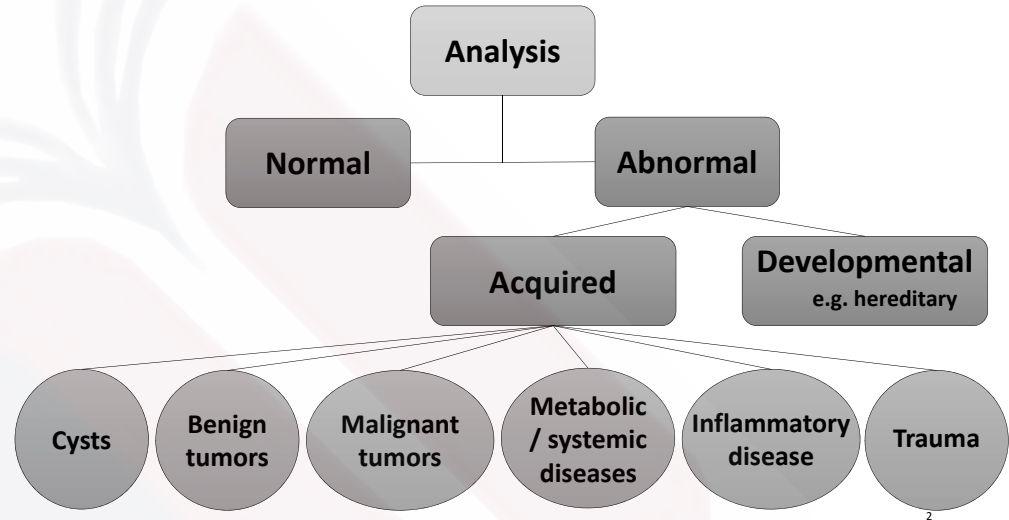


# Principles of radiographic interpretation & Inflammatory lesions

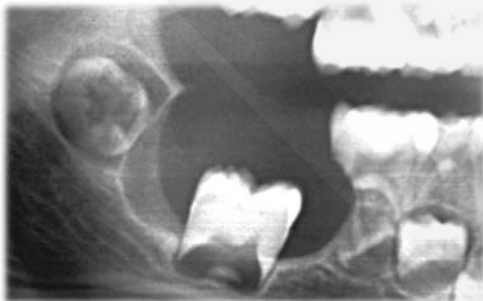
Lecture 8

IMAD BRINJIKJI



## Guidelines for radiologic interpretation

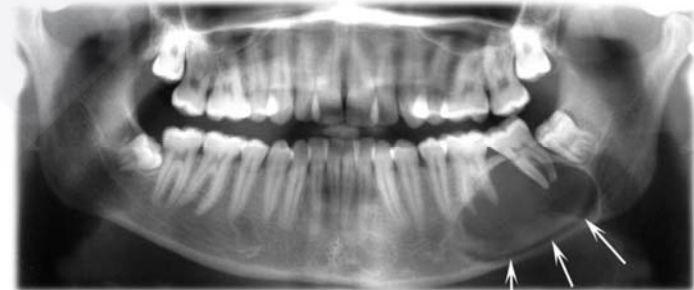
If the epicenter is coronal to a tooth, the lesion probably is composed of odontogenic epithelium.



3

## Guidelines for radiologic interpretation

If it is above the inferior alveolar nerve canal (IAC), the likelihood is greater that it is composed of odontogenic tissue.



4

## Guidelines for radiologic interpretation

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

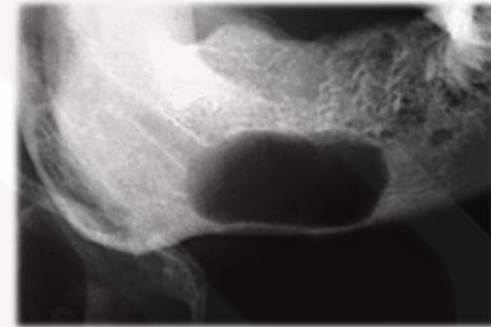


Lingual mandibular lesion (Stafne cyst)

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## Guidelines for radiologic interpretation

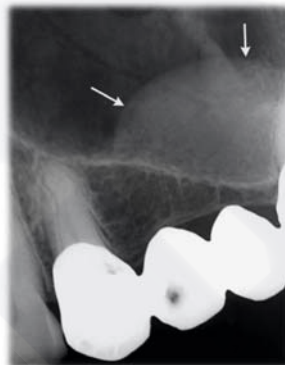
If it originates within the IAC, the tissue of origin probably is neural or vascular in nature.



