



# Odontogenic Cysts and Tumors

# Introduction

- ✱ Variety of cysts and tumors
- ✱ Uniquely derived from tissues of developing teeth
- ✱ May present to otolaryngologist

# Odontogenesis

- ✱ Projections of dental lamina into ectomesenchyme
- ✱ Layered cap (inner/outer enamel epithelium, stratum intermedium, stellate reticulum)
- ✱ Odontoblasts secrete dentin → ameloblasts (from IEE) → enamel
- ✱ Cementoblasts → cementum
- ✱ Fibroblasts → periodontal membrane

# Odontogenesis





# Diagnosis

- ✱ Complete history
  - ✱ Pain, loose teeth, occlusion, swellings, dyesthesias, delayed tooth eruption
- ✱ Thorough physical examination
  - ✱ Inspection, palpation, percussion, auscultation
- ✱ Plain radiographs
  - ✱ Panorex, dental radiographs
- ✱ CT for larger, aggressive lesions

# Diagnosis

- ✱ Differential diagnosis
- ✱ Obtain tissue
  - ✱ FNA – r/o vascular lesions, inflammatory
  - ✱ Excisional biopsy – smaller cysts, unilocular tumors
  - ✱ Incisional biopsy – larger lesions prior to definitive therapy

# Odontogenic Cysts

## ☀ Inflammatory

- Radicular
- Paradental

## ☀ Developmental

- Dentigerous
- Developmental lateral periodontal
- Odontogenic keratocyst
- Glandular odontogenic

# Radicular (Periapical) Cyst

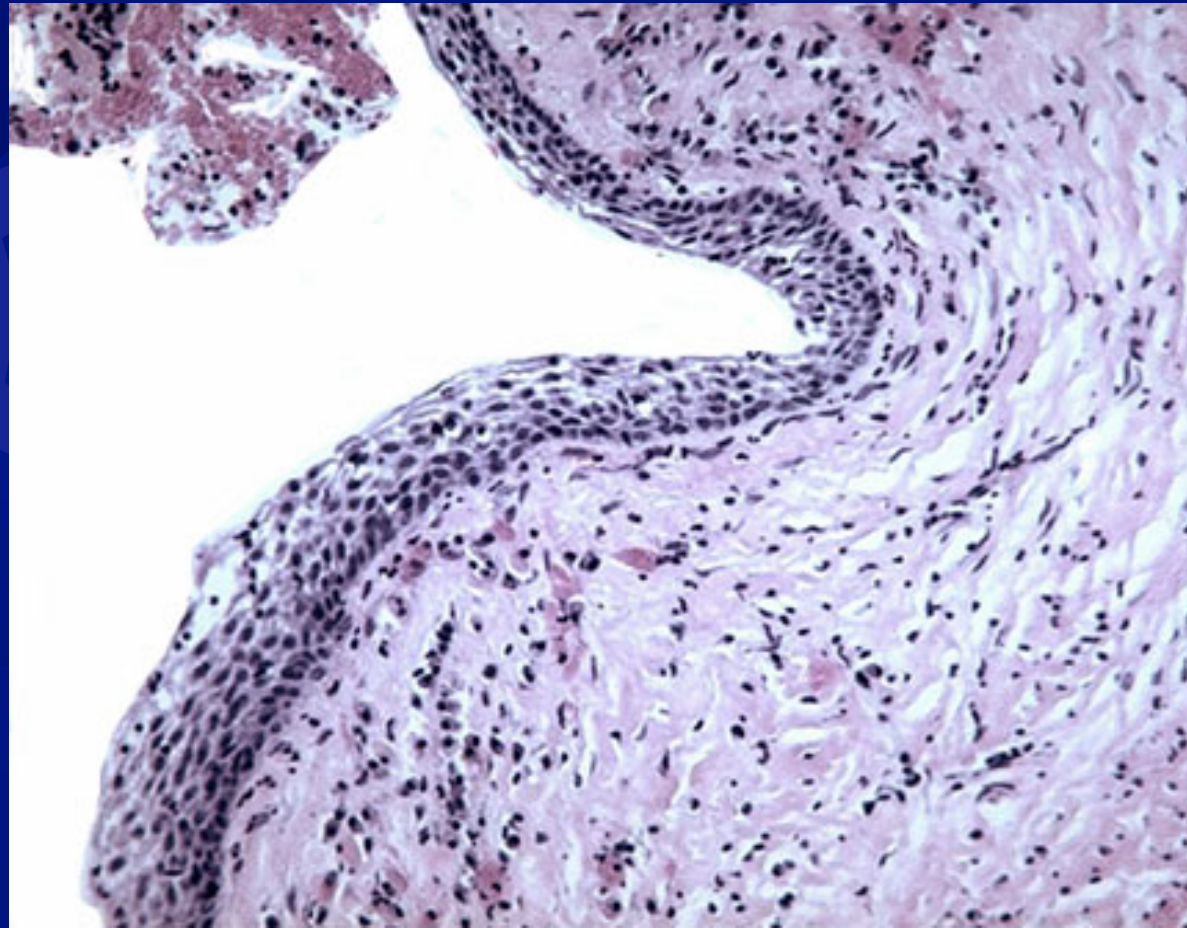
- ✱ Most common (65%)
- ✱ Epithelial cell rests of Malassez
- ✱ Response to inflammation
- ✱ Radiographic findings
  - ✱ Pulpless, nonvital tooth
  - ✱ Small well-defined periapical radiolucency
- ✱ Histology
- ✱ Treatment – extraction, root canal



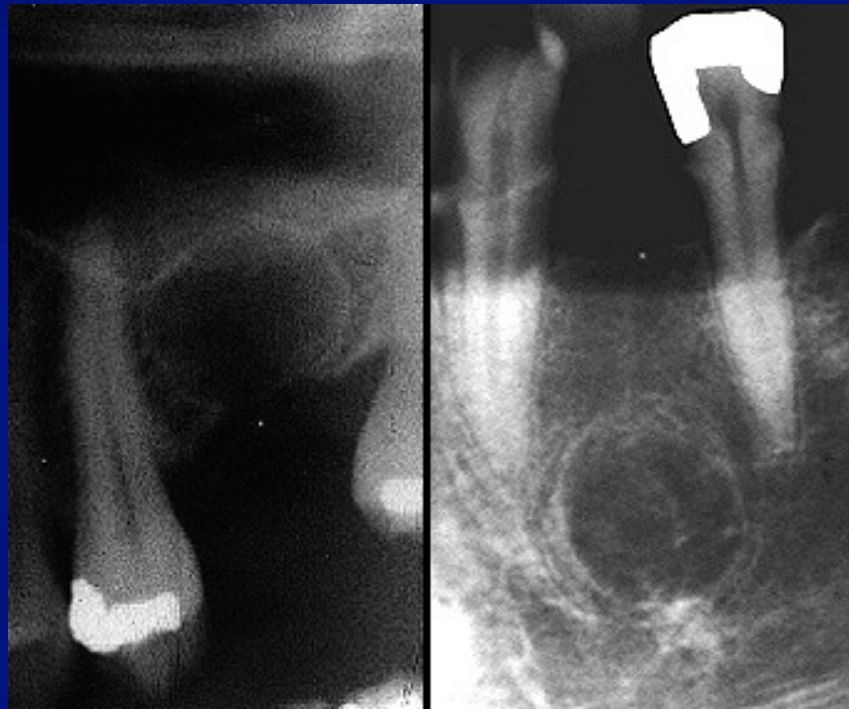
# Radicular Cyst



# Radicular Cyst



# Residual Cyst



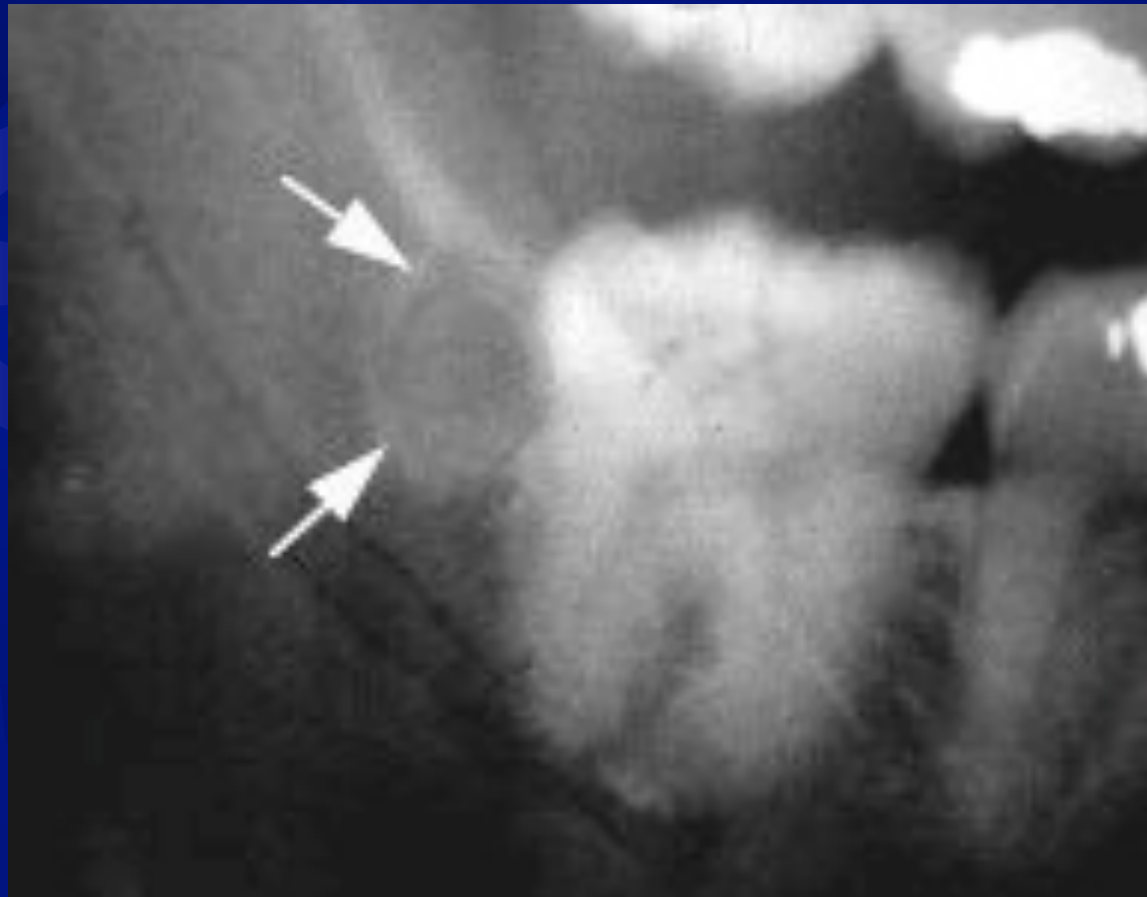


# Paradental Cyst

- ✱ Associated with partially impacted 3<sup>rd</sup> molars
- ✱ Result of inflammation of the gingiva over an erupting molar
- ✱ 0.5 to 4% of cysts
- ✱ Radiology – radiolucency in apical portion of the root
- ✱ Treatment – enucleation



