

ETIOLOGY OF PLEURAL EFFUSION AT A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To study the various diseases in cases of pleural effusion presenting at Holy Family Hospital, Rawalpindi. **Material and methods:** This cross sectional study was conducted at Department of Medicine, Holy Family Hospital Rawalpindi, from September 2018 to March 2019. Total 100 patients with pleural effusion were selected and different diseases were studied in selected cases. **Results:** Tuberculosis was the most common cause (28%) of exudative pleural effusion followed by parapneumonic effusion/empyema (25%) and malignant effusion (9%) while congestive cardiac failure (13%) was the most common cause of transudate effusion followed by liver cirrhosis in 8% of cases of all cases of the pleural effusion. **Conclusion:** Tuberculosis is the most common cause of pleural effusion while infections, malignancies and CCF comprise a significant number of cases.

KEYWORDS: Pleural, effusion, tuberculosis, malignant, pneumonia, exudative, transudate.

INTRODUCTION

Pleural effusion is the abnormal and excessive accumulation of fluid in pleural space.^[1] Pleural effusion can be a manifestation of a wide range of diseases, both local and systemic.^[2] Pleural space is a potential space that normally contains 0.1 to 0.2 ml/kg body weight fluid.³ Pleural fluid is produced and reabsorbed continuously. Pleural effusion occurs only when either filtration rate exceeds maximum lymph flow or reabsorption is impaired.^[4]

The most common symptom of pleural effusion is dyspnea. Pleuritic chest pain may be an early feature if there is inflammation or infiltration of parietal pleura. Physical examination of chest reveals reduced chest expansion, decreased vocal fremitus, stony dull percussion note, diminished breath sounds and reduced vocal resonance on the side of pleural effusion.^[5] There may be an area of bronchial breathing above the effusion due to compression of overlying lung. Trachea may be shifted to opposite side if the effusion is large. The clinical features combined with pleural fluid analysis lead to correct diagnosis in many cases of pleural effusion.^[6] Pleural effusion becomes clinically detectable when 500-ml fluid is present in pleural space. It is detectable on X-ray chest PA film when 175 to 200-ml fluid is present and 75-100 ml fluid can be visualized on lateral film. However, as little as 05 to 15 ml fluid is easily detectable on decubitus film.^[7] Ultrasonography helps to confirm the presence of effusion and aspiration

of small effusion. Sub pulmonary effusion may simulate raised hemidiaphragm but it may be differentiated by ultrasonography or radiological signs such as Hassel's sign or loss of vascular visibility below the hemidiaphragm.^[8]

Pleural effusion is classified as exudative and transudative on the basis of Light's criteria.^[9] All exudates have at least one of the following while transudates have none.

1. Ratio of pleural fluid to serum protein more than 0.5
2. Ratio of pleural fluid to serum LDH more than 0.6
3. Pleural fluid LDH more than 2/3 of upper limit of serum LDH. Despite the availability of a number of new markers, Light's criteria has an overall accuracy of 95% in differentiating exudative and transudative pleural effusions.^[10]

Common causes of exudative effusion are tuberculosis, malignancy, pneumonia, pulmonary embolism and viral infections while transudative effusion is usually due to heart failure (CCF), liver cirrhosis, nephrotic syndrome, peritoneal dialysis and myxedema.^[11] Pleural fluid analysis is mandatory in all cases of pleural effusion. If the effusion is exudative, then additional tests may be needed. Pleural fluid cytology helps in the diagnosis of malignant effusions. If the cytology is negative but there is strong clinical suspicion of malignancy then thoracoscopy is the procedure of choice.¹¹ Pleural fluid culture is positive in less than 40% cases of tuberculous

effusion.^[12] In this situation, detection of DNA from Mycobacterium in the effusion by PCR or determination of adenosine deaminase (ADA) is helpful in the diagnosis of tuberculosis.^[13] Pleural fluid culture is negative in up to 50% cases of purulent effusion.^[14] It is either because of prior antibiotic therapy or lack of facilities for anaerobic culture. Pleural biopsy is contraindicated in complicated parapneumonic effusion as it can lead to subcutaneous abscess formation.^[15] Measurement of D-dimer level in blood (16) may be helpful when the pleural effusion in a patient is suspected to be due to pulmonary embolism.^[16] Some viral infections leading to exudative effusion are misdiagnosed as tuberculous although most of them resolve spontaneously. However, no diagnosis is ever established in 15% of patients despite invasive investigations such as thoracoscopy and open pleural biopsy. There are many studies conducted to find out the pattern of pleural effusion in different parts of Pakistan and all over the world. But there is little work done on this issue in this region. Secondly, there is a tendency among doctors that patients with pleural effusion are labeled as tuberculous without proper investigations. This study is being conducted to find out the pattern of various causes of pleural effusion in this locality.

