

Endodontic treatment – from
access to the working length

Phases of the endodontic treatment

- **Investigation, diagnostic radiogram, consideration (local, regional, systemic factors)**
- **Preendodontic treatment**

Preendodontic treatment

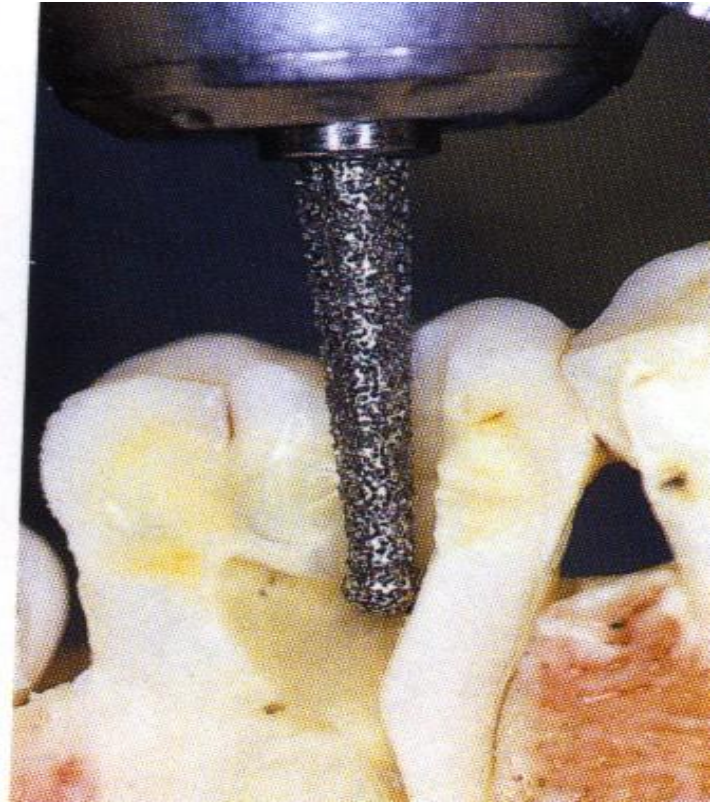
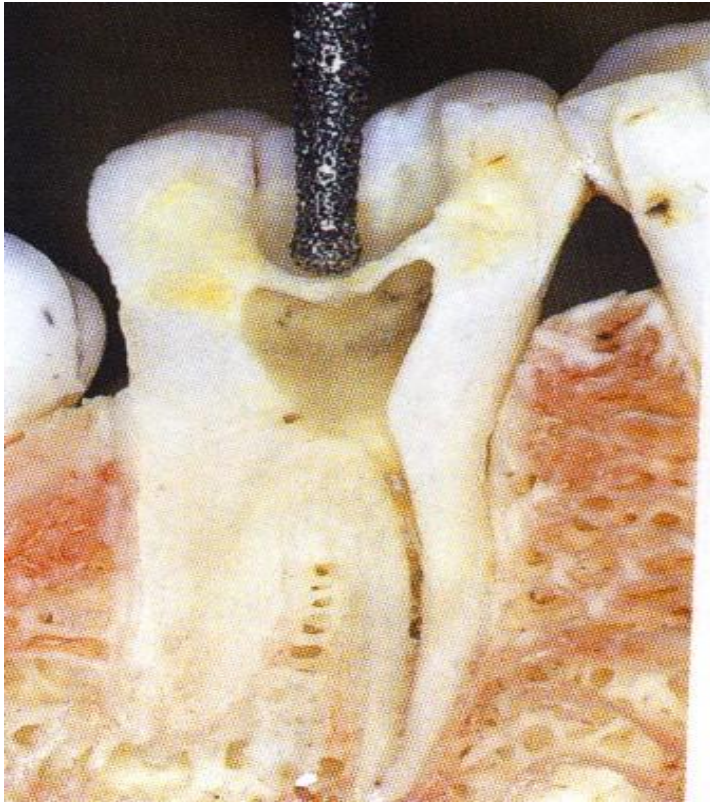
- **Removal of old fillings, carious dentin, temporary restoration - contours of treated tooth.**
- **Gingivectomy or elongation of clinical crown if necessary.**



- **Dry operating field – rubber dam**

See presentation Dry operation field

Access

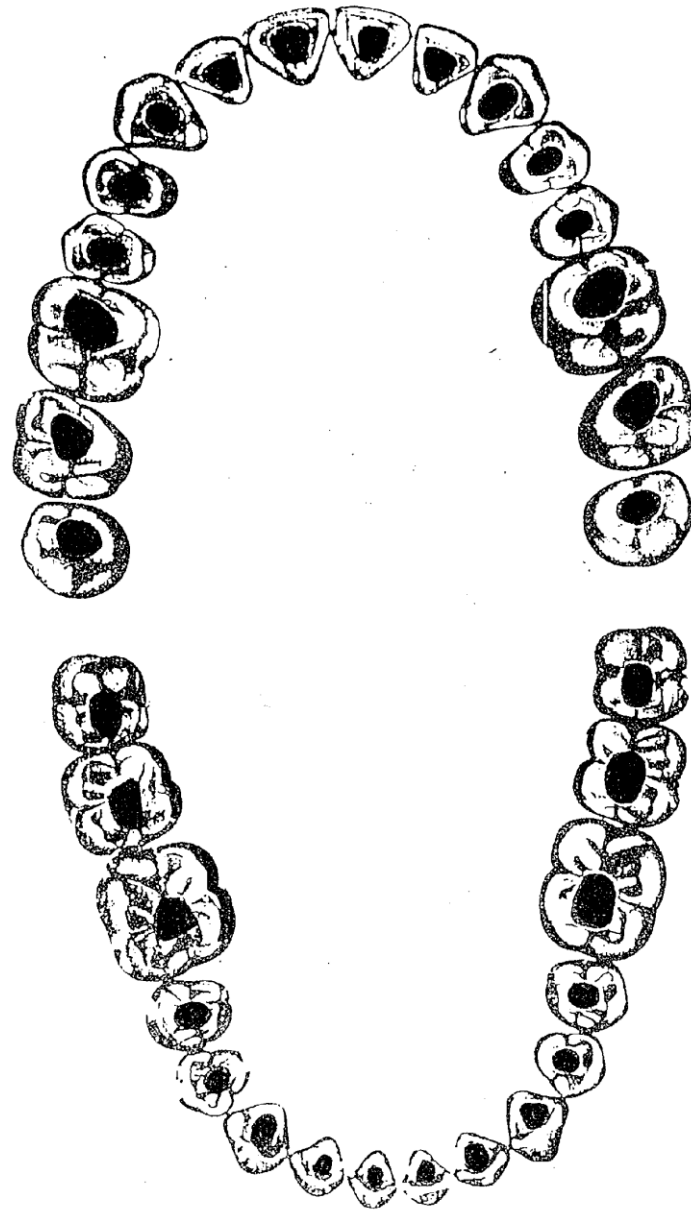


Phases of the endodontic treatment

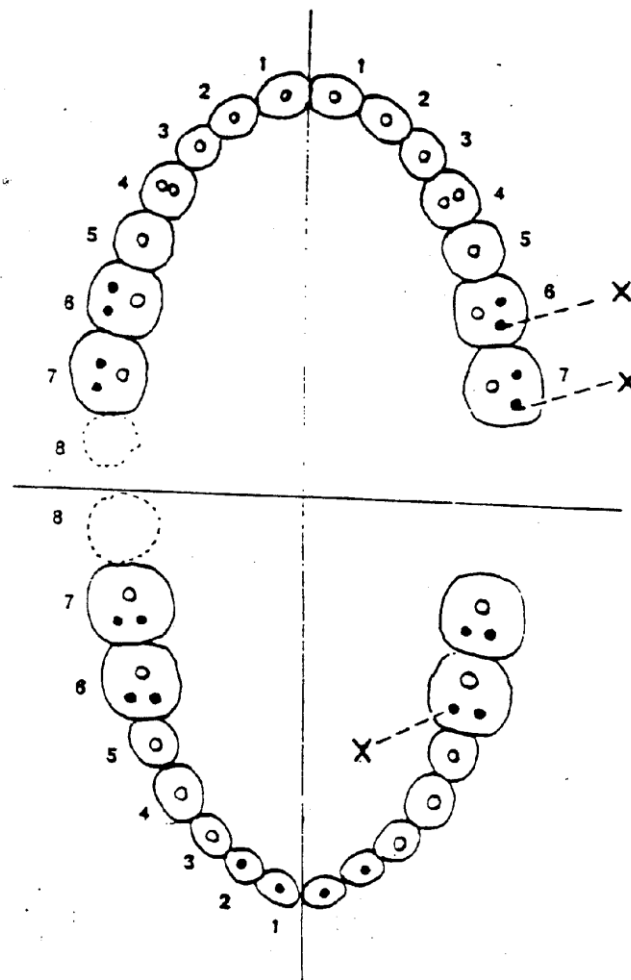
- **Opening of root canals**
- **Initial flaring and removal of content of root canal**
- **WL (working length)**
- **Root canal shaping and cleaning (irrigation)**
- **Rekapitulation**
- **Drying**
- **Filling**
- **Radiogram**
- **Postendodontic treatment**

Shapes of endo cavities

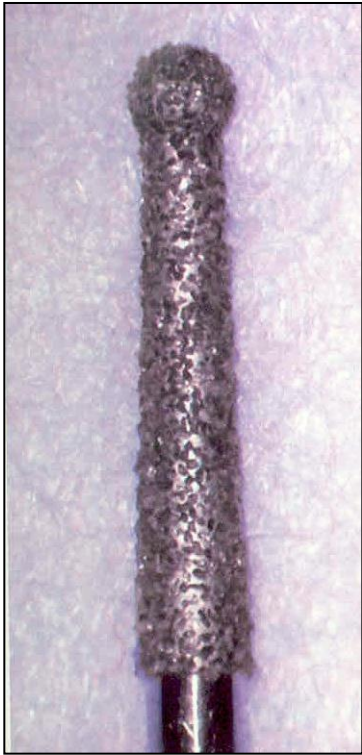
See special material on is



Number of root canals
First upper molar – 4 root canals



Instruments



Dia trepan

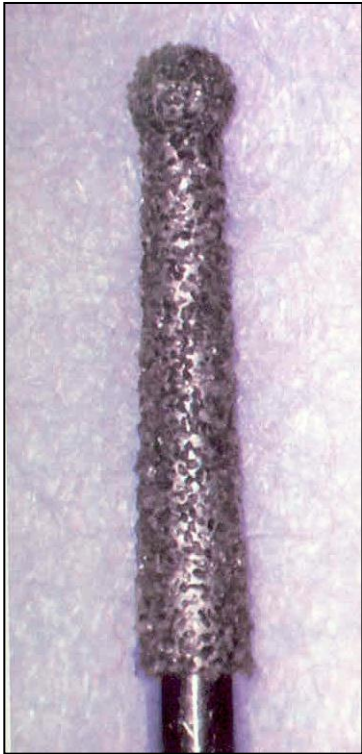


Dia balls



Ball burs

Preparation of the endodontic cavity



Dia trepan

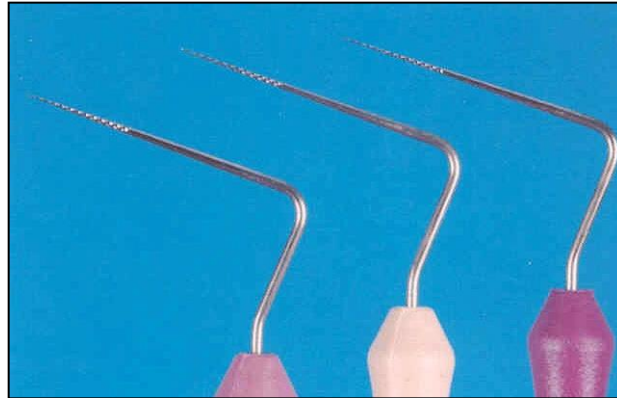
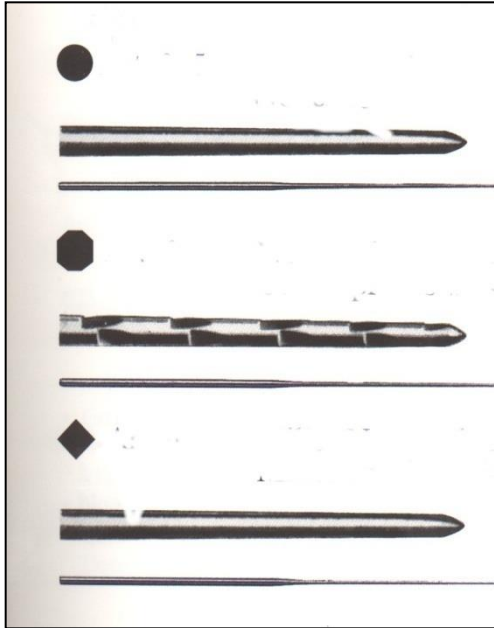


Safe ended tips
Batt's instruments

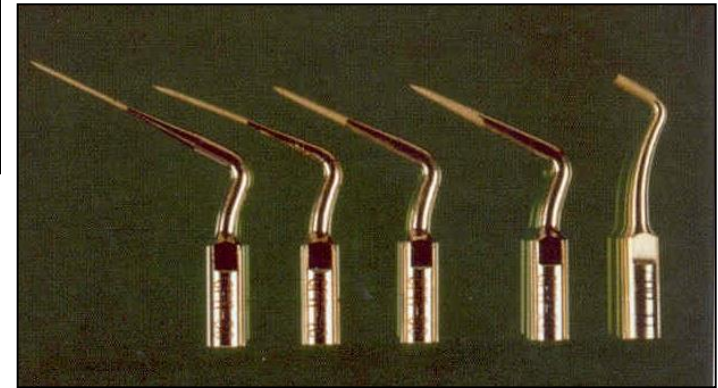


Fissure bur

Find of root canals



Endodontic probes, microopeners

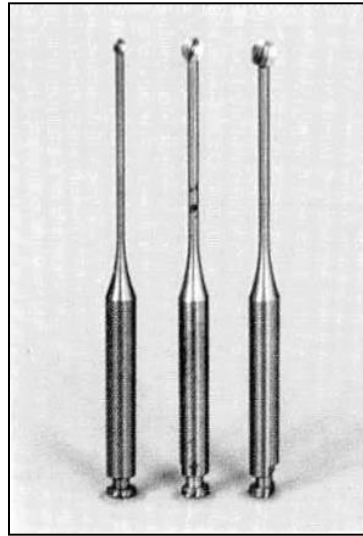


Ultrasound tips

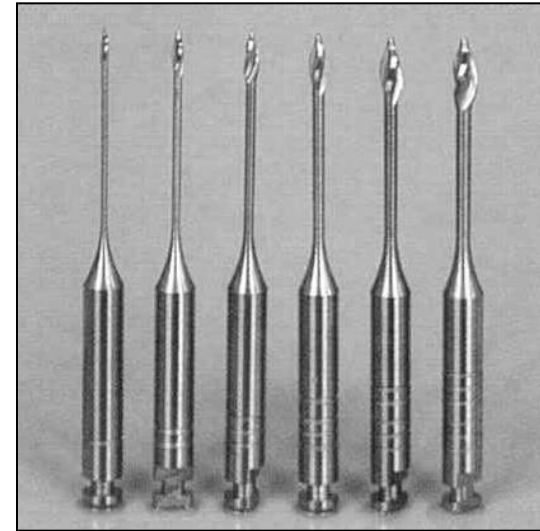
Opening of root canals



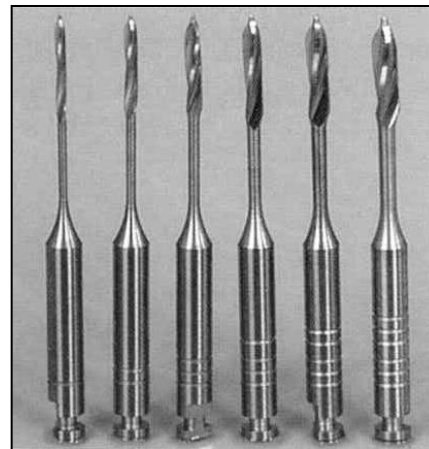
Ball burs



Miller's
burs

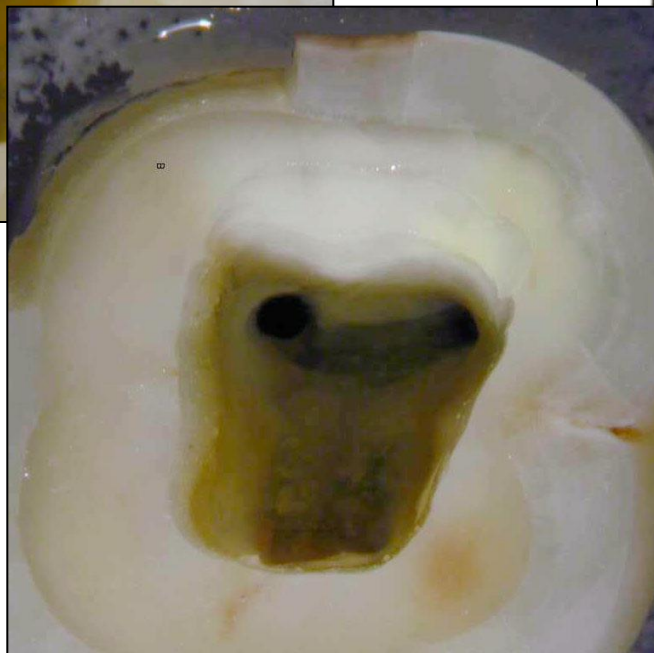
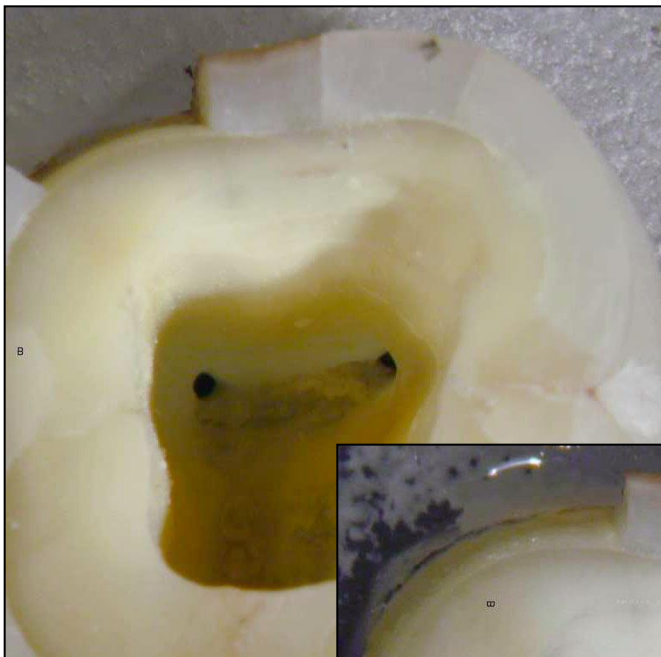


