

## Study on Diagnostic Approach for Pleural Effusion with Varied Etiology

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**Abstract:** Background: Pleural effusion is a commonest condition in clinical practice. Determining the cause of pleural effusion is not always easy. Proper history, clinical examination and investigations including pleural fluid studies may reveal etiological diagnosis of pleural effusion. Objective: In this study an attempt has been made to arrive at the etiological diagnosis by clinical profile of pleural effusion. Methods: A prospective study of 50 cases of pleural effusion was carried out in Department of Medicine, over period of two year. Cases admitted in Medicine and chest and TB ward were studied. The diagnosis of pleural effusion was done by detail history, physical examination and was then confirmed by chest x ray. Etiological diagnosis of pleural effusion was then confirmed by pleural fluid studies, like P<sup>H</sup>, pleural fluid protein, cytology. Results: Incidence of pleural effusion was more common in age group 20 – 50 years. Male predominance was more than females in both the groups. Tuberculosis was the commonest cause of exudative pleural effusion. Majority of tuberculous pleural effusion were right sided. Conclusion: Tuberculous pleural effusion is most common etiology followed by parapneumonic. Tuberculosis was the commonest cause of exudative pleural effusion. [Shrikant G NJIRM 2017; 8(4):63-67]

**Key Words:** Pleural effusion, Transudate, Exudate, Tuberculosis

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**Introduction:** Pleural effusion is a commonest condition in clinical practice. Determining the cause of pleural effusion is not always easy. Proper history, clinical examination and investigations including pleural fluid studies may reveal etiological diagnosis of pleural effusion. The first step in diagnosis of pleural effusion is to classify them as transudate and exudate.

Light et al<sup>1</sup> described the criteria to differentiate between transudate and exudate. These criteria have been widely accepted, however, low specificity of criteria may lead to unwanted invasive intervention in upto 20 to 30 percent of patients with transudates. This casts some doubts about the universal applicability of these criteria. Several alternative criteria have been proposed and of these, cholesterol level in pleural fluid seems to have higher diagnostic accuracy for differentiating between transudate and exudates.

An abnormal quality and quantity collected of fluid in the pleural cavity is called pleural effusion<sup>2</sup>.

Collection of fluid in pleural cavity has varied etiological factors<sup>3</sup>. Due to the different etiologies that can bring about pleural emission, it frequently exhibits an analytic issue, even after enormous investigations. The preliminary step is the difference between transudates and exudates as this gives an indication of pathophysiological mechanisms, differential diagnosis and need for further investigation. The analysis of

reason of pleural effusion is commonly accomplished by means of clinical, radiological, histological and laboratory findings.

In this study an attempt has been made to arrive at the etiological diagnosis by clinical profile of pleural effusion.

**Methods:** A prospective study of 50 cases of pleural effusion was carried out in Department of Medicine, over period of two year. Cases admitted in Medicine and chest and TB ward were studied. Institutional ethical clearance was obtained before beginning of the study. Informed consent was obtained from patients during study. The diagnosis of pleural effusion was done by detail history, physical examination and was then confirmed by chest x ray. Etiological diagnosis of pleural effusion was then confirmed by pleural fluid studies, like P<sup>H</sup>, pleural fluid protein, cytology.

- **Exudate:** This group of patients includes cases of tuberculous, malignant and parapneumonic pleural effusion. The etiological diagnosis of pleural effusion was made when following criteria for each disease were met :

1. **Tuberculosis:** History of low grade evening rise fever, cough with expectoration, history of haemoptysis, raised ESR, sputum AFB, evidence of pulmonary parenchymal involvement or evidence of extrapulmonary tuberculosis.

2. **Malignant:** History of weight loss, loss of appetite, cough with expectoration, haemotysis or history suggestive of secondaries in lungs. The diagnosis of malignant pleural effusion was confirmed when the fluid is haemorrhagic and the pleural fluid shows malignant cells on the smear or pleural effusion is in proven cases of malignancy (primaries from abdomen, breast, ovary, uterus etc.)

3. **Parapneumonic effusion:** History of moderate to high grade fever, cough with expectoration, breathlessness and pleuritic chest pain, clinical and radiological evidence of consolidation with parapneumonic effusion.

- **Trasudate:** This group included cases of
  1. Congestive cardiac failure of varied etiology
  2. Liver cirrhosis with ascitis.
  3. Nephrotic syndrome

1. **Congestive Cardiac Failure:** Symptoms and signs suggestive of congestive cardiac failure like tachycardia, tachypnoea, pedal edema, raised JVP, ventricular gallop, radiological evidence of enlarged heart, clinical and echocardiographic evidence of cardiac dysfunction, These features associatd with signs of underlying etiology like rnheumatic valvular heart disease, severe anaemia.

2. **Liver Cirrhosis with ascitis:** History of yellowish discolouration of eyes, distension of abdomen or swelling over the feet and signs of liver cell damage, clinical and laboratory evidence of hepatic damage with or without portal hypertension or hypoalbuminemia.

