

# **Cysts of the jaws**

**Dr. Afrah Adnan Aldelaimi**

**B.D.S., C.D.I., M.Sc., Ph.D.**

**Oral & Maxillofacial Pathologist**

**University of Anbar - College of Dentistry**

# Cyst

- ▶ is defined as an epithelial-lined pathologic cavity. In contrast to true cysts, pseudocysts lack an epithelial lining.
- ▶ Cysts of the maxilla, mandible, and perioral regions vary markedly in histogenesis, incidence, behavior, and treatment and can be divided into odontogenic cysts, nonodontogenic cysts, pseudocysts, and neck cysts.

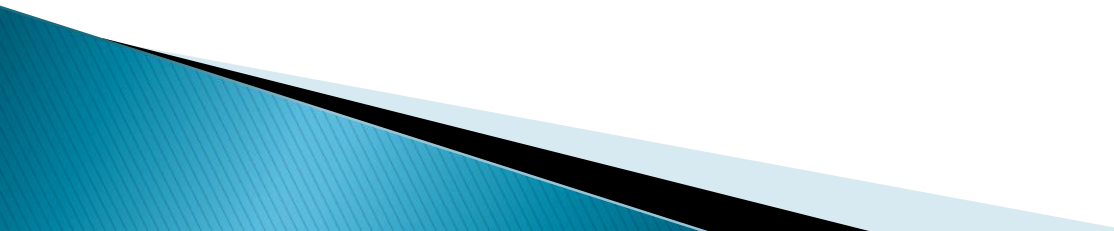
# Epithelial origin of jaw cysts

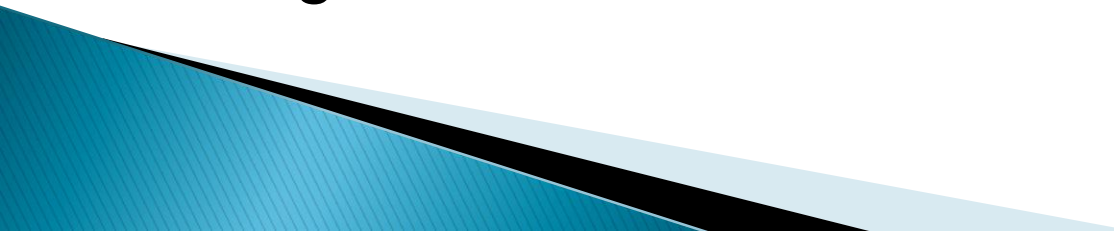
Type	Source	Origin of Rests	Cyst Examples
Odontogenic rests	Rests of Malassez	Epithelial root sheath	Periapical (radicular) cyst
	Reduced enamel epithelium	Enamel organ	Dentigerous cyst
	Rests of dental lamina (rests of Serres)	Epithelial connection between mucosa and enamel organ	Odontogenic keratocyst (KCOT) Lateral periodontal cyst Gingival cyst of adult Gingival cyst of newborn Glandular odontogenic cyst
Nonodontogenic rests	Remnants of nasopalatine duct	Paired nasopalatine ducts (vestigial)	Nasopalatine duct cyst

# Periapical (radicular or apical periodontal) cysts

- ▶ are the most common cysts of the jaws. These inflammatory cysts derive their epithelial lining from the proliferation of small odontogenic epithelial residues (rests of Malassez) within the periodontal ligament.



- ▶ They develop from a preexisting periapical granuloma (a focus of chronically inflamed granulation tissue located at the apex of a nonvital tooth). Stimulation of resident epithelial rests of Malassez occurs in response to the products of inflammation.
  - ▶ Cyst form from epithelial proliferation to separate the inflammatory stimulus (necrotic pulp) from the surrounding bone.
- 

- ▶ Breakdown of cellular debris within the cyst lumen raises the protein concentration, increasing osmotic pressure and resulting in fluid transport across the epithelial lining into the lumen from the connective tissue side.
  - ▶ With osteoclastic bone resorption, the cyst expands. Other bone resorption factors, such as prostaglandins, interleukins, and proteinases, from inflammatory cells and cells in the peripheral portion of the lesion causes additional cyst enlargement.
- 

**Caries, trauma, periodontal disuse**



**Death of dental pulp**  
Necrotic debris is inflammatory stimulus



**Apical bone inflammation**



**Dental granuloma formation**  
Composed of granulation tissue, scar, inflammatory cells



**Stimulation of epithelial rests of Malassez**



**Epithelial proliferation**



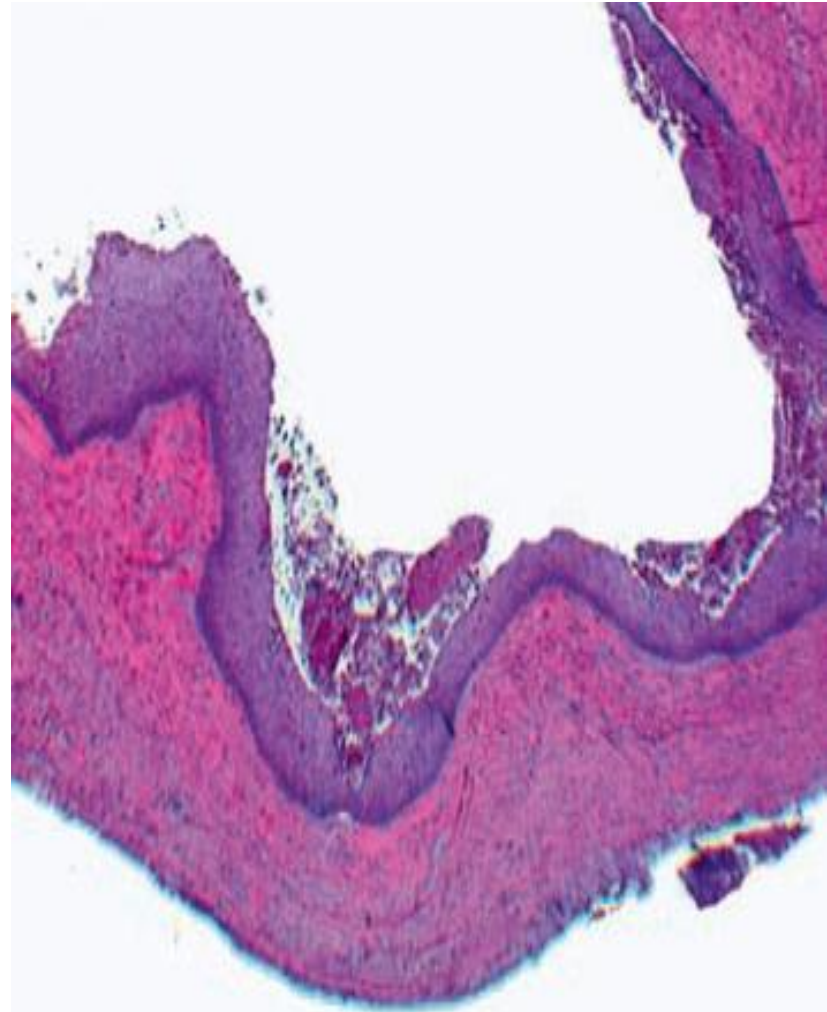
**Periapical cyst formation**  
Cyst wall separates pulpal irritation from bone

- ▶ Radiographically, a periapical cyst cannot be differentiated from a periapical granuloma.





