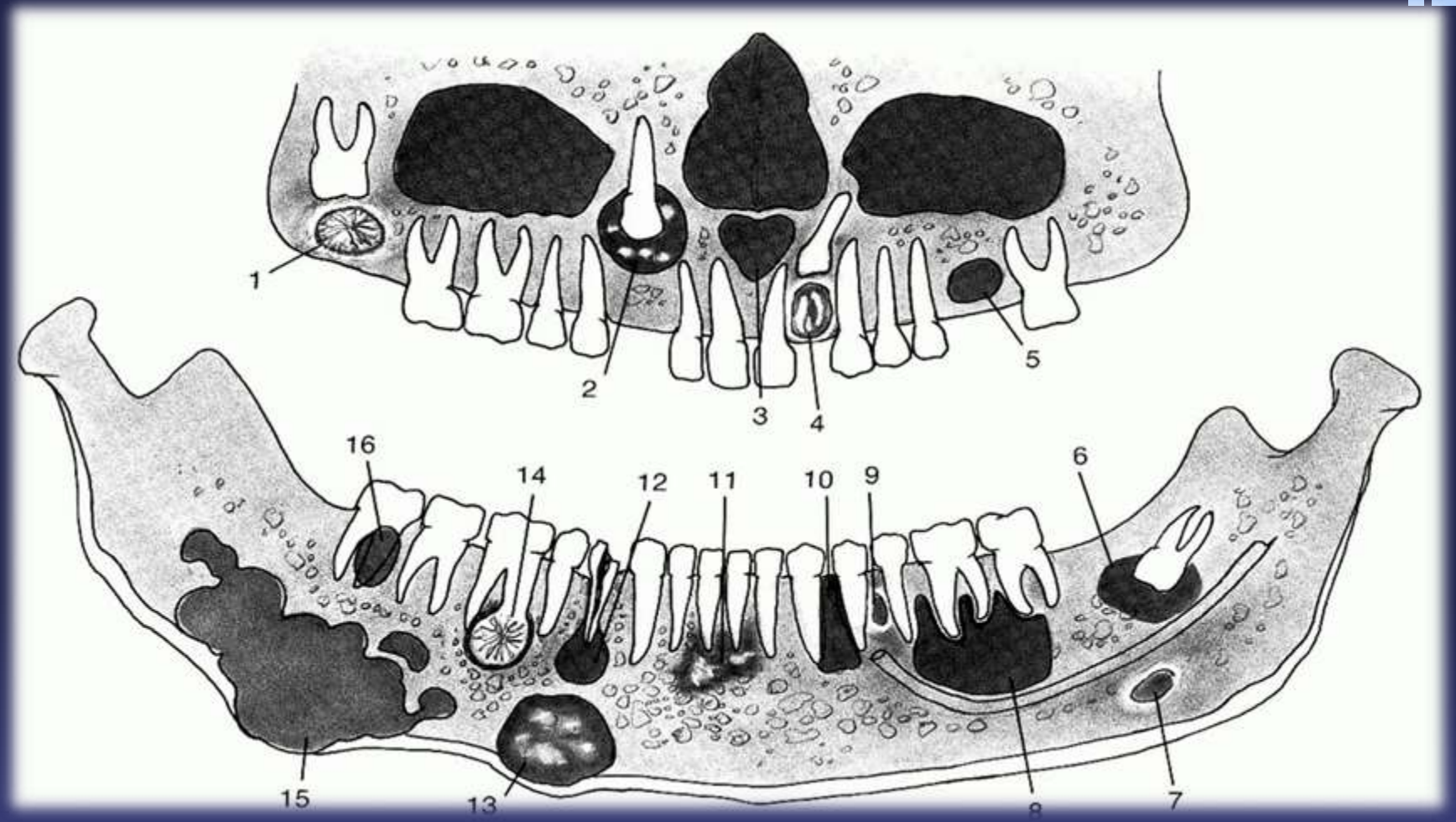
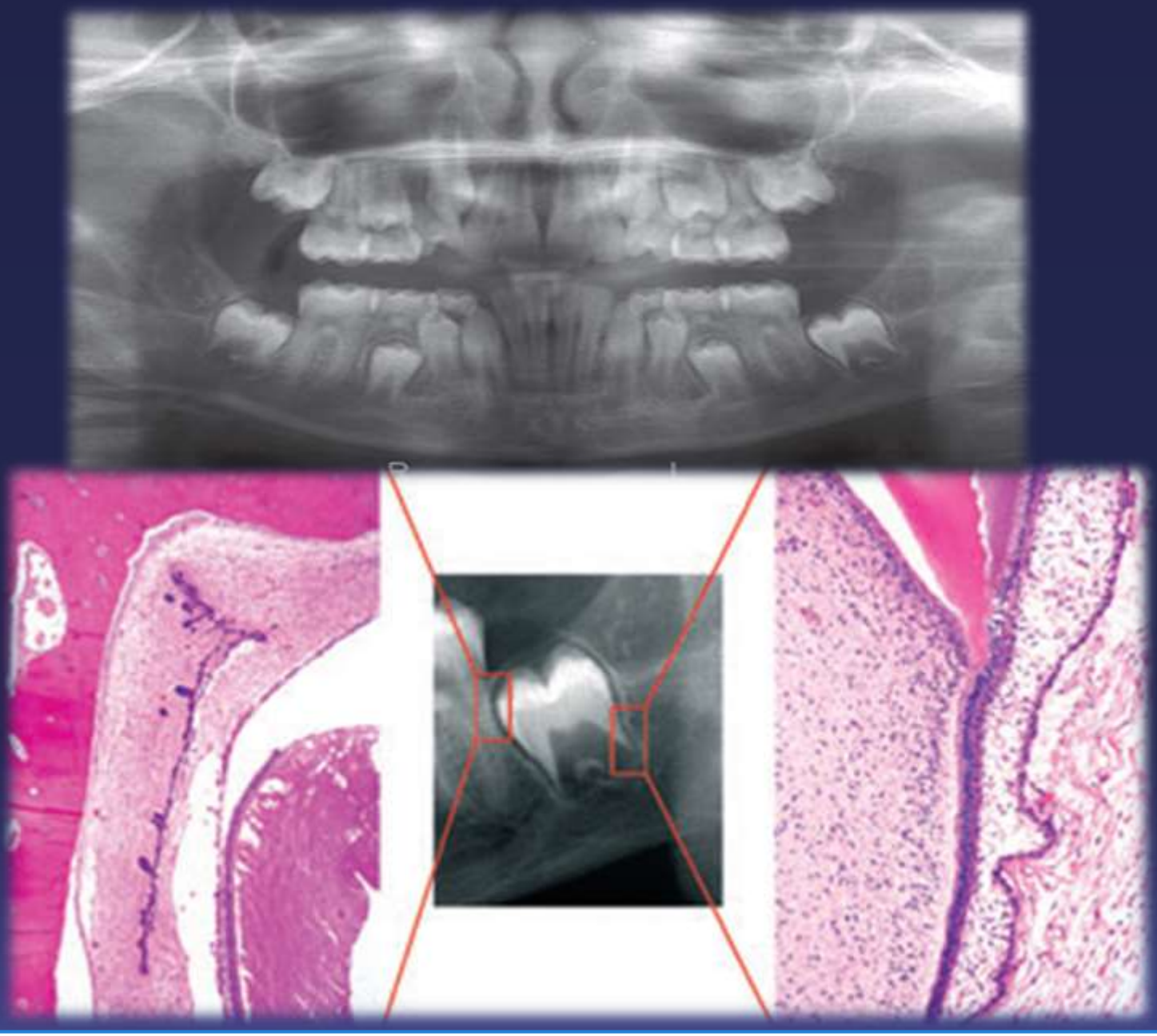
ODONTOGENIC CYSTS

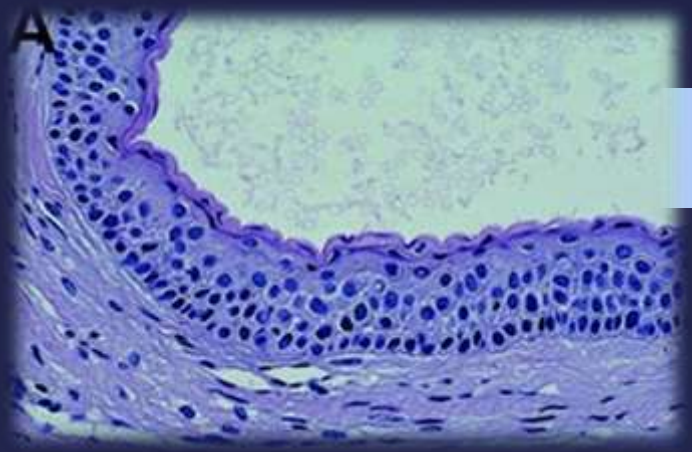


MRINAL SHETE



REVIEW Lesions of the jaws P J Slootweg Histopathology 2009, 54, 401–418

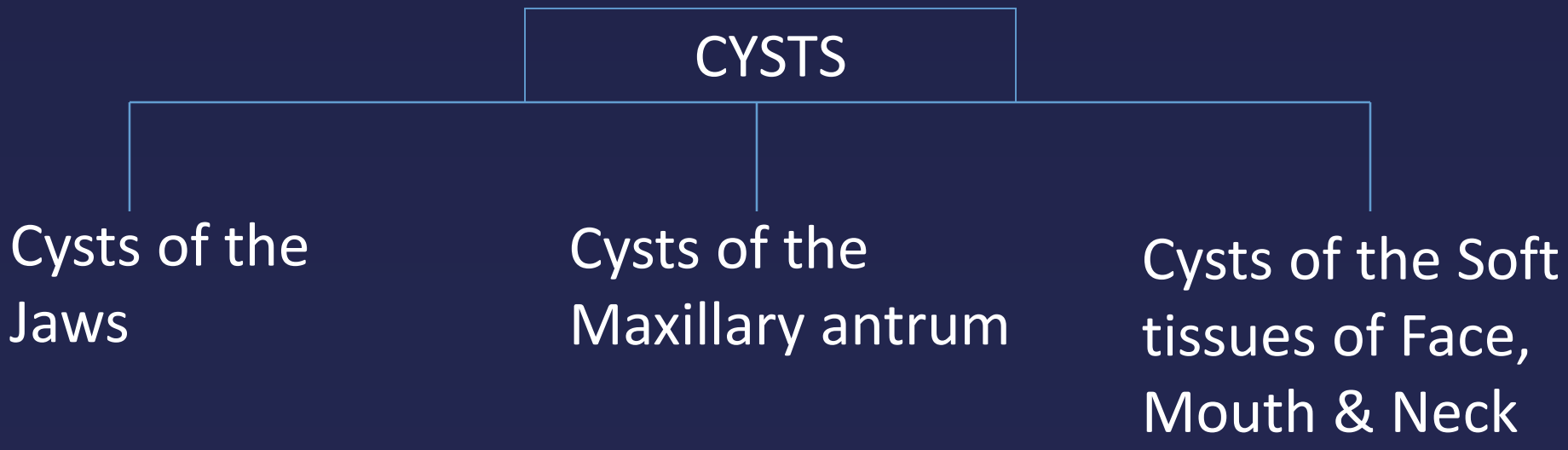
DEFINITION



- Cyst is an epithelial lined sac filled with fluid or semifluid material. (Killey and Kay 1966)

- A cyst is a pathological cavity having fluid, semifluid or gaseous contents and which is not created by the accumulation of pus, which may or may not be lined by epithelium. (Kramer, 1974).

CLASSIFICATION OF CYSTS (BY SHEAR)



CYSTS OF THE JAWS

Epithelial

Developmental

Odontogenic

1. Gingival cyst of infants
2. Odontogenic keratocyst
3. Dentigerous cyst
4. Eruption cyst
5. Lateral periodontal cyst
6. Gingival cyst of adults
7. Botryoid odontogenic cyst
8. Glandular odontogenic cyst
9. COC

Non-odontogenic

1. Nasopalatine duct cyst
2. Nasolabial cyst
3. Midpalatal raphae cyst
4. Globulomaxillary cyst
5. Median palatine, median mandibular cyst

Inflammatory

1. Radicular cyst
2. Residual cyst
3. Paradental cyst
4. Inflammatory collateral cyst

Non-epithelial

1. Solitary bone cyst
2. Aneurysmal bone cyst

WHO classification of cysts

A. DEVELOPMENTAL:

ODONTOGENIC CYSTS:

- 1. Gingival cyst of infants
- 2. Primordial cyst
- 3. Dentigerous cyst
- 4. Eruption cyst
- 5. Lateral periodontal cyst
- 6. Gingival cyst of adults
- 7. Glandular odontogenic cyst

NON- ODONTOGENIC CYSTS:

1. Nasopalatine duct cyst
2. Globulomaxillary cyst
3. Nasolabial cyst

B. INFLAMMATORY CYSTS

1. Raducular cyst
2. Apical and lateral cyst
3. Residual cyst
4. Paradental cyst

CLASSIFICATION

ODONTOGENIC CYSTS

- **DEVELOPMENTAL**

1. Dentigerous cyst
2. Eruption cyst
3. Odontogenic keratocyst
4. Gingival cyst of newborn
5. Gingival cyst of adults
6. Lateral periodontal cyst
7. Botryoid odontogenic cyst
8. Calcifying odontogenic cyst
9. Glandular odontogenic cyst

- **INFLAMMATORY**

1. Radicular cyst
2. Residual cyst
3. Paradental cyst
4. Mandibular infected buccal cyst

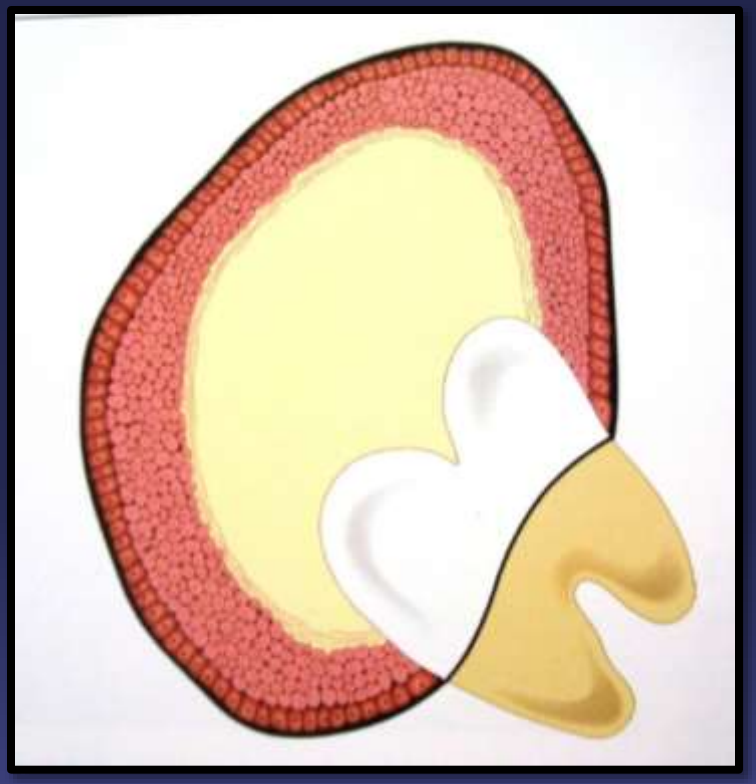
CLASSIFICATION BY TISSUE OF ORIGIN

Derived from Rests of Malassez	Derived form Reduced Enamel Epithelium	Derived from Dental Lamina	Unclassified
• Periapical cyst • Residual cyst	• Dentigerous cyst • Eruption cyst	• OKC • Gingival cyst of newborn • Gingival cyst of adults • Lateral periodontal cyst • Glandular odontogenic cyst	• Paradental cyst • Calcifying odontogenic cyst

DENTIGEROUS CYST

- Dentigerous means 'tooth bearing'. (by Browne)

- Def: It is an odontogenic cyst that surrounds the crown of an impacted tooth; caused by fluid accumulation between the reduced enamel epithelium and the enamel surface resulting in a cyst in which the crown is located within the lumen.



PATHOGENESIS

- Origin can be

1. Intrafollicular

2. Extrafollicular

- First theory was proposed by Toller (1967) who suggested that the origin of dentigerous cyst is due to the breakdown of the proliferating cells of the follicle following impeded eruption.

INTRAFOLLICULAR THEORY

1. In this the cyst develops due to the accumulation of fluid either between the layers reduced enamel epithelium or within the enamel organ itself.

- Not associated with enamel hypoplasia

2. Fluid accumulation within the enamel organ itself by degeneration of stellate reticulum cells at an early stage of development.

- Associated with enamel hypoplasia

- For the frequent presence of enamel hypoplasia with dentigerous cyst, Shear concluded that the presence of foci of enamel hypoplasia diminish the adherence of the reduced enamel epithelium to the crown of the tooth,

- provides the starting point for the development of the cyst.

EXTRAFOLLICULAR ORIGIN

1. Dentigerous cysts develop by accumulation of fluid between the reduced enamel epithelium and the enamel surface.

2. Crown of an permanent tooth may erupt into radicular cyst of its deciduous predecessor.

3. Follicular OKCs: impacted tooth erupts in to a pre-existing OKC.

HOW DOES FLUID ACCUMULATION TAKES PLACE ? Main in 1970

1. • **Pressure exerted by an erupting tooth on an impacted follicle due to eruptive force.**
2. • **Obstructs venous outflow and thereby induces rapid transduction of serum across the capillary wall**
3. • **Increased hydrostatic pressure exerted by pooling of this fluid causes separation of the follicle from the crown, with or without reduced enamel epithelium**

CLINICAL FEATURES

1. Age - 2nd to 3rd decade of life
2. Sex – more in males (3:2)
3. Site – mandibular 3rd molars, max. 3rd molars, max. cuspid
4. Mostly solitary in occurrence

Associated syndromes –

a. Cleidocranial dysplasia

b. Maroteaux-Lamy syndrome

RADIOGRAPHIC FEATURES

- Unilocular radiolucent area associated with the crown of the impacted teeth
- Well defined sclerotic margins unless secondarily infected

Expansion of bone, severe root resorption, displacement of teeth

Root resorption of adjacent teeth

Usually causes no pain unless secondarily infected

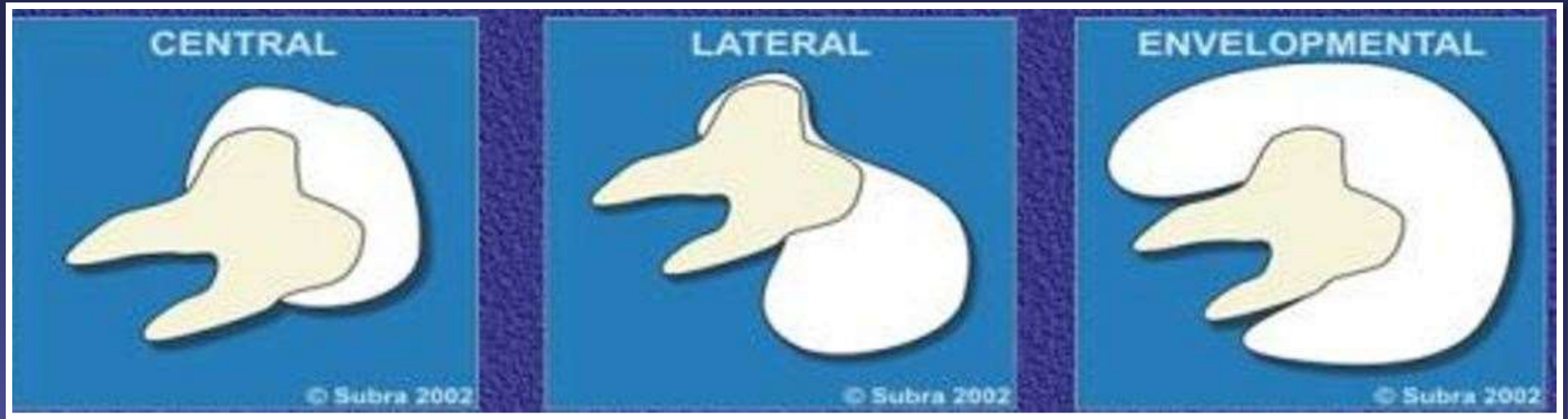
- Distinction between follicle and dentigerous cyst

  is difficult on radiograph

- Follicular space – 3 to 4mm

- Cyst – more than 5mm

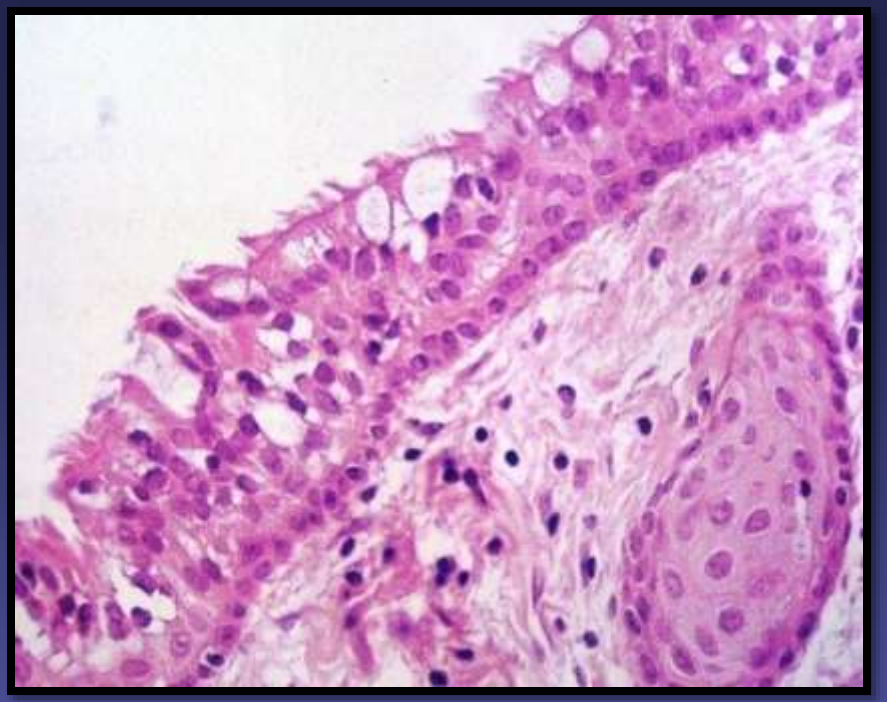
RADIOLOGIC VARIANTS OF DENTIGEROUS CYST

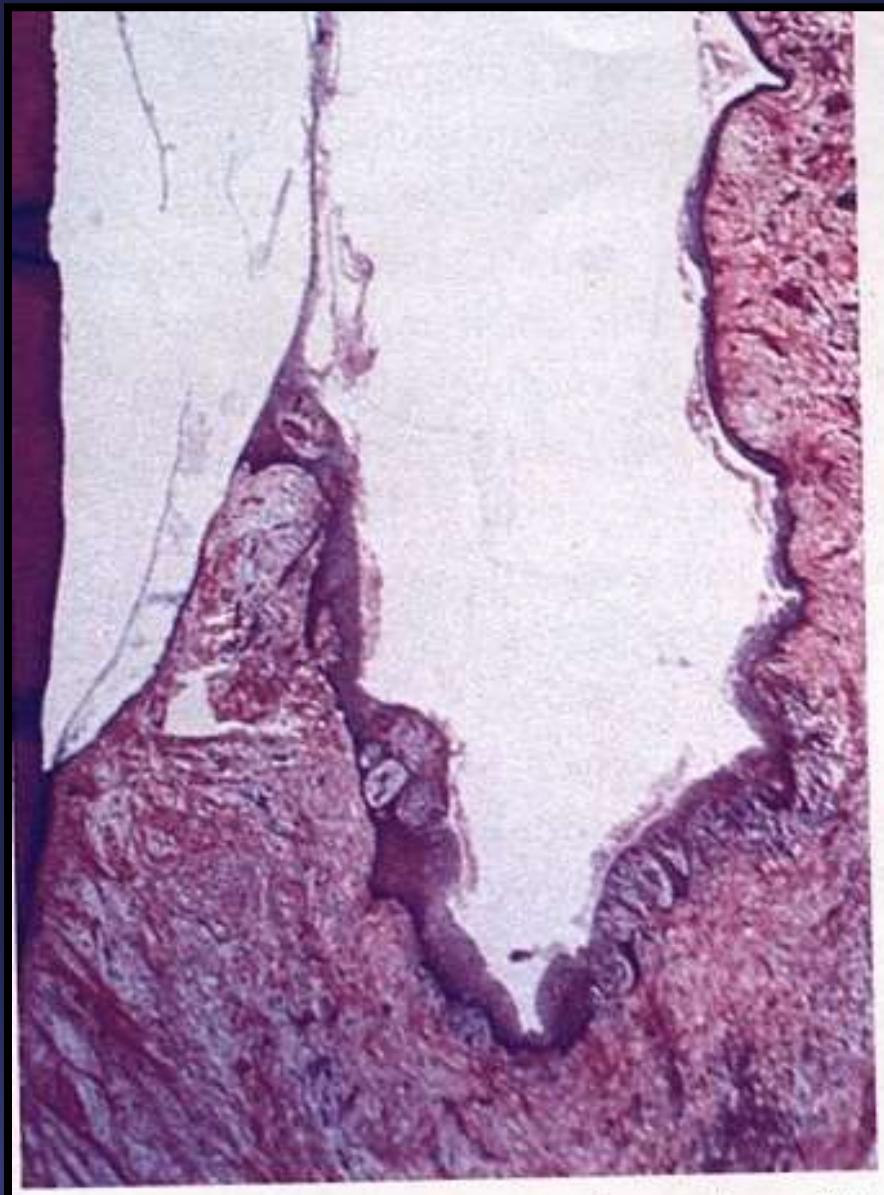


HISTOPATHOLOGY

- Thin connective tissue wall, lined by stratified squamous epithelium, only 2-3 cell layers resembling reduced enamel epithelium

- Lining epithelium is pleuripotential- may show mucous producing cells and sometimes ciliated cells, sebaceous, lymphoid follicles





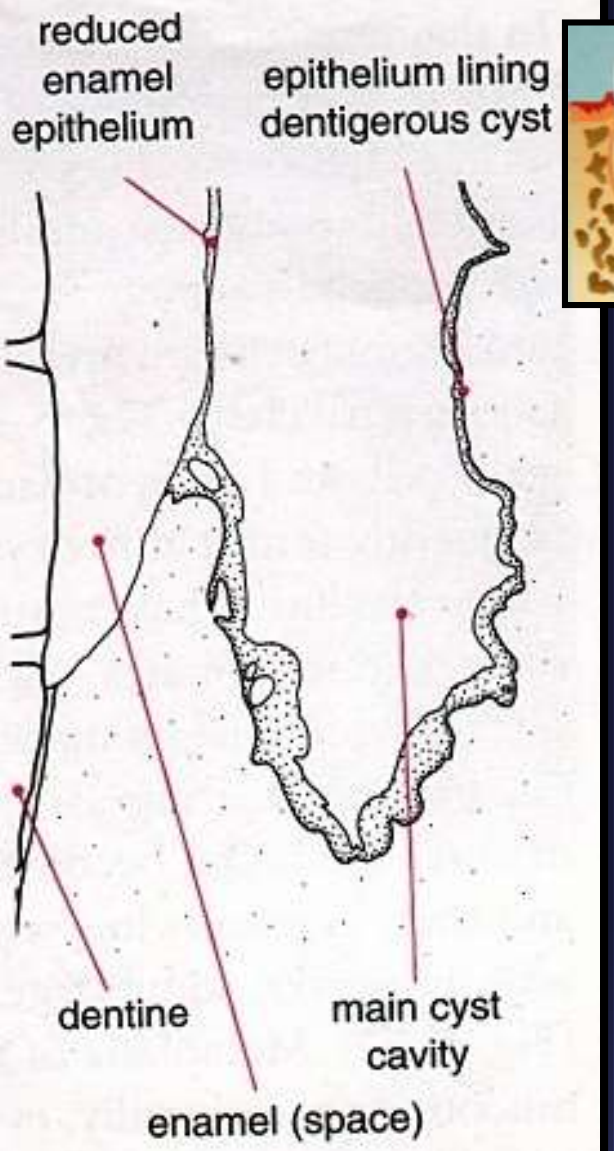
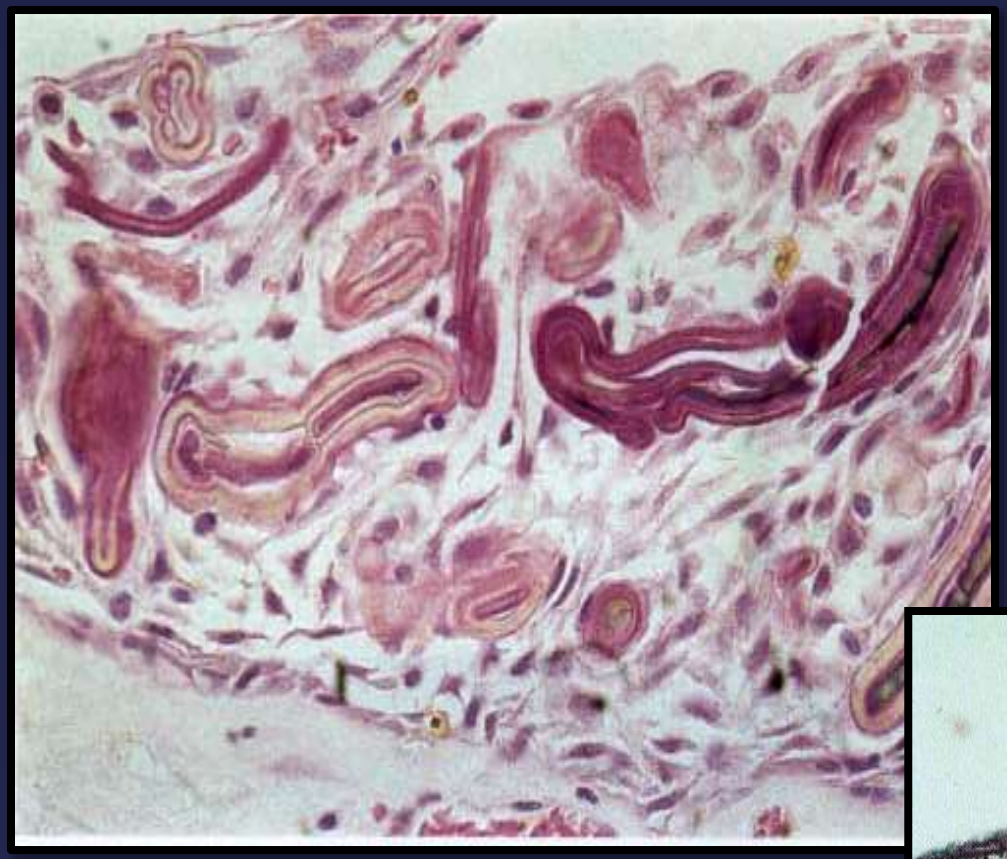
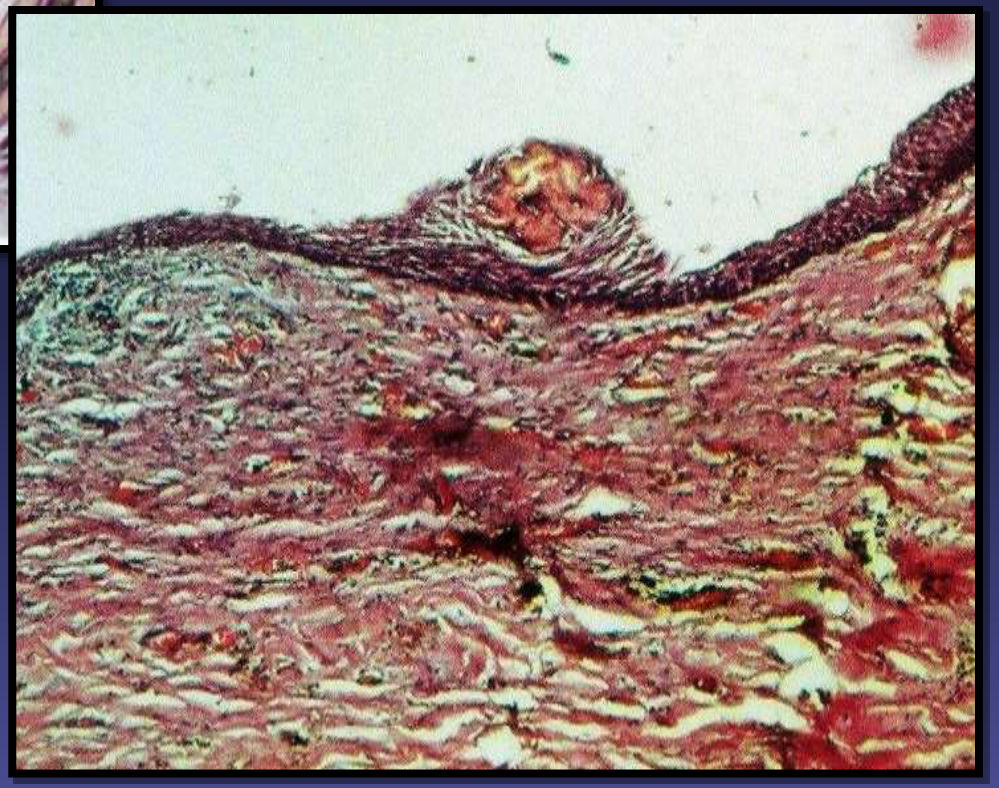


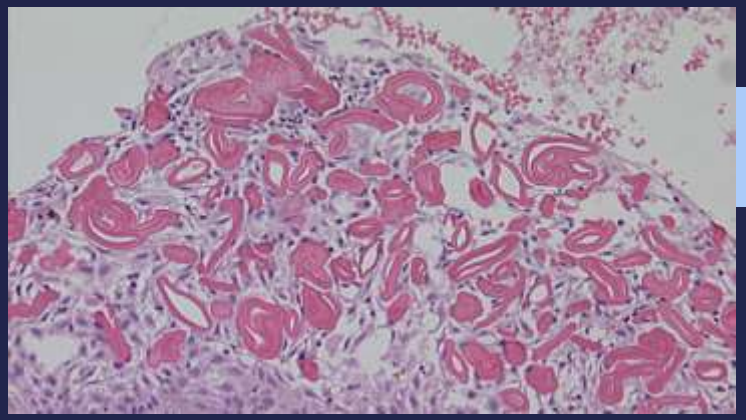
Fig. 5.22 Dentigerous cyst: formation of the lining by splitting of the reduced enamel epithelium. Remnants of the latter were attached to the enamel surface.

