

Endodontics

The object of the endodontics are pulpal and periodontal diseases – their diagnosis, therapy, prevention

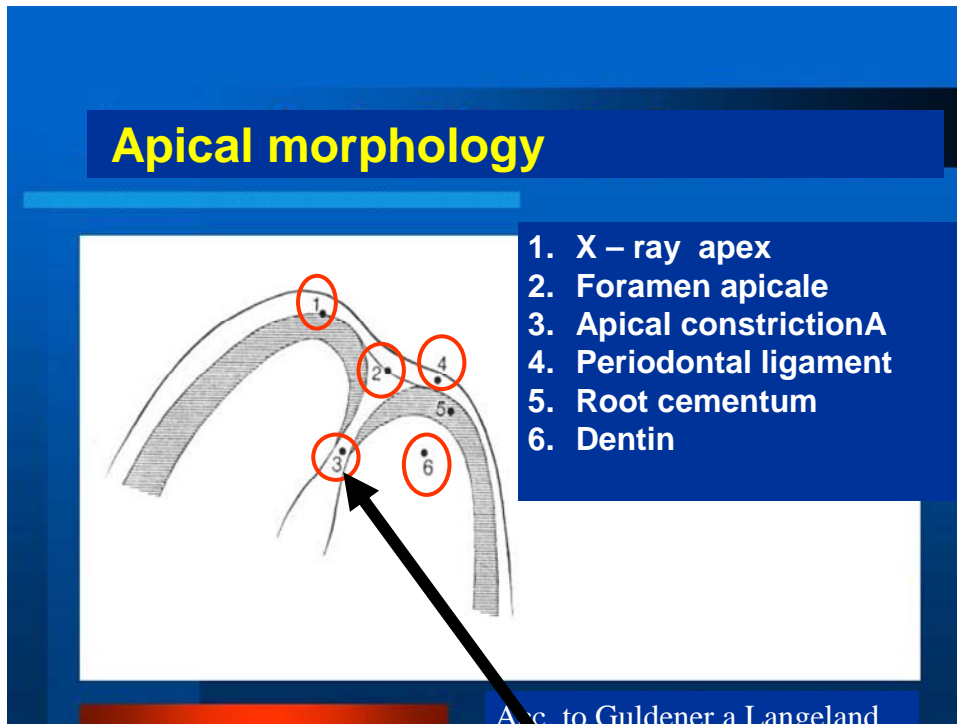
Morphology of the root canals

- The root canal is not round but almost always oval (long axis mesiodistal)
- The root canal does not go straight but it deflects distal
- The outfall is not on the top of the root but below (distal or distooral)
- The form of the outfall is funnel - shaped
- The root canal system has usually more outfalls (ramifications)
- The ramifications are situated mostly in apical area (first apical mm)
- All outfalls are situated in cementum

Basic forms of the root canal system (Weine)



Apical morphology



Canal shaping terminates in apical constriction

- Small communication
- Less risk of periodontal damage
- Prevention of overfilling
- Prevention of apical transport of infectious material
- Possibility of good bacterial decontamination
- Possibility of good condensation of the root filling

