



## Causes And Clinical Picture Of Spontaneous Pneumothorax In Adults

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### Abstract

**Aim:** To study the causes and clinical picture of spontaneous Pneumothorax in adults.

**Methods:** A prospective study of 102 consecutive patients who presented in Department of Pulmonary medicine, GMERS medical College and hospital, Vadnagar from March 2022 to December 2022 with symptoms and signs suggestive of Spontaneous Pneumothorax who met the inclusion criteria were selected for the study.

**Results:** A total 102 patients (85 cases of SSP and 17 cases of PSP) were included in the study. Age distribution showed a biphasic pattern with 1<sup>st</sup> peak in the 3<sup>rd</sup> decade and 2<sup>nd</sup> peak in the 5<sup>th</sup> decade. Overall male: female ratio was 5:1. The most common cause was found to be pulmonary tuberculosis.

**Keywords:** Spontaneous pneumothorax, epidemiology, tube thoracostomy

### Introduction

Pneumothorax is defined as the accumulation of air in the pleural space with secondary collapse of the surrounding lung. It is the most common pleural related problem that any doctor is going to encounter in clinical practice<sup>1</sup>. Pneumothorax can be divided into Spontaneous Pneumothorax and Traumatic Pneumothorax. Spontaneous Pneumothorax is sub classified as either primary spontaneous pneumothorax (PSP) or secondary spontaneous pneumothorax (SSP)<sup>2</sup> Primary Spontaneous Pneumothorax occurs without a precipitating event in a person with no clinical evidence of lung disease. Many of these individuals have occult lung disease with subpleural blebs on computed tomography (CT) scans. In contrast, secondary spontaneous Pneumothorax occurs as a complication of underlying lung disease, most often Tuberculosis, COPD<sup>3</sup>. The most common mode of presentation of spontaneous Pneumothorax is sharp unilateral chest

pain which is continuous and exacerbated by deep inspiration and postural change<sup>4</sup>. Patient may also present with dyspnoea or sometimes both. The possibility of Pneumothorax should be considered in any patient with COPD who has increasing shortness of breath, particularly if chest pain is also present<sup>1</sup>. Most of the pneumothoraces can be diagnosed accurately with physical examination and chest radiograph, though occasionally a chest CT might be required<sup>5</sup>.

### Methodology

Total 102 consecutive patients who presented in Department of Pulmonary medicine, GMERS medical College and hospital, vadnagar, Mehsana from March 2022 to December 2022 with symptoms and signs suggestive of spontaneous pneumothorax who met the inclusion criteria were selected for the study. All patients with X-ray documentation of

spontaneous pneumothorax alone, hydro-pneumothorax or pyopneumothorax were included who are also willing for further investigation and treatment. Patient below 14 years, pregnant women and patients with traumatic history preceding pneumothorax and patients with pneumothorax in ICU ventilator settings were excluded from the study. Investigations included routine blood investigations and specific investigations such as Chest X-Ray, sputum smear for AFB, Sputum for AFB culture and sensitivity, sputum for gram staining culture and sensitivity, sputum gene Xpert MTB/RIF where needed, CT chest, USG Thorax and pleural fluid complete examination and cytology etc were done whenever found necessary.

**Results**

The age distribution of the patients in our study showed a biphasic pattern with the first peak occurring between 21 and 30 years of age and the second peak occurring between 41 and 50 years of age. Most of the patients with PSP presented in the 21–30 year age group (3<sup>rd</sup> decade) while most of the patients with SSP presented in the 41–50 year age group (5<sup>th</sup> decade). This shows that patients with PSP are significantly younger compared to patients with

SSP. The first peak in the 3<sup>rd</sup> decade of life contributed to 32% of the total cases while the second peak in the 5<sup>th</sup> decade of life contributed to 37% of the total cases (Table 1). Sex distribution of the patients in our study indicates that SP is more common among men with a Male: Female ratio of 5:1. This Male preponderance is more pronounced in PSP with ratio 9:1 compared to SSP where the ratio is 7:3. Males contribute to 73.3% of cases with females accounting to only 26.7% of cases (Table 2). The analysis of symptoms of patients presenting with spontaneous pneumothorax in our study indicates that the most common presentation irrespective of the type of SP is dyspnoea seen in 93% of the cases, followed by unilateral chest pain seen in 83% of cases. Cough is seen in 78% of cases while fever is seen in only 13% of cases. Hemoptysis was seen in 5% of the cases studied (Table 3). The commonest etiology for SSP in our study was found to be Pulmonary Tuberculosis accounting to 44 (44%) of the cases, followed by COPD accounting for 36 (36%), Bronchial Asthma 6 (6%) and pyogenic infections seen in 10 (10%) of the cases. HIV associated Pulmonary infection was seen in 4 (4%) (Table 4).