RUSHTON BODIES





Rushton or Hyaline bodies origin



- Rushton in 1955 --- hyaline bodies resemble in appearance and liability to fracture, the keratinized secondary enamel cuticle of Gottlieb.

- Shear in 1961 --- (using histochemical studies) they are of odontogenic epithelial origin and are form of keratin.

- Wertheimer et al in 1966 --- secondary product of odontogenic epithelial cells

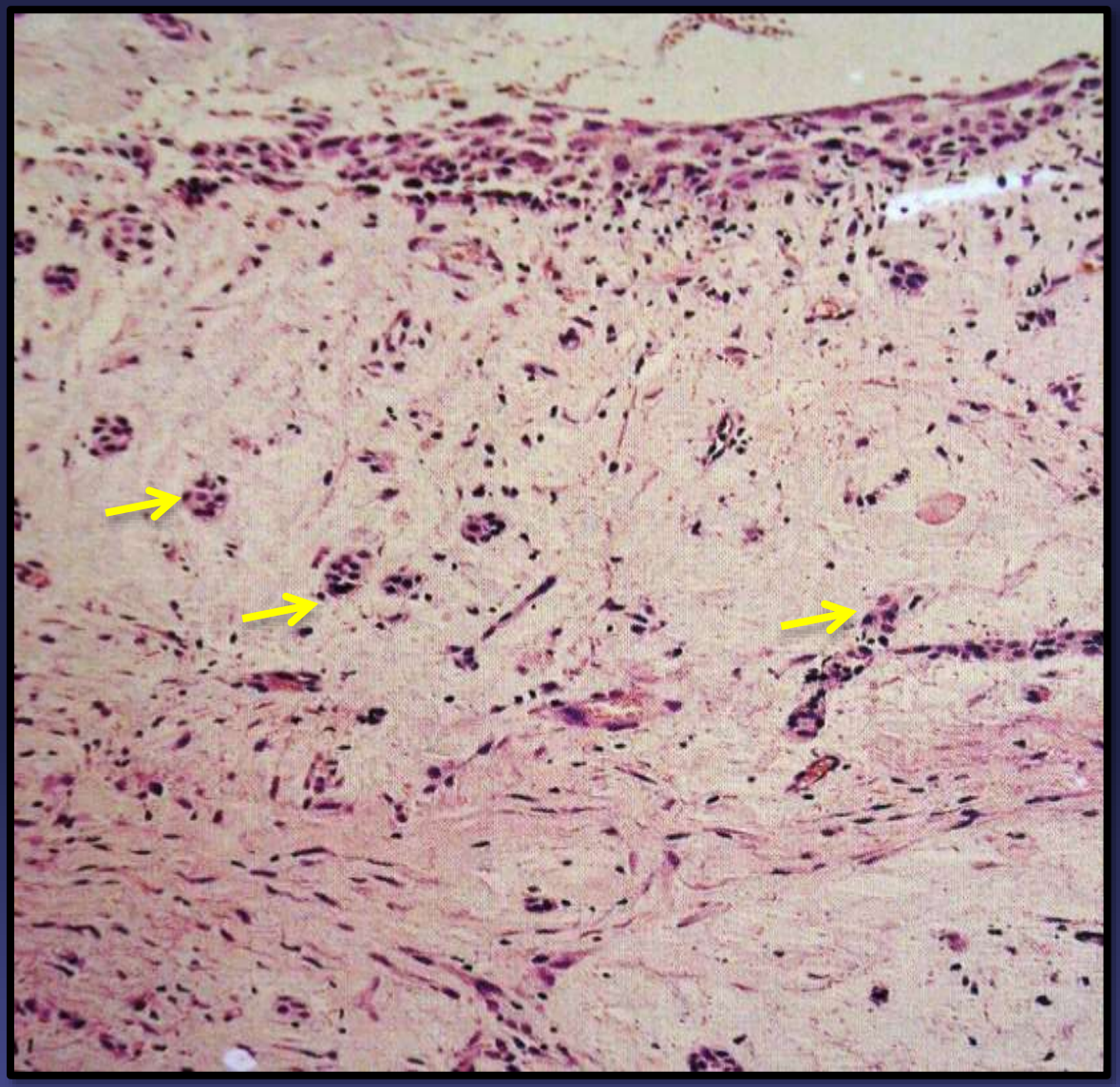
- Bouyssou and Guilhem in 1965 and Sedano and Gorlin in 1968 --- Haematogenous origin

- Derived from thrombi in venules of C.T that became vericose and strangled by epithelial cuffs which encircled them and they reacted histochemically as Haemoglobin.

- Thrombi shrink centrifugally and undergo splitting or they may calcify.

- Morgan and Heydan in 1975 --- derived from degenerating RBCs.

CONNECTIVE TISSUE WALL



POTENTIAL COMPLICATIONS

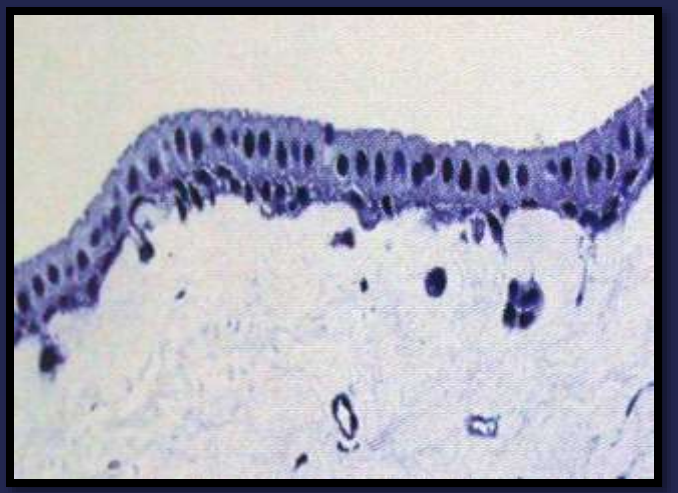
1. Development of an ameloblastoma either from the lining epithelium or from rests of odontogenic epithelium in the wall of the cyst

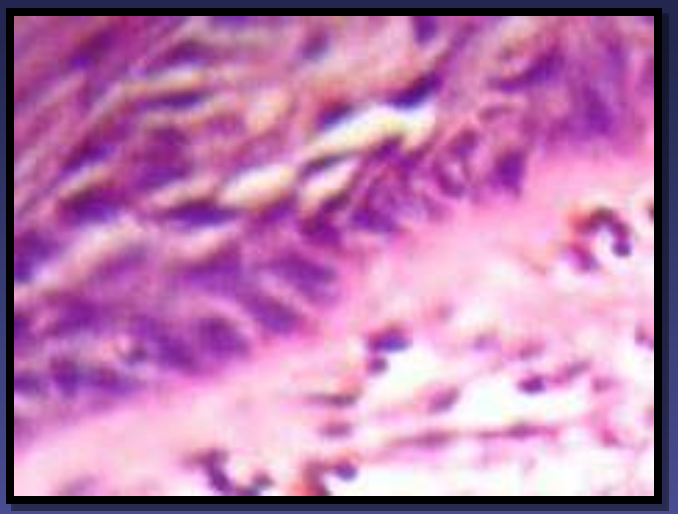
2. Development of squamous cell carcinoma form the same two sources

3. Development of mucoepidermoid carcinoma form the lining epithelium of dentigerous cyst which contains mucous secreting cells or cells with this potential

VICKER AND GORLIN'S CRITERIA

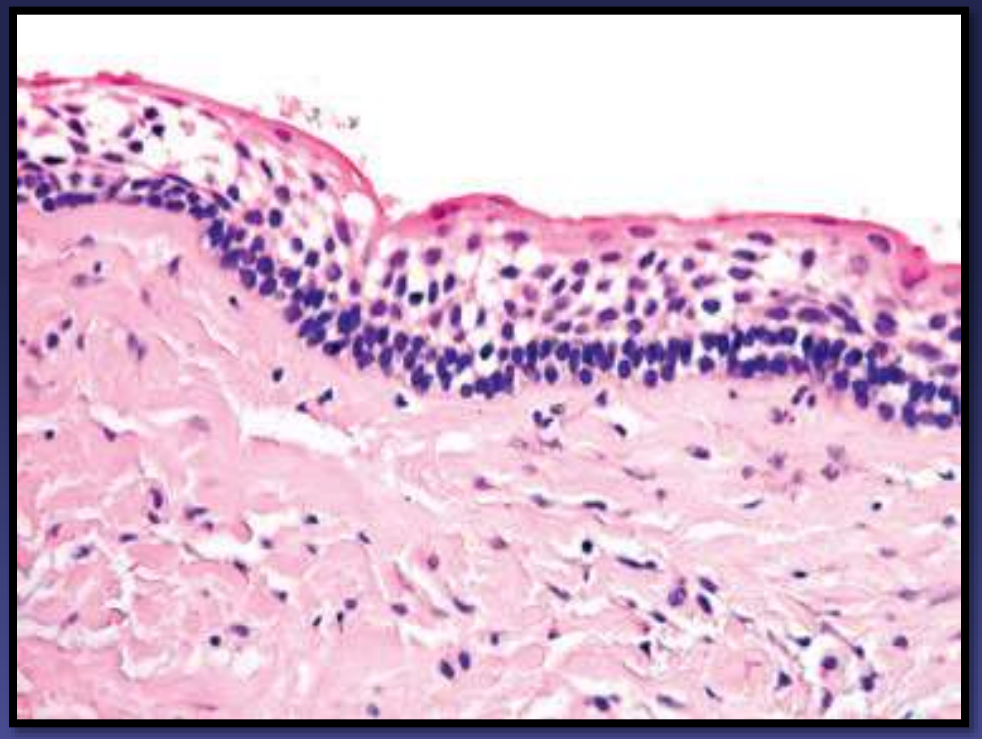
1. Hyperchromatism of the basal cell nuclei
2. Palisading with polarization of the basal cells
3. Cytoplasmic vacuolization with intercellular spacing in the lining epithelium
4. Cuboidal / columnar basal cells
5. Subepithelial Hyelinization.





- Presence of sprouting or budding and protruding of epithelial islands from the lining epithelium has been claimed to be evidence of neoplastic transformation.

- Squamous metaplasia in long standing cyst lining appear to precede the development of carcinomatous change.



Dentigerous cyst and mucoepidermoid carcinoma

- Several sources have been proposed for central MEC:

1. Mucous metaplasia of odontogenic cyst epithelium.
2. Entrapment of salivary tissues from submandibular, sublingual or minor salivary glands from retromolar area.
3. Maxillary sinus epithelium.
4. Iatrogenic entrapment of minor salivary glands

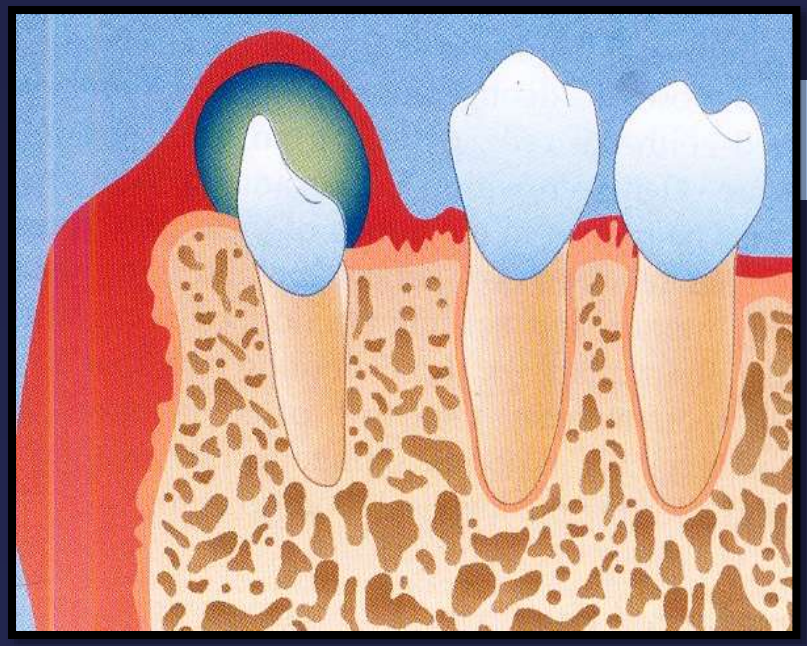
Reference: Neoplasms associated with odontogenic cysts K.M.K Masthan journal of Dentistry and Oral hygiene 2011, vol-3(10)

EXAMINING THE CYSTIC FLUID

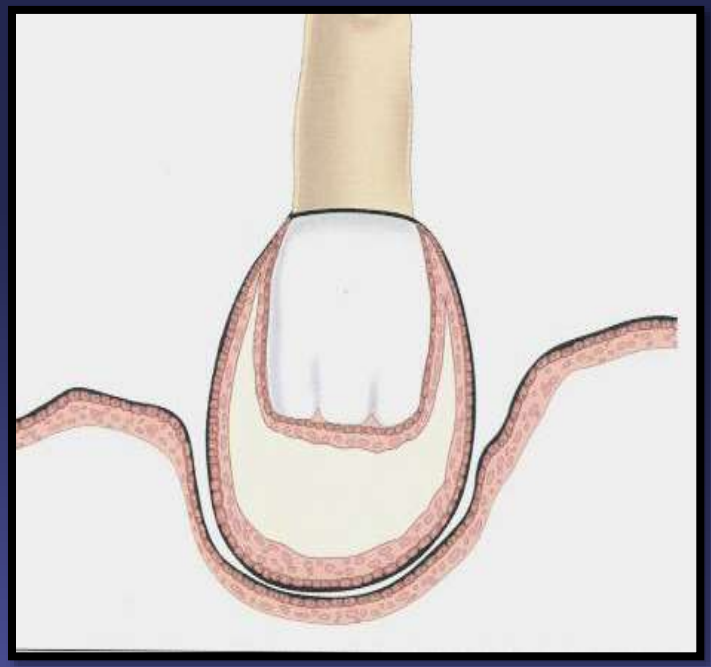
- Cystic fluid: Pale, straw colored fluid
- Thin, watery in consistency
- Soluble protein levels in DC: 6.75gm/dl (Skaug- 1973)

ERUPTION CYST

- Defined as a odontogenic cyst with histologic features of a dentigerous cyst, that surrounds the crown of a tooth that has erupted through the bone but not soft tissue and is clinically visible as a soft fluctuant mass on the alveolar ridges.



- It is a dentigerous cyst occuring in soft tissues (Shear)
- The eruption cyst occurs when a tooth is impeded in its soft tissue overlying the bone
- Pathogenesis is similar to dentigerous cyst



CLINICAL FEATURES

- Occurs more frequently clinically, as they rupture and are not submitted for histological examination
- More common in children, but can occur in adults
- Both dentitions can be involved
- Occurs commonly anterior to the 1st molar

- Lesion appears to be circumscribed, often fluctuant transparent swelling of the alveolar ridges

- Sometimes cystic cavity may contain blood and may appear deep purple, hence the name “Eruption hematoma”

- Usually painless unless secondarily infected

HISTOPATHOLOGY

- Superior aspect is covered by stratified squamous epithelium
- This is separated from the cyst by a strip of dense connective tissue which usually shows a mild chronic inflammatory cell infiltrate

ERUPTION CYST

Histopathology-

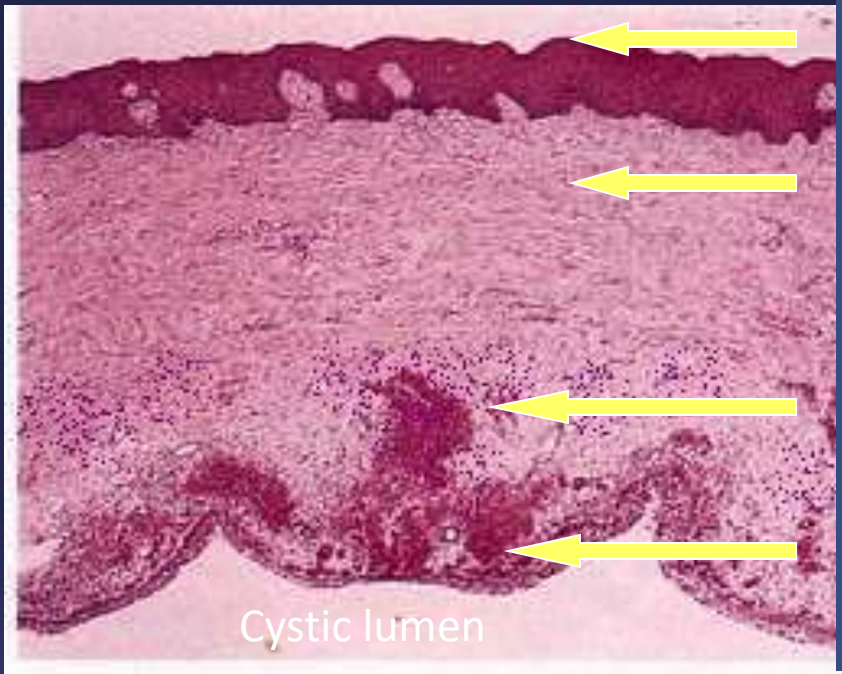


Fig. 21.9 Eruption cyst. The oral mucosa above is separated from the roof of the cyst below.

Oral epithelium

Gingival C.Tissue
(Acellular, densely collagenous & eosinophilic)

Follicular C. Tissue

(Densely cellular, less collagenous & basophilic)

Cyst epith. Lining (2-3 cell layer str. squamous)

RADIOGRAPHIC FEATURES

ODONTOGENIC KERATOCYST (OKC)

HISTORY

- Called as “Cholesteatoma”(Hauer 1926, Kostecka 1929)
- Philipsen (1956) gave the term “ODONTOGENIC KERATOCYST”
- Mikulicz in 1876 described it as “dermoid cyst”

- Shear (2003) referred it as “Keratocystoma”
- Philipsen & Reichart (2004)

  “Keratinizing cystic odontogenic tumor”
- Philipsen (2005)

  “Keratocystic odontogenic tumor”

- Initially called as “primordial cyst” (Robinson 1945) & (Forssell 1979)

Primordial Cyst

- Defined as cyst which arises by breakdown of the stellate reticulum of the enamel organ before any mineralized tissue is formed and hence develops in place of a tooth which may be one of the normal series or a supernumerary tooth.

- So, it is found in place of a tooth rather than associated with it.

ORIGIN

1. Dental lamina or its remnants

2. From offshoots of basal layer of oral epithelium

CLINICAL FEATURES

1. 3rd most common cyst after radicular and dentigerous cyst

2. Age – 1st – 9th decade
   -Highest peak in 2nd to 3rd decade
   -Bimodal age occurance

3. Sex – M>F

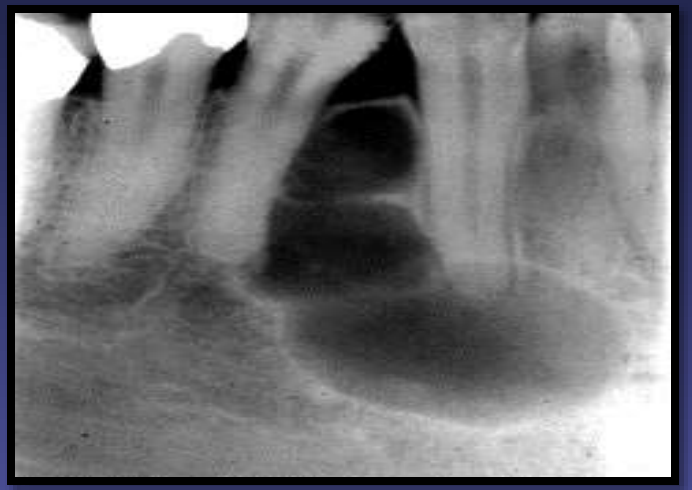
4. Site – mandible > maxilla

5. May complaint of pain, swelling or discharge

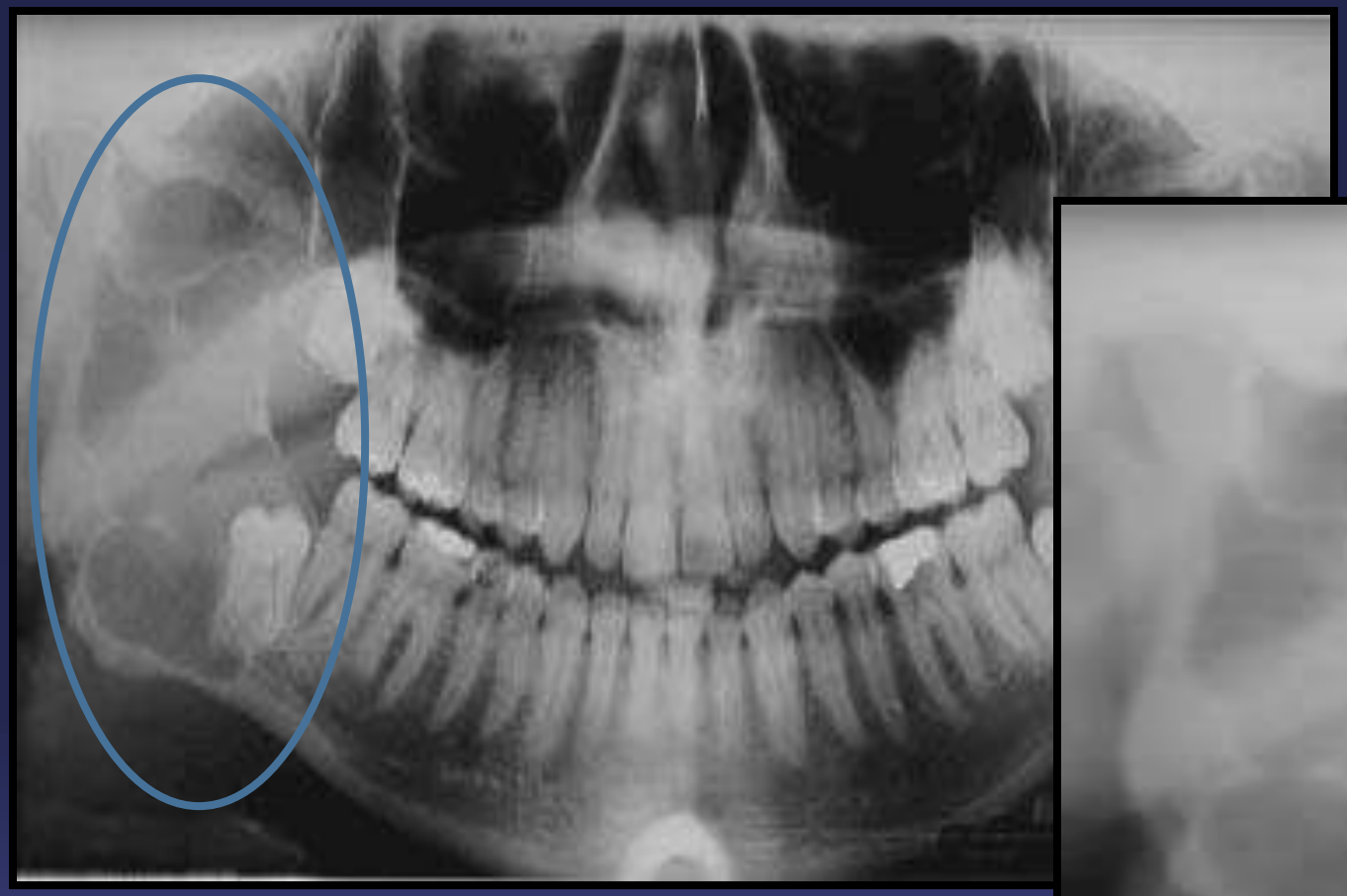
6. Expands in medullary cavities, hence clinically observable expansion of bone is late.

7. Causes displacement of teeth

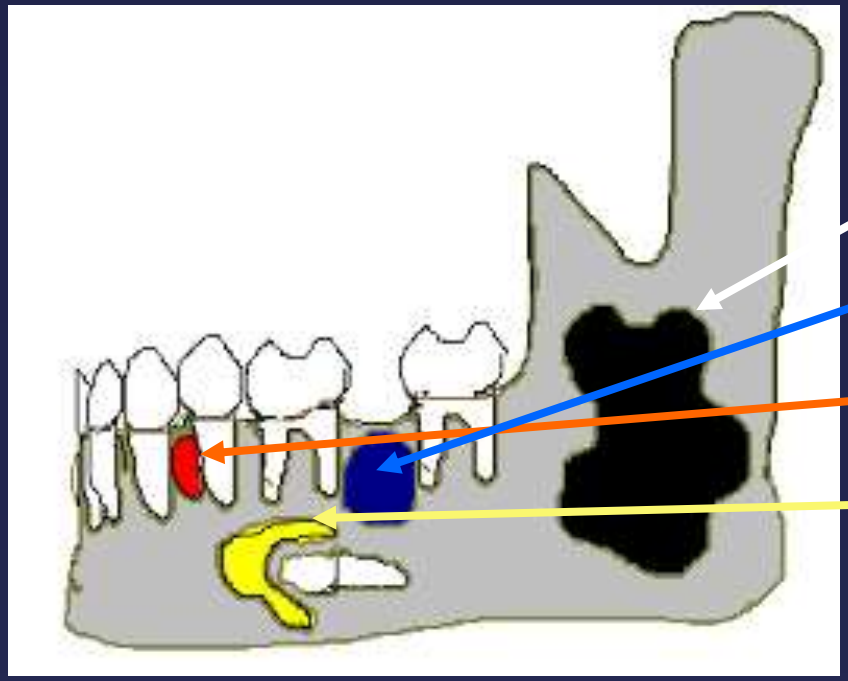
8. Most patients are free of symptoms until the cyst has developed a large size



RADIOHRAPHIC FEATURES



Types of OKC (Main-1970a):



- Extraneous
- Replacemental
- Collateral
- Envelopmental

Replacemental variety is also called as PRIMORDIAL Cyst

Histologic features:

Picket Fence

Tomb stones

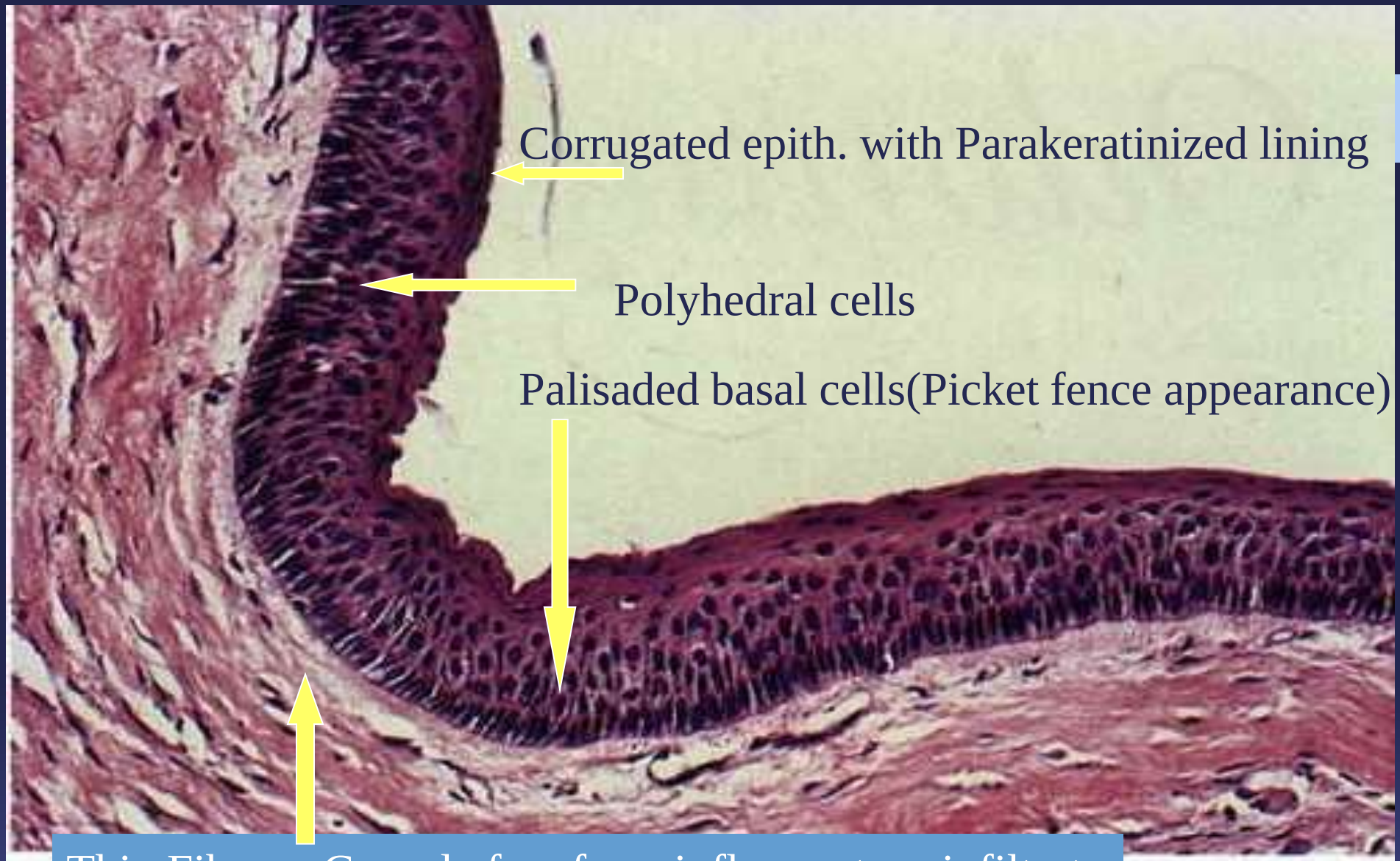
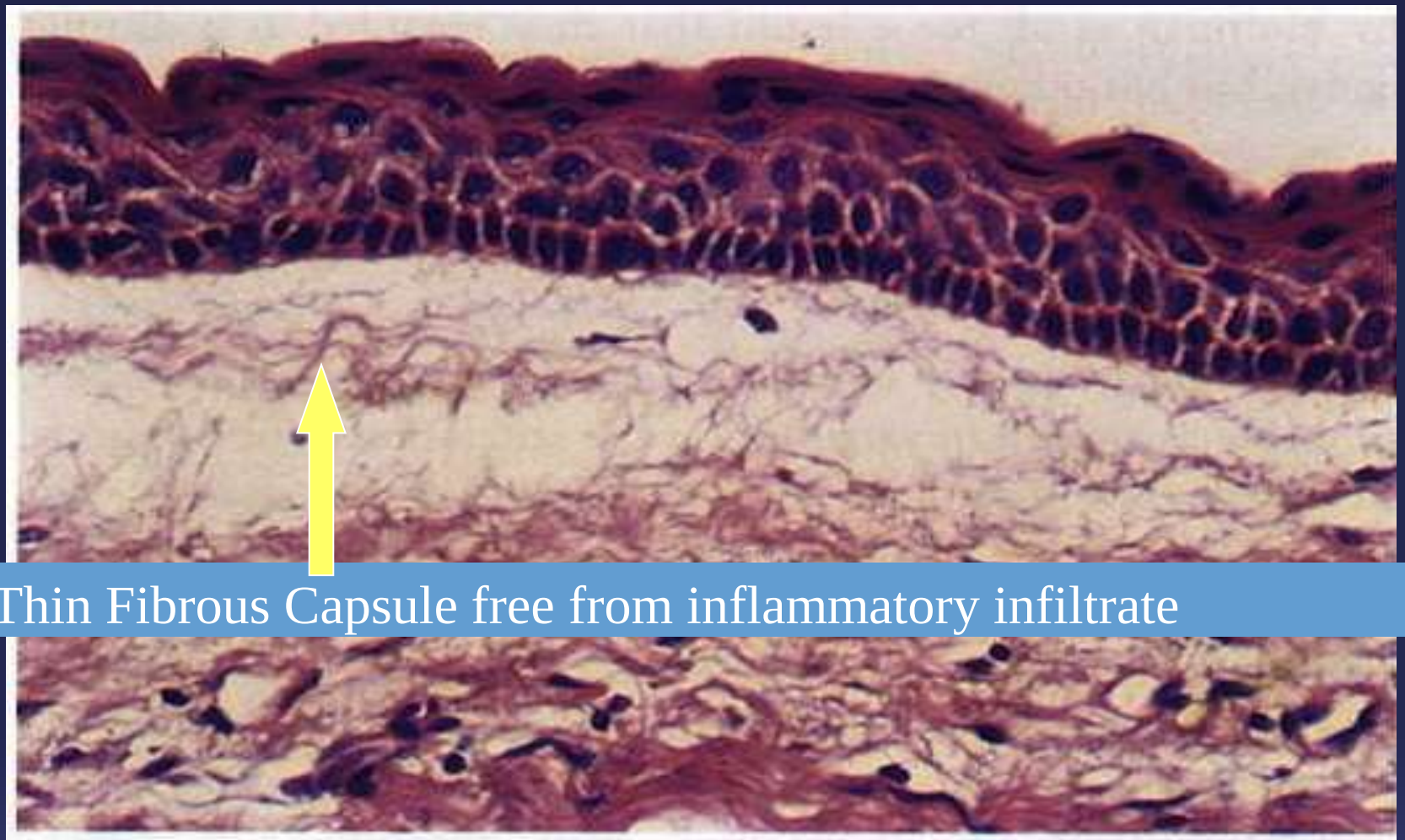


Fig. 20.2 Odontogenic keratocyst, parakeratinized type. The lining is of uniform thickness with a prominent basal cell layer.



Thin Fibrous Capsule free from inflammatory infiltrate

Fig. 20.3 Odontogenic keratocyst, parakeratinized type. Higher power view confirms the uniform thickness of the epithelial lining, the prominent columnar basal cell layer, the thin eosinophilic parakeratin, and the tenuous attachment to the fibrous wall.

