

# Principles of Radiographic Interpretation

- ADEQUATE DIAGNOSTIC IMAGES  
(Distortion- Density- Contrast)  
(number & Type)
- VISUAL SEARCH STRATEGIES

# ANALYTIC OR SYSTEMATIC STRATEGY

- Auat minnie
- Step by Step

### STEP 1: LOCALIZE ABNORMALITY

- Anatomic position (epicenter)
- Localized or generalized
- Unilateral or bilateral
- Single or multifocal

### STEP 2: ASSESS PERIPHERY AND SHAPE

#### Periphery

- Well defined
- Punched-out
- Corticated
- Sclerotic
- Soft tissue capsule
- Ill defined
- Blending
- Invasive

#### Shape

- Circular
- Scalloped
- Irregular

### STEP 3: ANALYZE INTERNAL STRUCTURE

- Totally radiolucent
- Totally radiopaque
- Mixed (describe pattern)

### STEP 4: ANALYZE EFFECTS OF LESION ON SURROUNDING STRUCTURES

- Teeth, lamina dura, periodontal membrane space
- Inferior alveolar nerve canal and mental foramen
- Maxillary antrum
- Surrounding bone density and trabecular pattern
- Outer cortical bone and periosteal reactions

### STEP 5: FORMULATE INTERPRETATION

## STEP 1: LOCALIZE ABNORMALITY

### *Localized or Generalized*

- *Metabolic diseases*

### *unilateral or bilateral*

- **Normal anatomy** .....bilateral..... submandibular gland fossa
- FD..... unilateral
- Paget's disease and cherubism.....always seen bilaterally in the jaws

### *Position in the Jaws*

If the **epicenter** is

- coronal to a tooth, the lesion probably is composed of odontogenic epithelium.



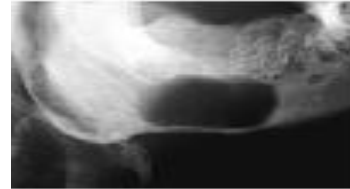
- above the inferior alveolar nerve canal (IAC).....odontogenic tissue



- If the epicenter is below the IAC, it is unlikely to be odontogenic in origin



- **within the IAC**..... neural or vascular



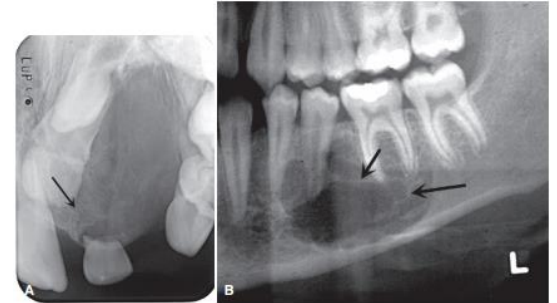
- The probability of **cartilaginous** lesions and **osteochondromas** occurring is greater in the **condylar** region.

- If the epicenter is within the **maxillary antrum**, the lesion is **not** of odontogenic tissue, as opposed to a lesion that has grown into the antrum from the alveolar process of the maxilla

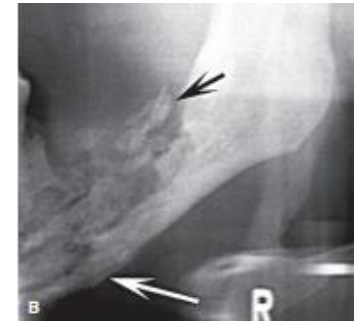


Exact location:

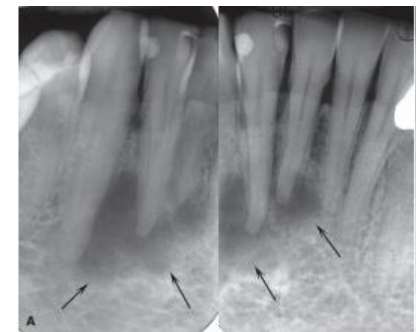
- The epicenters of **central giant cell granulomas** commonly are located anterior to the first molars in the mandible and anterior to the cuspid in the maxilla in young patients