# Paradental Cyst





# Dentigerous (follicular) Cyst

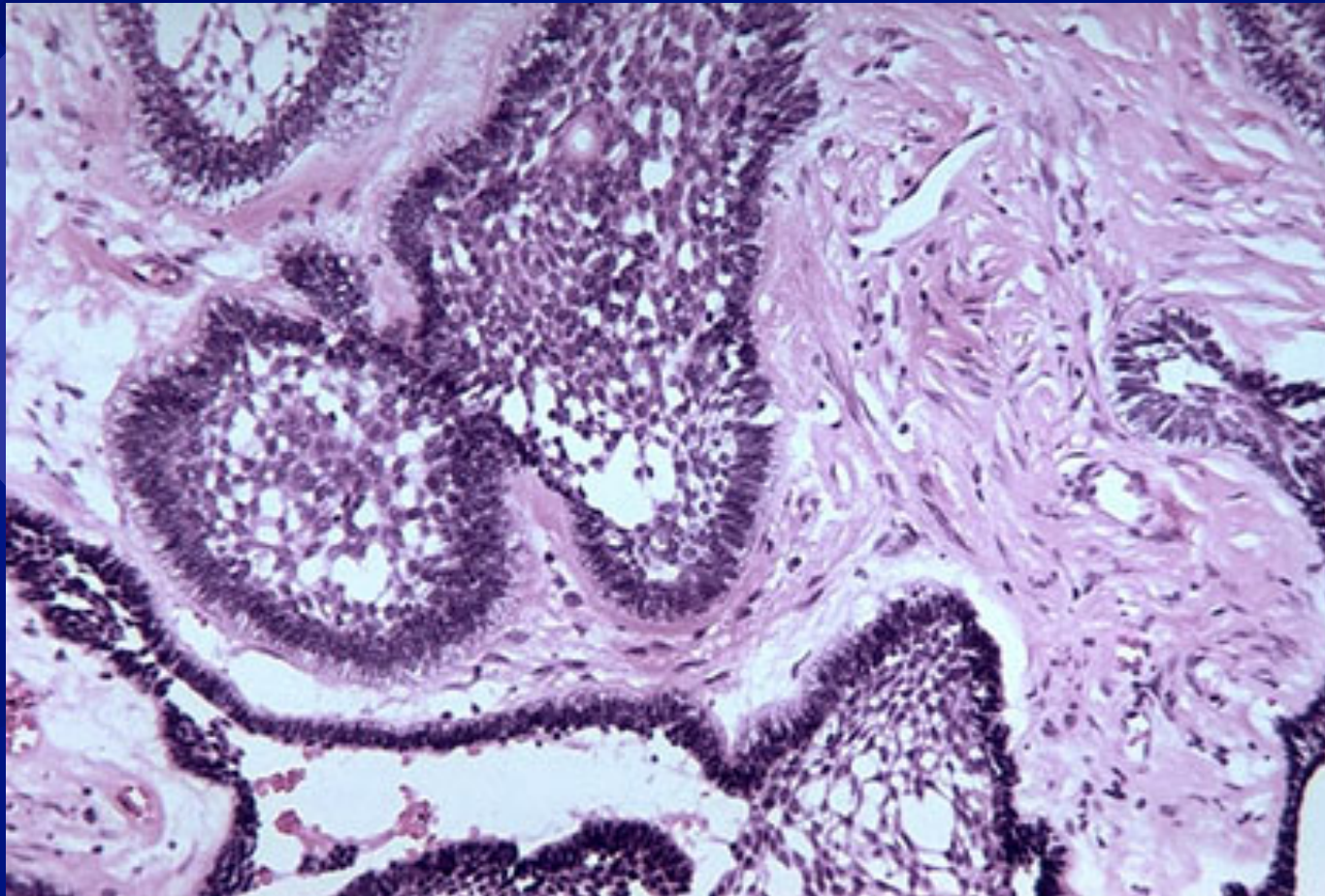
- ✦ Most common developmental cyst (24%)
- ✦ Fluid between reduced enamel epithelium and tooth crown
- ✦ Radiographic findings
  - ✦ Unilocular radiolucency with well-defined sclerotic margins
- ✦ Histology
  - ✦ Nonkeratinizing squamous epithelium
- ✦ Treatment – enucleation, decompression

# Dentigerous Cyst





# Dentigerous Cyst

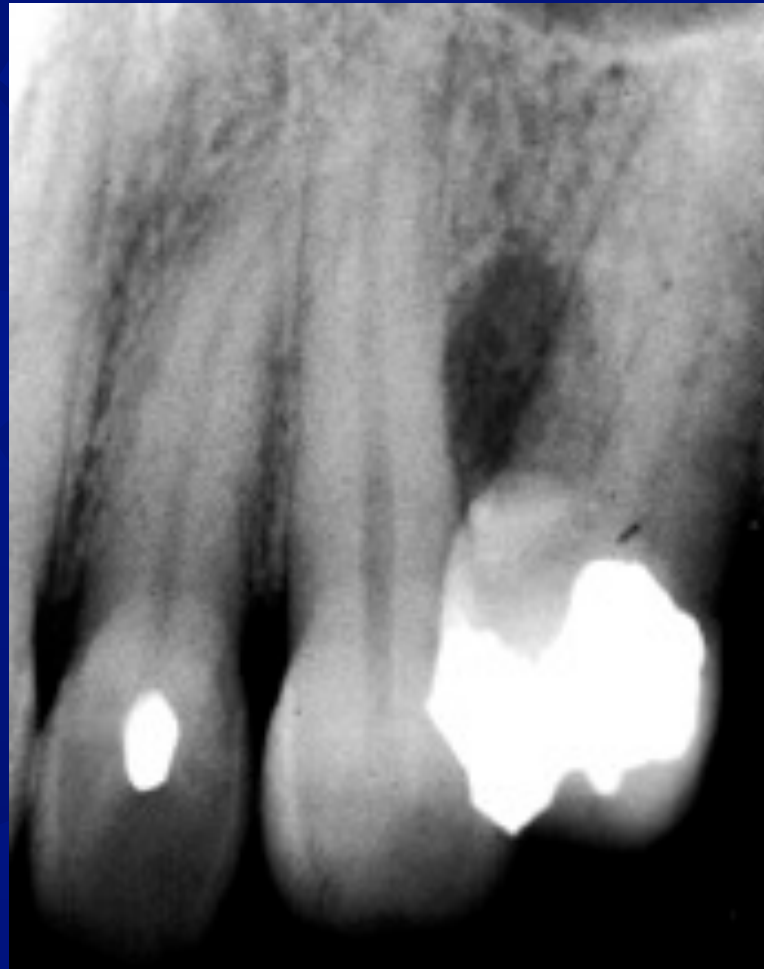




# Developmental Lateral Periodontal Cyst

- ✱ From epithelial rests in periodontal ligament vs. primordial cyst – tooth bud
- ✱ Mandibular premolar region
- ✱ Middle-aged men
- ✱ Radiographic findings
  - ✱ Interradicular radiolucency, well-defined margins
- ✱ Histology
  - ✱ Nonkeratinizing stratified squamous or cuboidal epithelium
- ✱ Treatment – enucleation, curettage with preservation of adjacent teeth

# Developmental Lateral Periodontal Cyst



# Odontogenic Keratocyst

- ✱ 11% of jaw cysts
- ✱ May mimic any of the other cysts
- ✱ Most often in mandibular ramus and angle
- ✱ Radiographically
  - ✱ Well-marginated, radiolucency
  - ✱ Pericoronal, inter-radicular, or pericoronal
  - ✱ Multilocular

# Odontogenic Keratocyst

## Radiographic Presentation of the Odontogenic Keratocyst

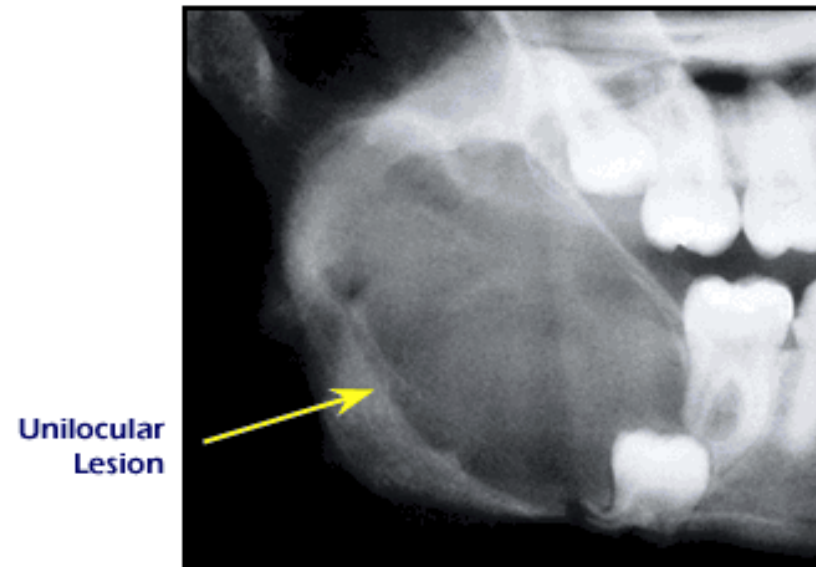


Fig.1A - Large OKC involving an impacted third molar tooth, unilocular with scalloped borders, representing the typical radiographic appearance of OKC.



# Odontogenic Keratocyst

## Radiographic Presentation of the Odontogenic Keratocyst

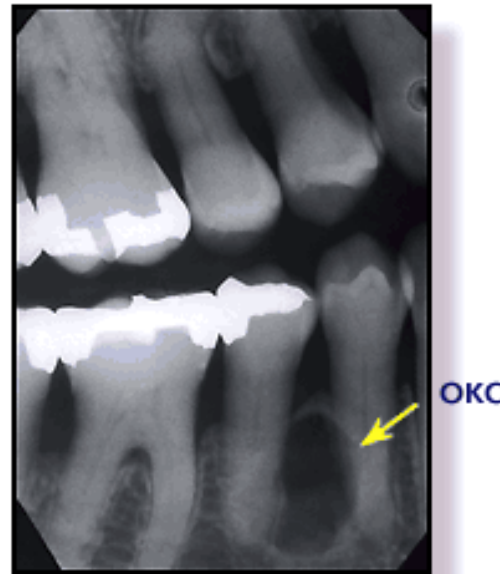


Fig.1B - Small and well corticated margins between mandibular first and second premolars simulating lateral periodontal cyst.