- ▶ The periapical cyst is lined by nonkeratinized stratified squamous epithelium of variable thickness with large numbers of neutrophils fewer numbers of lymphocytes involved.
- ▶ Plasma cell infiltrate and spherical intracellular Russell bodies, representing accumulated gamma globulin, cholesterol clefts, and multinucleated giant cells may be seen.

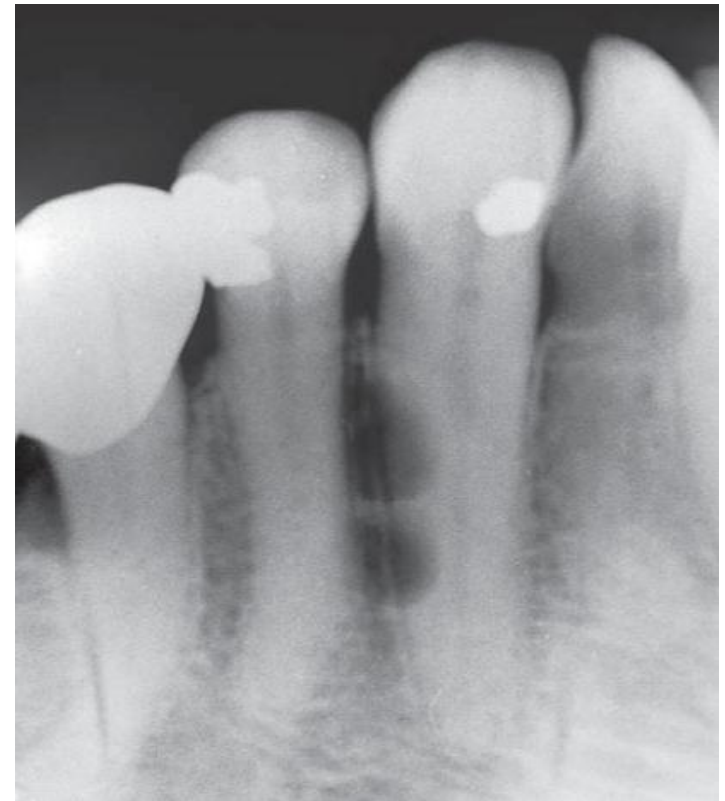


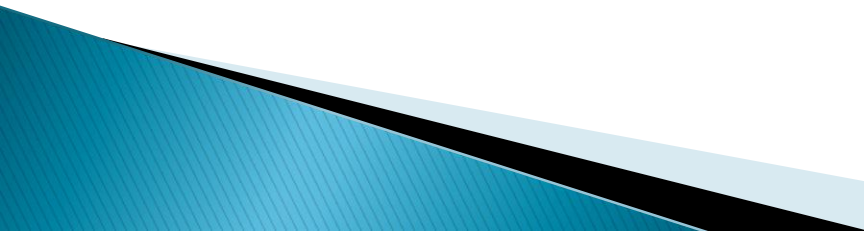
# Treatment and Prognosis

- ▶ Antibiotic
- ▶ Extraction
- ▶ Root canal filling
- ▶ Apicoectomy and direct curettage of the lesion.
- ▶ When the necrotic tooth is extracted but the cyst lining is incompletely removed, a **residual cyst** may develop months to years causing significant bone resorption and weakening of the mandible or maxilla.

# Lateral periodontal & Gingival cyst

- ▶ It is a nonkeratinized developmental cyst occurring adjacent or lateral to the root of a tooth. Its origin from rests of dental lamina.
- ▶ Pathogenetically it linked to the gingival cyst of the adult; the former is believed to arise from dental lamina remnants within bone, and the latter from dental lamina remnants in soft tissue between the oral epithelium and the periosteum (rests of Serres).



- ▶ Most lateral periodontal cysts and gingival cysts of the adult occur in the mandibular premolar and cuspid regions.
  - ▶ Male predilection has been noted for lateral periodontal cysts 2:1 distribution while in gingival cysts show a nearly equal gender predilection.
  - ▶ The median age for both types of cysts is between the 5<sup>th</sup> – 6<sup>th</sup> decades of life.
- 

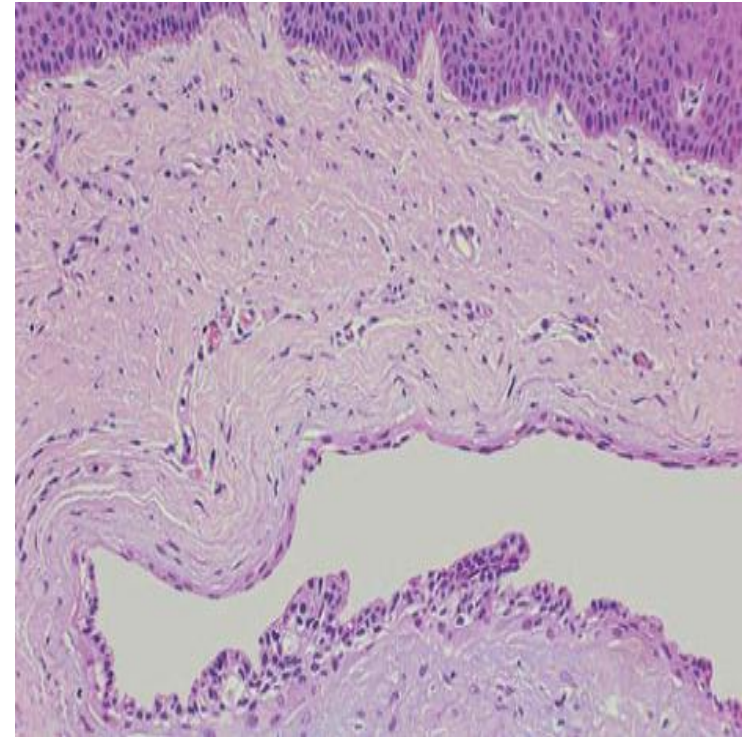
- ▶ **Gingival cyst appears as a small soft tissue swelling within or slightly inferior to the interdental papilla. It may assume a slightly bluish discoloration when it is relatively large. Most cysts are less than 1 cm in diameter. Radiography reveals no findings.**



- ▶ **Lateral periodontal cyst presents as an asymptomatic, well-delineated, round or teardrop-shaped unilocular radiolucency with an opaque margin along the lateral surface of a vital tooth root. Root divergence is rarely seen.**



- ▶ **Histopathology** Both cysts are lined by a thin, nonkeratinized epithelium. Clusters of glycogen-rich, clear epithelial cells may be noted in nodular thickenings of the cyst lining.
- ▶ **Treatment and Prognosis** Local surgical excision of both cysts



# Gingival cysts of the newborn (Bohn's nodules)

- ▶ It appears as multiple nodules along the alveolar ridge in neonates as a proliferate of the dental lamina that remain within the alveolar ridge mucosa to form small, keratinized cysts.
- ▶ These cysts are self-limiting rupture into the oral cavity within a few weeks to a few months.





