

Lecture C

D. de Groot - Like

Contents

- Reactions of the pulp •
Microbiology of pulpitis and pulp necrosis (knowledge clip)
- Cervical dentin sensitivity • Root
resorption
- Reader Endo 1:
 - Learning task 1

Pulpitis

- Caries lesion in the enamel
 - First signs of pulp inflammation •

Caries lesion in dentin (bacteria in tubules)

- Bacterial products •
 - Odontoblasts (peritubular and tertiary dentin) •
 - Proliferation of blood vessels
 - Increase in fibroblasts, lymphocytes, plasma cells, macrophages, dentritic cells, neutrophils



Pulpitis

- More and more neutrophilic granulocytes (acute inflammatory cells)
- Microorganisms invade tertiary dentin -> neutrophilic granulocytes tubules inside
 - Lysosomal tissue breakdown -> (micro) abscesses
- Microorganisms in pulp tissue -> local necrosis

Pulpitis

- Reversible pulpitis
 - Pulpitis heals after removal of the cause (e.g. restoration)
 - Quick, short pain with cold •
Easy to localize
 - Pain disappears after removal of the cause



Pulpitis

- Irreversible pulpitis
 - Chronic pulpitis (usually few complaints)
 - Acute pulpitis (a lot of pain!)
 - Pain persists after removal of the pain stimulus
 - Pain with cold and hot
 - Spontaneous pain
 - Difficult to localize



Pulpitis

- Can you see pulpitis on the x-ray?



Pulp polyep

- Hyperplastic pulp • In young pulp with ample blood supply (usually deciduous molars)
- Pulp is exposed in a short time
- No necrosis due to high resistance
- Tissue is covered by “wandering” epithelial cells of oral mucosa

