



Clinical Study of Pneumothorax with or without fluid

KEYWORDS

Pneumothorax, Hydropneumothorax, Pyopneumothorax, Tuberculosis, HIV

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ABSTRACT *Introduction: Pneumothorax is defined as the accumulation of air in the pleural space with secondary collapse of the surrounding lung. Pneumothorax is a common medical emergency and is a diagnostic and therapeutic challenge to the physician. The condition can itself be serious and crippling and at times may endanger the life of the patient, because of the respiratory insufficiency and cardio-respiratory embarrassment or due to associated complications. Aims and Objectives: To study the cause of Pneumothorax and their association with TB and HIV. Methods: Sixty consecutive patients, diagnosed as Pneumothorax after clinical examination and radiological investigations were considered for the study. Discussion: Fifty five cases were due to secondary Pneumothorax and five were primary Pneumothorax. Twenty one cases had TB aetiology (excluding TB-HIV co- infection). HIV was found in 21 cases of which co-infection of TB-HIV was seen in 15 cases, 6 had Pneumocystis jerevecci. Five had Pyogenic infection and 5 had Pneumothorax due to COPD. One case of Asthma, Amoebic abscess and Pancreatic pseudocyst presented with Pneumothorax. The most common aetiology in our study was TB (36 cases: 21 of TB and 15 due to TB-HIV infection). Conclusion: The most common cause of Pneumothorax in our study was found to be Tuberculosis.*

INTRODUCTION:

Pneumothorax is defined as the accumulation of air in the pleural space with secondary collapse of the surrounding lung. Pneumothorax is a common medical emergency and is a diagnostic and therapeutic challenge to the physician. Pneumothorax is classified as Spontaneous and Traumatic. Primary Spontaneous Pneumothorax occurs in persons without clinically apparent lung disease and Secondary Spontaneous Pneumothorax is a complication of pre-existing lung disease. Traumatic Pneumothorax is caused by penetrating or blunt trauma to the chest, with air entering the pleural space directly through the Chest wall, Visceral pleural penetration or Alveolar rupture due to sudden compression of the chest. Iatrogenic Pneumothorax results as complication of a diagnostic or therapeutic intervention. Pneumothorax may be classified Patho-physiologically as Open, Closed or Valvular and may be partial or complete. This study is taken up to identify the cause of Pneumothorax and its association with HIV and Tuberculosis and to investigate the magnitude and pattern of Clinical, Radiological and Bacteriological presentation.

MATERIALS AND METHODS:

A hospital based prospective observational clinical study consisting of 60 patients attending the Department of Pulmonary Medicine with symptoms of Pneumothorax with or without fluid, pus or blood in the pleural cavity were admitted and investigated to study the clinical aspects. Thus this represents impartial and objective investigation in determining the "Clinical study of Pneumothorax with or without fluid". All cases of pneumothorax preceding trauma and below the age group of 12 were excluded.

The sputum samples collected under aseptic conditions were sent to Microbiological Laboratory for Grocott-Gomori's Methanamine Silver staining to confirm the diagnosis of PCP as it is a common opportunistic infection affect-

ing immunosuppressed or patients with previous or active tuberculosis.

RESULTS AND OBSERVATIONS:

There were 60 patients who presented with Pneumothorax with or without fluid identified in 2561 cases admitted in the Department of Pulmonology, Government General Hospital, Vijayawada during the study period. The overall incidence rate is 2.34%. A total of 5 (0.195%) patients presented with Primary Spontaneous Pneumothorax and 55 (2.14%) presented with Secondary Spontaneous Pneumothorax. Of the 60 patients, 5 (8.33%) were Primary Spontaneous Pneumothorax and 55 (91.66%) were secondary spontaneous Pneumothorax. Of them, 38 (63.33%) were male and 17 (28.33%) female. Out of 60 patients there were 42 males (70%) and 18 females (30%). The patients studied had mean age of 42.2 ± 13.4 years (16-70 years). Males were in mean age of 45.3 ± 11.5 (24-70 years) and females in 35 ± 15.1 (16-70 years). To apply statistical significance to the same data (by applying CHI-Square test), it was grouped into < 40 years and > 40 years. Males were 13 below the age group of 40 years and 29 above the age group of 40 years. Females below the age group of 40 were 14 and above 40 were 4. This did had statistical significance (p value=0.0008) in that females presented with pneumothorax at a younger age group than males. Males presented as pneumothorax were above 40 years of age. In the whole study group, most of the patients were in age group of 41-50 years.