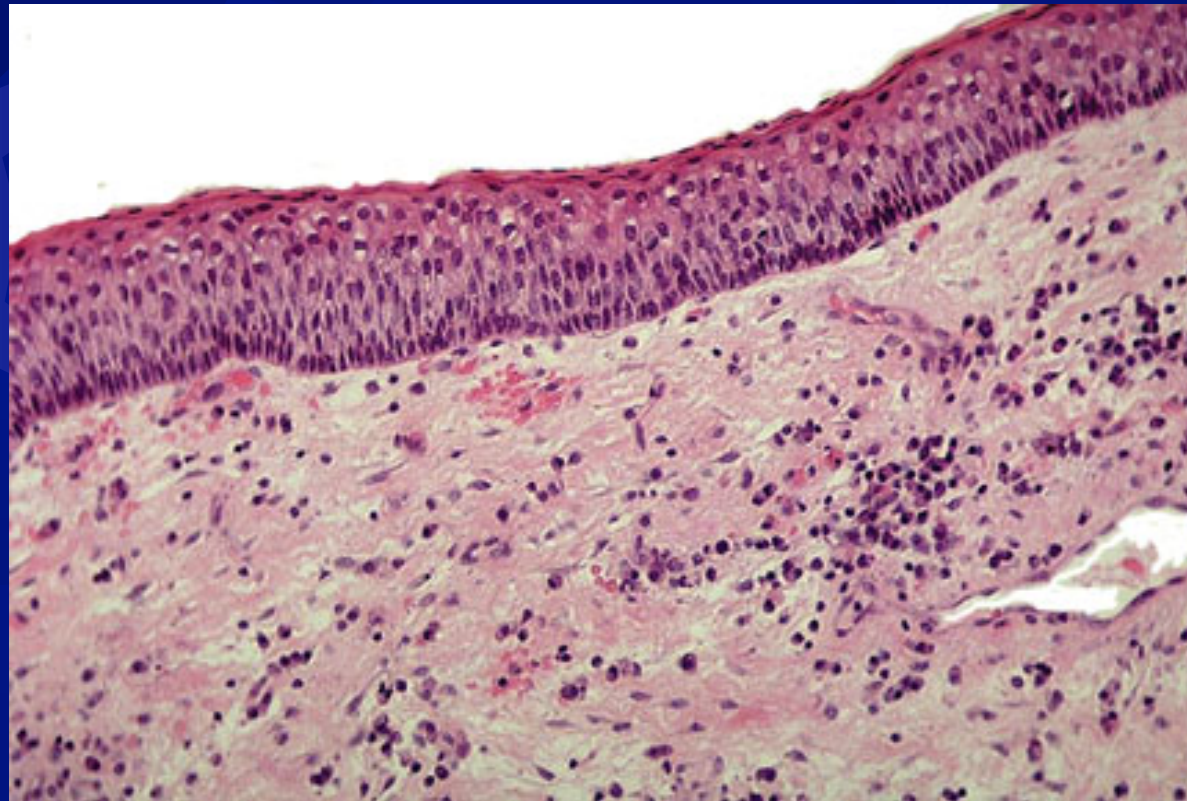


# Odontogenic Keratocyst

## ✴ Histology

- ✴ Thin epithelial lining with underlying connective tissue (collagen and epithelial nests)
- ✴ Secondary inflammation may mask features
- ✴ High frequency of recurrence (up to 62%)
- ✴ Complete removal difficult and satellite cysts can be left behind

# Odontogenic Keratocyst





# Treatment of OKC

- ✱ Depends on extent of lesion
- ✱ Small – simple enucleation, complete removal of cyst wall
- ✱ Larger – enucleation with/without peripheral ostectomy
- ✱ Bataineh, et al, promote complete resection with 1 cm bony margins (if extension through cortex, overlying soft tissues excised)
- ✱ Long term follow-up required (5-10 years)





# Glandular Odontogenic Cyst

- ✱ More recently described (45 cases)
- ✱ Gardner, 1988
- ✱ Mandible (87%), usually anterior
- ✱ Very slow progressive growth (CC: swelling, pain [40%])
- ✱ Radiographic findings
  - ✱ Unilocular or multilocular radiolucency

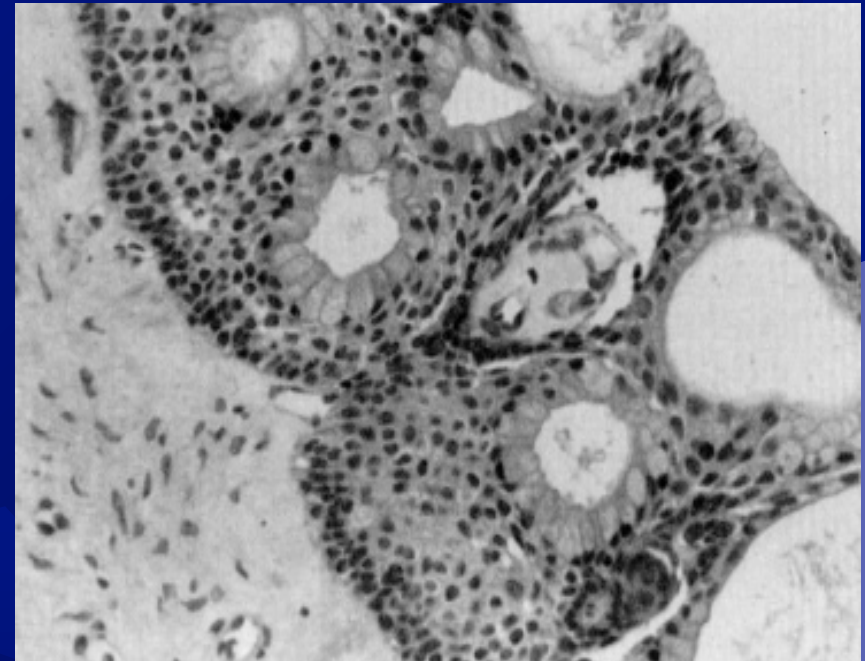
# Glandular Odontogenic Cyst



# Glandular Odontogenic Cyst

## ☀ Histology

- Stratified epithelium
- Cuboidal, ciliated surface lining cells
- Polycystic with secretory and epithelial elements



# Treatment of GOC

- ✱ Considerable recurrence potential
- ✱ 25% after enucleation or curettage
- ✱ Marginal resection suggested for larger lesions or involvement of posterior maxilla
- ✱ Warrants close follow-up



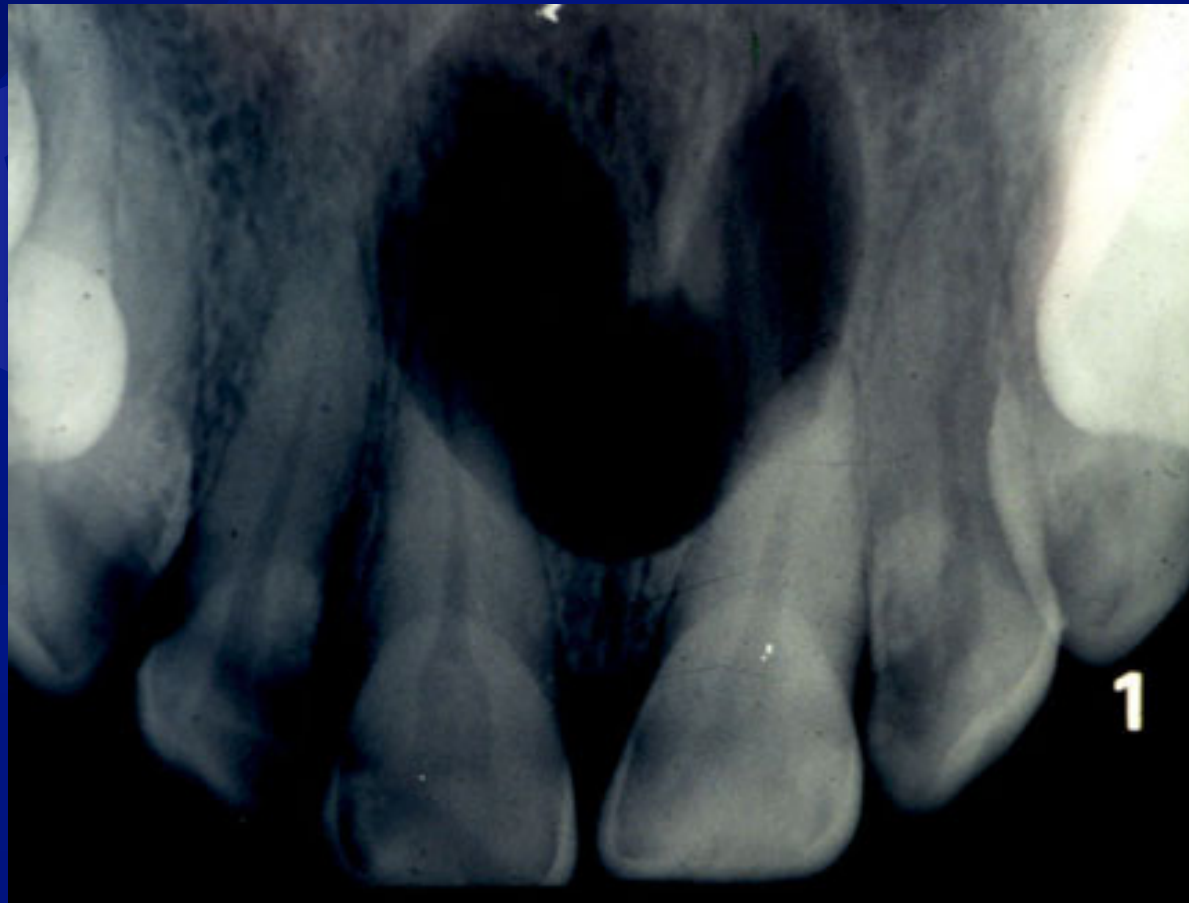
# Nonodontogenic Cysts

- ✱ Incisive Canal Cyst
- ✱ Stafne Bone Cyst
- ✱ Traumatic Bone Cyst
- ✱ Surgical Ciliated Cyst (of Maxilla)

# Incisive Canal Cyst

- ✱ Derived from epithelial remnants of the nasopalatine duct (incisive canal)
- ✱ 4<sup>th</sup> to 6<sup>th</sup> decades
- ✱ Palatal swelling common, asymptomatic
- ✱ Radiographic findings
  - ✱ Well-delineated oval radiolucency between maxillary incisors, root resorption occasional
- ✱ Histology
  - ✱ Cyst lined by stratified squamous or respiratory epithelium or both

# Incisive Canal Cyst



# Incisive Canal Cyst

- ✱ Treatment consists of surgical enucleation or periodic radiographs
- ✱ Progressive enlargement requires surgical intervention



# Stafne Bone Cyst

- ✱ Submandibular salivary gland depression
- ✱ Incidental finding, not a true cyst
- ✱ Radiographs – small, circular, corticated radiolucency below mandibular canal
- ✱ Histology – normal salivary tissue
- ✱ Treatment – routine follow up

