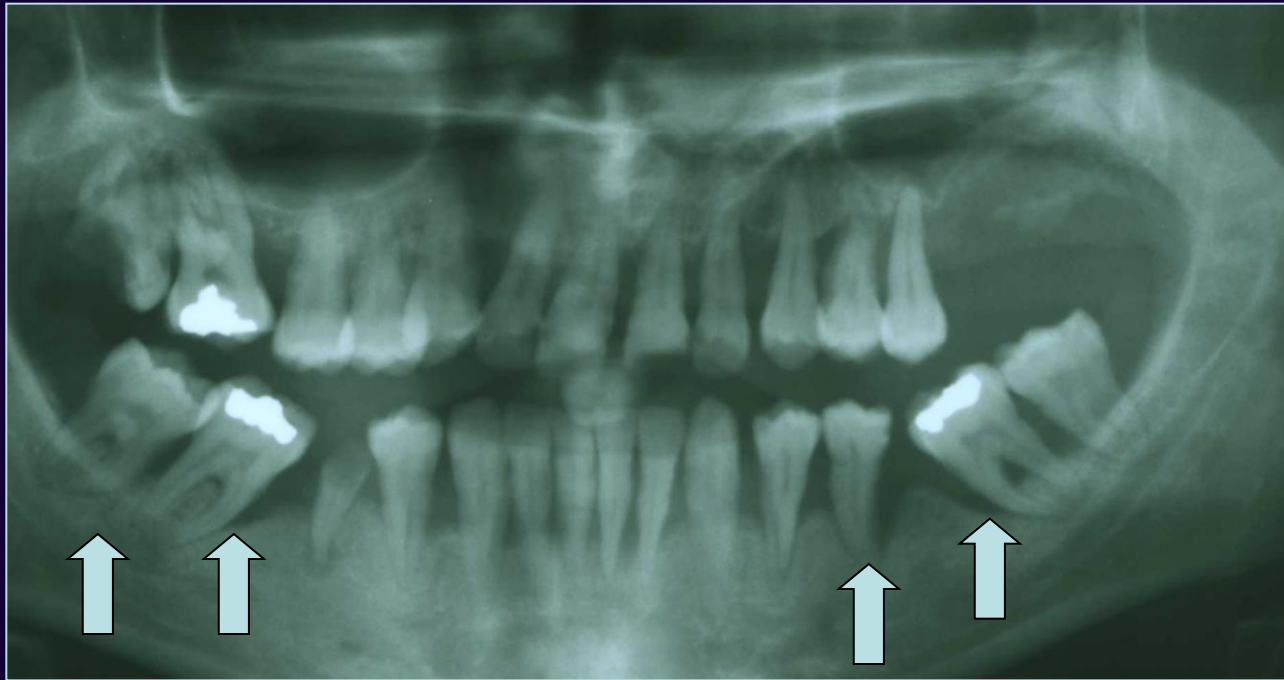


Endodontal - Periodontal Interrelationship



THE CAUSATIVE FACTORS ARE COMMON:

DENTAL BIOFILM



BOTH CAN DESTROY ATTACHMENT APPARATUS

BUT!!!!

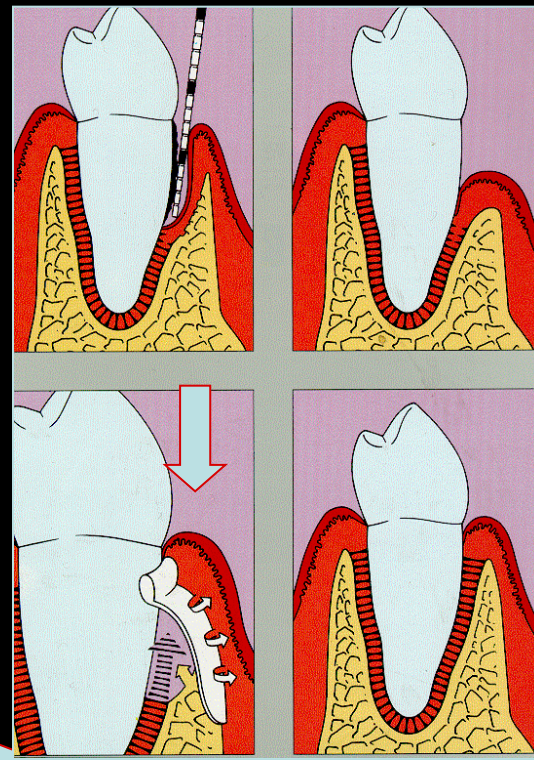


periodontitis is resulting in irreversible attachment loss

only GTR or other regenerative techniques can succeed

endodontal infection related attachment and bone loss is reversible unless root canal therapy fails

Spontaneous healing after correct root canal obturation



In 1919 Turner and Drew were the first to describe the effect of periodontal disease on the pulp,

DYSTROPHIC DEGENERATION, FIBROSIS CYSTIC DEGENERATION

Lang et al 1920
Chan LR, 1924
Curnock G.L. 1924



the term **PERIO-ENDO LESION** is used to describe lesions due to inflammatory products found in different degrees in both the periodontium and the pulpal tissues.

. **Pathway of communication between endodontal tissue and periodontal tissue**

Physiologic Pathways

- Dentinal tubules
- Lateral and accessory canals
- Apical foramen
- Palato-gingival groove

Iatrogenic

- Perforation
- Root fracture during root canal therapy
- Exposure of dentinal tubules during root planning

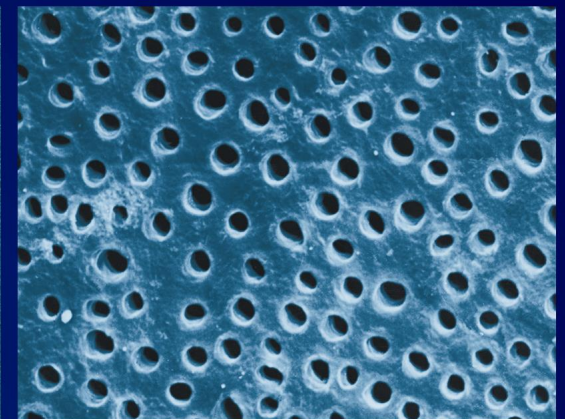
Pathological causes

- Perforations
- Vertical root fracture
- Loss of cementum

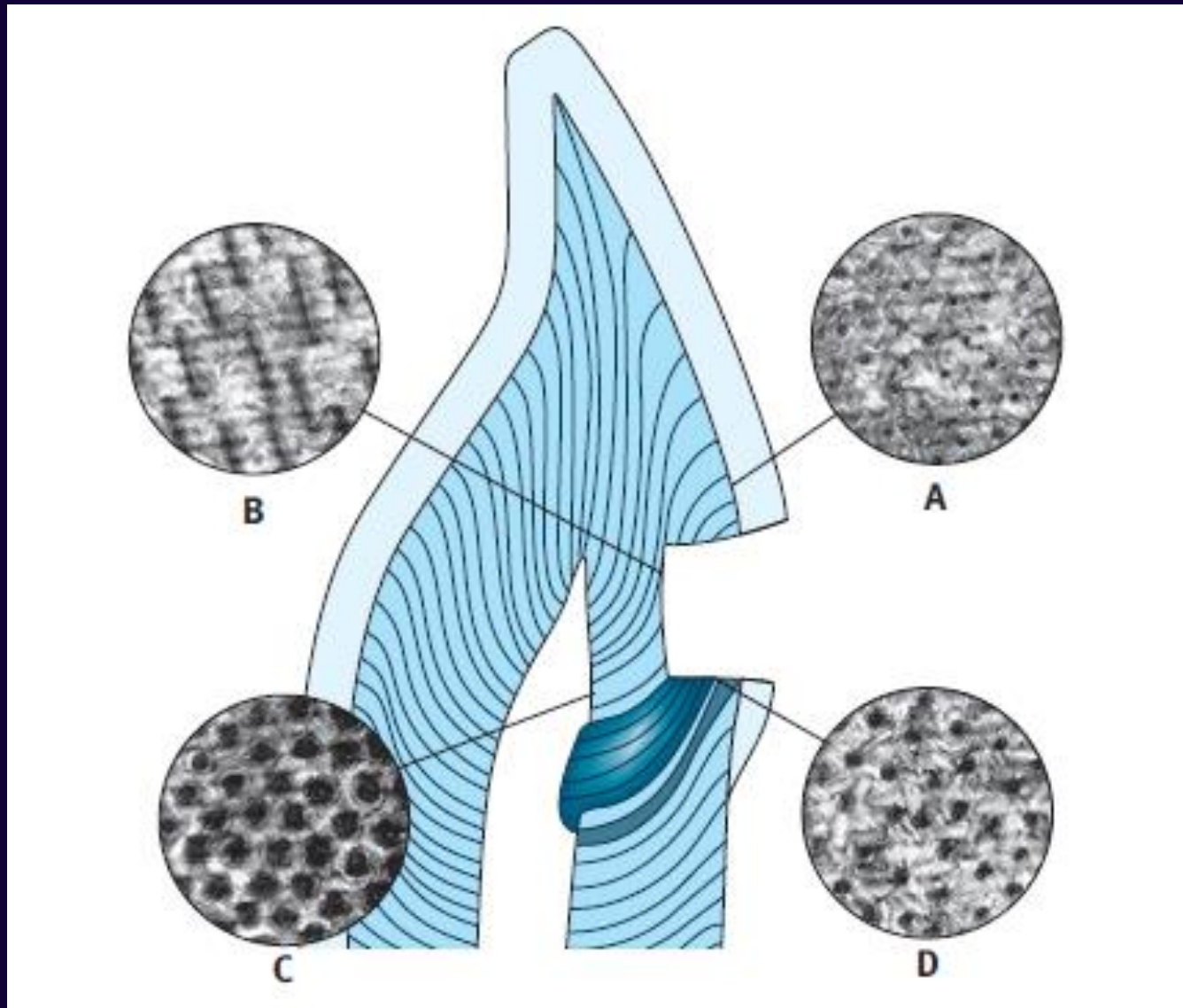


Dentinal Tubules:

- Dentinal tubules as many as 15000 dentinal tubules per square millimeter are present on the root surface at the cervical area
- Dentin tubules follow S-shaped contour within the crown while in the root portion it follows a straight course.

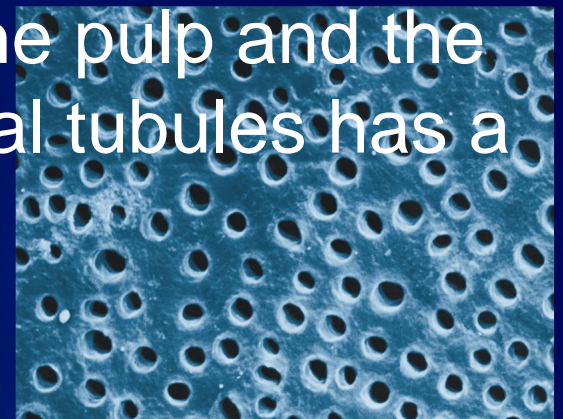


Dentin



Dentinal Tubules:

- The openings of dentinal tubules can be affected and **obliterated** with age, in response to sclerosis or calcifications.
- **cementum** acting as a **protective barrier** to the dentin
- If **cementum is removed** for any reason the direct communication between the pulp and the periodontium through this dentinal tubules has a good chance to be established.



Dentin





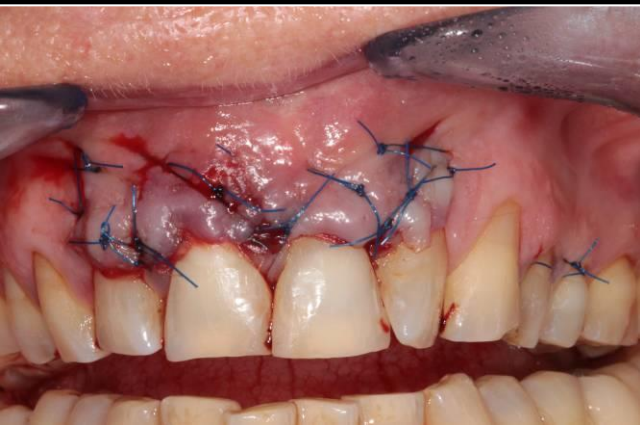




baseline



after restoration



Mucogingival surgery



two weeks



6 weeks postop



Baseline



restoration



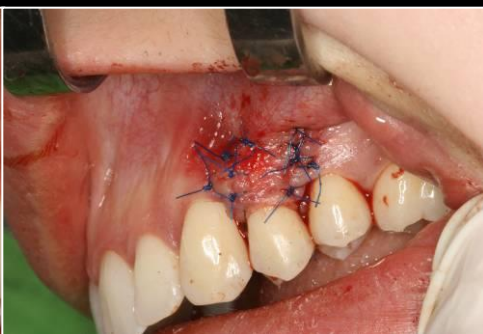
1 year



1,5 years



2 years postop.



