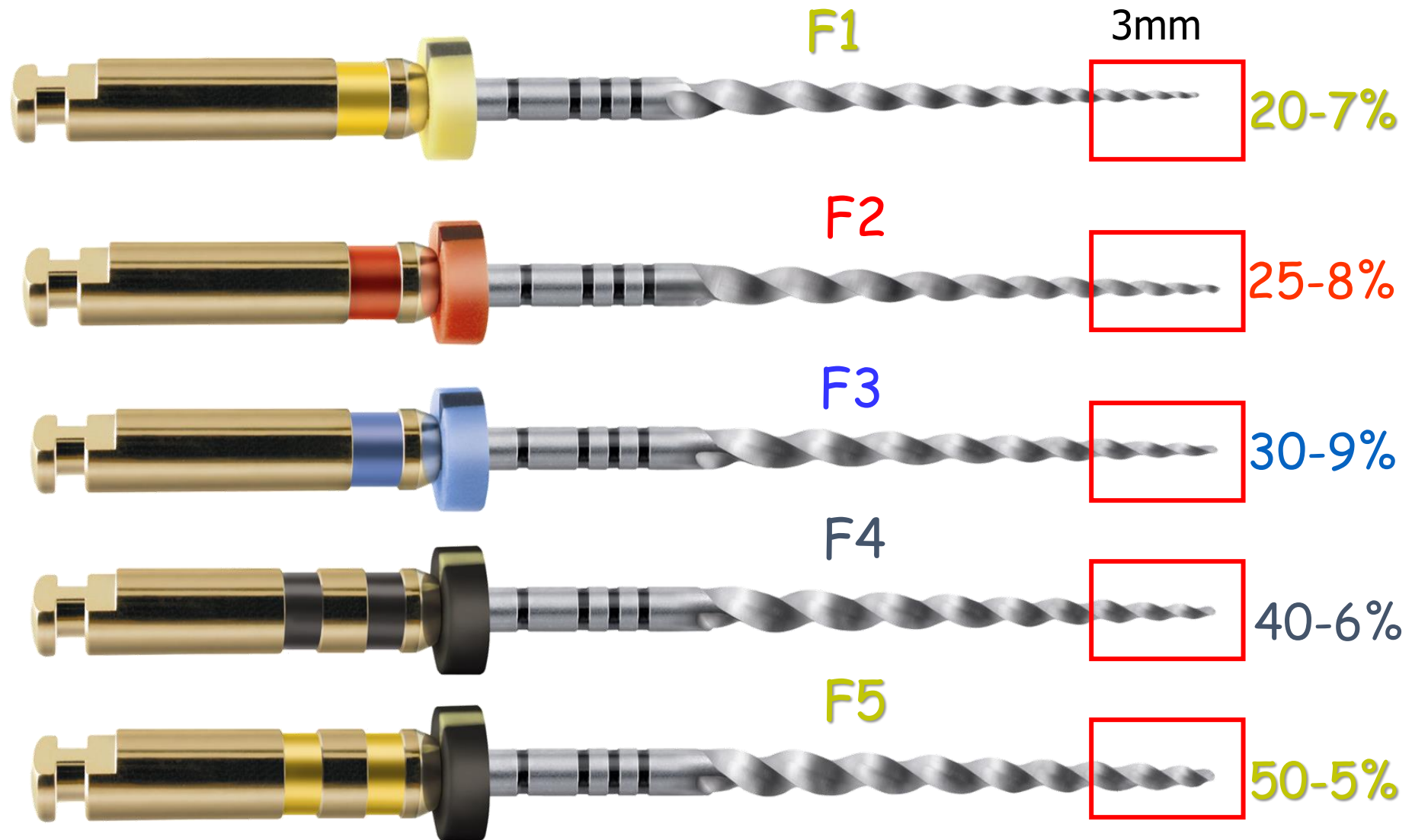
Finishing Files

F1. F2. F3. F4. F5

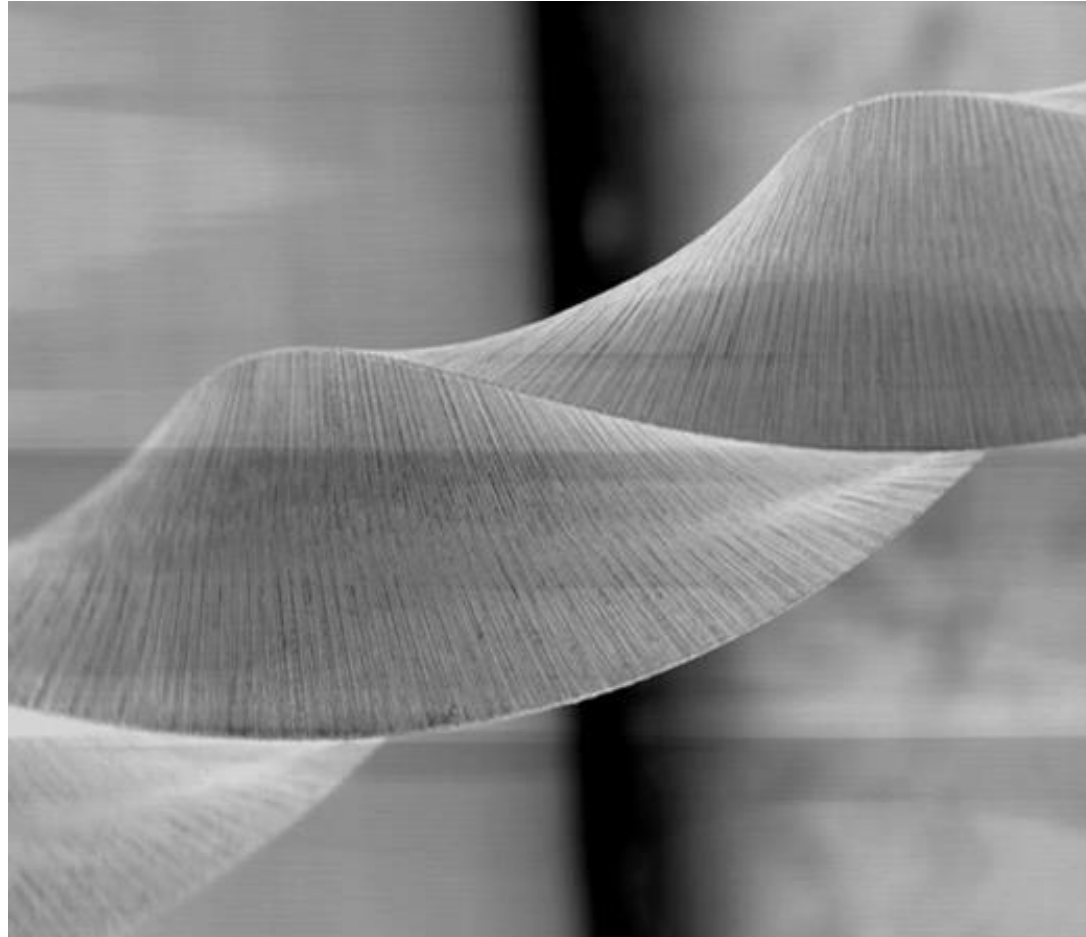


Shape the Apical part of the canal

Finishing Files (Variable Decreasing Taper)



