International Journal of Advances in Medicine
Yong BJC et al. Int J Adv Med. 2024 Sep;11(5):528-531
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933

DOI: https://dx.doi.org/10.18203/2349-3933.ijam20242320

Case Report

Pulmonary tuberculosis and secondary spontaneous tension pneumothorax in HIV patient: case report

Bernard Jonathan Christian Yong*, Ni Made Dwita Yaniswari

Department of Pulmonology, Wangaya Regional Hospital, Kota Denpasar, Bali, Indonesia

Received: 09 July 2024
Accepted: 06 August 2024

***Correspondence:**
Dr. Bernard Jonathan Christian Yong,
E-mail: bernardyong10@gmail.com

ABSTRACT

Tuberculosis remains as one of the top 10 infectious diseases causing mortality worldwide. In year 2022, Tuberculosis has caused an estimated 1.30 million deaths with 1.13 million of death caused by tuberculosis alone, while 167000 cases in TB-HIV coinfection. Secondary Spontaneous Pneumothorax has been well known as a complication of Tuberculosis, although the incidence is quite rare, it could be life threatening especially if the pneumothorax progress to tension pneumothorax. Patient, male 19 years old came to the emergency room with a sudden shortness of breath for 3 hours prior to hospital admission. X-ray thorax examination showed collapse of the right lung with hyperlucent avascular findings on the right lung, which suggest secondary spontaneous tension pneumothorax. He was treated with chest tube insertion and WSD placement, 2 hours after WSD placement, he became pulseless. ACLS protocols were given and unfortunately, we were unable to achieve ROSC on him. Tuberculosis remains one of the deadliest infection diseases, but can still be treated with the DOTS regimen. Some condition can make tuberculosis difficult to treat, such as immunodeficiency patient like HIV/AIDS. Spontaneous Pneumothorax has been well known as a complication of tuberculosis, although the incidence rate of pneumothorax in tuberculosis are quite low, however it could be life-threatening if it develops into a tension pneumothorax, especially in the settings of advanced stage HIV patients. Spontaneous pneumothorax can be fatal especially when it develops to tension pneumothorax. Further research is needed to know what population who are at risk of developing pneumothorax.

Keywords: Tuberculosis, Pneumothorax, HIV

INTRODUCTION

Tuberculosis (TB) remains as one of the top 10 infectious diseases causing mortality worldwide. In 2022, TB was the world's second leading cause of death from a single infectious agent, after coronavirus disease (COVID-19), and caused almost twice as many deaths as HIV/AIDS.[1] There were an estimated 39.0 million people living with HIV. Around 630.000 people died from HIV related causes and 1.3 million people acquired HIV.[2] Due to the lack of immunity, People live with HIV (PLHIV) has 20 to 30 times higher risk to develop TB compared than general population.[3] TB has caused an estimated 1.30 million deaths (including PLHIV) with 1.13 million of death caused by TB alone, while 167000 cases in TB-HIV coinfection. More than 10 million people got newly diagnosed with TB every year.[2] About a quarter of the global population is estimated to have been infected with TB and Indonesia was located on the 2nd major contributor of new cases in 2022 (10% of the global TB cases). Of the total number of people who develop TB disease each year, about 90% are adults, with among men (55%), woman (33%), and children (12%). Secondary Spontaneous Pneumothorax (SSP) has been known as a complication to TB even the incidence is quite rare (about 1.5-2% of cases).[4] However, it could be life threatening especially if the pneumothorax progress to tension pneumothorax. Tension pneumothorax is the most severe and life-

threatening complication, that develops when air entrapped inside the pleural space through one-way valve mechanism, compressing the lung and mediastinum, which can cause obstructive shock and death.[5] The treatment of SSP varies and depends on patient's condition, sometimes TB treatment alone can solve the SSP, or chest tube drainage (CTD) and some cases needs surgical intervention to solve the pneumothorax.[4] In this case report, we present a secondary spontaneous-tension pneumothorax in a TB-HIV coinfection patient.

