Tuberculosis Otitis Media
Introduction

- 85% TB $\rightarrow$ lungs, 15% $\rightarrow$ extrapulmonary or both

- Tuberculosis otitis media is rare $\rightarrow$ 0.9 to 0.04% of all TB, or 0.04% of all COM, or 4% of the head and neck TB

- 40~50% TOM have no evidence of TB elsewhere
History

- Wilde: the first to describe
- 1915: Turner and Fraser – 2.8% in suppurative otitis media
- 1960: Friedman – 0.09% in COM
- 1983: Jeang and Fletcher – 0.04% in COM
Epidemiology

- **Annual incidence** — 5.5/100000 before 1953 to 2.3/100000 after 1953
- **<15 years old**: 84% of all cases
- **TOM was the cause of suppurative otitis media**
  - In 50% of infants < 1 year
  - In 27.9% between the age of 1-2 years
ENT local finding

- Intact TM ➔ pale, tense, thickened and immobile, with a strong vascular (hyperemic) pattern
- Thick ear drum ➔ early multiple perforation with abundant pale granulation, and late fused to a large single
- Pale-yellow, avascular polypoid or granulation tissue in the middle ear and EAC
- Discharge may be serous, if bacterial superinfection (79%), mucoid or purulent
- Destruction of the ossicles may be visible ➔ conductive hearing loss
The pathogenesis

- Spread to the middle ear through the E tube
- Hematogenous spread from another TB focus
- Direct implantation through the EAC and TM perforation → After grommet tube insertion
- Aspiration of infected milk through the E tube was a very common way between 1900-1950
Characteristics

• Ear discharge does not react to abx
• Aminoglycoside otics alter the smear and culture
Examination

• EAC smears are positive in 20%, and cultures are positive in 5 to 35%
• Inoue et al: PCR provides a more rapid and reliable diagnosis
• Inoue et al: diagnosis cannot rest on staining of secretions alone; it more likely requires a biopsy with staining and culture
• Tissue culture: 2-6 weeks
Clinical presentation

- **Otorrhea:** near 100%, thick or mucoid or thin and watery, acute or chronic, constant or intermittent, light or profuse, and either serous or purulent.
- **Otalgia:** about 30%.
- **Profound hearing loss:** (conductive-90%, SNHL-8%, mixed-2%)
- **Vertigo, labyrinthitis**
- **Peripheral facial palsy:** 15~40%
- **Preauricular adenopathies, cervical adenopathies (7%)** or retroauricular fistulas, retroauricular bulging (20%)
- **Toxic sign-- extradural abscess or tuberculous meningitis**
- **Temporal petrositis**
Table 1. Clinical characteristics of tuberculous otitis media

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Groups</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fast onset</td>
<td>Slow onset</td>
</tr>
<tr>
<td>Number of patients</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Lymphadenitis</td>
<td>0</td>
<td>1 (11.1%)</td>
</tr>
<tr>
<td>Sensorineural hearing loss</td>
<td>1 (33.3%)</td>
<td>3 (33.3%)</td>
</tr>
<tr>
<td>Facial palsy</td>
<td>2 (66.7%)</td>
<td>3 (33.3%)</td>
</tr>
<tr>
<td>Cholesteatoma</td>
<td>0</td>
<td>2 (22.2%)</td>
</tr>
<tr>
<td>Labyrinth fistula</td>
<td>0</td>
<td>2 (22.2%)</td>
</tr>
<tr>
<td>Fallopian canal destruction</td>
<td>0</td>
<td>4 (44.4%)</td>
</tr>
<tr>
<td>Granulations</td>
<td>0</td>
<td>6 (66.7%)</td>
</tr>
<tr>
<td>Oedema</td>
<td>3 (100.0%)</td>
<td>3 (33.3%)</td>
</tr>
</tbody>
</table>
CT image

Fig. 1  Computerized tomography (CT) scan images which taken before (a) and after (b) tympanostomy tube insertion. These CT scans show development of soft tissue density in the left mastoid and middle ear after tympanostomy tube insertion.
ENT local finding
Intraoperative

**Fig. 3** Photograph of intraoperative finding demonstrating a granulomatous mass (*arrow*) in the mastoid antrum. *EAC* external auditory canal, *MCF* middle cranial fossa plate
Figure 1  Shows postaural scar and granulations.

