Radiographic features of cysts and benign tumors of the jaws

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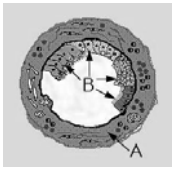
Cyst

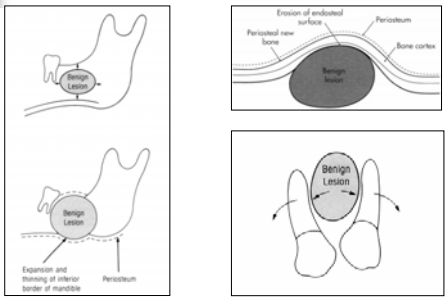
A Cyst is a benign pathologic cavity filled with fluid, lined by epithelium, and surrounded by a connective tissue wall



A = connective tissue wall

B = epithelium

Effects on adjacent structures



Adapted from: White and Pharoah: Oral Radiology-principles and interpretation, page 380

Types

- Odontogenic
- Non-Odontogenic
- Pseudocysts

Odontogenic Cysts

- Radicular cyst
- Residual cyst
- Dentigerous cyst
- Paradental cysts (Buccal bifurcation cysts)
- Odontogenic Keratocyst (OKC)
  - *Basal cell nevus-bifid rib-OKC syndrome*
- Lateral periodontal cyst
- Calcifying odontogenic cyst

Non-Odontogenic cysts

- Nasopalatine cyst
- Nasolabial cyst
- Dermoid cyst
- Cysts formerly known as "developmental cysts"

Pseudocysts

- Simple bone cyst (Traumatic bone cyst)
- Aneurysmal Bone Cyst
- Mucous Retention Cyst
- Stafne Bone Cyst (aka Stafne Bone Defect)

Odontogenic Cysts

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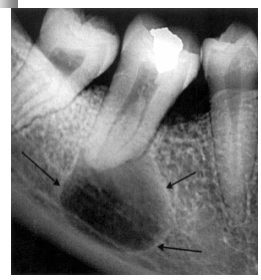
Radicular cyts



- Results from the stimulation of the epithelial cell rests in the PDL by the inflammatory products from the non-vital tooth
- Most common type of cysts in the jaws

Radicular cyts

Radicular cyts

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Residual Cyst

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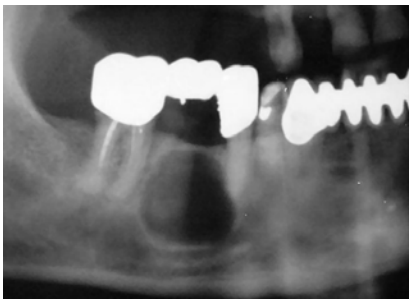
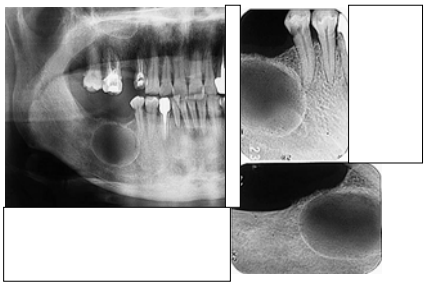
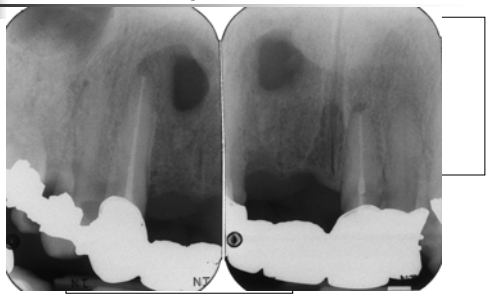


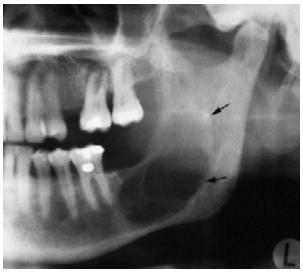
Residual Cyst



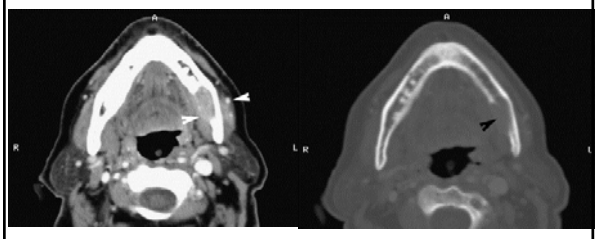
Residual Cyst



Residual cyst with Squamous Cell Carcinoma



Residual cyst with squamous cell carcinoma



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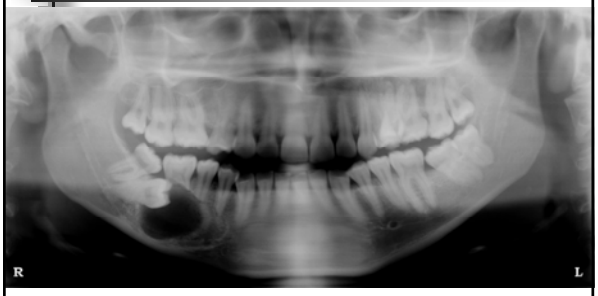
Dentigerous cyst (follicular cyst)

- Develops around the crown of an unerupted permanent or supernumerary tooth
- Second most common type of cyst in the jaws
- Asymptomatic
- Internal aspect is completely lucent except for the crown of the involved tooth
- Either resorbs or displaces the adjacent teeth
- Follicular spaces >5mm (normal 2-3 mm) should be closely followed for potential development of dentigerous cysts.

