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Case Report

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Tuberculosis among Health Care Workers

Migena Brati*, Kushtrim Salihu and Erisa Kola

[1]*University of Pristina- Kosovo; Cool Springs Internal Medicine and Pediatrics, Brentwood TN 37027, USA*

[2]*University of Pristina- Kosovo; Mount Sinai Medical Center, Columbus Ave, New York, NY 10024, USA*

Department of Pathology, Mother Teresa University Hospital Center, Albania

***Corresponding author**

Migena Brati, University of Pristina- Kosovo. Cool Springs Internal Medicine and Pediatrics, Brentwood TN 37027, USA. Phone: +1-615-719-4550; Email: migenabratid@gmail.com

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Abstract

Tuberculosis (TB) is a bacterial disease caused by Mycobacterium Tuberculosis. It spreads form one person to another through air. When infected people with TB cough, sneeze or spit, they propel the TB germs in the air. A person needs to inhale only a few of these germs to be infected.

Evidence of TB has been reported in human remains dated thousands of years. About one quarter of the world's population has latent TB, which means TB bacteria have infected people but are not (yet) ill with the disease and therefore cannot transmit the disease.

Tb occurs in specific risk groups such as immigrants, HIV-positive patients, homeless patients, prisoners, and alcoholics. Health care workers, who face frequent occupational exposure, are at particularly high risk.

When a person develops active TB, the symptoms (such as cough, fever, night sweats or weight loss) may be latent for many months. This can lead to delays in seeking care and transmission of the bacteria to others. People with active TB can infect 10-15 other people through close contact over the course of the course of a year. Without treatment, 45% of HIV- negative people with TB on average and nearly all HIV- positive people with TB will die.

Transmission of tuberculosis (TB) in health care settings to both patients and health care workers has been reported from virtually every country of the world, regardless of local TB incidence. We are presenting the case of an asymptomatic 28-year-old Caucasian male from Europe who initially was being screened for TB for pre-employment purposes.

Introduction

Tuberculosis (TB), which is caused by bacteria Mycobacterium complex, is one the oldest diseases known to affect humans and one of the top causes of infectious death worldwide [1-4]. Population genomic studies suggest that M. Tuberculosis may have emerged ~70,000 years ago in Africa and subsequently disseminated along with anatomically modern humans, expanding globally during the Neolithic Age as human density started to increase. Progenitors of M. tuberculosis are likely to have affected prehominids [5]. This disease most often affects the lungs, although other organs are involved in up to one-third of cases. If properly treated, TB caused by drug- susceptible strains is curable in most cases. If untreated, the disease may be fatal within 5 years in 50-65% of cases. Transition usually takes place through the airborne spread of droplet nuclei produced by patients with infectious pulmonary TB. Infectious droplet nuclei are generated when persons who have pulmonary or laryngeal TB disease cough, sneeze, shout, or sing. Depending on the environment, these tiny particles can remain suspended in the air for several hours. M. tuberculosis is transmitted through the air, not by surface contact.

Epidemiology

It is a major public-health problem, with around 9 million new cases and 2 million deaths estimated to occur each year. Patients with pulmonary TB whose sputum is smear-positive for M. tuberculosis form the main source of infection in communities. Case rates vary widely by country, age, race, sex, and socioeconomic status. In 2016, 64% of new cases occurred in 7 countries; mostly in India, followed by Indonesia, China, the Philippines, Pakistan, Nigeria, and South Africa [6].

In the US, the case rate declined from 1994 to 2014. 9, 105 TB cases (a rate of 2.8 cases per 100,000 persons) were reported in the United States in 2017. CDC estimates that about 13% of U.S TB cases with genotype data are attributed to recent transmission [7]. Distinguishing the numbers of cases attributed to recent transmission from those likely due to reactivation of longstanding, untreated TB is one of the many tools state and local programs can use to design and prioritize effective public health interventions.

Case presentation

A 28-year-old Eastern European male presents to the hospital for

routine tuberculosis screening prior to joining EMT learning courses. Patient is a graduated medical doctor from Eastern Europe. Due to prior BCG (Bacille Calmette-Guerin) vaccination, patient has never been tested routinely for tuberculosis, neither developed signs nor symptoms indicating the disease. Due to lack of prior tuberculosis screening, there was no exact time frame of the infection, suspect exposure during medical training. PPD test in this case was not recommended as an initial screening test due to previously administered BCG vaccine. Blood sample was taken for QuantiFERON –TB Gold Plus test that was positive in this case. Acid-fast bacillus and fungal cultures were performed right after, resulting positive for tuberculosis. In conjunction with chest x-ray (Figure 1A and 1B) and computerized tomography testing which showed cavitary lesions in the left lower lobe, risk factors, positive test results, positive AFB sputum culture, patient was diagnosed with active tuberculosis.