Phases of the endodontic treatment

- 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

Penetration to the pulp chamber



Dia trepan



Dia round burs — balls



Steel round burs



Penetration to the pulp chamber



Dia trepan



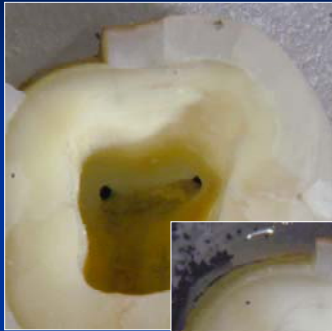
Dia round burs — balls



Steel round burs



Find the root canal orifice



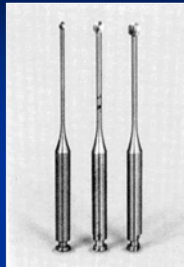
lenka.roubalikova@tiscali.cz

8

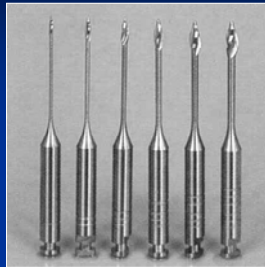
Find and open the root canal orifices



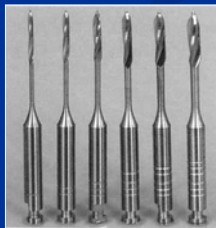
Rounded burs - balls



Miller's burs




Gates Glidden's burs



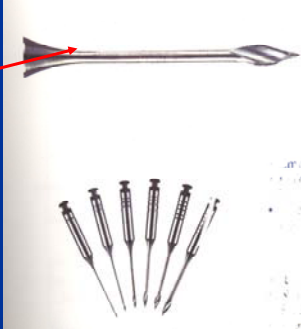
Peeso - Largo

lenka.roubalikova@tiscali.cz

10



Gates – Glidden:
Blunt, non active tip



Programm point of breakage

lenka.roubalikova@tiscali.cz 12