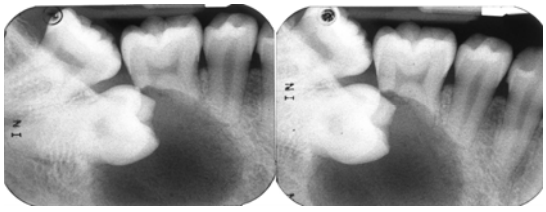
Dentigerous cyst

Dentigerous cyst



Root Resorption

Dentigerous cyst



Root Resorption

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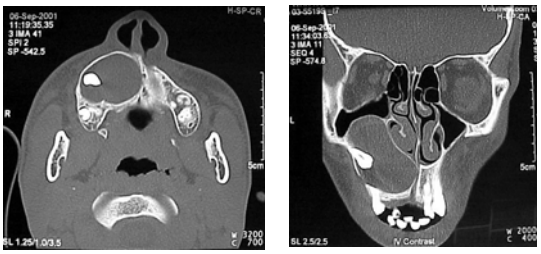
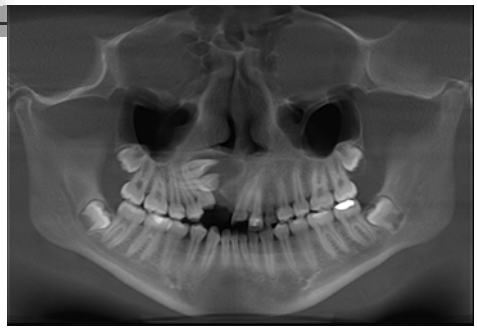
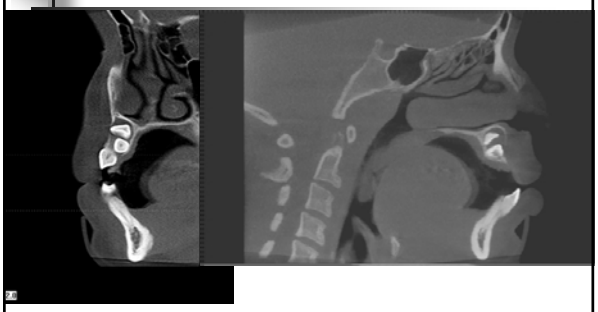


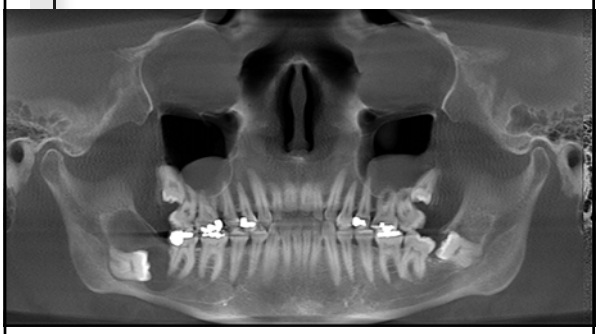
Dentigerous cyst



Dentigerous cyst



Dentigerous cyst 2



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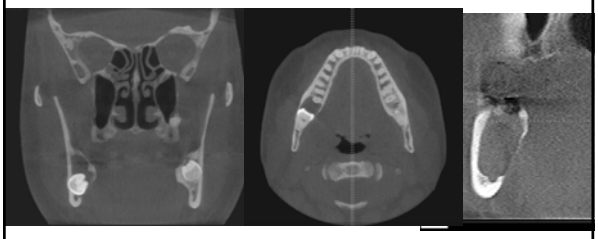

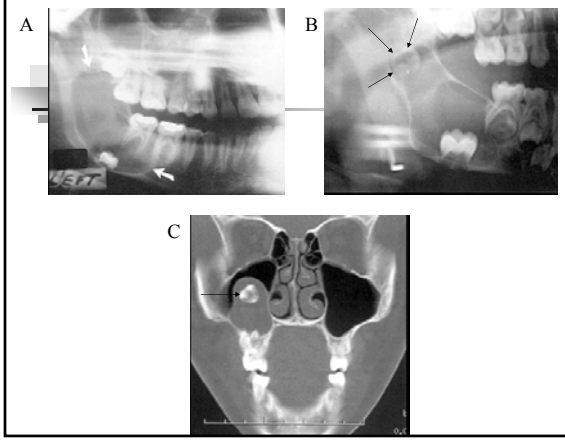

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Odontogenic Cysts

- Paradental cysts (Buccal bifurcation cysts)
  - Most common in the 6- to 11-year-old age group.
  - Usually associated with the mandibular first molar, occasionally the mandibular second molar.
  - The associated tooth has an altered eruption pattern with buccal tilting of the crown.
  - The associated tooth is vital.
  - Deep periodontal pockets on the buccal aspect of the tooth.
  - +/- swelling
  - +/- pain or tenderness
  - +/- infection.

David LA, Sandor GKB, Stoneman DW, The buccal bifurcation cyst: Is non-surgical treatment an option? *JCDA* 64(9) 712-717 1998.