Pulp polyep



Pulp polyep



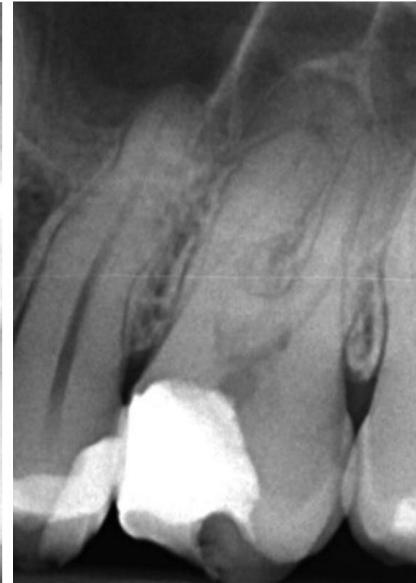
Pulp polyep



Pulp polyep



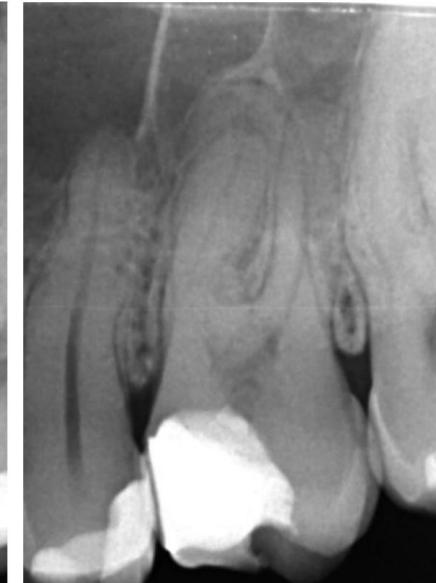
February 2022



April 2022



July 2022



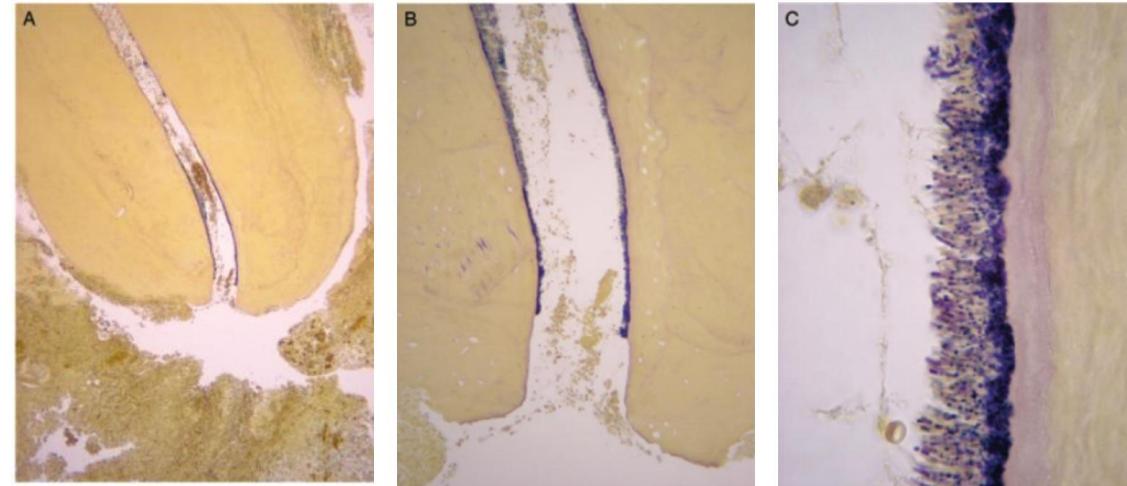
January 2023

Pulpitis -> pulpanecrosis

- >>Microorganisms
 - Lysosomal tissue breakdown -> (micro) abscesses
 - **Microorganisms in pulp tissue -> local necrosis**
- Pulpanecrose

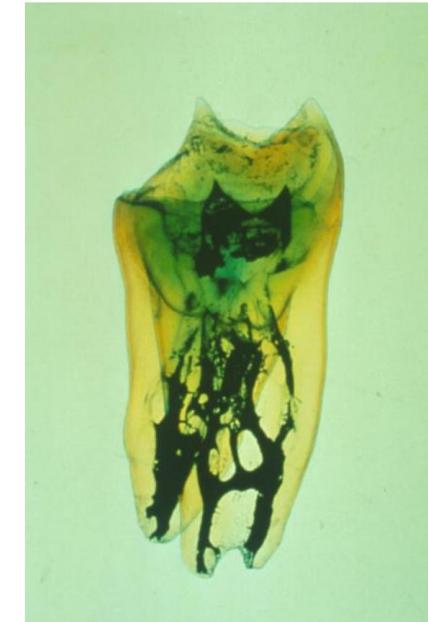
Pulpanecrose

- A biofilm consists of communities of **bacteria** attached to surfaces and encased in, a self-produced, **extracellular polymeric matrix**



Microbiology of pulpitis and pulp necrosis

- Microorganisms are the cause of pulpitis and pulp necrosis
- Knowledge clip on Brightspace



Pulpanecrose

- Due to infection
 - Microabscesses formation
 - Infection (and necrosis) spread apically
- As a result of trauma
 - Circulation arrest due to damage to blood vessels at the apex.
 - As long as no bacteria are introduced, the situation does not change

Resorption

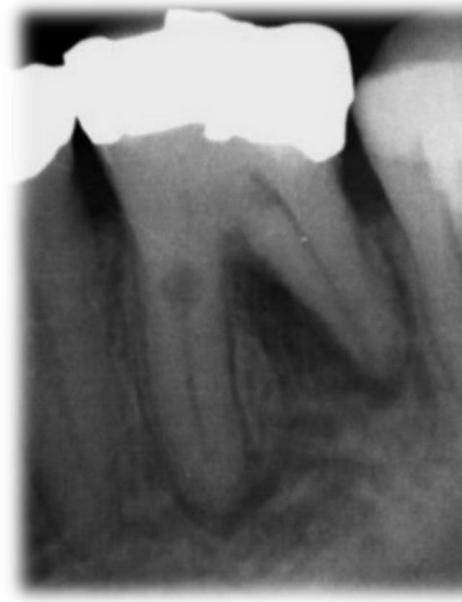
- Internal resorption
- External resorption
 - External cervical root resorption •
 - Surface resorption •
 - Replacement resorption
 - Inflammatory resorption
 - Pressure
resorption • Apical root resorption

