

Endodontics II.

**Root canal treatment (RCT) –
Phases**

Instruments

Methods

Techniques

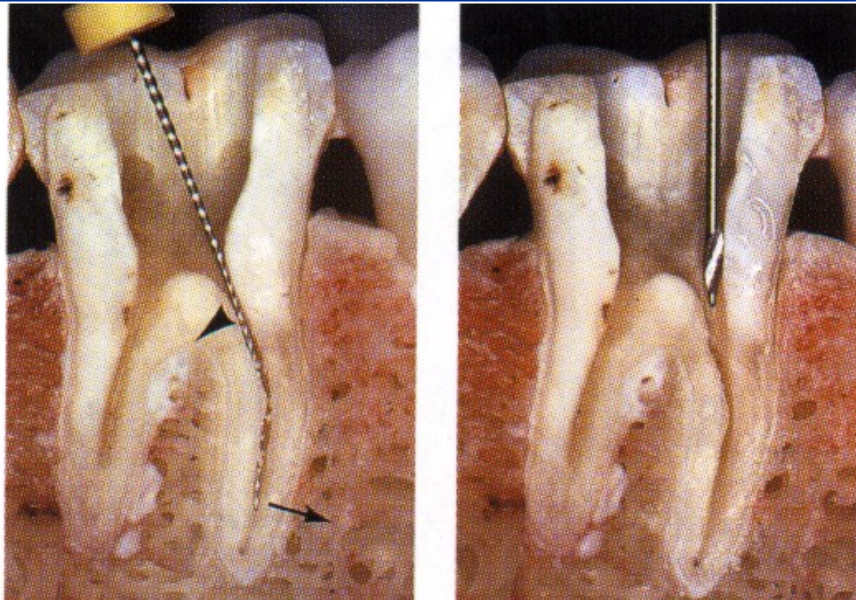
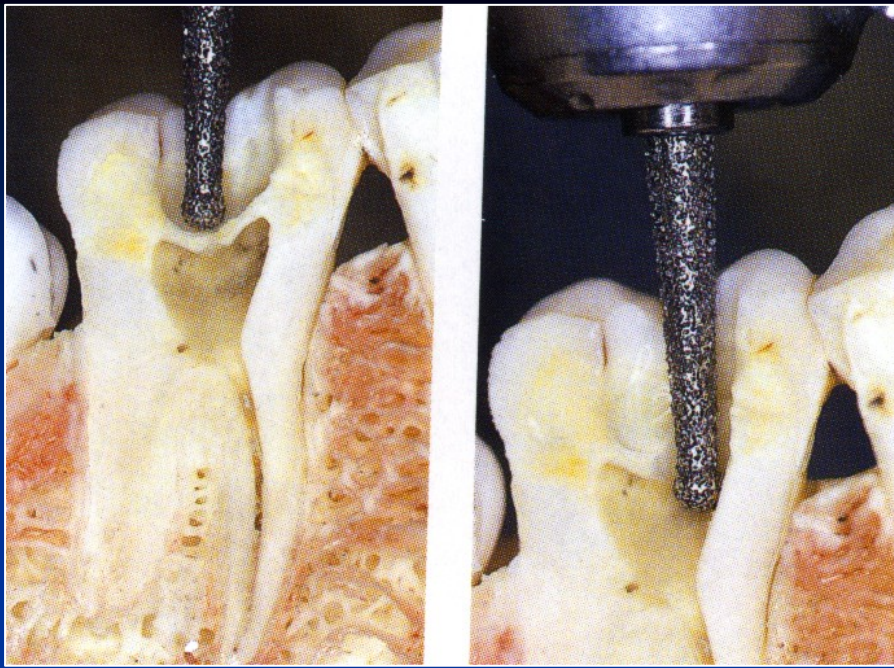
Acces

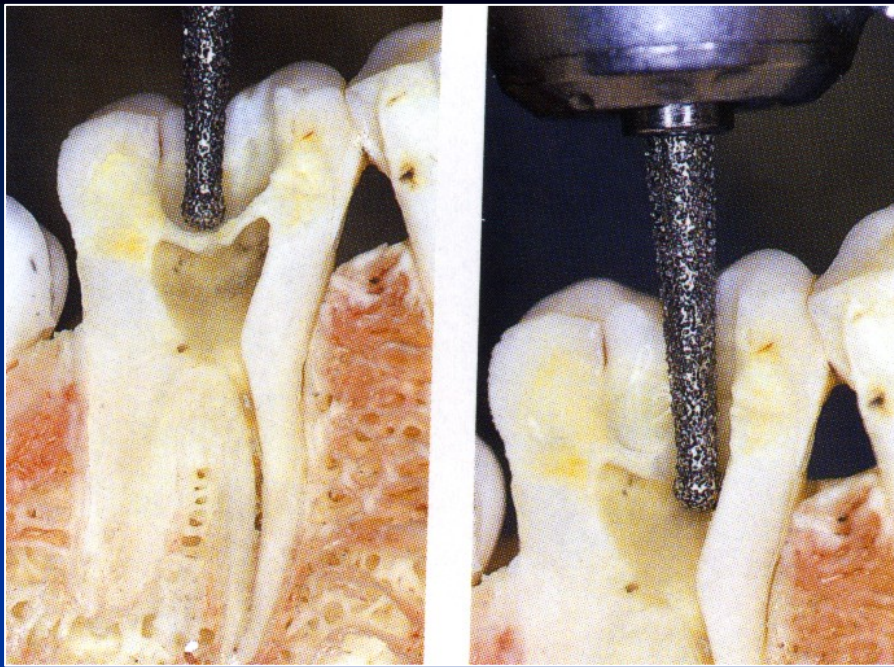
■ Access to the pulp chamber

Penetration to the pulp chamber and removal of its roof

- *Orifices of root canals must be seen clearly*
- *The instrument goes through to the root canal without bending*
- *Walls of the endodontic cavity are divergent*

Access





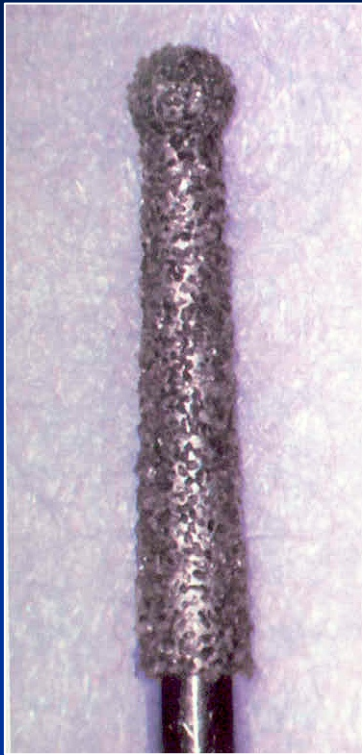
Access





The wall is weakend

Opening of the pulp chamber



Dia trepan



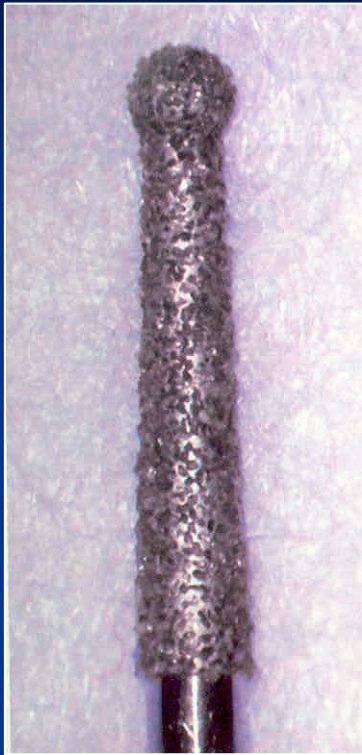
Dia round burs – balls



Steel round burs



Removal of the roof of the pulp chamber



Dia trepan

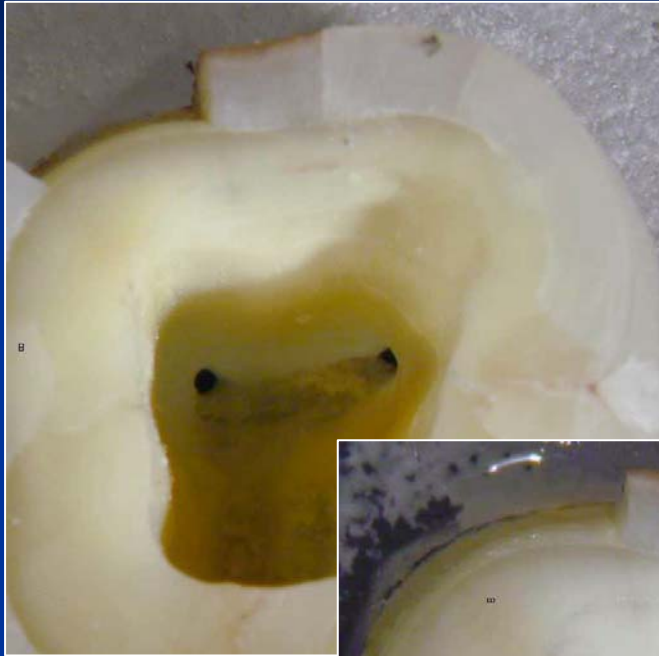


Safe ended tips
Batt's instruments

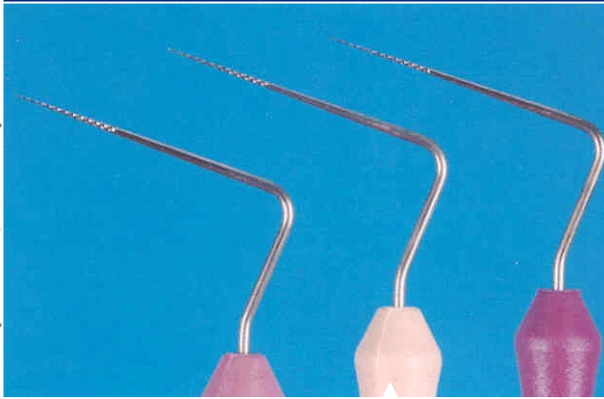
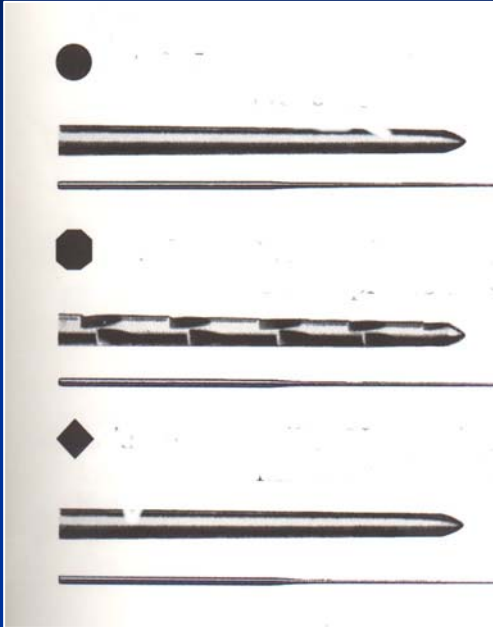


Fissur bur

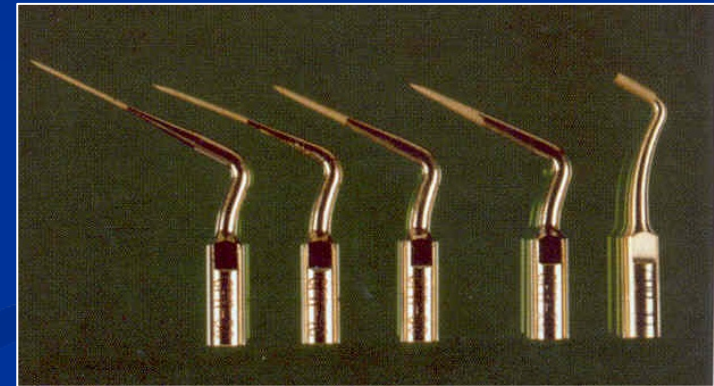
Finding of the root canal orifice



Finding and opening of rot canal orifices



Endodontic probes
Microopeners



Ultrasound tips

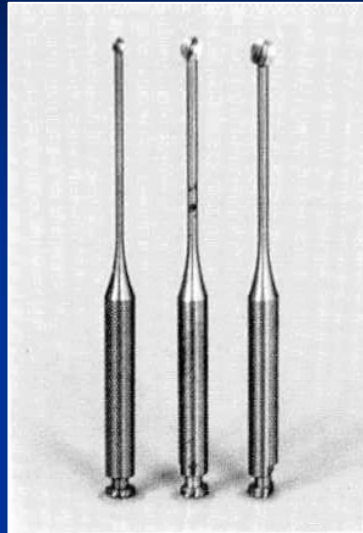


Dye

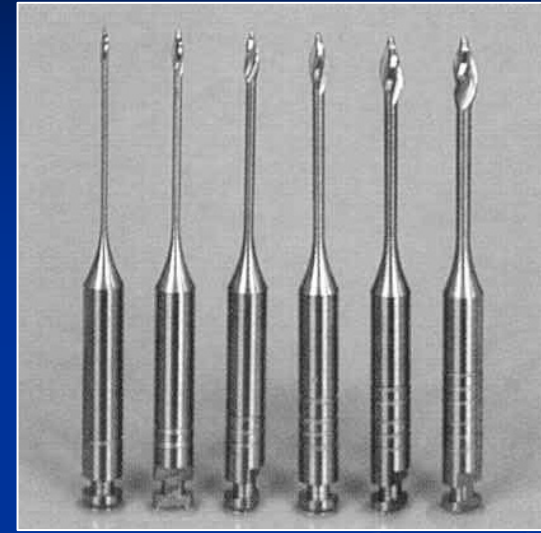
Finding and opening of root canal orifices