Odontogenic Cysts

- Radiographic Features of the Buccal bifurcation cyst
  - Fine radiopaque concave line as lower limit, producing a U-shaped radiolucent lesion that appears superimposed over the roots.
  - Intact periodontal ligament space and lamina dura.
  - Increased prominence of lingual cusps due to tilting.
  - Apices tilted toward lingual cortex.
  - Intact inferior border of mandible.
  - +/- periosteal reaction on buccal surface.
  - +/- bony expansion, thinning and associated swelling of the buccal cortex.
  - +/- displacement of adjacent unerupted teeth

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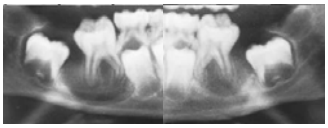
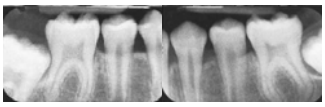
Buccal Bifurcation Cyst





These lesions tend to resolve without intervention

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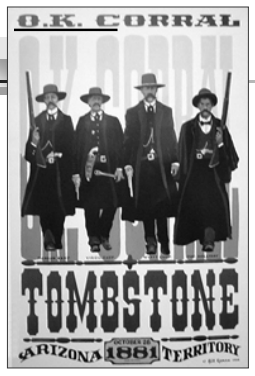
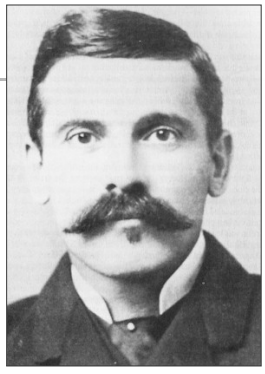




Odontogenic Keratocyst (OKC)

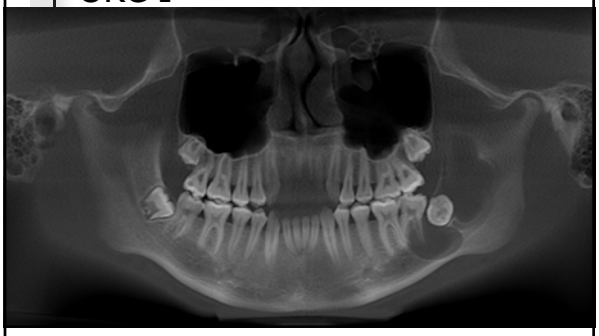
An OKC is a non-inflammatory odontogenic cyst that arises from the dental lamina. The epithelium in OKC appears to have innate growth potential similar to some benign tumors.

Odontogenic Keratocyst (OKC)

- First reported by Philipsen in 1956
- Peak occurence in the 2nd and 3rd decades
- Asymptomatic, swelling on occasion
- Pain from secondary infection
- Aspiration may reveal thick yellow cheesy material (keratin)
- High recurrence rate after surgical enucleation

OKC

OKC I



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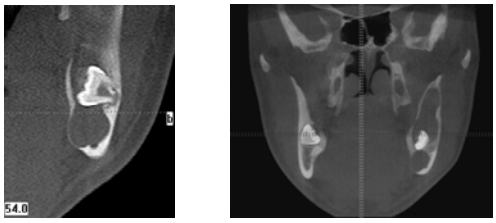

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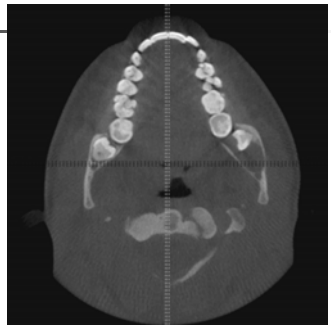
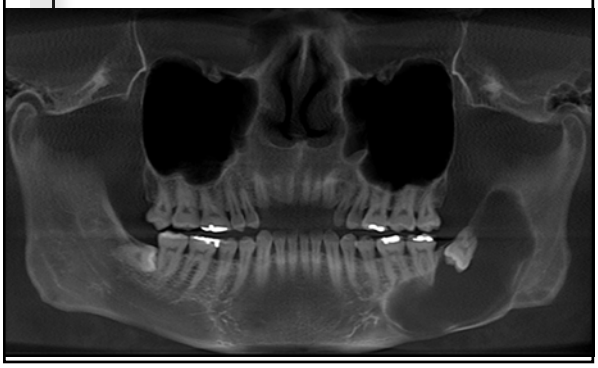
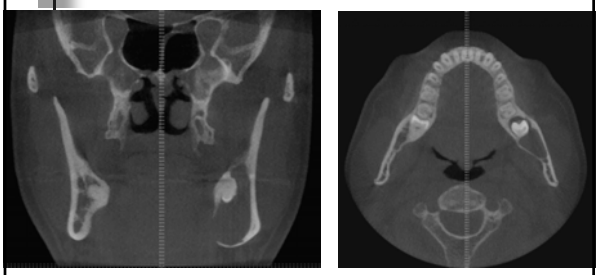


