

ROLE OF PLEURAL BIOPSY IN DIAGNOSIS OF UNILATERAL PLEURAL EFFUSION:STUDY OF 50 CASES IN RANGPUR MEDICAL COLLEGE & HOSPITAL, RANGPUR

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Abstract

Background: Pleural effusion remains the most common manifestation of pleural pathology. Sometime it is difficult to differentiate between tuberculous and malignant pleural effusion on routine cytological and biochemical examination. So pleural biopsy is an important tool for evaluating undiagnosed pleural effusion.

Aim: To find out the role of pleural biopsy in the diagnosis of unilateral pleural effusion.

Methods: This observational study was conducted in the Indoor patient department of Medicine in Rangpur Medical College Hospital from 01.01.2014 to 30.06.2014.

All patients having unilateral pleural effusion above the age of 15 years irrespective of sex, race and religion was enrolled in this study.

Results: Total fifty cases were enrolled in this study. Age of the patients varied from 16 to 78 years (Mean \pm SD, yrs: 47 \pm 31.0). Thirty six (72%) patients were male and fourteen (28%) were female. 9 patients (18%) were of higher socio-economic status, 13 (26%) patients were from lower class, and 28 (56%) were from middle class. Majority (36%) of the patients were farmer, followed by 22% were businessman, 18% were service holder and 16% were housewives. Out of 50 patients, Nineteen patients (38%) were smoker and rests (62%) were non-smoker. Common presenting complaints were fever (78%), respiratory distress (62%), cough (56%), chest discomfort (38%) and weight loss (32%). General physical examination findings revealed 62% having different grades of anaemia followed by clubbing in 22% cases. Respiratory system examination revealed 56% having left sided pleural effusion followed by 44% right sided pleural effusion. 36% shows shifting of trachea. Regarding pleural fluid analysis, color of pleural fluid was straw in most cases (42%) and sixteen cases (32%) had hemorrhagic fluid. Mean total cell count in pleural fluid was 1449.1/c.mm. Most (88%) had lymphocyte predominance. Mean protein in pleural fluid was 5.6 gm/liter. Radiological examination revealed that maximum patient (56%) having left sided effusion and total 18 patients having shift of trachea. Close pleural biopsy for histopathological study revealed maximum (36%) were different types of malignancy, 24% chronic granulomatous inflammation consistent with tuberculosis, 16% shows non-specific chronic inflammation and 24% cases showed no abnormal findings or pleural tissue not available or inadequate tissue for histological report. Out of total 18 cases of malignancy, 08 revealed adenocarcinoma, 03 revealed metastatic adenocarcinoma, 02 revealed non-hodgkin's lymphoma, 02 malignant mesothelioma and 03 of them revealed poorly differentiated carcinoma.

Conclusion: In this study male are predominant. Most of the respondent was non-smoker. Most common presenting complains were fever, respiratory distress, cough, chest discomfort and weight loss. Most of general physical examination findings were anamia and clubbing. Respiratory system examination findings were features suggestive of pleural effusion (56% left sided and 44% right sided), 36% having shift of trachea. chest x-ray findings of most (56%) of the study population were left sided pleural effusion. Close pleural biopsy for histopathological study revealed maximum (36%) were different types of malignancy followed by chronic granulomatous inflammation consistent with tuberculosis (24%).

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Introduction

A pleural effusion is an abnormal collection of fluid in the pleural space resulting from excess fluid production or decreased absorption.¹ In normal condition, contains a relatively small amount of fluid- approximately 10 ml on each side². Pleural effusion remains the most common manifestation of pleural pathology.

Pleural effusion develops in a number of conditions commonly malignancy, bacterial infection, tuberculosis. It represents a common diagnostic problem³ and requires extensive investigation. The percentage of undetermined causes is still around 20% even after complete diagnostic evaluation in a highly equipped hospital⁴. It demands vigorous investigation, careful analysis of clinical and laboratory results to have a definite diagnosis. Some of the laboratory procedures are invasive (open and close pleural biopsy) and demands higher technical facilities (Video Assisted Thoracoscopy – VATS). So, etiological approach to a patient with pleural effusion may be hazardous and troublesome for the clinicians.

