CLASSIFICATION OF PULPAL & PERIAPICAL PATHOSIS
Objectives

- Clinical classification of pulpal & periapical pathosis
- Pathobiology
- Treatment
DEPARTMENT OF RESTORATIVE DENTISTRY
FACULTY OF DENTISTRY KHON KAEN UNIVERSITY

SUBJECTIVE FINDINGS
- None
- Previous History of Pain
- Spontaneous Pain
- Pain to Hot
- Pain to Cold
- Pain on Mastication
- Referred Pain
- Pain Relieved by Heat or Cold
- Other (Specify)

PREVIOUS HISTORY
- None
- Deep Caries
- Carious Exposure
- Mechanical Exposure
- Pulp Cap (direct)
- Pulp Cap (indirect)
- Traumatic Injury
- Pulpotomy, Pulpectomy
- Other (Specify)

OBJECTIVE FINDINGS
- None
- Infection Swelling
- External Swelling
- Soft Tissue
- Tooth Discoloration
- Lymphadenopathy
- Panzygotic Crown
- Other (Specify)

RADIOGRAPHIC FINDINGS
- Normal
- Proximal Radiolucency
- Periapical Radiolucency
- Lateral Radiolucency
- Fracture of Root
- Resorption (internal)
- Resorption (external)
- Other (Specify)

ETIOLOGY
- Caries
- Trauma
- Periodontic lesion
- Dental Graft
- Operative Exposure
- Other (Specify)

DIAGNOSTIC TESTS
- N=NONRESPONSE
- N=ABNORMAL

<table>
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<th>Tooth No.</th>
<th>E ctor</th>
<th>Pulp Test No.</th>
<th>Cold</th>
<th>Heat</th>
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DIAGNOSIS
- PULPAL
  - WNL
  - Reversible Pulpitis
  - Irreversible Pulpitis
  - Necrotic
  - Previous R.C.T.

- PERIAPICAL
  - WNL
  - Acute Apical Pseudocyst
  - Acute Apical Abscess
  - Chronic Apical Pseudocyst
  - Chronic Apical Abscess
  - Anastomoses

FEE SCHEDULE
- Date
- Amount
- Receipt No.

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<tr>
<th>Prognosis</th>
<th>ENDODONTIC</th>
<th>PERIODONTAL</th>
<th>RESTORATIVE</th>
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RADIOGRAPHS
**P.R. = POINT OF REFERENCE**

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<tr>
<th>ROOT CANAL</th>
<th>LENGTH</th>
<th>P.R.</th>
<th>Final Inst. Size</th>
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**BACTERIOLOGICAL FINDINGS IDENTIFICATION**

<table>
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<tr>
<th>Date</th>
<th>Root</th>
<th>Anaerobe</th>
<th>Aerobe</th>
<th>Germ</th>
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**CLINIC PROCEDURE**

1. Medical History and Stamp Medical Alert
2. Diagnostic and Pre-treatment Radiograph
3. Preparation of Access Opening
4. Exact Measurement of Root Canal
5. Mechanical Instrumentation of Root Canal
6. Fitting of Trial Master Cone
7. Culture
8. Filling of Root Canal
9. *Preparation of Filled Root Canal for Post
10. *Surgical Treatment
11. *Apexification
12. *Blanching

* when indicated

**ROOT CANAL FILLING.**

- Lat. condense
- Customized cone
- Vertical condense
- Other (Specify)

**POST TREATMENT RESTORATIVE**

- Amalgam
- Pin tooth
- Tooth colored material
- Inlay-Onlay
- Other (Specify)
Classification of Pulp

- Normal pulp
Classification of Pulp

• Disease pulp
  — Reversible Pulpitis
  — Irreversible Pulpitis

• Hyperplastic

• Internal Resorption
  — Necrosis
Reversible Pulpitis

- **Symptom** not a disease
- **Quick, sharp hypersensitive response**
- **Irritants** (caries, restoration, procedures)
- **Subsides as soon as the stimulus is removed**
Symptomatic Irreversible Pulpitis

