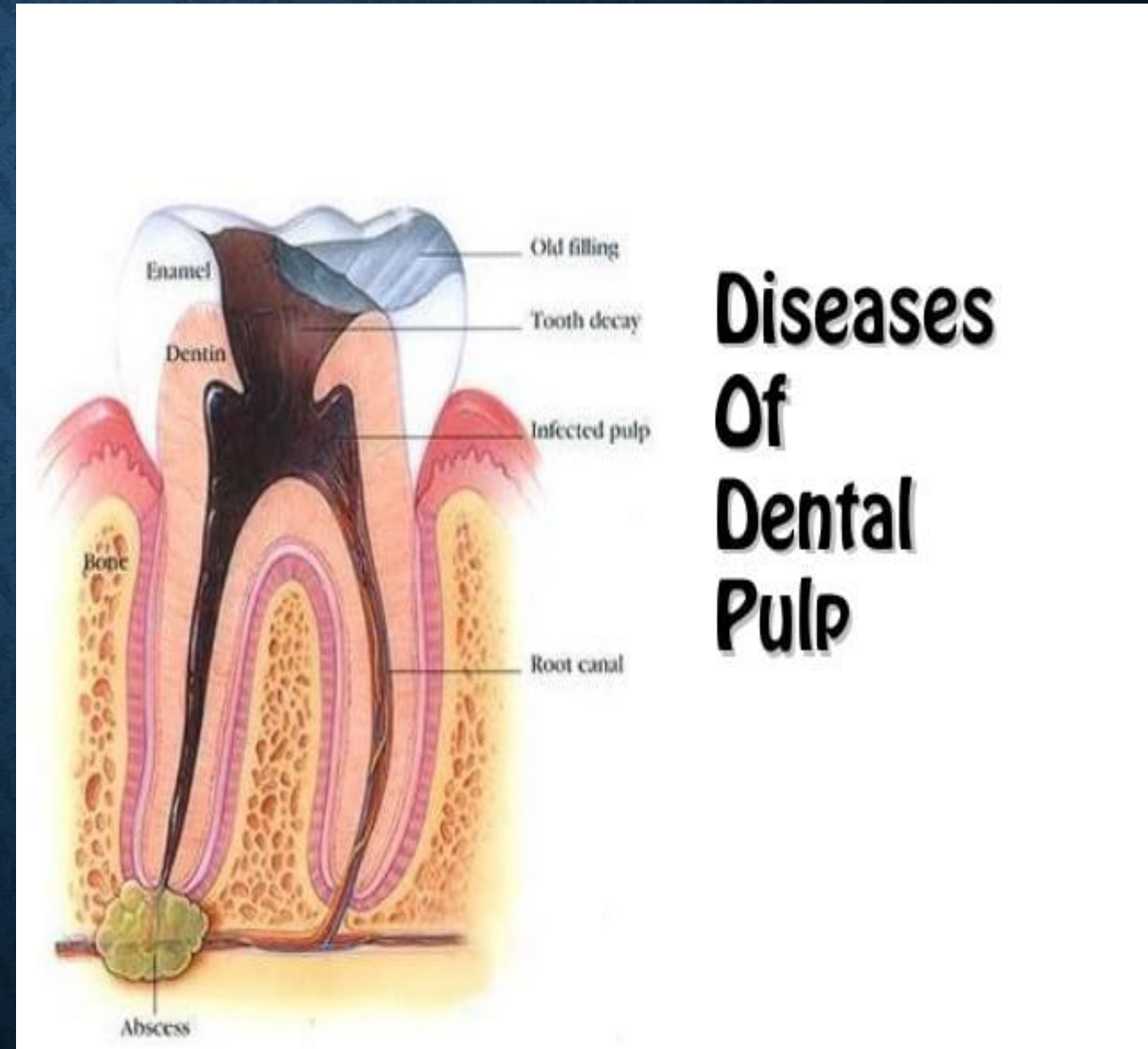


# ORAL PATHOLOGY

## LAB (3)

### 4<sup>TH</sup> STAGE



- Dental pulp – formative organ of the tooth which produces
  - **Primary dentin** during development of the tooth
  - **Secondary dentin** after the tooth eruption
  - **Reparative dentin** in response to stimulation as long as the odontoblasts remain intact.
- Pulp consists of
  - Tiny blood vessels
  - Lymph
  - Myelinated and unmyelinated nerve fibres, etc..

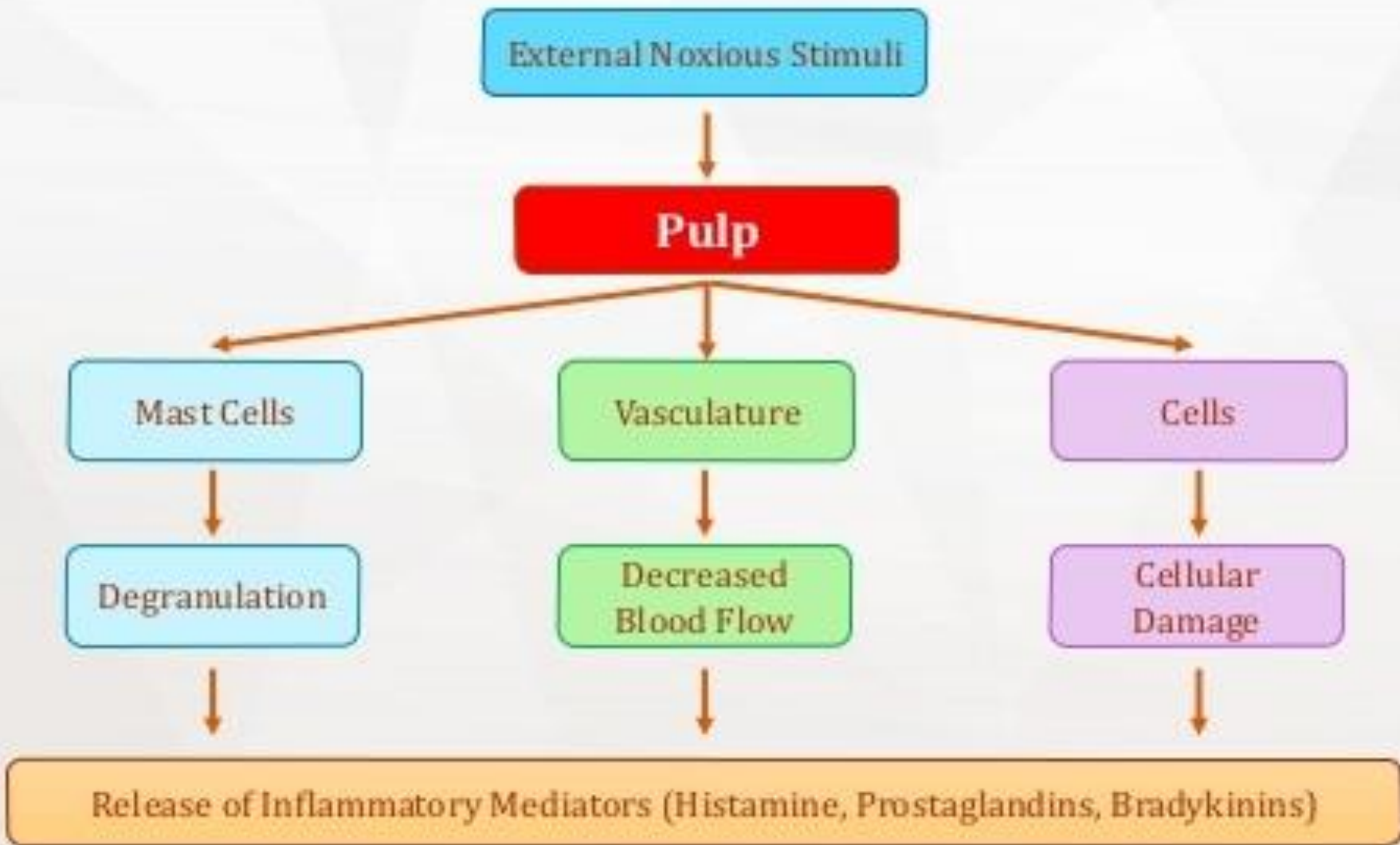
# DEFINITION OF PULPITIS

- It is the **inflammation** of pulp resulting due to :-
  - 1) Trauma
  - 2) Thermal shock during cavity preparation
  - 3) Excessive dehydration of cavity
  - 4) Placing of fresh amalgam in contact with pulp
  - 5) Chemical stimulus from any food-stuff



# TYPES OF PULPITIS

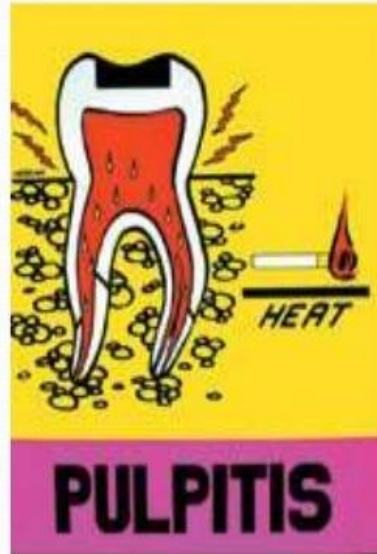
1. Reversible pulpitis
  - a) Symptomatic(acute)
  - b) Asymptomatic(chronic)
2. Irreversible pulpitis
  - a) Acute
    - Abnormally responsive to cold
    - Abnormally responsive to heat
  - b) Chronic
    - Asymptomatic with pulp exposure
    - Hyperplastic pulpitis
    - Internal resorption





## REVERSIBLE PULPITIS

- It is a mild to moderate condition of the pulp caused by noxious stimuli in which the pulp is capable of returning to uninflamed state following removal of stimuli.