Pulpextractor



**Removal of contents
of root canal**

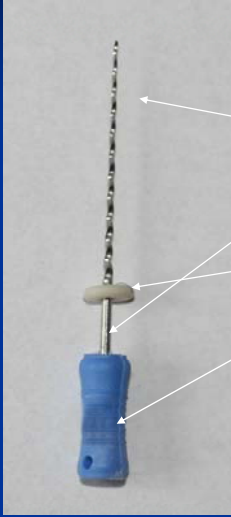


Pulpextractor

lenka.roubalikova@tiscali.cz 15

Reamer

Reamer

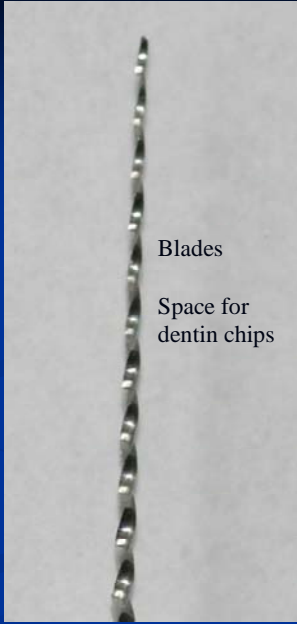


Bladed part

Shank

Stopper

Grip



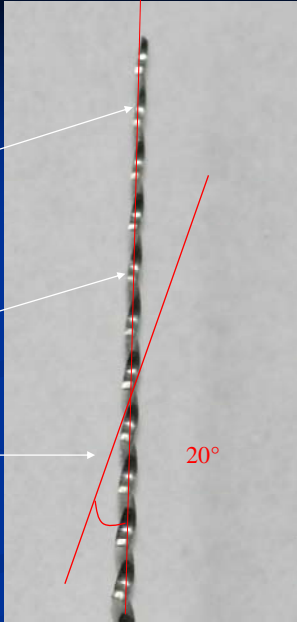
Blades

Space for dentin chips

lenka.roubalikova@tiscali.cz

19

Reamer



Blades

Space for dentin chips

Tangent angle

20°

Rotation – reaming action - penetration

lenka.roubalikova@tiscali.cz

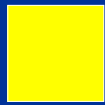
20

K- File

K file

Wire triangl or square

Symbol is always square

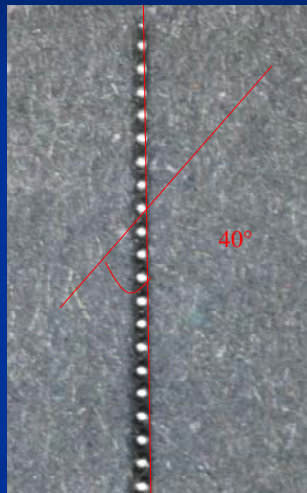


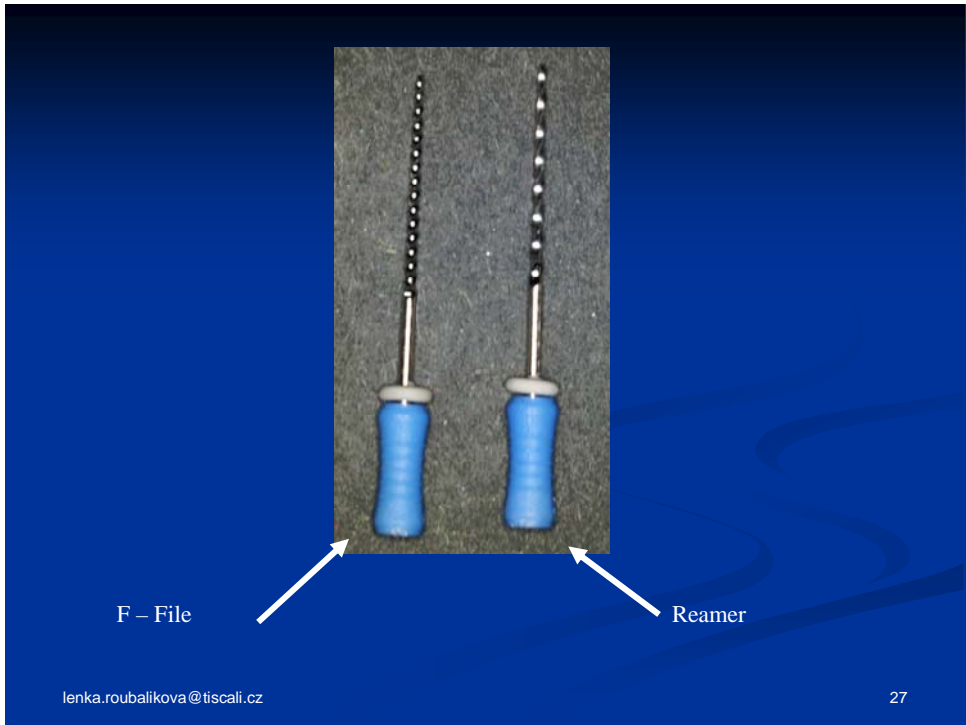
K-file

Filing

Also rotation

45° - 90°





H – file

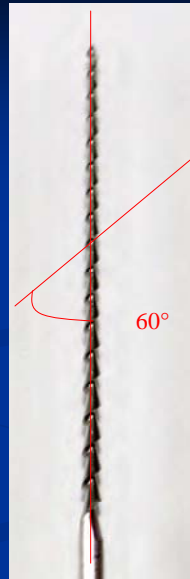


H- file

No rotation!!

Pull motion only!!

