Diseases of the Pulp & Periapical Tissues

Diseases of dental pulp:

Etiology:

1. Bacterial:
   - Dental caries
   - Cracks in crown.
   - Periodontal pockets
   - Malformed teeth.
2. Traumatic
   - Crown fracture
   - Root fracture
   - Partial avulsion
   - Bruxism
   - Abrasion.

3. Iatrogenic
   - Heat generation during grinding
   - Depth of penetration
   - Dehydration of tubules
   - Pulp exposure
   - Large metallic restoration with inadequate insulation.
   - Filling materials.

4. Anachoretic pulpitis:- when bacteria present in the circulating blood stream tend to accumulate in the pulp & cause infection.
5. Aerodontolgia:

   Toothache in flying personnel, Astranauts at high altitudes due to ↓ pressure.
6. Galvanism

A. Physical:

1. Mechanical→Trauma

i.e. accidental

Iatrogenic dental procedure

→ Pathologic wear (Attrition, Abrasion, Erosion , Bruxism)

→ Cracked tooth syndrome(incomplete fracture to the body of tooth leads to pain (idiopathic origin)

→ Barometric changes
(Barodontalgia / Aerodontolgia)

2. Thermal→During cavity preparation
   During setting of cement without base
   Deep restoration filling
   During polishing restoration.
   Electrical→Due to dissimilar metal.

B. Chemical:
   Any acid (restoration material)
   Erosion

C. Bacterial:
   Through caries / trauma
   Anachoresis

Pathway of bacterial invasion into pulp:

- Direct invasion from dentin such as caries , fracture , cavity preparation
- Invasion through lymphatics
- Invasion through blood.

Reaction of pulp to bacterial invasion

Inflammatory response

↓

Swelling of pulp.

↓

↑pressure (pain)

↓

Necrosis of pulp

↓

Alveolar abscess.

Classification of pulp disease :

I. According to inflammatory process.-
Acute pulpitis & Chronic pulpitis

II. Depending upon extent of involvement of pulp:-
Partial & Subtotal pulpitis

III. Partial / Focal pulpitis (confined to a portion of pulp)

&

Total / Generalized pulpitis(most of the pulp diseased)

IV. Based upon presence / absence of a direct communication b/w dental pulp & oral environment

→ Open pulpitis(Pulpitis aperta)

→ Closed pulpitis(pulpitis clausa)

Focal Reversible Pulpitis (Pulp Hyperemia)

- Earliest forms of pulpitis
- Mild transient & localized inflammatory reaction chiefly in the pulpal ends of irritated dentinal tubules.

O/E:-

- Slowly progressing chronic carious lesion.
- Stimuli of short duration eg: cutting dentin while cavity preparation

- Severe attrition or abrasion
- Chemical irritation to pulp (acid etching in cervical aspect of the tooth)
- Large metallic restoration without inadequate insulation.
- Restoration with defective margins.

C/f:

1. Sensitive to thermal changes particularly cold.
2. Pain → short duration & disappears as soon as the thermal irritant is withdrawn
3. Tooth responds to stimulation by the electric pulp tester (EPT) at a lower level of current, indicating a lower pain threshold.

D/d:

- Irreversible pulpitis-pain takes or lasts several minutes/longer.
- Reversible pulpitis –pain takes few seconds.

Treatment:

- Reversible condition
- Elimination of irritating factors
- Sealing of exposed dentinal tubules.
- Defective filling- Replaced

Acute pulpitis:

- Irreversible condition characterized by acute ,intense inflammatory reaction in pulp tissue.

- Mode of development:
- Sequelae of focal reversible pulpitis.
- Acute exacerbation of chronic pulpitis (phoenix abscess)
- As denovo condition, where inflammation is acute from beginning.

C/f:

- Tooth is extremely sensitive to hot & cold stimuli.
- Pain persists even after the stimuli has disappeared or removed.
- More severe pain i.e..sharp ,lancinating pain is experienced as the greater portion of the pulp becomes involved with intrapulpal abscess formation.

- Pain → continuous /intermittent depending upon degree of pulp involvement & stimulus.

- Pain ↑ in lying down position

(due to ↑ in local blood pressure in head & neck region.)

