Clinical Finding, Diagnosis, and Management of Tuberculous Mastoiditis in 4 Cases

Sally Mahdiani[1], Lina Lasminingrum[1], Bambang Purwanto[1], Riri Handayani[2]

[1]Medical Staff, [2]Resident, Department of Otolaryngology Head and Neck Surgery, Faculty of Medicine, Universitas Padjadjaran – Dr. Hasan Sadikin General Hospital, Bandung, Indonesia

Abstract

Background: Tuberculous mastoiditis is a rare case of chronic otitis media disease and extrapulmonary tuberculosis, caused by Mycobacterium tuberculosis. **Case Presentation:** Four cases of tuberculous mastoiditis were reported, ranging in age from 16 to 66 years. All patients presented with chronic discharge with signs of mastoiditis with intra and extratemporal complications. Two patients only manifested in the mastoid and two other patients had symptoms of tuberculosis in other organs, especially the lungs. All patients underwent radical mastoidectomy and histopathological examination showed tuberculosis. All patients received category 1 and category 2 antituberculosis drugs. **Conclusion:** The clinical features of tuberculous mastoiditis vary. Diagnosis of tuberculous mastoiditis can be done by histopathological examination and geneXpert. Surgical therapy and administration of antituberculosis are the main options in the management of tuberculous mastoiditis.

Keywords: *Antituberculosis, Mastoiditis, Radical Mastoidectomy, Tuberculosis*

Introduction

Tuberculosis (TB) is still a major health problem, especially in developing countries. In 1993, WHO declared TB a world emergency. In 2007, it was estimated that 13.7 million people suffered from TB with 9.3 million new cases and 1.8 million deaths. TB is an infectious disease caused by Mycobacterium tuberculosis[1-3]. Tuberculosis affects mainly the lungs but 15-30% of cases are outside the lungs[1, 2]. Middle ear TB and temporal bone are rare sites with an incidence of 0.04–0.9% of all tuberculosis cases, 0.04% of all cases of chronic otitis, and 1% of head-neck tuberculosis[4].

Corresponding Author:
Sally Mahdiani
Department of Otolaryngology Head and Neck Surgery, Faculty of Medicine Universitas Padjadjaran – Dr. Hasan Sadikin General Hospital, Jl. Pasteur No. 38, Bandung, West Java 40161, Indonesia
Mail: sallyunpad@gmail.com
Orcid ID: 0000-0002-9812-3564

TB is a challenging disease, making the diagnosis requires a high index of suspicion because of its varied and atypical presentation especially in developing countries[5]. The classic symptoms of tuberculous otitis media are multiple perforation of the tympanic membrane, painless otorrhea, and a lot of granulation tissue. Other symptoms include multiple ear secretions, bone destruction, preauricular, retroauricular and cervical lymphadenopathy, facial nerve paralysis, sensorineural hearing loss and an association with pulmonary tuberculosis[4]. The differential diagnosis of tuberculous otitis media includes fungal infection, Wegener's granulomatosis, midline granuloma, sarcoidosis, syphilis, otitis externa necrosis, lymphoma, histiocytosis, and cholesteatoma[6].

Diagnosis of TB otitis media is difficult. Surgery is sometimes performed first to diagnose the mastoid exploration in cases of facial nerve paralysis and mastoiditis. For a definite diagnosis of otitis media based on finding acid-resistant bacilli with granulomas on tissue biopsy, ear discharge or middle ear aspiration with or without Mycobacterium tuberculosis culture[7].

In many case reports, examination of geneXpert TB is used in detecting the presence of M. tuberculosis in pulmonary and extrapulmonary TB cases[8]. The administration of antituberculosis for tuberculous mastoiditis was in accordance with the treatment of extrapulmonary tuberculosis, namely category 1 antituberculosis for new cases of patients[9]. Based on the description above, we are interested in reporting a case of tuberculous mastoiditis.