# Dentigerous or follicular cysts

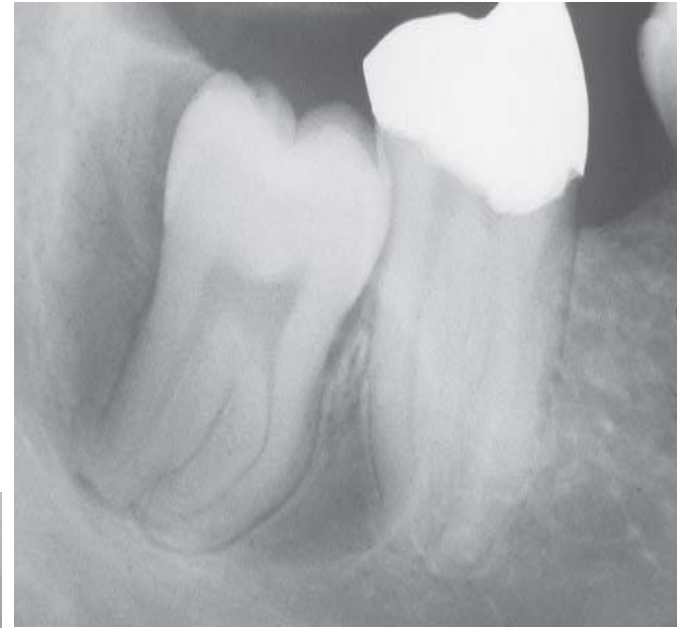
- ▶ It is second most common type of odontogenic cyst, and the most common developmental cyst of the jaws.
- ▶ It develops from proliferation of reduced enamel epithelium which expanded as a result of increase in cyst fluid osmolality and the release of bone resorption factors.



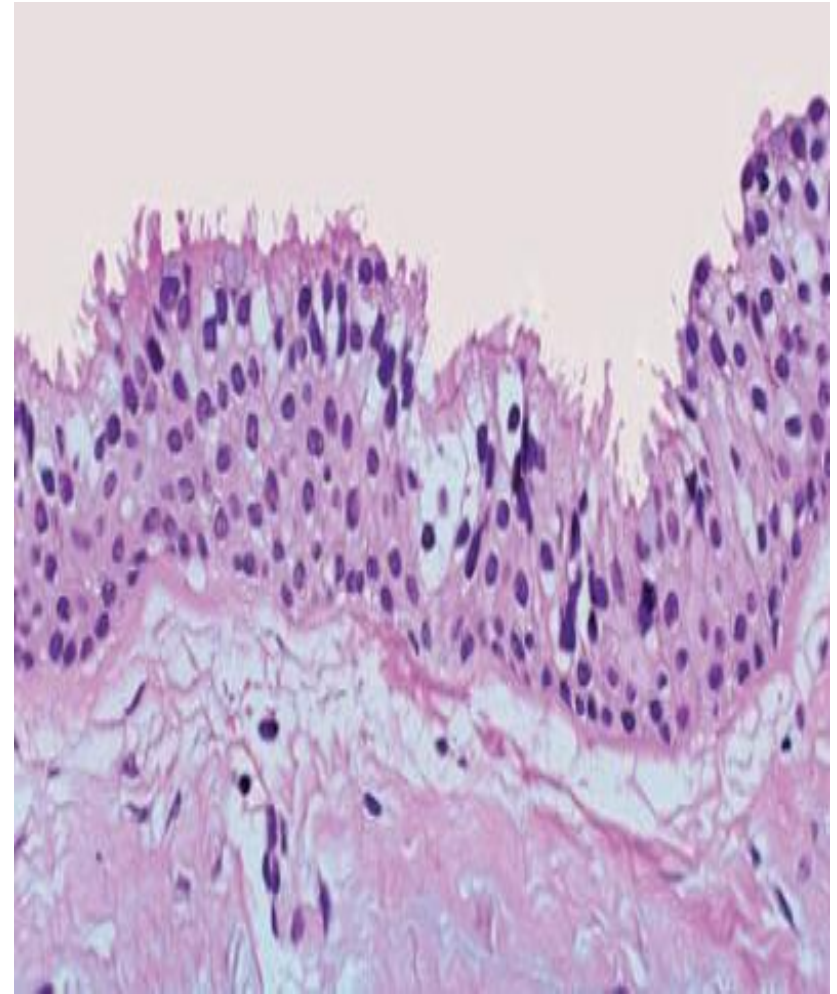
- ▶ **A dentigerous cyst is attached to the tooth cervix at the cemento-enamel junction and encloses the crown of the unerupted tooth. It is most commonly associated with impacted teeth (third molars and maxillary canines). The highest incidence of DC occurs during the 2<sup>nd</sup> and 3<sup>rd</sup> decades.**
- ▶ **In radiograph, it presents as a well-defined, unilocular radiolucency with corticated margins in association with the crown of an unerupted tooth. Resorption of roots of adjacent erupted teeth may occasionally be seen.**

## The cyst-to-crown relationship variations:

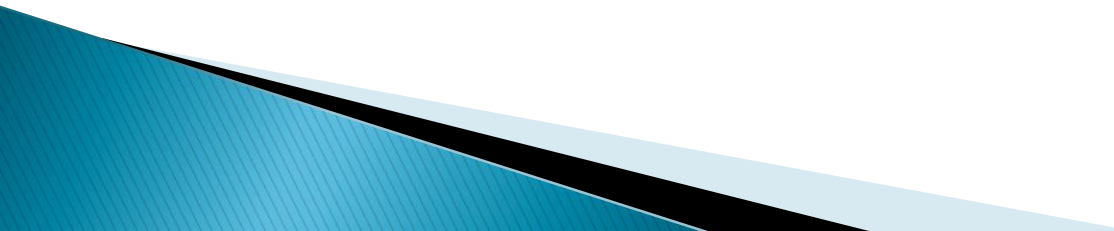
Central variety ,Lateral variety, Circumferential variety



- ▶ **Microscopically, the dentigerous cyst is formed by a fibrous connective tissue wall and is lined by nonkeratinized stratified squamous epithelium that arrange in 4-6 cell layers thick. Mucous cells, ciliated cells may be found, although in cases of secondary inflammation epithelial hyperplasia may be noted.**