Internal resorption

- Due to mechanical trauma, restorations in combination heat at a vital pulp
- Chronic inflammation, disappearance of odontoblast layer and predentin
- Coronal necrotic and infected pulp tissue and apically vital pulp
- Odontoclasten



Internal resorption



Internal resorption



Internal resorption

- Characteristic
 - Partly vital pulp •
 - Canal bulges, often symmetrical •
- Photo taken at a different angle will not change the image



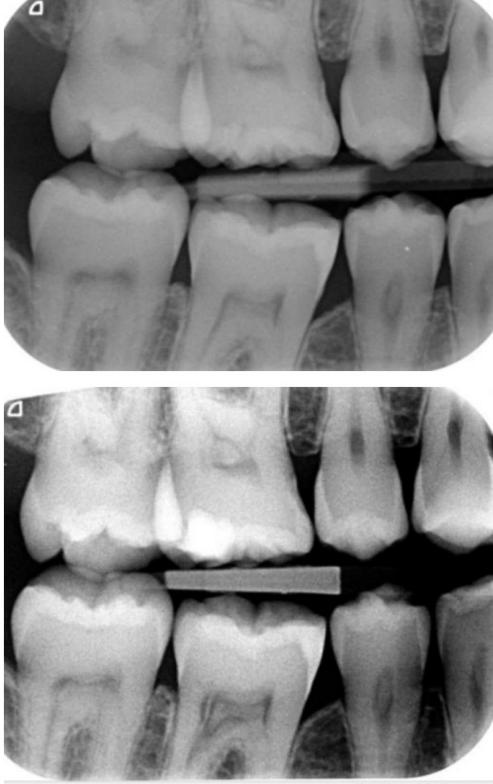
External cervical root resorption

- Begins apical to the epithelial attachment on the outer surface of the root
- Extension to coronal, apical and pulpal but:
 - Around pulp cavity
 - Pulp remains unaffected for a very long time
 - PRRS: parapulpary anti-resorption shield (predentine)
- Pulp plays no role in the etiology of ECR

External cervical root resorption

- Begins apical to the epithelial attachment
- Extends coronally, apically and pulpal
- Rondom pulpholte





