Endodontic treatment related surgery: methods and indications

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Endodontic treatment related surgery

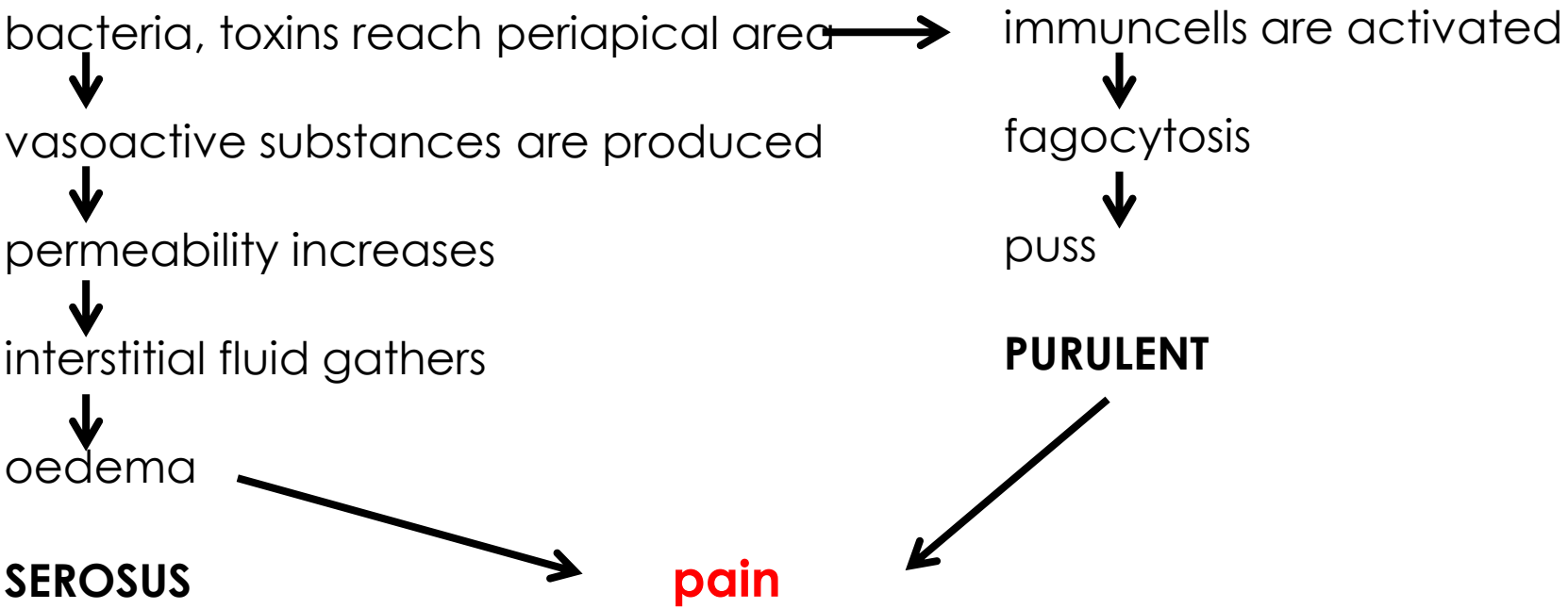
- Drainage
- Apicoectomy
- Root amputation
- Hemisection
- Bicuspidation

Drainage

Acute apical abscess

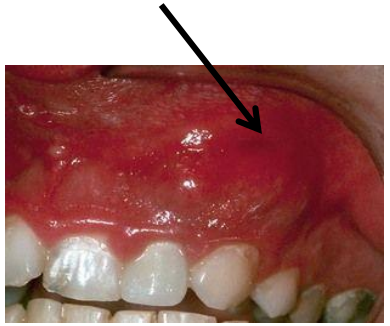
Inflammation progressess from the root canal to the periapical area, then as it *rapidly* progressess it collects underneath the periosteum

Pathophysiology



Acute apical abscess

Two main symptoms: pain and swelling



- Symptoms: **pain** general symptoms
- Extraoral examination: facial **swelling**
- Intraoral examination: subperiosteal swelling in vestibular region, on palate, lingually
- Palpation: serosus- hard, stiff; purulent- fluctuates
- Percussion: mild or acute pain
- Sensitivity test: no reaction (pulp necrosis)
- Radiological examination: depends on etiology

reversible pulpitis

no radiologic sign

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irreversible pulpitis

no radiologic sign

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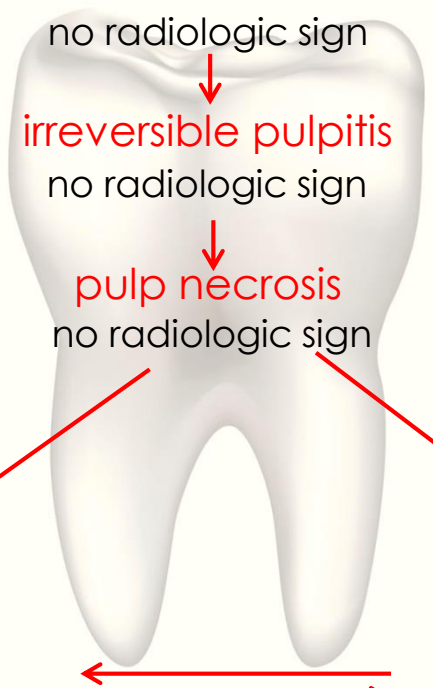
pulp necrosis