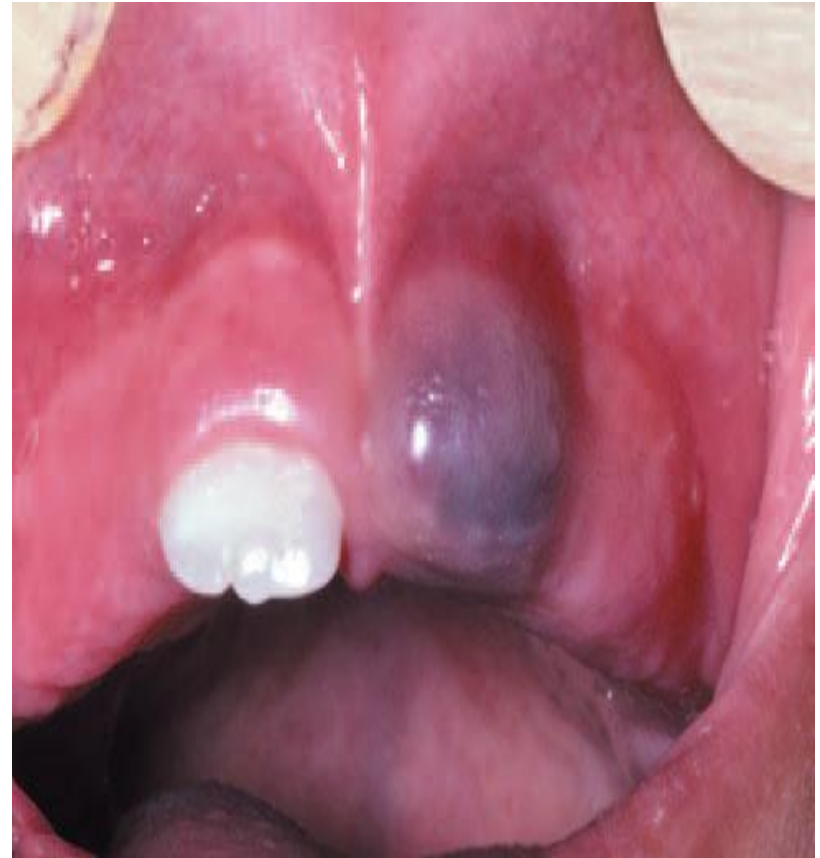


# Treatment

- ▶ Extraction of the associated tooth with enucleation
  - ▶ Potential complications of untreated dentigerous cysts include transformation of the epithelial lining into an ameloblastoma and rarely intraosseous mucoepidermoid carcinoma.
- 

# Eruption cyst

- ▶ It results from fluid accumulation within the follicular space of an erupting tooth. The epithelium lining this space is simply reduced enamel epithelium. With trauma, blood may appear within the tissue space forming an eruption hematoma.



- ▶ No treatment is needed because the tooth erupts through the lesion. Subsequent to eruption, the cyst disappears spontaneously without complication.



# Glandular odontogenic cyst sialo-odontogenic cyst

- ▶ A rare developmental odontogenic strong predilection is seen for the mandible (80%), especially the anterior mandible, slow growth rate, Jaw expansion with a wide age range.



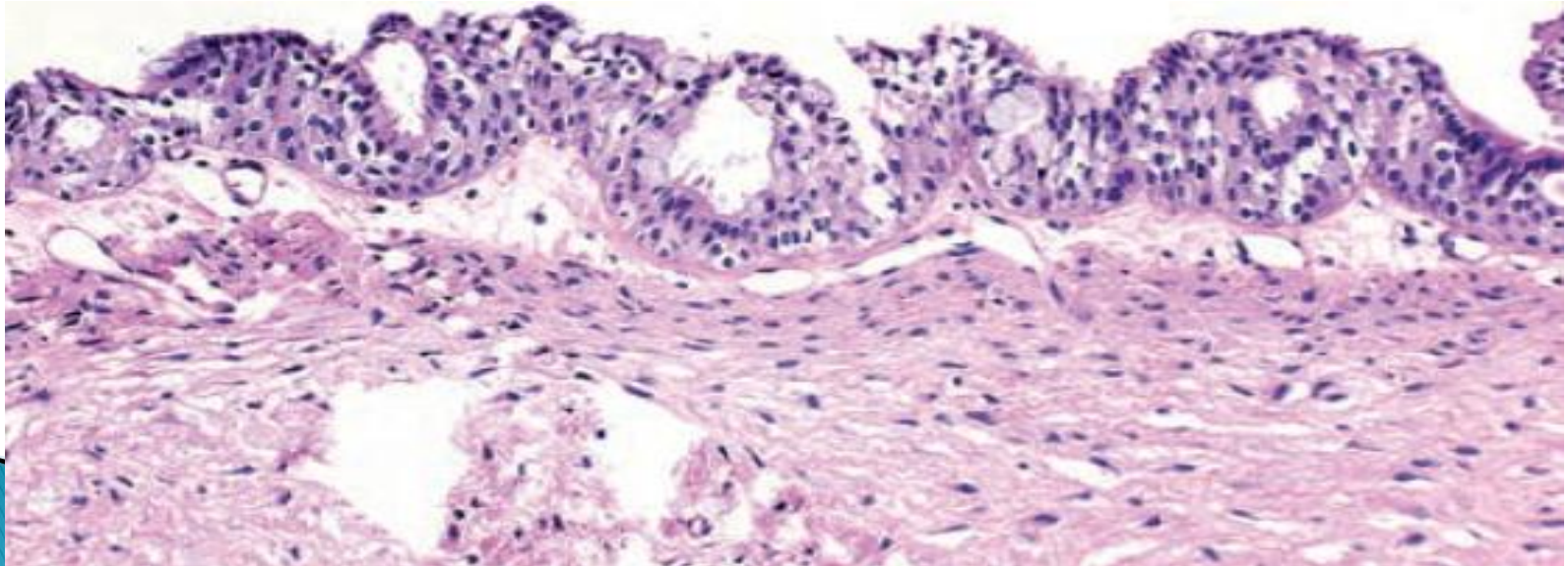


- ▶ **It is multilocular lesion with wide variation in size, from smaller than 1 cm to involving most of the mandible bilaterally with well defined, sclerotic and scalloped margin. Teeth may be displaced, and root resorption is noted in some cases.**



# Histopathology

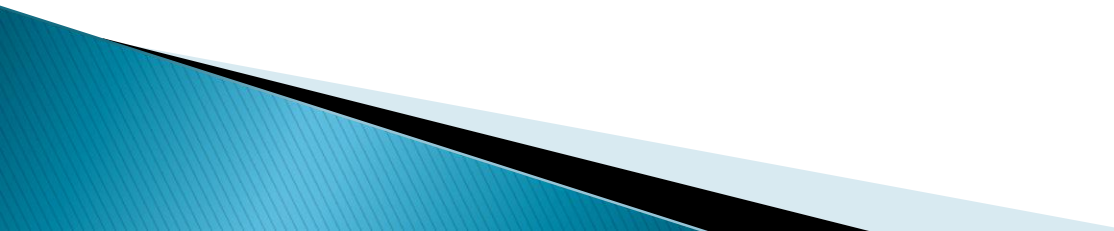
- ▶ It consist of nonkeratinized squamous epithelium lining with focal thickenings in which the epithelial cells assume a swirled appearance.
- ▶ The epithelial lining consists of cuboidal cells, often with cilia and mucous cells with mucin pools.



# Treatment and Prognosis

- ▶ This lesion can be considered locally aggressive; therefore, surgical management with adequate healthy bone remains beyond the extent of the cystic lesion. Longterm follow-up is essential given the local aggressiveness and recurrence rate (approximately 25%) of this lesion.

