The pathological changes in the pulp

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The pulp

What is the role of the pulp?

- Dentin health maintainer and restorer
- Provides the teeth sensitivity, circulation

Composition

- 75% water
- 25% organic and water-soluble inorganic substances
- Connective tissue that fills the root canal and pulp chamber

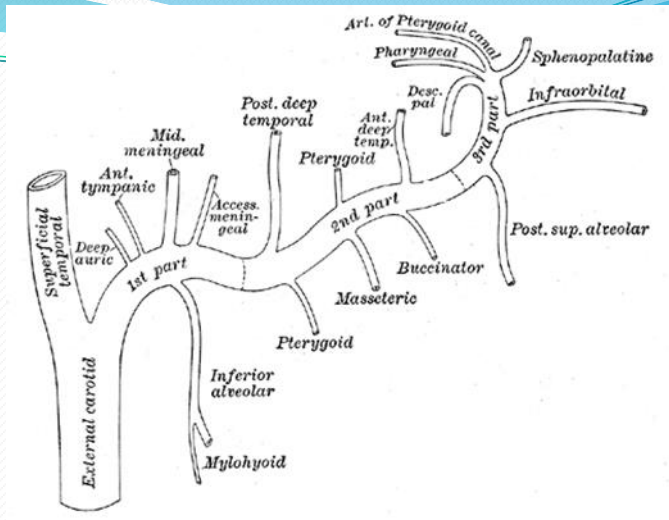
The pulp

Pulp matrix

- III, I, V type collagen fibers
  (III: gives flexibility, I: provides the tensile strength, V: characteristics to mesenchymal tissue
- Base: proteoglycan
- It has high water absorption and ion binding capacity

The pulp

Blood supply



- Artery and vein, alveolar superior, inferior branches
- Organizing into artelioli and venules
- Toward the surface it forms a capillary network
- Maintaining odontoblasts
- Regulation of liquid level
- Excess interstitial fluid drained through the lymphatic system

The pulp

Innervation

- N. trigeminal (sensory fibers)
- Gl. Cervical superior sensory fibers
- A-beta axon (small amount) palpation, pressure
- A- delta axon (2,000 / tooth) leads the sharp localized pain
- C axon (300 / tooth) leads the dull diffuse pain rises from thermal, mechanical and chemical stimuli
- a fiber network forming under odontoblasts layer
- some of the fibers reach the dentinal tubules

The causes of pathological changes in the pulp

Irritations

1. Mechanical

- **dental preparation made with insufficient cooling, high restorative, orthodontic treatment, improper scaling and curettage**

2.Chemical

- **alcohol, hydrogen peroxide, pulp base or its lack, too long time acidizing, inappropriate acid washing**

The causes of pathological changes in the pulp

Bacterial

- From the crown (caries)
- From the side canals (periapical space)
- From apex (retrograde)

Inflamation can be

- endodontic
- periodontal
- mixed

The pathological changes in the pulp

What marks it?

Patient side:

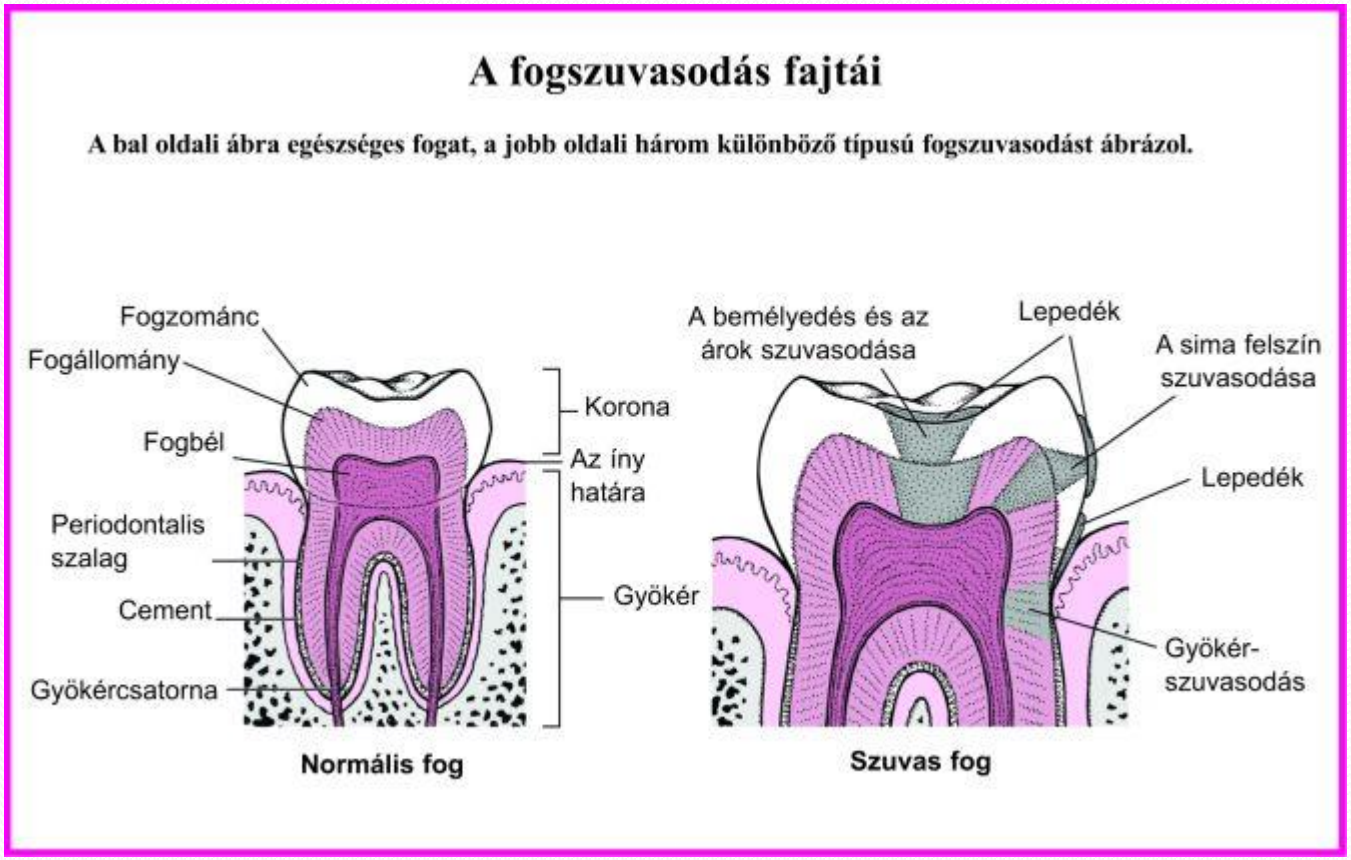
- Discomfort, pain, big hole in the tooth

Dentist side:

- Extensive caries, tooth discoloration, patient complaints

The pathological changes in the pulp

- Bacterial entry gates



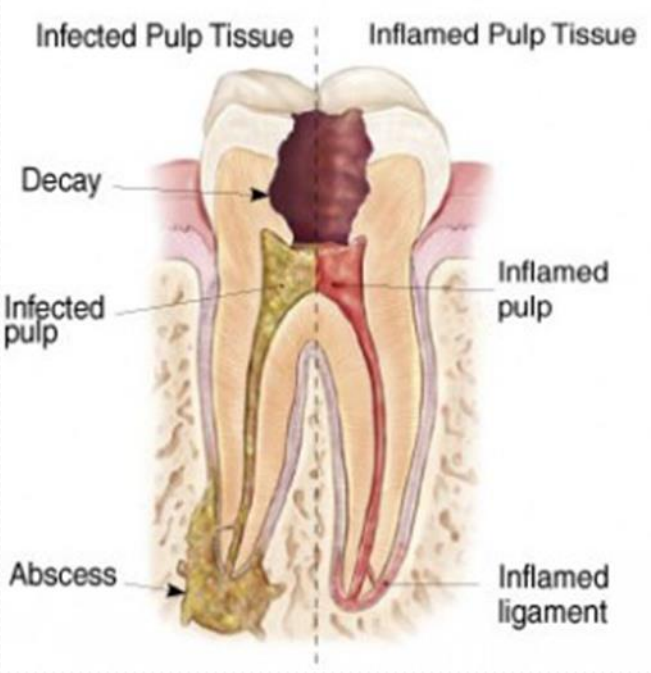
The pathological changes in the pulp

irritation → tissue inflammation starts

- process is reversible
- or irreversible
- the symptoms vary with the progression

In pulp tissue:

- acute or chronic inflammation,
- partial or complete necrosis



The pathological changes in the pulp

- Reversible pulpitis
- Irreversible pulpitis
- Hyperplastic pulpitis (pulp polyp)
- Pulp necrosis
- Pulp calcification
- Internal resorption

Reverzible pulpitis

Etiology

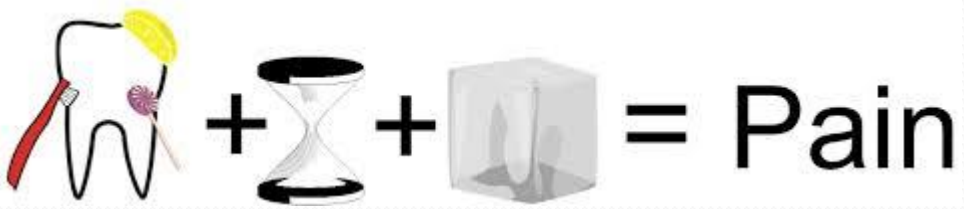
- caries
- dental procedures (mechanical, chemical)
- cervical erosion, high abrasion

Symptom

- cold, warm, salty, sweet stimuli occur the pain,
- well be localize
- Run off after removal of the stimulus

Course

- pulp tissue damage is reversible
- Inflamation affects only the pulp tissue
- exudate is draining (Starling hypothesis)
- Anteriovenosus anastomozy



Reverzible pulpitis

Sensitivity test

- Cold + (stronger than test tooth)
- Warm –
- Percussion –

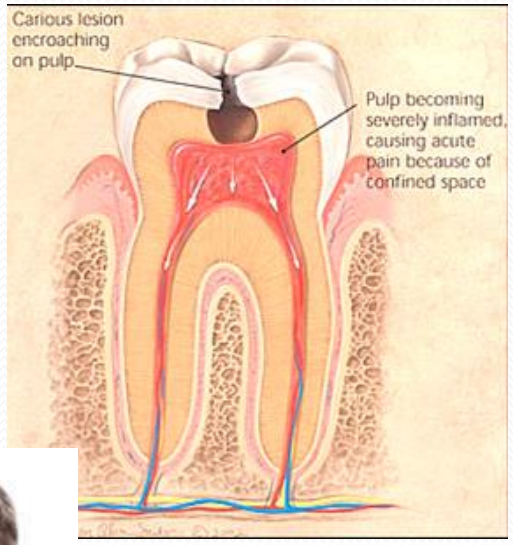
Rtg

- It does not give X-ray image, it may indicate the depth of caries

Treatment

- avoid irritating factors
- deep caries supply
- if necessary, pulp capping

Irreverzible pulpitis



Etiology

- the persistence of inflammation
- Caries reaches the pulp, the effect of their toxins
- dental preparation, trauma

Symptom

- spontaneous, radiant, unlocalized pain
- lying position (!)