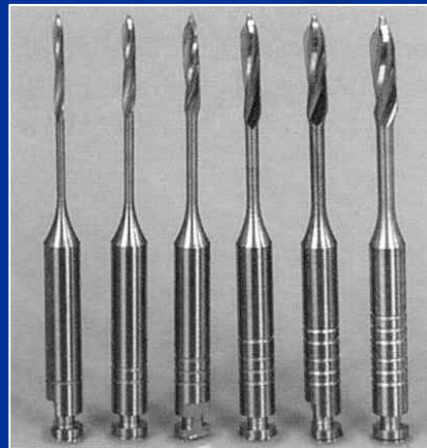
Rounded burs - balls



Miller's burs



Gates Glidden's burs



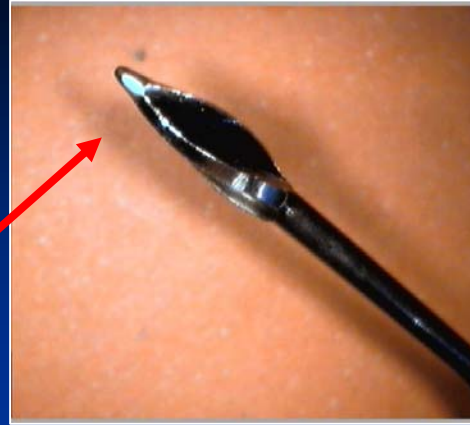
Peeso – Largo



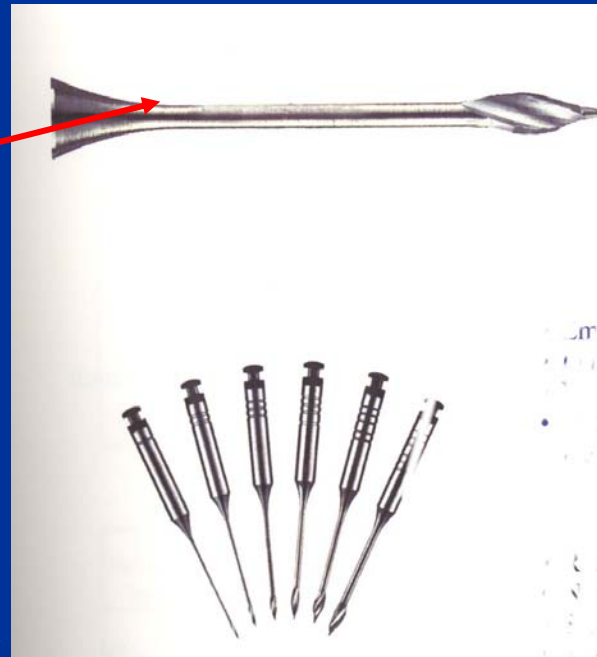
Gates - Glidden



Peeso-Largo



Gates – Glidden:
Blunt, non active tip

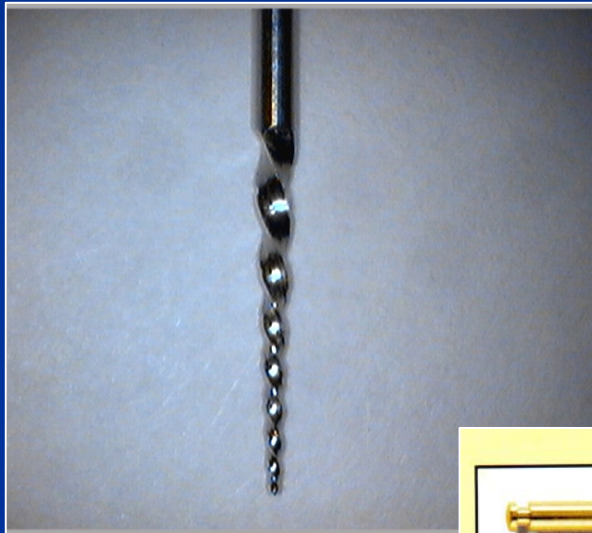


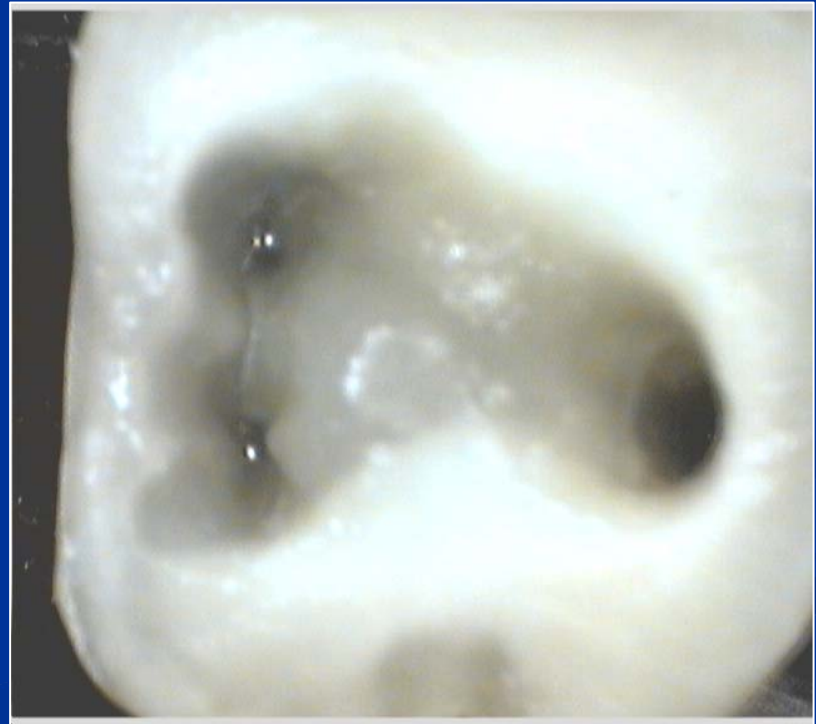
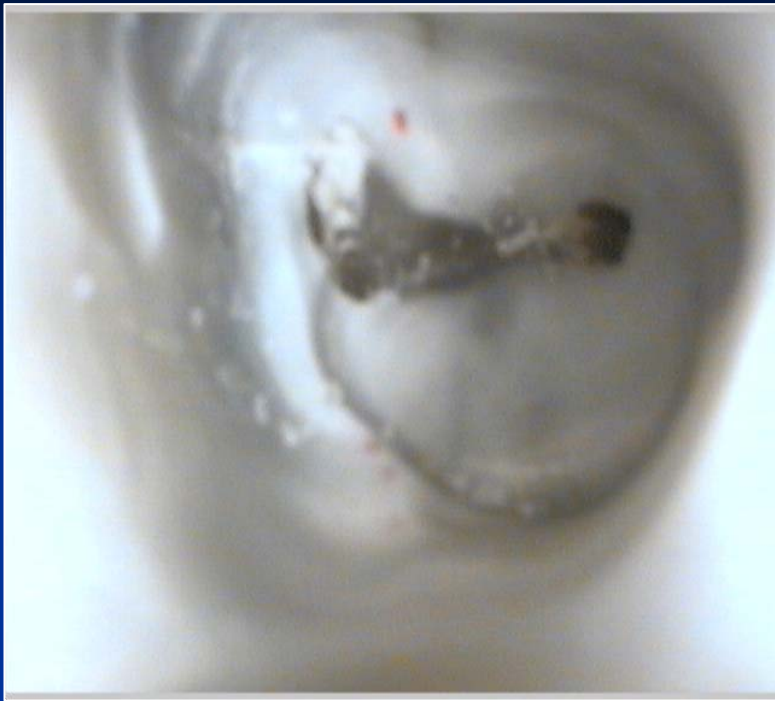
Programm point of breakage

Opening of the root canal orifice

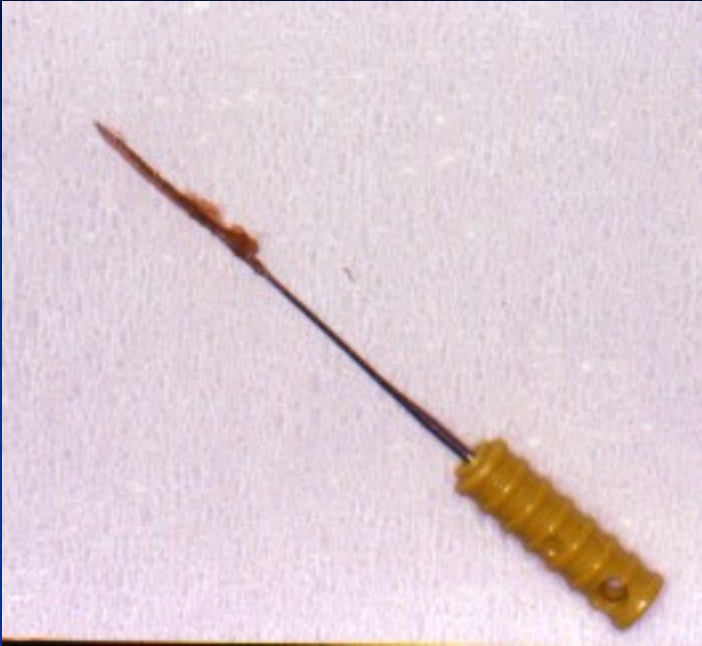
Ni-Ti instruments

E.g: Profile O.S., ProTaper SX, IntroFile etc.





Removal of contents of root canal



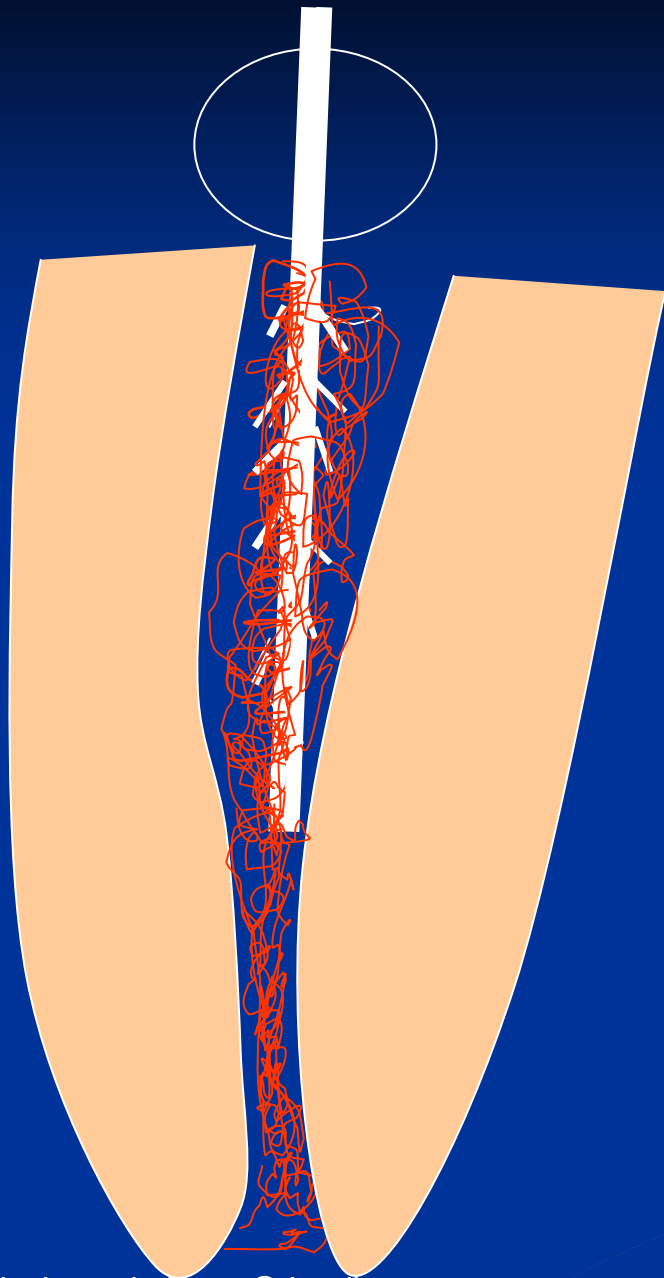
Pulpextractor

*Removal of soft content
– pulp, cotton, paper point*

Wider canals only!!!

*Risks: breakage of the instrument
Breaking of spurs and their pushing out*





➤ **Access !**

➤ **Size !**

➤ **mode of use !**

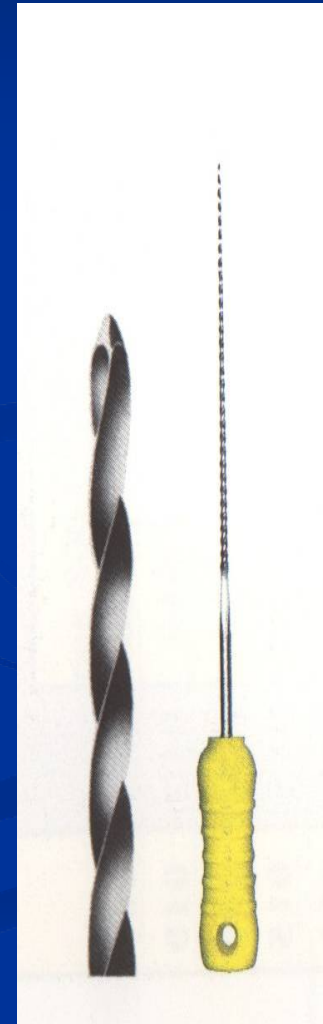
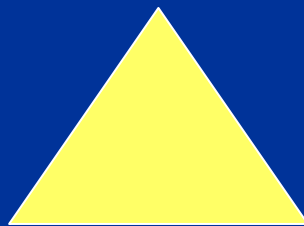
Canal shaping

- Reamers (penetration)
- Files (enlargement)