Gates Glidden's burs



Peeso – Largo

Finding of the root canal orifice





Access kits









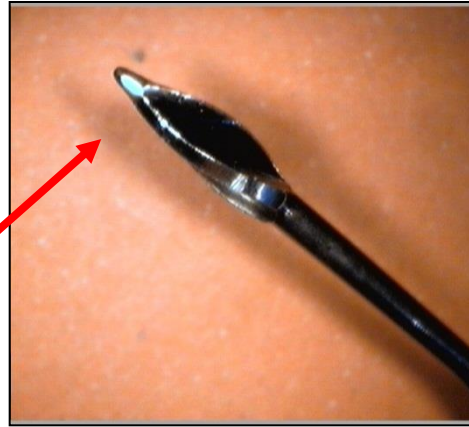




Gates - Glidden



Peeso-Largo

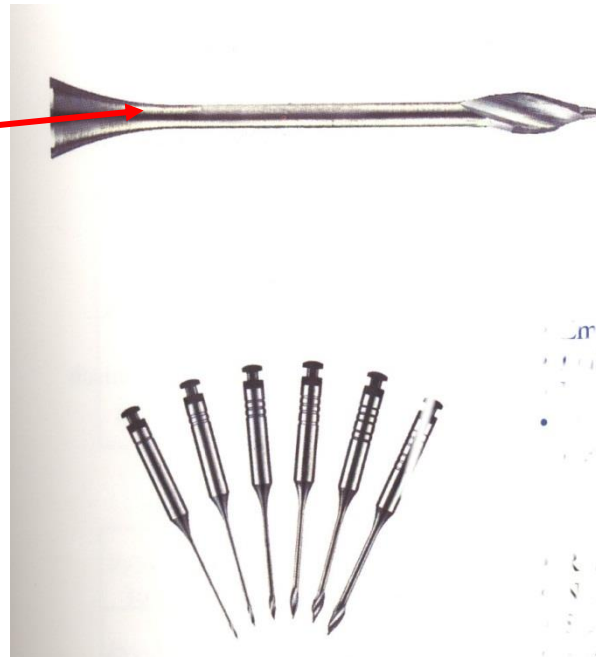


Gates – Glidden:

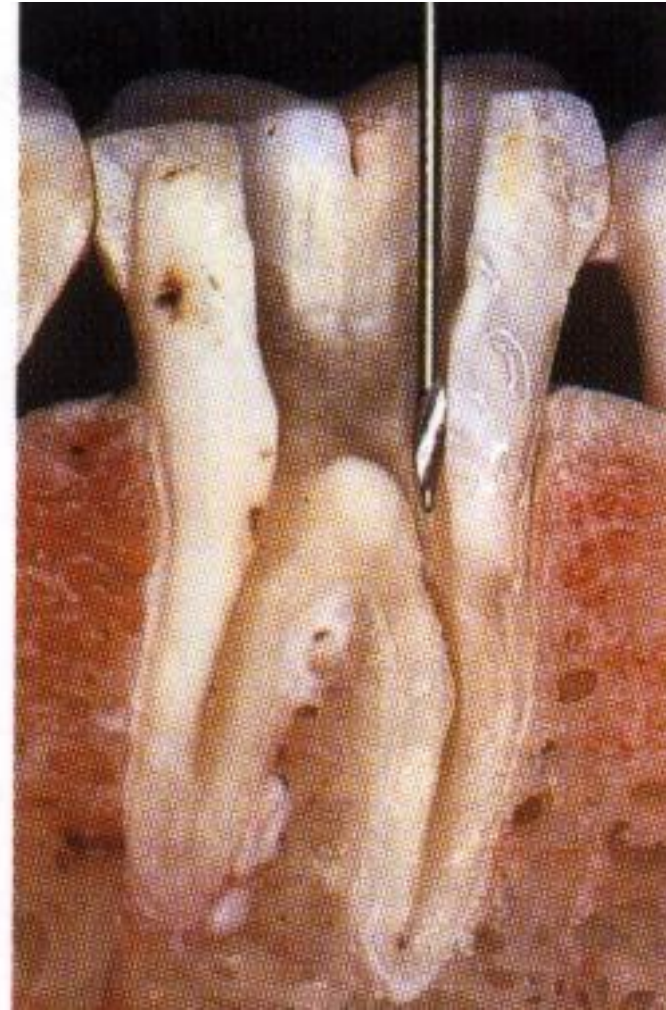
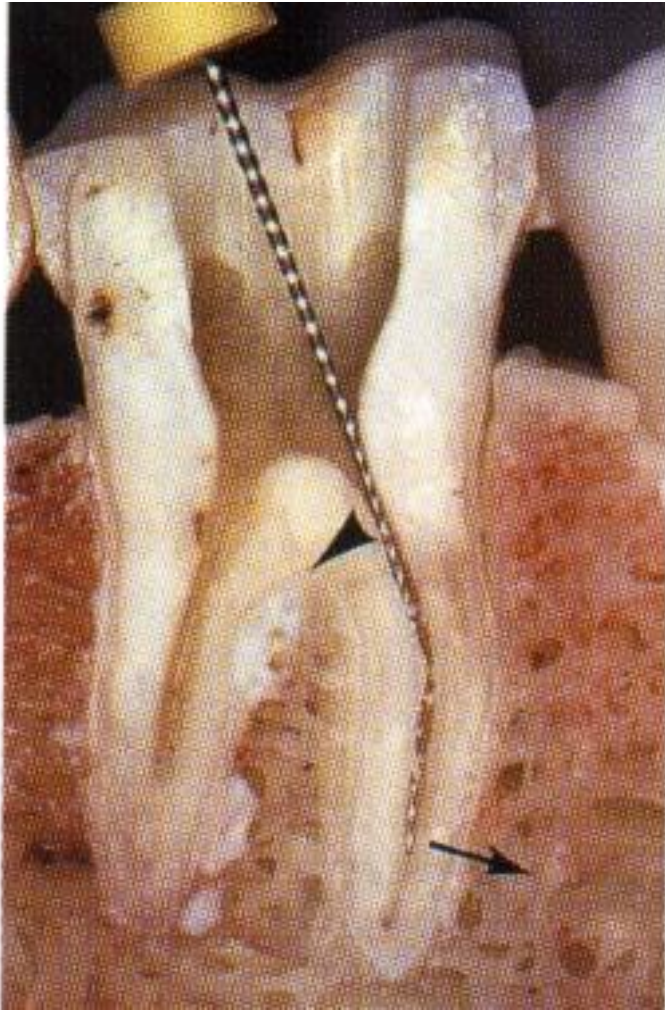
Tupá, neaktivní vodící špička

