

Clinical Profile of Recurrent Primary Spontaneous Pneumothorax Patients Presenting in Emergency at a Tertiary Care Hospital

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Abstract

Background: Pneumothorax is a potential emergency, occurring spontaneously or as a result of disease or injury i.e. etiologically the pneumothorax is classified into primary spontaneous pneumothorax, secondary spontaneous pneumothorax and traumatic pneumothorax. Generally accepted recurrence rate of primary spontaneous pneumothorax (PSP) is about 30%. Risk factors for a first occurrence are usually considered to be risk factors for recurrence.

Objectives: To describe the clinical profile of patients of recurrent primary spontaneous pneumothorax (RPSP) presenting as an emergency at a tertiary care institute.

Methods: We carried out this prospective observational cohort study from May 2010 to November 2012 at a tertiary care institute, to describe the clinical profile of patients of recurrent primary spontaneous pneumothorax (RPSP) presenting to us as an emergency. The patients were evaluated in detail. Diagnosis of pneumothorax was made clinically and confirmed by X-ray and CT scan of chest. Patients of all age groups and both sexes having only primary type of radiologically confirmed recurrent spontaneous pneumothorax were included in this study. The data from all the patients was compiled and analyzed statistically.

Results: Total thirty (30) patients were included in this study. Twenty-six (86.66%) were males and only 4 (13.33%) patients were females. Mean age of patients was 33.55 years. Most of the patients were in the height range of 161 - 170 cms (33%) and 171 - 180 cms (33%) with an average weight of 54.34 Kgs while as average body mass index (BMI) of patients in this study group was 19.45 Kg/m². Out of 30 patients, 20 (66.7%) were either smokers or ex-smokers.

Breathlessness was the most common (28; 93.3%) clinical presentation and majority (27; 90%) of the patients had right sided pneumothorax. Most (25; 83.3%) of the patients had medium degree of pneumothorax. Seventeen (56.7%) patients had history of one attack of pneumothorax in past while as 11(36.7%) patients had two previous attacks. Majority (26; 86.7%) of patients in this study were treated previously by only intercostal tube drainage (ICTD) for drainage of pneumothorax.

Conclusion: Recurrent primary spontaneous pneumothorax (RPSP) is more common in young tall male smokers with thin built and low body mass index. Most patients of RPSP present with breathlessness and chest pain with about 90% patients having right sided involvement.

Keywords: Primary Spontaneous Pneumothorax; Recurrent; Smoking; Breathlessness

Introduction

Pneumothorax (Figure 1) is a potential emergency, occurring spontaneously or as a result of disease or injury i.e. etiologically the pneumothorax is classified into primary spontaneous pneumothorax, secondary spontaneous pneumothorax and traumatic pneumothorax [1]. According to the intra-pleural pressure changes during the respiratory cycle, it can be divided into open pneumothorax, closed pneumothorax and tension pneumothorax. Depending upon the severity and percentage of lung involvement, pneumothorax is graded into mild/small (< 20%), moderate (20% - 40%) and severe/large (> 40%) [2].

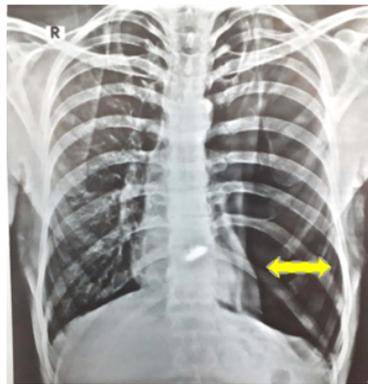


Figure 1: Left sided pneumothorax with ipsilateral lung collapse.

As the pneumothorax enlarges, the lung collapses due to compression. The main physiologic consequence of this process is a decrease in the vital capacity and a decrease in the partial pressure of oxygen in blood. Young and otherwise healthy patients can tolerate these changes fairly well with minimum changes in vital signs but those with underlying lung disease may have respiratory distress. A positive intra-pleural pressure, as small as 15 - 20 cm of H₂O, can interfere significantly with venous return to the heart, resulting in decrease in cardiac output. Pneumothorax causes a reduction in lung volume, lung compliance and oxygen diffusing capacity and hence hypoxemia.

Despite the absence of underlying pulmonary disease in patients with PSP, sub-pleural blebs and bullae are likely to play a role in the pathogenesis as they are found in up to 90% of cases of primary pneumothoraces at thoracoscopy or thoracotomy and in up to 80% of cases on CT scanning of the thorax [3,4]. The aetiology of such bullous changes in these otherwise healthy lungs is unclear.

Clinical history and physical examination usually suggest the presence of a pneumothorax; although clinical manifestations are not reliable indicators of size and severity [5,6]. In general, the clinical symptoms associated with secondary pneumothoraces are more severe than those associated with primary pneumothoraces, and most patients with a secondary pneumothorax complain of breathlessness which is out of proportion to the size of the pneumothorax [7,8]. Many patients, particularly those with primary pneumothoraces, do not seek medical advice for several days (46% waiting more than 2 days with symptoms)⁽⁹⁾. This feature is important because the occurrence of re-expansion pulmonary edema after re-inflation is related to the length of time the lung has remained collapsed [10,11].