Figure 2  Shows swelling and discharge from multiple sinuses anterior to the ear and postaural region.
Diagnosis

- Biopsy with staining and culture should be considered
- Difficult:
  1) Less than 0.9% of COM → the low incidence
  2) Clinical signs are variable and often different from the classic description
  3) False negative cultures →
     1) The fastidious nature of *Mycobacterium tuberculosis* (*M. Tb*)
     2) Other bacteria in the specimen interfering with it growth
     3) Neomycin: weak anti-TB activity

The culture of the tissue or secretion is usually negative
Positive (AFB) smears are uncommon (2-14%)
Differential diagnosis

Infectious:
- Fungal infections (e.g. histoplasmosis and blastomycosis), congenital or acquired syphilis, nocardiosis, chronic bacterial otitis, and necrotizing external otitis

Noninfectious:
- Wegener's granulomatosis, sarcoidosis, cholesteatoma, lymphoma, and histiocytosis X
- Trauma may cause CSF fluid to leak → chronic serous drainage
- Foreign bodies, tumors as SCC, rhabdomyosarcoma, and Langerhans cell histiocytosis
Histopathologic examination

- Nonspecific changes consistent with chronic inflammation
- May also reveal more specific signs such as massive lymphocyte and langhan giant cell infiltration and chronic granulomatous inflammation with multinucleated giant cells, central cassation, or epitheloid cells
Duration of symptom

Fig. 1. The duration of ear symptoms in patients with tuberculous otitis media.
Clinical presentation (TOM vs cholesteatoma)

The incidence of complications with cholesteatoma was significantly lower than in TOM.
Hearing loss

Fig. 2. Preoperative pure-tone averages (500, 1,000, 2,000 and 4,000 Hz).
Laboratory finding

- The number of Mycobacteria is very low in clinical specimens than sputum; pus swab for culture (+) 5~35% or AFS(+) <20%
- Even if the lesions appear active histologically, microscopic exam of tissue sections showed few or no TB; up to 10% false negative
- Confirmative diagnosis by tissue biopsy
- PCR amplification (<2 hrs) is useful for detecting DNA
- FNA : useful option at cervical adenopathies
Laboratory finding

- Tuberculin test: positive in 94% patients:
- Mastoid X-ray and chest X-ray
- Culture: positive tuberculous culture was obtained in <53% patients
<table>
<thead>
<tr>
<th></th>
<th>Acid Fast Bacilli Stain Discharge</th>
<th>Mycobacterium tuberculosis Culture Discharge</th>
<th>Acid Fast Bacilli Stain Tissue</th>
<th>Mycobacterium tuberculosis Culture Tissue</th>
<th>Histology</th>
<th>Polymerase Chain Reaction Tissue</th>
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<tr>
<td>Positive</td>
<td>2</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>49</td>
<td>7</td>
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<tr>
<td>Negative</td>
<td>18</td>
<td>20</td>
<td>33</td>
<td>42</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Not tested</td>
<td>33</td>
<td>33</td>
<td>11</td>
<td>11</td>
<td>0</td>
<td>45</td>
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Treatment

Effective anti T.B chemotherapy possible to cure the infection without the surgery

Medication:

• The same as that recommended for extrapulmonary T.B

• 4 anti-T.B drugs: isoniazid, rifampin, pyrazinamide, ethambutol for at least 6 months

• Surgery without anti-T.B therapy → development of fistulae and a failure of wound
Medication

- Treatment delay—13.2 months
- Excellent result of anti-T.B drug for otorrhea, closure of TM perforation, disappearance of facial palsy
- Effects of hearing: unpredictable
- Failure of drug treatment (HIV, preciously treated for TB)—consider multiresistant M. tuberculosis strain
Surgery

- Provide histological material for diagnosis
- For the complication of post-auricular abscess, facial nerve palsy, subperiosteal abscess, fistulae, CNS involvement
- For mastoid exploration
- After failure of medical treatment
- Anti-TB drug after surgery appeared to achieve a dry ear earlier than those without surgery (Yang-Sun Cho et al., Korea)
Conclusion

- Microbiological and histopathological verification should be conducted, but negative results do not rule out TB
- PCR testing represents a most reliable, but still controversial diagnostic method
Conclusion

• The progression of TOM can be variable and insidious

• Due to rarity → factors that contribute to the difficulty in diagnosing TOM include the unreability of smears, stains, and cultures in identifying AFB
Conclusion

• Delayed diagnosis and treatment can result in severe complications

• The importance of maintaining a high degree of clinical suspicion of TOM, particularly those whose PPD test is positive
Reference

• Mohammad Sohail Awan, et al: Tuberculous otitis media: Two case reports and literature review. *Ear Nose and Throat J* 2002; 81: 792-794
• Jacob Kahane and Benjamin T. Crane: Temporal Bone Histopathology Case of the Month, Tuberculous Otitis Media, Otology & Neurotology, Vol. 30, No. 6, 2009
• Chang Woo Kim et al: Tuberculous otitis media developing as a complication of tympanostomy tube insertion. *Eur Arch Otorhinolaryngol* 2006; accepted: 23 August

Thanks for your attention !!