

Aetiological Evaluation of Pleural Effusion in a Selected Hospital

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Abstract

Introduction: Pleural effusion is a common clinical manifestation of varying aetiology. Its outcome varies according to underlying aetiology. The causes and prognosis vary between developed and developing countries.

Objective: To find out the most common causes of pleural effusion in a tertiary care hospital of Bangladesh.

Materials and Methods: Total 50 patients were enrolled in the study during the period from January 2014 to November 2015 in combined military hospital, Dhaka. Informed written consent was obtained from all patients under the study, explaining the risk benefits and objectives of the study before sampling. Data were collected using a structured questionnaire containing all the key variables along with radiological, laboratory and pleural fluid analysis report. Data presented as frequency and percentage and Chi-square test was performed by using SPSS 23.0.

Results: Patients' mean age was 48.28 ± 12.53 years and ranged from 12 to 70 years where half of them were above 50. Male-female ratio was 1.63:1. Sixty five percent of the patients had positive smoking history. Persistent cough, fever and weight loss were the main presenting symptoms. Radiological findings revealed 50% had isolated right-sided pleural effusion and laboratory investigation found 28% cases ESR value 50-100 mm in 1st hour. Pleural fluid examination revealed 75% patient had straw coloured pleural fluid. Sputum for Acid-Fast Bacilli and other relevant investigations revealed 44% patients had tuberculosis, 16% had pneumonia, 8% had malignancy and 24% had other causes of pleural effusion.

Conclusion: This study revealed that the tuberculosis is the predominant cause of pleural effusion followed by pneumonia and malignancy.

Key-words: Pleural effusion, Tuberculosis, Ziehl-Neelsen stain, Adenosine deaminase.

Introduction

Pleural effusion is a common clinical condition in developed as well as developing countries like Bangladesh¹. It can be caused by several mechanisms including increased permeability of the pleural membrane, increased pulmonary capillary pressure, decreased negative intrapleural pressure, decreased oncotic pressure and obstructed lymphatic flow². Though the list of causes of pleural effusion is extensive, the great majority of the cases are caused by pneumonia, congestive heart failure and malignancy² in developed countries in contrast to developing countries like Bangladesh, where tuberculosis is a major cause³.

Clinical presentation of pleural effusion varies from asymptomatic to life-threatening symptoms depending upon the volume of effusion and underlying disease process. Pleural effusion that affects minimal lung functions is well tolerated whereas similar effusion in patients with underlying severe lung disease may cause ventilation failure⁴. Common causes of pleural effusion are tuberculosis, bronchogenic carcinoma, pneumonia, lymphoma, cirrhosis of the liver, congestive cardiac failure, nephrotic syndrome etc. Other rare causes includes pulmonary infarction, pancreatitis, Meigs' syndrome etc^{5,6}.

In 15% to 20% cases the cause of pleural effusions remain unknown despite intensive diagnostic efforts^{7,8}. Aetiological diagnosis of pleural effusion is very important for its proper management. Pleural fluid analysis, bacteriology, cytology and particularly pleural biopsy, provide adequate information for diagnostic purpose but in many occasions the diagnosis is difficult⁹. The aetiological distribution of pleural effusions that is observed in a particular study depends on the study population, whether the subjects are seen in primary care or tertiary referral setting, and the geographical region where the study is conducted¹⁰. As the differential diagnosis is wide, a systematic approach for investigating pleural effusion is necessary. Present study was conducted to detect the most common causes of pleural effusion in a tertiary care hospital of Dhaka city.

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Materials and Methods

This cross-sectional observational study was conducted in the Combined Military Hospital, Dhaka from January 2014 to November 2015. Patients admitted with pleural effusion and the history of persistent cough for more than a month, low-grade fever and gradual weight loss without any past history of bronchial asthma and chronic bronchitis were enrolled in this study. Patients with previous history of Empyema thoracis and Bronchiectasis were excluded. Informed written consent was obtained from all patients under the study, explaining the risk benefits and objectives of the study before sampling. Clinical examination, radiological findings, biochemical investigation, sputum examination for Ziel-Neelsen stain, sputum culture and finally pleural fluid analysis were performed for all cases. Results were recorded in a predesigned data form. Data analysis were performed with the SPSS 23.0 using basic descriptive statistics like frequency, percentage, mean and SD. Chai-square test was performed and p-value less than 0.05 were considered as significant.