OKC II



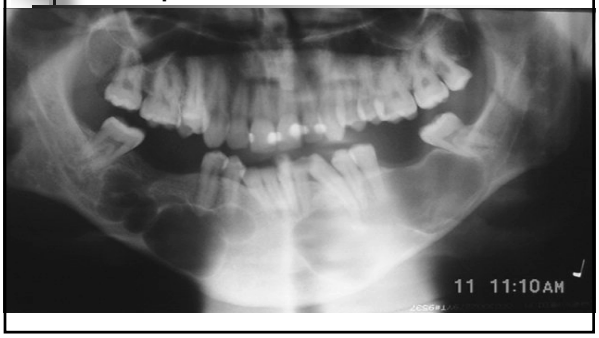
OKC II



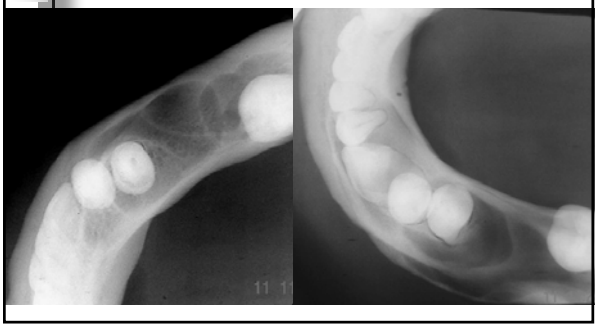
Basal cell nevus-bifid rib syndrome

- Age range 5-30 years
- Abnormalities including multiple nevoid basal cell carcinomas of the skin, skeletal abnormalities (bifid ribs, agenesis and/or synostosis of ribs, kyphoscoliosis, vertebral fusion, temporopatietal bossing, etc.), CNS abnormalities (calcification of falx cerebri), eye abnormalities, **multiple OKCs**

Multiple OKC's



Multiple OKC's



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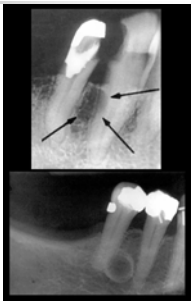
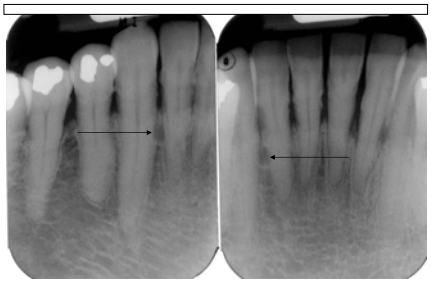
Lateral periodontal cyst

- Usually unicystic, it may also appear as a cluster of small cysts → *botryoid odontogenic cysts*
- Arise from the epithelial rests in the periodontium lateral to the root
- 50-75% develop in the mandible from lateral incisor to the premolar region
- In the maxilla, they appear between lateral incisor and canine



Lateral Periodontal Cyst

Lateral Periodontal Cyst



Lateral periodontal cyst

- Botryoid lateral periodontal cyst
- Origin from dental lamina?

[From Greek botruoeid s : botrus, *bunch of grapes* + -oeid s, *-oid.*]

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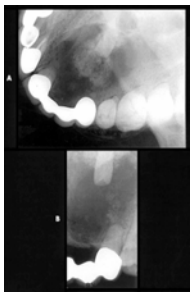
Calcifying odontogenic cyst

- Calcifying odontogenic cysts have a wide age distribution that peaks at 10 to 19 years of age, with a mean age of 36 years
- Clinically, the lesion usually appears as a slow-growing, painless swelling of the jaw. Occasionally the patient complains of pain. In some cases the expanding lesion may destroy the cortical plate, and the cystic mass may become palpable as it extends into the soft tissue.
- Aspiration often yields a viscous, granular, yellow fluid.

Calcifying odontogenic cyst



Calcifying odontogenic cyst

Case courtesy of the KAOMFR

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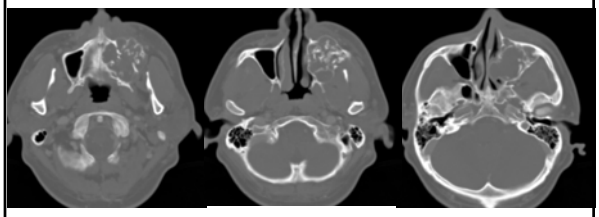

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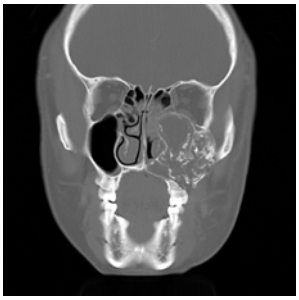

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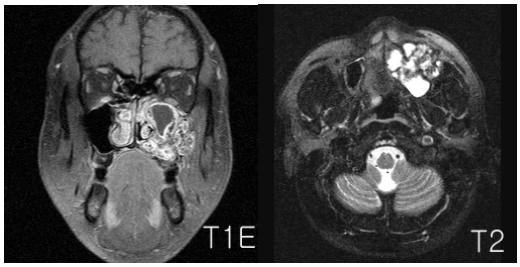
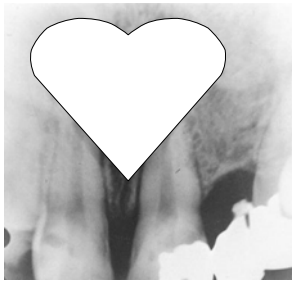


Case courtesy of the KAOMFR

Non-Odontogenic cysts

- Nasopalatine cyst
- Nasolabial cyst
- Dermoid cyst
- Former "developmental cysts"