- As the pulp is lying within dentinal walls, intra pulpal pressure builds up quickly & so is the pain during inflammation. Therefore lack of escape of inflammatory exudates.
- Responds to EPT at a lower level of current.
- If entrance of diseased pulp:

  - Not wide→ Pressure ↑ thus more painful.

  - Wide→ Pressure ↓ thus less painful.

- Tooth is not tender on percurssion unless inflammation has spread beyond the root apex into the periapical region.

- When intra pulpal pressure becomes very high during acute inflammation it can cause collapse of the apical blood vessel .This phenomenon is known as pulp strangulation

- Many abscesses may form characterized areas of liquefaction degeneration& necrosis.This is referred as "Acute Suppurative pulpitis"
- Microorganisms→ Mixed population

Treatment:

- Irreversible condition
- ✓ Root canal treatment
- ✓ Extraction of tooth
- ✓ Antibiotics

Chronic pulpitis

- Is a condition characterized by low grade often persistant inflammatory reaction in the pulpal tissue with little or no constitutional symptoms.

- O/E:- Same as that of acute pulpitis .Irritants here are of low virulence.

Mode of development:

- Mostly occurs as a chronic inflammatory reaction in the pulp from the very beginning.
- It may occasionally present as quiescent phase of the pre existing acutepulpitis.

C/f:

- Signs & symptoms are milder compared to acute pulpitis .
- Pain is not a prominent feature but there will be mild dull ache which is more often intermittent.
- The tooth is less sensitive to heat & cold stimuli.

- Usually responds to a higher level of current when EPT is used . It is due to degeneration of most of the nerve fibres in the chronically inflamed pulp.

- Even if pulp is exposed to the oral cavity still it is not painful.

Treatment:

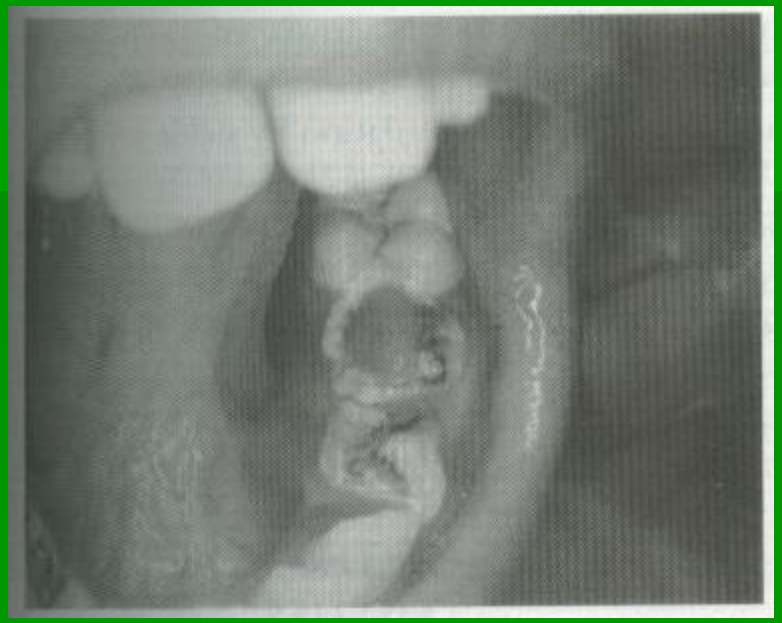
- Root canal treatment
- Extraction.

Chronic hyperplastic pulpitis (Pulp polyp)

- Special form of chronic pulpitis.
- An unusual type of chronic pulp disease which is characterized by an overgrowth of the tissue outside the boundary of the pulp chamber as a protruding mass.
- Long standing caries.
- Low grade irritation.

Mode of development:

- Chronic lesion from the onset.
- Chronic stage of the previous acute pulpitis.



C/f:-

- Commonly involved teeth:

  Deciduous molars &
  1st permanent molars.

- An excessive , exuberant proliferation of chronically inflamed dental pulp tissue.

- Children & young adults.