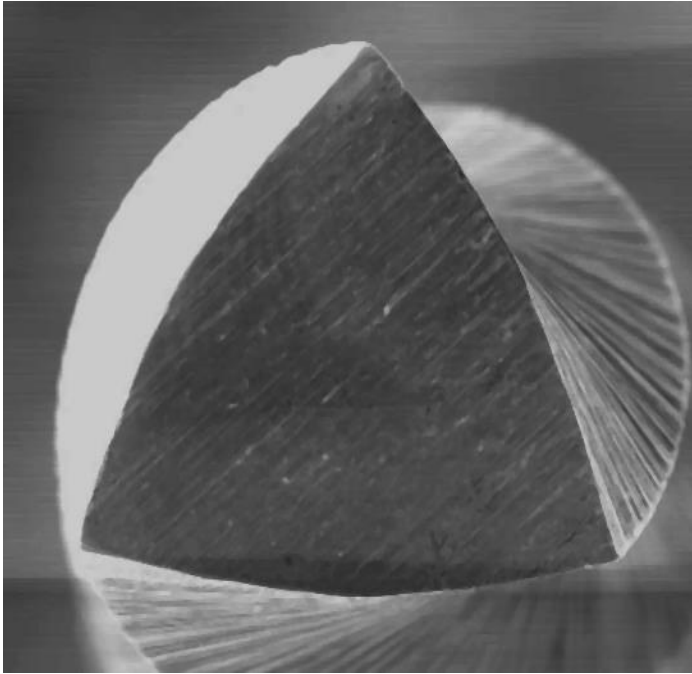
Morphology



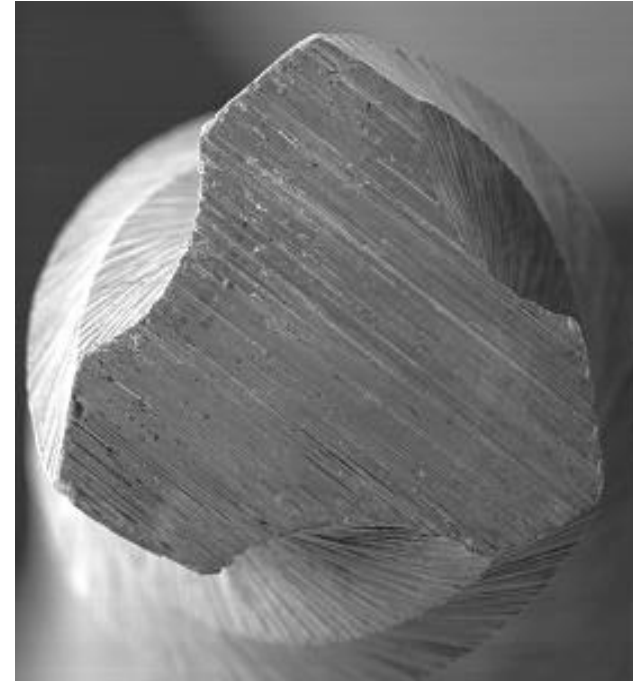
- Cutting blade (no radial land) : Efficiency

Characteristics

« Triangular » Cross-Section



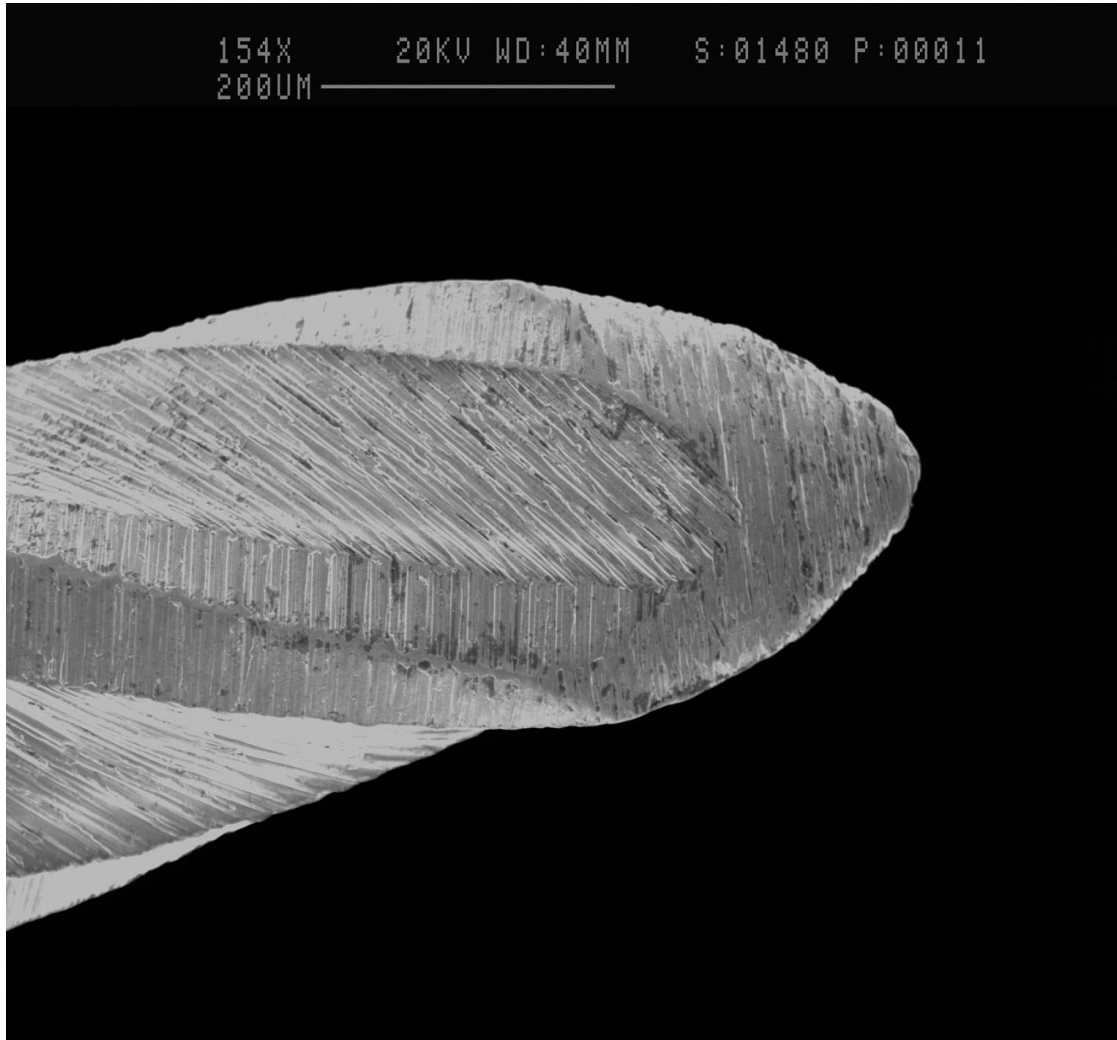
Convexe : S1, S2, SX, F1, F2



Concave : F3, F4, F5

- Triangular concave cross-section : Flexibility
- Triangular convexe cross-section : Resistance