Nasopalatine Duct Cyst

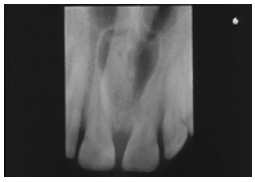


Nasopalatine duct cyst

Courtesy of Department of Oral Surgery, Hornouchi Hospital, Saitama, Japan

Nasopalatine duct cyst

- aka incisive canal cyst
- If it involves the posterior hard palate, termed median palatal cyst
- Anteriorly, may be called median anterior maxillary cyst, depending on the radiographic features



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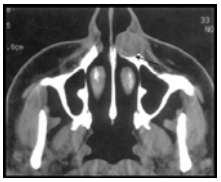
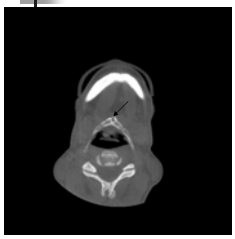
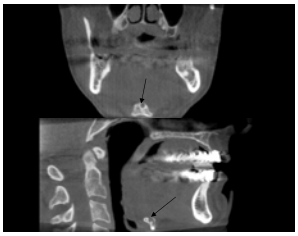
Nasolabial cysts

Source of the epithelium may be embryonic nasolacrimal duct, which initially lies on the bone surface.



Thyroglossal duct cyst





Courtesy of Dr. Sharon Brooks

Pathoses formerly known as "Globulomaxillary" Cysts

- Discredited as a developmental cyst
- Most are found, upon re-examination of histopathological and radiographic evidence, to be radicular or lateral periodontal cysts.

"Globulomaxillary" Cyst

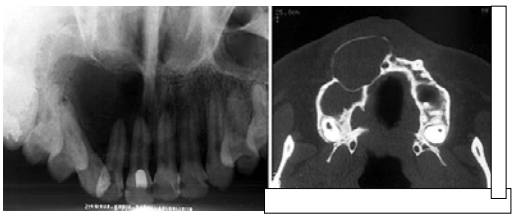


Image courtesy of Asahi University School of Dentistry

Pseudocysts

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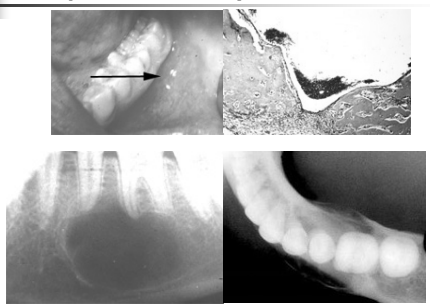
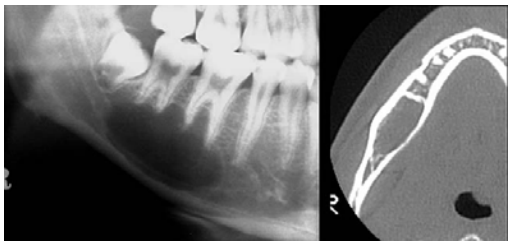
Simple Bone cyst



Simple Bone cyst



Simple bone cyst associated with florid cemento-osseous dysplasia

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- Stafne Bone Cyst (aka Stafne Bone Defect)

Aneurysmal Bone Cyst (ABC)

- The aneurysmal bone cyst (ABC) is an expansible osteolytic pseudocystic lesion that most often affects persons during their second decade of life. Albeit virtually any bone of the skeleton may be affected; ABCs are most frequent in the long tubular bones and spine. There are several reports of the occurrence of this pathological entity in the jaws and other craniofacial bones,

http://www.thejcdp.com/issue022/martins/03martins.htm

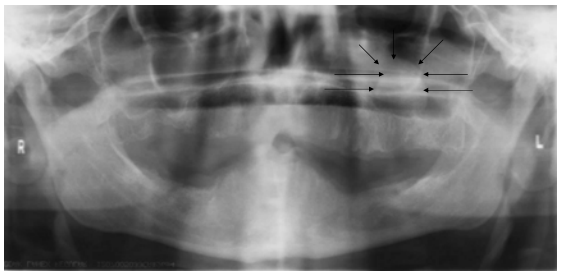
Pseudocysts

- Simple bone cyst (Traumatic bone cyst)
- Aneurysmal bone cyst
- Mucous retention cyst
- Stafne bone cyst (aka Stafne bone defect)

Mucous retention cyst

- Dome shaped opacity in the floor of the maxillary sinus
- Non-epithelial lined
- Fluid filled
- Usually asymptomatic

Mucous retention cyst



Pseudocysts

- Simple bone cyst (Traumatic bone cyst)
- Aneurysmal bone cyst
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- Stafne bone cyst (aka Stafne bone defect)

Mandibular salivary gland depression

Image courtesy of
University of Athens
School of Dentistry

Benign Tumors of the Jaws

Benign Jaw Tumors

- Hyperplasias (tori, exostosis and enostosis)
- Odontogenic tumors
  - Epithelial tumors
    - *Ameloblastoma*
    - *Adenomatoid Odontogenic tumor (AOT)*
    - *CEOT/ Pindborg's tumor*
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Benign Jaw Tumors

- Non-odontogenic tumors
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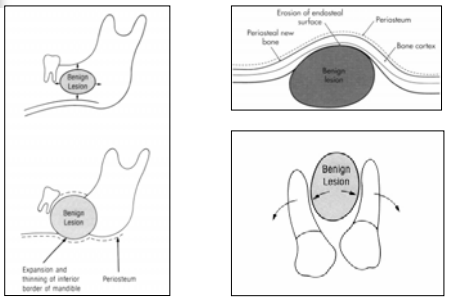
  - *Mixed tumors (neurofibroma, neurofibromatosis)*
  - *Mesodermal tumors (osteoma, Gardner's syndrome, central hemangioma, A-V fistula,osteoblastoma, osteoid osteoma*
  - *Pseudotumors: Central giant cell granuloma*