Sometime it is difficult to differentiate between tuberculous and malignant pleural effusion on routine cytological and biochemical examination. Pleural effusion is classified as exudative and transudative depending upon protein and LDH concentration in the fluid. It is exudative when protein concentration is 3 gm% or more and transudative when protein concentration is less than 3 gm%⁵. Thoracentesis with culture and pleural biopsy is indicated in suspected tuberculous pleural effusion. Pleural fluid culture is 44% sensitive and the combination of closed pleural biopsy with culture and histologic examination for granulomas is 70 to 90% sensitive for diagnosis of pleural tuberculosis⁶. Between 40 and 80% of exudative pleural effusions are malignant, while over 90% of malignant pleural effusions are exudative and approximately 15% of patients dying of cancer are reported to have malignant pleural effusions⁷.

Pleural biopsy is a valuable and time tested investigation in diagnosing tuberculous and malignant pleural effusion. Closed pleural biopsy provides the highest diagnostic yield in cases of pleural tuberculosis and malignancy, the two most important causes of pleural effusion⁸. However it can also be used to diagnose lymphoma, sarcoidosis, fungal, parasitic and rheumatoid pleurisy⁹. Diagnostic yield of pleural biopsy depends upon patient population,

biopsy technique, number of biopsy specimen, operator expertise and histopathological analysis¹⁰. This study carried out to find out the causes of exudative pleural effusion as revealed by percutaneous pleural biopsy.

Materials and Methods

This Observational study was conducted in the Indoor patient Department of Medicine in Rangpur Medical College Hospital from 01.01.2014 to 30.06.2014. All patients having unilateral pleural effusion above the age of 15 years irrespective of sex, race and religion was enrolled in this study. Those having co-existent respiratory and severe systemic illness, having bilateral pleural effusion and those are pregnant and lactating and those unwilling for pleural biopsy were excluded from the study. In this way total fifty patients were found to fulfill these criteria for the study. Respondents and their reliable attendant were interviewed by structured questionnaire by systematically purposive sampling interview- taking consent - result collection -preparing for tabulation.

Detailed history including demographic, social, occupational and personal data, symptoms and signs with duration, findings of general physical examination and respiratory system was noted. Routine blood picture, chest X-ray, sputum for AFB microscopy, Mantoux test was done. A pleural fluid aspiration was done and pleural biopsy was performed on all patients using Abram's needle maintaining proper asepsis (according to American Thoracic Society Guideline)¹¹. Collected specimens were subjected to histopathological examination. Aspirated Pleural fluid was subjected to biochemical, cytological and microbiological (Gram's staining and AFB staining) study. Pleural fluid was regarded as exudative if protein content of fluid was more than 30 mg/dl¹² or pleural fluid / serum protein >0.5¹³.

Statistical Analysis

Data was processed and analyzed using SPSS (Statistical Package for Social Sciences) software. Data processed on categorical scale was presented as frequency and percentage. While the data presented on continuous scale it was presented as mean standard deviation and analyzed with the help of student't' test. The summarized data was then presented in the table and chart.

Results

Total Fifty cases were included in this study. The demographic data, baseline investigations, Pleural fluid study and pleural biopsy of the patients included in the analysis are presented here.

Table 1
Age distribution

Years	Frequency	Percent
11-20	03	06
21-30	06	12
31-40	07	14
41-50	08	16
51-60	10	20
61-70	13	26
71 & above	03	06
Total	50	100

Minimum age was 16 and maximum age was 78 years, Maximum age group was 51 to 70 years.

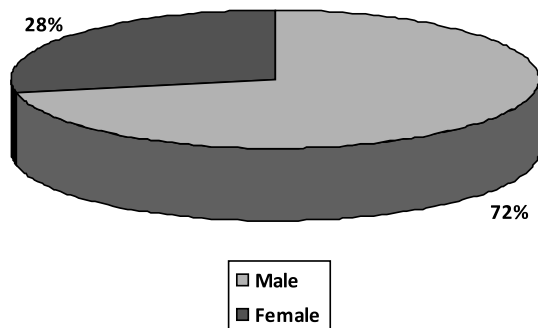


Fig.-1: Shows majority 72% were male and 28% were female.