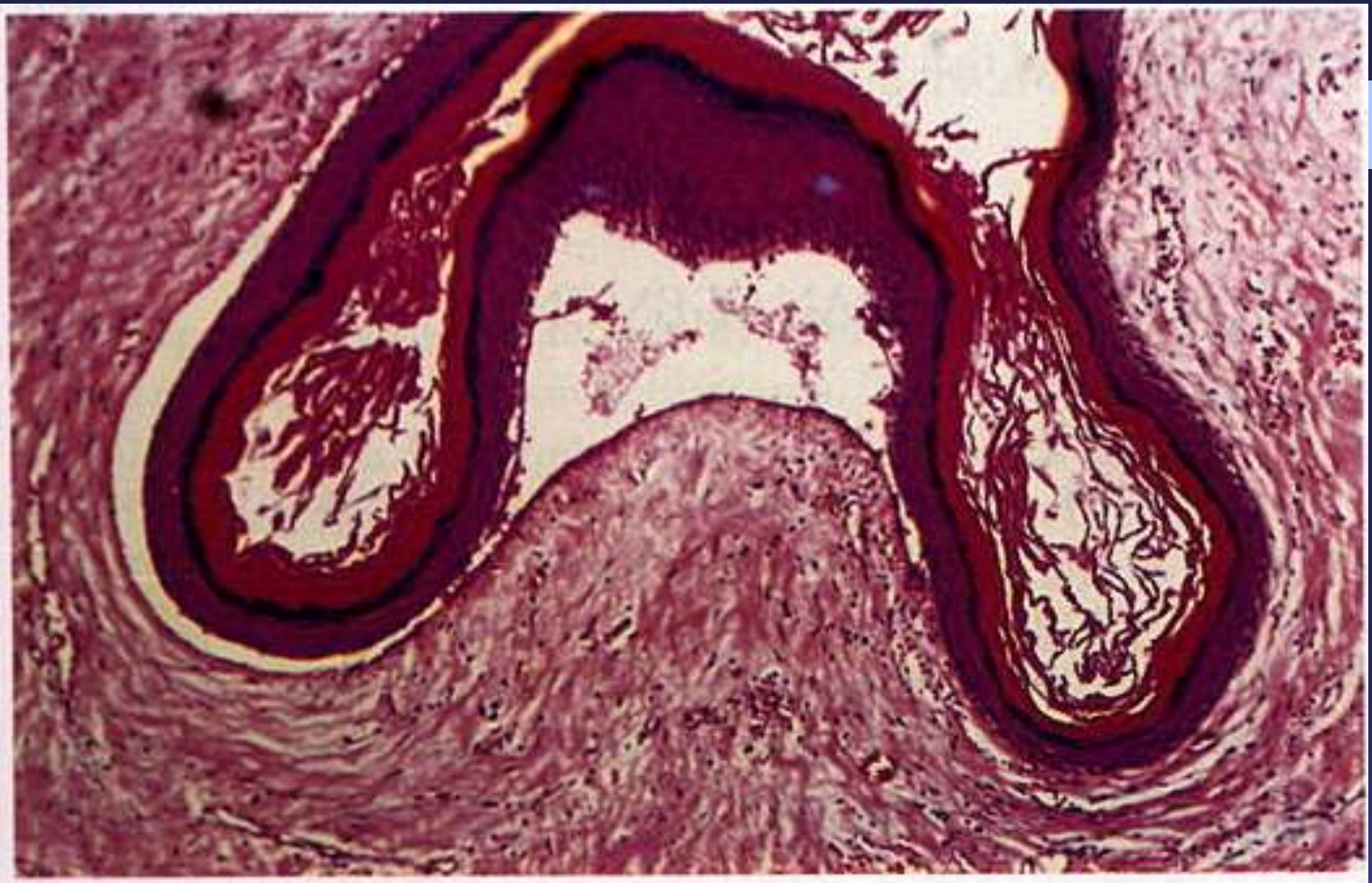


Fig. 20.6 Odontogenic keratocyst. The convolutions of the lining and its separation from the fibrous wall are common findings.

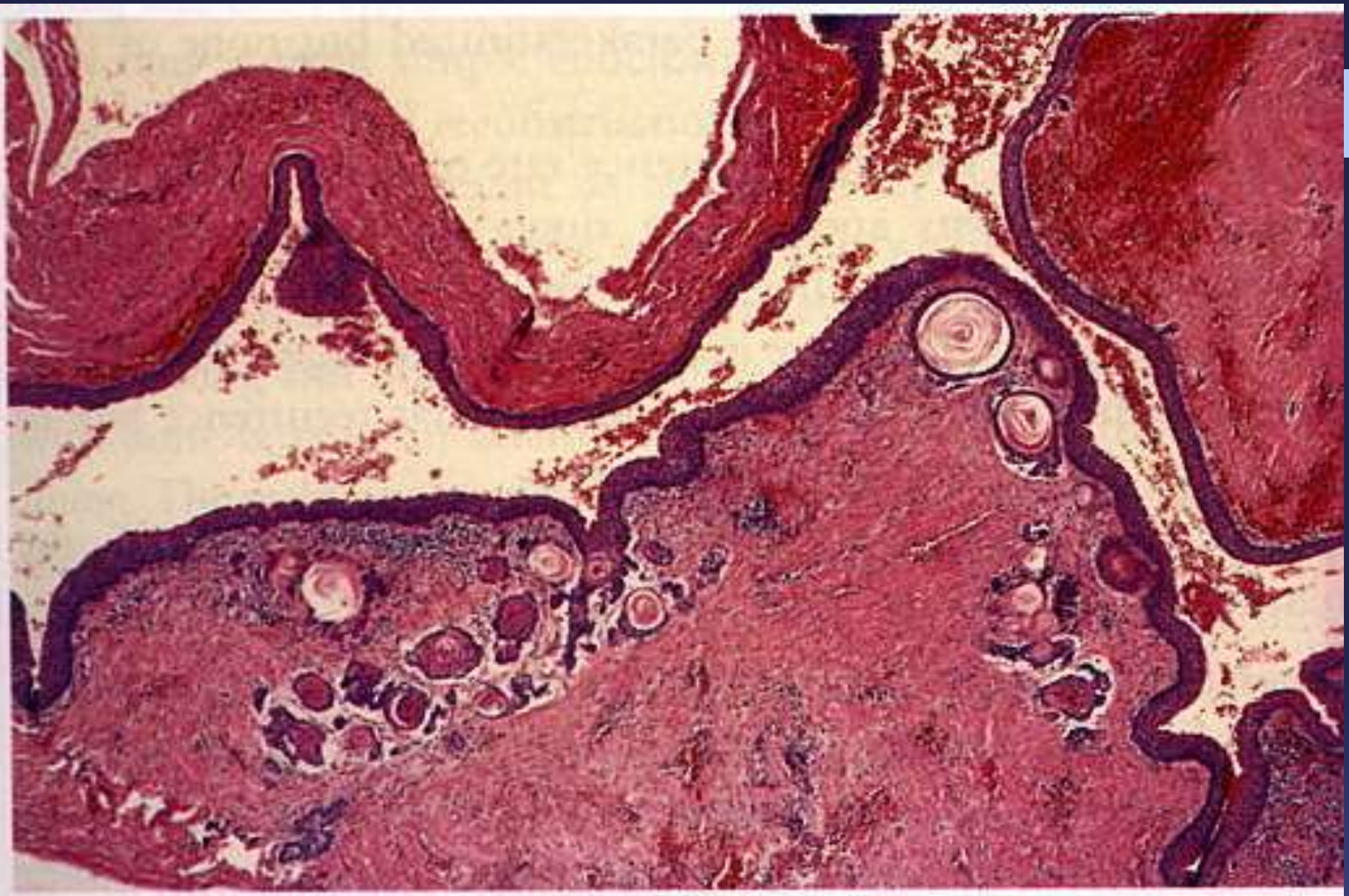
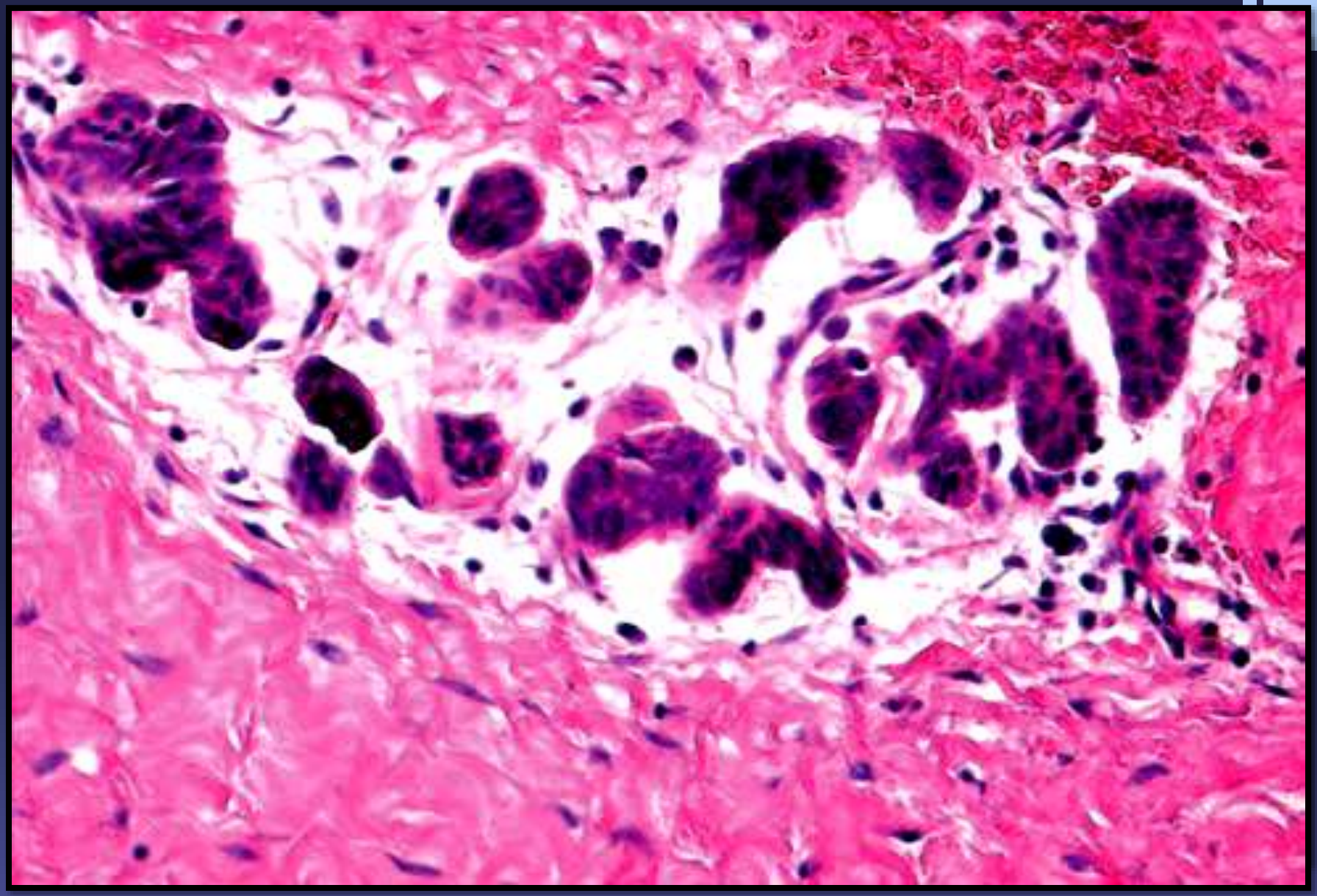


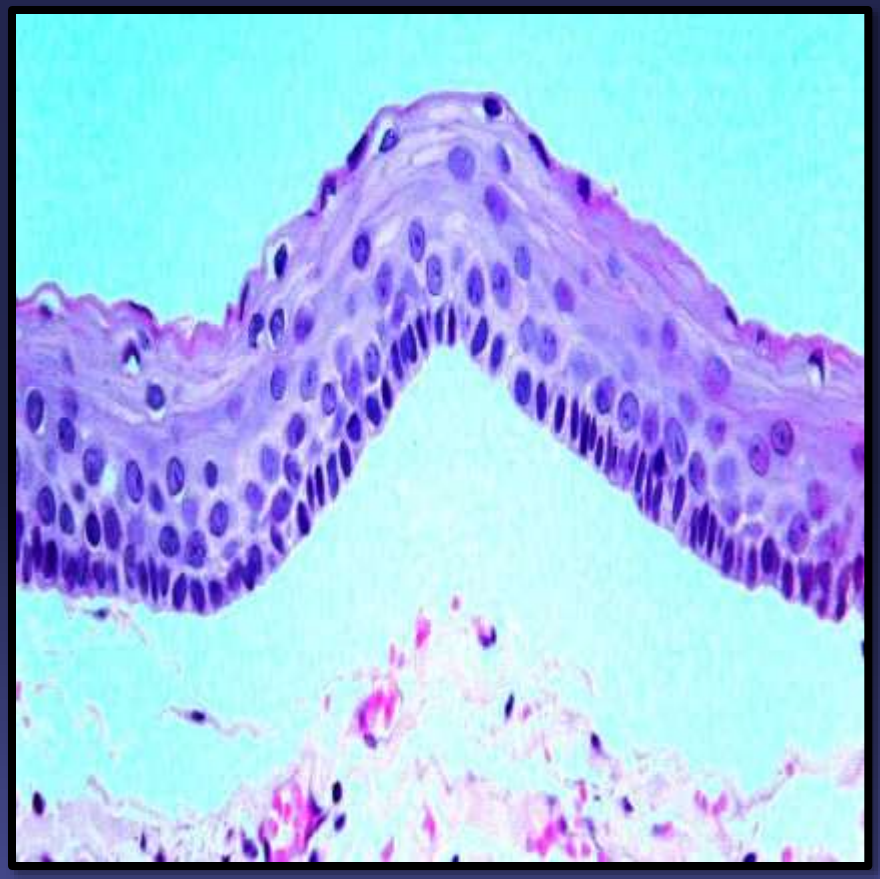
Fig. 20.7 Odontogenic keratocyst. Multiple daughter microcysts are present.

EXAMINING THE FIBROUS CAPSULE

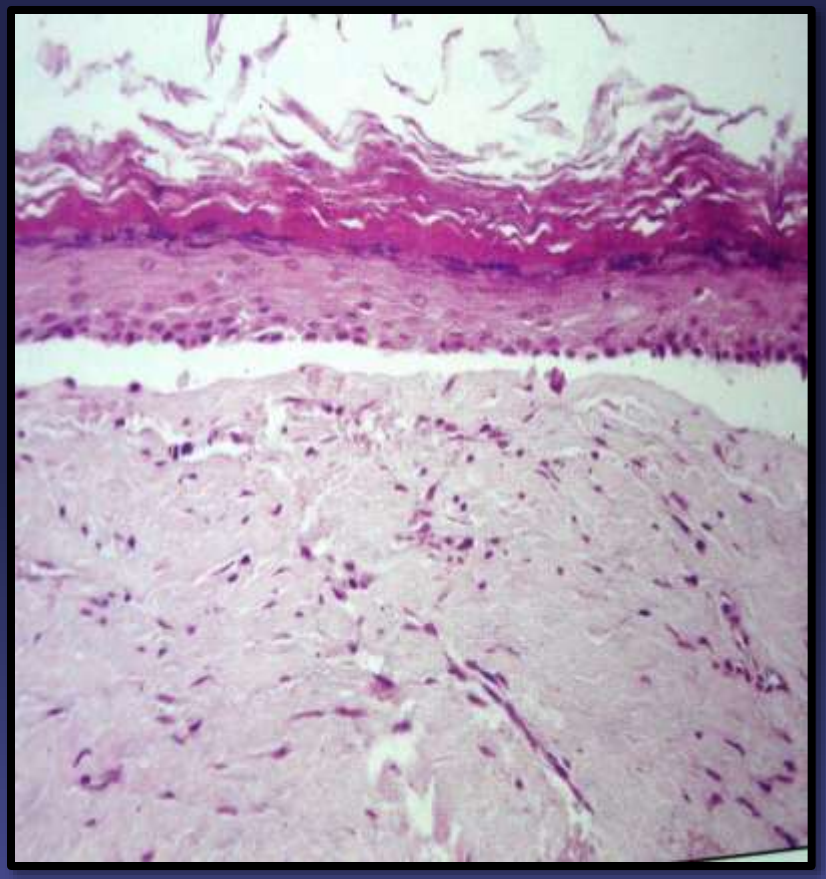


HISTOLOGIC VARIANTS OF OKC

Parakeratinized – 80-90%



Orthokeratinized – 7-10%



Orthokeratinized OKCs	Parakeratinized OKCs
Always in dentigerous association	Not always
Less aggressive	Aggressive
Usually around mandibular 3rd molars	With or without an associated tooth
No hyperchromatic basal cell layer	Hyperchromatic basal cell layer
Flat basal cell layer	Cuboidal to columnar basal cell layer
Shows a male predilection	No such predilection
Has a predilection for posterior mandible	No such predilection

ENLARGEMENT

Rate of growth

- Proliferation of epithelium & CT was in clusters & irregular. Not homogenous.
- Mean mitotic activity was 9

Role of osmolality

- Raised osmolality is not the sole cause.
- Mural growth in form of epithelial proliferation was also responsible

Role of inflammatory exudate

- Contributed significantly to its osmotic & hydrostatic pressure & hence expansile growth of OKC

Role of glycosaminoglycans

- Hyaluronic acid, Chondriotin 4 sulfate and Heparin sulfate.
- Release of these molecules contributes to osmotic and hydrostatic pressure. Hence in expansile growth.

Role of collagenolytic activity.

- Collagenase activity might influence the expansion.
- The collagen fibres were loosely packed & might be composed of procollagen, intermediates or pathologic collagens rather than tightly packed fibres

Role of IL, TNF, MMP's, tenascin, fibronectin

- Increase in bone resorption

EXAMINING THE CYSTIC FLUID

1. Soluble protein levels in OKC: < 3.5gm/dl (Toller 1970)

2. Aspirating cystic fluid & demonstrating keratinized squames in stained films.

3. A **keratocyst antigen (KCA)** was demonstrated in the fluid of OKC which was localized to epithelial cells.

- Highest recurrence rate:

- Tendency to multiplicity
- Satellite cysts
- Lining is thin & fragile
- Lining weakly attached to fibrous wall
- Extension of cyst in to cancellous bone
- Other ramnent of dental lamina contribute for second lesion

p53, PCNA, Ki-67, Calretinin

- These markers are expressed in actively proliferating cells, particularly in neoplasms.
- The presence of p53 in the nucleus was identified in the basal cells.
- PCNA staining was positive in all the basal and most parabasal cells.
- All p53 positive cells were also positive for PCNA thus proving the cells to be proliferating.

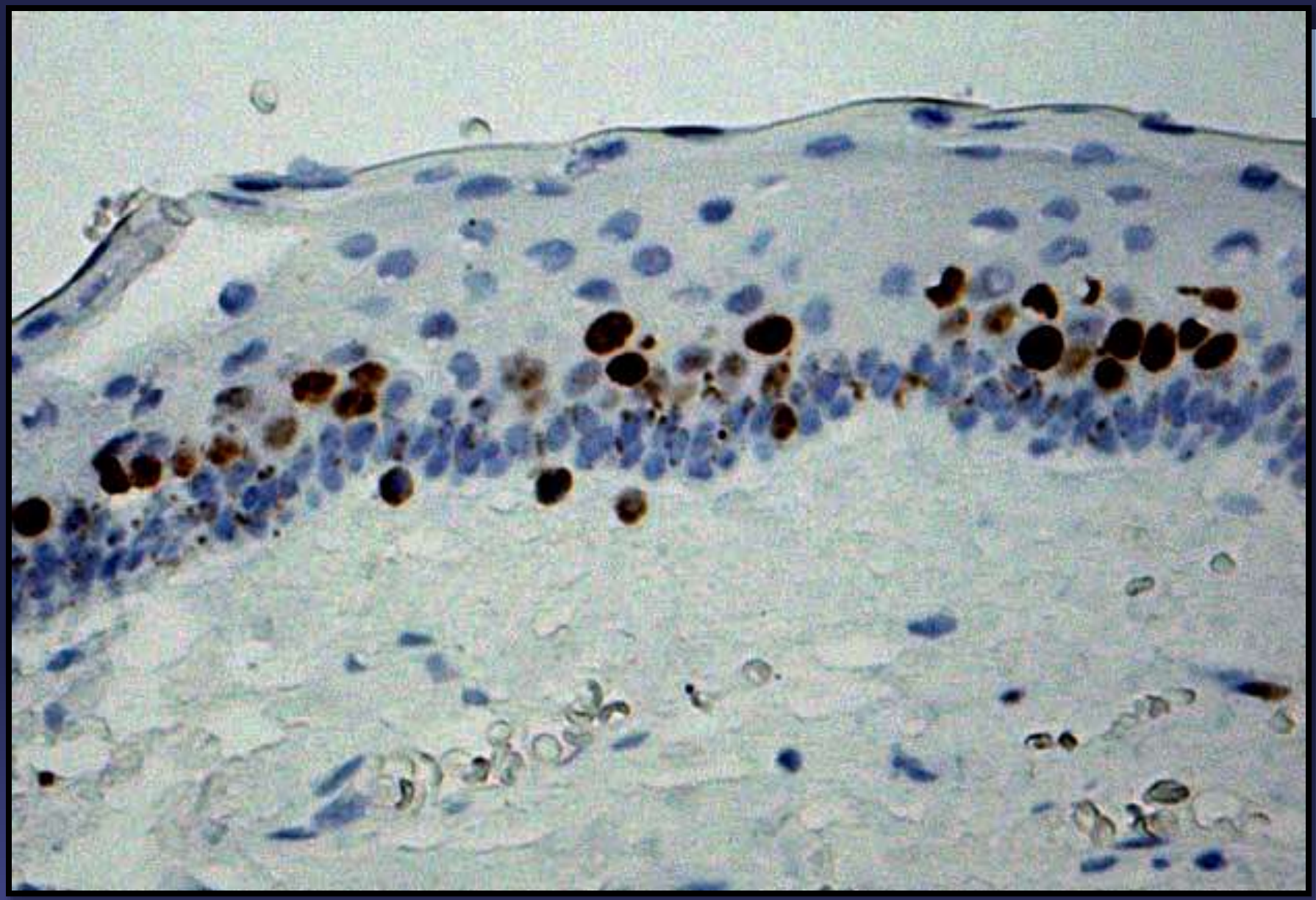
Review Biological pathways involved in the aggressive behavior of the keratocystic odontogenic tumor and possible implications for molecular oriented treatment – An overview Oral Oncology 46 (2010) 19–24

- Ki67 & calretinin showed a similar staining pattern as PCNA and this could point out to an abnormal control of cell cycle.

- p63 labeling was also more intense and diffuse in OKC thus pointing towards the abnormal control of cell cycle, leading to an intrinsic growth potential.

- There was over expression of bcl-2 to varying degrees in syndrome group rather than sporadic.

Review Biological pathways involved in the aggressive behavior of the keratocystic odontogenic tumor and possible implications for molecular oriented treatment – An overview Oral Oncology 46 (2010) 19–24



Moderate numbers of Ki-67-positive cells are present in the suprabasal layers of this odontogenic keratocyst.

JAW CYST- BASAL CELL NEVUS, BIFID RIB SYNDROME, GORLIN & GOLTZ SYNDROME.

- First described by Binkley and Johnson in 1951.
- Thoroughly reviewed by Gorlin & co workers.
- Caused by mutations in patched (PTCH) gene, mapped to chromosome 9q22.3-q31
- Transmitted as autosomal dominant.

- The **Nevoid Basal Cell Carcinoma Syndrome (NBCCS)** is an inherited medical condition involving defects within multiple body systems such as the skin, nervous system, eyes, endocrine system, and bones.

- Although primarily being known as Nevoid Basal Cell Carcinoma Syndrome, 10% of people with the condition do not develop basal cell carcinomas (BCCs).

SYNONYMS:

- NBCCS
- Gorlin Goltz syndrome,
- Basal cell nevus syndrome
- 5th phacomatosis
- Multiple BCC syndrome
- Multiple basalioma syndrome
- Multiple nevoid basal cell- epithelioma- jaw cysts- bifid rib syndrome
- Hereditary cutaneomandibular polyoncosis.

CLINICAL FEATURES

1. Cutaneous Anomalies:

BCC, palmar & plantar pitting.

2. Dental & Osseous Anomalies: OKC, bifid rib.

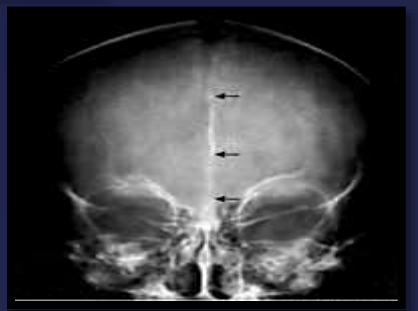
3. Opthalmic Anomalies: hypertelorism, congenital blindness.

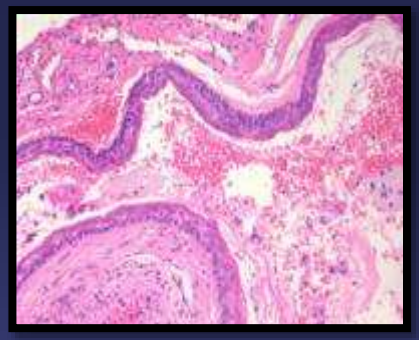
4. Neurologic Anomalies: mental retardation

BASAL CELL NEVUS SYNDROME

MAJOR CRITERIAS

Nevoid basal Cell Carcinoma Syndrome





Positive family history

MINOR CRITERIAS

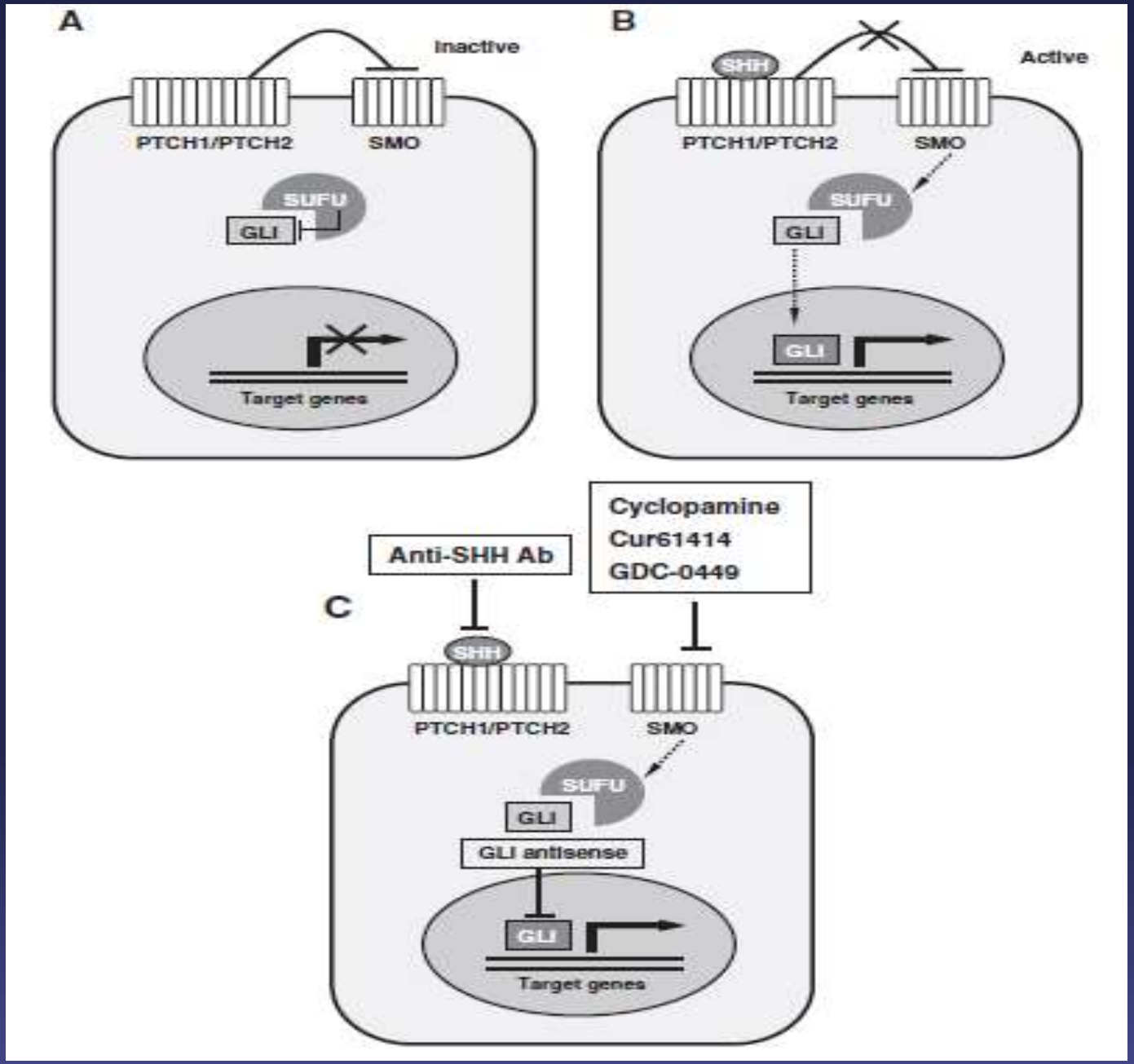
Nevoid basal Cell Carcinoma Syndrome

Sonic Hedgehog (SHH) in morphogenesis of the craniofacial complex

- In a growing embryo, cells develop differently in the different positions.

- The **Hedgehog signaling pathway** gives information to the cells, which are needed to make the embryo develop properly.

- Key regulator of development.



The Odontogenic Keratocyst: A Cyst, or a Cystic Neoplasm? *J Dent Res* 90(2) 2011 T.J.li

Two hit mechanism for the pathogenesis of OKC

- Many of the cysts arise with the allelic loss at 9q22.3.
- The defect in the gene is either the mutation occurred at very early stage of embryogenesis or might undergo point mutation at a later age.
- In the syndrome associated OKC's, with PTCH gene inactivation there was a loss of control of proliferative activity in the lining and this could act synergistically with the over expression of cyclin D, leading to neoplastic potential.

Two hit mechanism

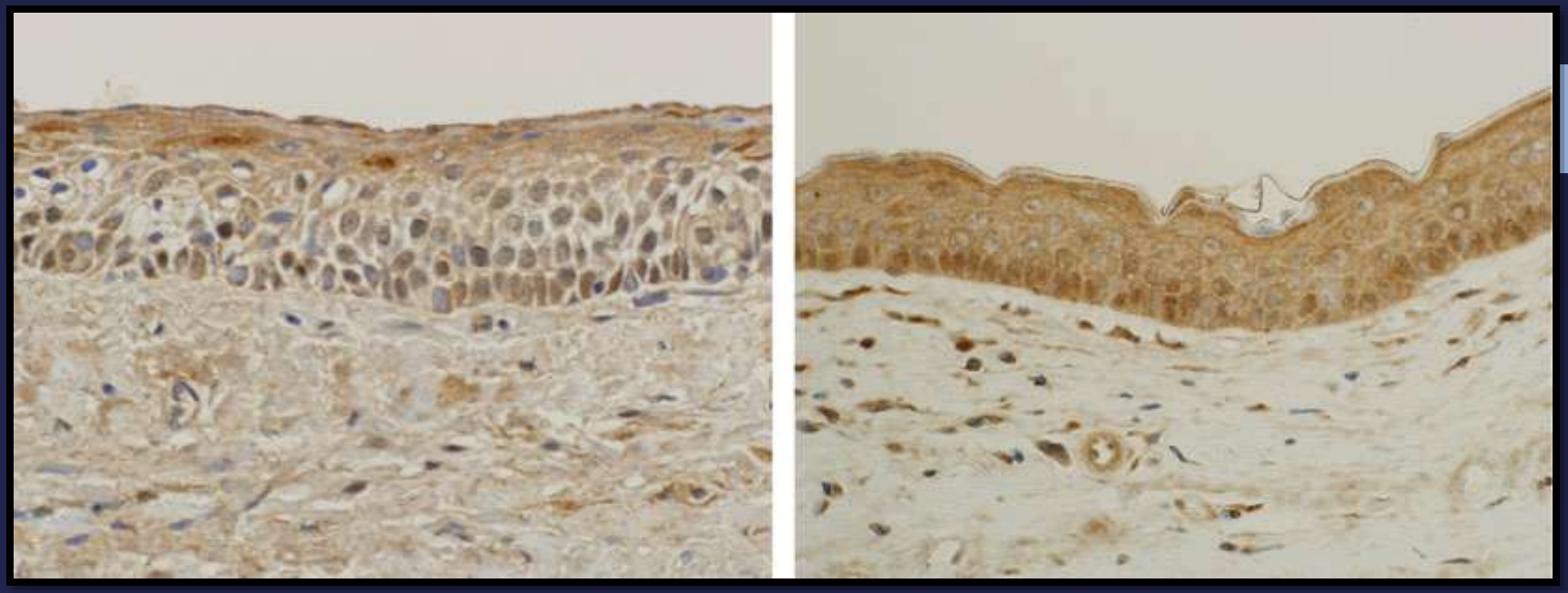
- The process by which a tumor supressor gene is inactivated
- *1st hit*: is a mutation in one allele, which, although it can dominantly be inherited, has no phenotypic effect.
- *2nd hit*: refers to loss of other allele and is known as loss of heterozygosity (LOH)
- In KOTs, this leads to dysregulation of the oncoproteins cyclin D1 and p53.
- LOH in 9q22.3– q31 region has been reported in many epithelial tumors, including OSCC, BCC, Transitional cell carcinoma.

Analysis of the neoplastic nature and biological potential of sporadic and nevoid basal cell carcinoma syndrome associated keratocystic odontogenic tumour

- The results implied that heparanase expression may be correlated with the neoplastic properties of KCOT, particularly in NBCCS-associated cases.

In sporadic KCOT, heparanase expression was comparatively weak and uneven. However, basal and keratinized cells showed moderate expression.

- **J Oral Pathol Med (2007) 36: 550–4**



Sporadic NBCCS

It is known that heparanase is rare in the normal tissue and often increases in tumors and promotes tumor invasion, angiogenesis and metastasis

Keratocystic odontogenic tumor, previously known as odontogenic keratocyst, is a benign cystic lesion, but it often shows locally destructive behaviour and high recurrence rate

- OKC's are ***first sign*** of NBCCS.

- Have appeared in early 2nd decade. This suggest OKC arise earlier in patients with NBCCS than without NBCCS.

- The appearance of 2 or more recurrent OKC's or appearance of OKC in young patient should lead dental practitioner to suspect that patient has NBCCS

Property	OKC with syndrome	OKC without syndrome
Age of occurrence	Single peak at 10-30 years.	Bimodal- 15-45 years & 55-65 years
Gender distribution	Females> males (17:1)	Males> females (1.7:1)
Site	Maxilla	Mandible-ramus area
Recurrence	More	Less
Index of activity	Higher	Lower
Satellite cysts	Common	uncommon
Ki67	Greater (hence more proliferative)	lesser
Pathogenesis	Mutation is already present in the germ line & only single mutational event is required in somatic cells to cause homozygous inactivation	Two independent mutational events are required in somatic cells.

Reclassification of OKC to tumor : Keratinizing Cystic Odontogenic Tumor

- In 1967 Toller suggested that OKC may best be regarded as benign neoplsm rather than cyst based on its clinical behaviour.