# Odontogenic keratocyst (OKC)

- ▶ It is a unique developmental odontogenic cyst developed from dental lamina remnants in the mandible and maxilla and exhibit aggressive clinical behavior, a relatively high recurrence rate, and an association with nevoid basal cell carcinoma syndrome.
  - ▶ Radiographically mimic other types of cysts, Multilocularity is often present.
- 

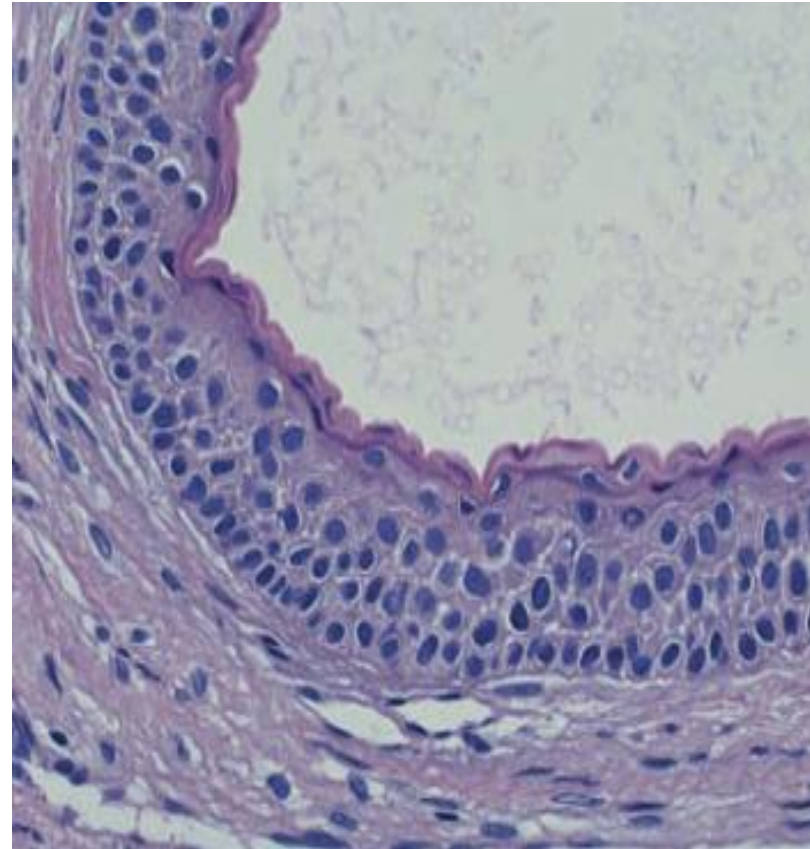
- ▶ It is common jaw cyst
- ▶ It occurs at any age and have a peak incidence within the 2<sup>nd</sup> and 3<sup>rd</sup> decades.
- ▶ About 5% of patients with OKCs is multiple cysts
- ▶ Mostly found in the mandible in 2:1 ratio in the ramus and posterior portion. In the maxilla, the third molar area is most commonly affected.



- ▶ Factors that may contribute to the pathogenesis of the OKC include a high proliferation rate, overexpression of the antiapoptotic protein Bcl-2 and several growth factors, and expression of MMPs 2 and 9.

# Histopathology

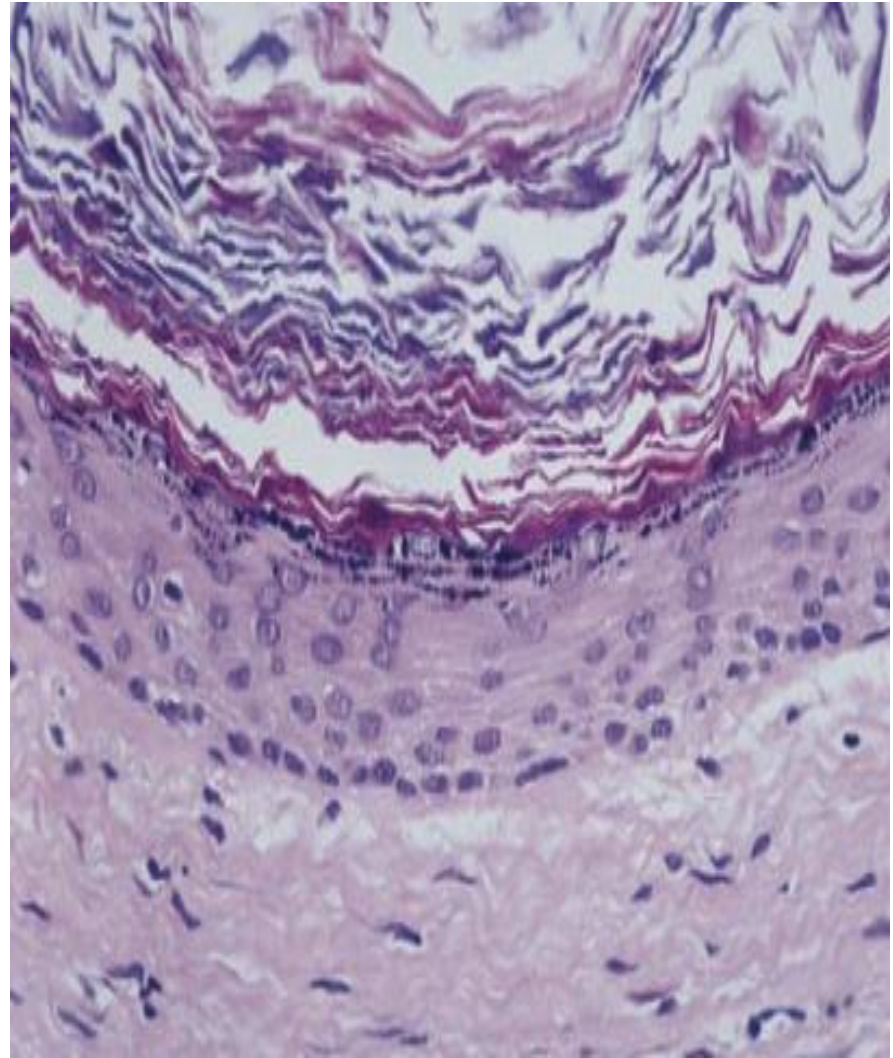
- ▶ The epithelial lining is uniform ranging from 6 to 10 cell layers thickness. The basal layer exhibits a characteristic palisaded pattern with polarized and intensely stained nuclei of uniform diameter. The luminal epithelial cells are parakeratinized and produce an uneven or corrugated profile. Focal zones of orthokeratinization can be seen.



- ▶ An orthokeratinized odontogenic cyst has been described difference from OKC. Histologic distinction between parakeratinized and orthokeratinized cysts is made because the latter type of cyst is less clinically aggressive, has a lower rate of recurrence, and generally is not associated with syndrome.



- ▶ **In the orthokeratotic odontogenic cyst, a prominent granular layer is found immediately below a flat, noncorrugated surface. The basal cell layer is less prominent and has a more flattened or squamoid appearance in comparison with the parakeratotic type.**