LATERAL AND ACCESSORY CANALS:

De Deus studied 1,140 teeth for accessory canals and found 27.4% exhibited accessory canals

Gutmann evaluated 102 teeth for the presence of accessory canals, and found 25.5% of the studied sample demonstrated accessory canals in furcation area.



LATERAL AND ACCESSORY CANALS:

2790 EXTRACTED TEETH % OF LATERAL CANALS

UPPER INCISORS 22%
UPPER CANINES 18%
UPPER PREMOLARS 19%
UPPER MOLARS 16%
LOWER INCISORS 10%
LOWER CANINES 12%
LOWER PREMOLARS 19%
LOWER MOLAR 13%

Hess W: The anatomy of the root canals of the teeth of the permanent dentition 1925.



De Deus studied 1,140 teeth for accessory canals and found 27.4% exhibited accessory canals

Gutmann evaluated 102 teeth for the presence of accessory canals, and found 25.5% of the studied sample demonstrated accessory canals in furcation area.

Accessory canals

can be seen around the furcation area

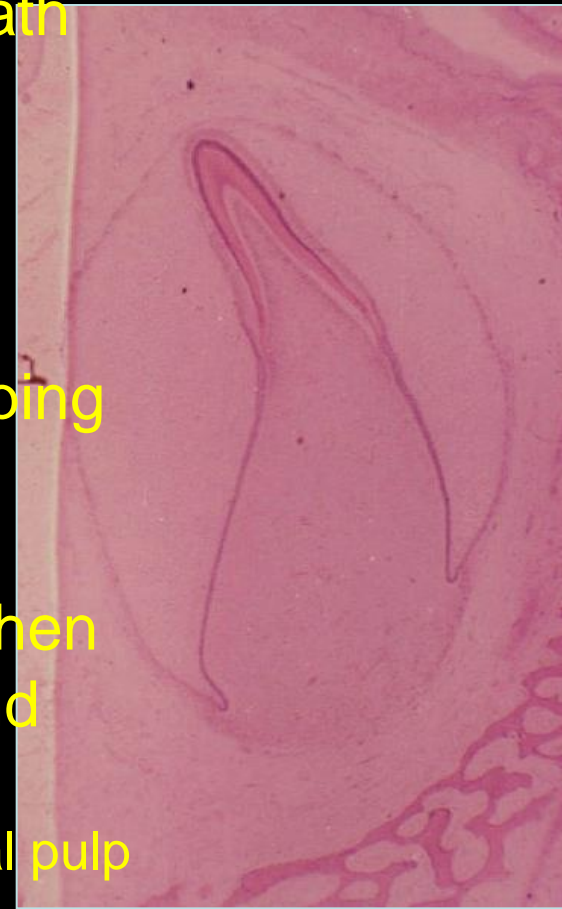
they usually develop in areas where root sheath cells are missing,

contain connective tissue and blood vessels.

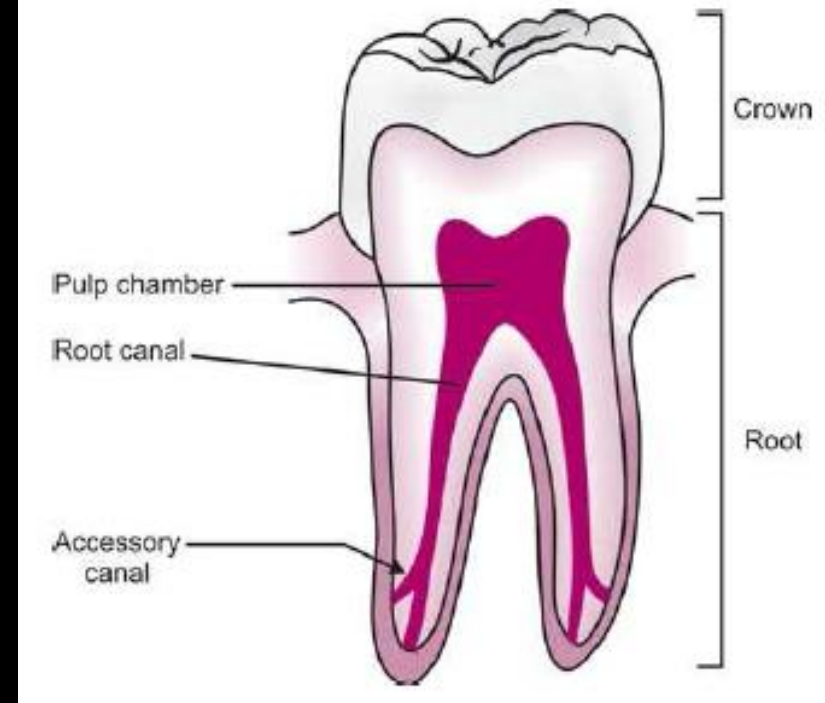
Accessory canals also develop where developing root meet a blood vessel.

If located in the area where dentin is forming then hard tissue develop around the vessels and form lateral canals

Kramer IR: The vascular architecture of the human dental pulp
Arch Oral Biol 1960 .



ACCESSORY CANALS



IN THE FURCATION AREA THE DIAMETER RANGING BETWEEN
4 μ m 250 μ m

Koenigs JF. et al: Preliminary scanning electron microscopic investigations of accessory foramina in the furcation areas of human molar teeth Oral Surg. 1974.

LATERAL AND ACCESSORY CANALS

Its role in pulpo-periodontal pathology :

Histological studies

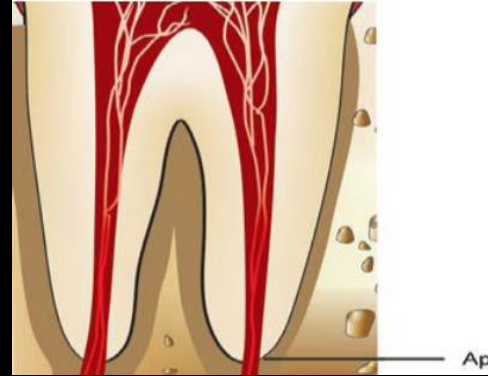
Caries free healthy extracted teeth

Caries free periodontally involved extracted teeth

Both had histological signs of disturbances

Czarnecki RT & Schilder H: A histological evaluation of the human pulp in teeth with varying degrees of periodontal disease J. Endodon 1979;5:242-253

LATERAL AND ACCESSORY CANALS:



Periodontitis leads to total pulp necrosis if the bottom of the pocket reached the apex

Langeland KS. et al: Periodontal disease bacteria and pulpal histopathology Oral Surg, Med Path 1964; 17:592-603



Based on etiology, diagnosis, prognosis and treatment (Simon's Classification)

- Primary endodontic lesion
- Primary periodontal lesion
- Primary endodontic with secondary periodontal involvement
- Primary periodontal with secondary endodontic involvement
- True combined lesions

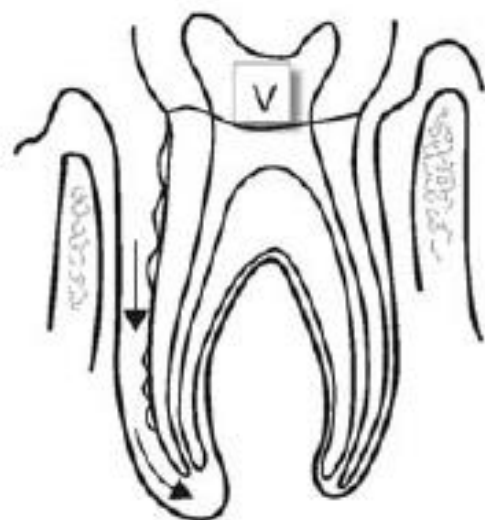
Simon, JHS., Glick DH., Frank AL.: The relationship of endodontic-periodontic lesions J. Periodontol 1972.



primer pulpális laesio



primer pulpális laesio
másodlagos parodontális károsodás



primer parodontális laesio



primer parodontális laesio
másodlagos pulpális károsodás



valódi kevert
pulpoparodontális folyamat

A. Primary endodontic lesion

- Necrotic pulp acute exacerbation or chronic apical lesion

Root canal treatment

B. Primary periodontal lesion

- chronic periodontitis progressing apically along the root surface → pulpal effect
- wide periodontal pocket
- vital pulp,
- minimal or no pain,
- Periodontal therapy

Simon, JHS., Glick DH., Frank AL.: The relationship of endodontic-periodontic lesions J. Periodontol 1972.

C. Primary endodontic with secondary periodontal involvement



Untreated Primary endodontic lesion

- draining abscess through the periodontium
sinus tract formation
creation of secondary periodontal problem.
- Root canal therapy
- After 2-3 months periodontal therapy

D. Primary periodontal with secondary endodontic involvement

- periodontal disease exposes lateral canal
- severe pain, signs of pulpal disease
- periodontal and endodontic therapies are required

E. True combined lesions:

- Pulpal pathosis progressing coronally and periodontal pathosis progressing apically
- develops independently around the same tooth and at the same time unite.
- have significant periodontal involvement with considerable attachment loss

Simon, JHS., Glick DH., Frank AL.: The relationship of endodontic-periodontic lesions J. Periodontol 1972.

Classification of endodontal and periodontal lesions

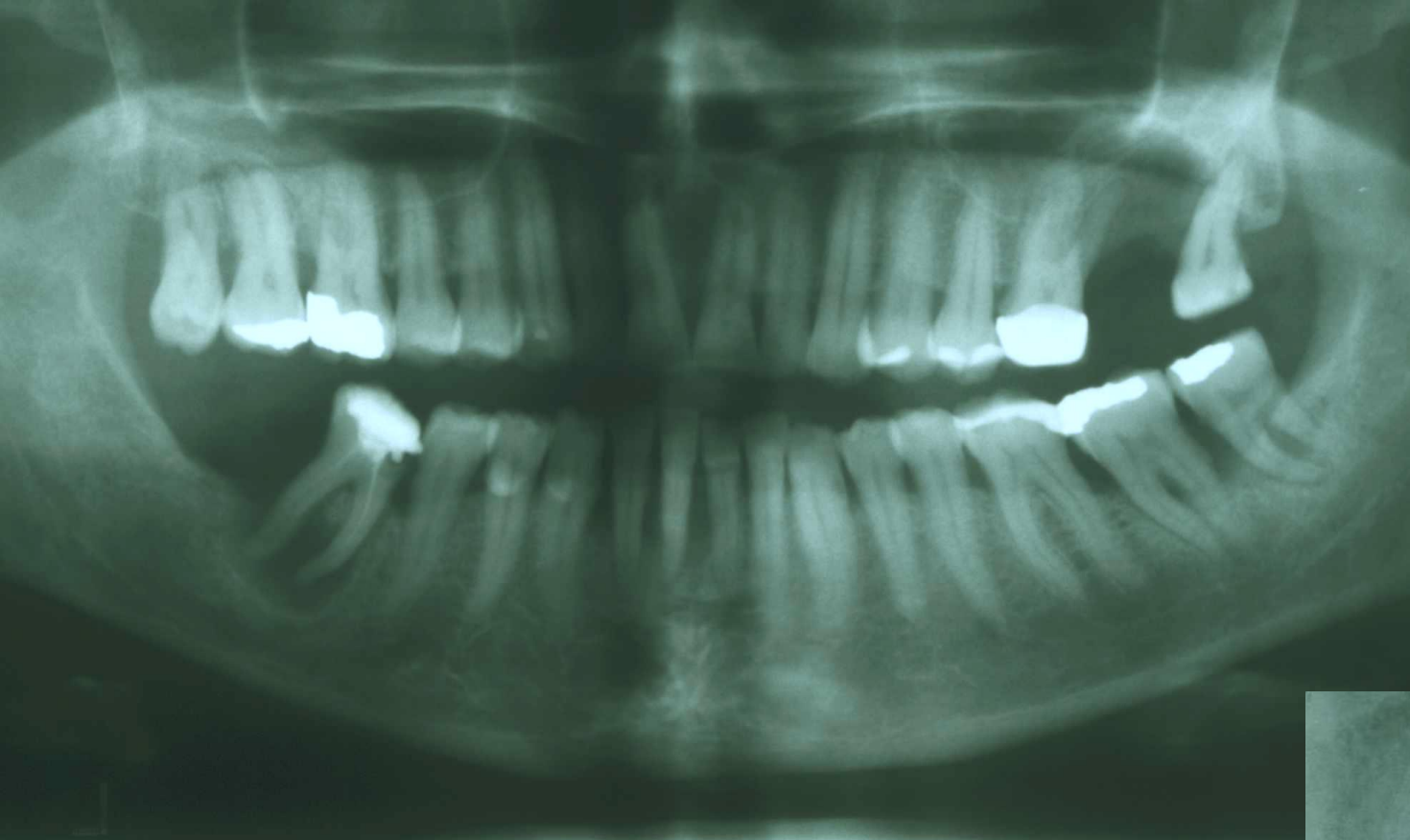
- Endodontal pathology with secondary periodontal involvement
- Periodontal pathology with secondary endodontal involvement
- True combined lesions
- Vertical root fracture

Grant DA., Stern IB., Everett FG.: Periodontics in the tradition of Orban and Gottlieb 1972.

