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OSTEOMYELITIS OF **JAW**

By

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INTRODUCTION

- **The word “osteomyelitis” originates from the ancient Greek words osteo (bone) and myelitis (marrow) and literally means infection of medullary portion of the bone.**
- **It may be defined as an inflammatory condition of bone that begins as an infection of medullary cavity & haversian system & extend to involve the periosteum of affected area.**

PREDISPOSING FACTOR

- **Local Factors (decreased vascularity/vitality of bone)**

- 1. Trauma**
- 2. Radiation injury**
- 3. Paget's disease**
- 4. Osteoporosis**
- 5. Major vessel disease.**

- **Systemic Factors (impaired host defence)**

- 1. Immune deficiency states**
- 2. Immunosuppression**
- 3. Diabetes mellitus.**
- 4. Malnutrition.**
- 5. Extremes of age.**

ETIOPATHOGENESIS

.Conditions reducing host factors

- 1. Diabetes**
- 2. Tuberculosis**
- 3. Sever anemia**
- 4. Leukemia**
- 5. Agranulocytosis**
- 6. Acute infection - such as - scarlet fever, influenza**
- 7. Typhoid**
- 8. Sickel cell anemia**
- 9. malnutrition**
- 10. Chronic alcoholism**

• Condition affecting the jaw vascularity

- 1. Metastasis from area of infection such as another bony site & kidney**
- 2. Radiation**
- 3. Osteoporosis**
- 4. Osteopetrosis**
- 5. Fibrous dysplasia**
- 6. Peripheral vascular disease.**

PATHOGENESIS

- 1. Virulent organism get entry into medullary cavity via many routes.**
- 2. localization of infection (most infection are localized by a pyogenic membrane & soft tissue abscess wall).**
- 3. disorganization of pyogenic membrane by micro organism & by chronic movement of unreduced fracture of jaw.**
- 4. Due to chronic movement of unreduced fracture or disorganization of pyogenic membrane there will be ischemia & this will introduce the bacteria & microbes deep into under lying cavity.**
- 5. Accumulation of pus & there will be increased pressure in medullary cavity.**
- 6. Pus travel through haversian & Volkmann's canal & accumulation beneath the periosteum & elevating it from cortex & there by reducing the blood supply.**

7. Reduced blood supply causes necrosis of bone.

8. Then pus penetrate the periosteum mucosal & cutaneous fistulae develop & thereby discharging the purulent pus.

9. Small section of necrotic bone may get completely lysed while large get localized & get separated from the shell of new bone by bed of granulation tissue. The dead bone is surrounded by the new viable bone this is called involucrum.

10. Involucrum contain one or more holes on the surface pus find its way from these orifices.

11. Beside all this microorganism precipitate the thrombi formation these thrombi provided isolating barrier from the immune response & further proliferation of microbes :- thrombi can cause systemic spread of infection

EITIOLOGY

- 1. Odontogenic infection like pericoronitis, periapical, periodontitis**
- 2. Infection from infected dental cyst**
- 3. Compound fracture of jaw.**
- 4. Traumatic injury**
- 5. Middle ear infection & upper respiratory tract infection through hematogenous route.**
- 6. Furuncle of chin by lymphatic route**
- 7. Peritonsillar abscess**

CLASSIFICATION

- **Hudson's classification**
 1. **Acute osteomyelitis**
 - a. **Contiguous focus**
 - b. **Progressive**
 - c. **Hematogenous**
 2. **Chronic osteomyelitis**
 - a. **Recurrent multifocal**
 - b. **Garre's**
 - c. **Suppurative or nonsuppurative**
 - d. **Sclerosing**



- **Clinical Classification**

- 1. Suppurative OML**

- A. Acute**

- B. Chronic**

- C. Infantile**

- 2. Non Suppurative OML**

- A. Sclerosing OML – focal or diffuse**

- B. Garre's OML**

- C. Actinomycotic OML**

- D. Specific infective OML - TB, syphilis**

- E. ORN**



INFANTILE OSTEOMYELITIS

It is rare type of osteomyelitis infant few weeks after birth.

It usually involve the maxilla.

