



ORIGINAL ARTICLE

On Examination and Radiological Findings of Tubercular and Malignant Pleural Fluid Collected from Patients Presented with Exudative Pleural Effusion

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Abstract

Background: The on examination and radiological findings of tubercular and malignant pleural fluid may vary among patients with exudative pleural effusion. **Objective:** The purpose of the present study was to assess the on examination and radiological findings of tubercular and malignant pleural fluid collected from patients presented with exudative pleural effusion. **Methodology:** This cross-sectional study was carried out at medicine indoor department of Sylhet MAG Osmani Medical College Hospital, Sylhet, Bangladesh from October 2009 to March 2010. Patients who were admitted with pleural effusion were selected as the study population. Pleural fluid was collected and laboratory tests were performed in the Department of Laboratory Medicine of the Hospital. The clinical features and haematological findings of tubercular and malignant pleural fluid were assessed. **Results:** A total of 50 cases were selected consecutively in the study. Among 30 tubercular pleural effusion, chest movement and expansion decreased in 26 cases. However, in 12 malignant pleural effusion cases, most of the patients' chest movement and expansion were found diminished which was in 9 cases. Radiological findings showed that more than half (54.0%) of the patients had right sided pleural effusion. **Conclusion:** In conclusion chest movement and expansion as well as vocal resonance are decreased in both tubercular and malignant pleural effusion patients with absent of breath sound. [*Journal of Current and Advance Medical Research, July 2022;9(2):74-78*]

Keywords: Clinical features; tubercular; malignant pleural fluid; exudative pleural effusion

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Introduction

The tuberculous pleural effusion is diagnosed by direct smear examination of pleural fluid¹. However, in cases of granuloma, pleural biopsy specimen is preferred. In case of malignant effusions, pleural biopsy yield is low, but fluid analysis may reveal the specific cell type². Moreover, other diagnostic procedures, like biopsy and histopathology of any accessible lymph nodes, fibre optic bronchoscopy (FOB) may help to reach a tissue diagnosis³. Tuberculous pleural effusions are thought to be due primarily to a hypersensitivity reaction to tuberculous protein in the pleural space. Pleural effusion may occur as part of primary tuberculosis in children, when the peripheral focus or a caseating lymph node ruptures into the pleural space⁴⁻⁵. Pleural effusion usually occurs 3 to 6 months after infection.

Malignant pleural effusion may occur due to malignancy involving the pleura which may be secondary or primary⁶. However, this kind of pleural effusion is secondary to metastatic disease and is one of the important causes of exudative pleural effusion. The three tumours cause approximately 75.0% of all malignant pleural effusions which are lung carcinoma, breast carcinoma and lymphoma⁷⁻⁸. Metastasis may also occur from stomach, ovary, pancreas, uterus etc. About 75.0% of metastatic tumours of the pleura are of a carcinomatous nature, metastatic carcinoma being the most common malignant tumours in the pleura⁹⁻¹⁰. Both Hodgkins and Non Hodgkins varieties of lymphoma can cause pleural effusion, often bilateral as a result of metastatic involvement of pleura or lungs or lymph nodes. Diagnosis is often assisted by other features of lymphoma. Lymphatic carcinomatosis may also cause bilateral pleural effusion¹¹.

This benign neoplasm, sometimes-called benign mesothelioma is a localized growth that is often attached to the pleural surface by a pedicle¹². The tumour may be small or may reach an enormous size but is always remains confined to the surface of the lung. These tumours do not usually produce a pleural effusion. This tumour has no relationship to asbestos exposure¹¹. Malignant mesotheliomas in the thorax arise from either the visceral or the parietal pleura¹²⁻¹³.

The purpose of the present study was to assess the on examination and radiological findings of tubercular and malignant pleural fluid collected from patients presented with exudative pleural effusion.

Methodology

Study Settings and Population: This comparative cross-sectional study was carried out at medicine indoor department of Sylhet MAG Osmani Medical College Hospital, Sylhet, Bangladesh over a period of six months from October 2009 to March 2010. Patients who were admitted with pleural effusion were selected as the study population. Patients who were presented with clinically and radiologically detected pleural effusion with exudative pleural effusion were included in this study. Exclusion criteria were transudative pleural effusion, traumatic pleural effusion or haemothorax, effusion due to chest surgery and chylothorax. The variables studied were demographic characteristics like age, sex and clinical presentation.

Study Procedure: Pleural fluid was collected by a physician. The laboratory tests were performed in the Department of Laboratory medicine of the Hospital. Chest X-ray was performed to all patients. Data were collected using a structured questionnaire (research instrument) containing all the key variables. Clinical parameters like chest movement and expansion, percussion and breath sound were recorded.