1. Behavior: KOT is locally destructive and recurrence rate is high.

2. Histopathology: proliferation and budding of basal layer in to the connective tissue

3. Genetics: PTCH gene involvement

GINGIVAL CYST OF INFANTS

- Multiple or solitary, superficial raised nodules on the edentulous ridges of infants
- Derived from rests of dental lamina
- Asymptomatic and produce no discomfort to the infants

- Bohn’s nodules and Epstein’s pearls are two similar lesions

- Epstein’s pearls are cystic keratin filled nodules found along the mid-palatine raphe, probably derived from entrapped epithelial remnants along the line of fusion.

- Bohn’s nodules are keratin filled cysts scattered over the palate and apparently derived from palatal salivary gland structures.

HISTOPATHOLOGY

- True cysts with thin epithelial lining which lacks rete ridges

- Lumen is usually filled with desquamated keratin occasionally containing inflammatory cells

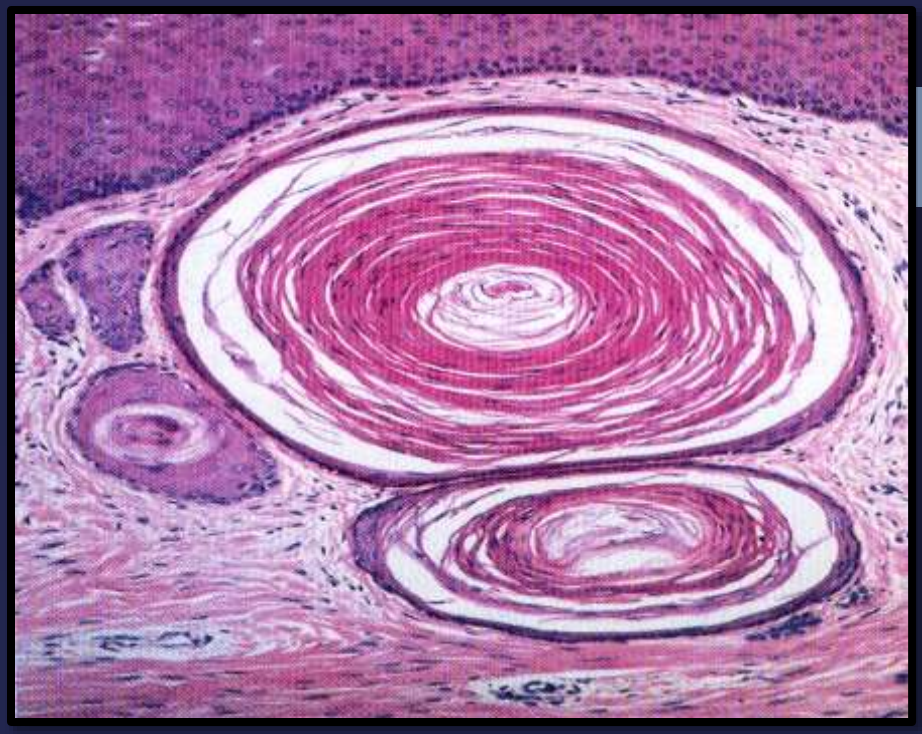
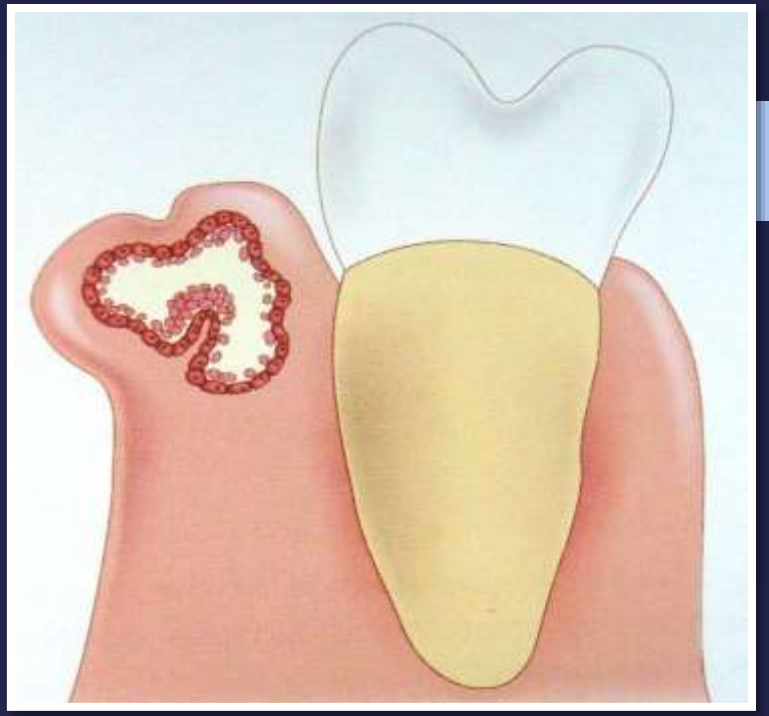


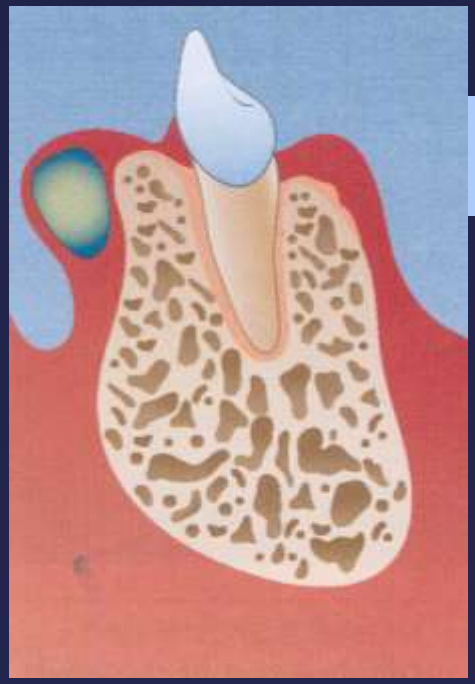
Fig. 5.13 Gingival cyst: histology shows minute cysts formed from the rests of Serres immediately beneath the alveolar mucosa. Foetal specimen.

GINGIVAL CYST OF ADULTS

- Developmental odontogenic cyst of the gingival soft tissue.
- Derived from the rests of the dental lamina
- Contain a lining of embryonic epithelium of cuboidal cells and distinctive focal thickenings like Lateral periodontal cyst.



POSSIBLE SOURCES OF CYST FORMATION



1. Heterotopic glandular tissue
2. Degenerative changes in a proliferating epithelial peg
3. Remnants of dental lamina, enamel organ or epithelial islands of periodontal membrane
4. Traumatic implantation of epithelium

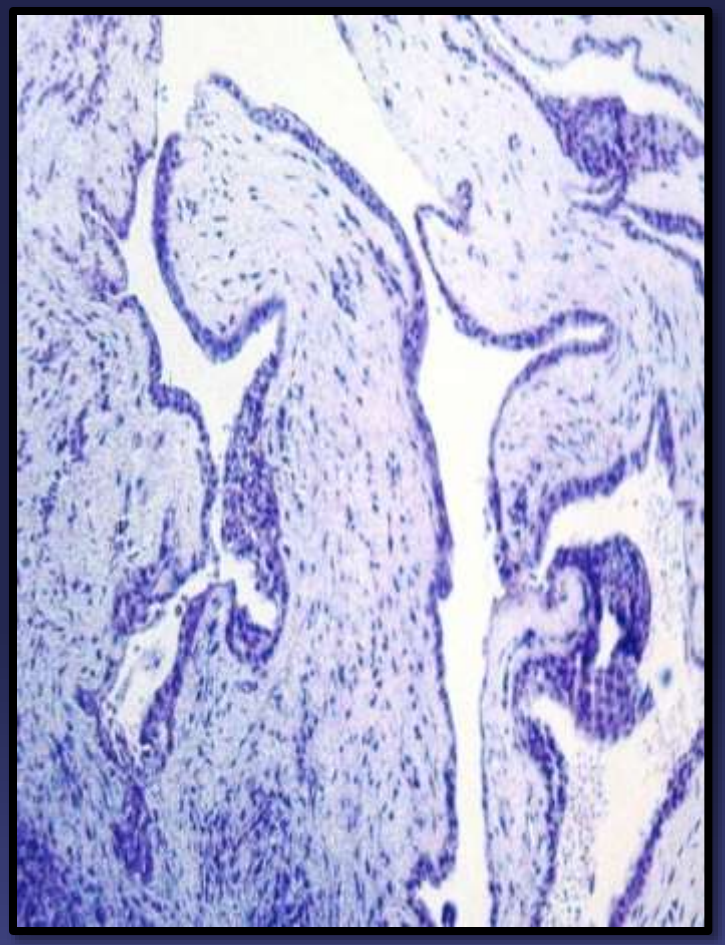
CLINICAL FEATURES

1. More common in adults (over 40yrs of age)
2. Site – canine-premolar area
3. Small well circumscribed lesion on the gingiva
4. Usually seen in the attached gingiva or interdental papilla

HISTOPATHOLOGY

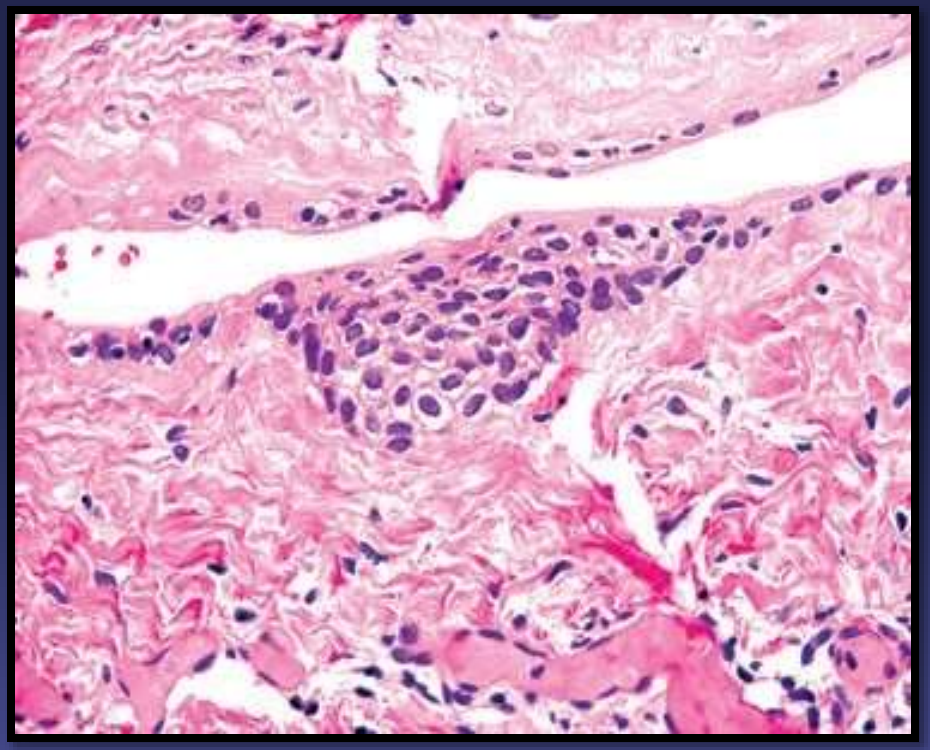
1.Epithelium ranges in thickness from 1-3 layers of flat cuboidal cells to thick stratified squamous epithelium without rete ridges

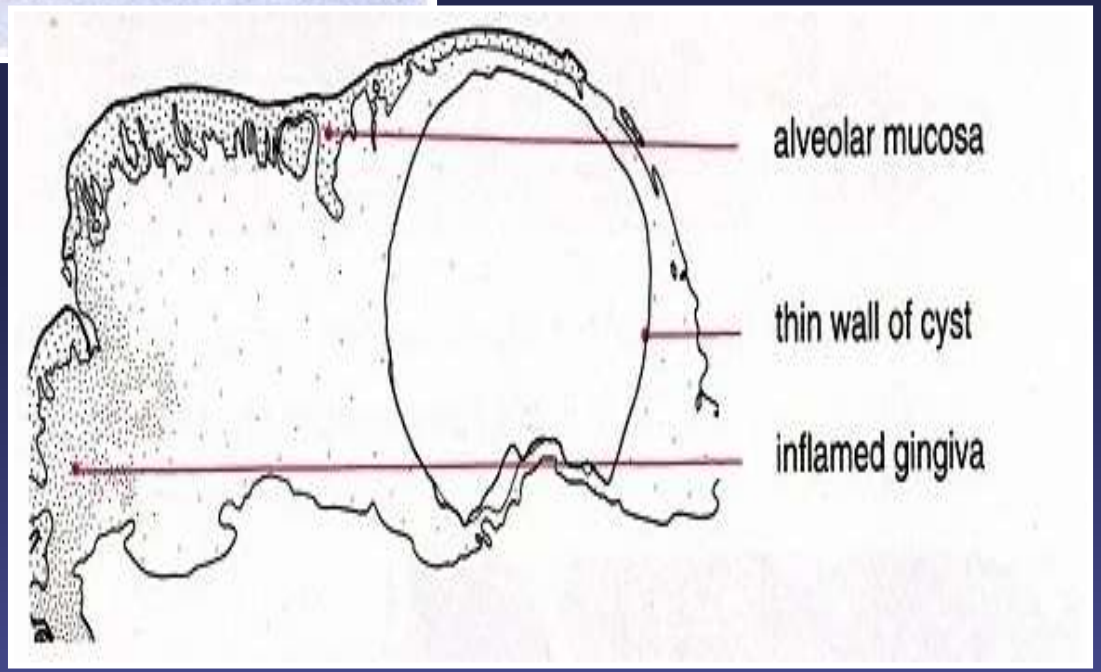
2.Many epithelial cells have pyknotic nuclei and show perinuclear cytoplasmic vacuolization



- Glycogen-rich clear cells are present especially in the focal thickenings of the lining

- Rests of dental lamina may be present in the connective tissue




alveolar mucosa
thin wall of cyst
inflamed gingiva

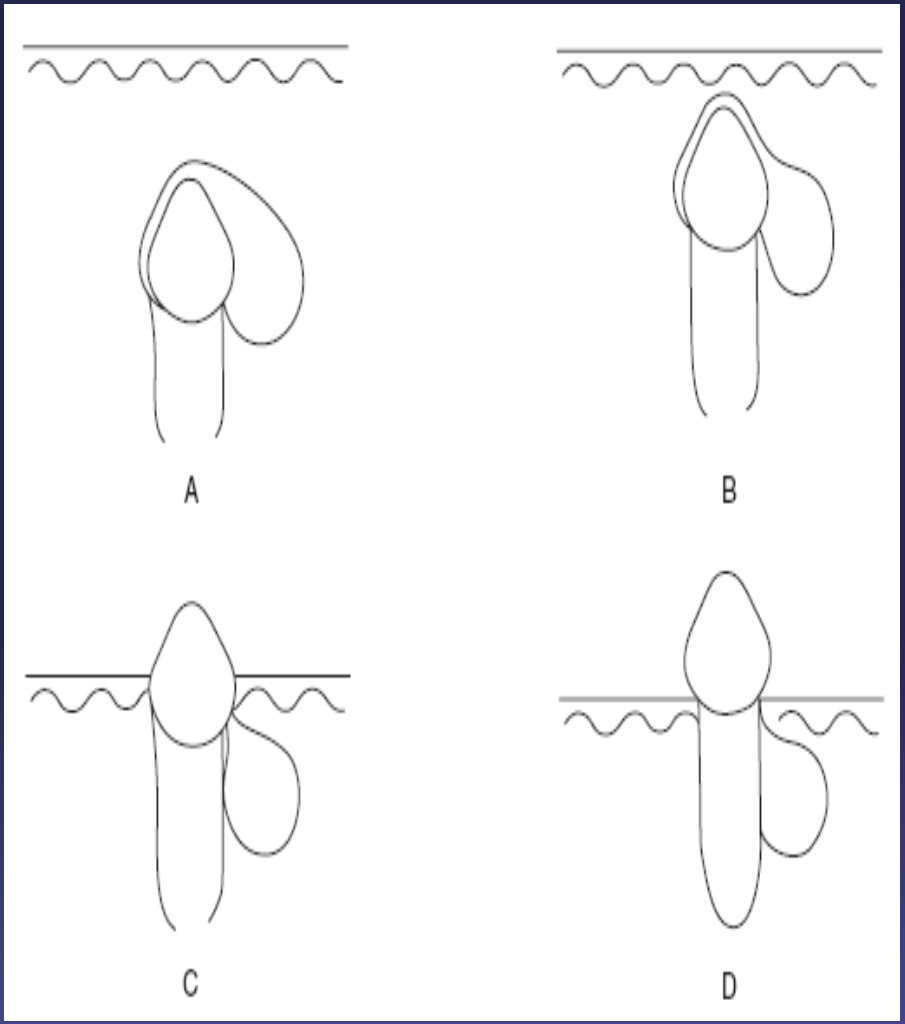
LATERAL PERIODONTAL CYST

- Slow growing, non-expansile developmental odontogenic cyst
- Occurs on a lateral periodontal position.

VARIOUS THEORIES AND PATHOGENESIS

1. Develops as a dentigerous cyst along the lateral surface of the crown and as the tooth erupts,

the cyst assumes a position in approximation to the lateral surface of the root



2. Proliferation of rests of Malassez in the periodontal ligament – stimulus is unknown

3. As a primordial cyst of a supernumerary tooth – more occurrence of supernumerary teeth in premolar area

4. Proliferation and cystic transformation of rests of dental lamina

- Wysocki et al concluded that the lateral periodontal cyst and gingival cyst of adults share a common histogenesis from the post functional dental lamina rests.

- These two cysts are basically central / intraosseous and peripheral / extraosseous manifestations of the same lesion

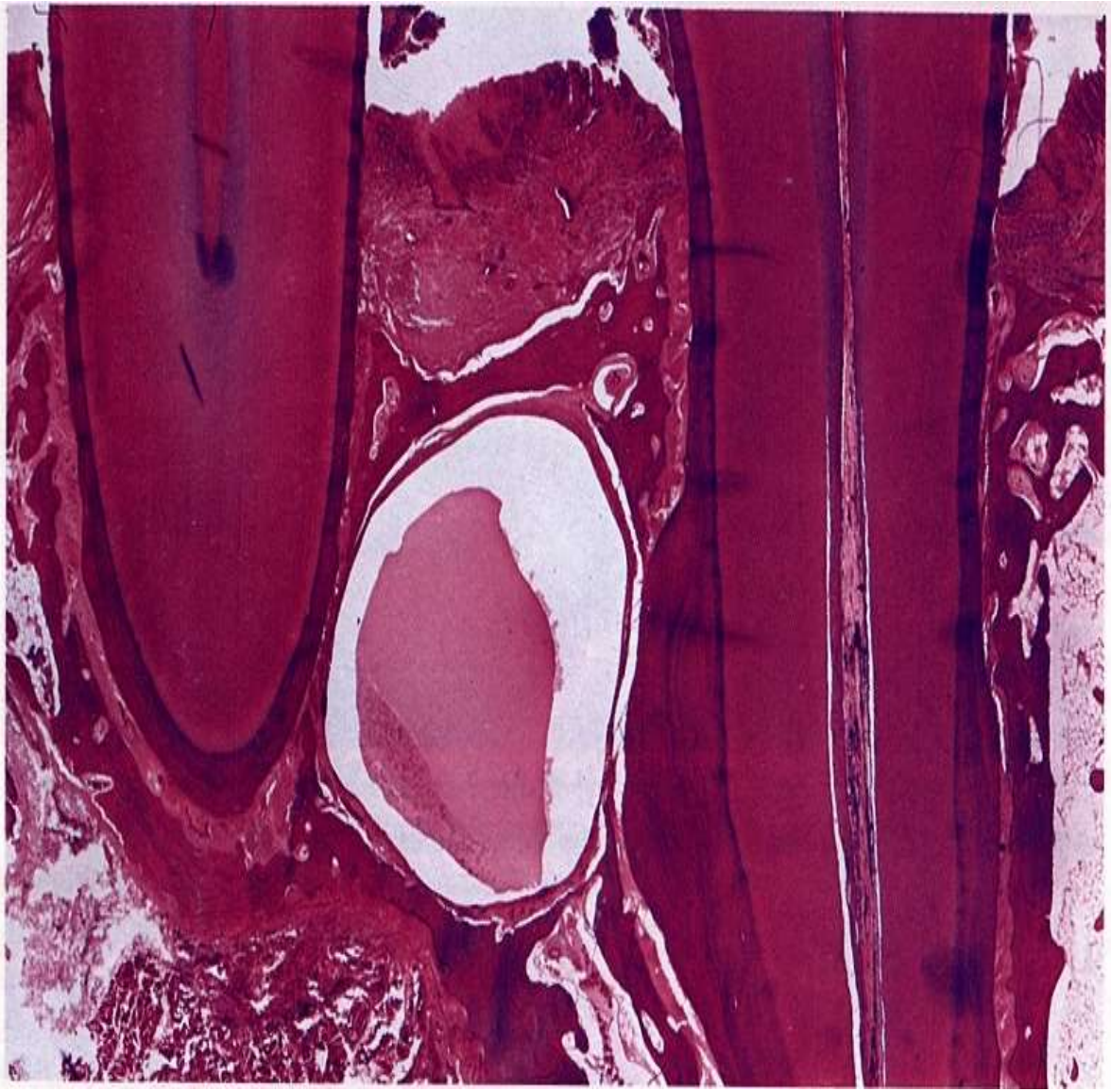
CLINICAL FEATURES

1. Chiefly in adults (mean age-50yrs)
2. Predilection for canine-premolar area
3. Male = Female

RADIOGRAPHIC FEATURES

- Radiolucent area in apposition to the lateral surface of the tooth
- May or may not be well circumscribed
- Most lesions have definite borders and surrounded by a rim of sclerotic bone

HISTOPATHOLOGY



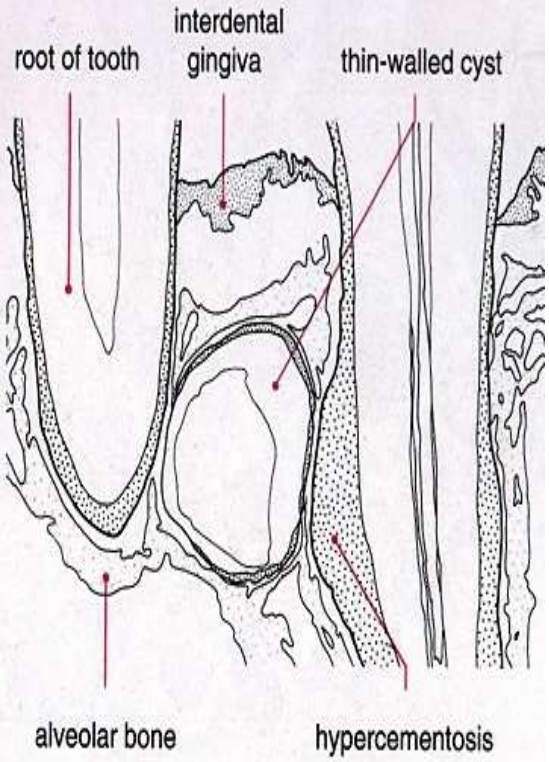
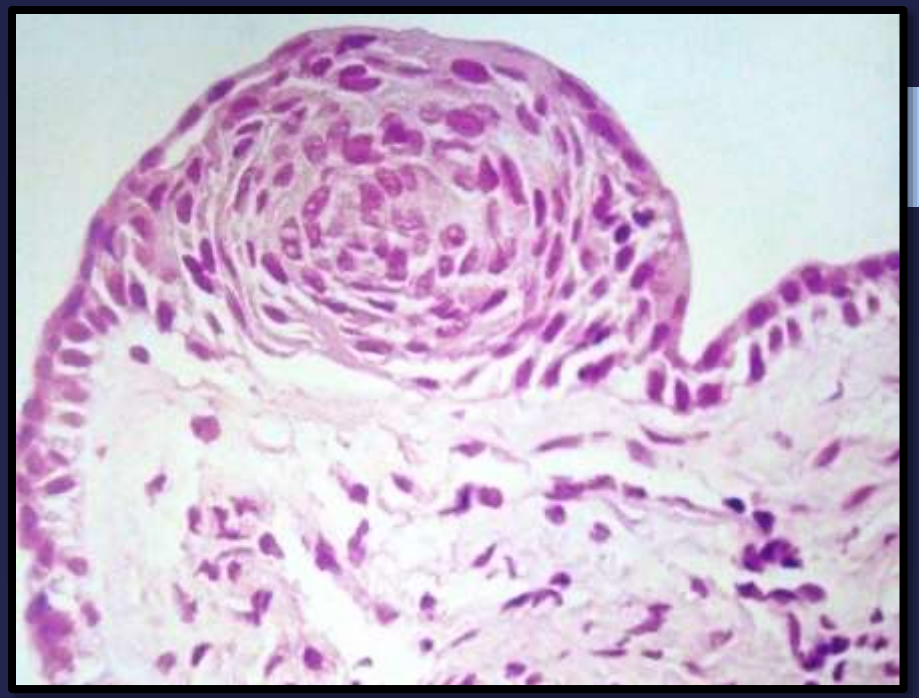
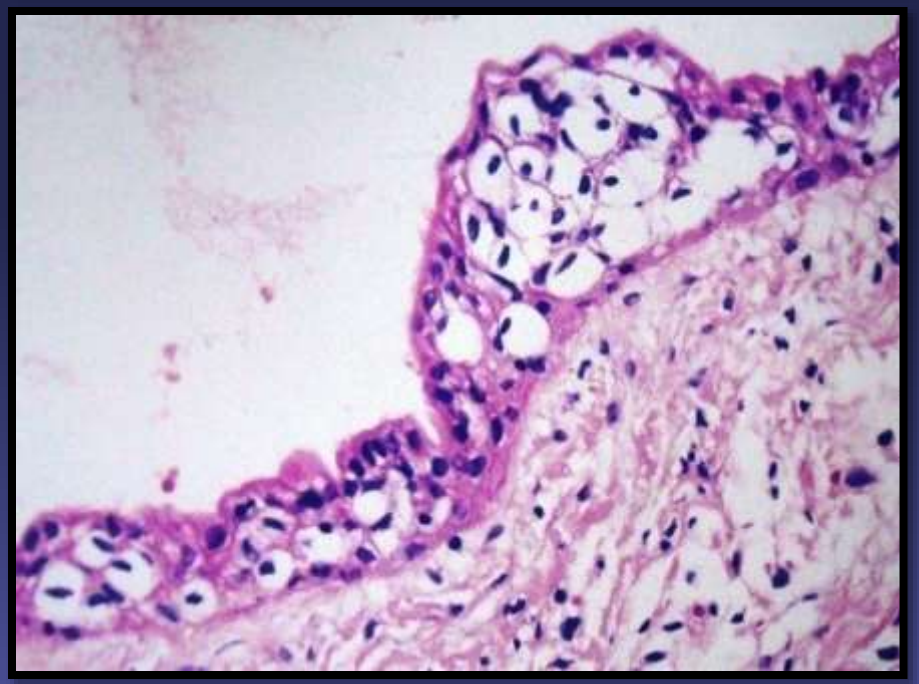


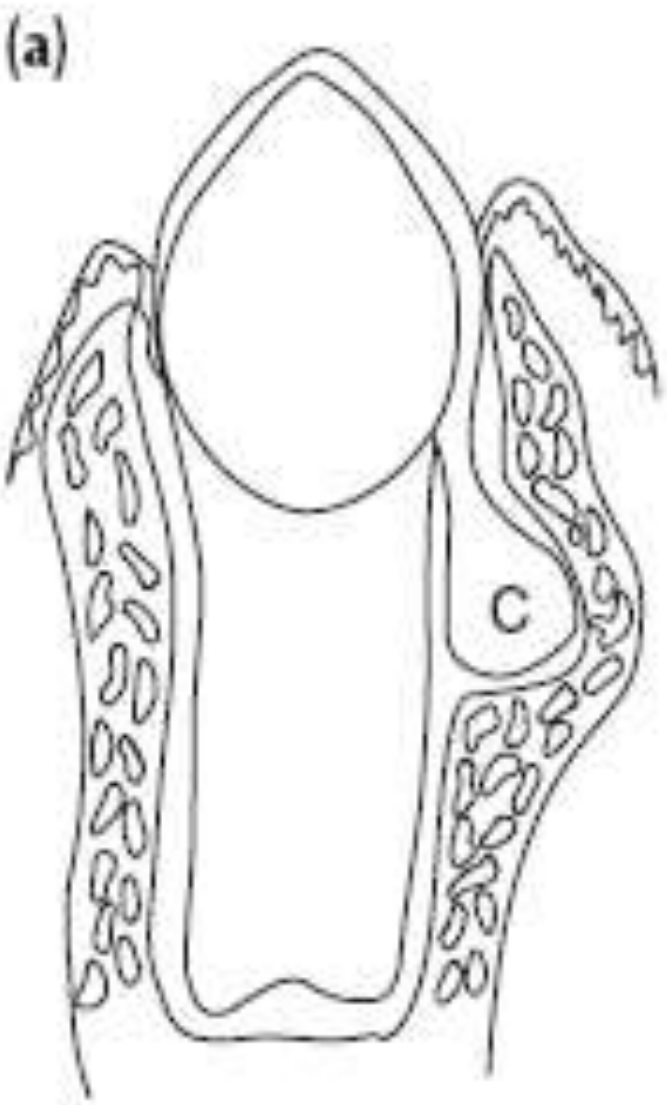
Fig. 5.15 Lateral periodontal cyst: section shows that the cyst is lined by epithelium resembling reduced enamel epithelium. The teeth are vital.