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## Guidelines for radiologic interpretation

- 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 (works with relatively small lesions).
- The continuity of floor of the maxillary sinus assists in the diagnosis between odontogenic and non-odontogenic lesions.



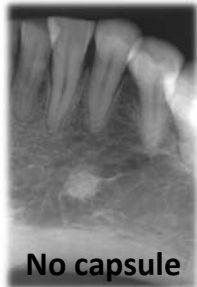
## Guidelines for radiologic interpretation

- The probability of cartilaginous lesions and osteochondromas occurring is greater in the condylar region.
- Corticated borders are a characteristic of cysts and benign slow-growing tumors.

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## Guidelines for radiologic interpretation

- The soft tissue capsule may be seen in conjunction with a corticated periphery, as is observed with odontomas and cementoblastomas.



## Inflammatory diseases

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### Inflammatory diseases

- The most commonly diseases in the jaws. Redness/heat/swelling/pain.
- May be classifies according to the source of the initiation of the inflammation.

#### Necrotic pulp

Restricted  
periapical  
inflammatory  
lesion

Spread out  
Osteomyelitis

#### Soft tissue

periodontal  
lesions

Pericoronitis

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### General rules for inflammatory lesions

- The location
  - The apex of the tooth or around the root (accessory canals) for periapical inflammatory lesions.
  - Around the partially erupted tooth or around the tooth with the periodontal disease (pericoronitis and periodontal lesions)
  - Osteomyelitis is in the mandible (diffuse).
- Very early lesions (initial acute phase) may not show any changes in the image.
- The periphery
  - Ill defined.

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## General rules for inflammatory lesions

### ○ Internal structure

- Radiolucent (as a result of bone resorption).
- Radiopaque (as a result of bone formation).
- A combination (the most common feature in the inflammatory lesions).

### ○ Effects on surrounding structures

- With chronic infections, root resorption may occur.
- The periosteal may also respond to the inflammation (layers of new periosteal bone “onion skin”).

## Periapical inflammatory lesions

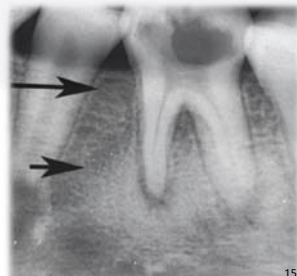
13

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## Periapical inflammatory lesions

Periapical inflammatory lesion (apical periodontitis) are:

- Periapical abscess.
- Periapical granuloma.
- May also be classified into acute or chronic.



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## Periapical inflammatory lesions

These lesions are capable of producing an inflammatory periosteal reaction, most notably in the adjacent floor of the maxillary antrum.

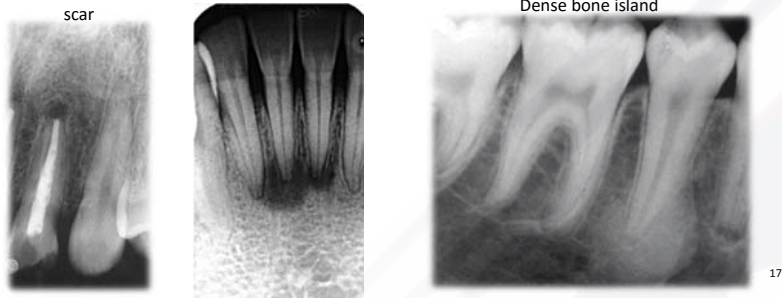


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## Periapical inflammatory lesions