- **Spontaneous** intermittent or continuous pain
- **Sharp or dull** pain
- **Localized** or referred
- **Moderate to severe** pain
Symptomatic Irreversible Pulpitis

- Sudden temp changes (cold) elicit prolong pain
- Postural change induces pain
- EPT is little value because pulp is still responsive to electrical stimulation
Asymptomatic Irreversible Pulpitis

Hyperplastic Pulpitis

- Reddish, cauliflower-like growth of pulp tissue "Pulp polyp"
- Young people
- Pain during mastication
Asymptomatic Irreversible Pulpitis

Internal Resorption

• Trauma

• Recruitment of blood-borne clastic cells

• Pink spot

• Identify during routine radiographic exam
**Pulp Necrosis**

- Partial or Total
- **Long-term interruption of blood supply to the pulp**
- No response to EPT & Thermal pulp test??
- Laser Doppler flowmetry or Pulse oximetry
Classification of Periodontium

- Periapical Disease
  - Within Normal Limits (WNL)
  - Acute-Apical Periodontitis (AAP)
    - Apical Abscess (AAA)
  - Chronic-Apical Periodontitis (CAP)
    - Apical Abscess (CAA)
Classification of Periodontium

- Phoenix abscess (Acute exacerbation of CAP, Flare-ups)
- Periapical Osteosclerosis (Condensing Osteitis)
- Periapical or Radicular cyst
**WNL**

- Mild transient response
- **Subsides immediately**
- No pain to palpation & percussion
- Absence of pathosis signs & symptoms
- Lamina dura intact
- **Calcific metamorphosis**
Acute Apical Periodontitis (AAP)

- Extension of pulpal inflam into periradicular tissue
- Mechanical or chemical trauma by endo instruments
- Occlusal trauma by hyperocclusion or bruxism
AAP

- Vital or nonvital teeth
- EPT & Thermal test is the only way to confirm endo treatment
- WNL or widened of PDL space
- Painful on percussion or chewing
**Acute Apical Abscess (AAA)**

- Painful purulent exudate around apex
- Resulted from exacerbation of AAP
- Moderate-severe pain & swelling
AAA

- Pain from percussion & palpation
- Increase in tooth mobility
- Normal or slightly thickened lamina dura
• Differ from lateral periodontal abscess- vital & pocket
• Differ from phoenix abscess- periradicular radiolucency
• No response to EPT
Chronic Apical Periodontitis (CAP)

- Necrotic pulp
- Asymptomatic periradicular lesion
- No response to EPT
- Tenderness to palpation & percussion
- Thickening of PDL or Periapical Radiolucency
Chronic Apical Abscess (CAA)

- Asymptomatic periradicular lesion
- Necrotic pulp
- No response to EPT
- Tenderness to palpation & percussion
- Periapical Radiolucency
- Sinus tract
**Phoenix Abscess**

- Preceded by chronic apical periodontitis
- Symptoms identical to acute periradicular abscess but with radiolucency
Endodontic flare-ups

• Acute Exacerbation of CAP

• Pulp necrosis with periradicular lesion

• Contributing factors
  * Inadequate debridement
  * Debris extrusion
  * Overinstrumentation
Flare-ups

• Contributing factors
  * Overfilling
  * Retreatment
  * Periapical lesion
  * Host factors - fear & anxiety
    - allergies/ age/ gender
Chronic Osteosclerosis

- Condensing osteitis / Focal sclerosing osteomyelitis
- Excessive bone mineralization around the apex of a symptomatic or asymptomatic, vital or nonvital tooth
- Low-grade pulp irritation
Pathways of Infection

The most frequent portals of pulp infection - exposure of pulp to oral cavity: caries, fractures
Microflora of Infected & Necrotic Pulp

• >90% is **obligate anaerobes**
  
  (Fusobacterium, Porphyromonas, Prevotella, Eubacterium & Peptostreptococcus)
Pathogenicity of Endodontic flora

