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Case Report

Tuberculosis, neck abscess a case report and literature review

Tanvir Hussain*, Mudassar Malik, Abdul Matin, Sarwar Attique, Enas Alaqeab, Tark Shrayyef, Muhammad Aaqil Khan

Department of Otolaryngology, Head and Neck Surgery, Limerick University Hospital, Ireland

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***Correspondence:**
Dr. Tanvir Hussain,
E-mail: tanvir_hussain14@yahoo.com

ABSTRACT

This case report discusses the diagnosis and management of TB in a 35-year-old male patient of Asian origin living in Ireland. The patient presented with neck abscess, fatigue, and low energy levels. Clinical examination revealed a neck lump with a discharging wound. Further investigations, such as imaging, blood tests, and histopathology, led to the diagnosis of tuberculosis (TB). The tests further showed pulmonary nodules and enlarged lymph nodes. The patient's QuantiFERON test was positive, indicating latent TB infection. Various diagnostic tests were conducted to rule out other infections and autoimmune conditions. Treatment involved incision and drainage of the neck abscess and a combination of anti TB drugs such as isoniazid, pyrazinamide, rifampicin, and ethambutol. Providing a significant focus and conducting comprehensive diagnostic evaluations is crucial for effectively treating extrapulmonary TB. It is imperative to quickly identify, manage, and take preventative measures in order to achieve the optimal patient outcome when dealing with TB.

Keywords: TB, Neck, Abscess, Asia, Fatigue

INTRODUCTION

Tuberculosis (TB) is a communicable respiratory illness that spreads through the coughs or sneezes of infected individuals and is caused by *Mycobacterium tuberculosis.*[1] Despite significant medical advancements enhancing treatment outcomes, it poses severe health threats to patients. As mentioned in study done by Qian et al the world health organization (WHO) has provided data indicating that around 1.3 million deaths related to TB occurred within populations not affected by human immunodeficiency virus (HIV), while approximately 0.37 million deaths were reported among those who are HIV-positive on a global scale in 2016.[2] Unfortunately, control measures are hindered due to drug-resistant TB strains and unvaccinated chronically ill patients, as there is currently no cure for this disease. Castaneda et al also added moreover, patients with HNTB typically exhibit a slow or paradoxical response to treatment, which provides less informative results, making the management of the disease challenging and often making it difficult to ascertain if the patient has been fully cured.[3] This paper aims to comprehensively explore the experiences of a 35-year-old Asian man who has TB. It examines the underlying mechanisms that lead to TB symptoms and identifies possible causes. Additionally, it scrutinizes clinical indicators of TB infection and evaluates varied diagnostic methods used in proper diagnosis procedures. It will further investigate alternative treatments developed specifically for improving patient results.

CASE REPORT

A 35-year-old male of Asian origin was referred to the emergency department of Limerick university hospital Ireland. The patient's main complaint was a left-sided neck lump which had been slowly growing over the past six months. The patient was scheduled for an ultrasound

as the outpatient basis in radiology department at limerick university hospital advised by GP due to its benign appearance of neck swelling. There was no cough, phlegm, night sweats, runny nose, fever, localized pain, tenderness, weight loss, rash, or loss of appetite. However, he did mention increasing fatigue and low energy levels, as well as noticing the lesion's growth in size. The patient had no history of travel outside the United Kingdom in the past 10 years.

Clinical examination

Presence of a wound on the left side of the neck.

Figure 1: A picture of the neck wound.

Oral examination and flexible laryngoscopy were performed to assess the patient's neck and throat.

Neck examination

Non-tender fluctuation of approximately 2 cm in the left neck lump and a self-bursting discharging skin wound were observed.

Laboratory tests

Routine blood tests were conducted to assess various blood parameters.

Microbiological tests

Gram stain: No organism seen.

Swab culture: Corynebacterium Amycolatum++, strep mitis group (scanty), *Enterococcus faecalis*

Bronchial washing (BAL): Positive for acid-alcohol fast bacilli and hemophilus parainfluenza.

Imaging

Chest X-ray and CT thorax revealed: Multi-segmental upper lobe predominant solid and cavity pulmonary nodules, right upper lobe apical segment cavity lesion. Left para-aortic lymphadenopathy.