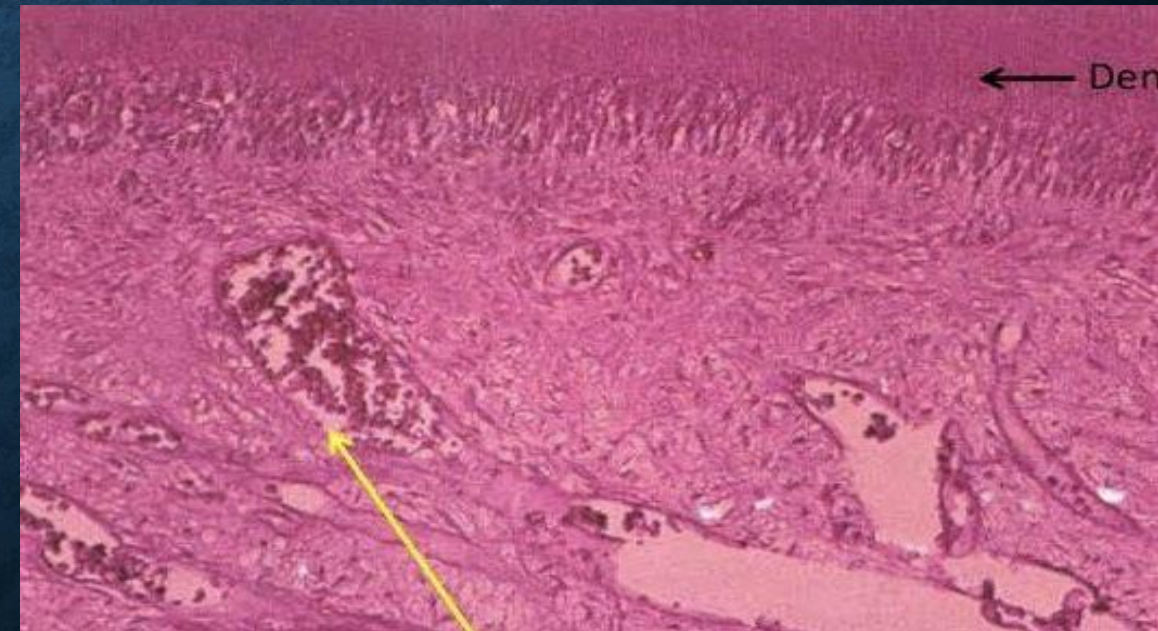
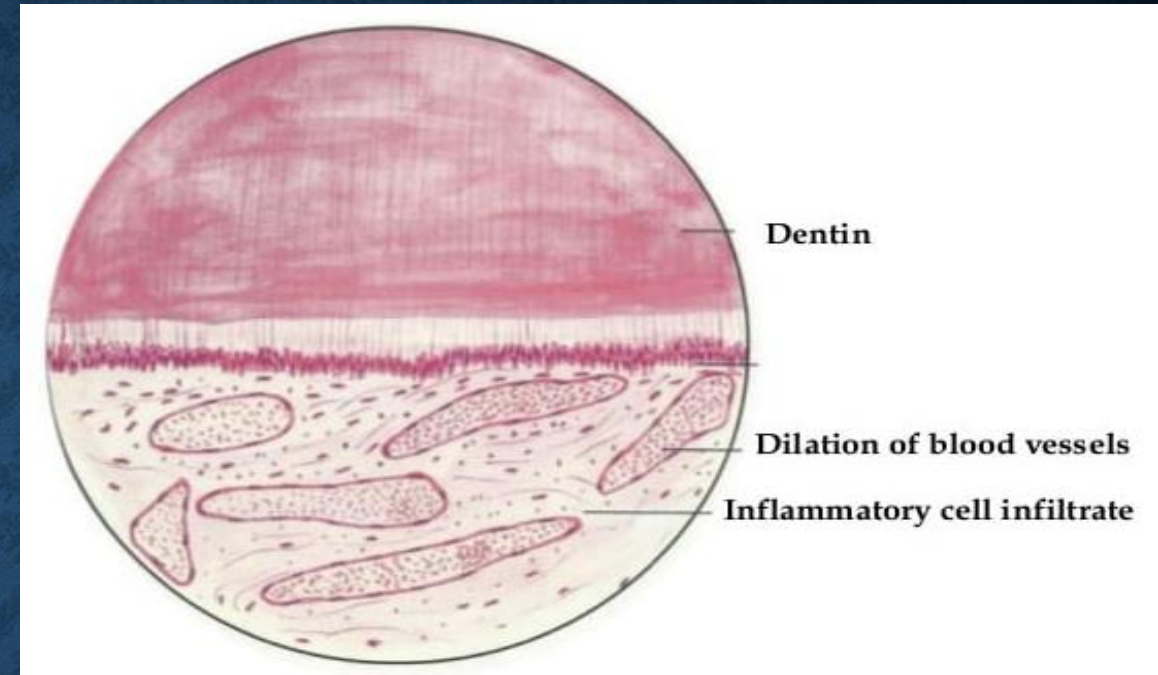
## SYMPTOMS

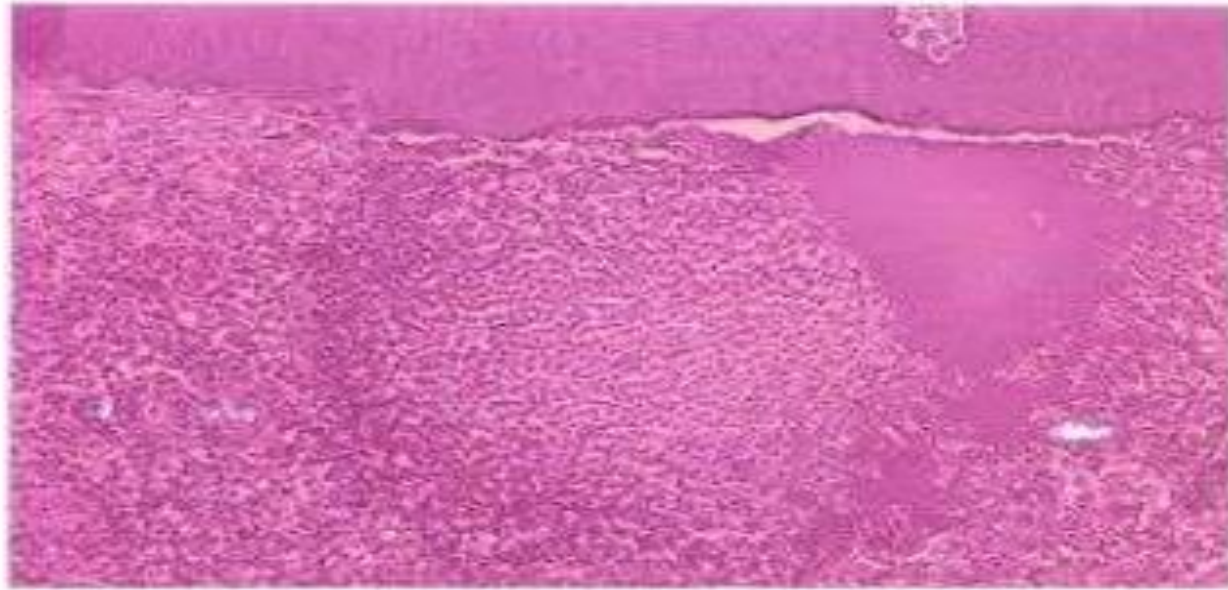
- Symptomatic reversible pulpitis is characterized by **sharp pain lasting for a moment.**
- It is more often brought on by cold than hot food or beverages and by cold air.
- Clinically, the difference between reversible & irreversible pulpitis is quantitative, the pain of irreversible pulpitis is more severe & lasts longer.



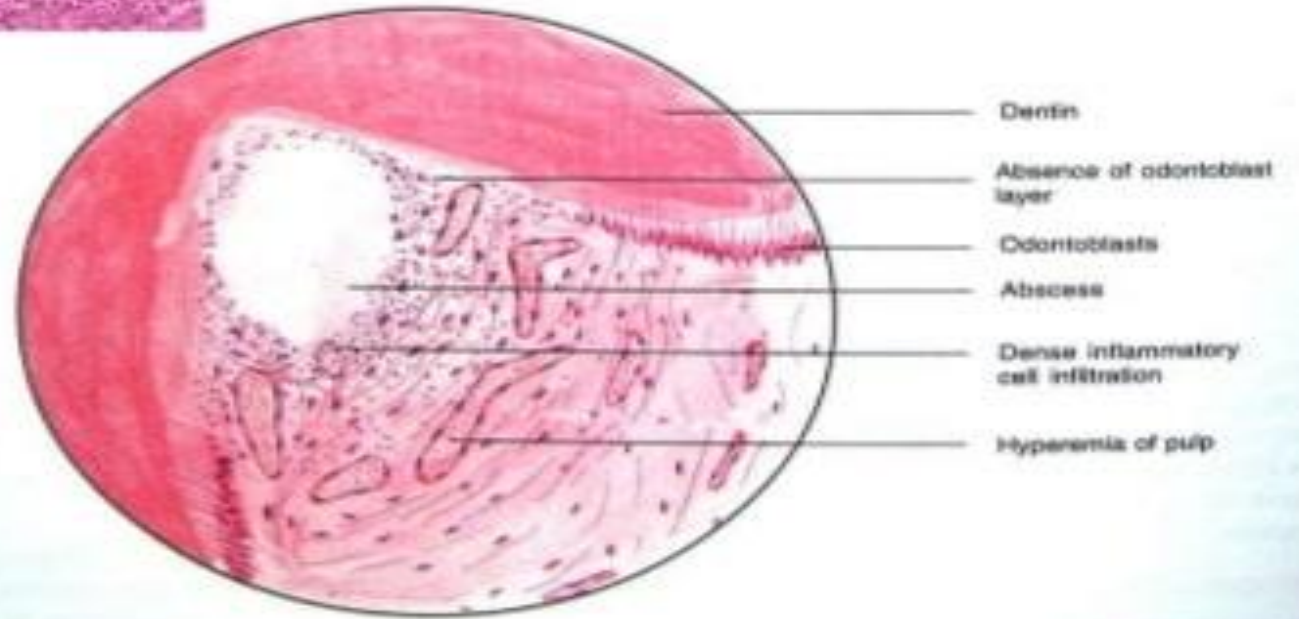
# HISTOPATHOLOGY

- It may range from hyperemia to mild to moderate inflammatory changes limited to area of involved dentinal tubules such as dental caries.
- Microscopically, one can see reparative dentin, disruption of odontoblast layer, dilated blood vessels, extravasation of edema fluid, presence of immunologically competent chronic inflammatory cells.