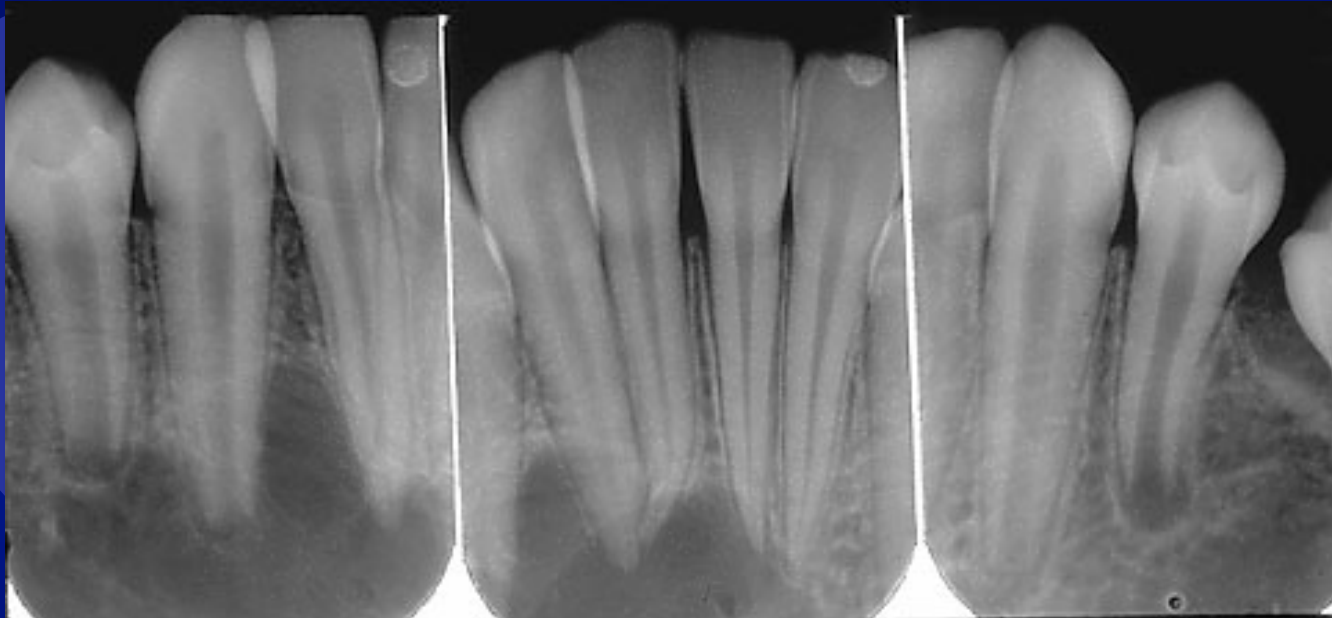
# Stafne Bone Cyst



# Traumatic Bone Cyst

- ✱ Empty or fluid filled cavity associated with jaw trauma (50%)
- ✱ Radiographic findings
  - ✱ Radiolucency, most commonly in body or anterior portion of mandible
- ✱ Histology – thin membrane of fibrous granulation
- ✱ Treatment – exploratory surgery may expedite healing

# Traumatic Bone Cyst

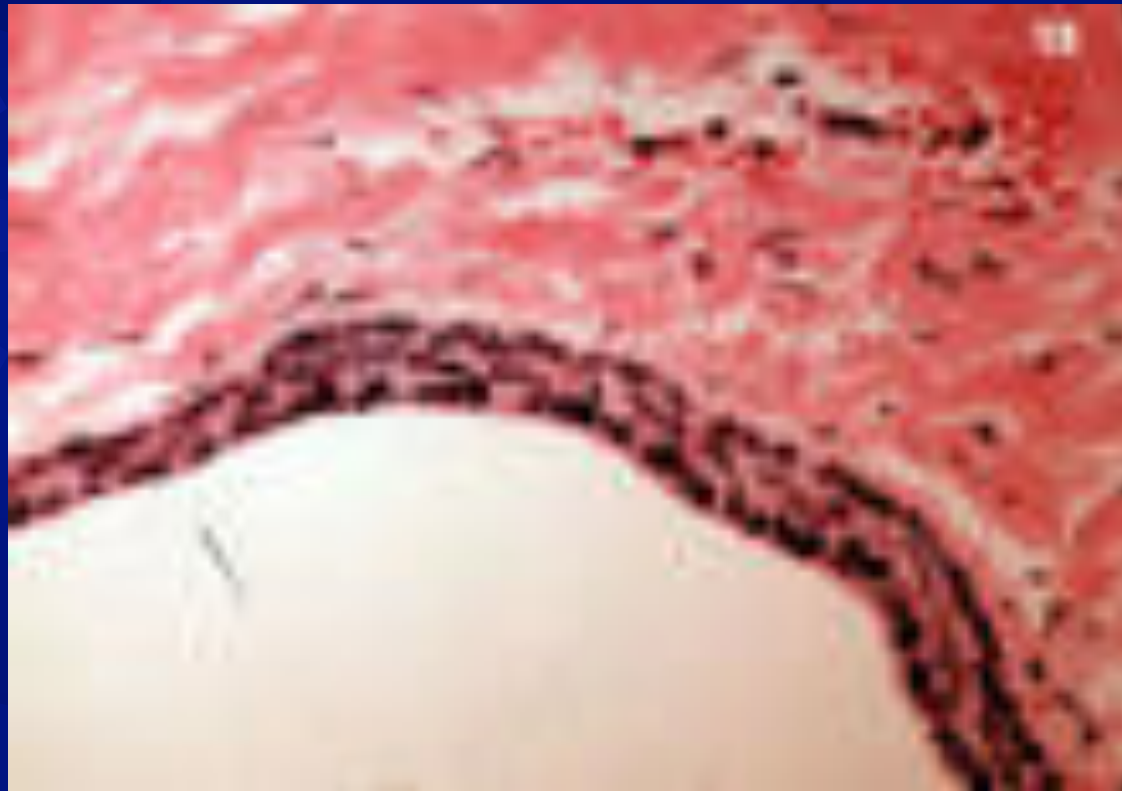




# Surgical Ciliated Cyst

- ✱ May occur following Caldwell-Luc
- ✱ Trapped fragments of sinus epithelium that undergo benign proliferation
- ✱ Radiographic findings
  - ✱ Unilocular radiolucency in maxilla
- ✱ Histology
  - ✱ Lining of pseudostratified columnar ciliated
- ✱ Treatment - enucleation

# Surgical Ciliated Cyst



# Odontogenic Tumors

- ✱ Ameloblastoma
- ✱ Calcifying Epithelial Odontogenic Tumor
- ✱ Adenomatoid Odontogenic Tumor
- ✱ Squamous Odontogenic Tumor
- ✱ Calcifying Odontogenic Cyst

# Ameloblastoma

- ✱ Most common odontogenic tumor
- ✱ Benign, but locally invasive
- ✱ Clinically and histologically similar to BCCa
- ✱ 4<sup>th</sup> and 5<sup>th</sup> decades
- ✱ Occasionally arise from dentigerous cysts
- ✱ Subtypes – multicystic (86%), unicystic (13%), and peripheral (extraosseous – 1%)

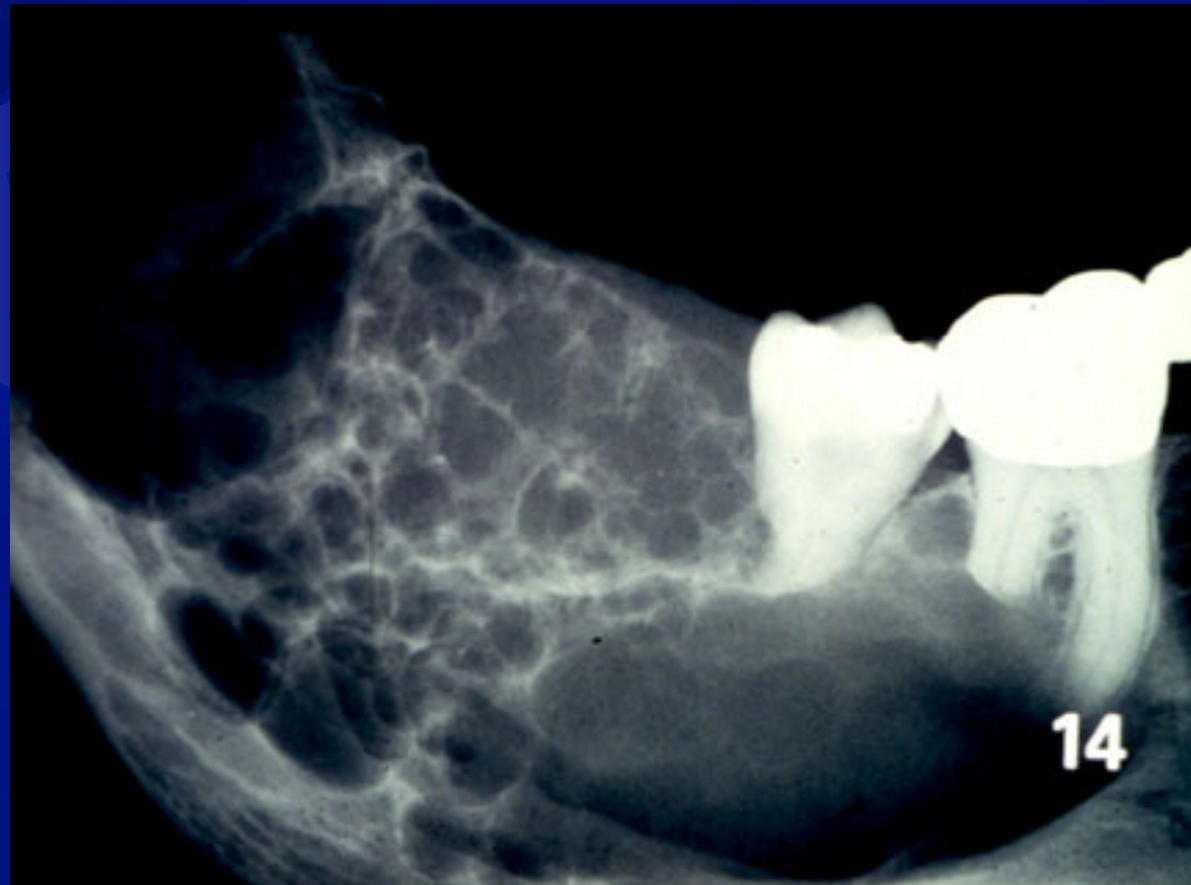


# Ameloblastoma

## ✦ Radiographic findings

- ✦ Classic – multilocular radiolucency of posterior mandible
- ✦ Well-circumscribed, soap-bubble
- ✦ Unilocular – often confused with odontogenic cysts
- ✦ Root resorption – associated with malignancy