Characteristics



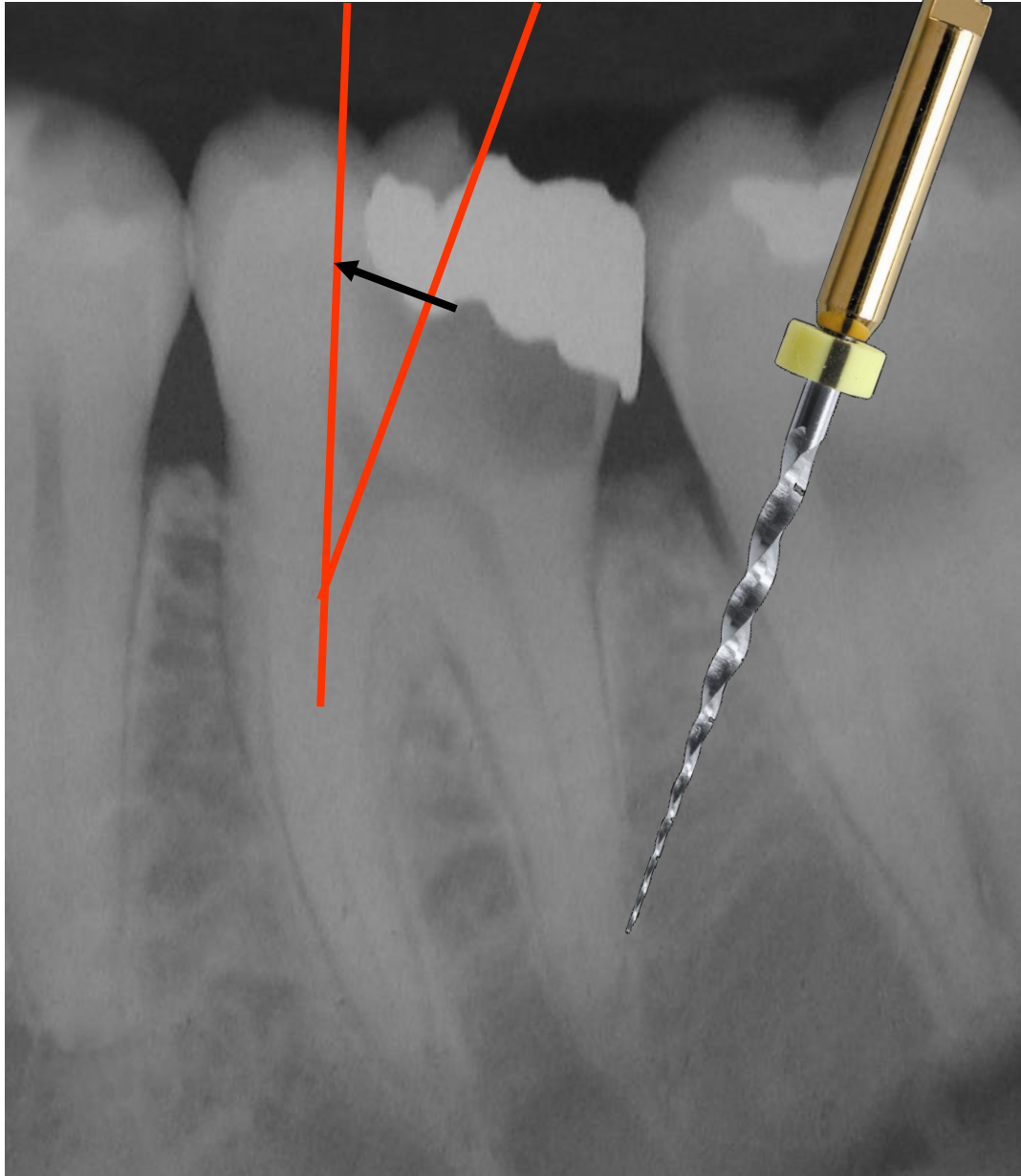
Radial land

- Safe non cutting tip : acts as a guide

Short instrument with high taper

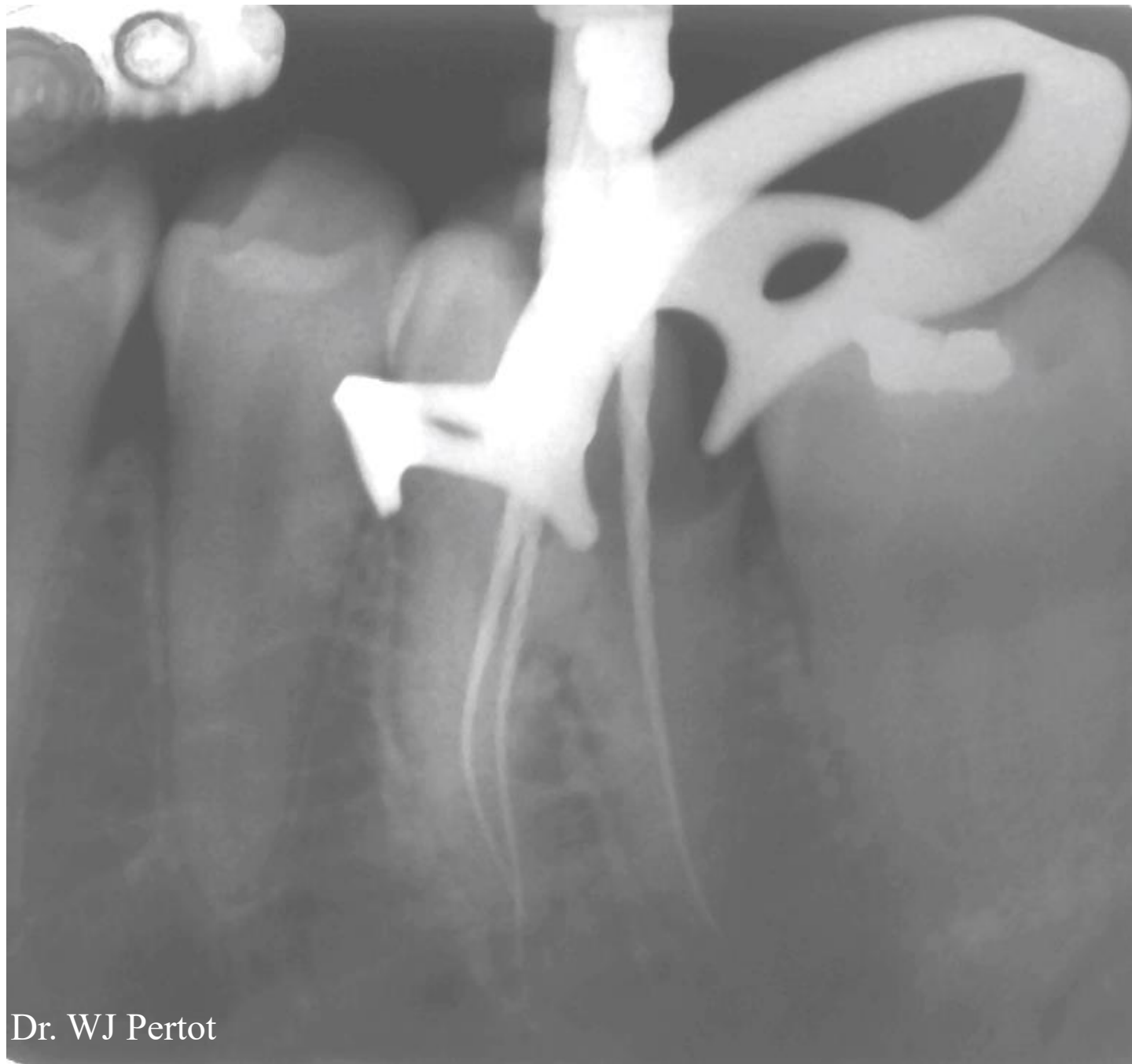


For Relocating Canal Orifice
(only when needed)