Table-II
Sex distribution

	Frequency	Percent
Male	36	72
Female	14	28
Total	50	100

Table shows majority 72% were male and 28% were female.

Table-III
Occupational distribution

	Frequency	Percent
Housewife	08	16
Farmer	18	36
Business	11	22
Service	09	18
Others	04	08
Total	50	100

Table shows majority 36% were farmer, followed by 22% were businessman, 18% were service holder and 16% were housewives.

Table-IV
Presenting complaints

	Frequency	Percent
Fever	39	78
Dyspnoea	31	62
Cough	28	56
Chest pain/discomfort	19	38
Weight loss	16	32
Haemoptysis	02	04

Table-V
Smoking history

	Frequency	Percent
Smoker	19	38
Non Smoker	31	62
Total	50	100

Table shows most of the respondent were non-smoker whereas (62%) and 38% were smoker.

Table-VI
CxR findings of the patients

	Frequency	Percent
Left sided pleural effusion	28	56
Right sided pleural effusion	22	44
Shift of trachea	18	36
Pulmonary opacity	11	22
Total	50	100

Table shows maximum (56%) having left sided effusion and total 18 patients having shift of trachea on CxR.

Table-VII
Analysis of histological reports of pleural biopsy (n=50)

Histopathology report	Total Number	Percentage (%)
Granulomatous inflammation consistent with tuberculosis	12	24%
Non-specific chronic inflammation	08	16%
Malignancy	18	36%
Others	12	24%

Table shows analysis of histopathology reports of Pleural biopsy where maximum (36%) represents malignancy.

Table-VIII
Distribution of malignancy

	Frequency	Percent
Adenocarcinoma	08	16
Metastatic adenocarcinoma	03	06
Malignant mesothelioma	02	04
Non-hodgkin's lymphoma	02	04
Poorly differentiated carcinoma	03	06
Total	18	100

Table shows maximum malignancies (22%) were adenocarcinoma (including metastatic).

Discussion

This prospective study was done to know the cause of unilateral pleural effusion and to observe different laboratory findings including pleural biopsy to find out an effective tool for diagnosis. The study was done on fifty cases of unilateral pleural effusion.

Age of the patients varied from 16 to 78 years (Mean \pm SD, yrs: 47 ± 31.0). 3 patients (06%) were between 11-20 years, 06 patients (12%) were between 21 to 30 years, 7 patients (14%) between 31 to 40 years, 8 patients (16%) were between 41 to 50 years, 10 patients (20%) were between 51 to 60 years, 13 patients (26%) were between 61 to 70 years and 3 patients (06%) were above 70 years.

Thirty six (72%) patients were male and fourteen (28%) were female. 09 patients (18%) were of higher socioeconomic status, 13 (26%) patients were from lower class, and 28 (56%) were from middle class.

Majority (36%) of the patients were farmer, followed by 22% were businessman, 18% were service holder and 16% were housewives. Out of 50 patients, Nineteen patients (38%) were smoker and rests (62%) were non-smoker.

Clinical Presentation: 39 patients (78%) were presented with fever for 10 days to 6 months (mean-32.7 days). Thirty one patients (62%) had respiratory distress with an average duration of 15.9 days. 28 patients (56%) had cough for 14 to 90 days duration (mean-40.7 days), 18 (36%) of them had productive cough, of whom 04% had haemoptysis. Nineteen patients (38%) had chest pain or discomfort, of these

nine (18%) had left sided, seven (14%) had right sided, two had both sided and in one, pain was located in central. The duration of chest pain ranges from 12 to 240 days with an average of 38.7 days. Sixteen patients (32%) had weight loss.

General physical examination findings revealed 62% having different grades of anaemia followed by clubbing in 22% cases. Respiratory system examination revealed 56% having left sided pleural effusion followed by 44% right sided pleural effusion. 36% shows shifting of trachea.