- **Osteomyelitis** occurs in the mandible and rarely in the maxilla



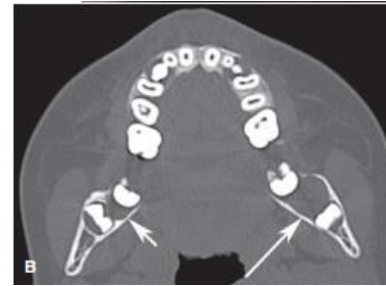
- **Periapical osseous dysplasia** (periapical cemental dysplasia) occurs in the periapical region of teeth



### *Single or Multifocal*

multifocal lesions in the jaws:

- periapical cemental dysplasia
- keratocystic odontogenic tumors
- metastatic lesions
- multiple myeloma
- leukemic infiltrates



### *Size*

dentigerous cysts have growth potential, they are often much larger than a hyperplastic follicle.





# STEP 2: ASSESS PERIPHERY AND SHAPE

## *1. Well-Defined Borders*

## *2. Ill-Defined Borders*

### *Well-Defined Borders:*

- **Punched-Out Border**

sharp boundary or a very narrow zone of transition in which no bone reaction  
.....multiple myeloma

- **Corticated Border**

radiopaque line of reactive bone at the periphery of a lesion  
This is commonly seen with cysts and benign slow-growing tumors

- **Sclerotic Margin**

not uniform in width

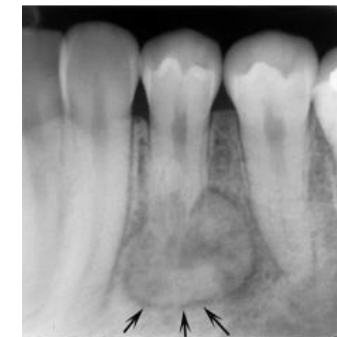
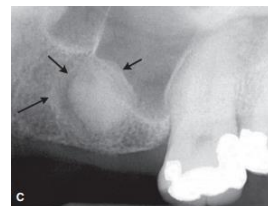
periapical osseous dysplasia and may indicate:

1. a very slow rate of growth
2. the potential for the lesion to stimulate the production of surrounding bone

- **Soft Tissue Capsule**

presence of a radiolucent line at the peripher

.....odontomas and cementoblastomas



### *Ill-Defined Borders*

- **Blending Border**

gradual between the adjacent normal bone trabeculae and the abnormal-appearing trabeculae of the lesion.  
The focus of this observation is on the trabeculae and not on the radiolucent marrow spaces.

**sclerosing osteitis  
fibrous dysplasia**



- **Invasive Border**

enlarging radiolucency at the expense of bone trabeculae.

These borders have also been described as :

- permeative
- finger-like
- bay-type

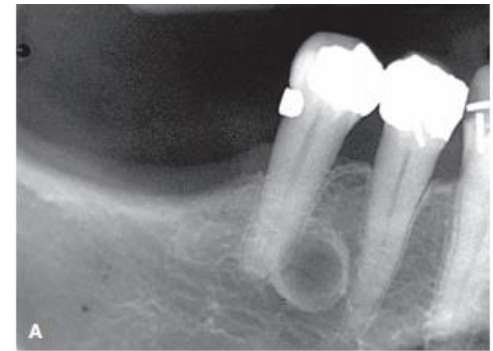
This growth may result in enlargement of the **marrow spaces** at the periphery

- rapid growth
- malignant lesions



## *Shape*

- A circular or fluid-filled shape, similar to an inflated balloon, is characteristic of a cyst. It can also be described as hydraulic



- A scalloped shape is a series of contiguous arcs or semicircles that may reflect the **mechanism of growth.**

- **KOT**
- **TBC**
- **irregular**



# STEP 3: ANALYZE INTERNAL STRUCTURE

- A totally **radiolucent** interior is common in cysts
- totally **radiopaque** interior is observed in osteomas
- The **mixed** density

a list of most radiolucent to most radiopaque material seen in plain radiographs:

- Air, fat, and gas
- Fluid
- Soft tissue
- Bone marrow
- Trabecular bone
- Cortical bone and dentin
- Enamel
- Metal

### *Abnormal Trabecular mixed Patterns*

- **fibrous dysplasia**

the trabeculae usually are:

greater in number

shorter

and not aligned in response to applied stress to the bone but are randomly oriented

orange-peel or a ground-glass appearance.



