



Clinical Study of Spontaneous Pneumothorax

KEYWORDS

Primary spontaneous pneumothorax, secondary spontaneous pneumothorax, Tuberculosis, COPD, Observation, Aspiration, ICTD

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ABSTRACT

Background: Pneumothorax is classified into traumatic and spontaneous. Spontaneous pneumothorax divided into primary spontaneous pneumothorax if there is no clinical evidence of lung disease and secondary spontaneous pneumothorax associated with lung disease.

Method: Prospective observational study done at Pulmonary medicine department, Kurnool medical college. We studied the causes, presenting features, management and outcome of Spontaneous Pneumothorax in this study.

Patients admitted in pulmonary medicine ward with a diagnosis of spontaneous pneumothorax were classified as primary spontaneous Pneumothorax (PSP) and Secondary spontaneous Pneumothorax (SSP). The diagnosis was made by chest radiograph, and computed Tomography if necessary. Necessary investigations done for confirmation of lung disease in SSP. Depending on clinical features, extent of pneumothorax and underlying lung disease management decided as observation with oxygen inhalation or aspiration or Intercostal ChestTube Drainage (ICTD) with under water seal. Supportive treatment given to all patients and Specific treatment for underlying lung disease given in SSP.

Results : Total 69 patients were included in this study males were more 48(69.6%). Mean age was 44.9 yrs(range 20 to 70 yrs). Out of 69 PSP were 10 (14.5%) and SSP were 59(85.5%). Lung diseases in SSP were Tuberculosis 33, Chronic obstructive pulmonary (COPD) disease 20, Asthma 2, interstitial lung diseases 2 and pneumonia 2. Treated with observation and oxygen inhalation 4, with aspiration 10 and with ICTD 55. In PSP cases lung expansion occurred in 2 to 8 days. In SSP cases lung expansion occurred in 4 - 30 days. 4 cases of SSP referred for surgery.

Conclusion: Spontaneous Pneumothorax is more common in males. In majority of PSP dyspnoea is less, can be managed by observation with oxygen inhalation or by aspiration. Tuberculosis is the common cause for SSP in India and should be looked for in all spontaneous pneumothorax cases. Majority cases of SSP are managed by ICTD. Compared to SSP hospital stay in PSP is short

Introduction : Pneumothorax is an emergency so early recognition and prompt treatment saves the patient. Pneumothorax classified into spontaneous and traumatic. Spontaneous pneumothorax divided into primary spontaneous Pneumothorax (PSP) if there is no clinical evidence of lung disease and secondary spontaneous pneumothorax (SSP) associated with underlying lung disease¹. This study is under taken to study the causes, clinical presentation, mode of management and response to treatment in spontaneous pneumothorax

Method : Prospective observational study done from April 2014 to March 2015 at pulmonary medicine department, Kurnool medical college, Kurnool

Inclusion criteria: Age more than 14 yrs, radiological evidence of pneumothorax.

Exclusion criteria: Age less than 14 yrs, Traumatic Pneumothorax

Total 69 patients admitted in pulmonary medicine ward with a diagnosis of spontaneous pneumothorax were taken into the study after obtaining consent. Clinical features like chest pain, dyspnoea, cyanosis, heart rate, respiratory rate, Blood pressure recorded at the time of presentation. History of previous pneumothorax, tuberculosis, Obstruc-

tive airway disease or other lung diseases and treatment history recorded. Chest radiograph taken in all cases and Computed Tomography of chest done whenever necessary. Depending on underlying lung condition pneumothorax divided into PSP, and SSP. Other investigations done were sputum for Acid Fast Bacilli (AFB), grams stain, culture sensitivity for pyogenic organisms, blood sugar, oxygen saturation and spirometry. Mode of treatment decided basing on degree of dyspnea, cyanosis, underlying lung condition, extent of pneumothorax in chest radiograph as per British Thoracic Society guideline of pleural disease². PSP without dyspnea and pneumothorax less than 15% treated with Oxygen inhalation and Observation^{1,2}. Patients with less dyspnea no cyanosis, stable, more than 15% pneumothorax were treated with aspiration and oxygen. Patients with severe dyspnea treated with Intercostal Chest Tube Drainage (ICTD) under water seal irrespective of the size of pneumothorax^{2,3}. Time taken for lung expansion recorded. In cases where lung expansion was not seen even after 4 to 6 weeks referred for surgery. Other treatment given were ATT for patients with active pulmonary tuberculosis, antibiotics, bronchodilators and symptomatics.

