Pulmonary tuberculosis presenting as tension pneumothorax

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Abstract

Although detection of spontaneous pneumothorax during evolvement active pulmonary tuberculosis is not uncommon, presentation of pulmonary tuberculosis as tension pneumothorax is rare. There is limited literature regarding pneumothorax complicating pulmonary tuberculosis. Pneumothorax due to tuberculosis can be managed by intercostal drainage in the majority; only a minority needs surgical intervention. Many patients need intercostal drainage for a prolonged period. We report a patient presenting with a tension pneumothorax who was found to have active pulmonary tuberculosis. His pneumothorax was managed successfully with prolonged intercostal drainage. Lessons we learnt during the management of this patient is discussed.

Key words: tension pneumothorax, pulmonary tuberculosis, bronchopleural fistula

Introduction

Tuberculosis is a devastating infection which has affected mankind since the ancient times. It is still one of the leading causes of mortality due to infectious disease worldwide.¹ The burden of tuberculosis is more in countries with low socio-economic indices. The world health organization reports around 10 million of new cases annually.² The disease can result in both pulmonary and extra pulmonary manifestations.

Pulmonary tuberculosis (PTB) can be complicated by spontaneous pneumothorax due to development of broncho-pleural fistula. Although a life-threatening complication it is under reported.³

Case report

A 20-year-old man presented to the casualty medical ward of Colombo South Teaching Hospital with severe respiratory distress preceded by worsening difficulty in breathing and left sided pleuritic type chest pain for two days duration. He had low grade fever, productive cough, loss of appetite and loss of weight for one month before presentation. He had been previously well with no contact history of tuberculosis. There was no history of smoking or substance abuse.

On examination, his respiratory rate was 36 cycles per minute. Oxygen saturation on room air was 90%. Blood pressure was 80/60 mmHg and pulse rate was 110 beats per minute. Trachea was deviated to the right side with reduced breath sounds over the left lung. Percussion note over left lung was hyper-resonant. He was febrile, pale, and emaciated.

Tension pneumothorax was suspected, and an urgent chest X ray was done (Figure 1). Urgent needle thoracotomy was performed by a 14G wide bore cannula inserted to the left 2nd intercostal space in the mid clavicular line. Release of air under pressure was noticed during the needle thoracotomy and patients' vitals started to stabilize. After an intercostal drainage tube (ICD) inserted by the surgical team, patient stabilized further.

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Figure 1. Urgent chest X-ray done on admission showing left tension pneumothorax with mediastinal shift.

Investigations showed white cell count of $13 \times 10^9/\text{dL}$, C reactive protein of 179 mg/L and ESR 101 mm in the first hour. Chest radiograph following ICD insertion (Figure 2) showed expanded left lung with cavitation and fibrosis in the lung parenchyma. Three smears of sputum were positive for acid fast bacilli. Sputum and blood cultures were negative. Retroviral studies were negative. With the diagnosis of active pulmonary tuberculosis, patient was started on category 1 anti-tuberculosis treatment (ATT) on the 4th day after admission.

Patient clinically improved with treatment and the ICD was removed on the seventh day. However, he developed pleuritic type chest pain and difficulty in breathing within 24 hours of removal of the ICD. Repeat chest X-ray showed re-accumulation of air and ICD was re-inserted. Following re-insertion of the ICD there was continuous bubbling of air and a high-resolution computed tomography done showed a broncho pleural fistula (Figure 3). Patient was then referred to a specialized thoracic surgical unit at the Chest hospital, Welisara for possible surgical intervention. However, no surgical intervention or video-assisted thoracoscopic surgery was performed, and he was managed conservatively with ICD which was kept for a total duration of 15 weeks. During this stay he had one failed attempt of ICD removal. Serial CT scans and chest X-rays were performed during the hospital stay and after discharge. Last CT scan done 8 months after the admission showed post tuberculosis changes with

Figure 2. Chest X-ray following intercostal tube insertion showing expanded lung.

large cavities without any evidence of pneumothorax. He completed the six-month ATT course without complications. Although decortication was initially planned, it was not done as there was no evidence of restrictive layer of fibrous tissue.

Figure 3. High-resolution computed tomography showing evidence of a broncho pleural fistula.

Discussion

Tuberculosis is an infectious disease with multi organ involvement and protean manifestations. It is caused by *Mycobacterium tuberculosis* and lung is the major site of primary infection. Since tuberculosis usually has non-specific and mild symptoms initially, by the time of presentation there is significant lung damage. This is particularly true in low socio-economic backgrounds. Destruction of lung tissue in active PTB can cause formation of broncho-pleural fistula leading to spontaneous secondary pneumothorax (SSP).

Studies have shown the risk SSP to be 0.6 - 1.4%.⁴ Given the annual tuberculosis incidence of 64/100000 in Sri Lanka, SSP would be contributing to a significant morbidity.⁵ Considering the global tuberculosis burden, (estimated 10 million in 2019) the number affected with SSP is massive.⁶ It is surprising that detailed publications related to SSP complicating tuberculosis is limited. Further, tension pneumothorax complicating pulmonary tuberculosis were extremely limited in literature. In a recently published case report of a patient who had a sudden death, a CT scan done prior to autopsy showed a tension pneumothorax with histo-pathological evidence of active tuberculosis.⁷ There was another published case report of a tension pneumothorax in a previously diagnosed tuberculosis patient.⁸ There were no reported cases of active tuberculosis presenting as tension pneumothorax.