**Dental pulp exhibiting acute inflammatory infiltrate consisting predominantly of polymorphonuclear leukocytes.**



Pulp abscess



## DIAGNOSIS

### 1) Inspection:

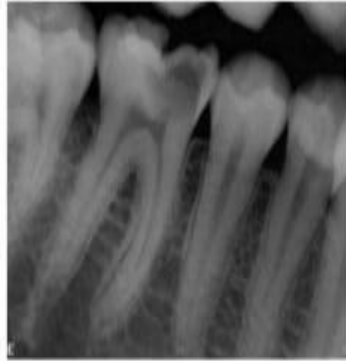
- Discloses a deep cavity
- Pulp exposure

### 2) Radiography:

- Exposure of the pulp
- Caries under a filling

### 3) Thermal test

---



## TREATMENT

- The best treatment for reversible pulpitis is prevention.
- Periodic care to prevent the development of caries, early insertion of a filling if a cavity has developed.
- Desensitization of necks of teeth where gingival recession is marked.
- Use of cavity varnish or cement base before insertion of filling & care in cavity preparation & polishing are recommended to prevent pulpitis.

# IRREVESESIBLE PULPITIS

- It is **persistent** inflammatory condition of pulp either symptomatic or asymptomatic caused by a noxious stimulus.
- The pain persists for **several minutes to hours**, lingering after removal of thermal stimulus.
- Most common cause is bacterial involvement of pulp through caries.
- Any clinical, chemical, thermal factor can also cause irreversible pulpitis.





## SYMPTOMS

- In early stages, a paroxysm of pain is caused by sudden temperature changes particularly cold.
  - The pain often continues when cause has been removed.
  - The patient may describe the pain as sharp, piercing or shooting & it is generally severe.
  - It may be intermittent or continuous depending on the degree of involvement of pulp.
  - The patient may also have pain referred to adjacent teeth, sinuses or to the temple when upper posterior teeth are involved.
- In later stages, the pain is more severe & is generally described as boring, gnawing or throbbing.
  - The pain need not to be macroscopically exposed but a slight exposure is generally present.
  - Pain is increased by heat & is sometimes relieved by cold.
  - After exposure & drainage of pulp, pain may be slight manifesting itself as a dull consciousness or it may be entirely absent.

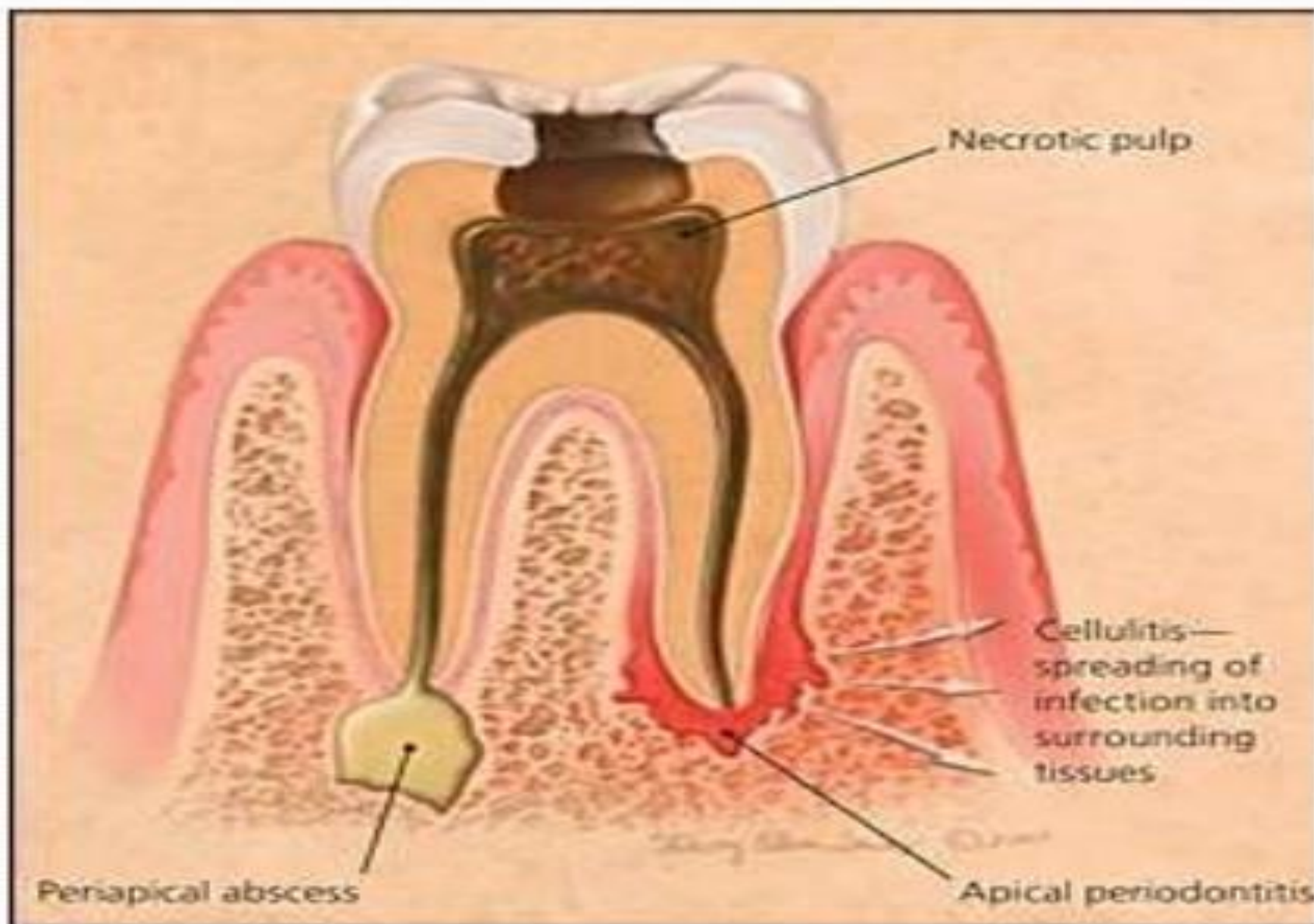


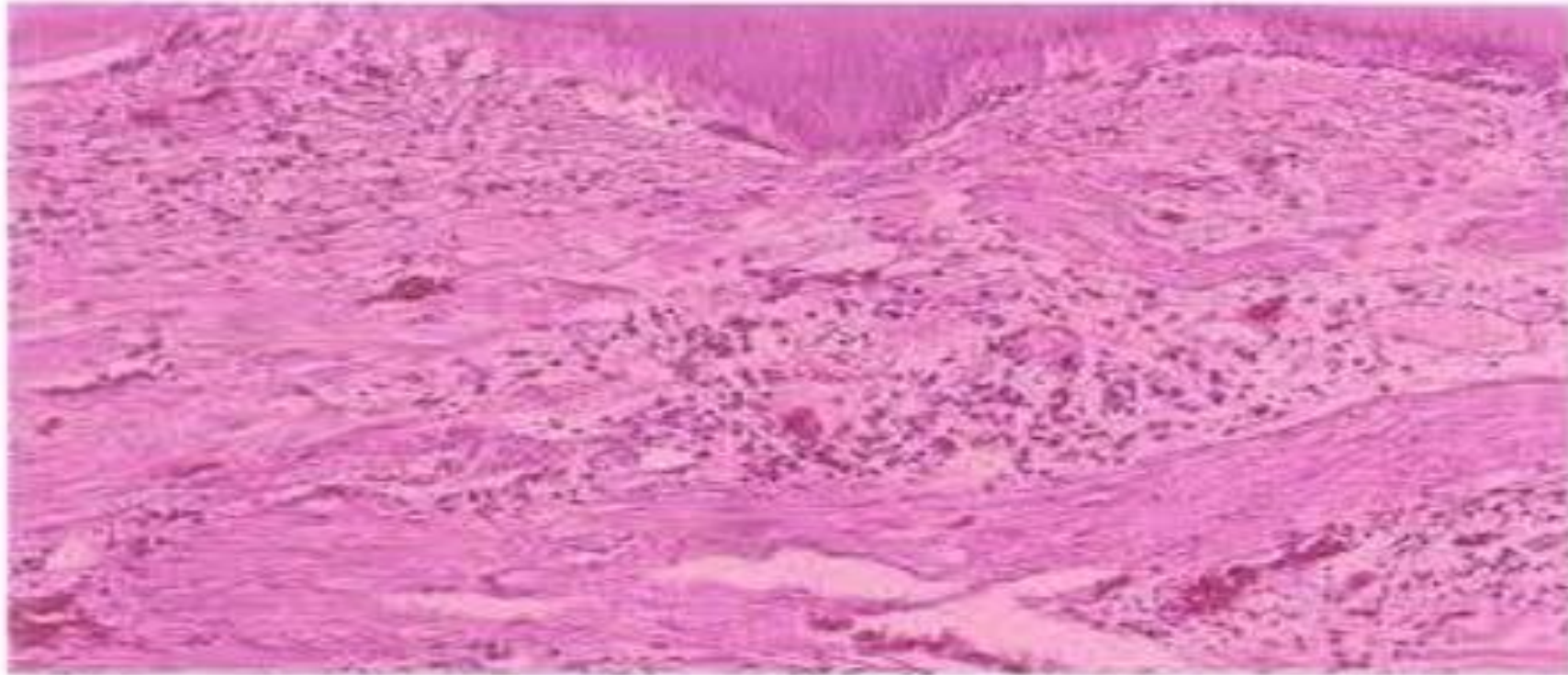
# HISTOPATHOLOGY

- Irreversible pulpitis may be caused by a **long-standing** noxious stimulus such as caries.
- As it penetrates the dentin, caries cause a chronic inflammatory response.
- If the caries is not removed, the inflammatory changes in pulp will increase in severity as the caries approaches the pulp.
- The post-capillary venules become congested & affect the circulation within the pulp, causing necrosis.

