

Original article

**MANAGEMENT OF SPONTANEOUS PNEUMOTHORAX IN ER OF A TERTIARY CARE HOSPITAL – AN OBSERVATIONAL STUDY.**

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**ABSTRACT:**

**Introduction:** Pneumothorax is an emergency having high mortality rate. Early recognition and management is crucial.

**Aim:** To study the demographic data, clinical presentation, risk factor and management of cases of spontaneous pneumothorax presenting to ED.

**Material and Method:** Observational analytical study done in 75 patients aged 20-74 years admitted at a tertiary care hospital from April 2018 to March 2019. Patients coming with spontaneous pneumothorax in ER were included in the study. History of trauma and iatrogenic causes were excluded.

**Result:** Details about demographic data, clinical presentation, risk factor and management were recorded. Their main complaints were dyspnoea followed by chest pain. In our study out of 75 patients, ICD was inserted in 63 patients, 7 patients managed with simple needle aspiration and 5 patients were treated conservatively. In our study 58 patients were shifted to E Ward/ICU, 8 patients were shifted to CT Sx ward, 5 patients shifted to ward, 3 patients took LAMA and 1 patient expired.

**Conclusion:** In our study we found that SSP (secondary spontaneous pneumothorax) is more common than PSP (primary spontaneous pneumothorax), majority of patients were male and COPD (chronic obstructive pulmonary diseases) is the commonest cause of the SSP. Intercostal tube drainage is the main mode of management.

**Key words:**

Spontaneous pneumothorax, chronic obstructive pulmonary disease, intercostal tube drainage

**TITLE: "Management of Spontaneous pneumothorax in ER of a tertiary care hospital – an observational study."**

## **INTRODUCTION**

Pneumothorax is defined as the presence of free air between visceral and parietal pleura.<sup>1</sup> It is categorized according to its aetiology into spontaneous, traumatic and iatrogenic.

Spontaneous pneumothorax is an abnormal collection of air in the intrapleural space without preceding trauma. It is further divided into primary pneumothorax – in apparently healthy volunteer without lung disease and secondary pneumothorax occurring as a result of underlying lung disease such as chronic obstructive lung disease.<sup>2,3</sup>

Primary spontaneous pneumothorax results from rupture of sub pleural emphysematous blebs at the apex of the lung and it is related to airway inflammation. Secondary spontaneous pneumothorax occurs in patient with underlying lung disease like Airway diseases (COPD, severe asthma) and infections of the chest (tuberculosis, pneumonia, etc.) but, many other pulmonary disease process has been associated with secondary spontaneous pneumothorax (interstitial lung diseases, malignancy, catamenial pneumothorax, pulmonary infarction, pulmonary haemorrhage, pulmonary alveolar proteinosis, tuberous sclerosis, etc.)<sup>1</sup> When it occurs it is more serious because it decreases the pulmonary function of a patient with already compromised pulmonary function.

Pneumothorax is one of the commonest life-threatening clinical conditions and requires emergency management in Emergency Room including bed rest, oxygen therapy, observation, simple aspiration and closed intercostal tube drainage. Any delay in management may endanger the life of the patient and leads to increase in morbidity and mortality.

Spontaneous pneumothorax is relatively common in clinical practice but not reported frequently so we studied Management of Spontaneous pneumothorax in ER of tertiary care hospital as an observational study.

**Aim:**

**To study:**

- Demographic data in terms of age and sex
- Clinical presentation of patients with spontaneous pneumothorax in ED
- Risk factor of spontaneous pneumothorax
- Management of spontaneous pneumothorax in ED.

**Materials and Methods:**

Institutional permission taken

**Type of study-** Observational

**Study place-** Emergency department of a tertiary care hospital.

**Period of study-** April 2018 to March 2019

**Study group-** All patients who presented with spontaneous pneumothorax in ED.

**Sample size** - 75 patients.

**Inclusion criteria -**

- Adult patients presented with spontaneous pneumothorax in ED
- Patients/Relatives willing for study

**Exclusion criteria -**

- Patients presented with pneumothorax with history of trauma or Iatrogenic complication of any procedure

