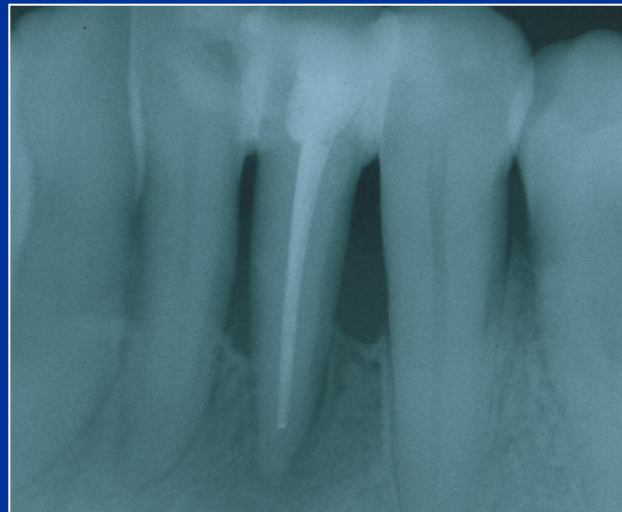
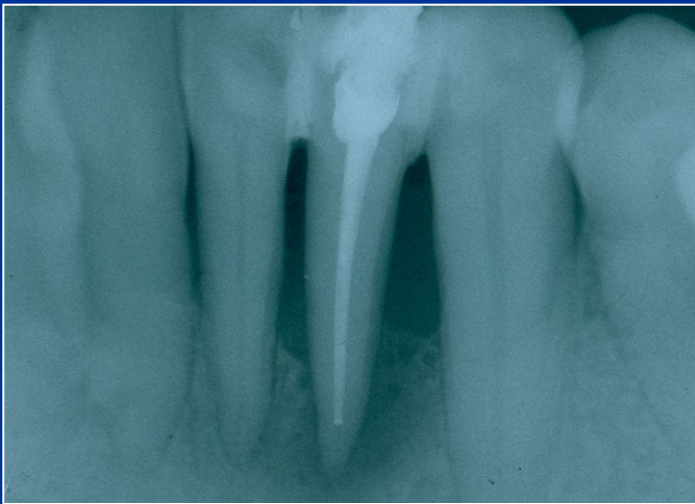
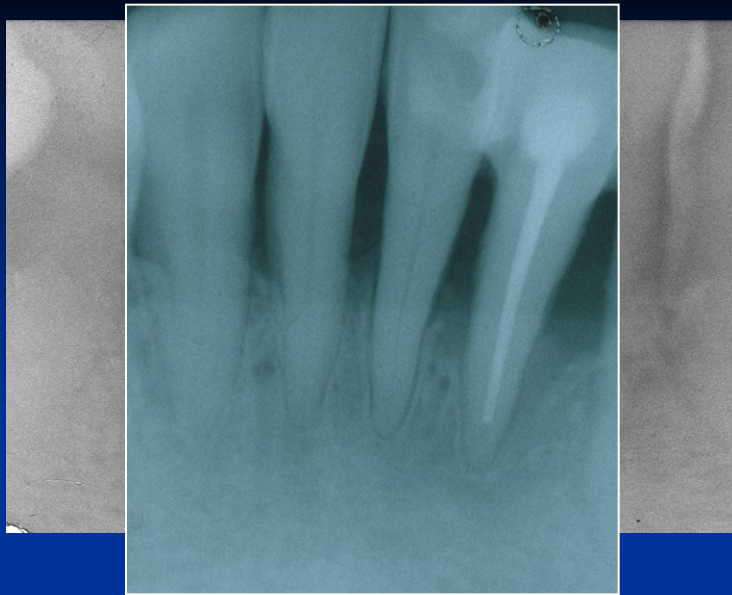


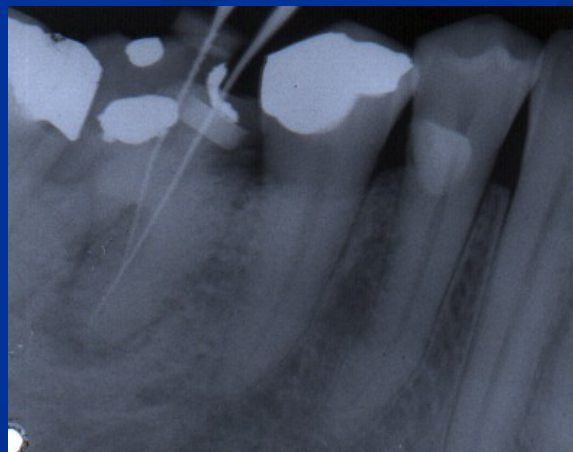
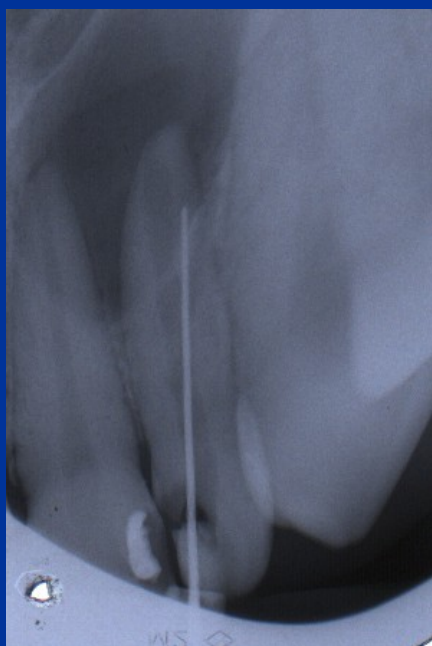