Of the 55 cases the aetiology of Tuberculosis was associated with 21 (38.18%). HIV cases were 21 (38.18%) of which 15 (27.28%) were associated with TB and 6 (10.90%) without TB. Five (9.1%) were due to pyogenic infections, 5 (9.1%) chronic obstructive pulmonary diseases, One (1.81%) Asthma, and one (1.81%) each Amoebic abscess and Pancreatic pseudocyst (1.81%).

GRAPH-1: AGE DISTRIBUTION AMONG MALES AND FEMALES

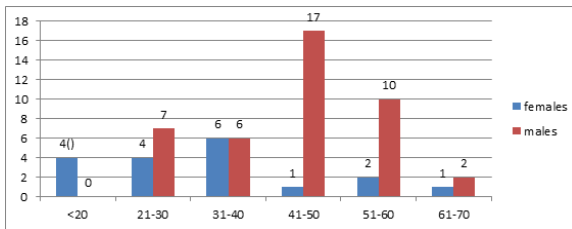


TABLE 1 GROUPING OF PATIENTS OF SECONDARY SPONTANEOUS PNEUMOTHORAX BASED ON AETIOLOGY N=55

AETIOLOGY	TOTAL
Tuberculosis	21(38.18 %)
HIV	21(38.18%)
Associated with TB-15(27.28%)	
Pneumocystis jiroveci pneumonia-4(7.27%)	
Pneumonia-2(3.63%)	
Pyogenic infections	5(9.1%)
COPD	5(9.1%)
Asthma	1(1.81%)
Amoebic	1(1.81%)
Pancreatic pseudocyst	1(1.81%)
Total	55(100%)

In the study, right sided cases were 35(13 Pneumothorax, 10 Pyopneumothorax and 12 were Hydropneumothorax), left sided 24(12 pneumothorax, 8 Pyopneumothorax and 4 were hydropneumothorax) and one with bilateral pneumothorax. To apply statistical significance, bilateral pneumothorax is merged into right

Presentation of clinical features in patients with pneumothorax with or without fluid n=60

Symptoms	Males n=42	Females n=18	Total n=60	Chisquare value	Pvalue
Shortness of breath	28(66.67%)	17(94.44%)	45(75%)	5.1852	0.02278
Dry Cough	7(16.67%)	4(22.22%)	11(18.33%)	0.2597	0.610
Expectoration	13(30.95%)	6(33.33%)	19(31.66%)	0.033	0.855
Chest pain	22(52.38%)	13(72.23%)	35(58.33%)	2.0408	0.15
Haemoptysis	8(19.04%)	5(27.77%)	13(21.67%)	0.5658	0.452
Fever	23(54.76%)	12(66.66%)	35(58.33%)	0.7357	0.3913

Sputum for AFB was positive in 28(46.67%), of which 17(28.33%) were males and 11 (18.33%) females. There is statistical significance in distribution of HIV seropositivity and seronegativity. Of 21 HIV reactives, 13 were AFB Positive and 8 Negative and among these, males were 6 and females 7. There is no statistically significant difference in the distribution of AFB positivity status between HIV positive males and females (p value = 0.864).

A total of 22(36.67%) patients had previous history. Half (9) of the female patients had previous history of Pulmonary tuberculosis or Anti tubercular treatment (ATT) when compared to 30.95% (13) males and this difference between males and females is not statistically significant (p = 0.161). Smoking was one of the precipitating causes of Pneumothorax. In this study, 26(42) males (41.66%), and 1(18) female were smokers (1.66%) and a total of 26(43.33%) were smokers affected with Pneumothorax.

ADA levels were <40U/l in 3 cases of COPD presenting

with hydropneumothorax, one ruptured amoebic abscess and one case of Pseudocyst of pancreas. ADA levels of >40U/l are seen in 11(3 female, 8 male) cases of Tuberculosis, 15(6 females, 9 males) of TB-HIV co-infections and 3 pyogenic infection (females only).

DISCUSSION/CONCLUSION:

Pneumothorax is defined as the presence of air in the pleural cavity. The incidence of primary spontaneous Pneumothorax in a study from Olmsted County, Minnesota was 7.4 per 100,000 per year in males and 1.2 per 100,000 per year in females; and that of secondary Pneumothorax was 6.3 per 100,000 per year in males and 2 per 100,000 per year in females. In the present study, the incidence of SP was calculated to be 2.26%.The incidence of primary spontaneous pneumothorax was found to be 0.25% in males and 0.101% in females and of secondary spontaneous pneumothorax was 2.41% in males and 1.72% in females. This figure does not reflect the true incidence of SP in the general population and is not strictly comparable to the figures quoted in Western studies, since our study is from a tertiary care institute wherein the denominator comprises of patients predominantly referred hospital admission.

