

## Challenges encountered in the diagnosis of tuberculous otitis media: case report and literature review

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### Abstract

**Objective:** To report a rare case of tuberculous otitis media, and to highlight barriers to clinical and microbiological diagnosis.

**Method:** Case report and literature review.

**Results:** Tuberculous otitis media is a rare cause of chronic ear infection in the UK. Its symptoms may mimic a range of other otological conditions, including otitis media, chronic suppurative otitis media, cholesteatoma and necrotising otitis media.

**Conclusion:** This case report highlights the challenges of obtaining a clinical diagnosis of tuberculous otitis media, and emphasises the fact that screening for acid-fast bacilli is not sufficient, in isolation, to rule out mycobacterial infection.

**Key words:** Otitis Media; Suppurative Tuberculosis; Ear, Middle

### Introduction

Tuberculous otitis media is rare in the UK, accounting for only 0.04 per cent of chronic suppurative otitis media cases.<sup>1</sup> For this reason, it is often diagnosed late.<sup>2</sup>

Tuberculous otitis media may occur at any age, and commonly presents with features of chronic otitis media, including otorrhoea and hearing loss, with or without facial palsy.<sup>3</sup> Complications include fistulae, facial nerve palsies, labyrinthitis, tuberculous osteomyelitis, mastoiditis, hearing loss and spread of infection to the central nervous system.<sup>4</sup> It is therefore imperative that this condition is diagnosed and treated early.

Computed tomography (CT) is the imaging modality of choice for the investigation of chronic middle-ear disease, and is highly sensitive in detecting soft tissue disease and bony erosion.<sup>5</sup> The radiological signs of tuberculous otitis media include soft tissue filling the entire middle-ear cavity, preservation of mastoid air cells without bony damage, soft tissue extension, and mucosal thickening of the external auditory canal.<sup>5</sup> While these changes are characteristic of tuberculous otitis media they are not diagnostic, and accurate diagnosis depends on tissue histology or microbiological culture.

The mainstay of treatment for tuberculous otitis media is quadruple therapy with the antituberculous drugs isoniazid, rifampicin, pyrazinamide and ethambutol.<sup>6</sup> The involvement of a multidisciplinary team is essential, in order to investigate for extra-aural foci of infection and to trace patient contacts, given the high incidence (up to 93 per cent) of pulmonary tuberculosis (TB) in patients presenting with tuberculous otitis media.<sup>7</sup>

### Case report

A 40-year-old Eastern European woman presented to the ENT department with a two-month history of unilateral, right-sided otalgia and otorrhoea. She was systemically well. Otoscopy revealed debris in the external auditory canal and oedema of the canal wall.

A diagnosis of otitis externa was made and the patient treated with topical steroid-antibiotic drops.

However, her symptoms failed to resolve, and over the course of the next three months she developed moderate to severe right-sided hearing loss, vertigo, tinnitus and a right-sided facial palsy (House–Brackmann grade V).

Examination of the ear with an operating microscope showed a large posterior perforation, with pale debris in the middle ear and attic. At this stage, the diagnosis was revised to probable cholesteatoma. A CT scan of the temporal bones showed soft tissue material filling the middle-ear cleft, but no bony erosion (Figure 1).

The patient was admitted for examination of the right ear under general anaesthesia. During this procedure, the tympanic membrane was found to be absent, and pale granulation tissue was seen in the middle-ear cleft (Figure 2). An intra-operative culture swab taken from the middle-ear cleft grew *Pseudomonas aeruginosa*, causing the diagnosis to be revised again, to necrotising malignant otitis externa.

A tissue biopsy from the middle ear, taken during the procedure, showed pale granulation tissue but no epithelial cells, malignant cells or granulomata. Staining of the biopsy material for acid-fast bacilli showed no evidence of mycobacteria. However, subsequent culture of biopsy tissue grew mycobacterium species, identified as *Mycobacterium*



FIG. 1

Axial computed tomography scan demonstrating soft tissue reaction in the right middle-ear cleft. A = anterior; R = right; L = left; P = posterior



FIG. 2

Endoscopic image of the right ear showing a large central perforation. The handle of the malleus, long process of the incus and pale granulation tissue in the middle-ear cleft can all be clearly seen. (0° endoscopy, Karl Storz).

*tuberculosis* on polymerase chain reaction. This allowed the diagnosis of tuberculous otitis media, and the patient was commenced on quadruple therapy (i.e. rifampicin, pyrazinamide, pyridoxine and ethambutol) for 12 months.