Risk of breakage in small sizes



ISO

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

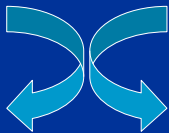


ISO norma

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

Shaping technique

- Rotation – 45°

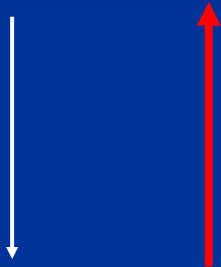


K – reamer

K- file

Shaping technique

■ Filing



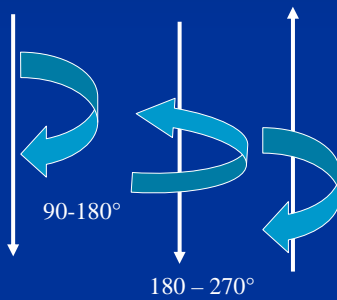
H- file

K – file

Risk of periapical infection
Risk of plug

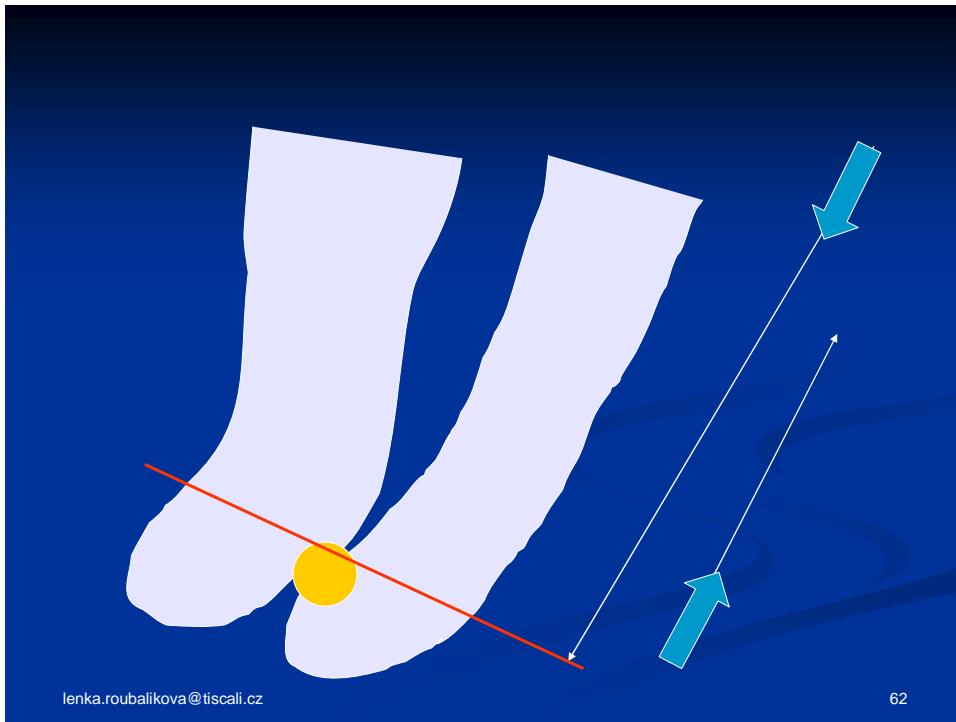
Shaping technique

■ Balanced force



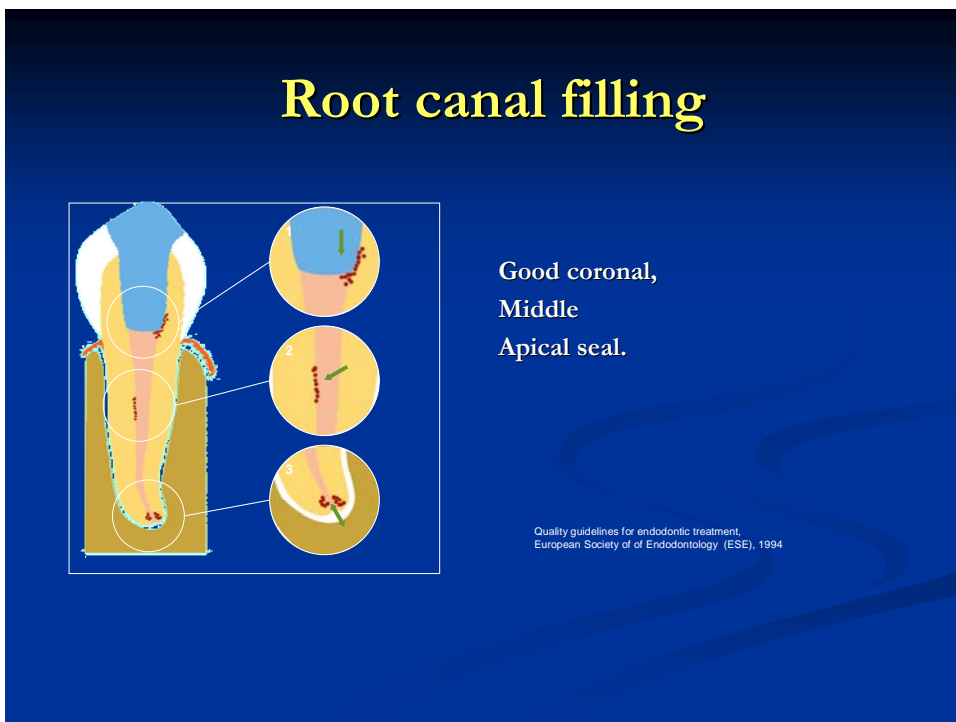
K- flexofile

K – file



Root canal filling

Guttapercha + sealer



Ideal root canal filling (Grossman 1988)

