

Instruments of RCT

Handout

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Aims of the preparation

The root canal system

- 1) has to be cleaned from organic debris (microorganisms, pulpal tissue) and
- 2) has to be shaped to taper form for hermetic 3D filling.

Isolation

- Rubber dam
Plastic clamp, frame
with hinge

Trepanation

- Turbine (FG)
 - diamond, round,
halfround tip
- Micromotor
 - in case of amalgam
carbide, accelerator
- Occlusal, oral opening

Access cavity

- Turbine (FG)
 - diamond, longer shaft,
smooth halfround tip
- Micromotor
 - steel, longer shaft
- Straight access
 - to prevent unnecessary curvatures (enamel triangle, dentin ledge)
 - to prevent false route

Steps of canal preparation

1. Opening and shaping of the coronal part
2. Opening of the apical third
3. Determination of the working length
4. Tapering of the apical part
5. Final apical enlargement

Instruments

- Finger-hand-held / engine driven devices
- Rotation /up-down oscillation
- Stainless steel / NiTi (shape memory effect)

Exstirpation

- Coronal pulp – (pulpotomy) excavator, round bur
- Root pulp (pulpectomy)

- Barbed broach, Donaldson, nerve needle
- Dissolve by irrigation (NaOCl)

Tools

- Orifice opener (engine driven)
 - Gates-Glidden drill (1-6, non cutting edge, guide), 800/min
 - Peeso reamer (longer head, more aggressivity)

Measure, colour code

- ISO standardized: number of the instrument = tip diameter measured in hundredths of mm (between 15-60 + 0.05 mm, over 60 + 0.1 mm steps)
- Between ISO 10-15 50%, 15-20 33%, between 20-25 only 25%-os increase!
- Manubrium, stems, active part, cutting / partially cutting / non-cutting tip - silicone rubber stopper
- Diameter increases to the direction of the grip (+0,02 mm/1mm, 2% conicity)

Taper = growth increase of canal diameter divided by the distance between the two measuring points

Geometry

Cutting edge angle, Helical angle

negative	neutral	positive cutting edge
scratch		active still cutting

Classic hand-held devices

Kerr-reamer

- clockwise continuous rotation

Kerr-file

- max half-turn rotation, rather oscillating motion in apical-coronal direction

Hedström-file

- it is effective by pulling out

Technics for preparation I.

How to move the instruments?

- **Filing** apical-coronal oscillatory motion (straightens the canal, compresses the debris)
- **Dilation** constant rotation (due to the flexibility the channel will not straighten, debris from the canal is pulled outside)
- **Back and forth rotation** (thin instruments can easily bend in case of pushing)
- **Recapitulation** introduce No. 10 needle into full working length to remove obstructions

How to move the instruments?

Combinations

- **Quarter-turn pull**

(apical push until constipation, 90° clockwise rotation to cut the edges into dentin and pull out into coronal direction) (canal is straightened, but the debris is removed)

- **Balanced force**

(apical push until constipation, 45-90° clockwise rotation → rotation in the opposite direction by 180° while maintaining the apical pressure, over ISO No. 25)

(below No. 25 filing only, because of less resistance against torsion, canal is not straightened out, its shape is maintained, preferred!)

How deep we should prepare?

Determination of the working length

Apex locator, X-ray needle control

Technics for preparation II.

The sequence of instrumentation

- Step back technique

Shorter and shorter introduction of more and more thicker instruments deep throaty, taper shape, gradually increasing diameter

- Crown down technique

From thicker to thinner and thinner instruments down till the working length, gradually advance step-by-step towards the apex

Engine driven instruments

- **Regular” handpiece**

NiTi drills, Gates-Glidden, lentulo

- **Special endodontic handpieces**

Convert the rotary motion into filing motion, a quarter turn back and forth

- **Endodontic micromotor**

Programmable rotation, torque control, auto reverse, accumulator, built in apex locator

- **Alternative devices**

Oscillating movement workers: sonic (1500-8000Hz)

ultrasonic: propagate irrigation, removal of broken needles, preparation for retrograd root canal filling

Laser: photodynamic cleaning, tubulus-apex closure by dentin melting?

Lifespan of the instruments

- Physical (abrasion, wear due to curved canals, fatigue and torsion fracture) and chemical (corrosion due to sterilizing agents and rinsing solutions) factors
- Manufacturers limit the number of use
- Before using the files/threads should be checked visually! If somewhere it is corrupted or not even, do not use more!

Instruments of the root canal filling

- Plugger (1-8, vertical condensation)
- Spreader (10, 20, 30, 40, lateral condensation)
- Endo-Bloc
- Lentulo (1-4)

The future...

- Revascularisation
- Bioengineering (pulpal stem cells)