




Tuberculous or non-tuberculous pneumonia: A case report

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ABSTRACT

Tuberculosis (TB) and pneumonia are among the top-10 global causes of death worldwide. Many studies highlight the diagnosis delay of TB in patients with an initial presentation of pneumonia. We present a case of a 16-year-old boy who complains of a productive cough associated with blood-streaked sputum for one-month duration. Having pulmonary tuberculosis (PTB) contact three years ago puts him at risk of a similar infection. Despite the episodes of missed appointments in serial follow-ups, we were ultimately able to exclude PTB in this patient.

Keywords: adolescent, pulmonary tuberculosis, pneumonia, tuberculous pneumonia

INTRODUCTION

Chronic cough is a common presentation in primary care, mainly related to infection. Apart from bronchopneumonia, pulmonary tuberculosis (PTB) is a common and endemic infection in some countries, including Malaysia. Pneumonia and PTB can be either different entities or a combined infection or exist one after another. In the diagnosis of PTB, the manifestations of pneumonia are often more prominent, which may conceal the characteristics of PTB and lead to misdiagnosis [1]. Meanwhile, an enthusiastic approach to smear-negative PTB in a susceptible population can lead to overdiagnosis, followed by unnecessary treatment of anti-tuberculosis and worsening disease progression of other lung pathology [2]. Therefore, a comprehensive assessment should be carried out at the primary care level to avoid unnecessary yet timely referrals to specialized clinics.

CASE

A 16-year-old boy from a background of moderate socioeconomic status presented to the health care clinic for a prolonged cough of one-month duration. The cough was intermittent and productive, with occasional episodes of blood streaks. It was initially associated with low-grade fever, which only lasted for three days. He denied any pleuritic chest pain, shortness of breath, or failure symptoms. There was no recent upper respiratory tract infection or ill contact. He disclosed a history of PTB contact three years ago. Yet, he had no constitutional symptoms of tuberculosis (TB). There is also no family history of malignancy. He has underlying mild intermittent allergic rhinitis and denied taking any medication over the counter. He is a non-smoker. He stays in the hostel and occasionally returns to his hometown during school breaks.

On examination, he was a medium build boy. He was afebrile, and his vital signs were stable, with good oxygenation. Bacille Calmette- Guérin (BCG) scar was present. There was no palpable cervical lymphadenopathy. Respiratory examination revealed normal chest expansion with no added sound on auscultation. Cardiovascular and other system examinations were unremarkable.

Various tests had been planned in staggered outpatient appointments. On the first contact, COVID-19 rapid test was carried out and was non-reactive. This was followed by serial workup for PTB screening, which included the chest X-ray (CXR), full blood count (FBC), sputum for culture and sensitivity (C&S), sputum examination for acid-fast bacilli (AFB), and mycobacterium tuberculosis (MTB) C&S. FBC showed a slightly raised total white cell count with predominantly neutrophil and normal platelet count. CXR revealed consolidation over the right upper zone (**Figure 1**), and all three sputum AFB samples were negative for mycobacterium. At that time, the result for sputum MTB C&S was still pending. Since smear-negative PTB infection was very suspicious, Xpert MTB/resistance to rifampicin (RIF) assay was immediately ordered. However, the result was negative. The result of sputum for C&S was not available as the patient refused to send further investigation.

Hence the decision to treat him as bronchopneumonia was made. An empirical antibiotic, tablet amoxicillin 500 mg three times daily for one week was initiated. His allergic rhinitis was treated with oral loratadine 10 mg daily. However, he did not comply with both treatments despite the absence of any adverse reaction. We faced difficulty to manage his compliance issue as throughout the scheduled follow-ups, he always came alone, and at times, his parents were contacted when he defaulted. In fact, at two-month, the cough remained the same.

Due to unresolved symptoms and a high index of suspicion to smear-negative PTB, he was eventually referred to a respiratory physician for a second opinion. A repeat CXR



Figure 1. Multifocal air-space opacities with air bronchogram seen at right mid to upper zone & left retrocardiac region (reprinted with permission of the patient)

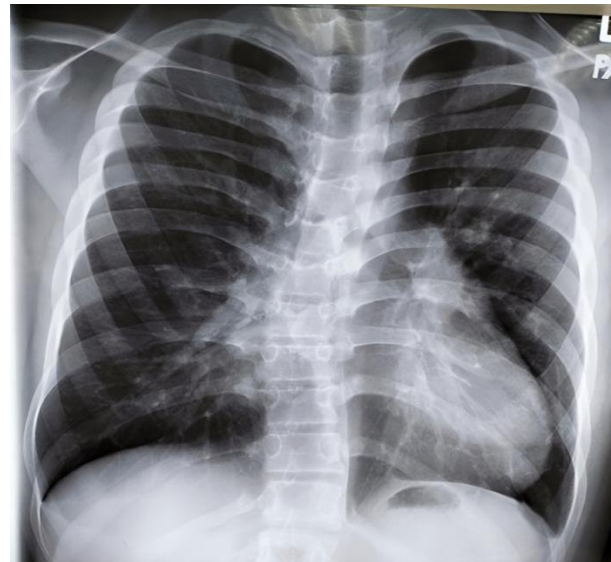


Figure 2. Resolution of the opacities over the right upper to mid zone after two months of follow-up (reprinted with permission of the patient)

(**Figure 2**), which was carried out showed marked improvement in the consolidation over the right upper zone.

He was seen twice at the respiratory clinic, whereby eventually MTB C&S result showed no pathogen isolated, and clinically the chronic cough resolved. He was discharged well with precautionary advice regarding the likelihood of PTB infection in the future.