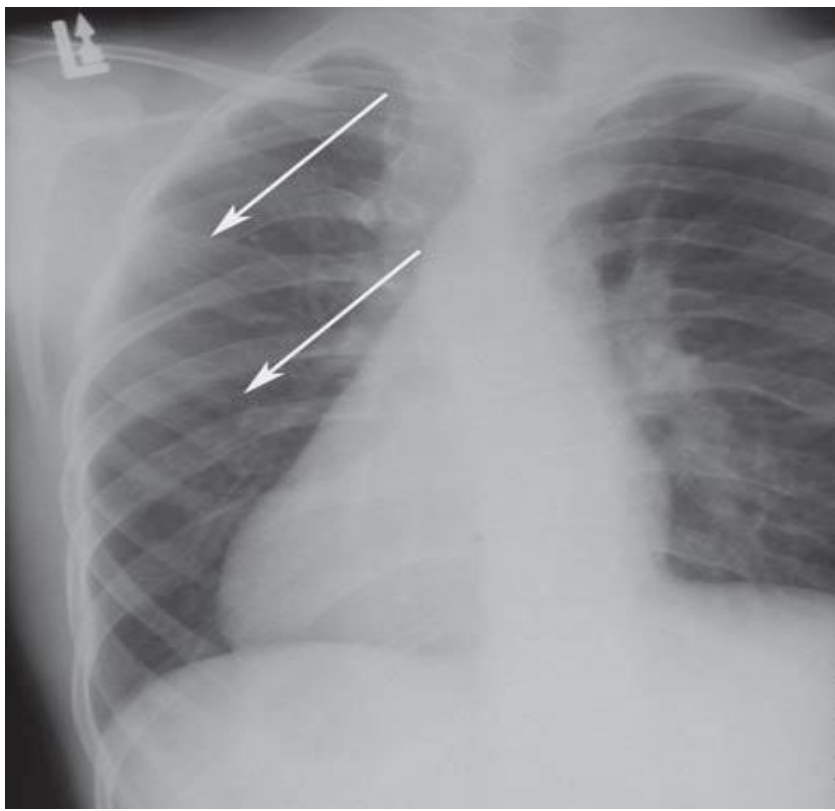
# Treatment and Prognosis

- ▶ **Wide surgical excision with peripheral osseous curettage is the preferred method of management because of the aggressive nature the recurrence rate varies from 10-30% that depend on how the lesion is managed and is also related to the friable, thin connective tissue wall of the cyst may lead to incomplete removal and small daughter satellite cysts in the bone adjacent to the primary lesion. Also, cystic proliferation of the overlying oral epithelial basal cell layer, if not eliminated during cyst removal, is considered significant by some.**

# Nevoid Basal Cell Carcinoma Syndrome

- ▶ Autosomal-dominant inheritance pattern, mutations found in the PTCH gene
- ▶ Clinical Features: Multiple odontogenic keratocysts, Multiple basal cell carcinomas, Skeletal anomalies (bifid rib), Calcified falx cerebri, Facial defects





# Calcifying odontogenic cysts (COCs)

- ▶ It are developmental odontogenic lesions that occasionally exhibit recurrence derived from odontogenic epithelial remnants within the gingiva or within the mandible or maxilla.
- ▶ It usually appears in individuals younger than 40 years of age and has a decided predilection for females. More than 70% of COCs are seen in the maxilla.

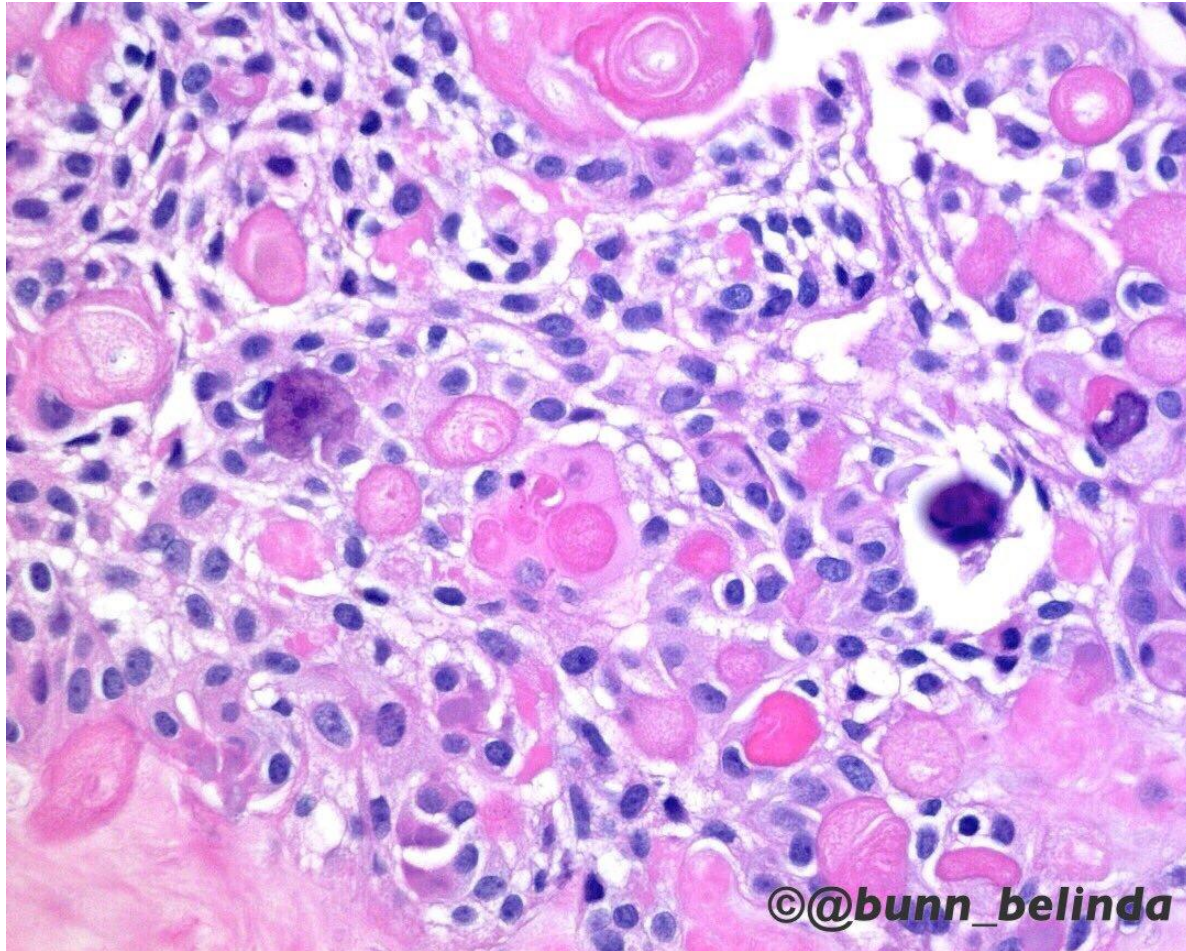


- ▶ **Radiographically, COCs may present as unilocular or multilocular radiolucencies with well-demarcated margins. Within the radiolucency scattered irregularly sized opacities may produce a salt-and-pepper type of pattern.**



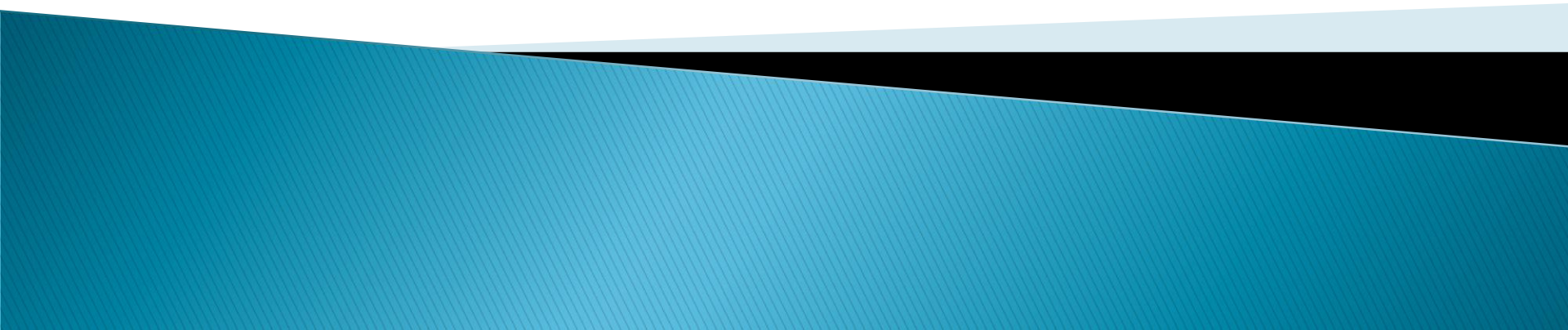
# Histopathology

- ▶ **It consists of well-delineated epithelial lining is of variable thickness with a fibrous connective tissue wall. Intraluminal epithelial proliferation obscures the cyst lumen producing the impression of a solid tumor.**
- ▶ **The most prominent and unique microscopic feature is the presence of Ghost cells which are anucleate retain the outline of the cell membrane. These cells undergo dystrophic mineralization**