- Focal thickened plaques of proliferating lining cells may be seen projecting into the lumen

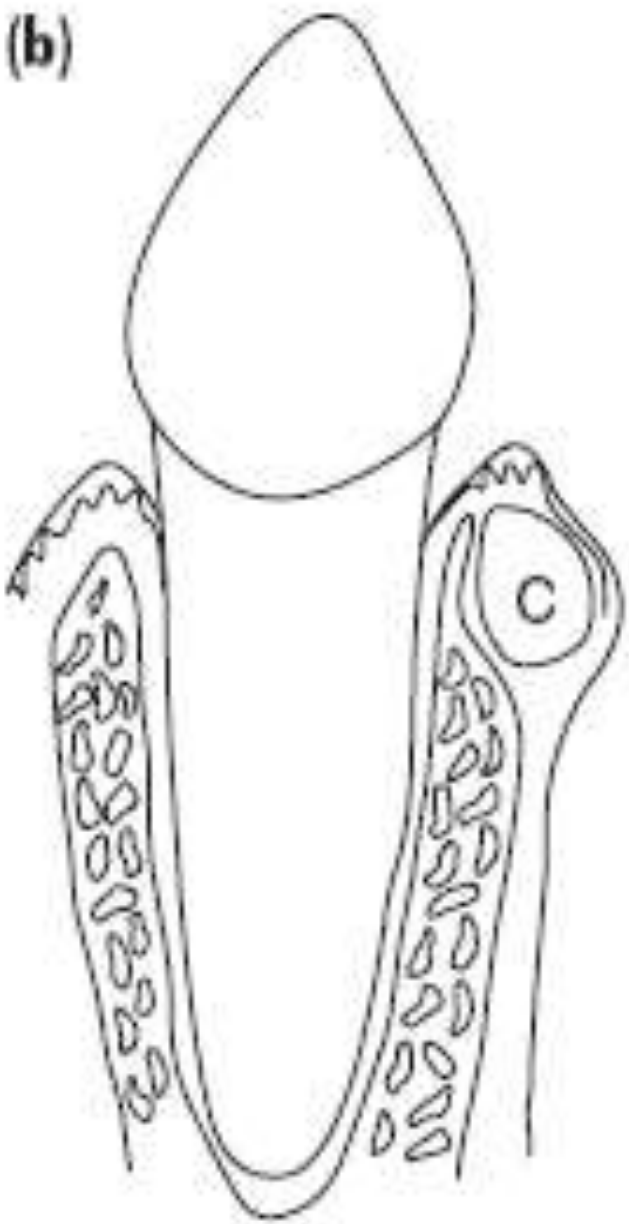
- Many of the epithelial lining cells have a clear, vacuolated, glycogen rich cytoplasm







Lateral periodontal cyst

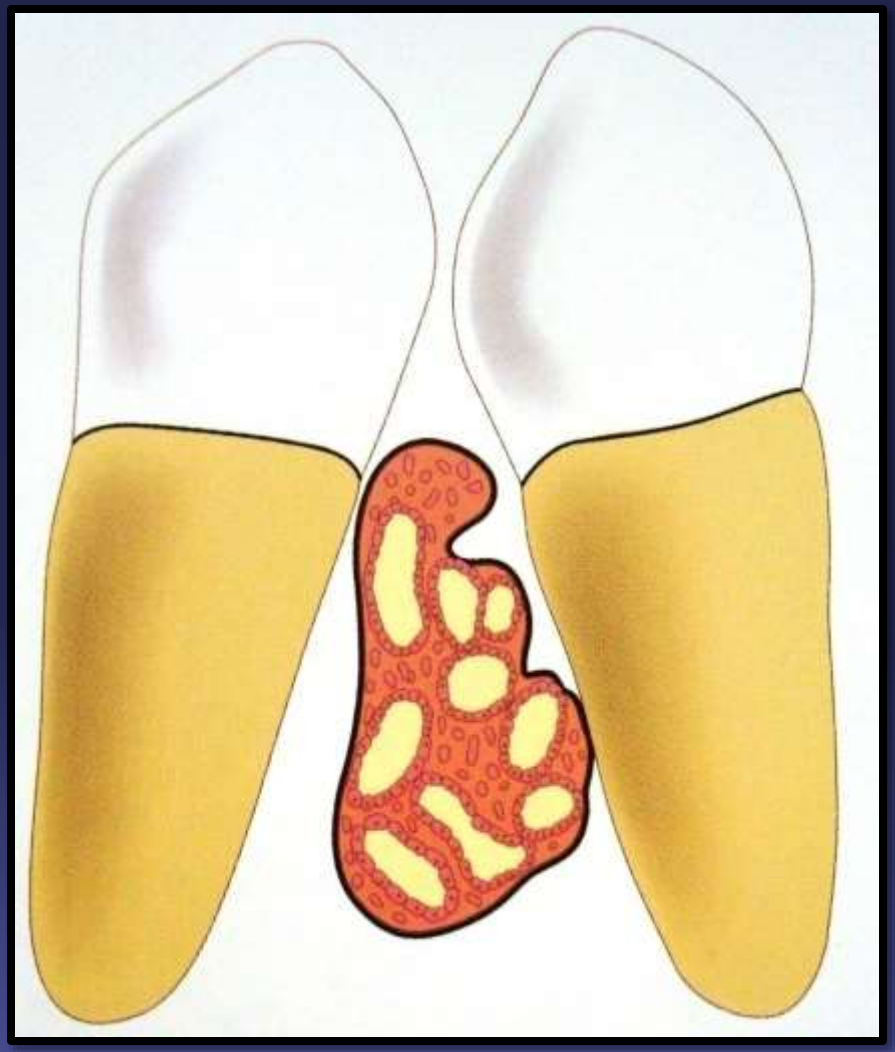


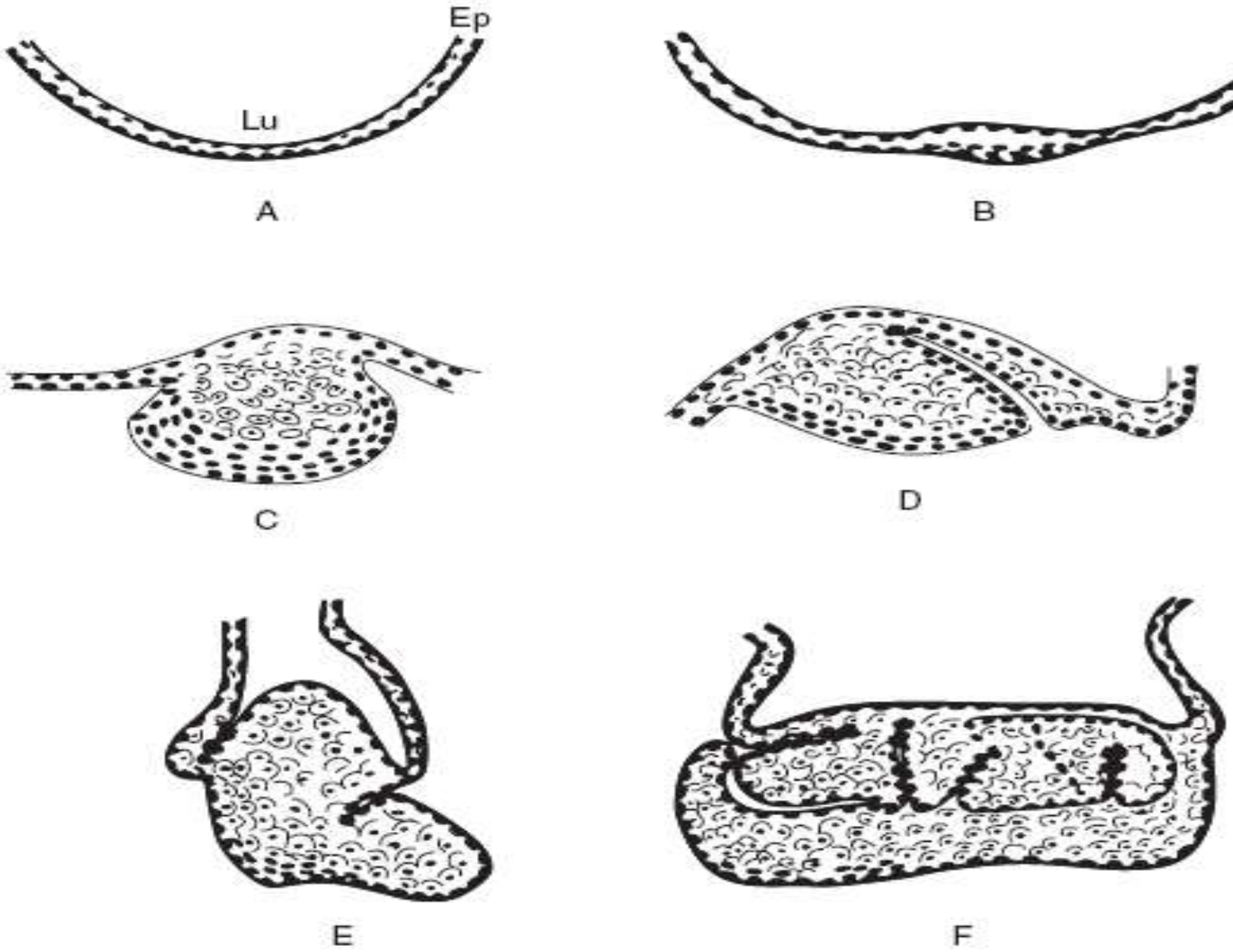
Gingival cyst of adults

BOTRYOID ODONTOGENIC CYST

- This is a cystic lesion with clinical and radiologic features of a lateral periodontal cyst

- Weathers and Waldron (1973) first suggested the term botryoid odontogenic cyst because the gross specimen resembled a cluster of grapes

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CLINICAL FEATURES

1. Age – 5th to 7th decade of life
2. Site – more in the anterior mandibular region
3. Usually asymptomatic but may cause pain

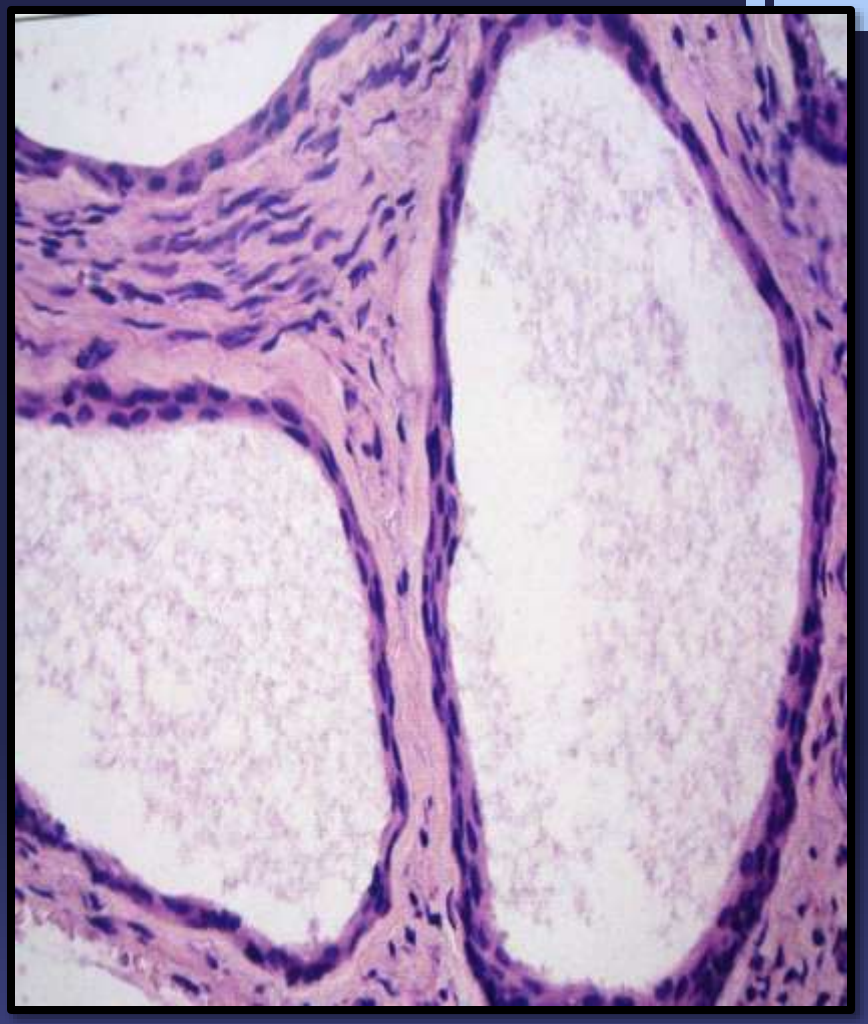
RADIOLOGIC FEATURES

- Mostly it is a multilocular radiolucency, but can be unilocular as well

HISTOPATHOLOGY

- Similar to lateral periodontal cyst
- It is multicystic with thin fibrous connective tissue septa

- Cystic cavities are lined by thin nonkeratinised epithelium but occasionally may be lined by stratified squamous epithelium
- Lining may contain plaque like thickenings
- Clear cells are also present



GLANDULAR ODONTOGENIC CYST

- An unusually large solitary or multilocular odontogenic cyst probably derived from rests of dental lamina, consisting of a stratified squamous epithelium containing numerous mucous secreting cells.

- First described by Padayachee and Van Wyk (1987) as 'sialo-odontogenic cyst'

- Gardner et al (1988) used the term 'glandular odontogenic cyst'

- Also called as 'mucoepidermoid odontogenic cyst' (Sadeghi et al 1991)

CLINICAL FEATURES

- Age –2nd to 9th decade

(peak in 6th decade)

- Sex – more in males

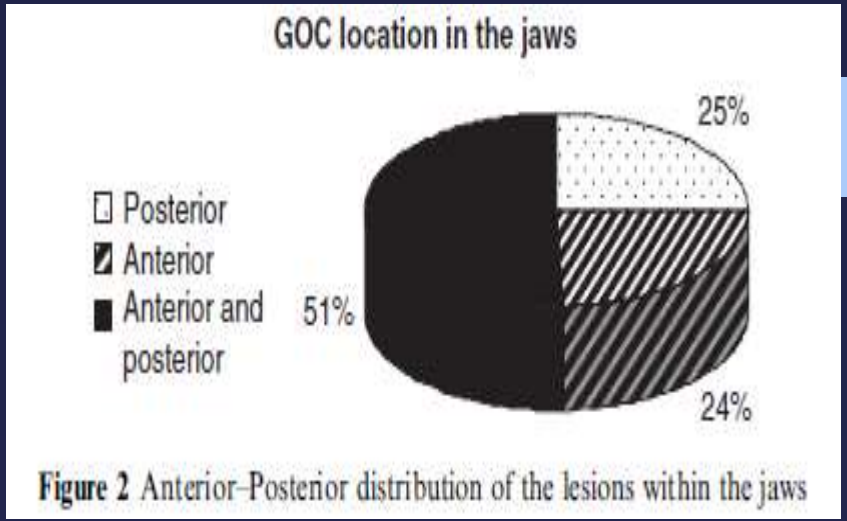


Figure 2 Anterior–Posterior distribution of the lesions within the jaws

- Site – mandible (ant. region)

- Rare cystic lesion usually produces a painless swelling

- Aggressive or potentially aggressive lesion

- Recurs if not adequately excised

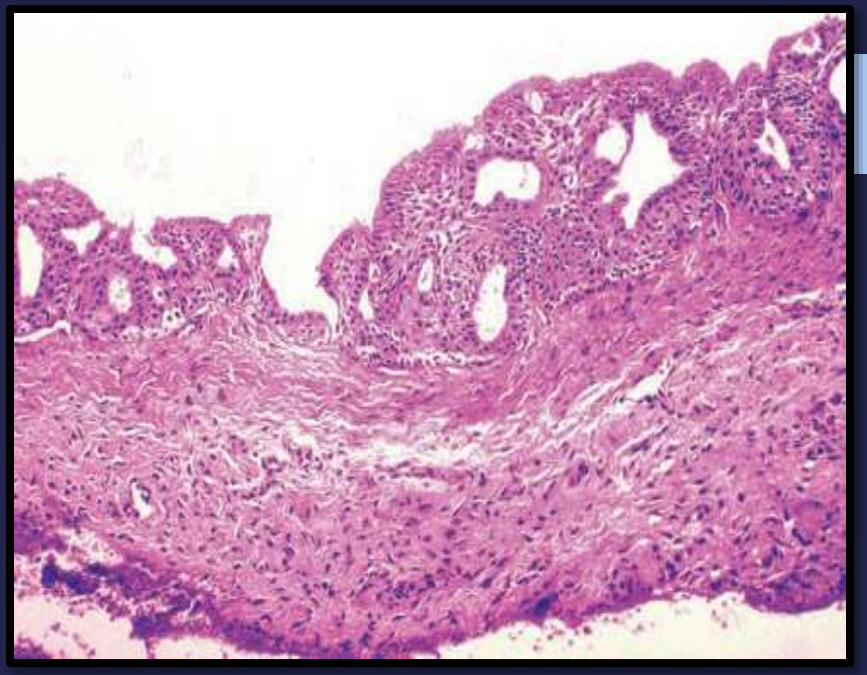
RADIOGRAPHIC FEATURES

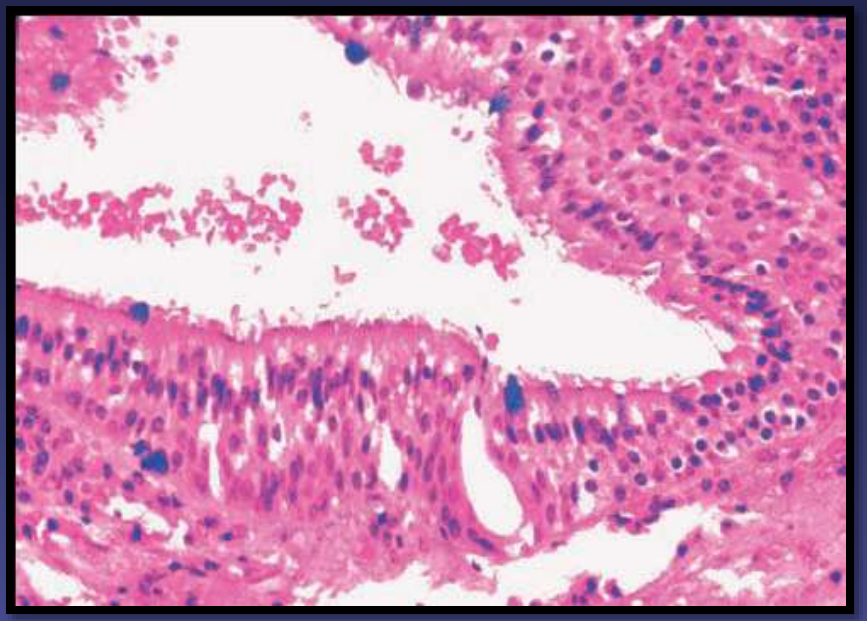
- Could be a well-defined unilocular or multilocular lesion
- Can cause cortical expansion while larger lesions perforate the cortical plates
- Can cause displacement and resorption of teeth

HISTOPATHOLOGY

- Cyst is lined in parts by non-keratinised stratified squamous epithelium with chronic inflammatory cell infiltrate in the connective tissue wall

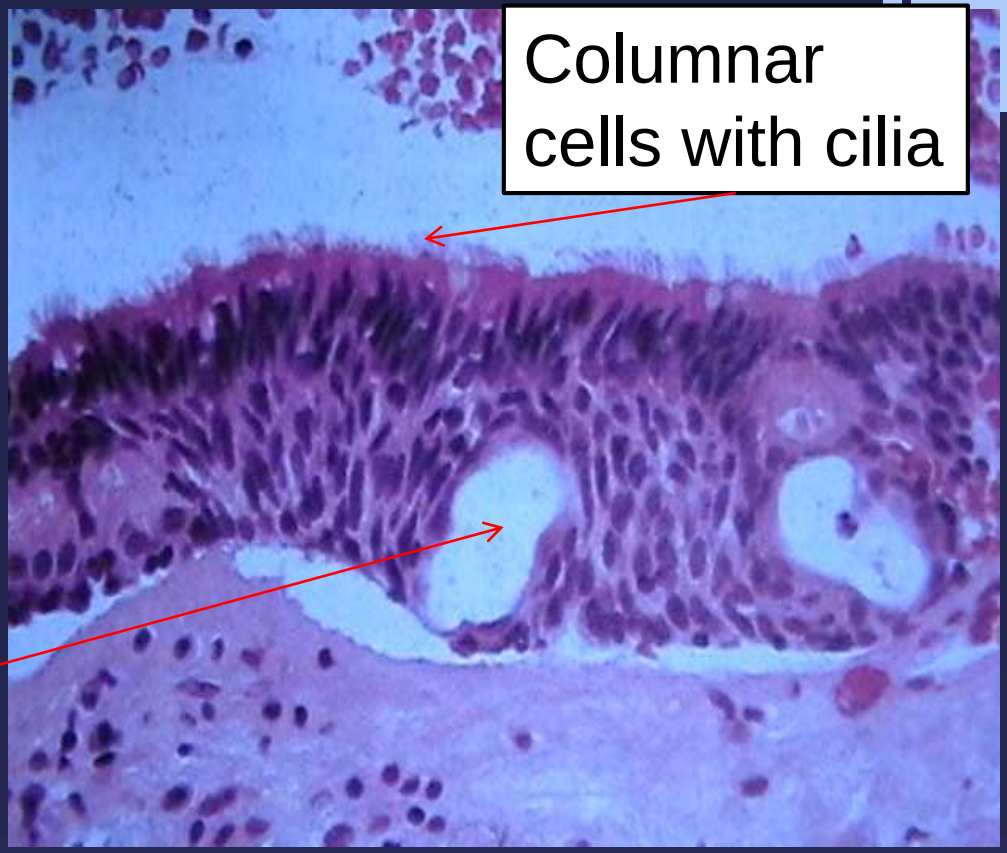
- Diagnosis is made when the superficial layer of the epithelial lining consists of columnar or cuboidal cells called as ‘Hobnail’.





- These cuboidal or columnar cells have cilia or filliform extensions of the cytoplasm

- The epithelium has a glandular or pseudo glandular structure with intraepithelial crypts or microcysts

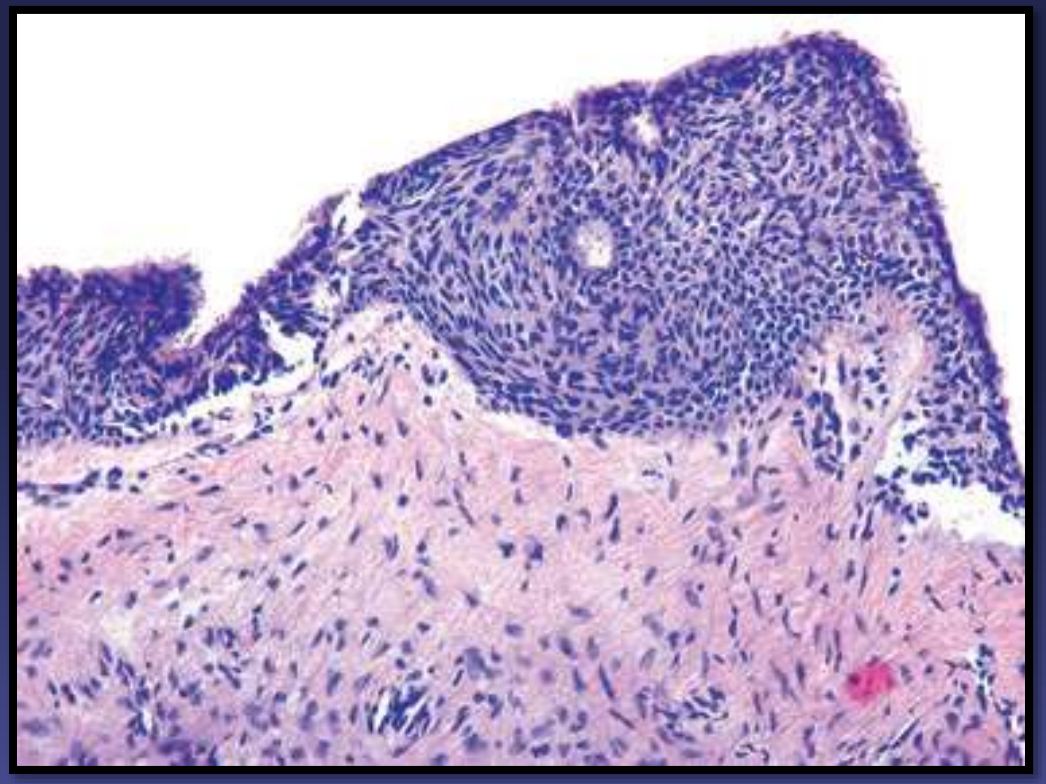


- Numerous goblet cells may be present.

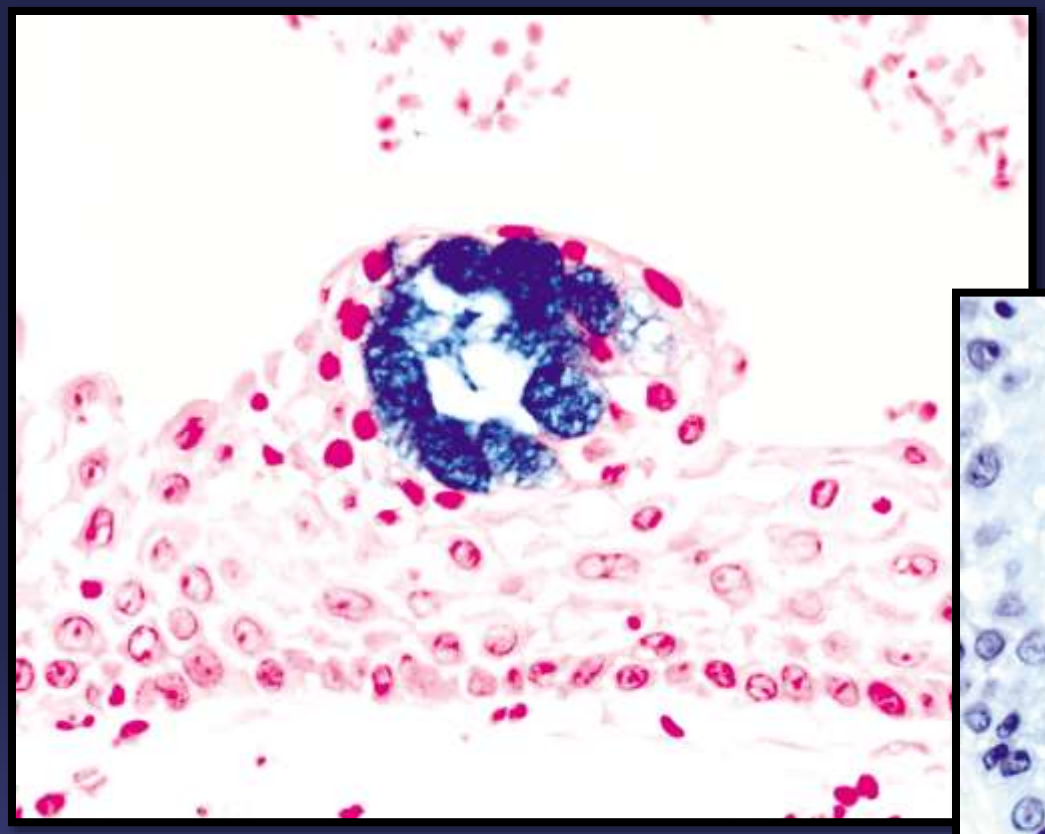
- Sometimes the epithelium may be thin similar to reduced enamel epithelium.

- Epithelial thickenings or plaques may also be present.

- These plaques are identical to lateral periodontal cyst, botryoid odontogenic cyst, and gingival cyst of adults.

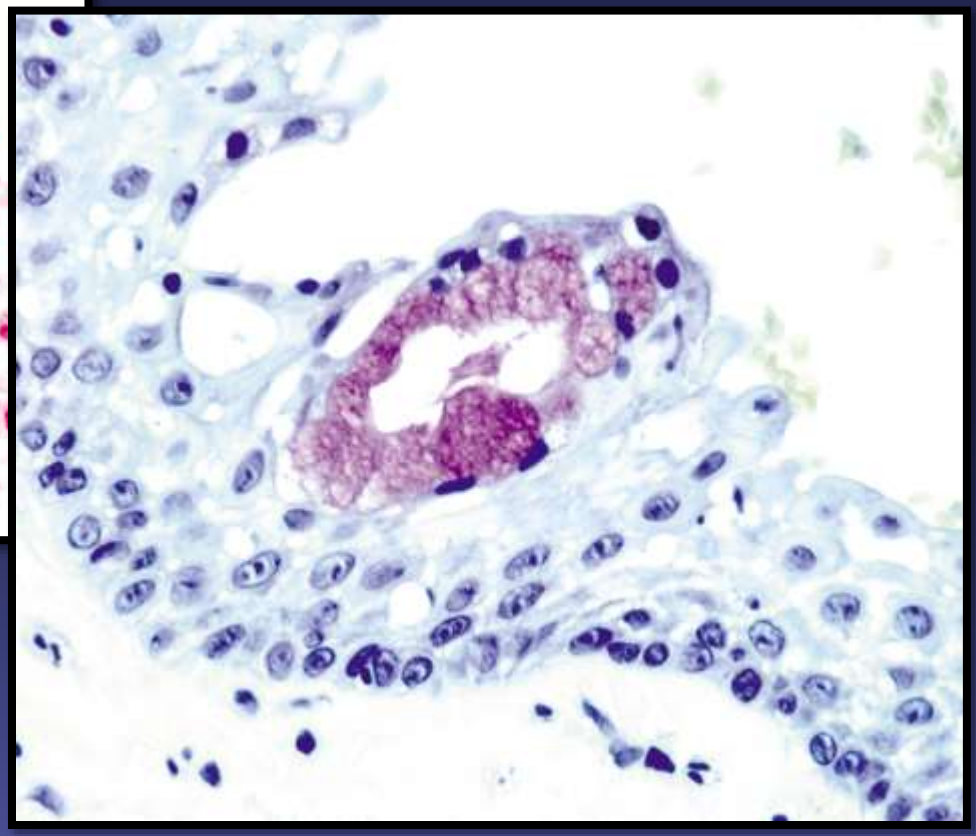


Intraepithelial gland-like structures lined with mucous cells.



(a) Alcian blue stain

(b) Mucicarmine stain



Glandular odontogenic cyst: a challenge in diagnosis and treatment; I Kaplan, Y Anavi, Oral Diseases (2008) 14

- **The major criteria include:**

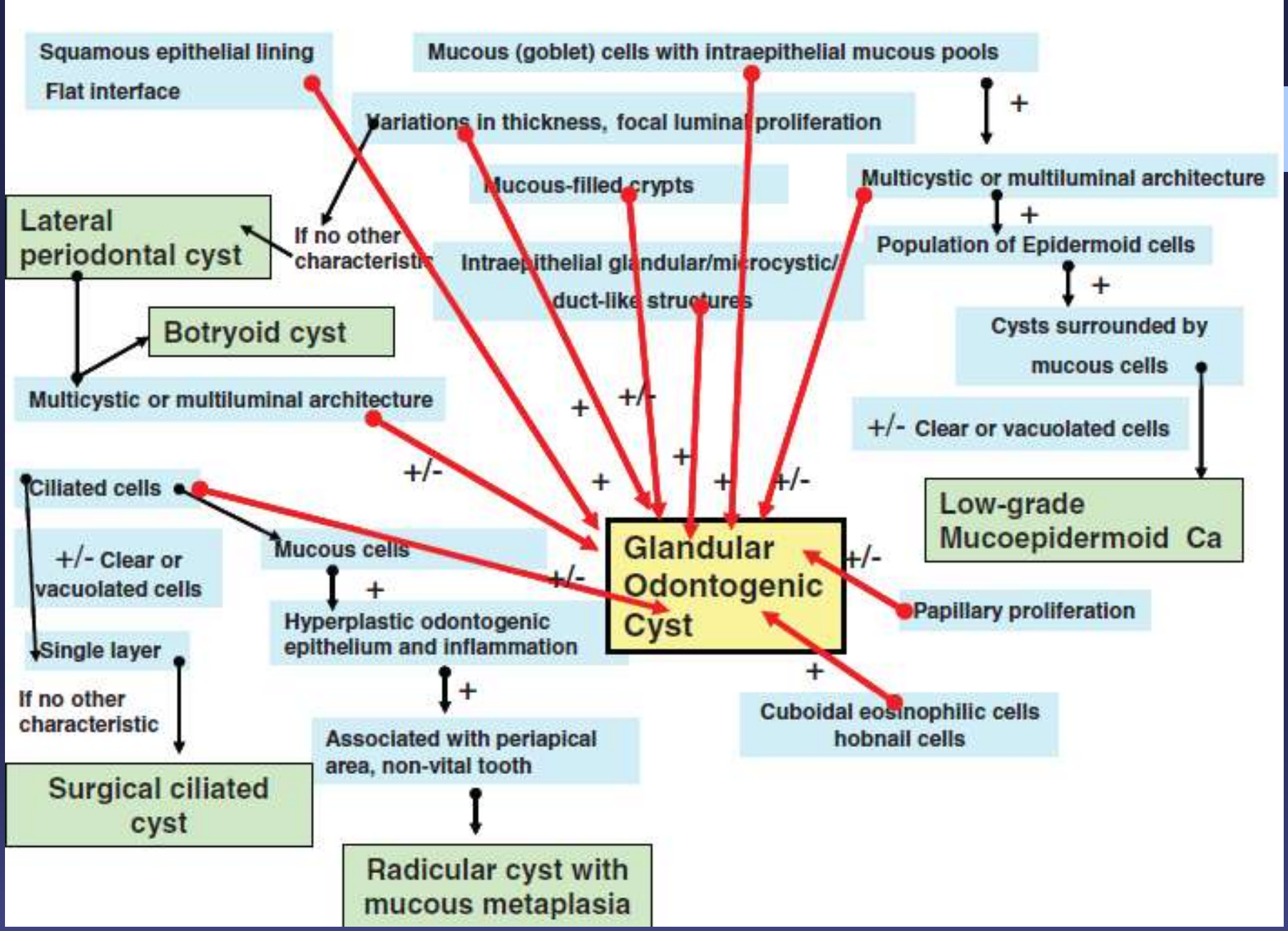
1. Squamous epithelial lining, with a flat interface with the connective tissue wall, lacking basal palisading.
2. Epithelium exhibiting variations in thickness along the cystic lining with or without epithelial spheres' or whorls' or focal luminal proliferation.
3. Cuboidal eosinophilic cells or 'hob-nail' cells.
4. Mucous (goblet) cells with intraepithelial mucous pools, with or without crypts lined by mucous producing cells.
5. Intraepithelial glandular, micro-cystic or duct-like structures.

- **The minor criteria include:**

- Papillary proliferation of the lining epithelium.
- Ciliated cells.
- Multicystic or multiluminal architecture.
- Clear or vacuolated cells in the basal or spinous layers.

Applying this set of criteria will help narrow down the list of differential diagnosis

Glandular odontogenic cyst: a challenge in diagnosis and treatment I Kaplan, Y Anavi, A Hirshberg Oral Diseases (2008) 14, 575–581.



Glandular odontogenic cyst: a challenge in diagnosis and treatment I Kaplan, Y Anavi, A Hirshberg Oral Diseases (2008) 14, 575–581.

CALCIFYING ODONTOGENIC CYST

- OTHER NAMES

- ✓ Keratinizing and /or calcifying odontogenic cyst (Gold 1963)
- ✓ **Gorlin cyst.**
- ✓ Gorlin Gold cyst.
- ✓ Cystic keratinizing tumor.
- ✓ Dentinogenic ghost cell tumor
- ✓ Keratinizing ameloblastoma.
- ✓ Dentinoameloblastoma

J Oral Pathol Med (2008) 37: 302–308

HISTORY

- First described by Gorlin et al in 1962
- 1971 WHO classification described COC as “non-neoplastic cystic lesion.”
- 1992 replaced this phrase with “most lesions appear non-neoplastic.”

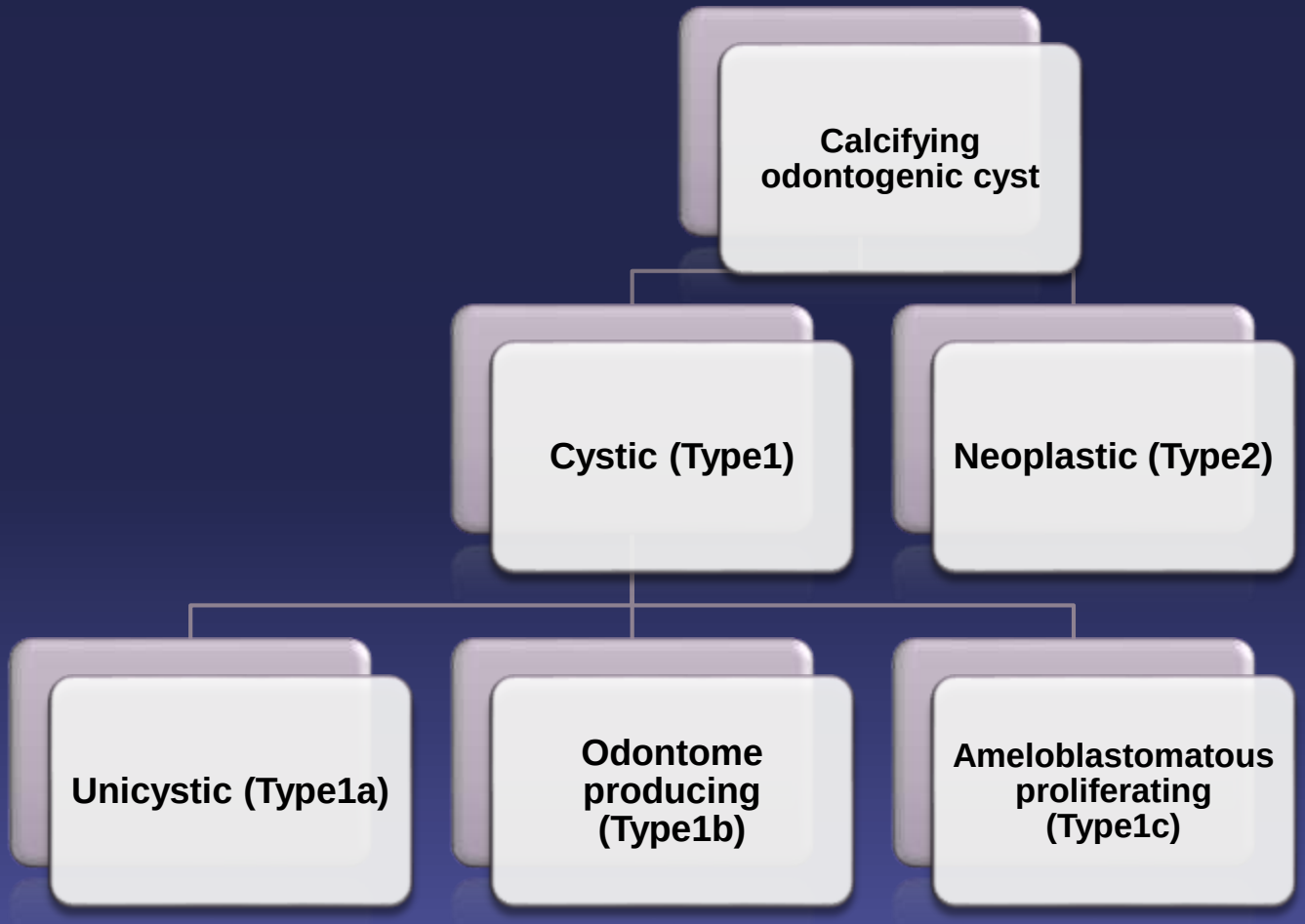
COC repesents a heterogenous group of lesions that exhibit a variety of clinicopathologic and behavioural features. Because of this there has been a disagreement on the terminology and classification.