3. **Nephrotic syndrome:** History of periorbital puffiness, pedal edema, proteinuria, hyperlipedemia and hypoalbuminemia.

**Exclusion Criteria:** Few cases of pleural effusion in which cause of pleural effusion was undermined or more than one cause was present were excluded from the study to avoid false positive or false negative results.

Difference between transudate and exudates were made using Light's criteria<sup>4</sup>.bHowever, in present

study first five criteria were taken to differentiate between transudate and exudate.

**Results:** In the present study, 50 cases of pleural effusion were studied. Etiological diagnosis of pleural effusion was confirmed by history, clinical examination and necessary investigation in each case. Out of 50 cases, 39 (78%) were males and 11 (22%) were females from different age groups (Table 1).

Most of the patients with pleural effusion of varied etiology were from age group of 20 years to 50 years (34 patients). Youngest patient was of 14 years of age and oldest was of 71 years of age.

Out of 50 cases, 9 were transudate and 41 were exudates of varying etiology. In exudative pleural effusion, out of 41 cases, 32 were of tuberculous origin 6 cases were of parapneumonic effusion (non tuberculous exudates) and 3 cases were of malignant pleural effusion.

**Table 1: Showing age incidence & M:F ratio in transudate and exudate**

Type	No. of Cases	Sex Incidence	Age range (Yrs)
Transudate	9	M : 5 F : 4	38 to 71 20 to 65
Exudate	41		
Tuberculosis	32	M : 27 F : 5	16 to 60 22 to 40
Parapneumonic	6	M : 5 F : 1	25 to 55 14
Malignant	3	M : 2 F : 1	65 55

Out of 9 transudates, were male in a range of 38-71 years, and 4 were females in a range of 20-65 years.

Out of 32 cases of exudative pleural effusion due to tuberculosis, 27 more males' age range 16-60 years and 5 were females with age range of 22-40 years. Out of 6 cases parapneumonic pleural effusion, 5 were males in range of 25 to 55 years; one was female of 14 years. The malignant pleural effusion includes 3 cases of which 2 were males of 65 years age and 1 was female of 55 years of age.

The nine cases of transudative pleural effusion include 3 cases of liver cirrhosis with ascitis, 1 case of nephritic syndrome and 5 case of congestive cardiac failure out

of which 1 case was due to rheumatic valvular heart disease and 4 were due to severe anaemia (Table 2).

**Table No 2: Incidence of side of pleural effusion in transudate & exudate.**

Type	Right	Left	Bilateral	Total
A) Transudate	5	2	2	9
B) Exudate				
Tuberculosis	23	9	0	32
Parapneumonic	5	1	0	6
Malignant	3	0	0	3

Out of 9 cases of transudative pleural effusion, 5 were on right side, 2 were on left side and 2 were on bilateral. Out of 32 cases of tuberculous pleural effusion 23 cases were of right sided and 9 cases of left sided pleural effusion. In parapneumonic effusion out of 6 cases, 5 were on right side and one was on left side. In malignant pleural effusion, all the 3 cases were of right sided pleural effusion.

Most of the patients with tuberculous pleural effusion had lymphocytic predominance on peripheral smear and had raised E.S.R.

Out of 32 cases of tuberculous pleural effusion. 31 cases were showing evidence pulmonary tuberculosis in form of caverno – caseous infiltration, volume loss and hilar lymphadenopathy in association with pleural effusion on x ray film. One case of right sided pleural effusion had no evidence of pulmonary tuberculosis but the cervical lymph node biopsy was suggestive of tuberculous lymphadenitis. There were only 3 cases of pulmonary tuberculosis whose sputum examination was positive for A.F.B.

Serum cholesterol was done in all cases of pleural effusion, and found to be in the range of 145 to 255 mg / dl and not specific for any particular group.

#### Discussion:

**Age & sex distribution:** The study includes 50 cases of which males were 39 and females were 11 with M:F ratio of 3.5:1. The patients were divided into two groups transudate & exudate on the basis of etiological diagnosis and confirmative pleural fluid study of these 50 cases, 9 were transudate and 41 were exudate. The 5 male patients in transudative group were between 38 - 71 years & 4 female patients were in range of 20 – 65 years. Exudative group includes 41 cases of pleural effusion of which 32 were

of tuberculous origin. There were 27 males in a range of 16 to 60 years and 5 females in a range of 22 – 40 years.

Malignant pleural effusion includes 3 cases 2 were male in age of 65 years & female of 55 years of age. It is clear from these observation that in this study male preponderance was more than female with M:F ratio of 3.5:1. Most of the patients were in the range of 20 to 50 years of age. K.N. Ram & Jaya Sing<sup>5</sup> conducted study in which they studied 40 cases of pleural effusion of which 13 were transudates (10 male + 3 females) aged  $37.54 \pm 9.93$  (20 – 56 year). Tuberculous exudate includes 19 patients all were male aged  $42.58 \pm 13.88$  (18 – 60 ) years. Nontuberculous exudates comprised of 8 patients (6 males + 2 females) aged  $55 \pm 15.79$  (18 – 70 years).

