



Case report

The role of thoracoscopic biopsies in the diagnosis of pleural tuberculosis

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A B S T R A C T

Tuberculosis (TB) is a significant public health problem in many developing countries. In many cases, tuberculosis may present a significant diagnostic challenge. A 32-year-old male Chinese immigrant presented to our institution with a fever and non-productive cough. He was found to have a right pleural effusion, for which a chest drain was inserted. His tuberculin skin test was unreactive (0mm) although he was not immunocompromised (HIV negative). All cultures were negative, and 3 sputum samples and his pleural fluid sample tested negative for acid-fast bacilli. A computed tomography (CT) scan of his chest revealed features suggestive of an early empyema. There was no evidence suggestive of a malignant effusion. In an effort to attain a diagnosis, he underwent a video-assisted thoracoscopy (VATS) procedure with pleural drainage and biopsies. Anti-tuberculosis therapy (ATT) was commenced due to a high level of suspicion after failure of empirical therapy.

Although the Ziehl-Neelsen stain for acid fast bacilli was negative, pleural biopsies demonstrated active chronic granulomatous pleuritis with many Langerhans type giant cells highly suggestive of tuberculosis. He was responsive to treatment and completed 6 months of ATT with complete clinical resolution. In young, immunocompetent patients with an exudative, culture-negative effusion, the diagnosis of pleural tuberculosis must be considered. Pleural biopsy is the gold standard for diagnosing pleural TB but demonstration of acid-fast bacilli or necrotizing granulomas in the specimen are not absolutely necessary to make the diagnosis.

1. Introduction

Tuberculosis (TB) is a significant public health problem in developing countries. In 2015, there were 10.4 million new cases of tuberculosis with 60% of global cases originating from six countries (India, Indonesia, China, Pakistan, Nigeria and South Africa). The estimated incidence of TB in China (67 per 100,000) is much greater than that for Trinidad and Tobago (17 per 100,000) [1]. Confirming Tuberculosis may be challenging for patients in resource limited environments who present with unreactive tuberculin test and who are culture negative. Thoracoscopic Biopsies may be considered for patients with pleural effusions and a high degree of suspicion. We report the case of a 32-year-old Chinese immigrant with a pleural effusion and pleural tuberculosis without the demonstration of mycobacterium tuberculosis or typical histological findings of a caseating/necrotizing granuloma.

2. Case report

A 32 year-old male presented with a 6 day history of an intermittent fever with chills and non-productive cough. He was previously well and did not report any haemoptysis, night sweats, weight loss or chest pain. His past medical and surgical histories were unremarkable. There was no history of exposure to ill contacts, institutionalization or cigarette smoking. Of note, the patient was a Chinese immigrant who spoke minimal English.

The patient's vital signs were stable on admission. Auscultation of his chest revealed decreased breath sounds in the right mid-to-lower zones, as well as diminished vocal fremitus in these regions. These regions were stony-dull to percussion, suggestive of an effusion. The remainder of his physical examination was unremarkable. Laboratory investigations revealed an elevated C-reactive protein (CRP) levels (220.2 mg/L) without a leukocytosis. Chest radiography demonstrated a large right pleural effusion. A chest tube was inserted (Fig. 1) under local anesthesia and drained 900mls of pleural fluid in the first 24 hours. Pleural fluid biochemical analysis revealed pleural fluid protein/serum protein ratio was 0.69 with a pleural fluid LDH of 3925 U/L, indicating an exudate. Sputum and pleural fluid cultures demonstrated no bacterial growth, but few pus cells and no malignant cells were identified. His tuberculin skin test was negative (0 mm, read at 72 hours). Sputum and pleural fluid smears were negative for acid-fast bacilli. He was also HIV-negative with no evidence of immunocompromise.