Naprogramované místo

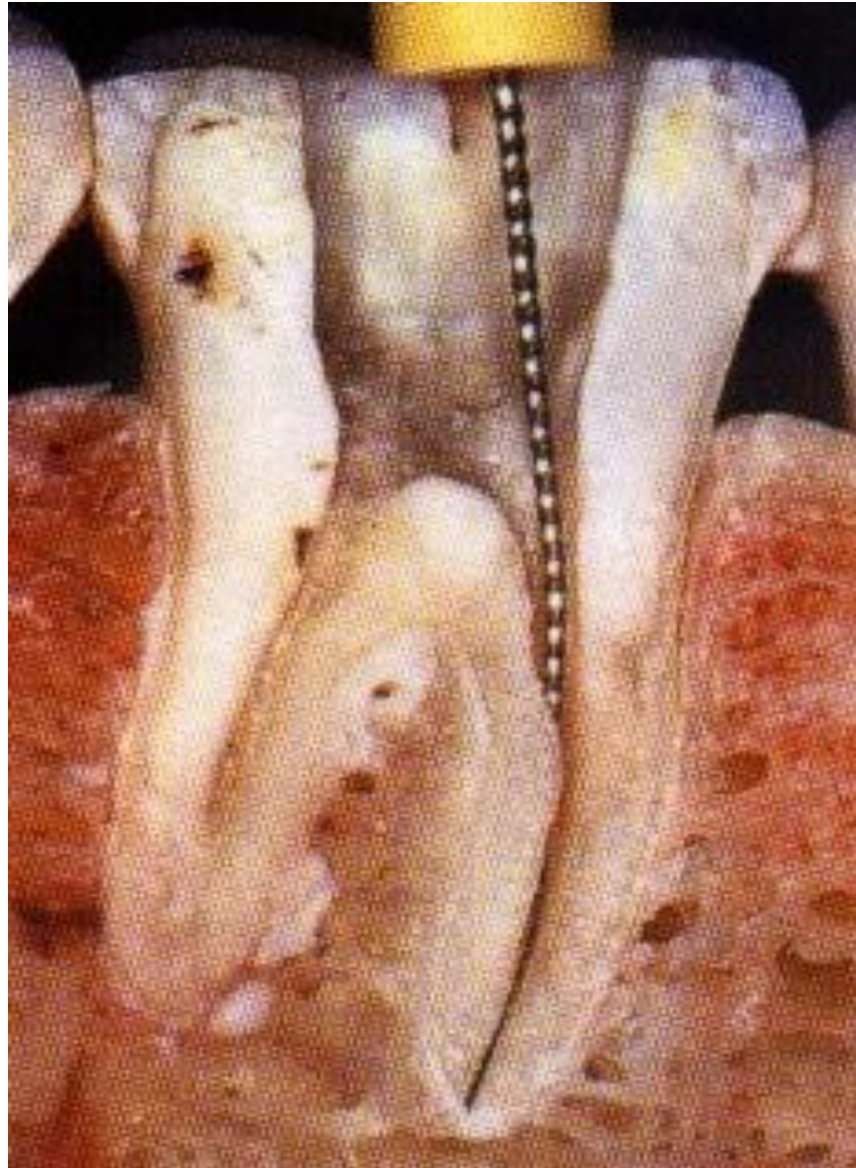
zlomu



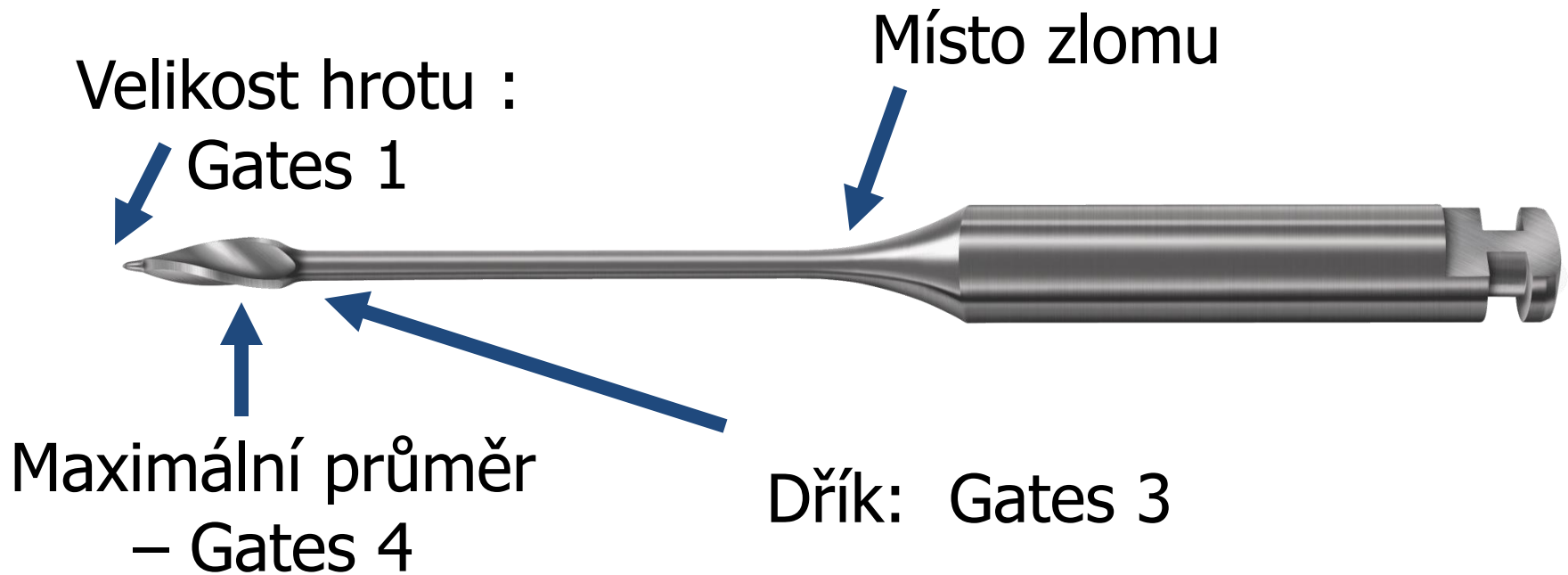
Opening of root canal orificies

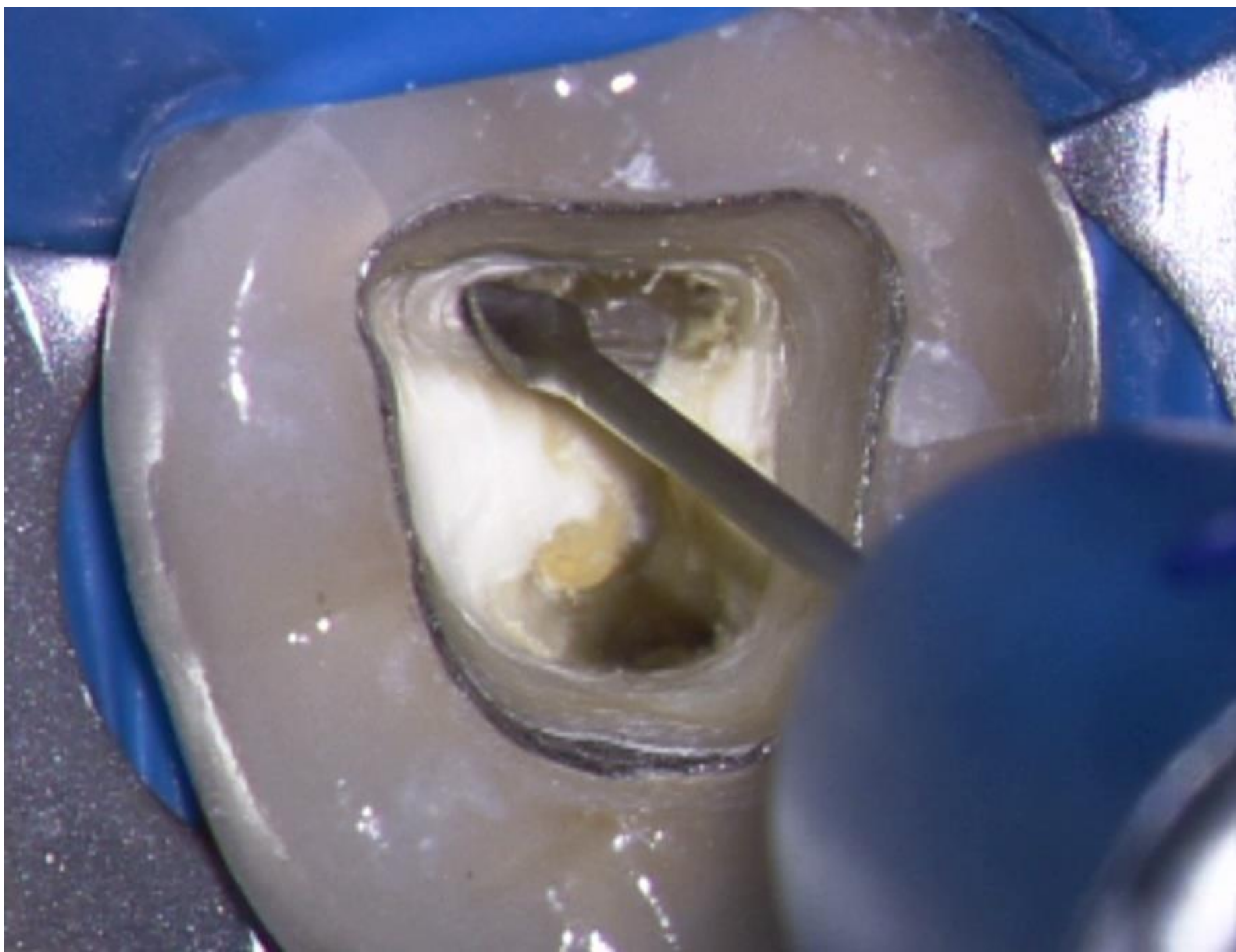


After opening of the access and shaping of the root canal orifice



X-GATES





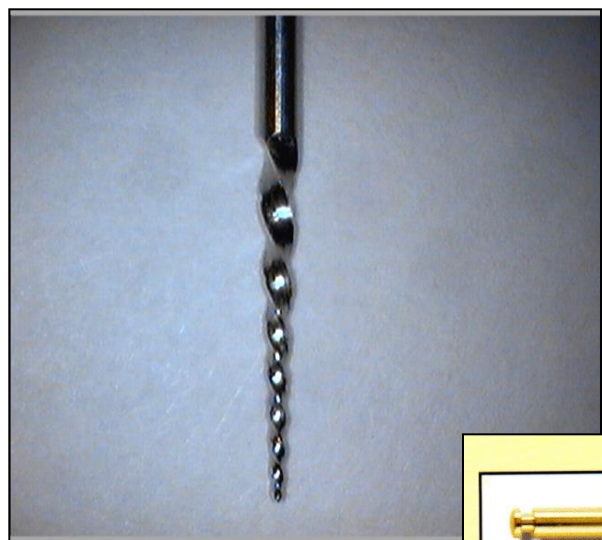


Rozšíření vstupu do kořenových kanálků

Ni-Ti nástroje

S velkou kónicitou (kónusem)

Např.: ProFile O.S., ProTaper SX, IntroFile aj.



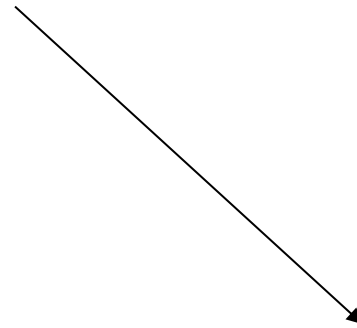
Ultrasound

Less invasive – better overview



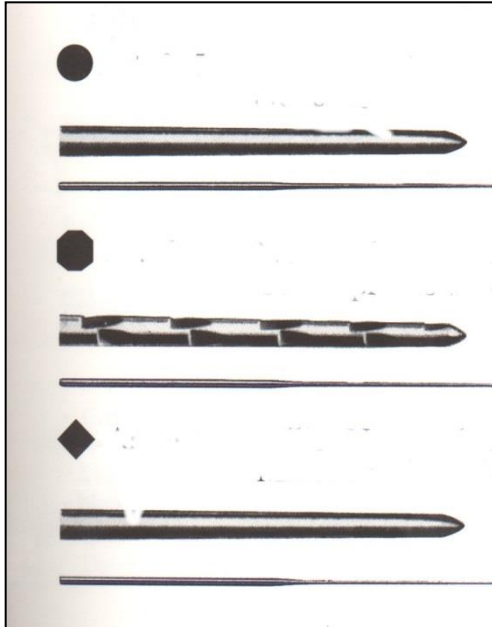




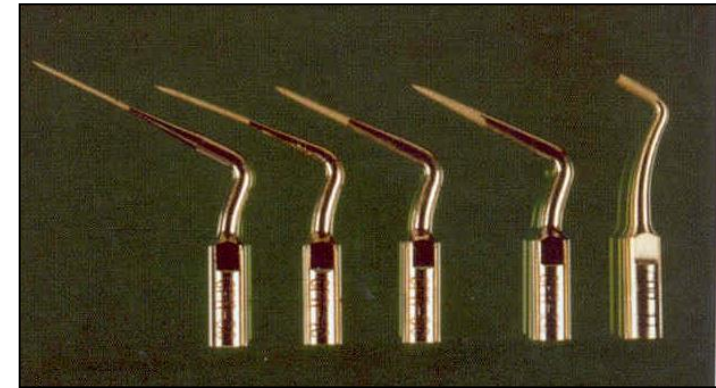


The pulp chamber correctly open

Finding and opening of rot canal orifices



Endodontic probes
Microopeners



Ultrasound tips

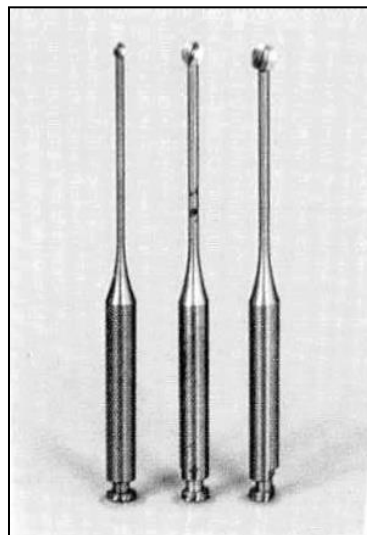


Dye

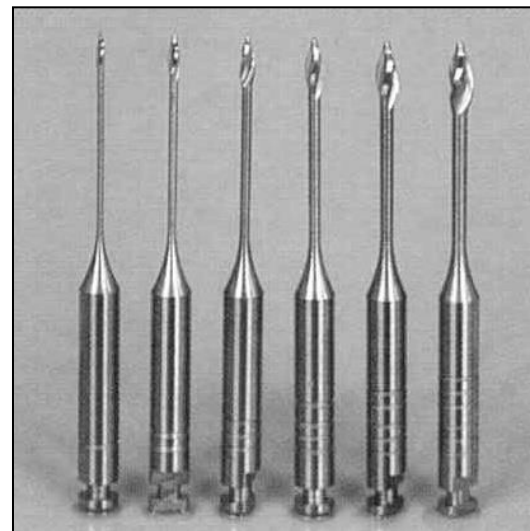
Finding and opening of root canal orifices



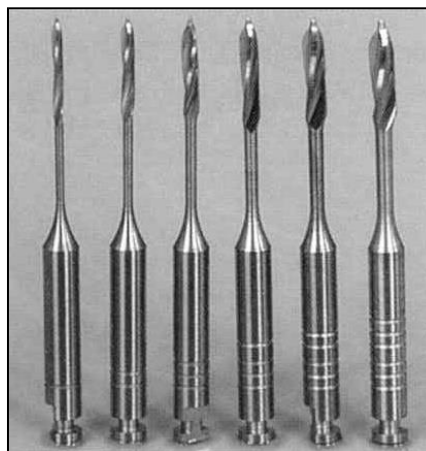
Rounded burs - balls



Miller's burs



Gates Glidden's burs



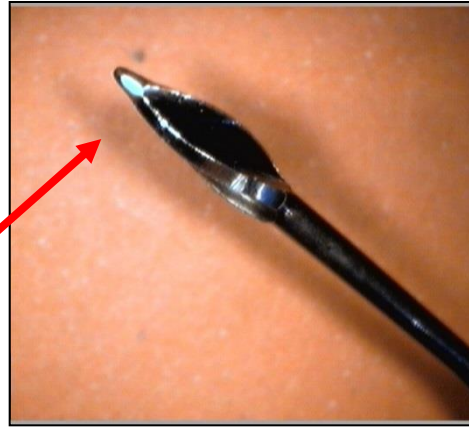
Peeso $\frac{3}{2}$ Largo



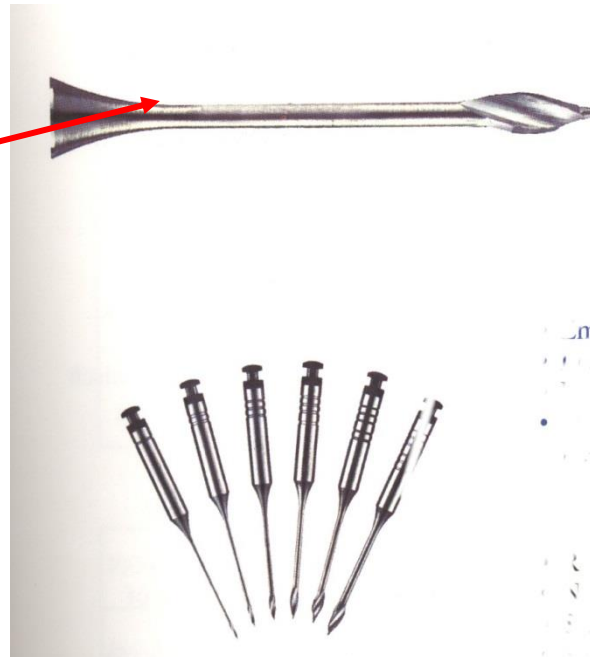
Gates - Glidden



Peeso-Largo

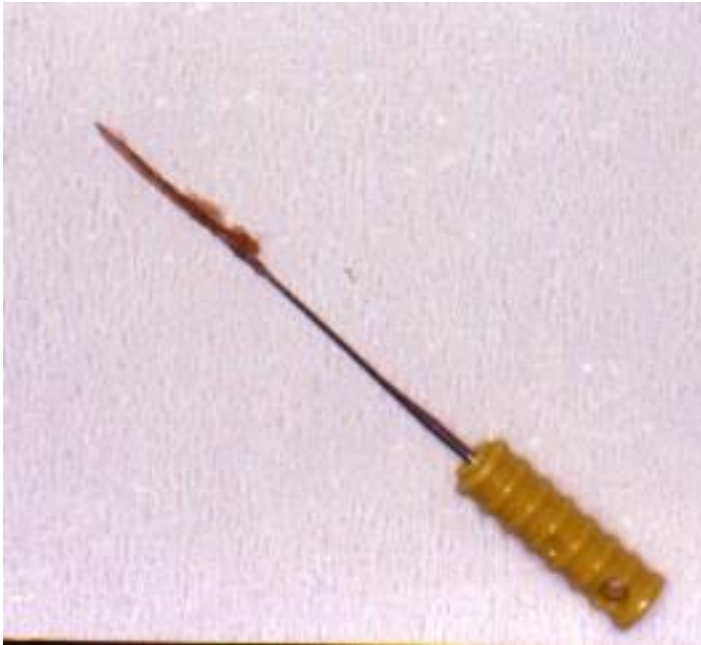


Gates – Glidden:
Blunt, non active tip

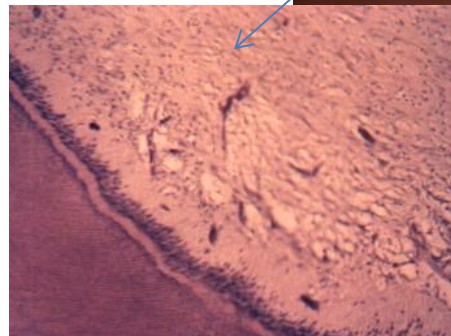


Programm point of breakage

Pulpextractor



Dental pulp



Soft wire
Prickles like harpune
Insertion
Rotation
Exstirpation

Initial flaring – glide path

- **Learn the morphology of root canals**
- **Minimize the risk of fractures**

Hand instruments

C- file, pathfinder, Flex –O-File, Flexicut

nstruments should be precurved

Manual preflaring:

Decreases separation of NiTi instruments

Decreases their torsional stress

Increases their life span



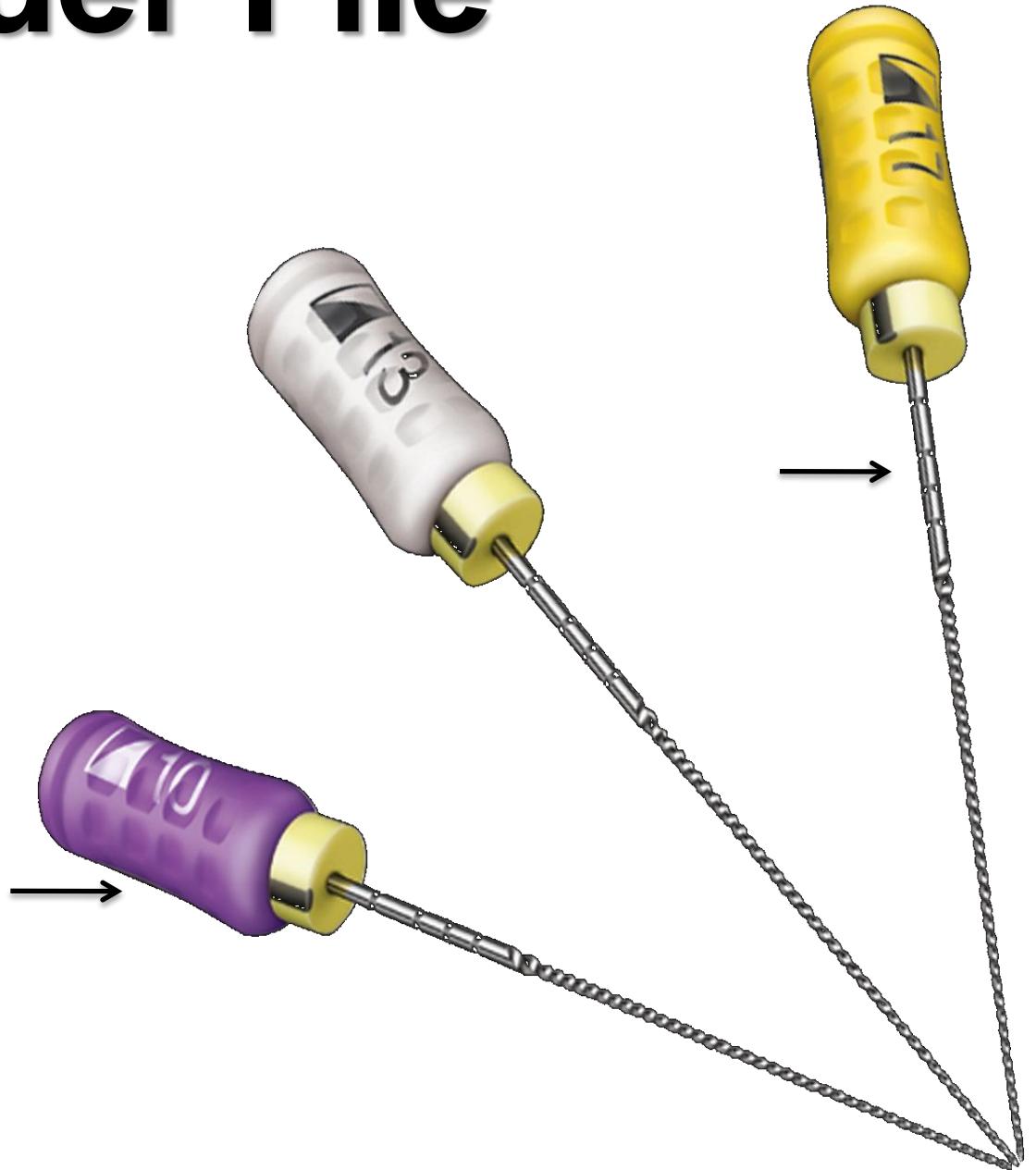
C- File



ProFinder File

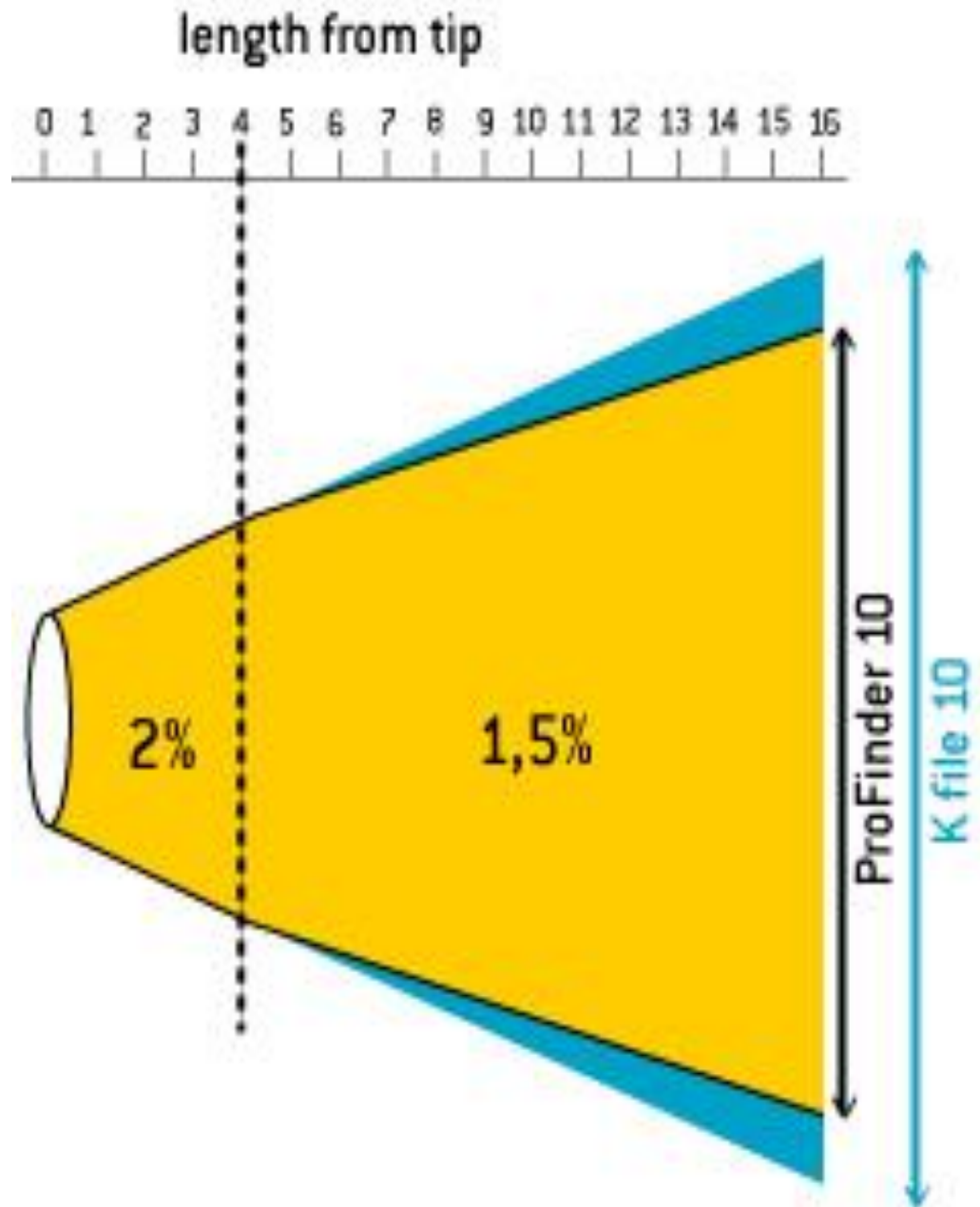
Regressive taper

Silicone grip,
regressive taper



ProFinder File

Regressive taper



Canal shaping

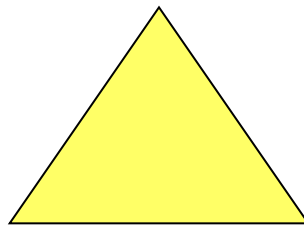
- Reamers (penetration)
- Files (shaping)

Reamer

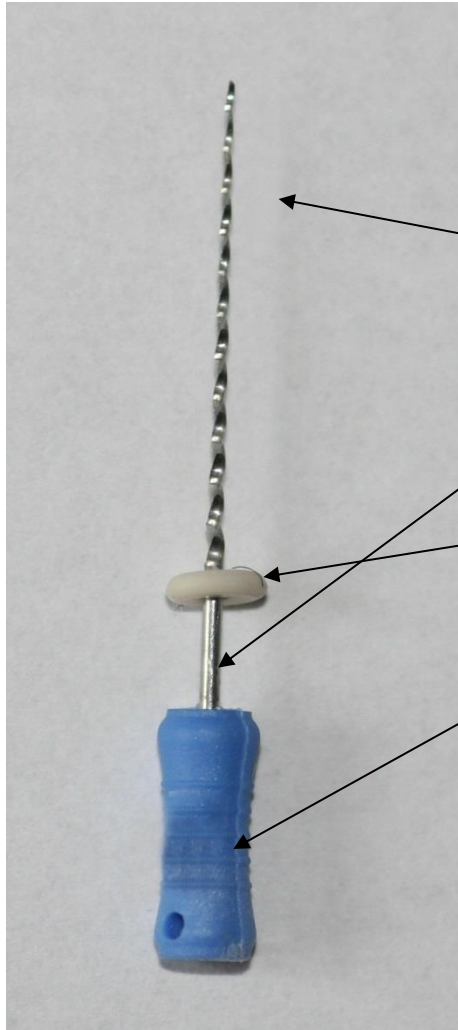
K -reamer

Triangl or square wire spun

Symbol



Reamer

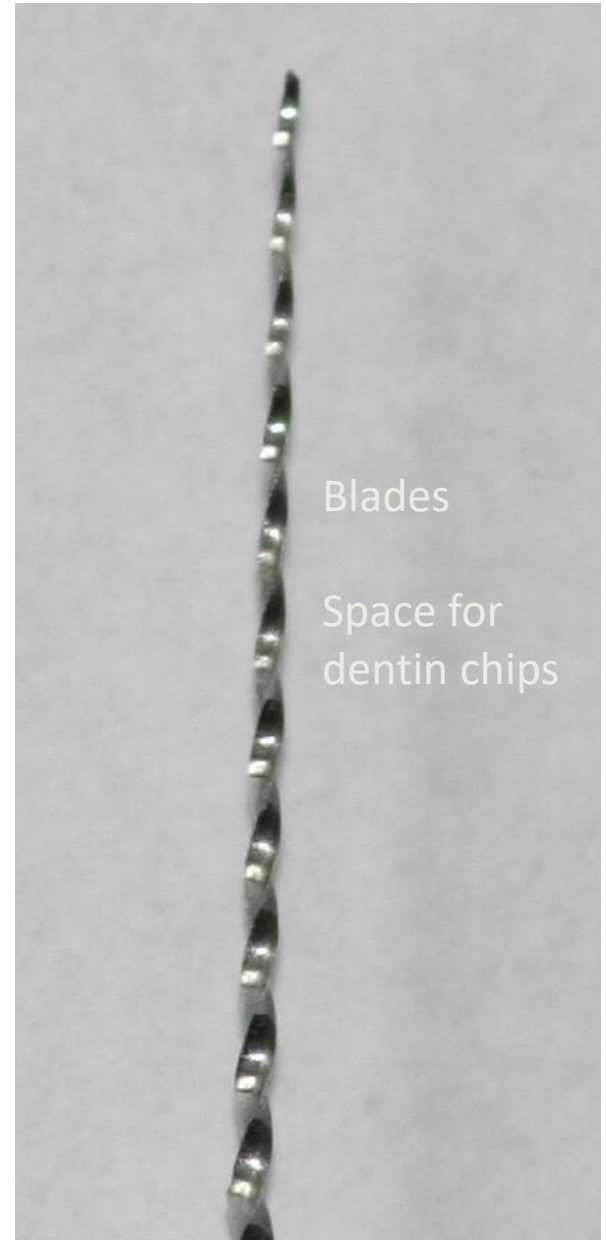


Bladed part

Shank

Stopper

Grip



Blades

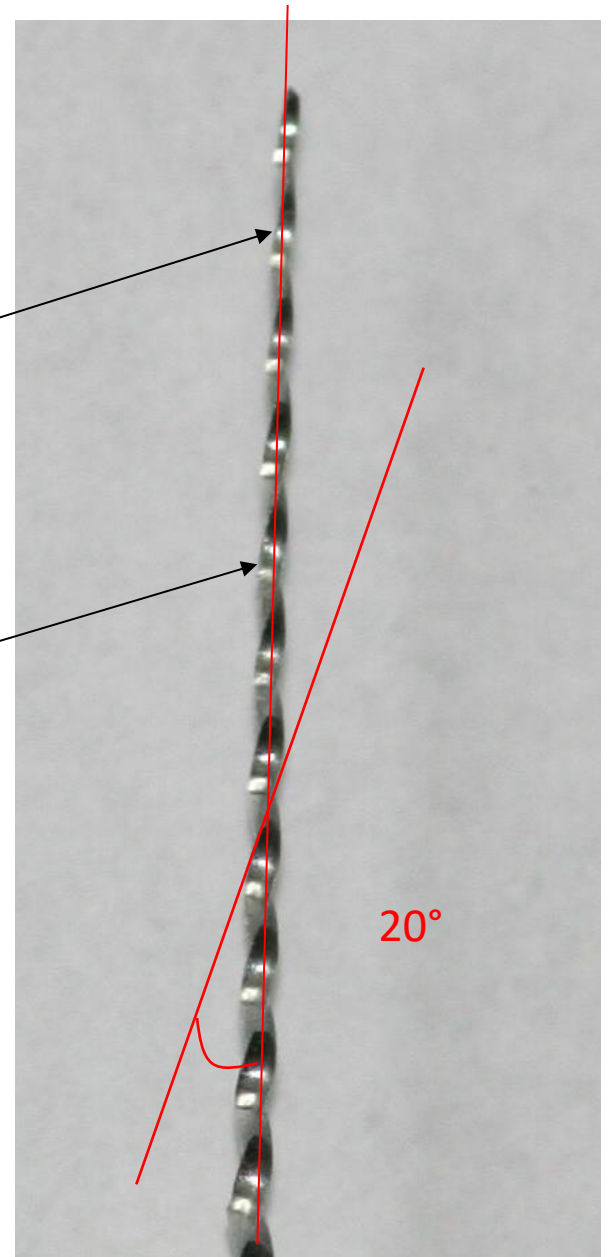
Space for
dentin chips

Reamer

Blades

Space for dentin chips

Rotation – reaming action - penetration



Reamer

Rotation (clockwise) – penetration

**Application of plastic material
(counterclockwise)**

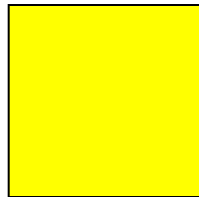
Files

- 1. K-file**
- 2. K-flexofile, flexicut, flex-R**
- 3. K-flex**
- 4. H-file, S-file**

K file

Wire triangle or square

Symbol is always square

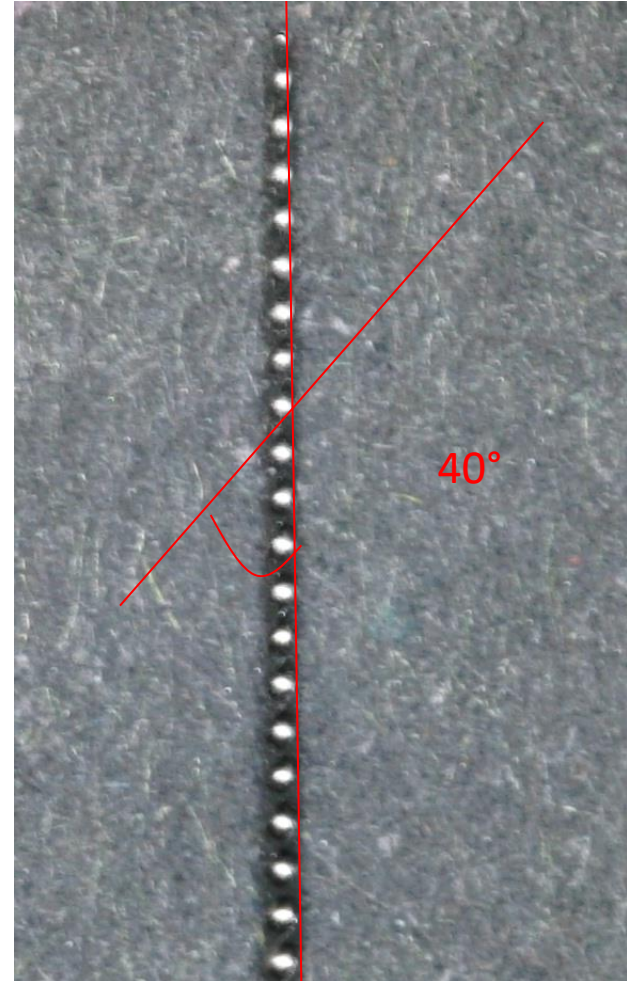


K-file

Filing

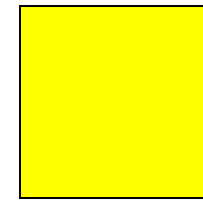
Also rotation

45° – 90°



K-flexofile, flexicut, flex-R

- Triangle wire always

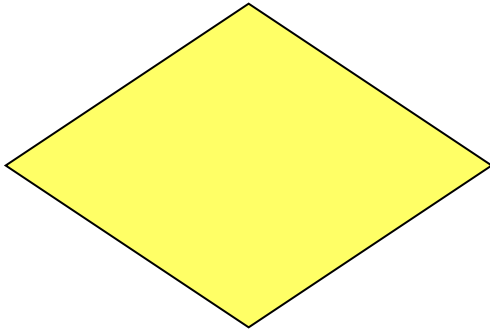


Flexibility

K- flexofile a flex – R file: non cutting tip and first blades are blunt

Like K-file

K- flex



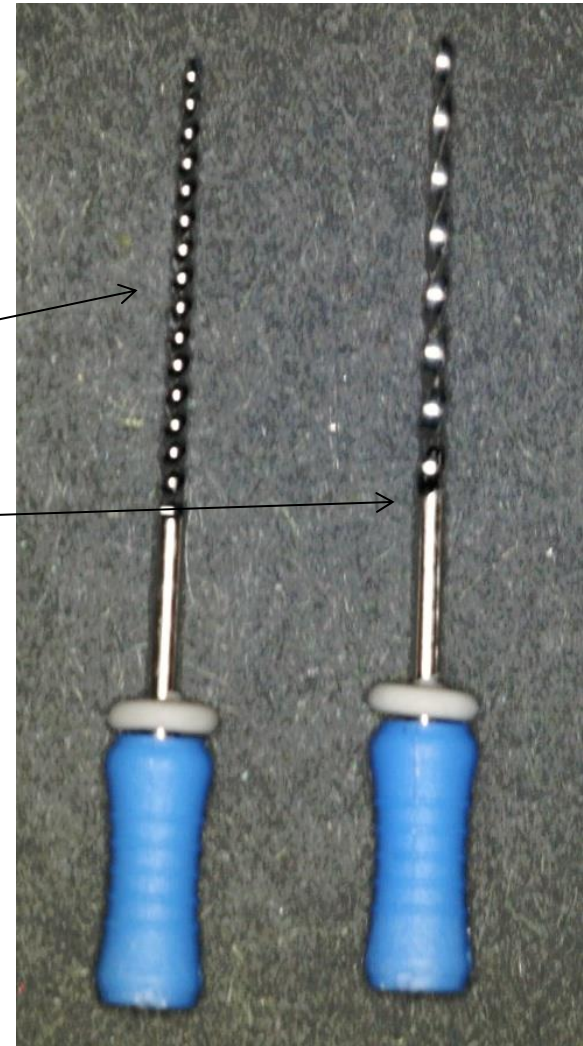
Rhombus

Two blades in action

Enough space for dentin chips

Flexibility, efficacy

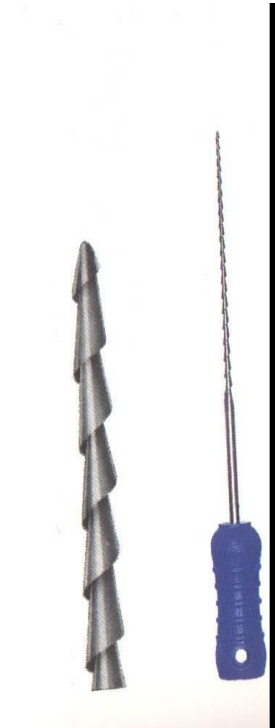
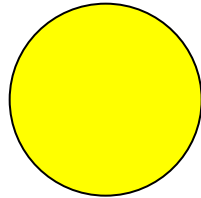
K-file and reamer: the difference



H-file

= Hedstroem file

Ring

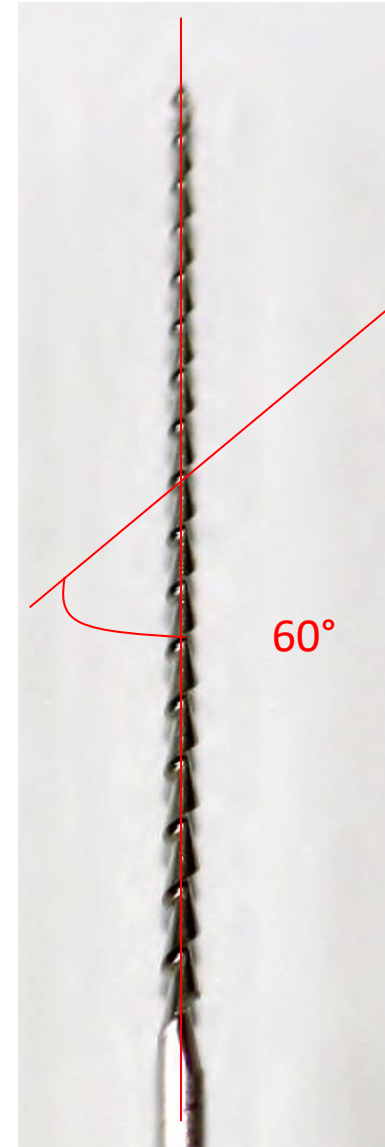
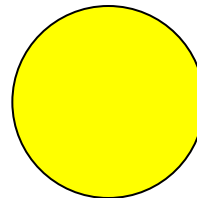


H- file

No rotation!!