- **Route Of Infection:**

1. **Hematogenous route**

2. **Trauma - prenatal trauma of oral mucosa from obstetrician's finger.**

3. **Infection- infection from mucosal bulb use to clear the air way immediate after birth**

4. **Infected nipple**



Etiology:-

- **Staphylococcus aureus infection**
- **streptococci infection**
- **Pneumococci infection**

Clinical Features

- Fever**
- Anorexia**
- Dehydration**
- Occasionally - convulsion, vomiting**



Sign & Symptoms:

a) Redness

b) Edema of eyelid

c) Intracanthal swelling

d) Proptosis

e) Sinus will develop






Radiographic Features:

- 1. Minimal bone involvement**
- 2. Long standing case –sequestrate**

Treatment:

- 1. I.V. Antibiotics**
 - 2. Culture**
 - 3. Irrigations-sinus tracts**
 - 4. Sequestrectomy**
- 

ACUTE SUPPURATIVE OSTEOMYELITIS

- **Organisms entry into the jaw, mostly mandible, compromising the vascular supply**
- **Medullary infection spreads through marrow spaces**
- **Thrombosis in vessels leading to extensive necrosis of bone**
- **Lacunae empty of osteocytes but filled with pus , proliferate in the dead tissue**
- **Suppurative inflammation extend through the cortical bone to involve the periosteum**
- **Stripping of periosteum comprises blood supply to cortical plate, predispose to further bone necrosis**
- **Sequestrum is formed bathed in pus, separated from surrounding vital bone**

Clinical Features

- **Early :**

- 1. Severe throbbing, deep- seated pain.**
- 2. Swelling due to inflammatory edema.**
- 3. Gingiva appears red, swollen & tender**

- **Late :**

- 1. Distension of periosteum with pus.**

- **Final:**

- 1. Subperiosteal bone formation cause swelling to become firm.**



Radiographic Features

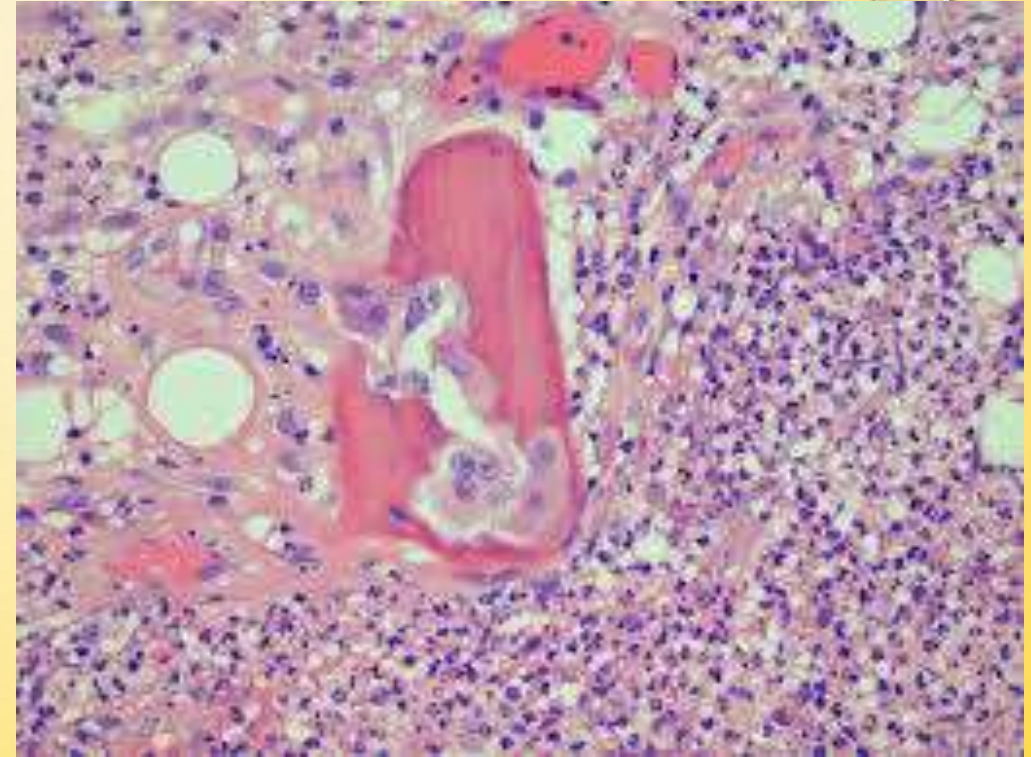
- **May be normal in early stages of disease .**
- **Do not appear before 10 days.**
- **Radiograph may demonstrate ill-defined radiolucency.**
- **After sufficient bone resorption irregular, moth eaten areas of radiolucency may appear.**