Sx is used with a
brushing motion

to relocate
the orifice and insure a
straight line access

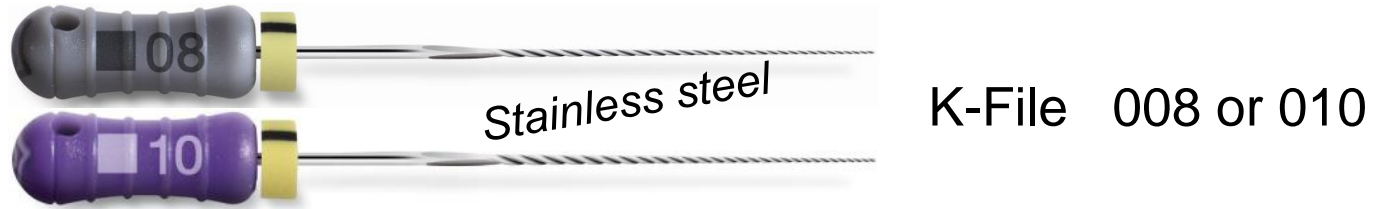


Dr. WJ Pertot

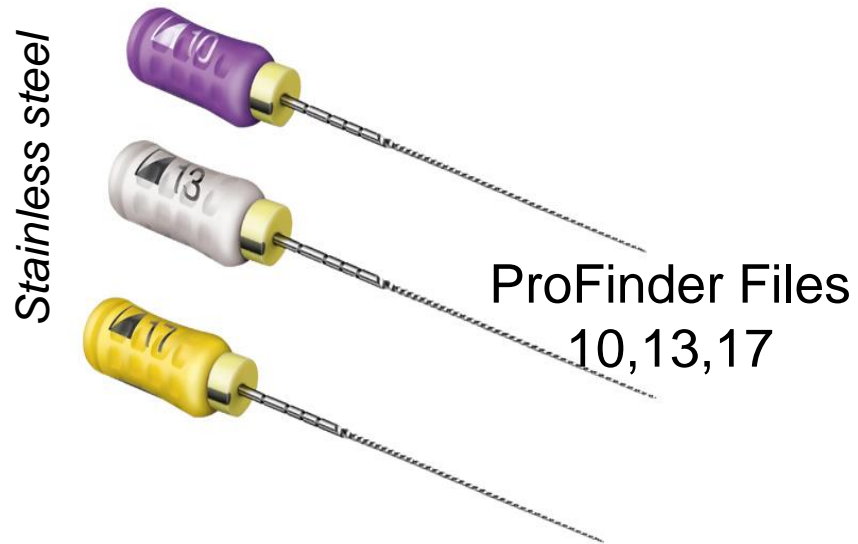


Dr. WJ Pertot

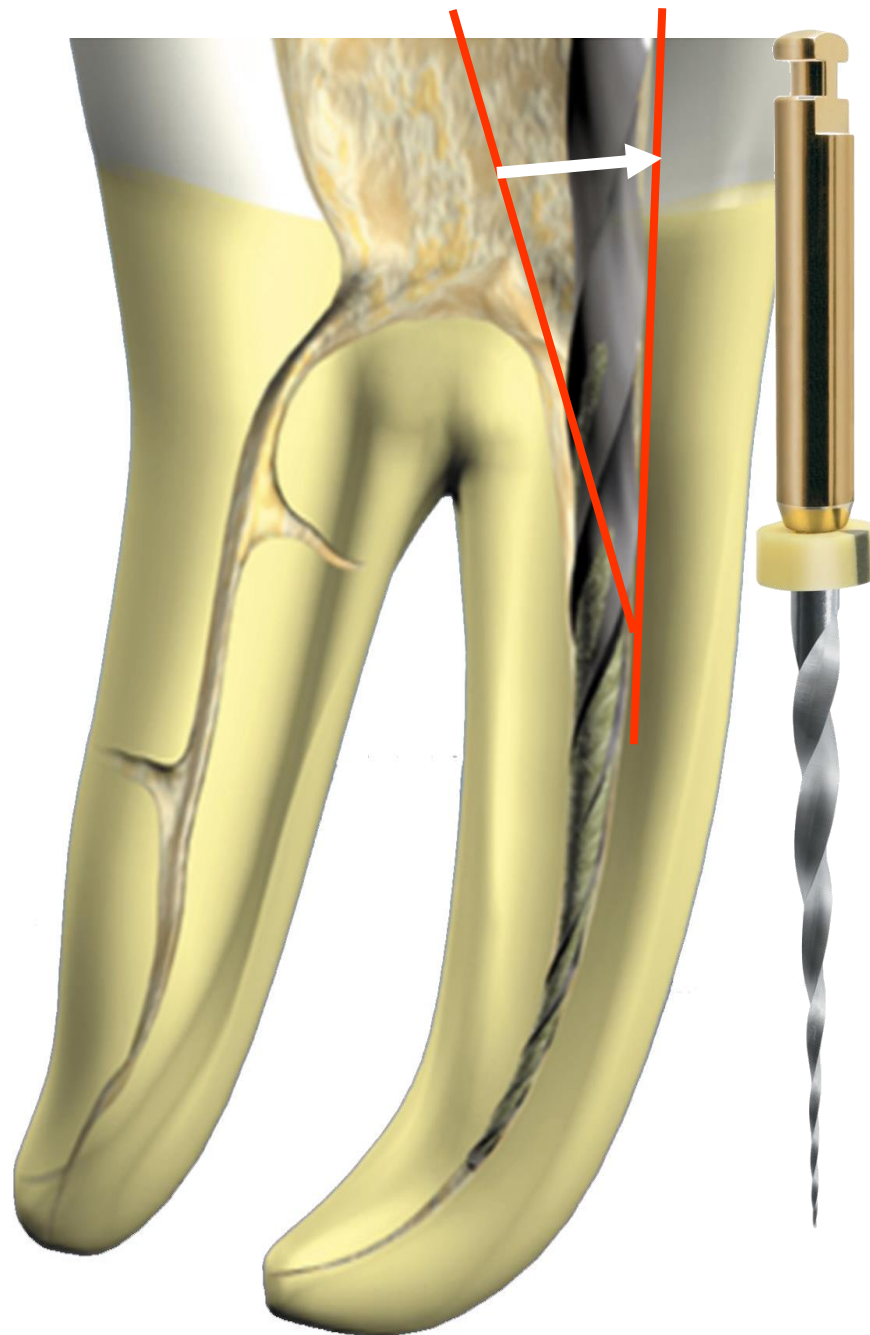
SCOUTING THE CANAL :



Then hand instruments
to the level they are accepted in the canal.



OR NiTi ROTARY INSTRUMENTS : Pathfiles



If needed, use SX with a brushing motion to relocate the orifice of the canal and create a straight line access

(don't use Sx deep in the canal)

