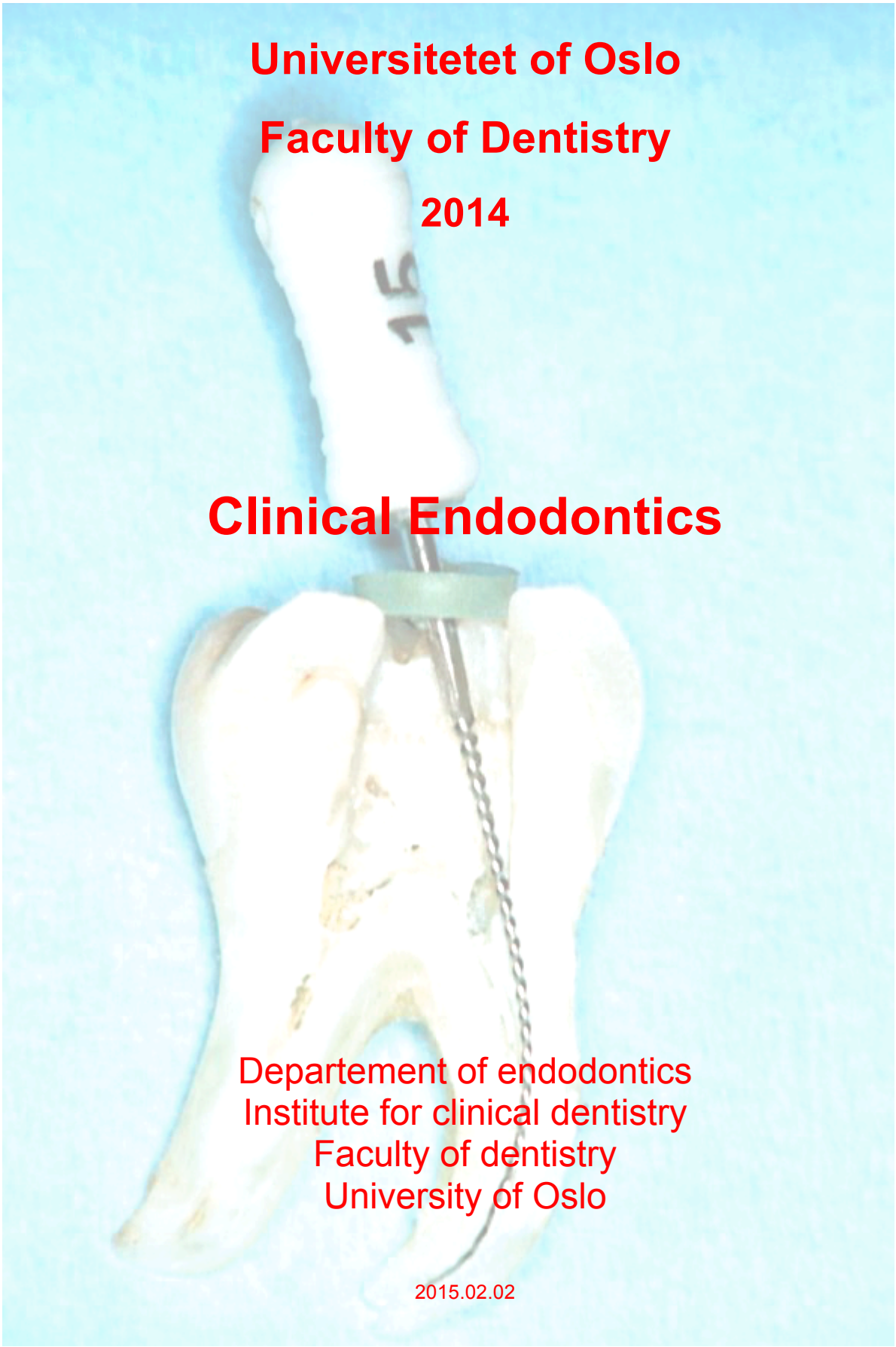
Universitetet of Oslo

Faculty of Dentistry

2014



Clinical Endodontics

Departement of endodontics
Institute for clinical dentistry
Faculty of dentistry
University of Oslo

2015.02.02

SYSTEMATIC ENDODONTIC TREATMENT

A. Set-up

B. Charting: examination, diagnosis and treatment plan

1. Taking of medical history: Chief complaint, present illness, past medical history, health form including medication, allergies and other relevant information
2. Examination; clinical and radiographical
3. Diagnosis
4. Treatment plan, informed consent and cost of treatment

C. Preparation of the tooth

6. Preparative measures; pre-endodontic build-up, local anaesthesia, access cavity preparation, rubber dam isolation

D. Aseptic treatment

7. Start locating and negotiating the rootcanal(s)
8. Decide working length with electronic apex locator
9. Working length radiograph taken with a paralleling technique
10. Radiographic verification or correction of working length
11. Choose Reciproc-file
12. Routine canal instrumentation
13. Canal instrumentation deviant from normal routine
14. Temporary canal dressing
15. Masterpoint radiograph
16. Canal obturation

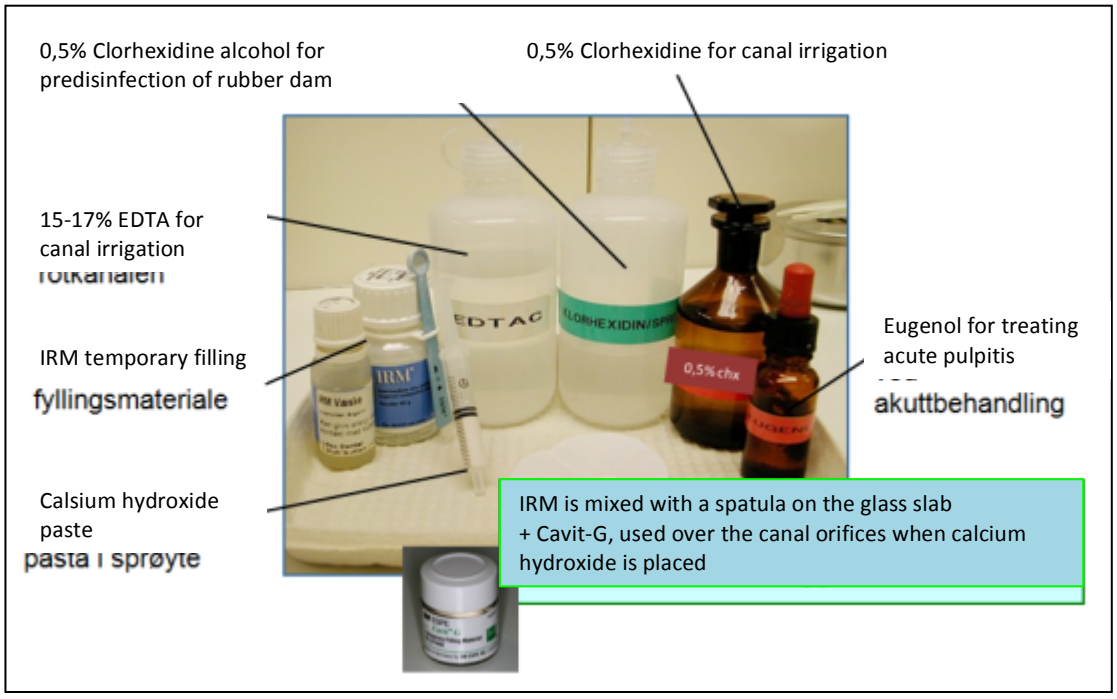
E. Finalization procedures

17. Coronal canal plug
18. Coronal restoration, temporary or permanent
19. Reflect upon and decicion of treatment prognosis