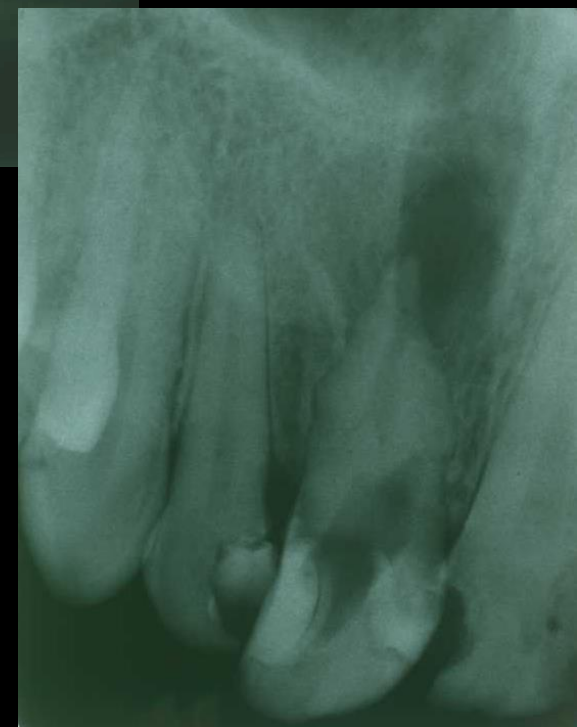
Classification of endodontal and periodontal lesions

- Endodontal pathology with secondary periodontal involvement
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- True combined lesions
- Vertical root fracture





- Endodontal pathology with secondary periodontal involvement



Non treated necrotic pulp leads to periapical lesions in 95%

Although via the lateral or accessory canals can result in lateral periododontal granuloma



- **Endodontal pathology with secondary periodontal involvement**

In dentine tubuli of the extracted non vital teeth abundant anaerobic microorganisms were detected.

Chirnside IM: Bacterial invasion of non-vital dentin J. Dent Res. 1961.

- Endodontal pathology with secondary periodontal involvement

Isolated bacteria

the necrotic pulp is a bacterial reservoir

Fusobacterium

Prevotella

Porphyromonas

Capnocytophaga,

Eubacterium

spirochetes

Sundquist: Endodontic microbiology 1990

PERIAPICAL GRANULOMA

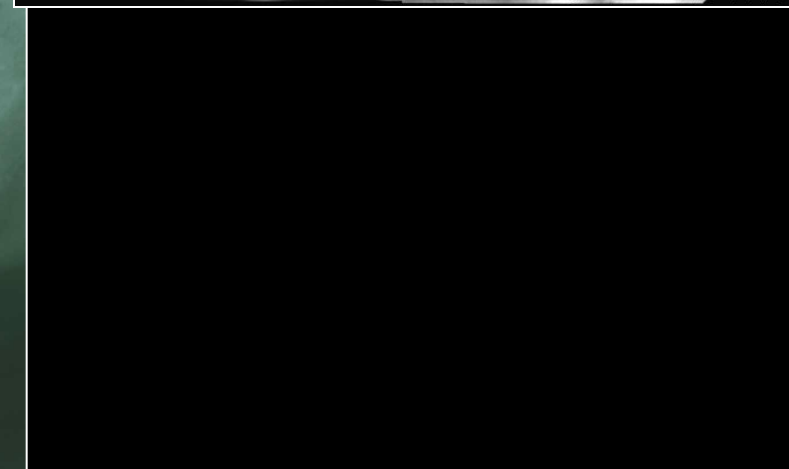
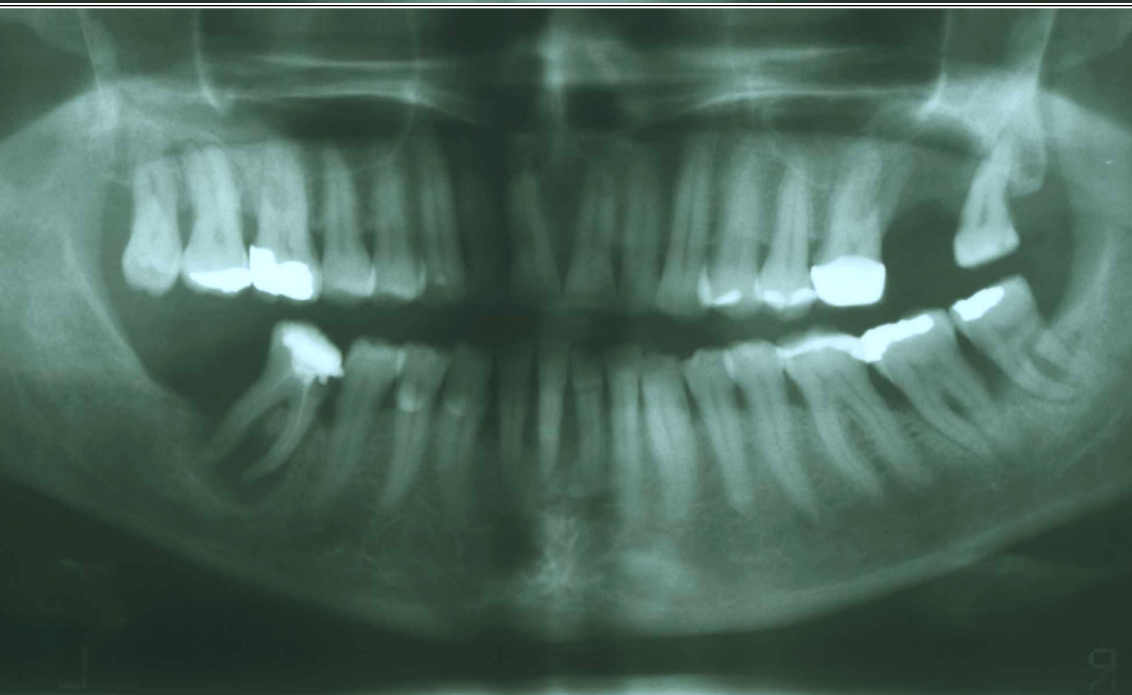
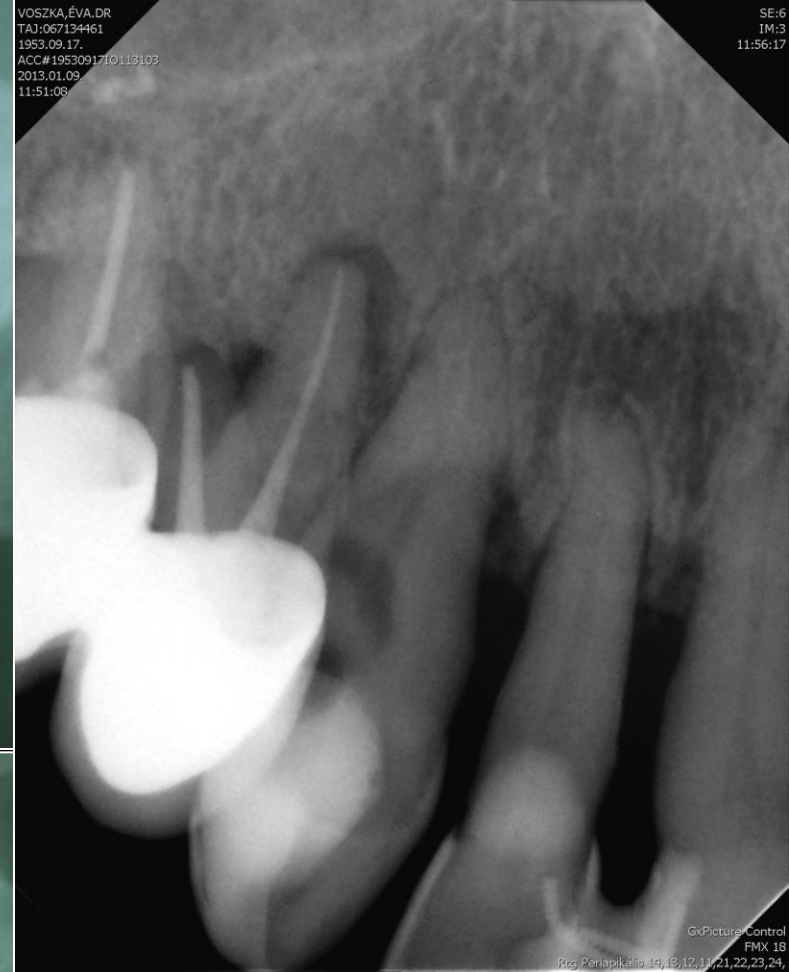
- after the initial inflammation - a steady stable reaction develops
- the protective immune reactions and the bacterial activity get an equilibrium and balanced - this might last for years
- Histologically around the apex a well circumscribed barrier develops consisting PMN cells,
- The alveolar bone is separated by a fibrotic capsule. The bacterial content of the granuloma is minimal



PERIAPICAL GRANULOMA

- Bacteria growing in the root canal and its toxins are neutralized by the barrier cells of the granulation tissue in the granuloma. .

•(Márton I & Kiss Cs. Protective and destructive immune reactions in apical periodontitis Oral Microbiol and Immunol 2000;15:139-150.)



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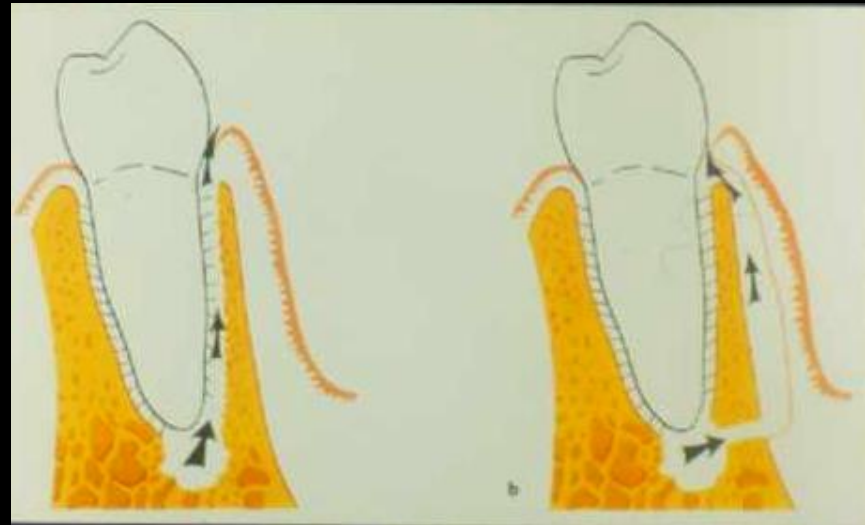
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GxPicture Control
FMX 18
Prog Periapikális 14, 15, 16, 17, 21, 22, 23, 24,

•Endodontal pathology with secondary periodontal involvement

Laterally spreading inflammation enters into the **PDL** and results in a fistula tract formation and rapid periodontal attachment loss in a localized segment of the periodontium

If the inflammation breaks through the bone entering into the **periosteum** – **cellulitis develops** without periodontal attachment loss



- **Endodontal pathology with secondary periodontal involvement**

Endodontal failures

- Root perforation – “via falsa”
- Sealer or guttaperche in the periapical region foreign body reaction
- Sealer in the lateral canal and foreign body reaction in the lateral PDL



Classification of endodontal and periodontal lesions

- Endodontal pathology with secondary periodontal involvement
- Periodontal pathology with secondary endodontal involvement
- True combined lesions
- Vertical root fracture

Grant DA., Stern IB., Everett FG.: Periodontics in the tradition of Orban and Gottlieb 1972.