Results

Patients' mean age was 48.28±12.53 years and ranged from 12 to 70 years where half of them were above 50 (Table-I). Sixty two percent of the patients were male with a male-female ratio of 1.63:1. Sixty five percent of the patients had positive smoking history. Persistent cough (92%), fever (86%) and weight loss (84%) were the main presenting symptoms (Table-II). Radiological findings revealed that 50% of the patients had isolated right-sided pleural effusion, 40% had left-sided and 10% had bilateral. Three quarter (75%) of the patients pleural fluids were straw coloured, 20% hemorrhagic and 8% turbid.

Table-I: Distribution of patients according to age (n=50)

Age (Years)	Frequency	Percentage
<20	04	08
21-30	06	12
31-40	07	14
41 -50	08	16
>50	25	50
Total	50	100

Mean age = 48.28±12.53 years; Age range = 12-70 years

Table-II: Distribution of patients by clinical presentation (n=50)

Clinical presentation*	Frequency	Percentage
Cough	46	92
Fever	43	86
Dyspnoea	26	52
Chest pain	30	60
Haemoptysis	05	10
Weight loss	42	84
Productive sputum	23	56
Hoarseness of voice	06	12

*multiple response

Most common cases of pleural effusion were tuberculosis (44%) followed by pneumonia (16%) (Table-III). Adenosine deaminase (ADA) was positive in 20(40%) cases and sputum examination revealed 4(8%) patients were Ziel-Neelsen stain positive. Growth of organism in sputum culture (non tubercular) was found in 8(16%) cases. Out of 04 malignant patients, 2 had malignant cell on cytological examination of pleural fluid (Table-IV).

Table-III: Distribution of patients according to aetiology (n=50)

Diagnosis	Frequency	Percentage
Tuberculosis	22	44
Malignancy	04	08
Pneumonia	08	16
Liver abscess	02	4
IgA nephropathy	01	2
Rheumatoid arthritis	01	2
Others	12	24
Total	50	100

Table-IV: Distribution of patients by sputum and pleural fluid examination (n=50)

Findings of sputum & pleural fluid examination		Tuberculosis (n=22)	Malignant (n=04)	Pneumonia and Others (n=24)
Sputum	Gram staining positive	00	00	4
	Growth of organism in culture	00	00	8
	AFB (Ziehl-Neelsen) stain positive	4	00	00
Pleural fluid	Malignant cell on cytology	00	02	00
	Adenosine Deaminase Positive	20	00	00

Association between diagnosis of pleural effusion and ESR demonstrates that 16 patients with tuberculosis and malignancy had ESR within 50-100 mm at the end of 1st hour and 7 patients had ESR>100 mm. Among the other causes of pleural effusion 14 patients had ESR within 50-100 mm at the end of 1st hour and 4 patients had ESR above 100 mm. This difference was statistically significant (p< 0.001) (Table-V).

Table-V: Distribution of ESR value in the study population (n=50)

ESR value	Diagnosing pleural effusion			P-value
	Tuberculosis	Malignancy	Others	
<50mm	2	1	6	<0.001
50-100mm	14	2	14	
>100mm	6	1	4	
Total	22	4	24	

Discussion

In this study, the mean age of the patients was 48.28±12.53 years and male to female ratio 1.63:1. Vaides et al¹¹ reported that pleural effusion patients aged 57.1±21.1 years and the male/female ratio was 1.6:1 which correlates the present study. Majority of the patients complained of cough (92%) followed by fever (86%), chest pain (60%) and dyspnoea (52%). Haque et al⁵ reported cough (86%), fever (82%), chest pain (53%), dyspnoea (38%), hemoptysis (6%) in his study.

Mostafa et al¹² found cough, dyspnoea, fever and chest pain as common findings in both tuberculous and malignant pleural effusion which correlate well with the present study.

Liam et al¹³ conducted a study on 120 patients and observed that 64.5% had right-sided pleural effusions. In another study by Haque et al⁵ found right-sided pleural effusions in 56% which also correlates with this study. This study revealed that 60% of patients had ESR 50-100 mm in 1 hour. Haque et al⁵ found most 68% of the patients with ESR value was within 50-100 mm which also correlates with this study.

In this study the aetiology of pleural effusion demonstrated that 44% tuberculosis, 16% pneumonia and 08% was malignancy. Similar study was carried out in Bangladesh by Mohammad et al¹⁴ found causes of pleural effusion was tuberculosis 52%, malignancy 25% which is also close to the result of the present study. In another study, Liam et al¹³ also showed the two most common causes of pleural effusions were tuberculosis 44.1% and malignancy 29.6% which also correlates well with the present study.

Conclusion

Analysis of the pleural fluid and other investigations reveals that tuberculosis is the predominant cause of pleural effusion in Bangladesh and pneumonia and malignancy follow it. Some effusions remain unexplained despite extensive tests. A systematic approach to pleural effusions will generally result in a specific diagnosis and help to guide specific therapy.

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