Endodontics I.

Case selection and treatment planning

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Common medical findings that may influence endodontic treatment planning

- Pregnancy
- Cardiovaslular disease
- Cancer
- HIV and acuired immunodeficiency syndrome
- End stage renal disease
- Dialysis
- Diabetes
- Prosthetic implants
- Patients with anticoagulation therapy
- Behavioral and psychiatric disorders

- Pregnancy
- Cardiovaslular disease
- Cancer
- HIV and acuired immunodeficiency syndrome
- End stage renal disease
- Dialysis Diabetes
- Behavioral and psychiatric disorders
- Psychosocial evaluation
- Recent medical research: Dental implications

- Pregnancy is not a contraindication to endodontics but it does modify treatment planning. Consult a physician iif you are not sure.

- Ragiography

If possible NO!!!

Lead apron and thyroid collar

- Drugs

Antibiotics (penicilin, cephalosporin, clarithromycin - all with caution !)

Analgetics (paracetamol – with caution!)

Local anaestetics (first if possible no in emergency with caution yes, second trimesters YES, third trimester with caution – a risk of contractions).

- Pregnancy
- Cardiovaslular disease
- Cancer
- HIV and acuired immunodeficiency syndrome
- End stage renal disease
- Dialysis
- Diabetes
- Prosthetic implantation
- Behavioral and psychiatric disorders
- Psychosocial evaluation
- Recent medical research: Dental implications

- Cardiovascular disease

- Vulnerability to emotional and physical or stress during dental treatment including endodontics.

- Consultation with the patient´s physician is mandatory before the initiation of endodontic treatment if within 6 month after the attack.

- Patients who have had heart attack (myocardial infarcation) within 6 month should not have elective dental care.

Medication can potentially interact with vasoconstrictors in LA

Increased susceptibility to repeat the heart attack.

- Risk of vasoconstrictors

No administration:

- Patients with non stable angina pectoris
- Uncontrolled hypertension
- Refractory arythmia
- Recent myocardial infarction (less than 6 month)
- Recent stroke (less than 6 month)
- Recent coronary bypass graft (less than 3 month)
- Uncontrolled congestive heart failure
- Uncontrolled hyperthyreoidism

Risk of bacterial endocarditis

Caused by a bacteremia – can be associated with endodontic treatment.

It is potentially fatal.

- Patients who have a history
- of murmur or mitral valve prolapse with regurgitation
- Rheumatic fever
- Congenital heart defect
- Arteficial heart valves

Risk of bacterial endocarditis

Must be minimized using

ANTIBIOTIC PROPHYLAXIS

Short term administration of antibiotic in high dosage – according to recent recommendation.

Cancer

- Risk of metastasis in jaws. Careful examination, OPG.
- Cancer in orofacial region - all potential focuses must be removed, no endodontic treatment during and after radiotherapy. Risk of radionecrosis – radioosteomyelitis.

Radiotherapy - decreasing number of osteoblasts, osteocyts, endothelial cells and blood flow.

Routine dental procedures can be done if granulocyts counts is grater than 2000/mm^3 platelet count grater than 50.000/mm^3.

Consultation with responsible specialist.

HIV and aquired immunodeficiency syndrome

- HIV patients do not have an increased risk of postoperative pain or inflammation.

Precautions of infection of dental team.

Generally – number of CD4 lymphocyts is important (less than 200/mm^3 hihger risk of opportunistic infections).

Renal disease and dialysis

- End stage renal disease – best way hospital setting.
- Dialysis – consultation wsith the specialist
- (some drugs are eliminated by dialysis, the treatment is best scheduled a day after dialysis since on the day of dialysis patients are generally fatiogued and have a bleeding tendency)

Diabetes

- Patients with well medically controlled diabetes and free of serious complications (renal disease, hypertension, coronary atherosclerotic disease) is a candidate for endodontic treatment.

- *Non insulin patient may require insulin*
- *Insulin patient may require hihger dosis of insulin*
- *Source of glucosa should be available*
- *Appointments should be scheduled with consideration given to the patientś normal meal and insulin schedule.*

Especially when surgical endodontics is indicated – consultation with specialist is useful.

Prosthetic implant

- Can require antibiotics prophylaxis depending on time after implantation and other patient´s diseases.

Consultation with patient´s physician.

Endodontic is an unlikely cause the bacteremia in comparison with extractions, scaling, periodontal sutgery.

Patients with anticoagulation therapy

- Risk of bleeding from dental pulp and root canal

- Risk of haematoma when nerve blocking anaesthesia is used.

Treatment depending on laboratory tests, consultation with specialist.

Behavioral and psychiatric disorders

- Patient´s ability of cooperation and drug interaction (local anaesthetics)

Consultation of physician usefull and sometimes necessary.

Regional factors that influence endodontic case selection

- Position of the tooth and its importance for function
- The tooth must be valuable for the function

(dystopic teeth,third molars etc..)

Local factors that may influence endodontic case selection

- Periodontal consideration

(poor periodontal prognosis – no endodontic treatment)

- Surgical consideration (some lesions are nonodontogenic)
- Restorative consideration (root intraosseus caries, poor crown/root ratio, extensive periodontal defects)
- Others (calcification, obliteration,root resorption, dilaceration etc.)

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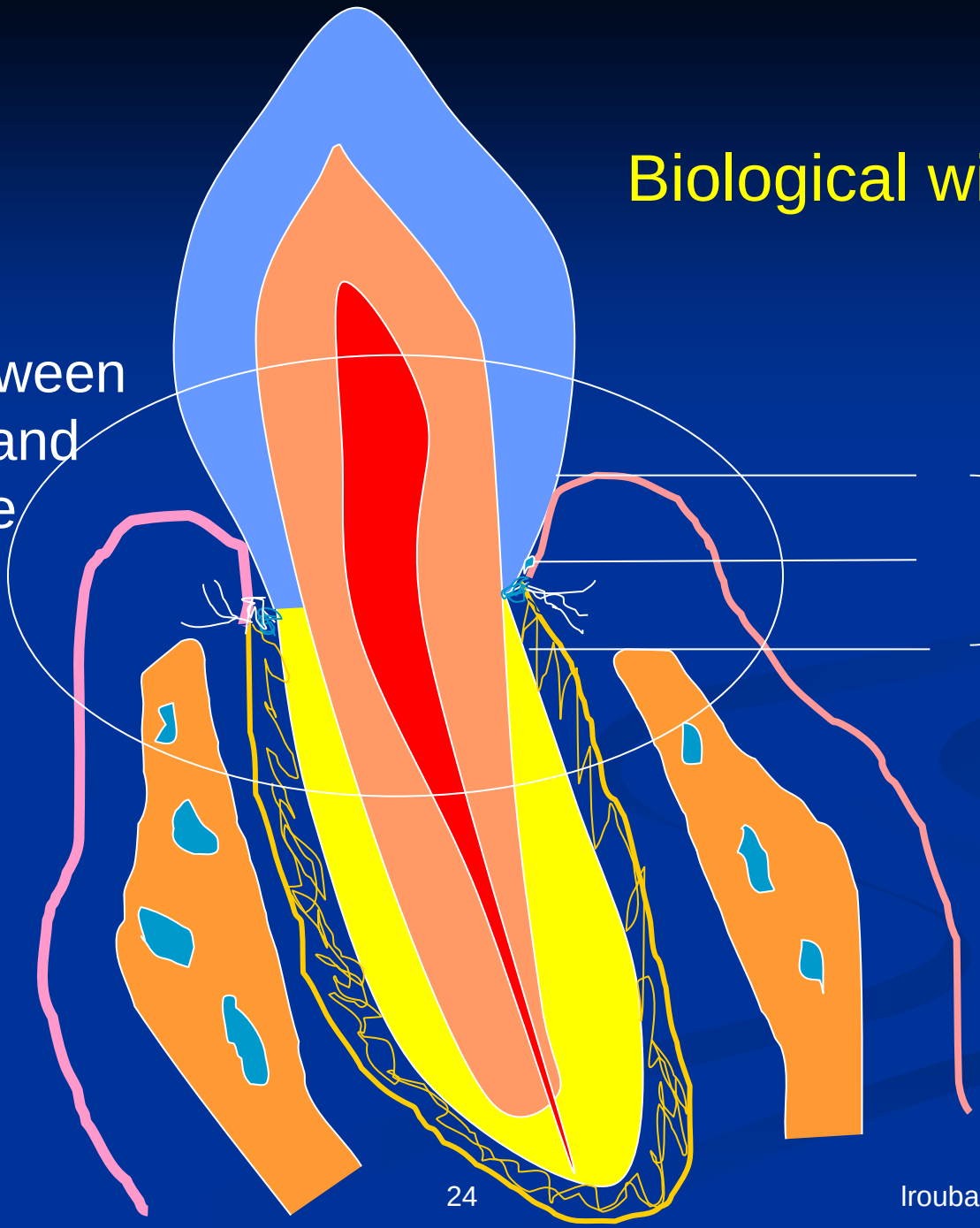
Biological width

Distance between free gingiva and alveolar bone



Gargiulo AW, Wentz FM, Orban B (J Perio 1961)

Vacek JS, Gher ME, Assad DA, Richardson AC, Gambaressi LI (Int J Perio & Rest Dent 1994)

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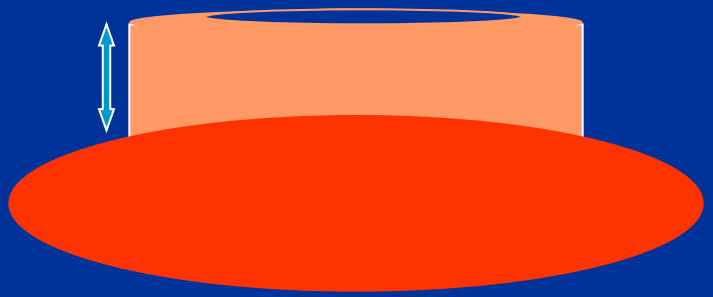
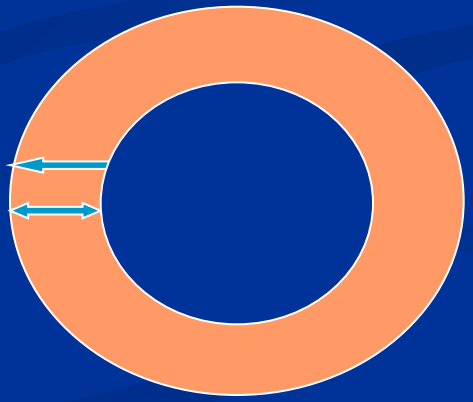
Ferrule effect

1,5 – 2 mm



1,5 mm

1 mm



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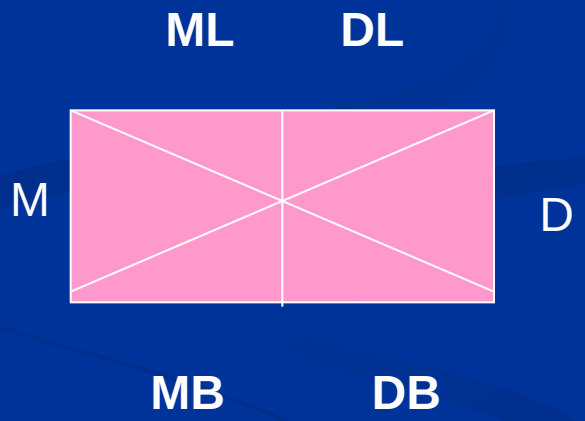
Rest of hard dental tissues – tooth restorable index

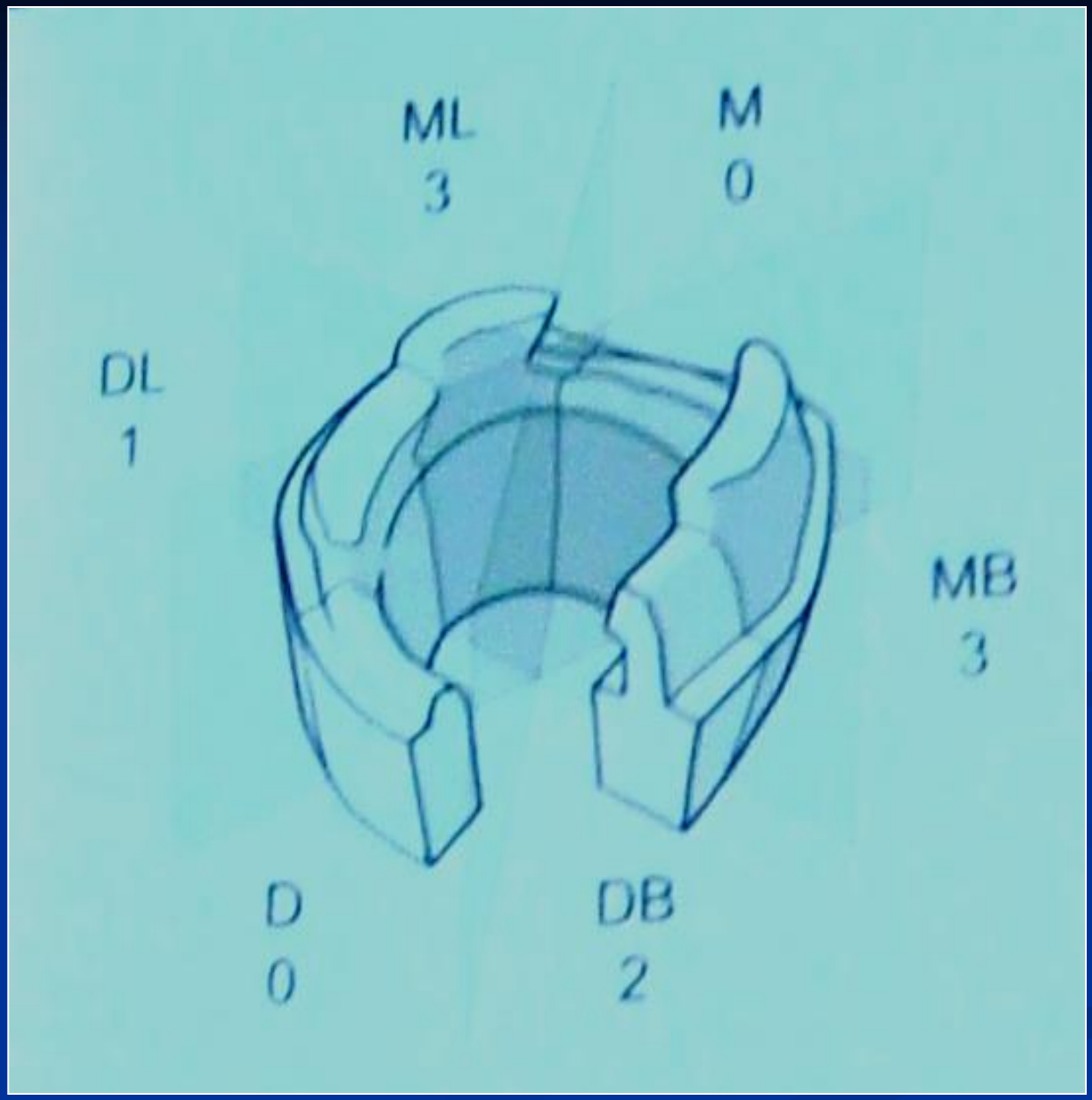
Scóre	Description
0	≥1/3 no supragingival dentin dentin
1	Width of remaining dentin is ≤1,5 mm
2	Supragingival dentin width and height is app.1 mm ≥ 2/3
3	Sufficient amount od dentin – more than 1,5 x 1mm

Sextant:



Minimal height 1mm

Minimal width before the treatment 1,5 mm


ML
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M
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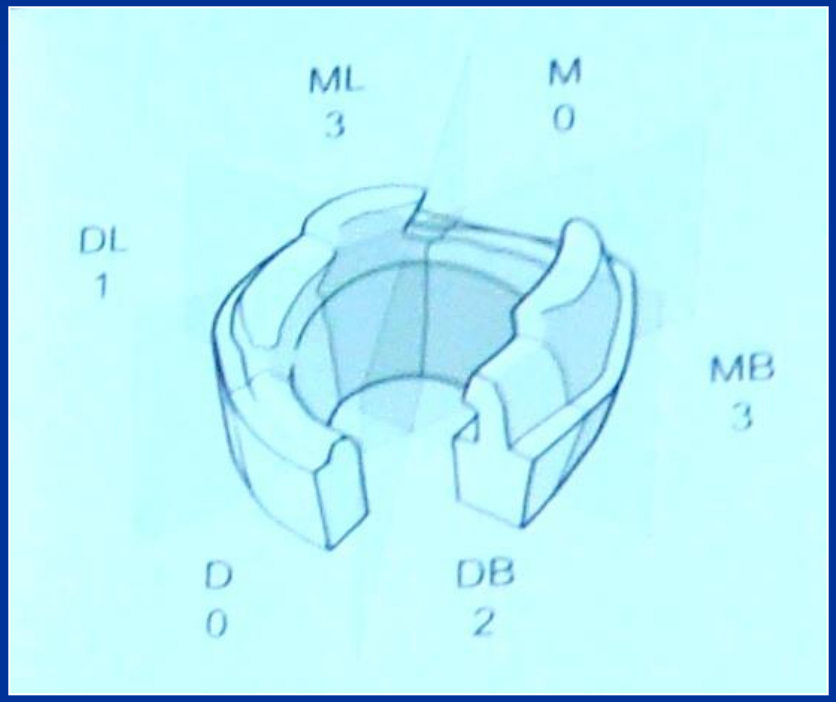
2

Posouzení zbývajících zubních tkání - TRI



Minimální skóre 0

Maximální skóre 18

Bandlish DB, Mc Donald AV, Setchel DJ
Assesment of the amount of remaining coronal dentine in root treated teeth
Journal of Dentistry 2006;9:699 - 708

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Non restorable teeth

Elongation of clinical crown surgically

Orthodontic extrusion

Extraktion

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Diagnosis in endodontics

- Chief complaint
- Medical history
- Dental history
- *History of present dental problem*
- *Dental history interview*

Questionnaire

Examination and testing

- Extraoral examination

(inspection – facial symetry, loss of definition of the nasolabial fold,palpation of the cervical and submandibular lymph nodes)