# Ameloblastoma



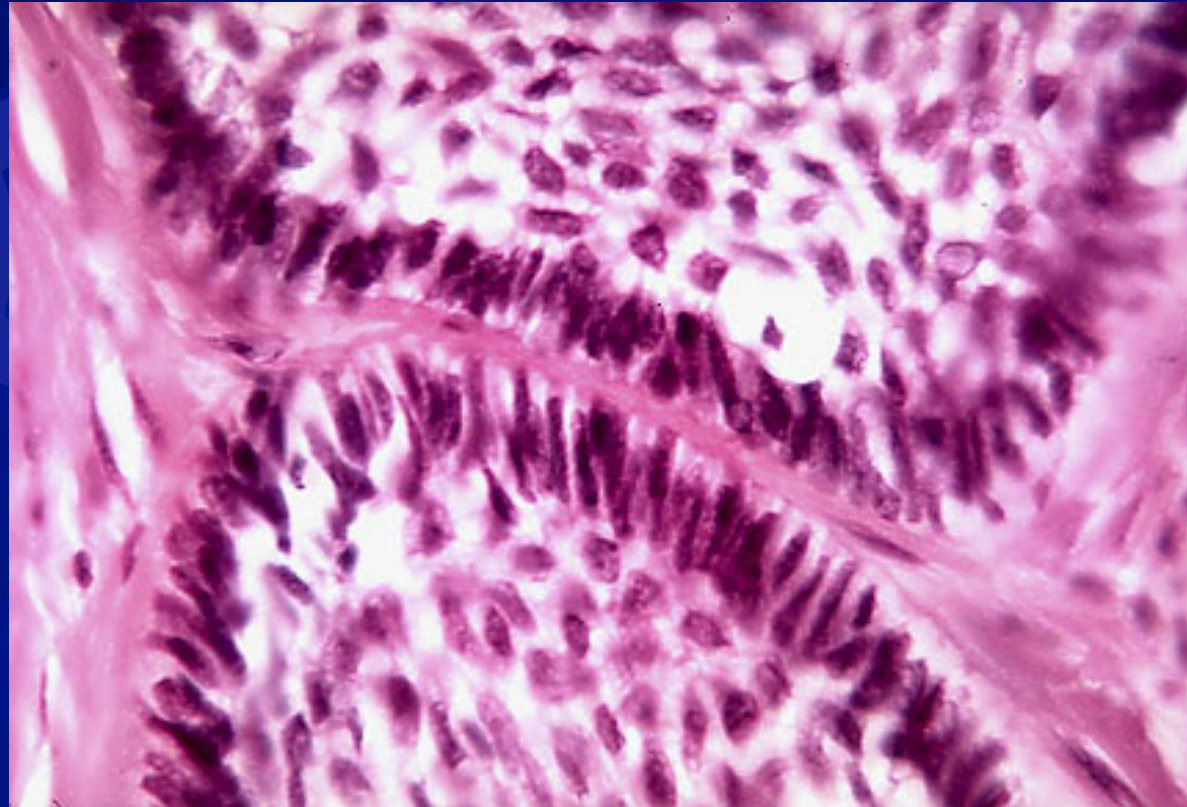
# Ameloblastoma

## ★ Histology

- ★ Two patterns – plexiform and follicular (no bearing on prognosis)
- ★ Classic – sheets and islands of tumor cells, outer rim of ameloblasts is polarized away from basement membrane
- ★ Center looks like stellate reticulum
- ★ Squamous differentiation (1%) – Diagnosed as ameloblastic carcinoma



# Ameloblastoma





# Treatment of Ameloblastoma

- ★ According to growth characteristics and type

- ★ Unicystic

- Complete removal
- Peripheral osteotomies if extension through cyst wall

- ★ Classic infiltrative (aggressive)

- Mandibular – adequate normal bone around margins of resection
- Maxillary – more aggressive surgery, 1.5 cm margins

- ★ Ameloblastic carcinoma

- Radical surgical resection (like SCCa)
- Neck dissection for LAN



# Calcifying Epithelial Odontogenic Tumor

- ✱ a.k.a. Pindborg tumor
- ✱ Aggressive tumor of epithelial derivation
- ✱ Impacted tooth, mandible body/ramus
- ✱ Chief sign – cortical expansion
- ✱ Pain not normally a complaint

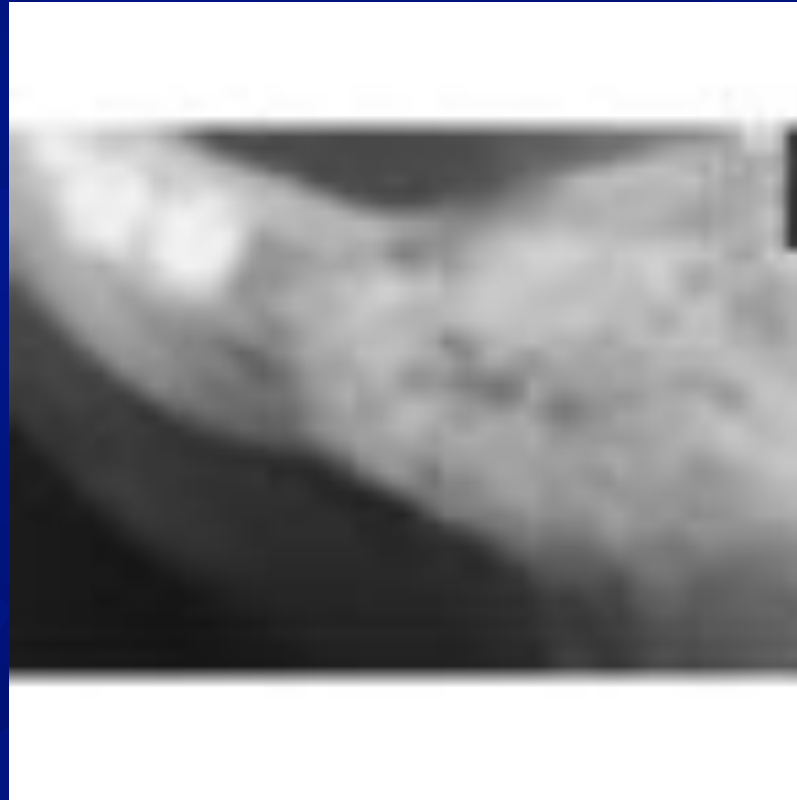


# Calcifying Epithelial Odontogenic Tumor

## ★ Radiographic findings

- ★ Expanded cortices in all dimensions
- ★ Radiolucent; poorly defined, noncorticated borders
- ★ Unilocular, multilocular, or “moth-eaten”
- ★ “Driven-snow” appearance from multiple radiopaque foci
- ★ Root divergence/resorption; impacted tooth