- existing trabeculae in response to **inflammation**

The result is thick trabeculae, giving the area a more radiopaque appearance

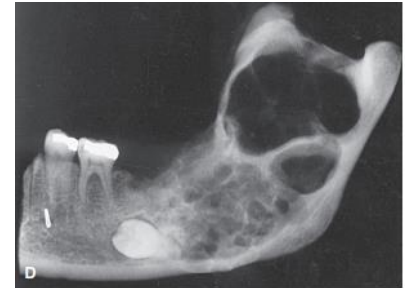


## *Internal Septation*

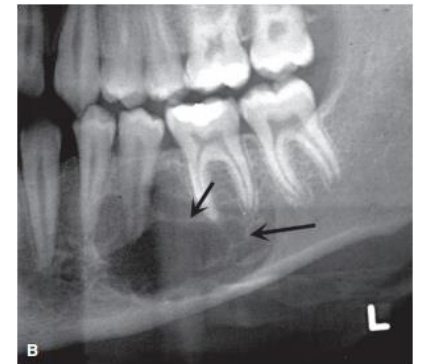
multilocular

The origin of this internal bone may be trapped bone, such as in ameloblastomas, or reactive bone, such as in giant cell granulomas, or the bone may be manufactured by the lesion, such as in ossifying fibromas

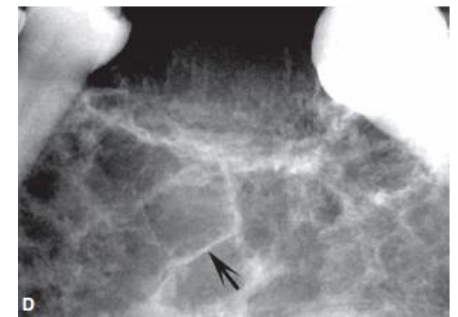
**curved, coarse septa** ..... Ameloblastoma ..... soap bubble appearance



**low density and wispy or granular septations**..... CGCG

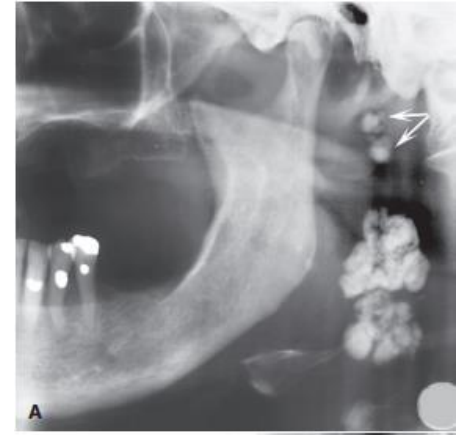


**a few straight, thin septa**..... Myxoma



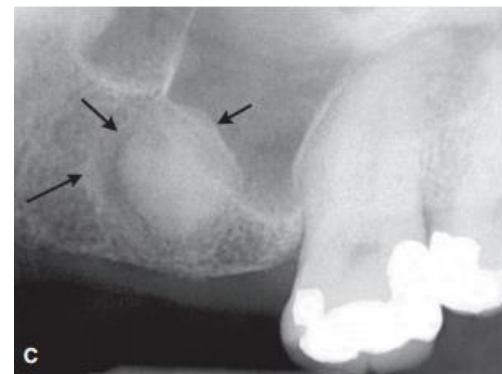
## *Dystrophic Calcification*

- damaged soft tissue
- calcified lymph nodes that appear as dense, cauliflower-like masses in the soft tissue
- Chronic inflammation cysts



## *Amorphous Bone*

- homogeneous, dense, amorphous structure and sometimes is organized into
- round or oval shapes.