- Intraoral examination

- Soft tissue examination
- Intraoral swelling
- Intraoral sinus tract
- Palpation
- Percussion
- Mobility
- Periodontal examination

Examination and testing

- Pulp test
  - Thermal
  - Electric

Radiographic examination

Intraoral radiography

Film or sensor placed in oral cavity

Special apparatus

- Teeth
- Alveolar bone
- Periodontal space
- Fillings
- Caries
- Impacted teeth
- Level of endodontic treatment

Position of the tubus

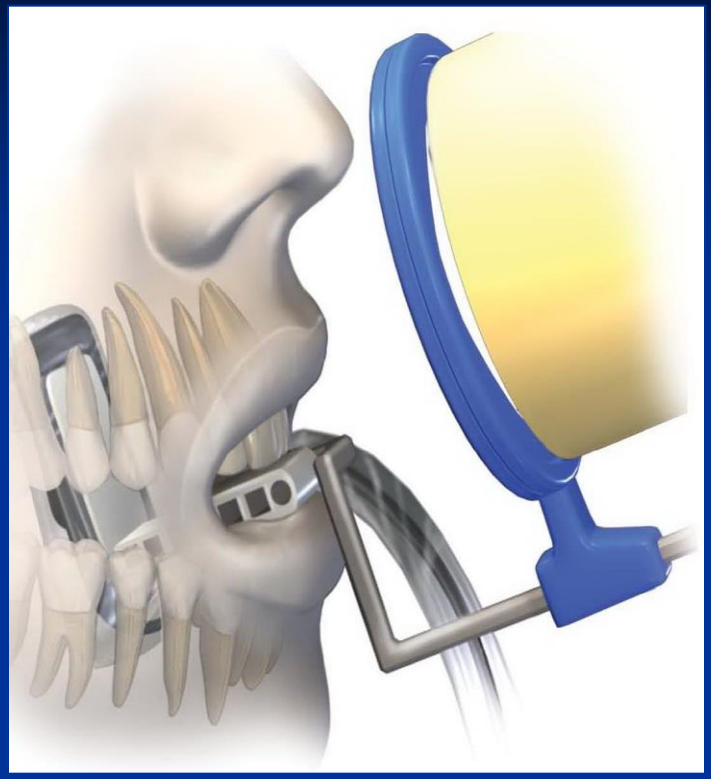
- In vertical plane
- In horizontal plane

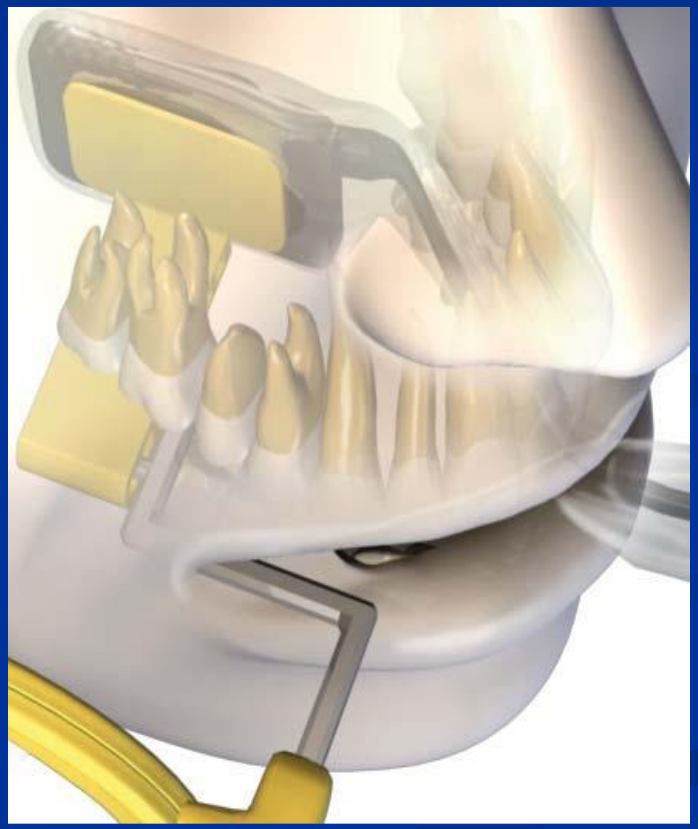
Parallel technique

Modified parallel technique

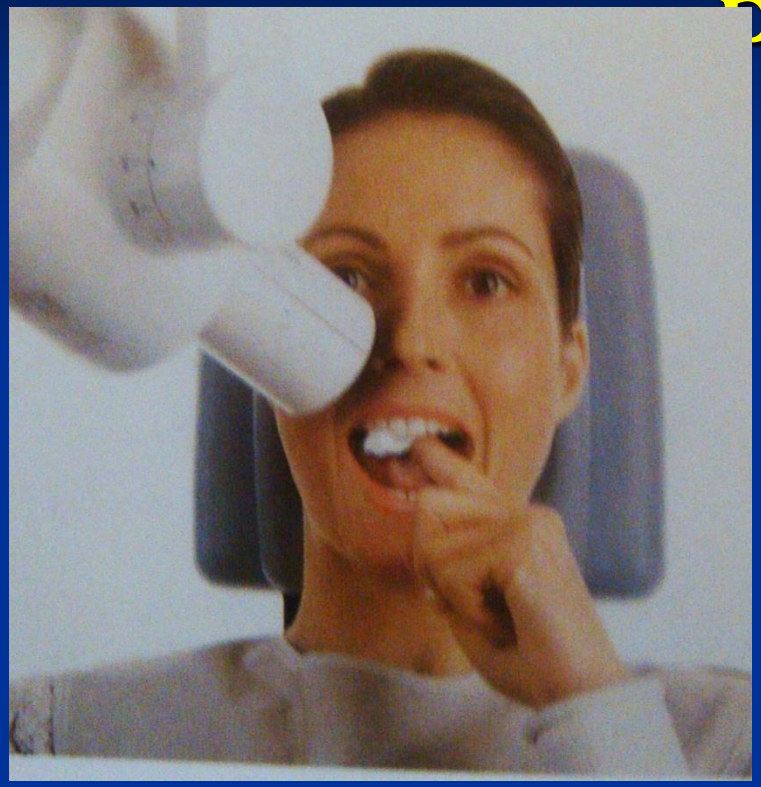
Technique of bissecting angle

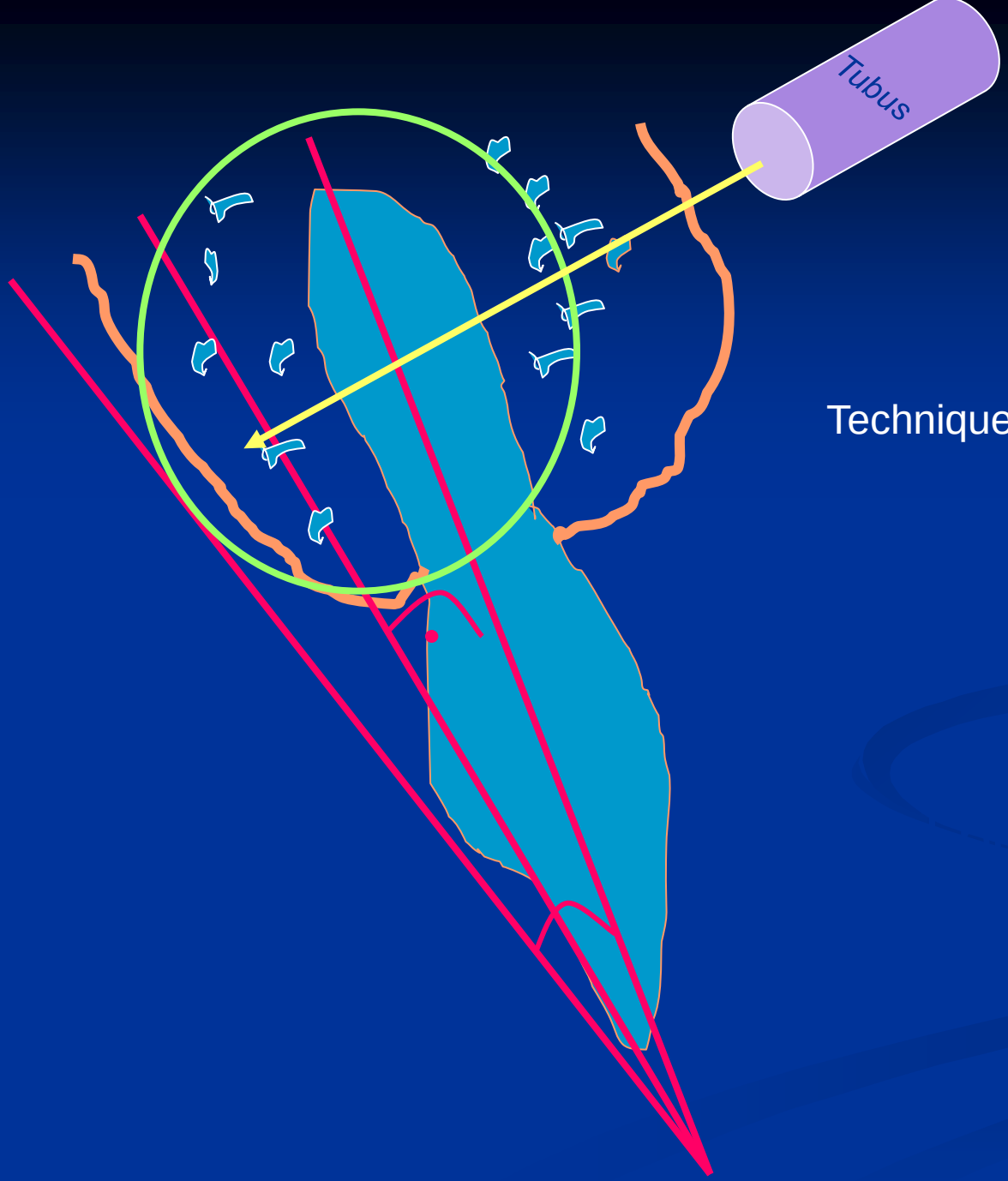
In vertical plane





If parallel technique is not possible



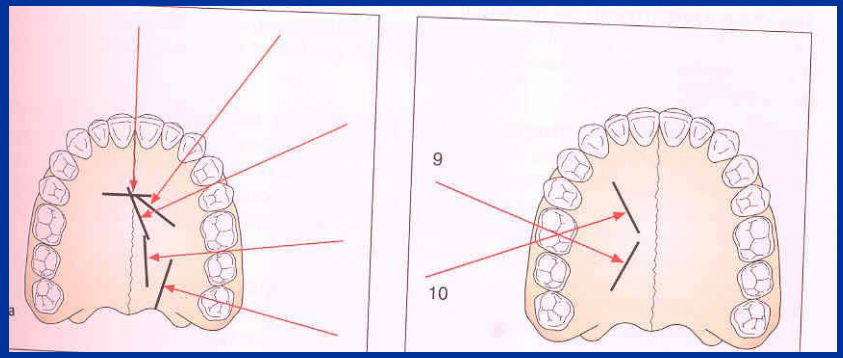


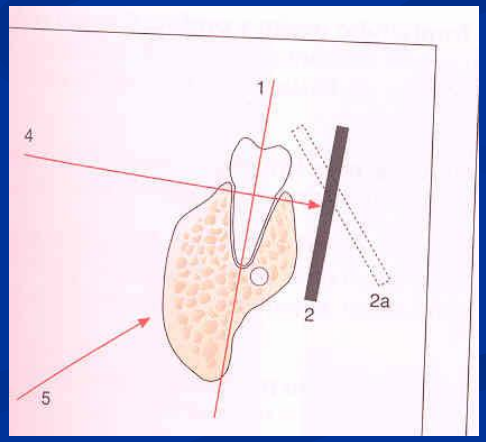
Technique of bissecting angle

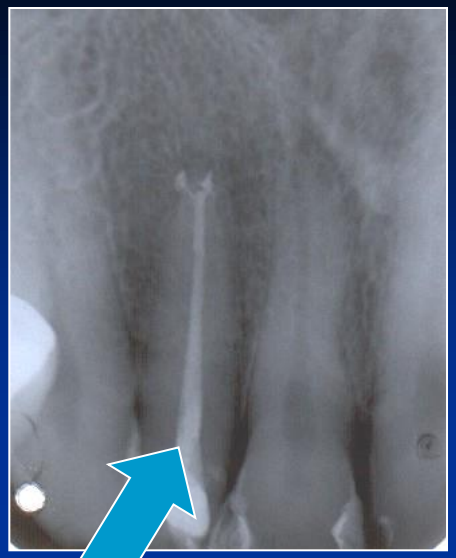
In horizontal plane

Orthoradial and excentric projektion

- Orthoradial – the central beam goes parallel to interdental septa
- Excentric– the central beam goes from distal or mesial side.







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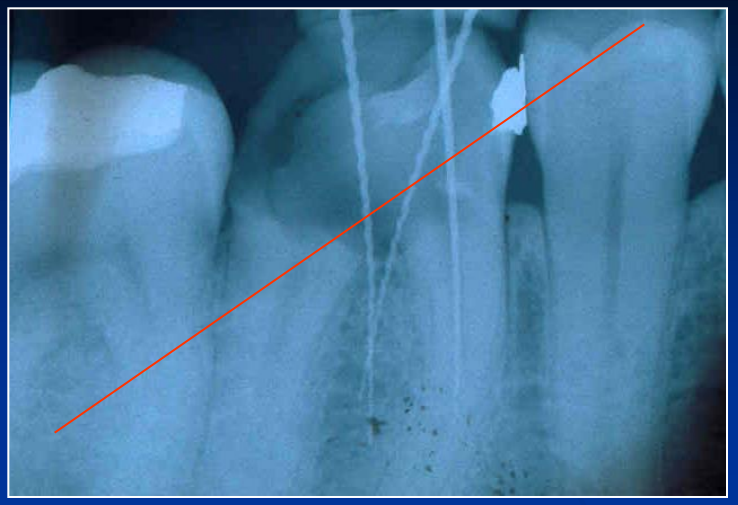

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Clinical classification od pulpal and periapical diseases

Pulp diseases

-Normal pulp

- Reversible pulpitis

- Irreversible pulpitis

- Necrosis

Periodontal diseases

- Periradicular periodontitis (chronic apical periodontitis)

- Periradicular abscess (acute apical periodontitis)

Pulpal disease

- Normal pulp – no spontaneus symtoms, the pulp respond to pulp tests, symptoms are mild, do not cause patient´s discomfort.

Transient sensation reversing in seconds.

- Reversible pulpitis

Stimulation is uncomfortable, sharp pain,revers quickly after irritation. (dental caries, recent dental treatment , exposed dentin, defective restoration).

Pulpal disease

- Irreversible pulpitis

Symptomatic

- Intermittent spontaneus pain
- Pain on stimuli asp. cold – stimul can cause an attack of pain.
- Pain is sharp or dull, usually referred
- Patient can hardly recognise which tooth is causative.

Pulpal disease

- Irreversible pulpitis

Symptomatic

- pain during the night
- during the time the attacks are longer
- the stimuli are less on cold but more on hot
- during time the patient can recognize the causative tooth
- X ray negative or widened periodontal ligament space. (Thickening of periodontal membrane)

Pulpal disease

- Irreversible pulpitis

Asymptomatic

Can become symptomatic or necrotic

Necrosis and gangraena

- Necrotic pulp become very often gangrenous

- no symptoms
- no response on vitality tests
- pain on hot
- typical smell (gangraena can be open or closed)
- no radiographic finding or widened of periodontal ligament space.

Periapical diseases

- Apical periodontitis (periradicular periodontitis)

- Chronic

No symptoms, no response on vitality tests, periapical radiolucency. Can become acute (exacerbation)

- Acute

Symptomatic, pain on percussion, bite, hot, palpation, mobility.No respons on vitality tests. X ray – periapical radiolucency, or widened periodontal ligament space.

Periapical diseases

- Can propagate intraorally or/and extraorally

- Subperiostal abscess
- Submucous abscess
- Abscess in surrounding tissues
- Non limited inflammation - cellulitis

Endodontic treatment

- Irreversible pulpitis
- Necrosis, gangreana
- Apical periodontitis

Conservative, conservative/surgical approach, surgical approach.