LATERAL AND ACCESSORY CANALS

ITS ROLE IN PULPO-PERIODONTAL PATHOLOGY :

100 subjects' 387 teeth with more than 50% periodontal attachment loss followed up for 2-25 years

Total 14 teeth needed root canal therapy

Ross IF & Thompson RH: A long term study of root retention in the treatment maxillary molars with furcation involvement J Periodontol 1978;49: 238-244

LATERAL AND ACCESSORY CANALS

ITS ROLE IN PULPO-PERIODONTAL PATHOLOGY :

52 subjects' 417 teeth with more than 50% periodontal attachment loss followed up for 4-13 years

Total 14 teeth needed root canal therapy

But 15% of the 255 abutments needed root canal therapy

Bergenholtz G & Nyman S: Endodontic complications following periodontal and prosthetic treatment of patients with advanced periodontal disease furcation involvement J Periodontol 1984;55: 63-68

**•Periodontal pathology with
secondary endodontal involvement**

85 hopeless periodontally involved
extracted teeth

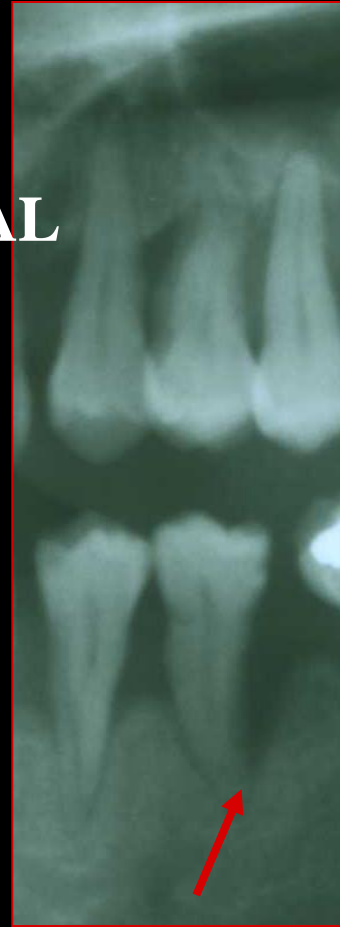
- 5 totally intact pulp tissue
- 23 atrophic degeneration
- 42 partial chronic pulpitis
- 15 total necrosis

Seltzer S, et al. The interrelationship of pulp and periodontal disease Oral Surg. 196

- **Periodontal pathology with secondary endodontal involvement**

IN THE DEEP PERIODONTAL POCKET LATERAL CANALS CAN BE EXPOSED TO BIOFILM

Until the blood circulation is maintained
thought the main apical canal no total pulp
necrosis occurs



Langeland K. et al: Periodontal disease, bacteria and pulpal histopathology Oral S 1974.

- **Periodontal pathology with secondary endodontal involvement**



Classification of endodontal and periodontal lesions

- Endodontal pathology with secondary periodontal involvement
- Periodontal pathology with secondary endodontal involvement
- • True combined lesions
- Vertical root fracture

Grant DA., Stern IB., Everett FG.: Periodontics in the tradition of Orban and Gottlieb 1972.

- True combined lesions

Simultaneously occurs plaque related periodontitis and pulpal damage due to deep caries or chemical/bacterial pulpal damage







Classification of endodontal and periodontal lesions

- Endodontal pathology with secondary periodontal involvement
- Periodontal pathology with secondary endodontal involvement
- True combined lesions



- Vertical root fracture

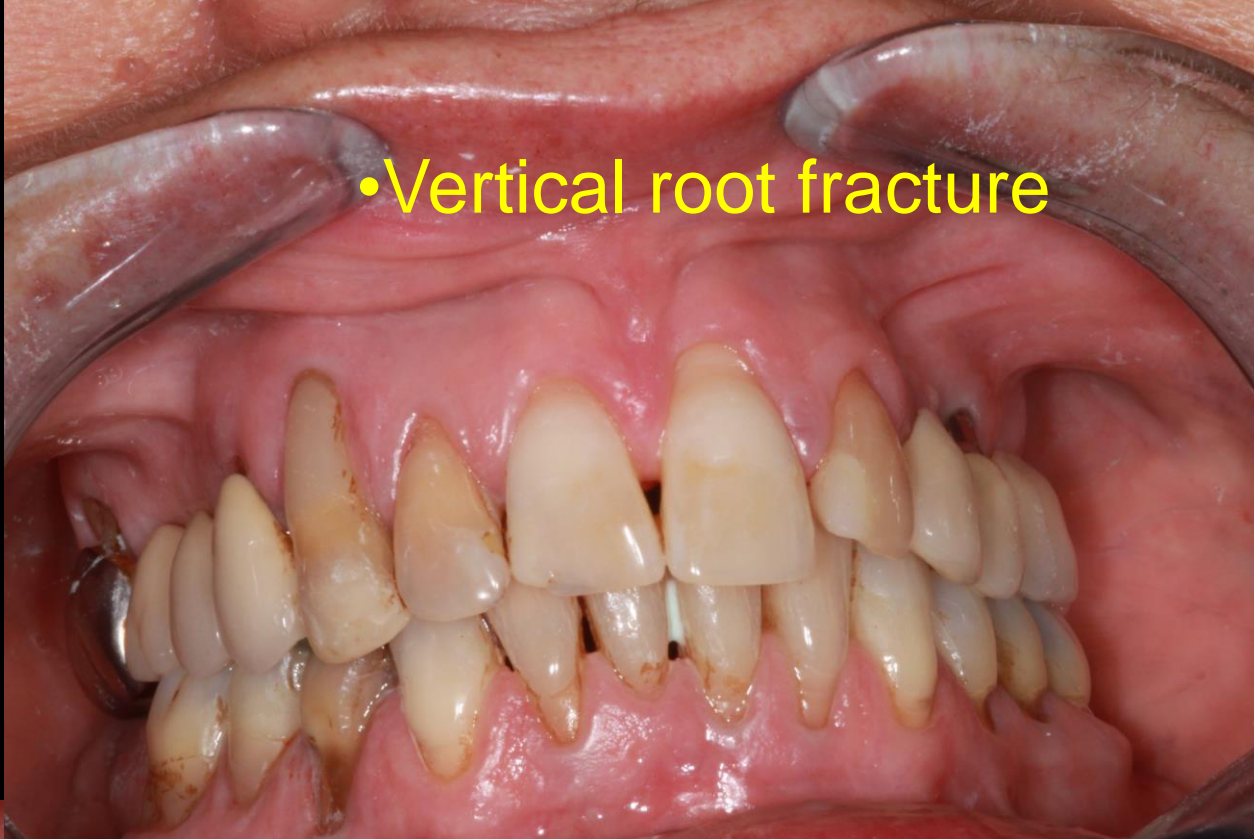
Grant DA., Stern IB., Everett FG.: Periodontics in the tradition of Orban and Gottlieb 1972.



•Vertical root fracture



• Vertical root fracture



• Vertical root fracture



Clinical and radiological diagnosis



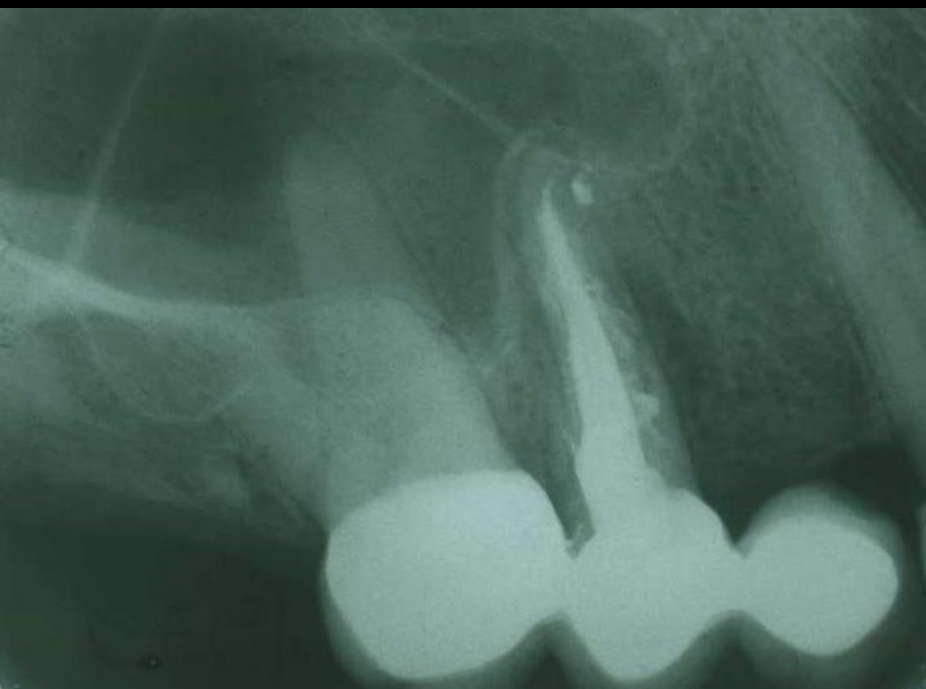
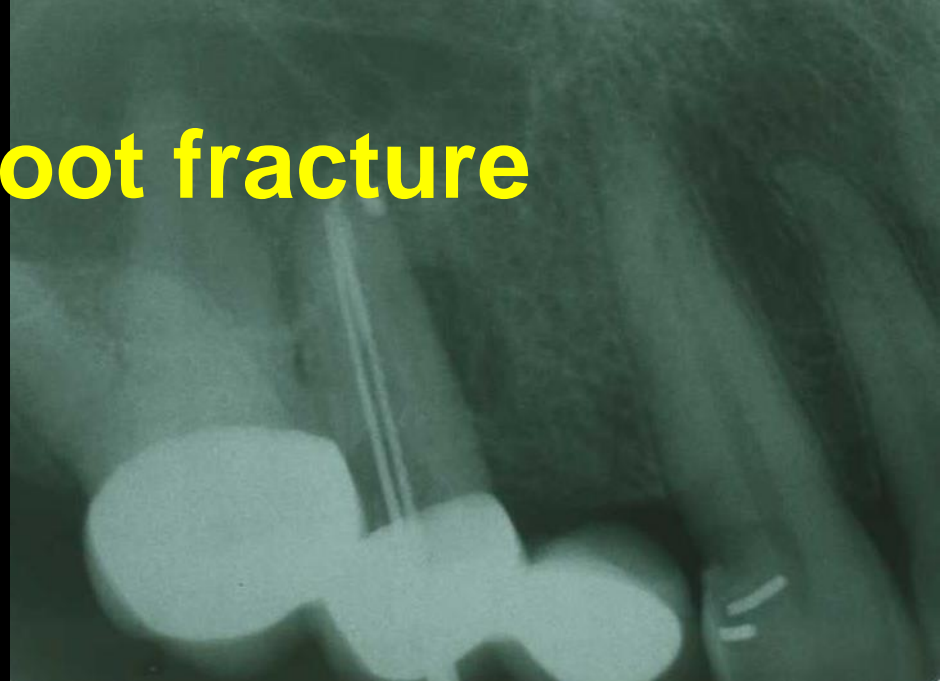
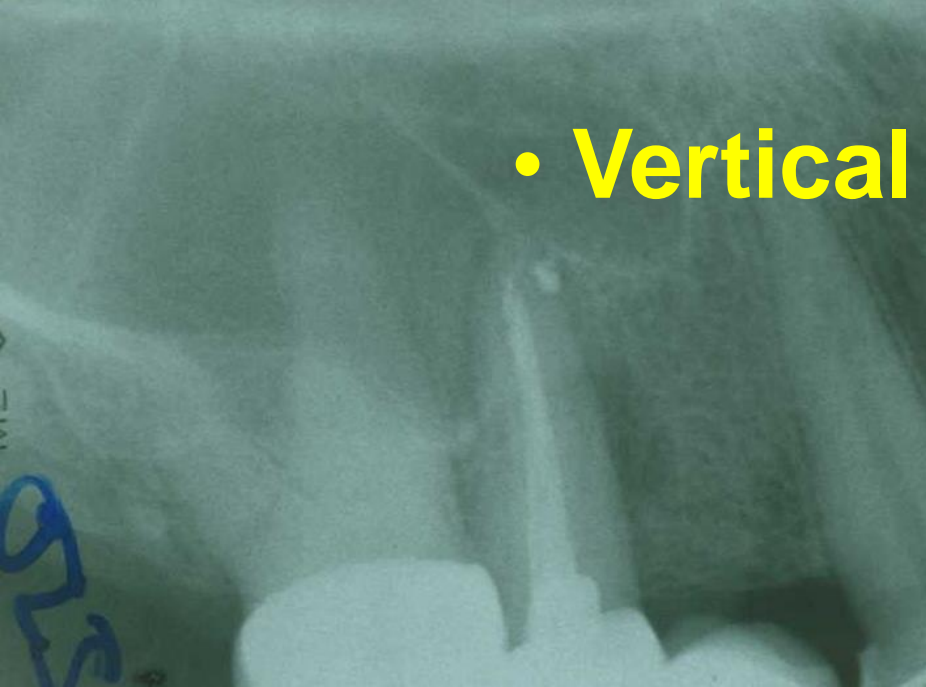
Many times it is difficult to differentiate from localised aggressive periodontitis



