

Diagnostic Imaging Review

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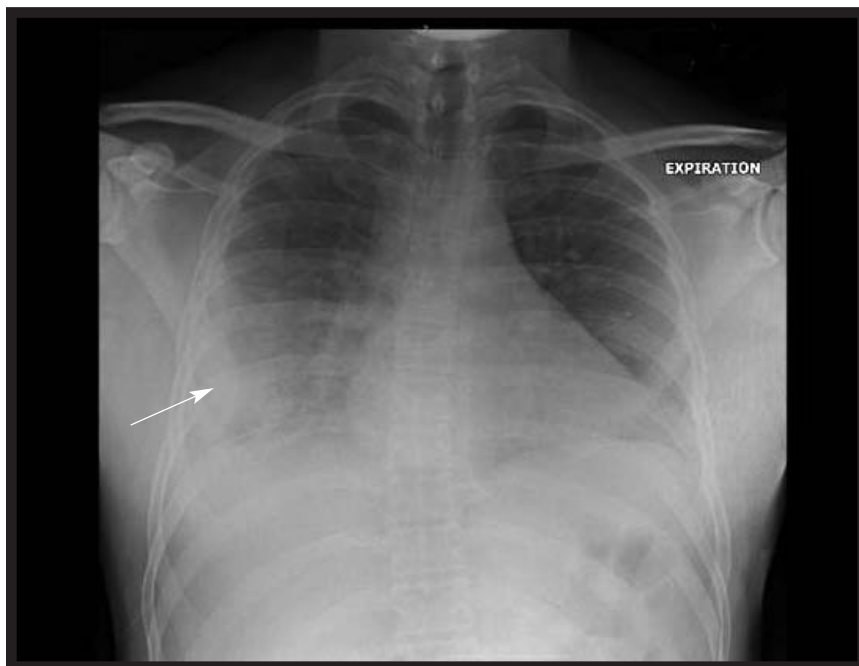


FIGURE 1. A right pleural effusion is seen on the patient's radiograph.

An immigrant with fever, chills, and pleural effusion

CASE

A 33-year-old male presented to the emergency department (ED) with fever, night sweats, and chills for 1 week. OTC cold remedies had not provided relief. His current symptoms were not associated with cough, chest pain, or shortness of breath, and the patient denied any weight loss, loss of appetite, or recent travel. He denied having any sick contacts. He was from Jamaica and had been living in the United States for more than 10 years. He had no history of tobacco use but admitted to occasional marijuana use and report-

ed limited alcohol intake. The family history was significant for diabetes on the father's side and a treated tuberculosis infection in the maternal grandmother. The patient said that he had undergone purified protein derivative (PPD) skin testing 3 years ago, and the result was negative.

Examination The initial evaluation in the ED revealed a temperature of 100.9°F; pulse, 97 beats per minute; respirations, 18 breaths per minute unlabored; and BP, 158/81 mm Hg. Oxygen saturation was 96% on room air (by pulse oximetry). Physical examination

demonstrated a well-developed, well-nourished male of medium build. The head and neck examination was without abnormalities. Heart sounds S1 and S2 were appreciated, along with regular rate and rhythm. The abdomen was soft and scaphoid, with positive bowel sounds in all four quadrants. The chest examination revealed unequal breath sounds with the right side diminished. Further maneuvers elicited dullness on percussion on the right side.

Testing Laboratory tests included a WBC count, which was normal but significant for monocytosis on the differential. Results of an electrolyte panel and tests for renal and liver function were within normal ranges. A rapid HIV test was negative. An ECG showed normal sinus rhythm and a heart rate of 59 beats per minute; no ST-T changes were observed, and the axis was normal.

Chest radiography demonstrated a right pleural effusion, most likely loculated (Figure 1). The radiography finding was confirmed by CT, which showed a relatively large right pleural effusion, thickened pleura, and partial loculation of the fluid (Figure 2). What diagnosis do these images suggest, and what should be the next steps?

DISCUSSION

Hospital course The patient was admitted for further investigation of his symptoms and radiologic findings. Pulmonary and infectious disease consultations were obtained. Multiple blood cultures were sent off with no organism grown. Sputum samples were sent off for microbiology, and repeated acid-fast staining for *Mycobacterium tuberculosis* was negative.

Ultrasound was performed to evaluate the consistency of the pleural fluid and to mark the best location for thoracentesis (Figure 3). The ultrasound revealed a loculated pleural effusion, which is often seen with a prolonged inflammatory pleural process. Tho-

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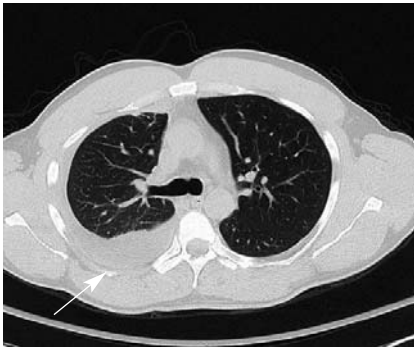


FIGURE 2. CT confirmed the effusion and also showed thickened pleura and partial loculation of the fluid.

racentesis of the right pleural space yielded 800 cc of straw-colored fluid. Microbiologic analysis of this pleural fluid did not produce any pathogens; however, it showed an exudative (Light's criteria), predominantly lymphocytic effusion. Fluid lactate dehydrogenase was elevated to 1,135 IU/L, and lymphocytes constituted 99% of the cell differential. An in-hospital PPD test was placed intradermally and resulted in greater than 10 mm induration.

