

# Periapical diseases.

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# Periapical periodontitis - aetiology

- Pulpitis and pulp necrosis
- Trauma
- Endodontic treatment

# Periapical periodontitis

- Acute periapical periodontitis
- Chronic periapical periodontitis  
(periapical or apical granuloma)
- Acute periapical abscess and spread of inflammation

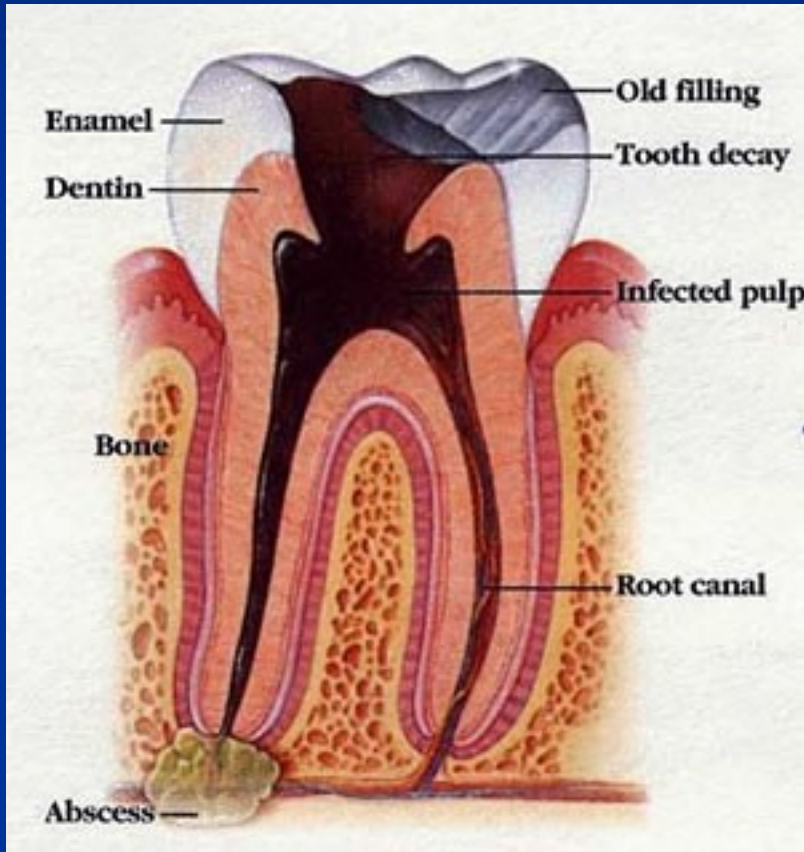
# Periapical periodontitis

- Dynamic process; inflammation can vary with time
- Outcome reflects the balance between the nature, duration, and severity of the irritant and the effectiveness of the host defences
- Bacterial infection of the root canals is the major cause of clinically significant periodontitis
- Can follow acute traumatic injury to periapical tissues without pulp necrosis
- Endodontic treatment, instrumentation of infected root canal

# Acute periapical periodontitis

- Acute inflammatory exudate in the periodontal ligament (between root apex and alveolar bone)
- Pain elicited by external pressure (pulpitis well located)
- Hot or cold stimulation does not induce pain, as it would in pulpitis
- Radiography usually normal; no bone resorption yet
- Acute periapical or alveolar abscess can develop directly

