Skull base osteomyelitis

By nagy ibreak Abdelkader MD
## History

The disease was first described by Meltzer and Kelemen in 1959.

In 1968, however, Chandler was the first to name it “malignant otitis externa.”

## Skull base osteomyelitis

Aggressive potentially life-threatening infection of the soft tissues of the external ear and surrounding structures, quickly spreading to involve the periostium and bone of the skull base.

### Synonyms

- **necrotizing external otitis**
  
  *(used for aggressive soft tissue infection in the absence of bony involvement)*

- **skull base osteomyelitis**
  
  *(used for the condition once bone infection is confirmed)*
causative agent

- In the most cases, the causative agent is Pseudomonas aeruginosa
- **Other bacteria** including (Staphylococcus aureus, S epidermidis, Proteus Klebsiella)
- fungal (Aspergillus)

**Conditions leading to more invasive MOE**

- **Impaired host immunity** 
  spread out of the external canal.
- **More virulent Pseudomonas species contain a mucoid surface layer** 
  protects the bacterium from phagocytosis
- **M.O also produce lytic enzymes, including endotoxin, collagenase, and elastase, causing a necrotizing vasculitis and endarteritis**
- **Invasion of surrounding tissue.**
MOE should be suspected in elderly diabetic with severe, unremitting otalgia, aural fullness, purulent otorrhea, and hearing loss. Immunocompromised patients with granulation tissue at the bony–cartilaginous associated cranial neuropathies

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<th>Symptoms</th>
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| ✓ **Otalgia**  
The pain is typically severe constant, deep-seated, worse at night, awakening the patient from sleep.  
- Chronic purulent otorrhea  
- Aural fullness  
- Hearing loss(CHL)  
- Cranial nerve palsies(VII > IX, X>XII>VII).  
- Headach  
- Temporomandibular joint pain & trismus  
- Patients usually have no systemic symptoms of infection, such as fever, chills. |
**Signs**

- Granulations at bony cartilagenous junction
- Purulent secretions
- Occluded canal and obscured TM
- Periaural lymphadenopathy may present
- Cranial nerve involvement.
- Trismus

**Diagnostic tools**

- Radiological
- C&S
- Biopsy
Imaging Studies

1- Computerized tomography
2- Magnetic resonance Imaging
3- Technetium-99 scintigraphy
4- Gallium 67 scintigraphy

Computerized tomography

- Computed tomographic scans help to evaluate the extent of bony involvement.
- It is a little use in early diagnosis as the pathology is late to appear on the CT scan (at least one third of bone mineral must be lost before radiologic changes become apparent)
- It is a little use in monitoring the resolution of infection (follow-up) because:
  - clinical cure occurred before radiologic improvement
  - pathology is late to disappear on the CT scan as the bone remineralization continues long after the infection is cured.
Magnetic resonance imaging

- It provides more detail regarding soft tissue disease and, when combined with magnetic resonance angiography, can evaluate the patency of the dural sinuses.

- Role out any intracranial complications.

- It can differentiate between inflammation and a truly malignancy.

Technetium (Tc-99m)

- It detects bony involvement even before high resolution computed tomography (CT) scans can demonstrate bone destruction.

As the isotope is absorbed by osteoclasts and osteoblasts that continue remodelling after the infection has resolved.

Make the scan remain positive for up to nine months.

So

its only helpful for early detection of bony involvement.
Technetium (Tc-99m)

Its absorbed by leukocytes and is a more sensitive indicator of infection. The scan quickly returns to normal after the infection has resolved and it’s the best modality for therapeutic monitoring and is useful in determining the duration of antimicrobial therapy.

Gallium (Ga-67) scan

It should be remembered that Ga-67 is taken up by any inflammatory process, including simple otitis externa and it is useful for monitoring rather than diagnosis.
Gallium (Ga-67) scan

Summary

The best modality for monitoring & determining the duration of antimicrobial therapy is Ga-67

The best early diagnostic modality is Tc-99 scan
**base line for follow up**

- Patient symptoms
- Routine investigations
  - CBC
  - FBS
  - renal & liver function test
- ESR

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**Management**

**Hospitalization**
- Control of diabetes, other underlying cause if present.
- Parenteral Antibiotics follow with oral (at least 6 weeks)
- use of topical agents is controversial
- Daily débridement
- Hyperbaric oxygen therapy has been used as an adjunctive measure.
- Surgical intervention?
  is controversial many surgeons not recommending even with facial palsy.
Signs of improvement

- No pain
- ESR return to normal

Assessment of the Results

in each follow up visits must be examine the following:-
- Signs & Symptoms.
- ESR and blood sugar.
Clinical Response
usually within the first week of effective therapy. the first indicators of a favorable therapeutic response are Lessening of pain & lowered ESR

Relapse
occur in 20% of patients. after apparently successful therapy.
usually occurs within 3 months after therapy is completed.

Relapse
The first sign of relapse is usually recurrent otalgia, ESR elevated again (ESR is often over 100 mm/hour)

repeat biopsy and cultures are warranted to rule out an occult malignancy if inflammatory disease persists despite appropriate antibiotic therapy.
Differential diagnosis

carcinoma of the ear canal
granulomatous diseases
nasopharyngeal malignances
clival lesions, and fibrous dysplasia
Differential diagnosis

Nasopharyngeal carcinoma

Take home messages

1. Pseudomonas aeruginosa is responsible in over 95 percent of cases.
2. Diabetes mellitus is the most important predisposing factor.
3. The diabetic patients must be aware of scratching the ear and wrong manipulations.
4. Skull base osteomyelitis is a medical problem that requires medical treatment as the surgery limited or no role.
5. Erythrocyte sedimentation rate is a good predictor of the disease process and outcome of treatment.
6. Mortality rate has dropped from 50 percent to below 10 percent.