# **Non odontogenic cysts**



# **“Fissural” cysts**

- ▶ **They are cysts arise from epithelium entrapped along embryonal lines of fusion. However, the concept of a fissural origin for many of these cysts has been questioned in more recent years. In many instances the exact pathogenesis of these lesions is still uncertain. Regardless of their origin, once cysts develop in the oral and maxillofacial region, they tend to slowly increase in size, possibly in response to a slightly elevated hydrostatic luminal pressure.**

# Nonodontogenic Cysts

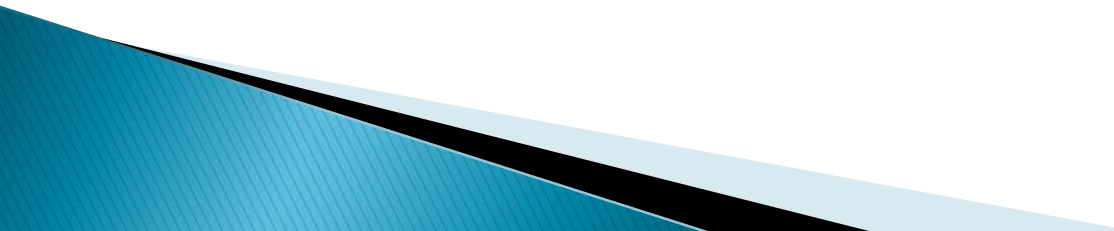
## Globulomaxillary Cyst/Lesion

- ▶ **Globulomaxillary cysts were once considered fissural cysts, located between the globular and maxillary processes (between maxillary lateral incisor and canine). The theory of origin involved epithelial entrapment within a line of embryologic closure with subsequent cystic change.**



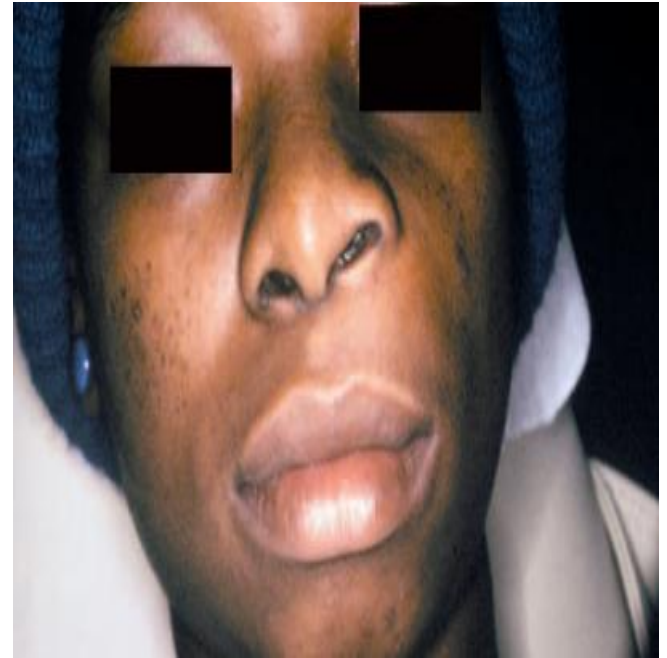
- ▶ **Radiologically, a globulomaxillary lesion appears as a well-defined inverted pear-shaped radiolucency, often producing divergence of the roots of the maxillary lateral incisor and canine teeth.**

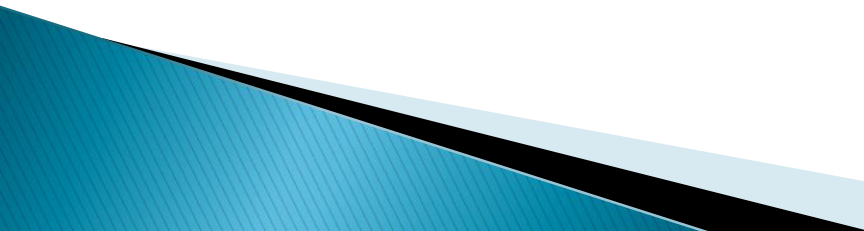


- ▶ **Radicular cyst and periapical granuloma can be ruled out with pulp vitality testing.**
  - ▶ **Asymptomatic; teeth vital; divergence of roots**
  - ▶ **Biopsy necessary to establish definitive diagnosis**
- 

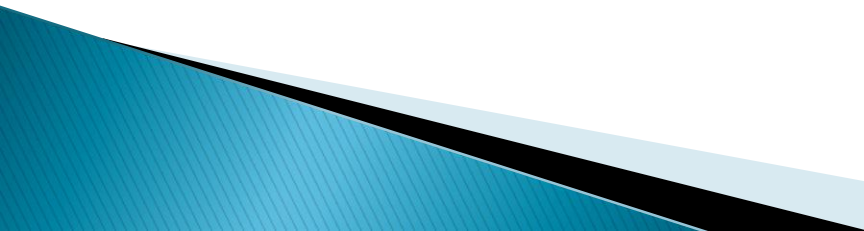
# Nasolabial Cyst

- ▶ It is a rare soft tissue cyst of the upper lip. The pathogenesis of the nasolabial cyst is unclear the lesion represents cystic change in the remnants of cells that form the nasolacrimal duct.
- ▶ a peak incidence noted in the 4<sup>th</sup> -5<sup>th</sup> decades. A distinct female predilection of nearly 4:1 has been noted.



- ▶ **The chief clinical sign is a soft tissue swelling that may present in the soft tissue over the canine region or the mucobuccal fold.**
  - ▶ **The epithelial lining of this cyst is characteristically a pseudostratified columnar type with numerous goblet cells.**
  - ▶ **Stratified squamous epithelium may be present in addition to cuboidal epithelium in some cases. The cyst is treated by curettage with few recurrences expected.**
- 

# **Nasopalatine duct cysts incisive canal cysts**

- ▶ **It is located within the nasopalatine canal**
  - ▶ **It develops from the proliferation of epithelial remnants of paired embryonic nasopalatine ducts within the incisive canal.**
  - ▶ **Men are affected more often than women, with differences as 3:1.**
  - ▶ **Most cases are asymptomatic, with the clinical sign of swelling usually calling attention to the lesion.**
- 