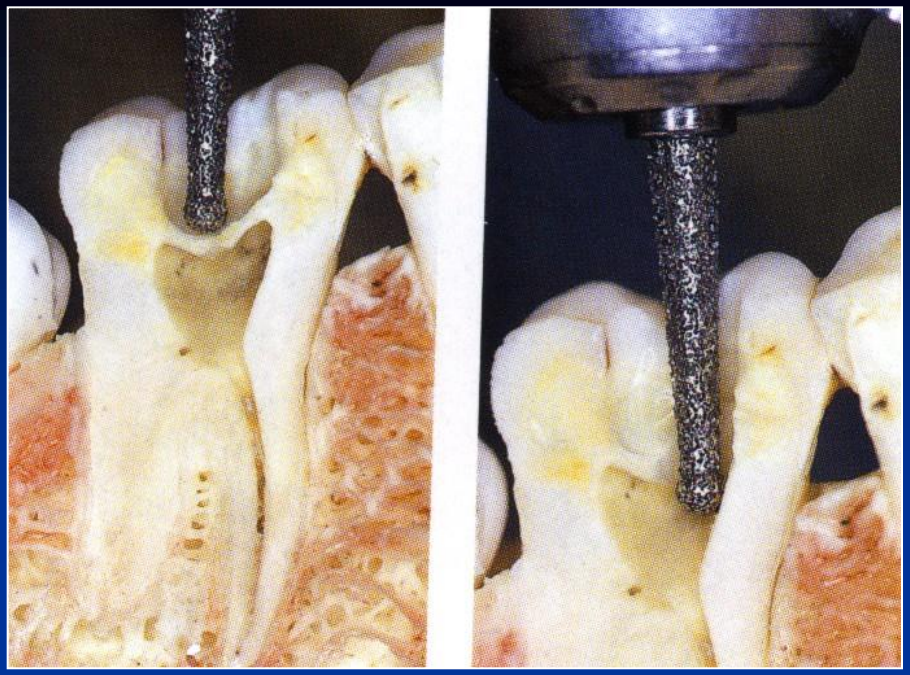
Acces

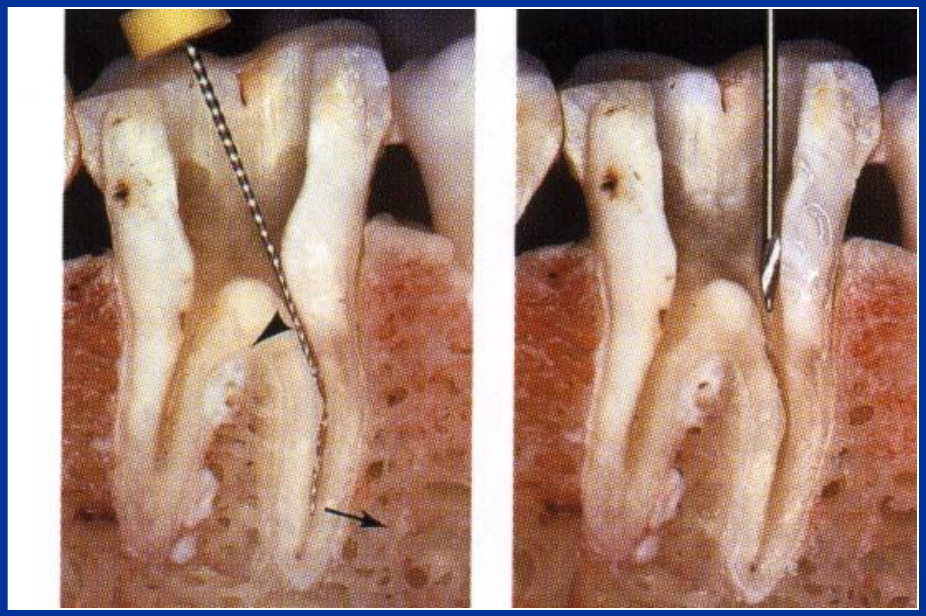
- **Accessto the pulp chamber**

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





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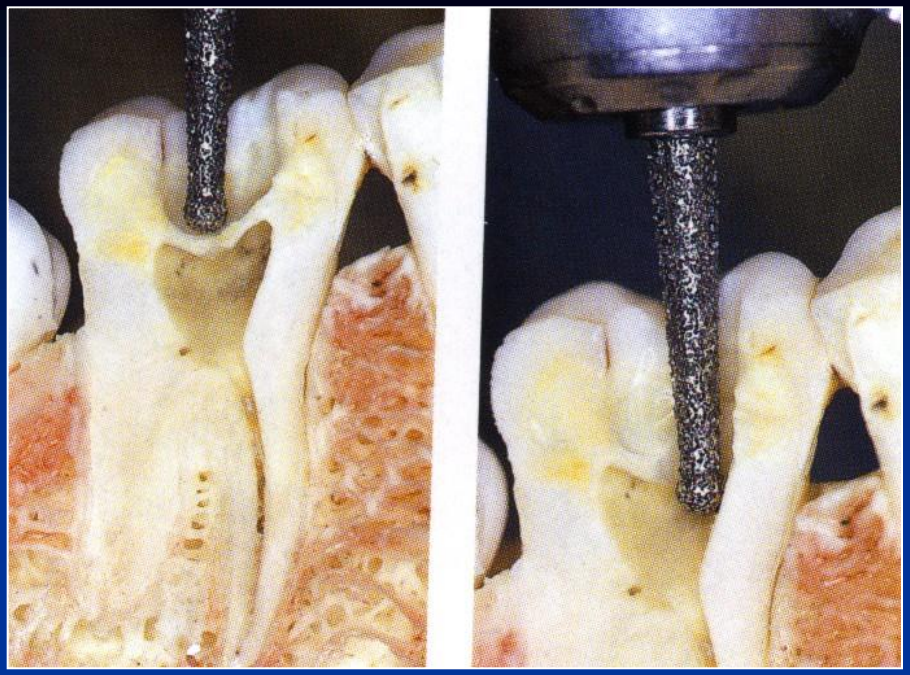


The wall is weakend

Opening of the pulp chamber

Dia trepan

Dia round burs – balls

Steel round burs

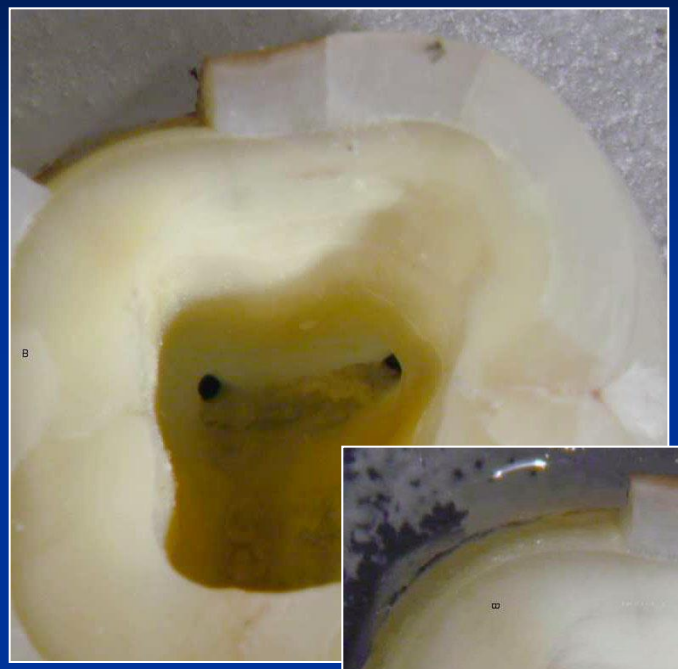
Removal of the roof of the pulp chamber

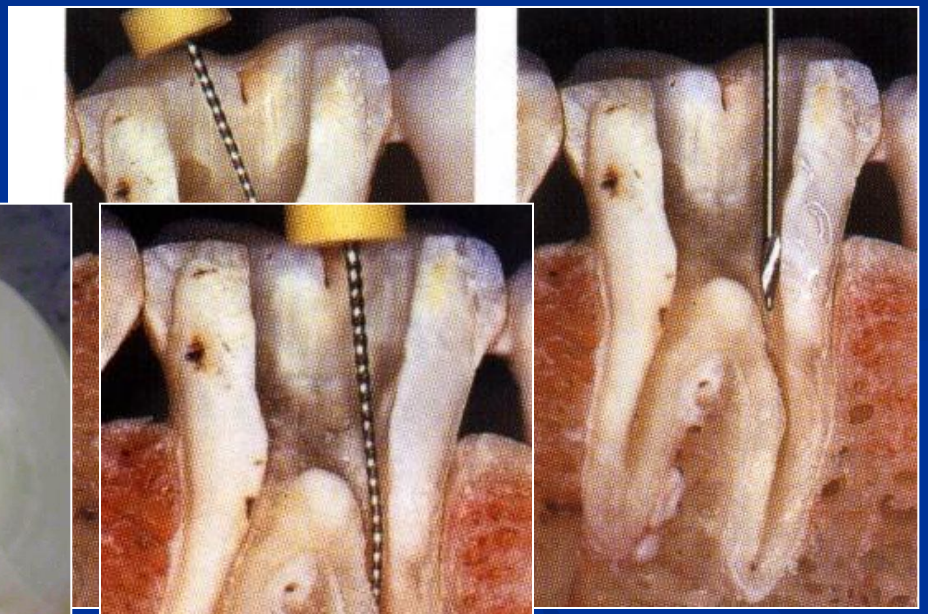
Dia trepan

Safe ended tips
Batt´s instruments

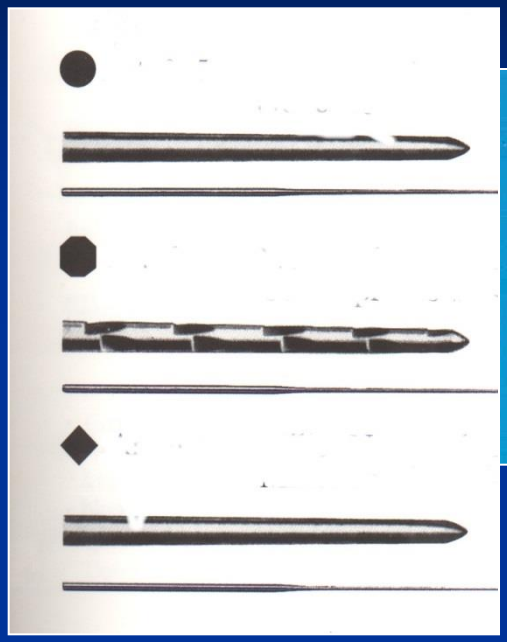
Fissur bur

Finding of the root canal orifice

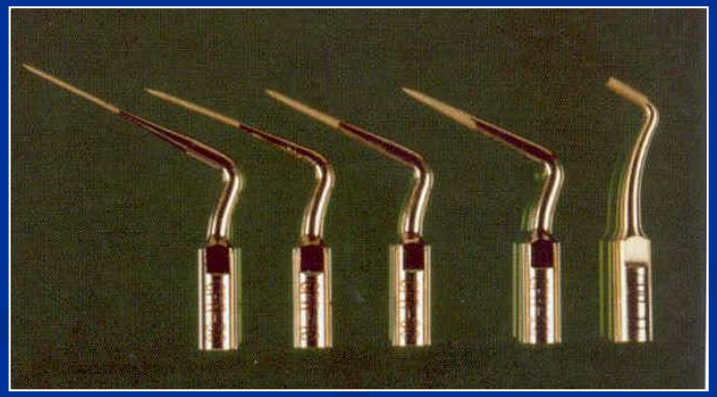




Finding and opeing of rot canal orifices



Endodontic probes
Microopeners



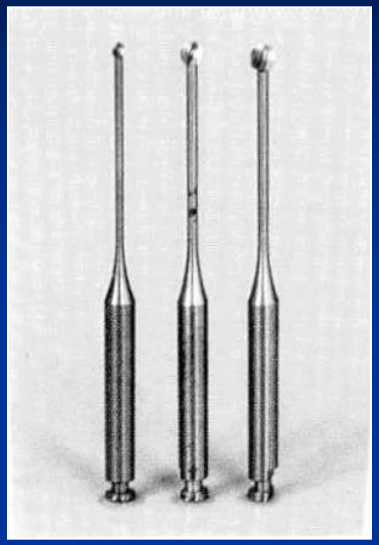
Ultrasound tips

Dye

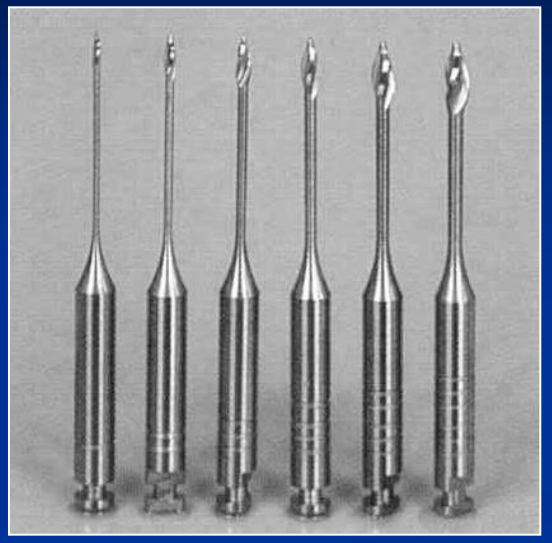
Ultrasound tips can be covered with diamond
or smooth or bladed