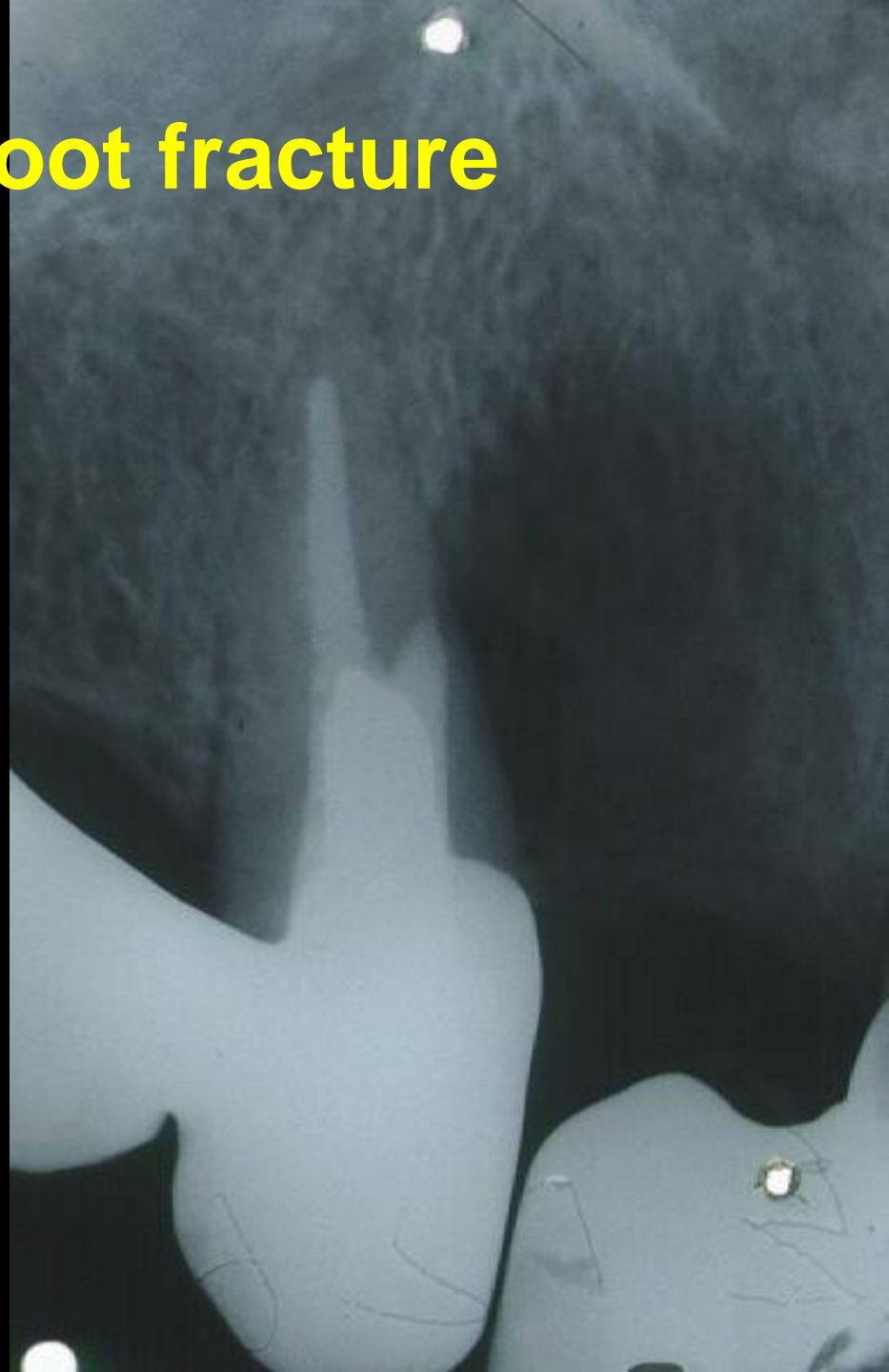
The most single rooted teeth are to be extracted

Multi rooted teeth can be dissected

- **Vertical root fracture**



- **Vertical root fracture**

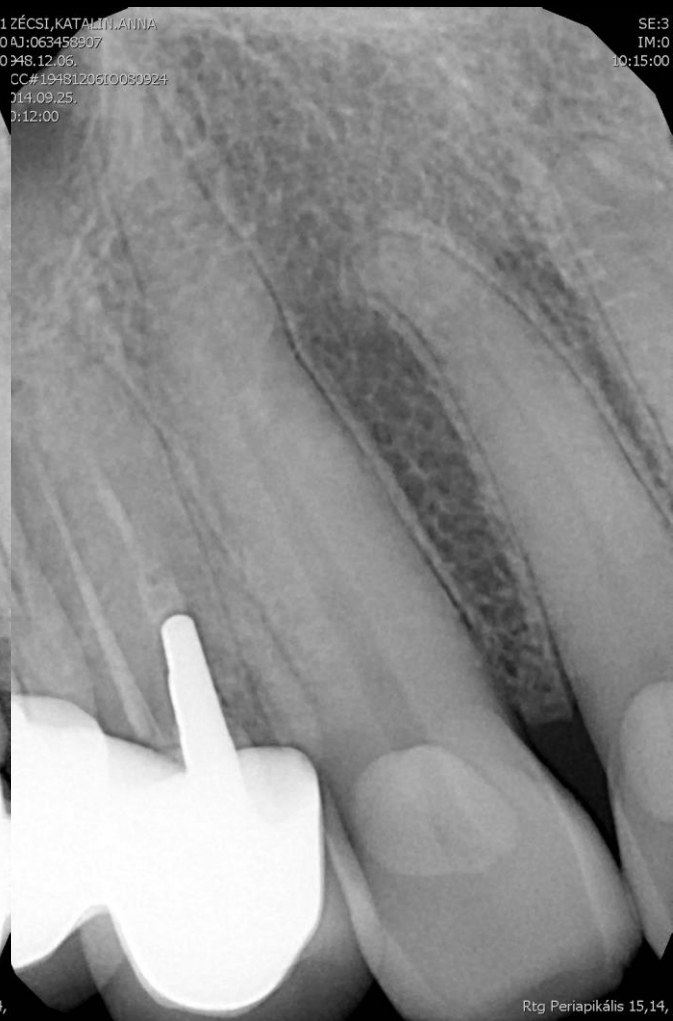


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- Vertical root fracture

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• Vertical root fracture

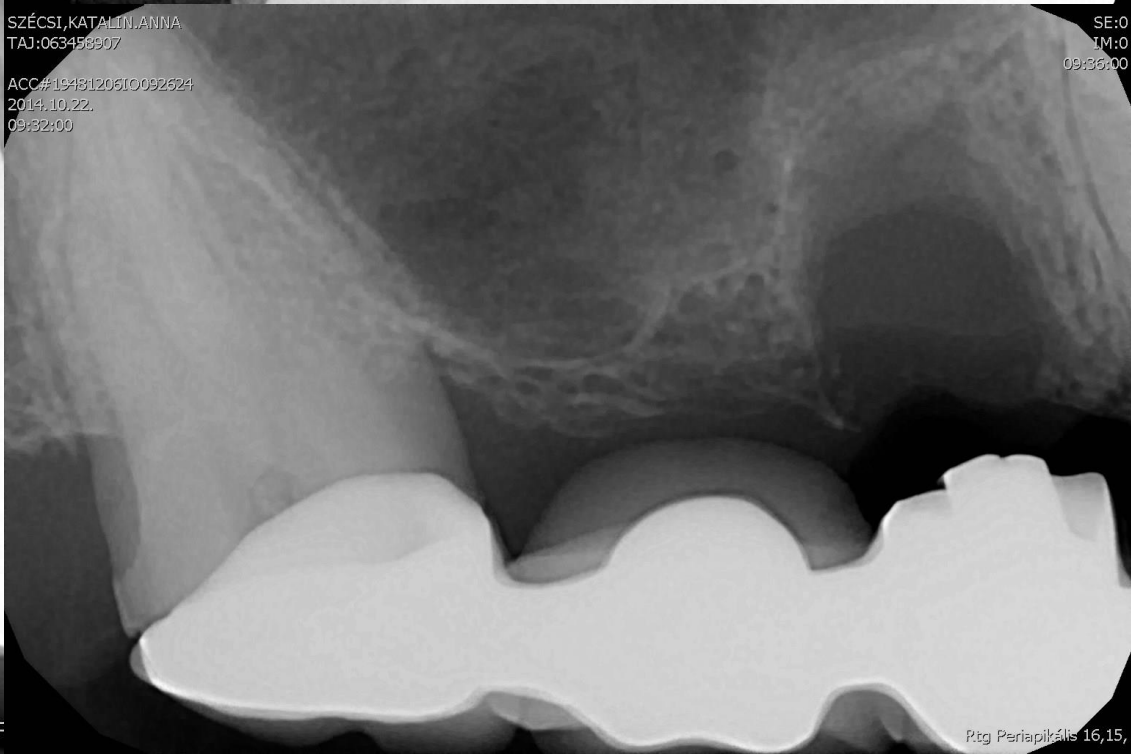


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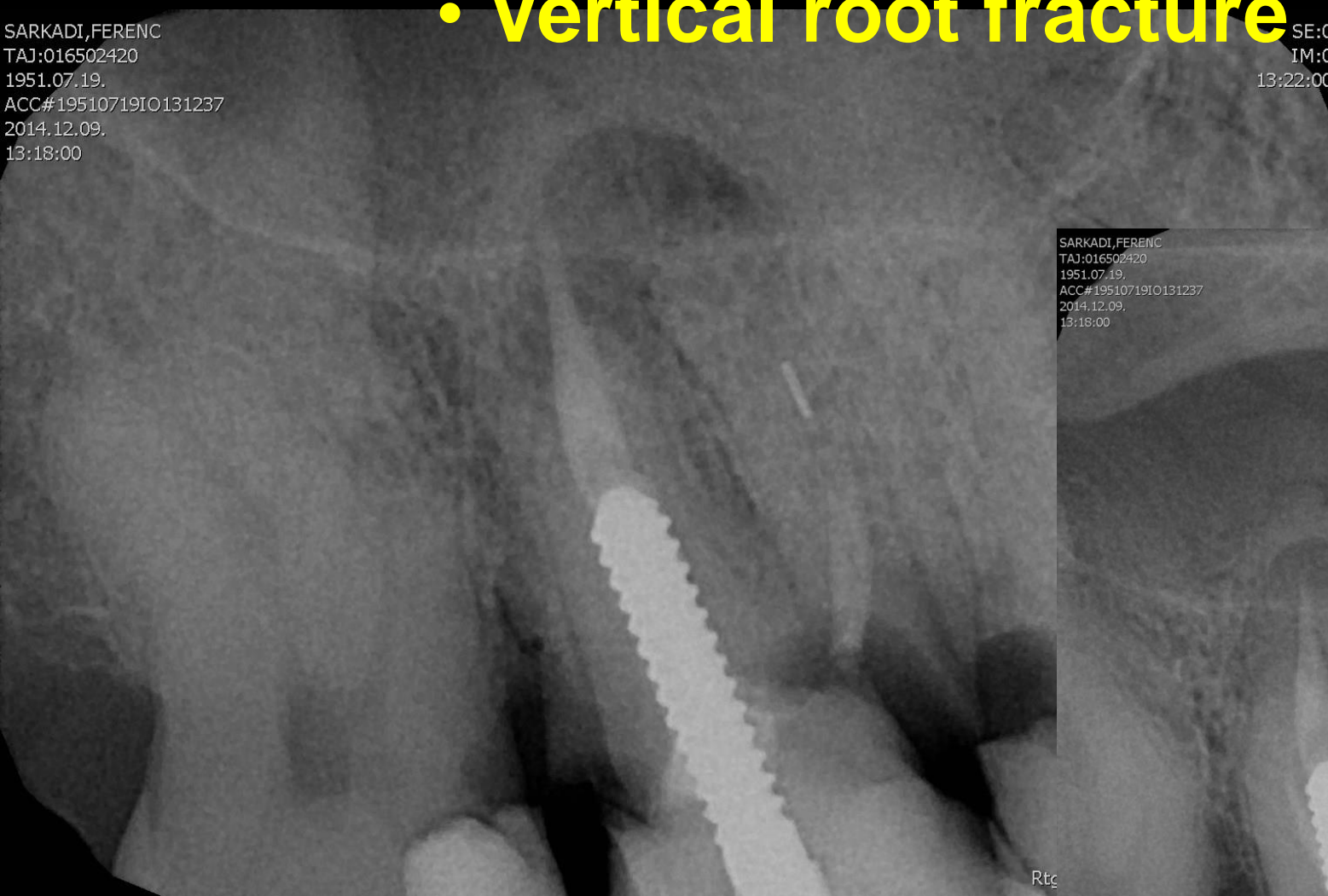
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P.tg Periapikális 16,15,