**RESULT:****TABLE 1: AGE Distribution**

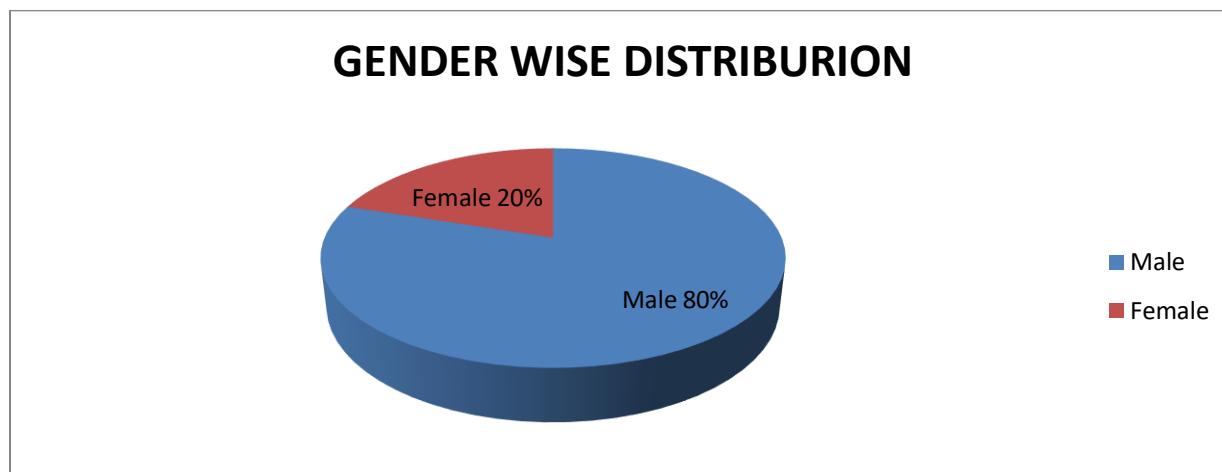
Age (yr)	No of patients(n=75)	Percentage (%)
20-30	08	10.67
31-40	16	21.33
41-50	28	37.33
51-60	12	16.00
61-70	08	10.67
>70	03	04.00

In our study the mean age was 46 years. Patients with PSP (primary spontaneous pneumothorax) were significantly younger as compared to patients with SSP (secondary spontaneous pneumothorax) (mean age 32 years vs 48 years). The age distribution of patients showed biphasic pattern. The first peak occurred between 20 and 40 years of age, which was predominantly contributed by PSP (primary spontaneous pneumothorax), while second peak occurred between 40 and 50 years.

**TABLE 2: GENDER**

Gender	No of patients(n=75)	Percentage (%)
Male	60	80.00

Female	15	20.00
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In this study majority of patients were male, with an overall male to female ratio of 4:1.

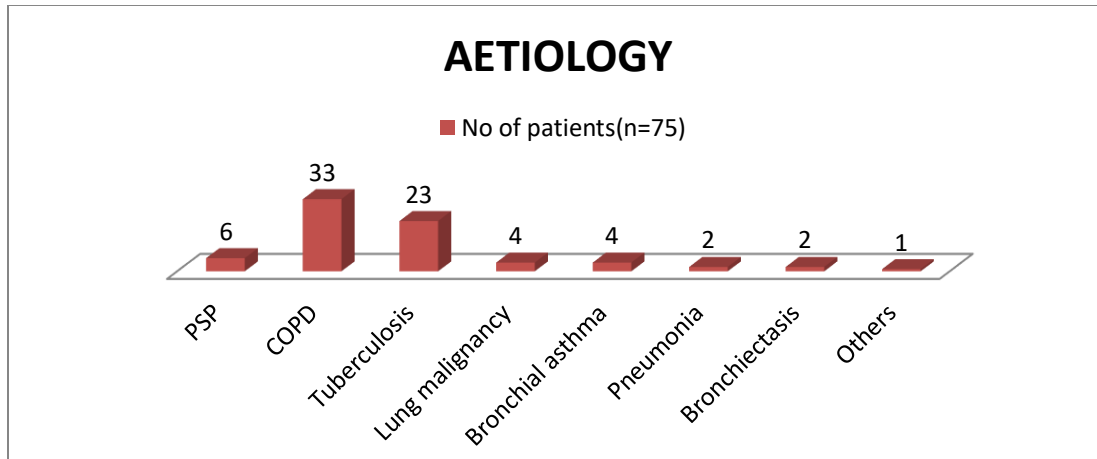
**TABLE 3: TYPE of spontaneous pneumothorax**

