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Original Research Article

CORRELATIONAL STUDY OF SPONTANEOUS PNEUMOTHORAX AND TUBERCULOSIS: AN INSTITUTIONAL BASED STUDY

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Abstract

Background: An ancient infectious disease, tuberculosis (TB) has affected humankind throughout history. Pneumothorax is defined as the presence of air in the pleural space. This study was conducted to evaluate the relationship between spontaneous pneumothorax and tuberculosis. **Materials and Methods:** The observational, retrospective, as well as longitudinal study analysed clinical reports from all individuals treated for SSP and TB. Age, sex, comorbidity, as well as prior medical history were gathered from the medical records. Radiological investigations, such as CT or conventional thoracic radiography, were always used to confirm the diagnosis of SSP. SPSS software was used for the analyses. **Result:** 100 individuals having SP had been treated throughout the study period out of which 50 were males and 50 were females. 12 (12%) of them developed SSP secondary to TB. Out of the 12 cases of SSP secondary to tuberculosis, 5 had residual inactive tuberculosis and 7 had active tuberculosis at the time of producing SSP (positive culture for Mycobacterium tuberculosis). Active TB was seen in 7 subjects. COPD and pneumonia were observed in 6 subjects each, dyspnoea and cough were evident in 5 subjects each. Chest pain and fever were observed in 3 and 1 subjects respectively. The most common radiological finding was infiltrates accounting for 45 subjects, followed by pleural thickening in 19 subjects. **Conclusion:** Active tuberculosis was found to be associated with spontaneous pneumothorax. The most common radiological finding among the subjects had been infiltrates.

INTRODUCTION

An ancient infectious disease, tuberculosis (TB) has affected humankind throughout history. Despite the introduction of medical TB treatment during the 20th century.[1,2] TB is the leading cause of mortality among curable infections.[3,4] This problem becomes more evident when considering the increasing incidence of human immunodeficiency virus/acquired immune deficiency syndrome.[5,6] These diseases have sped each other's progress, giving rise to the terms “co-epidemic” and “dual epidemic.” The majority of deaths due to TB occur in developing countries, as is emphasized in the World Health Organization's 2006 report, “Global Tuberculosis Control: Surveillance, Planning, Financing.”[7] In view of these issues, with the increasing incidence of TB and improving TB survival, the incidence of TB complications that need surgery has increased and merits more thorough consideration.[8,9] Pneumothorax is defined as the presence of air in the pleural space. A spontaneous pneumothorax typically occurs without history of chest trauma and can be classified as secondary or primary when it occurs in an individual with or without underlying lung disease, respectively.[10] Spontaneous pneumothorax can be secondary to a wide variety of lung diseases. Spontaneous pneumothorax secondary to pulmonary tuberculosis can occur in cases of residual fibrosis with retractions and bullae.[11]

The estimated incidence of spontaneous pneumothorax associated with active pulmonary tuberculosis is only approximately 1–2%. Other pulmonary infections, such as necrotizing bacterial pneumonias and particularly Pneumocystis jiroveci pneumonia in patients with acquired

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immunodeficiency syndrome (AIDS), are associated with spontaneous pneumothorax.[12]

Latent tuberculosis infection is characterized by an adaptive and specific immune response to Mycobacterium tuberculosis (MTB) complex antigens, with no evidence of clinically active TB. The microorganisms that cause latent infection can persist in an inactive phase for several decades, even during the entire life of the host; however, in approximately 5% of all infected individuals, the latent infection progresses to active replication and causes TB disease.[13] Hence, this study was conducted to evaluate the relationship between spontaneous pneumothorax and tuberculosis.

MATERIALS AND METHODS

This observational, retrospective, as well as longitudinal study analysed clinical reports from all individuals treated for SSP and TB. Age, sex, comorbidity, as well as prior medical history were gathered from the medical records. The amount of time between the pleural drainage procedure and the patient's death, or the date of the last follow-up observation prior to the analysis, if the subject was still alive, was regarded as long-term survival. The hospital's database was used for the follow-up. The variables that were taken into account as end-points were the recurrence of SSP and the survivorship following a pneumothorax. Radiological investigations, such as CT or conventional thoracic radiography, were always used to confirm the diagnosis of SSP. SPSS software was used for the analyses.

RESULTS

In this study, 100 individuals having SP had been treated throughout the study period out of which 50 were males and 50 were females. 12 (12%) of them developed SSP secondary to TB. Out of the 12 cases of SSP secondary to tuberculosis, 5 had residual inactive tuberculosis and 7 had active tuberculosis at the time of producing SSP (positive culture for Mycobacterium tuberculosis).

Active TB was seen in 7 subjects. COPD and pneumonia were observed in 6 subjects each, dyspnoea and cough were evident in 5 subjects each. Chest pain and fever were observed in 3 and 1 subjects respectively. The most common radiological finding was infiltrates accounting for 45 subjects, followed by pleural thickening in 19 subjects.