**Table 1: Age distribution (n=100)**

| Age group | PSP | SSP | %    |
|-----------|-----|-----|------|
| 14-20     | 2   | 0   | 1.9  |
| 21-30     | 14  | 19  | 32.3 |
| 31-40     | 0   | 18  | 17.6 |
| 41-50     | 1   | 37  | 37.2 |
| 51-60     | 0   | 08  | 7.8  |
| >60       | 0   | 3   | 2.9  |

**Table 2: Sex distribution (n=100)**

| Gender | PSP | SSP | %    |
|--------|-----|-----|------|
| Male   | 15  | 61  | 74.5 |
| Female | 2   | 24  | 25.5 |

**Table 3: Symptom analysis in Spontaneous pneumothorax**

| Symptom     | n  | %    |
|-------------|----|------|
| Dyspnea     | 92 | 76.7 |
| Chest pain  | 80 | 66.7 |
| Cough       | 94 | 78.3 |
| Fever       | 56 | 46.7 |
| Hemoptysis  | 6  | 5.0  |
| Weight loss | 40 | 33.3 |

**Table 4: Aetiology of Spontaneous pneumothorax (n=100)**

| Causes of SSP         | n  | %  |
|-----------------------|----|----|
| Tuberculosis          | 44 | 44 |
| COPD                  | 36 | 36 |
| Bronchial Asthma      | 6  | 6  |
| Pneumonia             | 4  | 4  |
| HIV                   | 4  | 4  |
| Bronchiectasis        | 2  | 2  |
| Post TB Calcification | 2  | 2  |
| Malignancy            | 2  | 2  |

**Discussion**

Although the entity of pneumothorax has been well recognized since the beginning of 9<sup>th</sup> century, very few studies are available regarding its epidemiology. In one study, 141 cases were with spontaneous pneumothorax, of which 77 were primary and 64 secondary to an underlying pulmonary disease<sup>6</sup>. The reported incidence of PSP among all patients presenting with SP have been widely variable in the few studies available from India, and has ranged from 12.5% in a study from Jaipur<sup>7</sup> to 25% from Rohtak<sup>8</sup> and 64% from Srinagar<sup>9</sup>. In the present study, the underlying aetiology was found in 85 patients (83%), leaving only 17 (16.6%) in the PSP group. This high relative incidence of SSP might be related to the fact that most patients of PSP were managed at the primary and secondary health care hospitals, while several patients of SSP, who had associated comorbidities, were referred to tertiary care hospitals. In the study conducted by Gupta D et al<sup>10</sup> in England,

it is found that the age distribution for Pneumothorax showed a biphasic distribution. The highest rates for men were in the 20–24 and 80–84 year age groups. The first peak for women was at a later age than men at 30–34 years and 2<sup>nd</sup> peak at 70–74 years. The biphasic distribution corresponds to primary and secondary spontaneous pneumothorax. The age distribution in the present study also shows a similar biphasic pattern of distribution i.e. 1<sup>st</sup> peak occurring in the age group of 21–30 years and the 2<sup>nd</sup> peak in 41–50 years. Classically, these two age peaks correspond to PSP and SSP respectively, where PSP is predominantly a disease of younger men. In our study, the second age peak occurred a little earlier (41–50 years) as compared to the 61–65 years range reported in the other Western studies<sup>6</sup>. The likely explanation for an earlier occurrence of the second peak is that a large number of the cases of SSP in this study were secondary to tuberculosis and not COPD, which is the leading cause of SSP in the West and occurs relatively later. The studies conducted on the

incidence of spontaneous pneumothorax in Olmsted county, Minnesota shows that the ratio of male to female was 6.2:1 for PSP and 3.2:1 for SSP. In another study conducted by Gupta D *et al*<sup>13</sup> The epidemiology of SP in England they found the M:F ratio of 2.7:1. The sex incidence in the present study showed a male preponderance with a male: female ratio of 5:1. This male preponderance was even more pronounced in PSP where the M:F ratio was 9:1 compared to 4.5:1 in SSP. The results obtained in the present study are comparable to the other studies. This higher incidence in men has been attributed to higher smoking rates in men, body habits and different mechanical properties of the lungs<sup>11</sup>. In the study conducted by Dines *et al*<sup>12</sup> on 57 patients with COPD in Mayo clinic, 100% complained of shortness of breath, whereas 74% had chest pain on the side of the pneumothorax. In a study done by Dheeraj G *et al*<sup>14</sup> it was found that Dyspnoea was the commonest symptom at presentation in 93% patients, and was associated with pleuritic chest pain in 83% patients. In the present study, dyspnoea was the commonest presentation seen in 93% of the patients while chest pain was seen in 83%. Cough seen in 78% of patients and fever was seen in 13% while hemoptysis in 5%. In a recent series of 505 patients from Israel with SSP, the aetiologies were: COPD, 348; Tumor, 93; Sarcoidosis, 26; Tuberculosis, 9; other pulmonary infections, 16; and miscellaneous, 1313. In a study conducted by Dheeraj G *et al*<sup>14</sup> on 48 patients of SSP, the commonest cause of SSP in India was found to be T.B accounting 42%, while COPD accounted to 25%. In the present study, the commonest aetiology was found to be Pulmonary Tuberculosis (44%) followed by COPD (36%) and pyogenic infections (10%). HIV associated pulmonary infections was seen in 4% of the cases studied.

## Conclusion

1. Spontaneous pneumothorax has a biphasic pattern of age distribution with the 1st peak in the 3<sup>rd</sup> decade of life and the 2<sup>nd</sup> peak in the 5<sup>th</sup> decade of life corresponding to incidence of PSP and SSP respectively.
2. Spontaneous pneumothorax is more common in the male gender and SSP is more common than PSP.
3. The commonest aetiological factor of SP in our country is Tuberculosis.

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