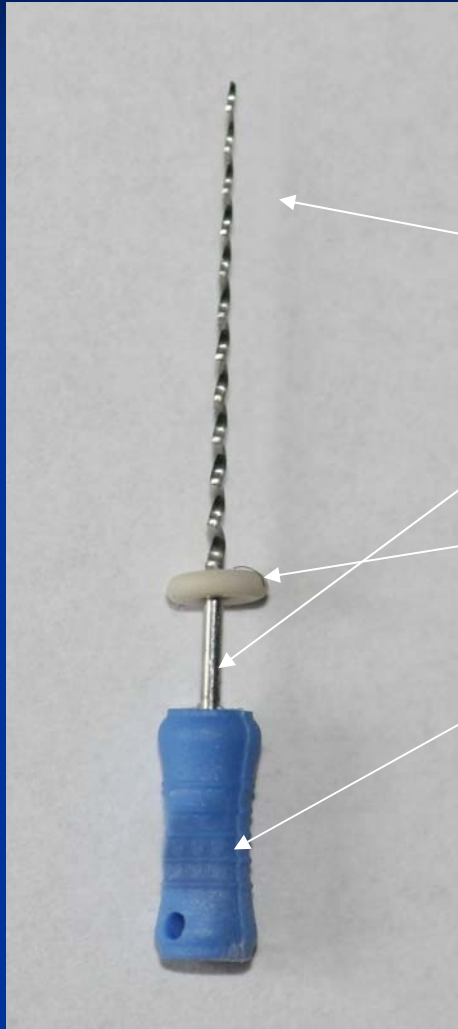
Reamer

K-reamer = Kerrův pronikač
Triangl or square wire spun

Symbol



Reamer

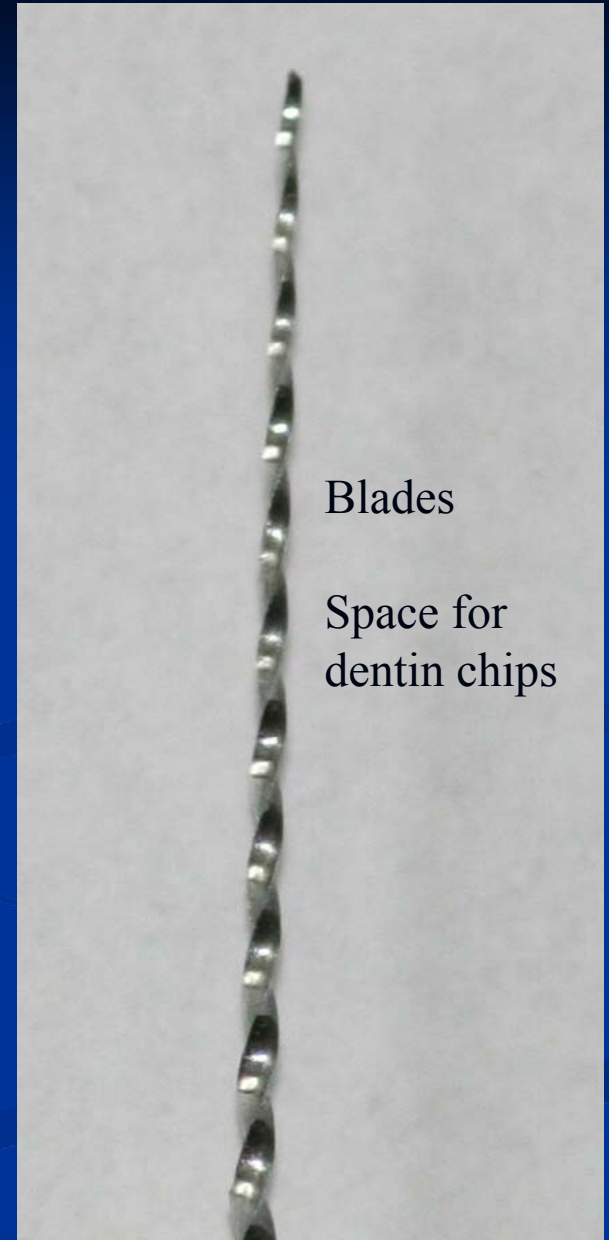


Bladed part

Shank

Stopper

Grip



Blades

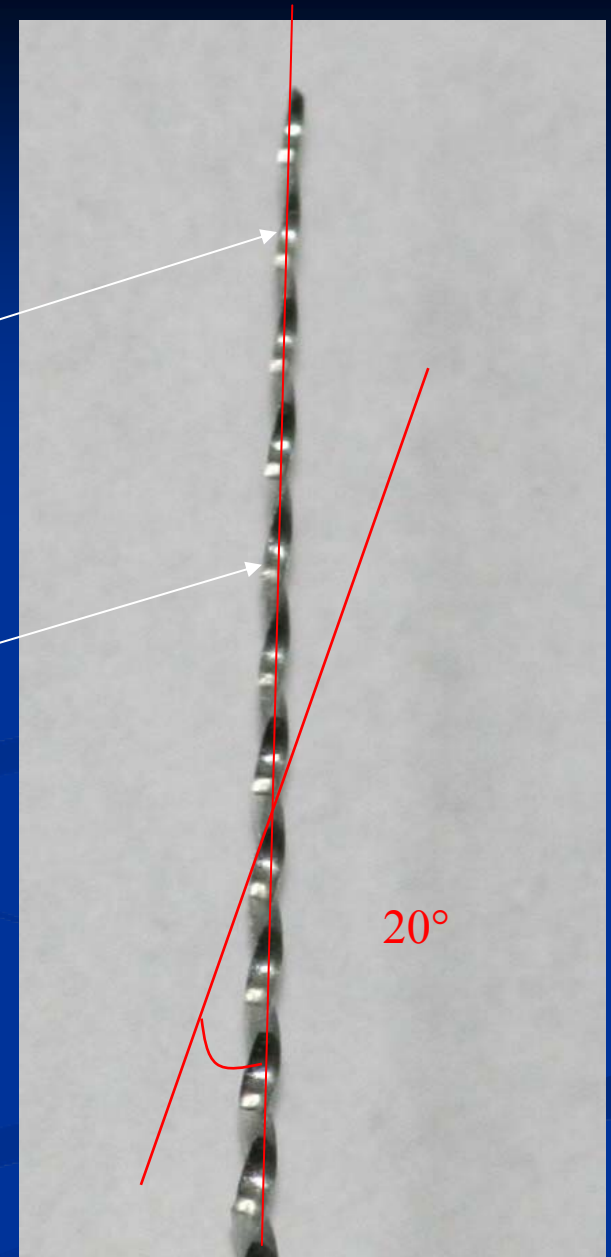
Space for
dentin chips

Reamer

Blades

Space for dentin chips

Rotation – reaming action - penetration



Reamer

Rotation (clockwise) – penetration

Application of plastic material
(contraclockwise)

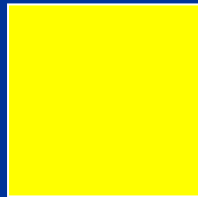
Files

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

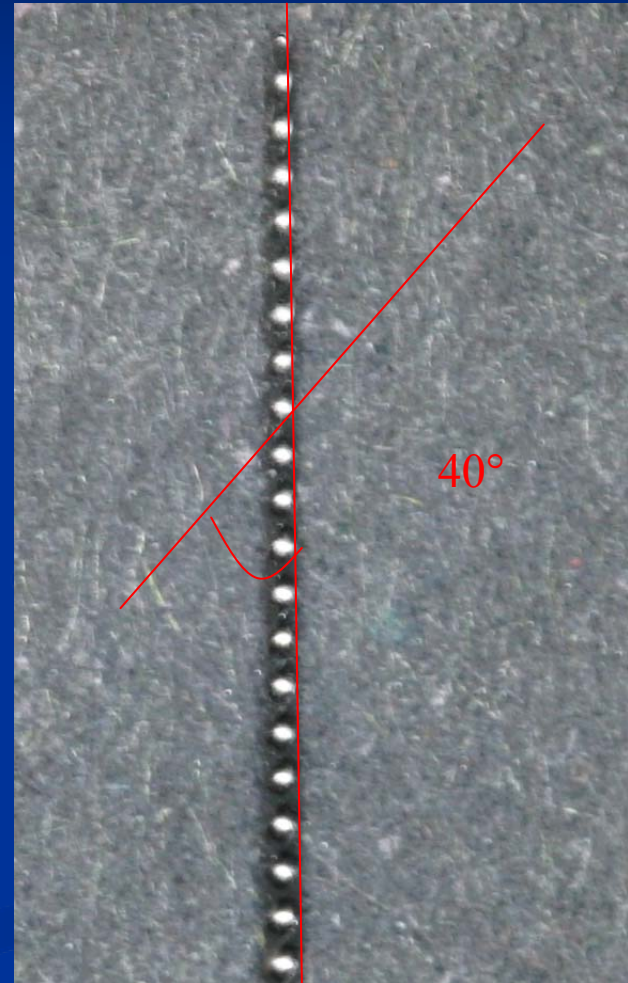


K-file

Filing

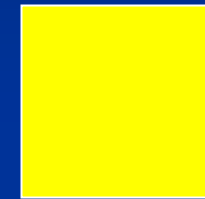
Also rotation

45° – 90°



K-flexofile, flexicut, flex-R

- Triangle wire always

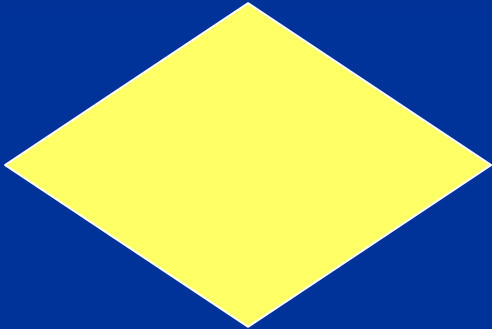


Flexibility

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

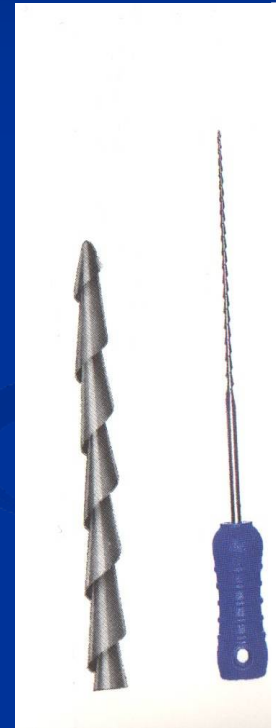
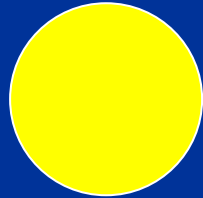
K-file a reamer: rozdíl



H-file

= Hedstroem file

Ring

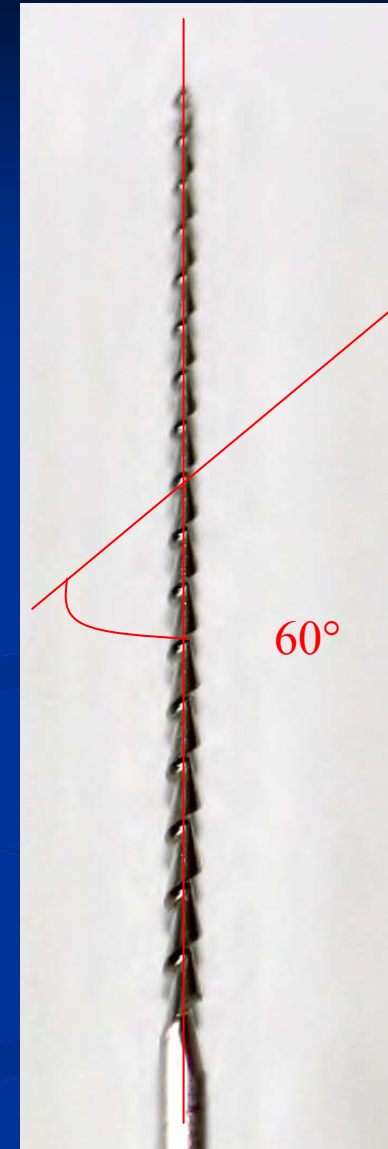
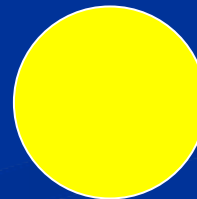


H- file

No rotation!!

Pull motion only!!

Risk of breakage in small sizes



ISO

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



ISO norma

06

08

10

20

25

30

35

40

50

55

60

70

80

Taper 2%

d_2

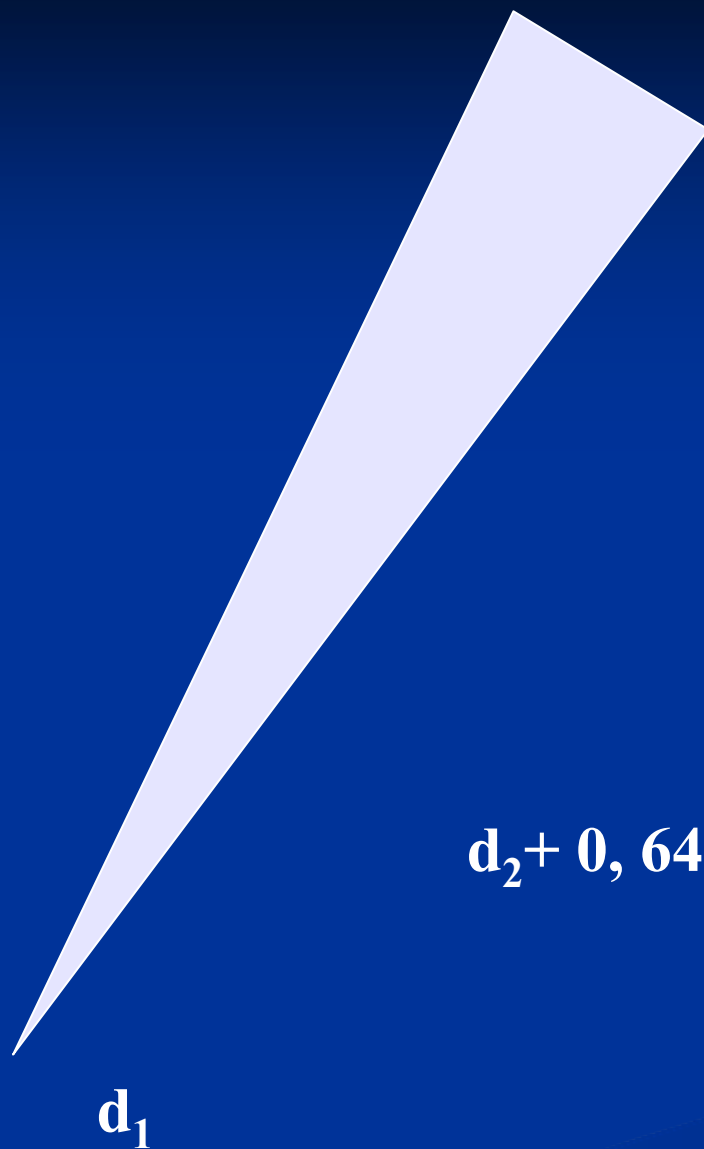
$d_1 - d_2 = 16 \text{ mm}$

$d_2 = d_1 + 0,32$

d_1

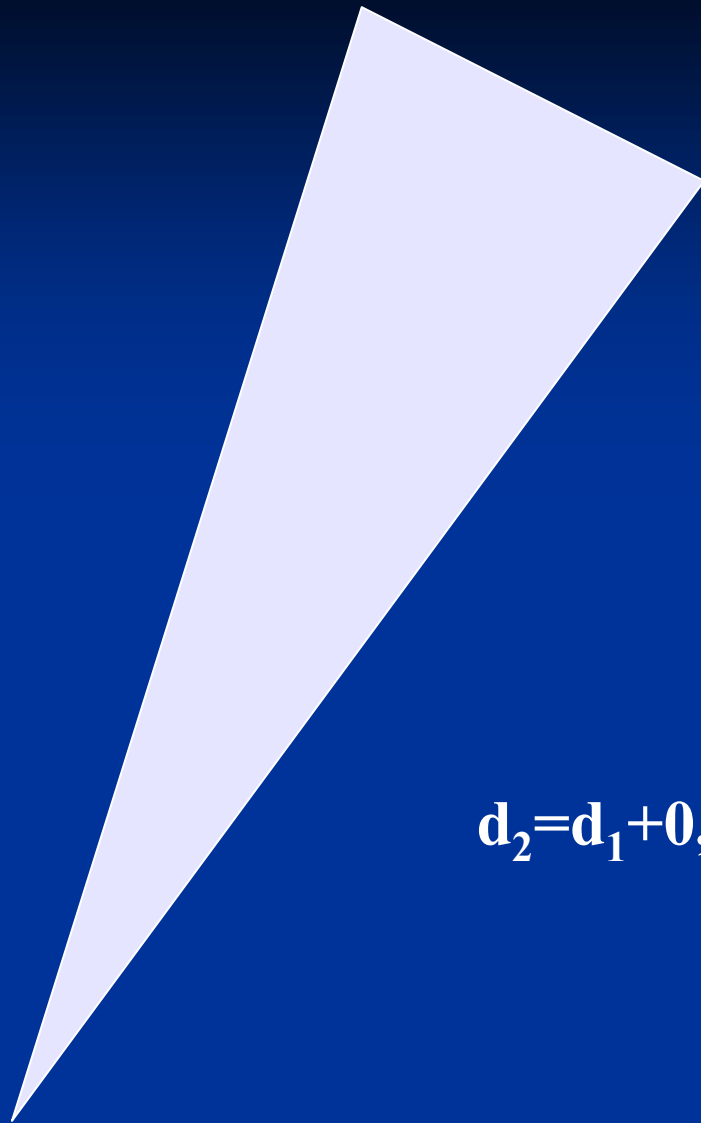
0,02 mm na 1mm

Taper 4%



0,04mm na 1 mm

Taper 6%



d_2

$$d_2 = d_1 + 0,96$$

d_1

0,06mm na 1 mm

■ Niti alloy

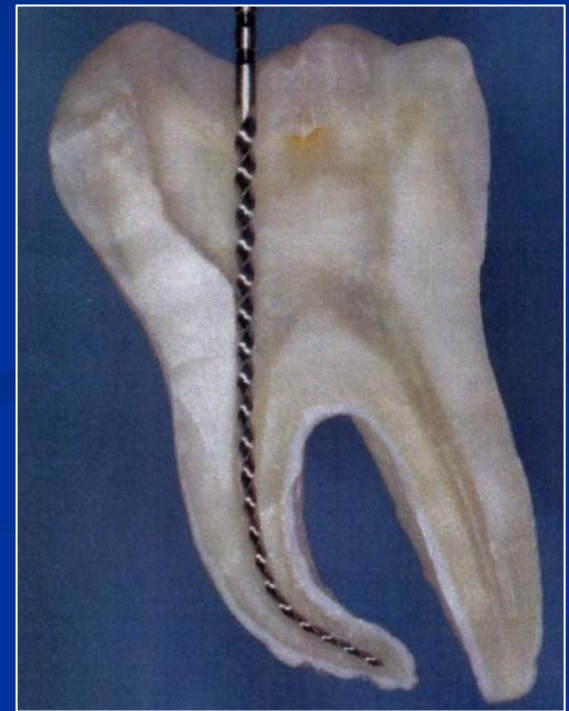
56 % nickel, 44% titanium,

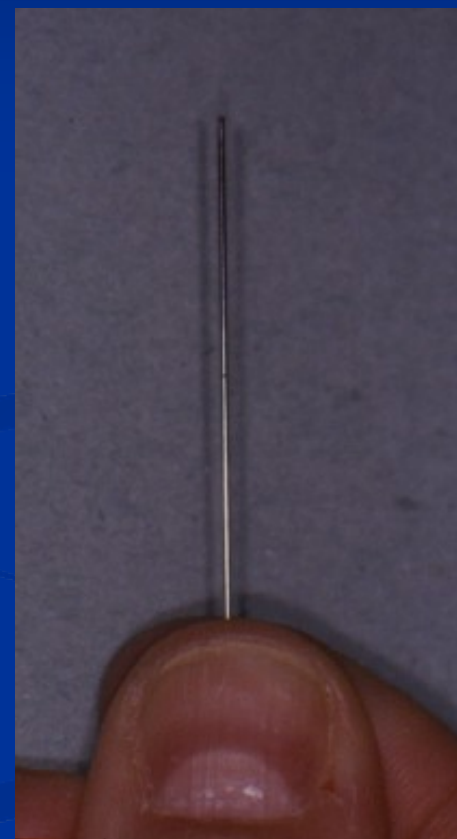
60% nickel, 40 % titanium

flexibility

memory effect

Cutting efficacy?