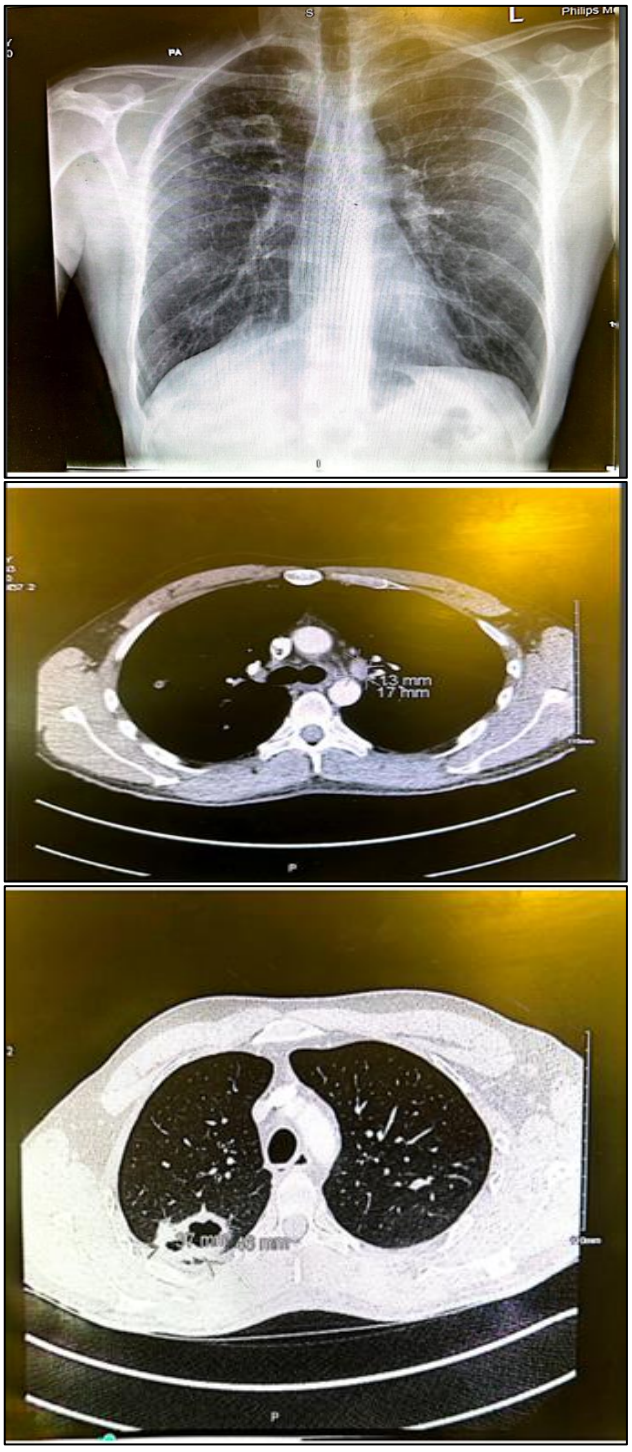

Figure 2: Radiological images for chest x-ray and CT scan.

TB tests

QuantiFERON TB results: Positive (indicating latent TB). Sputum culture (3 samples on different days): All negative.

Infectious disease screening

Screening for HIV 1+2, hepatitis BsAg, hepatitis-C antigen, and syphilis antibody: All negative. Screening for rheumatoid factor, antinuclear antibodies (ANA), and ANCA: All negative.

Biochemical tests

Sodium: 142, potassium: 4.5, urea: 4.9, creatinine: 75, eGFR > 90, albumin: 39, adjusted calcium: 2.51, bilirubin (Total): 4, alkaline phosphatase: 103, gamma-glutamyl transferase: 19, ALT: 21 and CRP: 18 (initially elevated, but normalized to zero within 2 days and remained normal thereafter).

Histopathology

Tissue samples taken from the wound were subjected to histopathological analysis, revealing: Granulomatous inflammation

Abscess-Level-5 necrotic node with central necrosis, ZN stain showed no acid-fast bacilli. No fungal elements detected.

Bronchoscopy and biopsy from pulmonary lesion showed granulomatous lesion with epitheloid cells suggestive of TB.

Plan

With pulmonologist and infectious disease team advise patient was started anti-tuberclosis treatment. Rifater (isoniazid, rifampicin, pyrazinamide), Ethambutol and pyridoxine (vitamin B6).