Diagnosis The patient's history, chest imaging, and pleural fluid analysis pointed toward an infectious etiology. In a foreign-born person coming from an area with high tuberculosis prevalence who has a history of exposure to *M tuberculosis* and active symptoms of infection, tuberculosis must be considered. Considering his high risk for pleural tuberculosis, the patient was started on an empiric four-drug anti-tubercular drug regimen pending culture and sensitivity results.

Pleural tuberculosis Tuberculosis remains the most common infection worldwide, and the pleura are the second most common site of extrapulmonary involvement.¹ While extrapulmonary tuberculosis is uncommon in persons born in the United States, the constant influx of new immigrants into this country means that the astute clinician should continue to consider the different manifestations of tuberculosis. Pleural tuberculosis accounts for about

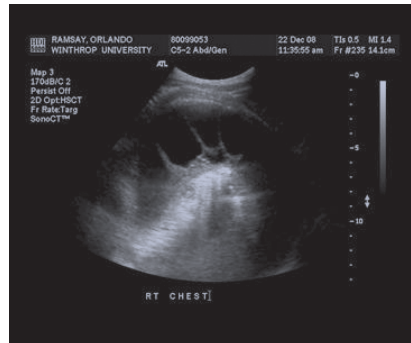


FIGURE 3. A loculated pleural effusion is seen on ultrasound performed to evaluate the consistency of pleural fluid.

5% of all tuberculosis cases in the United States.²

The accepted mechanism for pleural tuberculosis infection involves sub-pleural rupture of infected focus, which allows passage of the bacilli into the pleural space. Pleural disease with tuberculosis may follow acute primary, post-primary reactivation, or miliary infection. In most cases, patients present with acute symptoms of cough, fever, chills, and pleuritic chest pain.

The diagnostic approach to the patient with suspected pleural tuberculosis

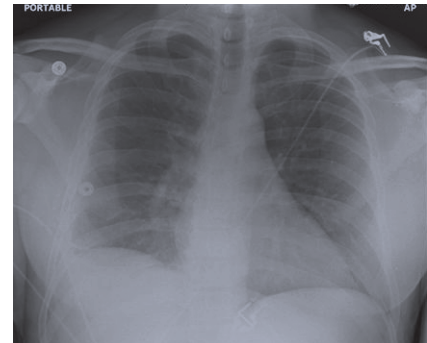


FIGURE 4. A follow-up chest radiograph indicates that the pleural effusion has resolved.

Nearly all pleural effusions associated with *M tuberculosis* are exudative in nature, as defined by Light's criteria. In observing the gross appearance of the pleural fluid, the clinician may see turbidity caused by cells and debris. Lymphocyte predominance on the differential stands out as highly suggestive of pleural tuberculosis. In addition, a high level of lactate dehydrogenase (usually >1,000 U/L), a low glucose level, and pH may be of use. Pleural fluid biomarkers have added significance in hard-to-diagnose cases. Aden-


“Pleural tuberculosis, if left untreated, will usually progress to active pulmonary disease or tuberculous empyema.”

begins with the history and examination, the time and duration of exposure, and the regional prevalence of *M tuberculosis* infection. Among the pertinent ancillary tests, chest radiography, pleural fluid sampling, PPD testing, and microbiological analysis may provide diagnostic support.

The chest radiograph may show unilateral pleural effusion, usually of small to moderate caliber. CT of the chest may further elucidate a loculated effusion with possible pulmonary involvement. Pleural thickening and enlarged mediastinal lymph nodes may be appreciated on CT evaluation.

osine deaminase, usually elevated in patients with pleural tuberculosis, has a good negative predictive value in countries with low prevalence of disease. Polymerase chain reaction and interferon gamma have supplemented the diagnostic armamentarium from pleural fluid sampling.

PPD testing may be negative in one-third of patients, a result that may be caused by recent infection.³ Sputum smear will be negative in most patients, and pleural fluid acid-fast staining may not give high yield. Pleural biopsy remains an option but has mostly been given up in favor of less invasive bio-



marker studies, clinical suspicion, and PPD testing.

Treatment Untreated tuberculous pleural effusion may occasionally resolve but usually active pulmonary disease will occur or tuberculous empyema will develop. A four-drug regimen should be instituted pending bacteriology analysis and sensitivity studies. Pleural tuberculosis has increased in persons with HIV infection, and diagnosis and treatment are similar for HIV-infected and non-HIV-infected patients. Awareness, screening, and timely management can prevent the spread of this treatable disorder.

Outcome In addition to being started empirically on a four-drug regimen for suspected pleural tuberculosis, the patient in this case was also taken for video-assisted thoracoscopic surgery (VATS) because of his acute illness and empyemalike changes on CT. VATS detailed loculated pleural effusion, filmy adhesions, and complete drainage of fluid. Multiple biopsies taken during VATS demonstrated necrotizing granulomatous inflammation with evidence of fibrinous pleuritis, all of which is consistent with pleural tuberculosis. The results of acid-fast bacilli tests of sputum and pleural fluid remained negative. Tissue culture taken during VATS yielded a positive identification of *M tuberculosis* by DNA probe.

When the patient returned for follow-up 2 weeks after being discharged, he reported marked improvement, including a return to normal daily activities. A follow-up chest radiograph showed resolution of the pleural effusion and of the infectious process affecting the pleural space (Figure 4). [JAAPA](#)

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