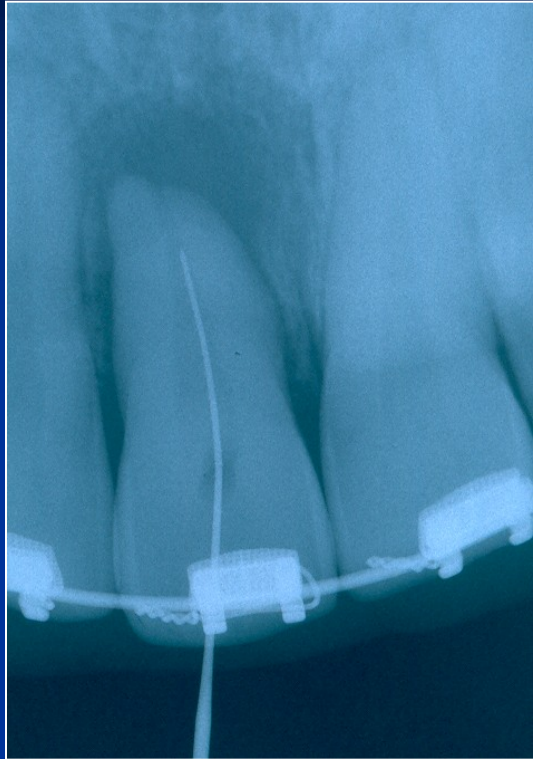
Root canal filling

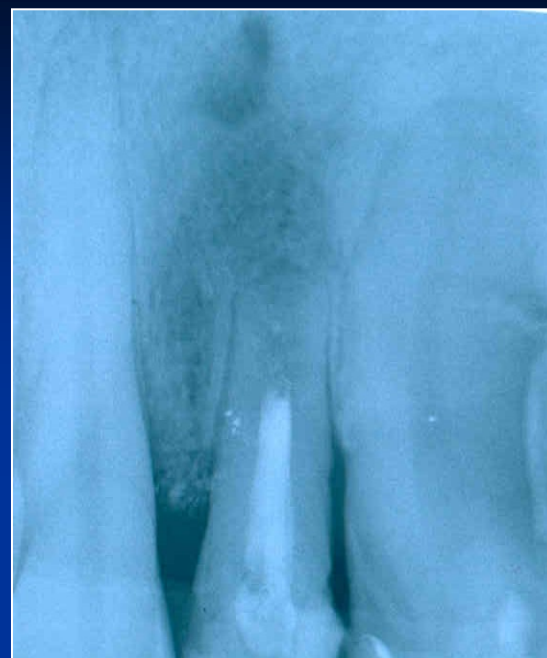
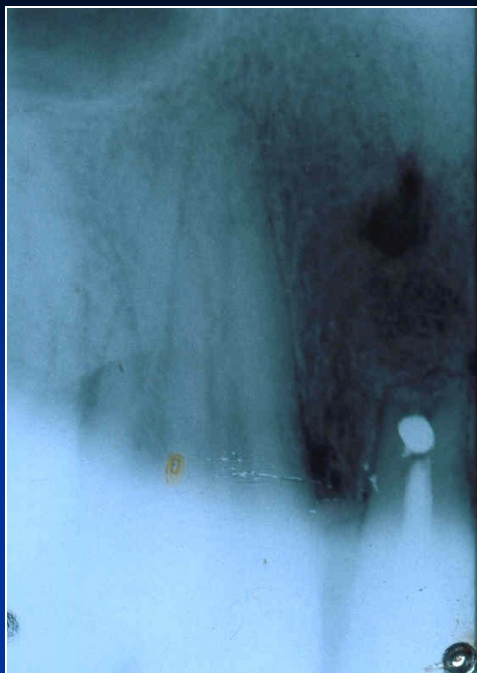