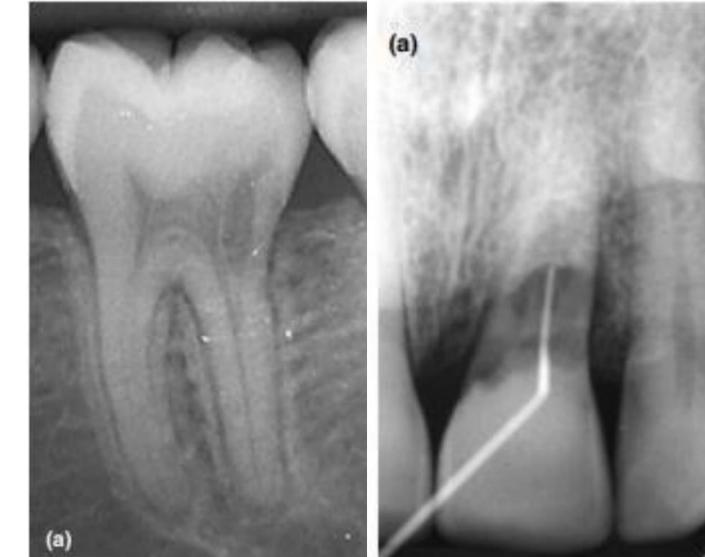




External cervical root resorption

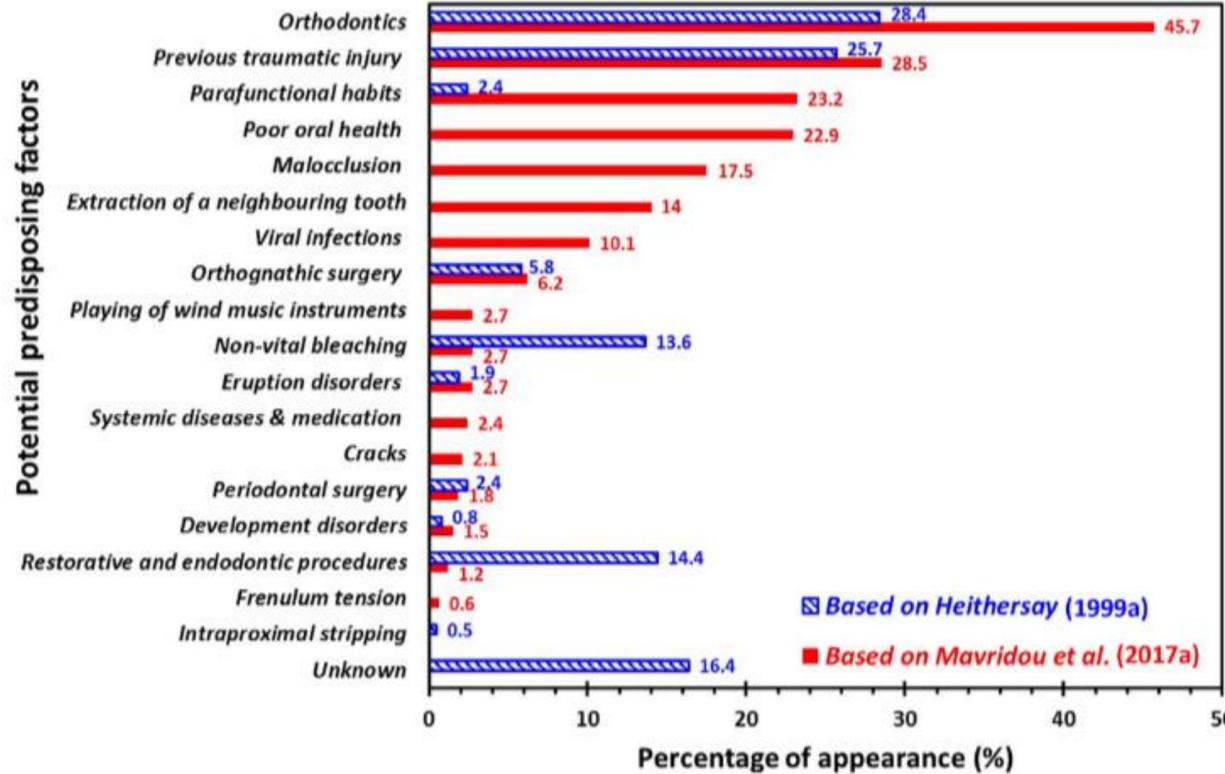
- Various predisposing factors:

• Orthodontics	45,7%
• Trauma	28,5%
• Parafunction	23,2%
• Insufficient MH	22,9%
• Malocclusion	17,5%
• Extraction of neighboring element	14,0%
• Periodontal therapy	1,6%