Course

- pain depends on the nature of inflammation or degree of necrosis
- **Acute inflammation:** intense, excruciating, unbearable spontaneous pain, throbbing in the lying position (due to vascular causes), cold stimulation intensifies the pain
- **Chronic inflammation:** pain decreases, throbbing, dull (inflammation turns into necrosis), cold sensitivity ↓
- warm ↑ in proportion to the extent of necrosis (bacterial infection derives gas)
- With an open pulp chamber pain is uncertain

Irreverzible pulpitis

Sensitivity test

Pain after termination of stimulus

Cold +

Warm -/+ depends from the necrotic part

Percussion – (+ if it reach the periodontitis)

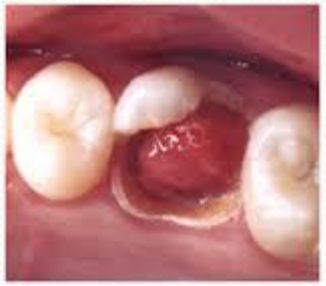
Rtg

- No rtg sign
- In advanced form the periodontal ligaments widened

Treatment

- root canal treatment:
- one seat in case serous (acute) cases,
- two seat in case purulent (chronic) or if medicine is necessary!

Hyperplastic pulpitis



Etiology

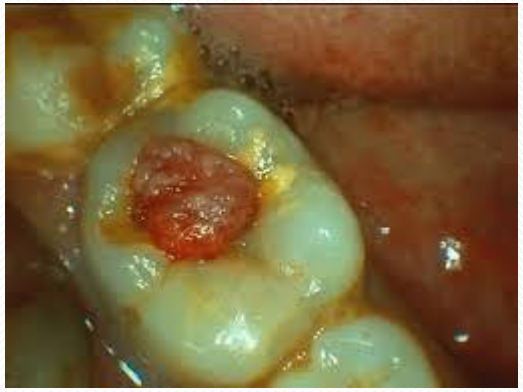
- Proliferative form of irreversible pulpitis (mainly in childhood, wide pulp chamber)

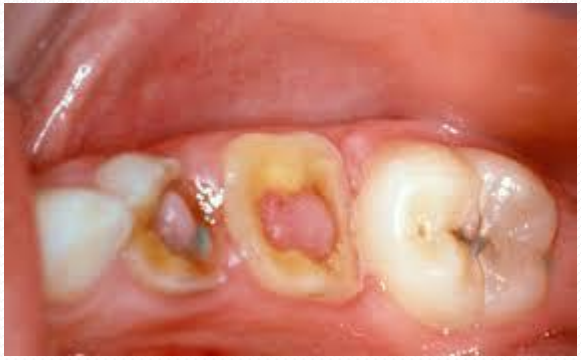
Symptom

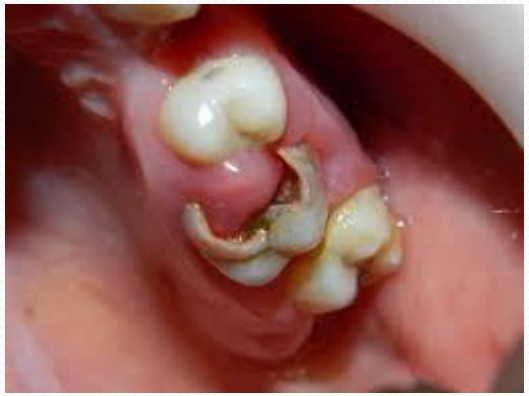
- No symptom (exudate draining)
- Or symptoms of irreversibile pulpitis