no radiologic sign



acute apic. periodontitis

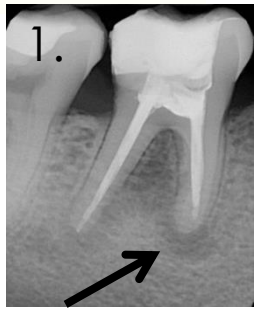
chronic apic. periodontitis

ACUTE APIC. ABSCESS

periostitis

phlegmone

radiolatency 10-12 days
widened period. space



apic. translucency

Purpose of drainage

- **Reduce swelling**
- **Relieve pain**

Steps of drainage

1. Anaesthesia *difficult task*

deponating causes further pain in area of oedema

partial anaesthesia is achieved:

- exsudate **dilutes** anaesthetic solution
- **low pH** of inflammed area disturbs hidolysis of aneasthetic solution
- due to inflammation **threshold of nerve endings** changes, smaller stimulus causes pain

1. block anaesthesia far from inflammation
2. topical anaesthesia
3. local anaesthesia at swelling
   starting on periphery of swelling
   slow deponation
   gradually moving to the center

Steps of drainage

2. Root canal treatment

1. trepantion *exsudate may be drained to some extent*
2. cleaning and desinfection of root canal
3. enlargement of foramen physiologicum max. #20 (apical stop!)
4. temporary sealing with $Ca(OH)_2$ and hermetically sealing temporary filling

Steps of drainage

3. Incision

1. purulent or serosus? *examine fluctuation with two fingers*
2. incision below punctum maximum
3. periosteum must cut(subperiosteal abscess!)

Steps of drainage

4. Drainage

1. incision lines must not close
2. few days
3. daily check-up

Contraindication of drainage

1. **anticoagulant disease**
   congenital
   acquired (pl. hepatic disease)
2. **anticoagulant therapy**
   cumarins
   - syncumar
   - marfarin, warfarin

   heparin
3. **phlegmone**: purulent diffuse swelling spreading through connective tissue space

Patient must be referred to in-patient hospital care right away!

If it spreads to spatium submandibulare or spatium periorbitale it may be life threatening!

Medication support

Local symptom-local treatment!
Systemic symptoms-systemic treatment!

When should we give antibiotics?

1. general symptoms: fever, weakness, lethargy
2. on daily control no regression, swelling increases, general symptoms appear

What should we give?

1. amoxicillin+klavulanic acid *first choice*
   AugmentinDuo 875mg/125mg 2x1, Augmentin 250mg/125mg 3x1
   one week
2. clindamycin *GI ulcus, hepatic disorders contraindication*
   Dalacin 150mg 4x1
   one week

Conservative aspect

first step of endodotic treatment must be conservative = orthograd treatment

- pulpal and periapical disease

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orthograd RCT

- unsuccessful RCT

even if RCT looks perfect on x-ray

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orthograd re-treatment

unaccessed root canal

incomplete root canal obturation

Why orthograd?

- **Radiological imaging has several confines in setting-up diagnosis**
  - layers overlap
  - not so detailed
- **CBCT**
- **conditions for orthograd re-treatment are met more easily**
- **orthograd re-treatment is less strain for patient**

Confines of endodontic treatment

Root canal treatment = chemomechanical preparation

Chemical and mechanical preparation of root canal is never 100%!

- effect of desinfecting irrigants cannot be maximized
- internal surface is not even
- lateral canals

Indication of apicoectomy

1. **anatomical reasons**
   - curved root
   - dilacerated root
   - denticulus
2. **unresolvable mistakes during RCT**
   - ledgeformation
   - apical oblitaration
   - perforation
   - separated instrument
   - overfilled root causing inflammation
3. **prosthetic reasons**
   - periapical lesion does not heal after revision and the tooth is the abutment of a prosthetic restoration
4. **unremovable materials in rootcanal-increasing risk of fracture**
   - cast metal, zirconium, ceramic post&core
   - silver point
   - cement as root canal filling
5. **persisting symptoms after RCT, even if radiologic control shows good RCF:**
   swelling, pain, periapical lesion not healing
   unseen reasons:
   - perforation
   - overfill
   - apical delta

Steps of apicoectomy

1. Anaesthesia

goal: reduce pain
vasoconstriction
mandibula: block anaesthesia+ local anaesthesia

Steps of apicoectomy

2. Creating flap

General rules

- continuous incision line – even wound margin
- horizontal and vertical lines meet in rounded angle – easily reflected
- blade of the scalpel must meet bonesurface at 45° – wider flap margin easily reflected
- incision should ot be over lesion – reduced microcirculation - delayed healing
- incision must not continue in vestibulum
- lesion is always bigger than seen on x-ray
- papilla must never be halfed