Finding and opening of root canal orifices

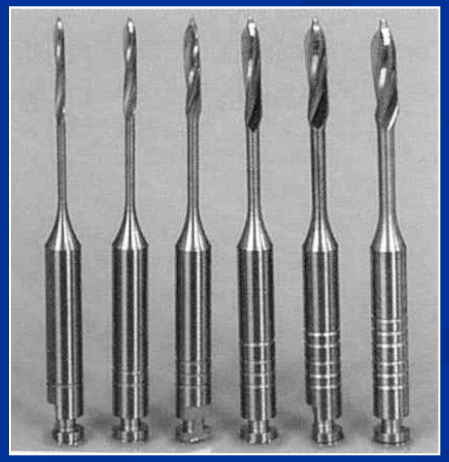
Rounded burs - balls



Miller´s burs



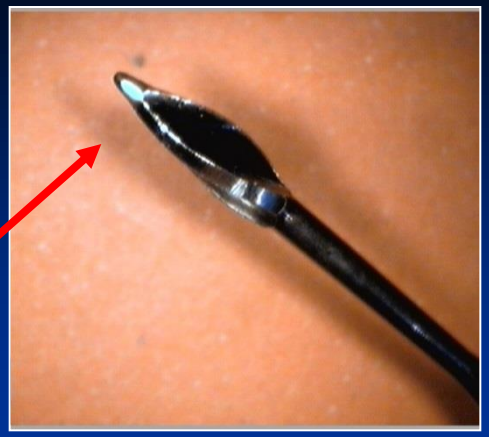
Gates Glidden´s burs



Peeso – Largo

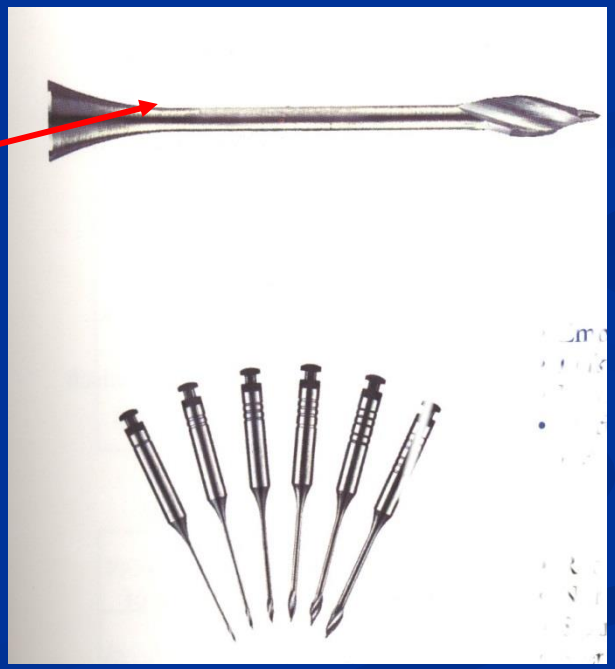
Gates - Glidden

Peeso-Largo

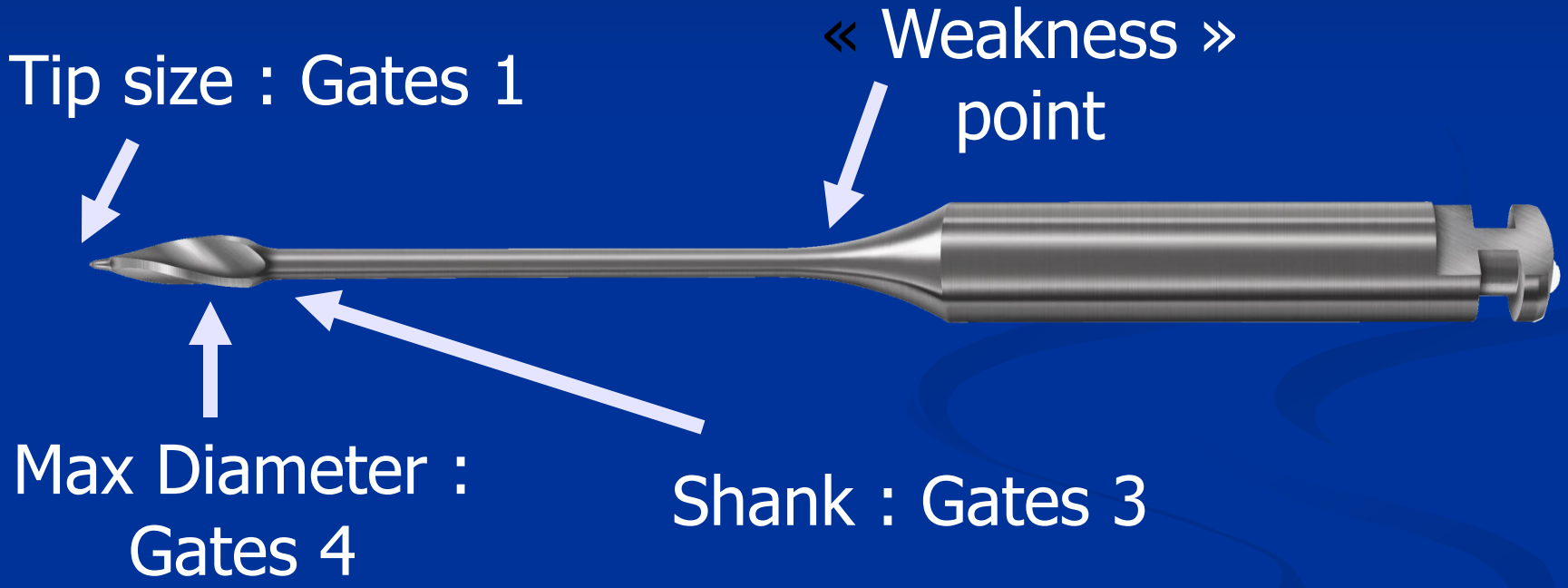


Gates – Glidden:
Blunt, non active tip

Programm point of breakage



X-GATES


Tip size : Gates 1
« Weakness » point
Max Diameter : Gates 4
Shank : Gates 3

Opening of the root canal orifice

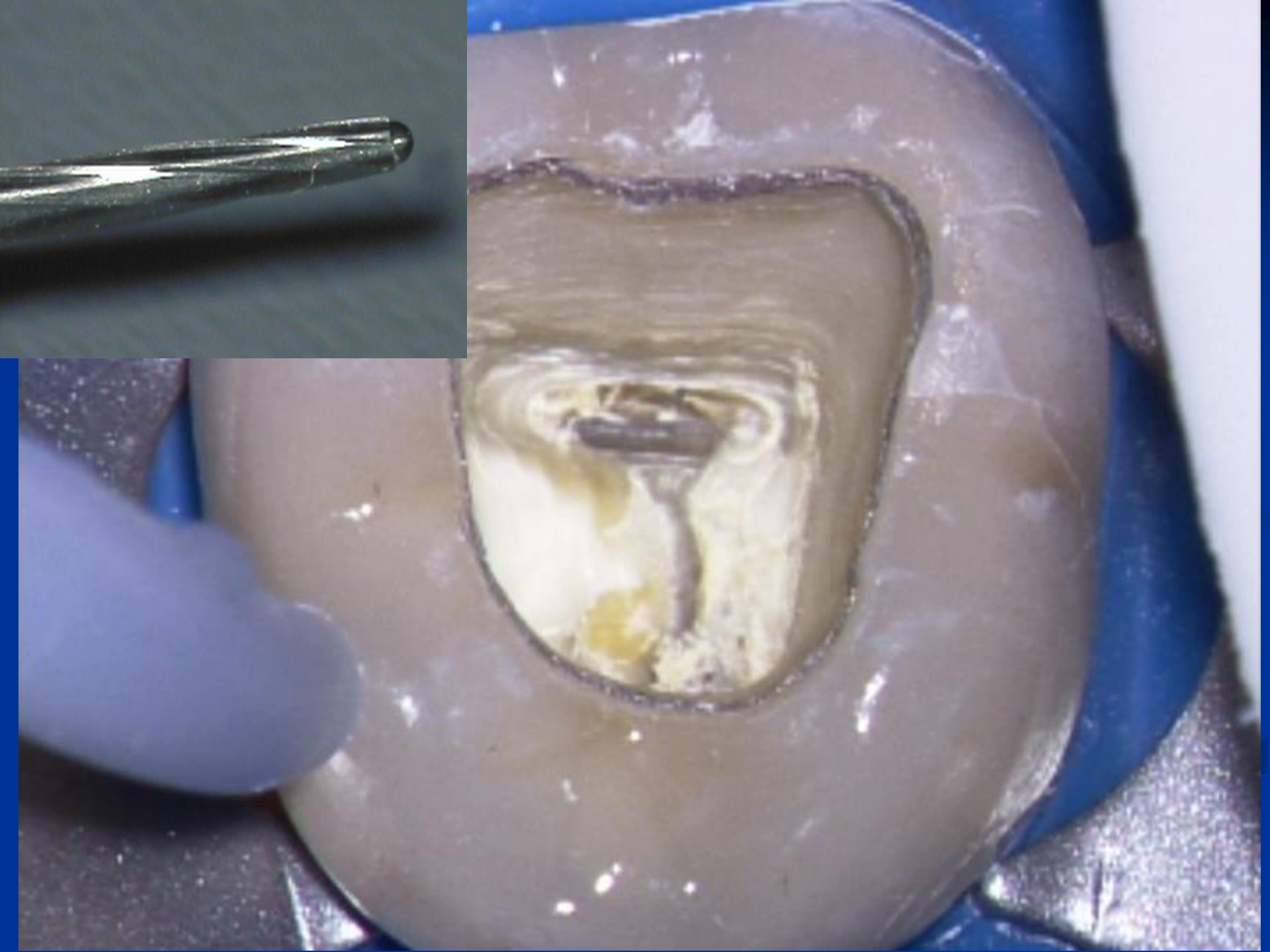
Ni-Ti instruments

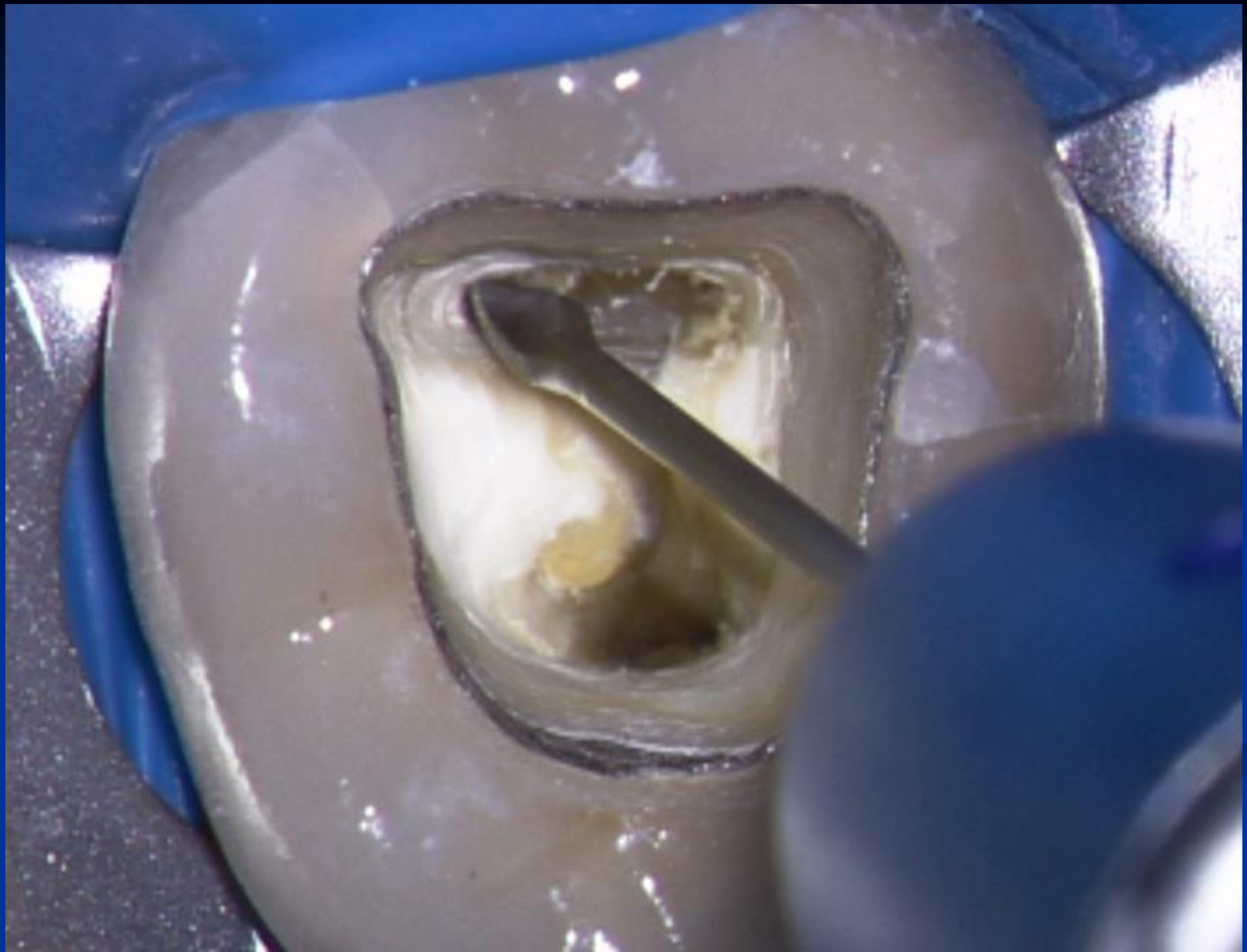
E.g: Profile O.S., ProTaper SX, IntroFile etc.


DENTSPLY
MAILLEFER
F 0001 016
E 0153 012
E 0123 010
E 0123 014
F 0199 016
X-Gates

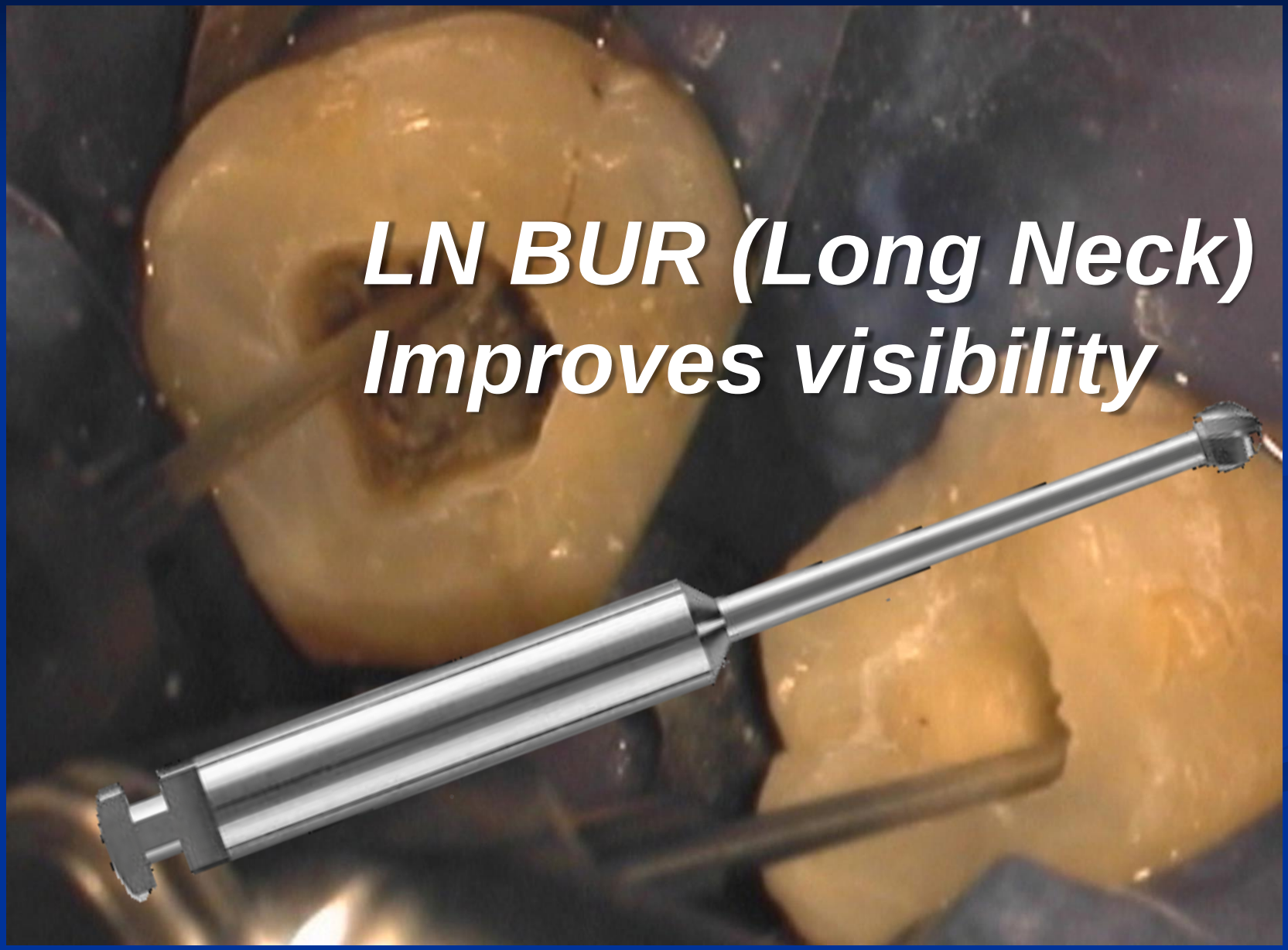
ACCESS Kit


DENTSPLY
MAILLEFER
F 0001 016
E 0153 012
E 0123 010
E 0123 014
Endo Z
X-Gates

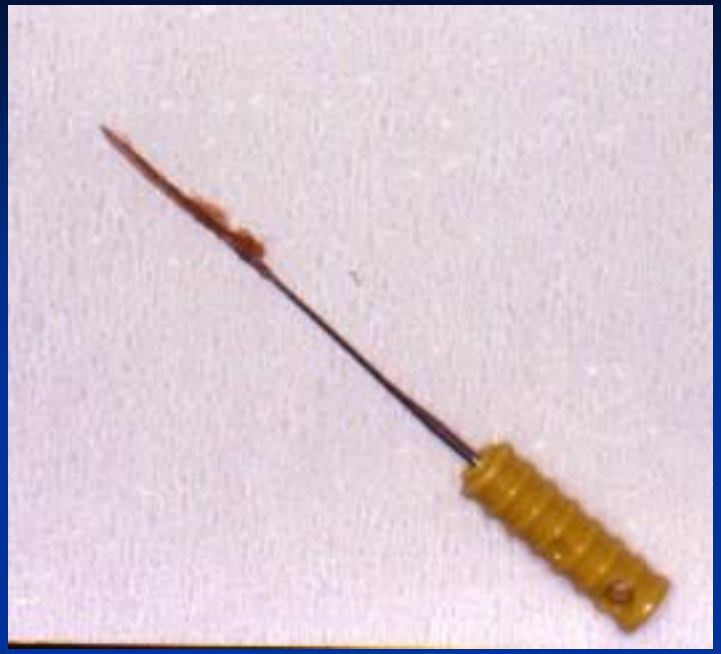




Tungsten Carbide Burs



Removal of contents of root canal

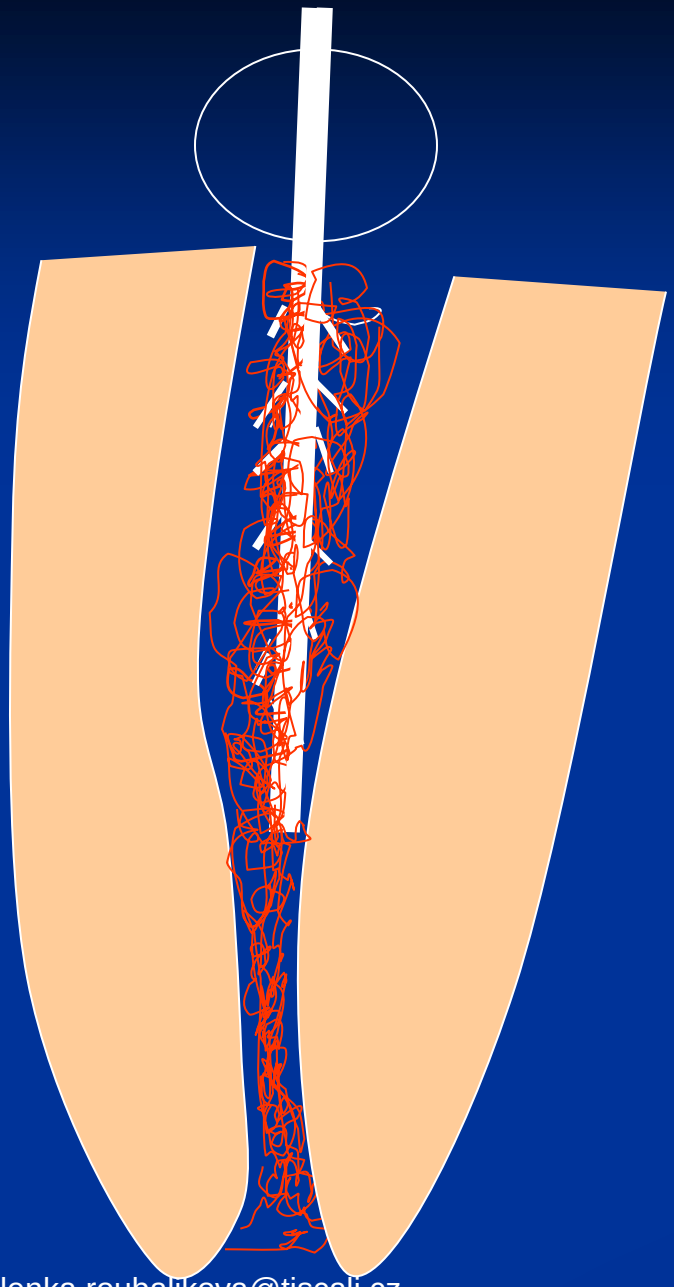


Pulpextractor

Emoval 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 (shaping)

Iniciální flaring – katetrizace Glide path

- Seznámit se s průchodností a anatomií kanálového systému
- Vytvořit cestu pro strojové opracování
- Snížit riziko zalomení kořenových nástrojů