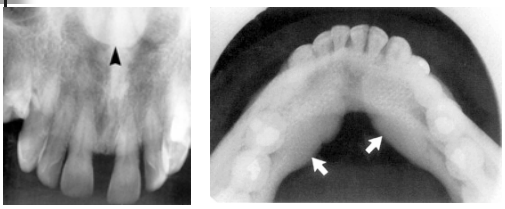
Effects on adjacent structures



Adapted from: White and Pharoah: Oral Radiology-Principles and Interpretation, page 380

Torus palatinus

Palatal and mandibular tori



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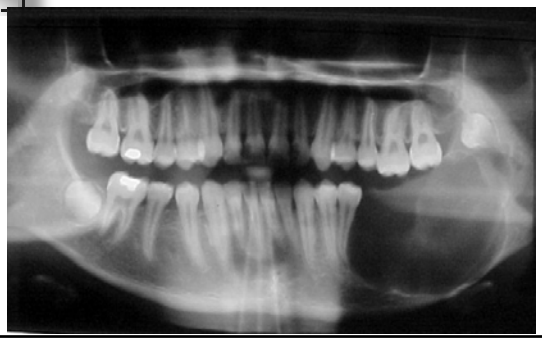
Ameloblastoma



Ameloblastoma

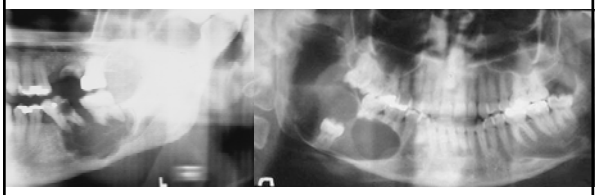
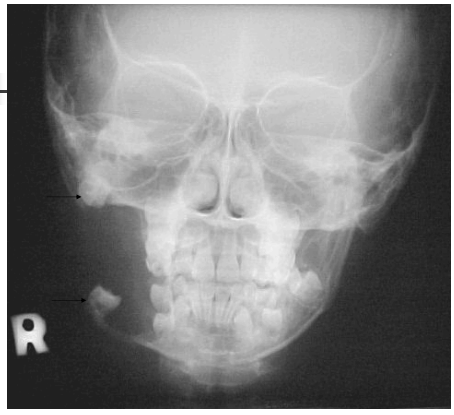


Image courtesy of
University of Athens
School of Dentistry



Ameloblastoma

X, Y and *Z* Axes

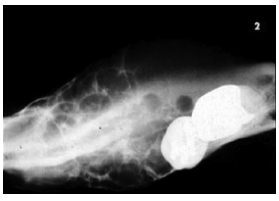


Image courtesy
of Asahi
University School
of Dentistry

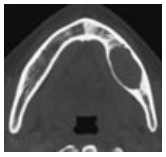
X, Y and *Z* Axes

Image courtesy
of Asahi
University School
of Dentistry

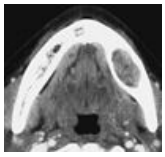
The next step

- R/O vascular lesions/A-V malformations
  - Auscultate for "bruit"
  - Palpate for "thrills"
- Aspirate
- Plan for biopsy
  - Advanced imaging
    - CT/MR

Advanced Imaging



Bone Window

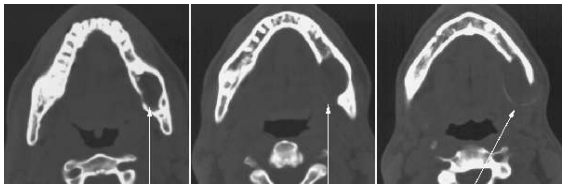


Soft Tissue Window

Case 1

Courtesy Nagaski University

Advanced Imaging

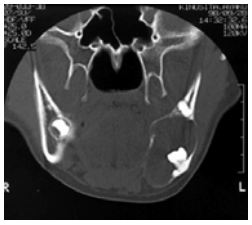


Bone Window

Case 2

Courtesy Nagaski University

Advanced Imaging: Establish your diagnosis

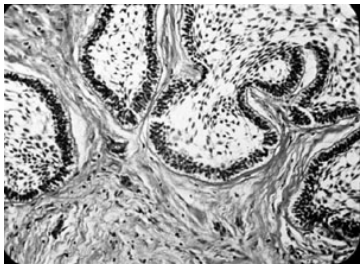


Coronal CT in bone windows

T1W MRI

T2W MRI

Confirm your diagnosis: Ameloblastoma



OKC v. Ameloblastoma

Case courtesy of the KAOMFR

Benign Jaw Tumors

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    - *Ameloblastoma*
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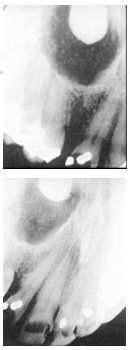
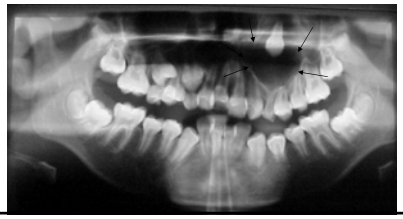
    - *Central odontogenic fibroma*