Statistical Analysis: Statistical analyses were performed with SPSS software, versions 22.0 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.). Continuous data were summarized in terms of the mean, standard deviation, median, minimum, maximum and number of observations. Categorical or discrete data were summarized in terms of frequency counts and percentages. For end points analysis, Fisher's exact test was used for categorical variables and an analysis of variance (Student t Test) was applied for continuous outcomes. A two-sided P value of less than 0.05 was considered to indicate statistical significance.

Ethical Consideration: All procedures of the present study were carried out in accordance with the principles for human investigations (i.e., Helsinki Declaration) and also with the ethical guidelines of the Institutional research ethics. Formal ethics approval was granted by the local ethics committee. Participants in the study were informed about the procedure and purpose of the study and confidentiality of information provided. All participants consented willingly to be a part of the study during the data collection periods. All data were collected anonymously and were analyzed using the coding system.

Results

A total of 50 cases were selected consecutively in the study. Out of 50 patients, 28.0% was in the range of 41 to 50 years followed by 26.0% between 31 to 40 years. About 18.0% was in the range of 51 to 60 years and 14% was above 60 years. Very few (2.0%) were below 20 years of age. The mean age of the patients was 44.5±12.86 years with age range 16 to 70 years (Table 1).

Table 1: Distribution of Age among the Study Population

Age Group	Frequency	Percent
Less Than 20 Years	1	2.0
21 to 30 Years	6	12.0
31 to 40 Years	13	26.0
41 to 50 Years	14	28.0
51 to 60 Years	9	18.0
More than 60 Years	7	14.0
Total	50	100.0

In most of the cases of pleural effusion due to any causes, chest movement and expansion were found diminished in affected side or sides. Among 30 tubercular pleural effusion, chest movement and expansion decreased in 26 cases. However, in 12 malignant pleural effusion cases, most of the patients' chest movement and expansion were found diminished (9 cases) (Table 2).

Table 2: Chest Movement & Expansion in Tubercular and Malignant Pleural Effusion (n=42)

Diseases	Chest Movement & Expansion		Total
	Decreased	Normal	
Tubercular	26	4	30
Malignant	9	3	12
Total	35	7	42

Mediastinal shifting to the opposite side was found in cases of unilateral massive pleural effusion (Table 3).

Table 3: Mediastinal Shifting in Tubercular and Malignant Pleural Effusion (n=42)

Diseases	Mediastinal Shifting		Total
	Present	Absent	
Tubercular	24	6	30
Malignant	8	4	12
Total	32	10	42

On percussion, twenty percent of the patients (10 in number) exhibited signs of tenderness (Table 4).

Table 4: Percussion note in Tubercular and Malignant Pleural Effusion (n=42)

Diseases	Percussion Note	
	Stony Dull	Impaired
Tubercular	30	0
Malignant	12	0
Total	42	0

In seventy-four percent of cases, breath sound was absent & vocal resonance decreased while in eighteen percent of cases added sound was found (Table 5).

Table 5: Breath sound & Vocal resonance in Tubercular and Malignant Pleural Effusion (n=42)

Diseases	Breath sound & Vocal Resonance		Added Sound
	Absent/Decreased	Increased	
Tubercular (n=30)	26	4	3
Malignant (n=12)	9	3	4

Radiological findings showed that more than half (54.0%) of the patients had right sided pleural effusion, 36.0% left sided and 10.0% bilateral. Patchy opacities with cavity lesion was found in 16.0% and mass lesion with irregular margin in 14.0% of cases (Table 6).

Table 6: Distribution of patients by Radiological findings

Radiological Findings	Frequency	Percent
Right-sided	27	54.0
Left-sided	18	36.0
Bilateral	03	6.0
Patchy opacity with cavity lesion	08	16.0
Mass lesion with irregular margin	07	14.0

Discussion

Tuberculous pleural effusion may also occur when tuberculous cavity in a patient with extensive post primary disease rupture into pleura¹⁴. This usually

causes a tuberculous pyopneumothorax. When the tuberculous material enters the pleural space of an individual who has become hypersensitive to tubercular protein from previous infection, causes an exudative inflammation in the pleura resulting in effusion¹⁵. Following a peripheral primary infection, the pleural space may be contaminated by organism that are transported lymphogenously to the pleura and hence across the surface of the lung to the hilum¹⁶. Classically tuberculous pleurisy with effusion occurs in younger individual in the absence of pulmonary infection⁹. Although simultaneous pulmonary tuberculosis may be present.