In the study we had 5 cases of primary spontaneous pneumothorax, 4 males and one female (M: F ratio 4:1). 38 males and 17 females were diagnosed as secondary spontaneous pneumothorax, with M: F ratio 2.1:1. The higher incidence in men has been attributed to higher rates of smoking, body habitus and different mechanical properties of the lungs.

There was a higher predilection to right sided accounting to 35(58.34%) and Left sided in 24 cases (40%) and one (1.66%) with bilateral involvement.

Most common symptoms presented by patients were Dyspnoea (75%), Chest pain (58.33%), Fever (58.33%), Cough with expectoration(31.66%), Haemoptysis(21.67%) and Dry cough(11.83%). Dyspnoea was significantly higher in females compared to males(p value=0.0278). Dyspnoea of varying degrees and pleuritic chest pain are most common complaints of pneumothorax and were seen in most of the patients in our study. Dry cough was most common symptom than cough with expectoration. In this study, cough with expectoration was higher (31.66%) and can be explained that there may be subpleural foci of infection and their rupture into pleural cavity, causing pneumothorax.

Haemoptysis is mostly seen in patients with pre-existing cavitating pulmonary tuberculous foci and fever, a constitutional symptom, was seen in all cases of pyopneumothorax. When data was grouped into patients with ≤ 3 symptoms and > symptoms, larger proportion of male (38) and female (11) patients had less symptoms and only 4 males out of 38 had > symptoms. This had statistically significant p value=0.0070.It indicated that impending death like signs are seen in most of the cases in the form of dyspnoea and chest pain.

A total of 20 (14 males, 6 females) were diabetics and 17 (14male, 3 female) were hypertensive. In the study group, sputum for AFB, 28(46.67%) cases were positive in which 17 were males and 11 females. The study group also had pulmonary tuberculosis on radiological evidence. There were 22 cases having a history of pulmonary tuberculosis or had Anti-tuberculous treatment. Of the 22, 10 were sputum positive and this may be due to defaulter, recurrence

and relapse. Tuberculosis has remained the dominant cause for SSP in all studies in adults from India. Around 1% of patients with active tuberculosis present with secondary spontaneous pneumothorax. There were studies and case reports where pneumothorax was due to earlier disease or as an active disease. 80% of these cases occur in developing countries. In spite of the fact that TB is a frequent cause of SSP, very few series, with very few patients, have been reported. Freixinet et al studied a total of 872 cases retrospectively over a period of 21 years. Tuberculosis occupied a gamut of secondary spontaneous pneumothorax. He concluded that SSP in patients with TB occurs especially in cases that demonstrate destroyed lung. He also stated that factors such as suffering active TB, fibrotic TB (radiological infiltrates) or having radiological patterns of destroyed lung had an association with recurrences. Botianu PV analysed 245 consecutive patients and found tuberculosis as most important aetiological factor for pneumothorax. Botianu analysed 272 patients retrospectively from 1985-2004 and found 67 patients of pneumothorax to have tuberculosis as an aetiology.

Gupta et al studied 60 patients of spontaneous pneumothorax of them 20 cases (41.2%) had secondary spontaneous pneumothorax due to Tuberculosis. Masoud Shamaei studied retrospectively a group of 53 patients and concluded that younger patients with weight loss and cavitory lesions with respiratory failure should prompt for consideration of pneumothorax, as early intervention could be initiated.

In present study, tuberculosis as cause of secondary spontaneous pneumothorax was observed in 21 patients (38.18%) correlating with studies by Botianu (30.2%), Gupta et, al (41.7%) and Freixinat et al (44.7%).

The study showed pneumothorax in 21 HIV seropositive individuals and of them 15 were co-infected with tuberculosis and of them, Four cases were diagnosed to have pneumocystic infection and two bacterial pneumonia. These findings correlates with M. Tumberello et al in 1995 with HIV& TB as 6.8% and HIV with pneumocystis as 9.5%, Dheeraj Gupta et al (2005) with 6.2% and 2.1% and Rivero et al (2008) with 15.2% and 29.5%. There is an increasing trend in the TB-HIV co- infection over period of time. Five cases (9.1%) in the study developed pneumothorax due to pyogenic infections like lung abscess, pneumonia and necrotizing infections. They were evaluated with Sputum for culture sensitivity and the offending organism was Pneumococci. Antibiotics were administered according to the sensitivity pattern..