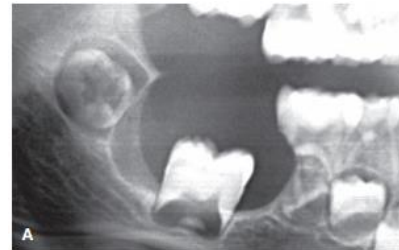


# STEP 4: ANALYZE EFFECTS OF LESION ON SURROUNDING STRUCTURES

## *Teeth, Lamina Dura, and Periodontal Membrane Space*

Displacement of teeth:

- Lesions with an epicenter above the crown of a tooth (i.e., **follicular cysts and occasionally odontomas**) displace the tooth apically
- Because **cherubism** originates and grows in the mandibular ramus, it has a propensity to push molars in an anterior direction



- Some lesions (e.g., **lymphoma, leukemia, Langerhans' cell histiocytosis**) grow in the papilla of developing teeth and may push the developing tooth in a coronal direction





## Resorption of teeth

- more chronic
- slowly growing process
- more commonly related to benign processes
- malignant tumors



## Widening of the PDL

uniform or irregular and

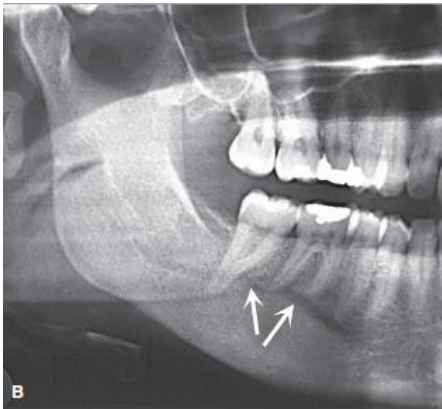
orthodontic movement....widening of the PDL+ lamina dura remains intact.

Malignant lesions..... can quickly grow down the ligament space, resulting in an irregular widening and destruction of the lamina dura



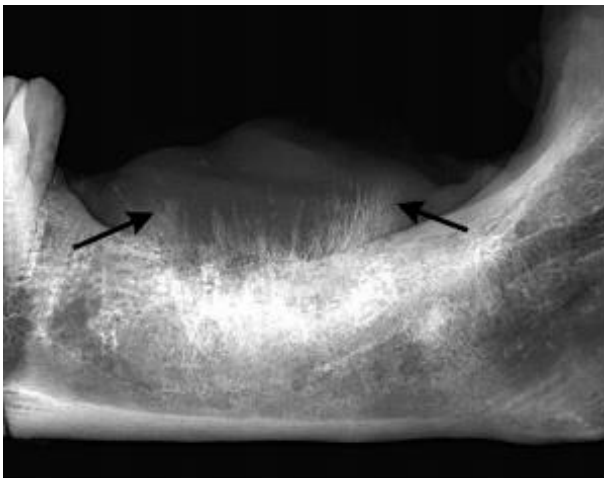
### *Inferior Alveolar Nerve Canal and Mental Foramen*

- Superior displacement of the IAC.....**fibrous dysplasia**
- Widening of the inferior alveolar canal with the maintenance of a cortical boundary may indicate the presence of a benign lesion of..... **vascular or neural origin within the canal**
- Irregular widening with cortical destruction may indicate the presence of .....a **malignant neoplasm** growing down the length of the canal.



## *Surrounding Bone Reaction*


- Onion-skin type of pattern:  
Inflammatory lesions  
Leukemia  
Lymphoma  
LCH
- Radiating pattern:  
Osteosarcoma



Describe this lesion  
3 differential diagnosis



- 1.LOCATION
- 2.PERIPHERY AND SHAPE
- 3.INTERNAL STRUCTURE
- 4.EFFECTS



*The End*