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

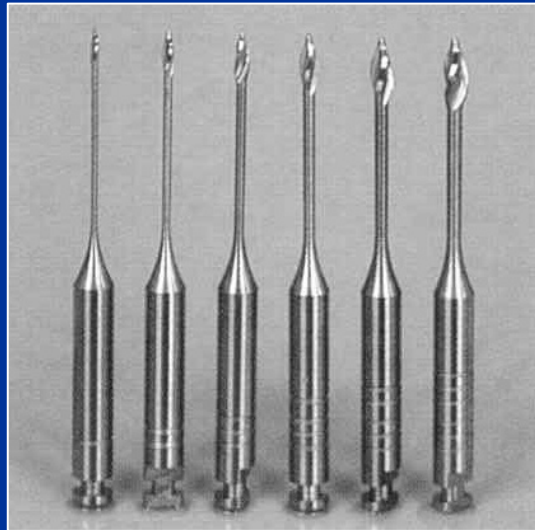
- ❑ Elimination of infection

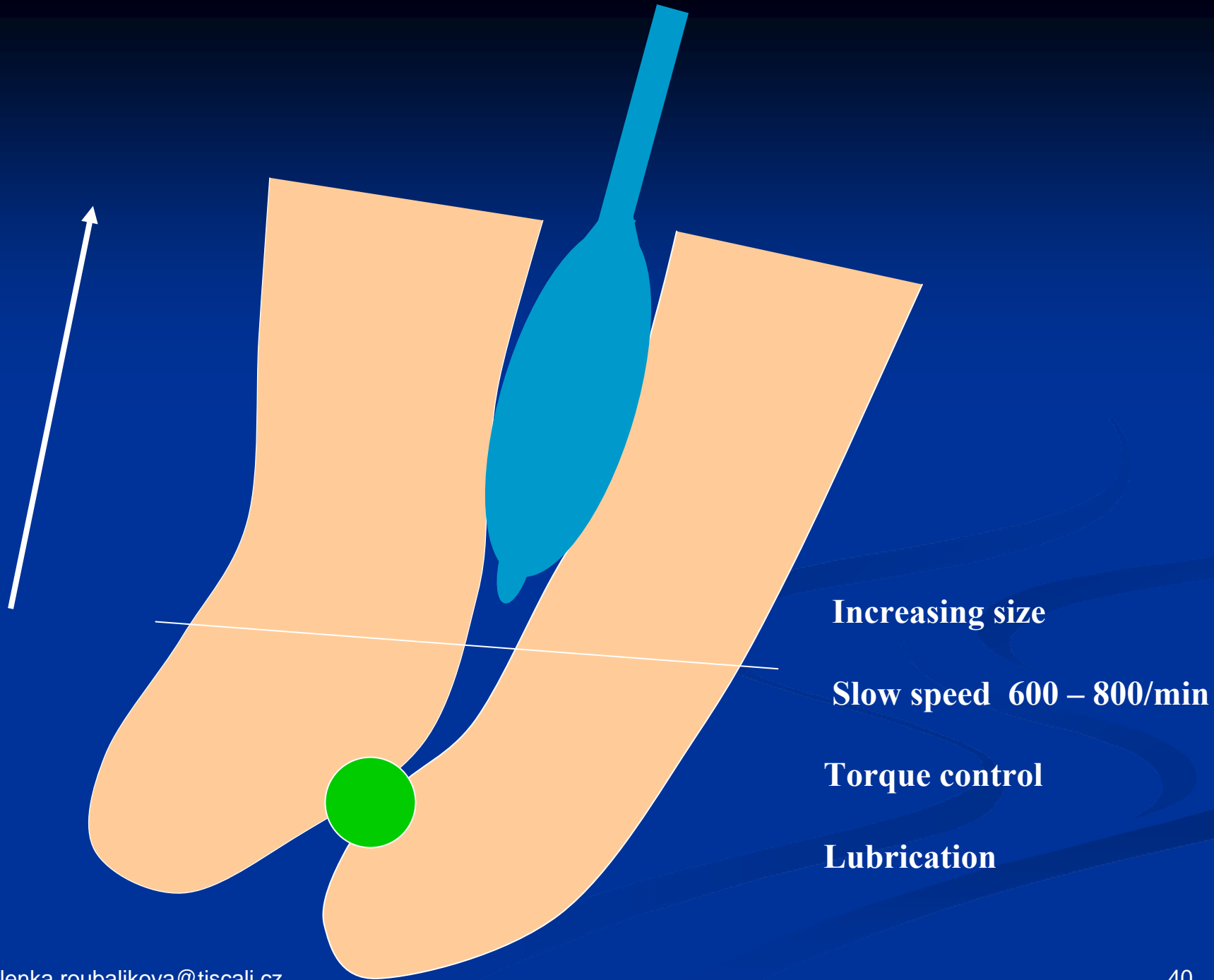
Mechanically – instrumentation, irrigation

Chemically – irrigation, temporary root canal filling

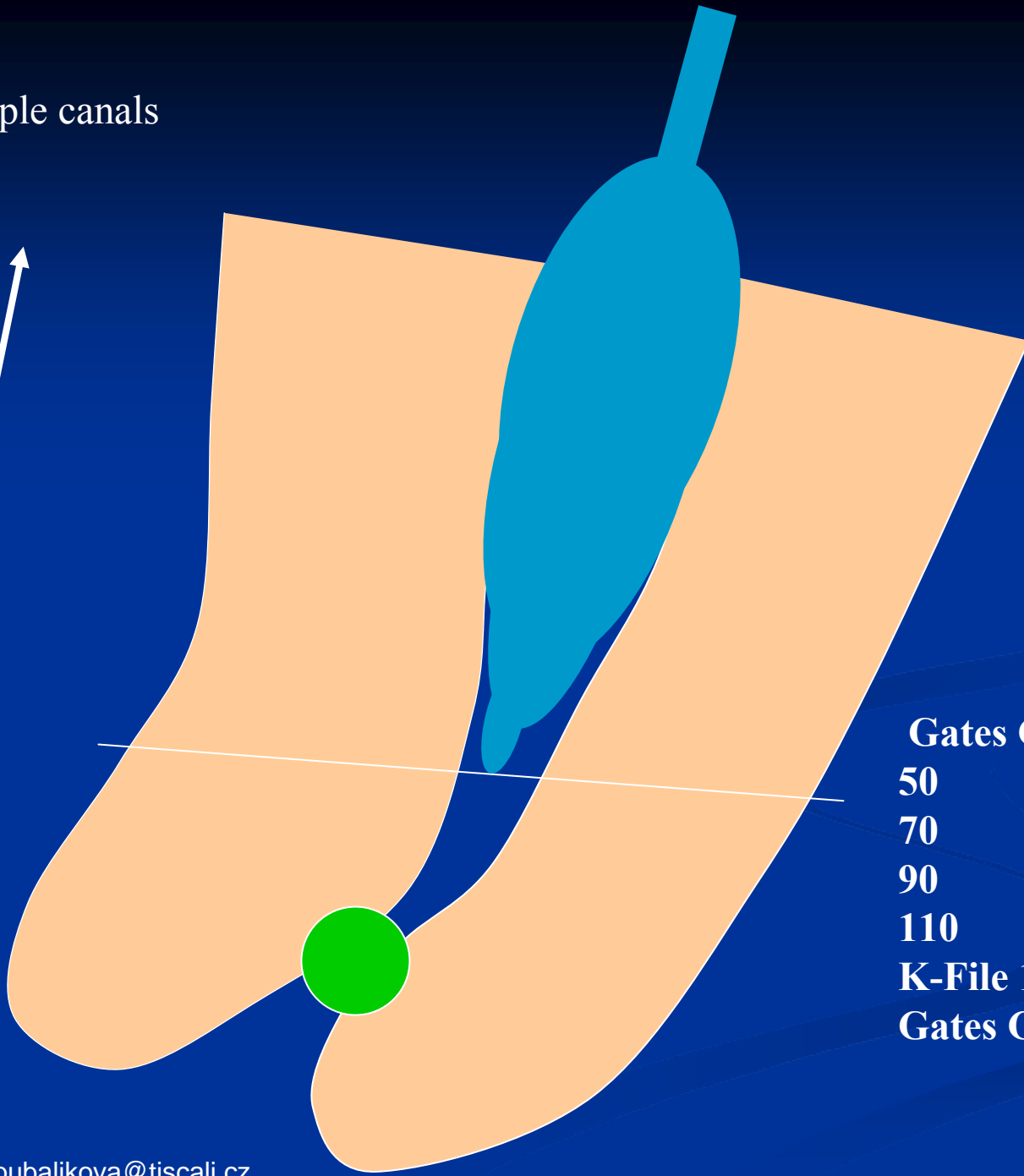
Canal shaping

Koronární flaring (Weine 1982, Peřinka 2003)





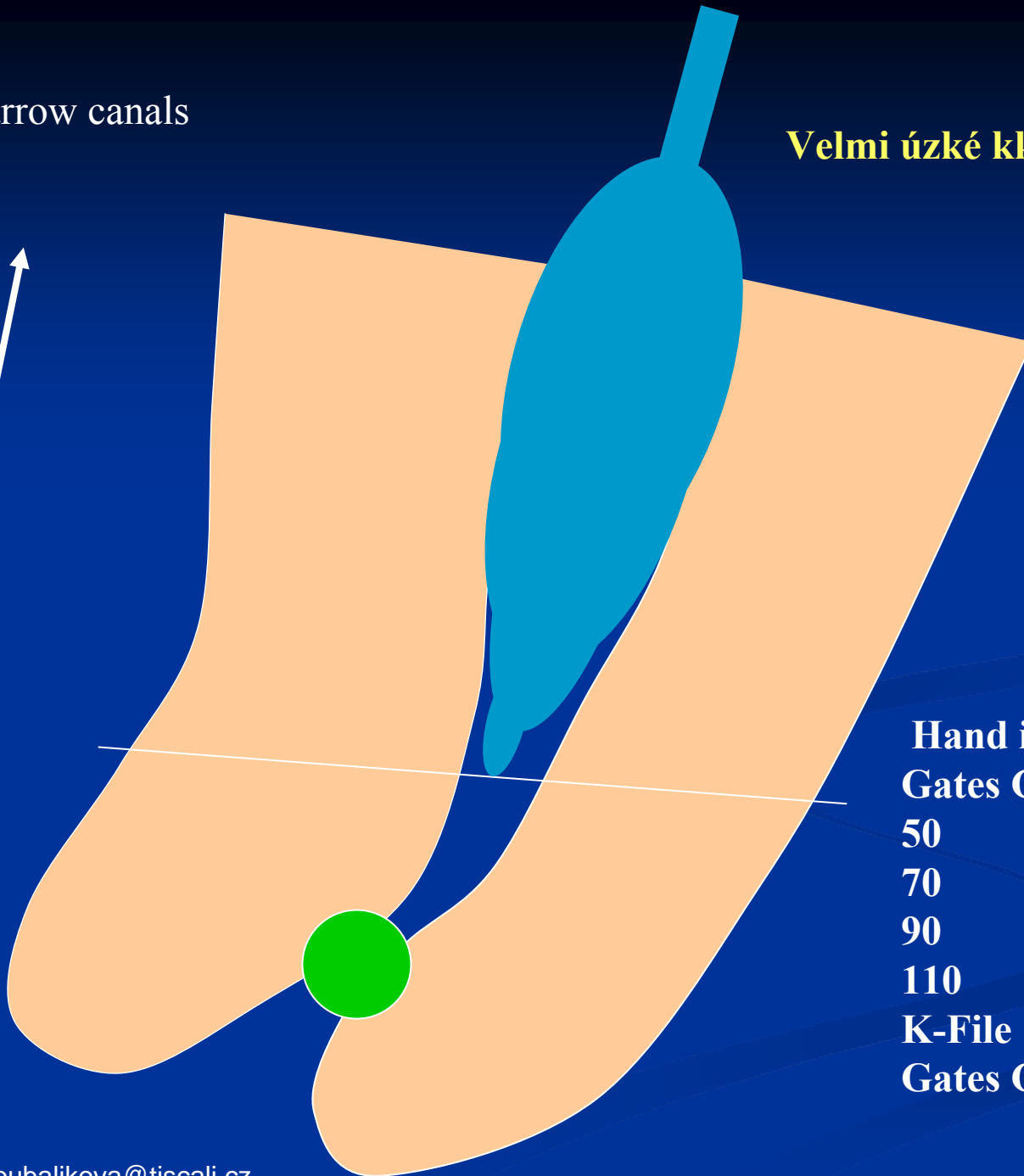
Simple canals



- 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

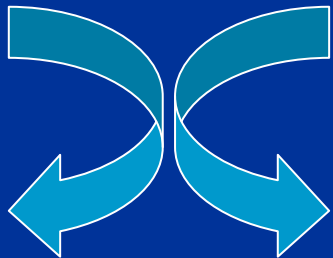
Lubrikacation

Importance

- Protection against fracture
- Better cleaning of coronal part Efektivní výplach a transport drti
- Effective irrigation
- Better conditions for measurement of working length
- Better conditions for apical preparation
- Less risk of complication