Tension pneumothorax is a medical emergency. It occurs due to the formation of a one-way valve which allows air to enter the pleural cavity during inspiration but prevent escape of air during expiration. This results in collapse of the ipsilateral lung. Rapid enlargement of the pneumothorax lead to mediastinal shift and kinking of great vessels causing hypoxemia and hemodynamic instability resulting in death unless the accumulated air is promptly released. The most common causes of tension pneumothorax are iatrogenic or related to trauma.⁹ In patients with COPD and tuberculosis the presence of fibrotic adhesions with large bullae is an important risk factor for the development of tension pneumothorax.¹⁰

British Thoracic Society pleural disease guidelines highlight the pitfalls in diagnosis and management of tension pneumothorax.⁹ Diagnosis of tension pneumothorax can be missed especially in patients in ICU and those with underlying lung diseases as symptoms and signs of tension pneumothorax may mimic the worsening of the underlying disease. Obtaining a chest X ray is not recommended; it delays the treatment. Furthermore, the mediastinal displacement visible in the chest X ray correlate poorly with the presence of tension within the pleural cavity.

Release of air under pressure in both inspiration and expiration after needle thoracotomy confirms the diagnosis.

The guideline cautions that a standard 14 G needle (4.5cm) may not be long enough to penetrate the chest wall in the second anterior intercostal space in the mid clavicular line in some patients. It recommends fourth or fifth intercostal space, where chest wall is less thick or prompt ICD in case of failed needle thoracotomy. In our patient, there was rapid decompression with use of the standard needle in the second intercostal space; he was a thin built patient who was further emaciated due to tuberculosis.

It is recommended that patients with secondary spontaneous pneumothorax be referred to a thoracic surgeon if air leakage persists for more than 48 hours. Surgical methods available for treatment of pneumothorax include thoracostomy, pleuro-pneumectomy or decortication.¹¹ However, majority of patients recover with a prolonged period of ICD. In a study 130 events of persistent air leak in spontaneous pneumothorax, air leak was resolved spontaneously by 14 days in 79% of patients with secondary pneumothorax.¹² In another study of SSP complicating tuberculosis, only 28% required surgical intervention.¹³ Our patient too, who had a broncho-pleural fistula did not require any surgical intervention although he was referred to a thoracic surgical unit.

Conclusion

This case illustrates many learning points in diagnosis and management of SSP, a less described complication of pulmonary tuberculosis. Tension pneumothorax must be diagnosed clinically; urgent needle thoracotomy should not be delayed for radiological confirmation. If prompt release of air is not observed if a standard 14G needle is used at the second intercostal space in the mid clavicular line, repeat needle thoracotomy in the fourth or fifth intercostal space should be done. SSP complicating tuberculosis needs prolonged period of ICD.

Conflicts of interest

There are no conflicts of interest.

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Ethics statement

Patient's consent was granted for the publication of this case report.

References

1. Dye C, Williams BG. Eliminating human tuberculosis in the twenty-first century. *J R Soc Interface* 2008; **5**(23): 653-62. doi.org/10.1098/rsif.2007.1138
2. World Health Organization. Estimated Epidemiological Burden of TB, Update 2010. www.who.int/tb/country/data/download/en/index.html
3. Treasure RL, Seaworth BJ. Current role of surgery in *Mycobacterium tuberculosis*. *Ann Thorac Surg* 1995; **59**(6): 1405-7. doi.org/10.1016/0003-4975(95)00145-B
4. Inh HJ, Hankins JR, Miller JE, et al. Pneumothorax associated with pulmonary tuberculosis. *J Thorac Cardiovasc Surg* 1972; **64**: 211-19.
5. WHO.int https://www.who.int/docs/default-source/searo/tuberculosis/rglc-report-sri-lanka-2019-july.pdf?sfvrsn=6ef508f7_2
6. Tuberculosis (TB). (n.d.). Retrieved from <https://www.who.int/news-room/fact-sheets/detail/tuberculosis>
7. Inokuchi G, Chiba F, Makino Y, Tsuneya S, Iwase H. Sudden death due to tension pneumothorax associated with pulmonary tuberculosis. *Forensic Sci Med Pathol*. 2020; **17**(1): 152-6.
8. Athey N, Hills A. Tuberculous tension pneumothorax. *Emergency Medicine Journal* 2010; **27**(3): 212.
9. MacDuff A, Arnold A, Harvey J Management of spontaneous pneumothorax: British Thoracic Society pleural disease guideline 2010. *Thorax* 2010; **65**: ii18-ii31.
10. Yoon JS, Choi SY, Suh JH. et al. Tension pneumothorax, is it a really life-threatening condition? *J Cardiothorac Surg* 2013; **8**: 197. doi.org/10.1186/1749-8090-8-197
11. Donath J, Khan FA. Tuberculous and post-tuberculous bronchopleural fistula. Ten year clinical experience. *Chest* 1984; **86**(5): 697-703.
12. Chee CB, Abisheganaden J, Yeo JK, et al. Persistent air-leak in spontaneous pneumothorax -- clinical course and outcome. *Respir Med*. 1998; **92**(5): 757-61.
13. Freixinet JL, Caminero JA, Marchena J, Rodríguez PM, Casimiro JA, Hussein M. Spontaneous pneumothorax and tuberculosis: long-term follow-up. *Eur Respir J*. 2011; **38**(1): 126-31.