Clinical appearance

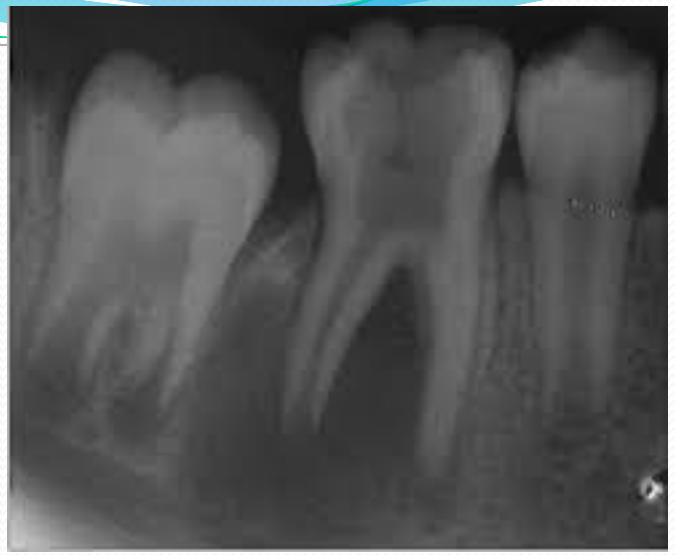
- Livid red formula is overgrown into carious cavity (must be isolated from gingiva!!!)







Hyperplastic pulpitis



Sensitivity test

Response to stimulus similar to the intact tooth

Rtg

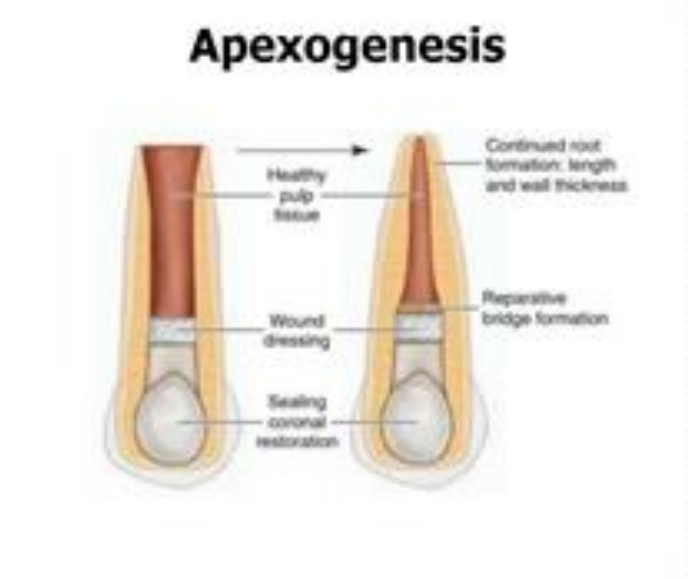
- No rtg sign

Histology

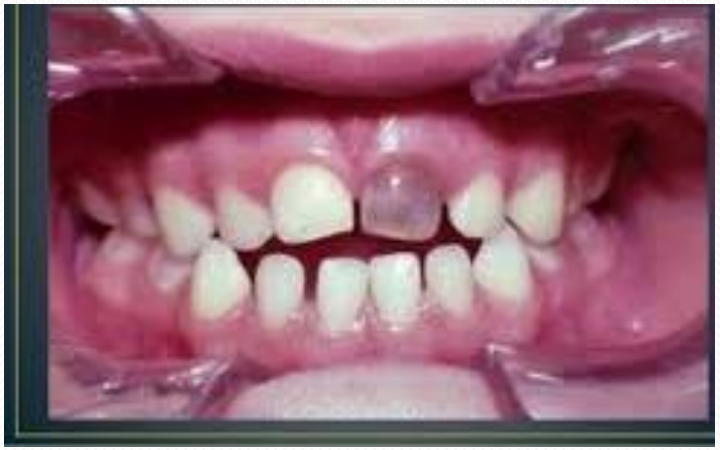
- granulation tissue

Treatment

- Pulpotomia, if the apex is still open
- Root canal treatment (blood cause problem)