Case Presentation

Case 1

A 16-year-old woman with main complaint of discharge from the right ear and behind the right ear since 2 weeks before being admitted to the hospital. Yellowish liquid mixed with blood. History of discharge from the right ear since 10 years ago, intermittent. History of swelling behind the ear since 1 month ago (Fig 1). The right ear has decreased hearing since 1 year ago.

Physical examination revealed general status within normal limit. From the examination of the ear, it was found fistula and granulation tissue in the right retroauricular, there was pus and no edema, no tenderness. The results of otoscopy of the right ear showed granulation tissue in the external acoustic canal filled almost the entire canal, there was mucopurulent secretions mixed with blood, the tympanic membrane was difficult to assess. In otoscopy the left ear was within normal limit. From the results of pure tone audiometry, it was found that the right ear had a very severe degree of sensorineural hearing loss and the left ear had hearing within normal limits. The patient was diagnosed temporarily with right mastoiditis with right retroauricular fistula and CAE granulation tissue. Performed curettage of the right external acoustic canal granulation tissue under local anesthesia, reddish colored tissue was obtained and sent to the anatomical pathology department for histopathological examination. Ear secretions are sent to the laboratory for examination of culture and germ sensitivity.

Pseudomonas aeruginosa was found and the results of sensitive resistance tests against antibiotics Ampicillin sulbactam, Cephazolin, Ciprofloxasin, Cotrimoxazole and Tigecylin. From the pathology examination of the granulation tissue found tuberculous inflammation in the external canal area of the right ear. Chest X-rays within normal limit. The patient was tested for geneXpert TB from ear secretions and got a positive result/rifampin sensitive. The patient was started on category 1 antituberculosis therapy.

The result of the temporal computed tomography examination showed suggestive right mastoiditis accompanied by cholesteatoma with destruction of the right petrous bone and surrounding mastoid air cells to the posterior part of the mastoid bone and apparently still limited to the meningens, obliterating the right external and internal acoustic canal and apparently associated with soft tissue. The patient was diagnosed as right mastoiditis with retroauricular fistula and tissue granulation of the external acoustic canal. Then the patient was treated with right radical mastoidectomy and retroauricular fistula repair. From operative findings, we only found stapes but the semisircular canal and facial canal were intact.

Patient returned 7 days after surgery, obtained dry surgical wounds, removed all sutures and removed the tampon on the external acoustic canal. The results of the histopathological examination of the operation concluded: tuberculous mastoiditis (fig 2). Antituberculosis therapy was continued. After 6 months of antituberculosis therapy, there was improvement in his general condition and ear symptoms. The wound on the retroauricular abscess is closed well. Antituberculosis drug administration was stopped.

Case 2

A 66-year-old woman with complaints of discharge from the left ear accompanied by pain behind the left ear since 2 months with feeling numb in the cheek and lip area since 9 months before being admitted to the hospital. All Symptoms are worsen so that the patient could not close her left eye. The patient was on antituberculosis treatment since 2 weeks due to miliary tuberculosis. A history of high blood pressure was recognized.

From the physical examination, the patient's blood pressure was 160/80 and other general status within normal limit. On the left otoscopy examination, it was found that the external acoustic canal was calm, there was mucopurulent secretions, the tympanic membrane

was completely perforated, and the granulation tissue was seen in the tympanic cavity. Retroauricular was within normal limit. Right ear otoscopy within normal limit. From the maxillofacial examination, the face is not symmetrical, there is a left peripheral cranial nerve VII paralysis of House Brackmann VI. Pure tone audiometry showed that the right ear had a mild degree of sensorineural hearing loss and the left ear was a profound degree of sensorineural hearing loss.

The results of culture found Pseudomonas aeruginosa and sensitive resistance test results resistant to Ampicillin sulbactam, Cephazolin, Cotrimoxazole, and Tigecylin. From the pathology examination of nasopharyngeal biopsy conclusions: Tuberculous nasopharyngitis. Chest X-ray gave a picture of miliary TB and the results of computed computed tomography with left mastoiditis. The patient was diagnosed as left CSOM with mastoiditis, left facial peripheral facial nerve paralysis HB VI, and tuberculous nasopharyngitis. Then the patient was treated with left radical mastoidectomy and facial nerve decompression. The results of the histopathological examination from granulation tissue in mastoid cavity showed tuberculous mastoiditis. The category 2 antituberculosis administration was continued. Examination of the TB gene Xpert from the sputum and granulation tissue were positive/rifampin sensitive.