C+ file

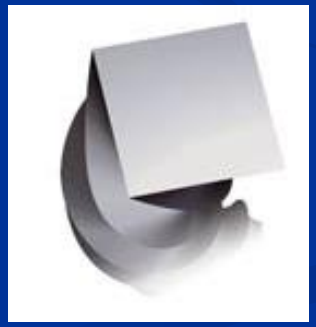
C+ file

Ostrý hrot

Čtvrecový průřez – stabilita

Flkexibilita

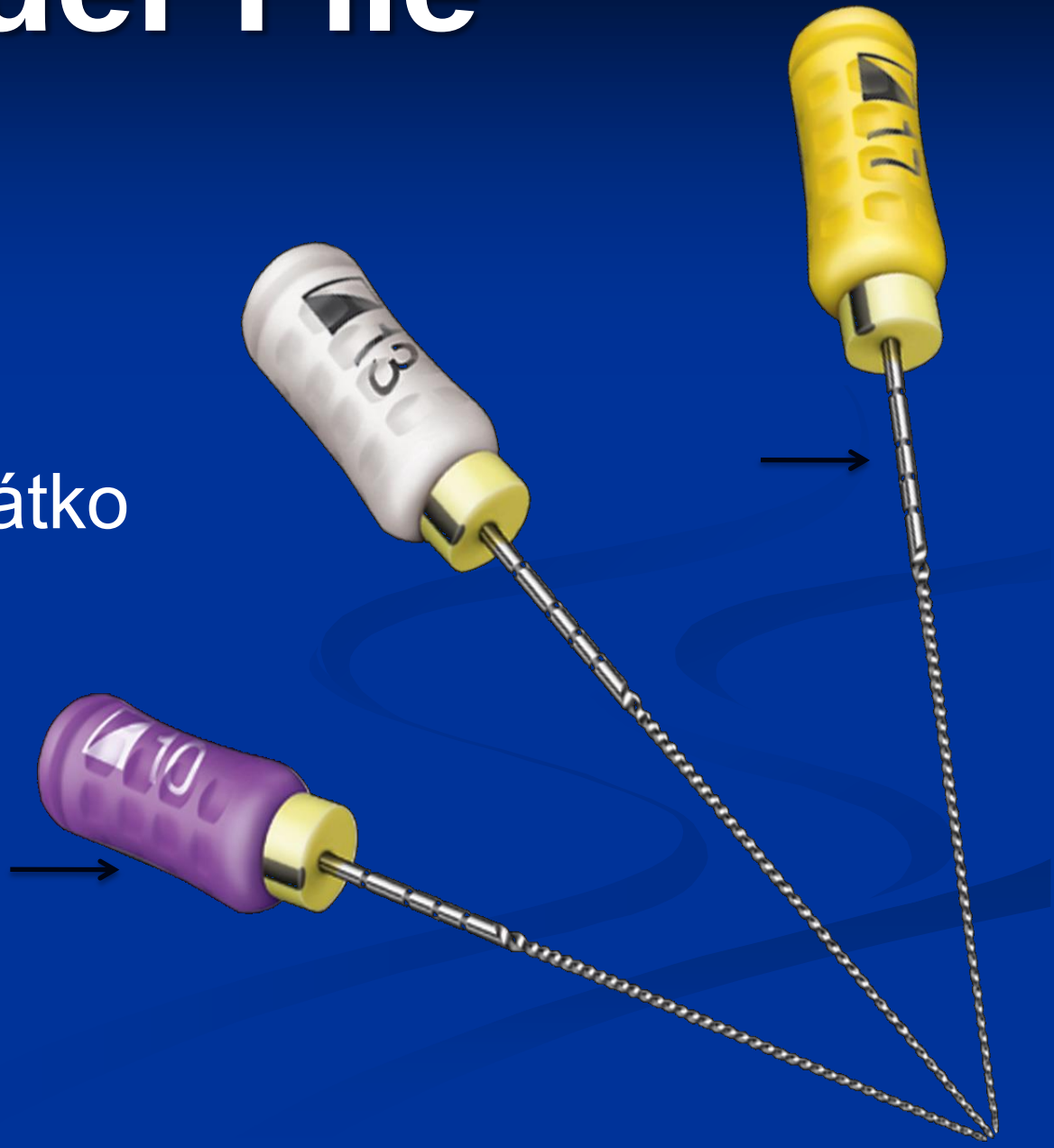
Vhodný pro kalcifikované kanálky

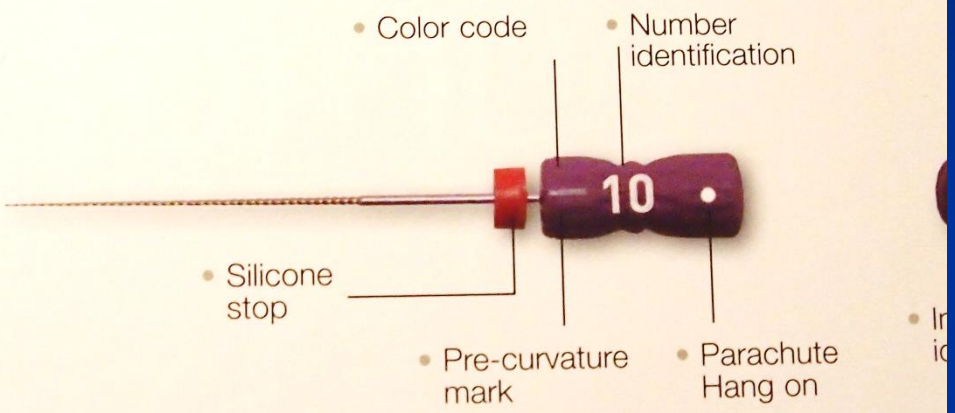


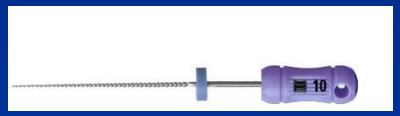
ProFinder File

Regresivní kónus

Silikonové držátko




Color code
Number identification
10
Silicone stop
Pre-curvature mark
Parachute Hang on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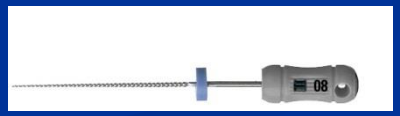

08

Ověření průchodnosti

První zprůchodnění

Úhel vstupu do kanálku

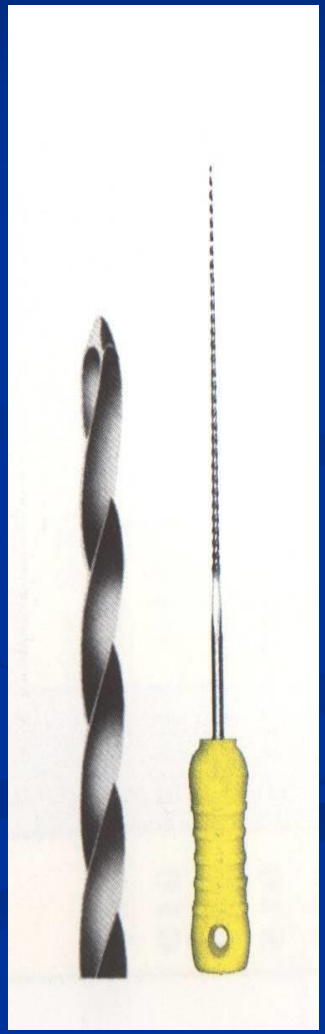
Místo pro strojové nástroje

Reamer

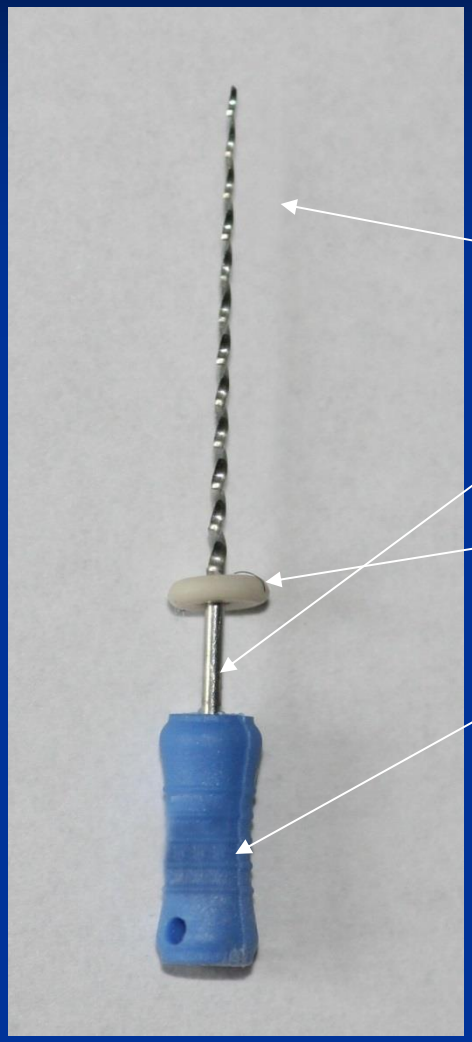
K -reamer = Kerrův pronikač

Triangl or square wire spun

Symbol



Reamer

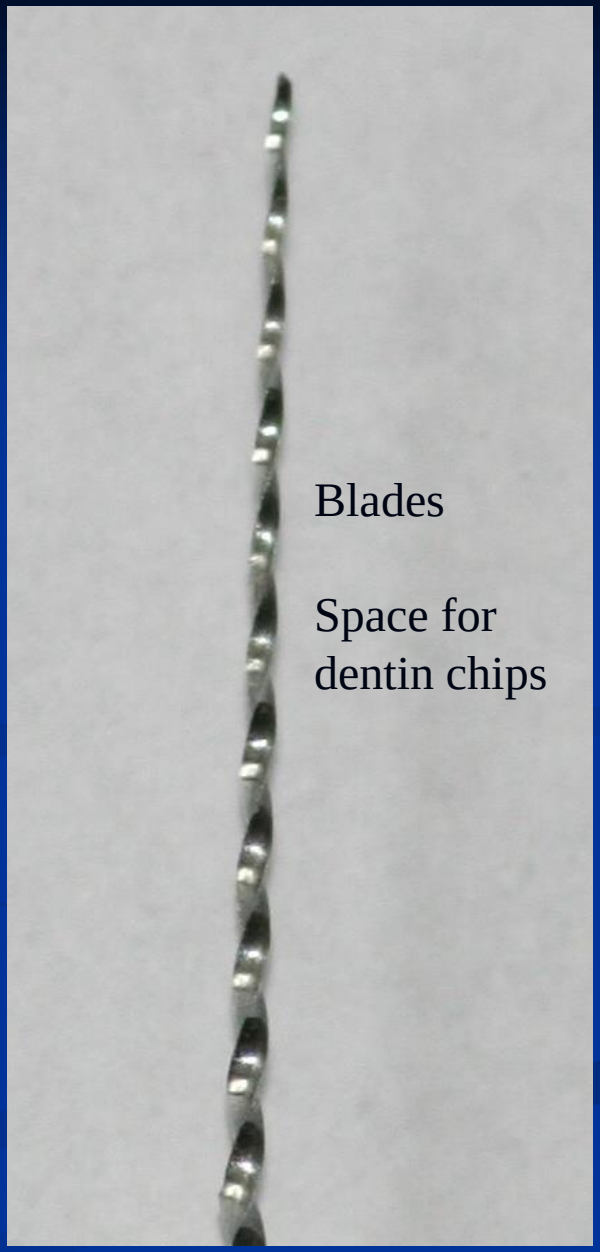


Bladed part

Shank

Stopper

Grip



Blades

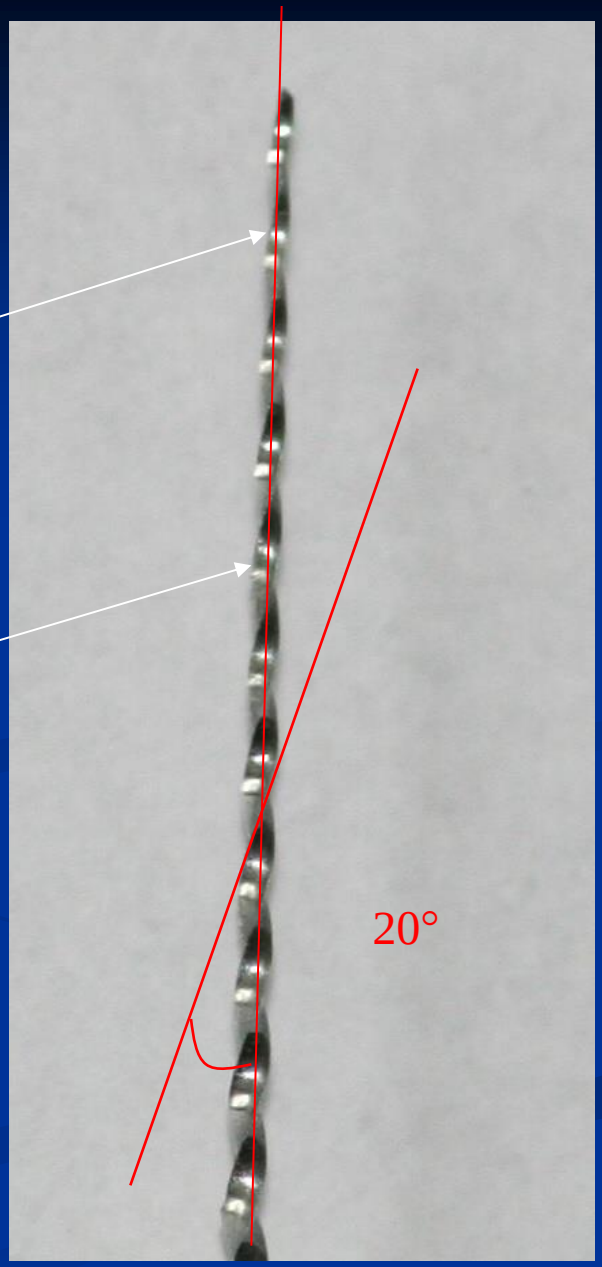
Space for dentin chips

Reamer

Blades

Space for dentin chips

Rotation – reaming achtion - panetration



Reamer

Rotation (clockwise) – penetration

Application of plastic material (contraclockwise)

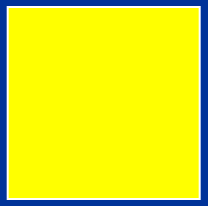
Files

1. K-file
2. K-flexofile, flexicut, flex-R
3. K-flex
4. H-file, S-file

K file

Wire triangl or square

Symbol is always square

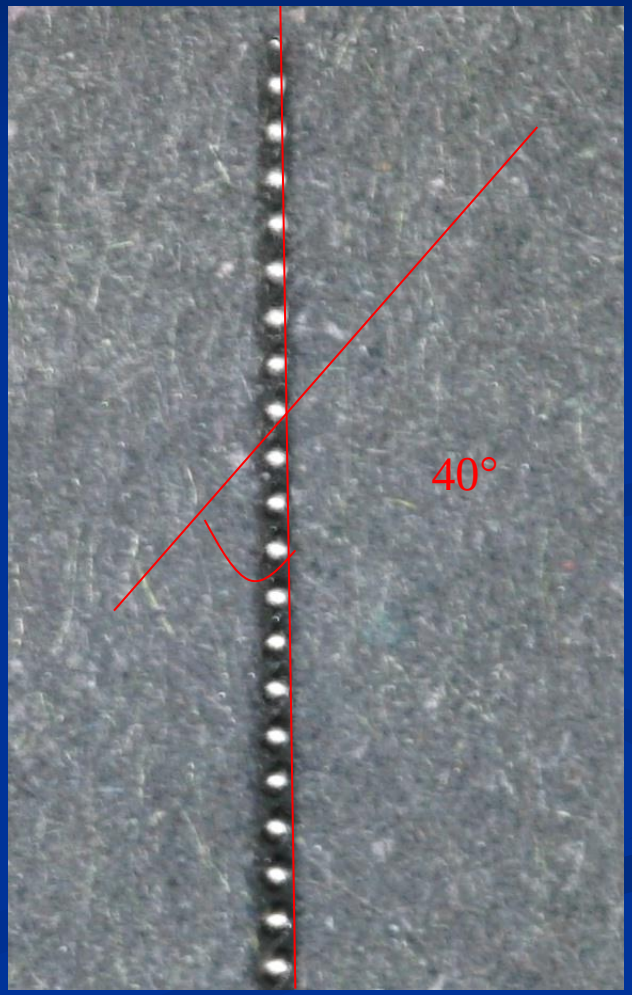


K-file

Filing

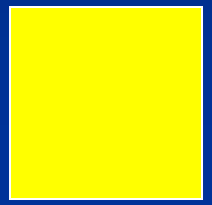
Also rotation

45° – 90°



K-flexofile, flexicut, flex-R

- Triangle wire always

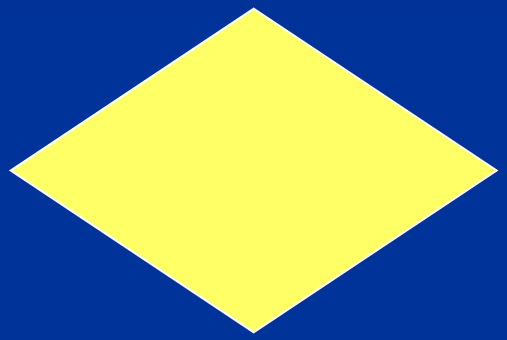


Flexibility

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, effifacy

K-file and reamer: difference

H-file

= Hedstroem file

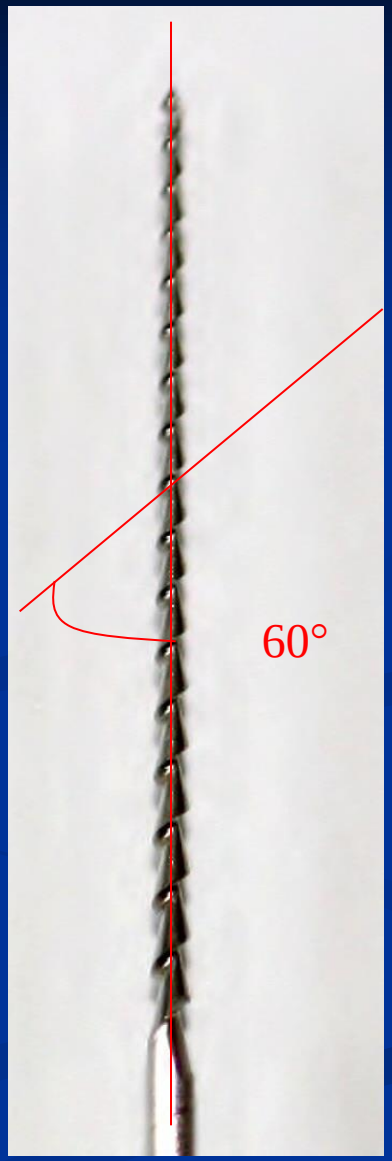
Ring

H- file

No rotation!!

Pull motion only!!