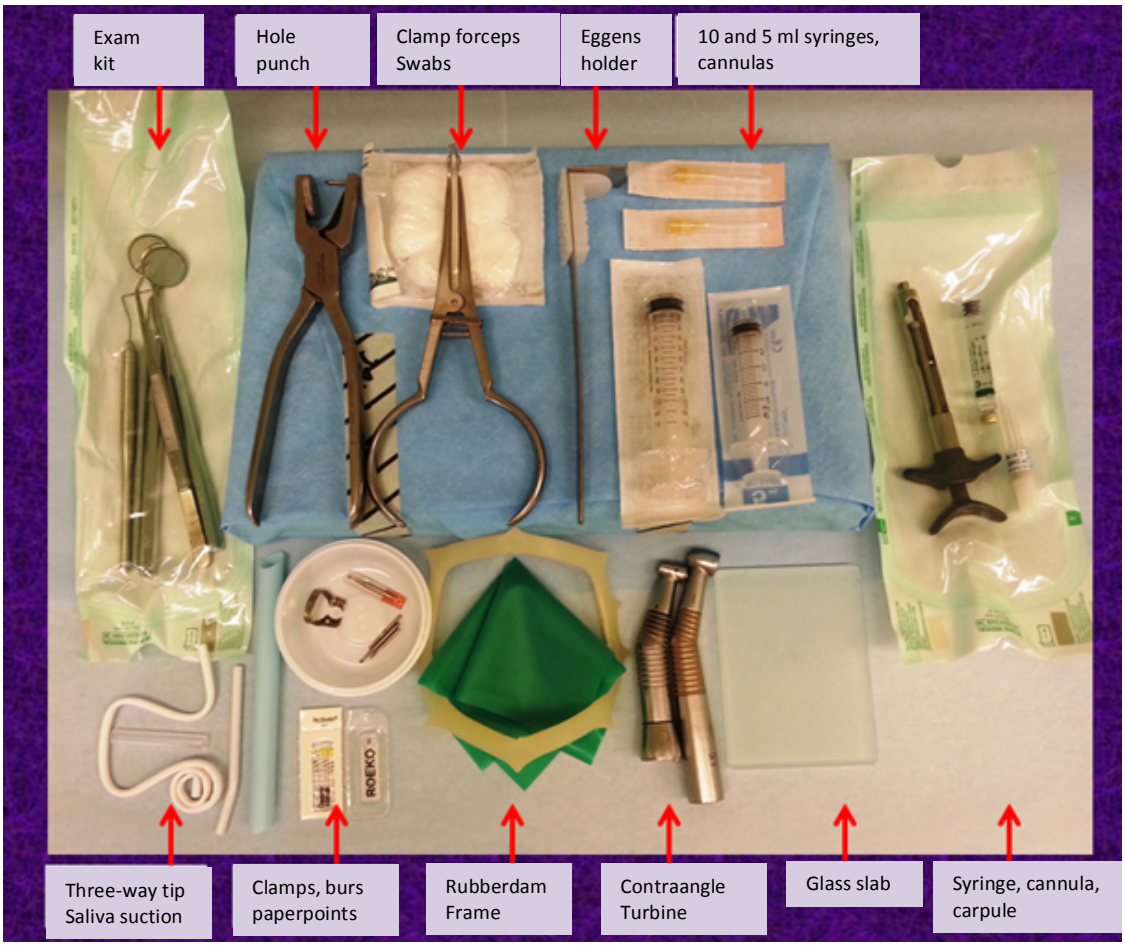
F. Retreatment

A. Setup and intstruments

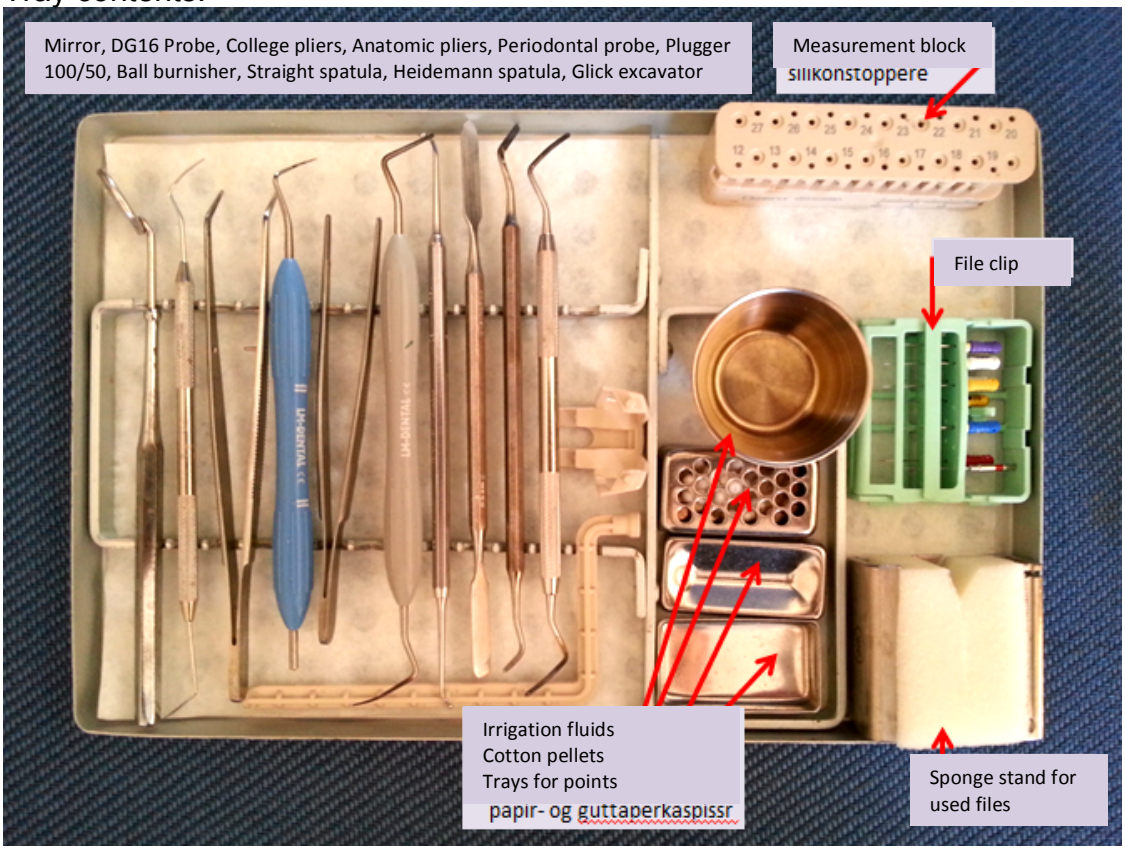
Dental unit is wiped down and prepared with all routinely used instruments and ancillary equipment for the endodontic procedure.



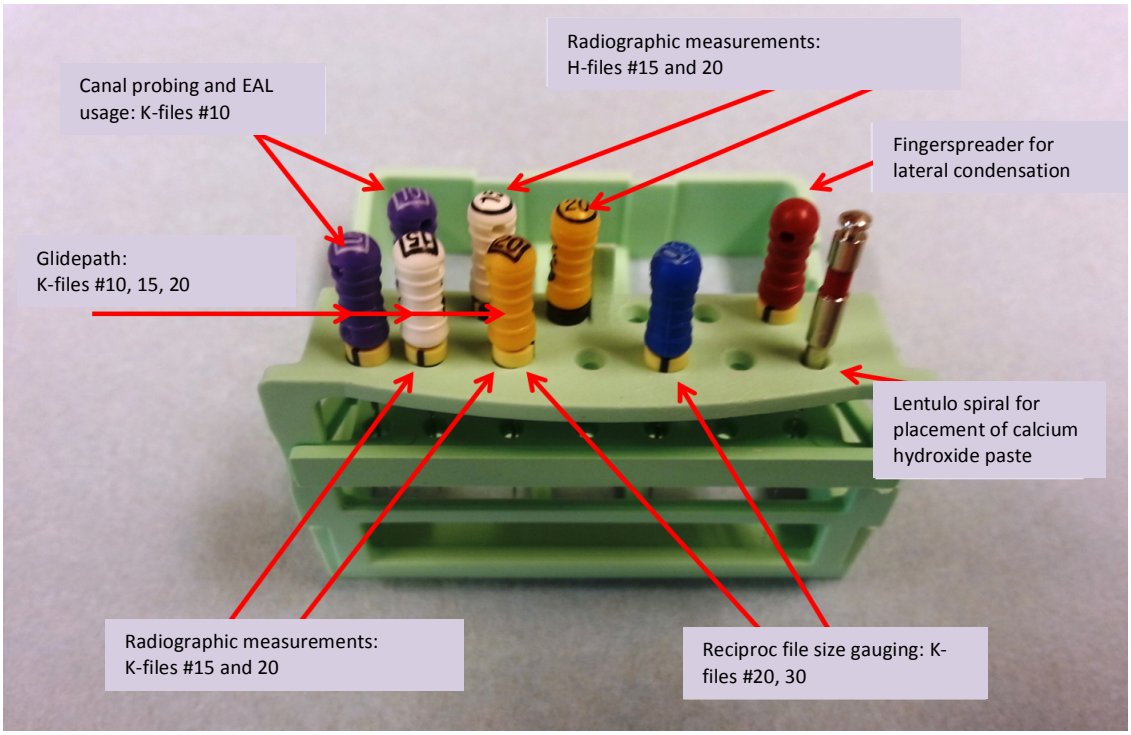
Equipment that usually needs to be collected:



Tray contents:



Endodontic file organizer:



Reciproc-files are collected *after* working length verification and file size gauging (see below).

B. Charting: examination, diagnosis and treatment planning

(B1) Taking of medical history, past and present. Should be complete at this step.

(B2) Examination, clinical and radiographical.

Inspect extraorally for swellings or asymmetries; palpate the lymph nodes.

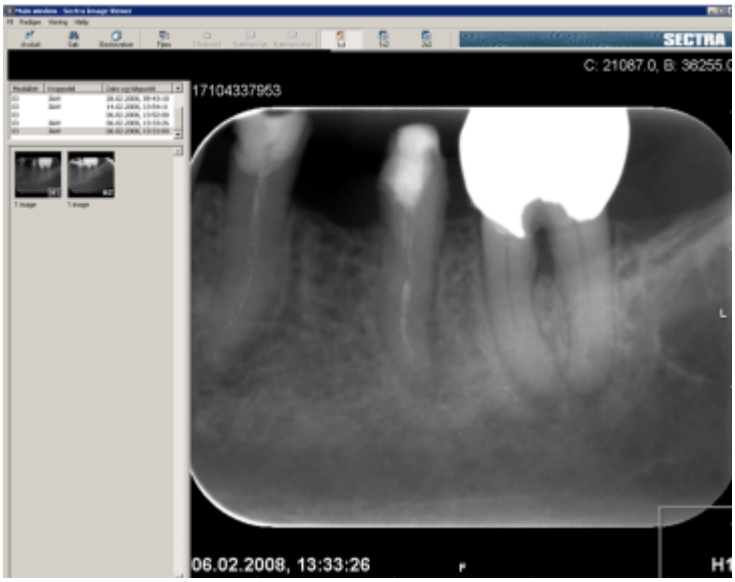
A complete intraoral examination includes inspection, palpation, percussion and pulp sensibility tests. Remember that pulp testing is a comparative test, so you need to test neighbouring as well as a contralateral tooth to assess this patients normal response.

Electric pulp tester: Dry the teeth to be tested and maintain a dry working field. Place a dab of toothpaste on the electrode tip, to enhance conductance. Place the probe incisally or on a cusp tip, well away from any metal restorations or gum tissue. The patient needs to touch the probe as shown on the left. The current increases, indicated by the display, stop when the patient can feel a sensation in the tooth and record the number on the display and what device and scale that were used (E.g. Analytic, 0-80).

Cold testing is used alongside electric testing, but is well suited for teeth with large restorations that block access with the electric probe. A cotton roll is held with a pair of pliers and one end is sprayed to saturation with the test spray (Endo-Ice). Place the cotton roll end in firm contact with the buccal or lingual surface of the tooth to be tested. Maintain a dry field; do not touch mucosa for prolonged periods. Record reactions.

The examination confirms which tooth that is to be treated, and is preceded by **a pre-operative or starting radiograph**, taken with a paralleling device. If a sinus tract is present, a separate radiograph is taken with a gutta-percha point inserted in the tract.

Parallelling technique for starting radiograph:



Eggen's film holder is used for paralleling radiographs.

Medical history, clinical and radiographic findings make the foundations for a

(B3) Diagnosis.

A pulpal and a periapical diagnosis are made. If both are normal, another reason for endodontic treatment must be made, for instance prosthethic indications. See charting appendix.

(B4) Proposed treatment

A treatment plan is formed on the basis of the diagnosis.

(B5) The patient is informed of this and costs and expected prognosis. Patient gives consent.

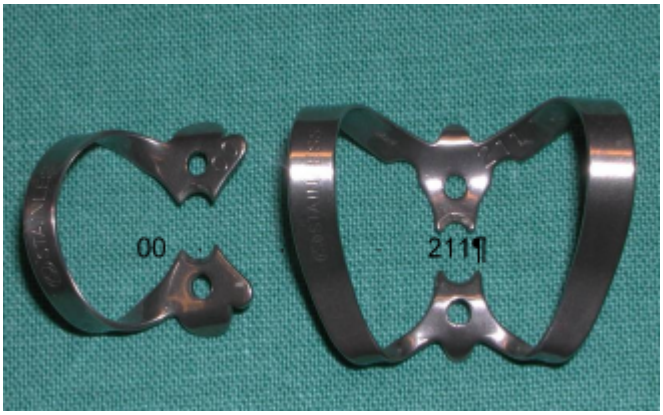
C. Preparation of the tooth

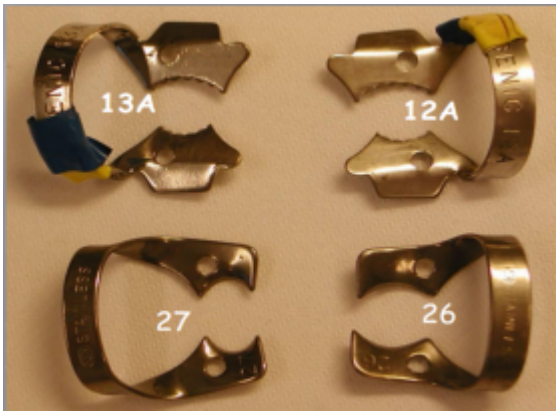
(C6) Pretreatment before start of aseptic routine.

These procedures should precede all root canal treatment procedures, every time. Local anaesthesia is used as needed. Access cavity is prepared with an appropriate selection of burs for micromotor or turbine handpieces.

> *Measure the distance on the radiograph from the occlusal surface to the pulp chamber floor in order to avoid iatrogenic perforations. Familiarize yourself with dental anatomy in order to perform access procedures safely.*

Remove all carious dentin. Assess need for build-up, a rubber dam must be able to seal the field to saliva without the use of sealing agents of unstable nature. Build-ups are made using composite. Rubberdam is placed with a suitable clamp. Pass dental floss through contacts to slide the rubbedam through the contact. After placement inspect for leakage of blood or saliva. Caulking agents is only to be used in the situation of orthodontic appliances, bridgework or if a split-dam is used. *On subsequent visits the rubberdam is placed before temporary fillings are removed.* If time is short, treatment procedures can be postponed after access cavity is made. Ideally, the tooth is then isolated with rubber dam, disinfected and sealed with an eugenol-drenched cotton pellet and a temporary filling, IRM®. The patient is rescheduled with a delay of less than 2 weeks.