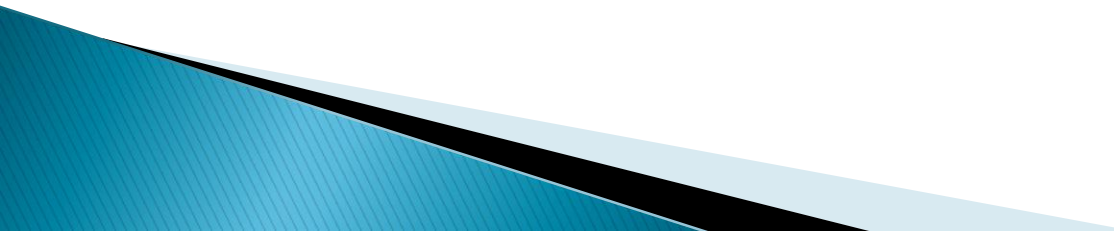


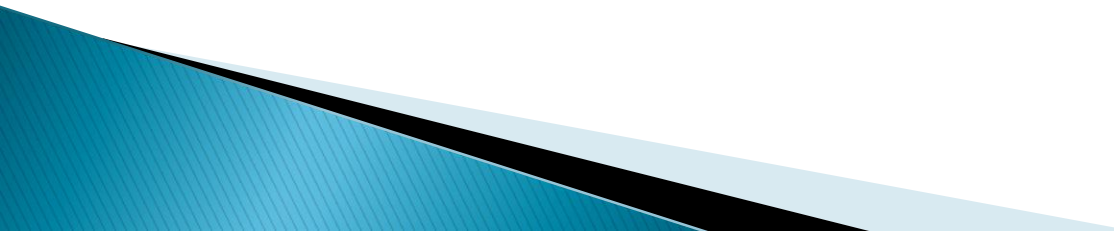
# Pseudocysts

## Aneurysmal Bone Cyst

- ▶ They are pseudocysts because they appear radiographically as cyst-like lesions but microscopically exhibit no epithelial lining.
- ▶ This lesion represents a benign lesion of bone that may arise in the mandible, the maxilla, or other bones. Within the cranio-facial complex, **The pathogenesis of the aneurysmal bone cyst is not well understood. Some evidence suggests a reactive process, and other evidence suggests a tumor. Supporting the tumor**
- ▶ **Histopathology:** fibrous connective tissue stroma contains variable numbers of multinucleated giant cells with blood filled spaces.
- ▶ **Treatment and Prognosis:** A relatively high recurrence rate has been associated with simple curettage. Excision or curettage with supplemental cryotherapy is the treatment of choice.

# Traumatic (Simple) Bone Cyst

- ▶ It is an empty intrabony cavity that lacks an epithelial lining (pseudocyst). It is seen most often in the mandible.
  - ▶ The pathogenesis is not known, assuming it is a traumatically-induced hematoma.
  - ▶ The most common site of occurrence is the mandible and pain is infrequently noted.
- 

- ▶ **Radiographically, a well-defined area of radiolucency**
  - ▶ **Microscopic examination identify delicate, well-vascularized, fibrous connective tissue without evidence of an epithelial component.**
  - ▶ **Treatment and Prognosis: Organization of the bony clot results in complete bony repair without recurrence.**
- 

# Static Bone Cyst (Stafne's Bone Defect)

- ▶ It is an anatomic depression of the mandible that appears to resemble a cyst on radiograph examination. It is believed to be developmental, The cause is unknown, but some have suggested that the lesion is due to entrapment of the salivary gland or other soft tissue during development of the mandible.

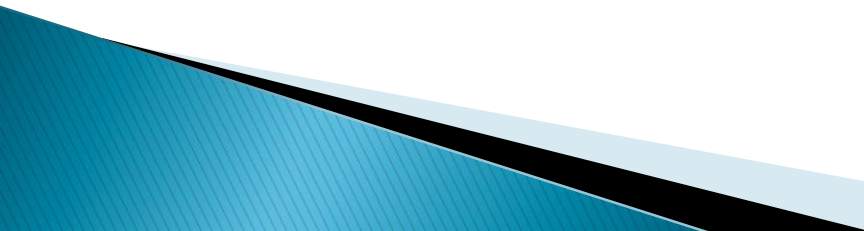


- ▶ **This lesion is entirely asymptomatic almost all cases appear in adults, particularly men.**
- ▶ **It appears as a sharply circumscribed oval radiolucency beneath the level of the inferior alveolar canal**
- ▶ **The appearance of a static bone cyst is usually pathognomonic, and no treatment is required.**



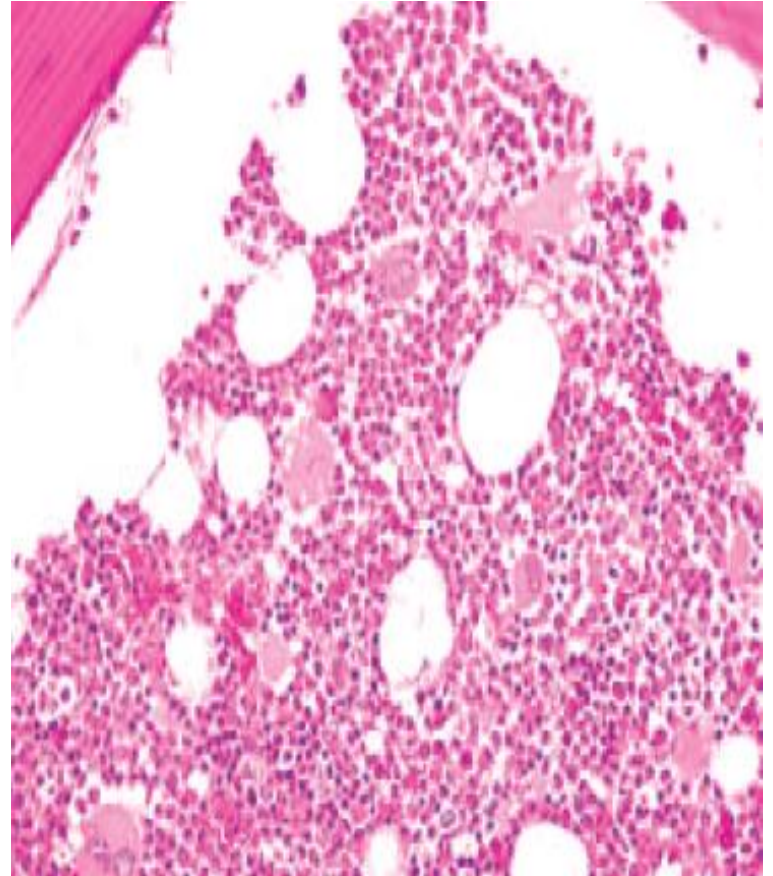
# **Focal osteoporotic bone marrow defects (hematopoietic bone marrow defects)**

- ▶ **uncommon lesions, asymptomatic, focal radiolucencies in areas where hematopoiesis is normally seen (angle of the mandible and maxillary tuberosity). Approximately 70% of these lesions occur in the posterior mandible; 70% occur in females.**

- ▶ **The pathogenesis of the osteoporotic marrow defect is unknown, although three theories have been proposed:**
    - ▶ **1. abnormal healing following tooth extraction**
    - ▶ **2. residual remnants of fetal marrow may persist into adulthood.**
    - ▶ **3. a focus of extramedullary hematopoiesis that becomes hyperplastic in adult life.**
- 

# Microscopic findings

- ▶ A predominance of hematopoietic cells with relatively fewer fat cells.
- ▶ Nonspecific radiographic findings, diagnosis by an incisional biopsy is generally desirable.





# **Suggestive Reading**

***Brad W Neville, Douglas D Damm,  
Carl M. Allen, Jerry E Bonguot.  
Oral And Maxillofacial Pathology,  
4th Edition, Elsevier, 2015***





Thank  
You!