Shaping technique

- Rotation – 45°

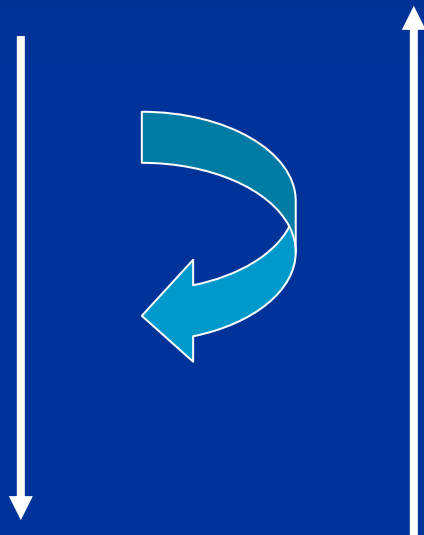


K – reamer

K- file

Shaping technique

- Rotace 45° tlak and pull motion



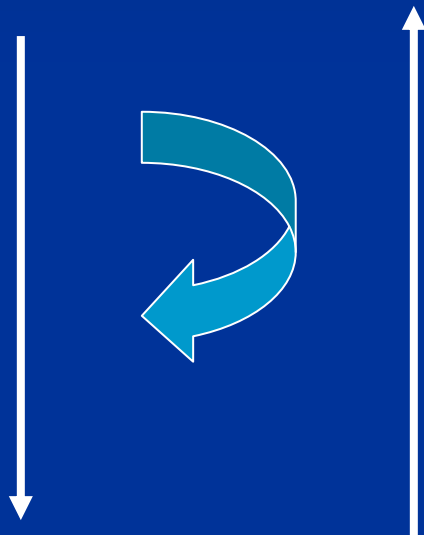
K – reamer

K- file

*Risk of ledging
Zip, elbow effect
Via falsa*

Shaping technique

■ Filing



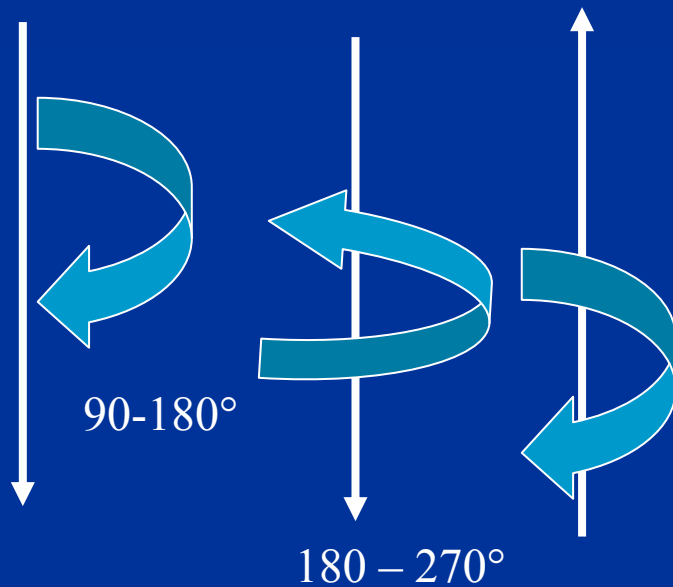
H- file

K – file

Risk of periapical infection infection
Risk of plug

Shaping technique

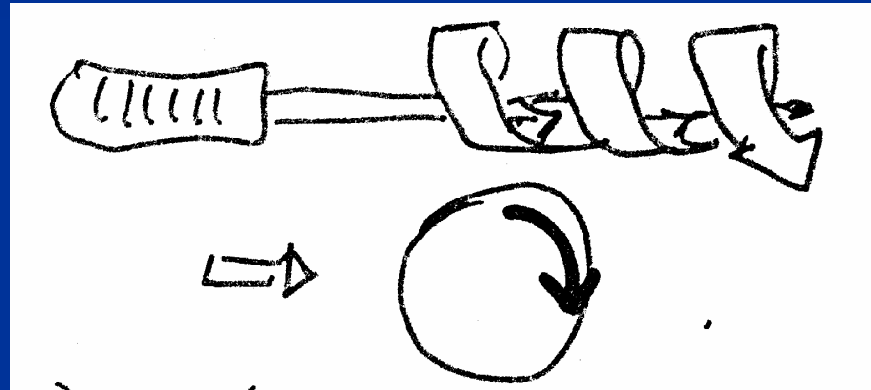
- Balanced force



K- flexofile

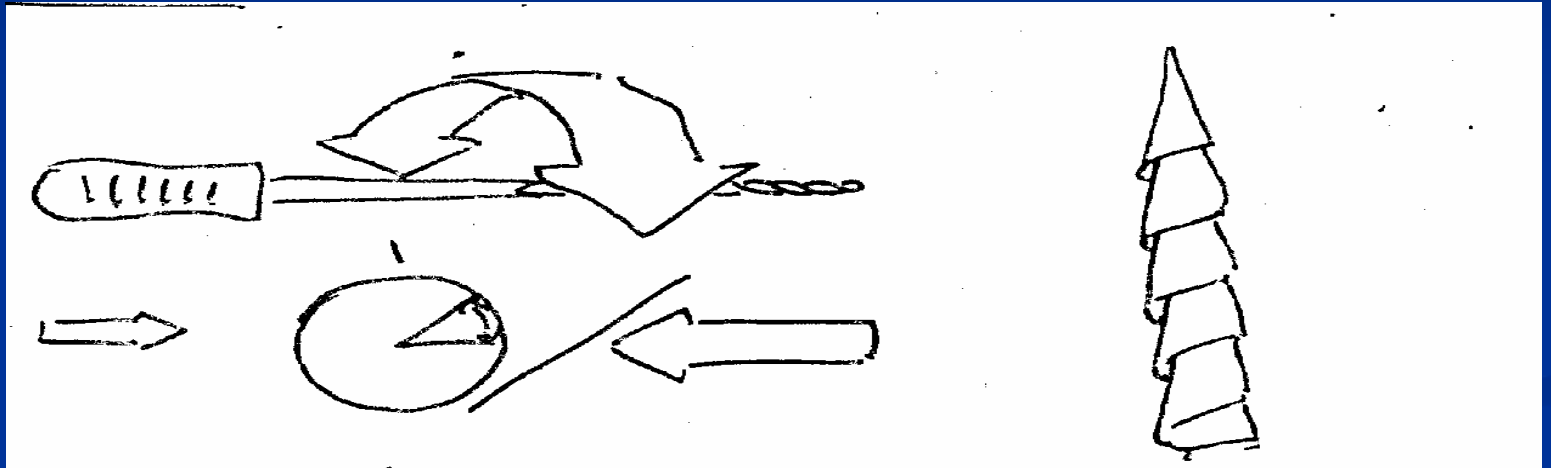
K – file (?)

Reaming)

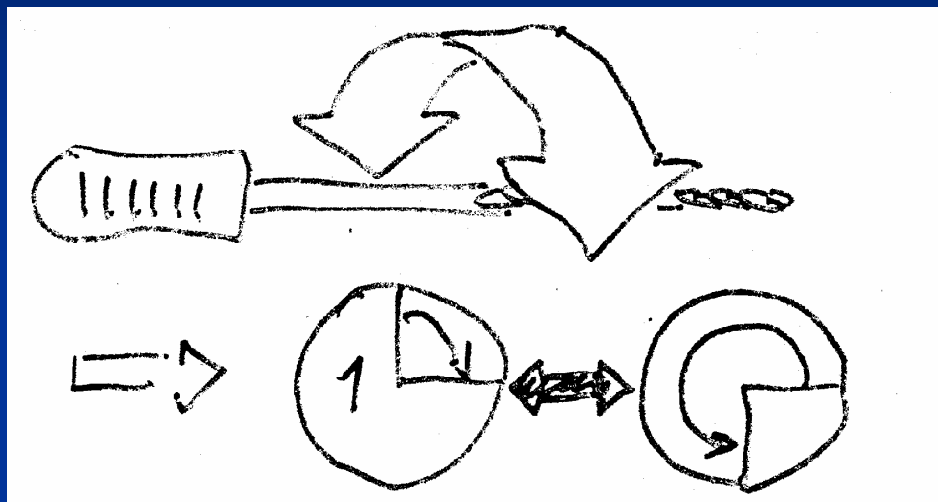


Jednoduchá rotace ve směru
hodinových ručiček, lehký tlak apikálně

Filing)