- Usually several factors are present

Mavridou et al 2022



Patel et al 2018

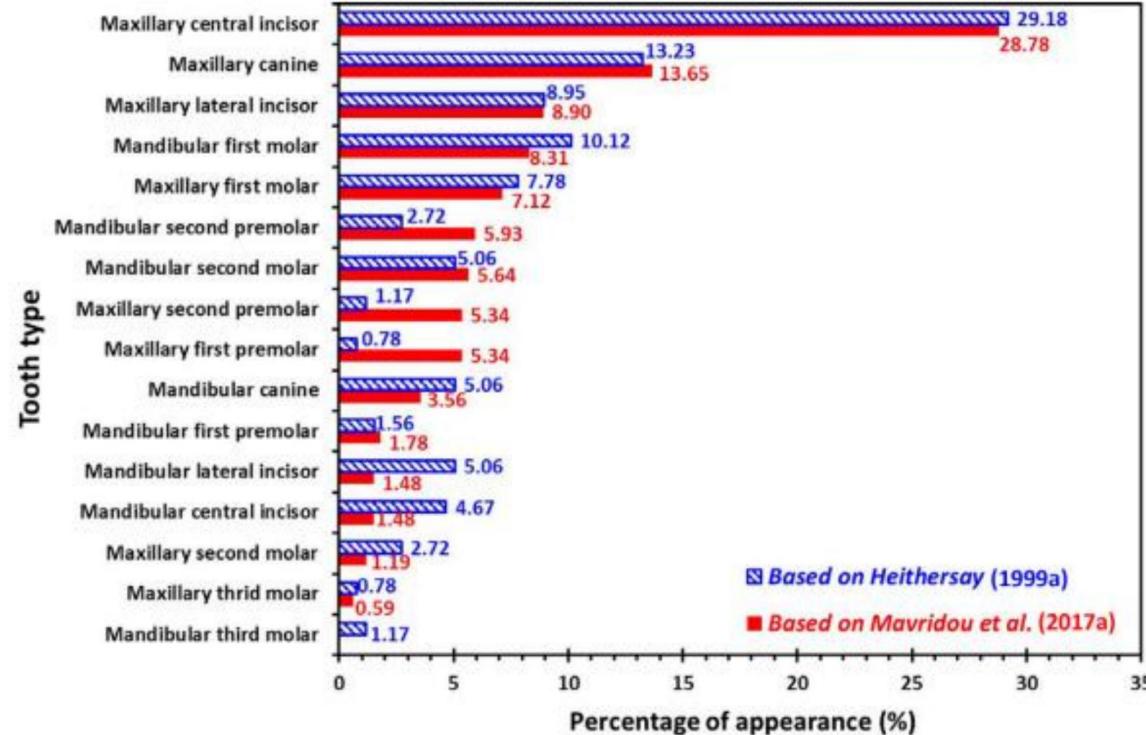


Figure 8 Comparison of percentage of appearance of ECR in different tooth types, as reported in the work of Heithersay 1999a and Mavridou *et al.* 2017a.

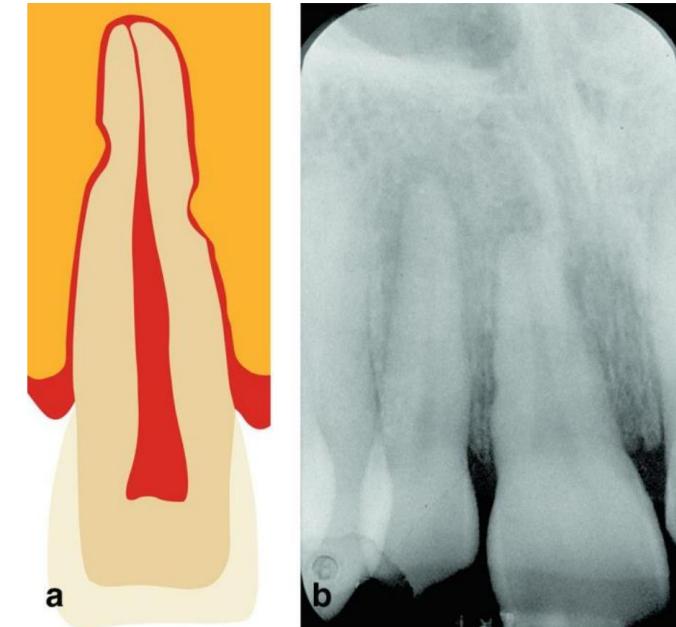
Patel et al 2018

Internal vs. External cervical resorption

- Internal resorption
 - Pulp •
 - Participates in etiology •
 - Odontoblast layer/predentine •
 - Pulp cavity bulge
- External cervical resorption
 - Pulp •
 - Does **not** contribute to etiology • Parapulpary anti-resorption shield • Apical epithelial attachment
 - Pulp cavity is normal •
 - Pink spot