Pulp necrosis



Etiology

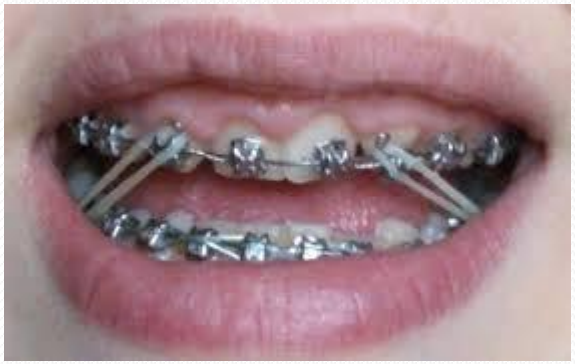
- Irreversible pulpitis
- trauma
- Incorrect orthodontic treatment

Symptom

- usually asymptomatic
- warm cause pain (in case of a closed cavity → gas of bacteria
- percussion can cause pain

Course

- veins, lymph vessels are compressed
- circulation stops
- necrosis



Pulp necrosis

Clinical appearance

- Gray teeth discoloration

Sensitivity test

- cold–
- warm +
- Percussion – , if it leads to the periapical space+

Rtg

- No rtg sign

Treatment

- Root canal treatment (one or two sites → infected or not)

Inside resorption

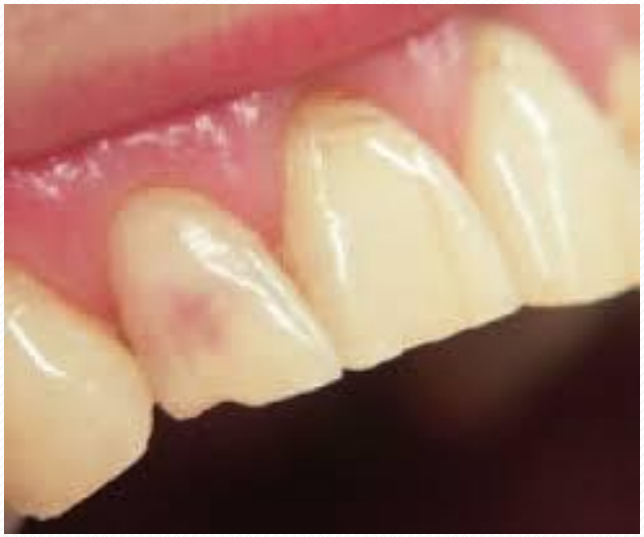
Etiology
- inflammation of the pulp (pulpitis chronica or granulomatosa clausa, Palazzi's granuloma)
- immune cells in the granulation tissue and dentinoclasts break down the inside dentin

Symptom
- asymptomatic purple patch on the crown

Course
- Progressive

Clinical appearance
- pink discoloration

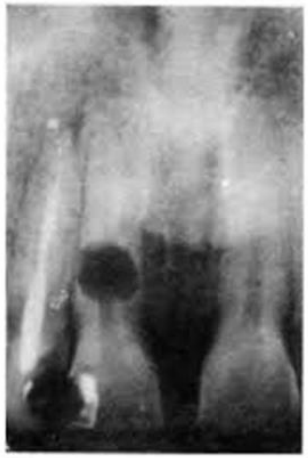
Sensitivity test
- response similar to the intact tooth
- in general, it will retain their vitality