AOT

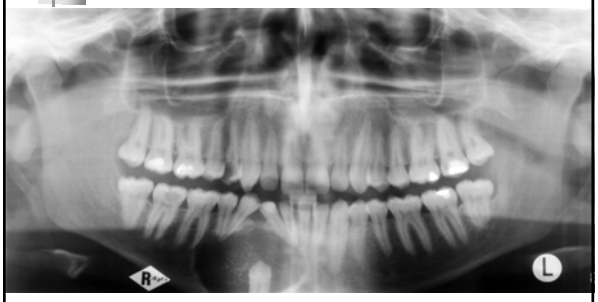
- Adenomatoid Odontogenic Tumor
- Most common location : maxillary canine and premolar region. 2:1 female to male ratio. Average age = ~16 yrs
- Tumors contain specks of calcified material
- Low recurrence rate



AOT



AOT



Adenomatoid Odontogenic Tumor

Radiographs courtesy of Akitoshi Kawamata DDS, Ph.D
Department of Oral Radiology
Asahi University, School of Dentistry

Adenomatoid Odontogenic Tumor

Radiographs courtesy of
Department of Oral Radiology
Okayama University, School of Dentistry

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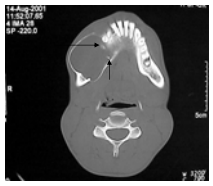
CEOT (Pindborg Tumor)

- Behaves like ameloblastoma
- Predilection for mandible-premolar/molar area
- >half of the lesions will have associated impacted or unerupted tooth
- Periphery well defined to diffuse
- Cystic lesion with numerous scattered, radiopaque foci of varying size and density giving it the appearance of "Driven Snow"
- Presence of amyloid and calcified "Liesegang Rings"



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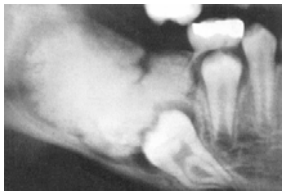
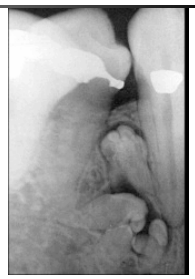
Odontomas



Complex

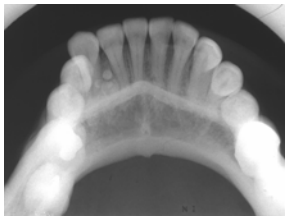


Compound

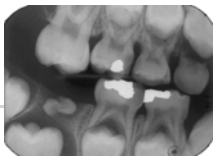
Odontoma

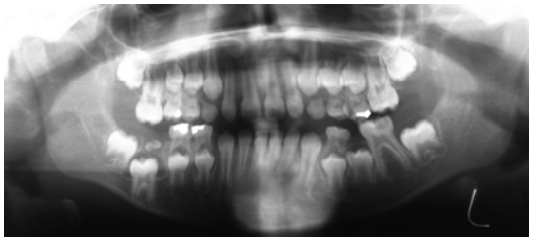
Compound

Odontomas



Odontomas

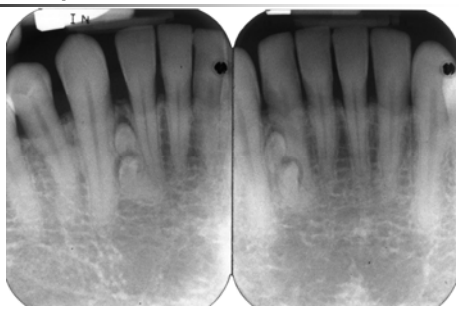




Complex Odontoma

Complex Odontoma

Compound Odontoma



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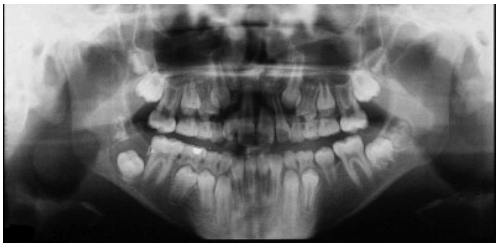
Ameloblastic fibroma

(Soft odontoma)



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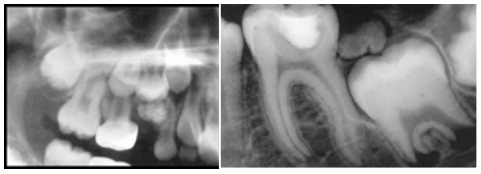
Ameloblastic fibro-odontoma



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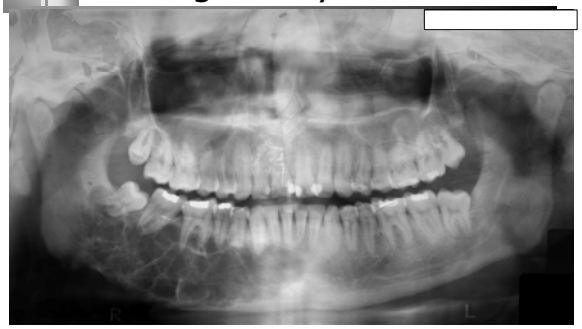
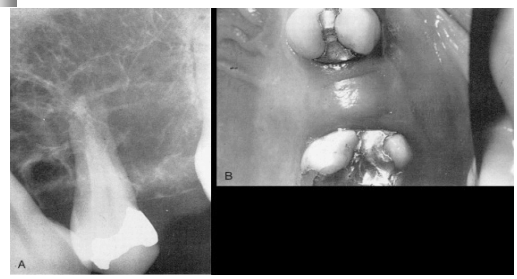
Odontogenic Myxoma