After 5 months of further OAT category 2 administration, an evaluation of the treatment was carried out. The patient felt a significant change in symptoms from ear symptoms. From the nasoendoscopy examination, there was no mass. However, from the results of the sputum examination, acid-resistant bacteria were found. The patient was then re-tested for geneXpert, and the result was positive/rifampin resistance. The patient was referred to the pulmonary tuberculosis section.

Case 3

A 19-year-old man with complaints of discharge from his right ear since 3 years of continuous coloration has a greenish yellow odor. Hearing loss is felt in the right ear. The right otoscopy showed that the external acoustic canal was normal, there was mucopurulent secretions, and the tympanic membrane was completely perforated, and granulation tissue was seen in the tympanic cavity. Left ear otoscopy within normal limit. Examination of culture and sensitivity of germs from ear secretions is carried out. The results of pure tone audiometry showed that the right ear had moderate conductive hearing loss and the left audiogram was normal.

We found Pseudomonas aeruginosa and resistant to Amikacin, Ampicillin sulbactam, Cefepime, Ceftazidime, Cephazolin, Cotrimoxazole Piperacillin Tazobactam and Tigecylin. The results of computed computed tomography showed isodense lesions filled the mastoid cavity, starting from the mastoid tip to the mastoid tegmen (fig 3). The patient was diagnosed with right CSOM accompanied by extreme mastoiditis. Then treated with radical mastoidectomy and obliteration. The results of the histopathological examination of the surgery concluded: chronic mastoiditis tuberculosis and cholesteatoma in the right mastoid.

The patient was consulted to the internal medicine department for antituberculosis therapy, then tested for the TB geneXpert with a positive result/rifampin sensitive and began to receive antituberculosis therapy. After 3 months after surgery and receiving antituberculosis therapy, the patient felt significant changes, increased body weight and reduced ear symptoms.

Case 4

A 34-year-old man with complaints of discharge from the right ear accompanied by ulcers behind the right ear. Complaints of discharge have been felt since 2 years. A history of swelling behind the right ear since 2 weeks ago. From the examination of the ear, there was ulcer in the right retroauricular (Fig. 1) with pus but no edema and no pain. The results of right otoscopy showed that the external acoustic canal was normal, there was mucopurulent secretions and tympanic membrane was completely perforated. Left otoscopy was within normal limits. Pure tone audiometry showed that the right ear had a profound degree of sensorineural hearing loss and the left ear had a mild degree of sensorineural hearing loss.

From the results of the curl found Aeromonas salmonicida and sensitive resistance test results to

the antibiotics Amikacin, Amoxycilin clavulanate, Ampicillin sulbactam, Cefadroxil, Cefixim, PiperacillinTazobactam, and Meropenem. Resistant to Ciprofloxacin, Levofloxacin, Cefepime, Ceftazidime, Cephazolin, Gentamicin Cotrimoxazole and Tigecylin. The chest X-ray showed a picture of pulmonary tuberculosis. The patient was consulted to the internal medicine department for antituberculosis therapy and started to receive category 1 antituberculosis therapy. The results of the temporal computer tomography examination showed that there was right mastoiditis that obliterating the external and right internal acoustic canal and seemed to be associated with soft tissue on the posterior mastoid.

The patient was diagnosed with right CSOM with extreme mastoiditis and retroauricular fistula and pulmonary tuberculosis. Then treated with radical mastoidectomy with obliteration and repair of right retroauricular fistula. From operative findings, we only found stapes but the semisircular canal and facial canal were intact.

Examination of TB geneXpert with positive results/rifampin sensitive was carried out. Category 1 antituberculosis therapy was continued. Then 3 months after giving antituberculosis, the patient was evaluated and the patient felt the general condition and weight gain. Complaints of ear symptoms are reduced. The fistula of the right retroauricle is well closed.