CASE REPORT

Patient, male 19 years old came to the emergency room with a chief complain of sudden shortness of breath for 3 hours prior to hospital admission. His parents said that he also had productive cough with a yellow phlegm. Physical examination was tachypnoeic (respiratory rate 42 times per minute), low saturation oxygen (75%), low blood pressure (80/40), high temperature (38.7°C), body weight 40 kg, height 1.6 m of tall, body mass index (BMI) 15.625, looked cachexia, absent of breath sound on the right lung, hyper-resonant on the right lung, elevated jugular vein and decrease of consciousness. X-ray thorax examination showed collapse of the right lung with hyperlucent avascular findings on the right lung, which suggest secondary spontaneous tension pneumothorax on the right lung. Laboratory examination showed elevated of leucocytes (10.82) neutrophil dominant (86%). Blood gas analysis (BGA) showed respiratory acidosis (pH 7.15, PCO2 95, PaO2 70, HCO3 29).

Previously he was diagnosed with HIV/AIDS on October 2023 and treated with anti-retro viral (ARV) medication (Tenofovir, Lamivudine, and Dolutegravir). He also was diagnosed with lung tuberculosis based on the GeneXpert tuberculosis and treated with the first line regimen for tuberculosis Rifampicin, Isoniazid, Pyrazinamide, Ethambutol (RHZE), however on the 7th days of treatment he had an allergic reaction and after desensitization he was planned to use the 9 months of Rifampicin, Isoniazid, and Ethambutol (9RHE regimen) which was started on the 2nd week of October 2023. On February 2024 (3 months of treatment) the patient suddenly had decrease of consciousness and stiffness throughout his whole body, CT-scan of the head showed a hydrocephalus, normal findings on his thorax X-ray and negative on antibody IgM of Toxoplasma. His level of consciousness was fluctuated in between of coma and stupor. He was treated in the hospital for a nearly of 1 month, and while being treated, his level of consciousness deteriorates more because of the hydrocephalus. On that time, he was diagnosed as a decrease of consciousness caused by hydrocephalus, lung infection caused by TB, pneumonia, and Pneumonitis Jiroveci Pneumonia (PJP), HIV, and oral candidiasis. He was treated by DOTS 9 RHE regimen, antibiotic for pneumonia ceftriaxone 2 grams BID, cotrimoxazole 960 mg TID (2-2-1 tablets), methylprednisolone 62.5 mg BID, nystatin drops 1 ml QID, acetylcysteine 200 mg TID, and citicoline 500 mg TID. After 1 month of staying in the hospital he continued to deteriorate, and so his family were agreed to carry out the treatment at their home. However, 1 day after he got home, he became so tachypnoeic, and respiratory distress, so his family took him back to the hospital. The patient was diagnosed with secondary spontaneous-tension pneumothorax, and treated with chest tube insertion and water-seal drainage (WSD) placement. He also was given ceftriaxone 2 grams BID, levofloxacine 1×750 mg OD, methylprednisolone 62.5 mg BID, and acetylcysteine 1×5 gram IV. Around 2-3 hours after WSD installation his condition continued to deteriorate, then he became cardiac arrest.

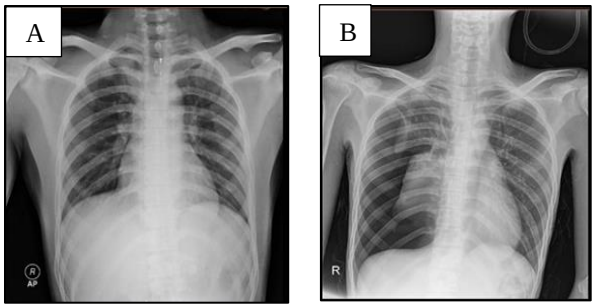

Figure 1 (A and B): Radiology findings. 05th of February 2024 on the left side and 07th March 2024 on the right side.