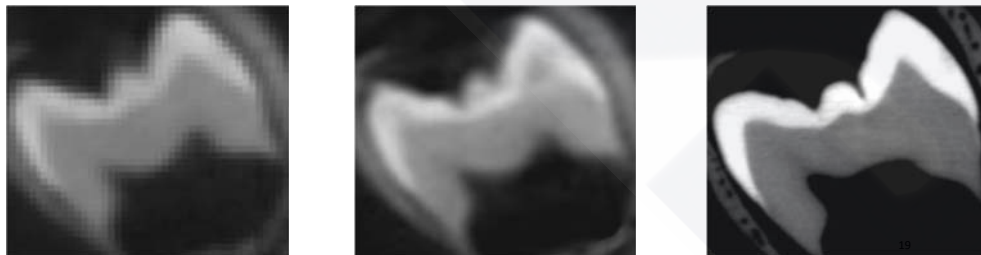
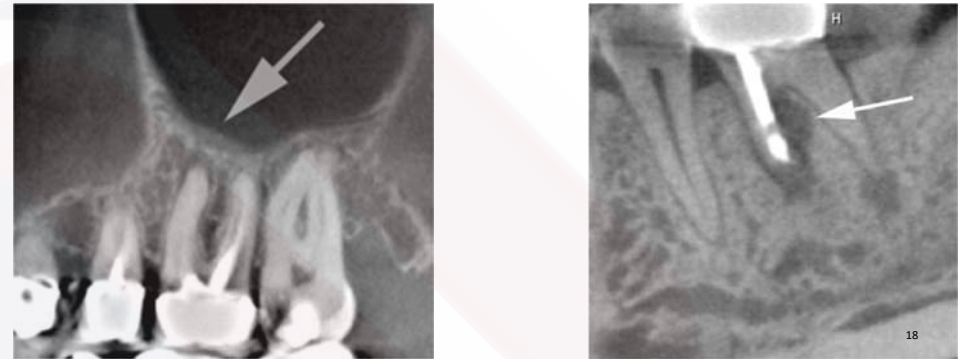
- Differential diagnosis:

- Observation in some cases (e.g. when a scar is expected).
- Dense bone island: Vitality test. No widening of the periodontal space. Not centered on the apex of the tooth.
- Lesions that are larger than 1 cm are usually periapical cysts.



## CBCT

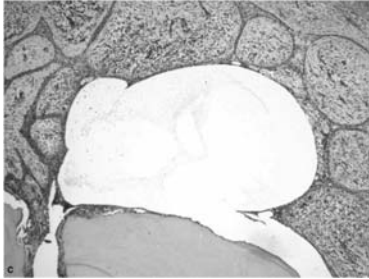
The application of high-resolution, small field-of view CBCT was proved to be effective for post endodontic treatment complications (recurrence or persistent inflammatory lesions).



The role of radiology in differentiating periapical lesions



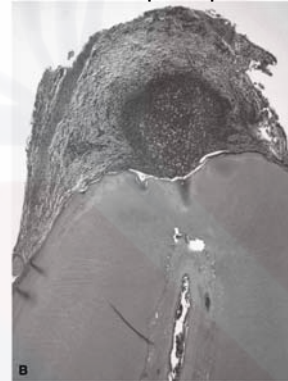
# The role of radiology in differentiating periapical lesions



**Cyst**



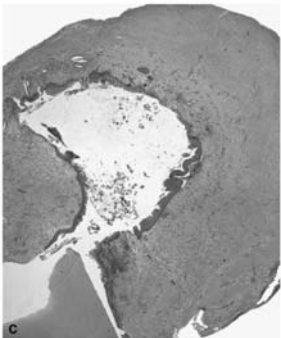
# The role of radiology in differentiating periapical lesions