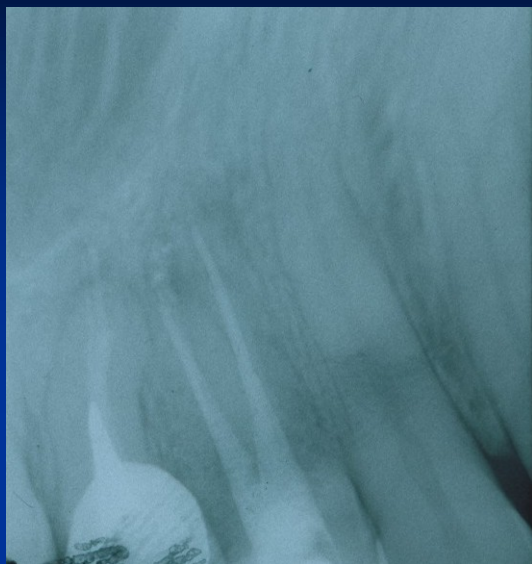


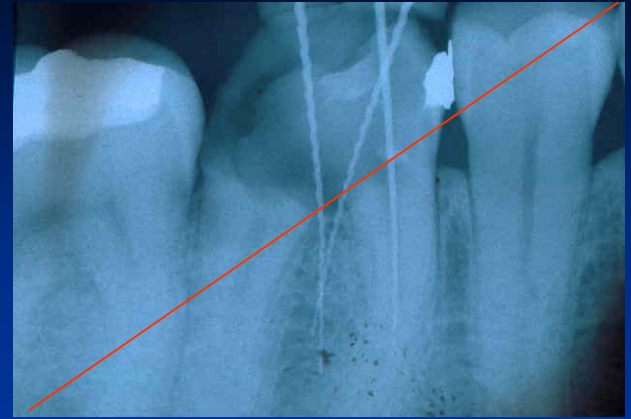






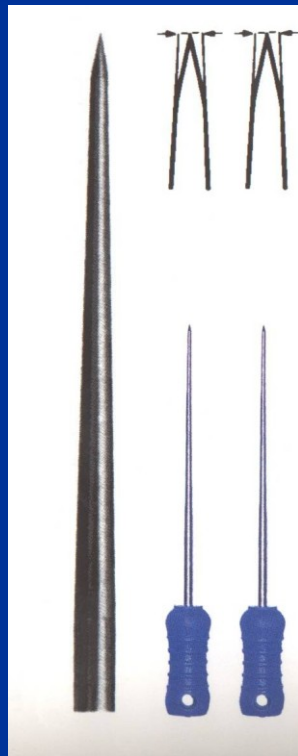




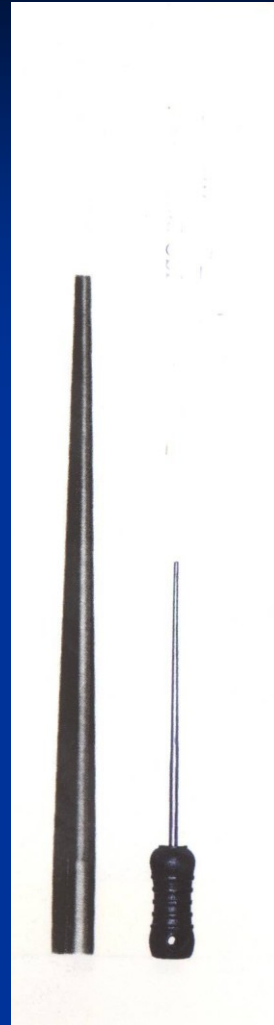


Lentulo

Spreader



Plugger - compactor

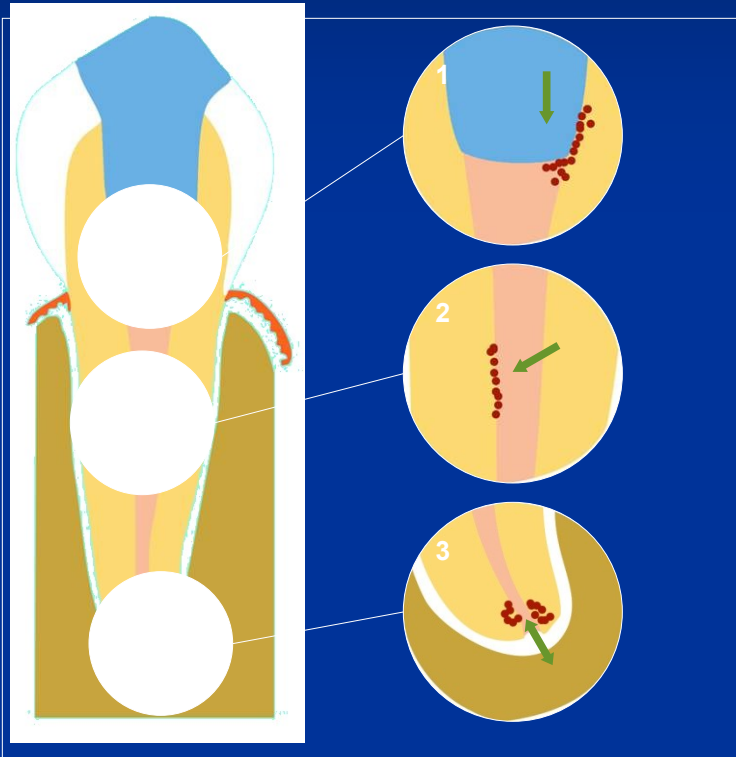


Root canal filling

- Guttapercha
- Sealer

Root canal filling

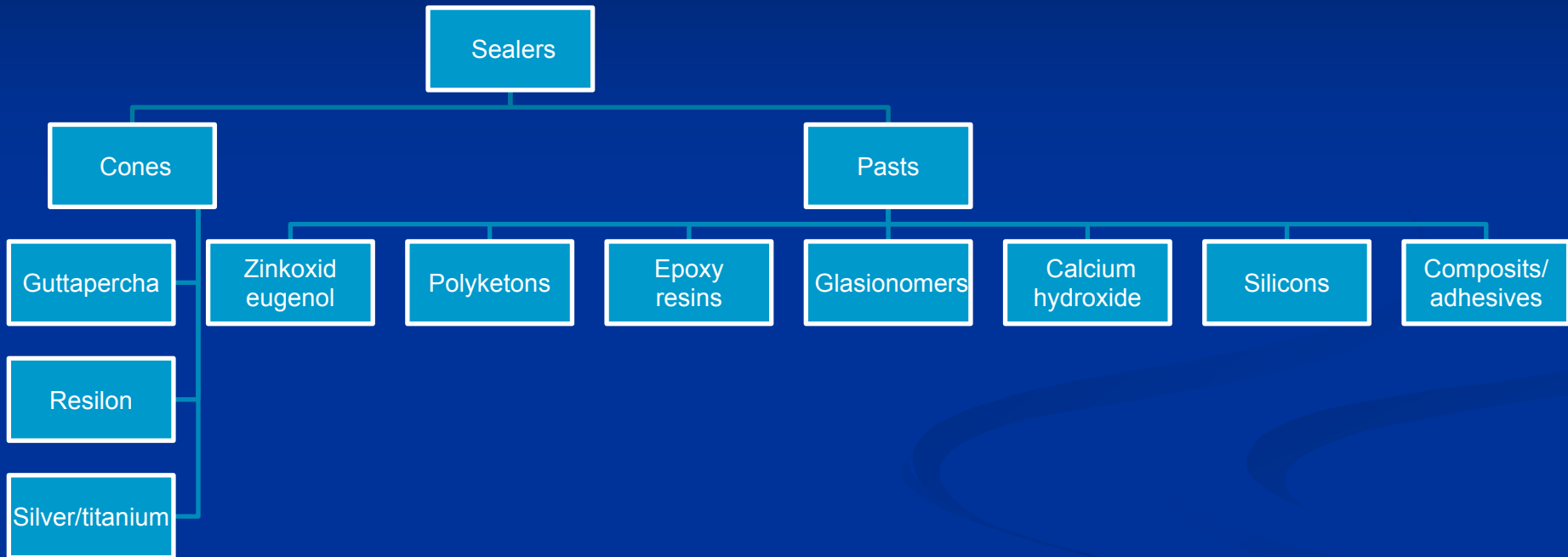
Root canal filling



Good coronal,
Middle
Apical seal.

Quality guidelines for endodontic treatment,
European Society of Endodontology (ESE), 1994

Root canal fillings



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

Classification of root canal fillings

- Solid
- Semisolid
- Pastes

Guttapercha

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

1,4 - polyisoprene

Crystallin structure (60%)

Brittle

Guttapercha

■ Beta phase

■ Alpha phase 42 – 49 °C

- plastic

- **Gamma phase** 56 – 62° (amorfní)

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%

Resilon

(Pentron)

- Thermoplastic synthetic polymer
- Points or material for injection

Composition:

Polyester polymers

Bioactive glass

Radioopaque fillers (bismuthum oxichlorid a and baryum sulphate)

Silver or titanium cones

- No good seal
- Silver cones - corrosion

Sealery

Chemically curing plastic materials

Good adhesion to root canal walls as well as solid cones

X- ray contrast

Biocompatibility

Sealers

Zinc Oxide-Eugenol

Chloropercha

Calciumhydroxide

Resins

Glasionomer

Silicone

Sealers

Importance

Filling of the spaces between the solid cones



Seal of the root canal filling

Zinc - Oxid Eugenol

Powder:

Zinc oxide

Liquid:

Eugenol

Acidic resins

Good adhesivity, antimikrobial effect, cytotoxic.
(resorbable)

Zink Oxid Eugenol sealers

Pulp Canal Sealer (Kerr, USA))

Tubuli- Seal (Kerr, USA)

Caryosan (Spofa Dental, ČR)

Chloropercha

Powder

Canadian balsam

Resins

Guttapercha

Zinc oxide

Liquid:

Chloroform

Resins

Chloroperča

Vlastnosti:

Good adhesivity

Shrinkage

Toxicity

Calciumhydroxide sealers

Base (powder)

Calcium hydroxide

Zinc oxide

Other components and vehicula

Kalciumhydroxidové sealery

Catalystr (paste)

Zinc stearat

Titanium dioxide

Baryum sulphate

or

Eugenol, Eukalypt

others

Kalciumhydroxide sealers

- Increase of the healing potential of periapical tissues
- Antibacterial effect
- Easy manipulation

But!

Resorbable if not homogeneous

Not suitable for the single cone technique

Resins

➤ Rezorcin formaldehyd

➤ Epoxide

➤ Polyketone

➤ Metacrylate

Rezorcín – formaldehyd resins

Toxicity

N2, Endomethason, Riebler's paste, Foredent

Epoxide resin

➤ Base (powder, paste)

Bismuth oxid

Titanium dioxide

Hexametylentetramine

(Silver)

➤ Catalyst (liquide, paste)

Bisphenoldiglycidylether

Epoxid resin (*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 toxicity

No suitable for the single cone technique !

Polyketone

➤ Base

Zinc oxide

Bismuth phosphate

Hexametylentetramine

➤ Liquid

Bisphenolglycidylether and other components

Polyketon resins

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

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 filling

- A cone inside the sealer – core material

Guttapercha

Resilon

Silver cones

Custom cones

Root canal filling

Guttapercha

Trans isomer of polyisoprene

2 crystalline forms (alpha, beta)

Beta – room temperature

Alpha after heating

Various process of cooling

Extremely slow cooling: Alpha phase recrystallize.

65°.

Less shrinkage, more dimensionally stable

Root canal filling

Guttapercha

20% gutta-percha

65% zink oxide

10% radioopacifiers

5% plasticizers

Root canal filling

Guttapercha

Cones: conventional and standardized sizes

Conventional: dimension of the tip and body

Standardized cones are designed to match the taper of the instrument.

