Endodontic treatment of immature teeth

Apexification

Semmelweis University
Pedodontic and Orthodontic Clinic
Causes: accident 99.9%
caries 0.01%

The further formation of the apex is in general interrupted.
Development of the root

Connective tissue cell
Root formation can be classified in seven stages by Moorrees.

Initial root formation

\[ \frac{1}{4} \]

half

\[ \frac{3}{4} \] of root length is achieved

Root length complete with apical foramen wide open

Half closed

Root is complete
Aim: to provide conditions not only for regeneration of surrounding bone and periodontium but also for subsequent closing of the wide apical opening.
It is very important to choose the adequate therapy to reach the desired aim. This depends on that tissue which fills in the apex at the beginning of the treatment.

vital rest pulp ➔ odontogenesis ➔ dentin tissue
Necrotic pulp, Hertwig's cementum
inflammation does not go around the epithelia root like tissue

not go around the sheath
root canal in a big size
Special case:

infected pulp ➔ granulation tissue ➔ reparative granulation tissue

inflammation spread + blood clot
over into bone tissue

mesenchimal cells ➔ calcified tissue
differentiate into ➔ irregular dentin
formatively active
immature bone
dones

cementum like tissue
Technical procedure

• **X–ray photo** to diagnose the developing stadium of root canal and the size of periapical lesion
Technical procedure

• Isolation, sterile appliances
  trepanation
• **mechanical cleansing** ➔ careful manipulation, methodical filing of the dentinal walls, causing minimal damage to the wide apical opening

  ➔ flushing with 0.5% NaOCl
Special case:

• strong bleeding is to be induced from periapical region by careful manipulation with a Kerr needle 12. Bleeding removes necrotic remnants ➔ apex

• irrigating with saline
• drying

Red Blood Cell
• Drying ➔ sterile cotton point
Ca(OH)$_2$ paste, or

Ca(OH)$_2$ point (deposit preparation, which releases calcium hydroxide from gutta-percha matrix)

one size smaller

ensures moist milieu
• Repetition of treatment ➤ suppuration

spontaneous } cease bleeding
Temporary canal filling

Ca(OH)$_2$ paste → periapical healing

- antibacterial effect
- leaching effect neutralizes necrotic residue
- mineralisation of organic matrix
**Condition:** compressed lightly towards the apex with a cotton pellet (not to hurt the apical area) to ensure contact with apical tissue.
• teeth are monitored at 3–6 month intervals

• if the paste resorbes ➔ retreated healing does not occur refilled
Permanent obturation

Condition:

• apex is closed by calcified tissue
• regeneration of surrounding bone tissue and periodontium
Selection of a suitable thickest point
The tip of the point is warmed by passing once through an alcohol flame.
The slightly softened point is pressed steadily but gently against the apical hard tissue barrier.
• Lateral condensation
• Completed filling
Mineral Trioxidid Aggregate

- Developed by Torabinejad at Loma Linda University in 1993

Mixture of tricalcium silicate, tricalcium oxide, tricalcium aluminate with other oxides. (Portland cement with bismuthoxide).

pH: 12.5 and biological, histological properties can be compared to those of Ca(OH)$_2$. 
Temporary canal filling

- Mineral trioxide aggregate (MTA)

Isolation disinfections, r.c.preparation disinfections
Extirpation from several mm. to preserve as interim dressing
from the apex
much dentin as p. with Ca(OH)\(_2\)
Root end filling

- Mineral trioxide aggregate (MTA)

Irrigation with saline MTA mixture introduced, gently moistened cotton pellet irrigation, condensed apical MTA plug 4 mm thick temporary filling drying, filling plug is checked.
MTA + final obturation

Initial stage

Ca(OH)2 filling

MTA+final obturation

1 yr later

2 yrs later
Initial stage

7 months later
Traumatised Incisors with necrotic pulp and open apex

6 months, Obturation completed
Fractured incisors

Esthetic restoration
Open apex with periapical lesion

Formation of calcific barrier at the apex
Traumatised incisors

Ca(OH)₂ paste placed in the canal

Permanent obturation

4 yrs later

5 yrs later
Early root formation with periapical lesion

Healing is evident

Permanent obturation

2 yrs later the tooth is asymptomatic
Incomplete obturation

Ca(OH)₂ filling

Root canal obturation

10 yrs later no any pathological change
Root formation in the stage 4, with periapical lesion

Formation of calcific barrier

Half heated guttapercha obturation
Dens invaginatus in immature stadium

Formation of calcific barrier

Permanent obturation

2 yrs later healing is evident
Thank you for your kind attention