Due to poor compliance, antituberculous medication was only taken for six months, after which time the patient's right-sided otorrhoea and otalgia had settled and her facial palsy had partially recovered (to House–Brackmann grade III).

## Discussion

Two valuable learning points can be derived from this case.

Firstly, this case exemplifies the fact that tuberculous otitis media closely mimics other, more common otological and

systemic disorders. For this reason, a high index of clinical suspicion is required to make the diagnosis. As in our patient, the diagnosis may be confused with otitis externa, cholesteatoma and necrotising otitis externa. The differential diagnosis also includes squamous cell carcinoma of the middle-ear cleft and fungal infection.

Secondly, this case highlights the difficulty that may be encountered in obtaining microbiological confirmation of *M tuberculosis* infection. In our patient, an ear swab taken directly from the middle-ear cleft yielded only *P aeruginosa*, further adding to the diagnostic confusion. Histological examination of biopsied granulation tissue did not identify any classical features of TB. Moreover, acid-fast bacilli testing on both the tissue biopsy and the ear swab was negative. The diagnosis was only made after mycobacterium species were cultured from tissue samples. The rarity of tuberculous otitis media, combined with the difficulty in gaining microbiological confirmation of the disease, may delay the correct diagnosis.

- Tuberculous otitis media is rare (representing 0.04 per cent of chronic suppurative otitis media cases)
- Symptoms may mimic other diseases of the external and middle ear
- Obtaining microbiological confirmation of disease may be difficult
- Diagnosis is often made late
- Polymerase chain reaction testing is often necessary to identify *Mycobacterium tuberculosis*

Previous studies of extrapulmonary TB have emphasised the challenge of obtaining positive microbiological evidence of TB.<sup>6</sup> Mycobacterial counts are often low, and other microorganisms may interfere with culture (e.g. staphylococcus, pseudomonas, klebsiella, proteus and streptococcal species).<sup>8</sup> The incidence of positive acid-fast bacilli testing in tissue samples has been reported to be in the region of 27%, while the incidence of positive *M tuberculosis* culture from tissue samples may be as low as 70%, again demonstrating the difficulty of achieving a positive diagnosis.<sup>9,10</sup>

## Conclusion

This case highlights the diagnostic challenge presented by tuberculous otitis media, and the high index of clinical suspicion needed for its diagnosis. Furthermore, it reinforces the fact that testing for acid-fast bacilli cannot in isolation be relied upon to make the diagnosis, and that culture together with polymerase chain reaction testing are also necessary.

A combination of clinical vigilance and appropriate diagnostic investigations will assist the early identification of cases of tuberculous otitis media. This may reduce the risk of developing potentially significant complications of the disease.

## References

- 1 Weiner GM, O'Connell JE, Pahor AL. The role of surgery in tuberculous mastoiditis: appropriate chemotherapy is not always enough. *J Laryngol Otol* 1997;**111**:752–3
- 2 Vaamonde P, Castro C, Garcia-Soto N, Labella T, Lozano A. Tuberculous otitis media: a significant diagnostic challenge. *Otolaryngol Head Neck Surg* 2004;**130**:759–66
- 3 Vital V, Printza A, Zaraboukas T. Tuberculous otitis media: a difficult diagnosis and report of four cases. *Pathol Res Pract* 2002;**198**:31–5

- 4 Wallmer LJ. Tuberculous otitis media. *Laryngoscope* 1953;**63**: 1058–77
- 5 Rhoa MH, Kimb DW, Kima SS, Sunga YS, Kwona JS, Leea SW. Tuberculous otomastoiditis on high-resolution temporal bone CT: comparison with nontuberculous otomastoiditis with and without cholesteatoma. *Am J Neuroradiol* 2007;**28**:493–6
- 6 Hoca NT, Ögretensoy M, Dayioglu D, Akbafı N. Tuberculous otitis media – a case report. *Turkish Respiratory Journal* 2008;**9**:48–50
- 7 Kirsch CM, Wehner JH, Jensen WA, Kagawa FT, Campagna AC. Tuberculous otitis media. *South Med J* 1995;**88**:363–6
- 8 Lee PY, Drysdale AJ. Tuberculous otitis media: a difficult diagnosis. *J Laryngol Otol* 1993;**107**:339–41
- 9 Cleary KR, Batsakis JG. Mycobacterial disease of the head and neck: current perspective. *Ann Otol Rhinol Laryngol* 1995;**104**: 830–3
- 10 Williams RG, Douglas-Jones T. Mycobacterium marches back. *J Laryngol Otol* 1995;**109**:5–15

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Mr O T Dale takes responsibility for the integrity of the  
content of the paper  
Competing interests: None declared

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