- Synergistically beneficial partners
- Release endotoxin
- Synthesis of enz that damages host tissues
- Interfere host defense
Acute Apical Periodontitis

Primary

- Limited to apical periodontal ligament
- Hyperemia, vascular congestion neutrophils
- Radiographically undetectable (bone has not been disturbed)
Acute Apical Periodontitis

Infection is involved

- Neutrophils release cytokines (leukotrienes) & PG
- Leukotrienes attracts neutrophils & macrophages
- Macrophages activate osteoclasts
- Bone resorbs
Chronic Apical Periodontitis

• Shifts to macrophages, T-lymphocytes & plasma cells

• T-cells produce cytokines that suppress osteoclastic activity & reduced resorption

• Acute if the equilibrium is disturbed
Chronic Apical Periodontitis

- **Periapical granuloma**

- **Granulomatous tissue with infiltrate cells, fibroblasts in a fibrous capsule**

- **Capsule is dense collagen fibers that are firmly attached to the root**
Periapical or Radicular Cyst

- Sequel to chronic apical periodontitis
- Epithelial lining
- 2 categories - Periapical True cyst (>50%)
  - Periapical Pocket cyst
    (cavity opens to the root canal)
Two hypotheses for the cyst formation

“Nutritional deficiency theory”

- Central cells are away from source of nutrition
- Undergo necrosis & liquefactive degeneration
Two hypotheses for the cyst formation

“Abscess theory”

- Inherent nature of epithelial cells to cover exposed CNT
- Proliferate surrounds the abscess
Condensing Apical Periodontitis

- Dense bone trabeculae with limited marrow space
- Osseous tissue is lined by osteoblasts
- Marrow space is infiltrated with lymphocytes
TREATMENT
Reversible Pulpitis

- Pulp Stress
- Chronopathologic status
- Caries
- Leak restoration/Marginal defects
- Hyperocclusion
- Operative procedures
Reversible Pulpitis

- Remove the cause of irritation
- Teeth should be allowed several weeks to recover
- Replace with a sedative temporarily filling (ZnOE)
- RCT if symptoms persist
Irreversible Pulpitis

• RCT

“COMPLETE REMOVAL OF THE PULP IS THE BEST TREATMENT”

• No contraindication to single-visit Rx
Irreversible Pulpitis

- Multirooted teeth - pulpotomy or partial pulpectomy (removal of the pulp from the widest canal)

- File should not be introduced into canals unless a pulpectomy is anticipated

- Medicated with Ca(OH)$_2$
Irreversible Pulpitis with AAP

- Complete C&S with Ca(OH)$_2$ between visits to prevent bacterial regrowth
- Occlusal reduction
- Teeth must not be left open
- Oral analgesics (NSAIDS)
Pulpal Necrosis with AAA

No Swelling

- Complete C&S with Ca(OH)$_2$ between visits
- Introduce a small file (#10-15) beyond the apex to establish drainage from periapical
- **NSAIDS**
Pulpal Necrosis with AAA

Localized swelling

- Drain through canal
- **C&S with copious NaOCl**
- Tooth may be left open (2 h) & med with Ca(OH)$_2$
- **Systemic use of antibiotics (Penicillin)**
**Pulpal Necrosis with AAA**

**Fluctuant localized soft tissue swelling**

- Incision & drain
- **Medical therapy:** hydration/soft diet/analgesics/oral hygiene
- **Systemic use of antibiotics**
**Pulpal Necrosis with AAA**

**Diffuse swelling**

- Drain through canal/ incision & drain
- **Thorough C&S with copious NaOCl**
- Antibiotics & analgesics
- Refer for hospitalization
Endodontic flare-ups

- Relaxing the patient
- C&S with NaOCl
- Ca(OH)$_2$ & Chlorhexidine gluconate
- Occlusal adjustment
Endodontic flare-ups

- Tooth is allowed to drain for up to 20 mins with rubber dam
- Incision & drain (fluctuant)
- Antibiotics & analgesics
References

• Pathways of the Pulp 9th edition
• Endodontics 4th edition
• Endodontic Therapy 5th edition