# Calcifying Epithelial Odontogenic Tumor





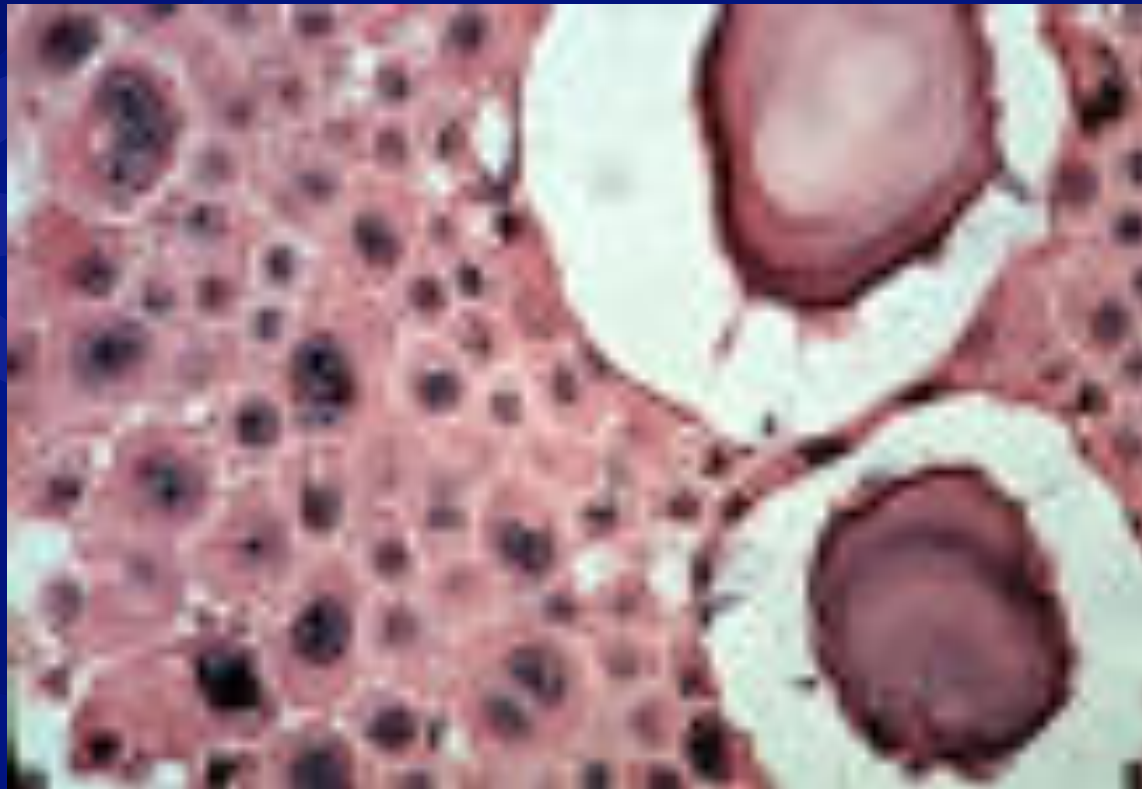


# Calcifying Epithelial Odontogenic Tumor

## ★ Histology

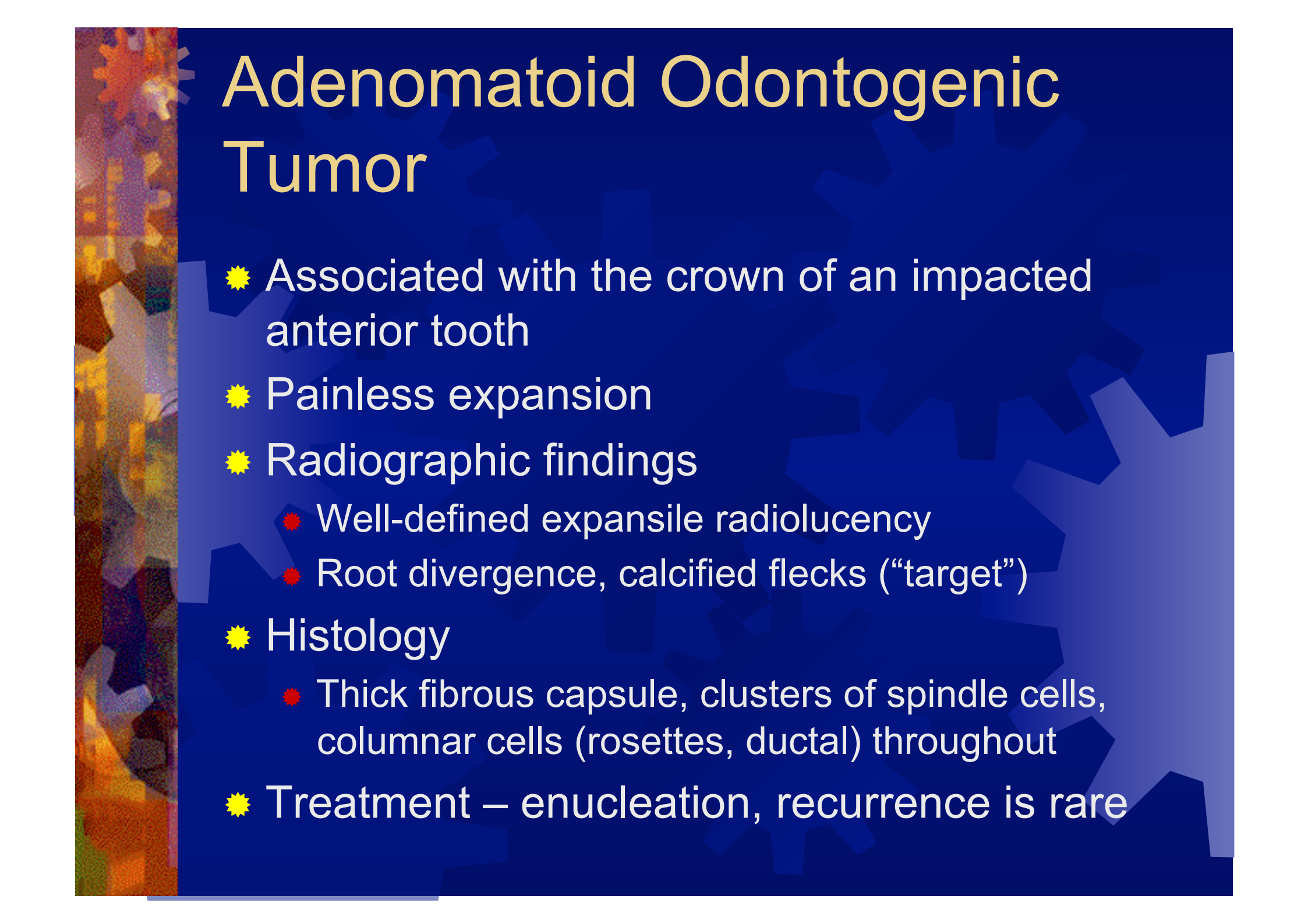
- ★ Islands of eosinophilic epithelial cells
- ★ Cells infiltrate bony trabeculae
- ★ Nuclear hyperchromatism and pleomorphism
- ★ Psammoma-like calcifications (Liesegang rings)

# Calcifying Epithelial Odontogenic Tumor



# Treatment of CEOT

- ✱ Behaves like ameloblastoma
- ✱ Smaller recurrence rates
- ✱ En bloc resection, hemimandibulectomy partial maxillectomy suggested

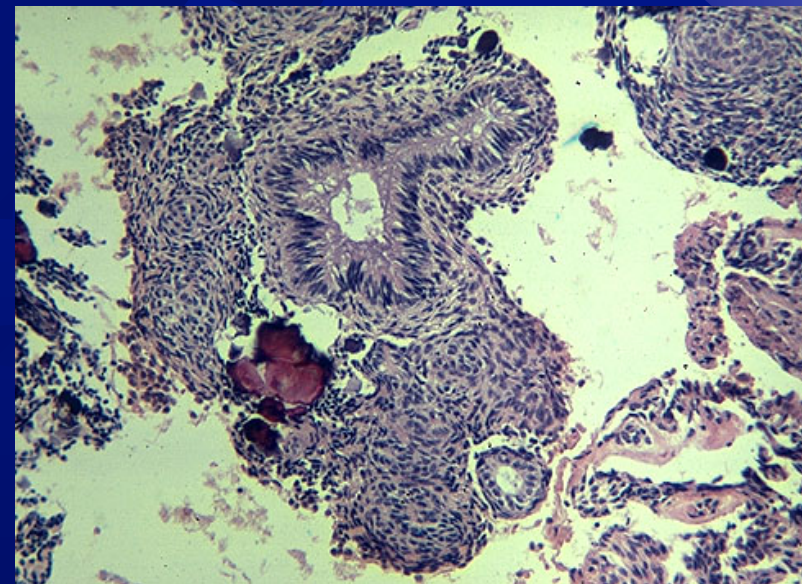


# Adenomatoid Odontogenic Tumor

- ✱ Associated with the crown of an impacted anterior tooth
- ✱ Painless expansion
- ✱ Radiographic findings
  - ✱ Well-defined expansile radiolucency
  - ✱ Root divergence, calcified flecks (“target”)
- ✱ Histology
  - ✱ Thick fibrous capsule, clusters of spindle cells, columnar cells (rosettes, ductal) throughout
- ✱ Treatment – enucleation, recurrence is rare



# Adenomatoid Odontogenic Tumor



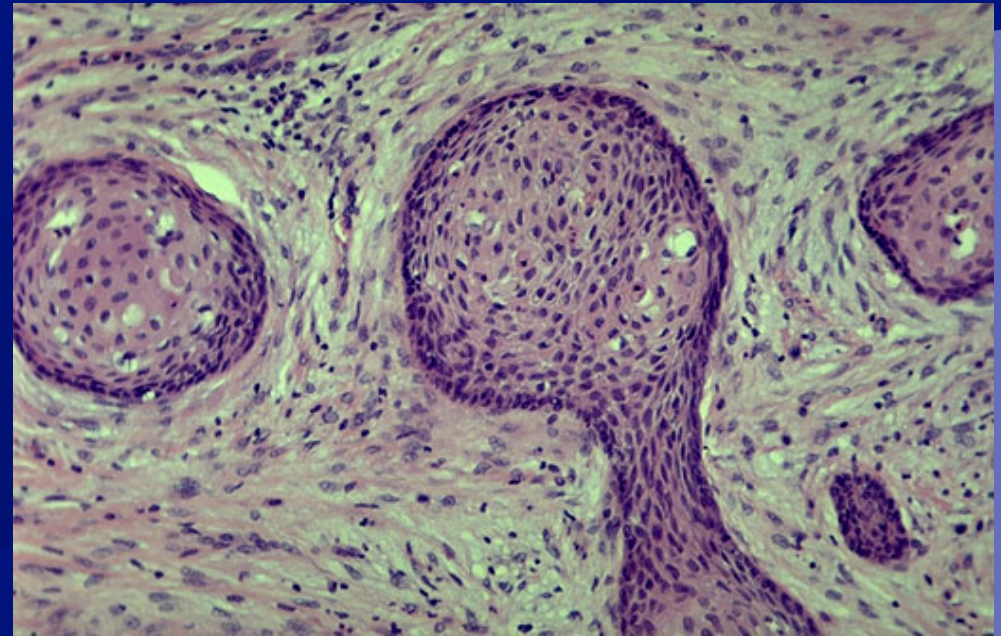


# Squamous Odontogenic Tumor

- ✱ Hamartomatous proliferation
- ✱ Maxillary incisor-canine and mandibular molar
- ✱ Tooth mobility common complaint
- ✱ Radiology – triangular, localized radiolucency between contiguous teeth
- ✱ Histology – oval nest of squamous epithelium in mature collagen stroma
- ✱ Treatment – extraction of involved tooth and thorough curettage; maxillary – more extensive resection; recurrences – treat with aggressive resection



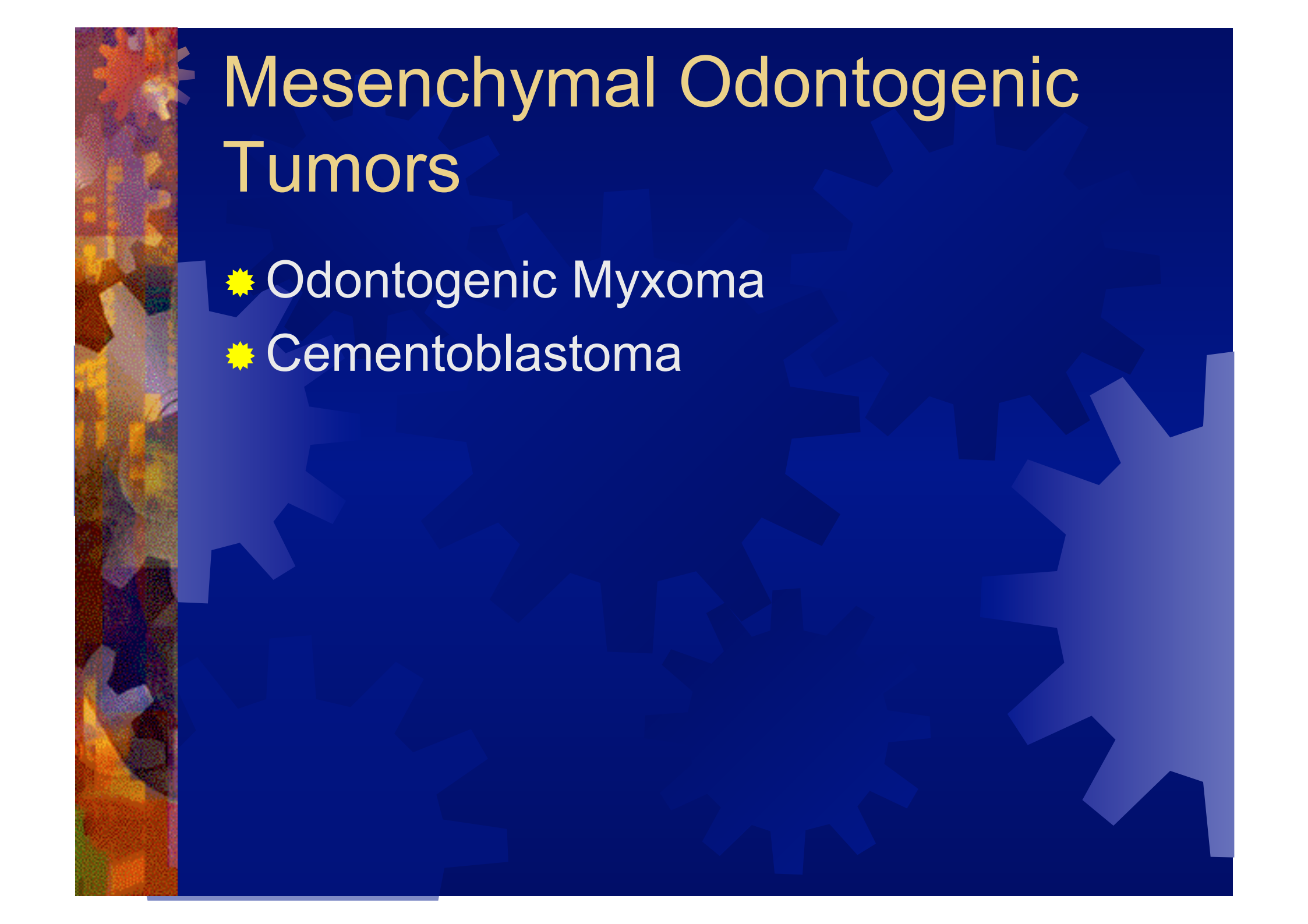
# Squamous Odontogenic Tumor



# Calcifying Odontogenic Cyst

- ✱ Tumor-like cyst of mandibular premolar region
- ✱ ¼ are peripheral – gingival swelling
- ✱ Osseous lesions – expansion, vital teeth
- ✱ Radiographic findings
  - ✱ Radiolucency with progressive calcification
  - ✱ Target lesion (lucent halo); root divergence
- ✱ Histology
  - ✱ Stratified squamous epithelial lining
  - ✱ Polarized basal layer, lumen contains ghost cells
- ✱ Treatment – enucleation with curettage; rarely recur





