Pneumothorax: A Review of 146 Adult Cases admitted at a University Teaching Hospital in Pakistan

Pages with reference to book, From 243 To 246

Syed Fayyaz Hussain,Asif Aziz,Hala Fatima (Department of Medicine, The Aga Khan University Hospital, Karachi.)

Abstract

Objective: There is a lack of data on the etiology and outcome of pneumothorax among the Pakistani population. Our aim was to review the etiology, clinical course, management and outcome of patients presenting with pneumothorax.

Patients and Methods: All adult cases with pneumothorax admitted to a University Teaching Hospital in Karachi, between January 1992 and June 1996, were reviewed and analyzed.

Results: A total of 146 patients were reviewed. Their mean age was 46.3 years (SD ±17.8 years) with a male to female ratio of 3.7:1. Secondary pneumothorax was the commonest type seen (45%), followed by traumatic (21%), iatrogenic (18%) and primary (16%). Tuberculosis (47%) and COPD (45%) were most common lung diseases associated with secondary pneumothorax. Pneumothorax secondary to TB presented at an earlier age than that with COPD (49.6 vs. 60.1 years). Similarly, patients with primary pneumothorax were significantly younger than patients with secondary pneumothorax (42.3 vs. 51.7 years). Rib fracture was the most common cause of traumatic pneumothorax. Coronary artery bypass grafting, transthoracic fine needle aspiration and neck vein cannulations were the leading iatrogenic causes. The commonest symptoms of pneumothorax were dyspnea (68%) and chest pain (40%). Most cases (81%) were successfully nmnaged by intercostal tube drainage.

Conclusion: In our study population, secondary pneumothorax was the commonest variety seen. TB was the commonest cause of secondary pneumothorax, closely followed by COPD. Nearly 40% of pneumothorax were either traumatic or iatrogenic. Intercostal tube drainage remains the treatment of choice for pneumothorax (JPMA 49:243, 1999).

Introduction

Pneumothorax is a common clinical problem. In West its annual prevalence was found to be 6-7/100,000 among males and 1-2/100,000 among females[1]. Primary pneumothorax is caused by the rupture of a small sub- pleural bleb. Secondary pneumothorax occurs in patients with underlying lung disease and chronic obstructive pulmonary disease (COPD) remains the most common underlying cause[2]. There is a high prevalence of pulmonary tuberculosis (TB) in Pakistan[3]. TB produces destruction of lung parenchyrna and may cause secondary pneumothorax. There has been lack of data on the proportion of secondary pneumothorax caused by TB among Pakistani patients. Similarly there has been no information about the course and outcome of other varieties of pneumothorax.

The aim of this study was to evaluate the etiology, clinical course and management of pneumothorax among Pakistani patients.

Methods

The study was conducted at The Aga Khan University Hospital; a 400 bedded teaching hospital in the city of Karachi with an approximate population of 10 million (provisional results of fifth population and housing census held in March 1988). With the help of the ICD code we extracted and reviewed the records of all patients with pneumothorax who were admitted between June 1992 and June 1996. All

patients were above the age of 15 years and had radiologically confirmed pneumothorax.
The medical records were reviewed for etiology, clinical presentations, course, management and outcome in each case. Data was collected using a standardized data form. An institutional software program EPI INFO version 6.0 was used for data analysis. Statistical analysis was by chi square test, t-test, and Fisher's exact test. A p-value less than 0.05 was considered significant.

Results

There were 164 occurrences of pneumothoraces among 146 patients, between January 1992 and June 1996, with an average of 36 cases per year. Secondary pneumothorax (45%) was the commonest variety seen followed by traumatic (2 1%), iatrogenic (18%) and primary (16%). The mean age of the patients was 46 (SD ± 17.8, Range 15-90) years with an overall male to female ratio of 3.7: 1. A positive history of cigarette smoking was obtained in 40% of cases. The highest incidence of pneumothorax was in the fifth and third decades of life. Patients with primary were significantly younger than patients with secondary pneumothorax (42.3 vs. 51.7 years, $p<0.05$). Similarly secondary pneumothorax associated with TB occurred at an earlier age than with COPD (49.6 vs. 60.1 years, $p<0.05$).
The mean duration of symptoms before presentation was 4.7 (range 1 - 25) days, with the majority of cases having experienced symptoms for 48hrs or less (67 %). The most common presenting symptom was dyspnoea (68%) followed by chest pain (40%), cough (20%) and fever (12%). In 14 % of cases, pneumothorax was asymptomatic and was detected only after a chest radiograph. The most common sign on physical examination was diminished breath sounds (75%), followed by tachypnoea (35%), increased resonance on percussion (28%), tracheomediastinal shift (17%) and cyanosis (8%). The clinical features of primary and secondary pneumothorax are presented in the Table.