**Type of effusion:** In our study which comprised of 50 patients included 9 cases of transudates, 41 cases of exudates of which 32 were tuberculous origin, 6 were parapneumonic & 3 were malignant pleural effusion. In Hamm study<sup>6</sup>, 70 cases of pleural effusion were studied in which underlying cause of effusion was identified in 62 cases, of there, 31 were defined as transudate & 31 as exudates.

Luis Valdes<sup>7</sup> studied 253 cases of pleural effusion which included 65 patients with transudative effusion 67 patients with malignant pleural effusion, 65 patients of tuberculous pleural effusion & 56 were of miscellaneous exudates.

Lesley Burgess<sup>8</sup> studied 393 cases of pleural effusion of which 123 (31 %) were transudate, 270 were exudates (69 %). S. Anchez<sup>9</sup> studied 130 cases of pleural effusion of which 33 were transudates and 97 were exudates. Two hundred & four patients with pleural effusion were studied Gil Suay<sup>10</sup> et al of which 48 were transudate, 47 were tubercular exudate, 30 were parapneumonic & 23 miscellaneous. In a study by Ortega & Heredia JL<sup>11</sup>, 104 patients with pleural effusion of well defined etiology were studied of which 56 were exudate and 38 were transudate.

**Side of Pleural Effusion:** In present study, out of 32 cases of tuberculous pleural effusion, 23 (71.8%) were right sided and 9 (28.2%) were left sided. Out of 9 cases of transudative pleural effusion, 5 were on right side & 2 were on left side while 2 were bilateral, which is comparable with the study done by Kataria YP<sup>12</sup>

(right side pleural effusion-60%), may be because of it involves right lung more than left lung.

In a prospective study, conducted by K.N. Ram & Jaya Sing<sup>5</sup>, it was found that of 40 total cases of pleural effusion, 13 were transudate of which 9 were right sided and 4 were bilateral, 27 were exudate of which 22 were right sided and 5 were left sided.

In a study conducted by Epstein et al<sup>13</sup>, it was estimated that out of 23 cases of tuberculosis with pleural effusion, 15 were having right sided, 6 cases were having left sided and 2 cases had bilateral pleural effusion. It is clear that tuberculous pleural effusion is more common on right side than left side.

Out of 32 cases of pulmonary tuberculosis 31 patients had evidence of active tuberculosis on chest x – ray in the form of caverno caseous infiltration or primary complex, hilar lymphadenopathy. All 3 cases of malignant pleural effusion had massive right sided effusion but there was no radiological evidence of malignancy.

Out of 6 cases of parapneumonic effusion, cases were differentiated on x ray as consolidation with parapneumonic effusion or hydropneumothorax.

Out of 9 cases of transudative pleural effusion, most of patients have minimum pleural effusion with associated findings according to underlying condition like cardiomegaly or elevation of both dome diaphragms in liver cirrhosis with Ascitis.

**Pleural Fluid Examination:** In the present study, examination of pleural fluid remains mainstay to differentiate between transudative and exudative pleural effusion. Usually first tap fluid is sent for laboratory investigations like P<sup>H</sup> (Reaction to litmus), appearance, protein, cytological examination and levels of pleural fluid cholesterol, and two groups were made by using Light's criteria<sup>4</sup>.

**P<sup>H</sup>:** In this study all patients of transudative effusion had alkaline P<sup>H</sup>, and most of the transudative fluid was clear colourless R.W. Light and associate<sup>4</sup> obtained higher P<sup>H</sup> values in 43 transudative effusion. While in present study, all the exudative pleural effusion had acidic P<sup>H</sup> which was the same conclusion drawn from the study by Light et al<sup>4</sup>. Holten et al<sup>14</sup> in his study stated that P<sup>H</sup> estimation of pleural fluid may be

diagnostic value. He found lower P<sup>H</sup> in exudative pleural effusion and higher PH in transudates. If pleural fluid cholesterol is taken as a parameter to differentiate between transudate & exudate, with cut off level of 0.3, when the ratio of pleural fluid / serum cholesterol is taken as a parameter to differentiate between transudate & exudate, the test has 90.78% efficiency. This is evident has suggested that pleural fluid cholesterol reflects etiology of pleural effusion.

**Conclusion:** From this study, it is concluded that pleural fluid cholesterol and pleural / serum cholesterol are both highly effective, in distinguishing between transudate and exudate. It is simple and effective screening test. it is also concluded that incidence of pleural effusion was more common in age group 20 – 50 years. Male predominance was more than females in both the groups (transudate and exudate). Tuberculosis was the commonest cause of exudative pleural effusion. Majority of tuberculous pleural effusion were right sided. It is also confirmed that tuberculous pleural effusion is most common etiology followed by parapneumonic.

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