1. Easy mixing
2. Sufficient working time
3. Good seal
4. X-ray contrast
5. Easy removal
6. No shrinkage
7. Long term volume stability
8. No bacterial growing
9. No permeability for fluids
10. Biocompatibility
11. No staining

Guttapercha

Dried juice of the Taban tree (*Isonandra percha*)
(gutta)

1,4 - polyisoprene

Crystallin structure (60%)

Brittle, thermoplastic

Guttapercha

- **Beta phase**

- **Alpha phase** 42 – 49 °C

- plastic

- **Gamma phase** 56 – 62° (amorphous)

Cooling process

very slowly (less than 0,5°C) – alpha phase

normal cooling– beta phase

Composition of guttapercha materials in endodontic

Guttapercha 19% – 22%

Zinc oxide 59 - 79%

Heavy metal salts 1% - 7%

Wax or resin 1% - 4%

Calciumhydroxide sealers

Base (powder)

Calcium hydroxide

Zinc oxide

Other components and vehicula

Catalyst (paste)

Zinc stearat

Titanium dioxide

Baryum sulphate

or

Eugenol, Eukalypt

others

Kalciumhydroxide sealers

➤ Increase of the healig potential of periapical tissues

➤ Antibacterial effect

➤ Easy manipulation

But!

Resorbable if not homogeneus

Not suitable for the single cone technique

Resin based sealers

- Epoxide
- Polyketone
- Metacrylate

Epoxide resin

- Base (powder, paste)
 - Bismuth oxid
 - Titanium dioxide
 - Hexametylentetramine
 - (Silver)
- Catalyst (liquide, paste)
 - Bisphenoldiglycidylether

Epoxide resins (*advantages*)

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

Epoxide resins (*disadvantages*)

- Difficult removal
- Staining
- Initiatory roxicity

No suitable for the single cone technique !

Polyketone

➤ Base

Zinc oxide

Bismuth phosphate

Hexametylentetramine

➤ Liquid

Bisphenolglycidylether and other components

Polyketone (*Advantages and disadvantages*)

Advantages

Good adhesion

No contraction

No dissolution

Disadvantages

High stickness

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 (synthetic polymer – cones or cartridges)

Glasionomer sealers

➤ Base (powder)

Aluminium silicate glass

➤ Liquid

Polyacrylic acid, polymaleic acid, tartaric acid

Glasionomer sealers

(Advantages and disadvantages)

Advantages:

Curing under wett 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.

Silicon based sealers

Polyvinylsiloxane (ev. in mixture with powdered guttapercha)

Biocompatibility

Hydrophilic

Further investigation desirable.

Instruments for the root canal filling

Instruments

- Lentulo
- Compactors
- Compactors - carriers
- Others

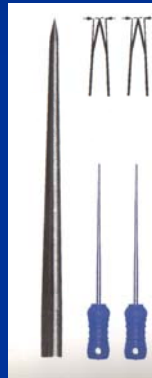
Lentulo



- 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



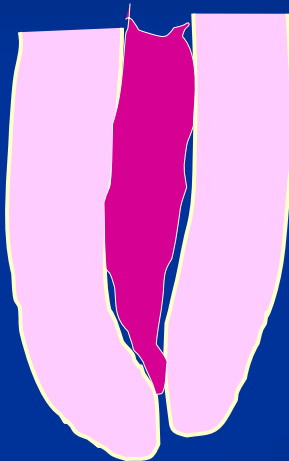
Not pointed

Vertical introduction

*Vertical condensatuion
- compaction*

Filling techniques

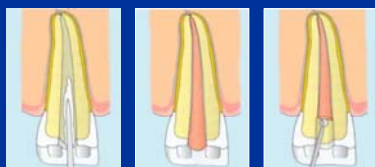
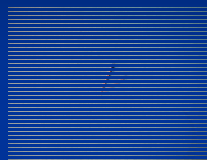
Paste only



**Shrinkage, difficult
removal**

Single cone technique

- Easy
- Fast
- Good control of WL
- Standard round preparation – risk of leakage