Risk of breakage in small sizes



ISO

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

06

08

10

15 45

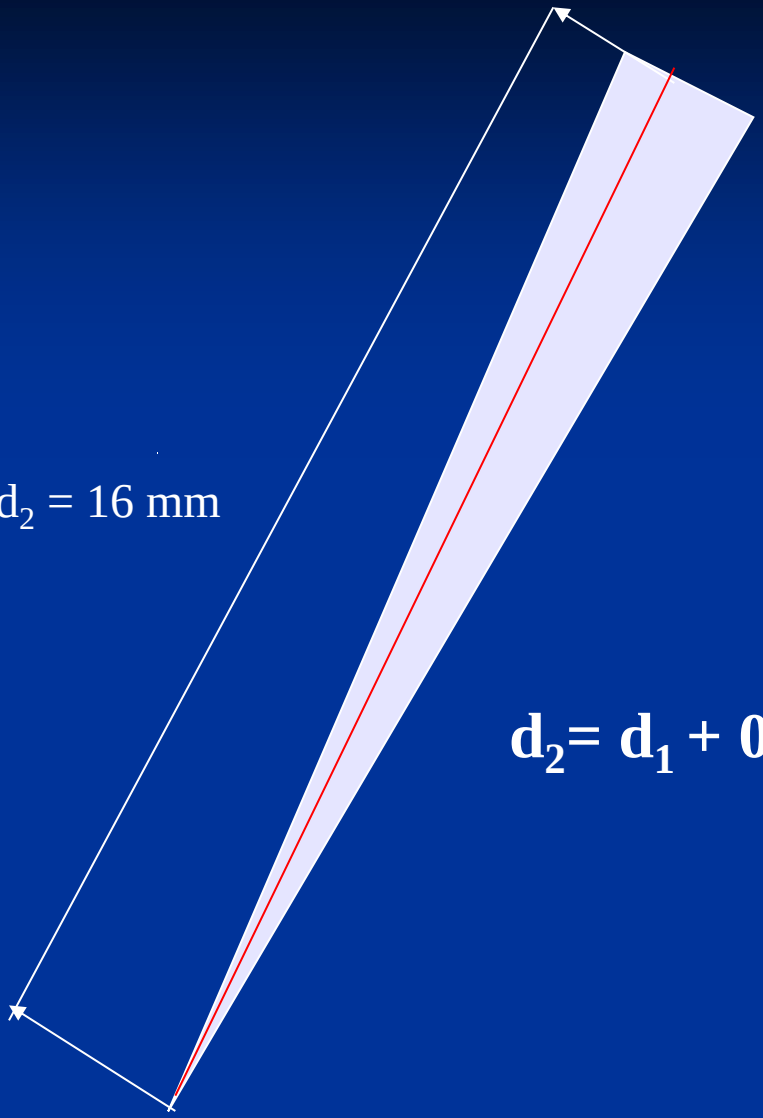
20 50

25 55

30 60

35 70

40 80



d_2

$d_1 - d_2 = 16$ mm

$d_2 = d_1 + 0{,}32$

d_1

Taper 2%

0,02 mm na 1mm

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Canal shaping and cleaning

- Basic rules
  - Elimination of infection
  - Enlargement till the apical constriction – simplify the shape

Final result:

  - 6% taper, 3 more in comparison to the apical size
  - Gangraena – clean dentin chips

Canal cleaning

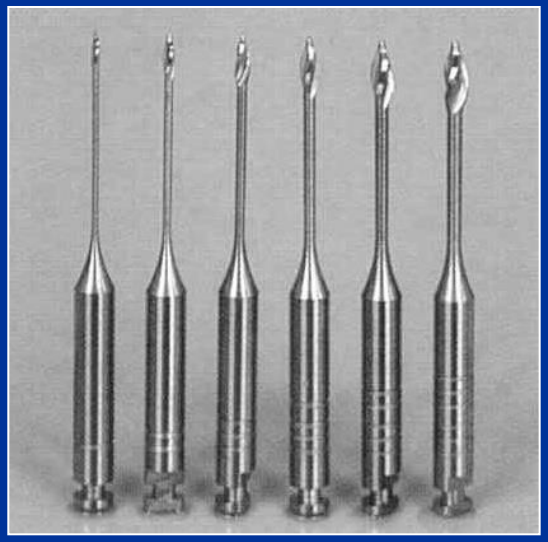
- Elimination of infection

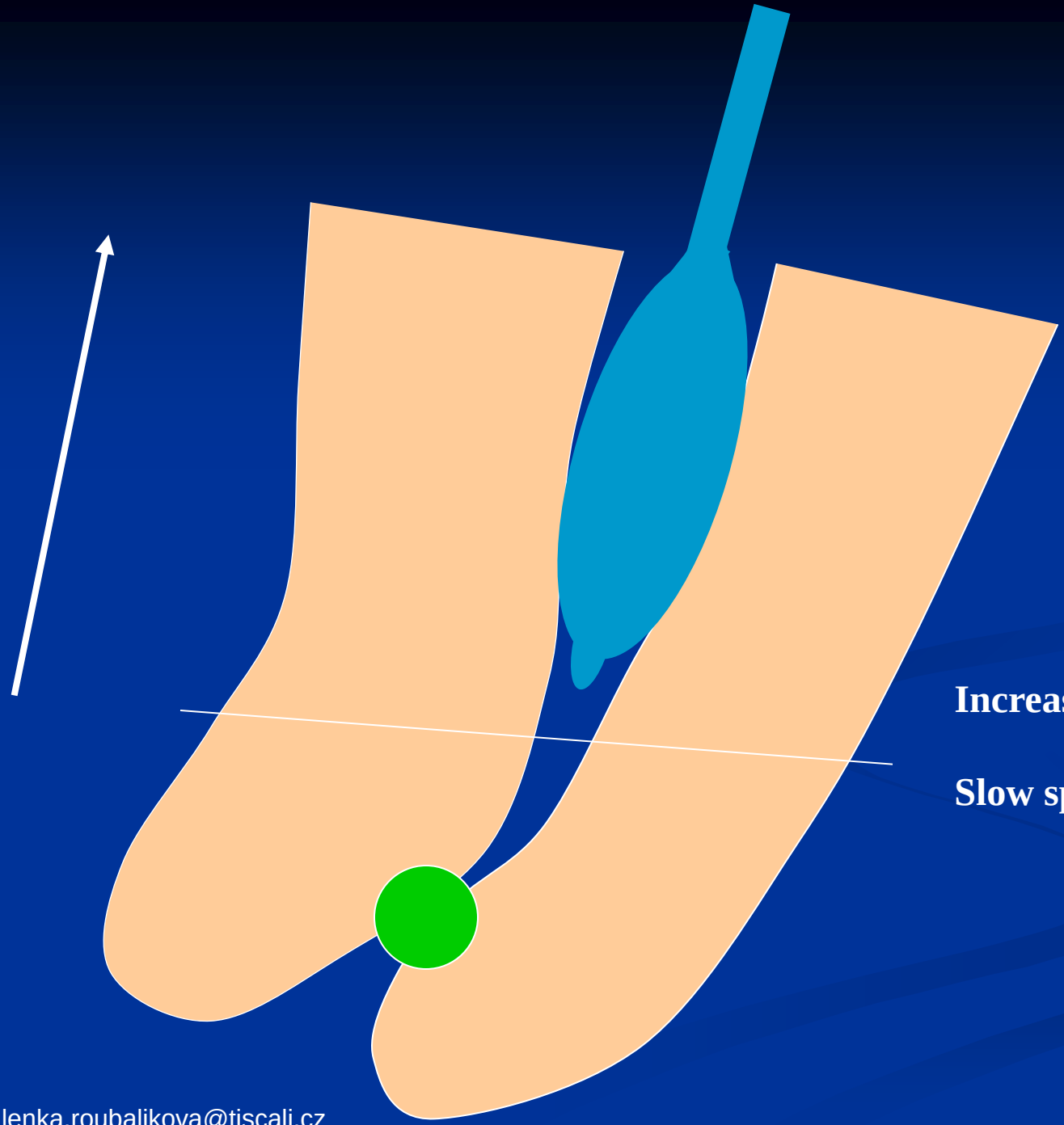
Mechanically – instrumentation, irrigation

Chemically – irrigiation, temporary root canal filling

Canal shaping

Coronal flaring (Weine 1982, Peřinka 2003)