Gorlin et al	1962	Calcifying Odontogenic Cyst
Gold	1963	Keratinizing Calcifying Odontogenic Tumor (KCOT)
Fejerskov & Krogh	1972	Calcifying Ghost cell Odontogenic Cyst (CGCOT)
Freedman et al	1975	Cystic Calcifying Odontogenic Tumor (CCOT)
Praetorius et al	1981	Dentinogenic Ghost cell Odontogenic Tumor (DGCT)
Ellis & Shmookler	1986	Epithelial Ghost cell Odontogenic Tumor (EGCOT)
Colmenero	1990	Odontogenic Ghost cell Tumor (OGCT)

Ref: So-called COC: review and discussion on the terminology and classification Makoto Toida JOPM 1998, 27, 49-52

CLASSIFICATION

- Studies by Praetorius et al (1981) has concluded that what was previously considered as a COC actually comprises two entities, a cyst and a neoplasm.



BY HONG et al

- **Cystic**
  - Nonproliferative
  - Proliferative
  - Ameloblastomatous
  - Associated with odontome
- **Neoplastic**
  - Ameloblastoma ex calcifying odontogenic cyst
  - Peripheral epithelial odontogenic ghost cell tumor
  - Central epithelial odontogenic ghost cell tumor

Oral Surg Oral Med Oral Pathol 72:56,1991

PRAETORIUS 2006

- Group 1- ‘Simple’ cysts

1. Calcifying odontogenic cyst (COC)

- Group 2- Cysts associated with odontogenic hamartomas or benign neoplasms: calcifying cystic odontogenic tumours (CCOT).

The following combinations have been published:

1. CCOT associated with an odontome.
2. CCOT associated with adenomatoid odontogenic tumor.
3. CCOT associated with ameloblastoma.
4. CCOT associated with ameloblastic fibroma.
5. CCOT associated with ameloblastic fibro-odontoma.
6. CCOT associated with odonto-ameloblastoma

- Group 3 -Solid benign odontogenic neoplasms with similar cell morphology to that in the COC, and with dentinoid formation.

✓ Dentinogenic ghost cell tumor

- Group 4 -Malignant odontogenic neoplasms with features similar to those of the dentinogenic ghost cell tumor.

✓ Ghost cell odontogenic carcinoma

SUGGESTED CLASSIFICATION (By hong et al)

- 1.Non-neoplastic (simple cystic) variants (CGCOC)

a. With non-proliferative epithelial lining.
b. With non-proliferative/ proliferative epithelial lining associated with odontomas.
c. With proliferative epithelial lining
d. With unicystic, plexiform ameloblastomatous prolifertaion of epithelial lining

- 2. Neoplastic variants.

A. Benign type (CGCOT)
   a. Cystic subtype
      α. SMA ex epithelial cyst lining.
   b. Solid subtype
      α. peripheral ameloblastoma like
      β. SMA like
B. Malignant type
   a. Cystic subtype
   b. Solid subtype

CLINICAL FEATURES:

- Intraosseous variant: bony hard swelling of the jaw.
- Extraosseous variant: local gingival growths.
- Symptomless.

AGE: Cystic variant: 2nd and 6th decade.
Neoplastic variant: Mean age of 62 years.
Peripheral: 53.8 years.

Gender: COC's with odontomas M:F- 1.5 :1
without odontomas M:F- 1: 1.9

LOCATION: Maxilla>Mandible (C-PM region)

- 79% CENTRAL, 21% PERIPHERAL.

RADIOGRAPHIC FEATURES:

- Uni/Multilocular radiolucency.
- Radio-opaque masses may be seen in cases associated with odontomas.
- Root resorption and divergence.
- Associated with unerupted tooth in 1/3rd cases.
- Peripheral lesions show saucerization of bone.

RADIOGRAPHIC FEATURES

PATHOGENESIS

- The epithelial lining of a calcifying odontogenic cyst a has the ability to induce the formation of dental tissues in the adjacent connective tissue wall

- Praetorius et al (1981) concluded that the COC was a unicystic process that developed from reduced enamel epithelium or remnants of odontogenic epithelium in the follicle, gingival tissue or bone.

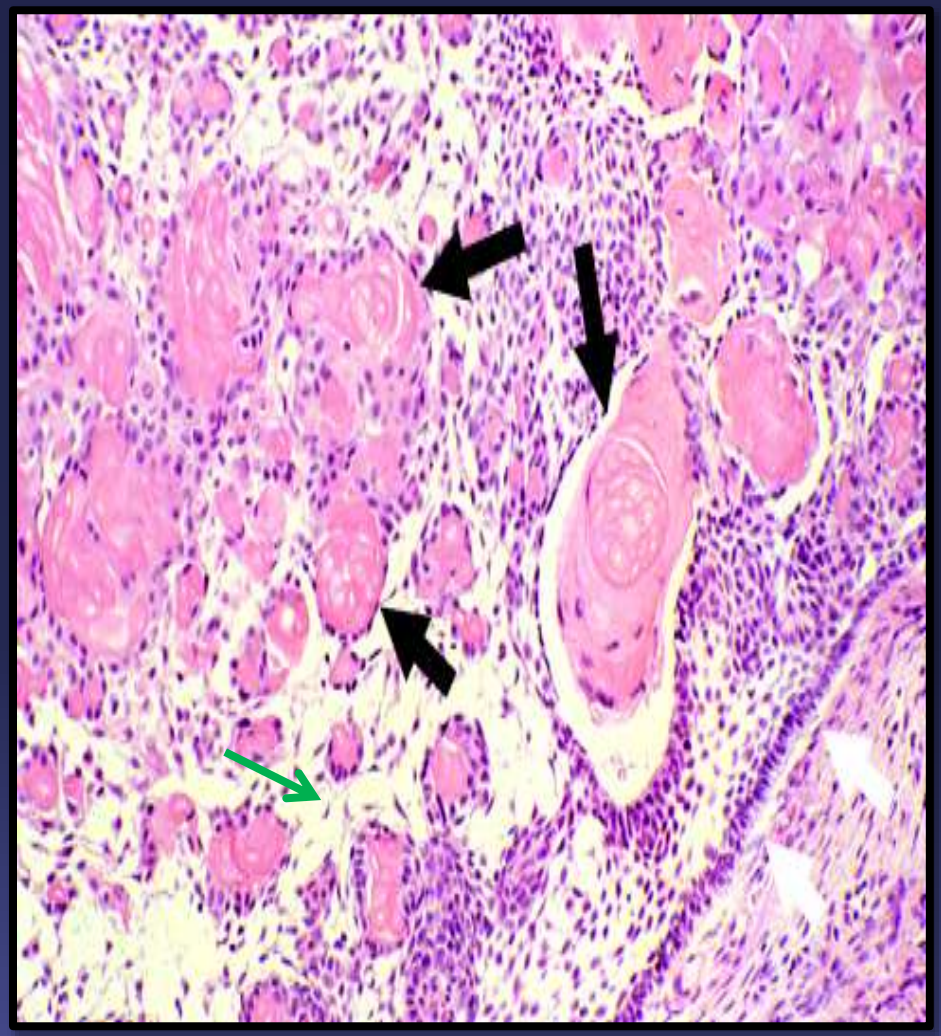
- Origin: central coc: frm REE or remnants of odonto epi
- peripheral coc: frm remnants of d. lamina or frm surface epi

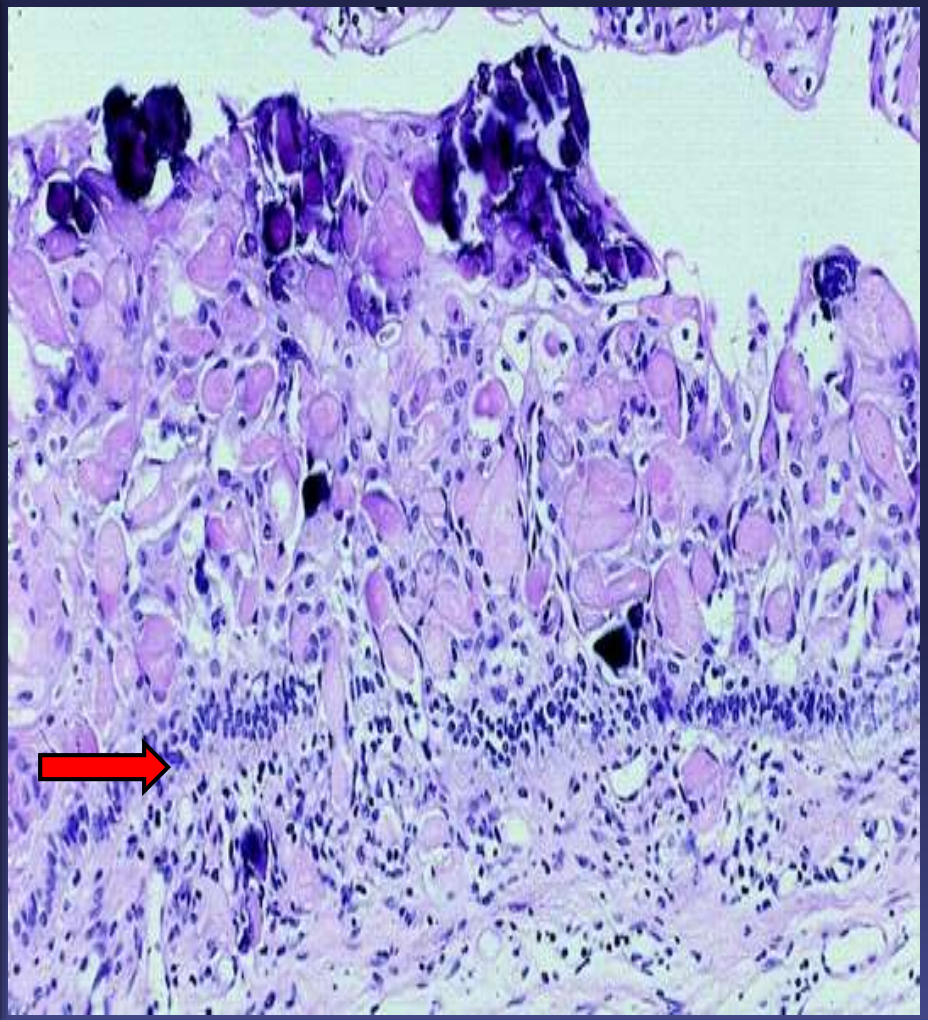
According to the 1992 WHO classification the COC is:

"A cystic lesion in which the epithelial lining shows a well-defined basal layer of columnar cells, an overlying layer that is often many cells thick and that may resemble stellate reticulum, and masses of 'ghost' cells that may be in the epithelial cyst lining or in the fibrous capsule.

The 'ghost' epithelial cells may become calcified. Dysplastic dentin may be laid down adjacent to the basal layer of the epithelium. and in some instances the cyst is associated with an area of more extensive dental hard tissue formation resembling that of a complex or a compound odontoma."

HISTOPATHOLOGY



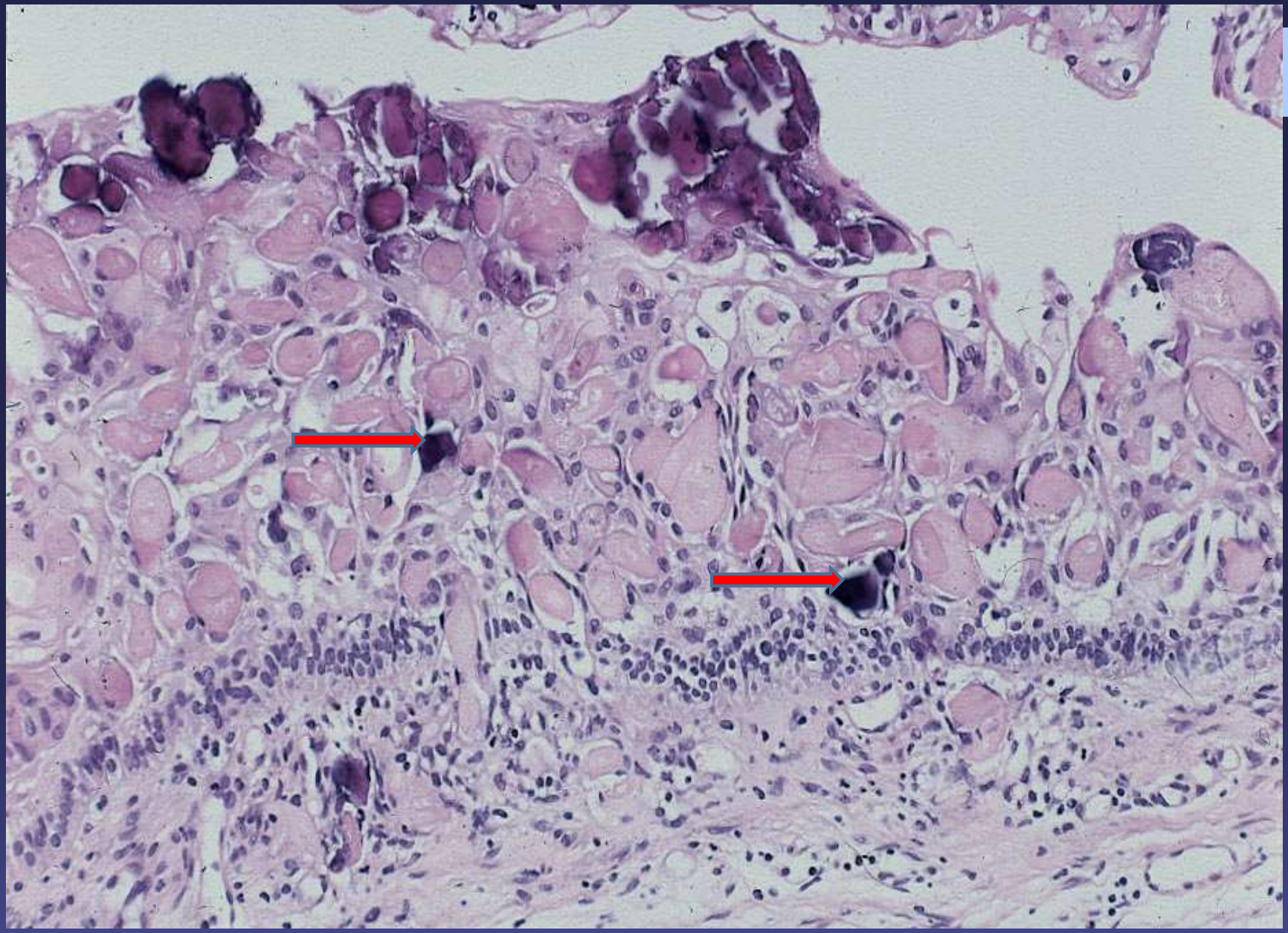


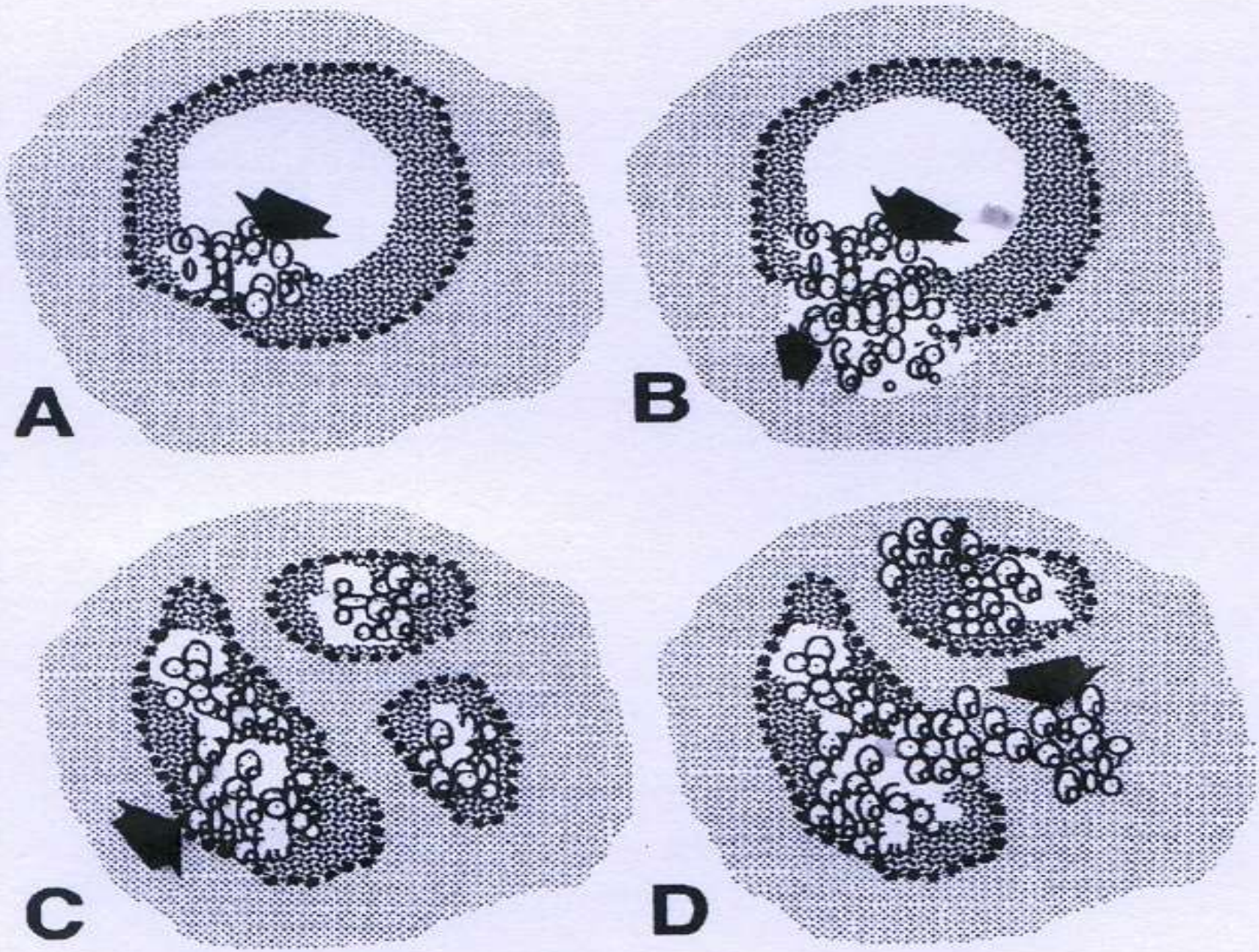
GHOST CELLS:

- Pale, eosinophilic, balloon shaped, elliptic epithelial cells which have lost their nuclei, having faint outline of original nuclei, hence the term ‘ghost’.

- May be present in epithelium or connective tissue and produce a giant cell reaction.

- Dystrophic calcification occurs, initially as fine basophilic granules and later as small spherical bodies




A
B
C
D

ORIGIN OF GHOST CELLS

- Pretorius 1975 --- The ghost cells represent an abnormal type of keratinisation and have an affinity for calcification.

- They have the same histological reactions as keratin, giving a yellow fluorescence with rhodamine B

- Hong et al 1991--- Various IHC studies have been carried out to find the nature of ghost cells. Since 1964 it was thought that g.c are abnormal keratinization but use of CK have failed to demonstrate positive staining.

- Recently thought to be coagulative necrosis of odo.epi. They were found to be positive for enamelin, sheathilin, and amelogenin.

According to Poul and Takata et al amelogenin is localized to ghost cells

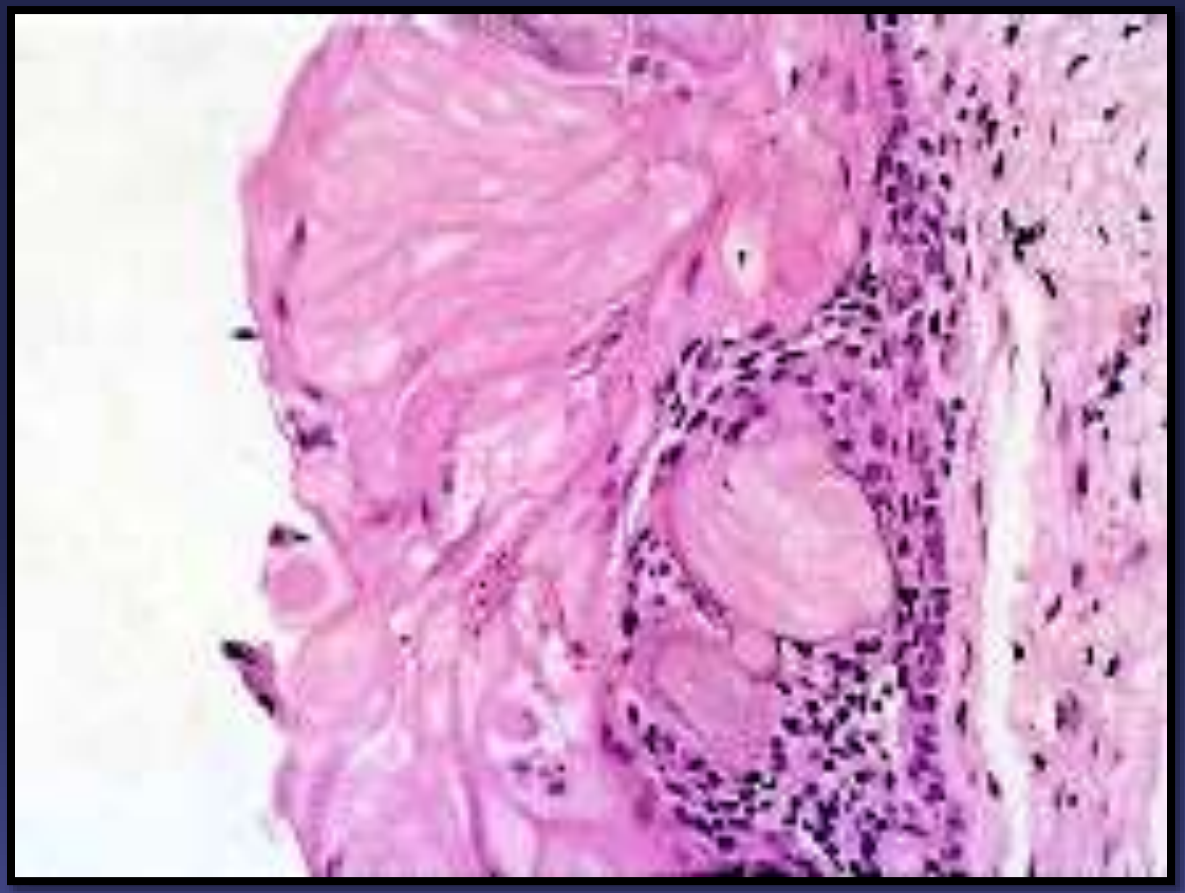
- The accumulation of the enamel matrix within the cells may be due to **their inability to secrete their products.** The inability of the matrix to mature into prismatic enamel is due to the absence of dentin and of odontoblasts.

- Aberrant keratinization – minor contribution

- Hong et al – feature of coagulative necrosis of odontogenic epithelium

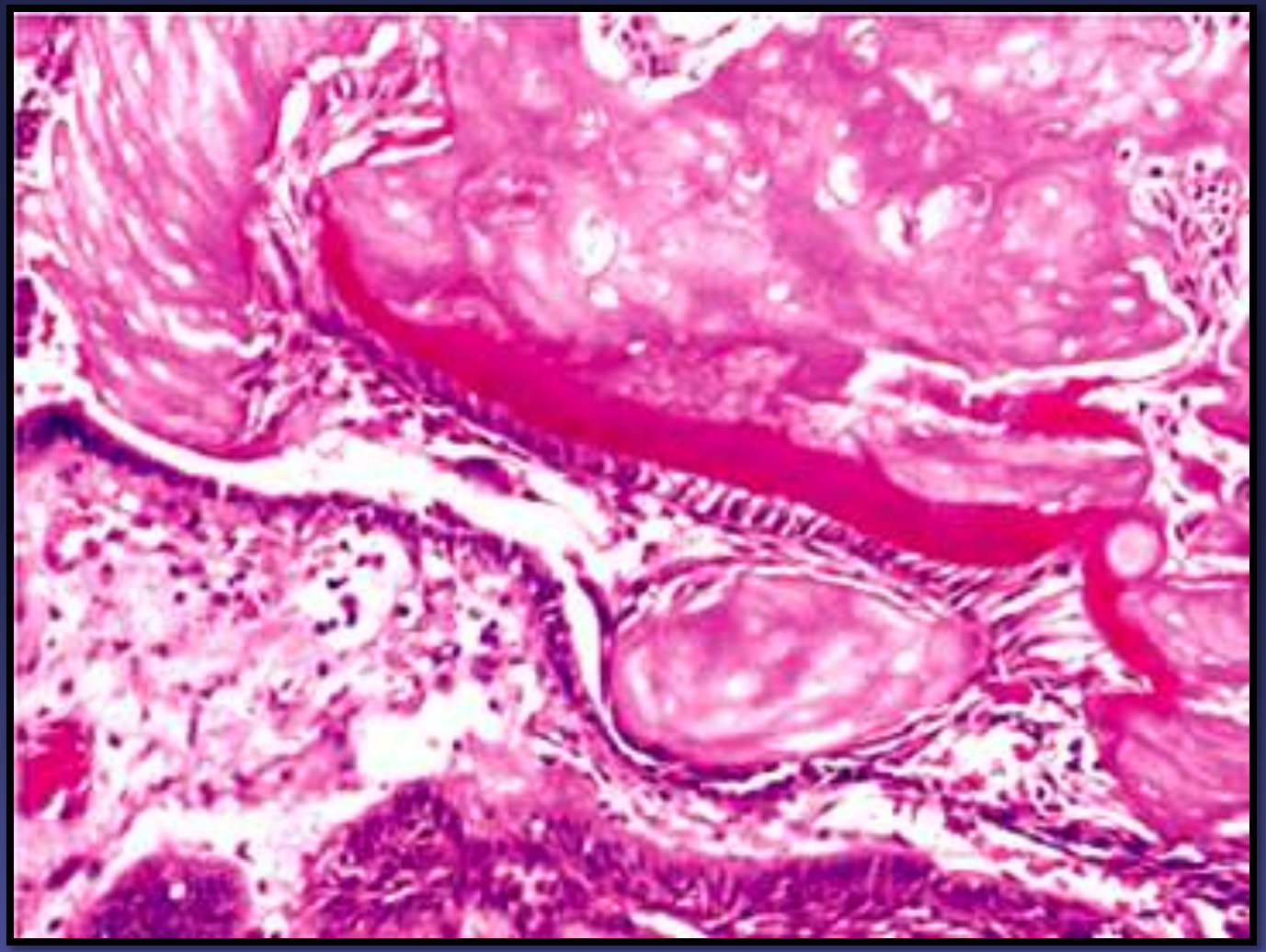
Reference: Paul D. Freedman, Oral surg. July, 1975

- The calcifications present in the calcifying odontogenic cyst are probably dystrophic in nature and not the result of physiologic maturation and mineralization of enamel matrix.

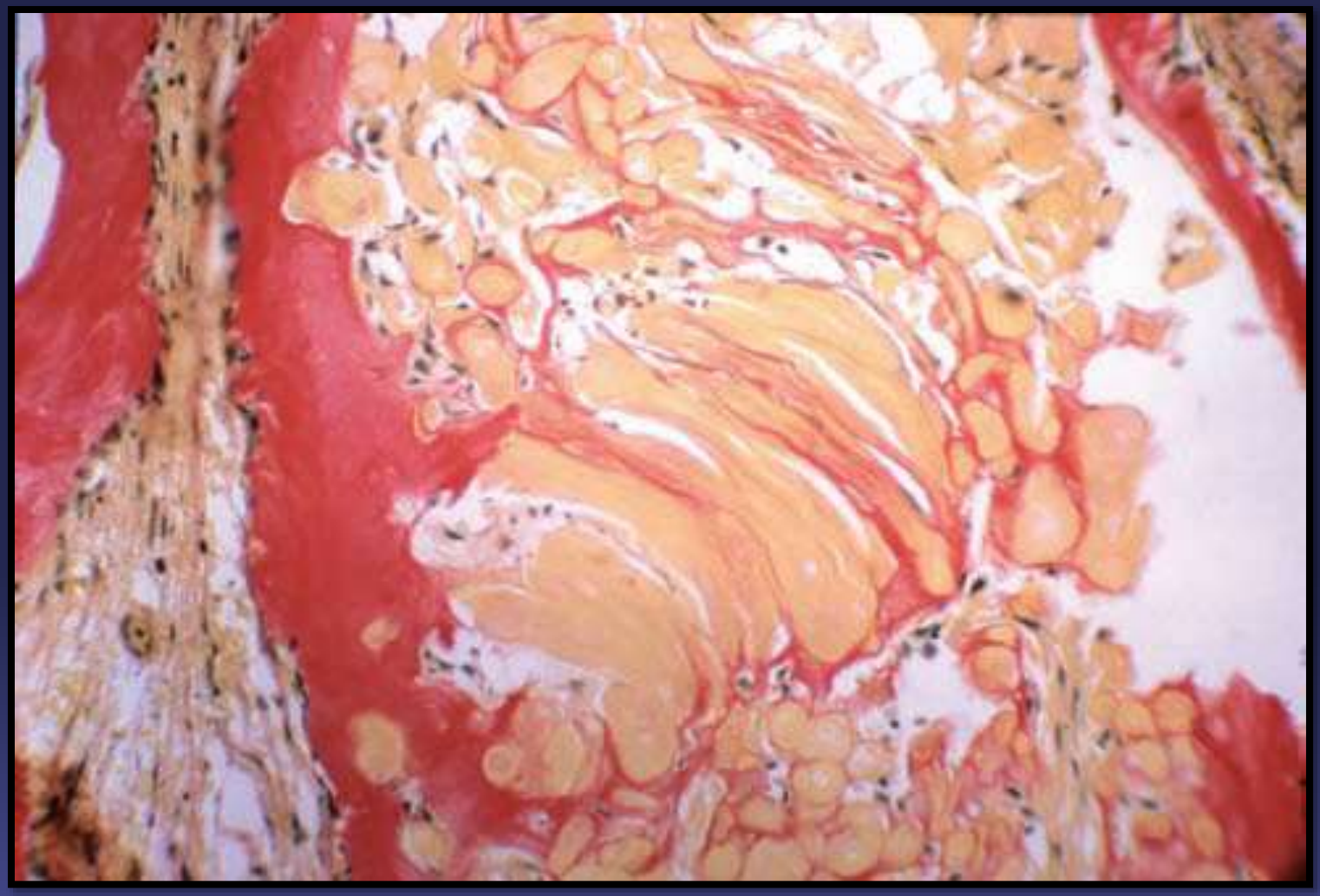


Paul D. Freedman, Oral surg. July, 1975

- Atubular DENTINOID material is seen in cyst wall close to epithelium lining, adjacent and in contact with ghost cells. It is a metaplastic process.



Van – Gieson stain – for demonstration of ghost cells and dentinoid material



Red staining - dentinoid and yellow staining - ghost cells

ANALYSIS OF GHOST CELLS IN CALCIFYING CYSTIC ODONTOGENIC TUMORS BY CONFOCAL LASER SCANNING MICROSCOPY

- Many hypotheses have been made about the nature of ghost cells

1. As abnormal keratinized bodies
2. Might represent simple cell degeneration or a form of enamel matrix
3. Ghost cells might be derived from the apoptotic process of odontogenic cells or represent different stages of normal and abnormal keratin formation, therefore deriving from metaplastic transformation of odontogenic tumors.

Oral Surg Oral Med Oral Pathol Oral Radiol Endo 2007;104:391-4

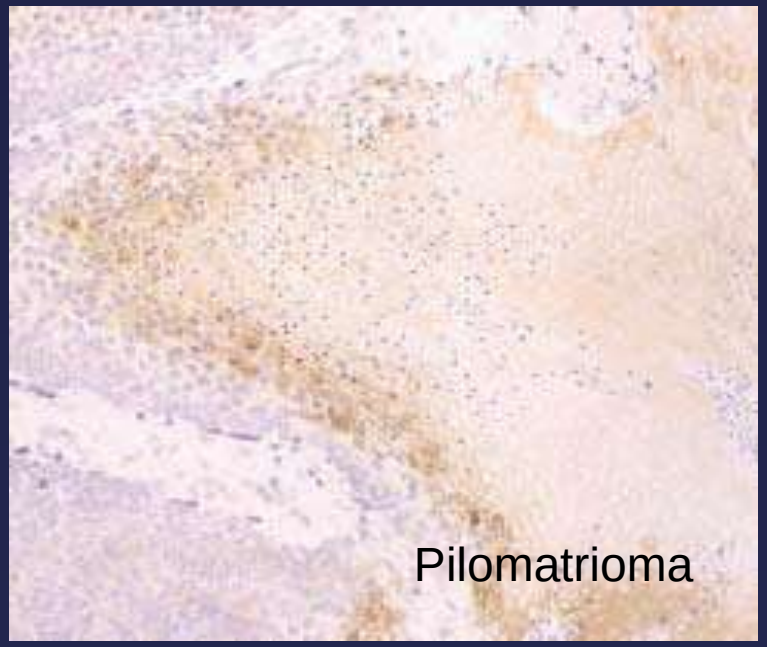
- 3 types of ghost cells are described in this study.
- These represent 3 different maturative stages of the same kind of cell, with varying extents of keratin expression.