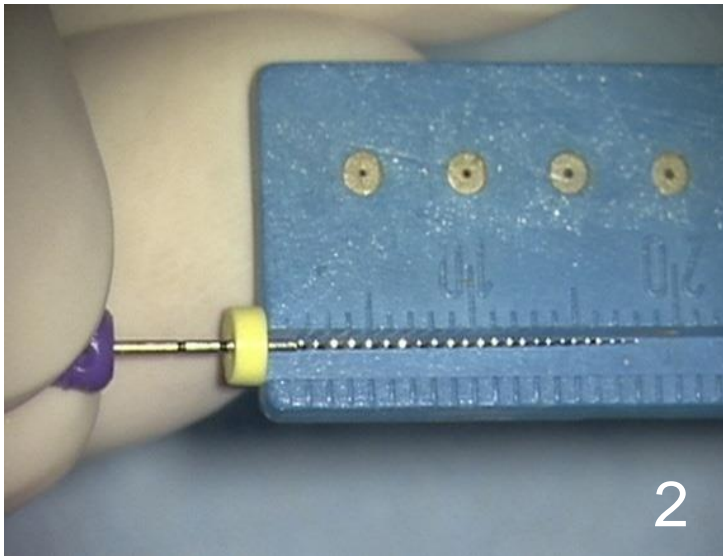
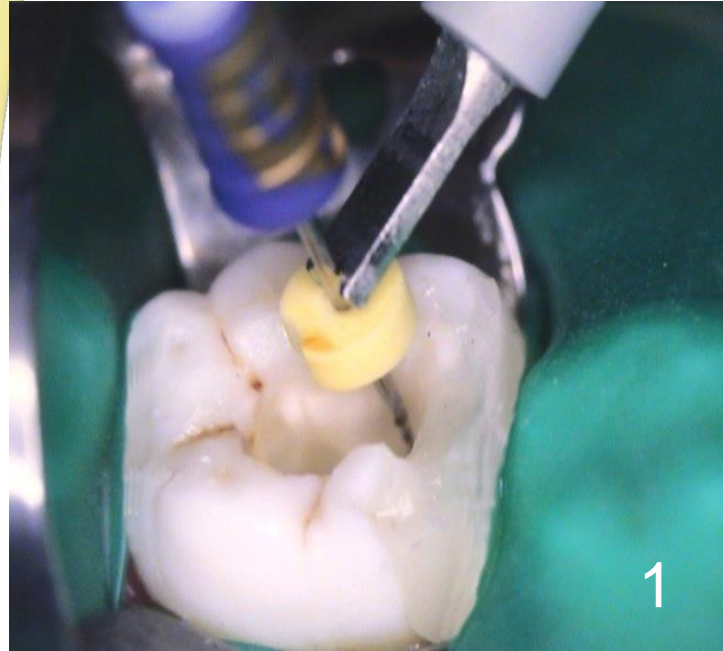
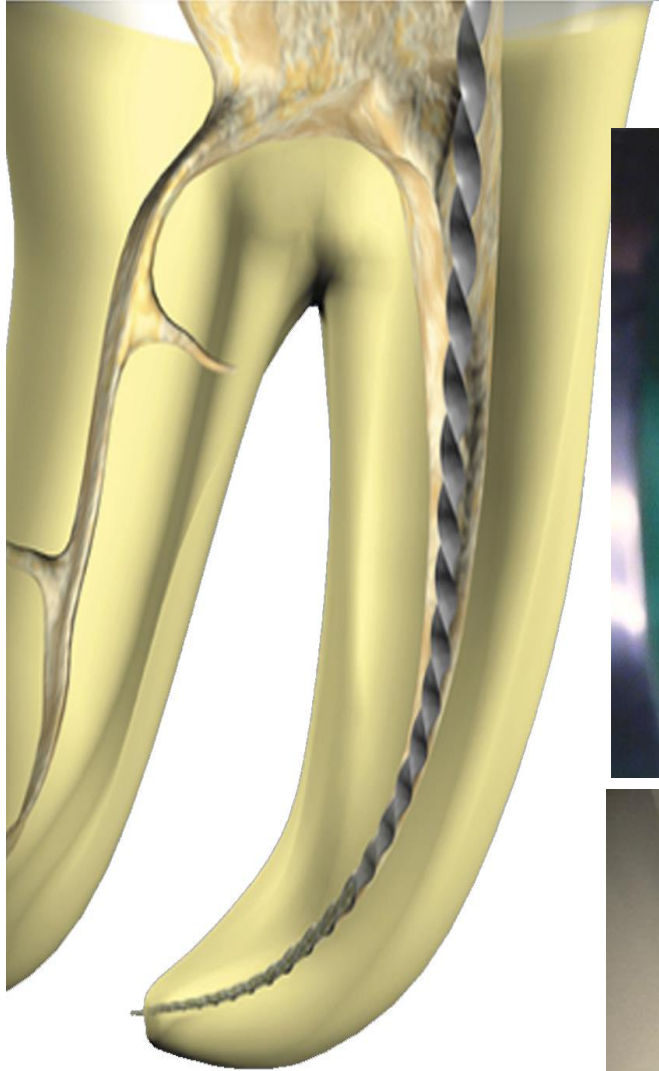


Use S1 with a brushing motion and enlarge the canal, no deeper than the level of the penetration of the scouting file

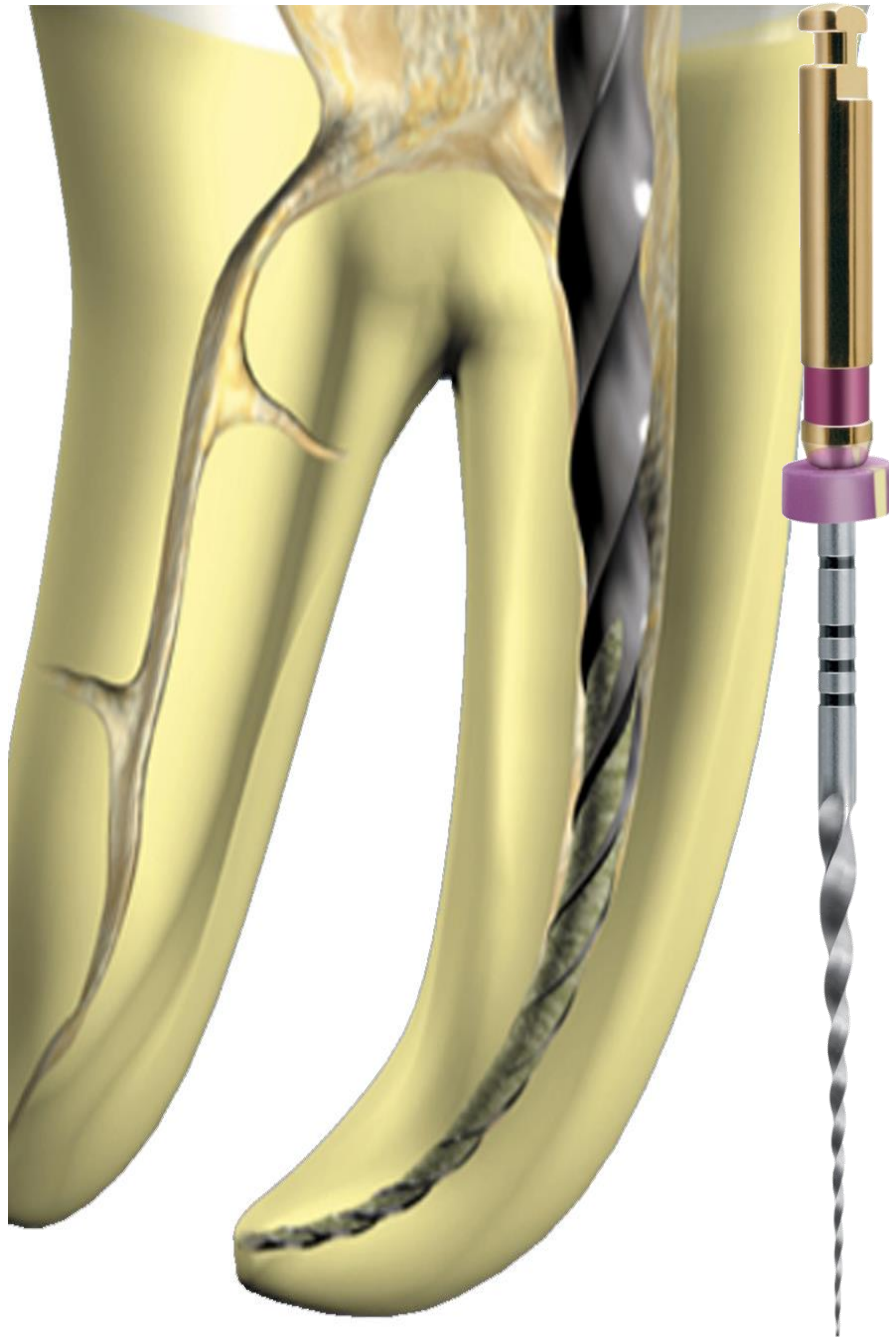
(to make sure that the tip of S1 is never blocked)

Using Pathfile, go to working length that you established right before

Determine WL



Apex Locator



After going to length with a stainless steel file size 15, use :

S1 to working length

with a brushing motion.