Balanced force technique



Methods of shaping

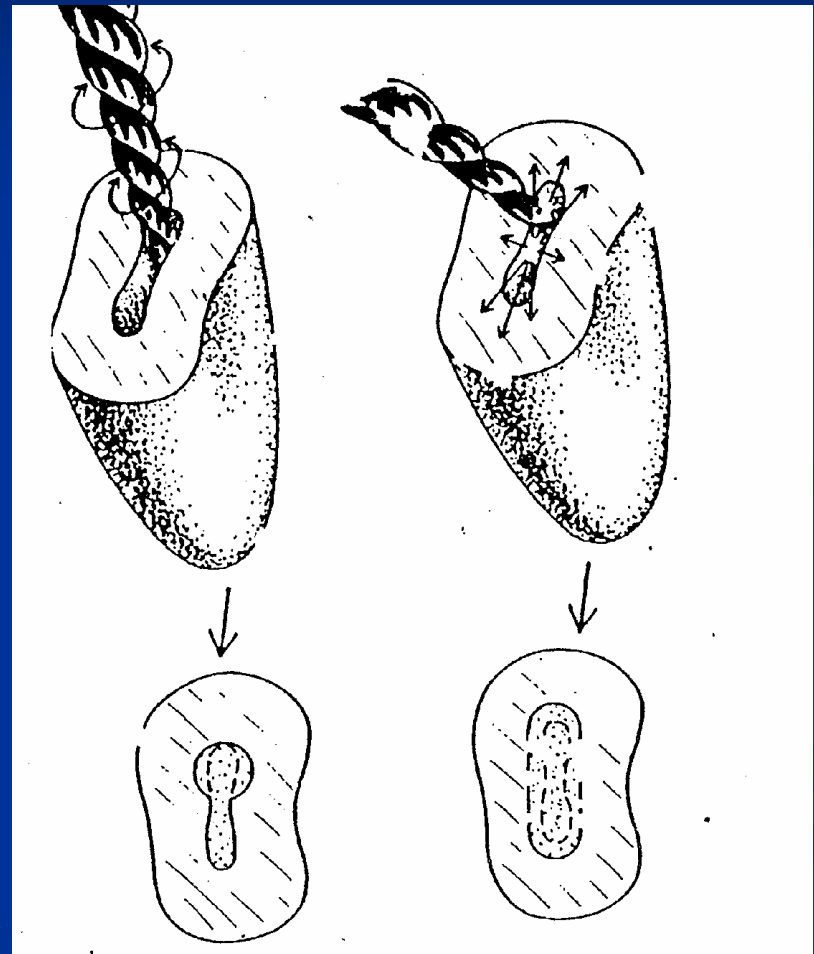
- Rotation and filing combined

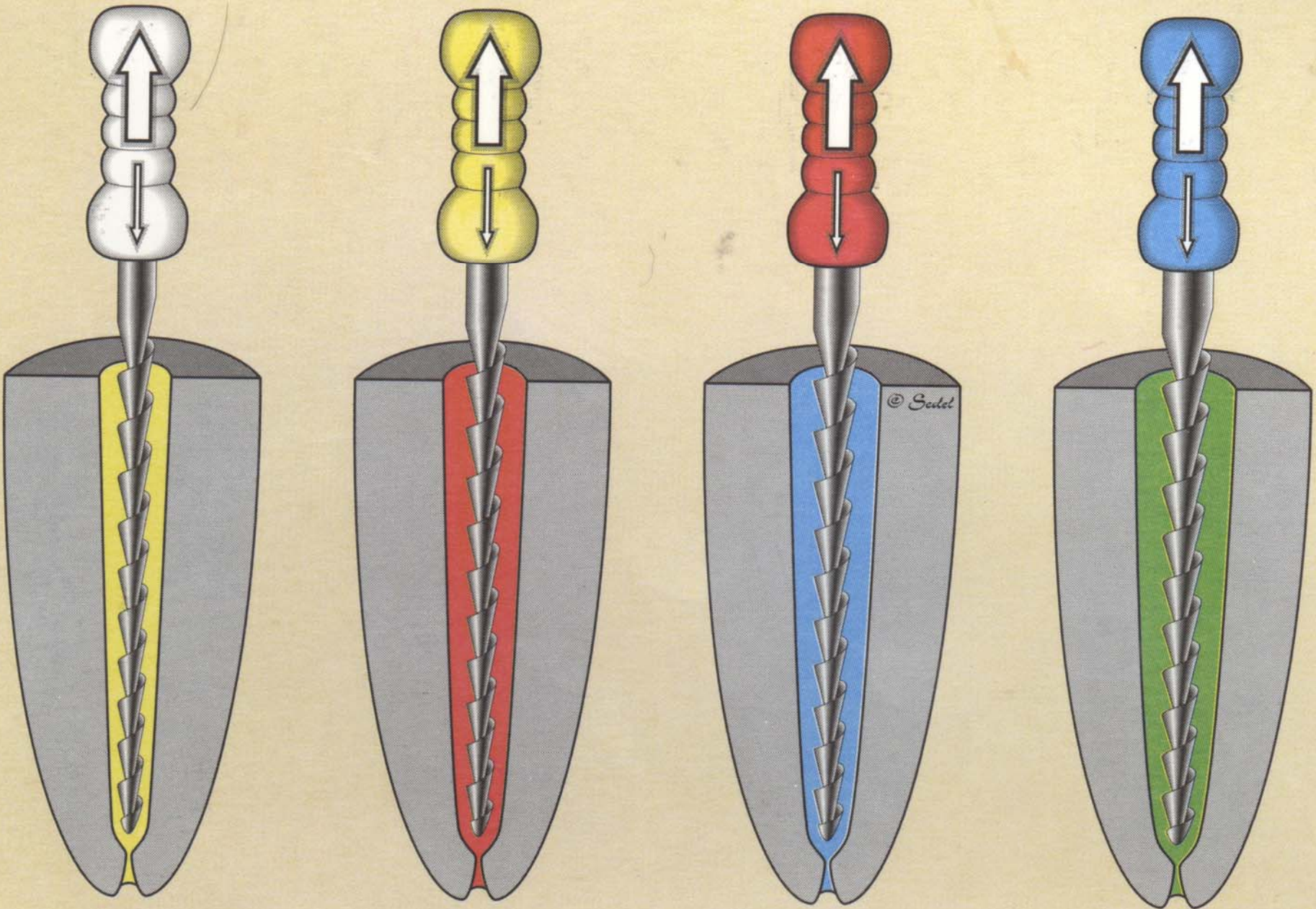
K - reamer

H- file

Methods of shaping

- Circumferential filing





Methods of shaping

■ Step back

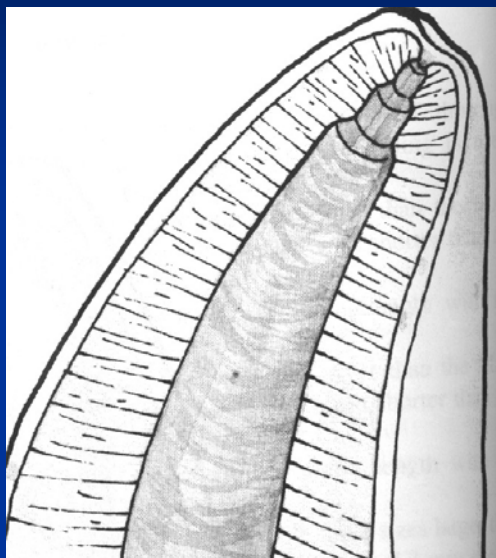
Vytvoření zarážky

prevence schůdků

H-file

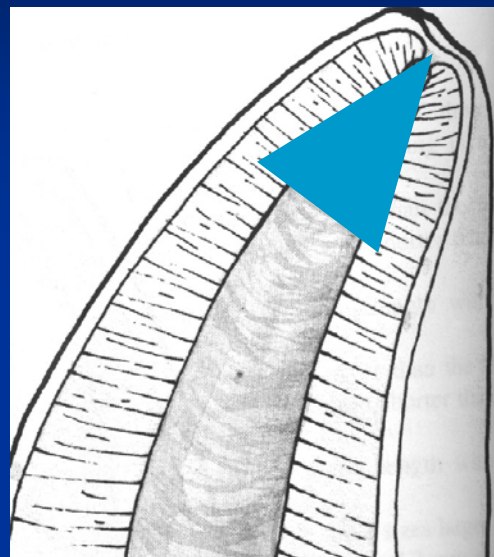
K-file

K-flexofile



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

Methods of shaping

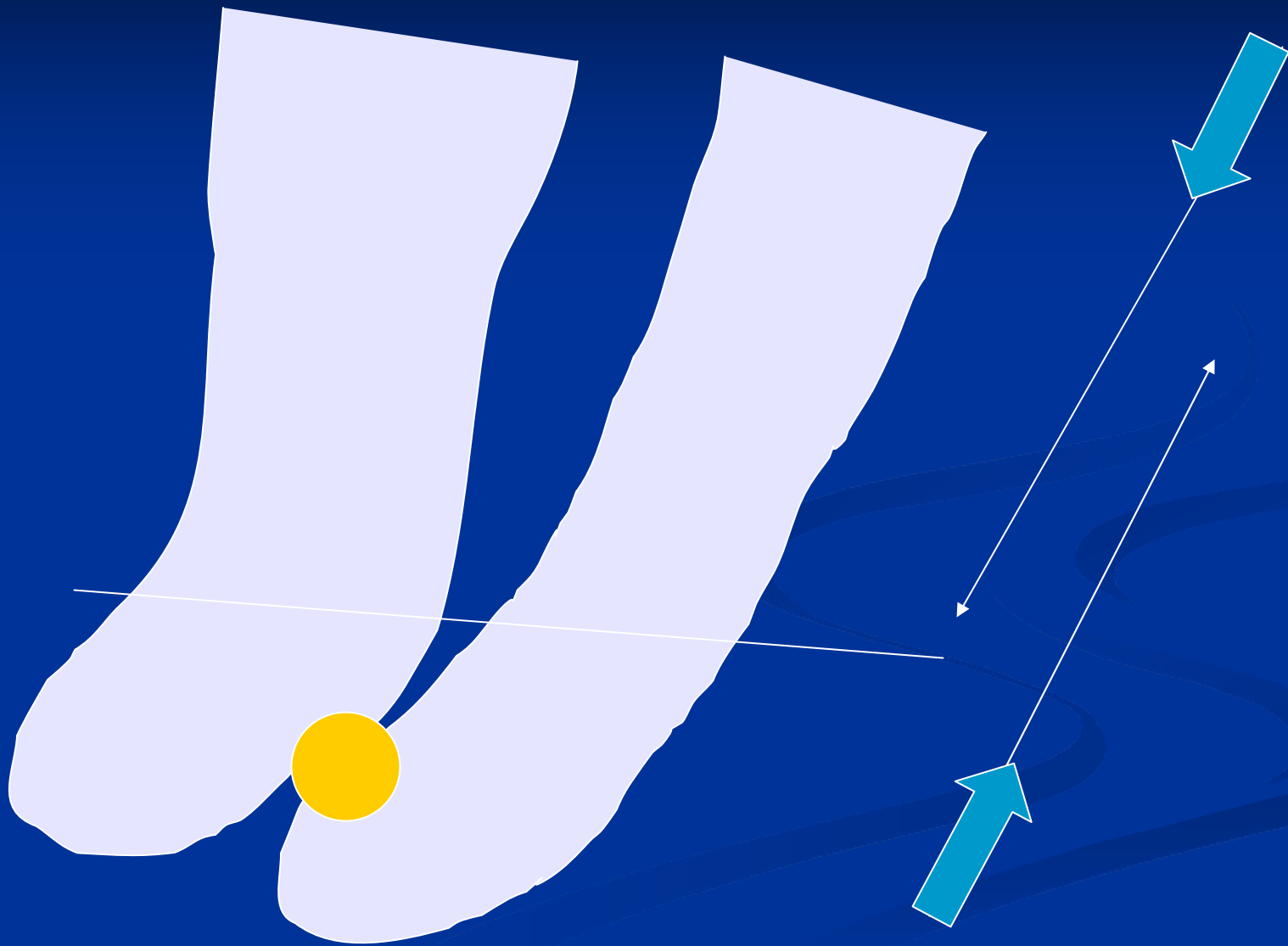
- Modified double flared with balanced force
 1. *Coronal flaring)*
 2. *Apical preparation balanced force*
 3. *Step back*
 4. *Final flaring*

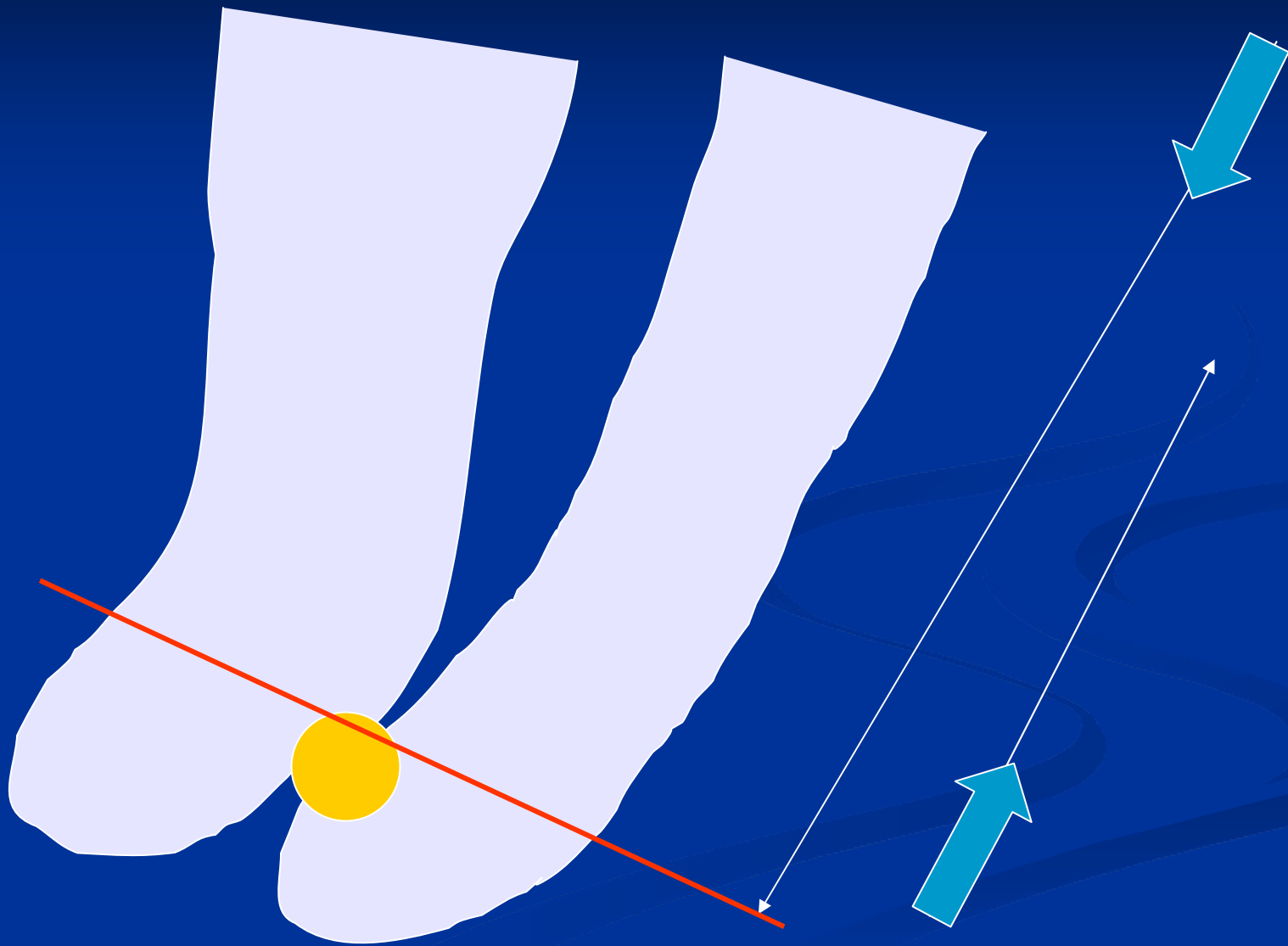
Flex Master organizer

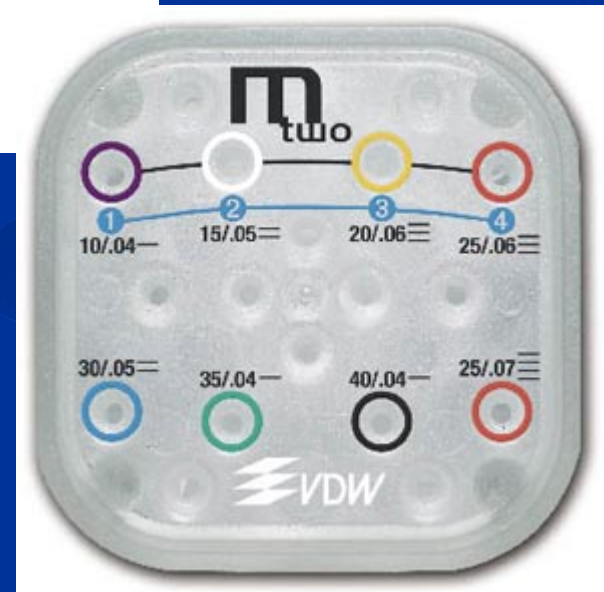
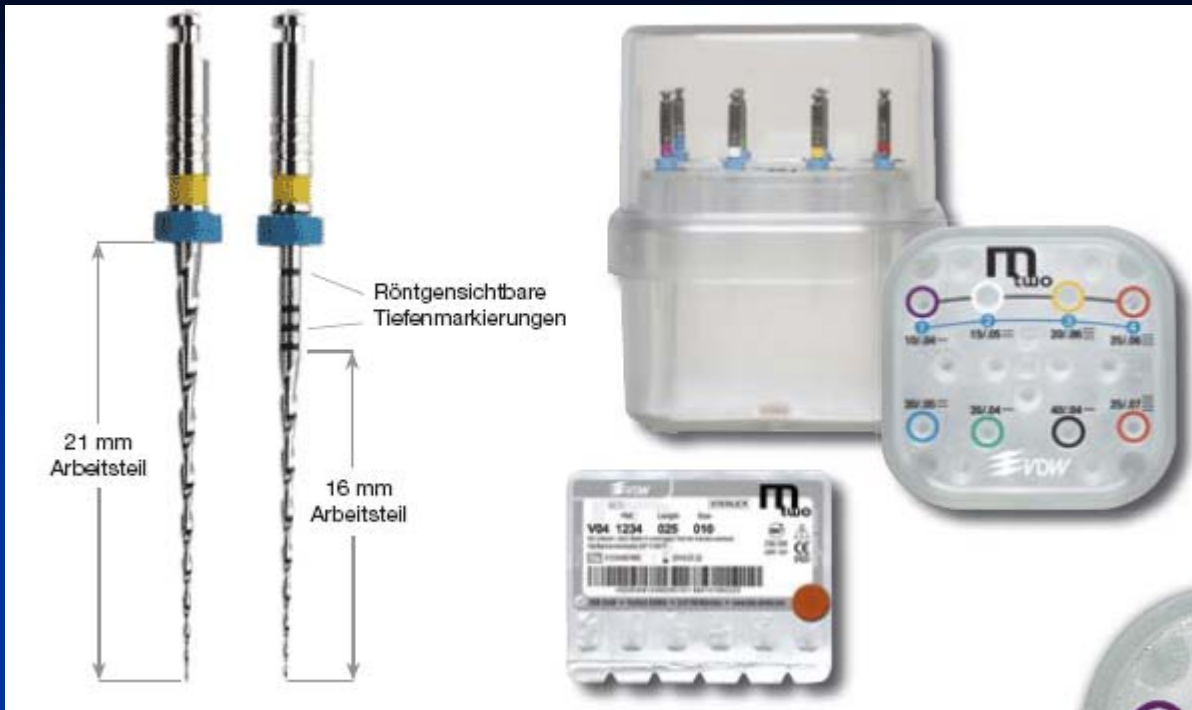
Crown down