Table. Comparison of features of primary and secondary pneumothorax.

	Primary	Secondary
Number of cases	26	74
Age (Mean ± SD) years *	42.3 ± 17.4	51.7 ± 17.6
Sex ratio (M : F)	2.2: 1	3.6:1
Clinical features		
Asymptomatic *	23 %	1.35 %
Dyspnoea *	53 %	93 %
Chest pain	38%	43 %
Diminished breath sounds	81 %	73 %
Hyperresonance	27 %	44 %
Mean PO2	64.67	57.46
Management		
Conservative therapy	11 %	7 %
Tube drainage	85 %	81 %
Surgery	4 %	12 %

* denotes statistically significant difference between the two groups ($p<0.05$)

Pneumothorax occurred with almost equal frequency on either side (44.5 %) and was bilateral in 11%. Arterial blood gases were measured in 78 cases and the mean PaO2 was 63.3 mm Hg (SD 19.1) with no significant difference between the primary and secondary types. Pulmonary TB, proven by culture or smear, was the most common cause of secondary pneumothorax, closely followed by COPD (Figure).

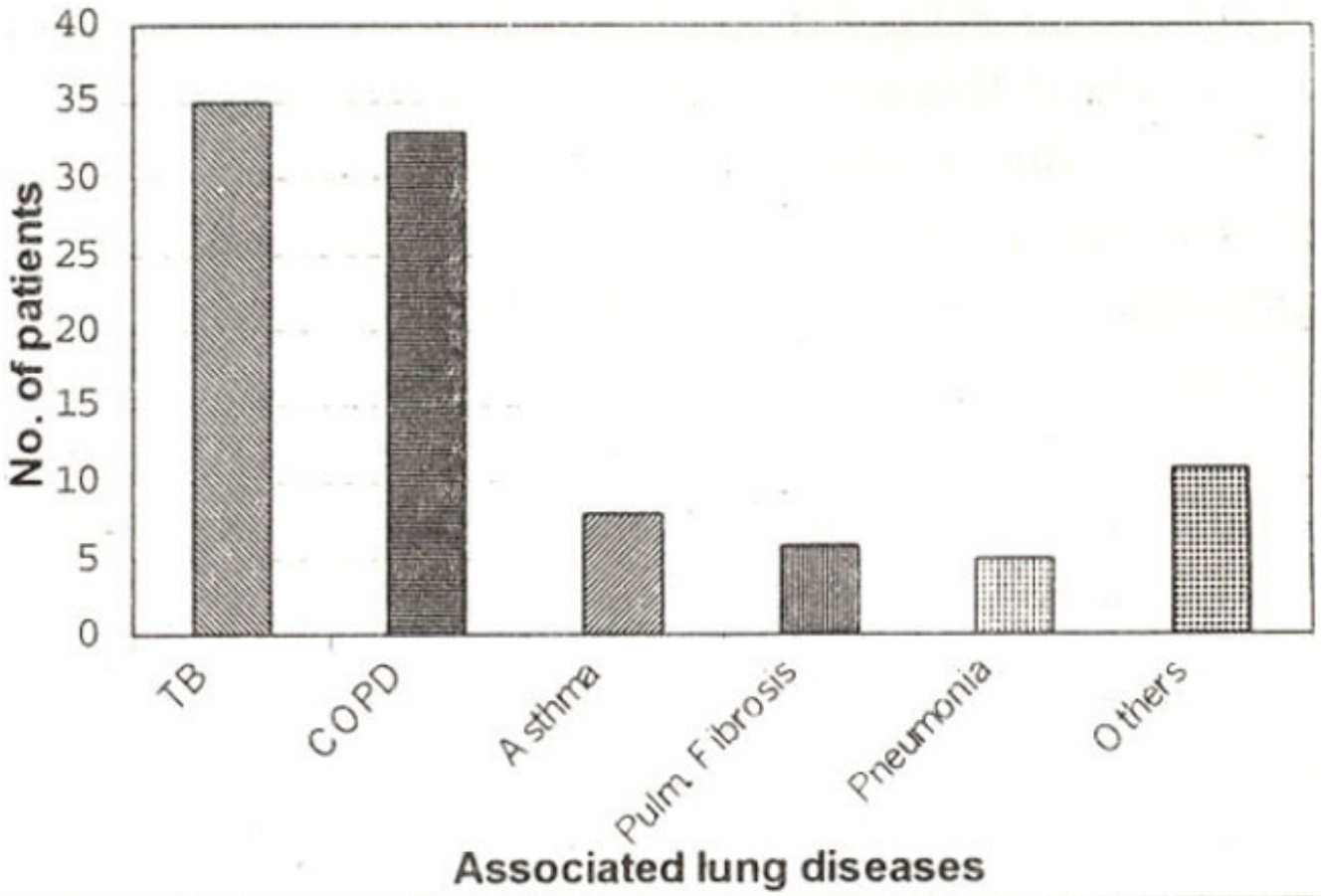

Figure. Lung diseases associated with secondary pneumothorax (Total No. = 74)

Many patients with secondary pneumothorax had a combination of two or more associated lung diseases. In females there was no case of catamenial pneumothorax.