Using Pathfile this step is skipped



When S1 reaches working length, use :

S2 to working length

with a brushing motion

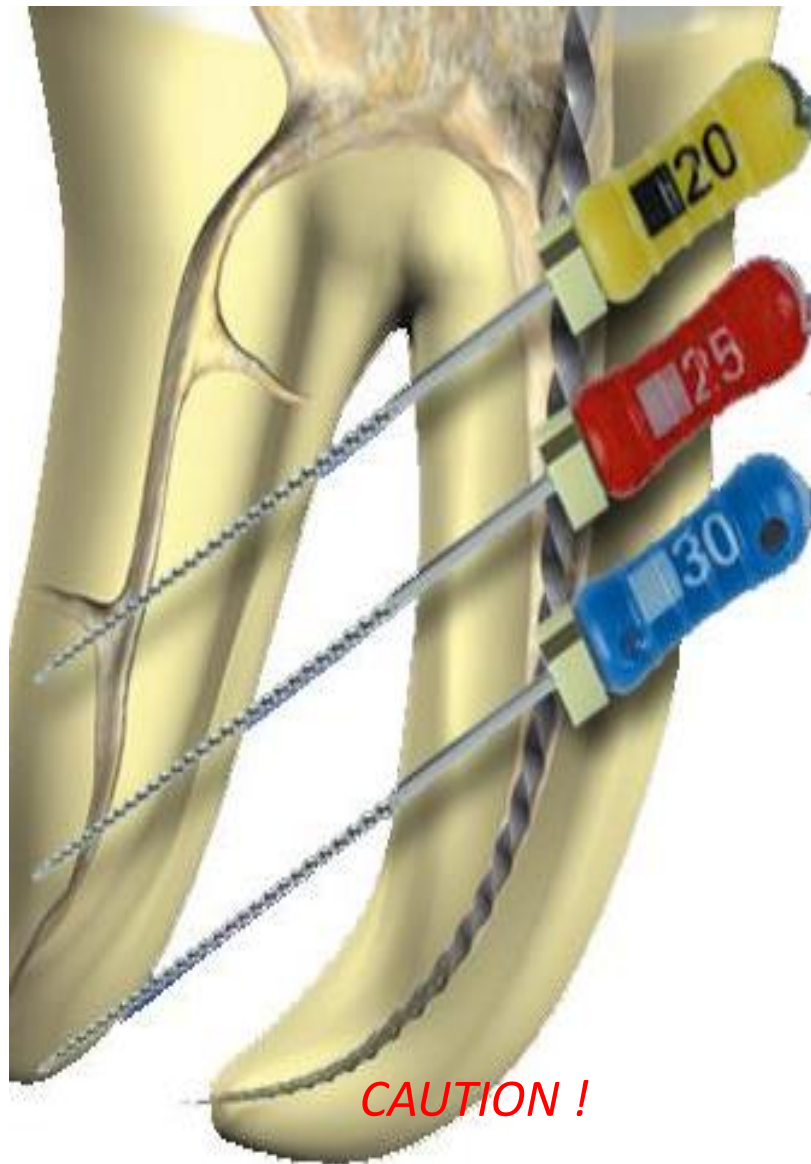


When S2 reaches working length, use :

F1 to working length.

**CAUTION !
NEVER USE A BRUSHING ACTION
WITH THE FINISHING FILES !!!**

*When a finishing file reaches the working length,
It is immediately withdrawn.*



Gauge the diameter of the foramen with stainless steel files and if the foramen is larger than 20, use F2, F3, F4 or F5 to working length, according to the real apical diameter.

CAUTION !

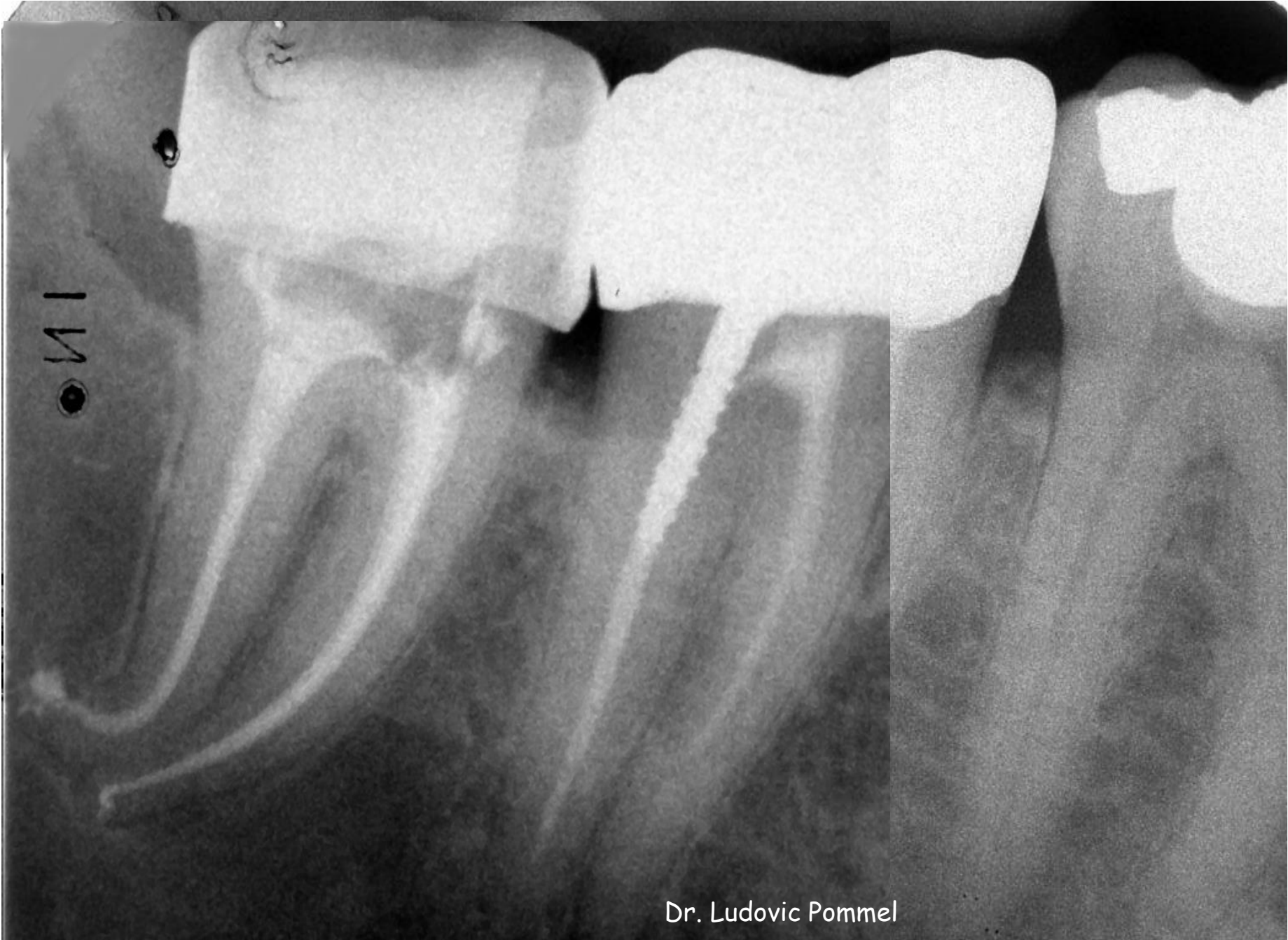
NEVER USE A BRUSHING ACTION WITH THE FINISHING FILES !!!