- Clinically appears as a small pinkish red , lobulated mass which protrudes from the pulp chamber & often fills up the carious cavity.
- Involves teeth with large open carious lesions.
- Since it contains few nerves it is relatively insensitive to manipulation

- May or may not bleed readily depending on the degree of vascularity of tissue.
- Distinction should be made b/w the adjacent gingival tissue proliferating into the carious lesion by tracing its attachment.
- Symptomless except during mastication.
- If hyperplastic pulp is cut → Tissue bleeds heavily.

Treatment

- Pulp extirpation
- Rct
- Extraction.

Pulp Necrosis (pulp gangrene)

End result of untreated pulpitis

Etiology:

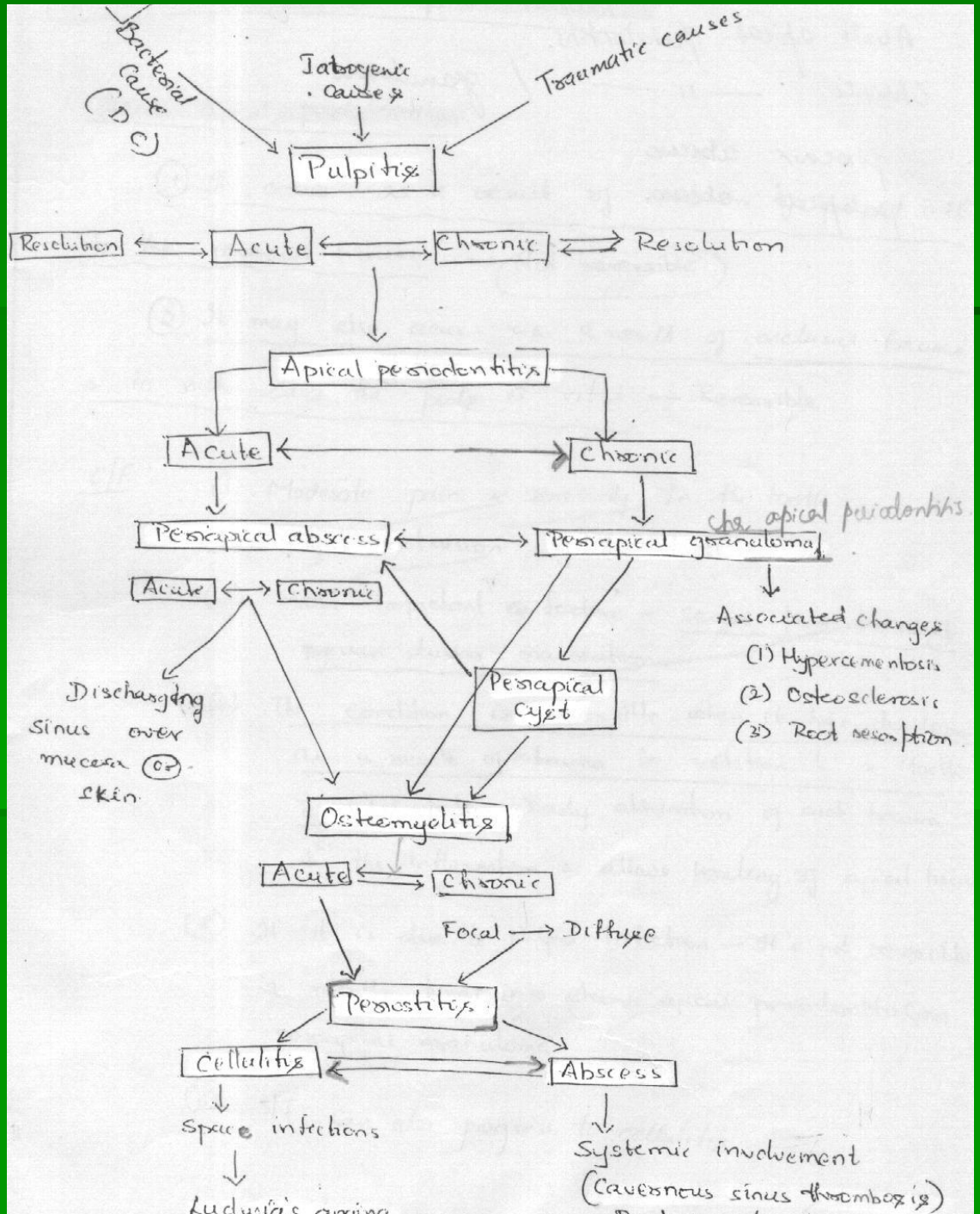
- Injury → inflammation→ necrosis
- Physical chemical & Thermal

C/F:-

- Gangrenous necrosis of pulp.
- Usually associated with foul odor.
- When pulp chamber is open for endodontic therapy no painful symptom , discoloration of the tooth (Brownish/ Grayish discolor)
- Dry gangrene due to trauma to tooth or infarct→ pulp nonvital but maintains normal histological character.