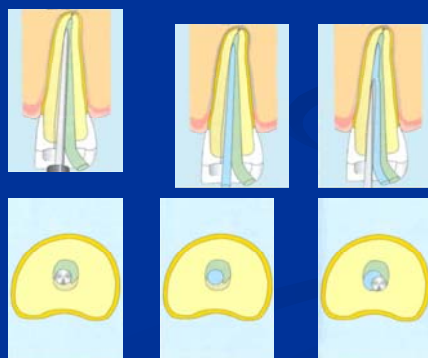
Wesselink, P.: Root filling techniques, Textbook of Endodontology, p. 286-299, Blackwell Munksgaard 2003, Oxford

lenka.roubalikova@tiscali.cz

16

Lateral condensation

-
- Standard cold technique



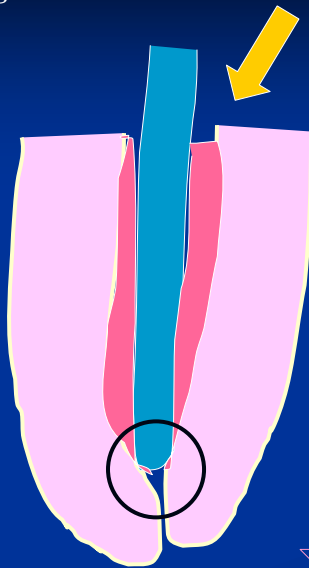
lenka.roubalikova@tiscali.cz

Wesselink, P.: Root filling techniques, Textbook of Endodontology, p. 286-299, Blackwell Munksgaard 2003, Oxford

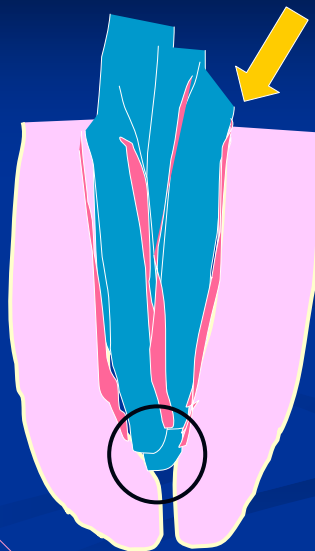
19



Single cone

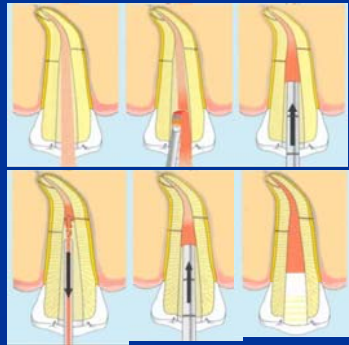


Lateral condensation

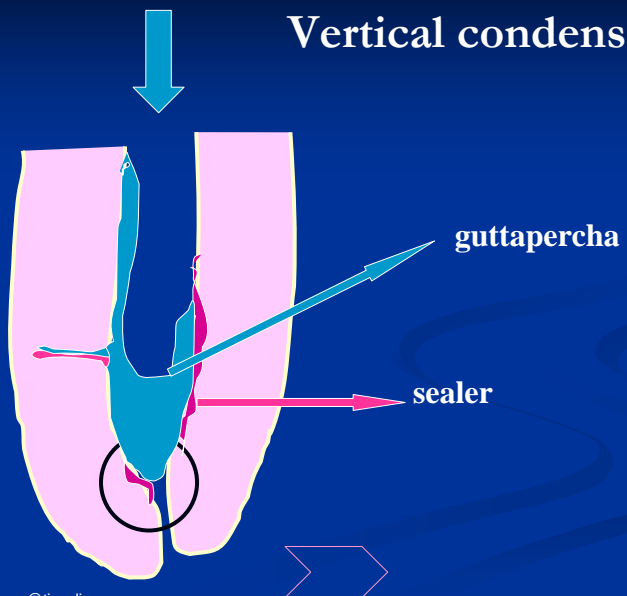


Vertical condensation

- Risk of extrusion
- Warm



Vertical condensation



Injection