Figure 3: Orthopantomogram presenting typical “Moth eaten” appearance

Histological Features

- **Submitted material for biopsy -predominantly consists of necrotic bone & is diagnosed as sequestrum**
- **Bone shows:**
 1. **Loss of osteocytes from lacunae.**
 2. **Peripheral resorption.**
 3. **Bacterial colonization.**
 4. **Acute inflammatory infiltrate consisting of polymorphonuclear leukocytes in haversian canals & peripheral bone.**



Management

Essential Measures

- **Bacterial sampling & culture.**
- **Empirical antibiotic treatment**
- **Drainage.**
- **Analgesics.**
- **Specific antibiotics based on culture & sensitivity.**
- **Debridement.**
- **Remove source of infection, if possible.**

Adjunctive treatment

- **Sequestrectomy.**
- **Decortication (if necessary)**
- **Hyperbaric oxygen.**
- **Resection & reconstruction for extensive bone destruction.**

Complications

• **Rare but include:**

- 1. Pathological fracture- extensive bone destruction.**
- 2. Chronic osteomyelitis- inadequate treatment.**
- 3. Cellulitis**
- 4. Septicaemia spread of virulent bacteria.**
- 5. Immuno-compromised patient**

CHRONIC SUPPURATIVE OSTEOMYELITIS

- **Inadequate treatment of acute osteomyelitis-**
 - 1. periodontal diseases**
 - 2. pulpal infections**
 - 3. extraction wounds**
 - 4. infected fractures**
- **Infection in the medullary spaces spread and form granulation tissue**
- **Granulation tissue forms dense scar to wall off the infected area**
- **Encircled dead space acts as a reservoir for bacteria & antibiotics have great difficulty reaching the site**

Clinical Features

- **Swelling**
- **Pain**
- **Sinus formation**
- **Purulent discharge**
- **Sequestrum formation**
- **Tooth loss**
- **Pathologic fracture**