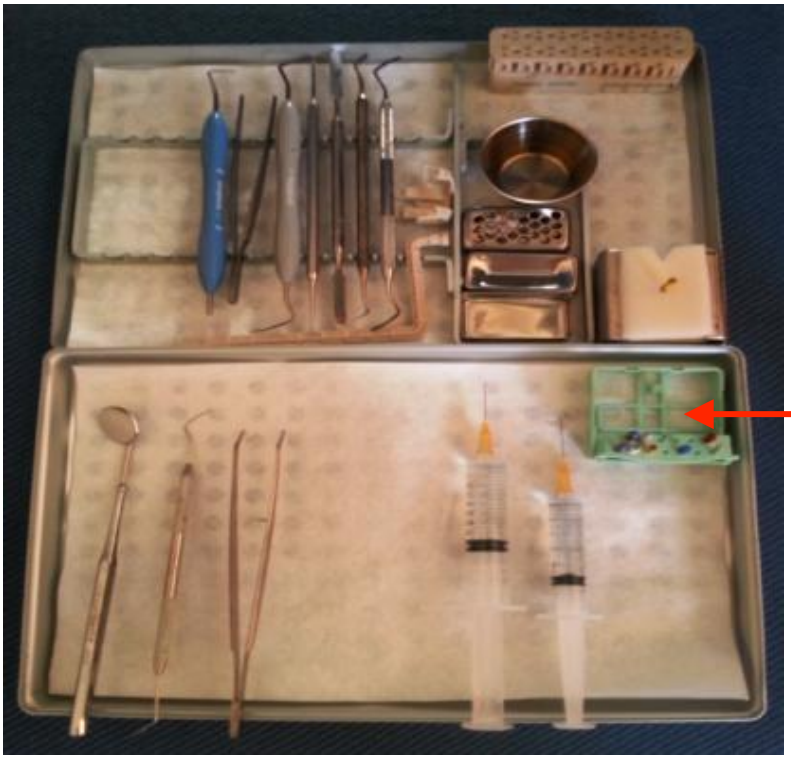
D. Aseptic treatment

All used and therefore contaminated examination and rubberdam instruments are removed.

(D7) Start of root-canal procedures.

Drape the patients torso with a plastic sheet to avoid permanent hypochlorite stains. The patient's eyes must be shielded with protective glasses, in lieu of this a cloth can be used. Wear protective glasses yourself. Disinfect the working field; tooth and a large surrounding portion of the rubberdam; use a swab with clorhexidine alcohol 70% for at least 2 minutes. The outermost wrapping layer of the endodontic tray is removed. The inner wrapping layer is folded out on the unit service table, but do not cover the holder for disposable cups. Open the cassette, use the bur plier to place the following items in the lid: metal bowl, mirror, probe, college pliers and foam stand. Fill the metal bowl with irrigation fluid. The irrigation fluid

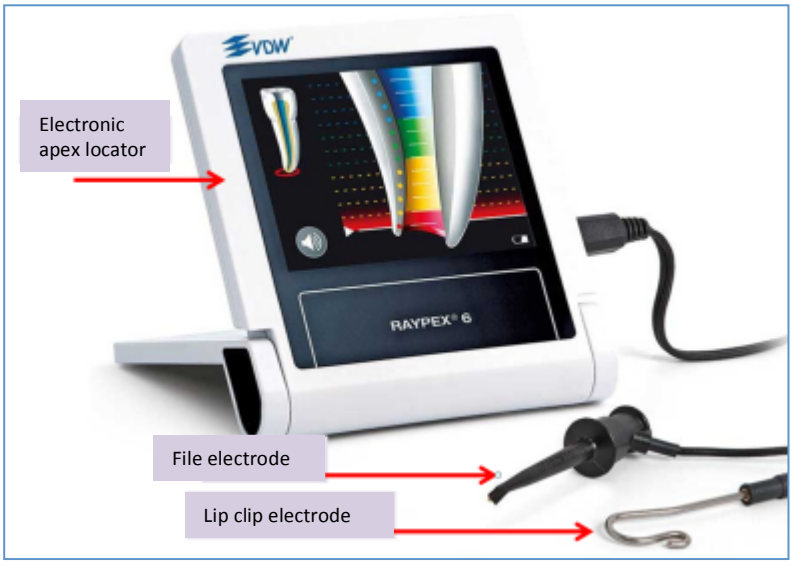
alternates each semester between 0,5% Chlorhexidine and 1% buffered Sodium Hypochlorite, combined with EDTA. Draw 10ml fluid up in a luer-lock syringe, the needle can be bent against a sterile surface to accommodate irrigation in the pulp chamber. When using working-length endodontic irrigation cannulas, place the cannula in the measuringblock and make a bend at the appropriate length, as a safeguard to irrigant extrusion.



Endodontic tray: Mirror, probe and college pliers working parts resting in lid, handles on rim.

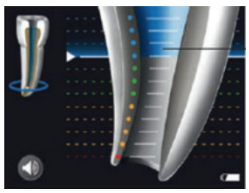
NB! Do not mix sterile and contaminated instruments! NB! Used instruments are placed in the foam stand.

(D8) Deciding working length with electronic apexlocator:

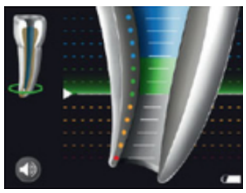


Tooth length from apex to coronal reference point is measured on starting radiograph and recorded.

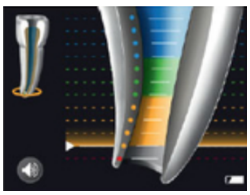
Follow instructions for the apexlocator and record tentative working length when the display indicates transition from green to yellow.



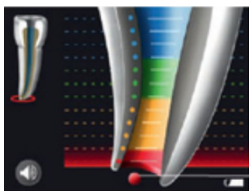
Blue:
In canal



Green:
Towards minor constriction



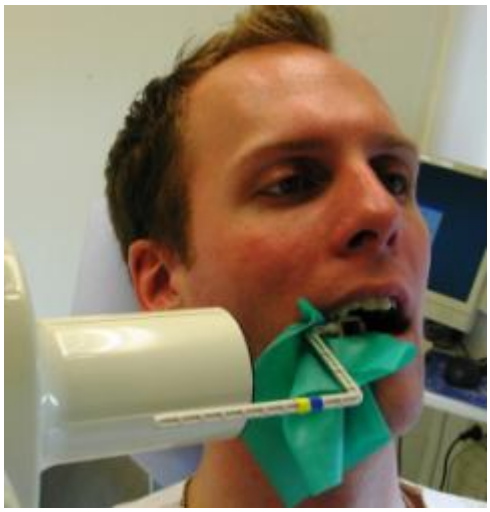
Yellow:
Towards foramen



Red:
Past foramen

(D9) Paralleling working length radiograph:

When working length is estimated with the apexlocator, a working length radiograph is taken, with endodontic instruments at least size #15 inserted to the appropriate length.
The radiograph is taken with the imageplate mounted in the Endo-Ray® paralleling device, allowing radiographs on a clamped tooth. NB! The Endo-Ray is contaminated, so do **not** place it back in the tray or lid.



If the working length acquired by the apexlocator is **longer** than the working length calculated from the starting radiograph, use the radiograph-derived shorter length. Combine the information from the resulting working-length radiograph and the electronic measurement to decide upon the final working length.

(D10) Radiograph as the only method for deciding working length.

If the apexlocator do not yield stable or reliable measurements, radiographic measurement is used alone. Deduct 10% plus 1mm from the total tooth length measured on the starting radiograph. Insert a file to the resulting length, and take a working length measurement radiograph. *This length correction is done to prevent over-instrumentation due to erratic measurements.*

Example: You have measured a 20mm tooth length in your starting radiograph. File length for the working length radiograph is: (20mm – 10%) – 1mm = 17mm.
Set the silicone rubber stopper at 17mm length for the file to be used. Insert the file in the root canal until the rubber stopper matches the reference landmark, the highest point on the tooth crown. Use a file that binds slightly at this length. File size ISO 15 is the smallest size that is easily seen on radiographs.

An adjustment to the working length is done now. Measure the distance from the file tip to the root apex, add (or deduct) to the working length so that the file tip will end 1-1,5mm short of the root apex. If the file-to-apex distance in the working length radiograph is long (>5mm), calculate the adjustment, and expose another measurement radiograph as a safeguard.

(D11) Choosing Reciproc-file:

One type of Reciproc-file is to be chosen per canal. The same file may be used on multiple/all canals in a tooth if two or more canals have the same file dimension selected. The procedure for file selection is:

1. Insert file #30 in the root canal: If it goes easily to working length, use R50.
2. If not, insert file #20: If it goes easily to working length, use R40.
3. Else: Use R25.

(D12) Routine instrumentation technique:

You are now ready to enlarge the root canal up to the dimensions of your chosen instrument.

> ***Vital pulpectomy:*** *The working length in pulpectomies should be ending 1-2mm short of the radiographic root apex.*

> ***Non-vital root canal treatment:*** *To maximize the effect of instrumentation and irrigation, it is imperative to achieve the optimal working length (1mm short of root apex). Avoid over-instrumentation!!*

Clean the canal by instrumentation and intermittent irrigation (CHX or NaOCl) according to these principles:

1. Manual instrumentation using K-files until #20 (or #30, in case of R50-sized canals) goes effortless to working length.
2. Chosen Reciproc-file is used in a fluid pecking motion, in an apex-ward direction.
3. Allow the file to advance by its own force maximum 3mm, less if resistance is met, this is called a “peck”. Repeat this peck 2 more times, in a fluid motion. The hand and fingers holding the handpiece must be prepared to not let the instrument run too deep too fast. Remove the file from the canal, wipe it clean on the sponge, irrigate the canal, insert last used hand instrument to working length, to verify an unimpeded glidepath.
4. Repeat until Reciproc-instrument reaches working length.
5. Assess the need for further preparation of the coronal part of the canal. This may be in the case of a ribbon-shaped/flat/oval root-canals (14, 24, 36M og 46M) and in the case of a C-shaped root.
6. Avoid under- and overinstrumentation.

NB! When treating curved root canals, *some straightening of the canal invariably occurs, this may shorten the initial working length. Recheck working length during instrumentation, electronically or radiographically.*

After preparation, irrigate the canals with EDTA (15%) and dry the canal with paper points.

(D13) Preparing deviant canals:

In some cases the Reciproc-files may be inadequate as last instrument before obturation. This applies especially in the case of root with large canals, where a defined apical stop cannot be prepared. It may also apply to retreatment cases, when a larger instrument than #50 may have been used. In these cases Reciproc may still be used, but some finishing work with K-type hand files is done to prepare the canal to the desired dimensions. Obturation is done using conventional gutta-percha sizes, with .02 or .04 taper and lateral condensation.

(D14) Temporary dressing

If the tooth is not obturated in the first visit, calcium hydroxide paste is applied as a temporary, antibacterial dressing. It is spun down in the root canal with a lentulo-needle (use slow speed) and compressed with the back end of paper points. The calcium hydroxide may be left in place for minimum 1 week, maximum 3 months.

Non-vital root canal treatment: *The canal is always dressed with calcium hydroxide paste, with the addition of chlorhexidine to the paste as an option. When conditions permits, roots may be filled in one visit if the pulp is not necrotic and/or infected.*

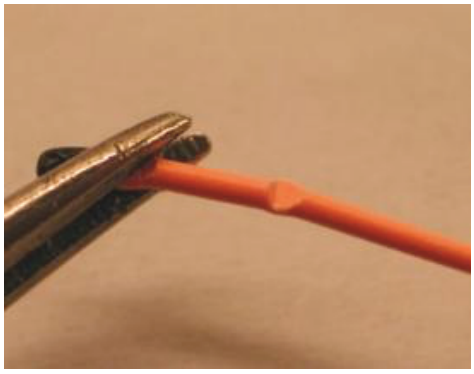
If there is ample space, place a 2mm thick layer of Cavit-G® (grey) over the canal entrances. IRM® is layered over this. Check that the filling is not too high in the occlusion.