**Abscess**



# The role of radiology in differentiating periapical lesions



**The cyst compromise a very small amount of the lesion**

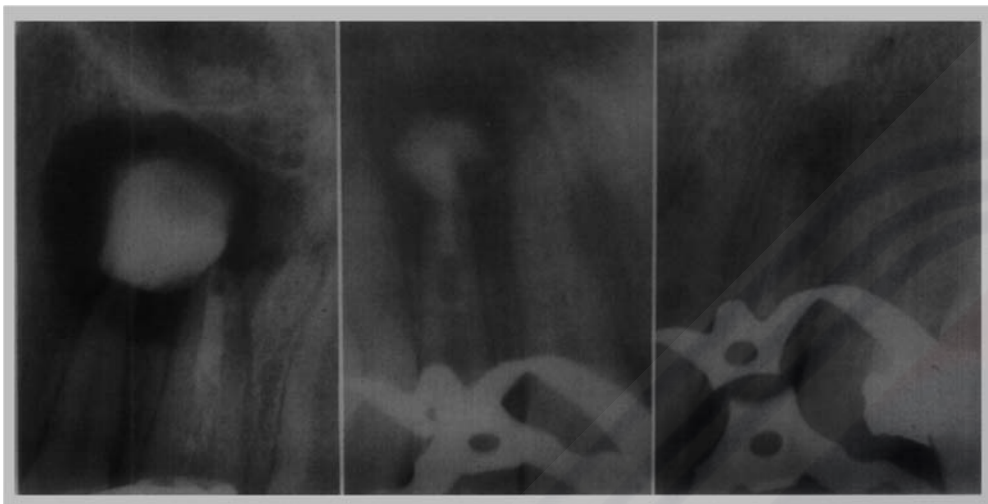


# The role of radiology in differentiating periapical lesions

Only 30% of lesions with radiopaque lamina were histologically diagnosed as cysts, and 70% were granulomas or abscesses.

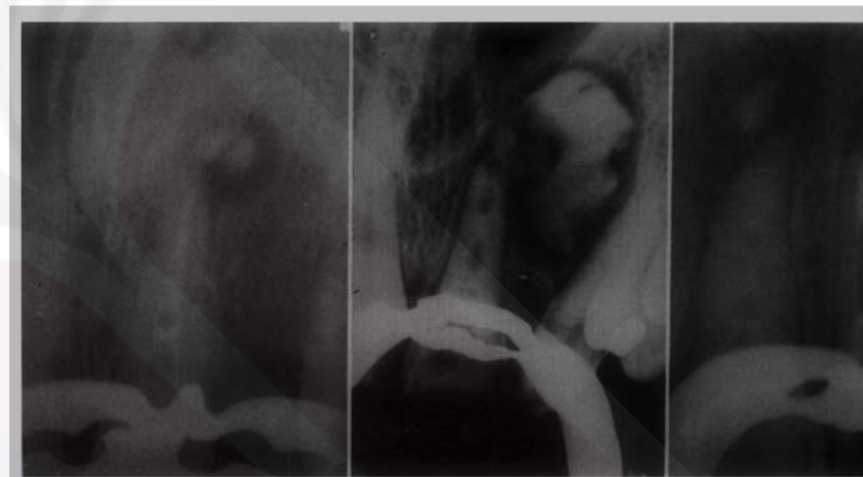
85.1% of lesions without a radiopaque lamina were histologically diagnosed as granulomas or abscesses, while 14.9% were cysts.

The use of contrast media injected inside the pulp canals did not assist in the differential diagnosis of these three lesions.



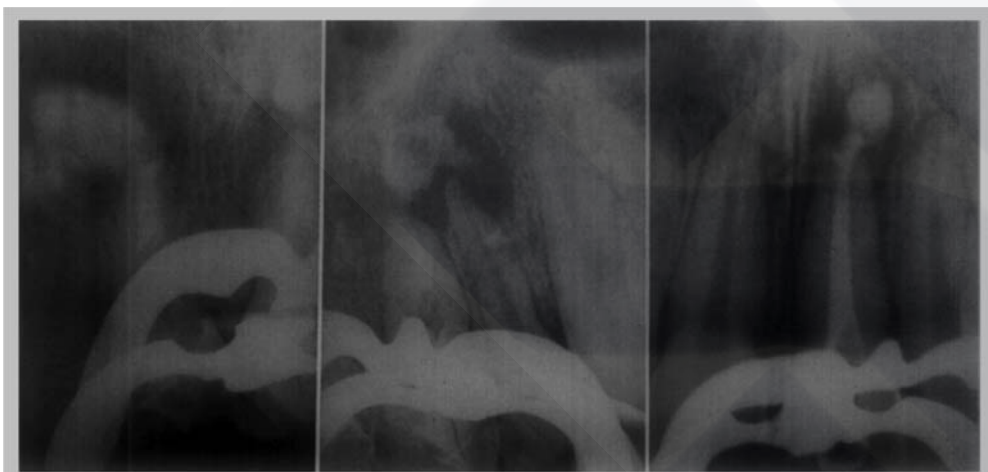
All these lesions are cysts

25



All these are granulomas.