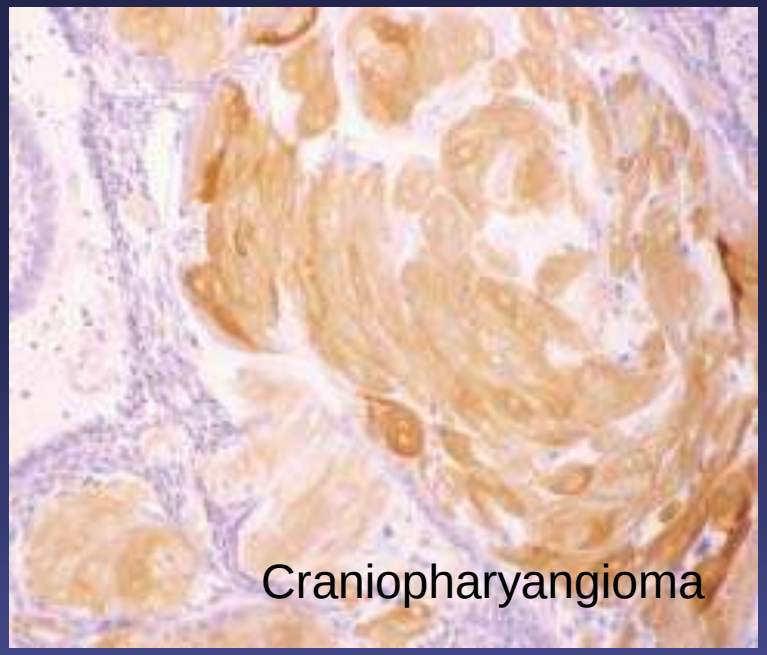
(1) Ghost cells scarcely detectable (green arrow)
(2) ghost cells well resolved (red arrow)
(3) ghost cells that showed an excellent resolution by CLSM (black arrow)

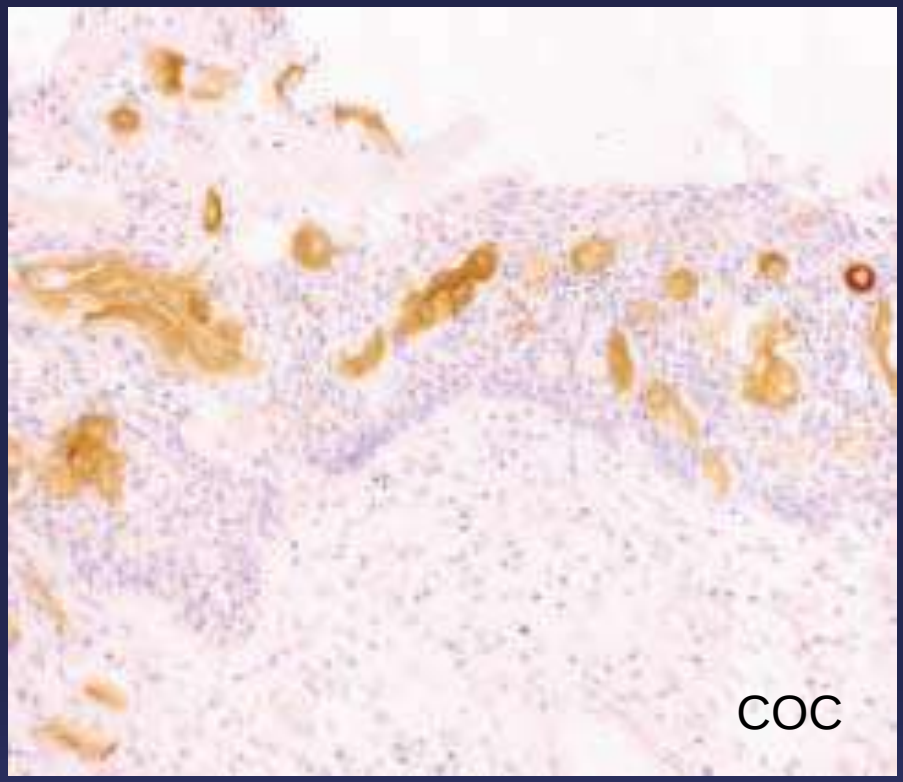
- Gorlin et al suggested that the COC is an oral counterpart of the cutaneous calcifying epithelioma of Malherbe (pilomatricoma), it is more likely to be the oral counterpart of the intracranial craniopharyngioma due to immunologic similarities

- Both lesions demonstrate similar immunoreactivity to low and high molecular weight cytokeratin and involucrin – a protein that is characteristic of terminally differentiated keratinocytes

(HP1) Hair protein-1







Ref: Epression of hard alpha Keratins in Pilomatrioma, Craniopharyangioma and COC American J of Clinical Patology 2005 (123) Kaoru Kusama, Yoichi K

RADICULAR CYST

(Periapical cyst, Apical periodontal cyst, Root end cyst)

- Arises from epithelial proliferation due to an inflammatory stimulus
- Epithelial lining is derived from the epithelial cell rests of Malassez
- It is a true cyst

CLINICAL FEATURES

1. Most common cystic lesion of the jaws

2. Age – rarely in 1st decade. Large cases in 4th and 5th decade. Highest peak in the 3rd decade

3. Sex – more in males

- Site – All tooth bearing areas.

  Max. ant. teeth most commonly affected

CLINICAL PRESENTATION

- Mostly symptomless
- Commonest complaint is of a slow growing swelling
- Initial enlargement is bony hard, later it exhibits a springiness
- Maxilla – buccal and palatal enlargement

  Mandible – usually buccal

- Pain and infection may also be present
- Radicular cyst in deciduous teeth are rare
- Multiple radicular cysts:
  - -Multiple dens-in-dente
  - -Dentinogenesis Imperfecta

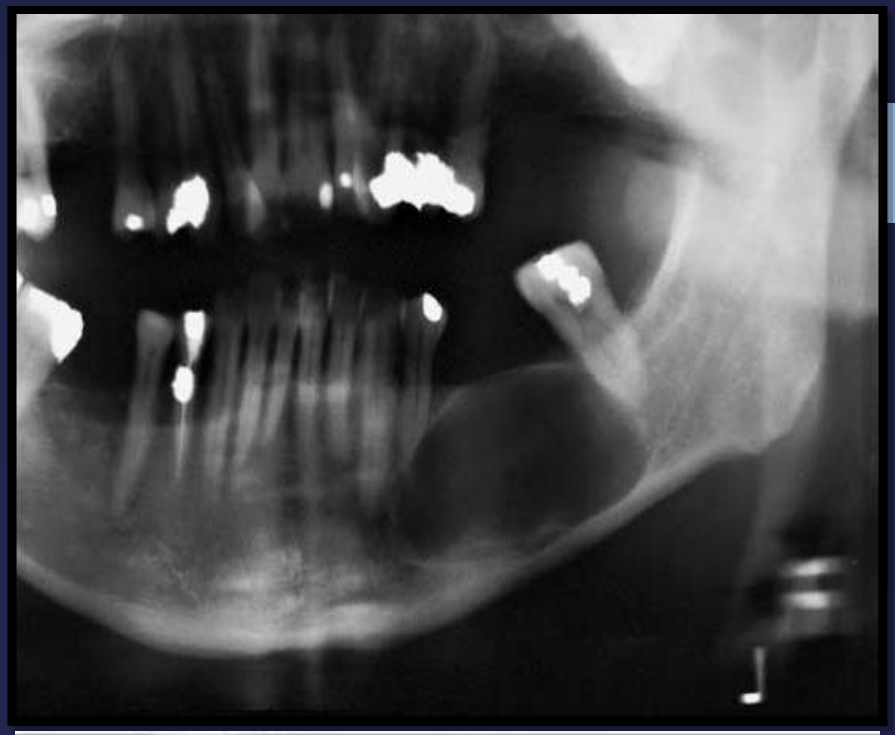
RADIOLOGICAL FEATURES

- Difficult to differentiate between a periapical granuloma and a small radicular cyst

- Classical description – round to ovoid radiolucency surrounded by a radio-opaque margin

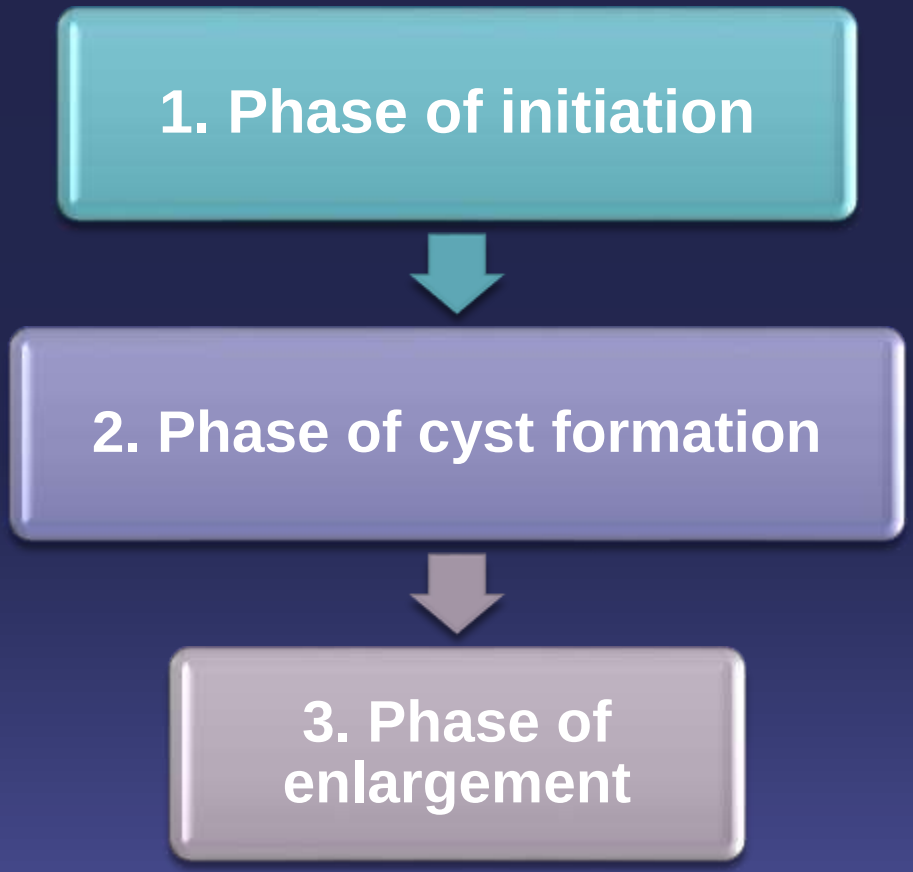
- In infected or rapidly enlarging cysts, the radio-opaque line may be absent and a D/D of odontogenic keratocyst should be considered

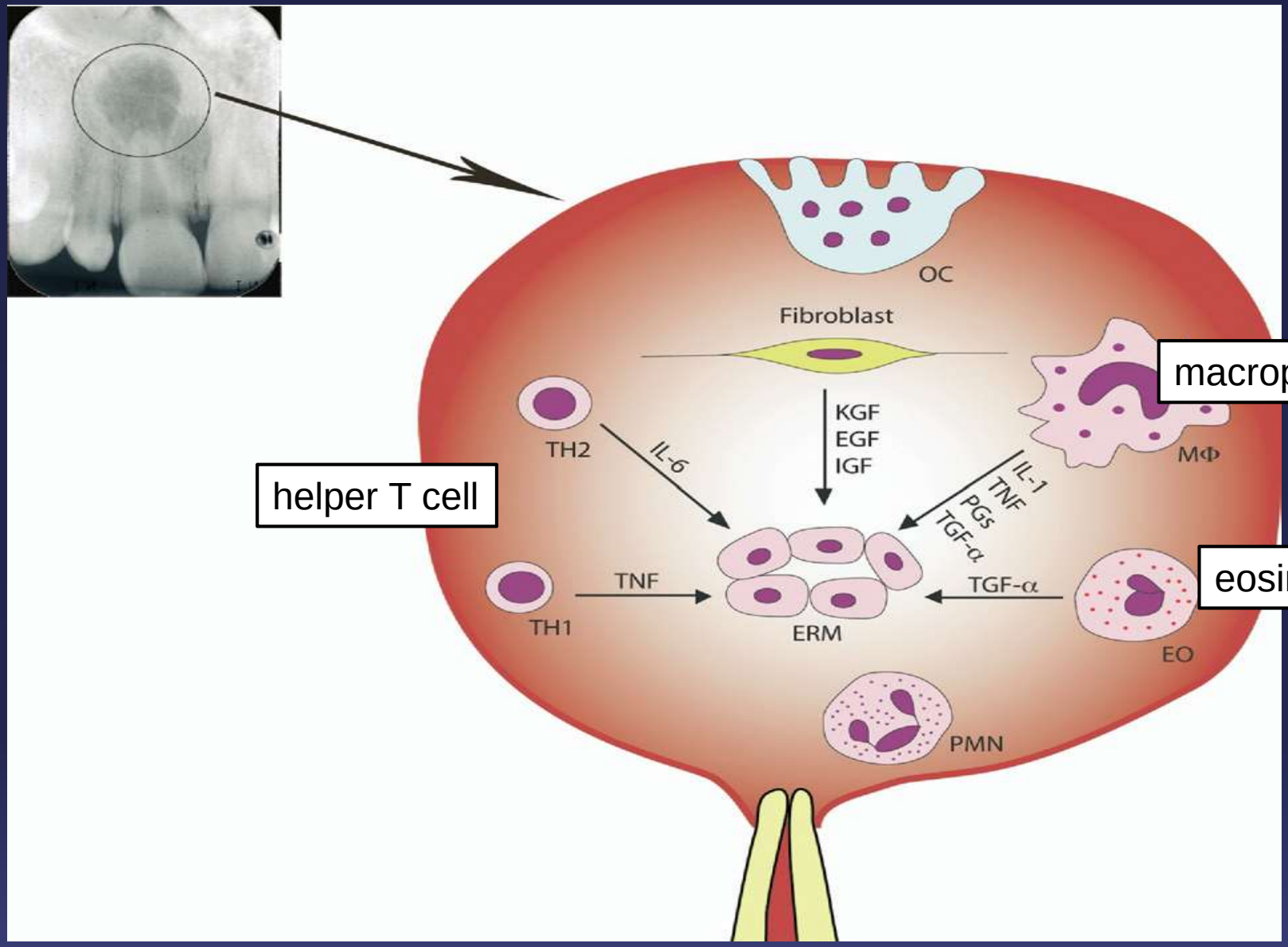
- Radicular cyst on the lateral margin of the tooth in association with the accessory canal must be differentiated from the lateral periodontal cyst



PATHOGENESIS

- Can be divided into –

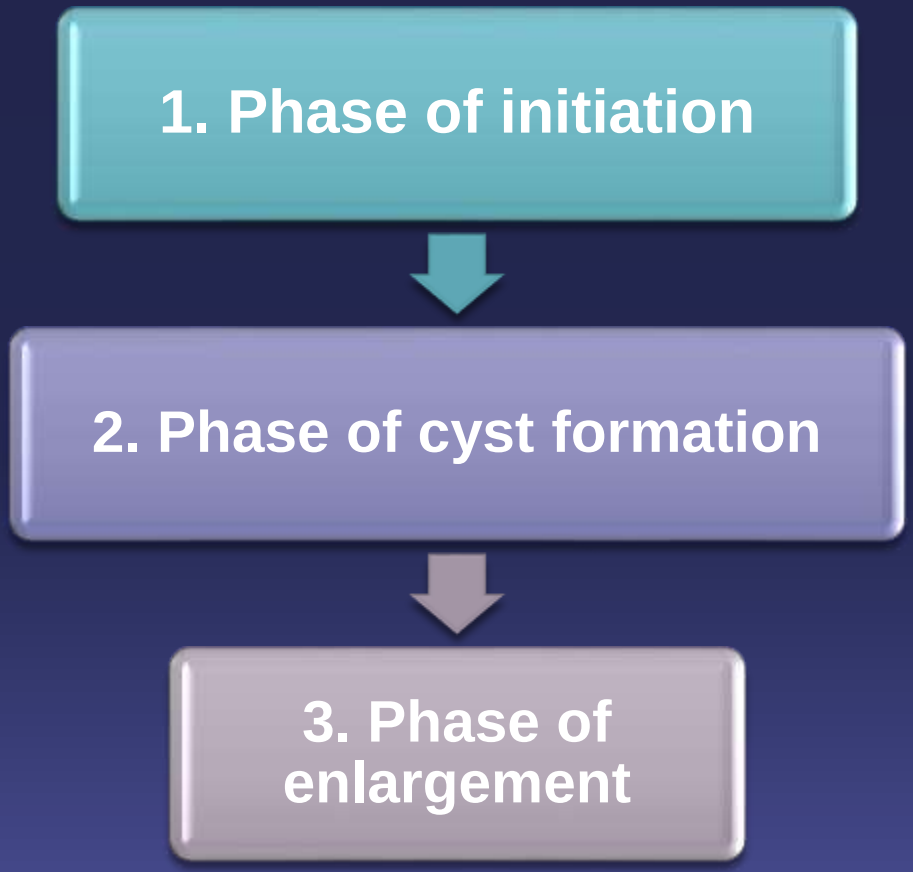


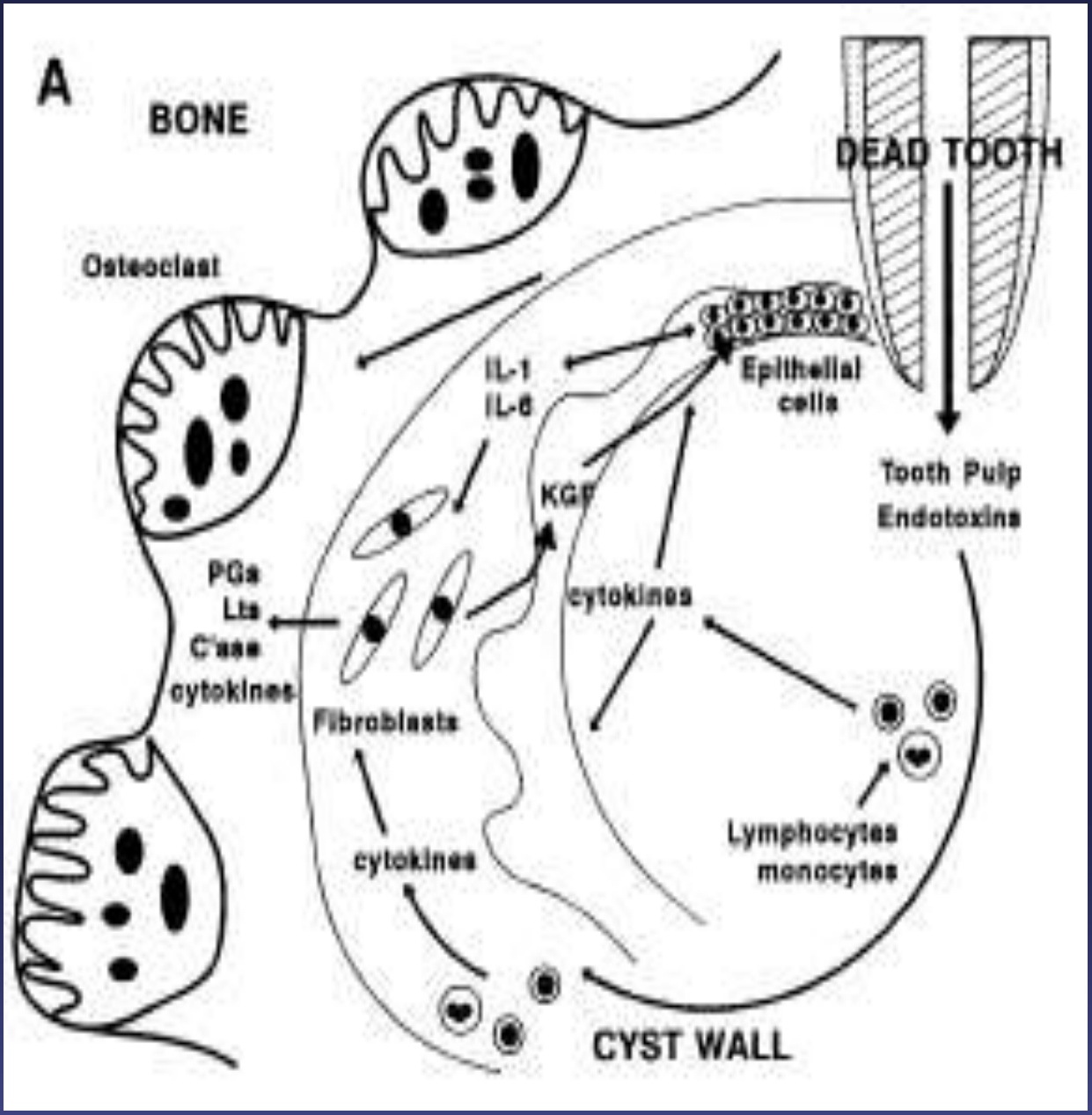


Proliferation of Epithelial Cell Rests, Formation of Apical Cysts, and Regression of Apical Cysts after Periapical Wound Healing JOE — Volume 33, 8, August 2007

PATHOGENESIS

- Can be divided into –





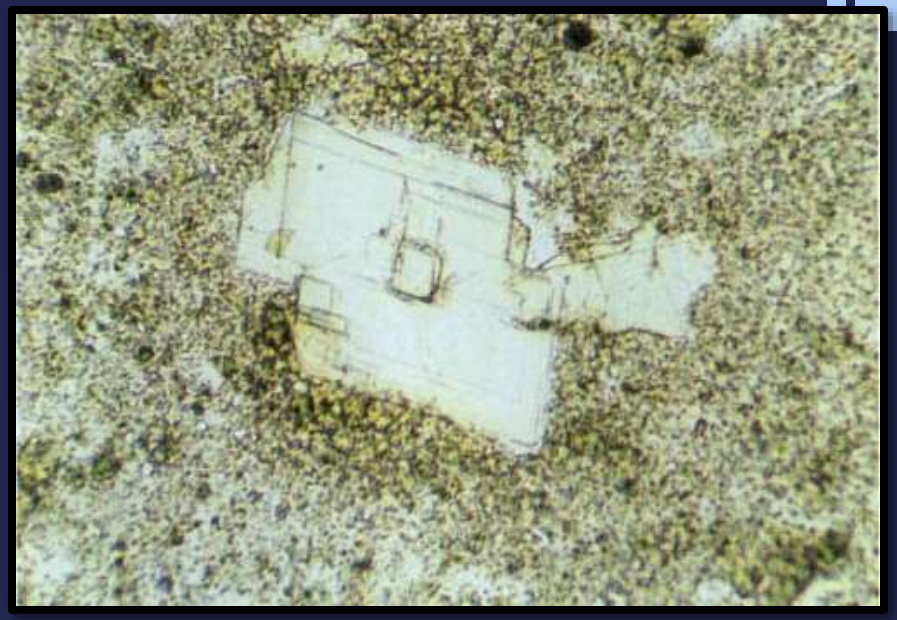
The role of endotoxin and cytokines in the pathogenesis of odontogenic cysts, S. Meghji, W. Qureshi ; Archs Oral Biol. Vol. 41, No. 6, pp. 523 531, 1996

GROSS PATHOLOGY

- Gross specimen may be spherical or ovoid intact cystic mass
- Thickness of wall may vary – thin to 5mm thick
- Yellow mural nodules of cholesterol may be seen
- Fluid is usually brown due to breakdown of blood. When cholesterol is present, they impart a shimmering gold or straw colour

- Cholesterol crystal in a cyst aspirate seen in a unstained smear

- Their presence indicate inflammation

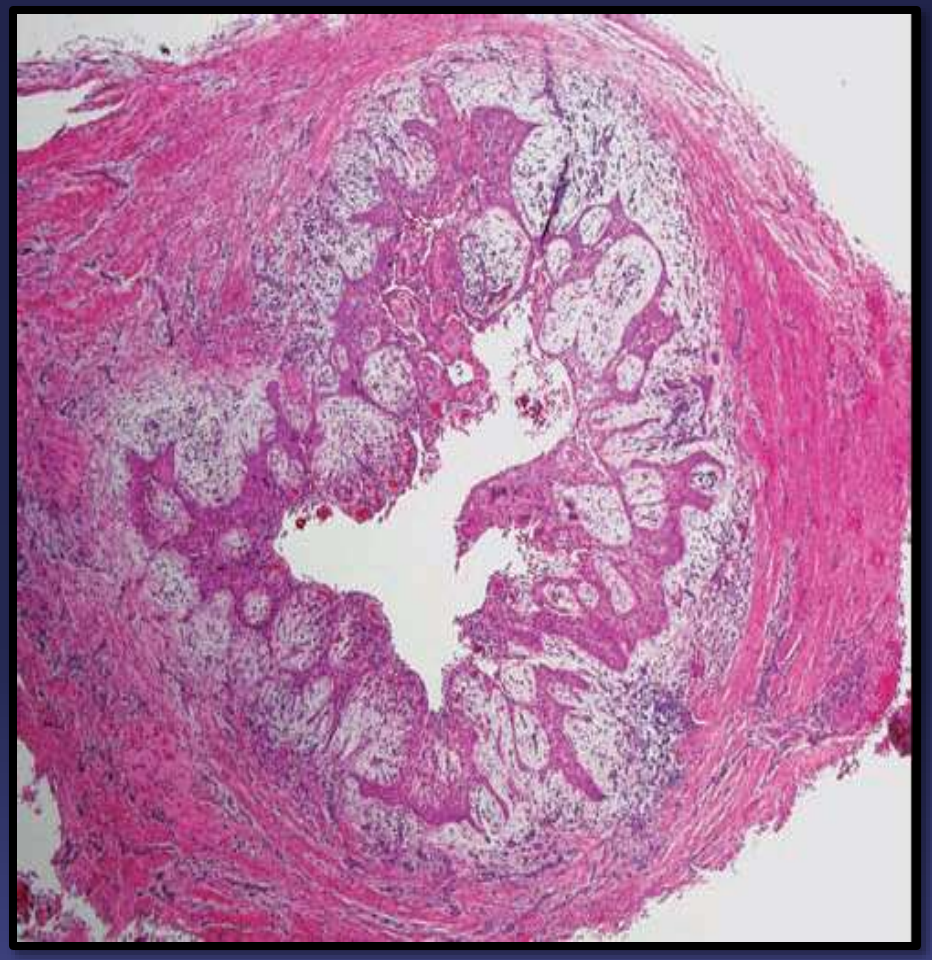


Cystic fluid:

- Clear, pale yellow
- Thin watery to thick
- Protein content: 7.48 gm/dl (Ksaug- 1973)

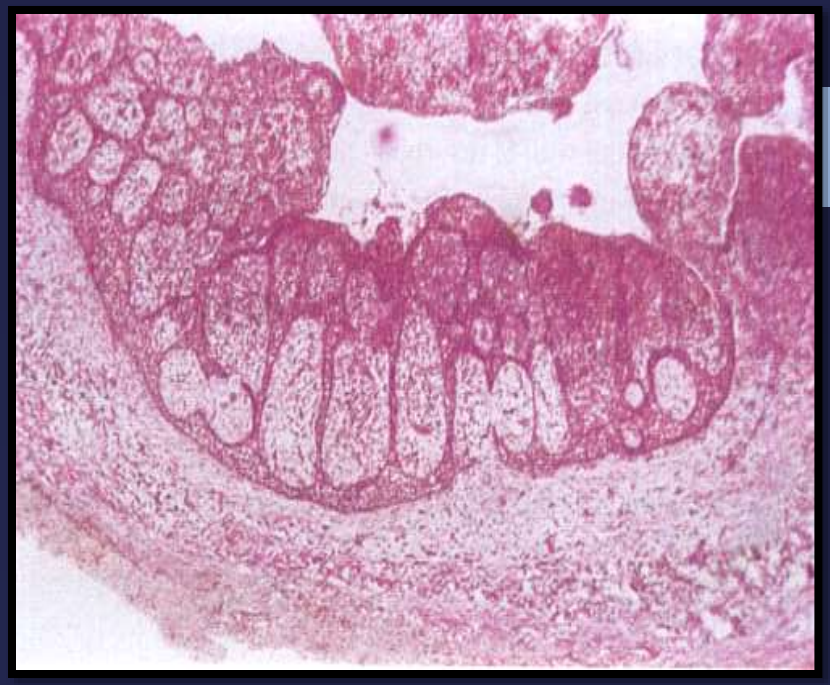
HISTOPATHOLOGY

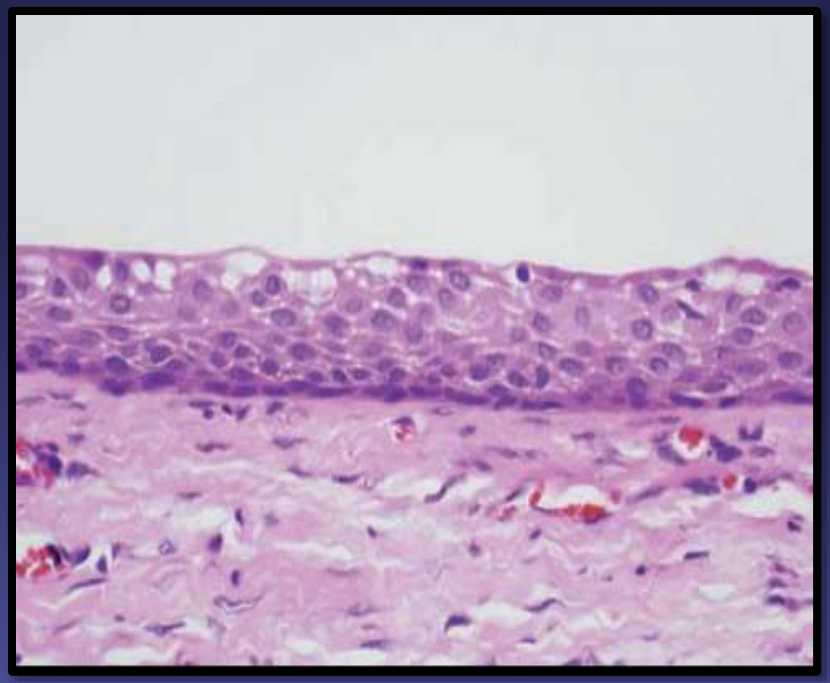
- Cyst is lined wholely or in part by stratified squamous epithelium
- Thickness ranges from 1 cell to 50 cell thick (majority between 6 to 20 cells)



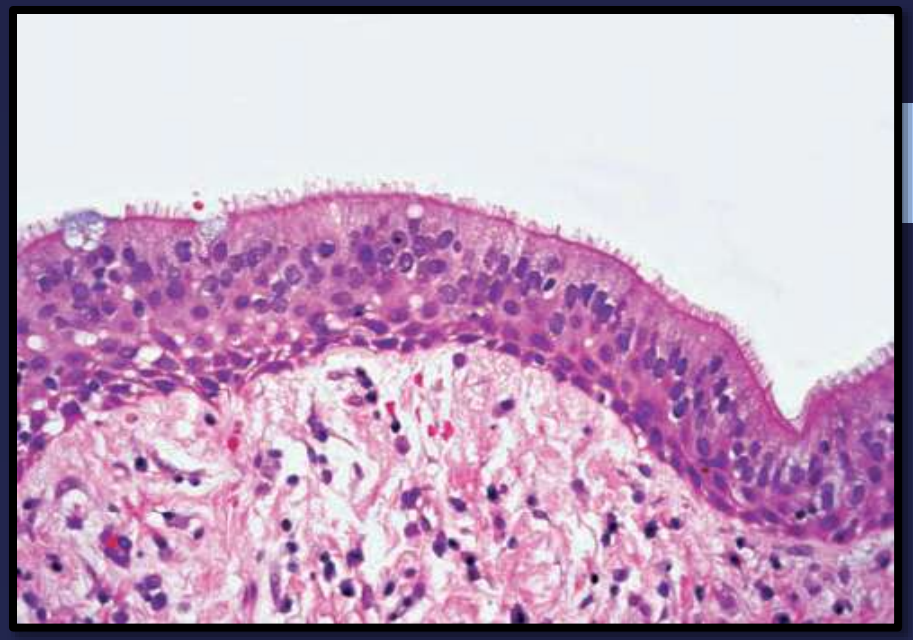
- Lining may be proliferating and show arcading and forking pattern.