The patient was treated empirically with broad spectrum antibiotics (Ceftazidime) for 5 days without improvement. A computed tomography (CT) scan of the chest (Fig. 2) revealed a right pleural effusion with pockets of air and associated right lower lobe compressive atelectasis, suggestive of an early empyema. In an effort to attain a definitive diagnosis and treat his empyema, a video-assisted thoracoscopy (VATs) procedure with pleural biopsy and drainage was performed. Multiple adhesions and fibrinous exudates were noted intra-operatively. Five pleural biopsies were taken at varying sites. Post-

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operatively, due to a high degree of clinical suspicion he was commenced on anti-tuberculosis therapy (ATT). An immediate clinical response was noted as his fevers subsided, and his CRP decreased to normal levels. He recovered uneventfully and was discharged after 48 hours, pending outpatient clinic follow-up.

The pleural biopsy samples demonstrated active chronic granulomatous pleuritis with many Langerhans type giant cells highly suggestive of tuberculosis. The Ziehl-Neelsen stain for acid fast bacilli was negative. At our last outpatient visit, the patient had completed 6 months of ATT with complete disease resolution. He is clinically well and will continue follow-up in the Thoracic Medicine outpatient clinic.

3. Discussion

Pleural tuberculosis should be considered in young, immunocompetent adults with an undiagnosed exudative effusion. Pleural TB often presents as an acute illness [2,3] with symptoms of fever and cough most frequently reported [4]. Our patient's pleural fluid protein/serum protein ratio was 0.69 with a pleural fluid LDH of 3925 U/L, indicating an exudate. We sought to treat this patient empirically with broad-spectrum antibiotics for typical micro-organisms associated with para-pneumonic effusions while concurrently screening for TB.

A diagnostic challenge was encountered when the patient's pleural fluid culture revealed no bacterial growth against a background of three negative sputum and pleural fluid smears and a negative tuberculin skin test. His clinical status was unchanged. For pleural fluid, Adenosine Deaminase (ADA) assays are 92% sensitive and 90% specific for diagnosing pleural TB. If the pleural fluid ADA > 70 U/L, this strongly suggests TB and anti-tuberculosis therapy (ATT) can be initiated.

In our resource-limited setting, Adenosine Deaminase (ADA) assays are not available. If pleural fluid ADA is 40–70 U/L, then pleural TB is likely and further investigations, such as thoracoscopy and biopsy are indicated. A pleural fluid ADA < 40 U/L should preclude the need for further investigations for pleural TB [5]. We administered ATT due to a high index of clinical suspicion of TB.

Our patient's chest radiograph did not exhibit any evidence of active pulmonary infection. A computed tomography (CT) scan of the chest revealed features suggestive of early empyema with compressive atelectasis. Evidence of pulmonary involvement is unlikely to be detected on chest radiography. High resolution computed tomography (HRCT)

scanning of the chest detects pulmonary involvement in up to 45% of patients with pleural TB [6]. Therefore, HRCT is a more accurate diagnostic tool for suggesting the presence of pulmonary involvement in patients with suspected pleural TB. Pulmonary involvement could not be confirmed radiologically in this case.

A histological analysis of pleural biopsy tissue is the gold standard for diagnosing pleural tuberculosis [2,5]. The demonstration of tubercle bacilli in the sputum, pleural fluid or biopsy specimens, or the demonstration of granulomas in the pleura is diagnostic of pleural tuberculosis [2]. Pleural fluid culture is only 10–35% sensitive in the diagnosis of pleural TB. In patients with isolated pleural effusion, sputum cultures are only positive 4% of the time. Sensitivity approaches 98% for pleural biopsies taken via thoracoscopy [7]. In one study, non-caseating granulomas were found in only 22% of pleural biopsy specimens in patients with pleural TB [4].

Video-assisted thoracoscopy (VATs) and pleural biopsy were performed on this patient to establish a definitive diagnosis. Sections of pleura showed active chronic granulomatous pleuritis with many Langerhans type giant cells, highly suggestive of TB. The pleural biopsy tissue yielded negative cultures and the Ziehl Neelsen stain for acid-fast bacilli was also negative. These pathological findings are atypical of tuberculous disease and pleural TB. There was symptomatic resolution after the initiation of ATT, with serial CRP measurements showing progressive decline. He has since completed ATT and returned to a state of clinical wellness.