Pull motion only!!

Risk of breakage in small sizes



ISO

- Diameter of the tip
- Length of the cutting part
- Taper



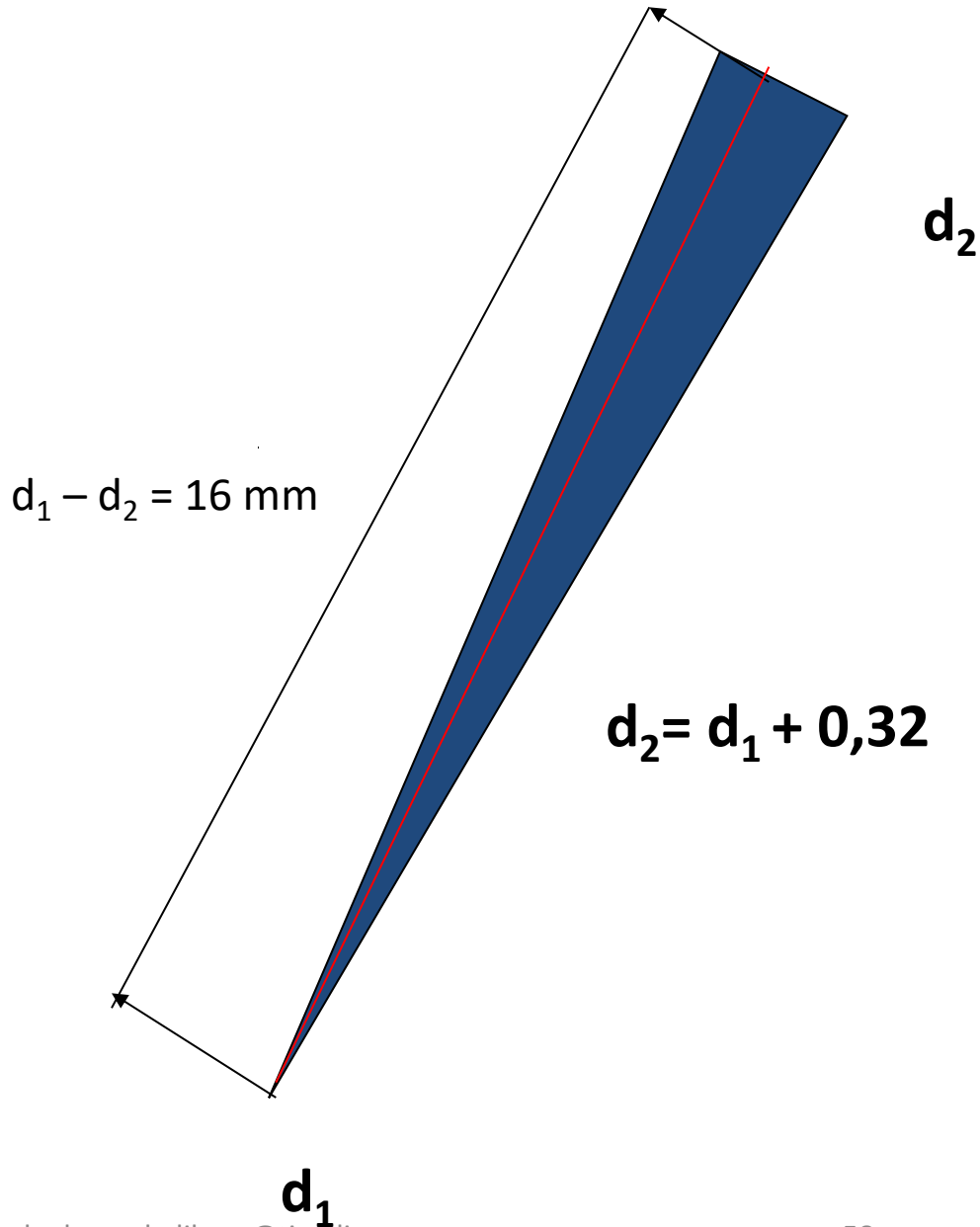
ISO standard

06	
08	
10	
15	45
20	50
25	55
30	60
35	70
40	80

Size – diameter at the tip

Stainless steel

Taper 2%



0,02 mm na 1mm

- **Niti alloy**

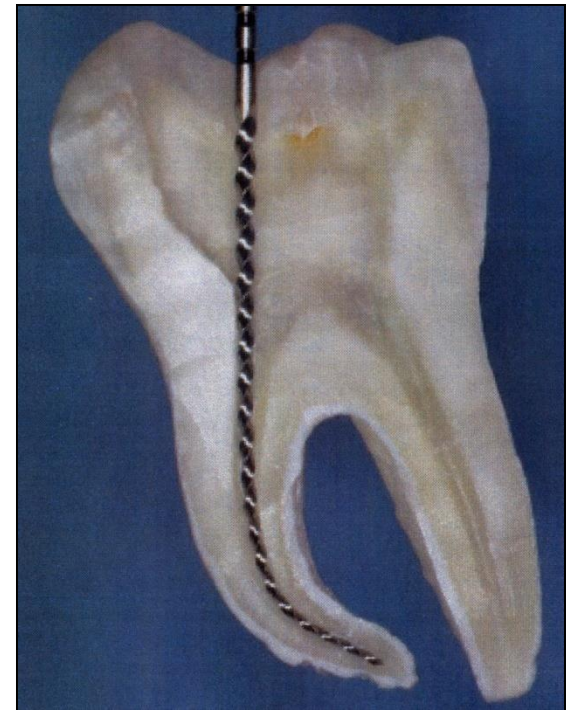
56 % nickel, 44% titanium,

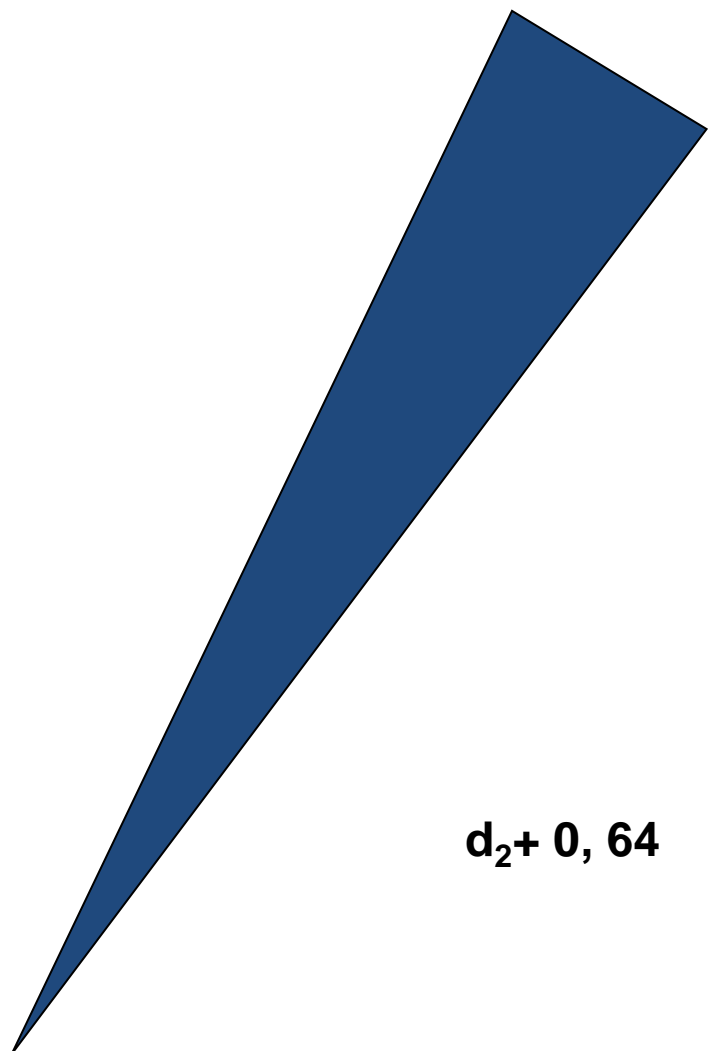
60% nickel, 40 % titanium

flexibility

memory effect

Cutting efficacy?

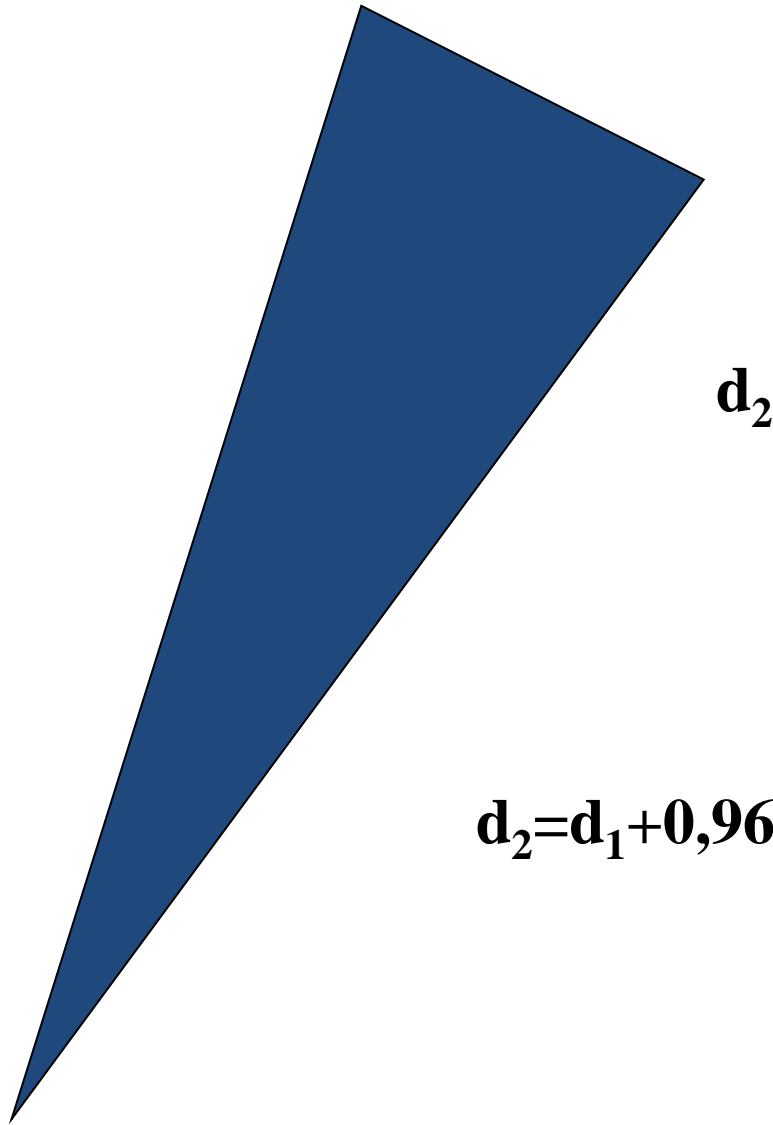




Taper 4%

0,04mm na 1 mm

Taper 6%



d_2

$$d_2 = d_1 + 0,96$$

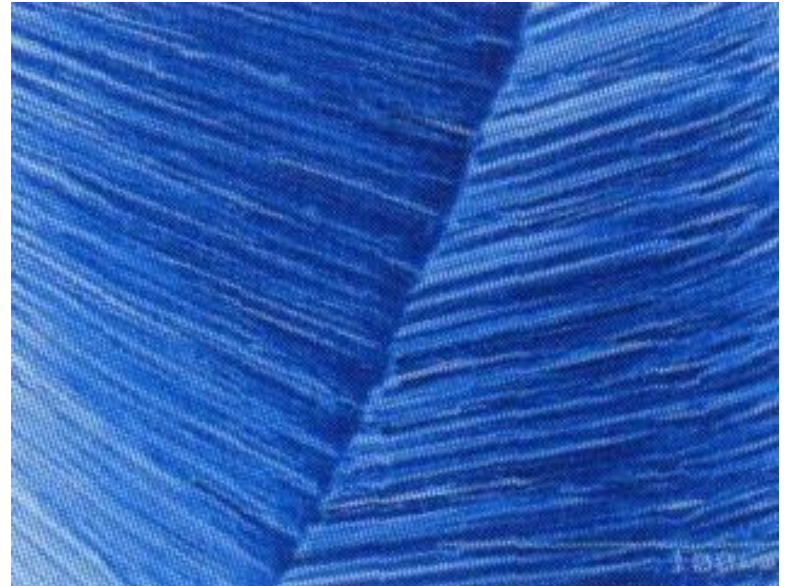
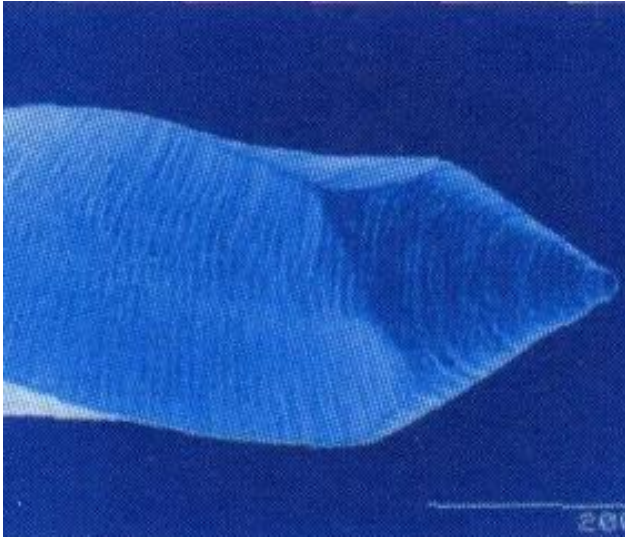
d_1