• Vertical root fracture

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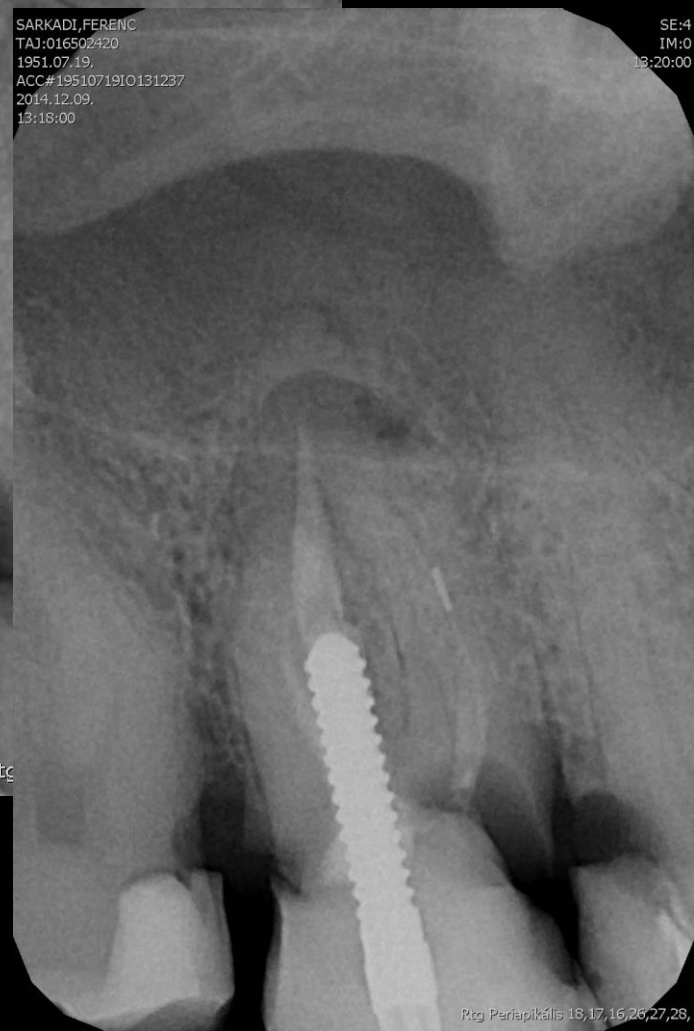
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Rtg

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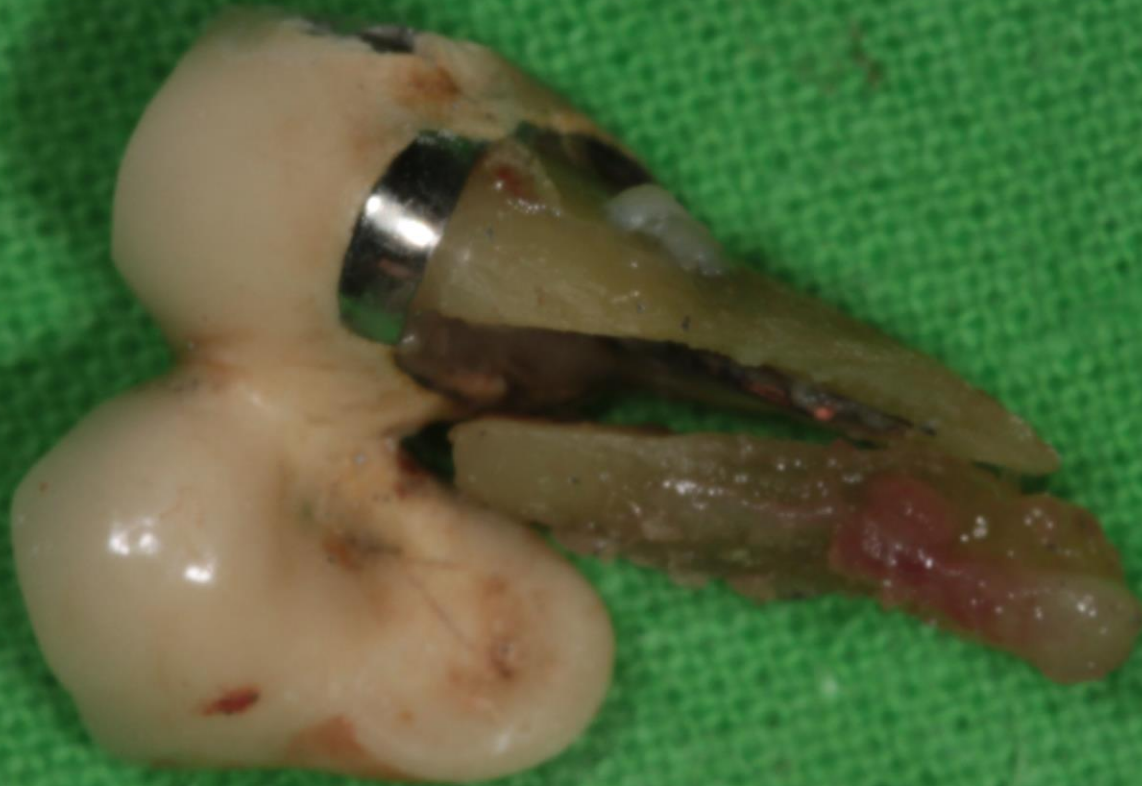
• Vertical root fracture

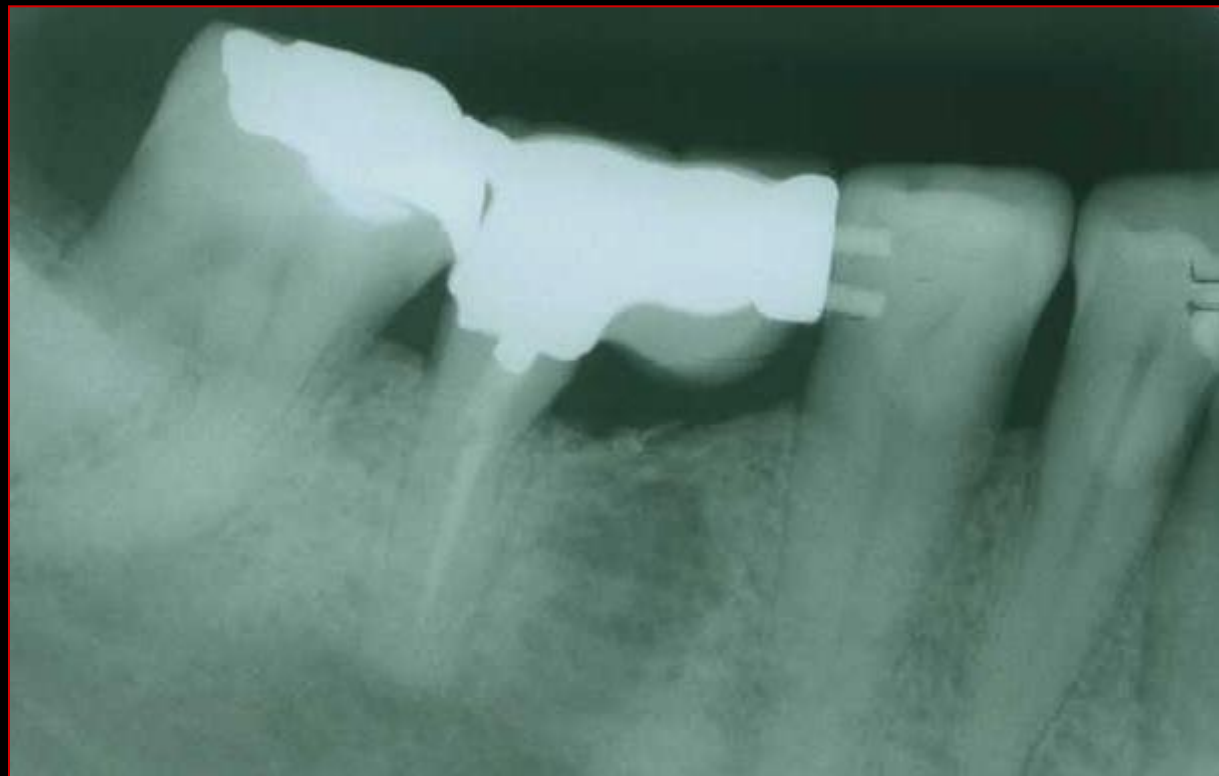
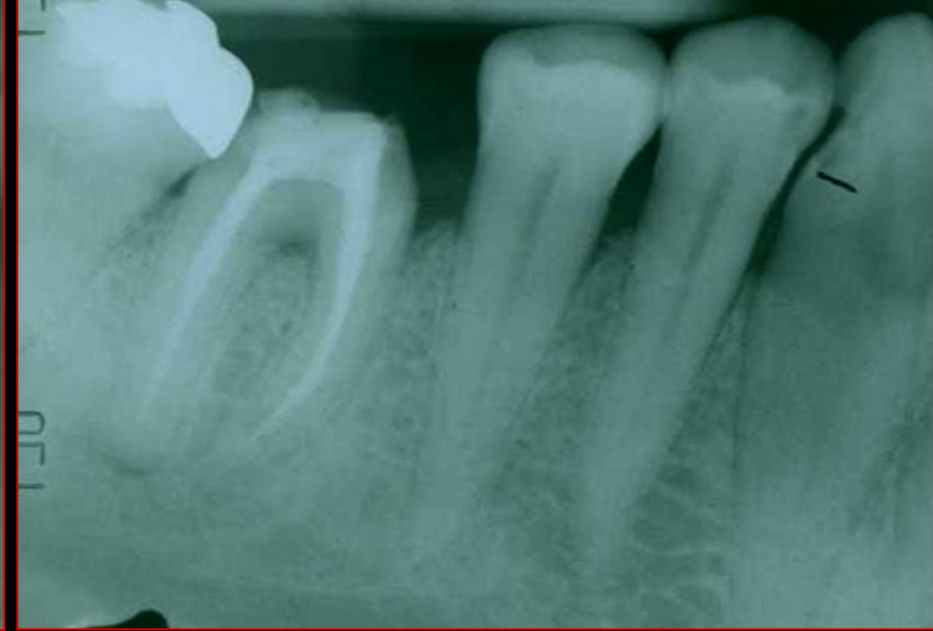
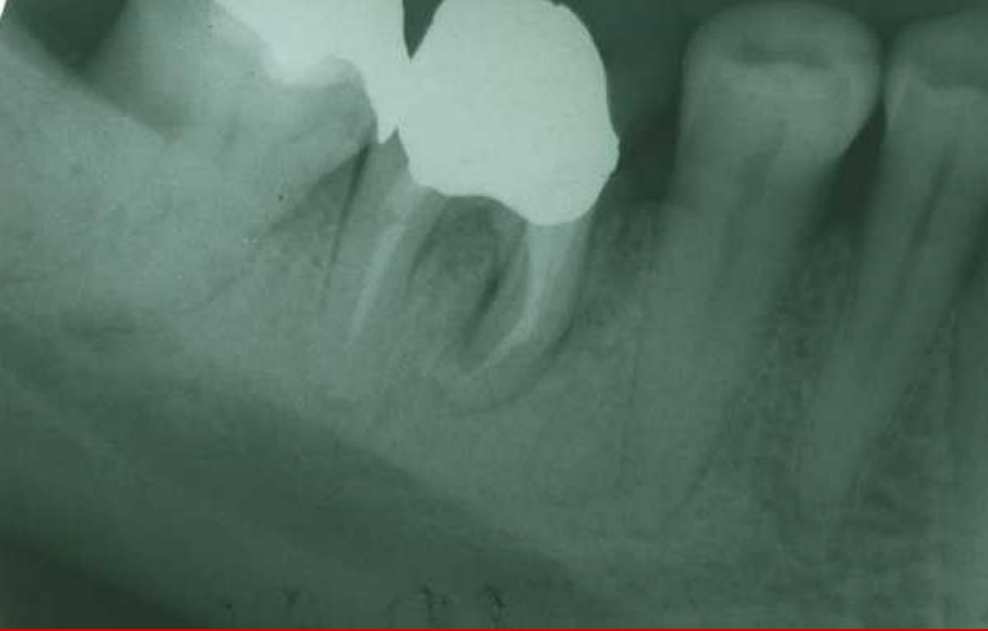