# Periapical abscess



# Chronic periapical periodontitis (periapical or apical granuloma)

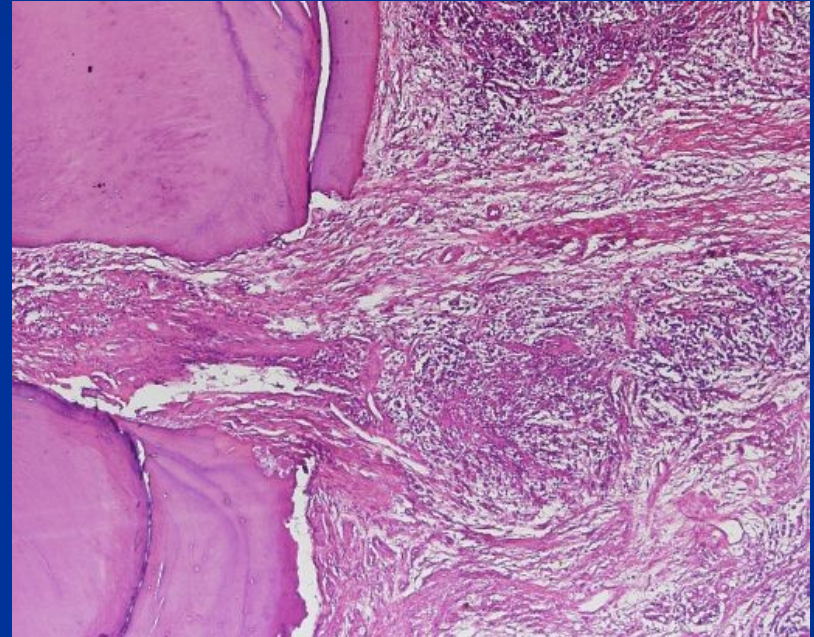
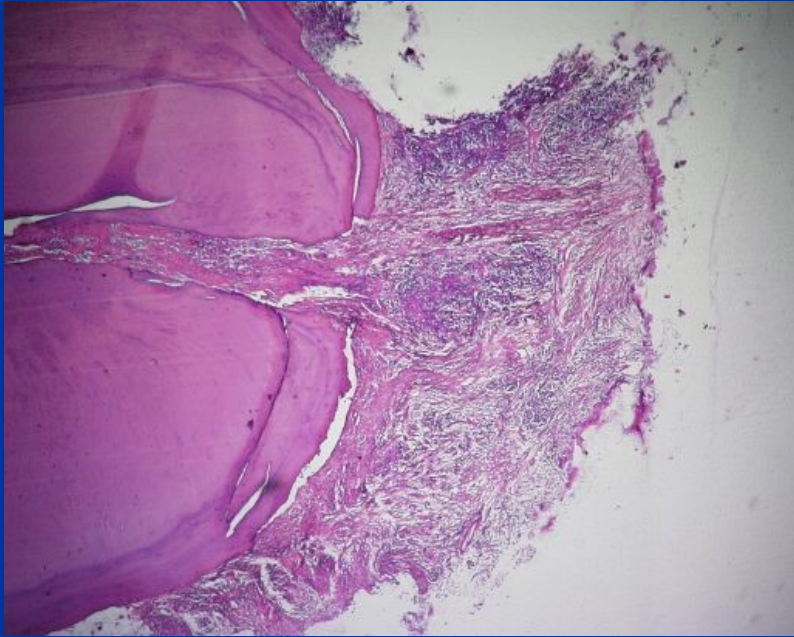
- Persistent irritation, bacteria (anaerobes predominate) in the pulp chamber and root canals results in chronic periapical periodontitis
- Resorption of periapical alveolar bone, replacement by granulation tissue, periapical granuloma
- Root with attached periapical granuloma

# Apical and periapical granulomas

- Asymptomatic (may remain quiescent for long periods) or symptomatic
- Chronically inflamed granulation tissue around apex of a non-vital tooth
- Infection and antigenic challenge from endodontic flora
- Stimulation of proliferation of rests of Malassez within the lesion (=radicular cysts)