Results: Among 69 cases male were 48 (69.6%) and female 21 (30.4%) (Table :1). Age ranged from 20 – 70 yrs with mean age 44.9 yrs (Table :2). Out of 69 PSP were 10 (14.5%) and SSP were 59 (85.5%) (Table :2). PSP was more

commonly seen in men 8 of 10 (80%). 67.8% (40 of 59) of SSP seen in males. History of smoking present in 36 (52.2%) and all were males. Pneumothorax occurred without physical exertion in 65 (94.2%) patients.

Table 1 sex wise distribution of cases in each type of pneumothorax

Type of pneumothorax	Male	Female	Total
PSP	8 (80%)	2 (20%)	10
SSP	40 (67.8%)	19 (32.2%)	59
Total SP	48 (69.6%)	21 (30.4%)	69

SP (Spontaneous pneumothorax) 69.6% in males. PSP (primary Spontaneous Pneumothorax) 80% in males and SSP (Secondary Spontaneous Pneumothorax) 67.8% in males

Table 2 : Type of pneumothorax and mean age

Type of pneumothorax	Number & percentage	Mean age years
PSP	10 (14.5%)	33.5
SSP	59 (85.5%)	46.9
Total SP	69	44.9

Mean age of Spontaneous Pneumothorax (SP) 44.9 yrs. Mean age of Primary Spontaneous Pneumothorax (PSP) 33.5 yrs and mean age of Secondary Spontaneous Pneumothorax (SSP) 46.9 yrs

Table 3 Lung disease in SSP

Lung disease	Number	Percentage
Pulmonary Tuberculosis	33	55.9
COPD	20	33.9
Asthma	2	3.4
ILD	2	3.4
Pneumonia	2	3.4

Pulmonary tuberculosis is the commonest cause of SSP. Next common cause is Chronic Obstructive Pulmonary Disease (COPD) Interstitial Lung Disease (ILD)

Presenting symptoms were sudden chest pain on side of pneumothorax followed by Dyspnea in 65 (94.2%) patients. The degree of dyspnea was more severe in SSP compared to PSP. Other symptoms were cough 54 (78.2%), fever 30 (43.5%). 3 (4.3%) presented with subcutaneous emphysema. Signs of underlying lung disease like crepitations, ronchi, bronchial breathing were present apart from hyperresonant note on percussion and diminished or absent breath sounds on side of pneumothorax. Fluid was present associated with air in 15 (21.7%) cases.

Table :4 Strategy of treatment given

Treatment strategy	PSP	SSP	Total SP
Observation and oxygen	4 (40%)	NIL	4 (5.8%)
Aspiration	5 (50%)	5 (8.5%)	10 (14.5%)
ICTD	1 (10%)	54 (91.5%)	55 (79.7%)
Total	10	59	69

SP (Spontaneous Pneumothorax), PSP (Primary Spontaneous Pneumothorax), SSP (Secondary Spontaneous Pneumothorax)

Among 69 patients 4 treated with observation, 10 with aspiration and 55 with Inter Costal tube Drainage (ICTD). Out of 10 PSP 4 treated with observation and oxygen inhalation. 5 with aspiration and 1 with ICTD (10%). Among 59 patients with SSP 5 (8.5%) treated with aspiration and

54 with ICTD (91.5%). 6 (10.9%) of the ICTD treated patients developed the following complications. Subcutaneous emphysema in 4, secondary infection in 2. Lung expansion did not occur in 4 (6.8%) patients and they referred for surgery

Discussion : Pneumothorax is classified into traumatic and spontaneous. The mechanism of spontaneous pneumothorax are due to rupture of subpleural bleb or bulla or rupture of parenchymal focus or rupture of a cavity causing a visceral pleural tear⁴. Another mechanism is bronchial obstruction with progressive hyperinflation of distal air spaces and air dissects along bronchovascular space into hilum, mediastinum into neck producing subcutaneous emphysema or through visceral pleura into pleural cavity producing pneumothorax⁴.

PSP was seen in 10 (14.5%) cases and SSP 59 (85.5%)^{3,5}. Most of the cases 65(94.2%) occurred at rest without any physical exertion⁶⁻⁹. More number of cases were seen in males 48 (69.6%) whereas 21(30.4%) occurred in females. (Table 1) similar to other studies^{3,6,10}. PSP more common in males 8 of 10 (80%) with a Male to Female ratio of 4:1. SSP also more common in males but with a Male to Female ratio of 2.1:1. similar male dominance seen in other studies^{3,6,10}. The age of patients ranged from 20 – 70 yrs with mean age of spontaneous pneumothorax as 44.6 yrs^{3,6,10}, mean age of PSP 33.5 yrs and mean age of SSP as 46.9 yrs³ (Table 2). The mean age of SSP was younger compared to studies by Melton L J 3rd et al¹¹ and GuptaD¹² may be because the common cause of SSP in our study was Tuberculosis. PSP (33.5yrs) occurred at a younger age compared to SSP (46.9yrs)^{3,6,13}.