DISCUSSION

Tuberculosis is still one of the top 10 infectious disease worldwide.[1] However, it can be cured by using the DOTS medication for 6 months. There is some condition that could make TB become worse such as non-immunocompetent patient.[6] TB is also the main cause of death in people with HIV, previous study showed the mortality rate in HIV patient with TB was nearly doubled compared to those without TB, another retrospective cohort study by Tancredi et al showed the 12 year survival probabilities were 74.1% and 55.7% among patients without TB and with TB-HIV coinfection.[7,8] HIV is known to deplete CD4+ cells with the end result in acquired immunodeficiency syndrome (AIDS), it also has been discovered that HIV lowers the T Helper -1 (Th-1) activity and increase the T Helper-2 (Th-2) activity, CD8+ levels also elevated due to the compensation of the low CD4+ level. The shift from Th1 to Th2 will decrease the expression of IL-2 and IFN-γ and increase the expression of IL-4, IL-5, and IL-13. The depletion of CD4+ T cells compromise the host's immune response, leaving the individual vulnerable to opportunistic infections such as TB.[9]In our case, at the time he was diagnosed with TB, his CD4+ levels are so low (51 cells/mm3), after 2 weeks he finished his sensitization (because of the allergic reaction) he began his ARV therapy. Low CD4+ levels have been recognized as a poor prognosis in HIV patients.

Pneumothorax is defined as the presence of air in the pleural space. Although intrapleural pressures are negative

throughout most of the respiratory cycle, air does not enter into the pleural space because the sum of all partial pressures of gases in the capillary blood. Pneumothorax is clinically categorized as spontaneous pneumothorax and non-spontaneous pneumothorax. Pneumothorax that occurs without any preceding trauma or obvious triggering events is called spontaneous pneumothorax.[10] Further, spontaneous pneumothorax is classified as primary (PSP, no underlying disease) and secondary (SSP, with underlying disease for example, infectious such as pneumonia, TB, and Chronic Obstructive Pulmonary Disease (COPD)). Between these two types of spontaneous pneumothorax, the SSP has worse outcome than PSP due to the impaired lung function, thus the clinical manifestation is often more severe and presented with respiratory distress.[11] Pathogenesis of secondary spontaneous-tension pneumothorax in tuberculosis includes sudden onset of bronchopleural fistula, empyema, cavitary formations, necrosis of pleura and pleural-pulmonary fibrotic adhesion, which possibly allows air leakage to the pleural cavity.[12,13] This mechanism cause inability of the lungs to expand and decompress the vena cava inferior that leads to reduced preload and low cardiac output, later the patient became hypoxemia and acute respiratory distress syndrome (ARDS) which could lead to death.[10] In our case, he continued to deteriorates even after we did the chest tube and WSD installation. People without HIV or Tuberculosis, tension pneumothorax has a low mortality rate. In previous study, the mortality rate of tension pneumothorax is as low as 3-7% if recognized early.[14] Although we can't find the study about tension pneumothorax mortality rate on tuberculosis patient, we also found a cohort study that showed a decrease of survival rate on tuberculosis pneumothorax survival. The study showed the survival rate on the 1, 3, 5, and 10 years was 95.6%, 84.8%, 81.5%, and 56.8% respectively, with the major cause of death was respiratory insufficiency, followed by pneumonia, and liver insufficiency.[15]

On the previous cohort study, the only predictions of poor prognosis were the patient's age (HR 1.063) (the older the patient, the worse the prognosis) and HIV infection (HR 6.336). This is what makes our case is unique, because our patient was only 19 years old, which supposed to have better prognosis. We think our patient has a poor prognosis maybe because his CD4+ levels are very low, and low quality of life due to his hydrocephalus.[15]

The risk factor and pathogenesis of secondary pneumothorax due to the longer hospital admission, coma, nasal feeding, and bedridden condition are still remain unclear. In our case, the patient was on bedridden position and treated in the hospital for about 30 days. However, we found a meta-analysis study conducted by Zhen Chen, that bed-ridden, hospital stay duration (more than 30 days), NGT, and consciousness disorders are all increase the risk of pulmonary infection.[16] Infection is one of the risk factor of SSP, including tuberculosis, PJP, and necrotizing pneumonia which can lead to pneumothorax.[10]

