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

dental 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.
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.
Mucogingival surgery

baseline

after restoration

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 INCISIORS 22%
- UPPER CANENES 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.

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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.

IN THE FURCATION AREA THE DIAMETER RANGING BETWEEN 4 um 250 um

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 disturbancies

LATERAL AND ACCESSORY CANALS:

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

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

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

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

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

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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 periodontal granuloma
• Endodontal pathology with secondary periodontal involvement

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

• Endodontal pathology with secondary periodontal involvement

Isolated bacteria

the necrotic pulp is a bacterial reservoir

Fusobacterium
Prevotella
Porphyromonas
Capnocytophaga,
Eubacterium
spirochetak

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 circumcised 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.)
•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 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

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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

• 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

• Periodontal pathology with secondary endodontal involvement
Classification of endodontal and periodontal lesions

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• True combined lesions

Simultaneously occurs plaque related periodontitis and pulpal damage due to deep caries or chemical/bacterial pulpal damage
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• 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
• Vertical root fracture
• Vertical root fracture
• Vertical root fracture
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• 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
Differential diagnosis
Differential diagnosis

Characteristics of pain
Vitality test
Percussion
Filling or caries
Periododontal pocket
Fistula tract abscess
Periodontal 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

stimuli

dentine

tubulus

nerve

pulp

cell
Abrasión

Defectos en forma de jalea después de la abrasión mecánica del dentín blando.
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)