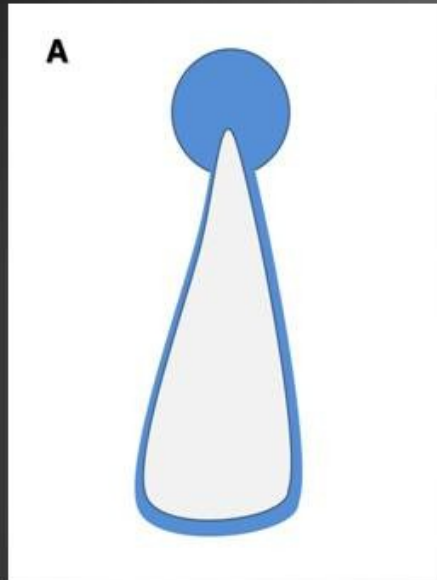
# Periapical granuloma



# Radiological findings in apical and periapical granulomas.

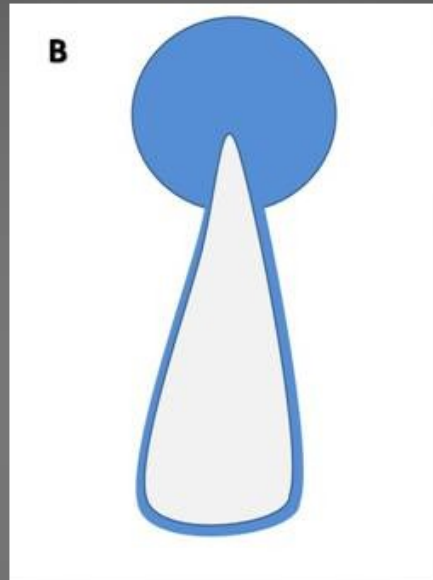
- Margins reflects the dynamics of the lesion
- Widening of periodontal ligament space at the beginning
- Active bone resorption = margins ill defined
- Static lesions = bone apposition and the formation of a zone of sclerosis (=osteosclerosis)

## Periapical Lucency



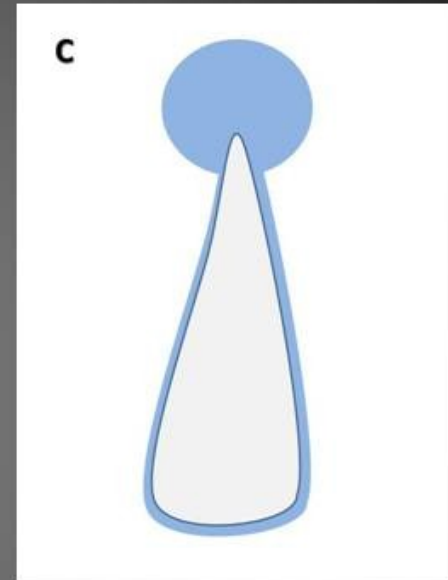
Apical granuloma

< 1.5 cm  
corticated margin



Radicular cyst

> 1.5 cm  
corticated margin



Abscess

less well defined  
margin

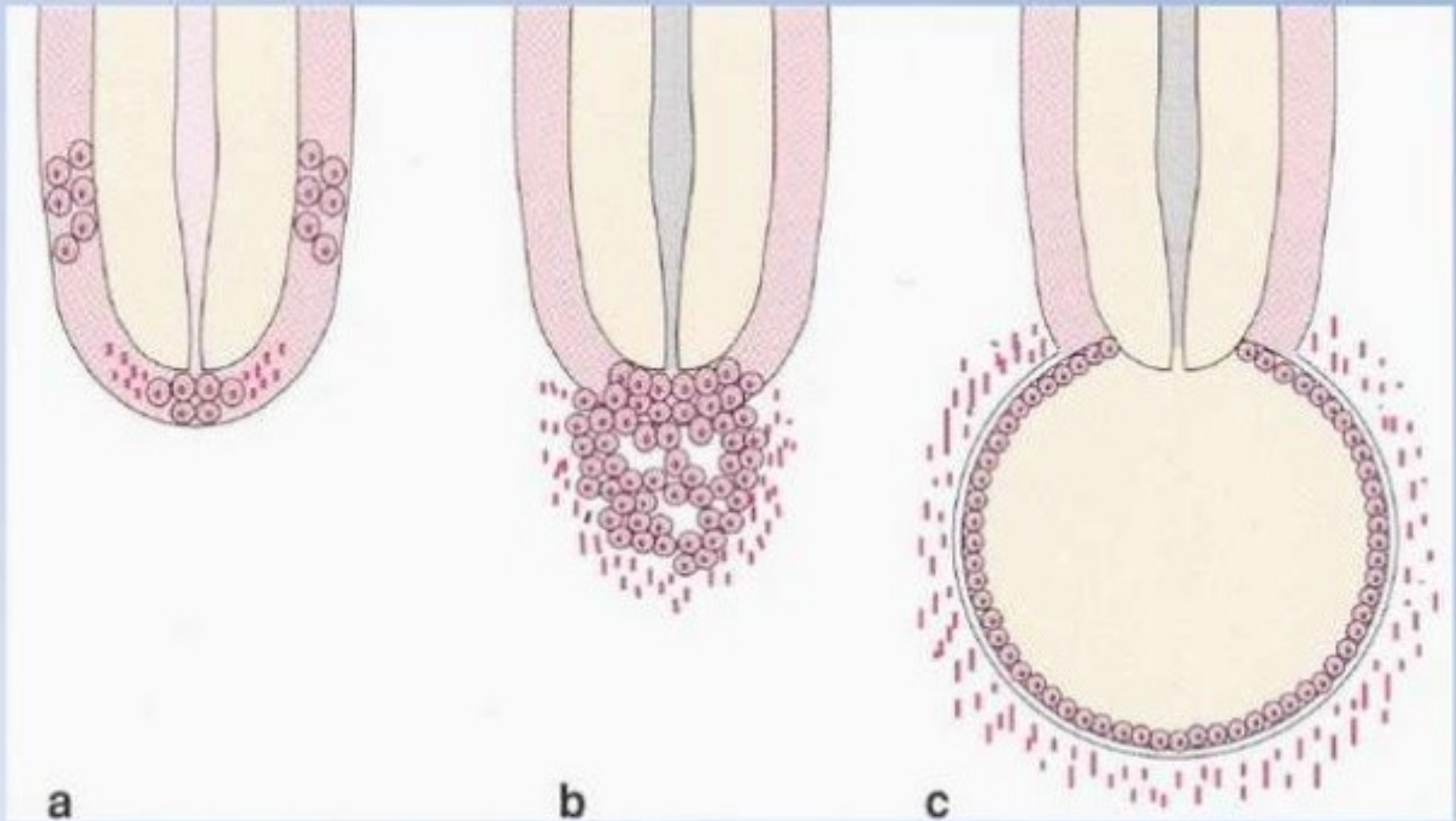
# Sequelae of chronic periapical periodontitis