Of the 35 cases of traumatic pneumothorax, 20 were due to fracture of the ribs, nine due to gunshot injuries, five due to blunt trauma of the chest and one case due to foreign body aspiration. latrogenic pneumothorax occurred in 29 cases, and were seen after cardiac surgery (7), mechanical ventilation (6), subclavian vein cannulation (5), fine needle aspiration (5) and pleural biopsy (2). There was one case each due to thoracocentesis, bronchoscopy, esophagoscopy and cardio-pulmonary resuscitation.

In 9% of cases, due to small size and lack of symptoms, the pneumothorax was managed conservatively with observation alone. Only 1% of cases were managed by needle aspiration alone, intercostal chest tube insertion with under water seal drainage was the most commonly used treatment and was successful in treating 81% of cases. Pleurodesis was needed in 3% and surgical intervention was sought in 6% of cases due to unresolved or recurrent pneumothorax. The most common complication of chest tube insertion was surgical emphysema (38%), which did not delay the resolution of the pneumothorax and it resolved within a few days of removal of the tube.

Majority (69%) of the cases of pneumothorax resolved within one week. Another 30% resolved within 1-3 weeks and two cases (1%) took more than 3 weeks, in 22 (13%) cases, the patients were sent home with an intercostal tube connected to a plastic bag with one way valve.

Recurrent pneumothorax had occurred in 23 (14%) cases of which 18 had only one recurrence, 4 had two and one had 3 recurrences during the period of the study. The side of recurrence was the same in 2 1/23 patients. The average interval between recurrences was 4.5 months, with 55 % occurring within 1 month. Another 27 % had a recurrence within 6 months, while 18% had a recurrence beyond 6 months.

There were 24 deaths (16.4%) among patients with unresolved pneumothorax. Of these, 14(9%) deaths could possibly be attributed directly to pneumothorax or its consequences. The remaining 10 deaths

occurred due to other medical causes, such as severe head injury or myocardial infarction.

Discussion

Our study reviews the clinical features of different types of pneumothorax among the Pakistani population and compares their characteristics with patients in other parts of the world. In our study secondary pneumothorax was nearly three times as common as primary and TB was the leading cause of the former. This is consistent with studies from those parts of the world where pulmonary tuberculosis remains prevalent[4]. Tuberculosis is endemic in Pakistan, where some 1.5 million suffer from TB, and more than 210,000 new cases occur each year (WHO. 1997). Among the 25% of cases that are ever diagnosed, many receive drugs inadequately because of faulty prescription, poor quality drugs or inability to purchase costly drugs.

COPD was an equally important cause of secondary pneumothorax in our study population. Cigarette smoking remains the most important cause of COPD. In a recent study of Pakistani medical students, the prevalence of smoking was found to bel 1%[5]. In our study a positive smoking history was obtained in 40% of cases. Smoking increases the relative risk of contracting a first spontaneous pneumothorax approximately nine-fold among women and 22 fold among men[6].

Dyspnoea, chest pain and decreased air entry are the cardinal clinical features of pneumothorax. Some patients may present with atypical symptoms or may remain asymptomatic. There should be a high index of suspicion for pneumothorax in patients with underlying lung disease, those receiving mechanical ventilation or following transthoracic needle procedures.

Pneumothorax may be recurrent in patients with underlying lung disease. After one episode of pneumothorax the probability that it will occur again increases greatly and taller males have been shown to have higher recurrence rates[7]. Videm et al reported that the recurrence rates for secondary and primary pneumothorax were similar[8]. In our study recurrences were more common in secondary (27%) than in primary pneumothorax (11%). Bilateral spontaneous pneumothorax has been reported to occur in 2-18% of all spontaneous cases[9]. It is usually associated with an underlying lung disease of mesenchymal origin e.g. lymphangiomatosis. In our series 13% of spontaneous cases had bilateral pneumothorax.

In the era of increasing use of invasive procedures the morbidity associated with iatrogenic pneumothorax has been growing. These procedures either affect the lung parenchyma or produce pneumothorax as a result of sudden changes in intrathoracic pressures. Transthoracic needle aspiration, central venous catheters, thoracocentesis, pleural and transbronchial biopsies, and positive pressure ventilation are the leading causes of iatrogenic pneumothorax. In a study by Sassoon et al incidence of iatrogenic type was found to be higher than spontaneous pneumothorax in their institution[10]. The reported incidence of pneumothorax, in different studies, was 35% following needle lung biopsy, 22% following central venous catheter and 7% among mechanically ventilated patients[11,12]. Traumatic pneumothorax has been shown to occur in 25-40 % of rib fracture cases[13], with an overall mortality between 10-15%. Most of the cases of traumatic pneumothorax have associated hemothorax.