MATERIAL AND METHOD

This cross sectional study was conducted at Department of Medicine, Holy Family Hospital, Rawalpindi, from September 2018 to March 2019. Total 100 patients with pleural effusion having age >12 years either male or female were selected. This study was a case series. One hundred patients of either gender were included in the study. Patients with history of trauma to chest or whose effusion was due to trauma were excluded from the study. A pertinent history was obtained and all the patients were thoroughly examined to confirm the clinical diagnosis of the effusion as well as to find the clinical features of the disease causing the effusion. A chest radiograph (PA film) was obtained in all the patients to confirm the presence of the effusion. Diagnostic thoracentesis was done in all the patients after explanation of the procedure and informed consent from the patient. Ultrasonic guided thoracentesis was done in patients who had small effusions. Chest radiograph was obtained after thoracentesis in all the patients to exclude the iatrogenic pneumothorax. Pleural fluid was sent for

cell count, protein, LDH, sugar level, Gram staining, AFB staining, malignant cells and special tests when indicated. Pleural fluid culture was done in all samples that fulfilled the Light's criteria for exudative effusion or the patient had history of fever. Percutaneous needle biopsy was done in patients whose pleural effusion was lymphocytic exudative. Blood complete examination including WBC count, blood sugar, serum creatinine, serum protein and serum LDH were done in all cases. Montoux test was done in patients with exudative effusions. Abdominal ultrasonography, echocardiography, CT scan, specific hormonal assays and other laboratory tests were done in specific indications. All the patients were managed according to the standard and recommended protocols. Therapeutic thoracentesis was done when large effusion caused respiratory embarrassment and chest tube drainage was done in patients with empyema or complicated parapneumonic effusions. The patients were followed up in Out Patients Department. All the data was collected on pre-designed proforma. All the information collected on the proforma was analyzed using SPSS version 10.0. Tables were made for various variables (age, sex, disease and laboratory parameters). Since it was an observational study, statistical test of significance was not needed.

RESULTS

One hundred patients were included in this study. They ranged from 12 years to above 80 years. Out of 100 patients, 61 were male while 39 were female with male to female ratio of 1.56:1.00. Most of the patients (57%) were 20 to 49 years old. Seven percent patients were less than 20 years old and only 1% were older than 80 years. The patients were divided into 8 groups (Table No.1). Tuberculosis (28%) was the most common cause of exudative pleural effusion in both sexes followed by parapneumonic effusions (25%) and malignant effusions (9%) while CCF (13%) was the most common cause of transudative effusions (Table No.2). Most of the patients were referred or had come from various areas of city. Most of the patients were illiterate or had low educational status (Table No.3). Seventy percent patients were illiterate. Educational level was lower in females as compared to males. Breathlessness was the most common symptom (Table No.4) and it was found in 86% patients. Other common symptoms included cough, chest pain, fever, expectoration (sputum) and ankle swelling.

Table 1: Causes Of Pleural Effusion.

No.	Diagnosis/disease	Males (%)	Females (%)	Total (%)
1.	Tuberculosis	16	12	28
2.	Parapneumonic	16	09	25
3.	Malignant	06	03	09
1.	CCF	09	04	13
2.	Liver Cirrhosis	03	05	08
3.	Renal failure	05	0	05
4.	Nephrotic syndrome	01	01	02
5.	Pancreatitis	02	0	02
6.	SLE	0	02	02

7.	Pulmonary embolism	0	01	01
8.	Scleroderma	0	01	01
9.	Sclerotherapy	01	0	01
10.	Liver abscess	01	0	01
11.	Hypothyroidism	01	0	01
15.	Cushing syndrome	0	01	01
	Total	61	39	100

Table 2: Age And Sex Distribution.

Age (years)	Males (%)	Females (%)	Total (%)
12 – 19	03	04	07
20 – 29	12	10	22
30 – 39	13	06	19
40 – 49	09	07	16
50 – 59	07	04	11
60 – 69	08	06	14
70 – 79	09	01	10
80 and above	0	01	01
Total	61	39	100

Table 3: Educational Level Of Patients.