- These necrotic areas attract polymorphonuclear leukocytes by chemotaxis & start an acute inflammatory reaction.
- The lysosomal enzymes lyse some of pulp stroma & form a purulent exudate.
- The inflammatory reaction produces micro-abscesses.
- If the carious process continues to advance & penetrates the pulp, an area of ulceration is formed which drains the carious exposure into oral cavity & reduces the intra-pulpal pressure & therefore, the pain.







**The dental pulp exhibits an area of fibrosis and chronic inflammation peripheral to the *zone* of abscess formation.**

---



# TREATMENT

- Treatment consists of **complete removal of pulp or pulpectomy**.
- In posterior teeth, in which time is a factor, the removal of coronal pulp or pulpectomy should be performed in emergency procedure.
- Surgical removal should be considered if tooth is not restorable.

## CHRONIC HYPERPLASTIC PULPITIS

- It is a productive pulpal inflammation due to extensive carious exposure of a young pulp. It is also known as “**pulp polyp**”.
- This disorder is characterized by development of **granulation tissue**, covered at times with epithelium & resulting from long-standing, low-grade irritation.





## DIAGNOSIS

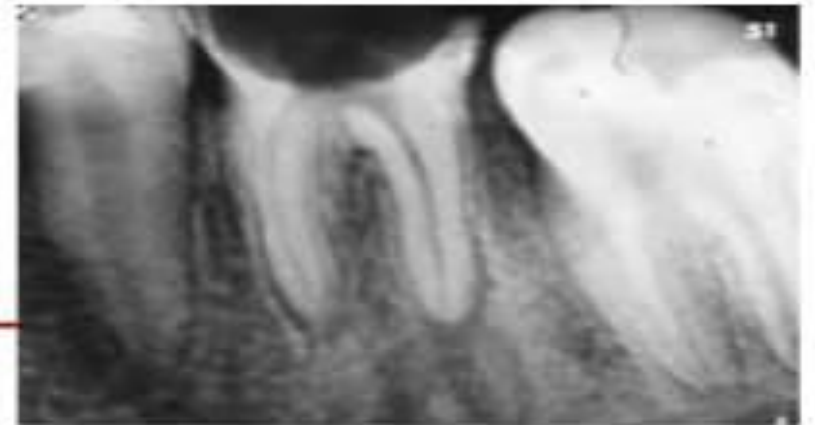
### Clinical Examination:

- Seen in children and young adults
- A freshly, reddish pulpal mass fills most of the pulp chamber or cavity or even extends beyond the confines of the tooth.



### Radiography:

- Large open cavity with direct access to the pulp chamber



# CAUSE & SYMPTOMS

- The cause of pulp polyp is slow, progressive carious exposure of the pulp.
- For the development of hyperplastic pulpitis, **a large open cavity; a young, resistant pulp; & a chronic low grade stimulus** is necessary. Mechanical irritation from chewing & bacterial infection often provide the stimulus.
- Pulp polyp is **symptomless** except during mastication, when pressure of food bolus may cause discomfort.





# HISTOPATHOLOGY

- The surface of pulp polyp is usually covered by stratified squamous epithelium.
- The pulp tissue is chronically inflamed
- The pulp polyps of deciduous teeth are more likely to be covered with stratified squamous epithelium than those of permanent teeth.
- The epithelium may be derived from gingiva or from freshly desquamated epithelial cells of mucosa or tongue.
- The tissue in pulp chamber is often transformed into granulation tissue, which projects from pulp into carious lesion.

# TREATMENT

- The treatment should be directed towards elimination of polypoid tissue followed by **extirpation of pulp**, provided the tooth can be restored.
- When the hyperplastic pulp mass has been removed with periodontal curette or spoon excavator, the bleeding can be controlled with pressure
- The pulp tissue of chamber is completely removed & a temporary dressing is sealed in contact with radicular pulp tissue.



# INTERNAL RESORPTION

- It is an **idiopathic** slow or fast progressive resorptive process occurring in the dentin of pulp chamber or root canals of teeth.
- The cause of internal resorption is not known, but such patients have a history of trauma.



# HISTOPATHOLOGY

- The internal resorption is the result of osteoclast activity.
- The resorptive process is characterized by lacunae, which may be filled with osteoid tissue. The osteoid tissue may be regarded as an attempt at repair.
- Multi-nucleated giant cells or dentinoclasts are present.
- The pulp is chronically inflamed.
- Metaplasia of the pulp i.e. transformation to another type of tissue such as bone or cementum.



## SYMPTOMS

- In internal resorption, the root of the tooth is asymptomatic .
- In crown, it is manifested as a reddish area called “**pink spot**”.
- The affected tooth is also known as “**Pink tooth of mummery**”
- The reddish area represents the granulation tissue showing through the resorbed area of crown.



## TREATMENT

- Extirpation of the pulp stops the internal resorptive process.
- In many patients, the condition progresses unobserved because it is painless, until the root is perforated.
- In such case, **mineral trioxide aggregate (MTA)** is recommended to repair the defect. When the repair has been completed, the canal with its defect is obturated with plasticized gutta-percha.