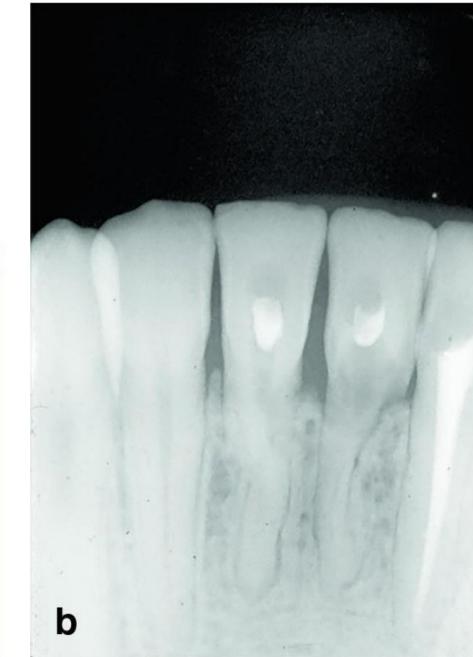
Surface absorption

- Minor trauma (concussion, subluxation)
- Minor damage to the PDL
- Cleaning up damaged PDL -> loss of (pre)cement
- Repair of the PDL and growth of the PDL over the defect.
- Therapy: none



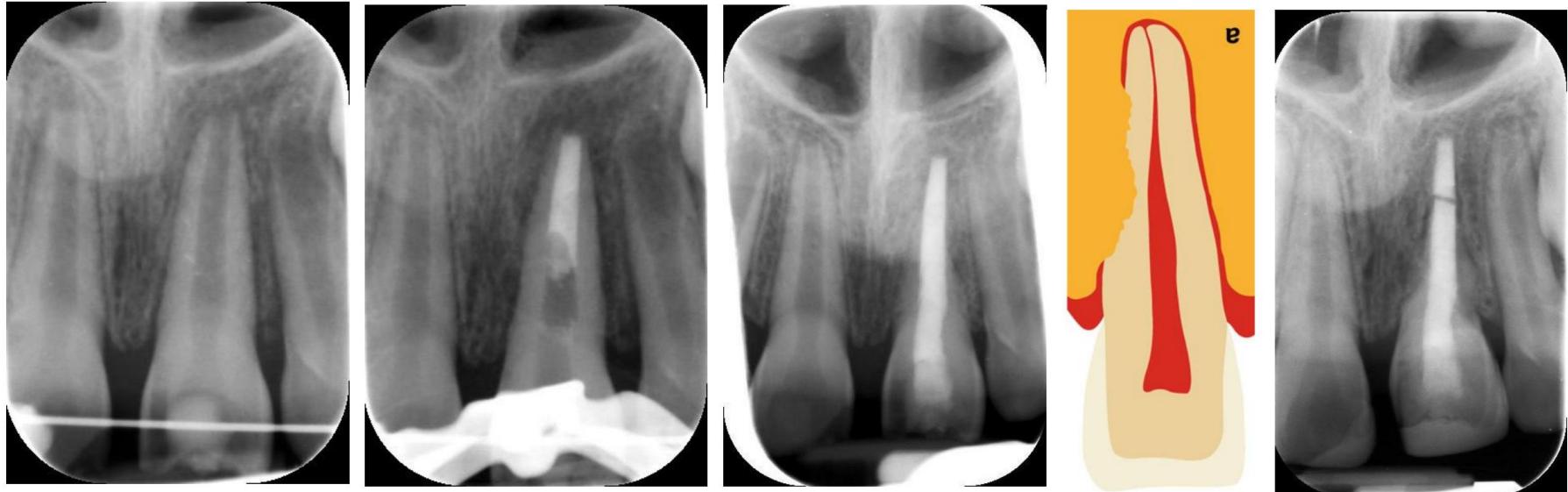
Replacement resorption

- More severe trauma (luxation, intrusion, avulsion)
- Major damage to PDL and cement
- Cleaning up damaged PDL and cement but no PDL repair
- Bone contact with dentin -> becomes dentin converted into bone.
- Therapy: none