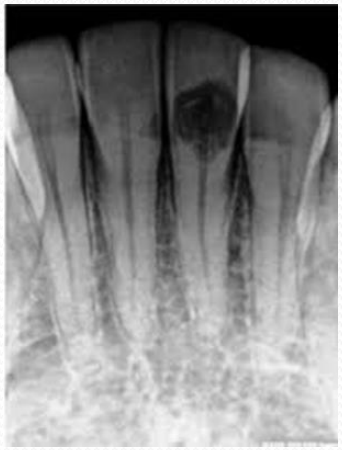


Inside resorption

Rtg

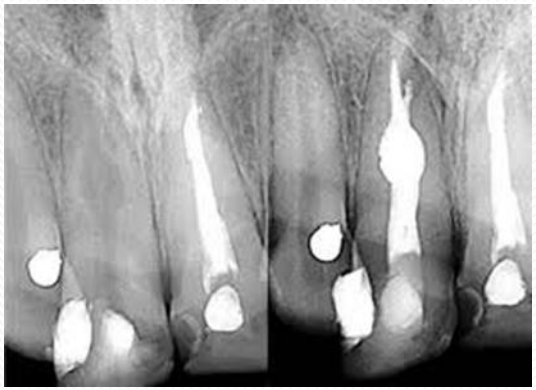
- Radiolucens laesio inside the root





Treatment

- Rootcanal treatment (rapidly)
- Warm gutta-percha technique, MTA



Pulp calcificatio

Etiology

- Advancing age
- Persistent stimuli (eg. caries) calcification
- Secondary dentin formation →the cavity system narrows
- At the end of the root cement apposition → foramen apical narrowing
- Deterioration in circulation, reduction in amount of blood flow →arteriosclerotic changes
- The number of cellular elements is decreasing → collagen bundles can be detected → pulp fibrosis
- number of blood vessels and nerves decreasing → dentin permeability↓

Symptom

- Asymptomatic

Course

- Progressive

Clinical appearance

- the crown may be discolored (yellowish)

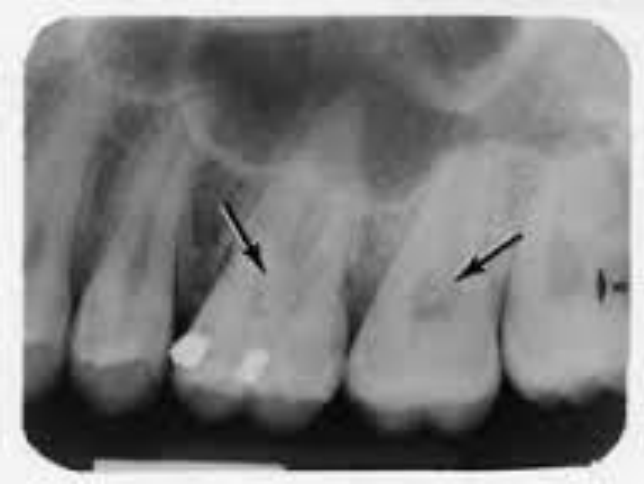
Sensitivity test

- No response for stimuli or reduced

Pulp calcificatio

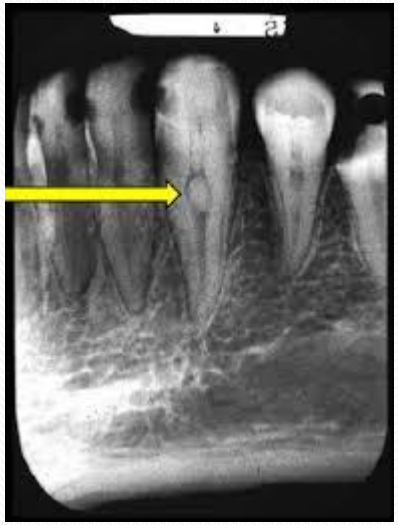
Rtg

- pulp chamber and root canal narrowing, obstruction
- pulp stones
- calcification metamorphosis



Treatment

- If it is necessery rootcanal treatment



Differencial diagnosis

Dentin sensitivity

- The pain is similar to reversible pulpitis
  But the pain is caused by a hydrostatic pressure difference in the dentin which is mechanically irritates the nerve endings

irreversible pulpitis

- need to be allocated from periapical inflammation
- in case of apical periodontitis there is axial percussion sensitivity
- In case of periapical abscess there is fistula
- the apical processes in general there are also x-ray findings

Sinusitis

thermal and electrical pain stimuli can not elicit in tooth
Typical symptoms of sinusitis are present: pain when you drive forward the head and pressure cause pain in the front wall of the maxilla

Unlocalizable pain

separation from: jaw, neuralgic pain, otitis media, osteomyelitis, inflammation of the parotid

Thank for your attention