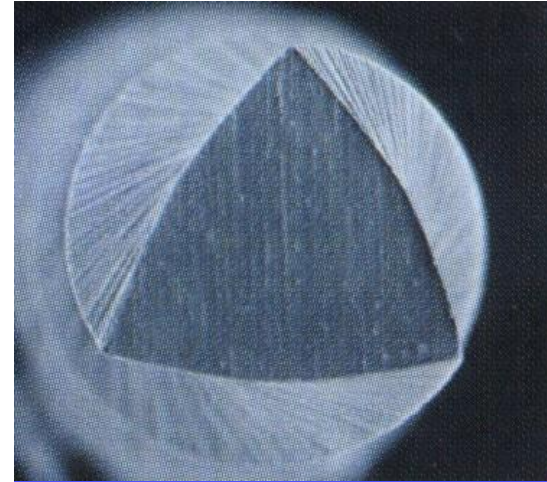
0,06mm na 1 mm



Vysoce kvalitní NiTi slitina

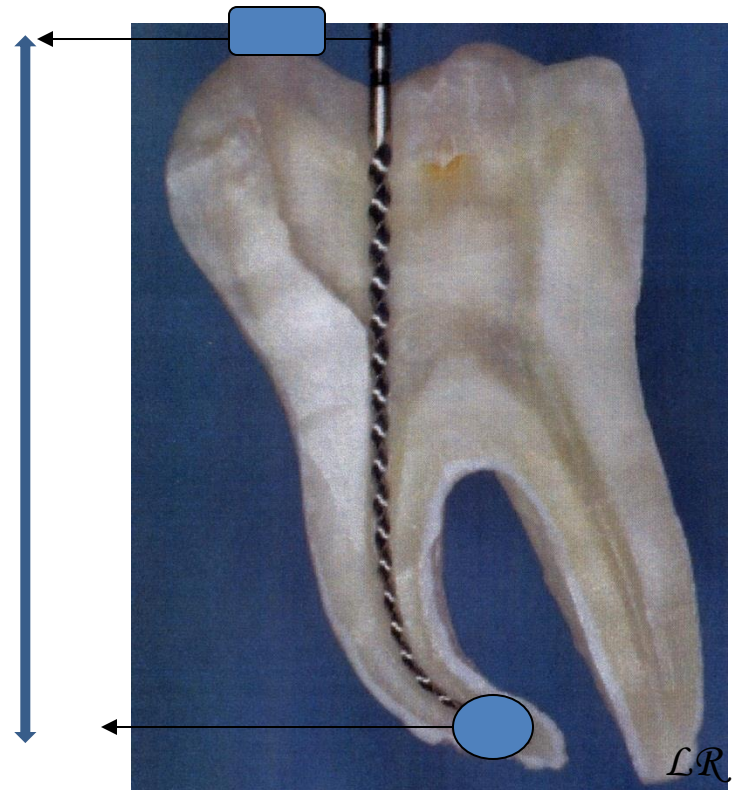






Working length

- Distance between the referential point and apical constriction
- Radiographically
- Apexlocators
- Combination



Why apical constriction

- Small apical communication
- Minimal risk of damage of periodontium
- Prevention of overfilling
- Prevention of extrusion of infection
- Good decontamination
- Good condition for root canal filling

Radiogram

X-ray with inserted root canal instrument

Safe length: average length of teeth reduced for
2 – 3mm

Tooth with clinical crown

Safe length

Average length of the tooth less 2 mm

- Maxilla:

I1 20

I2 18

C22-24

P20

M 18 mkk, 20 P

Safe length

Average length of the tooth less 2 mm

- Mandible

I 18

C20 -22

P18

M18

Procedure

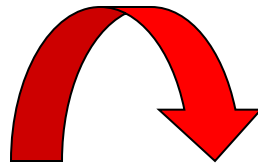
- Instrument ISO 15 inserted into the root canal, stop at the referential point
- Estimation of location of apical constriction (1 – 1,5 mm distance from x-ray apex.

If difference in the radiogram more than 2 mm - repeat

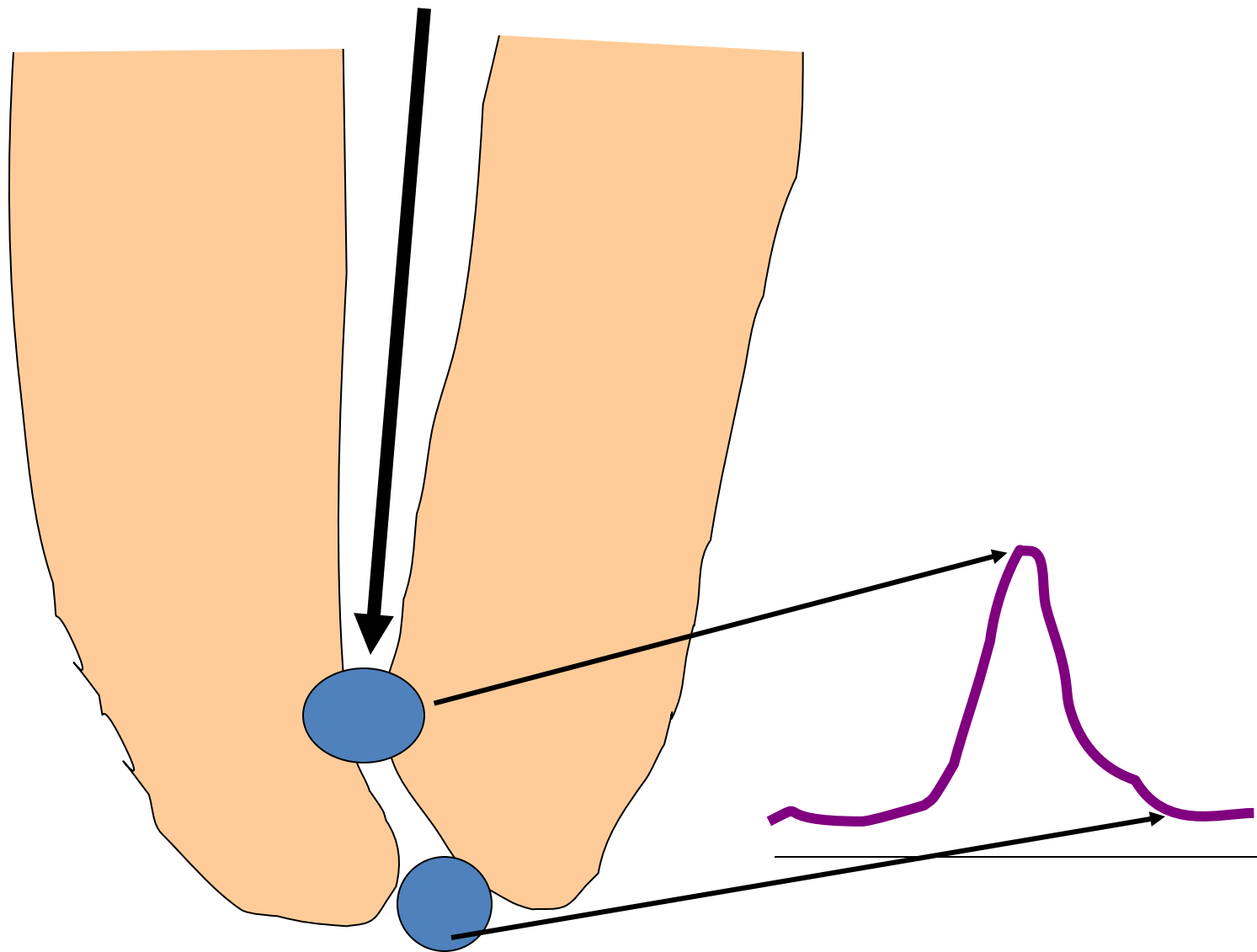
If 2 mm or less – add to the safe length

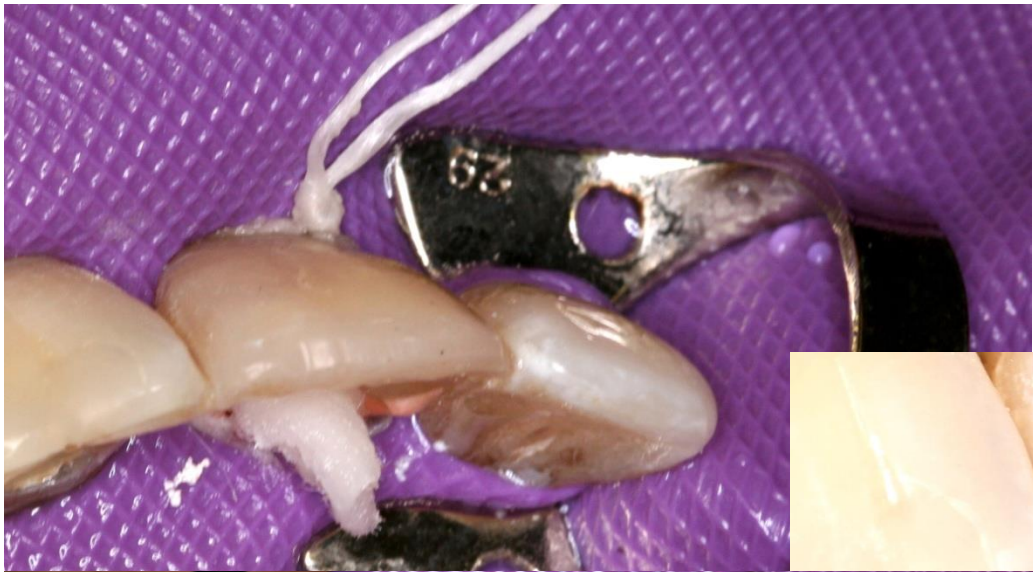
Endometry, odontometry

- Endometry



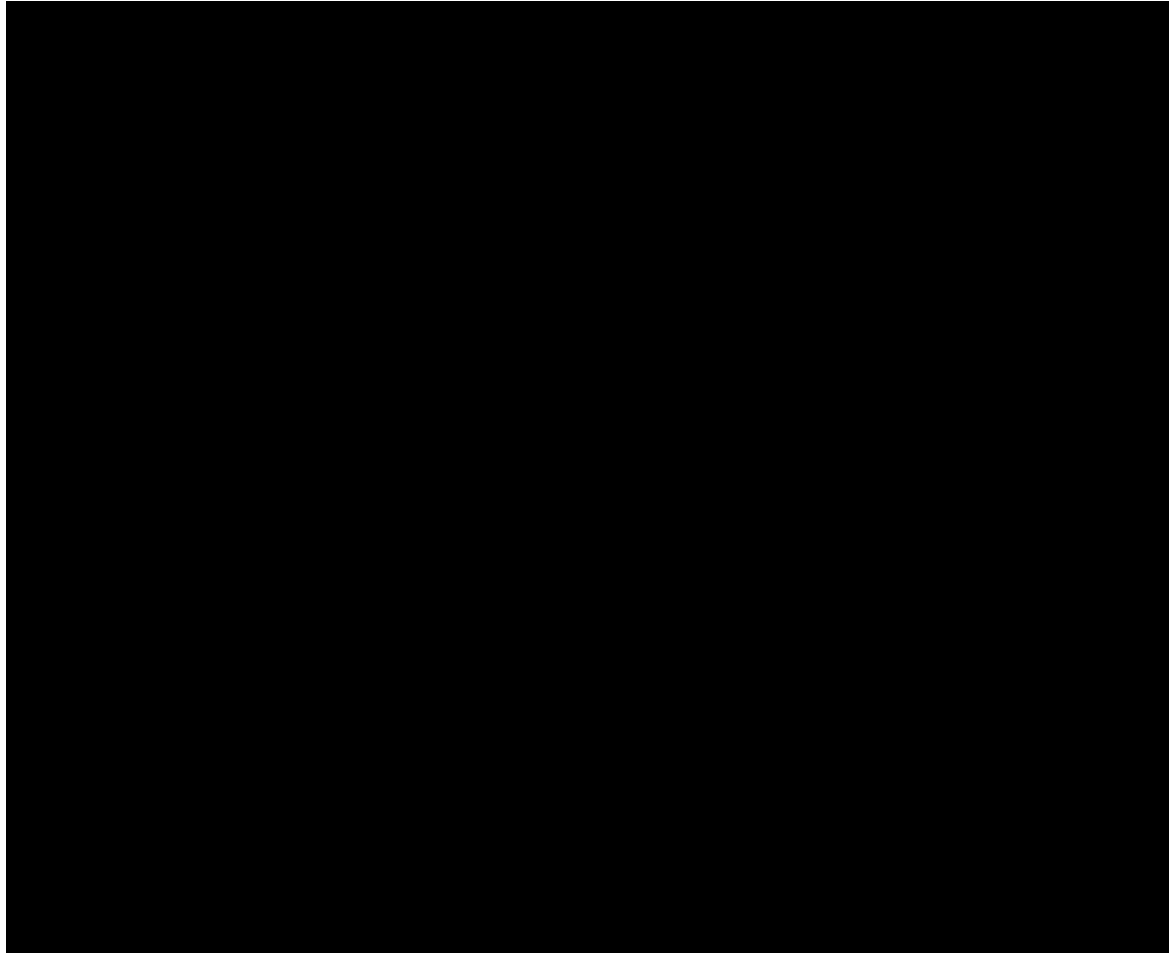
edevices based on measurement of electrical resistance





RAYPEX[®] 6





Canal shaping and cleaning

- Basic rules
 - Elimination of infection
 - Enlargement till the apical constriction – simplify the shape
 - 6% tape, 3 more in comparison to the apical size
 - Gangraena – clean chips

Canal cleaning

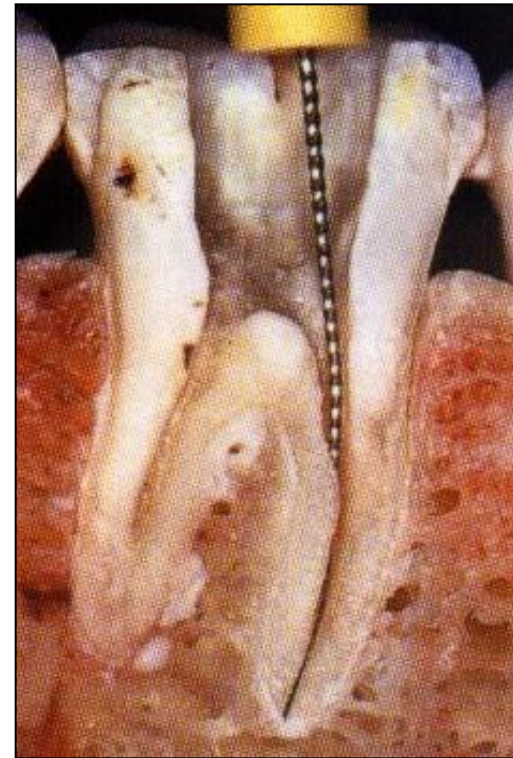
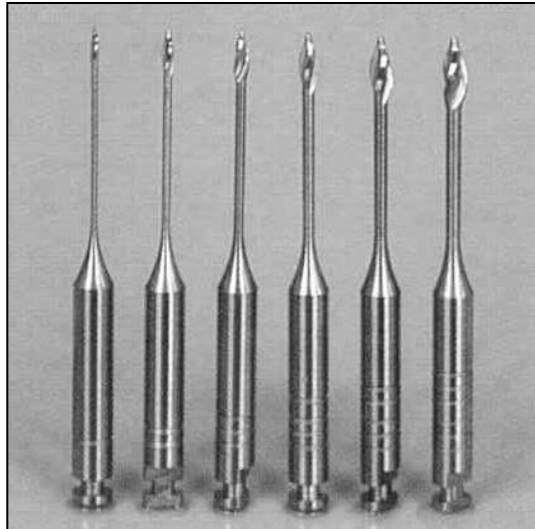
❑ Elimination of infection

