Journal of Medical Care Research and Review

JMCRR 3 (4), 349–351 (2020) ISSN (O) 2589-8949 | (P) 2589-8930

The Fundamentals in Diagnosing Tuberculosis

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DOI: 10.15520/mcrr.v3i3.90

Accepted 20-03-2020; Received 12-02-2020; Publish Online 27-03-2020

Reviewed By: Dr. A. Robert

ABSTRACT

The following case report illustrates a 24-year-old male who presented with massive unilateral pleural effusion caused by Tuberculosis (TB), which required drainage of approximately 2 liters of pleural fluid. This is a unique presentation as pleural effusion in TB are typically small to moderate in size, occupying less than one-third of the hemithorax in 80% of the cases [1]. Studies have shown approximately only 5% of patients with TB will develop extrapulmonary TB of which greater incidence of pleural effusion are found in patients who are tested positive for human immunodeficiency virus (HIV) [2]. This patient was tested negative for HIV, and he had no known comorbidities, which makes this case rather more unique.

1 INTRODUCTION

TB is an infection caused by the bacteria Mycobacterium tuberculosis that most often affect the lungs. It remains the deadliest infectious disease world-wide, although it is a preventable and curable infection. Each day, nearly 4500 people lose their lives to TB and approximately 30 000 people fall ill from it [[1]].

Pleural effusion is a rare extra-pulmonary manifestation of TB. Recent studies have shown that effusion is caused by the direct infection of the pleural membrane with a resultant lymphocyte driven immunological response. Reports say 90% of microbiological analysis of the pleural fluid in TB infected patients come back negative for acid-fast bacilli (AFB) often delaying diagnosis and the necessary treatment [[2]]. Therefore, more invasive diagnostic measures such as lung and pleural biopsy should be done in uncertain causes of pleural effusion to get a definitive diagnosis more promptly.

2 CASE DESCRIPTION

24-year-old male came into the ED with a two-week history of non-productive cough, left-sided pleuritic chest pain, orthopnea and dyspnea on minimal exertion. The patient moved from West Africa, Guinea two years ago. Further review of symptoms revealed chills, nocturnal sweating and significant weight loss. The patient had no significant past medical, family or surgical history. He denied smoking or any recent trauma. He gave remote history of contact to TB at birth from his Mother. Due to patient's prior exposure to TB, and recent immigration from Guinea, TB was high in the differential diagnoses and airborne precautions were arranged.

Vital signs upon admission showed, temperature of 102°F, heart rate was 91 beats·min^{-1}, blood pressure was 100/63 mmHg; respiratory rate was 21 breaths·min^{-1} and oxygen saturation of 97% on room air. Physical examination revealed dullness to percussion and crackles upon auscultation throughout the left lung field and diminished breath sounds on the base of the right lung.

Chest X-Ray and CT showed significant pleural effusion on the left side of the lungs with compressive atelectasis of approximately 80% of the left lung, and medial displacement of the left hemithorax. No masses, pleural enhancement or mediastinal lymphadenopathy were noted. Echocardiogram showed mildly reduced systolic left ventricular function, with ejection fraction of 45%. No pericardial effusion was present.

A chest tube was placed and it drained 1580 ml of yellow fluid. Study of the pleural fluid showed a lymphocyte predominance. Laboratory evaluation of the pleural fluid revealed: total protein, 5.8g/dL; lactate dehydrogenase, 217 IU/L; glucose, 100mg/dL; pH, 7.5; WBC, 380 cells/μL with 66% lymphocytes; adenosine deaminase, 32 units/L, RBC 580 cells/μL. The Light's criteria revealed an exudative pleural effusion.

The cytological examination of the pleural fluid showed no malignant cells. Expectorated sputum revealed three negative stains and cultures for AFB and the TB-PCR came back negative, the QuantiFERON-TB test was however positive. The histological examination of the left lower lung

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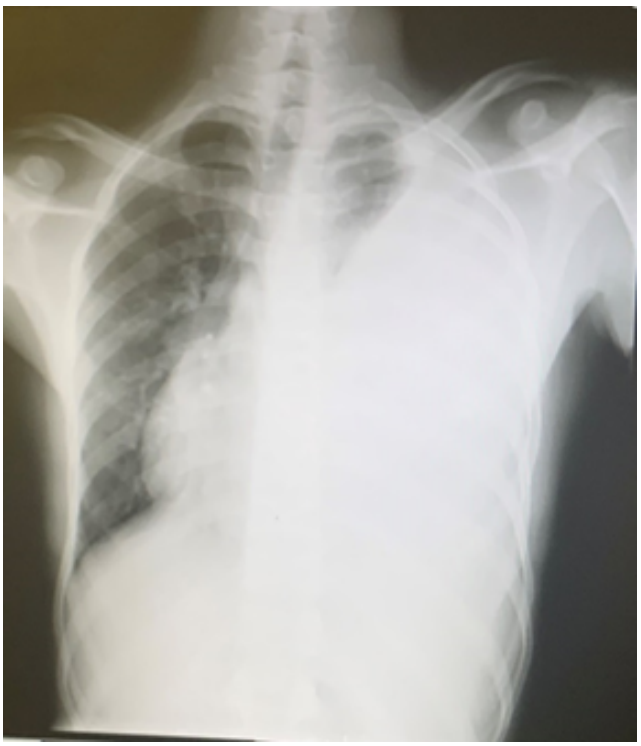