Reversible Pulpitis	Irreversible Pulpitis
✓Elicited pain. ✓Sharp pain. ✓Lesser than 20 mins duration. ✓Unaffected by the body position. ✓Easily localized	✓Spontaneous pain ✓Dull pain ✓Greatrer than 20 mins duration. ✓Affected by bopdy position . ✓Often difficult to localize.

Sequelae of pulpitis



Diseases of Periapical Tissues.

Acute apical periodontitis

Occurs as a result of

1. Extension of pulp inflammation into the Periapical tissues→ not reversible.
2. Occlusal trauma & in such cases pulp is vital→ reversible

C/f:

- Moderate pain & sensitivity in the tooth.
- Slight extrution of the tooth.
- Most important feature→ Severe pain on slight pressure during mastication.
- Reversible when it has developed due to trauma in relation to tooth with vital pulp.

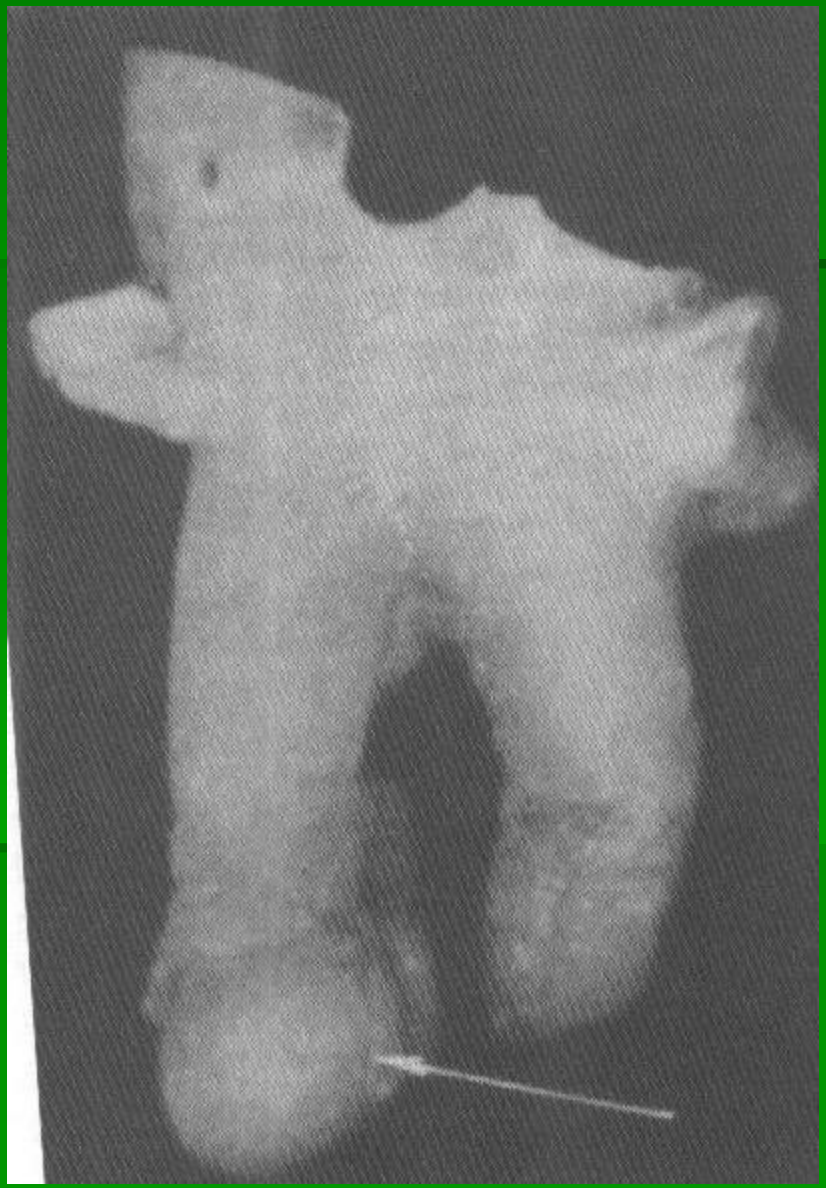
- Early elimination of such trauma decreases the inflammation & allows healing of apical tissues.
- If it is due to pulp infection it is not reversible & mostly turns in to acute Periapical periodontitis or Periapical granuloma.
- It can also progress to cellulitis.