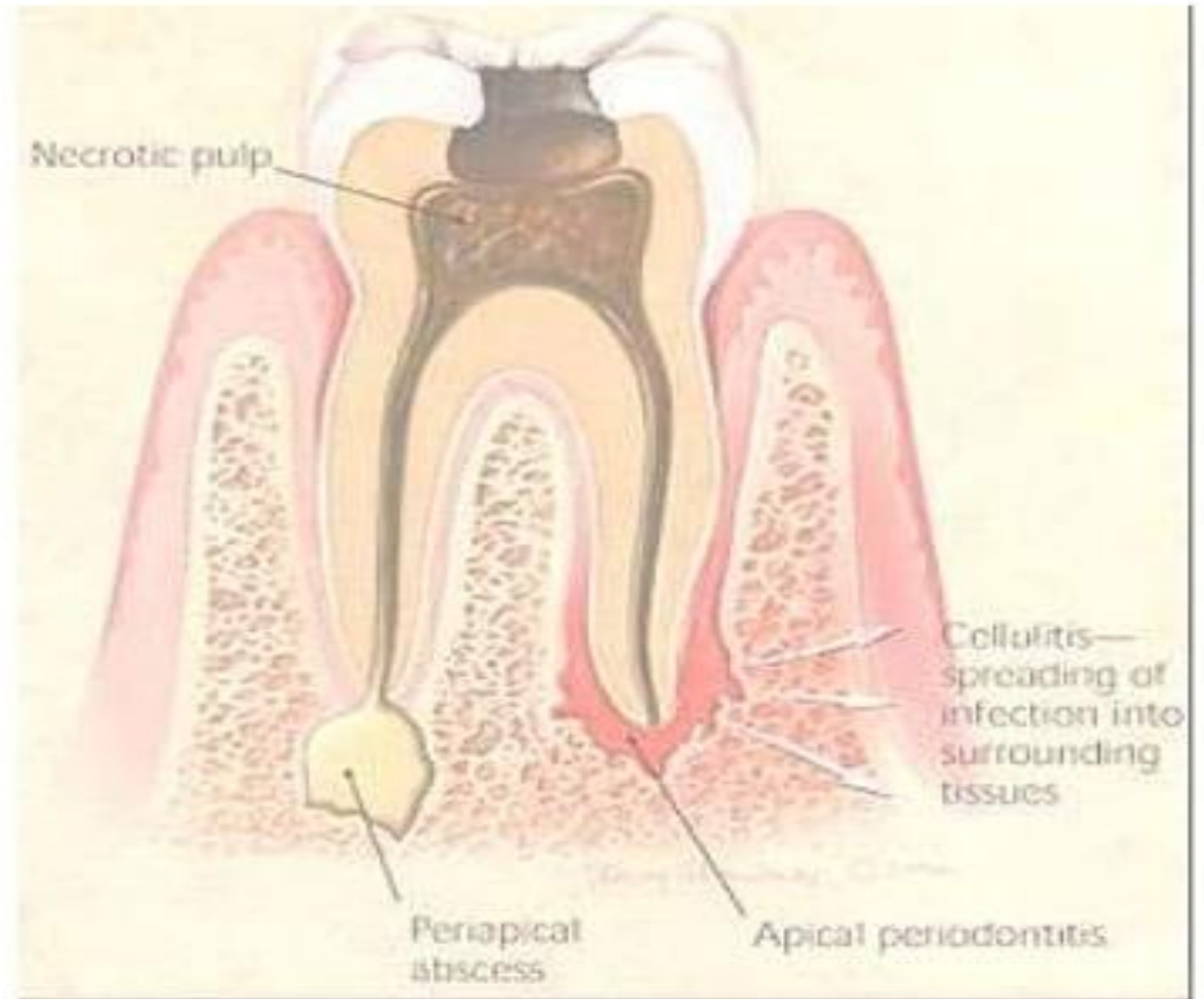




## Gangrenous Necrosis of Pulp

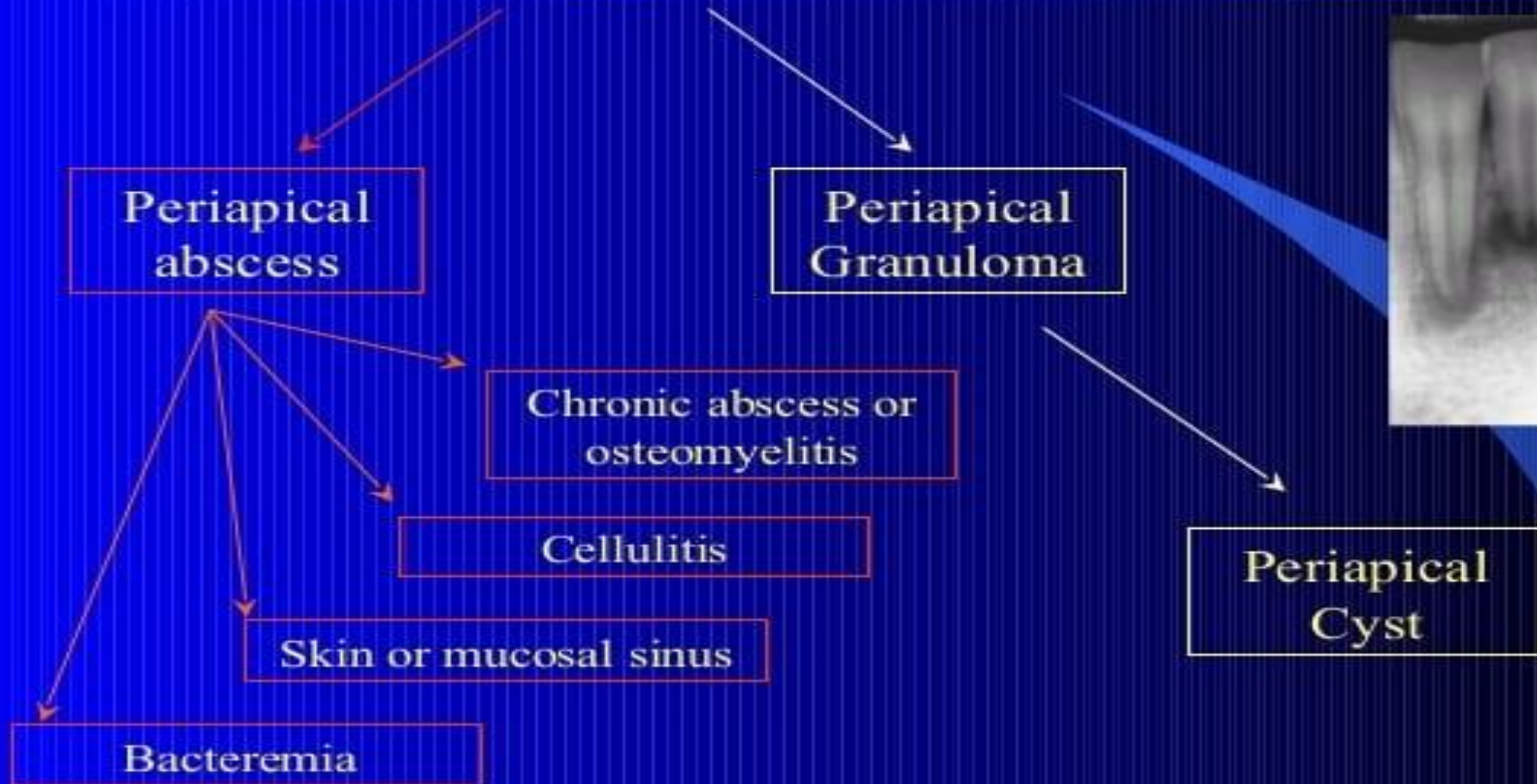
- Untreated pulpitis → results complete necrosis of pulp.
  - As this is associated with bacterial infection – pulp gangrene.
  - It is associated with foul odor when pulp is opened for endodontic treatment.
  - In sickle cell anemia, blockage of pulp vessels seen
  - Dry gangrene- pulp dies for unexplained reasons.
  - This may be due to trauma or infarct.
-

## **Diseases Of Periapical Tissues**





# Periapical inflammation



# Acute Abscess

## • Etiology:

- Acute pulpitis.
- Chronic periapical lesions.



*Aiman A. Ali, DDS, PhD.*

# Acute Abscess

## • Clinical Features:

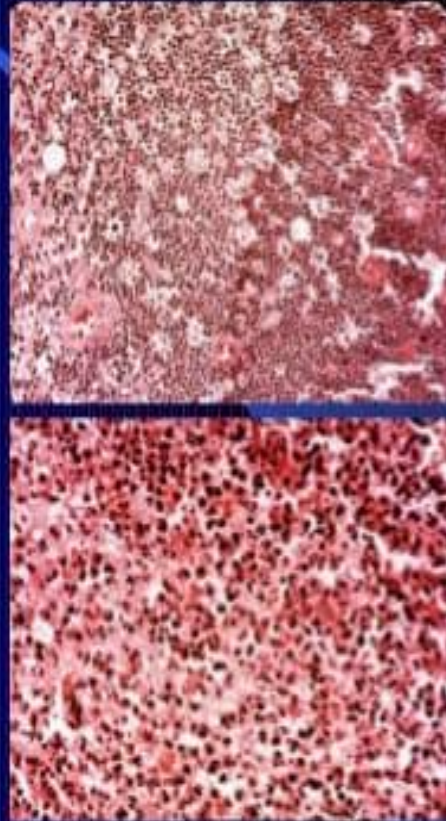
- Pain: sever and increases with percussion.
- Non-vital tooth.
- The tooth is slightly extruded in its socket.
- Fever and malaise and regional lymphadenitis.
- Osteomyelitis and swollen of the adjacent area.



# Acute Abscess

## • Histopathological Features:

- Zone of liquefaction composed of:
  - Exudates.
  - Necrotic tissue.
  - Dead neutrophils.
- Dilated blood vessels.
- Inflammatory [granular cell] infiltration.



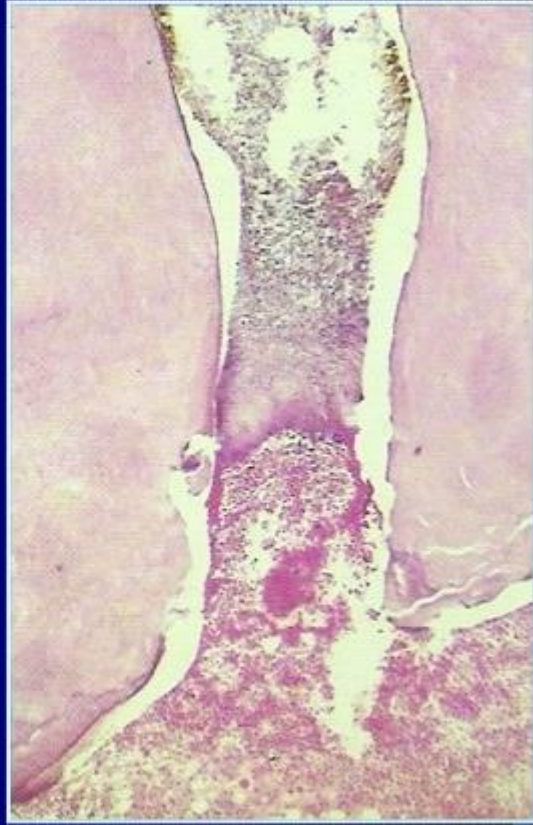
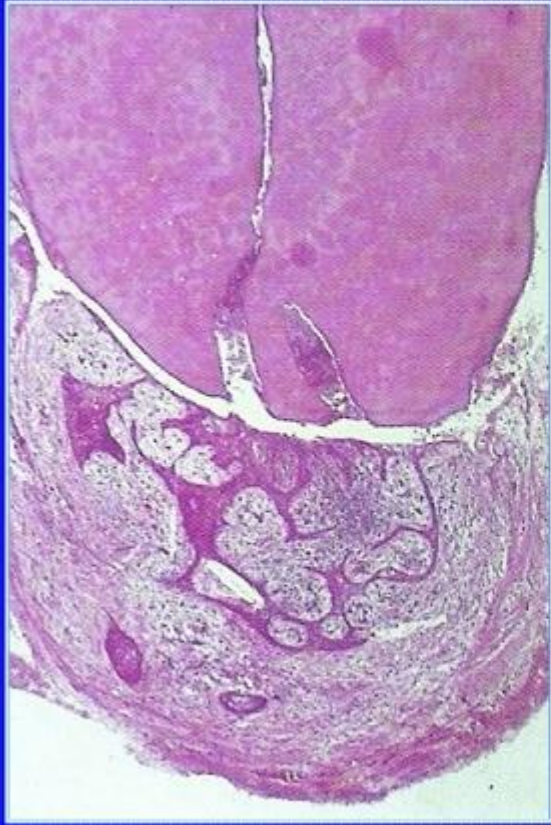
# Acute Abscess