4. Conclusion

In young, immunocompetent patients with an exudative, culture-negative effusion, the diagnosis of pleural tuberculosis must be considered. Pleural biopsy is the gold standard for diagnosing pleural TB but demonstration of acid-fast bacilli or necrotizing granulomas in the specimen are not absolutely necessary to make the diagnosis. Tuberculin skin testing and sputum smears are of little diagnostic value in pleural TB, but still serve as important screening measures. Pleural fluid ADA levels, if available, should serve to narrow the differential diagnosis and may be used in determining the need for pleural biopsy and initiation of ATT. Further studies are needed to determine the mechanisms which give rise to atypical findings in pleural TB in order to enhance our understanding of this disease.

Appendix

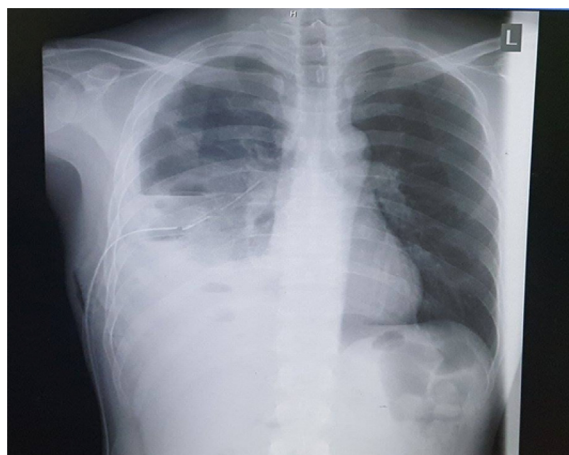


Fig. 1. Chest radiograph showing a right pleural effusion with a chest drain in situ.

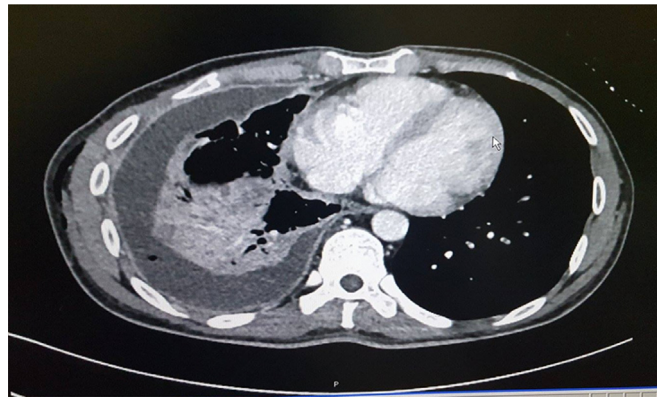


Fig. 2. Computed Tomography (CT) scan of the chest showing a right pleural effusion with air pockets and compressive right lower lobe atelectasis, suggestive of an early empyema.

References

- [1] WHO, Global Tuberculosis Report, (2016) www.who.int/tb/publications/global_report/en/ 2.4.17, p 1, 182 - 184.
- [2] R.W. Light, Update on tuberculous pleural effusion, *Respirology* 15 (2010) 451–458.
- [3] J.M. Porcel, Tuberculous pleural effusion, *Lung* 187 (2009) 263–270.
- [4] W.H. Ibrahim, et al., Does pleural tuberculosis disease pattern differ among developed and developing countries, *Respir. Med.* 99 (2005) 1038–1045.
- [5] D. Jeon, Tuberculous pleurisy: an update, *Tuberc. Respir. Dis.* 76 (2014) 153–159.
- [6] M. Seiscento, et al., Pulmonary involvement in pleural tuberculosis: how often does it mean disease activity? *Respir. Med.* 105 (2011) 1079–1083.
- [7] R.W. Light, Establishing the diagnosis of tuberculous pleuritis, *Arch. Intern. Med.* 158 (1998) 1967–1968.