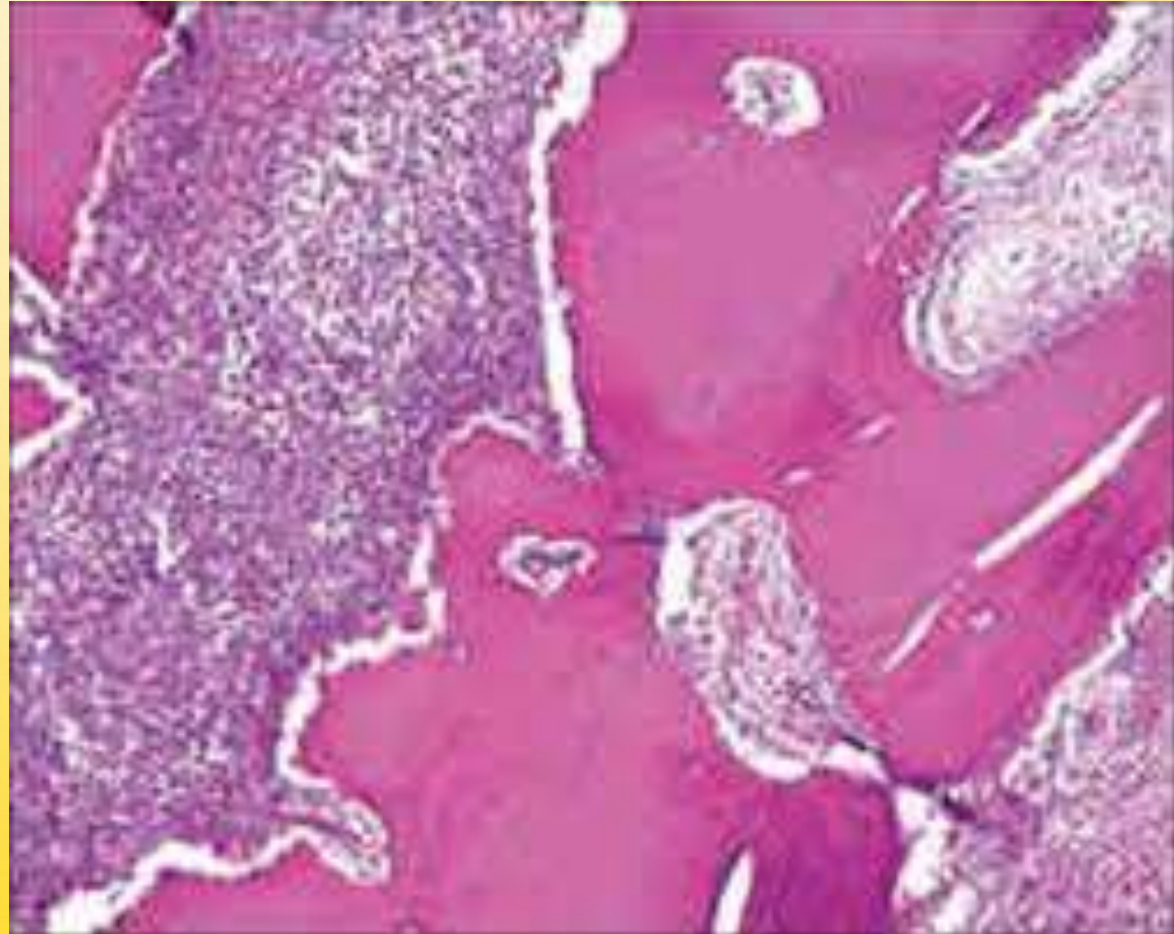
Radiological Features

- **Patchy, ragged & ill defined radiolucency.**
- **Often contains radiopaque sequestrate.**
- **Sequestrate lying close to the peripheral sclerosis & lower border.**
- **New bone formation is evident below lower border.**



Histological Features

- **Inflamed connective tissue filling inter-trabecular areas of bone.**
- **Scattered sequestrate.**
- **Pockets of abscess.**



Management

- **Difficult to manage medically.**
- **Surgical intervention is mandatory, depends on spread of process.**
- **Antibiotics are same as in acute condition but are given through IV in high doses.**
- **Small Lesions** - curettage, removal of necrotic bone and decortication are sufficient.
- **Extensive Osteomyelitis** - decortication combined with transplantation of cancellous bone chips.
- **Persistent Osteomyelitis** - resection of diseased bone followed by immediate reconstruction with an autologous graft is required. Weakened jawbones must be immobilized.

FOCAL SCLEROSING OSTEOMYELITIS

- Also known as “**condensing osteitis**”.
- **Localized areas of bone sclerosis.**
- **Bony reaction to low-grade peri-apical infection or unusually strong host defensive response.**
- **Association with an area of inflammation is critical.**

Clinical Features

- **Children & young adults are affected.**
- **In mandible, premolar & molar regions are affected.**
- **Bone sclerosis is associated with non-vital or pulpitis tooth.**
- **No expansion of the jaw.**

Histological Features

- **dense sclerotic bone. Scanty connective tissue.**
- **Inflammatory cells.**

Radiological Features

- **Localized but uniform increased radiodensity related to tooth.**
- **Widened periodontal ligament space or peri-apical area.**
- **Sometimes an adjacent radiolucent inflammatory lesion may be present.**
- **Increased areas of radiodensity surrounding apices of nonvital mandibular first molar**

• **MANAGEMENT**

- **Elimination of the source of inflammation by extraction or endodontic treatment.**
- **If lesion persists and periodontal membrane remains wide, re-evaluation of endodontic therapy is considered.**
- **After resolution of lesion, inflammatory focus is termed as bone scar.**



DIFFUSE SCLEROSING OSTEOMYELITIS

- It is an ill-defined, highly controversial, evolving area of dental medicine.
- Exact etiology is unknown.
- Chronic intraosseous bacterial infection creates a smouldering mass of chronically inflamed granulation tissue.