DISCUSSION

Community-acquired pneumonia (CAP) is a common disease, which can be potentially life-threatening, especially in the elderly and those with comorbidities [3]. A few prognostic criteria to assess the severity of CAP had been developed to determine the initial site of care. Both pneumonia severity index (PSI) and CURB-65 have been utilized in our practice. However, it is also common that apparent CAP, which required hospitalization in Asia regions with high PTB prevalence is due to TB. A systematic review found that over 10% of patients with CAP in Asia were caused by MTB [4]. Also, for the person who had been exposed to MTB, the risk of latent TB infection is 30% and without treatment, 5% to 10% will progress to active TB.

Many studies report challenges to discriminating PTB from other pulmonary infections like pneumonia. A cross-sectional study conducted by Croatian researchers revealed that over 30% of TB patients in intermediate TB countries were diagnosed longer than 30 days from their initial visits [5]. One case report discussing a young gentleman eventually diagnosed as PTB after fiberoptic bronchoscopy with bronchoalveolar lavage (BAL) revealed AFB following treatment failure of severe pneumonia with multiple courses of antibiotics [6]. He then responded clinically after starting on anti-TB treatment.

Even though PTB is a typical chronic disease, it can also present as acute pneumonia [1]. In tuberculous pneumonia (TP), the presentation is usually acute respiratory infection, mainly cough, which precedes other systemic symptoms, and it is often more than two weeks in duration [7]. It is also less severe than other bacterial pneumonia, but hemoptysis is

generally rare [8]. In a prospective study of 346 patients hospitalized for CAP, they found out MTB was isolated in 4.9% of cases and the predictive factors that favor PTB are longer duration of symptoms, history of night sweats, upper lobe involvement, cavitary infiltrates, lower total white blood cell count and lymphopenia [9]. Another study of TP also concluded that most cases have consolidation in the upper lobe, with the right lobe predominant [7]. While in atypical CAP, the presentation is usually subacute with progressive constitutional symptoms. Extra-cardiopulmonary symptoms may present, like rashes, ear or gastrointestinal symptoms. There is a preference for younger individuals. In CXR, the classic changes are patchy infiltrates and rarely have a prominent consolidation area [10].

The symptoms of smear-negative PTB are similar to smear-positive, but because of the absence of AFB isolated in sputum smear, it leads to a delay in the diagnosis as expert consultation is necessary for some centers. Sputum smear microscopy is readily available and affordable, but it has poor sensitivity in the detection of PTB because a positive smear requires 5,000-10,000 AFB/ml from a sputum sample. The gold standard for confirmation of PTB is sputum mycobacterial culture, as it requires only 10-100 AFB/mL to grow positive culture, but it takes months to process. Therefore, World Health Organization has recommended Xpert MTB/RIF and Xpert ultra as nucleic acid amplification tests for detecting TB and RIF resistance. It is faster but costly.

Chest radiograph has sensitivity ranged from 87% to 98% when compared with mycobacterial culture in diagnosing PTB. In a cross-sectional study comparing two community screening tests for TB, CXR was more sensitive in diagnosing PTB than Xpert MTB/RIF sputum examination, which was 80% versus 34% respectively. However, multiple factors limit the utility, including the need for experienced readers, the quality of the CXR film, radiation exposure risk and logistic issues. It is a diagnostic challenge to the physician because numerous diseases mimic each other. A neural network classifier was proposed to effectively classify TB, bacterial pneumonia and viral pneumonia in CXR interpretation [11]. However, this network is only sometimes practiced. As for this case, we

treated him as mild CAP and concomitantly investigated for TP. He is primed for Xpert MTB/RIF sputum examination while waiting for MTB C&S. Radiologist expertise was also involved in the comprehensive interpretation of the radiograph to differentiate TP from other infective causes.

In keeping with the likelihood of treating mild pneumonia, he was started on penicillin-based antibiotics. Choosing the appropriate empirical antibiotic largely depends on the most likely pathogen, individual risk factors, comorbidities, allergies, and cost-effectiveness [12]. Both British (National Institute for Health and Care Excellence and British Thoracic Society) and European guidelines suggested amoxicillin as the preferred first-line treatment for outpatient cases with low-severity pneumonia and without comorbidities, while American (Infectious Disease Society of America [IDSA] and American Thoracic Society [ATS]) guideline choose macrolides. It was concluded that amoxicillin is efficacious in reducing the severity and duration of mild radiologically proven pneumonia even if the symptoms have not yet manifested clinically [13]. Another meta-analysis also chose β lactam antibiotic over other antibiotic choices against atypical pathogens [14]. However, in this case, poor adherence to the antibiotic may contribute to poor symptom resolution.

Following poor compliance to treatment, a repeat CXR was carried out to monitor the disease's progression. According to [15], serial CXRs are essential in assessing the treatment response, including inappropriate antimicrobial therapy or excluding non-infectious diseases mimicking pneumonia. The best repeat CXR is after three to five days of appropriate antimicrobial therapy initiation. However, occasionally the abnormalities on the CXR may persist for months even after clinical defervescence particularly with pneumococcal pneumonia [15]. In this case, the repeat CXR showed a resolution of the consolidation.

CONCLUSIONS

In conclusion, although CAP is a common chest infection, investigating other causes is still advocated, especially in populations at risk of PTB. Considering the challenges of treating adolescents, primary care practice should comprise a comprehensive assessment with an individualized approach, by implementing the continuity of care. This case report demonstrates the need for a treating physician to follow up patient until the diagnosis is ascertained.

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