Pleural effusion is a very common problem in our clinical practice. Etiological diagnosis is essential for proper management of effusion. In this study, 50 cases of exudative pleural effusion were studied prospectively. In my study, among 50 patients 34 were male and 16 were female. This is a quite common picture in hospital admission in our country. The etiology of pleural effusion has been studied extensively at different times. In a series of 97 patients with pleural effusion, Haque et al¹² found following final diagnosis. This high incidence of tuberculosis in this country is probably due to poor socioeconomic condition, overcrowding and inadequate health service facilities.

The mean age of the patients was 44.5 ± 12.86 years and the lowest and highest ages were 16 and 70 years respectively. Majority (68%) of the patients was male and 32% female giving a male to female ratio roughly of 2.1:1. Vaides et al¹⁶ reported that pleural effusion patients aged 57.1 ± 21.1 years. More than three quarter (82%) of the patients exhibited decreased chest movement and expansion and 64.0% had mediastinal shifting. The chest was stony dull on percussion (98.0%). twenty percent of the patients exhibited signs of tenderness. In this study maximum number of patients belonged to 31 to 60 years of age (72.0%). Incidence was found lower before 20 years (2.0%) which is more or less similar to another study in Bangladesh¹¹. In 74.0% of cases breath sound was absent and vocal resonance decreased while in 18.0% of the cases added sound was heard. Around 54.0% of the patients had right-sided pleural effusion, 40.0% left-sided and 6.0% had bilateral. Patchy opacities with cavitary lesions were found in 16.0%, and mass lesions with irregular margins in 14.0% patients.

Liam et al¹³ conducted a study on 120 patients and observed that 64.5% had right-sided pleural effusions, 31.7% had left-sided pleural effusions, while in 3.8% both sides were involved. In another study by Haque et al¹² right-sided pleural effusions

were found to be more common (56.0%). As infections are more common on the right side than on the left, most types of pleural effusions showed a preference for the right side i.e. the right principal bronchus is shorter 1 inch, wider and more in line with the trachea than the left principal bronchus which causes inhaled particles to pass more frequently to the right lung.

Among 12 cases of malignant pleural effusion 11 cases were diagnosed as bronchial carcinoma, which constituted 24.0% of total cases of pleural effusion. In another study¹⁷, it was found as 25.0% cases.⁴⁷ Among 11 cases of bronchial carcinoma, 6(50%) cases were squamous cell carcinoma, 3 cases were small cell carcinoma and 2 cases were adenocarcinoma and 1 lymphoma. Exfoliative cytology for malignant cells in the sputum was positive in 1(8.5%) case. Malignant cell in the pleural fluid was found in 1(8.5%) case.

Standard posteroanterior and lateral chest radiography remains the most important technique for the initial diagnosis of pleural effusion. Free pleural fluid flows to the most dependent part of the pleural space⁷. In the upright position, this is the subpulmonic region and accumulation of fluid causes apparent elevation of the hemithorax, lateral displacement of the dome of the diaphragm and blunting of the costophrenic angle¹⁵. However, at least 250 mL of fluid must accumulate before it becomes visible in a posteroanterior radiograph. Lateral decubitus radiography is extremely valuable in the evaluation of a subpulmonic effusion and should be a routine test. On supine chest radiography, commonly used in intensive care, moderate to large pleural effusions may escape detection because the pleural fluid settles to the back and no change in the diaphragm or lateral pleural edges may be noted. In these cases, a pleural effusion must be suspected where there is increased opacity of the hemithorax without obscuring the vascular markings¹⁷.

If an effusion is suspected, lateral decubitus radiography or ultrasonography should be ordered, since both are more reliable for detecting small pleural effusions in the intensive care setting¹⁸. Loculated effusions, defined as effusions that do not shift freely in the pleural space, occur when there are adhesions between the visceral and parietal pleura. The lateral decubitus view helps in differentiating free fluid from the loculated fluid. The patient should be positioned with the affected side down on the x-ray table¹⁹. Chest radiographs can also provide important clues to the cause of the effusion. Bilateral effusions accompanied by

cardiomegaly are usually caused by congestive heart failure. Large unilateral effusions without contralateral mediastinal shift suggest a large atelectasis, infiltration of the lung with tumor, a mesothelioma or a fixed mediastinum due to tumor or fibrosis.

Conclusion

In conclusion chest movement and expansion as well as vocal resonance are decreased in both tubercular and malignant pleural effusion patients with absent of breath sound. In the light of the findings of the present study and discussion thereof, the following recommendations are put forward. All those interested in pleural diseases should determine the etiologic pattern of exudative pleural effusion using as less invasive diagnostic aids as possible. Further studies are needed to evaluate the utility of the procedures presently being used to come to a diagnosis of pleural effusion.

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