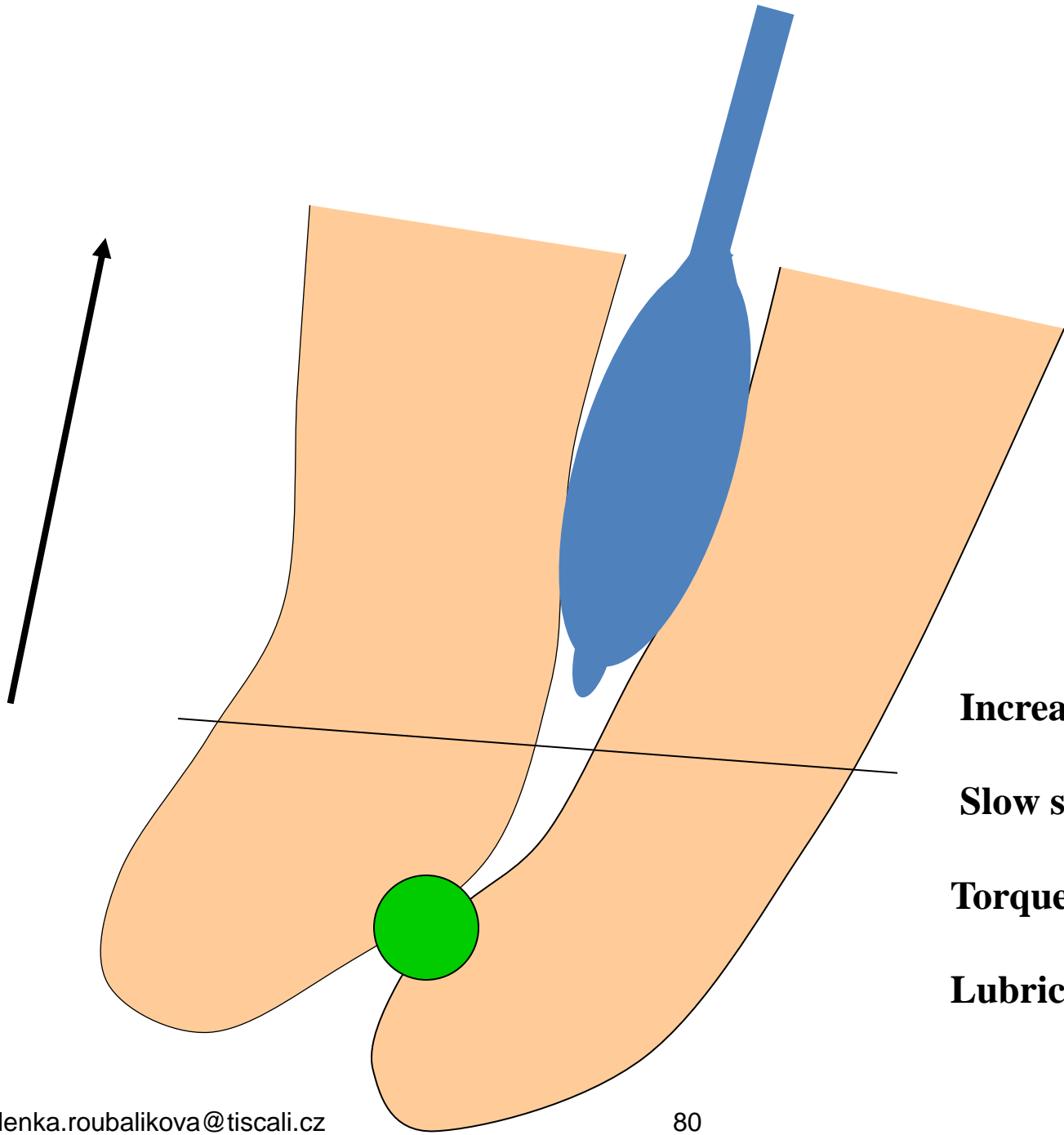
Mechanically – instrumentation, irrigation

Chemically – irrigation, temporary root canal filling

Canal shaping

Coronal flaring (Weine 1982, Peřinka 2003)





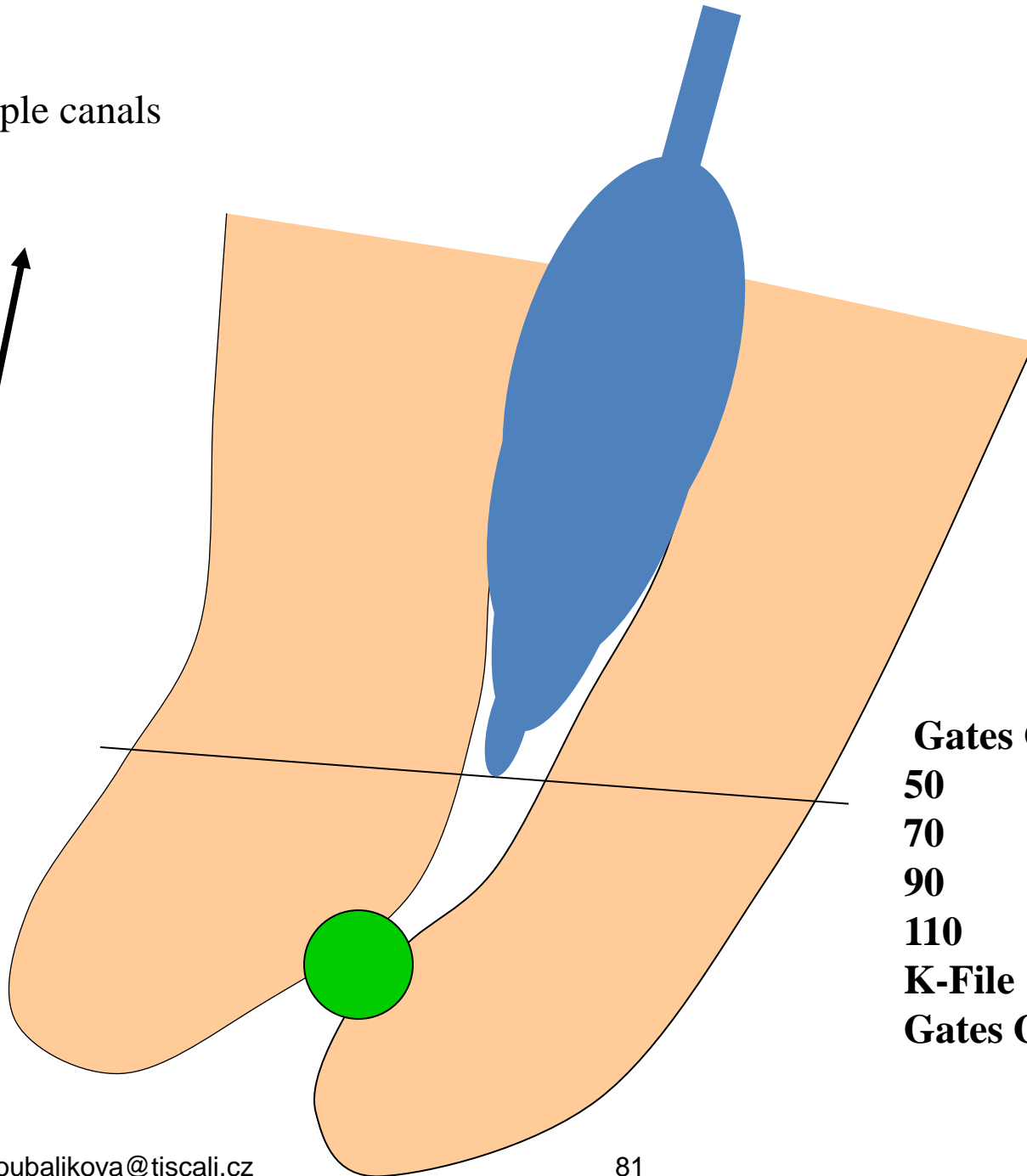
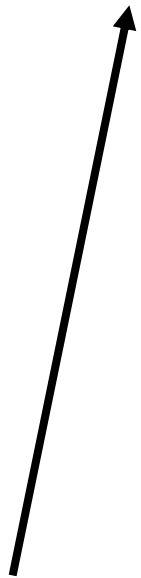
Increasing size

Slow speed 600 – 800/min

Torque control

Lubrication

Simple canals



Gates Glidden

50

70

90

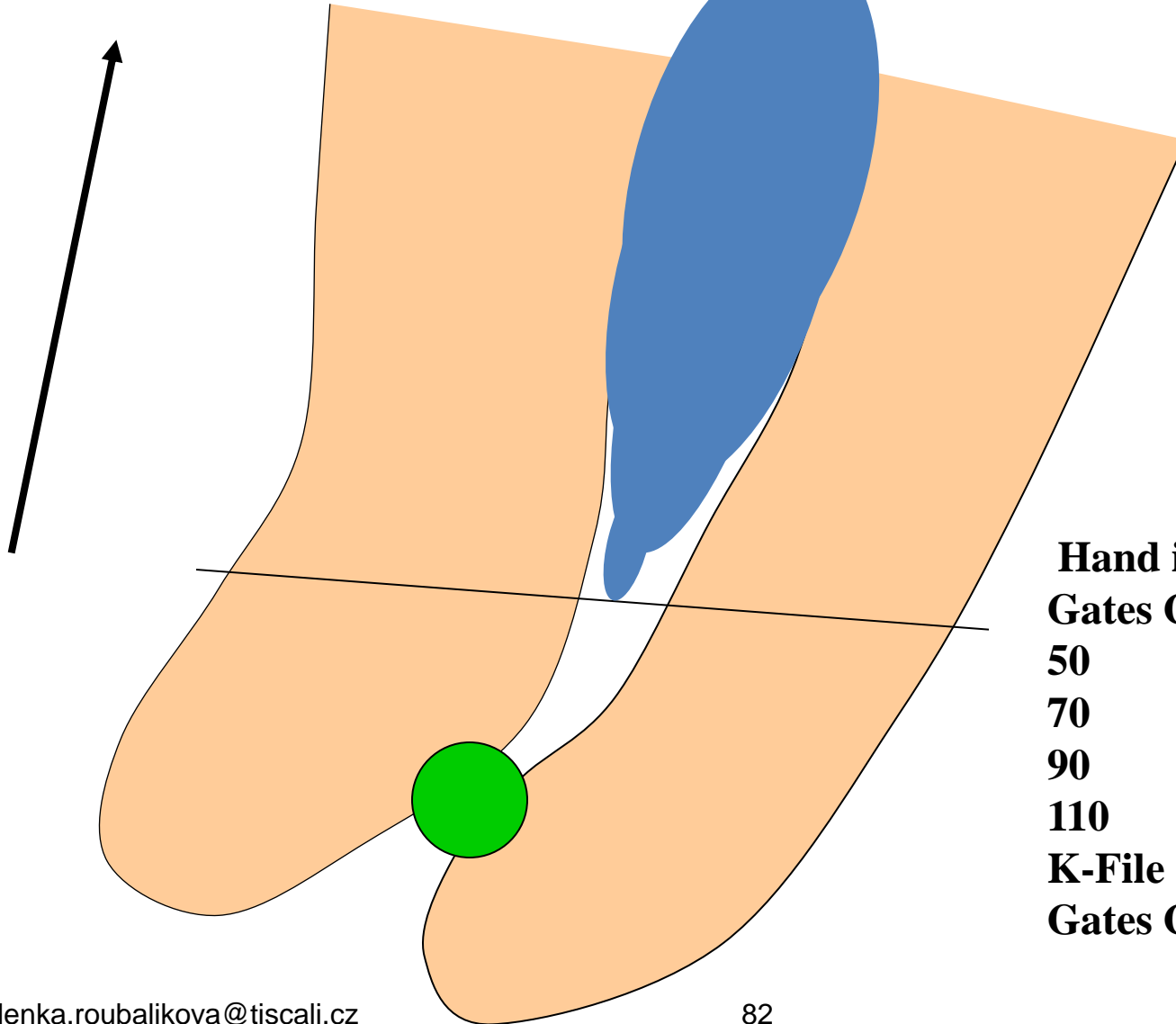
110

K-File 15

Gates Glidden 50

Narrow canals

Velmi úzké kk – jenom ručně !!!!



Hand instruments till 50

Gates Glidden

50

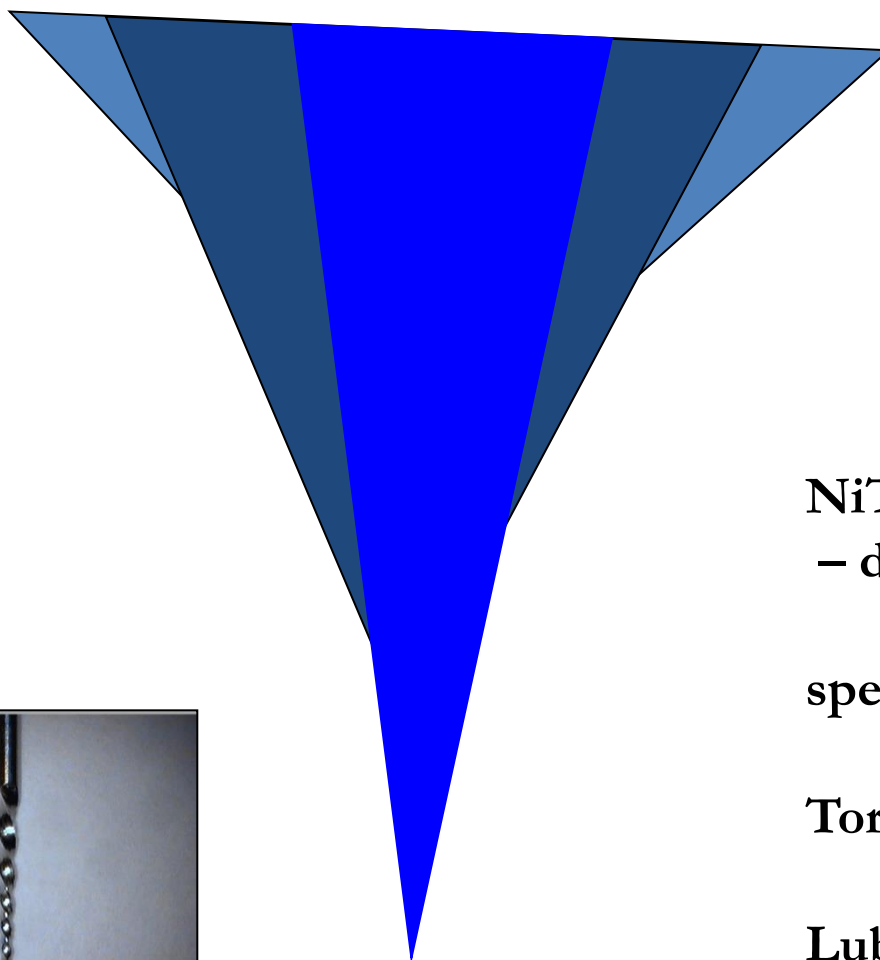
70

90

110

K-File 15

Gates Glidden 50



NiTi systém

– decreasing size

speed 250 - 300 rpm

Torque control

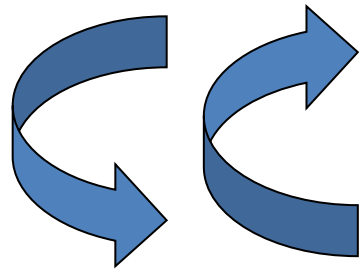
Lubrikacation

Importance

- Protection against fracture
- Better cleaning of coronal part (effective transport of debris)
- Effective irrigation
- Better conditions for measurement of working length
- Better conditions for apical preparation
- Less risk of complication

Shaping technique

- Rotation

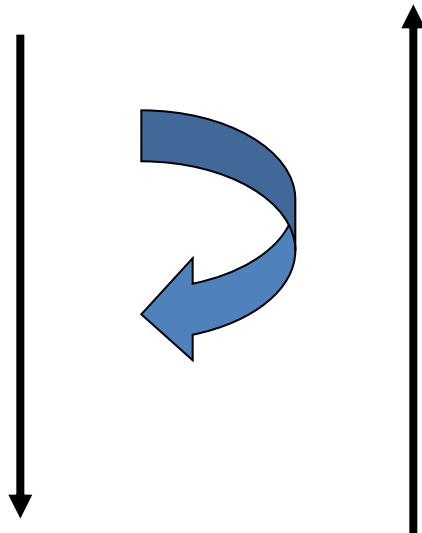


K – reamer

K- file

Shaping technique

- Rotace 45° tlak and pull motion



K – reamer

K- file

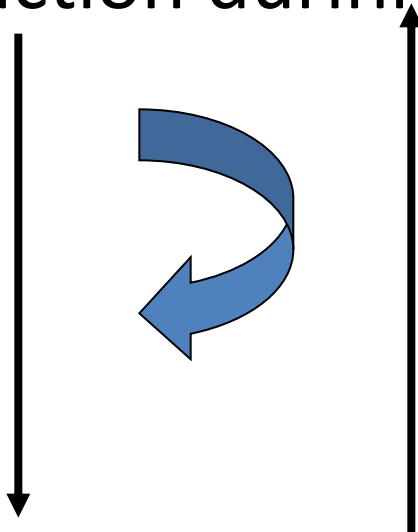
Risk of ledging

Zip, elbow effect

Via falsa - perforation

Shaping technique

- Filing - push and pull motion. The file is in action during the pull motion



H- file

S- file

K – file

Risk of periapical infection

Risk of plug

Balanced force technique – 1st step

- Insertion of the instrument one ISO size bigger than apical size of the root canal until the instrument come to the contact with the root canal wall. Rotation 90 – 180° Very slight pressure – the instrument is reaching the WL.