Type	No of patients(n=75)	Percentage (%)
Primary (PSP)	06	08.00
Secondary (SSP)	69	92.00

In our study, 92% patients having SSP (secondary spontaneous pneumothorax) where rest 8% having PSP (primary spontaneous pneumothorax)

**TABLE 4: AETIOLOGY**

Aetiology	No of patients(n=75)	Percentage (%)
PSP	06	08.00
COPD	33	44.00
Tuberculosis	23	30.67
Lung malignancy	04	05.33
Bronchial asthma	04	05.33
Pneumonia	02	02.67
Bronchiectasis	02	02.67
Others	01	01.33



In our study the commonest aetiology for SSP cases was identified as COPD 33 (44%) followed by pulmonary tuberculosis 23 (31%), lung malignancy 4 (5%), bronchial asthma 4 (5%), pneumonia 2 (2.6%), bronchiectasis 2 (2.6%) and others 1%.

**TABLE 5: ONSET**

Onset	No of patients(n=75)	Percentage(%)
Sudden	56	74.67
Insidious	19	25.33

In our study the onset was sudden in 56 (76%) patients while insidious in 19 (24%) patients.

**TABLE 6: PRECIPITATING FACTOR**

Precipitating factor	No of patients(n=75)	Percentage (%)
Light work	11	14.67
Coughing	07	09.33
Strenuous exercise	06	08.00
Straining of stool	03	04.00

In our study we found few precipitating factors for occurrence of Pneumothorax like coughing (9%), light work (15%), strenuous exercise (8%) and straining at stool (3%).

**TABLE 7: HISTORY OF SMOKING**

Smoker	No of patients(n=75)	Percentage(%)
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Yes	55	73.33
No	20	26.67

In our study 73% patients were chronic smokers was 27% patients were non smokers.

**TABLE 8: PRESENTING SYMPTOMS**

Symptoms	No of patients(n=75)	Percentage (%)
Dyspnoea	54	72.00
Chest pain	32	42.67
Cough	08	10.67
Hemoptysis	02	02.67

In our study dyspnoea was the commonest symptoms at presentation in 54(72%) patients followed by chest pain (43%), cough (11%) and hemoptysis (2.6%).

**TABLE 9: SIGN**

Sign	No of patients(n=75)	Percentage(%)
Desaturation (SPO <sub>2</sub> <94%)	69	92.00
Tachycardia	37	49.33
Tachypnea	30	40.00
Hypotension	10	13.33
Absent/diminished air entry	72	96.00
Diminished chest movement on respiration on side of pneumothorax	40	53.33

In our study typical sign of pneumothorax like diminished or absent air entry (96%), desaturation (90%), diminished movement of respiration on side of the pneumothorax (53%), tachycardia (49%) and tachypnea (40%) and hypotension (13%) were found in patients

**TABLE 10: TREATMENT WISE DISTRIBUTION**

Treatment	No of patients(n=75)	Percentage(%)
O <sub>2</sub> Therapy	70	93.33
ICD	63	84.00
Needle Aspiration	07	09.33
Conservative	05	06.67

In our study, among the 75 patients of SP 5 patients (6.67%) was managed conservatively only without oxygen supplementation. Supplemental oxygen was given ( $SPO_2 < 94\%$ ) to 70 (94%) patients. 7 (9%) patients managed with simple needle aspiration and 2 patients required ICD after failed needle aspiration and remaining 63 (84%) patients required intercostal chest tube drainage (ICD).

**TABLE 11: DISPOSITION**

Disposition	No of patients(n=75)	Percentage(%)
E-ward / ICU	58	77.33
CT- surgery ward	08	10.67
Ward	05	06.67
DAMA	03	04.00
Expired	01	01.33

58 patients were shifted to ICU/E-ward, 8 patients to CT-surgery ward, 5 patients were shifted to ward and 3 patients were DAMA and 1 patient was expired.