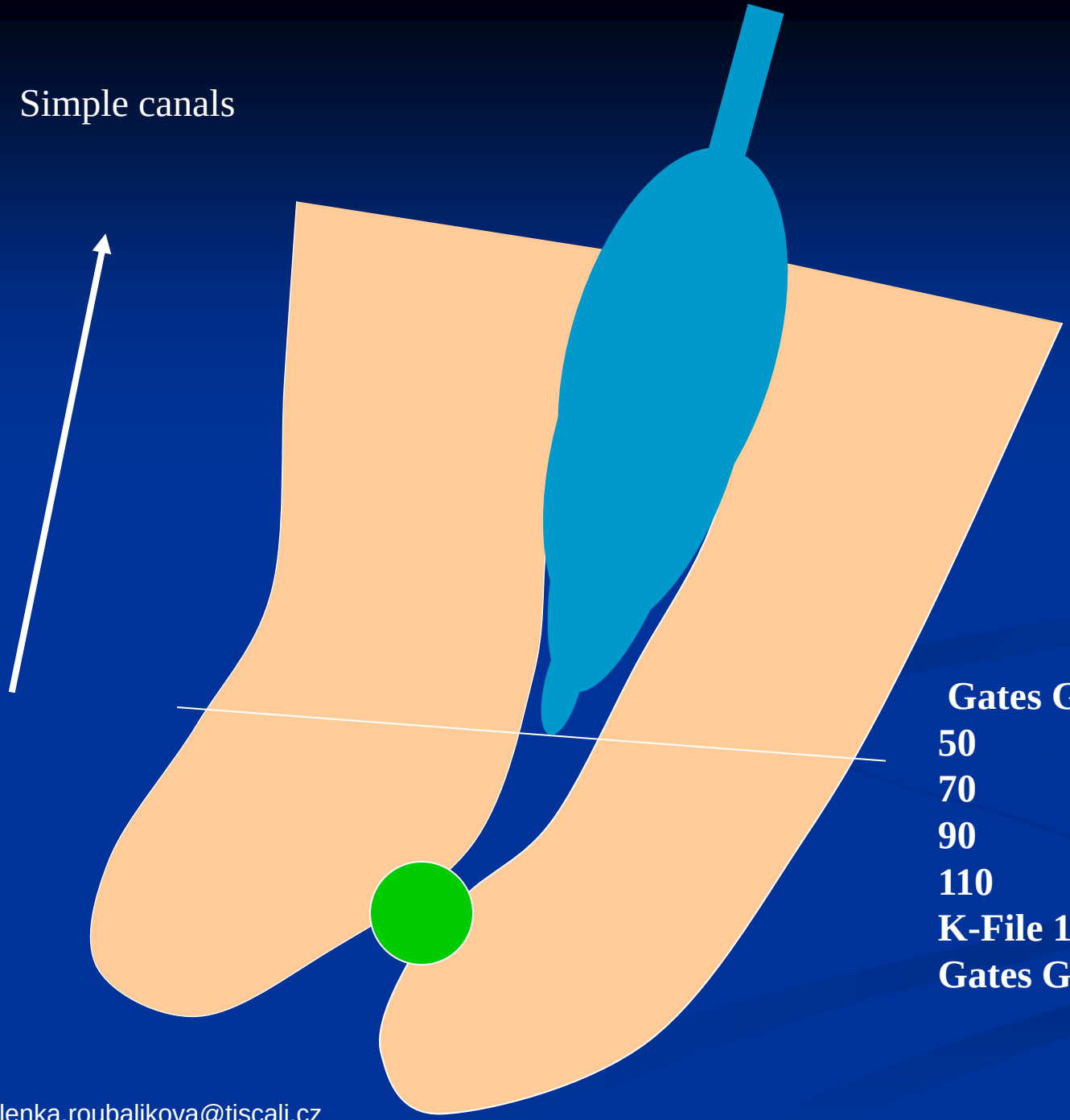




Increasing size

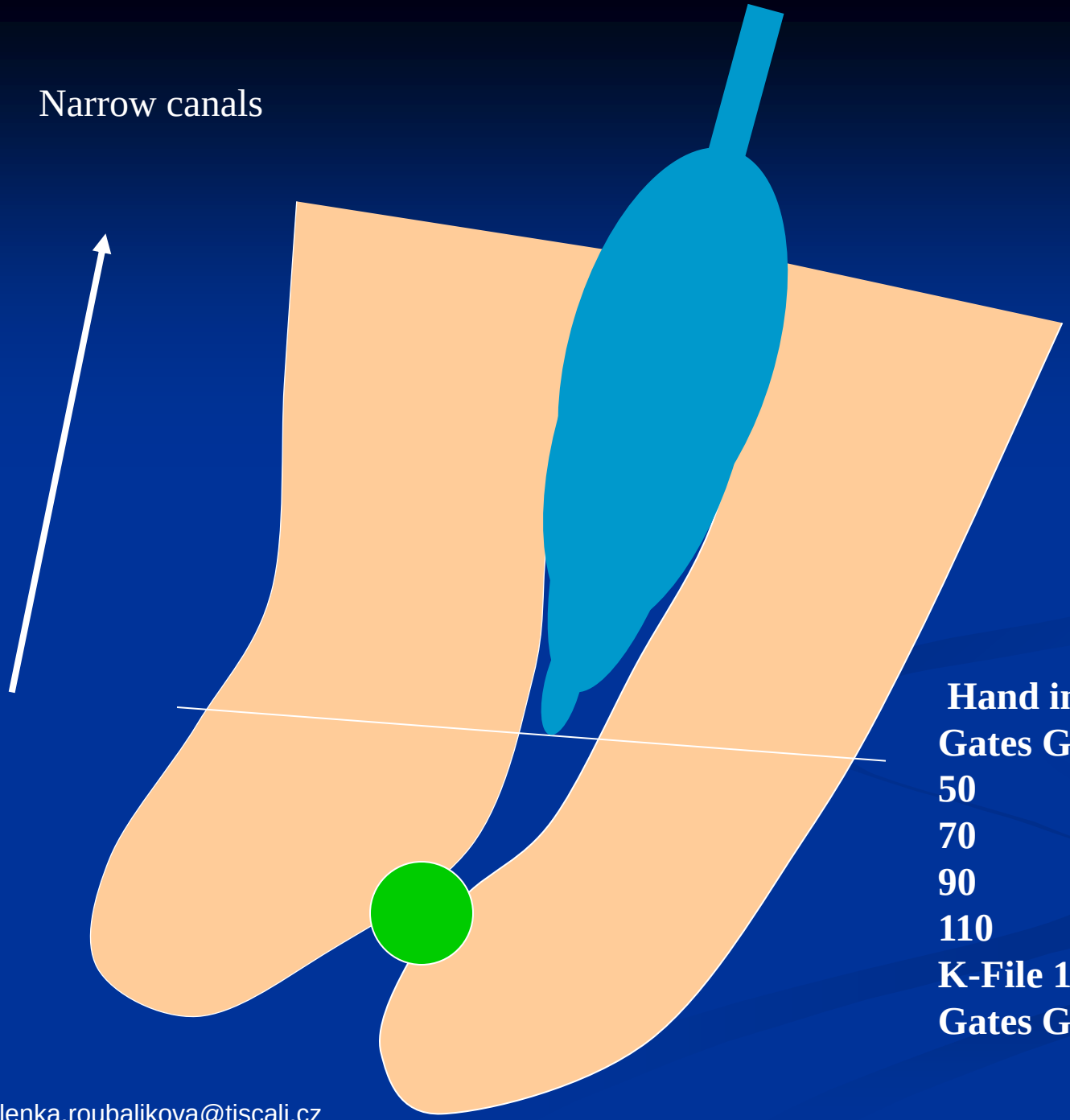
Slow speed 600 – 800/min

Simple canals

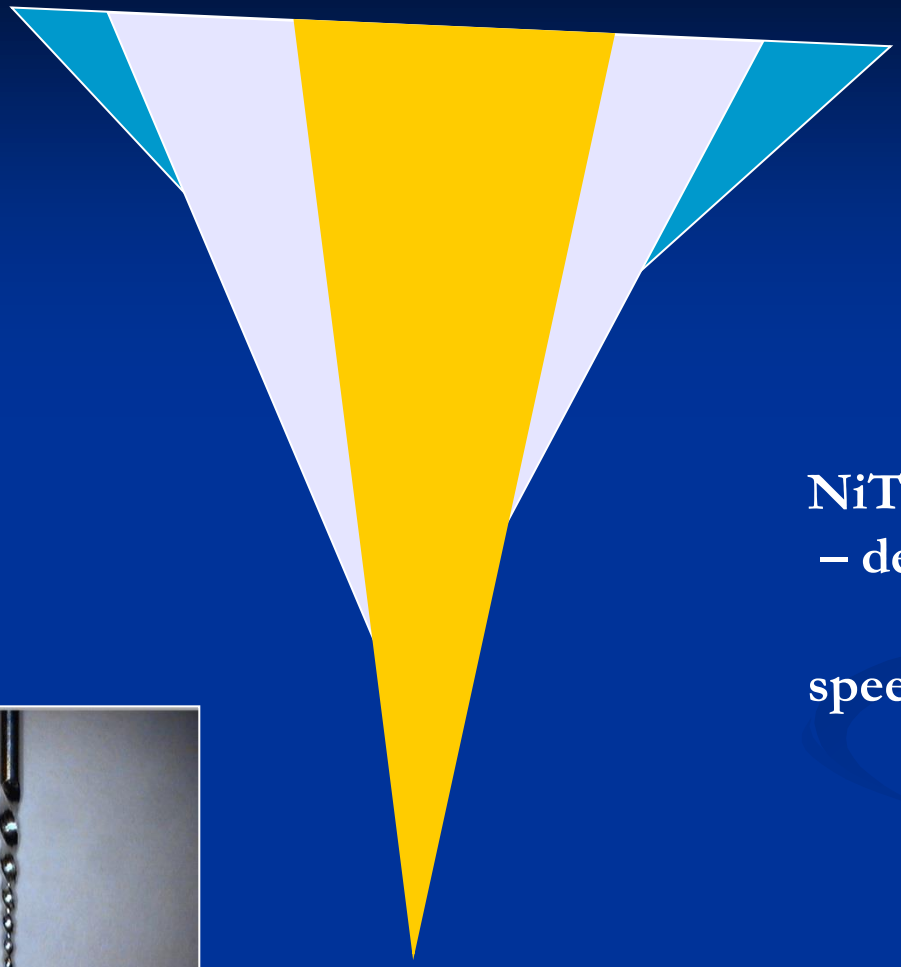


Gates Glidden
50
70
90
110
K-File 15
Gates Glidden 50

Narrow canals

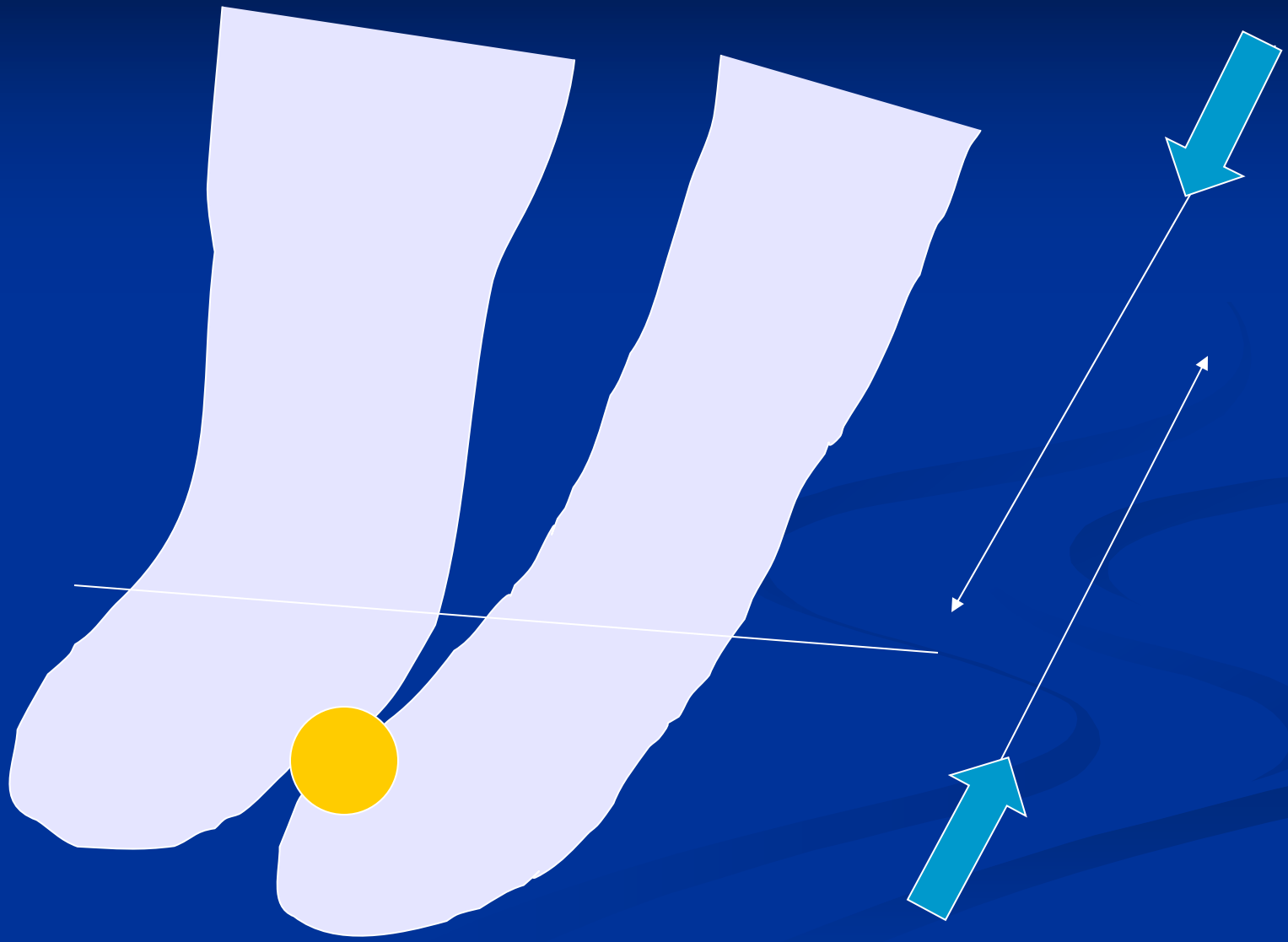


Hand instruments till 30
Gates Glidden
50
70
90
110
K-File 15
Gates Glidden 50



NiTi system
– decreasing size

speed 250 - 300 rpm

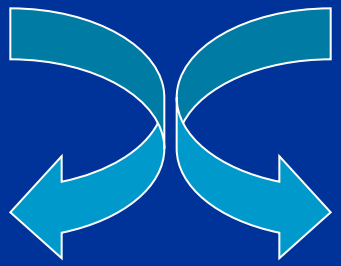


Importance

- Protection against fracture of root canal instrument
- Better cleaning of coronal part
- Effective irrigation
- Better conditions for establishment of working length
- Better conditions for apical preparation
- Less risk of complication

Shaping technique

- Rotation – 45° clockwise and contraclockwise

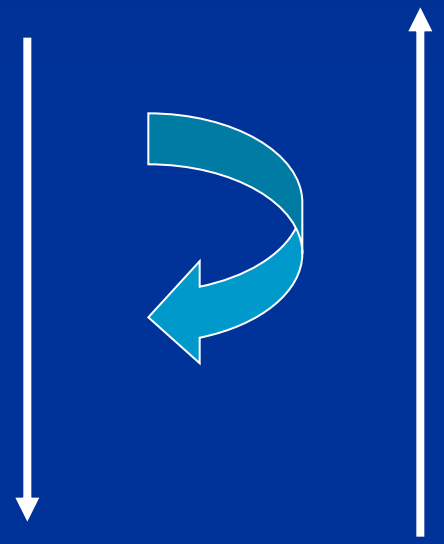


K – reamer

K- file

Shaping technique

- Rotation 45° slight pressure and pull motion



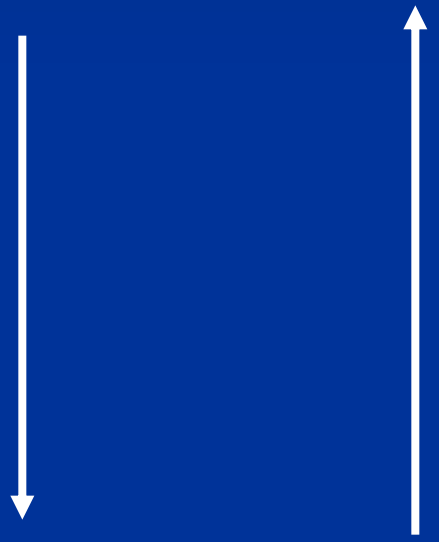
K – reamer

K- file

Risk of ledging
Zip, elbow effect
Via falsa

Shaping technique

- Filing

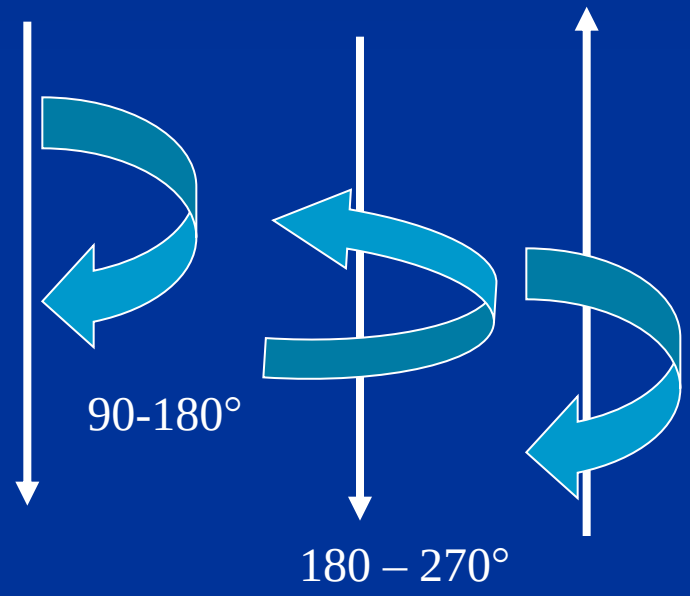


H- file

K – file

Risk of periapical infection infection
Risk of plug

Shaping technique



K- flexofile

K – file (?)

- Balanced force-

1. Introduce instrument 1 size bigger than apical size,
2. Rotation clockwise with very slight pressure, 90 – 180°
3. Rotation contraclockwise, pressure forward,
4. Pull motion and clockwise rotation

Methods of shaping

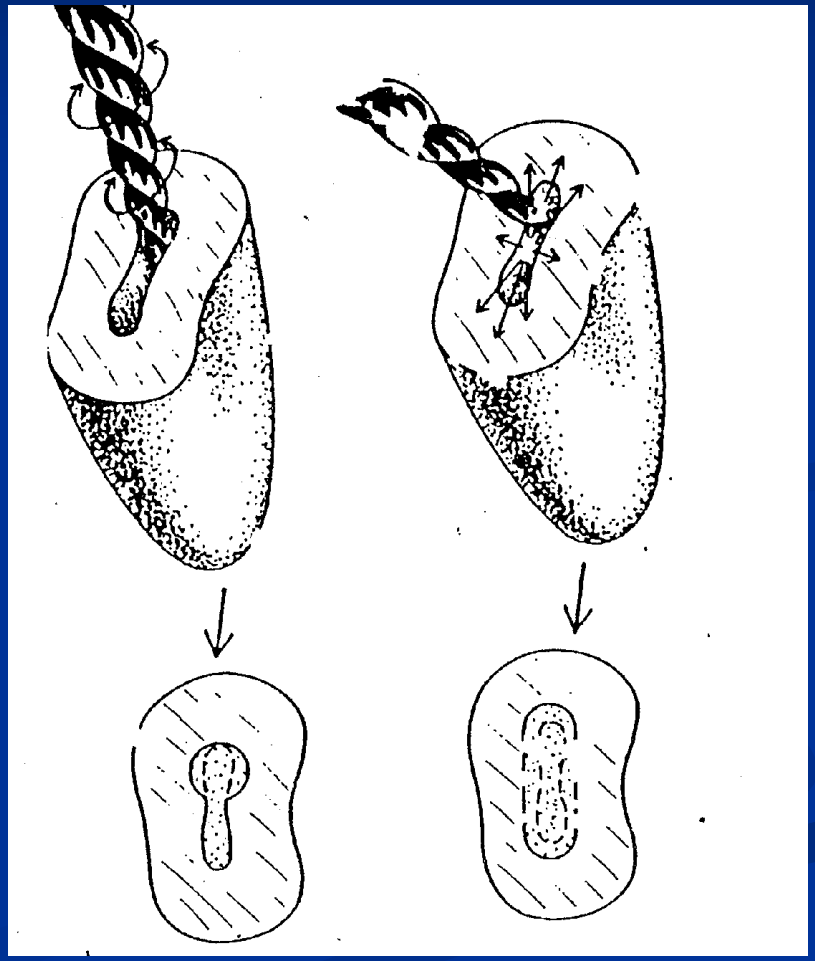
- Rotation and filing combined

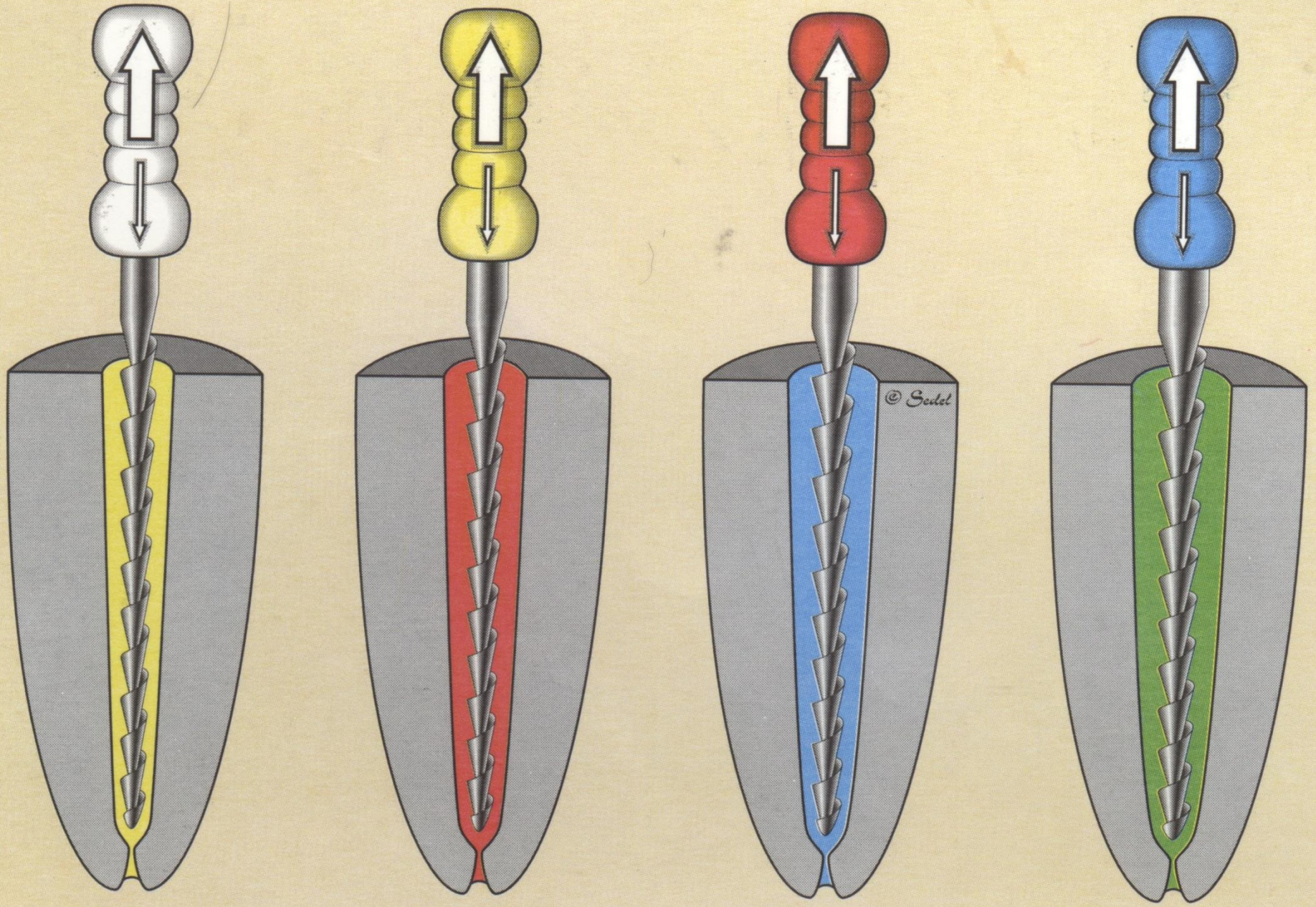
K - reamer

H- file

Methods of shaping

- Circumferential filing

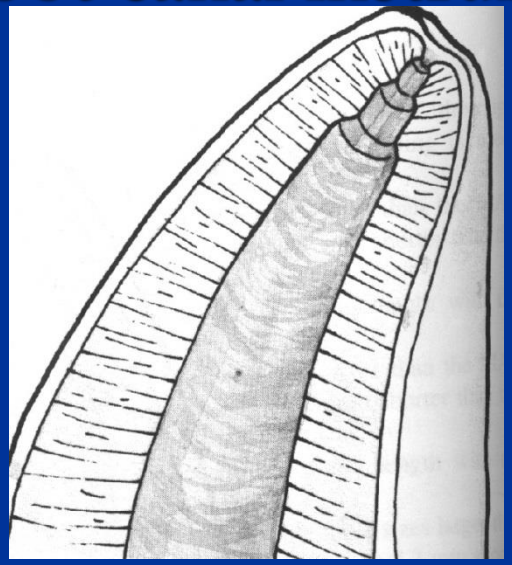



© Sedel

Methods of shaping

- Step back

Reduction of working length 1 mm after 3 sizes of root canal instrument.



H- file

K-file

K-flexofile

Methods of shaping

- Modified double flared with balanced force

1. *Coronal flaring)*
2. *Apical preparation balanced force*
3. *Step back*
4. *Final flaring*

Methods of shaping

- Step down

H –file opening of root canal

Gates Glidden

Establishment of working length

H-file

GG- files

H-file step back

Methods of shaping

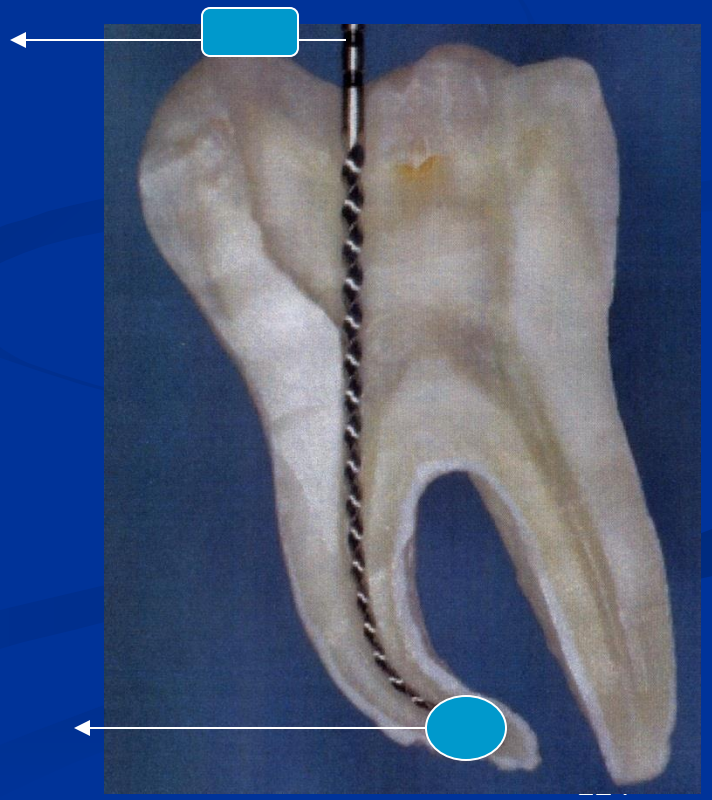
- Crown down presureless

Coronal flaring

K –file contraclockwise only

Working length

- Distance between referential point and apical constriction



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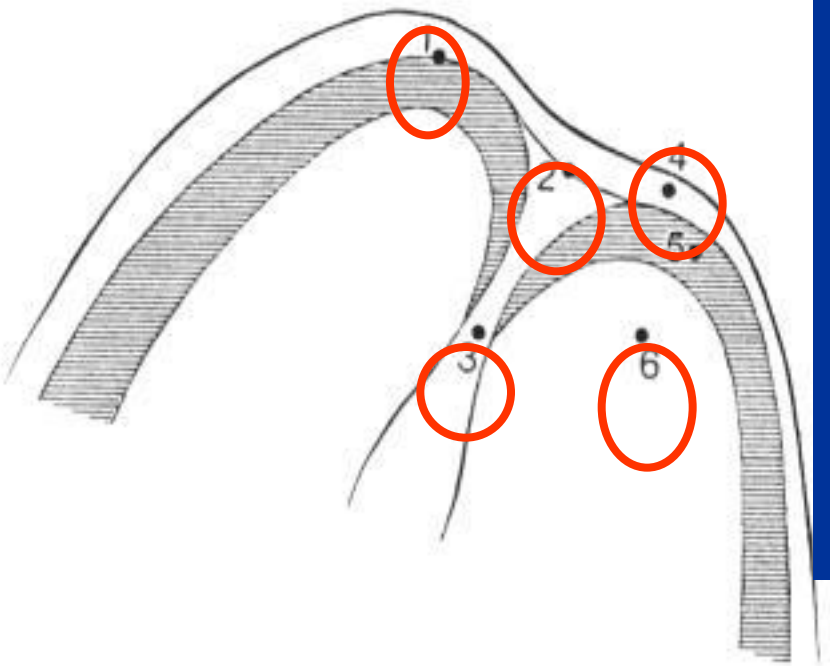
Apical morphology



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

Distance of apical constriction is 1 – 1,5mm from the apex.