Discussion on pulmonary and txtrapulmonary TB

Following Robert Koch's groundbreaking identification in 1882 that *Mycobacterium tuberculosis* (Mtb) is the causative agent of TB disease.[12] It primarily affects the lungs but can also affect other parts of the body.[15] Carranza et al said that TB is spread through the air. TB can exist in two forms: latent TB infection (LTBI) and active TB disease. In LTBI, TB bacteria but does not exhibit symptoms and is not contagious.[2] CDC added that TB bacteria can reside in the body without causing illness, known as latent TB infection. When individuals inhale TB bacteria and become infected, their immune system typically suppresses bacterial growth. Those with latent TB infection remain asymptomatic, feel well, and cannot transmit TB bacteria. If TB bacteria become active and proliferate, individuals transition from latent TB infection to TB disease. Consequently, individuals with latent TB infection often receive treatment to avert the development of TB disease. TB disease occurs when the bacteria multiply. There are two types of TB: pulmonary and extrapulmonary TB.

There are several factors that increase the susceptibility to developing TB. In CDC, these are family history or close contact with a TB-infected person, overcrowding, and lack of BCG vaccination.[4] Similarly, individuals with compromised immune systems due to chronic illnesses are highly susceptible to TB. A perfect example is HIV+ patients. Moreover, individuals with cancer who are undergoing chemotherapy have suppressed immune systems, which makes them susceptible to developing TB.[4] The presence of PTB increases the risk of dissemination of the bacteria to other parts of the body which may cause EPTB.

Pathophysiology of TB

The pathophysiology of TB involves a complex interplay between the host's immune system and the *Mycobacterium tuberculosis* bacterium. When inhaled, the TB bacteria enter the lungs and are engulfed by immune cells called macrophages. Macrophages typically contain bacteria within granulomas resulting from the body's defense mechanisms that isolate infections. This persistent containment of bacteria can lead to latent TB infection. However, diminished immunity caused by factors like malnourishment or illnesses can reactivate the disease and cause active TB symptoms. Furthermore, immunodeficiency is capable of triggering this reactivation process as well.

During active TB, the granulomas harbor and reproduce bacteria until they rupture. The release of these harmful particles into the lungs allows them to disperse through either the bloodstream or lymphatic system, causing new granuloma formation in different body organs. During this process, the immune response damages tissue, leading to an array of symptoms like fever, tiredness, and coughing.

TB is described as extrapulmonary when the bacteria infect other parts of the body beyond the lungs.[13] Neck TB, also known as cervical tuberculous lymphadenitis, is a form of extrapulmonary TB that affects the lymph nodes in the neck. The pathophysiology of neck TB is similar to that of pulmonary TB but localized to the cervical lymph nodes.[12] The primary route of infection is the same: inhaling airborne droplets containing *Mycobacterium tuberculosis*. However, in neck TB, the bacteria can reach the lymph nodes in the neck region, which act as filters for pathogens. Once the bacteria reach these lymph nodes, they infect and multiply within the lymphatic tissue, leading to the formation of granulomas and the characteristic swelling of the lymph nodes in the neck. Over time, the lymph nodes may become caseous (necrotic), softening the affected tissue. As the lymph

nodes enlarge, they can compress nearby structures, causing pain, difficulty swallowing, and visible swelling in the neck. In some cases, the infection may spread to adjacent structures, such as the skin or the spine, leading to more extensive disease.

Clinical presentation

Pulmonary TB usually manifests the following signs and symptoms. Persistent cough (hemoptysis), chest pain, fatigue, weight loss, fever, night sweats, shortness of breath, and general weakness.[10] Radiological exams may show tubercle or granulomatous lesions. When TB affects other parts of the body, the symptoms are more specifically for the region affected. For instance, in the neck TB, there is lymphadenopathy (swelling of cervical lymph nodes), dysphagia, neck tenderness, and abscess formation.

Diagnosis

TB can be diagnosed via clinical examination and confirmed via lab tests and/or radiology exams. The classical tests for TB are GeneXpert, chest X-ray, and/or CT scan.[7] There are also more tests, such as the tuberculin skin test, sputum culture, QuantiFERON test, and Bronchoalveolar lavage (bronchial washing).

Management of TB

Various methods are implemented to handle TB. One of them is oxygen therapy, which boosts the delivery of oxygen to tissues in order to enhance patient outcomes.[11] Another crucial intervention is antibiotic administration, including isoniazid, pyrazinamide, ethambutol, and rifampicin for six months, consisting of intensive and continuation stages required for complete eradication.[15] During the two-month-intensive phase, all four antibiotics are administered while only Rifampicin and Isoniazid remain active during at least four months continuation stage.