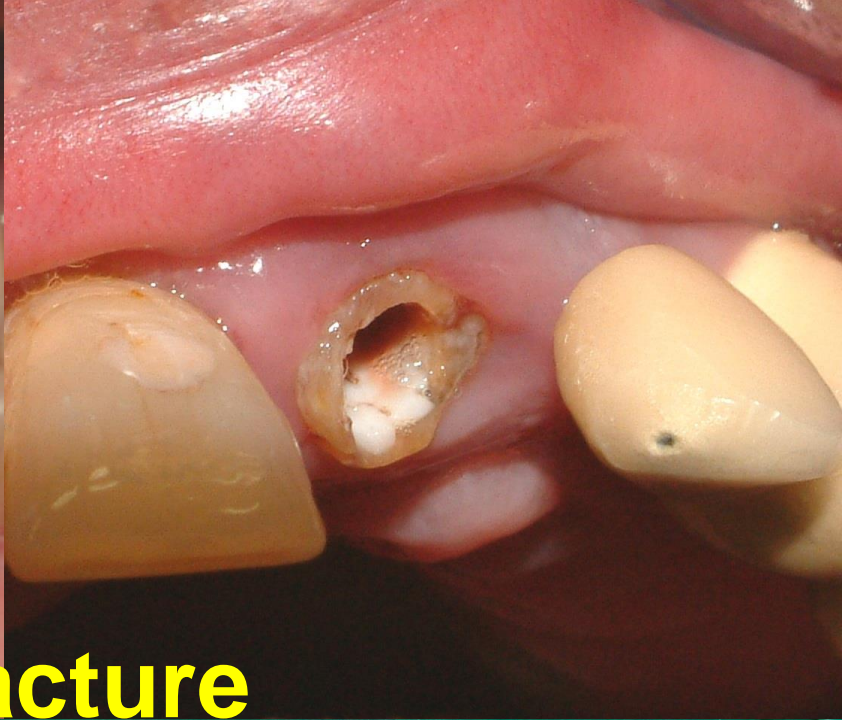
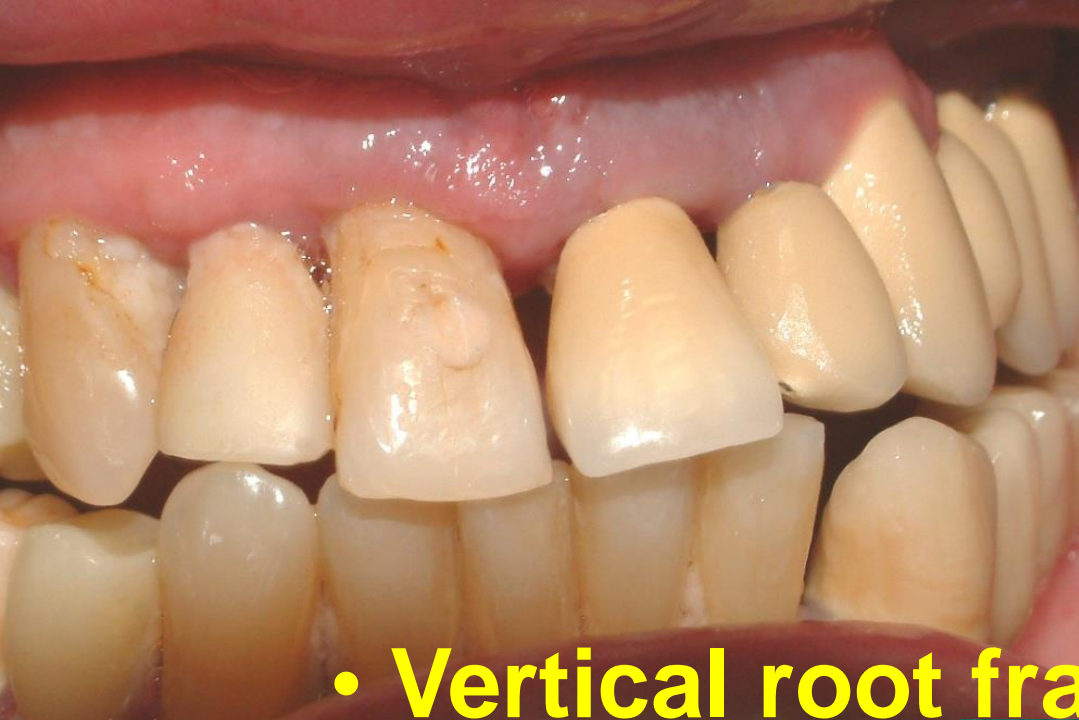
- Vertical root fracture



- **Vertical root fracture**







• **Vertical root fracture**







• Vertical root fracture





The effect of periodontal therapy on the pulp

Scaling

Rootplaning

Apically positioned flap surgery

Dentin tubuli exposition

Pulp degeneration

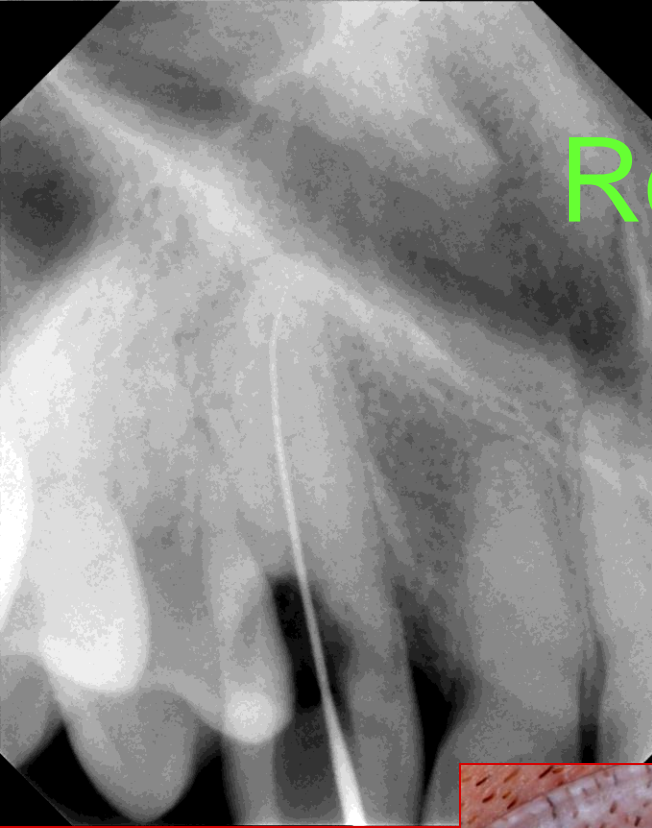




Root resorption



Root resorption









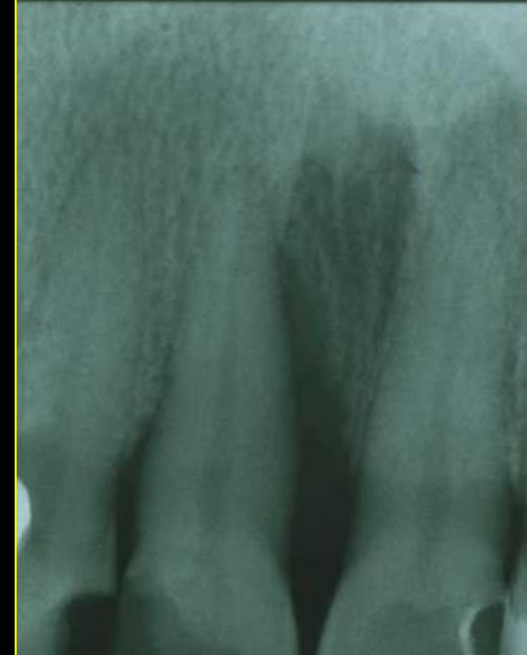












1998

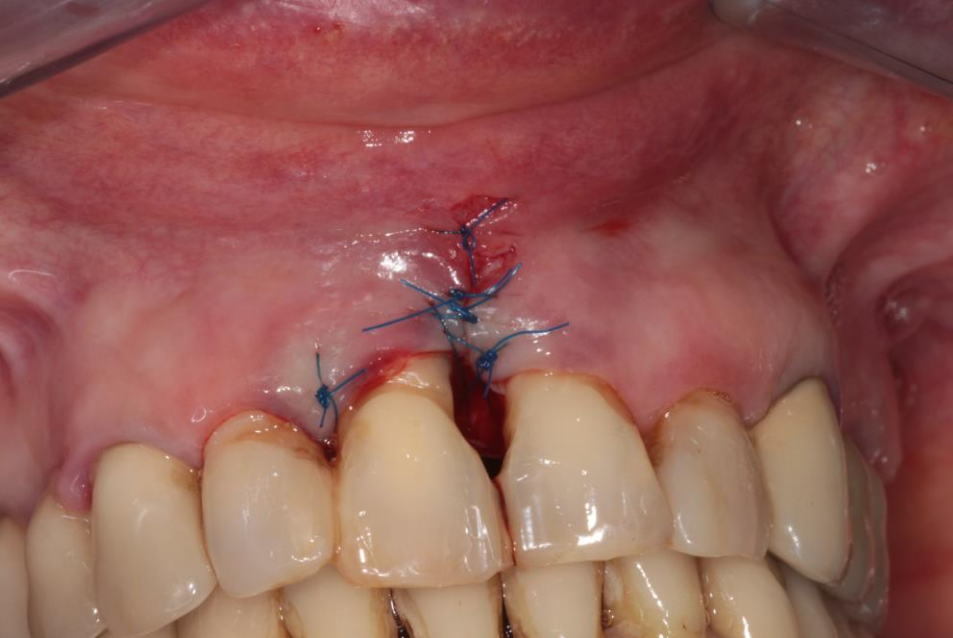


2001



2011





2012 dec





2004. 11.03



2013. 06.10.