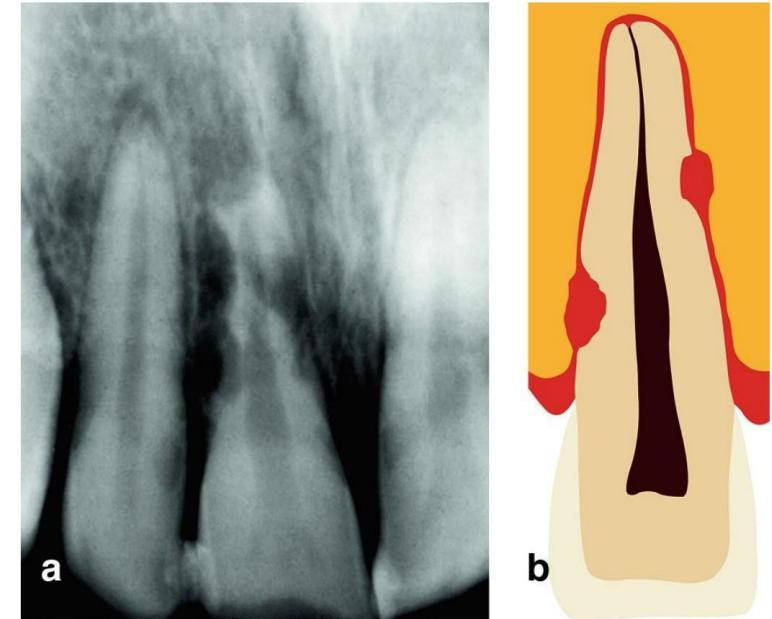
Replacement resorption

- Occurs most often after intrusion dislocation (6% - 25%) and after avulsion (40% - 75%)



Inflammatory resorption

- More severe trauma (luxation, intrusion, avulsion) • Major damage to PDL and cement • Infection of the pulp
- Very fast process
- Therapy: perform endodontic treatment