Root canal fillings - forms

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

Instruments

- Lentulo
- Compactors
- Compactors - carriers
- Others

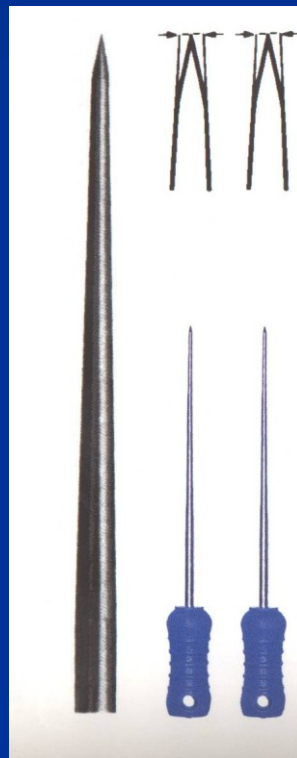
Lentulo



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

Compactors

Spreader



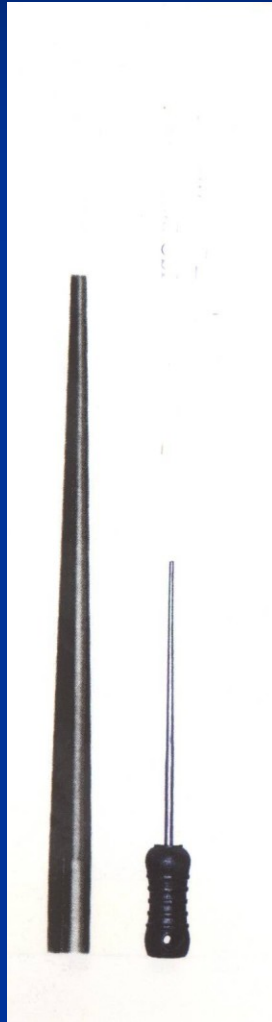
Pointed

Vertical introduction

*Lateral condensation
technique*

Compactors

Plugger



Not pointed

Vertical introduction