AIDS related spontaneous pneumothorax deserves special mention. Pakistan is considered to have a very low incidence of AIDS, but the true rate may be higher due to faulty reporting and lack of awareness of the modes of transmission of the disease. Pneumocystis carinii pneumonia, cytomegalovirus pneumonia, tuberculosis and atypical mycobacterial infection are the main causes of pneumothorax in AIDS[14].

Treatment of pneumothorax depends on severity of symptoms, size of pneumothorax, presence of underlying disease and history of recurrent pneumothorax. Intercostal chest tube insertion with drainage into an underwater seal remains the treatment of choice. Needle aspiration has been shown to

be effective and safe in uncomplicated cases but has never gained widespread popularity. For recurrent pneumothorax, obliteration of pleural space or pleurodesis is achieved by injection of chemicals in the pleural space (e.g. tetracycline) or by surgery. For persistent pneurnothorax and for bronchopleural fistula thoracotomy remains the procedure of choice. When surgery is indicated, thoracoscopic surgery has been shown to provide excellent results with low morbidity, low recurrence, high patient acceptance, a shorter hospital stay and possibly decreased cost[15].

Mortality due to pneumothorax has been reported to be 7-15%, mostly among elderly patients and among those having severe pre-existing lung disease[4]. The mortality in our series was 9% with no significant difference between the different types of pneumothorax.

In conclusion, our study is the first to report clinical characteristics of pneumothorax among Pakistani patients. Secondary pneumothorax was the commonest type seen and pulmonary tuberculosis was the commonest underlying
lung disease. Most cases were managed by intercostal tube drainage with resolution of pneumothorax usually within a week. Surgery was performed for cases with unresolved or recurrent pneumothorax.

References

1. Melton Li, Hepper NG, Orford KP. Incidence of spontaneous pneumothorax in Olmsted County, Minnesota: 1950 to 1974. Am. Rev. Rcsp. Dis., 1979;20: 1379-82.
2. Sasson CS. The etiology and treatment of spontaneous pncumothorax. Cure. Opin. PuIm. Med., 1995;1:331-38.
3. Alvi AR, Hussain SF. Shah MA, et at, Prevalence of pulmonary tuberculosis on the roof of the world Int. J. Tubere, Lung. Dis., 1998:2:909-13.
4. Awotedu AA, Adebo OA, Oluboyu ~‘0, et al. Spontaneous pneumothorax in adult Nigerians. East Afr, Med 1989;66:259-63.
5. Hussain SF, Moid 1, Khan JA. Attitudes of Asian medical students towards smoking. Thorax, 1995,50:996-97.
6. Bense L, Eklund G, Wiman LG. Smoking and the increased risk of contracting spontaneous pueumothorax. Chest. 1 987;92: 1009-12.
7. Sadikot RT, Greene 1, Meadows K, et at. Recurrence of primary spontaneous pneuinothorax. Thorax, 1997:52:805-9.
8. Videm V. Pillgram-Larsen J, Elinger o, et at. Spontaneous pneumothorax in chronic obstructive pulmonary disease: coin pli cations, treatment and recurrences. Eur. J. Respir. Dis., 1987:71 :3ô5-7 1.
9. Graf-Dcuel E. Knoblauch A. Simultaneous bilateral pneumothorax. Chest, 1994;105:1 142-46.
10. Sassoon CS, Light RW, O’Hara VS. et al. latrogenic pneumotkorax: etiology and morbidity. Results of a Department of Veterans Affairs Co-operative Study. Respiration, 1992:59:215-20.
11. Despars JA, Sassoon CS. Light RW. Significance of iatrogenic pneumothoraces. Chest, 1994 05: 1147-50.
12. Poe RH, Kallay MC, Wicks CM, et al. Predicting risk of pneumothorax in needle biopsy of lung. Chest, 1984:85:232-35.
13. Rasmussen OV , Brynitz S , Struve CE. Thoracic injuries. A review of 93 cases. Scand. J. Thorac. Cardiovasc. Surg., 1986:20:71-74,
14. Wait MA, Estrara A. Changing clinical spectrum of spontaneous pneumothorax. Am. J. Surg., 1992:164:528-31.
15. Yoak MB, Lambert-CJ Video-assisted thoracoscopic surgeiy for management of spontaneous pneumothorax. W. V. Med. J., 1997:93:176-78.