# Mesenchymal Odontogenic Tumors

- ✦ Odontogenic Myxoma
- ✦ Cementoblastoma

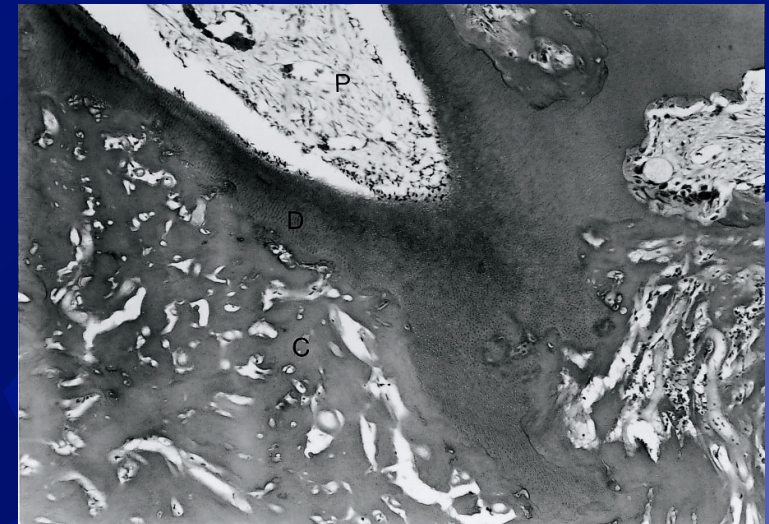
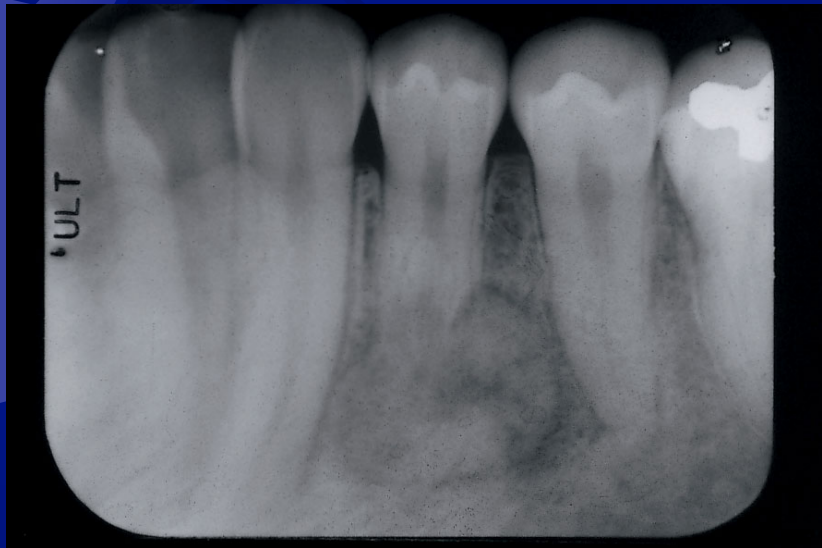
# Odontogenic Myxoma

- ✱ Originates from dental papilla or follicular mesenchyme
- ✱ Slow growing, aggressively invasive
- ✱ Multilocular, expansile; impacted teeth?
- ✱ Radiology – radiolucency with septae
- ✱ Histology – spindle/stellate fibroblasts with basophilic ground substance
- ✱ Treatment – en bloc resection, curettage may be attempted if fibrotic

# Cementoblastoma

- ☀ True neoplasm of cementoblasts
- ☀ First mandibular molars
- ☀ Cortex expanded without pain
- ☀ Involved tooth ankylosed, percussion
- ☀ Radiology – apical mass; lucent or solid, radiolucent halo with dense lesions
- ☀ Histology – radially oriented trabeculae from cementum, rim of osteoblasts
- ☀ Treatment – complete excision and tooth sacrifice

# Cementoblastoma





# Mixed Odontogenic Tumors

- ✱ Ameloblastic fibroma, ameloblastic fibrodentinoma, ameloblastic fibro-odontoma, odontoma
- ✱ Both epithelial and mesenchymal cells
- ✱ Mimic differentiation of developing tooth
- ✱ Treatment – enucleation, thorough curettage with extraction of impacted tooth
- ✱ Ameloblastic fibrosarcomas – malignant, treat with aggressive en bloc resection

# Related Jaw Lesions

## ★ Giant Cell Lesions

- Central giant cell granuloma
- Brown tumor
- Aneurysmal bone cyst

## ★ Fibroosseous lesions

- Fibrous dysplasia
- Ossifying fibroma

## ★ Condensing Osteitis



# Central Giant Cell Granuloma

- ✱ Neoplastic-like reactive proliferation
- ✱ Common in children and young adults
- ✱ Females > males (hormonal?)
- ✱ Mandible > maxilla
- ✱ Expansile lesions – root resorption
- ✱ Slow-growing – asymptomatic swelling
- ✱ Rapid-growing – pain, loose dentition (high rate of recurrence)



# Central Giant Cell Granuloma

- ✦ Radiographic findings

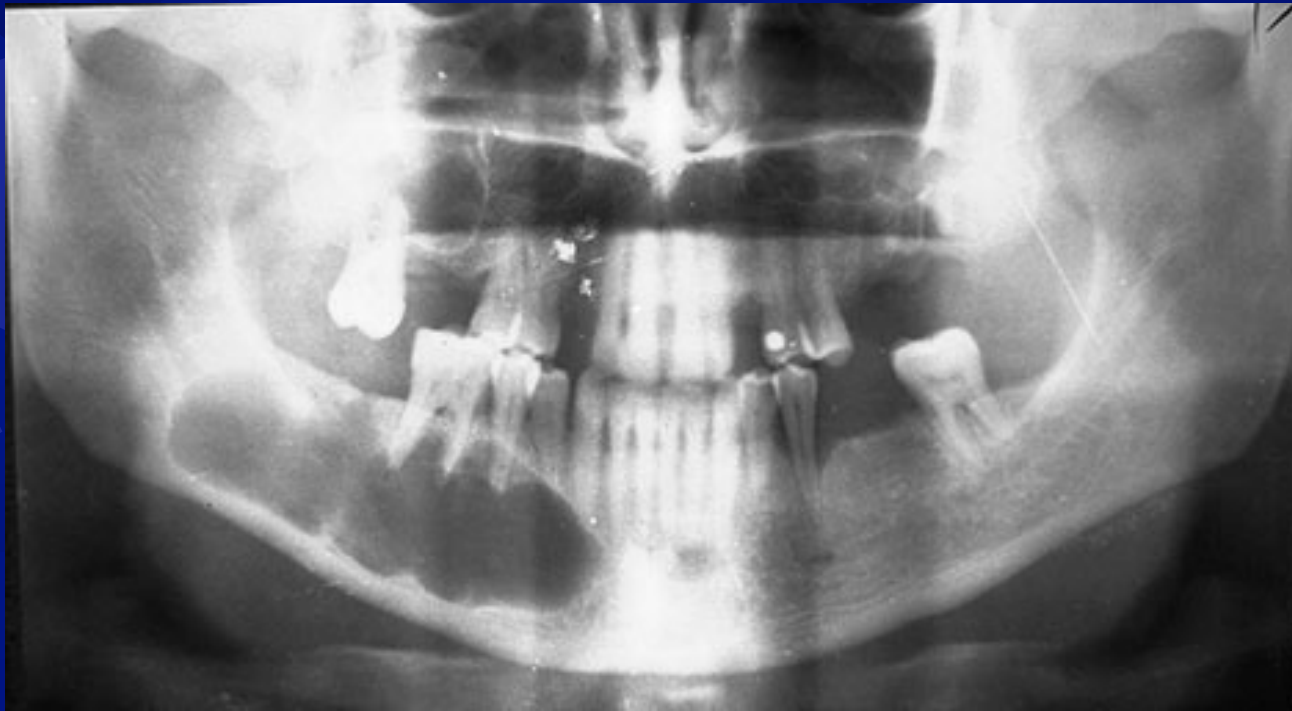
- ✦ Unilocular, multilocular radiolucencies
- ✦ Well-defined or irregular borders

- ✦ Histology

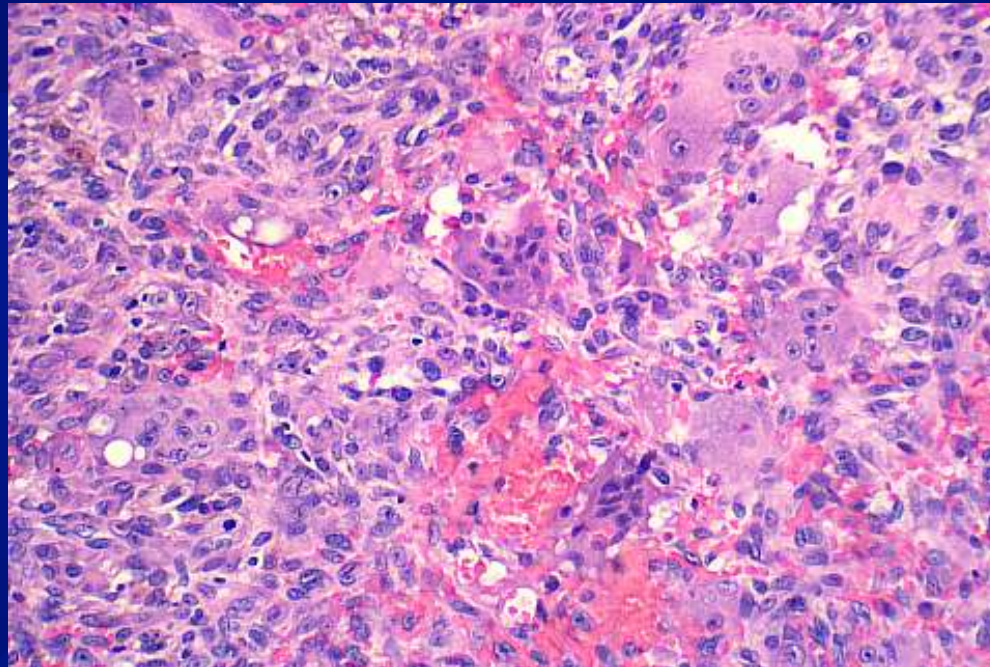
- ✦ Multinucleated giant cells, dispersed throughout a fibrovascular stroma



# Central Giant Cell Granuloma



# Central Giant Cell Granuloma





# Central Giant Cell Granuloma

## ☀ Treatment

- ☀ Curettage, segmental resection
- ☀ Radiation – out of favor (risk of sarcoma)
- ☀ Intralesional steroids – younger patients, very large lesions
- ☀ Individualized treatment depending on characteristics and location of tumor