*Vertical condensatuion
- compaction*

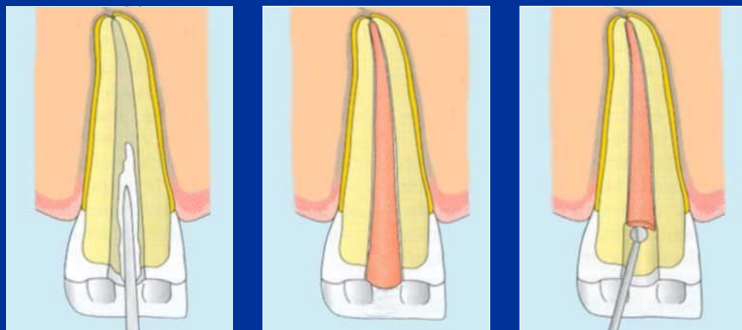
Filling techniques

Cold

Warm

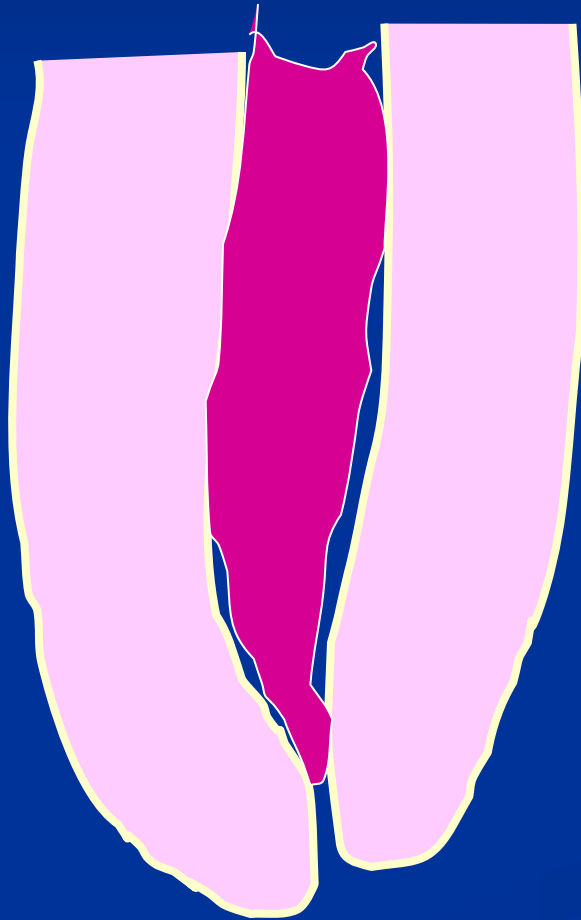
Single cone technique

- 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

Paste only



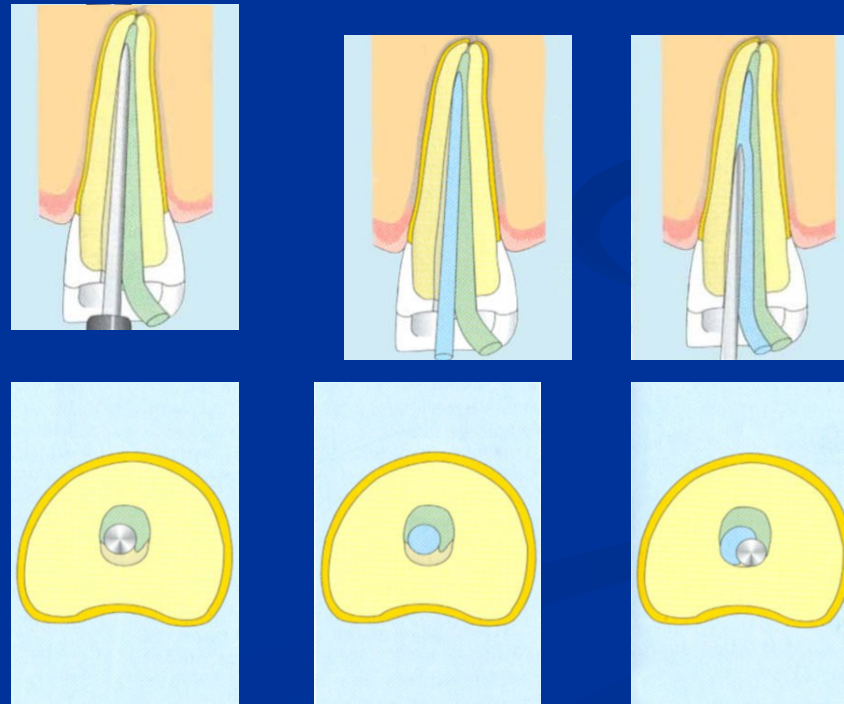
**Shrinkage, difficult
removal**



Lateral condensation

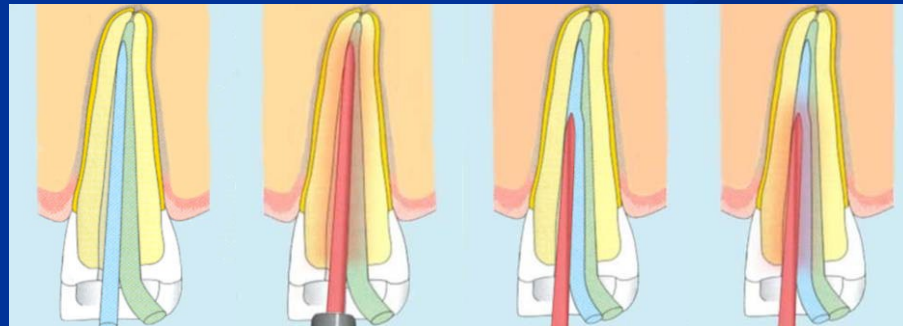
Lateral compaction

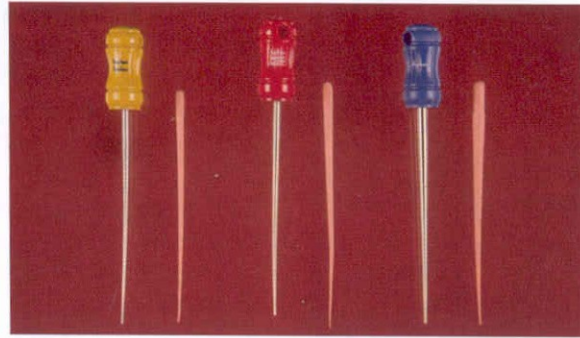
-
