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IMPORTANCE OF PLEURAL BIOPSY IN ANALYSIS OF UNILATERAL PLEURAL EFFUSION

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Abstract:

Introduction: *Pleural effusion remains the most common symptom of pleural pathology. It is sometimes difficult to distinguish tuberculosis from malignant pleural effusions on the basis of routine cytology and biochemistry. Therefore, a pleural biopsy is an important tool to evaluate undiagnosed pleural effusion.* ***Aim:*** *To understand the role of pleural biopsy in the diagnosis of unilateral pleural effusion.*

Methods: *This observational study was conducted at the Medicine Unit-II of Jinnah Hospital Lahore for one-year duration from June 2019 to June 2020. All patients with unilateral pleural effusion over 15 years of age, regardless of gender, race, or religion, were included in the study.*

Results: *A total of fifty cases were included in this study. The age of patients ranged from 16 to 78 years (mean ± SD, years: 47 ± 31.0). Thirty-six (72%) patients are male and fourteen (28%) are female. Nine patients (18%) were of higher socioeconomic status, 13 (26%) were lower class and 28 (56%) were middle class. Most of the patients (36%) are farmers, then 22% are businessmen, 18% are service users and 16% are housewives. Nineteen (38%) of the 50 patients were smokers and the non-smokers (62%) were non-smokers. Common complaints were fever (78%), respiratory failure (62%), cough (56%), chest discomfort (38%) and weight loss (32%). Overall results from a physical examination revealed that 62% had varying degrees of anemia followed by cystic fibrosis in 22% of cases. A respiratory examination showed that 56% of people had exudate on the left side and 44% on the right side. 36% show an offset of the trachea. Regarding the pleural fluid analysis, the color of the pleural fluid was straw colored in the majority of cases (42%) and sixteen cases (32%) had hemorrhagic fluid. The mean total number of cells in the pleural fluid was 1449.1 / c.mm. The majority (88%) had lymphocytes predominating. The mean pleural fluid protein content was 5.6 g / liter. Radiographic examination showed that the maximum number of patients (56%) had left-sided exudate and a total of 18 patients with a tracheal shift. Strict pleural biopsy for histopathological examination revealed up to (36%) different types of neoplasms, 24% chronic granulomatous inflammation corresponding to tuberculosis, 16% nonspecific chronic inflammation, and 24% of cases showed no abnormal results or no available or inadequate pleural tissue for the histological report. Out of all 18 cases of malignant neoplasms, 8 cases were diagnosed with adenocarcinoma, 3 cases with metastatic adenocarcinoma, 2 cases with non-Hodgkin's lymphoma, 2 cases with malignant mesothelioma, 3 cases with poorly differentiated cancer.*

Conclusion: *Men dominate this study. Most of the respondents were non-smokers. The most common complaints were fever, respiratory distress, cough, chest discomfort and weight loss. Most of the general results of a physical examination are anemia and clubbing. The respiratory system revealed features indicative of pleural effusion (56% left and 44% right), 36% had a tracheal shift. In the majority (56%) of the studied population, the chest X-ray was a left pleural effusion. A strict pleural biopsy for histopathological examination revealed up to (36%) different types of neoplasms, followed by chronic granulomatous inflammation consistent with tuberculosis (24%).*

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INTRODUCTION:

Pleural effusion is an abnormal accumulation of fluid in the pleural cavity resulting from excess fluid production or decreased absorption. Under normal conditions, it contains a relatively small amount of liquid, about 10 ml on each side. Pleural effusion remains the most common manifestation of pleural pathology [1-2]. Pleural effusion develops in many conditions, usually malignant, bacterial infection, tuberculosis. It is a common diagnostic problem and requires extensive research. The percentage of undefined causes is still around 20%, even after full diagnosis in a well-equipped hospital. It requires vigorous research, careful analysis of clinical and laboratory results to arrive at a final diagnosis [3-4]. Some laboratory procedures are invasive (pleural open and closed biopsy) and require higher technical support (video assisted thoracoscopy - VATS). Therefore, the etiological approach to a patient with pleural effusion can be dangerous and confusing for clinicians. It is sometimes difficult to distinguish tuberculosis from malignant pleural effusions on the basis of routine cytology and biochemistry. Pleural effusion is classified as exudative and translational depending on the concentration of protein and LDH in the fluid. There is exudate when the protein concentration is 3 g% or greater, and exudate when the protein concentration is less than 3 g%[5-6]. Thoracocentesis with culture and pleural biopsy is indicated when tuberculous pleural effusion is suspected. Pleural fluid culture is 44% sensitive, and the combination of closed pleural biopsy with culture and histological examination for granulomas is 70 to 90% sensitive in the diagnosis of pleural tuberculosis. 40 to 80% of pleural effusions are malignant, while more than 90% of malignant pleural effusions are effusions, and approximately 15% of cancer patients have malignant pleural effusions. Pleural biopsy is a valuable and proven test in the diagnosis of tuberculous and malignant pleural effusions [7-8]. Closed pleural biopsy provides the highest diagnostic efficacy in cases of pleural tuberculosis and malignant neoplasms, the two most important causes of pleural effusion. However, it can also be used to diagnose lymphoma, sarcoidosis, fungal, parasitic and rheumatoid pleurisy [9-10]. The diagnostic performance of a pleural biopsy depends on the patient population, biopsy technique, number of biopsy specimens, operator experience, and histopathological analysis. The purpose of this study was to determine the causes of pleural effusion revealed by percutaneous pleural biopsy.

MATERIALS AND METHODS:

This observational study was conducted at the Medicine Unit-II of Jinnah Hospital Lahore for one-year duration from June 2019 to June 2020. All patients with unilateral pleural effusion over 15 years of age, regardless of gender, race, or religion, were included in the study. The study excluded people with concomitant respiratory diseases and severe systemic diseases, with bilateral pleural effusion, pregnant and lactating patients, and those reluctant to perform a pleural biopsy. Thus, a total of fifty patients were found to meet these study criteria. The respondents and their reliable assistant were interviewed by means of a structured questionnaire through a systematic, deliberate sampling interview - consent to collect the results - preparation for the table. A detailed history is recorded including demographic, social, occupational and personal data, symptoms and signs with duration, results of general physical and respiratory examination. Routine blood photograph, chest X-ray, sputum for AFB microscopy, Mantoux test. Pleural fluid aspiration was performed and all patients underwent an Abram needle biopsy with proper asepsis (according to the guidelines of the American Thoracic Society). The collected samples were subjected to histopathological examination. The collected pleural fluid was subjected to biochemical, cytological and microbiological tests (Gram staining and AFB staining). Pleural fluid was considered exudate if fluid protein content was greater than 30 mg / dl12 or pleural fluid / serum protein> 0.513.

Statistical analysis:

The data was processed and analyzed using the SPSS (Statistical Package for Social Sciences) software. Data processed on a categorical scale are presented as frequency and percentage. While the data presented on a continuous scale was presented as mean

standard deviation and analyzed with the student's "t" test. The summarized data is then presented in a table and graph.

RESULTS:

A total of fifty cases were included in this study. The demographics, baseline examinations, pleural fluid examination and pleural biopsy of the patients included in the analysis are presented. The minimum age is 16, the maximum is 78, and the maximum age group is 51 to 70.

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

The table shows that the majority of 72% were men and 28% women. The table shows that the majority of 36% are farmers, then 22% are businessmen, 18% are engaged in services and 16% are housewives. The table shows that most of the respondents were non-smokers, while (62%) and 38% were smokers.

Table-II: Sex distribution

	Frequency	Percent
Male	36	72
Female	14	28
Total	50	100

28% were

Table shows majority 72% were male and 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

The table shows the maximum (56%) with left-sided exudate and a total of 18 patients with tracheal displacement in CXR.

	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

-smoker

Table shows most of the respondent were non 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

The table shows an analysis of the pleural biopsy histopathological reports, where the maximum (36%) is malignancy. The table shows the maximum malignant tumors (22%) are adenocarcinomas (including metastatic).