Laboratory findings: Total white blood cell count was found (mean) 8,048/c.mm. with a range from 5,000 to 14,000. No patient had leucopenia, thirteen patients had leucocytosis ($> 11,000$ /c.mm.). Mean ESR was 77 mm in 1st hour with a range 35 to 130 and was more than 100 mm in 1st hr. in 13 cases (26%). Mean Mantoux test reading after 72 hours was 5.8 mm; It had a range 0 to 22 mm; 21 cases (42%) had mantoux test positive (> 10 mm). In twenty one cases (42%), the color of pleural fluid was straw and sixteen cases (32%) had hemorrhagic fluid.

Mean total cell count in pleural fluid was 1449.1 /c m.m. It varied from 200 to 16,000/ c.mm. Most (88%) had lymphocyte predominance. Thirty cases (26%) had 100% lymphocyte. Mean protein in pleural fluid was 5.6 gm/liter and varied from 2.5 to 7.5 gm/l. Mean sugar value was 62.9 mg/dl and varied from 34 to 107 mg/dl. Gram's staining and AFB staining revealed no organism in pleural fluid.

Radiological examination revealed that maximum patient (56%) having left sided effusion and total 18 patients having shift of trachea. Moreover, 11 patients (22%) shows opacity in lung.

Close pleural biopsy for histopathological study revealed maximum (36%) were different types of malignancy, 24% chronic granulomatous inflammation consistent with tuberculosis, 16% shows non-specific chronic inflammation and 24% cases showed no abnormal findings or pleural tissue not available or inadequate tissue for histological report. Out of total 18 cases of malignancy, 08 revealed adenocarcinoma, 03 revealed metastatic adenocarcinoma, 02 revealed non-hodgkin's lymphoma, 02 malignant mesothelioma and 03 of them revealed poorly differentiated carcinoma.

Figure: Photograph of pleural histology slide reveals granulomatous inflammation consistent with TB pleurisy

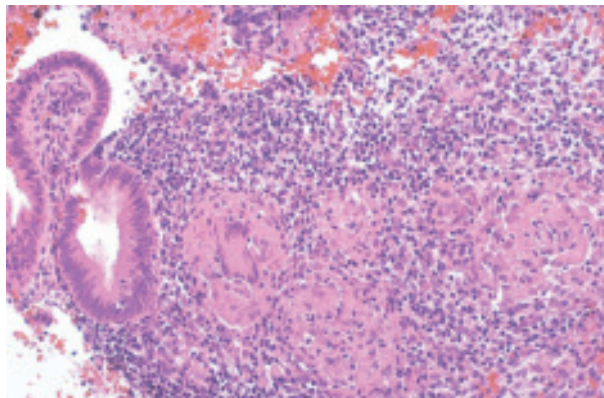


Fig-1: A caseating granuloma having Langerhans' giant cell seen on histological study of pleural biopsy tissue.

Thoracoscopic pleural biopsy is a useful and more sensitive diagnostic tool for pleural effusion¹⁸. Video assisted thoracoscopy (VATS) is used predominantly in the diagnostic evaluation of pleural effusion of unknown causes. Open pleural biopsy after thoracotomy provides the visualization of the pleura and the best biopsy specimen. This procedure is 100% sensitive in cases of pleural TB. This invasive procedure is indicated in progressive undiagnosed pleural disease cases and its routine use is not recommended⁵.

Al-Shimemeri AA et al demonstrated that closed pleural biopsy is still of value as a diagnostic procedure (47% diagnostic in undiagnostic pleural effusion cases) and should be carried out prior to invasive procedures such as thoracoscopy or open pleural biopsy¹⁹. Dicon AH et al in a direct comparative study for a diagnostic tool in pleural tuberculosis demonstrates combined pleural fluid analysis and close pleural biopsy has high diagnostic accuracy and might substitute thoracoscopy as a diagnostic tool²⁰.

All these facts and the evidences shown in this study sufficiently prove that close pleural biopsy for histopathological study is an easy, price-worthy and highly sensitive and specific tool for the diagnostic evaluation of pleural effusion of unknown causes. So, it's the investigation of choice especially in a resource-poor country like Bangladesh.

Limitations of this study were small sample size. Study was conducted in a tertiary level hospital. So, it might not reflect community status. Paediatric age group was not considered here.

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