- Standard cold technique



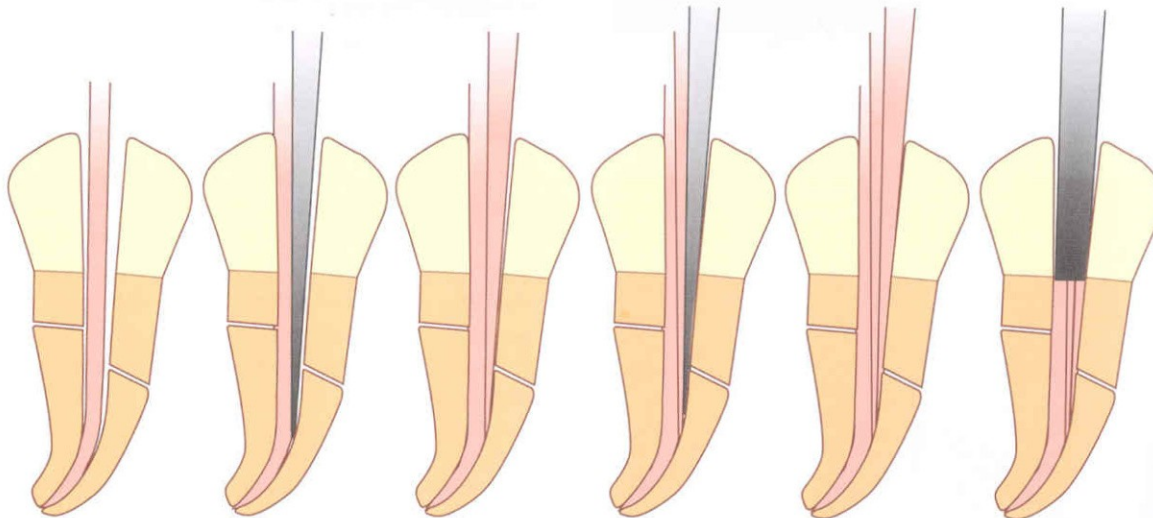


Warm lateral condensation

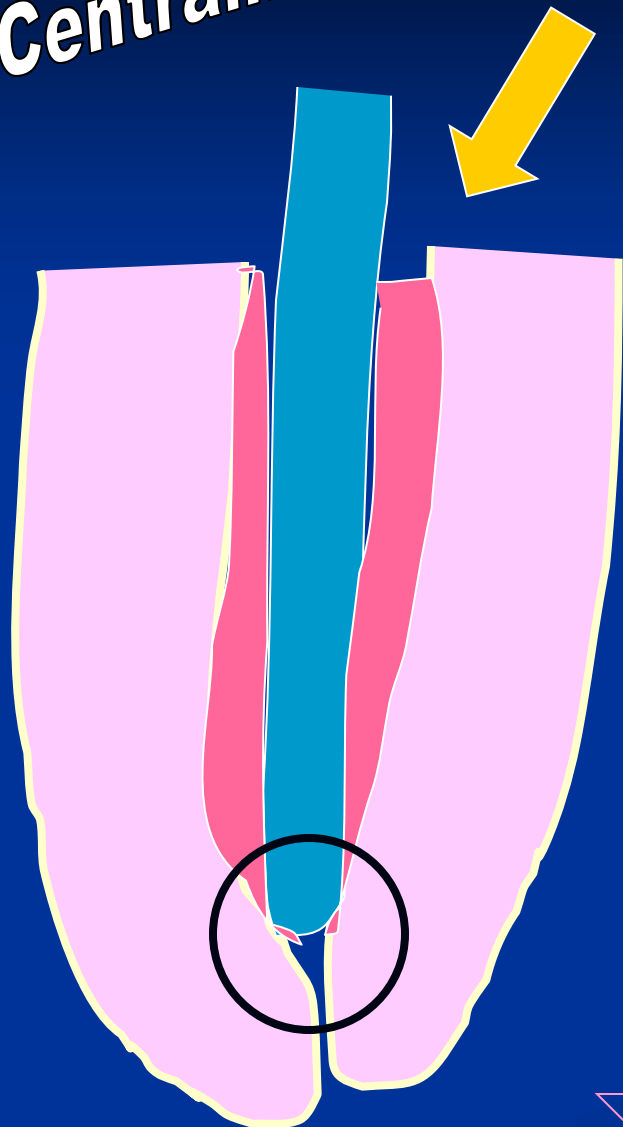




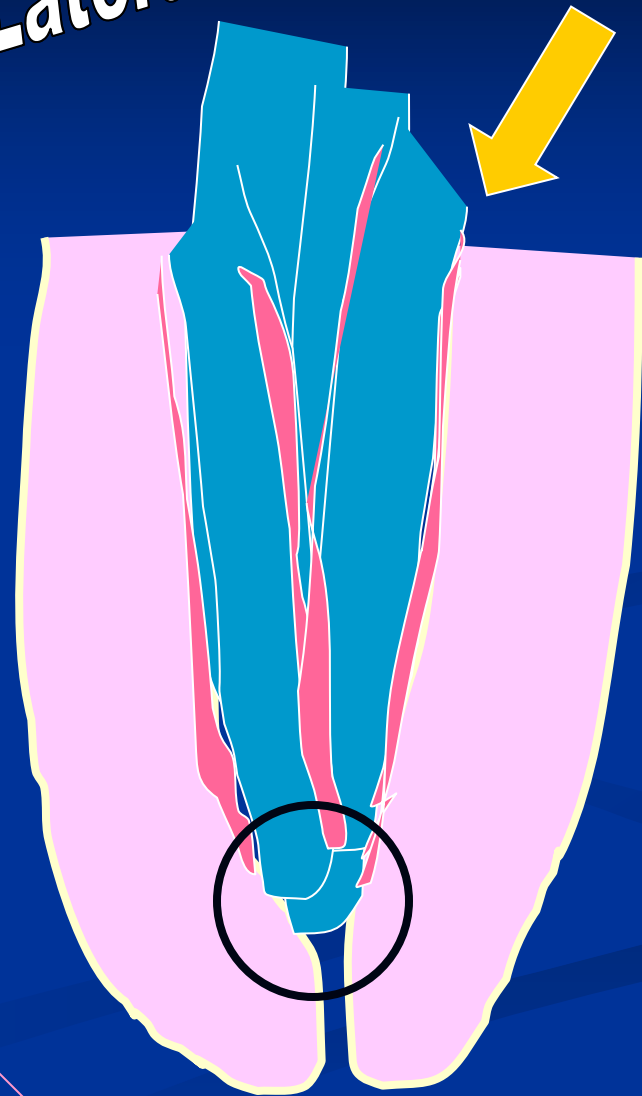
A



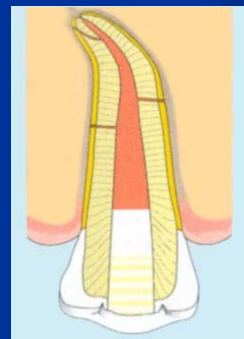
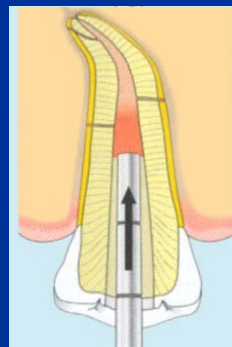
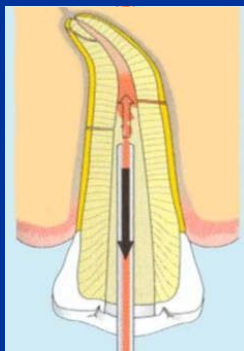
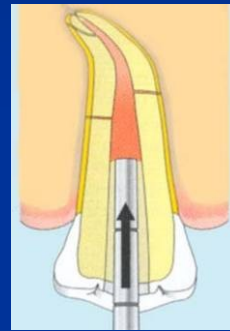
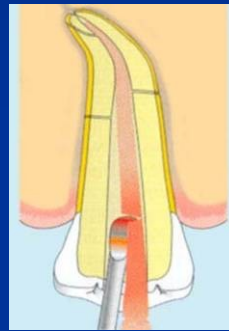
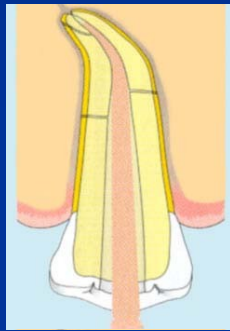
Centrální čep