- If odontogenic myxomas have a gender predilection, they slightly favor females. Although the lesion can occur at any age, more than half arise in individuals between 10 and 30 years. This tumor often is associated with a congenitally missing or unerupted tooth. It grows slowly and may or may not cause pain. It may also invade the maxillary sinus and cause exophthalmos. Recurrence rate is as high as 25%. This high rate may be explained by the lack of encapsulation of the tumor, its poorly defined boundaries, and the extension of nests or pockets of myxoid (jellylike) tumor into the trabeculae

Odontogenic Myxoma



Odontogenic Myxoma



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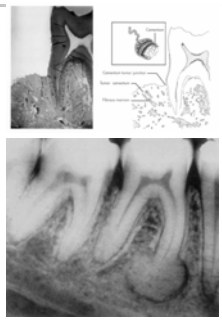
Benign Cementoblastoma

- Benign cementoblastomas are slow-growing, mesenchymal neoplasms, composed principally of cementum. The tumor manifests as a bulbous growth around and attached to the apex of a tooth root. Its histologic characteristics are similar to those of osteoblastomas, and it is composed of cementoblasts that arise from the mesenchyme of the periodontal ligament.



PCD

PCD

PCD

A= mandibular incisor periapical B= Intraoral mandibular occlusal view

Benign Jaw Tumors

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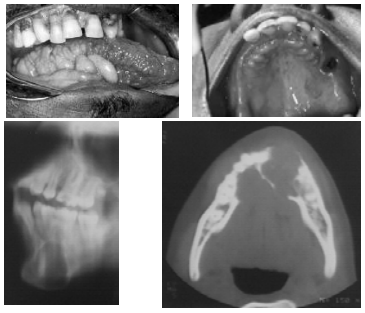
Neurofibroma



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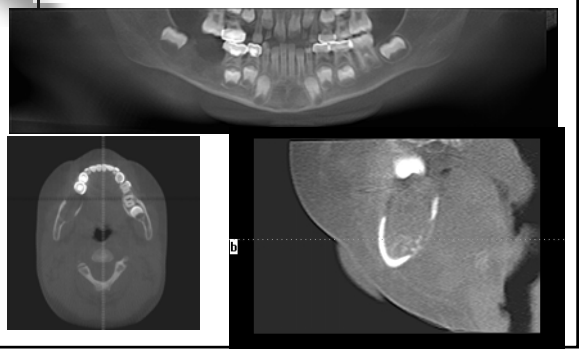
Central Hemangioma



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Osteoblastoma

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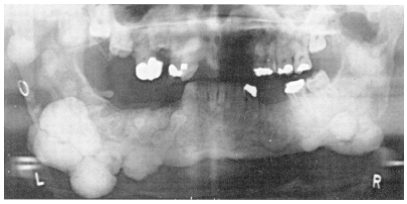
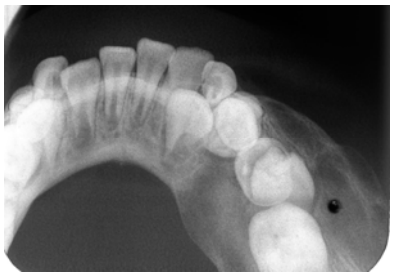
Osteoma



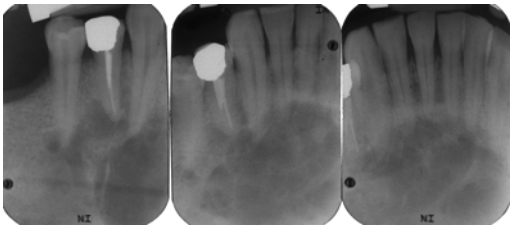
Gardner's syndrome: Gardner's syndrome, inherited as an autosomal dominant disorder, is characterized by intestinal polyposis, multiple osteomas, fibromas of the skin, epidermal and trichilemmal cysts, impacted permanent and supernumerary teeth, and odontomas.

Central Giant Cell Granuloma

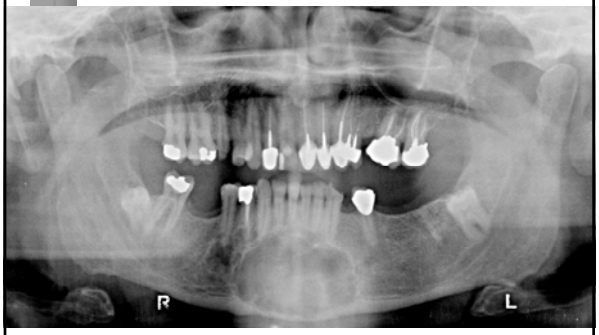
Central Giant Cell Granuloma



Central Giant Cell Granuloma



Central Giant Cell Granuloma



Acknowledgement

- Thanks to Dr. M. Mupparapu, DMD of the Department of Diagnostic Sciences, Division of Oral and Maxillofacial Radiology at UMDNJ-NJDS for the use of his materials