Figure 1. Retroauricular abscess

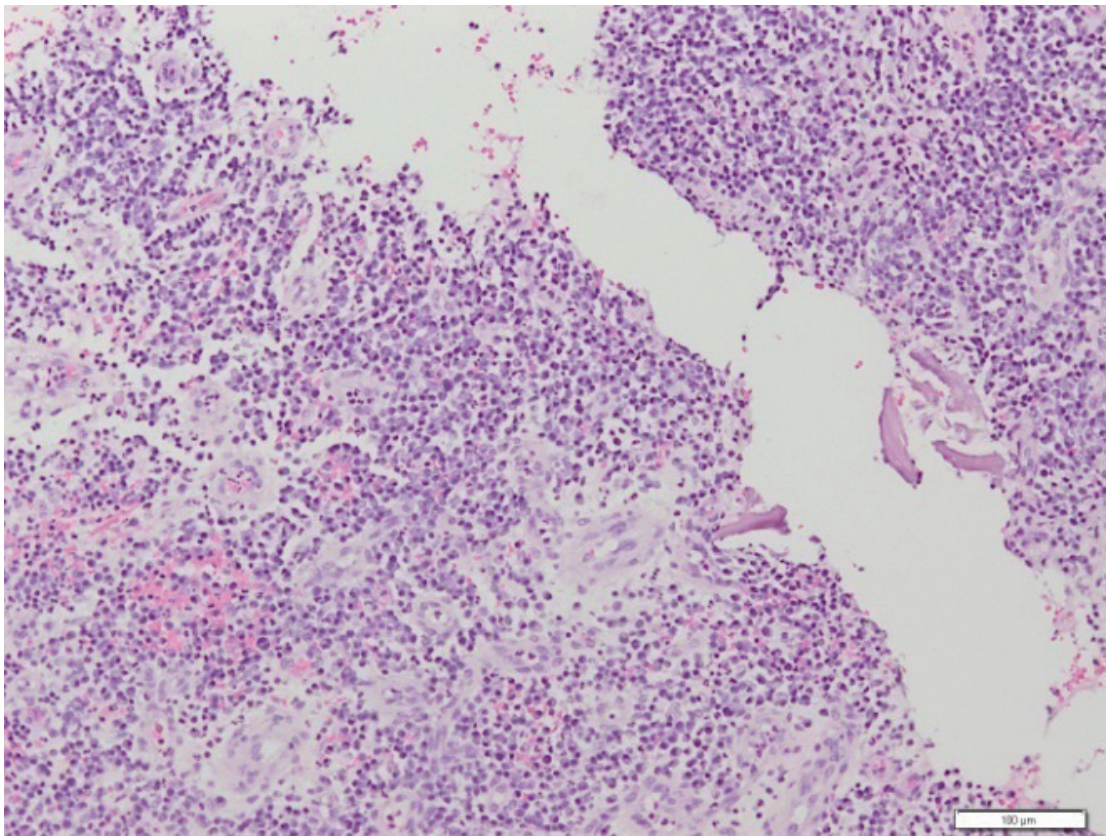

Figure 2. Histology shows the presence of Mycobacterium tuberculosis

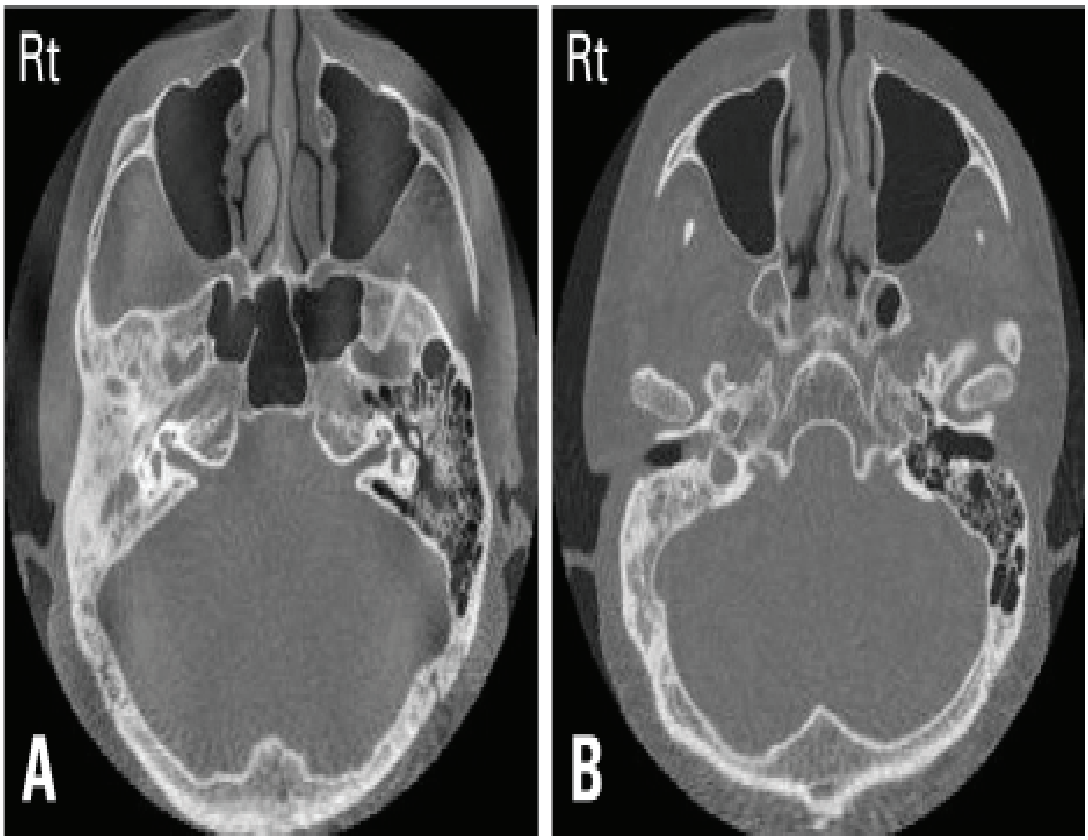

Figure 3. CT scan of damaged mastoid bone

Discussion

Primary tuberculosis of the ear is rarely reported and the disease is usually secondary to infections of the lungs, larynx, pharynx, and nose. TB bacteria can enter the temporal bone by a variety of routes: insufflation through the eustachian tube, haematogenous spread, contact from adjacent intracranial or extracranial infected foci, directly through the external acoustic canal via tympanic membrane perforation[9].

Temporal bone computer tomography is often used to assist in the diagnosis of tuberculosis otitis media. On computed tomography sclerosis of the mastoid cavity and opacification of the middle ear and mastoid can be found. The ossicular destruction and facial canal destruction are often confused with cholesteatoma features[7]. Histopathological examination is an important modality for diagnosis of TB, especially extrapulmonary TB. Bacterial infection caused by Mycobacterium tuberculosis, this slow growing aerobic Bacillus forming granulomas with caseose necrosis due to the cellular response of the tissue involved[10].

The geneXpert examination is a rapid test using the automatic polymerase chain reaction (PCR) molecular test. This test can detect the presence of M. tuberculosis and resistance to Rifampin for less than 2 hours. It is new generation technology of automated platforms for molecular diagnosis[8]. The standard of TB mastoiditis treatment is in accordance with the treatment of extrapulmonary TB, namely with antituberculosis drugs for at least 6 months. Treatment was divided into two phases: an intensive 2-month-phase with isoniazid, rifampin, pyrazinamide and ethambutol. Maintenance phase for at least 4 months with the drug isoniazid and rifampin. During treatment, improvement of clinical symptoms such as ear discharge and weight gain should be considered as measures of treatment success[11].