**Discussion:**

Pneumothorax is still one of the important presenting conditions to the emergency department and require prompt treatment in most of the cases. According to Ferraro and colleagues, PSP (primary spontaneous pneumothorax) is found in 80% of the cases of SP (spontaneous pneumothorax) and only 20% have an underlying lung disease<sup>4</sup>. Sousa et al<sup>5</sup> has found an underlying lung disease in 36.4% of the cases. The reported incidence of PSP (primary spontaneous pneumothorax) among all patients presenting with SP have been widely variable in various studies of 12.5% Agnihotri,<sup>6</sup> 20% Gupta and Mishra,<sup>7</sup> 25% Rohtak<sup>8</sup> and 64% Ahangar AG.<sup>9</sup> In the present study, an underlying aetiology has been found in 69 patients (92%) and only 6 patients (8%) are in the group of PSP (primary spontaneous pneumothorax). The high relative incidence of SSP (secondary spontaneous pneumothorax) in general may be related to the fact that most patients of PSP are managed at the primary and secondary healthcare hospital, whereas only patients of SP who have associated comorbidities are referred to tertiary care hospital. Ours is a tertiary care hospital so we received more patients of SSP (secondary spontaneous pneumothorax) due to that reason.

Our study has a male preponderance, with a male to female ratio of 4:1, which is similar to previous studies of Sousa<sup>5</sup> (3.7:1) and the Indian study by Gupta and Mishra<sup>7</sup> (5:1). The higher



incidence in men is attributed to the higher rates of smoking, body habitus, and different mechanical properties of the lungs.<sup>10</sup>

Age distribution in our study showed two age peaks correspond to PSP(primary spontaneous pneumothorax) and SSP respectively, where PSP is predominantly a disease of young men. In our study, second age peak occurred a little earlier (40-50 years) as compared to the 60-65 years range reported in the other western studies.<sup>11,12</sup> A study was carried out in Sweden to understand the relationship between smoking and occurrence of pneumothorax and it shown that smoking increases the relative risk of pneumothorax approximately 9-fold among women and 22-fold in men.<sup>13</sup> In our study 73% patients has a history of smoking where Sousa et al.<sup>10</sup> have found that 60.6% patients and Gupta et al.<sup>7</sup> found nearly half of the patients have smoked tobacco.

There is no relationship between the onset of pneumothorax and physical activity.<sup>14</sup>In our study we found few precipitating factors for occurrence of Pneumothorax like coughing (9%), light work (15%), strenuous exercise (8%) and straining at stool (3%). In other study such as Weissberg's only 10% episode took place with relation to physical effort.<sup>15</sup>

Clinical history and physical examination usually suggest the presence of a pneumothorax, although clinical manifestation are not reliable indicator of size.<sup>16,17</sup> In our study dyspnoea was the most common symptoms in SP, but chest pain was the most common symptom of PSP and dyspnoea was the most common symptom of SSP similar to study by Ahangar et al<sup>9</sup>. COPD (44%) was the leading cause of the SSP in our study followed by pulmonary tuberculosis (31%). Agnihotri et al<sup>6</sup> in their study in Jaipur, India before 1987(57%) and Gupta et al.<sup>7</sup>in Chandigarh, India from 2001 to 2002(42%) found pulmonary tuberculosis to be the most common aetiology of SSP. A possible explanation for this major change in aetiology in our study can be due to very well performance of revised national tuberculosis control program (RNTCP) in our country<sup>18</sup> and other possible explanation may be the increasing COPD burden in india,<sup>19</sup> air pollution and large number of smokers in our study. The most common modality of treatment in our study was intercostals drainage tube placement in 63 patients (84%). The oxygen supplementation accelerates the re-absorption of the penumothorax<sup>20</sup>, and therefore recommended to all the hospitalized patients. In our study 6% patients Spo2 was maintain >94% on room air so oxygen was not given. Conservative treatment in form of observation is recommended only for the small and few symptomatic PSP and rarely for SSP.<sup>21</sup> In our study 5 patients (6.67%) were treated conservatively. Simple needle aspiration is indicated for large size (>2 cm) PSP with breathlessness, and medium size (1-2 cm) PSP without breathlessness.<sup>22</sup> In our study 7 patients (9.33%) managed with simple needle aspiration.

## **Conclusion:**

In our study we found that SSP (secondary spontaneous pneumothorax) is more common than PSP (primary spontaneous pneumothorax). Majority of patients were male, dyspnoea was the commonest symptoms at presentation and COPD (chronic obstructive pulmonary diseases) was commonest cause of the SSP (secondary spontaneous pneumothorax). Intercostal tube drainage is the main mode of the treatment.