## • Treatment:

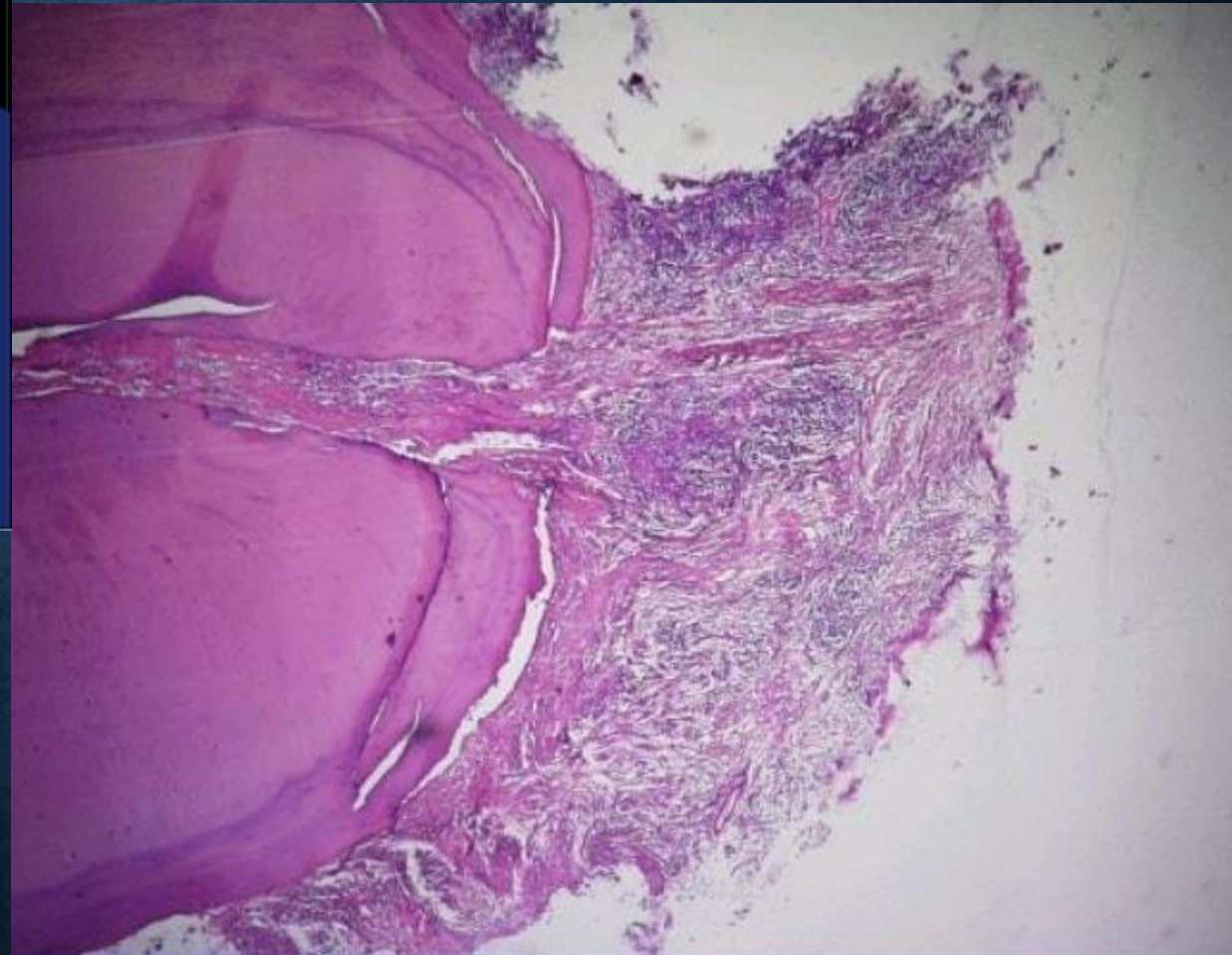
- Drainage.
- Administration of antibiotics.
- Supportive treatment.





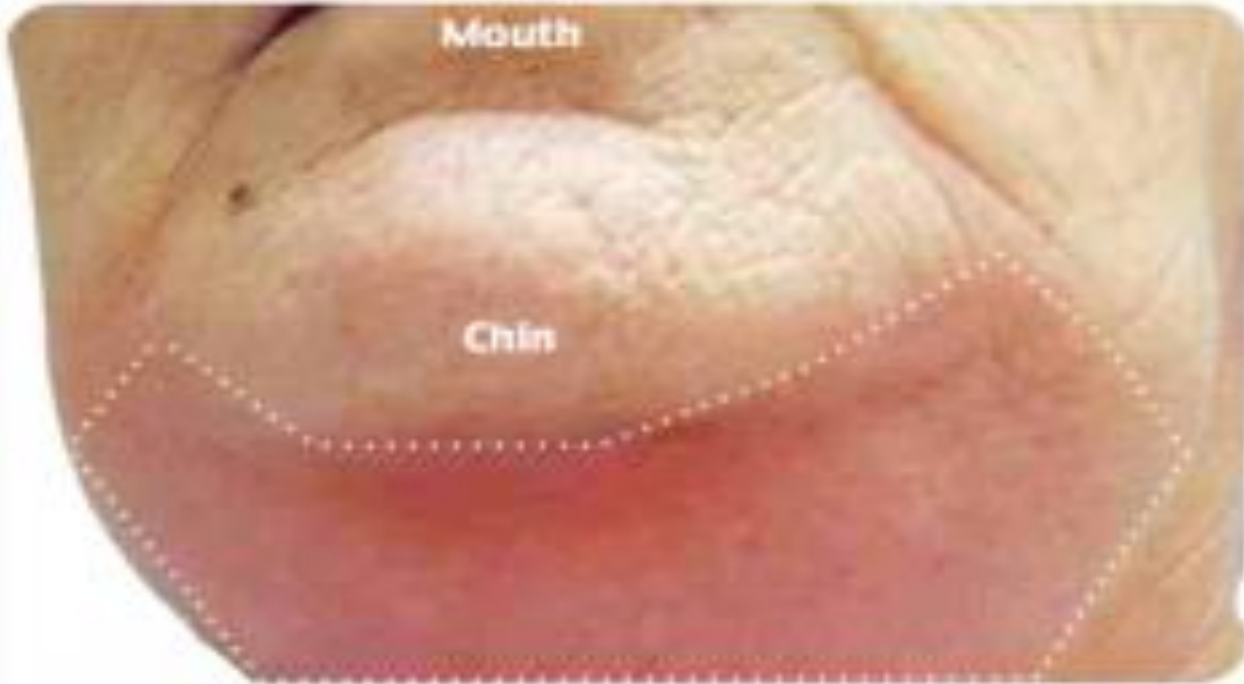


*Aiman A. Ali, DDS, PhD.*





# Ludwig's Angina



## Clinical

- Pain, drooling, dysphonia
- Brawny neck edema
- Bilateral submandibular swelling
- Tongue protrusion or elevation

## Management

- Emergent ENT/Oral surgery consultation
- Broad spectrum ABX and airway management





**Easy!**  
**My Name May Be**  
**Ludwig,**  
**But I Don't Cause**  
**Angina!**

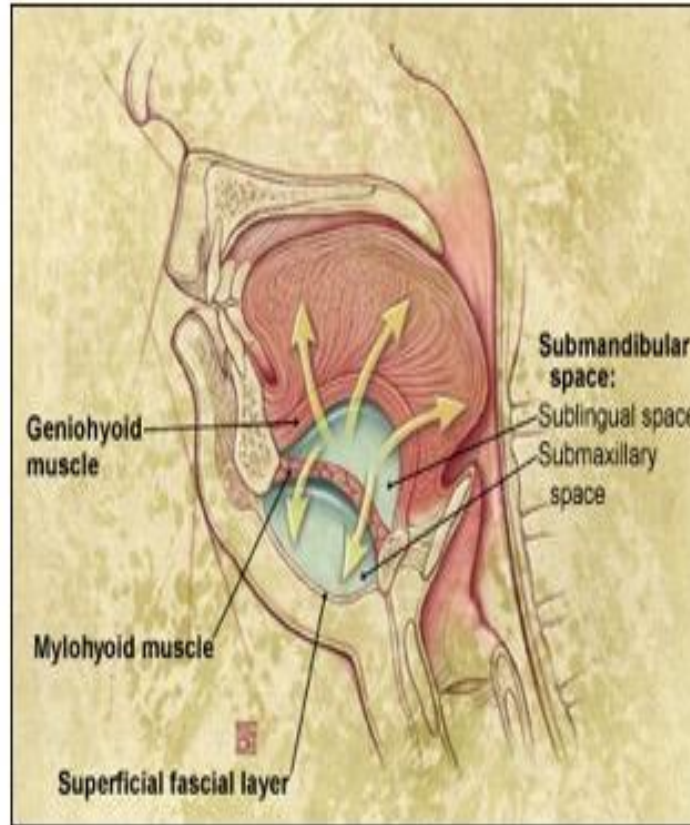


Image Credit: <http://www.oafp.org/atp/1999/0701/atp19990701p109-15.jpg>

## What is it?

- Bilateral infection of the submandibular space (which consists of the sublingual and submaxillary spaces)
- Aggressive, rapidly spreading cellulitis without lymphadenopathy with potential for airway obstruction<sup>1</sup>
- Infection can spread contiguously to the pharyngomaxillary and retropharyngeal spaces<sup>2</sup>
- Requires rapid intervention for prevention of asphyxia and aspiration pneumonia<sup>1</sup>

## X-Ray

- **Pulpitis:**

- Evaluation of the pulp chamber.
- Evaluation of the periapical region.



- **Acute abscess:**

- Thickening of periodontal membrane.
- Loss of the lamina dura.



*Aiman A. Ali, DDS, PhD.*

## Electrical Pulp Tester

- Acute reversible pulpitis.
- Acute irreversible pulpitis.
- Chronic pulpitis.
- Acute abscess.



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## **Apical periodontitis**

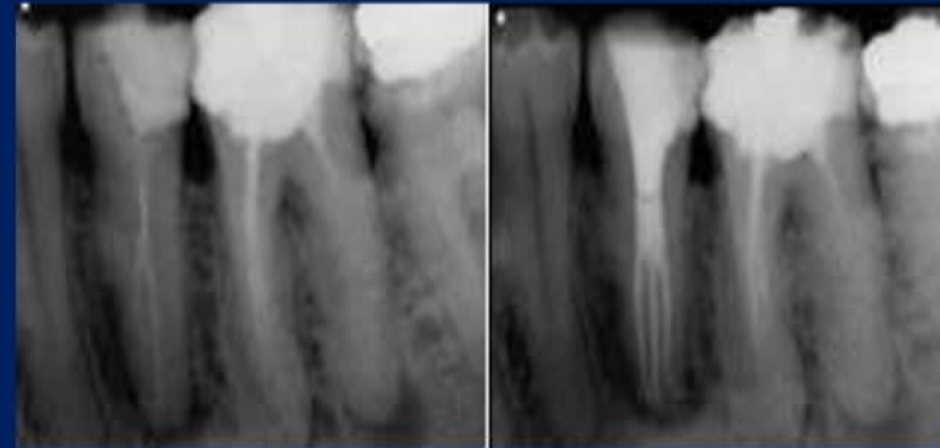
- **Inflammation of PDL around apical portion of root.**
- **Cause: spread of infection following pulp necrosis, occlusal trauma, inadvertent endodontic procedures etc.**
- **Types:**
  - **1.Acute Apical Periodontitis**
  - **2.Chronic Apical Periodontitis**

# Acute apical periodontitis

- **CLINICAL FEATURES:**
- Thermal changes does not induce pain.
- Slight **extrusion of tooth** from socket.
- Cause **tenderness on mastication** due to inflammatory edema collected in PDL.
- Due to external pressure, forcing of edema fluid against already sensitized nerve endings results in **severe pain**.
- **RADIOGRAPHIC FEATURES:**
- Appear normal except for **widening of PDL space**.