Five cases (9.1%) in the study developed pneumothorax secondary to COPD. These cases were diagnosed based on their history, clinical signs and Spirometry readings. They have been evaluated and follow up was made. They in due course of time developed pneumothorax. All of them had emphysematous changes in their Chest X-rays.

In the Study there were 26 smokers (25 males, one female).When Chi-square analysis was done the p value 0.00011.This indicates that smoking could be associated with development of pneumothorax. These 26 patients develop pneumothorax as primary spontaneous or secondary spontaneous. Three smokers had recurrences and two of them had associated COPD. It is understood that obstructive disease with habit of smoking showed higher recurrence rates and one (1.81%) patient had pneumothorax secondary to asthma and this correlates with studies by

Tanaka et al (2%) and O'Rourke JP (4%).

In the study there was one (1.81%) case where there was right hydropneumothorax due to rupture of amoebic liver abscess. The case was intervened with unknown procedures, where he developed hydropneumothorax eventually. Pleuro-pulmonary penetration of amoebic liver abscess occurs in 15%-20% cases. It develops when a right lobe abscess penetrates the diaphragm and produces an empyema or bronchopleural fistula. Such involvement is associated with right lower chest pain, usually accompanied by persistent cough. When an abscess penetrates a bronchus, expectorated material has the characteristics of amoebic pus.

A case report by Shah et al, there was an unusual case of consolidation due to amoebic abscess which on radiology showed hydropneumothorax on right side. A single case (1.81%) in the study, where Hydropneumothorax was developed due to pancreatic pseudocyst. Shahrudin et al studied 40 patients of pseudocyst of pancreas. After a non-operative period, 68 percent of pseudocysts regressed, completely in 14 percent, partially in 54 percent. Except for a patient with cyst-related obstructive jaundice, there were no complicated pseudocysts. Only 12 (28%) patients underwent cyst drainage. Fifteen patients (35%) sustained catheter-related complication, which included sepsis (26%), pneumothorax (9%), hydropneumothorax (2%), and septic right atrial thrombosis (2%), in the course of hospitalisation. Pancreaticobronchial fistulas may also occur and lead to respiratory distress in the form of Hydropneumothorax. It can occur as complication of pseudocysts in Acute pancreatitis.

In the study there were 34 cases of pneumothorax with fluid (hydropneumothorax or pyopneumothorax) 5 had ADA <40U/l. 8 cases had pleural fluid ADA in a range of 40-70U/l. There were 21 cases where pleural fluid ADA is higher than 70U/l. Measurement of ADA level in pleural fluid is diagnostically useful because ADA tend to be higher in Tuberculous effusions than in other exudates. Pleural Fluid was also analysed for sugar and proteins.

The study group showed elevated glucose and proteins and more of exudative nature. By Pleural fluid analysis, most of the fluids showed inflammatory pattern with reactive mesothelial cells. Malignant cells were not seen. Pleural fluid was sterile in almost all the cultures and none of them showed AFB. Though there was one case that showed right hydropneumothorax due to Amoebic liver abscess, amoebic cysts were not demonstrated in Pleural fluid. All cases diagnosed as pneumothorax with or without fluid are investigated and admitted.

The management was made depending on the symptoms of the patient and percentage of collapse. Three types of management were done Observation, Aspiration and ICT drainage. Observation was done in 4 cases with degree of lung collapse <10%. There was wait and watch policy, as small pneumothoraces can resolve by itself. The support of oxygenation was also useful. Radiological follow up was done to see the spontaneous resolution. Estimated rates of resorption are between 1.25% and 2.2% the volume of the cavity per day. Needle aspiration and chest tube insertion are two non-surgical treatments designed to drain excess air from the pleural space in the chest and Aspiration was done in 3 cases with venous catheters. ICT drainage was done in all case of pneumothorax with fluid. All patients with secondary Spontaneous pneumothorax should

be hospitalized, irrespective of whether they are stable or not. Intercostal tube drainage was done under aseptic conditions and Serial chest-x rays were taken for follow up. In the absence of a significant air leak, respiratory physiotherapy should favor resolution of the condition and the elimination of air from the pleural space.

Pain, intrapleural infection, wound infection, drain dislodgement and drain blockage were the most frequent complications of chest drain. Pain was commonly seen in most of the cases and Sudden re-expansile pulmonary edema is also seen as complication.

The outcome of the management was Total lung expansion due to pleural fibrosis or pleural thickening, Bronchopleural fistula and Recurrence. The most common cause of Pneumothorax in our study was found to be Tuberculosis.

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