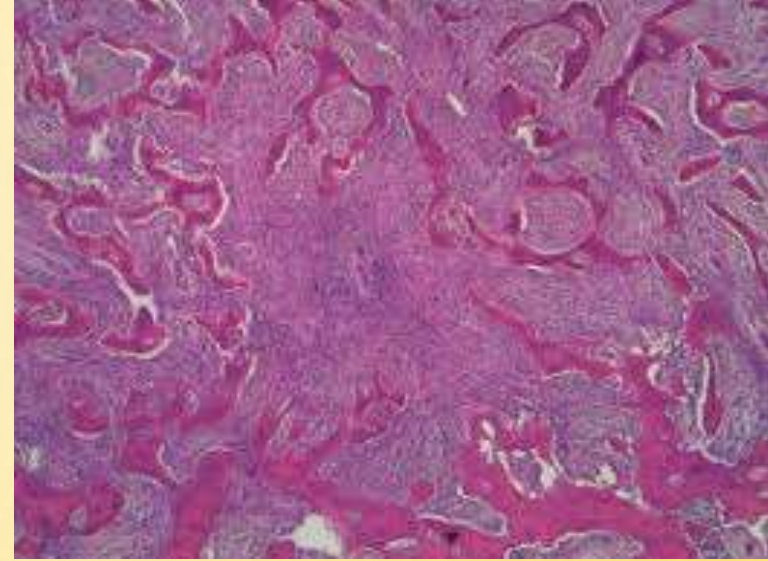
Clinical Features

- Arises exclusively in adult-hood with no sex pre-dominance.
- Primarily occurs in mandible.
- No pain.
- No swelling.



Histological Features

- **Bone sclerosis and remodelling.**
- **Scanty marrow spaces.**



- **Necrotic bone separates from vital bone & become surrounded by granulation tissue.**
- **Secondary bacterial colonization often is visible.**

Radiological Features

- **Increased radiodensity may be seen surrounding areas of lesion.**

Management

- **Elimination of originating sources of inflammation via extraction & endodontic treatment.**
- **Sclerotic area remain radiographically.**

GARRE'S OSTEOMYELITIS

- **Also known as “periostitis ossificans” & “proliferative periostitis”.**
- **It represents a periosteal reaction to the presence of inflammation.**
- **Affected periosteum forms several rows of reactive vital bone that parallel each other & expand surface of altered bone.**

Pathogenesis

- **The spread of low-grade, chronic apical inflammation through cortical bone causing periosteal reaction and stimulates proliferative reaction of periosteum leading to Garre's osteomyelitis.**

Clinical Features

- **Affected patients are primarily children & young adults.**
- **Incidence is mean age of 13 years. No sex predominance is noted.**
- **Most cases arise in the premolar & molar area of mandible.**
- **Hyperplasia is located most commonly along lower border of mandible.**
- **Most cases are uni-focal, multiple quadrants may be affected.**