At the start of the next visit, check the patient's subjective and objective symptoms. Thereafter prepare the tooth for a new aseptic endodontic treatment. If the canal preparation is complete, consider if treatment may be performed without local anaesthesia. **NB! Place rubberdam first,** disinfect the working field using clorhexidine alcohol, *and then* remove the temporary filling. Repeat disinfection after reopening access to the pulp cavity. Remove the calciumhydroxide dressing using the same size Reciproc- or handinstrument that was used at the former visit. Irrigate well, using the antiseptic irrigant. Do a final rinse with EDTA 15%, then dry the canals with paper points.

(D15) Masterpoint

The tooth must be free of symptoms, not tender to percussion or palpation. This is obviously tested before use of local anaesthesia. As stated above, the canals must be clean and dry. A gutta-percha masterpoint of same dimensions as the Reciproc-file used is selected. Mark working length by pinching the point with pliers, place it in the canal.

Expose a radiograph (masterpoint radiograph) using the Endo-Ray® paralleling device, verify correct placement of the gutta-percha-point. If the point goes to working length, obturation procedures are permissible.



(D16) Obturation

Pulpectomy: *If the tooth was symptom-free initially and instrumentation is completed, it may be obturated in the first visit.*

Non-vital root canal treatment: *Obturation always happens in visit 2 or later. Check for tenderness to percussion or palpation: A prerequisite to obturation is a symptom-free tooth. This is your responsibility. Furthermore, canals must be easy to dry, viz. absence of exudate, a sign of resolution in the periapical inflammation process.*

Guttapercha and Ah plus® sealer is routinely used for obturation. Cover the masterpoint with sealer, and place it in the canal. Fingerspreader B is inserted along the point to make space for accessory points (Size B), which also is covered in sealer prior to insertion. If doubts exists to the homogeneity of the fill, expose a new radiograph for verification.

After filling, sear off the surplus gutta-percha with a canal plugger heated in alcohol flame, and progressively remove 1-2mm of gutta-percha from the top of each canal.

E. Finishing procedures

(E17) Coronal plug.

When 1-2mm of filling has been removed from each canal orifice, clean/scrub the pulp cavity free of sealer remnants using chlorhexidine alcohol and cotton pellets. IRM is placed in the canal orifices, compact it with a plugger to avoid voids between your plug and the gutta-percha.

(E18) Coronal restoration.

A permanent restoration may be placed if time allows. Ensure that all dentin surfaces are cleaned well with chlorhexidine alcohol; a bur may also be used. A composite restoration with a bonding agent is placed per instructions. If time is short, fill the cavity with IRM. Remove the rubberdam/clamp, and expose a postoperative (Final) radiograph with Eggen's paralleling device.

The 4 radiographs Starting, Working length, Masterpoint and Final radiographs are all considered necessary documentation of the treatment.

(E19) Prognosis

Forecast the prognosis, and inform the patient. After 1 year it is possible to judge the result. It is useful to distinguish between an endodontic diagnosis (likelihood of developing/maintaining apical periodontitis) and the prognosis for the coronal restoration or other factors affecting the tooth's chances of survival.

F. Briefly regarding retreatment.

The principles for retreatment are the same as for treating teeth with primary endodontic disease, but the existing root-filling present some practical challenges: It must be removed to allow disinfection of the pulp space. The removal is done mechanically, using Hedstrom files worked in between filling and canal wall. Gates-Glidden drills may be used to alleviate initial removal. They break easily, but in a designated spot near the shaft. The resulting fragment is easy to remove with pliers. Select burs in small dimensions, (red or blue; 0,7 or 1,1mmØ) drill down a few millimetres from the pulp chamber, only in the straight, coronal portion of the root canal. Hedstrom file usage is easier after this initial removal. If the filling material is very tough gutta-percha, one may use a small amount – a drop – of chloroform, applied in the canal orifice. Chloroform softens and dissolves gutta-percha, easing removal. With time and resupply of chloroform (it evaporates fast) most old root-fillings may be removed entirely. Chloroform also dissolves rubber dam, gloves, synthetic clothing and many plastic components. Reciproc may also be used to remove gutta-percha:

After initial opening/removal of coronal ½-⅓ with Gates-Glidden, R25 is used until reaching estimated working length. If resistance is met, recapitulate with hand instruments, clean the Reciproc file on the foam stand and irrigate the canal (with an antiseptic). Continue in 2-3mm increments until working length is reached. Use the R25 in a brushing motion (while rotating) to remove filling materials from the canal walls. Decide upon which instrument size is necessary to clean the canal apically, R40 or R50 may do the job, sometimes hand instruments is necessary.

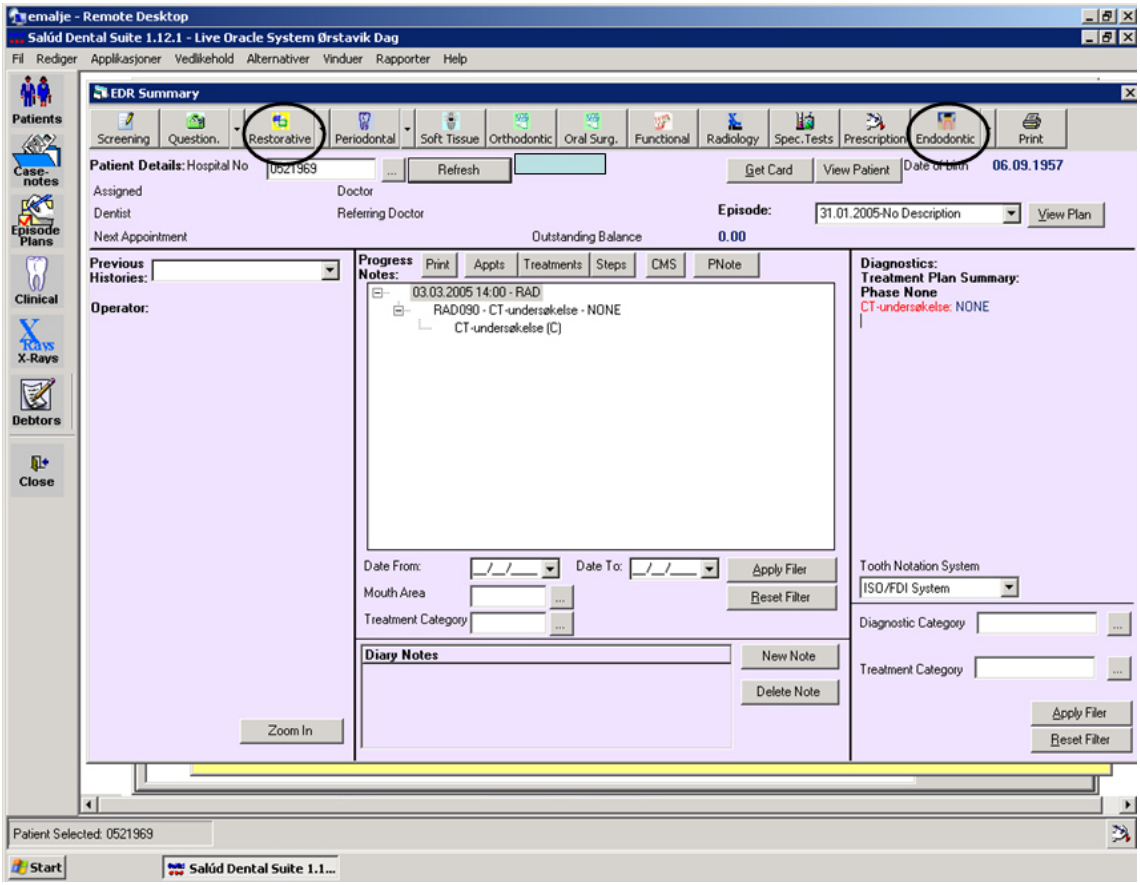
http://www.youtube.com/watch?v=LUNysZYnjmU

APPENDIX
Tutorial for endodontic charting in Salud.

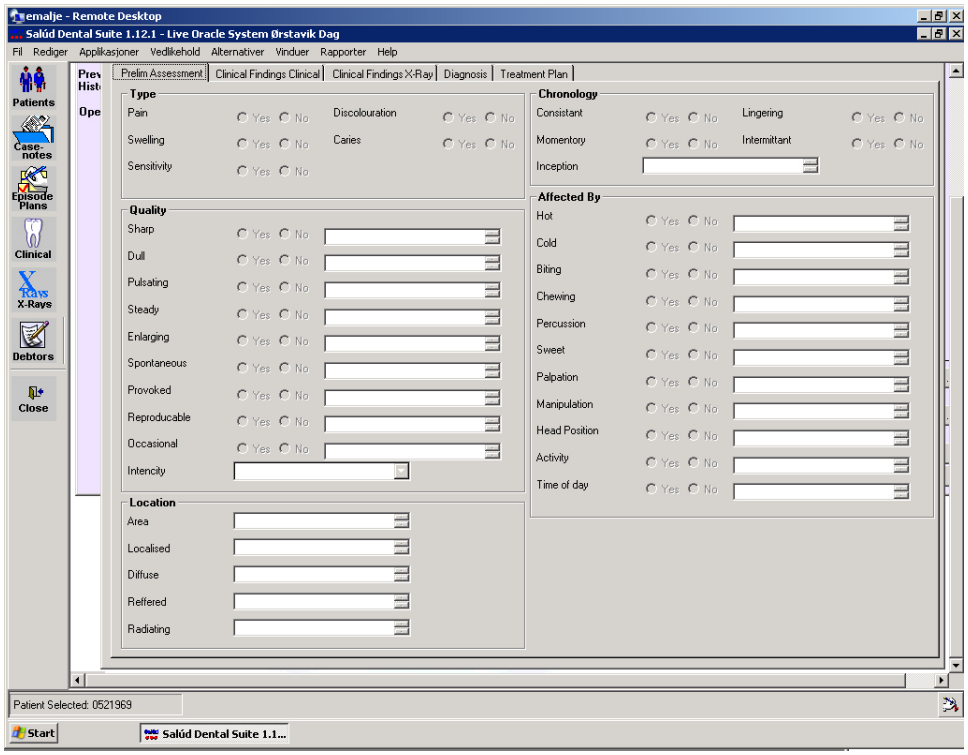
Three screens in Salud give access to patient history (preliminary assessment), examination (clinical and radiographical), diagnosis and treatment planning. (This may change in future upgrades)

Patient history – questionaire This form is/should be already completed.

In *Journal/EDR Summary*, first use *Endodontic* when taking history, thereafter use *Restorative*.



Select Endodontic initially, and complete all sections. This is only done once.



Prelim Assessment is a schematic taking of present history and chief complaint.

Type

Pain: Any pain affecting the patient. May also include discomfort, but noticeable for him/her.

Swelling: Present or past.

Sensitivity: Discomforting, subjective sensitivity to heat or cold.

Discoloration: Discoloured tooth in question. (E.g. blue or brown after trauma)

Chronology

Consistant: Pain/discomfort constantly versus now and then

Momentory: Noticeable pain upon provocation, but disappear fast.

Inception: When did the pain start? (Days, months, years before present) What invokes the pain? (Hot food, icecream, chewing?)

Lingering: Pain lingers after provocation has ceased.

Intermittant: Pain comes and goes, whit or without provocation.