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All these are chronic abscesses.

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The role of radiology in differentiating  
periapical lesions  
The role of radiology in

- The use of CBCT for the differential diagnosis for periapical lesions has not been confirmed.

A- 94.1% correct classification (the sample size was small).

B- A moderate accurate diagnosis between cysts and granulomas.

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# Osteomyelitis

## Osteomyelitis

- Osteomyelitis is a diffuse, uncontained inflammation of the bone.
- Acute or chronic phase.
- Osteomyelitis, most commonly is found in the posterior mandible. The maxilla rarely is involved.
- In cases of osteomyelitis, careful examination of the x-ray images may reveal sequestra.

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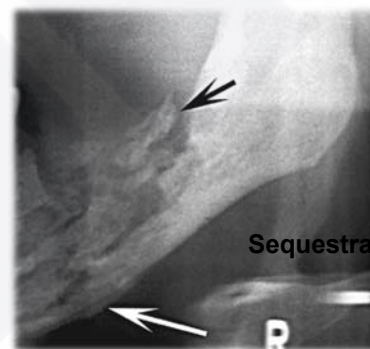
## Osteomyelitis

### Imaging techniques

- Conventional radiographs [not enough].
- MDCT or CBCT (main imaging techniques).
- Technetium and gallium bone scan (nuclear imaging) [not for chronic phase].
- MRI (high signal on T2; due to the presence of edema within the bone marrow) [not for chronic phase].

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## Osteomyelitis



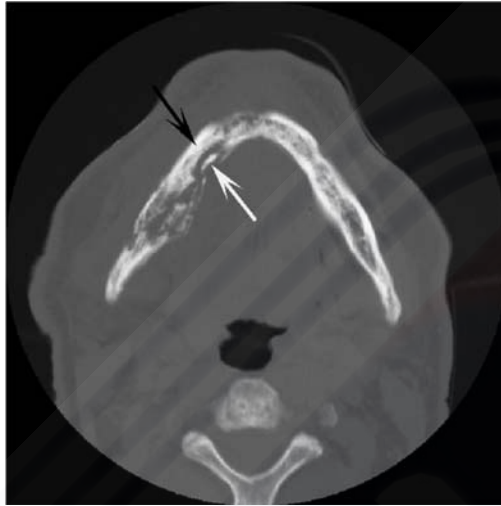
**Periosteal reaction**  
Layers of periosteal new bone.  
"Onion skin"



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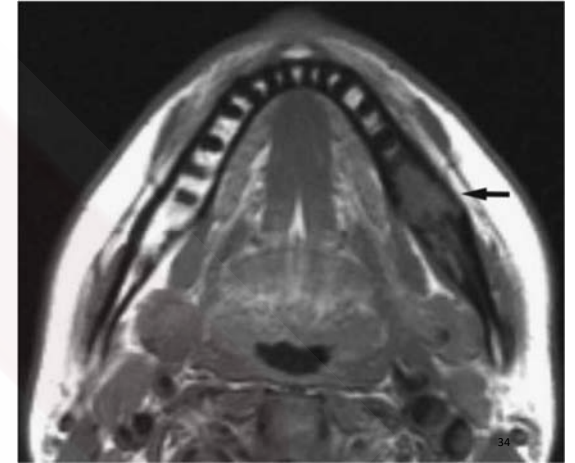


## Osteomyelitis



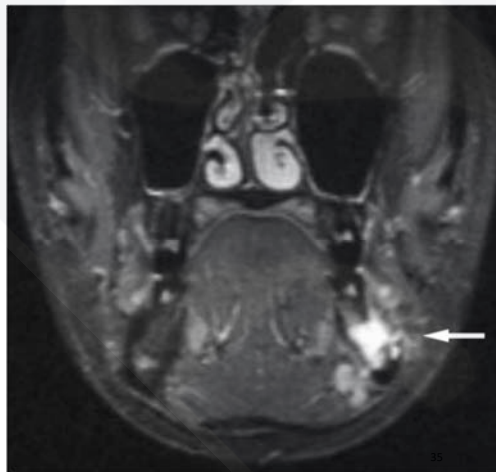
## Osteomyelitis

- T1: low signal (reduced signal).



