Inflammatory Lesions of the Jaws

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Inflammatory Lesions

- Most common pathologic conditions of the jaws
- Teeth create a direct pathway for inflammatory agents and pathogens to invade the bone when caries and periodontal disease are present.

Inflammatory Lesions

- Inflammation is the body's response to chemical, physical, or microbial injury.
- First, the inflammatory response destroys the causative agent and walls off the injured area.
- Second, it sets up an environment for repair of the injured tissue.

Bone Metabolism

- Balance of bone resorption by osteoclasts and bone deposition by osteoblasts.
- Osteoblasts mediate the resorptive activity of the osteoclasts.
- Inflammatory conditions of bone exist along a continuum, with varying clinical features.

Inflammation of the Bone

Periapical Inflammatory Lesions
Periodontal Lesions
Pericoronitis
Osteomyelitis
The Cardinal Signs of Inflammation

- Heat
- Redness
- Swelling
- Pain
- Loss of Function

Acute v. Chronic Lesions

**Acute Lesions**
- Recent onset
- Rapid
- Pronounced pain
- Often with fever and swelling

**Chronic Lesions**
- Long, insidious onset
- Prolonged course
- Intermittent, low-grade fever
- Gradual swelling

Acute v. Chronic Lesions

- Without a second radiograph, exposed at a different time, it is often impossible to determine if a lesion is chronic or acute.
- Therefore, temporal descriptors are usually omitted from radiographic descriptions

Radiographic Features

Location

Periapical Inflammatory Lesions
- Epicenter of the lesion is usually at the apex
- May also be along the lateral root surface due to accessory canals, root fractures, or iatrogenic perforations
Apical Rarefying Osteitis

**Location**
- Periodontal Lesions
  - Epicenter of the lesion is located at the alveolar crest
  - Inflammatory changes in bone may extend to the apex and into the furcation of posterior teeth

**Borders**
- Generally poorly demarcated
- Blending into normal trabeculation

Periodontal Disease and Apical Rarefying Osteitis

**Location**
- Osteomyelitis
  - Usually found in the posterior mandible
  - Involvement of the maxilla is rare, due to greater vascularity
Internal Architecture
- Resorption will give a radiolucent appearance to the lesion
- Bone formation (osteosclerosis) will give trabeculation a denser and more numerous appearance
- Usually, lesion will present as a combination of altered density
- Osteomyelitis will often yield sequestra of bone

Effects on Adjacent Structures
- Stimulation of surrounding bone, producing a sclerotic border
- Bone resorption, resulting in radiolucent areas
- Widening of the periodontal ligament space. The greatest widening will be at the epicenter of the lesion

Condensing Osteitis

Osteomyelitis

Apical Rarefying Osteitis
**Periapical Inflammatory Lesions**

- Acute apical periodontitis
- Chronic apical periodontitis
- Periapical abscess
- Periapical granuloma

*Preferred radiographic terminology*

**Unacceptable Terminology**

- PAP or periapical pathology
- Area
- Endo tooth
- Perio-endo lesion
- Endo-perio lesion

**From White and Pharoah, 5th edition p.367**

- Caries
- Necrotic pulp → Apical periodontitis
- Trauma

**Interrelationship of possible results of periapical inflammation**

**Apical Rarefying Osteitis and Sclerosing Osteitis**

- Local response of bone secondary to pulpal necrosis or severe periodontal disease
- At least 60% demineralization must occur before the lesion can be seen on a radiograph. Therefore, it is inappropriate to use a radiograph as a vitality test.
Periapical Inflammatory Lesions

- Histologically, the lesion is apical periodontitis, which is defined as a periapical abscess or periapical granuloma
- The reaction is initiated by toxic metabolites from the necrotic pulp
- Clinically, the symptoms may include pain, swelling, fever, lymphadenopathy, or may be asymptomatic

Periapical Inflammatory Lesions

- Acute lesions may evolve into chronic ones
- Therefore, it is important to note that the clinical presentation may not correspond with the histopathological or radiographic findings

Periapical Inflammatory Lesions

Location

- At the apex of a tooth
- May be along the root surface if associated with a lateral canal or perforation from root canal treatment

Apical Rarefying Osteitis

Borders

- Ill-defined, gradually blending with normal trabeculation
- Can occasionally have a well-demarcated border
### Periapical Inflammatory Lesions

#### Internal Architecture
- Earliest change is loss of bone density resulting in widening of periodontal ligament space
- As the lesion progresses, loss of density involves a larger area
- As the lesion progresses, a mixed rarefying and sclerotic appearance may be seen.