Differential diagnosis



Differential diagnosis

Characteristics of pain

Vitality test

Percussion

Filling or caries

Periododontal pocket

Fistula tract abscess



Periododntal abscess



periapical abscess

Differential diagnosis

Differential diagnosis

Radiological diagnosis

Gutta-percha point put into the fistula tract

Secunder caries

Quality of root canal obturation

Vertical horizontal bone loss

therapy

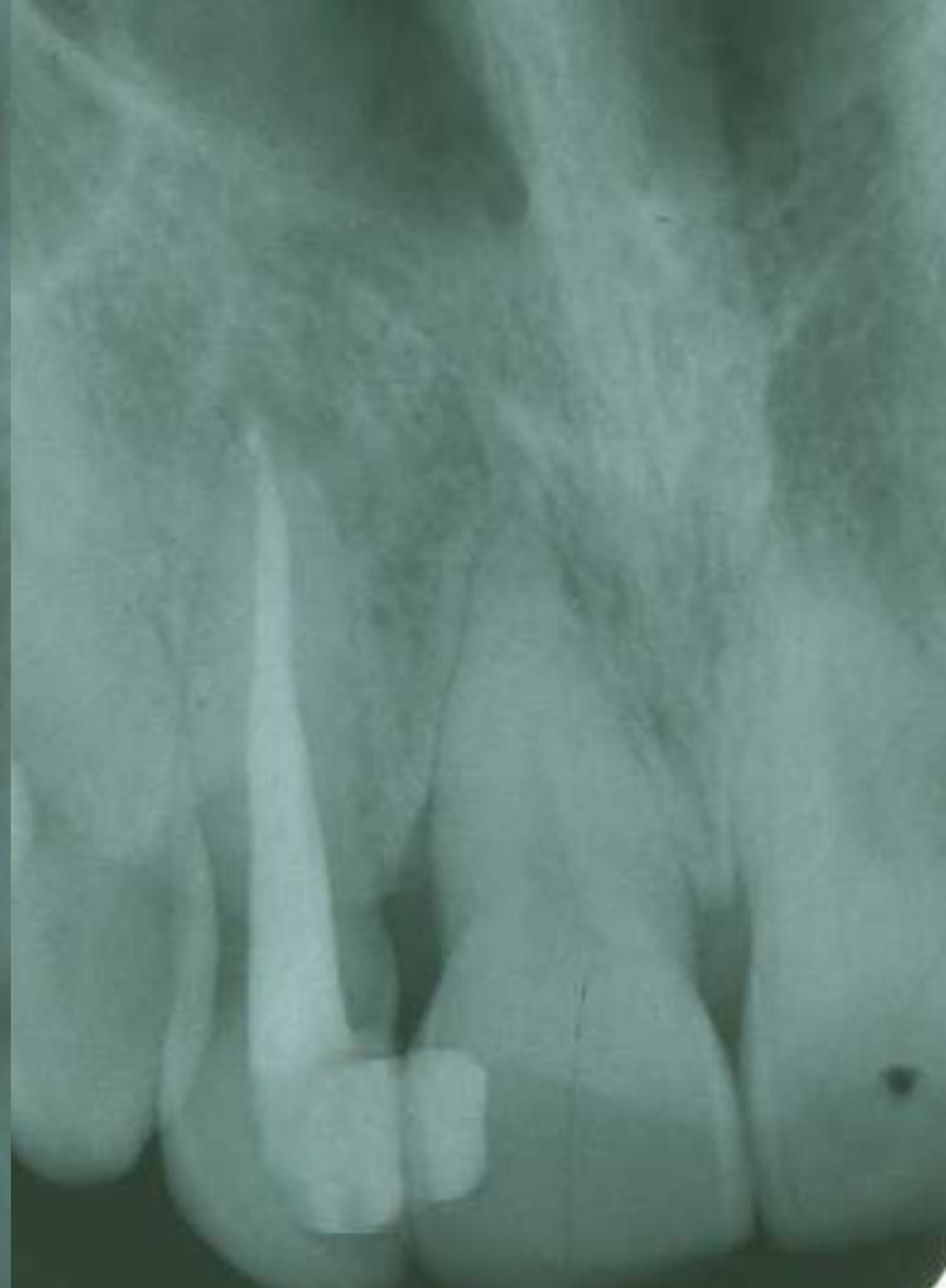
Endodontic therapy correct obturation

Subgingival curettage

Flap surgery

Dissection

hemisection





Root sensitivity





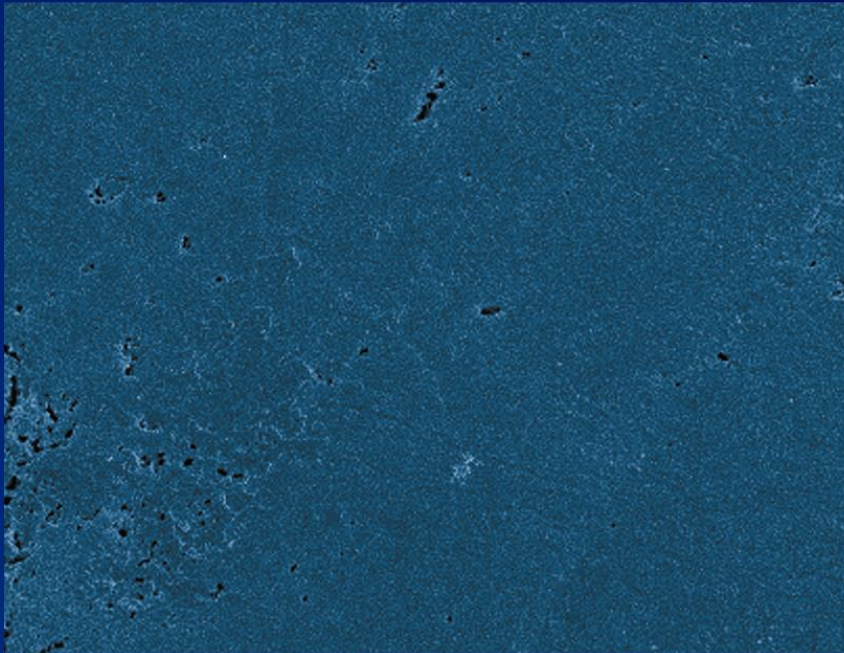


abrasion

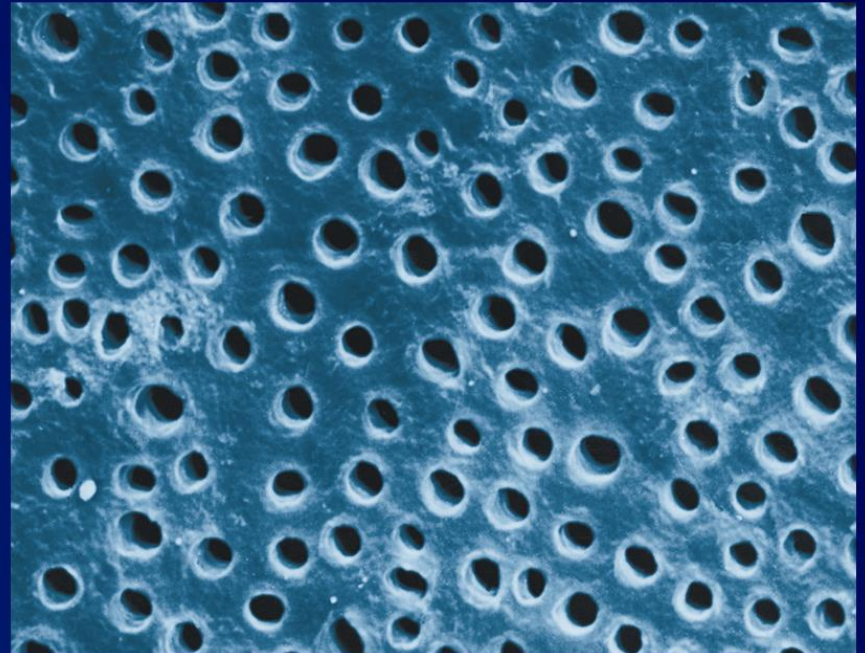
Dentine exposition



Hard tooth substances

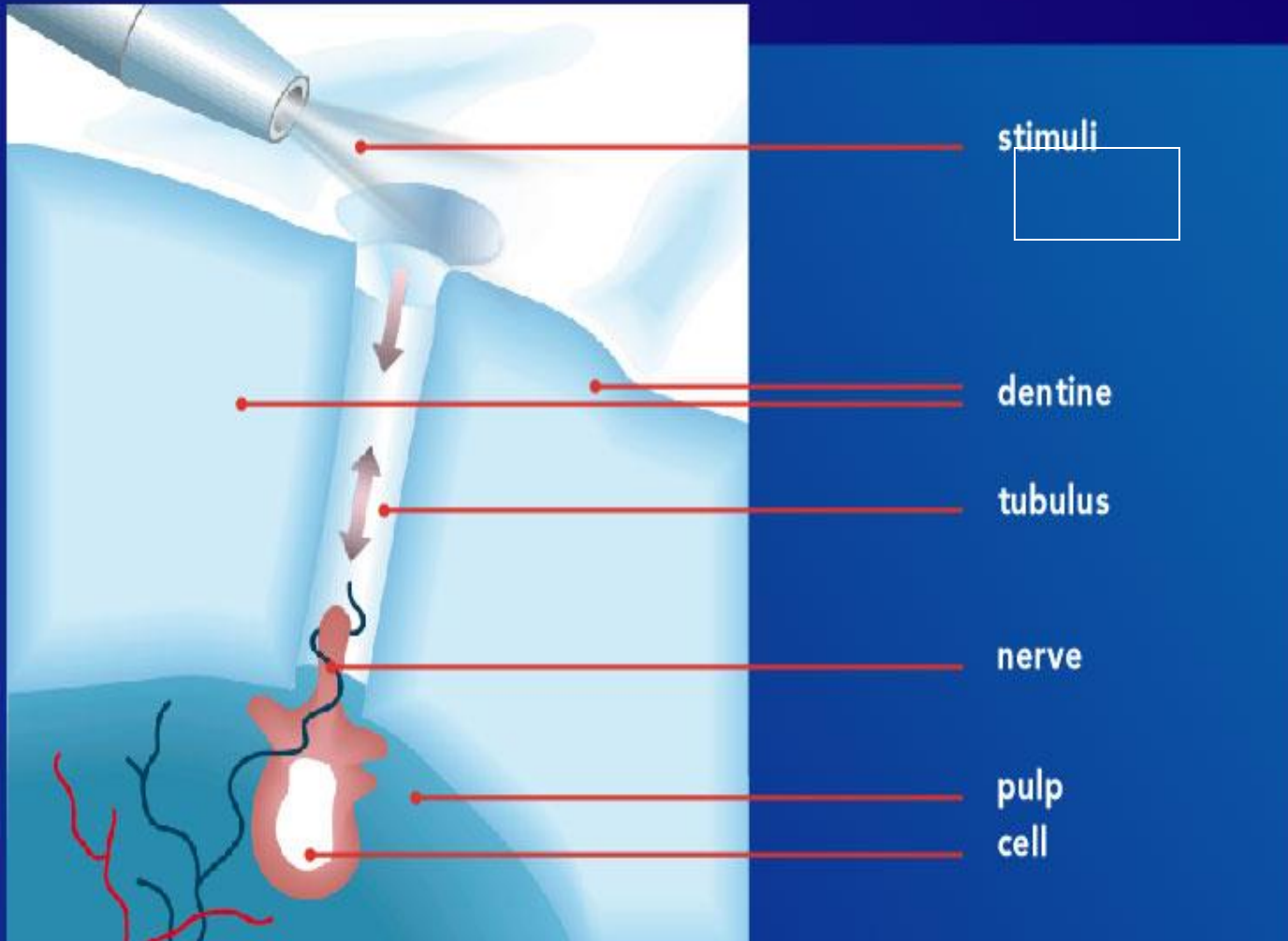


enamel



dentine

Dentine hypersensitivity

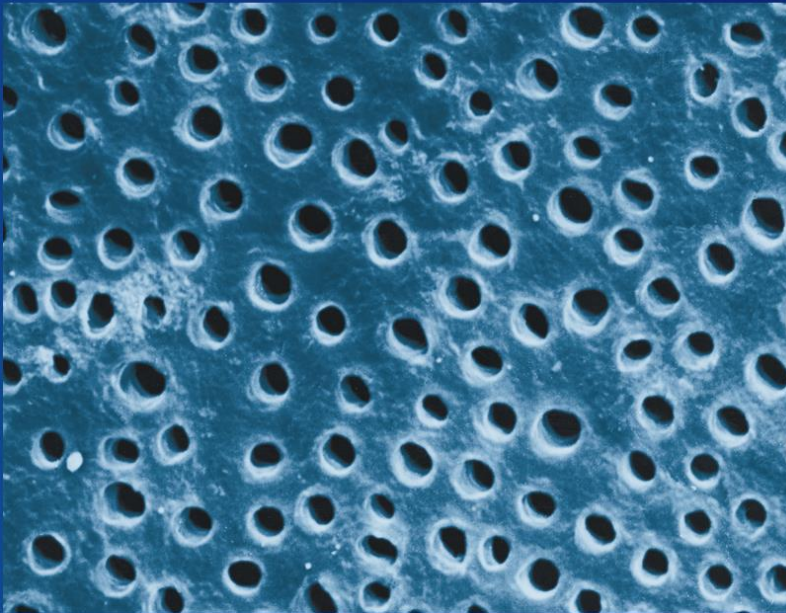


Abrasion

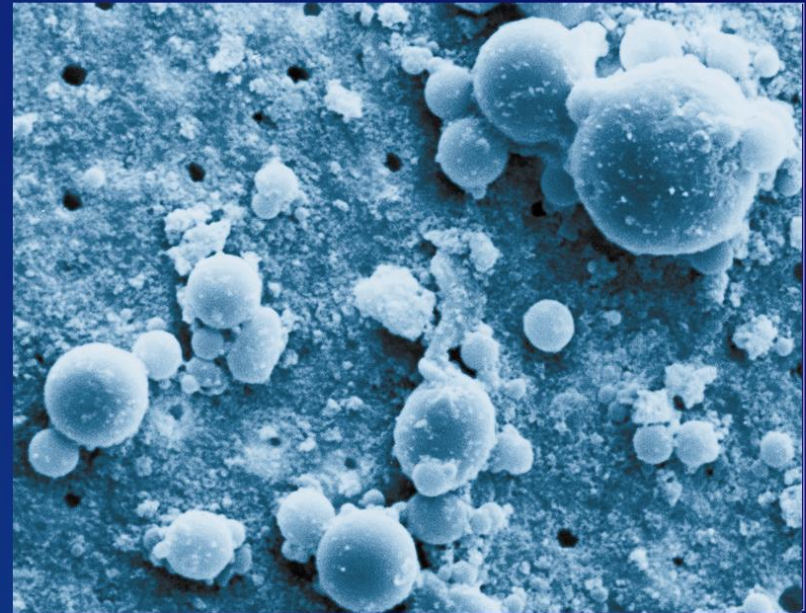


Wedge-shaped
defects after
mechanical abrasion
of the soft dentine

SEM observations after application of elmex® sensitive on dentine



Open dentine tubules (control)



Coverage of dentine tubules after application of elmex® sensitive toothpaste

N.Mordan et al. (2000)