Surgery for tuberculous mastoiditis is controversial. Surgery is required in cases to remove the sequester and improve drainage. Surgical techniques and instructions are the same as surgery for chronic suppurative otitis media with or without cholesteatoma[7]. In the treatment of TB mastoiditis cases above, all patients were subjected to radical mastoidectomy. Radical mastoidectomy provides access to the antrum, tweezers, labyrinth, endolympthatic sac, and vertical and horizontal segments of the facial nerve. All air cells along the tegmen, sigmoid sinus, facial nerve and semicircular canal are usually cleaned. The epitympanum can be accessed via the aditus ad antrum, the incus and the head of the malleus can be examined directly. The incus and malleus head can be lifted for greater access to the supratubal recess in the anterior part of the groin[12]. According to Cho et all, in the group that underwent surgery accompanied by administration of antituberculosis therapy gave better results compared to only antituberculosis therapy[2].

Conclusion

The clinical features of tuberculous mastoiditis vary. Diagnosis of tuberculous mastoiditis can be done by histopathological examination and examination of tuberculosis geneXpert. Surgical therapy and administration of anti-tuberculosis are the main options in the management of tuberculous mastoiditis.

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Conflict of Interest: The authors declare that they have no conflict of interest.

Ethical Approval : We have conducted an ethical approval base on Declaration of Helsinki at Ethical Committee in Dr. Hasan Sadikin General Hospital, Bandung, Indonesia.

References

1. Nicolau Y, Northrop C, Eavey R. Tuberculous otitis in infants: temporal bone histopathology and clinical extrapolation. Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology. 2006;27(5):667-71.
2. Cho YS, Lee HS, Kim SW, Chung KH, Lee DK, Koh WJ, et al. Tuberculous otitis media: a clinical and radiologic analysis of 52 patients. The Laryngoscope. 2006;116(6):921-7.
3. Dienye PO, Ndukwu GU. Tuberculous otitis media in an adult in a primary care setting: A case report. Asian Pacific Journal of Tropical Medicine. 2010;3(9):754-6.

4. Jesić S, Stosić S, Milenković B, Nesić V, Dudvarski Z, Jotić A, et al. Middle ear tuberculosis: diagnostic criteria. Srpski arhiv za celokupno lekarstvo. 2009;137(7-8):346-50.
5. Yildirim-Baylan M, Cureoglu S, Paparella MM. Langerhans' cell histiocytosis of the temporal bone. Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology. 2012;33(2):e15-e6.
6. Arya M, Dixit R, Paramez AR, Sharma S, Rathore DS. Tuberculosis of the middle ear with post auricular abscess. The Indian journal of tuberculosis. 2009;56(3):160-3.
7. Tang IP, Prepageran N, Ong CA, Puraviappan P. Diagnostic challenges in tuberculous otitis media. The Journal of laryngology and otology. 2010;124(8):913-5.
8. WHO Guidelines Approved by the Guidelines Review Committee. Automated Real-Time Nucleic Acid Amplification Technology for Rapid and Simultaneous Detection of Tuberculosis and Rifampicin Resistance: Xpert MTB/RIF Assay for the Diagnosis of Pulmonary and Extrapulmonary TB in Adults and Children: Policy Update. Geneva: World Health Organization Copyright © World Health Organization 2013.; 2013.
9. Maheshwari A, Panigrahi R. Tubercular otitis media: an under diagnosed entity. 2016. 2016;3(1):6 %J International Journal of Otorhinolaryngology and Head and Neck Surgery.
10. Maniu AA, Harabagiu O, Damian LO, Ştefănescu EH, FănuŢă BM, Cătană A, et al. Mastoiditis and facial paralysis as initial manifestations of temporal bone systemic diseases - the significance of the histopathological examination. Romanian journal of morphology and embryology = Revue roumaine de morphologie et embryologie. 2016;57(1):243-8.
11. Vital V, Printza A, Zaraboukas T. Tuberculous otitis media: a difficult diagnosis and report of four cases. Pathology, research and practice. 2002;198(1):31-5.
12. Chole R, Brodie H, Jacob A. Surgery of the mastoid and petrosa. 2nd edition ed: Philadelphia: Lippincott William & Wilkins; 2014.