Chronic apical periodontitis (Periapical granuloma)

- Localized mass of granulation tissue around the root apex of non vital tooth which develops in response to infection or inflammation.
- Most common sequelae of pulpitis

Pathogenesis:

1. Extension of pulpal inflammation or infection beyond the apex.
2. Occlusal trauma
3. Orthodontic tooth movement with excessive uncontrolled force.



4. Perforation of root apex during endodontic therapy.

5. Periodontal infection.

6. Acute trauma to the tooth.

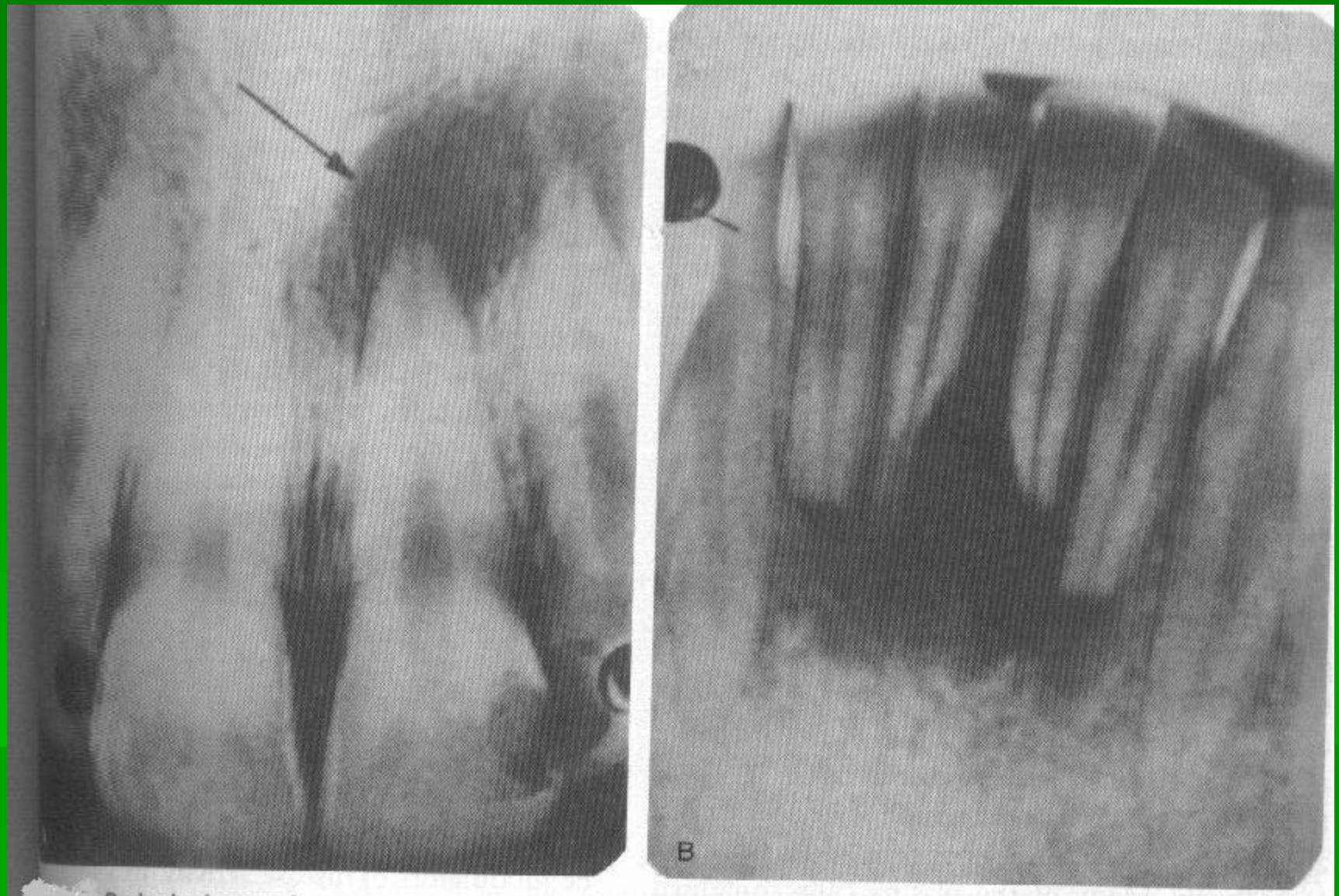
7. It may arise after quiescence of apical abscess or may develop as a initial Periapical pathosis