DISCUSSION

A 35-year-old male of Asian origin residing in Ireland presented with a 6-month history of a left-sided neck lesion that was painless. He experienced increasing fatigue and low energy levels in his body. Clinical examination revealed a non-tender neck lump with a self-burst skin wound. Imaging studies and diagnostic tests indicated multi-segmental upper lobe predominant solid and cavity pulmonary nodules, left para-aortic lymphadenopathy, and a positive QuantiFERON test. Subsequent tests revealed a diagnosis of extrapulmonary TB. The patient was started on anti-TB treatment.

Histopathology refers to the use of microscopic analysis on tissue samples to study cellular and structural changes in order to identify infections, inflammations, or specific pathogens. Histopathology of this case revealed granuloma abcess and central necrosis. Takeuchi et al also described bacilli travel to lymph nodes via hematogenous spread, settling in sinuses where inactive macrophages phagocytose them. Inside macrophages, bacilli replicate until enzymes and cytokines induce cell death, releasing bacilli. Monocytes and activated macrophages then form a granuloma to contain the infection, leading to the transformation of the granuloma into a lesion with a necrotic center and surrounding granulation tissue.[13] Radiological imaging technologies like chest X-rays or CT scans are able provide precise images for analyzing structures surrounding the lungs within chest regio. In this case chest X-ray and CT thorax revealed: Multi-segmental upper lobe predominant solid and cavity pulmonary nodules, right upper lobe apical segment cavity lesion and left para-aortic lymphadenopathy.

Hooda et al also described While CXR proves effective in detecting TB, it presents challenges. Expert personnel are needed to interpret CXR images for accurate TB diagnosis, as TB can manifest in various ways on the lungs, such as infiltrates, consolidation, and cavitation.[7] This facilitates identifying abnormalities in the thoracic region, such as lung nodules or cavities. The QuantiFERON test is a reliable blood test that measures interferon-gamma production after exposure to TB-specific bacteria antigens aiding in diagnosing latent TB infections (LTBI). This was concluded by Sotgiu et al in his study where 15 articles were chosen for analysis, predominantly observational and cross-sectional studies conducted in 8 different countries.[14] The TB group had varying sample sizes (ranging from 27 to 164), while the LTBI group ranged from 29 to 1031. The combined sensitivity of QFT-Plus for active TB was 0.94 (0.91 for TB1 and 0.95 for TB2), and the pooled specificity for healthy status was 0.96. For LTBI, the pooled sensitivity and specificity were 0.91 and 0.95, respectively. In conclusion, findings indicated that QFT-Plus exhibits higher sensitivity than QFT-GIT in detecting M. TB infection, primarily attributed to TB2 responses.[14] In addition to this, Sputum culture helps identify microorganisms that cause TB, while bronchial washing assists with the detection of abnormal cells by collecting fluid from lower respiratory tracts for laboratory testing purposes.[5,8]

Bossuyt et.al described that the presence of rheumatoid factor helps to detect rheumatoid arthritis, whereas autoimmune diseases such as systemic lupus erythematosus can be identified through the antinuclear antibodies test.[1] Screening tests for infectious illnesses like HIV and hepatitis B or C help in eliminating their possible existence.[3] Tests for infectious ailments like HIV, hepatitis B, and C screenings help to rule out the presence of these infections.[3] Eddabra et al mentioned that Swabs taken from wounds help identify specific organisms, allowing targeted antibiotic treatments to be administered, resulting in better prognosis through comprehensive diagnostic data, which ultimately helps optimize overall care plans for patients.[6]

Treatment

Incision and drainage are a surgical procedure performed to open and drain an abscess or collection of pus. It is done to alleviate pain, reduce swelling, and remove infected material from the area. The procedure was performed to address a neck abscess. The pus collected was sent for culture and sensitivity testing, and the results were awaited.

Antibiotic therapy- Isoniazid, pyrazinamide, rifampicin, and ethambutol make up the first-line treatment for TB. Patients usually take an antibiotic course of at least six months.[11]

CONCLUSION

In conclusion, TB continues to pose a significant threat worldwide, making it crucial for precautions to be taken during diagnosis and treatment. Recently, a person in their thirties displayed unexpected symptoms that underlined the importance of seeking expert guidance on risk factors, indications of infection, diagnostic techniques and treatments for TB. Early detection through this knowledge and administering effective remedies at an individual level can significantly aid global efforts against TB. It is crucial to integrate individualized case management with widespread public health programs to address the challenges presented by TB worldwide. The objective is to minimize TB's detrimental effects and ultimately create a world community devoid of this debilitating illness.

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