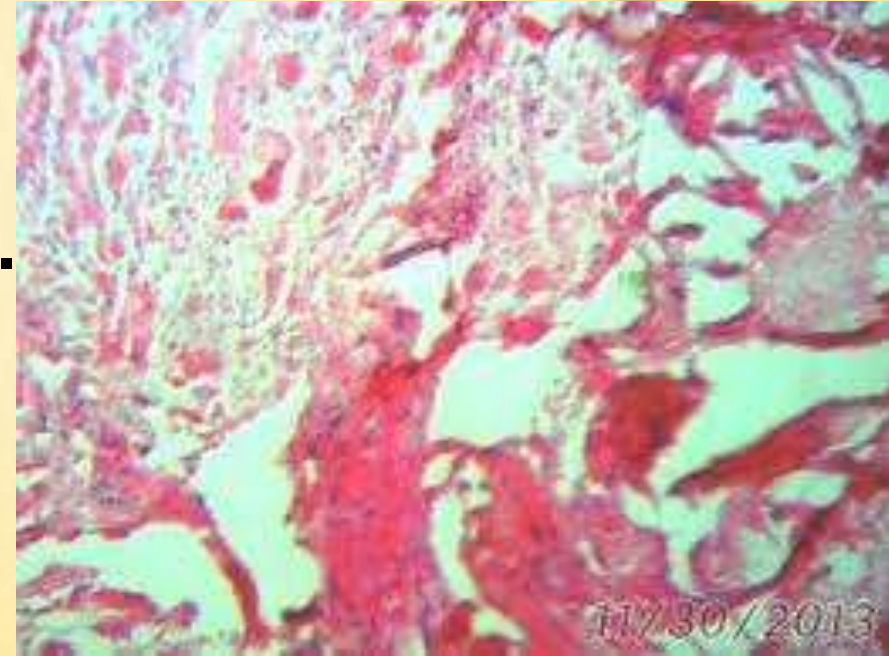
Radiological Features

- **Radiopaque laminations of bone roughly parallel each other & underlying cortical surface.**
- **Laminations may vary from 1-12 in number.**
- **Radiolucent separations often are present between new bone & original cortex.**



Histological Features

- **Parallel rows of highly cellular & reactive woven bone.**
- **Trabeculae are frequently oriented perpendicular to surface.**
- **Trabeculae sometimes form an interconnecting meshwork of bone.**
- **Between trabeculae, uninflamed fibrous tissue is evident.**



Management

- **Removal of infection.**
- **After infection has resolved, layers of bone will consolidate in 6-12 months .**

ACTINOMYCOSIS OSTEOMYELITIS

- **Rare chronic infection**
- **Actinomyces Israeli**
- **Normal flora**
- **3 types**
- **Thoracic**
- **Abdominal**
- **Cervicofacial**
- **Invades through soft tissue mucosa**

Clinical Features

- **Cervicofacial – mandible, parotid, maxillary sinus, tongue**
- **Extraoral swelling**
- **Sulphur granules**
- **Afebrile**

Investigations

- **Microscopy – branching filaments**
- **X-ray – radiolucent areas**
- **ESR increased**
- **Culture , biopsy**



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Treatment

- **IV antibiotic**
- **Prolonged treatment.**
- **Surgery sequestrectomy.**

TUBERCULOSIS OSTEOMYELITIS

- **Type of chronic osteomyelitis.**
- **Caused by mycobacterium tuberculosis.**

Aetiopathogenesis

- **Through direct inoculation of the bacilli into a wound**
- **Direct spread from infected sputum into an extraction socket.**

Clinical Features

- **Mandible more involved.**
- **Swelling in jaw painless.**
- **Pt. Complains of chronic discharging sinus.**
- **Loosening of teeth & sequestration of bone.**
- **Palpable lymph nodes.**

Diagnosis

- **Radiographs – PA chest radiograph essential.**
- **Scintigraphy**
- **Culture of pus & sputum**
- **Mantoux test**
- **Biopsy of lesion**



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Management :

- **Anti tubercular drugs**
- **Surgical – radical surgical resection.**

OSTEORADIONECCROSIS

- **Bone necrosis secondary to radiation damage.**

Clinical Features

- **Chronic pain**
- **Necrosis of bone & infection of tissues.**
- **Mandible more affected.**
- **Late sequestration of bone seen followed by severe pain.**
- **Permanent deformity of bone.**



Management :

- **Hyperbaric oxygen (HBO) therapy**
- **Adjunctive use of antibiotics, irrigation, local wound care, nutritional support.**



QUESTIONS

- 1. What is the conservative treatment plan of OML?**
- 2. What is the antibiotic treatment of OML?**
- 3. What is sequestrectomy?**
- 4. What is saucerization?**
- 5. What is decortication?**
- 6. What is fenestration?**
- 7. What are the microbial involve in OML?**
- 8. What is HBO therapy?**
- 9. What is Anti- tubercular drug?**
- 10. What is Mantoux test?**

QUESTIONS CONTD.

11. Describe ORN?

12. Describe tuberculosis OML?

13. Describe chronic suppurative OML?

14. Describe actinomycotic OML?

15. Describe sclerosing –(focal and diffuse) OML?

THANK YOU