When a finishing file reaches length, it is immediately withdrawn.



● ● ●
PROTAPER[®]
UNIVERSAL





Dr. Ludovic Pommel

Basic rules of power driven endodontics - rotary

Controlled rotation

Following sequences

Abundant irrigation

No pressure

Movement up and down

Touch apical constriction and going back

10-15s work in one phase, cleaning and
checking the instrument

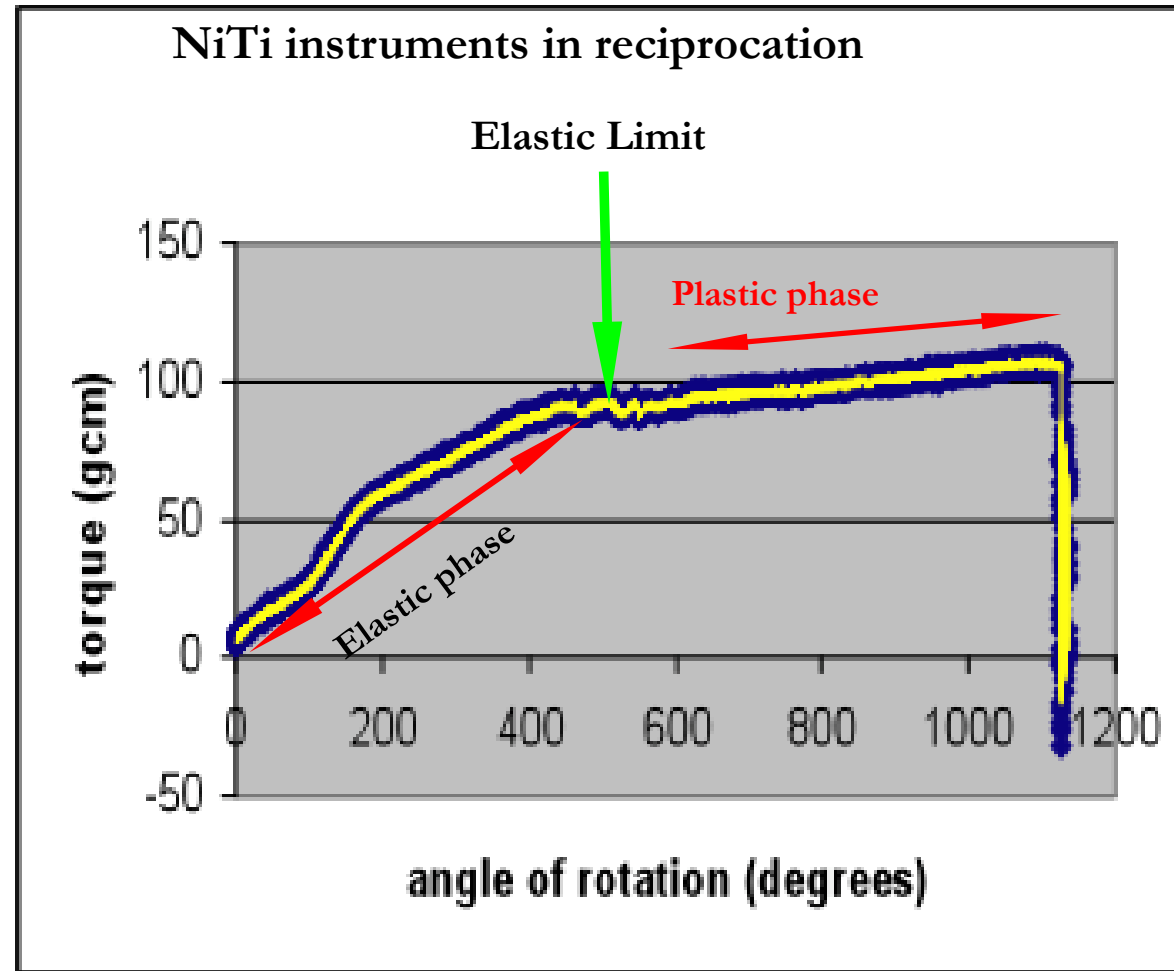
One file endodontics

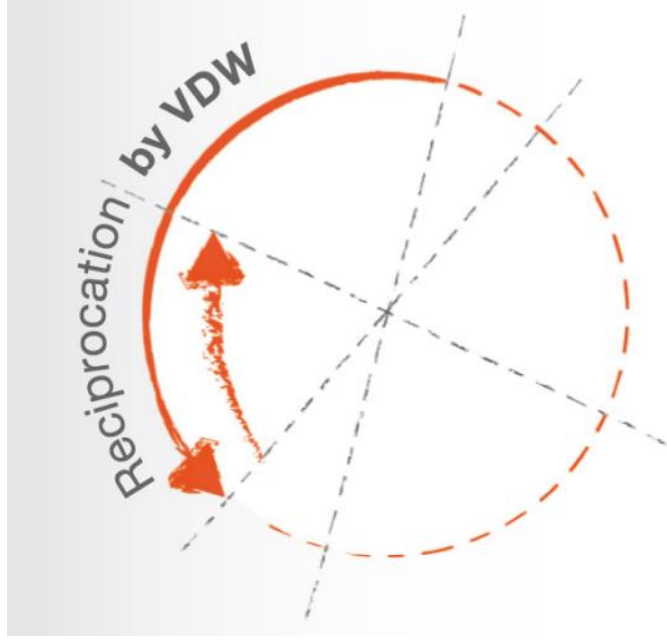




The instrument releases within the elastic phase

Reciprocation - benefits





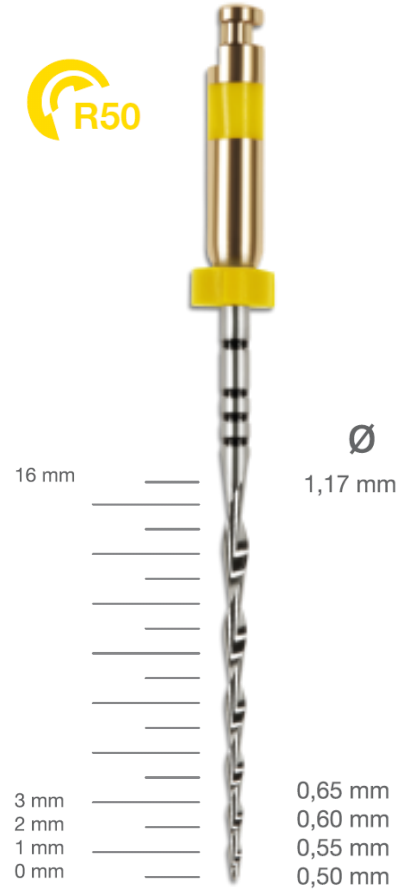
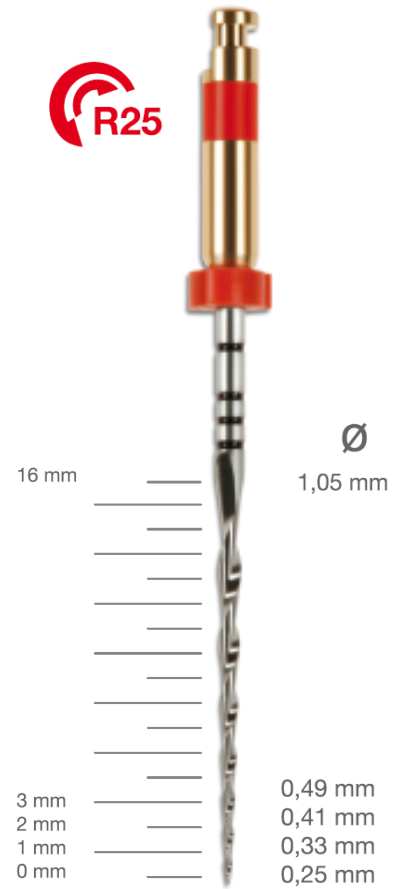
Reciprocation - benefits