Figure 1. Chest X-ray showing left sided pleural effusionoccupying more than 2/3 of the left hemi-thorax

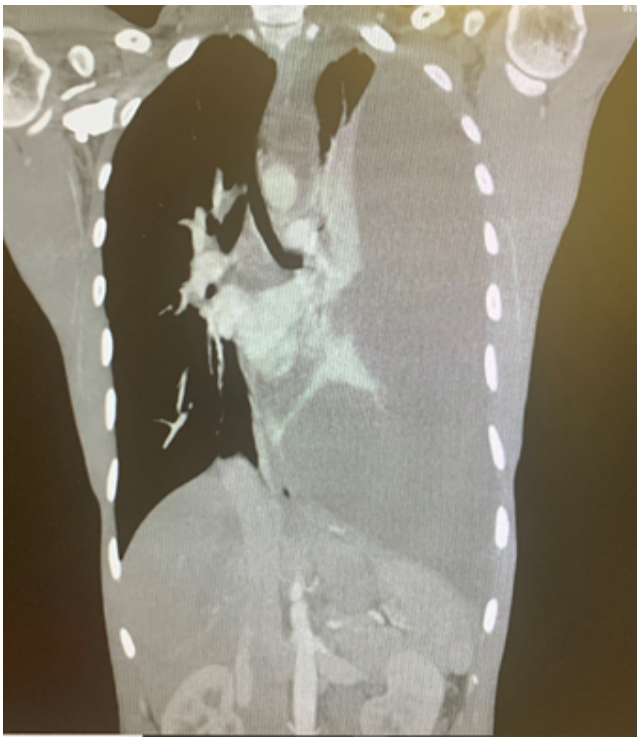

Figure 2. CT of the chest without intravenous contrastcorresponding to findings on Chest X-ray of large left sided pleural effusion

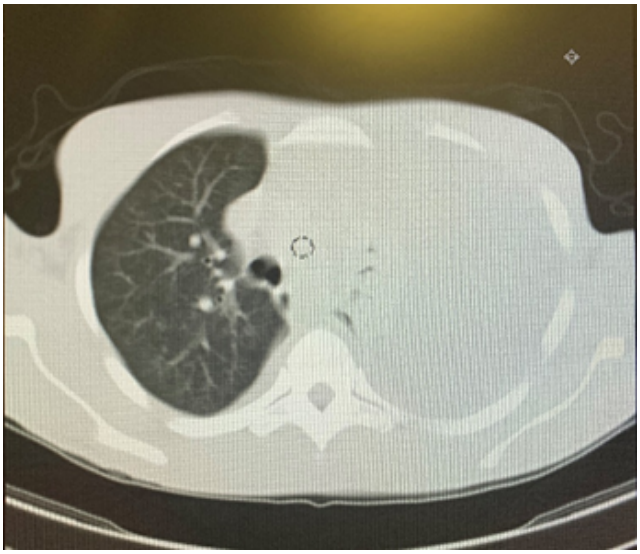

Figure 3. CT of the chest showing compressive atelectasis of mostof the left lung

lobe and pleural membrane biopsy showed multiple caseating granuloma containing AFB indicative of TB. The patient was immediately started on an anti-TB regimen.

3 DISCUSSION

Pleural TB is often under-reported in America, due to repeated negative Mycobacterial cultures. It is important to keep TB in the differential diagnoses in patients with lymphocyte predominant pleural effusion since only 10% of sputum sample will show AFB in an infected individual [[3]].

This case of TB was rather challenging to diagnose, since ADA was lower than 40 unit/L, glucose level of pleural fluid was higher than expected for TB, and multiple sputum samples came back negative for AFB, including cultures and TB-PCR. The presence of caseating granulomas on the biopsy samples of lung and pleural membrane should be used as a confirmatory test in suspected cases in areas of low prevalence of TB or if the patient is HIV negative, where yields of organism are found to be lower in quantity. It is important to get a patient on the right treatment regimen immediately to avoid deterioration of the condition and to prevent the spread amongst close contacts. [4]

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