Steps of apicoectomy

Types of flaps

- semilunar flap

- mucoperiosteal flap

- one or two vertical relieving incisions
- distal vertical relieving incision in molar region must be avoided
- vertical relieving incisions must run parallel to bloodvessels, nerves
- in sulcus length of incision depends on size of lesion
- vertical relieving incision must be at least one tooth mesially or diastally to lesion
- avoid n. mentalis at lower premolars

Steps of apicoectomy

- submarginal flap (Ochseinbein-Luebke flap)
  - no gingival recession
  - esthetic and well functioning prosthetic work on teeth

Size of the periapicalis lesion

1. covered by alveolar bone – intact cortical
2. thin cortical – granulomatosous tissue underneath *(easily accessed)*
3. no cortical – there is no alveolar bone buccally

Steps of apicoectomy

3. Osteotomy
   - low speed (2000 rpm)
   - round bur (Lindemann)
   - surgical handpiece
   - sterile isotonic cooling

4. Periapical curettage
   - removing granulomatosous tissue

5. Apical resection
   - high speed
   - needlepoint diamond bur
   - sterile isotonic cooling
   - slanting 45° in buccal direction

Steps of apicoectomy

6. Retrograde root canal obturation

diamond bur attached to ultrasonic handpiece

retrograde obturating material:

- ProRoot MTA (mineral trioxide aggregate)
- Biodentine (Ca++ silicate based)
- Super EBA (Zn+ oxide cement based)
- ~~(amalgam)~~

characteristics of retrograde obturating material:

- hermetic seal
- no shrinkage
- not dissolving
- bactericide
- biocompatible
- easily handled
- radiodens

Steps of apicoectomy

7. Reflection of flap

- alveolar site must be filled by blood
- flap should reflect precisely
- surplus blood should be removed by pressing wet gauze on surgical area
- simple suture
- knot should not be on margin of flap

8. Postoperative care

- AB therapy should not be given as rutin
- remove suture 5.-7. days
- control x-ray 6, 12, 24, 48 months

Contraindication of apicoectomy

1. anatomical reasons

- closeness of sinus
- closeness of fossa nasalis
- closeness of canalis mandibulae
- short root compared to clinical crown
- functionally unrestorable

2. periodontal reasons

- lack of stability
- vertical pockets
- paroendo-, endoparo-lesion

3. general state of health

- poor general state of health
- immunesuppresant state
- coagulation disorders
- anticoagulant therapy
- untreated diabetes
- severe cardial disorders
- first trimester of gestation (relative)

Root amputation

Definition: only one root of tooth is removed
Purpose: keep all the clinical crown

Indication of root amputation

1. severe periodontal lesion in bifurcation area
2. deep periodontal pocket involving one root
3. deep caries involving one root
4. perforation, internal resorption involving one root
5. vertical fracture involving one root
6. one root canot be RCF, eg. separated instrument

Steps of root amputation

1. RCF of root to be kept
2. anaesthesia
3. create a flap
4. osteotomy
5. root amputation
   - in horizontal plane
   - high speed
   - needlepoint diamond bur
   - sterile isotonic cooling
6. remove amputated root
7. reflect flap

Contraindication of root amputation

1. poor general state of health
2. more than one root is involved
3. furcation is located apically, pl. taurodens
4. fused roots
5. alveolar support of roots to be kept is weak
6. none of the roots can be RCF

Hemisection

Definition: tooth is halfed in resection plane passing through crown of tooth

Purpose: one root is removed with part o the crown

Indication of hemisection

1. severe periodontal lesion in bifurcation area
2. deep periodontal pocket involving one root
3. deep caries involving one root
4. perforation, internal resorption involving one root
5. vertical fracture involving one root
6. one root canot be RCF, eg. separated instrument

Steps of hemisection

1. RCF of root to be kept
2. anaesthesia
3. hemisection
   - in line of root fusion
   - high speed
   - needlepoint diamond bur
   - sterile isotonic cooling
4. remove unwanted root
5. prepare half-tooth to be kept
6. temporary crown
7. final crown 6-8 weeks later

Contraindication of hemisection

1. poor general state of health
2. more than one root is involved
3. furcation is located apically, pl. taurodens
4. fused roots
5. alveolar support of roots to be kept is weak
6. none of the roots can be RCF

Bicuspidation

Definition: tooth is halfed in resection plane passing through crown of tooth

Purpose: all root are kept and restored prosthetically separately

Indication of bicuspidation

1. perforation in furcation
2. parodontal lesion in furcation
3. buccolingual caries in furcation

Steps of bicuspidation

1. RCT
2. anaesthesia
3. bicuspidation
   - in line of root fusion
   - high speed
   - needlepoint diamond bur
   - sterile isotonic cooling
4. prepare both halves for crown
5. temporary crowns
6. final crowns 6-8 weeks later

Contraindication of bicuspidation

1. poor general state of health
2. furcation is located apically, pl. taurodens
3. fused roots
4. alveolar support of roots is weak
5. none of the roots can be RCF

Thank you for your attention!