Educational level	Male	Female	Total
Illiterate	41	29	70
Primary school	05	04	09
Middle school	05	02	07
High school	04	02	06
Higher secondary	02	01	03
Graduate	02	01	03
Post-graduate	02	0	02
Total	61%	39%	100%

Table 4: Common Symptoms.

	Symptoms	Percentage
1	Breathlessness	86
2	Cough	64
3	Fever	59
4	Chest pain	46
5	Expectoration	20
6	Ankle swelling	18

DISCUSSION

In this study, tuberculosis was the most common cause of pleural effusion found in 28% cases followed by parapneumonic effusion in 25% cases and malignant effusion in 9% cases. All of these effusions were exudative. Congestive Cardiac Failure (CCF) was the most common cause of transudative effusion followed by liver cirrhosis in 8% cases. Male to female ratio was 1.56:1.00. This male to female difference may be due to delayed consultation by females and gender inequality in utilization of health care facilities. Fifty percent patients were illiterate. It may be due to low literacy rate in Pakistan. Breathlessness was the most common symptom found in 86% patients. It is the most common symptom of clinically significant pleural effusion. The other symptoms included cough, chest pain and fever. Tuberculosis was the most common cause of pleural

effusion. In literature, CCF is the most common cause of the pleural effusion. The predominance of tuberculous in this study may be because tuberculosis is very common and it is also the commonest cause of exudative effusion in Pakistan. Parapneumonic effusion was the second most common cause of pleural effusion.¹⁷ Malignancy was the third most common cause of exudative effusion and it comprises of 09% of all cases of pleural effusion. Carcinoma of bronchus was the most common cause of malignant effusion in males while pelvic malignancies were most common cause in females. Malignant cells were seen in pleural effusion in 4 patients and pleural biopsy showed malignant infiltration of parietal pleural in rest of 5 cases. Nineteen to 25% cases of exudative effusion,^[18] are reported to be due to malignancies and most cases are due to CA bronchus and carcinoma of

breast. This low percentage of malignant effusions may be due to high prevalence of tuberculosis in our country. Among the transudates CCF was the most common cause. While CCF is the commonest cause of pleural effusion in the literature, the low number of cases of CCF in this study may be because most cases of CCF are managed in Cardiology wards. Liver cirrhosis was the second most common cause of transudative effusion. It may be because of high incidence of viral hepatitis and increasing incidence of hepatitis C infection.^[19-20]

Five cases of pleural effusion resulted from renal failure. Three cases were transudative while 2 were exudative in nature. Although uremia is a rare cause of pleural effusion, incidence and prevalence of renal failure is increasing in Pakistan.²¹ In Peshawar, in medical wards of a teaching hospital, 4.8% admissions were due to renal failure.^[20] Uremia usually leads to exudative effusion while peritoneal dialysis can result in transudative effusion. Transudative effusions in patients with uremia in this study may be due to volume overload. Two (2%) patients had pleural effusion secondary to nephrotic syndrome. Pleural effusion in patients with nephrotic syndrome is probably due to hypoproteinemia. Other diseases constituted a small number of cases of pleural effusion including scleroderma, hypothyroidism, SLE, sclerotherapy of esophageal varices and liver abscess. The small percentages of these diseases reflect their prevalence.

Pleural effusion analysis was helpful in categorizing the effusions into exudates and transudates. Definitive diagnosis of malignancy was possible in four (44%) out of 9 patients with malignant effusion in whom malignant cells could be demonstrated in the effusion. Various studies,^[22] have shown that malignant cells can be demonstrated in 62 to 90% cases of malignant effusion. The low yield in this study is probably due to delayed examination of the fluid and lack of expert cytologists. AFB stain was not positive in any case of tuberculous effusion. It is because there are few bacilli in the effusion and is well documented in the literature.^[12] Although thoracentesis is said to be a safe procedure with minimum complications, 5 (5%) patients had iatrogenic pneumothorax in this study.

Pleural effusion in patients with collagen vascular diseases such as SLE, scleroderma and rheumatoid arthritis is exudative in nature. The occurrence of exudative effusion in the patient undergoing injection sclerotherapy of esophageal varices was perhaps due to penetration of esophageal wall and transmission of organisms into the pleural space.

CONCLUSION

Tuberculosis is the most common cause of pleural effusion in this area. However, infections (parapneumonic effusion), malignancies, CCF and liver cirrhosis also cause a significant number of cases of pleural effusion. Less common causes include renal

failure, nephrotic syndrome, hypothyroidism, pulmonary embolism and collagen vascular disorders.

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