CONCLUSION

Tuberculosis is still one of the top 10 infectious disease cause mortality worldwide that can be treated with the DOTS regimen. Some condition like immunodeficiency such as HIV can make tuberculosis harder to treat. One of the complications that has been well known so far is spontaneous pneumothorax. Although the incidence of secondary pneumothorax is quite rare, we must be aware that spontaneous pneumothorax could be life threatening especially if it develops into a tension pneumothorax and happens in advanced stage HIV patients. This also requires further research regarding the risk of patients to developing spontaneous pneumothorax, so we can be extra careful when treating patients in population who are at risk of developing spontaneous pneumothorax.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. WHO. Report 2020-2023. Available at. https://www.who.int/teams/global-tuberculosis. Accessed on 12th March 2024.
2. WHO. HIV Report. 2023. Available at. https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library. Accessed on 10th March 2024.
3. Sadirova D, Grigoryan R, Parpieva N, Barotova V, Trubnikov A, Kalandarova L, et al. Incidence rate and risk factors for Tuberculosis among people living with hiv: a 2015–2017 cohort from Tashkent, Uzbekistan. Int J Environ Res Public Health. 2021;18(11):5746.
4. Aktogu S, Yorgancioglu A, Cirak K, Kose T, Dereli S. Clinical spectrum of pulmonary and pleural tuberculosis: a report of 5,480 cases. Eur Respir J. 1996;9(10):2031-5.
5. Smith S, Faris PD, Blackmore C, Ball CG, Robertson HL, et al. Clinical presentation of patients with tension pneumothorax. Ann Surg. 2015;261(6):1068-78.
6. Bruchfeld J, Correia-Neves M, Källenius G. Tuberculosis and HIV co-infection. Cold Spring Harb Perspect Med. 2015;5(7):17871.
7. Koenig SP, Kim A, Shepherd BE, Cesar C, Veloso V, Cortes CP, et al. Increased mortality after tuberculosis treatment completion in persons living with human immunodeficiency virus in latin America. Clin Infect Dis. 2020;71(1):215-7.
8. MV, Sakabe S, Waldman EA. Mortality and survival of tuberculosis coinfected patients living with AIDS in São Paulo, Brazil: a 12-year cohort study. BMC Infect Dis. 2022;22(1):223.
9. Wong K, Nguyen J, Blair L, Banjanin M, Grewal B, Bowman S, et al. Pathogenesis of human immunodeficiency virus-mycobacterium

tuberculosis co-infection. J Clin Med. 2020;9(11):3575.
10. Noppen M. Spontaneous pneumothorax: epidemiology, pathophysiology and cause. Eur Respir Rev. 2010;19(117):217-9.
11. Onuki T, Ueda S, Yamaoka M, Sekiya Y, Yamada H, Kawakami N, et al. Primary and Secondary Spontaneous Pneumothorax: Prevalence, Clinical Features, and In-Hospital Mortality. Can Respir J. 2017;2017:1-8.
12. Puhalla S, Bhattacharya S, Davidson NE. Hormonal therapy in breast cancer: A model disease for the personalization of cancer care. Mol Oncol. 2012;6(2):222–36.
13. Shamaei M, Tabarsi P, Pojhan S, Ghorbani L, Baghaei P, Marjani M, et al. Tuberculosis-associated secondary pneumothorax: a retrospective study of 53 patients. Respir Care. 2011;56(3):298-302.
14. Hoechter DJ, Speck E, Siegl D, Laven H, Zwissler B, Kammerer T. Tension pneumothorax during one-lung ventilation-an underestimated complication? J cardiothorac vasc anesth. 2018;32(3):1398-402.
15. Freixinet JL, Caminero JA, Marchena J, Rodriguez PM, Casimiro JA, Hussein M. Spontaneous pneumothorax and tuberculosis: long-term follow-up. Eur Respir J. 2011;38(1):126-31.
16. Chen Z, Song T, Li Y, Luo L, Li Z, Zhao Q. The pulmonary infection risk factors in long-term bedridden patients: a meta-analysis. Am J Transl Res. 2021;13(10):11014-25.

Cite this article as: Yong BJC, Yaniswari NMD. Pulmonary tuberculosis and secondary spontaneous tension pneumothorax in HIV patient: case report. Int J Adv Med 2024;11:528-31.