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Complicated Tuberculosis Meningitis (TBM): A Case Report

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ABSTRACT

Background: One of the most serious types of meningitis caused by Mycobacterium tuberculosis (MTB) which involves meningeal layer and is usually associated with high mortality and morbidity. We focused on the significance diagnosis and prompt treatment.

Methods: We describe a case of TBM.In a 40-Year-old Asian male. He was no respiratory distress, neck stiffness, constipation, and nausea, but frequent urination. In addition, the patient had a history of drug addiction.

Results: His Magnetic Resonance Imaging (MRI) showed hyperintense Lesions. Sputum culture for *Mycobacterium tuberculosis* (MTB) was found positive and he was given a therapeutic trial of quinolones and Steroids.

Conclusion: Observing the principles of biological safety among the personnel of medical centers and screening for TB disease in drug-positive and HIV-positive is essential.

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Introduction

Tuberculosis can affect any organ including the nervous system which represents about 6% of the extra-pulmonary manifestations of the disease (1). The common age is 6 months till 4 years- old (2). The central nervous system in tuberculosis can manifest itself in three forms of TB meningitis, intracerebral tuberculosis, and spinal tuberculosis (3). Clinical manifestations of the disease are described in three stages. The first stage, which lasts about three weeks, develops fever and anger, anorexia, headache and personality changes. The second stage is demonstrated with meningitis, vomiting and neurological symptoms. The third stage includes paralysis of the limbs, cranial nerve involvement, decreased consciousness, seizure, and death, which will last about 2 weeks after the beginning of the disease (3, 4). The prevalence of cerebral tuberculosis in untreated patients is about 2.9 percent which will lead to death in the condition of lack of diagnosis in the early stages of the disease (5). Tuberculosis meningitis (TBM) is the severe form of tuberculosis which affects the membranes covering the brain and spinal cord (6). This disease is associated with high rates of death and disability (7). While there are international standard recommendations for the treatment of people with pulmonary tuberculosis (lung tuberculosis) for six months using anti-TB treatment, a wide range of recommendations and different solutions are available to treat people with TBM, worldwide (8). Some experts recommend TMB treatment for 9 months, 12 months or more in order to prevent recurrence of the disease (8, 9). Longer-term diets have potential harms: patients will have poor adherence to treatment which can be associated with increased relapse and the development of drug resistance and increase the costs for patients and healthcare system (10). Diagnosis methods include history and clinical examination, sputum culture and smear, analysis of cerebrospinal fluid, chest X-ray, and CT scan, Magnetic Resonance Imaging (MRI), and NAAd nucleic acid amplification (9, 10).

Case Report

The patient was a 40-year-old married man and a medical laboratory staff (The patient was worked in the TB Department of Danesh Laboratory of Tehran and Milad Hospital Laboratory, which appears to be likely infected at the Danesh Laboratory) referred to the hospital following symptoms of upper respiratory tract infection, cough without sputum, and fever with chills. He also mentioned headaches, vomiting, and Lethargy about one to two weeks before referral. After arrival, he had a reduction in consciousness and Glasgow's index of the patient was 9 out of 15. There was no respiratory distress, neck stiffness, constipation, and nausea, but frequent urination. In addition, the patient had a history of drug addiction. Initial tests were sent to the patient (Table 1).

Table 1. The results of initial patient experiments.

WBC:11600	AST:17
Hb:14.7	ALT:7
PLT:187000	Mg:2.5
PMN:87%	PH:7.44
LYMPH:9%	HCO3:27
MON:12%	PCO2:38
CRP:80	SO2:85.5
ESR:45	PO2:55.5
Na:135	U\A:NL
K:3.8	PT:13.5
BUN:11	PTT:38
cr: 0.8	ADA:8
Ca:8.5	HIV: Neg

Table 2. Results of cerebrospinal fluid (CSF) analysis.

Color: yellow	Direct smear: Neg
Total count:58	
WBC:55	CSF culture: Pos
PMN:35	Glu:<20
Lymph:20	Protein:128
RBC:3	

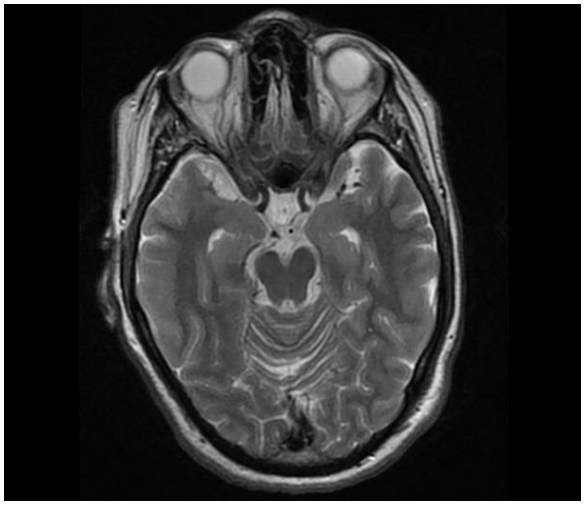

Figure 1. MRI Axial section of the patient showing hyperintense lesions.