Balanced force technique – 2nd step step

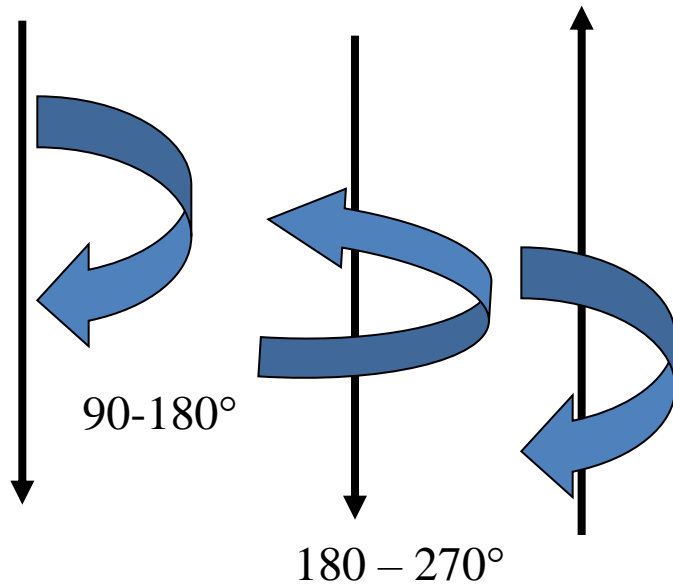
- Rotation of the instrument counterclockwise 180 -270°, pressure forward. Dentin chips are broken.

Balanced force technique – 3rd step

- The instrument is being pulled out and is rotating clockwise – the debris is being removed.

Shaping technique

- Balanced force

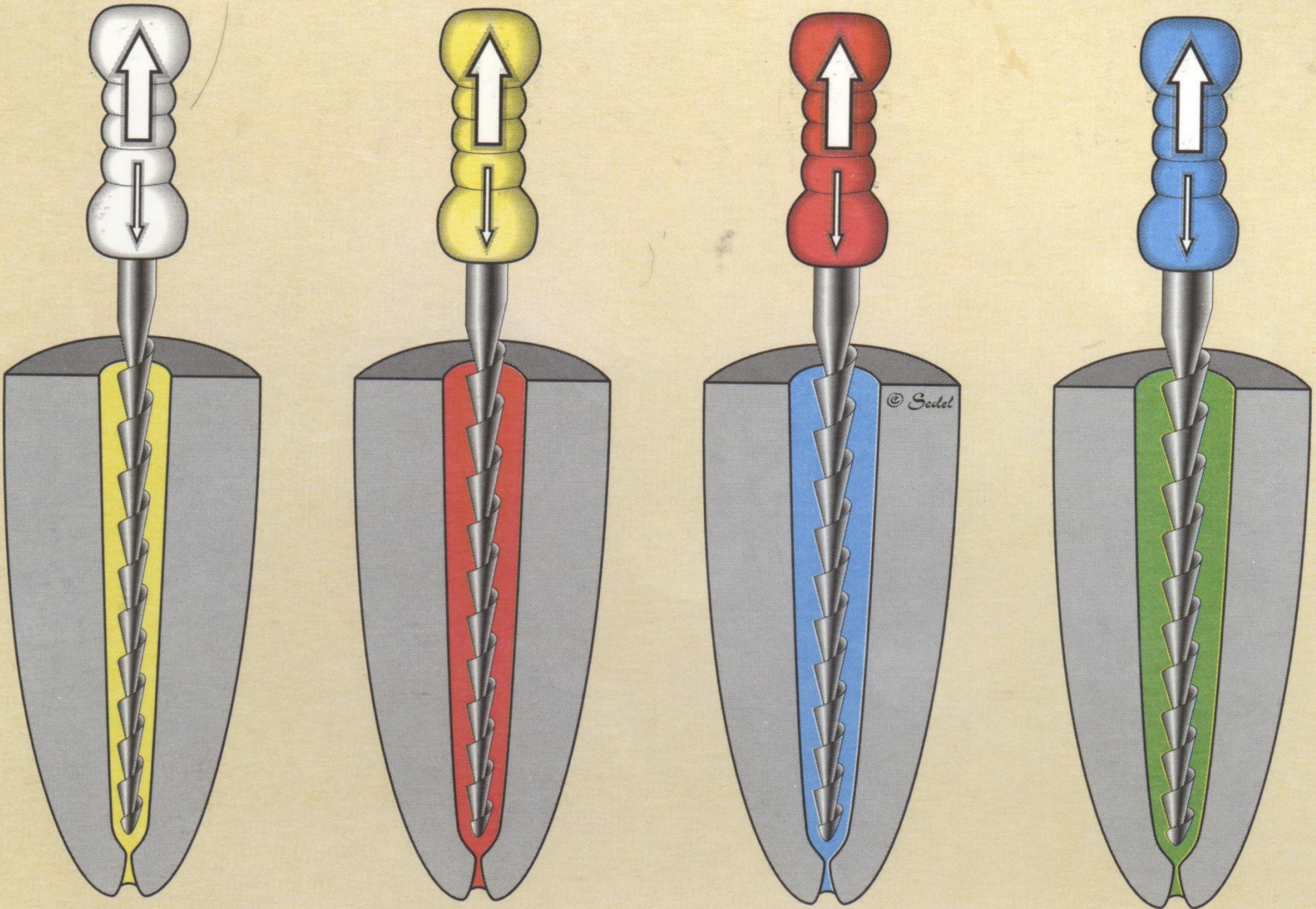


K- flex- O- file

K – flex- R - file

Methods of shaping

- Filing around the root canal – circumferentially. The shape of the root canal is kept.



Methods of shaping

- Step back

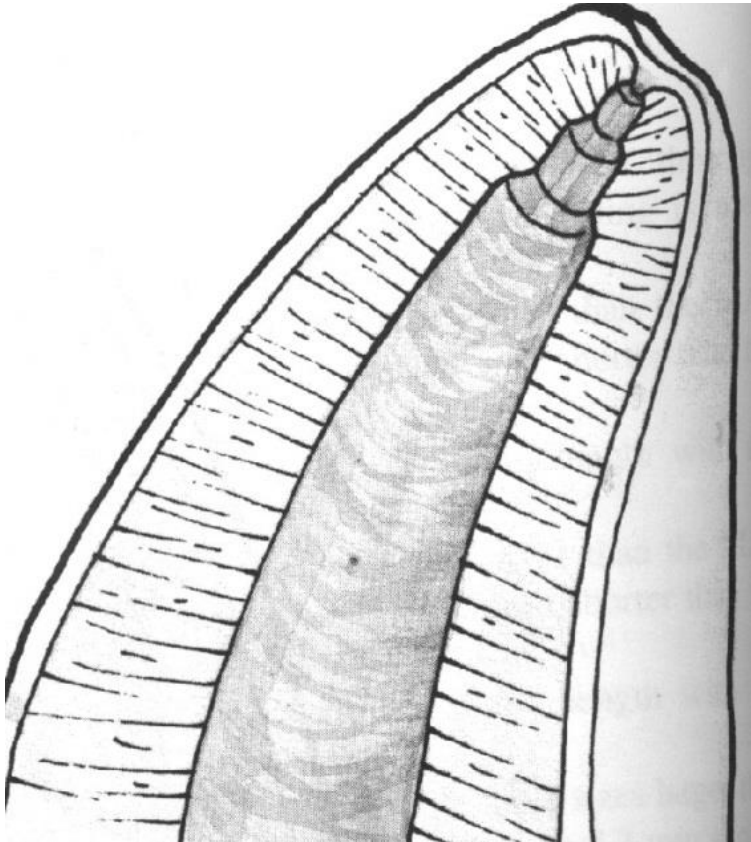
H-file

K-file

Apical stop

K-flexofile

Prevention of the ledge



Taper
Final flaring with
the smallest instrument

H- File nebo K - Flexofile.

Methods of root canal shaping

- Modified double flared with balanced force
 1. *Coronal flaring)*
 2. *Apical preparation balanced force*
 3. *Step back*
 4. *Final flaring (filing)*

Method modified double flared

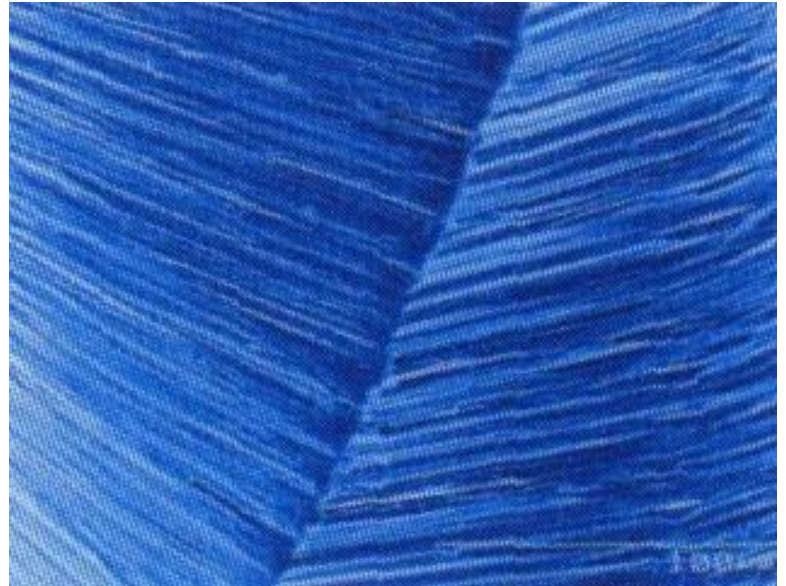
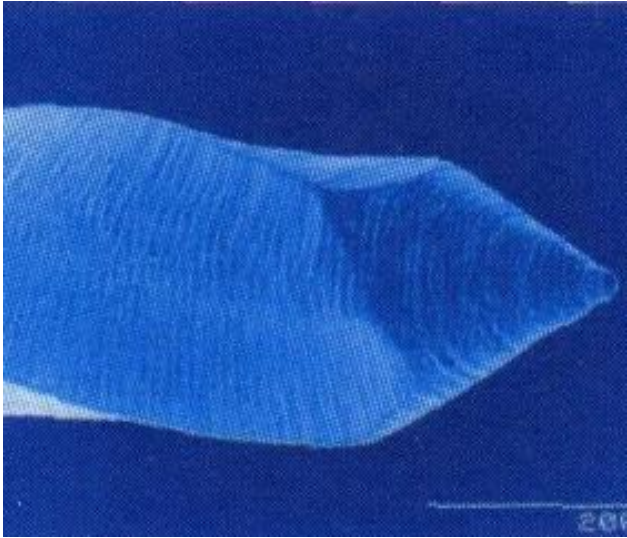
- I. Opening of root canal
 - Coronal third – coronal flaring
- II. Apical preparation

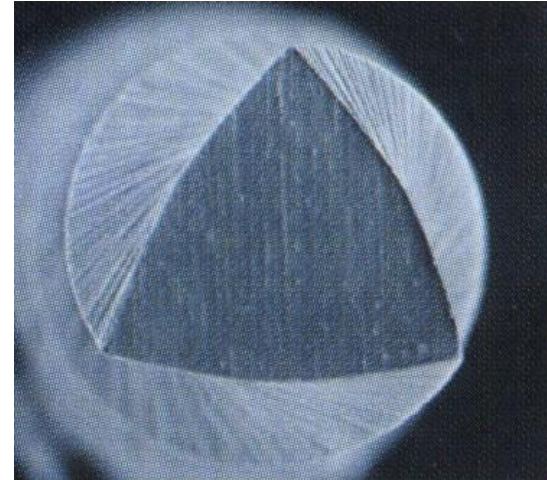
Cathetrization, measurement, shaping till ISO 30 – 35 balanced force. Master file – MAF (till WL)

- III. Step back
- Final flaring (MAF)

Vysoce kvalitní NiTi slitina

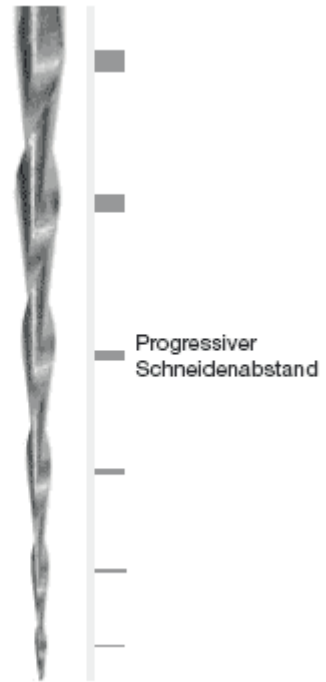


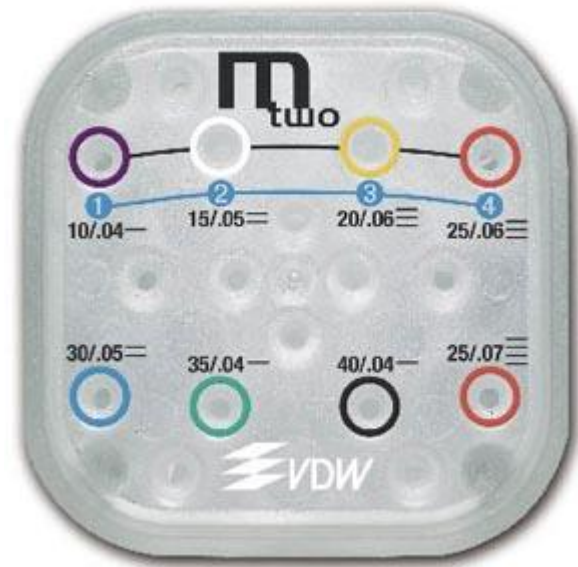
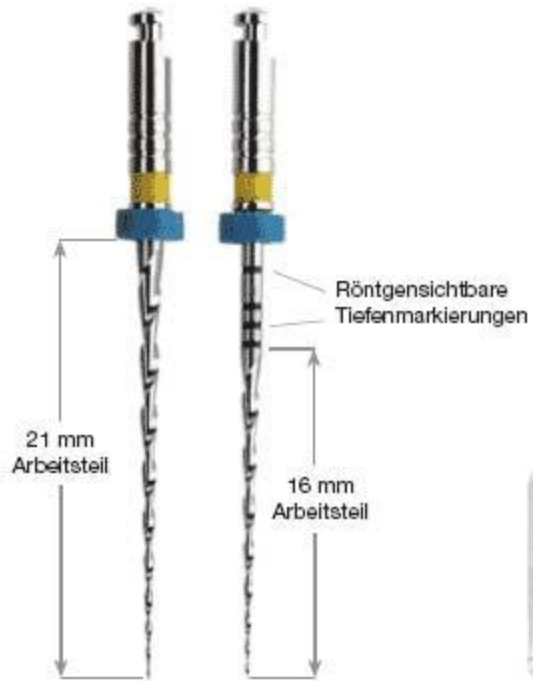


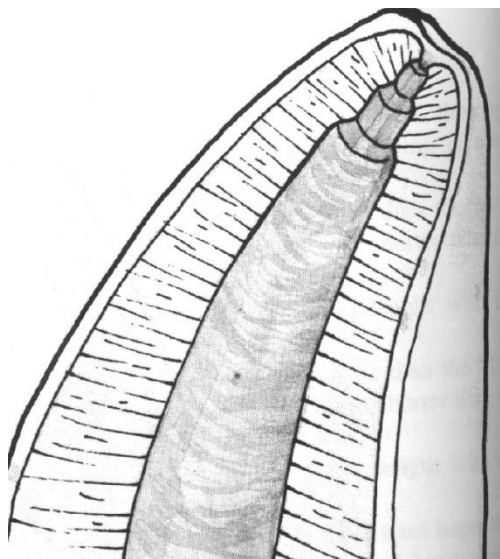




Nicht schneidende Spitze

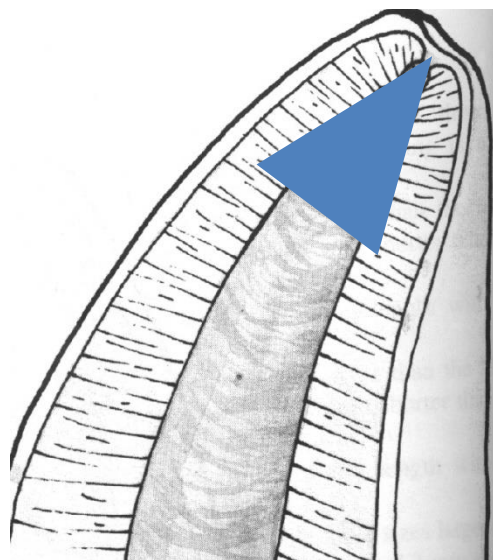






2% kónus

30	u apexu	0,30 mm
35	1 mm od apexu	0,35 mm
40	2 mm od apexu	0,40 mm
45	3 mm od apexu	0,45 mm



6% kónus

30	u apexu	0,30 mm
30	1 mm od apexu	0,36 mm
30	2 mm od apexu	0,42 mm
30	3 mm od apexu	0,48 mm

Apikální hranice opracování

We always combine hand and
powerdriven instruments

Hand instruments

- Initial flaring – reshaping
- Recapitulation
- Difficult part of the root canals
- Measurement of the apical size