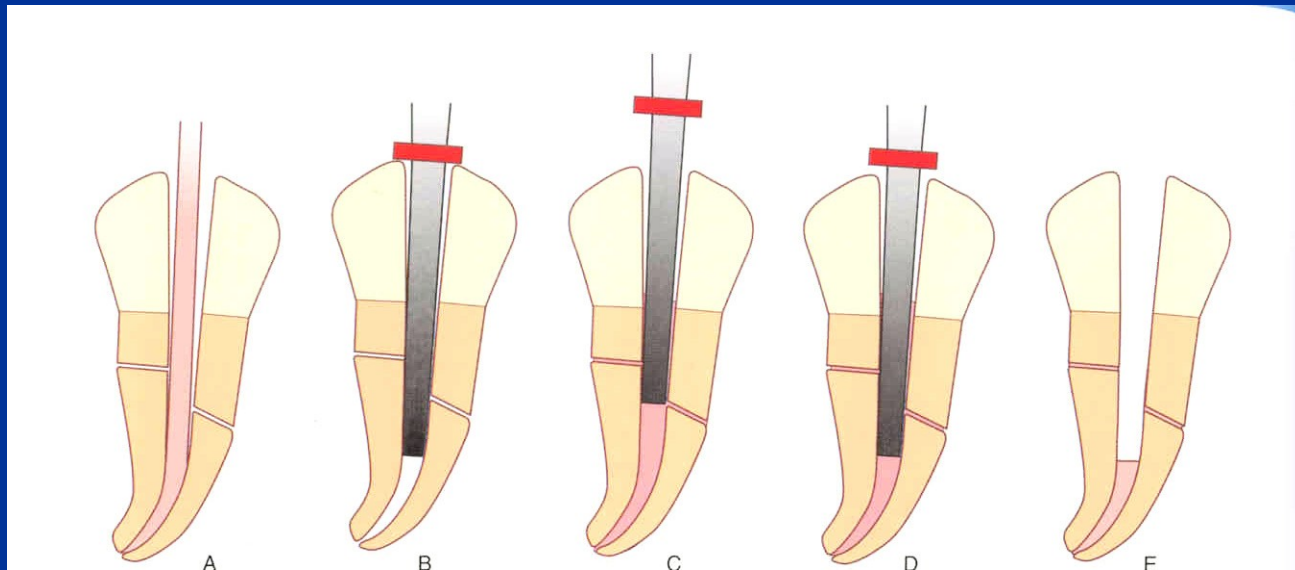


Laterální kondenzace



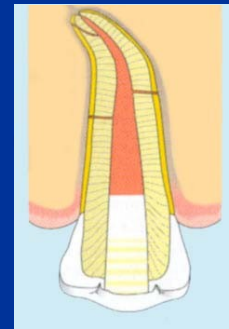
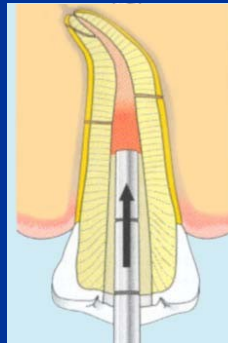
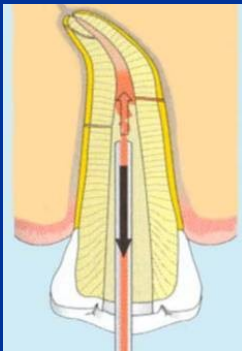
Vertical condensation

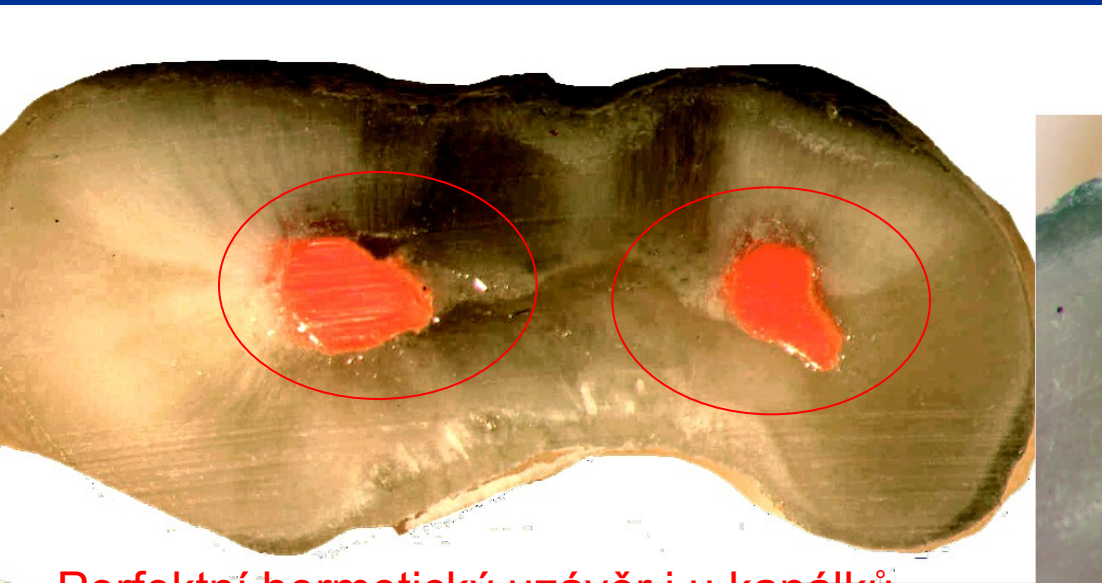




Injection

- Rychlá technika
- Možná extruze sealeru
- Teplo





Perfektní hermetický uzávěr i u kanálků s nepravidelným tvarem

Fáze plnění 2. Backfill

BeeFilllem hermeticky uzavřeme a zaplníme zbývající část kanálku kulatého i oválného a uzavřeme postranní ramifikace ve vrchních částech kanálku.