Tertiary care hospital is well equipped for observation and management, so needle aspiration only is not much practised but needle is inserted in clinically suspected tension pneumothorax and followed by ICD insertion. Now a days RNTCP is very well implemented all over India which has lead to reduction of tuberculosis but rising COPD (chronic obstructive pulmonary diseases) cases requires more studies for evaluation.

## **Take home message:**

When any patient with spontaneous pneumothorax presents to ER, prompt diagnosis and management becomes a challenge to an emergency physician and immediate management saves life and decreases morbidity and mortality.

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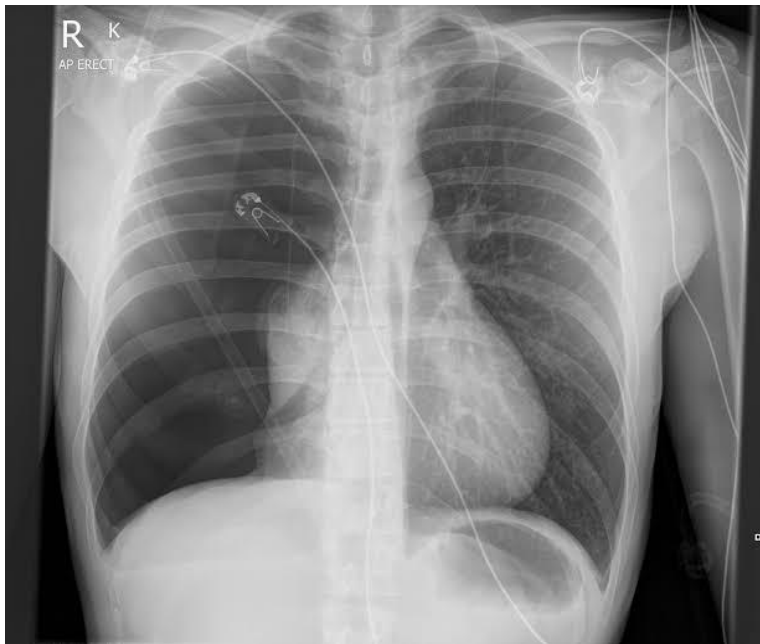
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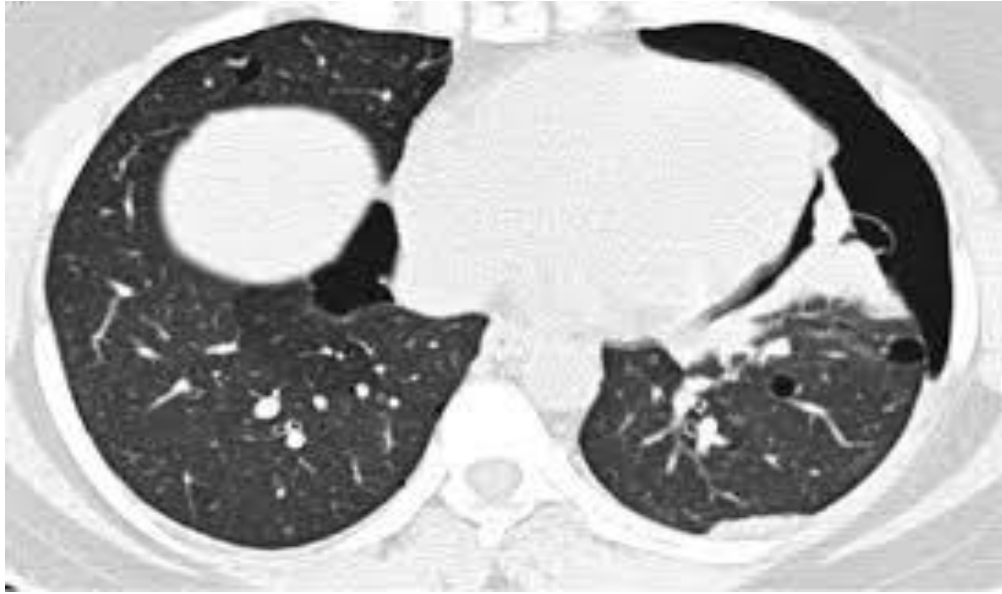
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Conflict of interest : NIL



**Figure 1:C-XRAY(PA) RIGHT SIDE PNEUMOTHORAX**



**Figure 2: HRCT - PNEUMOTHORAX**