Generally accepted recurrence rate of PSP is about 30% but it varies according to studies [12-14]. Risk factors for a first occurrence are usually considered to be risk factors for recurrence. According to the Scientific Committee of European Respiratory Society, smoking might be the only reversible risk factor for recurrence after a first episode of PSP [15].

Objective of the Study

Our aim in this study was to describe the clinical profile of patients of recurrent primary spontaneous pneumothorax (RPSP) presenting as an emergency at a tertiary care institute.

Methods

It was a prospective observational cohort study to describe the clinical profile of patients of recurrent primary spontaneous pneumothorax (RPSP) presenting to us as an emergency at a tertiary care institute. We carried out this study in the department of Cardiovascular and Thoracic Surgery, at Sheri-Kashmir Institute of Medical Sciences (SKIMS) Srinagar, Kashmir; from May 2010 to November 2012. The patients were evaluated in detail. Detailed history was taken and general physical examination as well as systemic examination was performed. Diagnosis of pneumothorax was confirmed by X-ray and CT scan of chest.

Patients of all age groups and both sexes having only primary type of radiologically confirmed recurrent primary spontaneous pneumothorax were included in this study. Patients having secondary and traumatic type of pneumothorax were not included in this study. Also, the patients with previous history of open or thoracoscopic surgical intervention and patients with first attack of PSP were excluded from the study. The data from all the patients was compiled and analyzed statistically and the inferences were drawn.

Results

Total thirty (30) patients were included in this study. Out of thirty patients, 26 (86.66%) were males and only 4 (13.33%) patients were females. Mean age of patients was 33.55 years. However, the most common age group (Table 1) involved was 10 - 20 years (36.7%) followed by 31 - 40 years (20%) and 41 - 50 years (20%).

Age Group	Number of Patients	Percentage (% age)
10-20yrs	11	36.7%
21-30 yrs	3	10.0%
31-40 yrs	6	20.0%
41-50 yrs	6	20.0%
51-60 yrs	2	6.7%
61-70 yrs	1	3.3%
Above 70 yrs	1	3.3%
Total	30	100%

Table 1: Age distribution of recurrent primary spontaneous pneumothorax.

Average height of patients in this Study group was 167.10 cms and about 77% patients had height above 160 cms while only 3(10.0%) patients had height < 150 cms. Most of the patients were in the height range (Table 2) of 161 - 170 cms (33%) and 171 - 180 cms (33%).

Height (in Cms)	No. of Patients	Percentage (% age)
141 - 150	3	10.0%
151 - 160	4	13.3%
161 - 170	10	33.3%
171 - 180	10	33.3%
Above 180	3	10.0%
Total	30	100.0%

Table 2: Range of height.

Average weight of patients of our patients was 54.34 kgs while as average body mass index (BMI) was 19.45 Kg/m². Only 10 (33.3%) patients were nonsmokers, rest 20 (66.7%) were either smokers or ex-smokers. With respect to clinical presentation; out of 30 patients enrolled in the study, 28 (93.3%) presented with breathlessness, 26 (86.7%) with chest pain, 6 (20%) with cough and only 2 (6.7%) patients presented with fever (Figure 2).

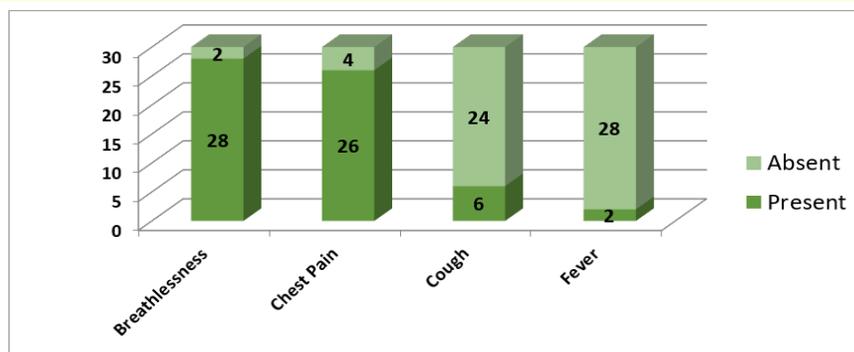


Figure 2: Clinical presentation of primary spontaneous recurrent pneumothorax.

Majority (27; 90%) of our patients had right sided pneumothorax while as only 3 (10%) patients had left sided involvement. Seventeen (56.7%) patients had past history of only one previous attack of pneumothorax (Table 3).

No. of previous attacks	No. of Patients	Percentage (% age)
One	17	56.7%
Two	11	36.7%
Multiple	2	6.7%
Total	30	100%

Table 3: Number of previous attacks of pneumothorax.