Table 1: Gender-wise distribution of subjects.

Gender	Number of subjects
Males	50
Females	50
Total	100

Table 2: Descriptive analysis: clinical characteristics and radiological findings of the sample studied.

Variable	Cases
Clinical characteristics	
Active TB	07
COPD	06
Pneumonia	06
Dyspnoea	05
Cough	05
Chest pain	03
Fever	01
Radiological findings	
Infiltrates	45
Pleural thickening	29
Bronchiectasis	13
Granulomas	07
Pleural effusion	06

DISCUSSION

A pneumothorax is a collection of air outside the lung but within the pleural cavity.[14] Pneumothorax is divided into spontaneous pneumothorax and non-spontaneous (traumatic) pneumothorax. Among them, spontaneous pneumothorax is divided into primary spontaneous pneumothorax (PSP) and secondary spontaneous pneumothorax (SSP). Iatrogenic and non-iatrogenic pneumothorax are the two types of non-spontaneous pneumothorax. This article focuses on SSP. SSP is considered to be one of the causes of spontaneous pneumothorax.[15] The most common risk factors were chronic obstructive pulmonary disease (COPD), asthma, human immunodeficiency virus (HIV) combined with pneumocystis pneumonia, necrotizing pneumonia, tuberculosis nodules, and cystic fibrosis, followed by rare diseases. Based on the above, secondary spontaneous pneumothorax, as a potentially life-threatening disease, requires immediate action.[16]

Pneumothorax secondary to TB usually occurs after extensive TB involvement of the lung, and the sudden onset of bronchopleural fistulization and empyema with severe cavitary formations or occasionally with miliary TB. The TB organism invades the pleura and causes liquifactive necrosis, then pleural rupture.[17]

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Hence, this study was conducted to assess the relationship between tuberculosis and spontaneous pneumothorax.

In this study, 100 individuals having SP had been treated throughout the study period out of which 50 were males and 50 were females. 12 (12%) of them developed SSP secondary to TB. Out of the 12 cases of SSP secondary to tuberculosis, 5 had residual inactive tuberculosis and 7 had active tuberculosis at the time of producing SSP (positive culture for Mycobacterium tuberculosis). Active TB was seen in 7 subjects. COPD and pneumonia were observed in 6 subjects each, dyspnoea and cough were evident in 5 subjects each. Chest pain and fever were observed in 3 and 1 subjects respectively. The most common radiological finding was infiltrates accounting for 45 subjects, followed by pleural thickening in 19 subjects.

Freixinet JL et al,[18] (2011) retrospectively analysed the experience of SP in patients diagnosed with TB in their hospital between 1989 and 2010. Out of 872 patients treated for SP during this period, 47 (5.4%) had TB antecedents, 21 with active TB (0.95% of the 2,089 TB cases diagnosed during this period) and 26 with residual inactive TB. 46 cases were treated with pleural drainage (PD): 40 (85%) with only one PD, two with two, and four with three. The mean ± SD length of PD treatment was 12.9 ± 11.3 days. In 11 (23%) cases, a relapse of SP occurred, with no statistical relationship between the different studied variables. In 13 (28%) cases, it became necessary to carry out a resection (atypical segmentectomy in all cases) for persistent air leaks with PD. Survival statistics were unfavourable only in elderly patients and those infected with HIV. They concluded that the treatment of SP secondary to TB with PD is usually a sound response, with a good general prognosis and a low percentage of cases that require another PD and surgical treatment.

Kwas H et al,[19] (2017) retrospectively analysed the experience of SP secondary to TB in patients who were hospitalized in their department between 2005 and 2015. The mean age of patients was 38,5±19 years. Two patients had a history of pulmonary tuberculosis. The chest x-ray showed a pneumothorax in 5 cases, a hydropneumothorax in 5 cases and cavitary lesions accompanying SP in 5 cases. Acido-alcoolo-resistant bacilli were isolated in the expectorations in all patients. Treatment associated antitubercular chemotherapy in compliance with the national plan of struggle against tuberculosis, chest drainage and respiratory physiotherapy. The average duration of chest tube drainage was 23 days. Two patients underwent surgery. The course was favourable in 5 cases. A delay (>1month) to bacilli negativation was noticed in 2 patients and pachypleuritis requiring surgical pleural decortications in 2 patients. In their study, tubercular pneumothorax was always associated with active cavitated tuberculosis. The course was most of the time favourable with antitubercular chemotherapy and chest drainage. However, pleural sequelae such as pachypleuritis persisted sometimes.

CONCLUSION

Active tuberculosis was found to be associated with spontaneous pneumothorax. The most common radiological finding among the subjects had been infiltrates.

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