- Inflammatory cell infiltrate in the proliferating epithelial lining may be PMN leukocytes and may also show chronic inflammatory cells



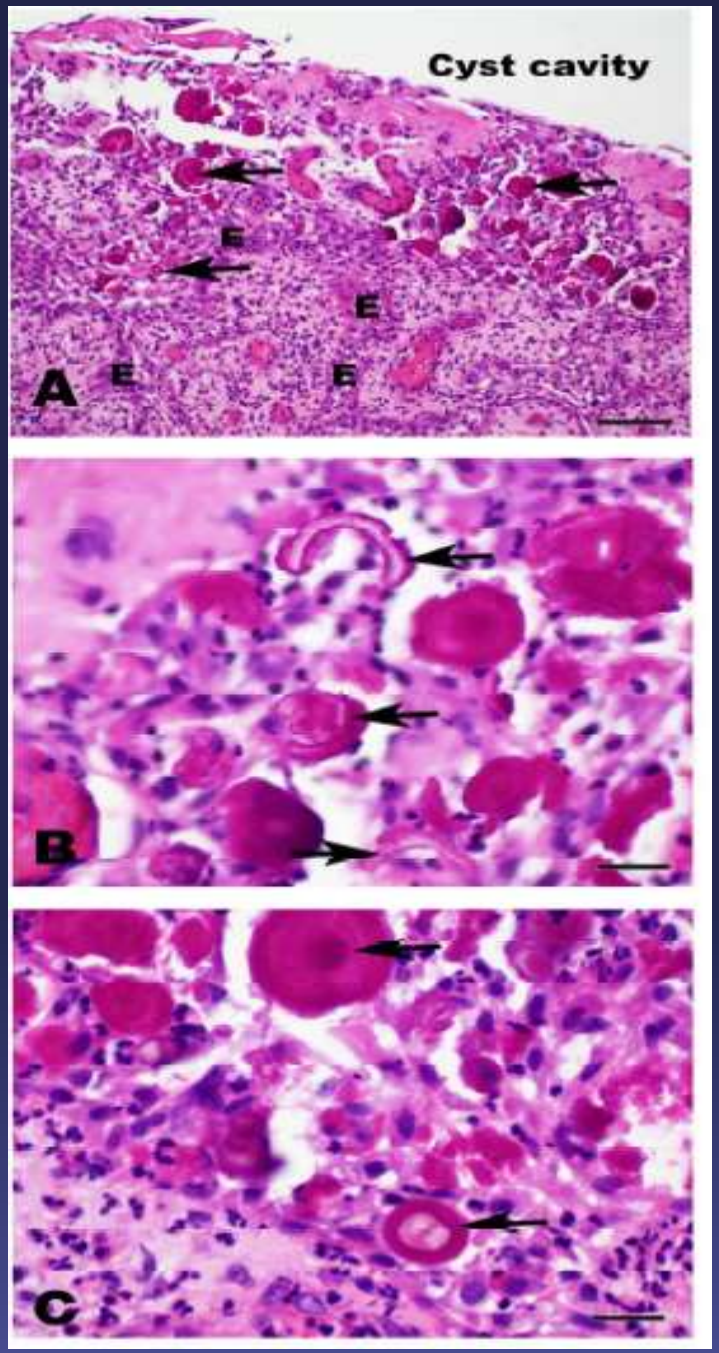


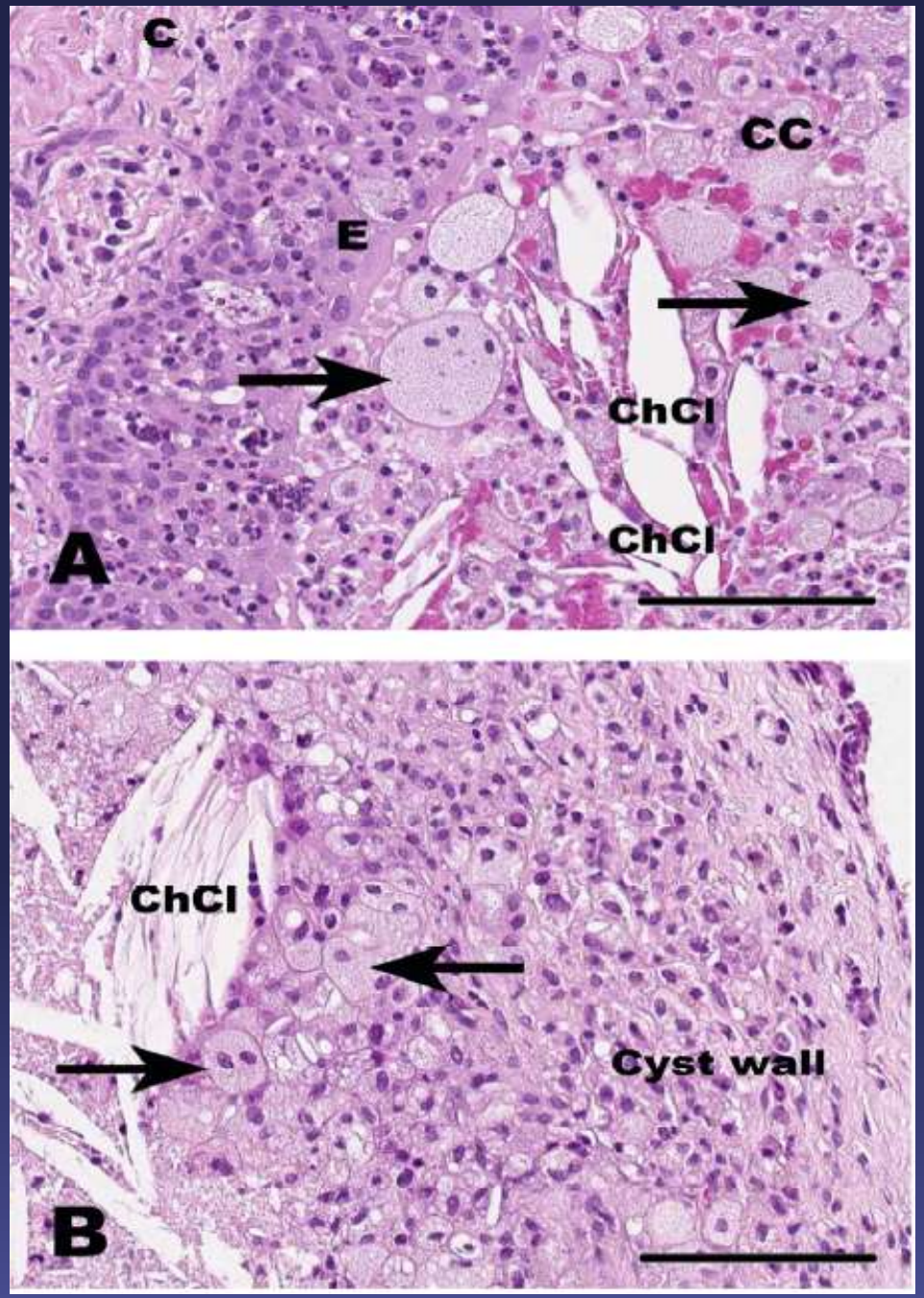
- Mucous cells or ciliated cells may be seen. These are seen mainly in the cysts of the maxilla, but can also be seen in the mandibular cysts (result of metaplasia)



- Hyaline or Rushton bodies can be seen in the epithelium of radicular cyst

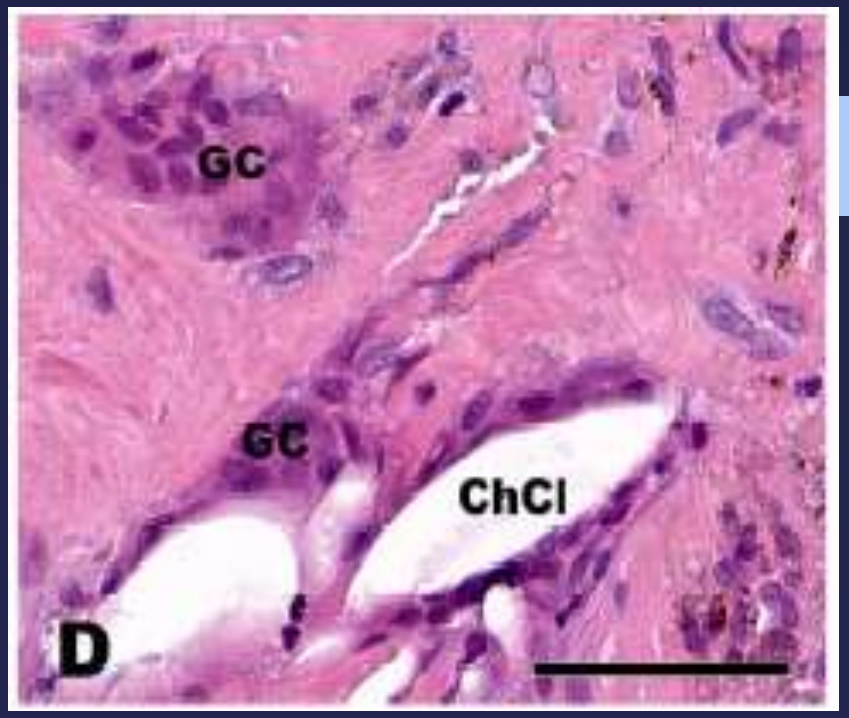
- +ve for– orecin, mallory aldehyde fuchin, PAP, Gomori
- -ve for-- PAS

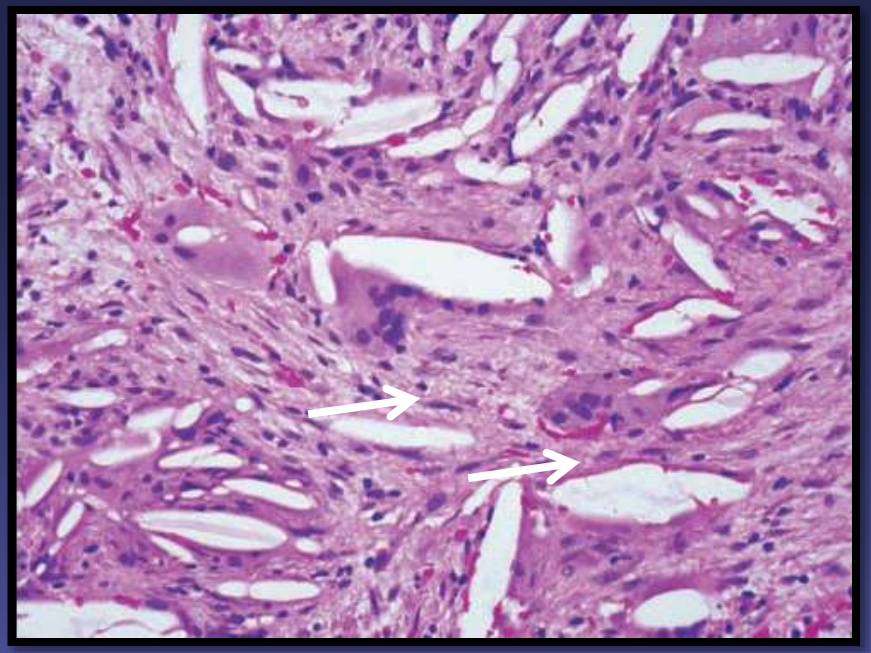

Cyst cavity
E
E
A
E
E
B
C


C
CC
E
ChCl
ChCl
A
ChCl
Cyst wall
B

Cholesterol clefts:

- Cholesterol clefts can be seen in many radicular cysts but not all.
- Once the cholesterol crystals are deposited in the tissues they behave as foreign bodies and evoke a foreign body giant cell reaction
- Some authors suggested that the giant cells are derived from pericytes





- The fibrous capsule of the radicular cyst is mainly composed of condensed collagen peripherally and a loose connective tissue adjacent to the epithelial lining

- **Layers of fibrous capsule (Toida et al in 1990)**

- Inner granulomatous
- Intermediate
- Outer fibrous connective tissue layer

- Varying intensities of acute and chronic inflammatory cell infiltrate & Remnants of odontogenic epithelium may be seen in the fibrous capsule

Types of Radicular Cyst:
Nair in 1998 & Simon in 1980

- True Radicular Cyst:
- Close cavity entirely lined by epithelium.

- Apical pocket Cyst:
- (Bay Cyst- by simon)
- Epithelium is attached at the root apex so that the lumen opens into the affected the root canal

COMPLICATIONS

- Squamous cell carcinoma arising from lining epithelium of radicular cyst

- Before diagnosing following possibilities should be considered:

1. Possibility of a cyst and neoplasm developing independently adjacent to each other and ultimately fusing

2. Careful examination of the patient and detail history to exclude the possibility of a neoplasm arising from a oral mucosa

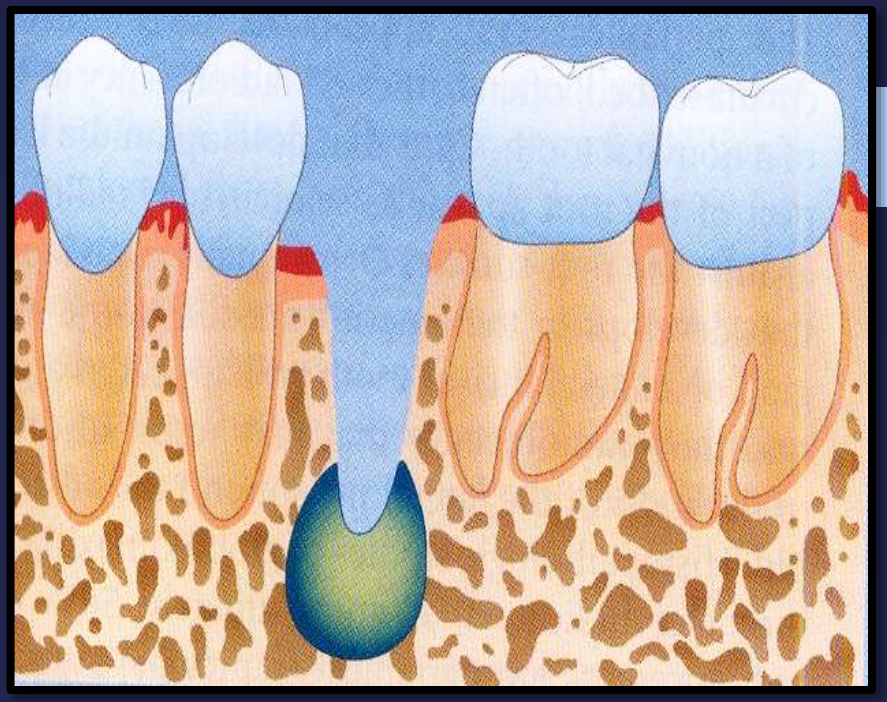
3. Another possibility is that the lesion was a epithelial neoplasm, which underwent a secondary cystic change

- Browne and Gough (1972) suggested that squamous/ keratin metaplasia in long-standing radicular cysts may precede malignant change and examples of epithelial dysplasia are occasionally seen in jaw cysts without any evidence of carcinomatous transformation.

RESIDUAL CYST

1. These are actually periapical cysts from the teeth that have bee removed

2. May be found associated with any of the teeth



PARADENTAL CYST

- Inflammatory cyst
- Uncertain origin
- Found on the distal aspect of the vital mandibular 3rd molars
- Also called as inflammatory periodontal cyst or collateral cyst

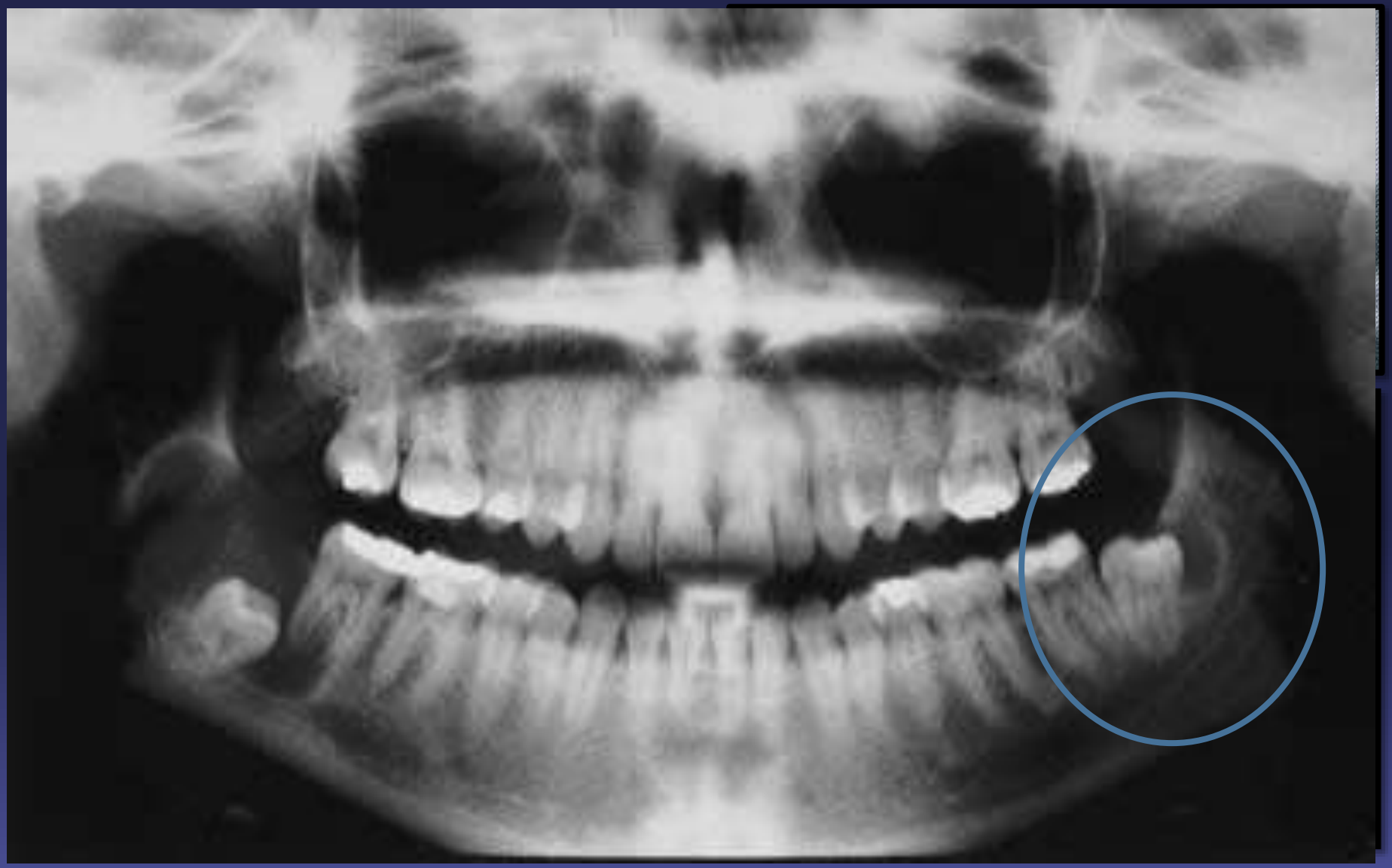
ORIGIN AND PATHOGENESIS

- Craig (1976) suggested that the cyst arises from either the cell rests of Malassez or the reduced enamel epithelium
- Ackerman, Cohen and Altini (1976) favored the origin from the reduced enamel epithelium.
- Praetorius (1989) concluded that the cyst was of inflammatory origin initiated by pericoronitis

CLINICAL FEATURES

1. Age – 10-40 years of life
2. Sex – more in males
3. Site – mostly located distally and distobucally to third molars
4. Involved teeth are vital

RADIOGRAPHIC FEATURES



HISTOPATHOLOGY

1. Lined by hyperplastic nonkeratinised stratified squamous epithelium

2. Intense inflammatory cell infiltrate is associated with the cyst

3. Histologically can not be differentiated from radicular cyst

MANDIBULAR INFECTED BUCCAL CYST

- Has certain characteristic of a paradental cyst and is regarded by same workers as a variant of it
- Affects the perm. mandibular 1st and 2nd molar rather than the wisdom teeth and affects the younger age group
- Praetorius (1989) regarded the mandibular infected buccal cyst as a paradental cyst and said that the age differences reflect the dates of eruption of involved teeth

- Diagnostic features are –

1. Young age of the patient
2. Mandibular molar site
3. Buccal periostitis
4. Vital pulp
5. Radiographic preservation of the continuity of the lamina dura

- Cyst is always situated on the buccal surface of a mandibular molar, most frequently the 1st permanent molar after partial or complete eruption

RADIOGRAPHIC FEAURES

- There is involvement of the periosteum, new bone may be laid down either as a linear band or laminated if there are 2 or more layers

- Cyst will be seen on the buccal aspect of the affected tooth

CYSTIC FLUID- A CLUE FOR DIAGNOSIS

- Analysis of cystic content may provide an important clue for diagnosis.

- Protein content: Radicular cyst - 7.48g%
  Dentigerous cyst- 6.75g%
  OKC- 3.5g%

- Cholesterol is seen in 40% radicular and dentigerous cyst, only 20% OKC shows cholesterol.

- 80% OKC fluid shows epithelial cells.

Some observations on the fluids of odontogenic cysts R, M, BROWNE et al , JOP 1976: 5: 74-87

(PSEUDOCYSTS) SOLITARY BONE CYST

- Syn:
- Traumatic bone cyst
- Simple bone cyst
- Haemorrhagic bone cyst

- Occurs in mandible
- Resembles solitary bone cyst located in the metaphyses at the upper end of the humerus & the femur in children & adolscents.

CLINICAL FEATURES

- Uncommon lesion.
- Howe used these criteria to determine the lesion:
- Cyst should be single
- No epithelial lining
- Show no evidence of acute or prolonged infection
- Should contain principally fluid & not soft tissue

- Age: young individuals, peak incidence 2nd decade of life.
- Sex: males
- Site: majority in mandible, maxilla is reported (anterior maxilla)
- Mandible: body, symphyseal area.

- Patient c/o swelling.
- h/o significant trauma to the area
- Pain
- Labial parasthesia
- `

RADIOGRAPHIC FEATURES

- Radiolucent area with an irregular but definite edge & slight cortication.
- Occlusal view: radiolucency extending along cancellous bone.
- Little effect on the buccal & lingual plates.
- Scalloping is a prominent feature of simple bone cysts & occurs both between teeth & away from teeth.
- Lamina dura may or may not be lost & occasional root resorption may occur.

PATHOGENESIS

- Following trauma to a bone,

- which causes intramedullary haemorrhage,

- only a failure of early organization of the haematoma in some marrow spaces &

- subsequent liquifaction of the clot can lead to the formation of a traumatic cyst.

Other theories:

1. Cystic degeneration of primary bone tumors
2. Result of faulty calcium metabolism such as in hyperparathyroidism.
3. Ischemic necrosis of fatty marrow
4. End result of low grade chronic infection.
5. Osteoclasis… disturbed balance between osteoclasis and repair of bone after trauma

HISTOLOGICAL FEATURES

- Loose vascular fibrous tissue membrane of variable thickness with no epithelial lining.
- Haemosidrin pigments.
- Small multinucleate cells scattered.
- Adjacent bone shows osteoclastic resorption on its inner surface.

DEVELOPMENTAL LINGUAL MANDIBULAR SALIVARY GLAND DEPRESSION

- Syn:
- Static bone cavity or defect of the mandible
- Static bone cyst
- Stafne cyst or defect

- Unusual form of slightly aberrant salivary gland tissue wherein a developmental inclusion of glandular tissue is found within or, more commonly, adjacent to the lingual surface of the body of the mandible within a deep & well circumscribed depression.

- First recognized by Stafne in 1942
- Males predilection.

RADIOGRAPHIC FEATURES

- Ovoid radiolucency located between the inferior alveolar canal & inferior border of the mandible in the region of the 2nd or 3rd molars.
- Differentiated from traumatic or haemorragic bone cyst: lies superior to inferior alveolar canal.
- Anterior variant: round or ovoid radiolucency in the area between central incisors & 1st premolars exists.

- Surgical exploration of these cavities has indicated that they represent developmental defects on the lingual aspects of the mand which are occupied by a lobe of normal submandibular salivary gland.

ANEURYSMAL BONE CYST

- Uncommon solitary lesion of bone.
- Term was suggested to describe the characteristic ‘blow out’ of the bone seen in the radiographs of the lesion.

- Lesion has been known to regress after incomplete removal.
- Similar to & probably related to other reactive non neoplastic processes:

Giant cell reparartive granulomas of the jaws

CLINICAL FEATURES

- Young persons, occurring under the age of 20 yrs
- No gender predilection.
- A h/o traumatic injury preceding development of the lesion.
- Lesions are also seen in long bones & vertebral column, clavicle, rib, skull & bones of the hands & feet.

- Produce firm swellings—painful.
- Swelling & malocclusion frequently become progressively worse.
- Displacement of teeth (vital)

- Lesion perforates the cortex & is covered by periosteum or thin shell of bone, it may exhibit springiness or ‘egg shell crackling’, but not pulsatile.
- Difficulty in opening of the mouth: impingement of the lesion on the capsule of TMJ.

RADIOLOGICAL FEATURES

- Ovoid or fusiform expansion of the bone & may balloon the cortex.
- Unilocular, multilocular or honeycomb-like.
- Displacement of the teeth
- Root resorption.

PATHOGENESIS

- No. of theories:
- Trauma
- Cyst results from a vascular disturbance: sudden venous occlusion or the development of an arteriovenous shunt.
- Secondary phenomenon arising from prexisting bone lesion.

4 phases:

- 1. osteolytic initial phase
- 2. Active growth phase- rapid destruction of bone & subperiosteal blown out pattern
- 3. mature stage- stage of stabilization…… formation of peripheral bony shell and interal bony septa….. Soap-bubble Appearance
- 4. healing phase- ossification

PATHOLOGY

- At operation an intact periosteum & a thin shell of bone usually covers the cyst. When this is removed, dark venous blood wells up. Bleeding may be profuse & difficult to control until the cyst has been removed.
- 'Blood soaked sponge'
- Cyst contains variable amounts of soft tissue consisting of friable vascular tissue which subdivides the cavity into a number of blood filled locules.

Pathogenesis

1. Result of persistant local alteration in hemodynamics>>> increased venous pressure>>>>> subsequent development of dialated and engorged vascular bed in the transformed bone area.

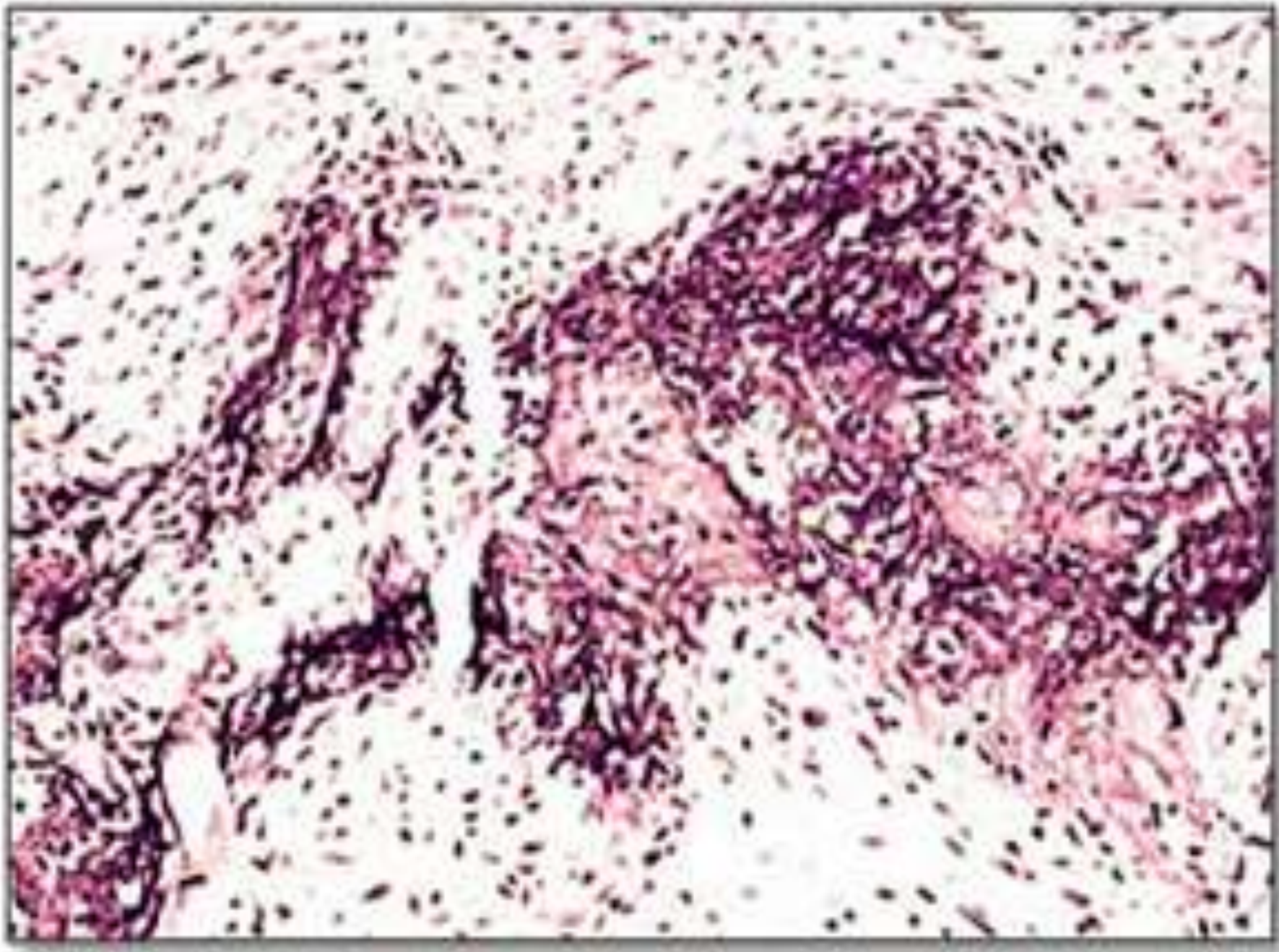
2. Lesion represents an exuberant attempt at the repair of hematoma of bone. Similar to CGCG.

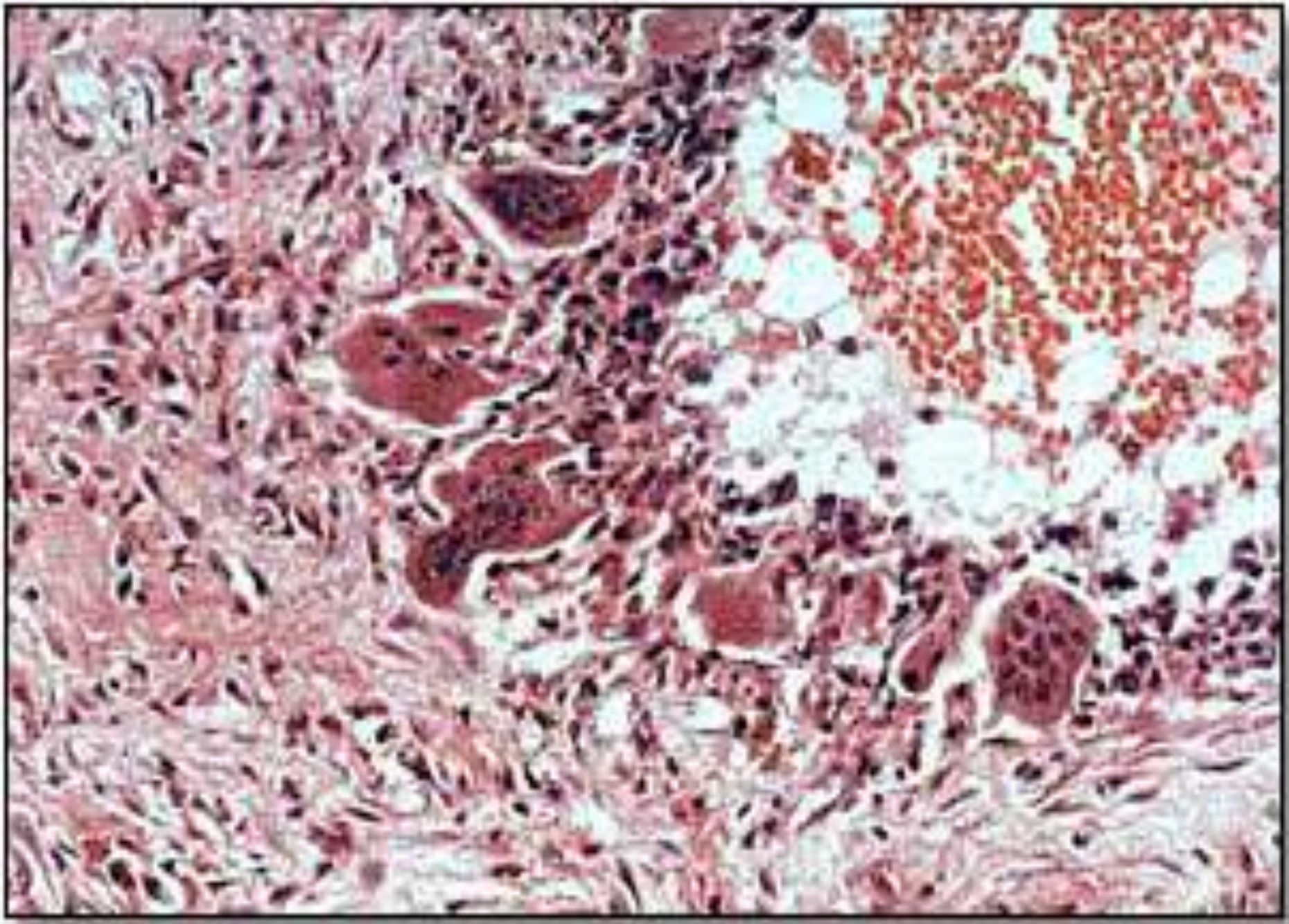
   but, in ABC hematoma maintains a circulatory connection with the damaged vessel.

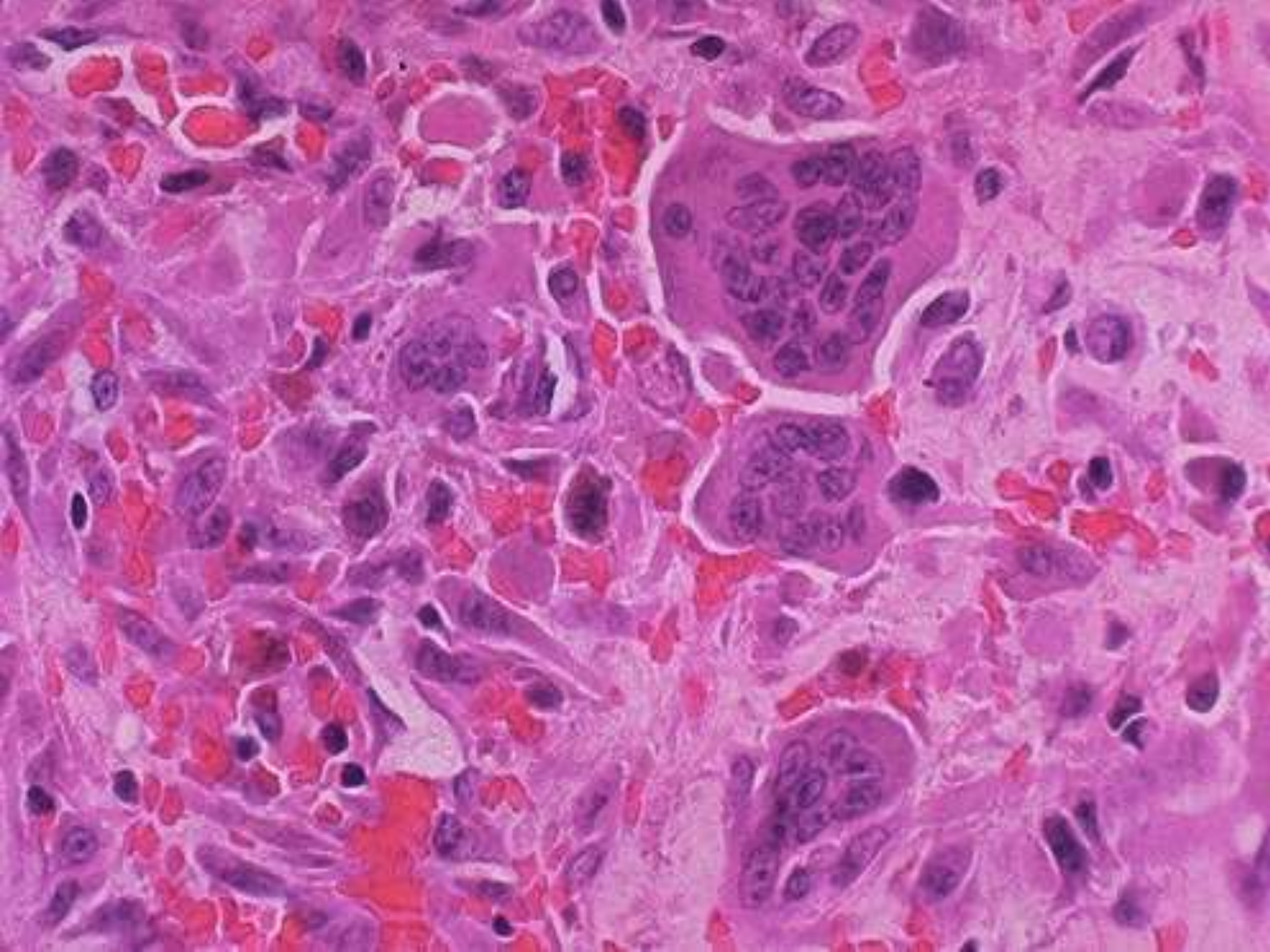
3. Secondary reactive lesion of bone

HISTOLOGICAL FEATURES

- Capillaries & blood filled spaces of varying size lined by flat spindle cells & separated by delicate loose textured fibrous tissue.
- Small multinucleate cells & scattered trabaculae of osteoid & woven bone.
- Solid areas: sheets of vascular tissue, containing large no. of multinucleate giant cells, fibroblasts, haemorrhage & haemosidrin.







TREATMENT

- Determined by the nature of the associated lesion.
- Curretage
- Complete excision
- Bone grafting