Most (25; 83.3%) of the patients had medium degree of pneumothorax (Table 4). Majority (26; 86.7%) of patients in this study were treated previously by only intercostal tube drainage (ICTD) for drainage of pneumothorax (Table 5). However, two patients had previously received ICTD with blood patch pleurodesis (which had failed) while as one patient had previously received ICTD with bleomycin pleurodesis (which again had failed). Only one patient had been managed conservatively for previous attack of pneumothorax.

Degree of Pneumothorax	No. of Patients	Percentage (%age)
Mild	0	0.0%
Moderate (medium)	25	83.3%
Severe (Large)	5	16.7%
Total	30	100%

Table 4: Degree of pneumothorax (on X-ray/CT).

Treatment received in past	No. of Patients	Percentage (% age)
ICTD*	26	86.7%
ICTD+ blood pleurodesis	2	6.7%
ICTD+ bleomycin pleurodesis	1	3.3%
Managed conservatively	1	3.3%
Total	30	100%

Table 5: Treatment received in past.

*ICTD: Intercostal Tube Drainage.

Discussion

The modern description of primary spontaneous pneumothorax occurring in otherwise healthy people was provided by Kjaergard in 1932 [16]. Primary pneumothorax is more common in males than females [8]. The incidence of PSP in men ranges from 7.4 and 37 per 100,000 population per year in the United States and the United Kingdom respectively. While as the incidence in women ranges from 1.2 and 15.4 per 100,000 population per year in the United States and United Kingdom respectively [17]. The reason for these geographic differences is unknown. A seven year hospital database study of emergency department visits from January 2008 to December 2014 reported that 79 percent of pneumothoraces were in males and 21 percent in females [18]. In our study also the proportion of male patients out-numbered the females.

The results of our study are almost consistent with that of Waseem M Hajjar, *et al.* [19] who in their study titled, 'Primary Spontaneous Pneumothorax: Clinical Profile, Seasonality and Recurrence of 132 Adult Patients in a University Hospital, Kingdom of Saudi Arabia' concluded that the majority of PSP patients were males (88.6%) with mean age of patients 24.62 (S.D \pm 8.8) years, 59.8% were smokers and average BMI of was 19.4 kg/m². By comparing our study with this study, it seems the clinical profile of RPSP remains same that of first episode PSP patients.

Undoubtedly, smoking plays a role [20-22]. The lifetime risk of developing a pneumothorax in healthy smoking men may be as much as 12% compared with 0.1% in non-smoking men [22]. This trend is also present, though to a lesser extent, in women [22]. In our study also about 67% patients were either smokers or ex-smokers.

There does not appear to be any relationship between the onset of pneumothorax and physical activity [23]. Patients with primary pneumothoraces tend to be taller than control patients [14,24]. Most of the patients in our study also were taller than the average height. The gradient in pleural pressure increases from the lung base to the apex, thus alveoli at the lung apex in tall individuals are subjected to significantly greater distending pressure than those at the base of the lung and, theoretically, are more predisposed to the development of sub-pleural blebs [25].

Though there is enough literature describing the clinico-pathological features of PSP but there is not much data in literature that can characterize the patients with RPSP. However a large multi-center French study by S Kepka, *et al.* [26] done with the aim to describe and compare the characteristics of patients presenting with first episode of PSP to those of patients presenting with recurrent PSP, concluded that clinical presentation, age, gender, smoking habits, and use of cannabis were similar in both groups. No clinical factor associated with recurrence was identified by multivariate analysis. In this study the authors showed that the RPSP was more common in males (78%) with 65% patients being less than 30 years of age and 74% patients were smokers. These results are again consistent with the results of our study.

Rami K, *et al.* [27] demonstrated in their study that breathlessness is the most common symptom of spontaneous pneumothorax. We also concluded that breathlessness followed by chest pain are the most common presentations of RPSP. Another observation in our study was that about 90% of RPSP are right sided. One of the theoretical reason for right sided predominance of RPSP is that right lung is taller than the left lung; hence there might be higher pulmonary-pleural pressure gradient and higher chances of spontaneous pneumothorax.

Most common mode of treatment of previous attacks of RPSP in our study has been intercostal tube drainage (ICTD) but about 10% patients were treated with pleurodesis in addition to ICTD. Various treatment options [28] for spontaneous pneumothorax include simple clinical observation or needle aspiration for mild asymptomatic pneumothorax, intercostal tube drainage for symptomatic cases, and bleomycin or blood patch pleurodesis [1,29] for severe symptomatic or recurrent pneumothorax.

Conclusion

The emergency and occasionally the life threatening condition of recurrent primary spontaneous pneumothorax (RPSP) is more common in young tall male smokers with thin built and low body mass index. Most patients of RPSP present with breathlessness and chest pain with about 90% patients having right sided involvement. Strong emphasis should be placed on the relationship between smoking

and pneumothorax in an effort to deter those smokers who have developed a pneumothorax from smoking to avoid recurrence of pneumothorax.

Conflict of Interest

Authors declare that we have no conflict of interest.

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