- Antigenic challenge and host's immunological response in balance = quiescent granuloma
- The balance disturbed = enlargement of the granuloma, bone resorption
- Bacteria invading the granuloma from the root canal = acute exacerbation = acute symptoms = enlargement of granuloma = abscess formation
- Suppuration in the granuloma
- Development of radicular cyst
- Osteosclerosis (=bone apposition)
- Hypercementosis (=apposition of cementum)

# Radicular cysts

- Apical, residual periapical, or lateral sub-types
- Apical most common
- Associated with non-vital tooth
- Apical radiolucency indistinguishable from a periapical granuloma
- May be symptomless
- Enlargement of cyst leads to bone resorption

## ***Radicular cyst / pathogenesis***

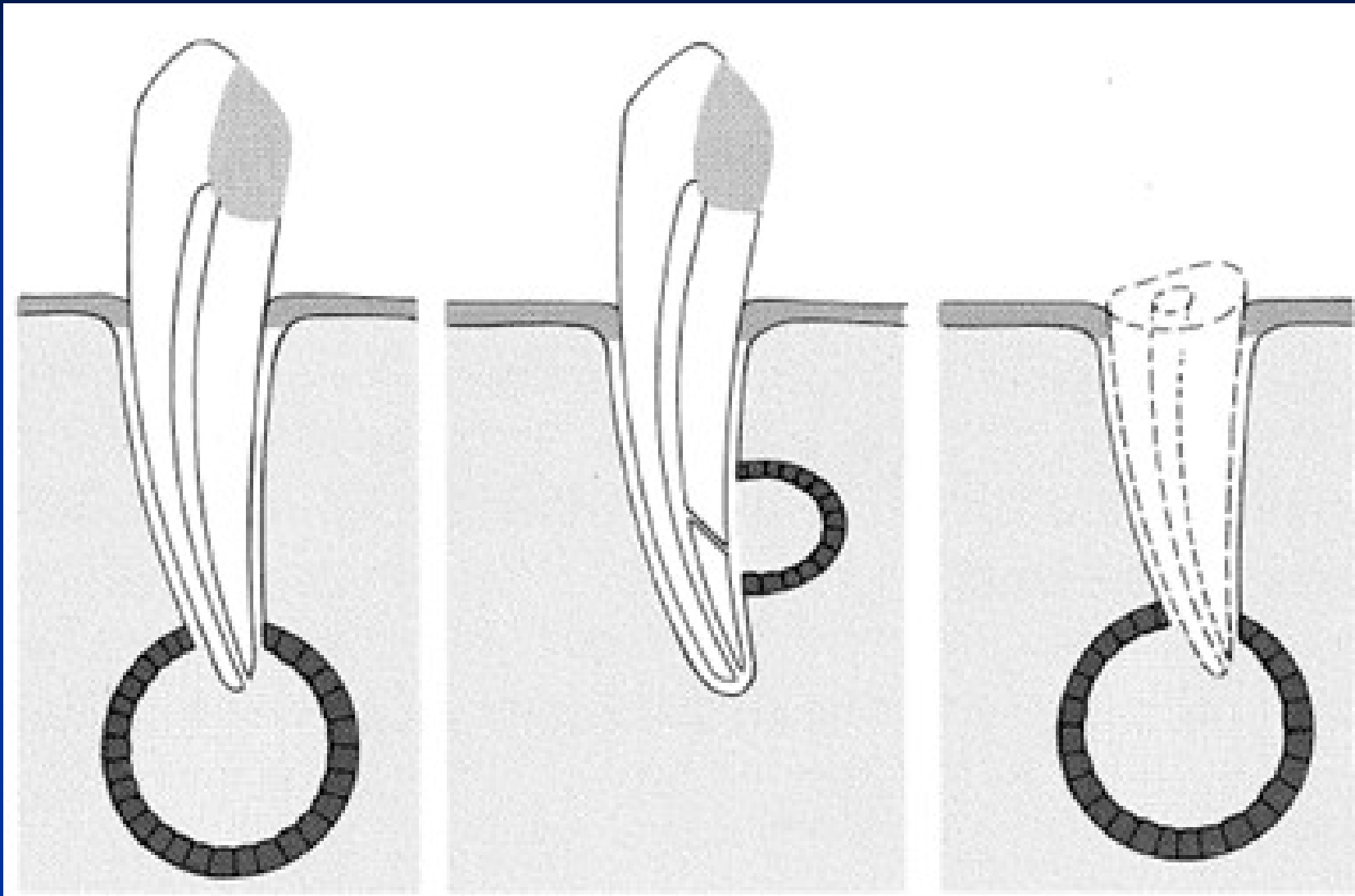


***a Initiation***

***b Cyst formation***

***c Cyst enlargement***

# Radicular cyst



apikální

laterální

reziduální

# Radicular cyst

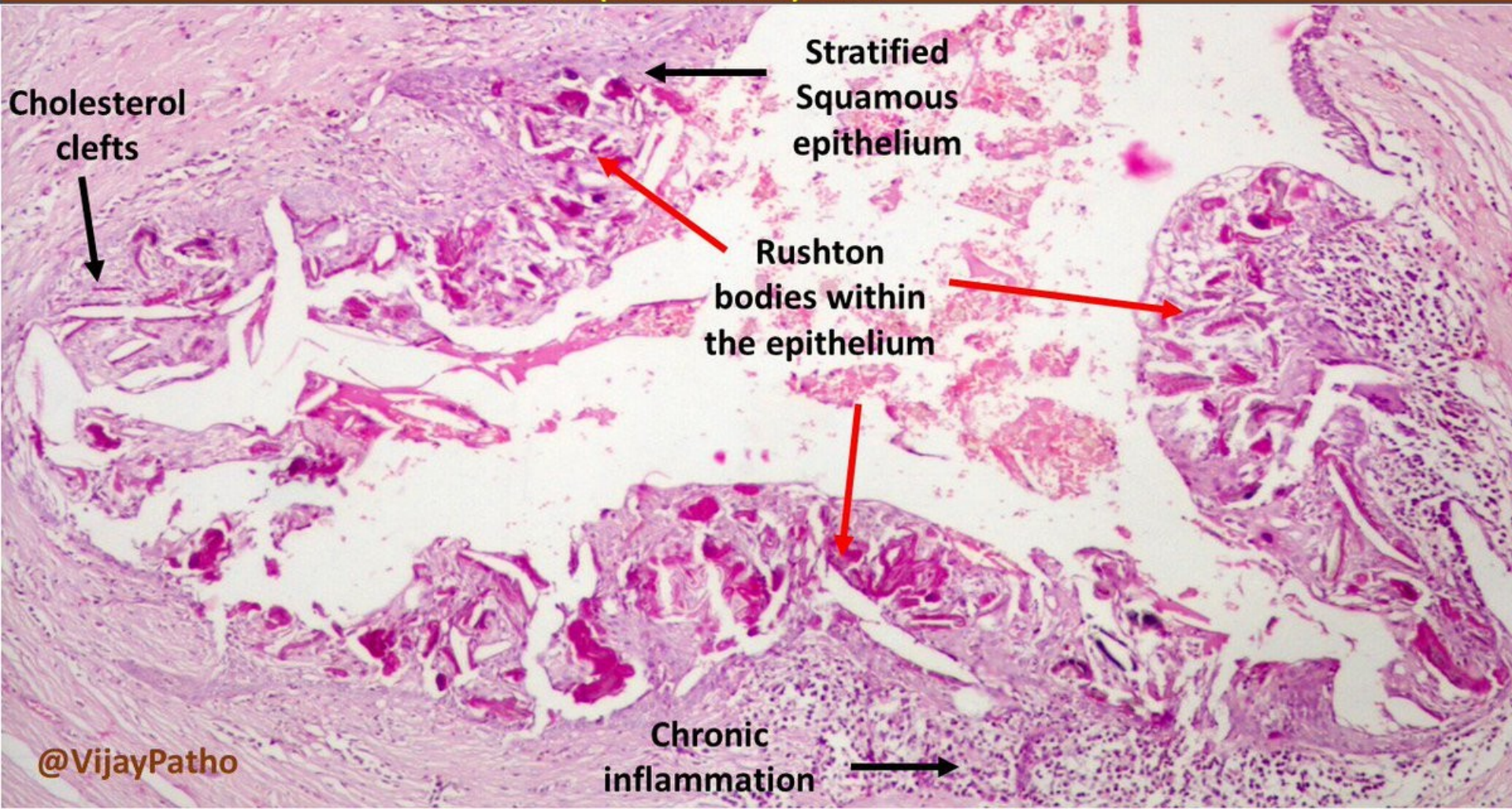




# Radicular cyst-histology

- Arise from proliferation of the rests of Malassez within chronic periapical granulomas
- Lined by non-keratinizing squamous epithelium
- Supported by a chronically inflammed capsule
- Capsule may contain collections of cholesterols