C/f:

1. Most are asymptomatic.
2. Pain & sensitivity if if acute exacerbation occurs.
3. May produce sensitivity to percussion due to hyperemia, edema & inflammation of the apical Pdl.
4. Mild pain during chewing food.
5. Patient might give a history of pain (during pulpitis) which has subsided.
6. Tooth is usually non vital.
7. Tooth doesnot respond to EPT unless in multirooted tooth.

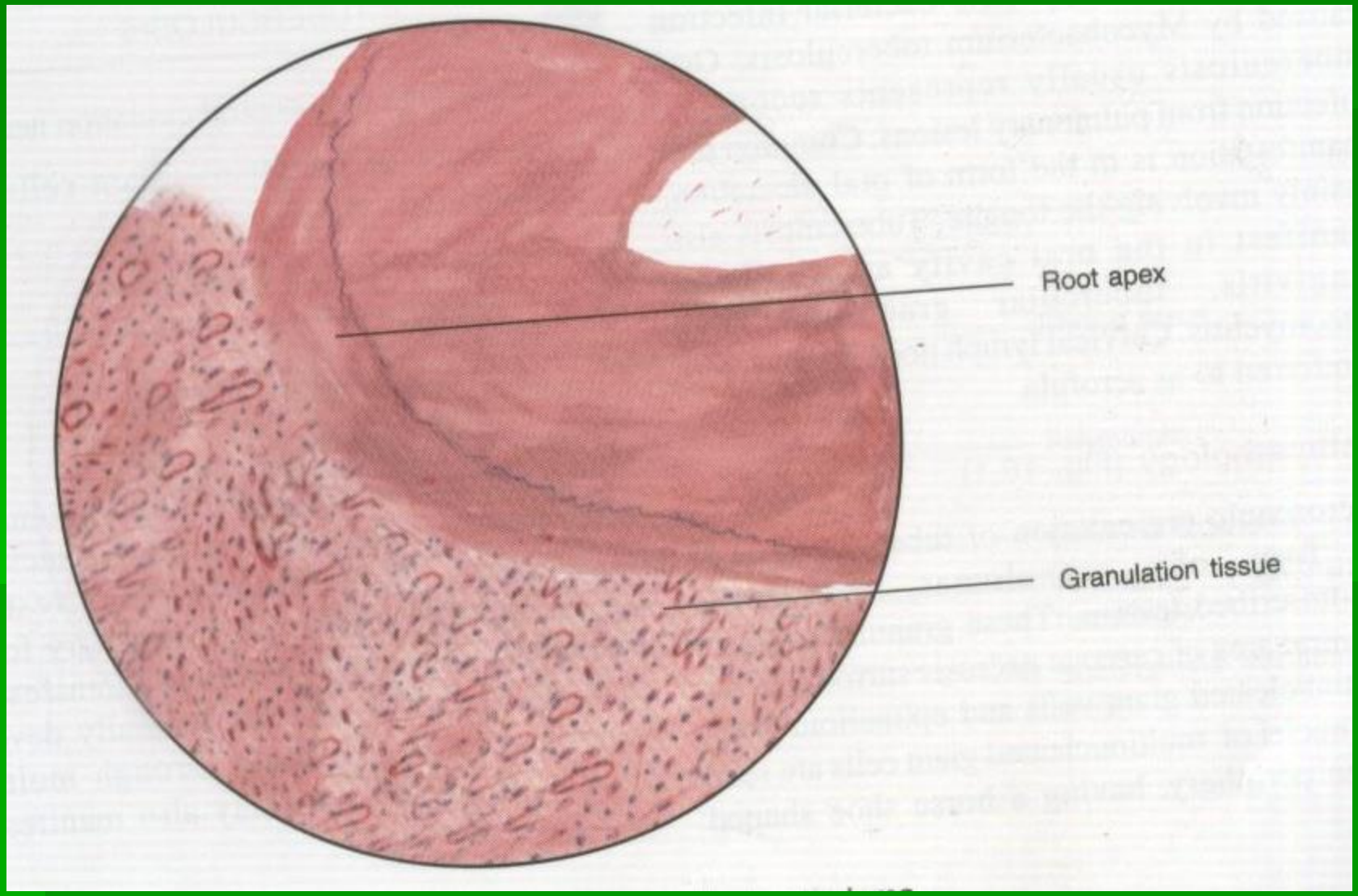
R/F:

1. Usually discovered on routine radiographic examination.
2. Radiolucency of variable size is present.
3. Loss of apical lamina dura.
4. Periodontal ligament space is increased.
5. Lesion may be circumscribed or ill defined.
6. Size varies– from small barely perceptible lesions to 2 cm in diameter.(Usually > 2cm is periapical cysts (but not a must))
7. Root resorption- In long standing lesions.



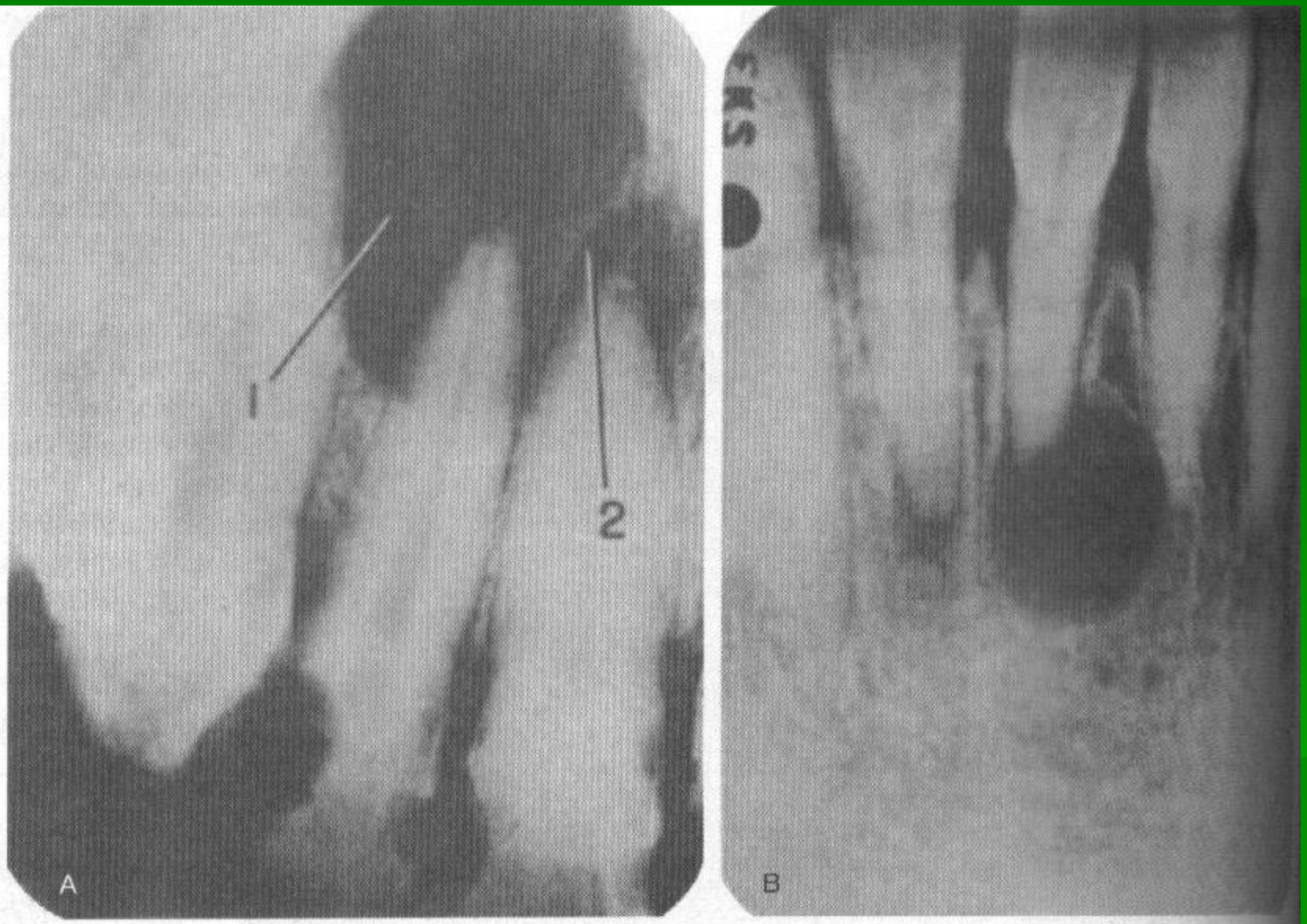
, Periapical granuloma.
*periapical radiolucencies signify destruction of bone and replacement by granulation tissue. The maxillary central inci-
has a carious lesion of the distal surface that involves the pulp. The mandibular incisors (B) have sustained trau-
injury with loss of pulp vitality and subsequent formation of diffuse periapical granulomata.*