# Brown Tumor

- ✱ Local manifestation of hyperparathyroid
- ✱ Histologically identical to CGCG
- ✱ Serum calcium and phosphorus
- ✱ More likely in older patients



# Aneurysmal Bone Cyst

- ✱ Large vascular sinusoids (no bruit)
- ✱ Not a true cyst; aggressive, reactive
- ✱ Great potential for growth, deformity
- ✱ Multilocular radiolucency with cortical expansion
- ✱ Mandible body
- ✱ Simple enucleation, rare recurrence

# Fibrous Dysplasia

- ✦ Monostotic vs. polystotic

- ✦ Monostotic

  - ✦ More common in jaws and cranium

- ✦ Polystotic

  - ✦ McCune-Albright's syndrome

  - ✦ Cutaneous pigmentation, hyper-functioning endocrine glands, precocious puberty

# Fibrous Dysplasia

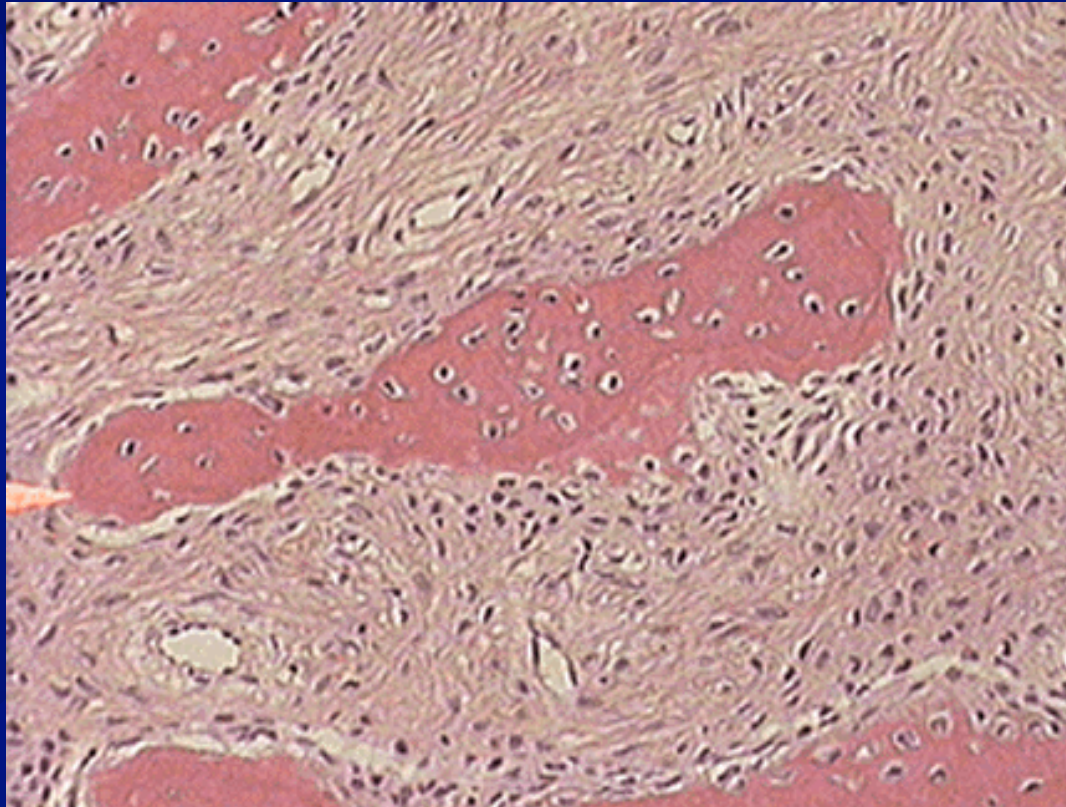
- ✱ Painless expansile dysplastic process of osteoprogenitor connective tissue
- ✱ Maxilla most common
- ✱ Does not typically cross midline (one bone)
- ✱ Antrum obliterated, orbital floor involvement (globe displacement)
- ✱ Radiology – ground-glass appearance

# Fibrous Dysplasia





# Fibrous Dysplasia



# Fibrous Dysplasia

- ✱ Histology – irregular osseous trabeculae in hypercellular fibrous stroma
- ✱ Treatment
  - ✱ Deferred, if possible until skeletal maturity
  - ✱ Quarterly clinical and radiographic f/u
  - ✱ If quiescent – contour excision (cosmesis or function)
  - ✱ Accelerated growth or disabling functional impairment - surgical intervention (en bloc resection, reconstruction)

# Ossifying Fibroma

- ✱ True neoplasm of medullary jaws
- ✱ Elements of periodontal ligament
- ✱ Younger patients, premolar – mandible
- ✱ Frequently grow to expand jaw bone
- ✱ Radiology
  - ✱ radiolucent lesion early, well-demarcated
  - ✱ Progressive calcification (radiopaque – 6 yrs)



# Ossifying Fibroma







# Ossifying Fibroma

- ✱ Histologically similar to fibrous dysplasia
- ✱ Treatment
  - ✱ Surgical excision – shells out
  - ✱ Recurrence is uncommon

# Condensing Osteitis

- ✱ 4% to 8% of population
- ✱ Focal areas of radiodense sclerotic bone
- ✱ Mandible, apices of first molar
- ✱ Reactive bony sclerosis to pulp inflammation
- ✱ Irregular, radiopaque
- ✱ Stable, no treatment required

# Condensing Osteitis



The background of the slide is a dark blue field filled with several large, semi-transparent gears of varying sizes and shades of blue. On the far left, there is a vertical strip with a colorful, abstract, and pixelated pattern in shades of orange, yellow, and brown. The word "Conclusion" is written in a yellow, sans-serif font in the upper left area of the slide.

# Conclusion



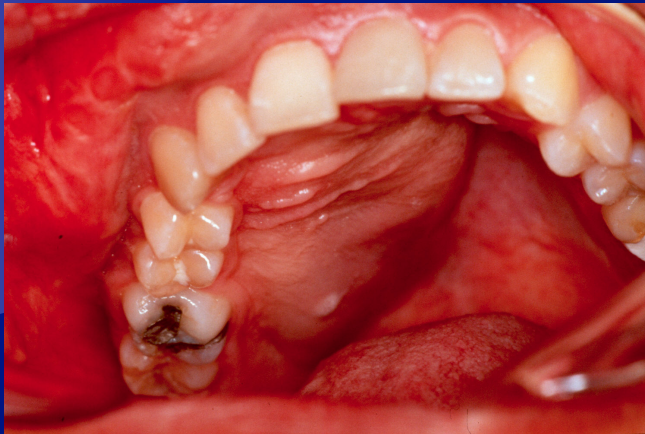
# Case Presentation

- ★ 20 year-old hispanic female with several month history of lesion in right maxilla, treated initially by oral surgeon with multiple curettage.
- ★ Has experienced recent onset of rapid expansion, after pregnancy, with complaints of loose dentition and pain.

# Physical Examination



# Physical Examination



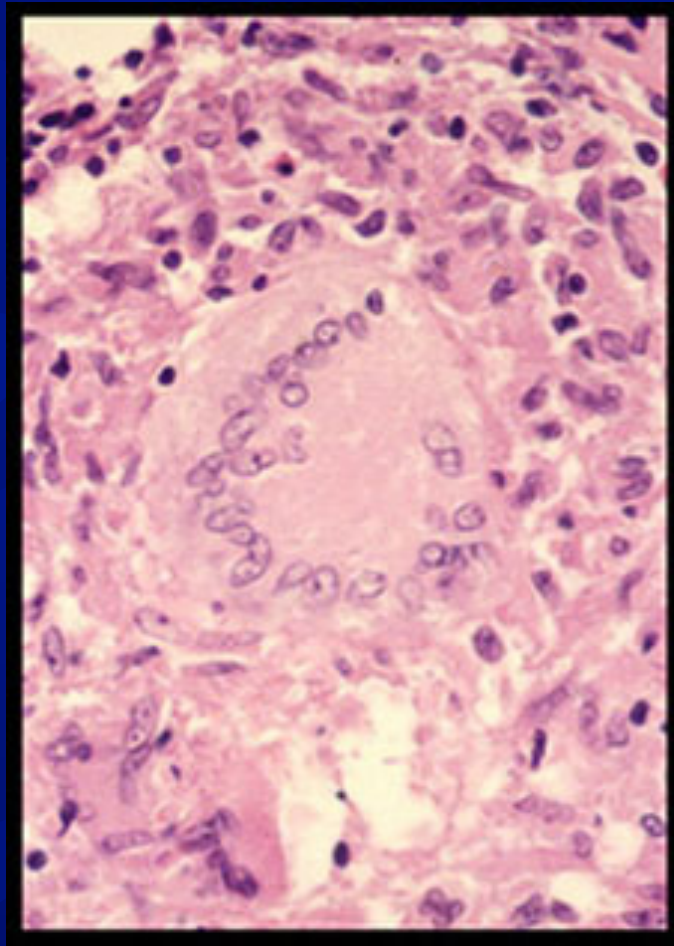


# Radiographs

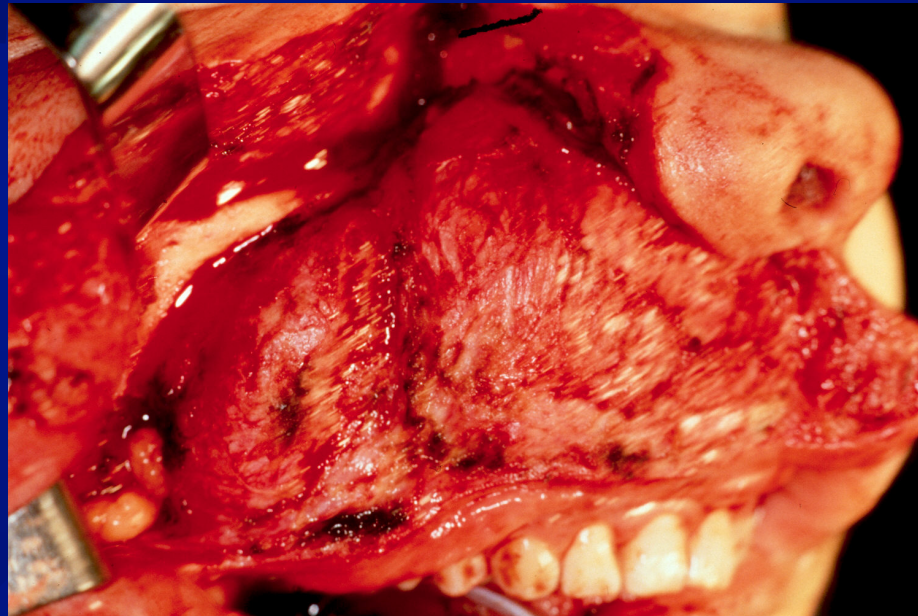
- ✱ Plain films – facial series
- ✱ Computerized Tomography of facial series



# Pathology



# Treatment



# Treatment