Quality:

Enlarging: Increase of pain intensity during a bout of pain

Intensity: According to the patient's own words, and/or "rate your pain from 1-10"

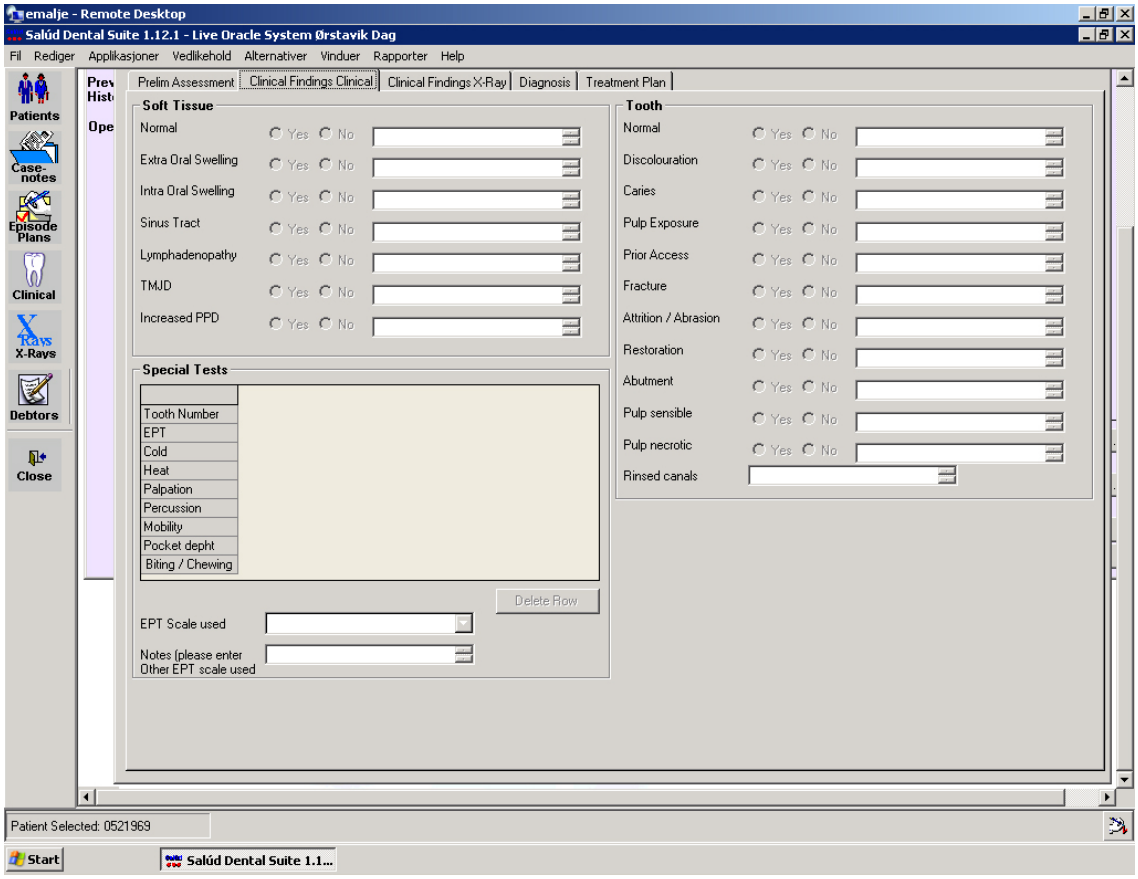
Affected By

Self-explanatory

Location

Area: Tooth, teeth, jaw half or side of face.

Referred: If you have reason to believe that pain originates from a different anatomical region than the patient describes where he/she experiences pain.



Clinical Findings Clinical equals clinical examination

Soft Tissue

Normal: No variation from healty mucosa elsewhere in the mouth.

Sinus tract: Describe location.

Lymphadenopathy: tender or swollen (palpable) lymph nodes.

TMJD: Temporomandibular joint dysfunction: From an endodontical perspective this is colloquial for joint pain or tenderness.

Increased PPD: Periodontal probing depth: PPD>3mm is noted. One measure per tooth examined, deepest pocket. Narrow pocket may indicate a vertical root fracture.

Tooth:

Prior access: Someona has prepared or has attempted an access cavity to the pulp.

Abutment: Tooth supports a bridge or is supportive to a partial denture.

Rinsed canals: Info regarding this may be stated in a referral or by the patient. Describe.

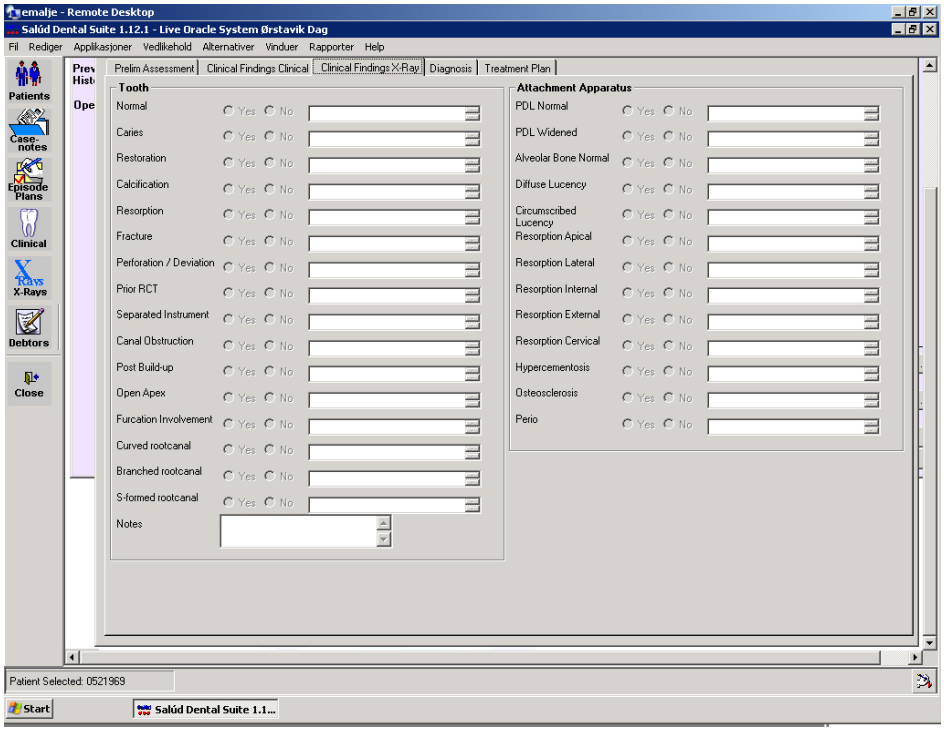
Special Tests

Test the tooth in question, neighbouring teeth and a contralateral tooth.

EPT: Electric pulp tester

Heat: Not used

Biting/chewing: Make the patient chew on a cotton roll, place it on the tooth in question and assess pain response.



Clinical Findings X-Ray. At least 1 recent radiograph is required, depicting the entire tooth in a paralleling projection. Additional radiographs may be necessary to visualize roots overlapping other structures.

Tooth:

Normal: Largely “yes”. “No”s may be e.g. a fused tooth, hypoplastic enamel, abrasion/attrition, and fractured crown. Root-filled teeth are normal.

Calcification: Abnormal calcification visible in the pulp, or obliteration concealing all but traces of pulp space

Resorption: Expose a mesio- and distoeccentric radiograph when suspecting internal resorption.

Fracture: Radiographic signs of root fracture, vertical or horizontal.

Perforation/Deviation: Signs that bur or canal instruments have or almost have made a perforation to the periodontal ligament.

Prior RCT: Any trace of filling material in the canals.

Separated Instrument: Visible instrument fragment in a canal.

Canal Obstruction: “Yes” if calcified pulp, posts or separated instrument.

Open Apex: Immature root or signs of past over-instrumentation.

Furcation Involvement: Loss of bone in the furcal area: Grade 1 probeable, Grade 2 Clearly probeable, Grade 3 probeable all through.

Curved Root Canal: Marked curvature. >30°

Branched Root Canal: Canals may be traced to 2->1 canal or 1->2 canals

Attachment Apparatus:

PDL: Periodontal ligament: Normal: ”No” if a lesion is seen or if there is loss of lamina dura

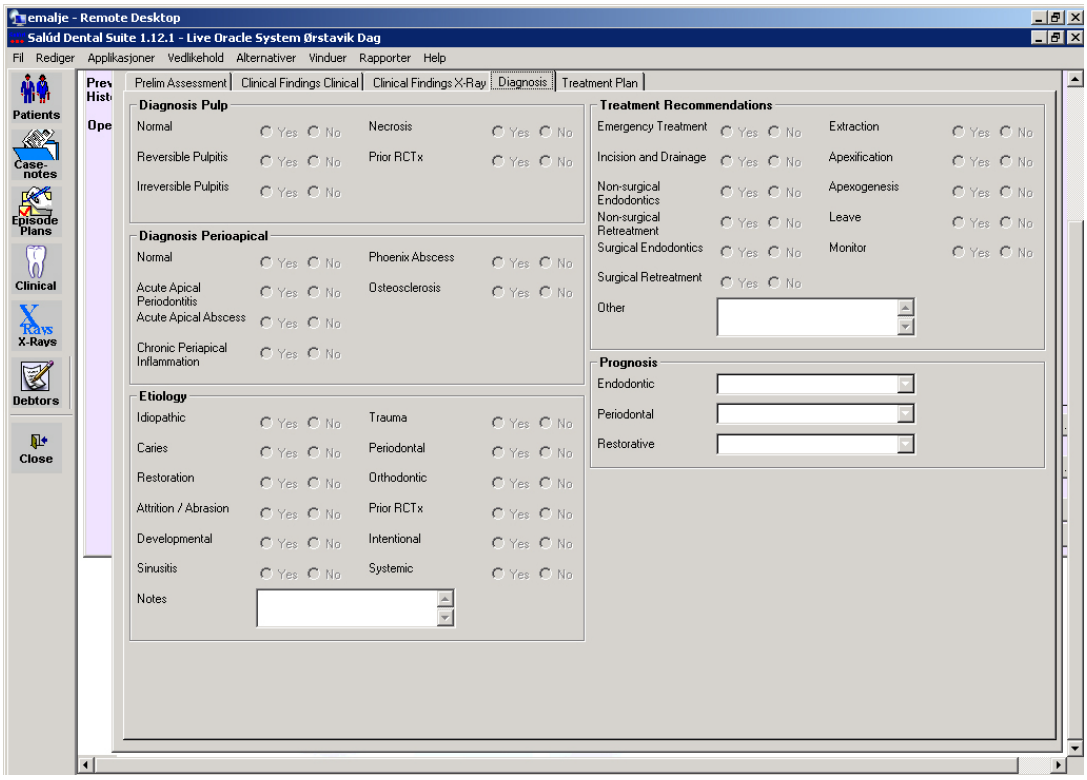
PDL Widened: More than twice the thickness of the tooth’s normal ligament space is a “Yes”.

Alveolar Bone Normal: Largely yes, if not atypical loss of bone or unusal mineralization pattern.

Hypercementosis: Cement layered on the root apex give the root a club-shaped form

Osteosclerosis: Increased bone density, often in vicinity to a root.

Perio: Radiographic assessment of periodontal bone level for the area and the tooth in question. >⅔ periodontal bone support intact is a “No”.



Diagnosis: Fill out the form, but repeat for “Restorative” chart form.

Diagnosis Pulp

Self-explanatory

Diagnosis Periapical

Acute Apical Periodontitis: Clinical signs of acute inflammation in the periapical area; no radiological signs

Acute Apical Abscess: Swelling and/or visible redness of mucosa/skin overlying the tooth in question

Chronic periapical inflammation: Radiographic signs of apical lesion and negative sensibility of the pulp

Phoenix Abscess: Acute clinical symptoms *plus* radiographic signs of an apical lesion

Osteosclerosis: Condensing apical periodontitis: Negative sensibility tests or old pulp cap/pulpotomy together with a bony densification near the apex

Etiology:

Idiopathic: = unknown

Periodontal: If we suspect a marginal periodontitis carried infection to the pulp

Prior RCTx: Previously root-filled. “Yes” if the root-filling looks substandard on the radiograph.

Intentional: “Yes” if we do a pulpectomy for prosthetic reasons

Systemic: “Yes” if general medical reasons necessitates treatment; e.g. imminent cardiac surgery

Treatment Recommendations: Skip this.

Prognosis: IMPORTANT

Endodontic: Grade your hope on curing or preventing apical periodontitis.