History of smoking present in 36 (52.2%)^{2,6,14} and all were males. smoking is associated with a 12% risk of developing pneumothorax in healthy smoking men compared with 0.1% in non smokers^{1,2}. 5 of PSP and 31 of SSP were smokers.

Presenting symptoms were sudden chest pain on side of pneumothorax followed by Dyspnoea in 65 (94.2%) patients⁶. The degree of dyspnoea and other clinical symptoms were out of proportion to size of pneumothorax in SSP compared to PSP due to compromised state of lung. Other symptoms were cough 54 (78.2%), fever 30 (43.5%). 3 (4.3%) patients with SSP presented with subcutaneous emphysema. Signs of underlying lung disease like crepitations, ronchi, bronchial breathing were present apart from diminished or absent breath sounds on side of pneumothorax. Fluid was present associated with air in 15 (21.7%) cases.

Pulmonary Tuberculosis 33 (55.9%) was the common cause of SSP in our study similar to other studies in India^{3,5,10,15,16}, COPD seen in 20 (33.9%), Asthma in 2 (3.4%), Interstitial lung disease in 2 (3.4%) and pneumonia in 2 (3.4%) (Table :3). Both active (28) and inactive (5) tuberculosis has caused SSP. Sputum smear for AFB positive in 28 cases. Chest radiograph showed lesions suggestive of Tuberculosis active in 28 and as inactive sequelae in 5. High resolution computed tomogram showed ILD in 2 patients. In 2 cases of pneumonia chest radiograph showed bronchopneumonia in one and lobar pneumonia in one. sputum culture positive for staphylococci in one and for klebsiella in one.

The degree of dyspnoea and other clinical symptoms were out of proportion to size of pneumothorax in SSP

compared to PSP due to compromised state of lung so the clinical assessment is more important than size of pneumothorax in deciding the management². In our study 4 (5.8%) patients treated with observation and oxygen, 10 (14.5%) patients treated with aspiration and oxygen and 55 (79.7%) patients with ICTD (Table: 4).

Among 10 cases of PSP 4 (40%) patients managed with observation and oxygen inhalation, 5 (50%) patients with aspiration, and one (10%) patient with ICTD^{3,10} (Table:4). All responded well to treatment with complete lung expansion and discharged with an advice to come to hospital if dyspnea develops. The hospital stay was 2 to 8 days¹⁰

Out of 59 cases of SSP 5 (8.5%) cases managed with aspiration and 54 (91.5%) cases with ICTD^{3,10} (Table :4). 3 of the SSP associated with subcutaneous emphysema treated with ICTD and oxygen responded well with lung expansion and absorption of subcutaneous emphysema. Specific treatment like Antitubercular drugs for tuberculosis, broad spectrum antibiotics for pneumonia, bronchodilators for COPD given. 5 cases treated with aspiration discharged in 4 to 6 days. 54 cases treated with ICTD 49 discharged in 7 to 30 days. Hospital stay in SSP was 4 to 30 days¹⁰. In 4 cases of SSP with Tuberculosis there was persistent air leak and pleural thickening so referred to surgery after 6 weeks of Anti tubercular treatment^{1,17,18}.

The oxygen supplementation accelerates the reabsorption of pneumothorax so given to all patients^{2,19}

90% (9 of 10) of PSP managed with observation and aspiration where as only 8.5% (5 of 59) of SSP managed with aspiration⁸. Only 10% (1 in 10) of PSP required ICTD compared to 91.5% (54 in 59) in SSP². Hospital stay in PSP (2 to 8 days) was less than SSP (4 to 30 days)^{10,17,18}. None of PSP required surgery but 4 (6.8%) of SSP referred for surgery.

Recurrence of pneumothorax same side seen in 1 case of PSP treated previously with aspiration. One patient of SSP with COPD presented with recurrence of pneumothorax opposite side within 3 months. Both treated with ICTD and pleurodesis²

Conclusion : SSP is more common than PSP. PSP more common in males and younger generation. In India tuberculosis (either active or inactive) is the commonest cause for SSP. COPD is the next common cause of SSP. PSP can be managed mostly by observation or aspiration with oxygen inhalation and SSP managed by ICTD. Duration of hospital stay was more for SSP compared to PSP. Pleural thickening and persistent air leak require surgical man-

agement in SSP. Recurrent pneumothorax is managed by ICTD and Pleurodesis.

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