- **HISTOLOGIC FEATURES:**
  - PDL shows signs of inflammation -**vascular dilation**  
infiltration of PMNs
  - Inflammation is **transient**, if caused by acute trauma.
  - If irritant not removed, progress into **surrounding bone resorption**.
  - **Abscess formation** may occur if it is associated with **bacterial infection** Acute periapical abscess / Alveolar abscess.
- 
- **TREATMENT & PROGNOSIS:**
  - **Selective grinding** if inflammation due to occlusal trauma
  - RCT



## **Chronic Apical Periodontitis (Periapical Granuloma)**

- **Most common sequelae of pulpitis or apical periodontitis.**
- **If acute (exudative) left untreated turns to chronic (proliferative).**
- **Periapical granuloma is localized mass of chronic granulation tissue formed in response to infection.**
- **But term is not accurate since it doesn't show true granulomatous inflammation microscopically.**



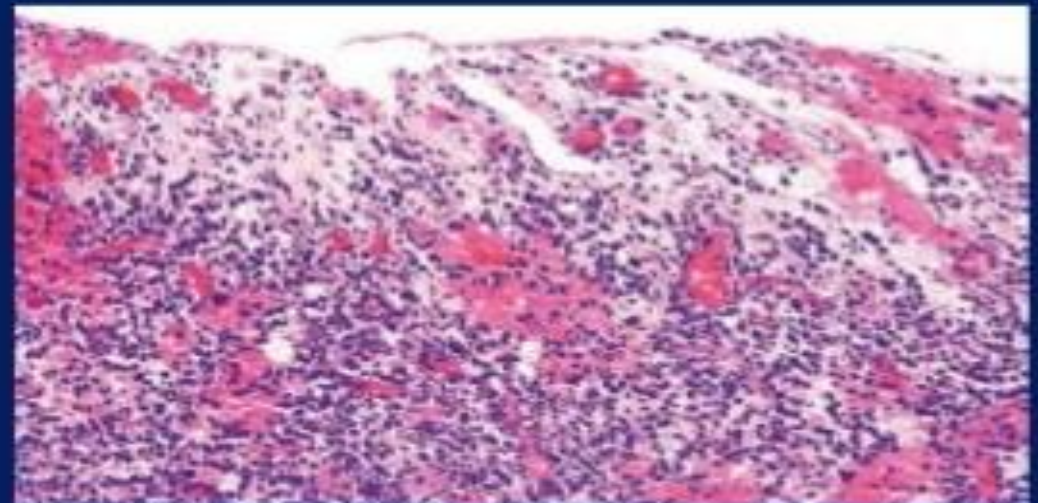
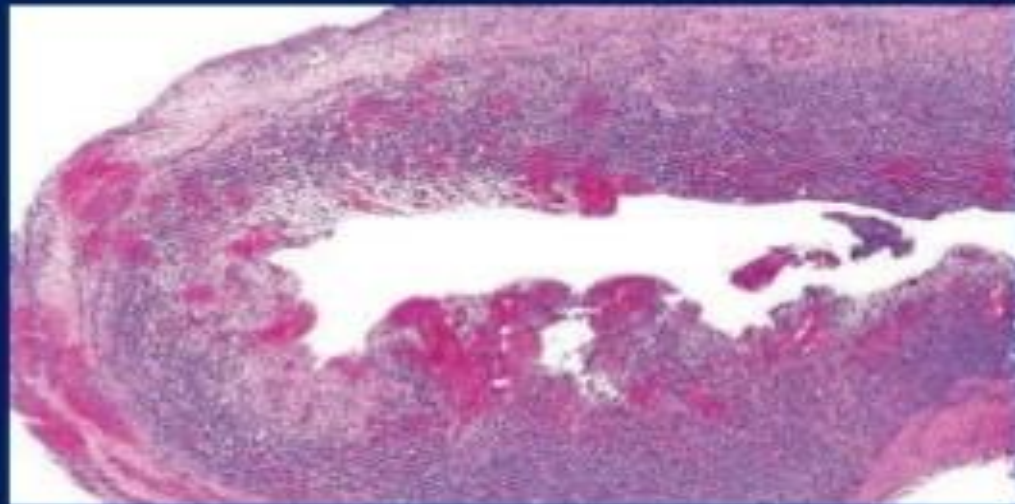
- **CLINICAL FEATURES:**
- Tooth involved is **non vital** / slightly tender on percussion.
- **Percussion** may produce **dull sound instead metallic** due to granulation tissue at apex.
- **Mild pain** on chewing on solid food.
- Tooth may be slightly elongated in socket.
- Sensitivity is due to hyperemia, edema & inflammation of PDL.
- In many cases, **asymptomatic**.
- **No perforation of bone & oral mucosa** forming fistulous tract unless undergoes acute exacerbation.

- **RADIOGRAPHIC FEATURES:**
- **Thickening of PDL** at root apex.
- **As concomitant bone resorption & proliferation of granulation tissue** appears to be **radiolucent area**.
- **Thin radiopaque line or zone of sclerotic bone** sometimes seen outlining lesion.
- **Long standing lesion** may show **varying degrees of root resorption**.



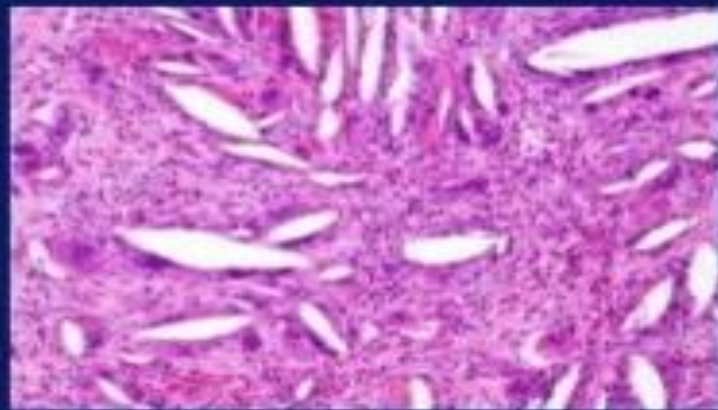


- **HISTOLOGIC FEATURES:**
- Granulation tissue mass consists **proliferating fibroblasts, endothelial cells & numerous immature blood capillaries with bone resorption.**
- Capillaries lined with swollen endothelial cells.
- Its is relatively homogenous lesion composed of **macrophages, lymphocytes & plasma cells.**
- Lymphocytes produces IgG, IgA, IgM & IgE modulators of disease activity.
- Plasma cells containing **Russels body** are found extracellularly.





- T lymphocytes produce cytotoxic lymphokines, collagenase & other enzymes & destructive lymphokines.
- Collection of **cholesterol clefts**, with **multinuclear giant cells**.
- **Epithelial rests of Malassez may proliferate** in response to chronic inflammation & may undergo cystification.



- **Bacteriologic Features:**
- Strep. viridans, strep. Hemolyticus, non hemolytic strep, staph. aureus, staph. Albus, E coli & pneumococci are isolated from lesion.
- **TREATMENT & PROGNOSIS:**
- Extraction or RCT with / without apicoetomy.



- **Residual Cyst**
- Type of **inflammatory odontogenic cyst** in **edentulous alveolar ridge**.
- Occur due to extraction of tooth, **leaving periapical pathology untreated** or **incomplete removal of periapical granuloma /cyst**.

- **RADIOGRAPHIC FEATURES:**

- **Round /ovoid radiolucency** in alveolar ridge.
- **Lumen may show radiopacity - dystrophic calcification**

- **TREATMENT & PROGNOSIS:**

- Cyst should **curetted** & lining should be subjected to **histopathological examination**.

## Periapical Abscess (Dento-Alveolar abscess, Alveolar Abscess)

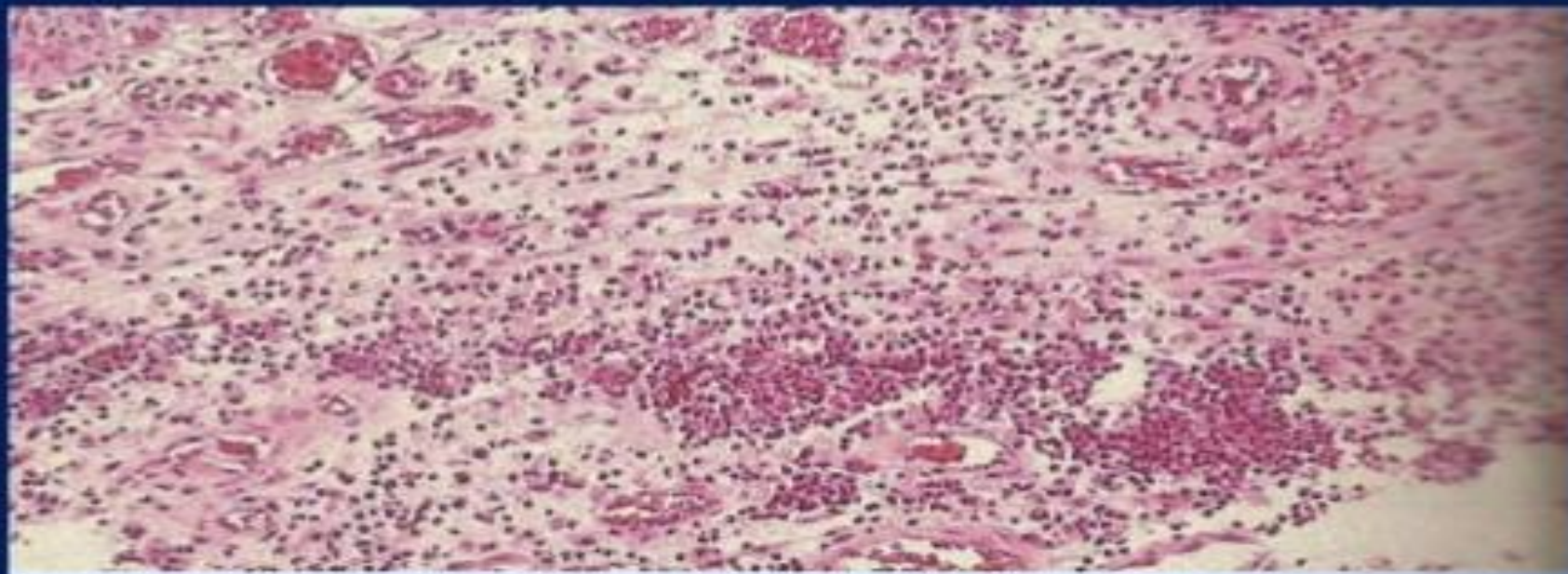
- Developed from acute periodontitis / periapical granuloma.
- Acute exacerbation of chronic lesion **Phoenix Abscess**
- Cause due to – pulp infection, traumatic injury pulp necrosis, irritation of periapical tissues ( endo procedures).