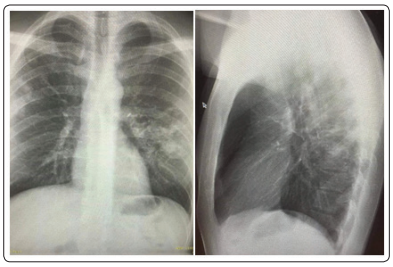

Figure 1a **Figure 1b**

The patient received first time multidrug treatment with pyrazinamide, ethambutol, rifampin and isoniazid tablets for 6 months. During the treatment, two months later, the patient developed sudden onset dyspnea and shortness of breath. He was transported to the emergency room where he was diagnosed with secondary apical pneumothorax (Figure 2a and 2b).

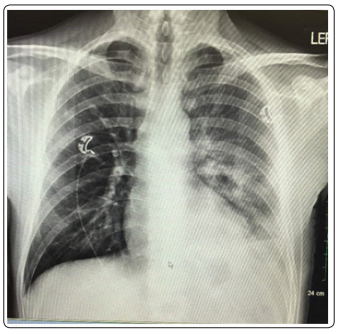

Figure 2a

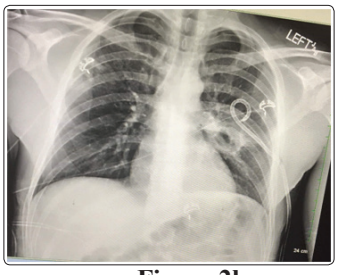

Figure 2b

Rapidly a chest tube was placed which provided symptomatic improvement. After seven days of hospitalization, the patient was discharged ambulatory, continuing his treatment for tuberculosis for another four months. At the end of the treatment, patient reported no symptoms; chest x-ray was consistent with prior tuberculosis infection.

Discussion

Mycobacterium tuberculosis occurs in every part of the world. It is a treatable and curable disease. The approach to TB control that is now internationally recommended is the DOTS ('directly-observed treatment, short-course') strategy, which aims to prevent the transmission of M. tuberculosis, and the related illness and death, by using combinations of anti-TB drugs to treat patients with the active disease. A significant importance in the outcome and management of tuberculosis is early detection and treatment. People living with HIV are 20-30 times more likely to develop active tuberculosis than people without HIV. Many tuberculosis cases can be cured when medicines are provided and taken appropriately, therefore adequate information, supervision and support form healthcare provider is crucial. Active, drug-susceptible tuberculosis disease is treated with a course of four antimicrobial drugs for a six-month period. Prematurely stopping the treatment or incorrect diagnosis can lead to another major tuberculosis issue, which is Multi Drug Resistant TB (MDR-TB) [8-14].

Other factors are bacteria that do not respond to isoniazid or rifampin, which is the two most powerful, first- line of treatment for TB. MDR-TB is treated with other second line treatment; however, this option is limited to expenses and extensive time of treatment up to two years. The patient was subjected to frequent follow up visits to ensure proper treatment was implied

Conclusion

Tuberculosis is a worldwide infectious disease, frequently reported in a particular group of population such as:

- People who live or used to live in homeless shelter or prison where TB is more frequent
- People who are born or have spent more than one year of living in countries such as Mexico, Guatemala, Haiti, India, China, Philippines.
- Others with weakened immune system or with certain disease are more susceptible to developing the disease

Tuberculosis remains a significant cause of both illness and death in developed countries especially among individuals with a suppressed immune system.

The prognosis is in direct proportion with early detection and treatment. Tuberculosis can remain latent for a long period. It is important to test at least yearly, people with high risk of developing TB. After confirmation of active tuberculosis, patient should be started immediately treatment for six to nine months. Others who have been in close contact with patients diagnosed with TB should also be tested and treated if necessary. Vigorous implementation of routine symptom screening to rapidly identify presumptive TB patients and access to confidential HIV/TB-related services for health care workers is important to reduce the risk of nosocomial TB transmission and promote a safer health care setting. Patient has written consent has been obtained prior to the case review.

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