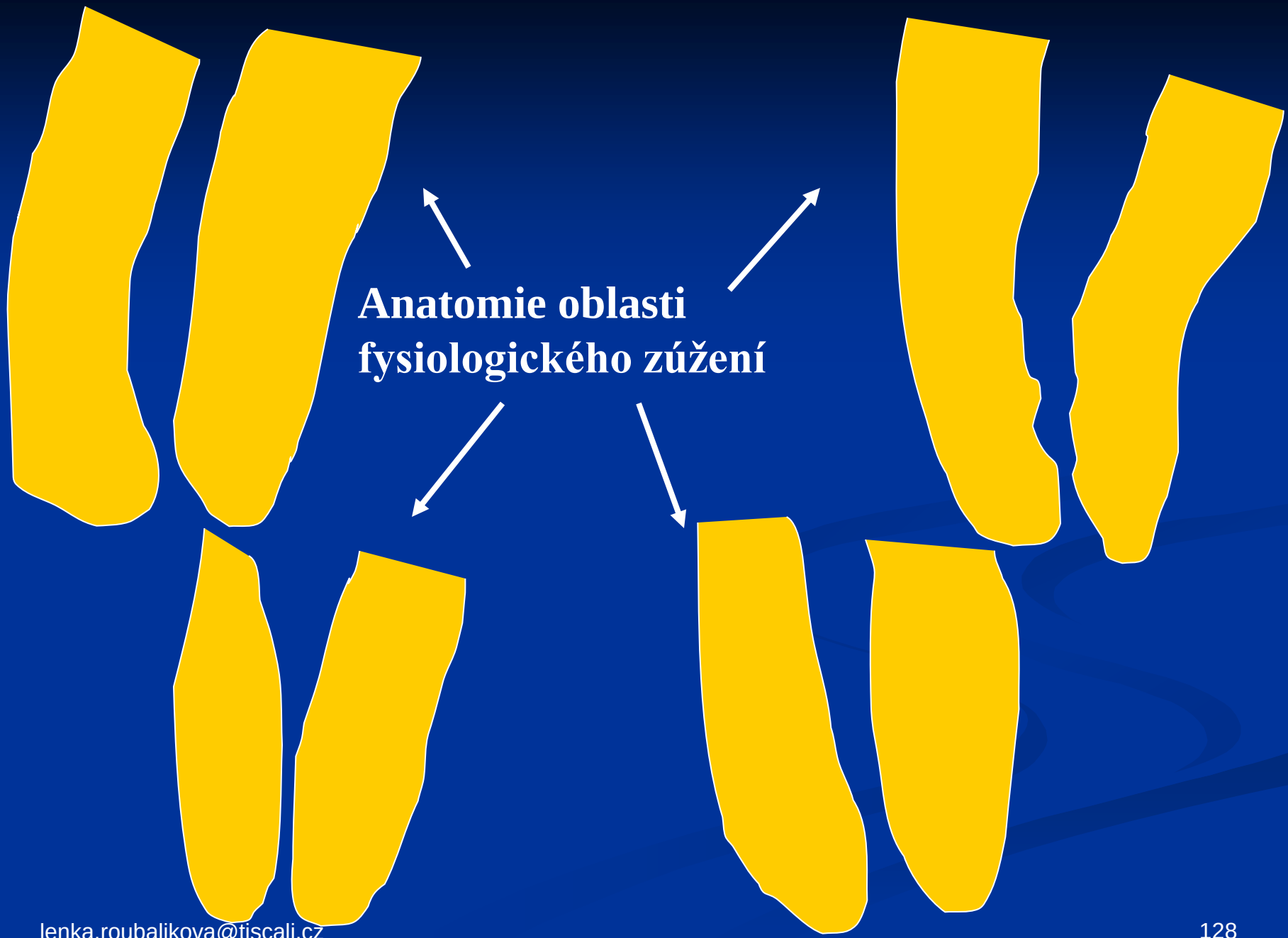
Establishment of working length

- X-ray
- Apexlocators
- Combination

X-ray

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

- I 18, C 20, P 18, M 18

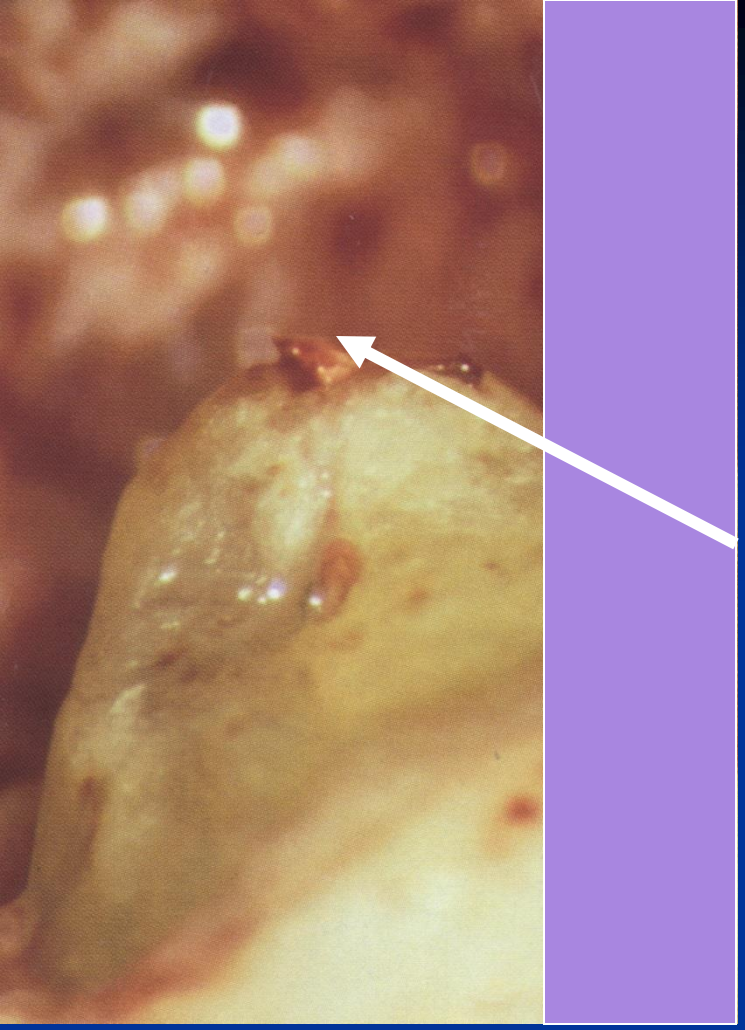

Anatomie oblasti
fysiologického zúžení

X-ray method

- Root canal instrument in root canal (ISO 15)
- Safe length
- X-ray
- Estimation – apical constriction

Why apical constriction

- Small comunication
- Less risk of damage of periodontal ligament
- Prevention of extrusion of root canal filling
- Good compaction of root canal filling (guttapercha).



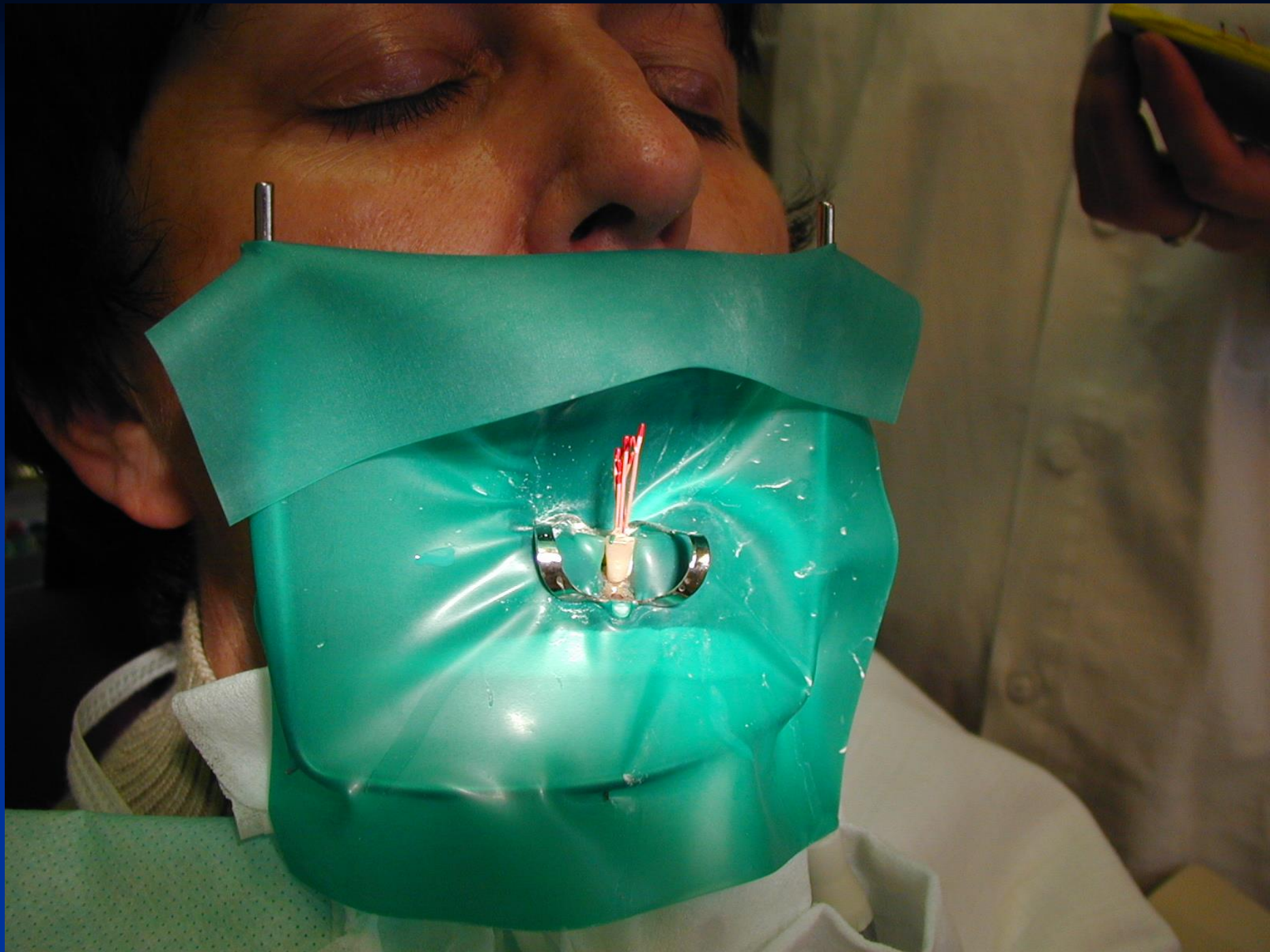
Real situation

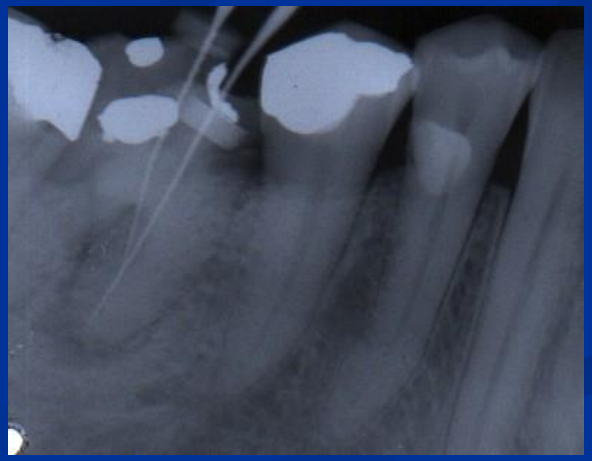
X-ray apex

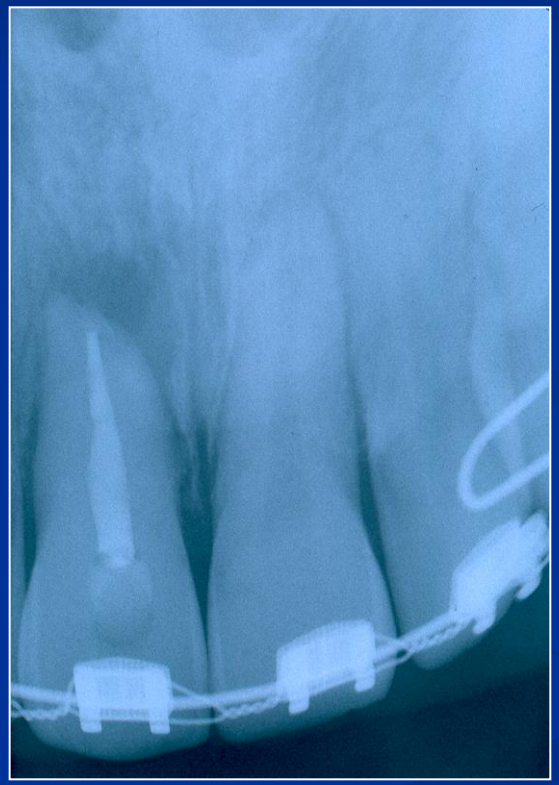
Apexlocators

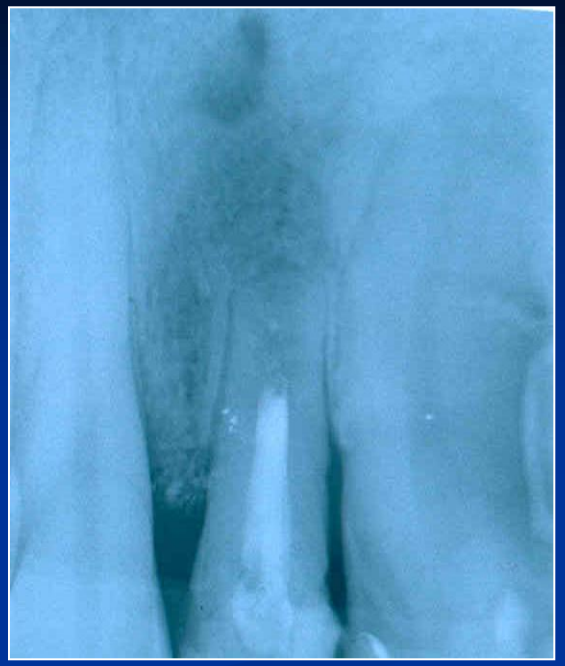
- Rinciple is based on measurement of electric resistance in root canal.

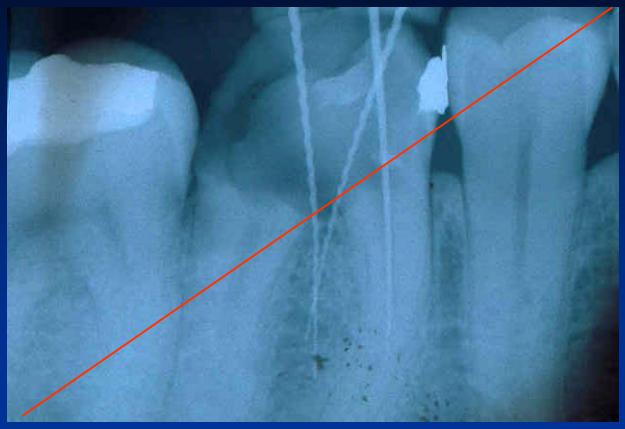
- Fast
- No irradiation
- Not always correct





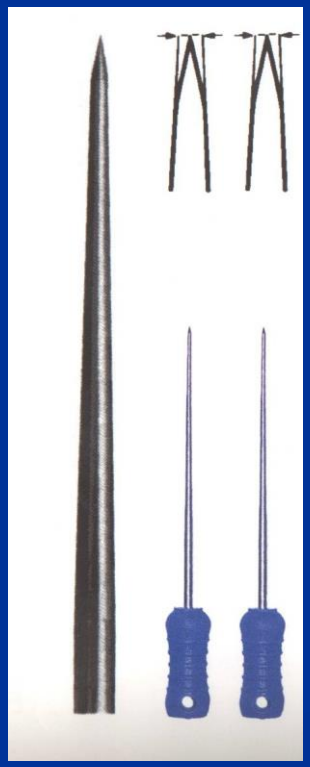






Rotační plnič
-lentule

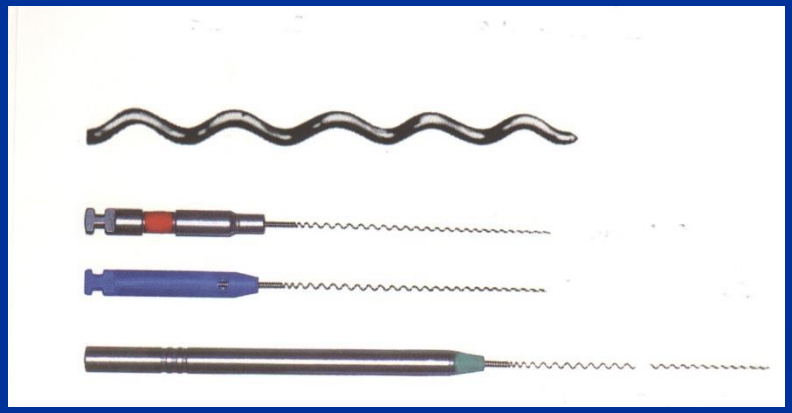
Kořenové cpátko
- spreader



Kořenové cpátko - plugger

Kořenové cpátko
- spreader

Kořenové cpátko
- plugger



Rotační plnič
-lentule