Surface, replacement, inflammation resorption



Pressure resorption

- Breaking teeth • Orthodontics
- Therapy: removing pressure

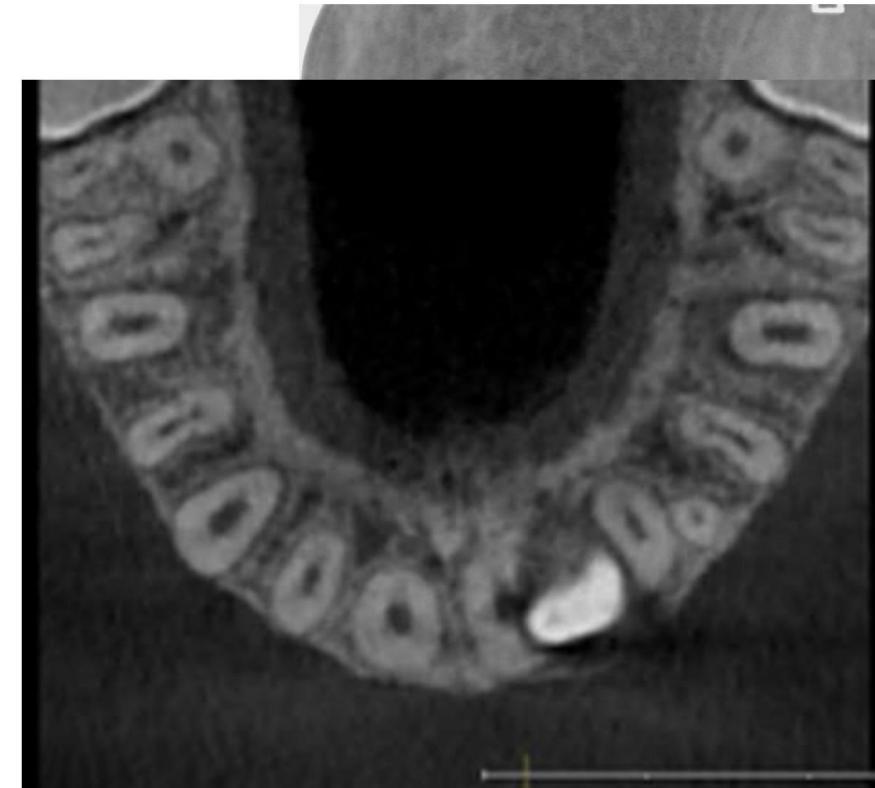


Photo J. Maassen

Apical root resorption

- Periapical inflammation
 - 80% apical resorption of cementum and dentin at the root tip •
- Often limited •
- Sometimes more prominent
- Therapy: endodontic treatment



Photo J. Maassen

Radboudumc

Resorption

- Internal resorption
- External resorption
 - External cervical root resorption •
 - Surface resorption •
 - Replacement resorption
 - Inflammatory resorption
 - Pressure
resorption • Apical root resorption

Pulpitis

- Reversible pulpitis
 - Pulpitis heals after removal of the cause (e.g. restoration)
 - Quick, short pain with cold •
Easy to localize
 - Pain disappears after removal of the cause
- Cervical dentin sensitivity



(Cervical) dentin sensitivity

- 10-25% of patients • Loss of tooth enamel or root cementum • Exposed dentin tubules • Recession • External bleaching
 - Attritie
 - Abrasion
 - Erosion

(Cervical) dentin sensitivity

- Hydrodynamic theory
 - Stimulus of dentin surface • Fluid flow in tubules • Activation of Raschkow's plexus • Sharp, stabbing pain
- Odontoblasts • Cold receptors
- Chronic irritation by irritants from food/microbial toxins • Superficial inflammation of the pulp • Decreased stimulus threshold & increase in the number of nerve endings

(Cervical) dentin sensitivity

- Diagnosis
- Predisposing factors •

Elimination of cause

- Anamnesis of dietary habits •

Reduce acidic drinks/food • Oral

hygiene instructions • Do

not brush for 1-2 hours after
acidic

food • Carbon toothpaste



Effect van verschillende dranken op dentine

Dietary Compounds pH

White wine	2.30	+++
Red Wine	2.63	++
Coke	2.94	-
Ribena	2.97	+
Orange juice	3.00	++
Yogurt	3.26	++
Grapefruit juice	3.60	+++
Apple juice	4.10	+++
Tea	5.00	-
Coffee	5.50	-
Coffee & milk	6.20	-

- No tubules + Few tubules

++ Tubules visible +++ Tubules well opened

Effect van verschillende dranken op dentine als ook tegelijkertijd gepoetst wordt

Dietary Compounds pH 3 min.

Lemonade	2.20	+++
Coke	2.30	++
Ribena	2.35	+++
White wine	2.60	+++
Grapefruit juice	2.70	+++
Apple juice	3.0	+++
Red wine	3.2	+++
Orange juice	3.3	+++
Natural yogurt	4.1	++
Milk	5.7	-
Tea and milk	6.6	-
Coffee and milk	6.6	+

(Cervical) dentin sensitivity

- Application agents: formation of deposits in tubules/smear layer on dentin surface.
- Adhesive lacquers: closing the tubule opening with a “plug” of synthetic resin
- Toothpaste:
 - potassium salts (reducing irritability of A-fibers)
 - strontium (closing tubules)
 - fluorides (closing tubules)
 - tin salts; oxalates (closing tubules)

To ask?