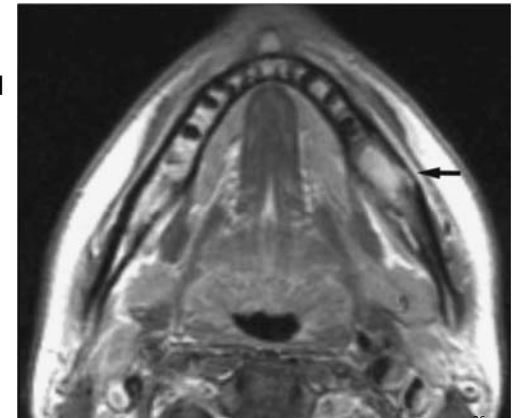
## Osteomyelitis

- T2 and STIR: high signal.



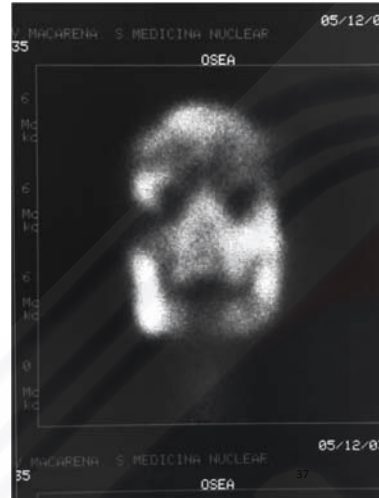
## Osteomyelitis

- Post-Gd: Contrast enhancement of the affected bone marrow.



## Osteomyelitis

- Gamma camera: hyper-concentration in the radioactive elements of the affected areas.



## Osteomyelitis

### Differential diagnosis of osteomyelitis

- Always consider the presence of sequestra and new periosteal bone formation.
- Page's disease (no sequestra, no new periosteal bone formation).
- Malignant tumors malignancies have specific radiologic features.

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## Pericoronitis

## Pericoronitis

- Inflammation of the tissues surrounding the crown of a partially erupted tooth.
- Most commonly with the mandibular 3<sup>rd</sup> molars.
- Gingival reaction (swollen and may become secondarily traumatized).

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## Pericoronitis

- Clinical features: pain and swelling. Trismus is a common presentation.
- Imaging features (Range from)
  - No change (the inflammatory lesion is confined to the soft tissues).



Localized rarefaction and sclerosis.



Osteomyelitis in the most severe cases.

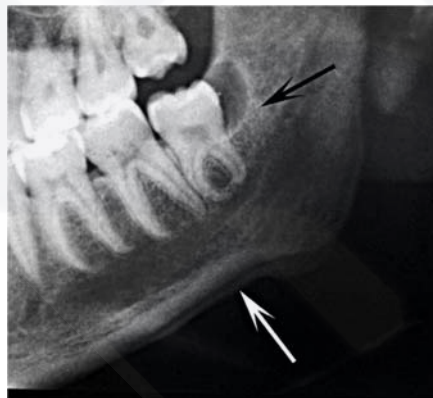
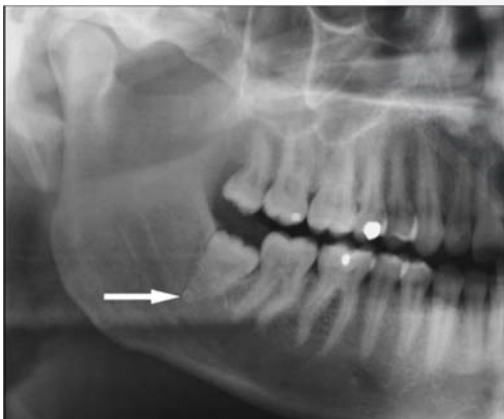
41

## Pericoronitis

- The periphery of pericoronitis is ill defined.
- The internal structure of bone adjacent to the pericoronitis most often is sclerotic with thick trabeculae. An area of bone loss or radiolucency immediately adjacent to the crown that enlarges the follicular space may be seen.

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## Pericoronitis



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## Pericoronitis

### Differential diagnosis

- Fibrous dysplasia (consider the clinical symptoms).
- Malignant tumors:  
The presence of an impacted teeth with the clinical symptoms.  
Consider the features of the malignant tumors.

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