- Hypertonic content: breakdown products, serum proteins, water and electrolytes, cholesterol crystals

## PERIAPICAL (RADICULAR) CYST



# Expansion of radicular cyst

- Hydrostatic pressure of the cyst fluid increased due to hypertonic content
- Water drawn into the cyst cavity along this osmotic gradient
- Cyst expansion
- Bone resorption

# Aetiology and microbiology

## Frequently detected bacterial species in periapical abscesses

### Microaerophilic streptococci

S. Milleri group e. g. S. anginosus

### Anaerobic streptococci

Peptostreptococcus species,  
e. g. P. anaerobius

### Gram-positive anaerobic rods

Actinomyces species, e. g. A. israelii  
Eubacterium species, e. g. E. lentum

### Gram-negative anaerobic rods

Porphyromonas species, e. g. P. gingivalis  
Prevotella species, e. g. P. intermedia  
Bacteroides species  
Campylobacter species  
Fusobacterium species, e. g. F. nucleatum

# Routes of spread

- Increase in hydrostatic pressure causes pus to track along lines of least resistance
- Pus directly into oral cavity through a sinus following penetration of periostium and mucosa
- Palatal mucoperiostium resistant = palatal abscess
- Abscesses in molar region penetrate the buccal cortical plate spreading into soft tissues = cellulitis
- Abscesses at anterior maxillary teeth = perforation of the labial bone = spreading to inner canthus of the eye and lower eyelid, obliteration of nasolabial fold, into upper lip
- Abscesses at maxillary molars and premolars = into the maxillary sinus
- Abscesses at mandibular premolars and molars = involvement of submandibular, sublingual and lateral pharyngeal spaces, and anteroposteriorly under the skin surface
- Abscesses at mandibular incisors and canine = labially, perforate the bone, subcutaneous abscess in the midline between attachments of mentalis muscles

# Cellulitis

- Rapidly spreading inflammation of the soft tissues
- Usually associated with streptococcal infections (related to the release „spreading enzymes, e. g. hyaluronidase, stroptokinase)
- diffuse, tense, painful swelling of soft tissues; malaise, elevated temperature
- Risk: cavernous sinus thrombosis; extension into submandibular and cervical tissues = respiratory embarrassment; pain, trismus

# Ludwig's angina

- Severe cellulitis involving the submandibular, sublingual, and submental spaces
- May involve the pharynx and larynx
- Oedema of the glottis; risk of death by suffocation

# Ludwig's angina



Figure—Submandibular and sublingual erythema and swelling typical of Ludwig's angina.