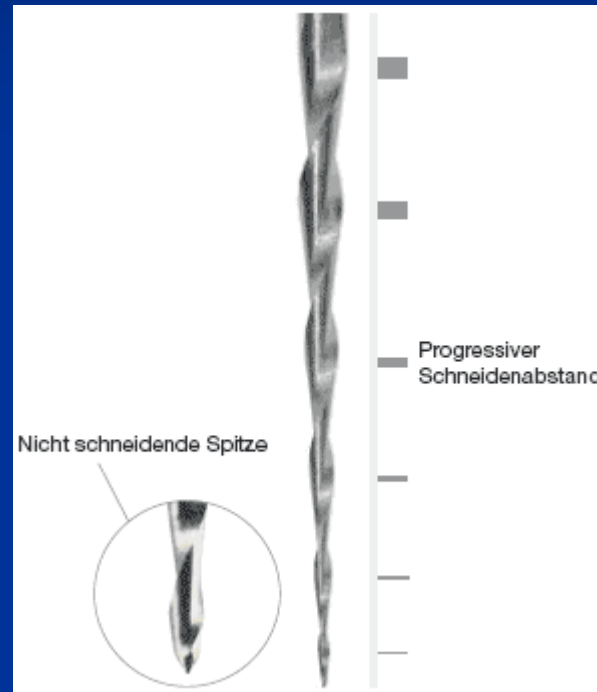
Apical
preparation





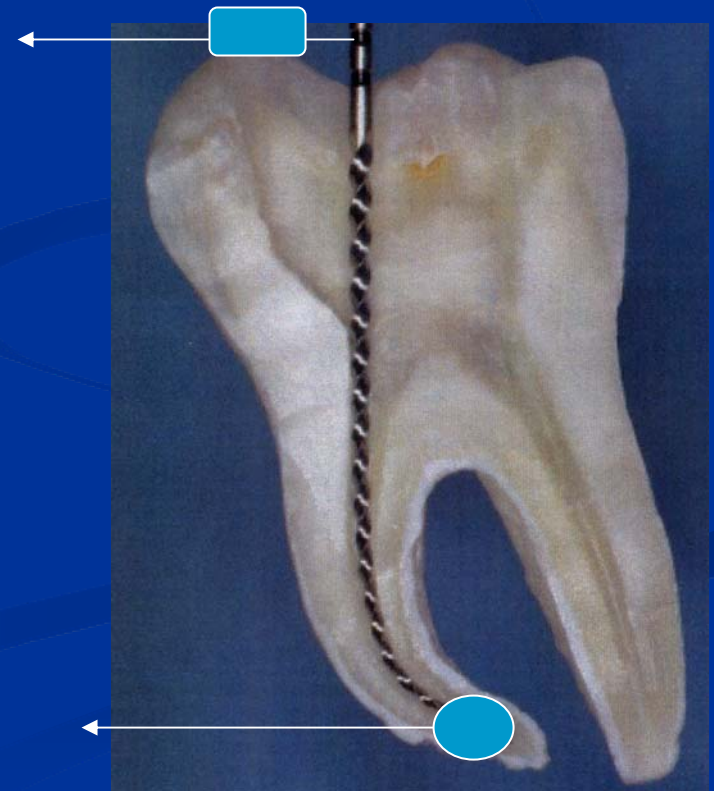




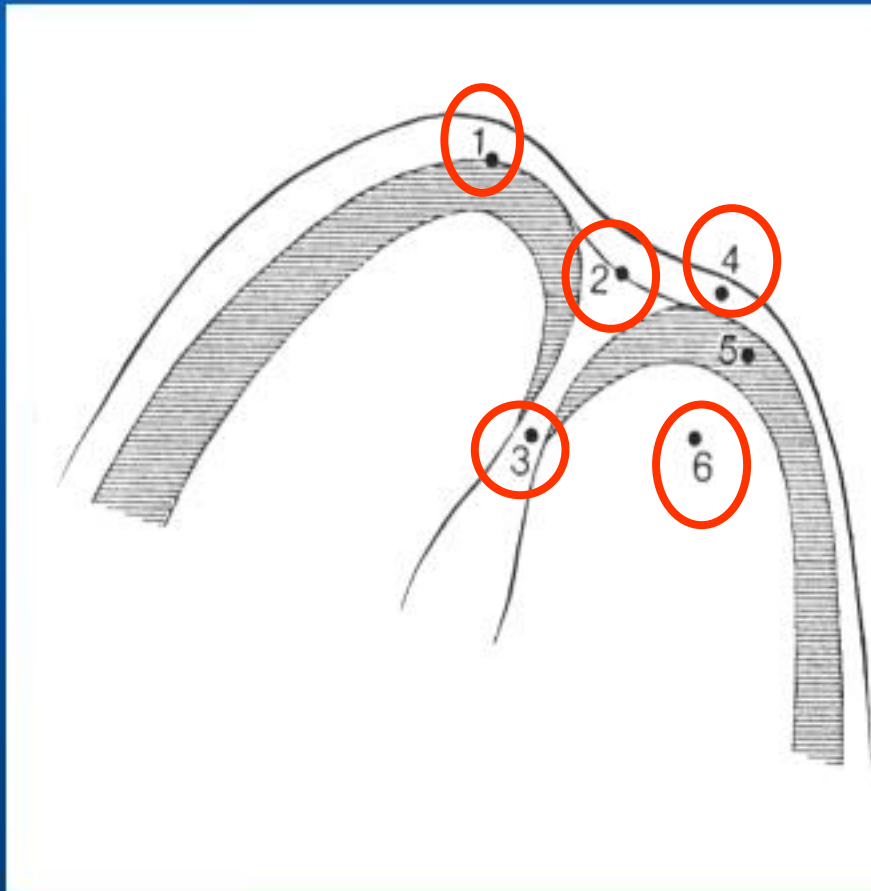


Working length

- A distance between the referent point and apical constriction



Apex anatomy



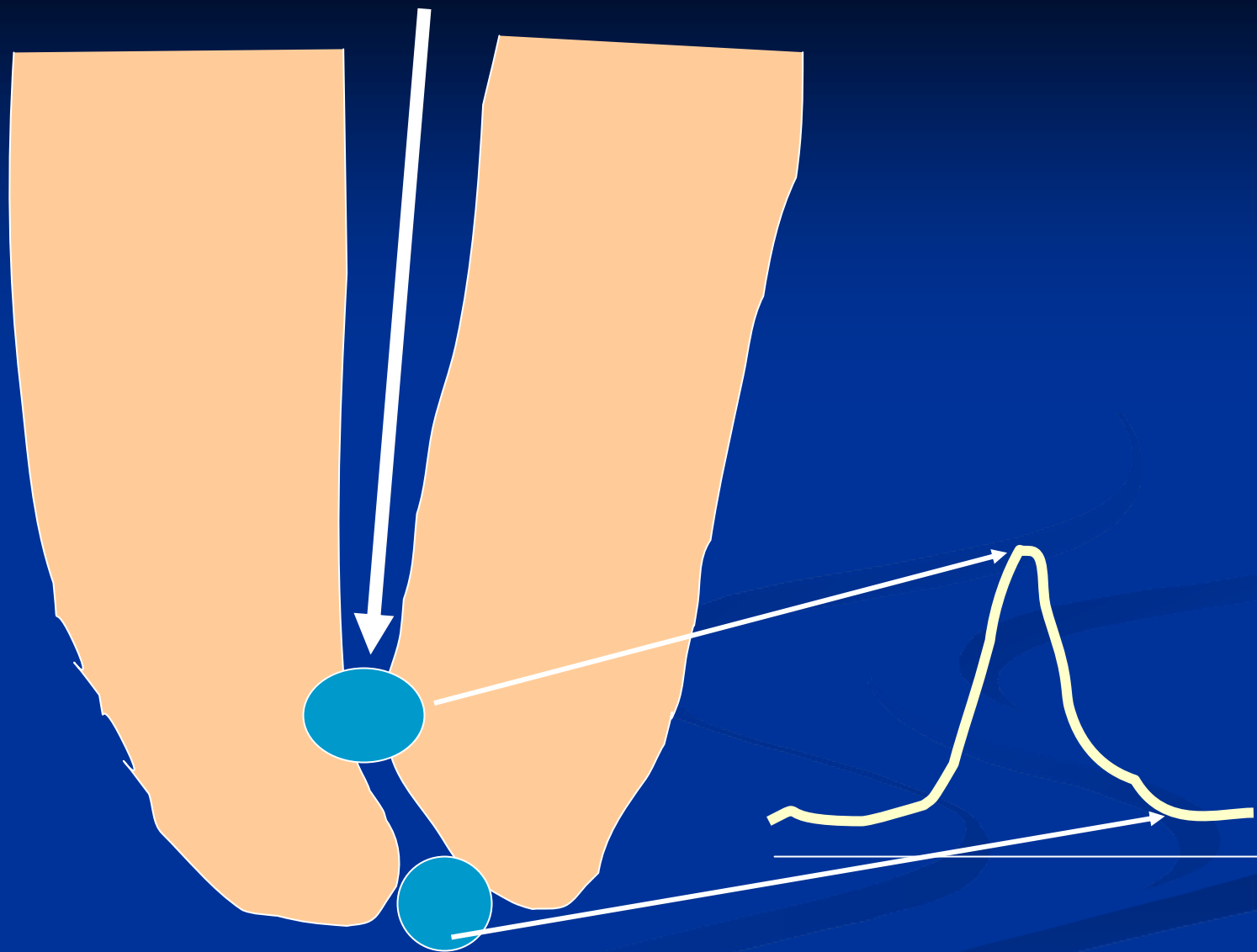
1. X-ray apex
2. Foramen apicale
3. Apical constriction
4. Perionontal ligament
5. Root cementum
6. Dentin

Methods

- X- ray
- Endometry (Electrometry) - apexlocators

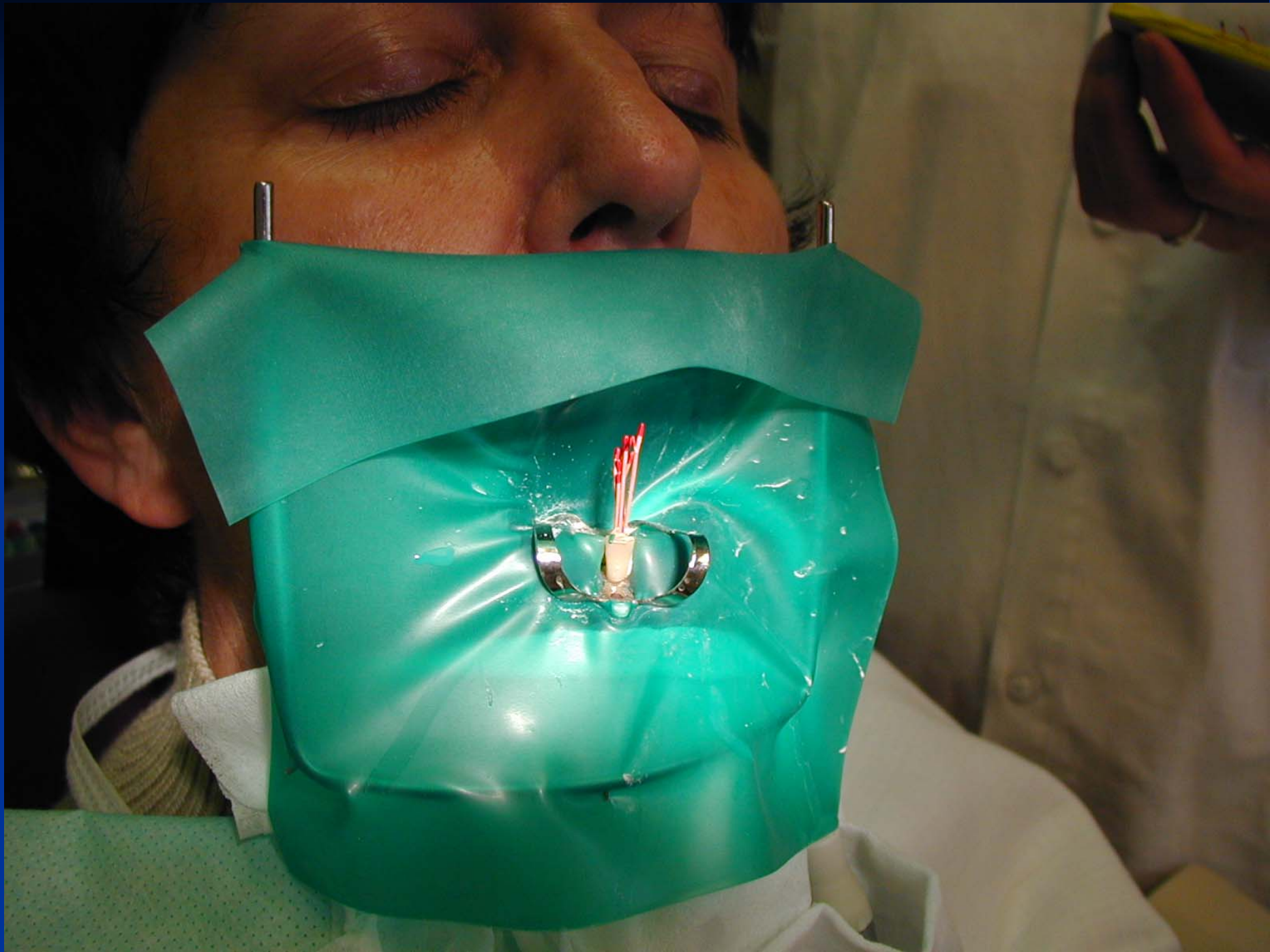
X-ray

- Safe length
- I 20 C 22 – 24, P 20, M 18, 20
- I 18, C 20, P 18, M 18



Údržba přístroje

- Povrchová desinfekce přístroje
- Slizniční elektroda (retní klip) a úchytka na kořenové nástroje se běžně sterilizují
- Přístroj nenecháme zbytečně zapnut
- Baterii dobíjíme



Epoxide resin

➤ Base (powder, paste)

Bismuth oxid

Titanium dioxide

Hexametylentetramine

(Silver)

➤ Catalyst (liquide, paste)

Bisphenoldiglycidylether

Epoxidové pryskyřice

(advantages)

- Long working time
- Hydrophilic (good penetration)
- Good adhesion to the root canal walls
- Volume stability
- No dissolution
- Antibacterial

Epoxidové pryskyřice (disadvantages)

- Difficult removal
- Staining
- Initiatory roxicity

No suitable for the single cone technique !

Polyketone

➤ Base

Zinc oxide

Bismuth phosphate

Hexametylentetramine

➤ Lequid

Bisphenolglycidylether and other components

Polyketonové pryskyřice

(Výhody a nevýhody)

Advantages

Good adhesion

No contraction

No dissolution

Disadvantages

High stickiness

Not removable

Products: Diaket, Diaket A (3M ESPE)

Methacrylate resins

Endo ReZ (Ultradent) – UDMA

For injection – single cone technique

Epiphany (Pentron)

Bis- GMA, etoxy bif- GMA, hydrophilic bifunctional methacrylates

Calcium hydroxide, baryum sulphate, baryum glass silica.

Sealer in combination with Resilon

Glasionomer sealers

➤ Base (powder)

Aluminium silicate glass

➤ Liquid

Polyacrylic acid, polymaleic acid, tartaric acid

Glasionomer sealers

(Advantages and disadvantages)

Advantages:

Curing under wet conditions, chemical bonding to hard dental tissues, no staining

Disadvantages

Short working time, difficult removal,
porous

Products

Ketac Endo (3M ESPE), Endion (VOCO)

Silicon based sealers

Polyvinylsiloxane (ev. in mixture with powdered guttapercha)

Biocompatibility

Hydrophilic

Further investigation desirable.