### Periapical Inflammatory Lesions

#### Internal Architecture
- The region of the lesion closest to the apex is generally lucent, while the periphery tends to be exhibit sclerotic changes
- When the lesion is mostly lucent, the term *Apical Rarefying Osteitis* is used
- When the lesion is mostly sclerotic, the term *Apical Condensing Osteitis* is used

### Periapical Inflammatory Lesions

#### Internal Architecture
- When closely examined, the sclerotic areas exhibit both increased number *and* thickness of trabeculae

### Periapical Inflammatory Lesions

#### Effects on adjacent structures
- Lesions may stimulate resorption or deposition of surrounding bone.
- The sclerotic lesion may be localized or may extend over a wider area
- The lesion may destroy cortical borders, such as the floor of the maxillary sinus or cause displacement or remodeling. This remodeling is called *halo effect*

### Halo Effect

![Image of Halo Effect]

### Periapical Inflammatory Lesions

#### Effects on adjacent structures
- Chronic lesions may result in root resorption
- If the cortical border of the maxillary sinus is perforated, there may be a localized thickening of the Schneiderian membrane. This is called *mucositis*
Root Resorption

Halo Effect and Mucositis

Mucositis

Mucositis

Periapical Inflammatory Lesions

- Effects on adjacent structures
  - Internal or external resorption of the root, calcification of the pulp chamber, and wide appearance of the pulp chamber may be evident

Internal Resorption
Early lesions of Periapical Cemental Dysplasia (PCD) often have an appearance similar to that of a periapical inflammatory lesion. Pulp vitality testing must be performed to differentiate the two lesions.

- Idiopathic osteosclerosis
**Pericoronitis**

- Inflammation of the tissues surrounding a partially erupted tooth.
- Usually occurs around 3rd molars
- Starts in soft tissue surrounding erupting tooth
- May extend into the bone surrounding the tooth
- Often associated with trismus

**Radiographic Features of Pericoronitis**

- **Location**
  - Early lesions may show no radiographic features
  - Follicular space may be expanded around the crown. >3mm should be monitored

- **Borders**
  - May be ill defined
  - A sclerotic border is not unusual

- **Internal Architecture**
  - Radiolucent, with thin, sparse trabeculae
  - Increased trabeculation toward periphery
Radiographic Features of Pericoronitis

Effects on adjacent structures
- Sclerotic border
- In larger lesions, periosteal new bone formation may be evident

Differential diagnoses
- Enostoses and osteosclerosis
- Fibrous dysplasia
- Malignancies such as osteosarcoma and squamous cell carcinoma

Pericoronitis

Osteomyelitis
- Inflammation of the bone
- May spread to involve:
  - Marrow
  - Cortex Periosteum
  - Cancellous portion
- Caused by pyogenic organisms from abscessed teeth, trauma, or surgery
- Source of infection can not always be identified

Osteomyelitis
- Bacteria and by-products stimulate an inflammatory reaction in bone
- In young patients, the periosteum is lifted by inflammatory exudates. New bone is laid down. This is called Garre's Osteomyelitis
- Presence of sequestra is a hallmark of osteomyelitis. These can be seen in both plain films and CT
**Osteomyelitis**
- Acute and chronic forms exist
- Acute form demonstrates purulent drainage
- Paresthesia of the lip may be present, suggesting a malignancy

**Radiographic features of Osteomyelitis**

**Location**
- The most common location of osteomyelitis of the jaws is the posterior body of the mandible
- Involvement of the maxilla is rare, perhaps due to its excellent vascularity

**Borders**
- The borders of these lesions are ill-defined, gradually blending into the normal trabecular pattern

**Internal architecture**
- Initially, there is a slight decrease in the radiodensity of the bone, with the trabeculae becoming less well defined
- There may be scattered areas of lucency in the area
- Later, areas of sclerotic bone are seen
- Sequestra are most apparent in the chronic forms

**Effects on adjacent structures**
- Surrounding bone may be resorbed or laid down
- May cause resorption of the cortex
- In Garre's osteomyelitis, the cortex is expanded through deposition of new bone. The radiographic appearance of these new layers of bone is termed onion skin or proliferative periostitis
Osteomyelitis in a 12 yo male

Case courtesy of Dr. Grace Petrikowski

Osteomyelitis and FCOD

Case courtesy of Dr. Grace Petrikowski
Sequestrum of Osteomyelitis

Garre’s Osteitis

Garre’s Osteitis

Osteonecrosis of the Jaw (ONJ)

- Found in patients using Bisphosphonates for chemotherapy
- May also be found in patients using Phosamax for osteoporosis
- Radiographic appearance resembles chronic sclerosing osteomyelitis

ONJ Case 1
Radiographic features of Osteomyelitis

Differential diagnosis:

- Fibrous dysplasia
- Pagets disease of bone
- Osteosarcoma
- Osteonecrosis of the Jaw (ONJ)

The patient's age and clinical presentation may help in the diagnosis.
Thanks!