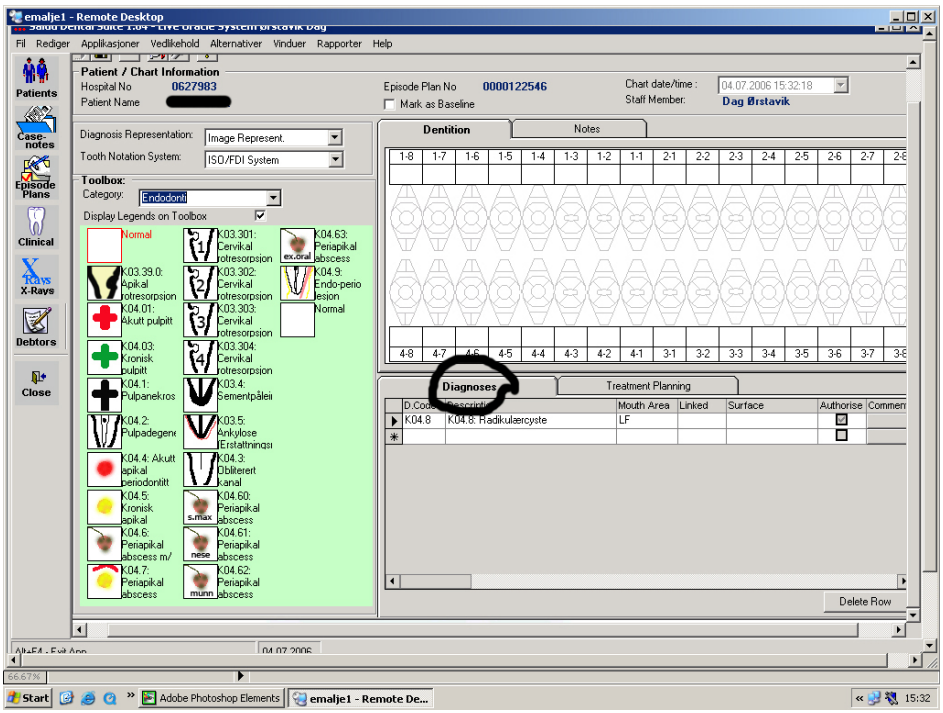
Periodontal: This is “uncertain” if marginal bone support is less than 1/3 of root

Restorative: Assess this if there is a severely broken-down crown or a plan of using the tooth as an abutment in a larger prosthetic construction.

Treatment Plan: NOT filled out; this step is done in the Restorative section

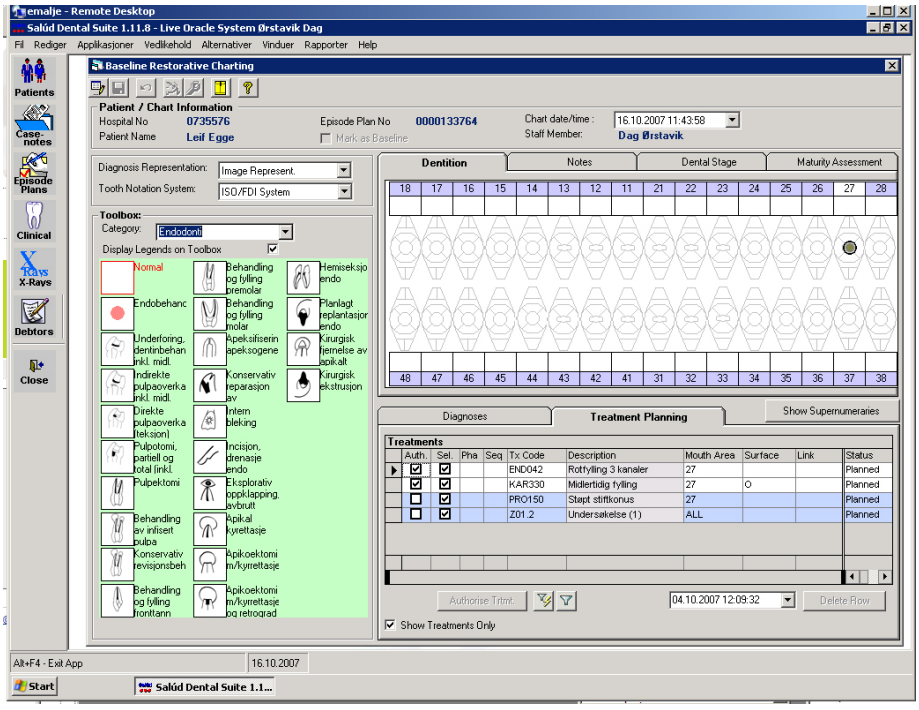
Baseline Restorative Charting – Filter "Endodonti"; Diagnoses

Re-enter your diagnosis on the tooth in question from the endodontic charting form.



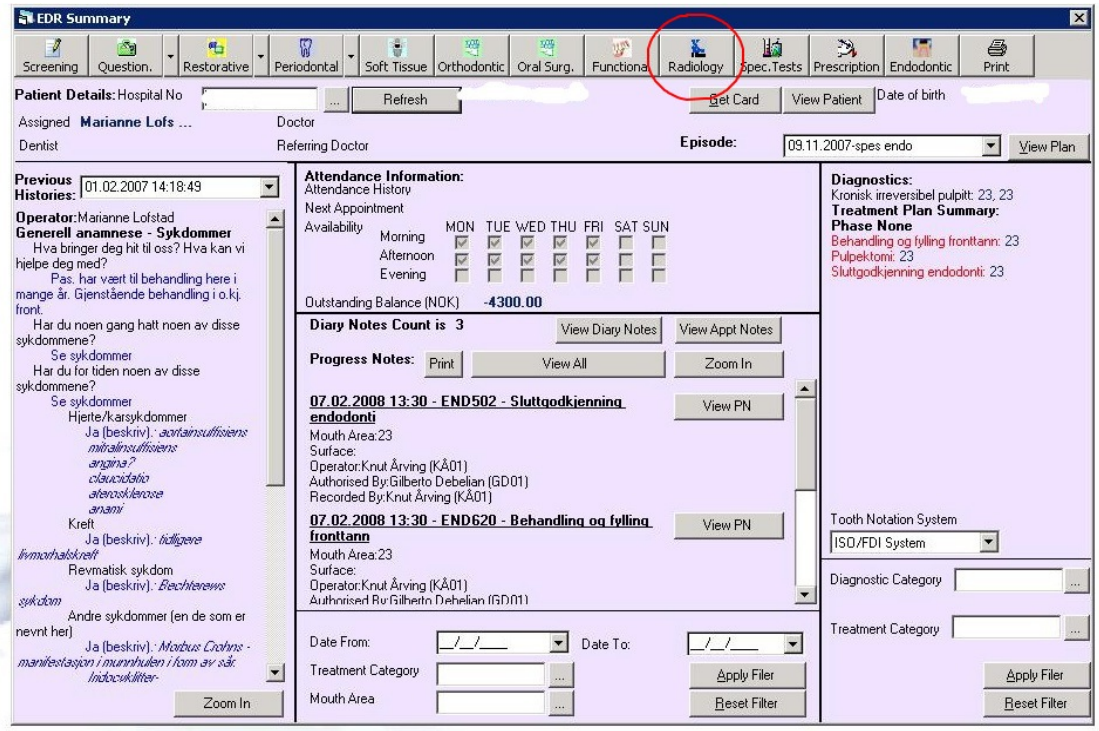
Baseline Restorative Charting – Filter Endodonti; Treatment Planning

The treatment agreed upon is entered for the concerning tooth. Enter the treatment for the tooth first (pulpectomy END610, disinfection END611, retreatment END612), then what type of tooth (front tooth, premolar, molar). Enter Progress Notes for the type of tooth (END 620, 630, eller 640), not the type of treatment.

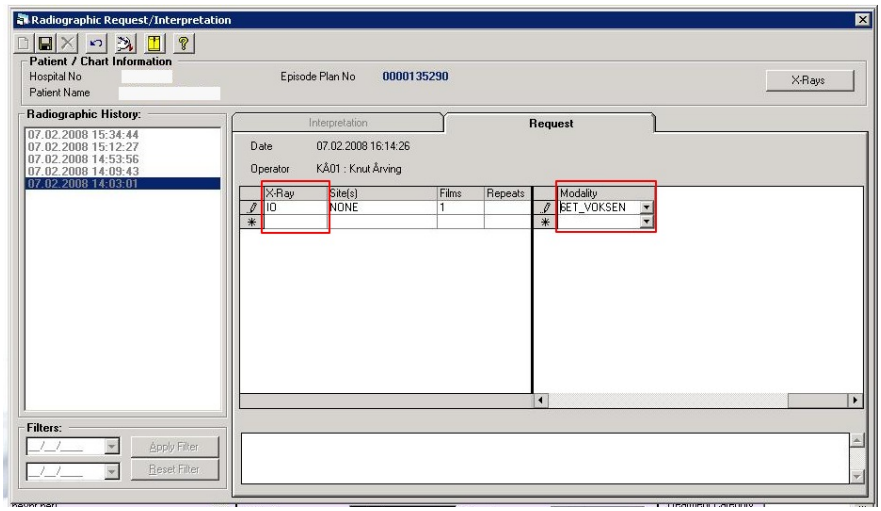


Radiographic imaging

An imaging modality and location must be requested prior to scanning the Digora imaging plate. This is done via the “Radiology”-button in the EDR Summary window.



Choose then the type of radiograph (X-Ray), which in endodontics is intraoral (IO), thereafter which scanner to use (Modality). For the endodontic section the scanner is 6ET_VOKSEN.

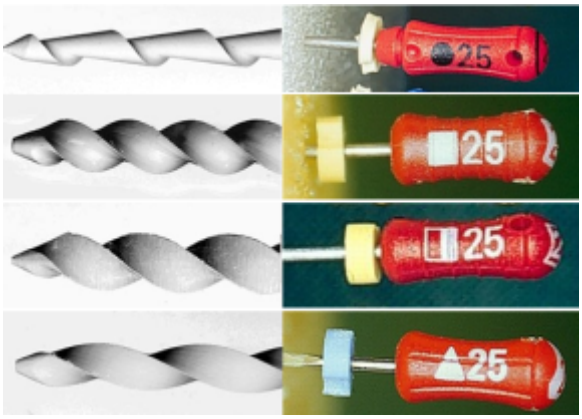


Press the save icon, then proceed with scanning in order to archiving and viewing the image in PACS and SECTRA, respectively.