- **Simplicity**
 - Ony one instrument for one tooth
 - Sterile – single use
- **Safety**
 - Minimized risk of fracture
 - No risk of contamination
 - Users friendly

Wave One

- Regressive taper

RECIPROC®



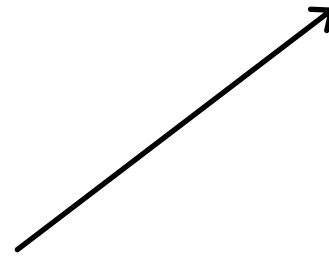
Compatibility – paper and gutta cones



m-wire®
nickel titanium



- Sterile
- For single use
- No autoclaveable



STERILE



Remnants of tissue after cleaning and sterilisation



Abb. 4 ▲ Nickel-Titan-Instrument mit Rückständen nach klinischer Anwendung trotz Durchführung eines Reinigungsprotokolls zur Prionendekontamination

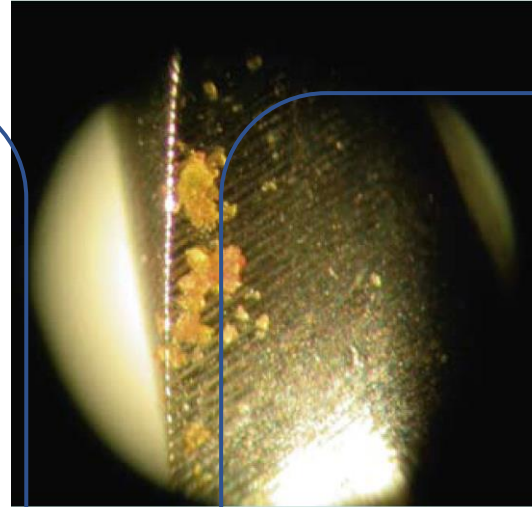


Abb. 5 ▲ Organische Rückstände auf einem Edelstahl-Handinstrument nach Sterilisationsprozess

Basic Research—Technology

Effect of Prion Decontamination Protocols on Nickel-Titanium Rotary Surfaces

David Sonntag, DMD,* and Ove A. Peters, PD, DMD, MS, FICD†

Abstract

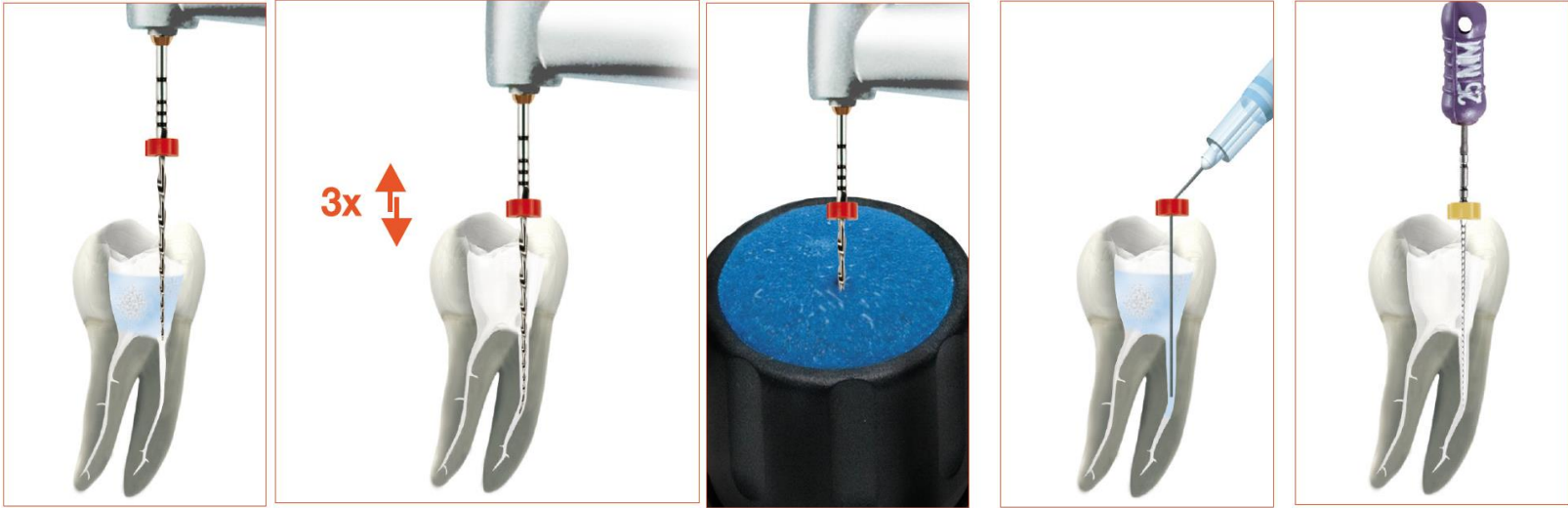
Decontamination of instruments is a prerequisite for their potential reuse but may affect surface integrity. Hence, the effect of prion removal protocols on 7 brands of nickel-titanium files was investigated. Baseline debris scores were determined under magnification

Prions are proteins that have been linked to fatal neurodegenerative diseases commonly called transmissible spongiform encephalopathies. The term *prion* (PrP) was coined by Prusiner (1) in 1982, when he described a protein with a nonpathogenic isoform PrP^C and the infectious agent PrP^{Sc} as a cause of scrapie, a veterinary disease. Similar agents may infect humans with Creutzfeldt Jacob Disease (CJD), which in fact

Choice of the instrument

- Hand instrument ISO 30: 50
- Hand instrument ISO 20: R40
- Hand instrument ISO 10: 20, 25

- The hand instrument must reach the WL without any bending



Pracovní postup s reciprokačními nástroji

**Ruční nástroj dosáhne
pracovní délku bez
předehtnutí**

**Preparace může být
zakočena R 25**



Gradual curvature tooth 25
Dr. Ghassan Yared

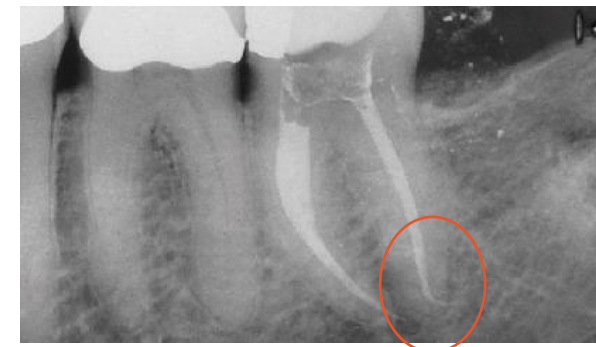


Gradual curvature tooth 37
Dr. Ghassan Yared

Pracovní postup s reciprokačními nástroji

**Ruční nástroj iSO 10 dosáhne
pracovní délku pouze s
předehtutím
→ ruční preparace ISO 15**

If the ISO size 15 hand ISO 15
dosáhne pracovní délku bez
předehtutí – R 25
Nedaří – li se, ruční preparace.



Abrupt curvature tooth 47, root canal
preparation was finished manually
Dr. Ghassan Yared

Basic rules of power driven endodontics - reciprocation

- Movement in amplitudes: up/down 3 mm
- Cleansing of instruments each 3 amplitudes
- Reach the apical constriction and go out !



Combination of reciprocating and rotary movement

Oscillation (AET - ENDO EZE)