Figure 2. Chest X-ray of the patient, No specific Symptoms were seen

The chest X-ray has been normal (Fig2). Patient echocardiography had no evidence of cardiac failure or endocarditis. Contrastive brain MRI for the patient, with the rejection of cerebrovascular problems, indicated the multi-focal areas with circular border view and cerebral edema (Fig1). The cerebrospinal fluid was prepared and sent to the laboratory for analysis and culture and the following results were obtained (Table 2).

Regarding the low glucose in the cerebrospinal fluid and the brain MRI response, and the constant trend of clinical symptoms, the cerebrospinal fluid was sent for acid-fast smear and PCR. Mantoux and IGRA (Interferon-gamma) tests were also requested and reported as negative. Subsequently, anti-TB treatment was initiated, including isoniazid and rifampin, and ethambutol and streptomycin. A few days after the beginning of initial experimental treatment, the PCR response (based on IS6110) was reported to be beneficial for positive Mycobacterium tuberculosis. The result of culture was reported positive, too. (Colony type: cord form, TCH resistance, Niacin positive, Nitrate positive, 22-degree catalase positive, 68-degree catalase negative). The patient antibiogram result also indicated sensitive to all first-line treatment drugs (isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), ethambutol (EMB) and streptomycin (SM).

Discussion

One of the most serious types of meningitis which involves meningeal layer and is usually associated with high mortality and morbidity is caused by *Mycobacterium tuberculosis* (MTB). Tuberculosis meningitis causes stable neurological complications in patients, so early diagnosis is an important issue which has always been considered (11). SM Graham considering the importance of TB meningitis recommended tuberculosis testing in most cases of aseptic meningitis (12).

The most common symptoms of meningitis are a headache and neck stiffness with fever, dizziness and insensitivity, vomiting and Inability to tolerate light (photophobia) or loud noises (sound phobia). Usually, only non-specific symptoms such as irritability and sleepiness are observed in children. If skin lesions are observed, it may indicate a definite cause for meningitis. For instance, Meningococcal meningitis may be associated with a specific skin disorder. TB meningitis caused by *Mycobacterium tuberculosis* is more common among countries where tuberculosis is present. Hence, it also happens in people with immune problems like AIDS (11).

Diagnostic methods include seeing tuberculosis in acid-fast coloring, brain imaging and typical findings of circular lesions with specific margins, PCR and IGRA tests. The prognosis of the disease depends entirely on early diagnosis and early treatment. In endemic areas, the presence of the patient should be considered for TB meningitis due to decreased consciousness and neurological disorders. In addition, the findings of imaging in TB meningitis, including leptomeningeal, increased ventriculomegaly and basal cisternal induced by hydrocephalus, and such symptoms should be considered (13, 14).

Basically, the treatment of tuberculosis begins with a therapeutic regimen such as isoniazid, rifampin, pyrazinamide and a fluoroquinolone or aminoglycoside and usually lasts for two months, followed by rifampin and isoniazid for another 9 months. Meanwhile, various studies have shown that 1 in 106 to 1 in 108 Tuberculosis Isolates mutants are resistant to first-line drugs. And when medications are used alone, resistant strains of tuberculosis bacilli develop and multiply rapidly, so in regimens that combine multiple drugs, the recovery rate is higher than 95% (8).

Meningitis tuberculosis has 3 clinical stages. In phase 1, the patient is completely alert and has non-specific symptoms such as fever, restlessness, loss of appetite and without any sign of neurological symptoms. The duration of symptoms is about 1-3 weeks. Stage 2 is the stage of neurological symptoms and seizure, and the patient has symptoms of meningeal irritation. Stage 3 is a coma. Therefore, depending on the stage at which the patient is diagnosed, the fate will be different (15). This is a relatively rare condition in which TB meningitis was detected in the lab personnel. This shows that lab personnel can be at risk in the event of non-observance of the safety principles. Unfortunately, because the patient had been referred to the physician at the end of the illness, despite being properly diagnosed and starting a drug treatment, died. The patient referred to the symptoms of shock, respiratory distress and associated with abnormal findings of the CSF. No specific symptoms were found in his chest image, but in MRI with brain gadolinium showed hydrocephalus and inflammation.

Conclusion

According to the description of the above patient and the bad consequences of a late diagnosis of TB infections, it is necessary to observe the principles of biological safety among health and medical personnel and personnel screening for the weakness of the immune system, drug addiction, and HIV.

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Ethics approval and consent to participate

This study was approved by the ethical research committee at the Pasteur institute of Iran.

Conflict of interest

No potential conflicts of interest were disclosed.

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