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 Malignancy	08	16%
	18	36%
Others	12	24%

DISCUSSION:

This prospective study was conducted to understand the cause of unilateral pleural effusion and to observe various laboratory findings, including pleural biopsy, to find an effective diagnostic tool. The study was conducted on fifty cases of unilateral pleural effusion. The age of patients ranged from 16 to 78 years (mean ± SD, years: 47 ± 31.0). 3 patients (06%) were 11-20 years old, 06 patients (12%) were 21-30 years old, 7 patients (14%) were 31-40 years old, 8 patients (16%) were aged 41-50 years, 10 patients (20%) were aged 51-60 years, 13 patients (26%) were aged 61-70 years, and 3 patients (06%) were aged over 70 years [11]. Thirty-six (72%) patients were male and fourteen (28%) were female. 09 patients (18%) were of a higher socioeconomic status, 13 (26%) were in the lower class and 28 (56%) were in the middle class. Most of the patients (36%) are farmers, then 22% are businessmen, 18% are service users and 16% are housewives. Nineteen (38%) of the 50 patients were smokers and the non-smokers (62%) were non-smokers. Clinical picture: 39 patients (78%) had fever lasting from 10 days to 6 months (mean 32.7 days). Thirty-one patients (62%) had respiratory failure of a mean duration of 15.9 days. 28 patients (56%) had a cough lasting up to 90 days (mean 40.7 days), 18 (36%) of these had a productive cough, of which 04% had haemoptysis[12]. Nineteen patients (38%) had chest pain or discomfort, of which nine (18%) were on the left, seven (14%) on the right, two on either side, and one of the pains was centrally located. The duration of chest pain ranges from 12 to 240 days, with an average of 38.7 days. Sixteen patients (32%) lost weight. Overall results from a physical examination revealed that 62% had varying degrees of anemia followed by cystic fibrosis in 22% of cases. A respiratory examination showed that 56% of people had exudate on the left side and 44% on the right side. 36% show an offset of the trachea. Laboratory results: Total white blood cell count (mean) 8048 / c.mm. ranging from 5,000 to 14,000. No patient had leukopenia; 13 patients had leukocytosis (> 11,000 / c.mm.). The mean ESR was 77 mm in the first hour ranging from 35 to 130 and over 100 mm in the first hour. in 13 cases (26%)[13]. The mean reading in the Mantoux test after 72 hours was 5.8 mm; It ranged from 0 to 22 mm; 21 cases (42%) were positive for the Mantoux test (> 10 mm). In 21 cases (42%), the pleural fluid was straw-colored and sixteen (32%) had hemorrhagic fluid. The mean total number of cells in the pleural fluid was 1449.1 / cm3 / cm3. It ranged from 200 to 16,000 / c.mm. The majority (88%) had lymphocytes predominating. Thirty cases (26%) contained 100% lymphocytes, and the mean pleural fluid protein content was 5.6 g / L and ranged from 2.5 to 7.5 g / L. Al-Shimemeri AA et al. Have shown that closed pleural biopsy continues to be of value as a diagnostic procedure (47% of diagnosis for non-diagnostic pleural effusion) and should be performed prior to invasive procedures such as thoracoscopy or open pleural biopsy[14]. Dicon AH et al. In a direct comparative study of a diagnostic tool in pleural tuberculosis, they showed that the combined analysis of the pleural fluid and a thorough pleural biopsy have a high diagnostic accuracy and can replace thoracoscopy as a diagnostic tool [15].

CONCLUSION:

All these facts and the evidence presented in this study sufficiently demonstrate that a strict pleural biopsy for histopathology is an easy, inexpensive, very sensitive and specific tool for the diagnostic evaluation of pleural effusion of unknown causes. It is therefore a study of choice, especially in a resource-poor country such as Bangladesh. The limitation of this study was the small sample size. The examination was conducted in a 3rd degree hospital. So it may not reflect the status of the community. The pediatric age group is not included.

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