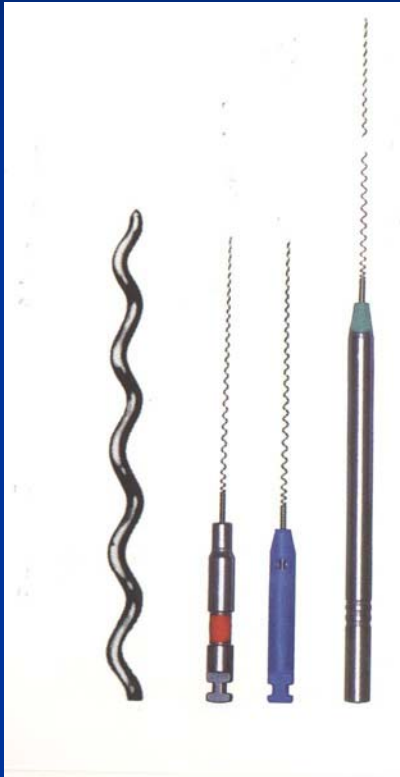
Root canal fillings - forms

- **Points (Cones)**
- **Materials for injection**
- **Plastic materials**

Instruments

- Lentulo
- Compactors
- Compactors - carriers
- Others

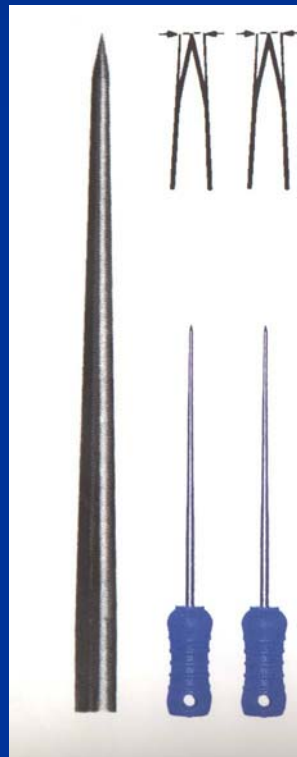
Lentulo



- delivers pastes
- 1,5 – 2 mm ahead
- at most for $\text{Ca}(\text{OH})_2$

Compactors

Spreader



Pointed

Vertical introduction

*Lateral condensation
technique*

Compactors

Plugger



Not pointed

Vertical introduction

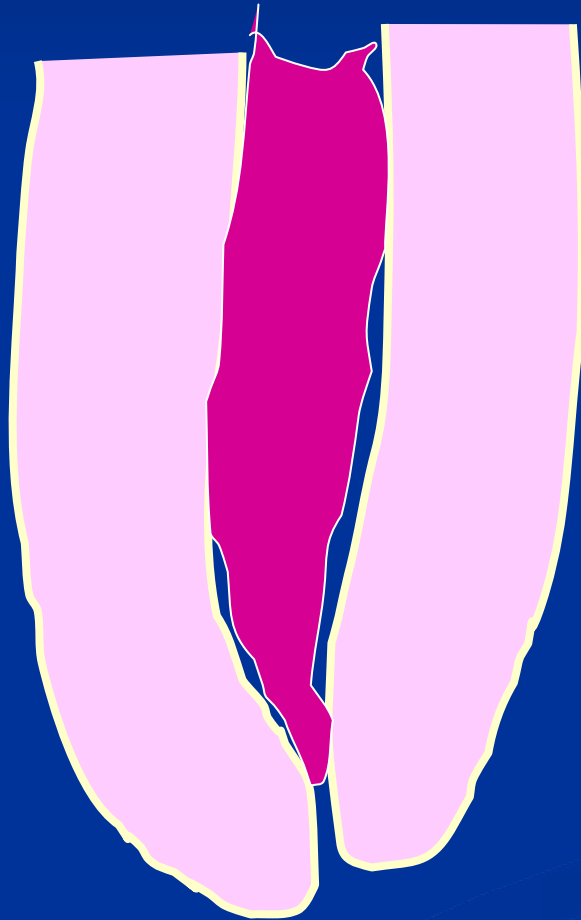
*Vertical condensatuion
- compaction*

Filling techniques

Cold

Warm

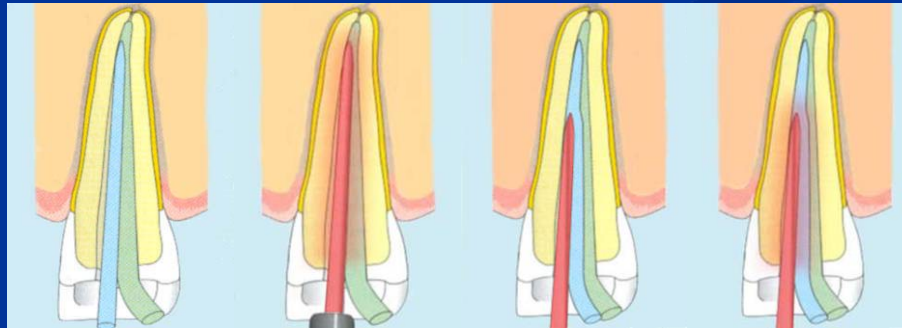
Paste only

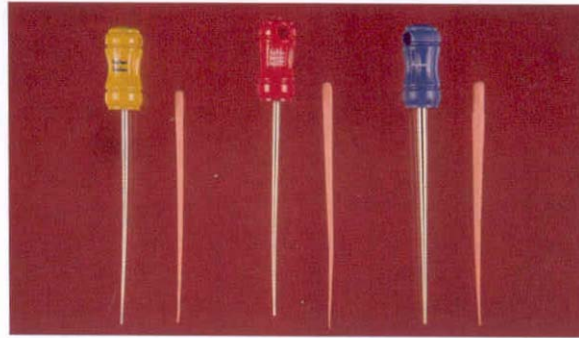


**Shrinkage, difficult
removal**

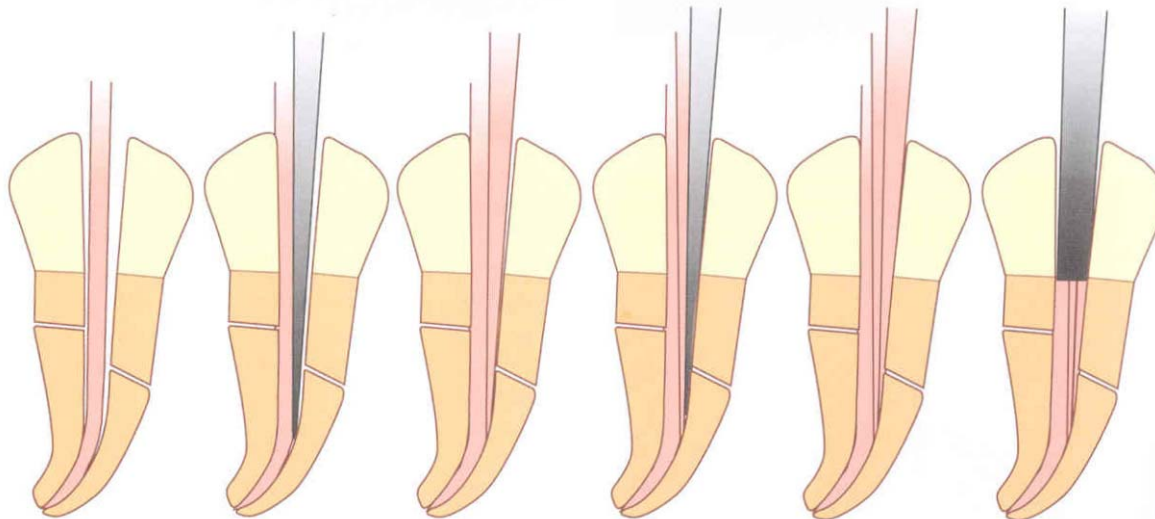


Warm lateral condensation



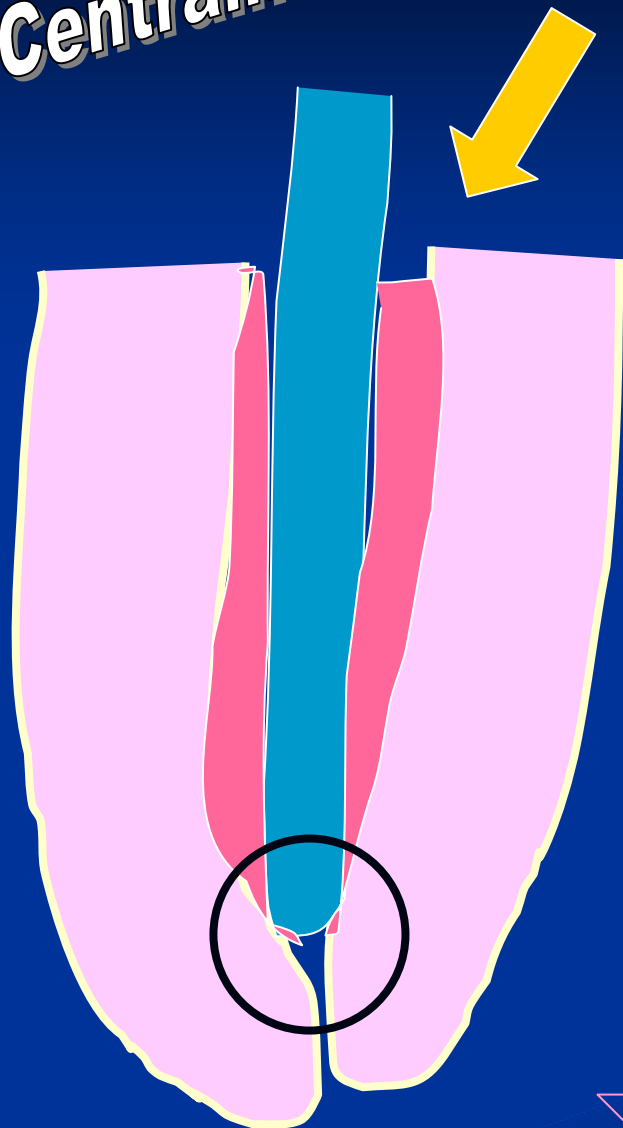


A

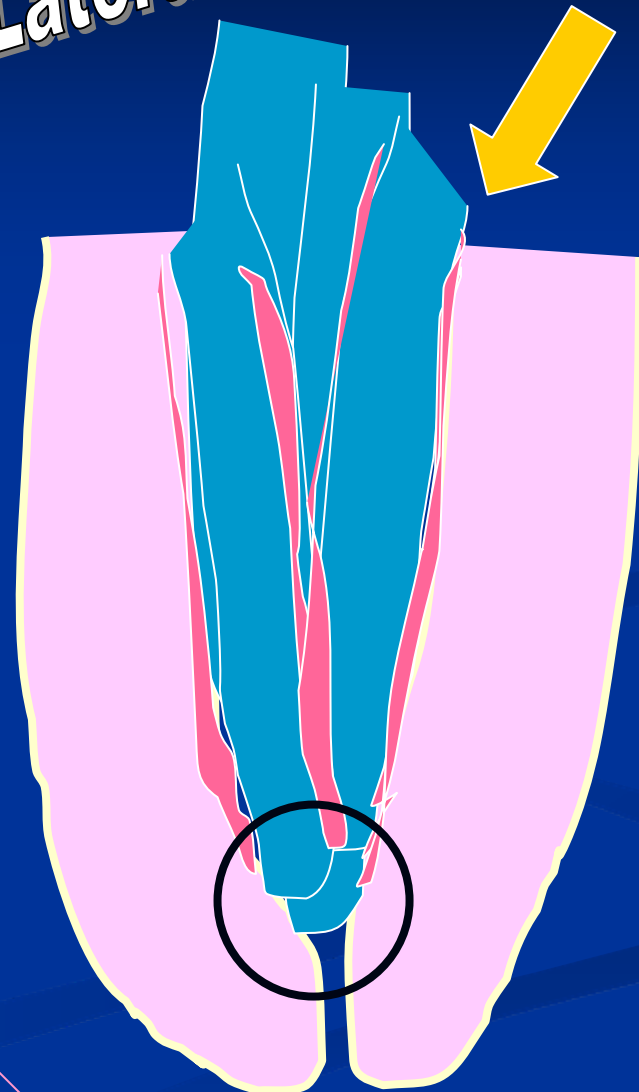




Centrální čep

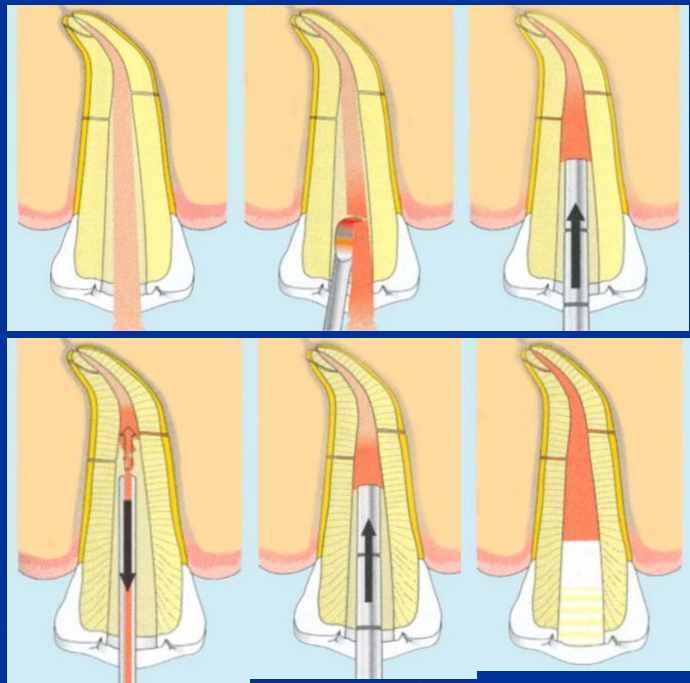


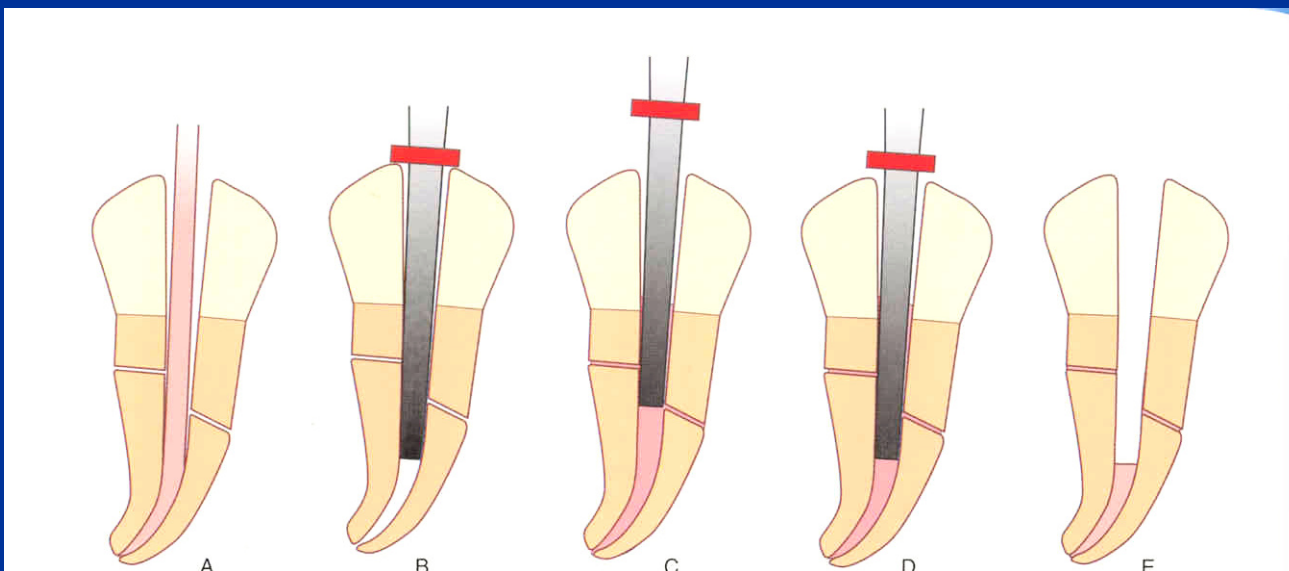
Laterální kondenzace



Vertical condensation

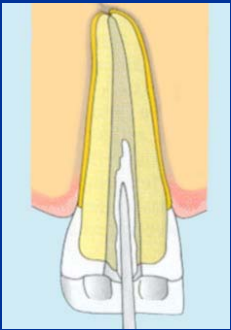
- Obtížnější kontrola pracovní délky
- Možná extruze sealeru
- Teplo

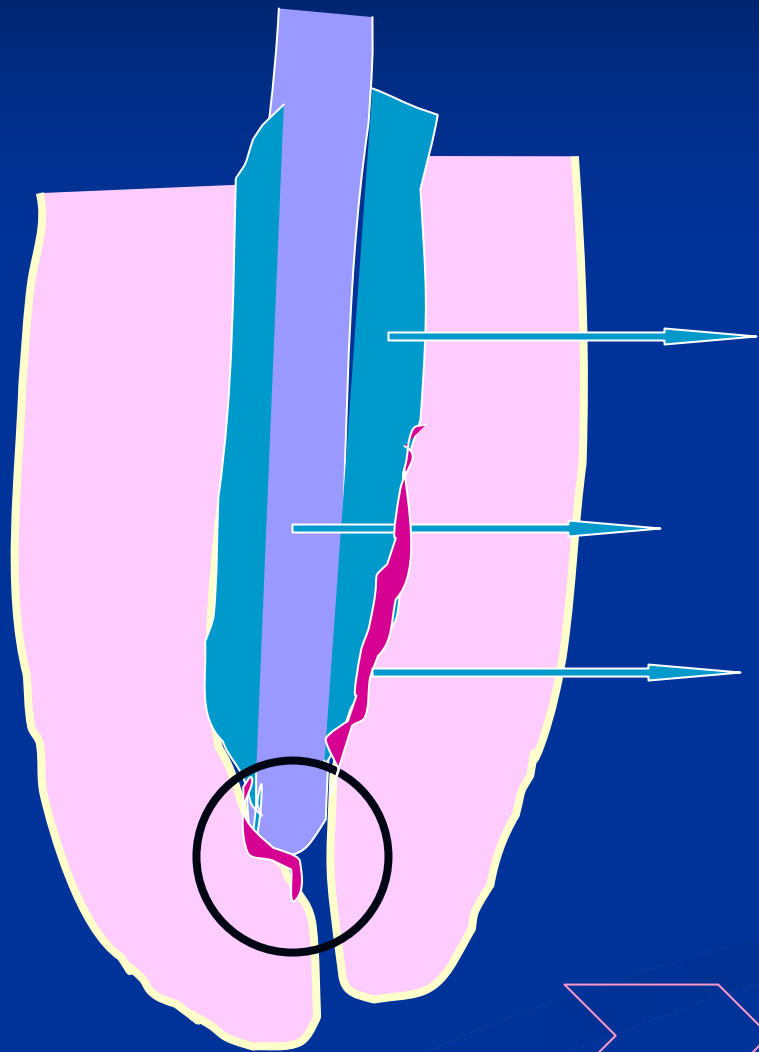




Thermafil

- Guttapercha on the carrier

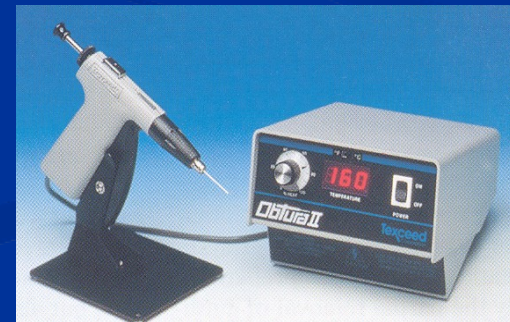
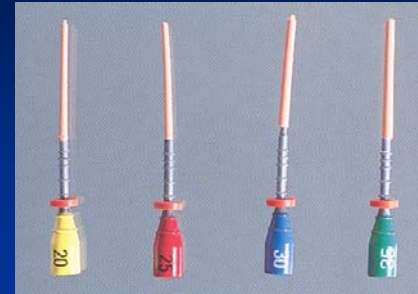




guttapercha

carrier

sealer



Thermafil, Soft Core etc.