Periapical granuloma



Treatment:

- Extraction
- Root canal treatment
- Apical curettage.



Apical periodontal cyst.

A, This cyst (1) developed in a pre-existing periapical granuloma such as that involving the apex of the maxillary [illegible] incisor (2). The two conditions cannot be differentiated by the roentgenogram—only histologically. B, This cyst develo[illegible] after traumatic injury to the mandibular incisors with loss of pulp vitality. There is mild apical root resorption associated [illegible] the development of the periapical lesion.

Acute exacerbation of chronic periapical granuloma. (Phoenix abscess)

- Most of the periapical granulomas clinically remains quiet as long as the balance b/w the bacteria contained within the root canal & body s defence in the granuloma is sustained .

- If this balance is lost an explosive type of acute exacerbation occurs in the preexisting chronic lesion which is known as **phoenix abscess.**

- Clinically presents severe pain, local swelling, extreme tenderness on pressure on the tooth & sometimes facial cellulitis.

Treatment

- Drainage through root canal.
- Antibiotics.

Periapical abscess (Dentoalveolar abscess)

- Defined as a localized acute or chronic suppurative infection in the periapical region of the tooth.
- **Etiology:**

1. Extension of pulpal infection into periapical tissue.
2. Perforation of the periapical foramen during root canal treatment which results in entry of pulpal microorganisms into periapical area.
3. Infection or bacterial invasion into preexisting periapical granuloma or cyst or scar.
4. Anachoretic infection of periapical tissue.

Pathogenesis:

- Mixed bacterial infection caused by strict anaerobes Prevotella & Porphyromones etc…
- Anaerobic streptococci & staphylococci also play major roles in causing the disease..

C/f:

1. Severe pain in affected tooth.
2. Localized swelling & an erythematous change in overlying mucosa.
3. Pain increases with percussion.
4. Tooth is slightly extruded from its socket.
5. Fever & Lymphadenopathy.

6. Pus discharging sinus often develops on the alveolar mucosa over affected root apex.
7. At the intra oral opening of the sinus tract , there is often a mass of subacutely inflammed granulation tissue known as parulis(gum boil).
8. Once drainage is there- pain reduces.
9. Pain comes back only when the drainage is blocked.

R/f:

1. Slight periodontal membrane thickening- Acute periapical abscess.

2. Chronic abscess developing in a periapical granuloma presents radiolucent area of the apex of the tooth.

3. In case of draining sinus – Gutta percha can be inserted & radiograph taken-It will reveal the source of infection.

Treatment:

1. Drainage
2. Antibiotics
3. Affected tooth- RCT & extraction


thank you
very much!