- **RADIOGRAPHIC FEATURES:**
- Slight thickening of PDL space.
- **Radiolucent area at apex of root.**





- **HISTOLOGIC FEATURES:**
- Area of suppuration composed of PMN leukocytes, lymphocytes, cellular debris, necrotic materials & bacterial colonies.
- Dilation of blood vessels in PDL & bone marrow space.
- Marrow space show inflammatory infiltrates.
- Tissue around area show suppuration containing serous exudate.



- **TREATMENT & PROGNOSIS:**
- Drainage of abscess by opening pulp chamber or extraction.
- RCT.
- If untreated, causes osteomyelitis, cellulites & bacteremia & formation of fistulous tract opening to oral mucosa.
- Cavernous sinus thrombosis has been reported





Enamel

Dentin

Pulp

Cementum

Periodontal ligament

Lamina dura

Apical foramen

*F. Gaillard*  
2018

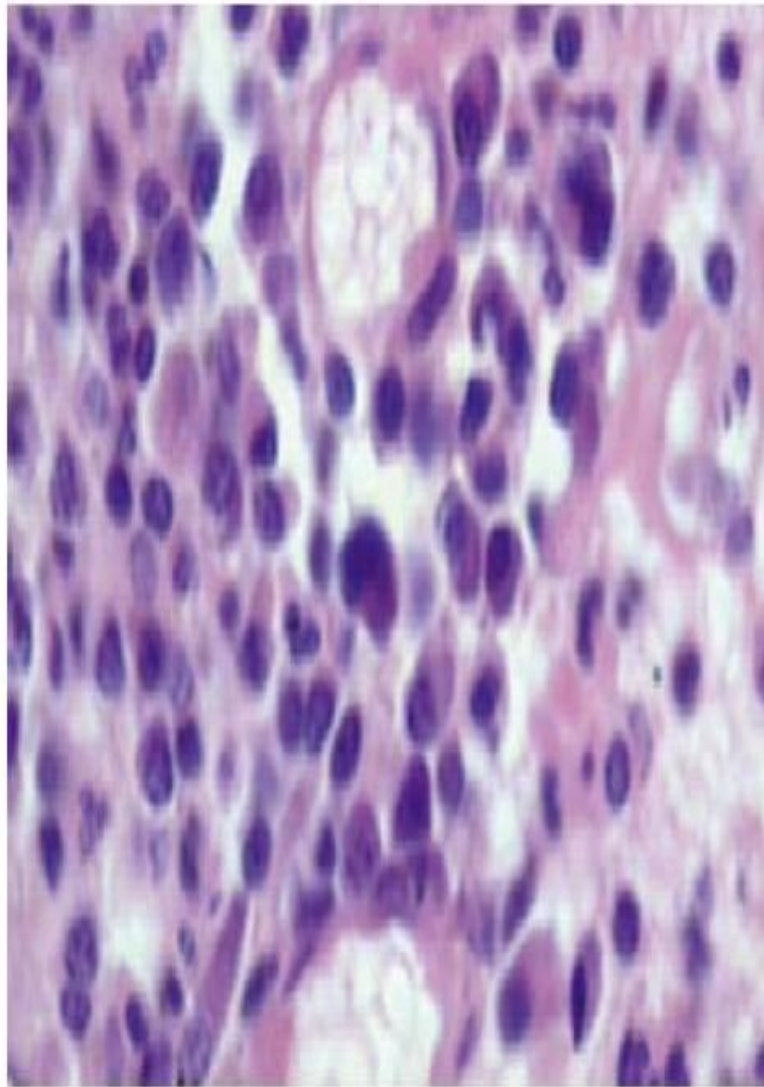


Figure 1: Periapical granuloma

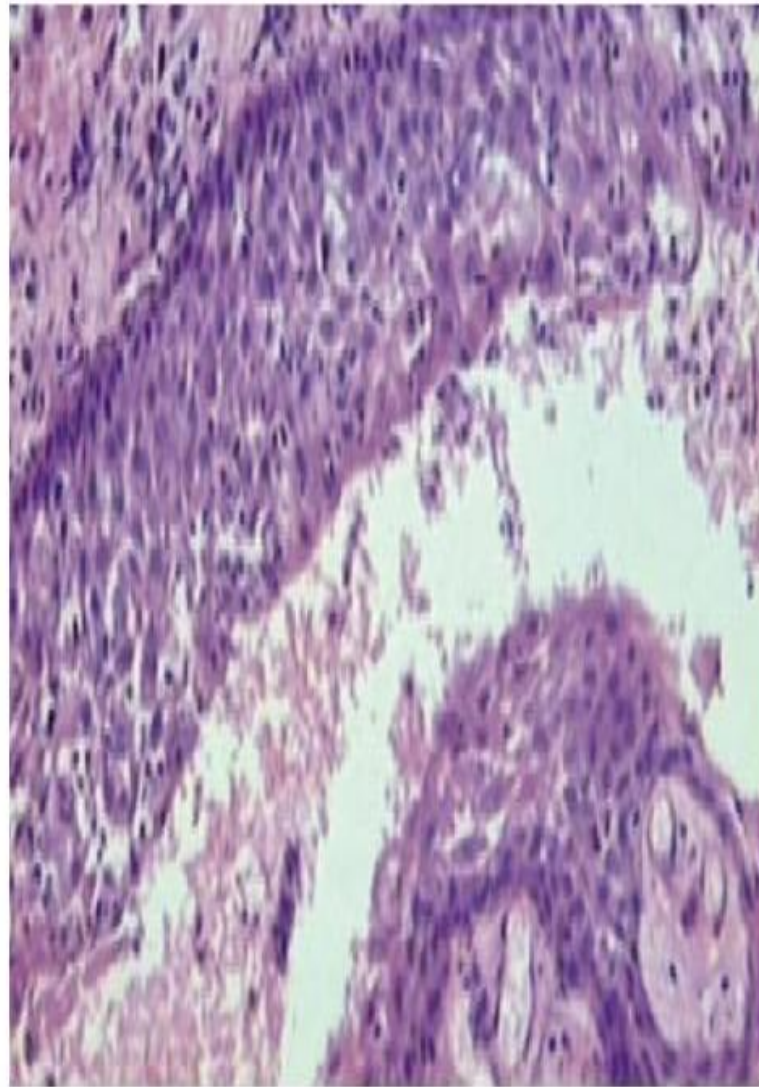


Figure 2: Periapical cyst

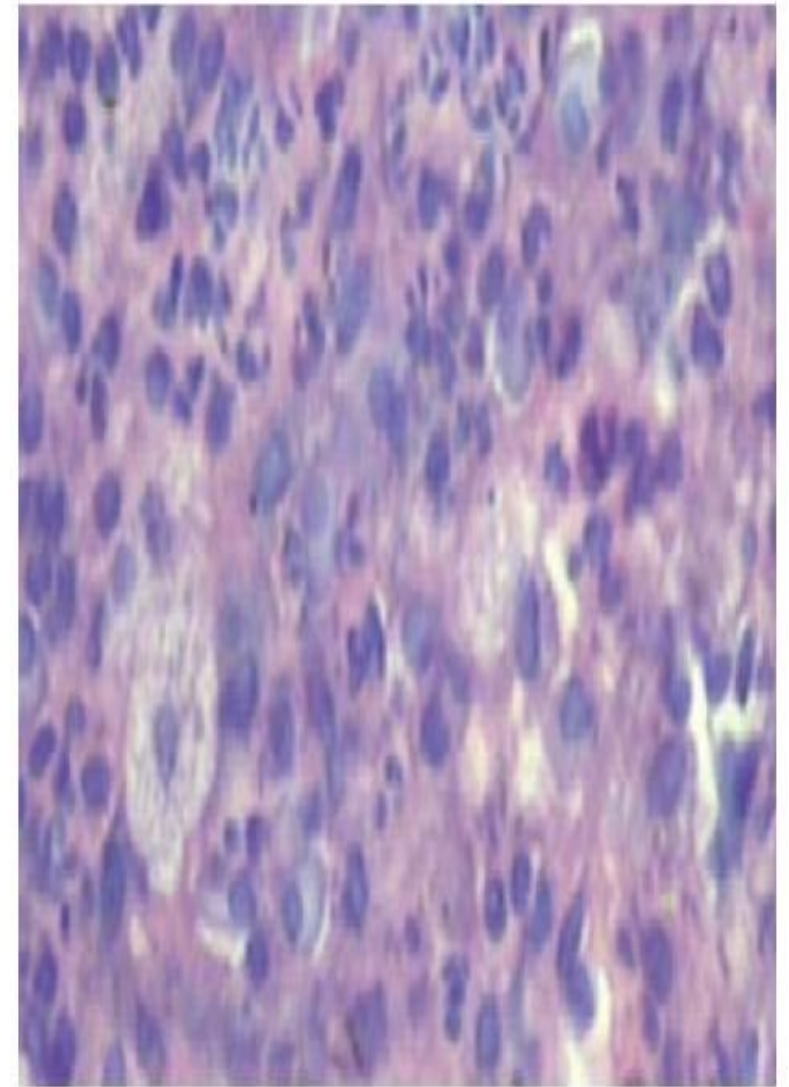


Figure 3: Periapical abscess