APPENDIX OF REFERENCE KNOWLEDGE

ROOT CANAL INSTRUMENTS

Tip Handle, symbol



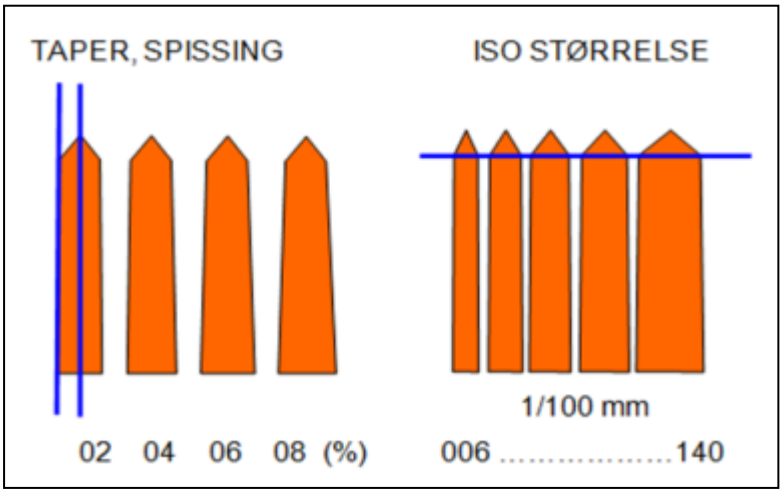
H-file

K-file

NiTi-file

Reamer

LENGTHS: 21, 25, 28, 31 mm TO SHAFT/MANDREL



COLOUR CODING Size increase from light to dark colours

PINK GREY PURPLE **WHI YEL RED BLU GRE BLK** WHI YEL RED BLU

PULP DIAGNOSES

K04a Healthy Pulp

K04.0 Pulpitis

K04.00 Symptomatic reversible pulpitis

K04.01 Acute irreversible pulpitis

K04.03 Chronic irreversible pulpitis

K04.05 Chronic, hyperplastic (pulp polyp)

K04.1 Necrosis of pulp

K04.10 Sterile necrosis

K04.11 Pulp gangrene

K04.19 Previously root-filled

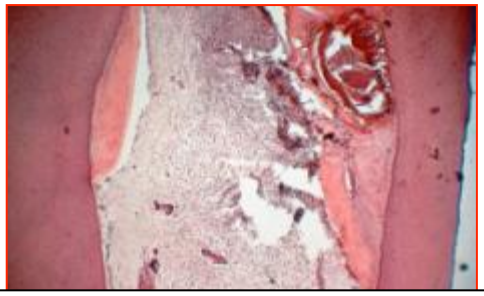
K04.2 Pulp degeneration

Denticles, local and diffuse calcifications

K04.3 Abnormal hard tissue formation in pulp

K04.30 Tertiary- or reactionary dentin

Vital, healthy pulp



Chronic pulpitis under a carious lesion, with areas of acute inflammation and lots of reactionary dentin

PERIAPICAL DIAGNOSES

K04b Healthy apical periodontium

K04.4 Acute apical periodontitis

K04.5 Chronic apical periodontitis

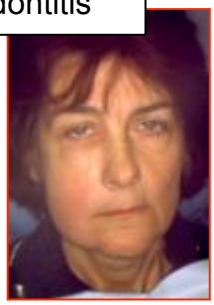
K04.50 Chronic apical periodontitis

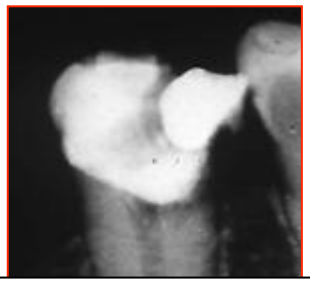
K04.51 Chronic lateral/interradicular periododontitis

K04.6 Periapical abscess with sinus

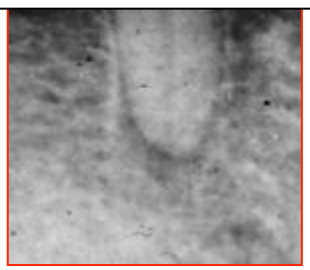
K04.7 Periapical abscess without sinus

Acute apical periodontitis





Chronic apical periodontitis



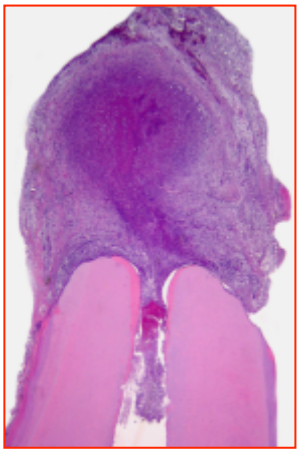
K04.8 Radicular cyst

K04.80 Apical- and lateral-cyst: ”bay cyst” and ”true cyst”

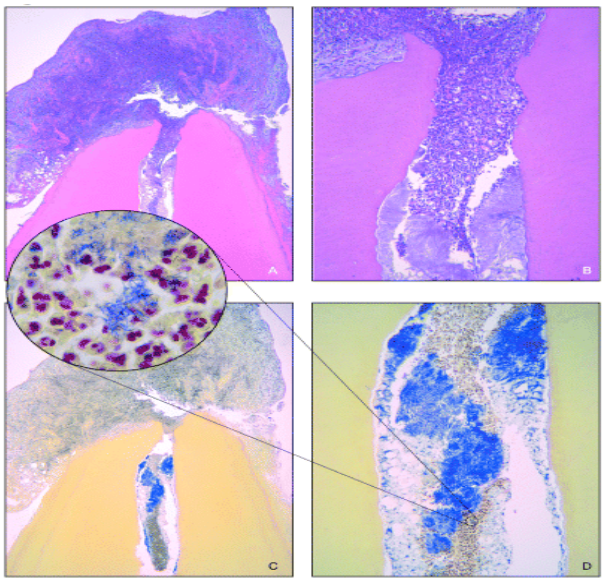
K04.81 Residualcyst

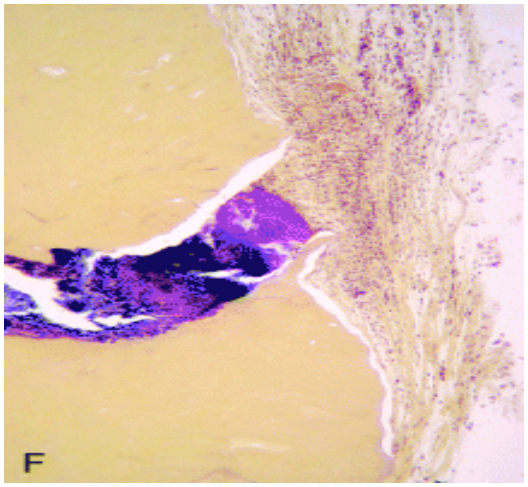
K04.82 Inflammatory periodontal cyst (lateral)

Chronic apical periodontitis after tooth wear

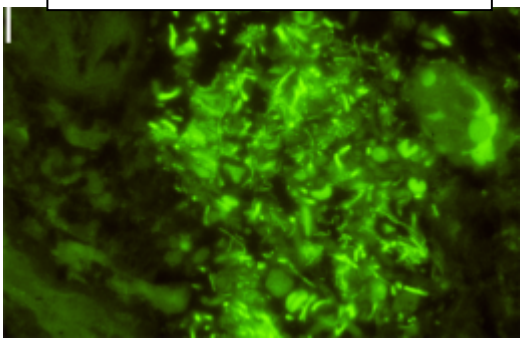


Chronic apical periodonitis is a respons to a ***bacterial infection*** of the root canal system. Histologically, there is granulation tissue, epithelial proliferations, sometime foreign bodies and a fibrous capsule in the periphery. The epithelium may develop into a cyst, a lumen that often is connected to the root canal. Solitary floating bacteria may be found in the pulp, but also in the form of biofilm on the canal walls, in the apical delta, in dentin tubuli and on the cementum surface.
(Ricucci & Bergenholtz 2006).

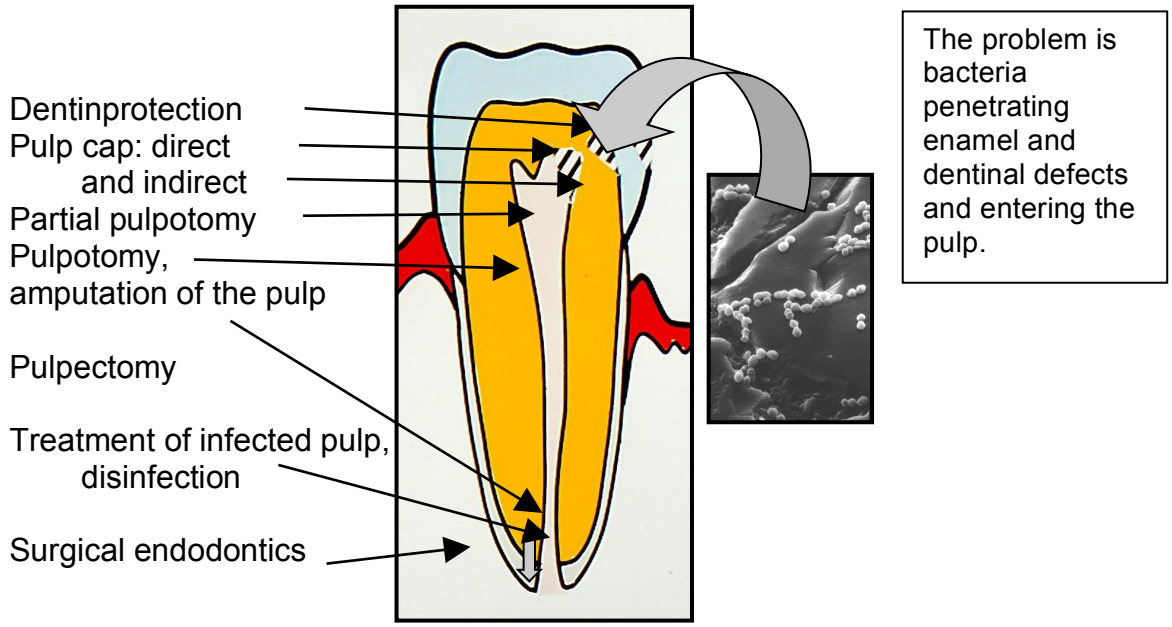




Blue-stained bacteria found in pulp and foramina, and green-stained bacteria on the cementum surface. (below, Sunde et al).



ENDODONTIC PROCEDURES



Endodontics is:

1 Prevention of apical periodontitis: pulp capping, pulpotomy, pulpectomy.

2 Treatment of apical periodontitis: treatment of infected pulp, surgical endodontics.

APICAL PERIODONTITIS IS CAUSED BY INFECTION OF THE ROOT CANAL

Endodontics becomes:

1 Aseptic routine as a preventive measure against root canal infection

2 Disinfection/antiseptic routines to eliminate an existing infection of the root canal

List of endodontic procedures

Cavity liner, dentin pretreatment

Indirect pulp capping

Direct pulp capping

Pulpotomy, partial and total

Pulpectomy

Treatment of infected pulp

Orthograde retreatment

Apexification, apexogenesis and hard tissue barrier formation

Perforation repair

Surgical treatments:

Incision and drainage

Apical debridement

Apicoectomy

Retrograde obturation

Biopsy

Hemisection

Root resection

Planned replantation

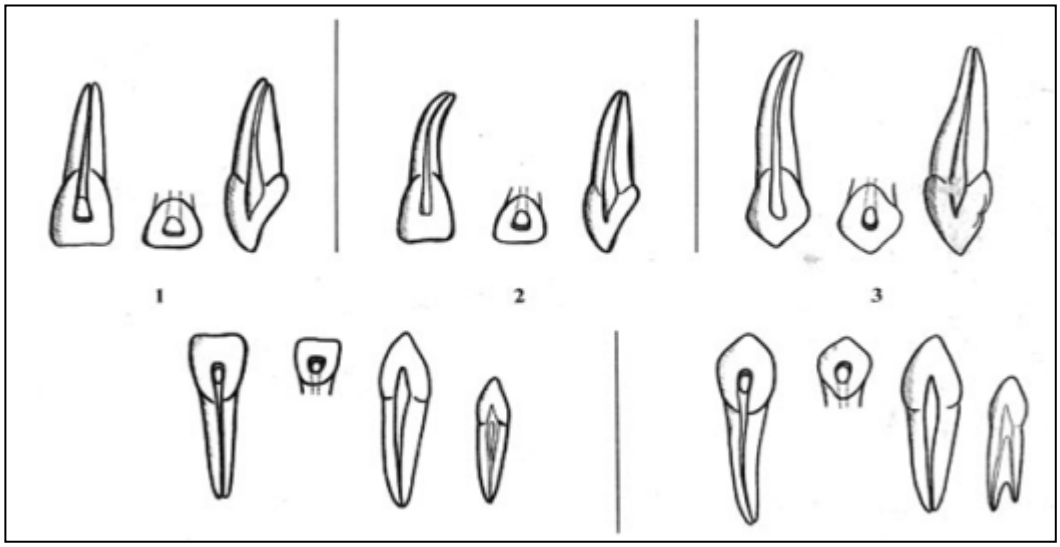
Removal of apical root fragment

ROOT CANAL ANATOMY – FRONT TEETH

1 Canal 100%

1 Canal 100%
Apical curve 50%

1 Canal 100%
Apical curve 60%



1 Canal 60%, 2->1 40%
Apical curve 30%

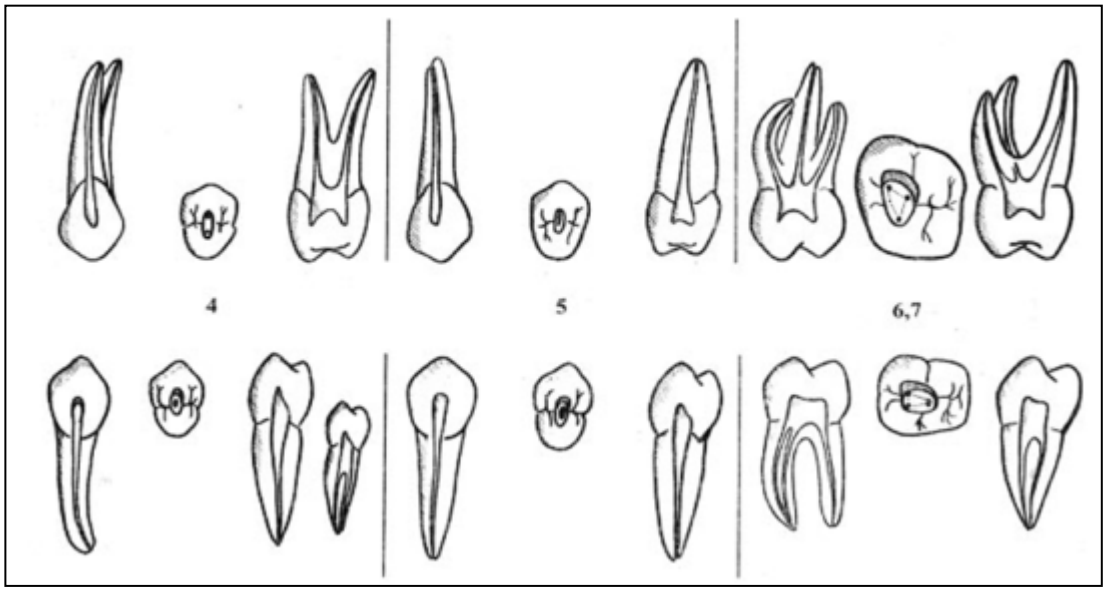
1 Canal 80%, 2 canals 20%
Apical curve 30%.
May have a bifid root

ROTKANALANATOMI – PREMOLARER OG MOLARER

2 canals 75%, 1 in 15%, 2->1 in 10%
Apical curve 35%.
Hard to standardize

1 Canal 60%, 2 in 40%
Apical curve 60%.

3 canals 10-20%, 4 in 80-90%
Apical curve MB root 80%



1 Canal 80%, 2 in 20%
Apical curve 40%.

1 Canal 90%, 2 in 10%
Apical curve 50%.

3 canals 80%, 2 in 15%, 4 in 5%
Apical curve M root 70%.
M standardization difficult

Prescription and use of medicines:
(NB! Links may be outdated. Ensure that the information is current)

National guidelines for antibiotics in general practice:

http://helsedirektoratet.no/publikasjoner/nasjonale-faglige-retningslinjer-for-antibiotikabruk-i-primerhelsetjenesten/Publikasjoner/IS-2030_nett_low.pdf

ANTIBIOTIC TREATMENT

The most effective way of treating an acute odontogenic infection is drainage of pus. “Ubi pus, ibi evacua”. When there is pus, perform an incision and establish drainage. In some cases a drain may be used to prolong drainage. Use of antibiotics depends of the severity of the infection. Such treatment should ideally be guided by the results culturing and tests for antibiotic susceptibility.

Before the resistance testing results exists, treatment is started empirically using:
Phenoxymethylpenicillin (penicillin V) 1 g x 4 for 5 days

In the case of allergy to penicillin, use: Clindamycin 300 mg x 4–5 for 5 days

When the infection is under control, general conditions have improved and dysphagia, trismus and swelling is reduced, *then* all infectious foci are treated. Treatment will on large consist of endodontic, periodontal or extraction therapy.

Antibiotic regimen for the prevention of endocarditis.

Dental procedures where this is recommended:
Extraction, subgingival depuration, treatment of root-canals, all procedures penetrating mucosal or skin barriers. Surgical procedures and biopsy in the oral cavity.
Conditions where this is recommended:
A history of endocarditis
Cardiac valve replacements or vascular grafts of the major vessels
Cardiac transplantation recipients with valve defects
Congenital valve defects:
Complicated, uncorrected cyanotic congenital defects of the heart (single ventricle, TGA, Fallot etc.)
Artificially created pulmonal shunts or conduit
The first 6 months after operation or catheter-based intervention of inborn cardiac defects
Partially defective cardiac defects that has been treated
Antibiotig regimen:
The standard prophylactic regimen provide satisfactory security for all patients, including those with a high risk, by all interventions performed without general anesthesia.
If a patient already uses one type of antibiotic drug, another antibiotic drug must be chosen for prohylaxis.
Standard antibiotic prophylactic regimen:
Peroral: amoxicillin 500 mg, 4 capsules 1 hour prior to procedure
Alternate drug: I.V: ampicillin 2 g 30 min. prior to procedure.
In case of allergy to penicillin: Peroral: clindamycin 600 mg capsule 1 hour prior to procedure
Alternate drug: I.V: clindamycin 600 mg 30 min prior to procedure.

http://www.oslo-universitetssykehus.no/SiteCollectionDocuments/Om%20oss/Avdelinger/Hjerte-lunge-kar/retningslinjer%20for%20antibiotikaprofylakse%20mot%20endokarditt.pdf
http://legeforeningen.no/Fagmed/Norsk-cardiologisk-selskap/Retningslinjer/
http://www.escardio.org/guidelines-surveys/esc-guidelines/Pages/infective-endocarditis.aspx
http://eurheartj.oxfordjournals.org/content/30/19/2369.full.pdf - Eur Heart J 2009;30:2369-2413

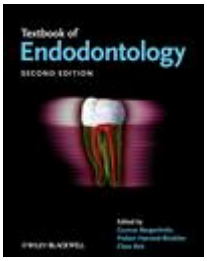
Analgesic/anti-inflammatory drugs, also used after oral sugery:
400 mg ibuprofen (Ibux, Ibumetin) 2 tablets 3 x day for anti-inflammatory effect
500 mg paracetamol (Paracet, Pinex) 1-2 tablets 3 x day)
Double the starting dose; up to 4x per day
Alternatively paracetamol/codein (500/30mg) up to 4x per day if severe pain (elderly)

Antibiotic treatment (In presence of fever, malise and risk of infection spreading):
Primary course: Penicillin V phenoxymethylpenicillin (Apocillin) 1 g / 1 tablet 5 x daily for 5 dager. May be used in combination with Metronidazol (Flagyl) 400mg, 1 tablet x 3 per day for 7 days.
If allergic to penicillin: Clindamycin (Dalacin) 300 mg, 2 capsules 2 x day for 5 days.
Alternate regimens: Metronidazol (Flagyl) 400mg, 1 tablet x 3 per day for 7 days (not for pregnants/lactating); narrow spectrum, no anaerobic or facultative anaerobic bact., penicillin resistance; Erytromycin (Ery-Max) 250 mg, 2 capsules 2 x day (every 12. hour) for 7 days; ineffective to anaerobic bacteria.

(Adult doses given.)

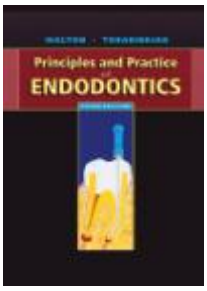
Textbooks for undergraduate students:

Bergenholtz G, Hørsted-Bindslev P, Reit C.
Textbook of Endodontology
Blackwell Munksgaard
2. Ed. 2010



Tronstad L.
Clinical Endodontics
3rd ed. Thieme 2009

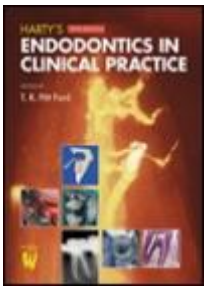
Walton R, Torabinejad M.
Principles and Practices of Endodontics.
3rd ed. Saunders 2002



Beer R, Baumann MA, Kielbassa AM
Pocket Atlas of Endodontics.
Thieme 2006
Clinician-oriented manual, useful supplement

Pitt Ford TR (ed).
Harty's Endodontics in Clinical Practice
5th ed. Wright 2004

New ed. 2010



Computer-assisted learning:

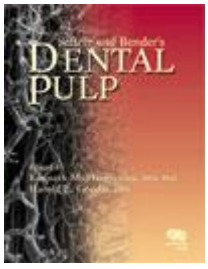
Haapasalo MPP (ed).
Visual Endodontics

In Appstore

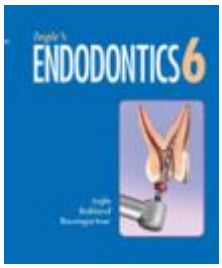
Textbooks for postgraduate students and for in-depth reading:

Ørstavik D & Pitt Ford TR (eds)
Essential Endodontology
Blackwell 2008

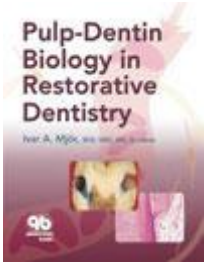
Hargreaves K & Goodis H (eds)
Seltzer and Bender's 'The Dental Pulp'
Quintessence 2002



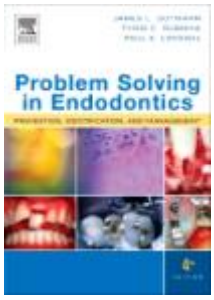
Ingle J, Bakland L & Baumgartner JL (eds)
Ingle Endodontics
BD Decker 2008



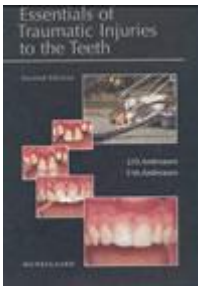
Mjör, Ivar A (ed).
Pulp-Dentin Biology in Restorative Dentistry
Quintessence 2003



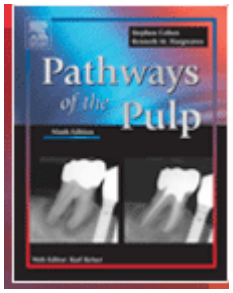
Gutman JL, Dumsha TC & Lovdahl PE (eds)
Problem Solving in Endodontics
Elsevier 2006



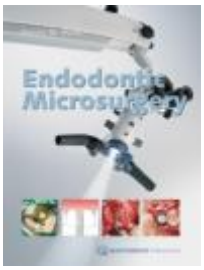
Andreasen, J.O. & Andreasen, F.M.
Essentials of Traumatic Injuries to the Teeth
Munksgaard 2000



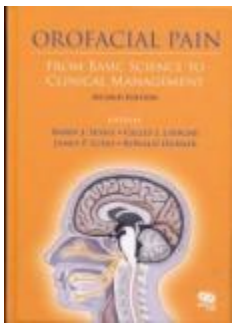
Cohen S & Hargreaves K (eds)
Pathways of the Pulp
Elsevier 2008



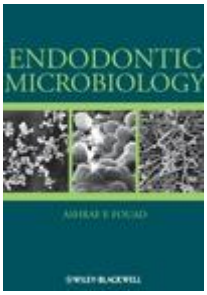
Merino E
Endodontic Microsurgery
Quintessence 2009



Sessle B et al (Eds)
Orofacial Pain, 2nd Edition
Quintessence 2008



Fouad A (Ed)
Endodontic Microbiology
Wiley 2009



Rhodes JS.
Advanced Endodontics Clinical retreatment and Surgery
Taylor & Francis 2006