ORIGINAL RESEARCH

Assessment of cases of pleural effusion

Dr. Lalit Kumar Misra[1], Dr. Ravi Bhasker[2]

[1]MD- Pulmonary Medicine, Prof & Head, Career Institute of medical sciences, Lucknow, U.P., India
[2]MD- Pulmonary Medicine, Professor, Career Institute of medical sciences, Lucknow, U.P., India

Corresponding author
Dr. Ravi Bhasker
MD- Pulmonary Medicine, Professor, Career Institute of medical sciences, Lucknow, U.P., India

Received: 08 April, 2023 **Accepted: 12 June, 2023**

ABSTRACT
Background: Pleural effusion is a medical condition characterized by the accumulation of excess fluid in the pleural space. The present study was conducted to assess cases of pleural effusion.
Materials & Methods: 74 patients with pleural effusion of both genders were included. According to the etiology, the Light's criterion, pleural bilirubin/serum bilirubin > 0.6 mg/dL, and cholesterol in pleural, the pleural effusions were classified as exudative and transudative. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of each parameter was performed.
Results: Out of 74 patients, males were 44 and females were 30. Pleural effusion was exudative in 48 and transudative in 26 cases. The cause was tuberculosis in 38, para pneumonic in 20 and malignancy in 16 cases, heart failure in 18 and liver cirrhosis in 8 cases. The difference was significant (P< 0.05).
Conclusion: Exudate and transudate were the two types of pleural effusion. In the exudate, the reason was discovered to be tuberculosis, para pneumonic, and cancer. In the transudate, the cause was liver cirrhosis and heart failure.
Key words: exudate, transudate, Pleural effusion

Introduction

Pleural effusion is a medical condition characterized by the accumulation of excess fluid in the pleural space, which is the space between the layers of the pleura, a thin membrane that surrounds the lungs and lines the inside of the chest cavity. The pleura helps the lungs expand and contract during breathing.[1]

The accumulation of fluid in the pleural space can occur due to various underlying conditions, including pneumonia, tuberculosis, and other respiratory infections can lead to pleural effusion.Congestive heart failure can cause fluid to accumulate in the pleural space.Impaired kidney function can result in fluid retention and contribute to pleural effusion.A blood clot in the lungs can cause inflammation and fluid build-up in the pleura.Certain types of cancer, such as lung cancer or breast cancer, can lead to pleural effusion.Chest injuries or surgeries may cause fluid to accumulate in the pleural space.[2]

Fluid is drained out mostly through lymphatics within the parietal pleura.[3] Transudative pleural effusions derive from general illnesses that may not directly affect the pleura but alternatively provide an asymmetry of Starling's forces, ending in moving of fluid within the pleural space.Intrapleural illness can be suggested by the presence of exudative effusion. In order to differentiate exudative from transudative pleural effusion,Light et al [4]established a criteria to do so with sensitivity 99% and specificity 98% that include pleural protein/serum protein of >0.5, pleural LDH/serum LDH of >0.6 and an estimated level of LDH in the pleural fluid more than two thirds LDH serum level. The present study was conducted to assess cases of pleural effusion.

Materials & Methods

The present study was conducted on 74 patients with pleural effusion of both genders. All were informed regarding the study and their consent was obtained.

Data such as name, age, gender etc. was recorded. A comprehensive physical examination and history taking were done. The tapping of the pleural fluid was diagnostic. Following that, the samples underwent tests for glucose, white blood cell count, LDH, cholesterol, bilirubin, protein, acid fast stain, Gram stain, bacterial culture, and cytology. According to the etiology, the Light's criterion, pleural bilirubin/serum bilirubin > 0.6 mg/dL, and cholesterol in pleural, the pleural effusions were classified as exudative and transudative.The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy

of each parameter was performed. Results thus obtained were statistically analyzed. P value less than 0.05 was considered significant.

Results

Table I Distribution of patients

Total- 74		
Gender	**Males**	**Females**
Number	44	30

Table I shows that out of 74 patients, males were 44 and females were 30.

Table II Assessment of parameters

Parameters	**Variables**	**Number**	**P value**
Type	Exudative	48	0.01
	Transudate	26	
Cause	Tuberculosis	38	0.05
	Para pneumonic	20	
	Malignancy	16	
	Heart failure	18	
	Liver cirrhosis	8	

Table II, graph I shows that pleural effusion was exudative in 48 and transudative in 26 cases. The cause was tuberculosis in 38, para pneumonic in 20 and malignancy in 16 cases, heart failure in 18 and liver cirrhosis in 8 cases. The difference was significant (P< 0.05).

Graph I: Assessment of parameters

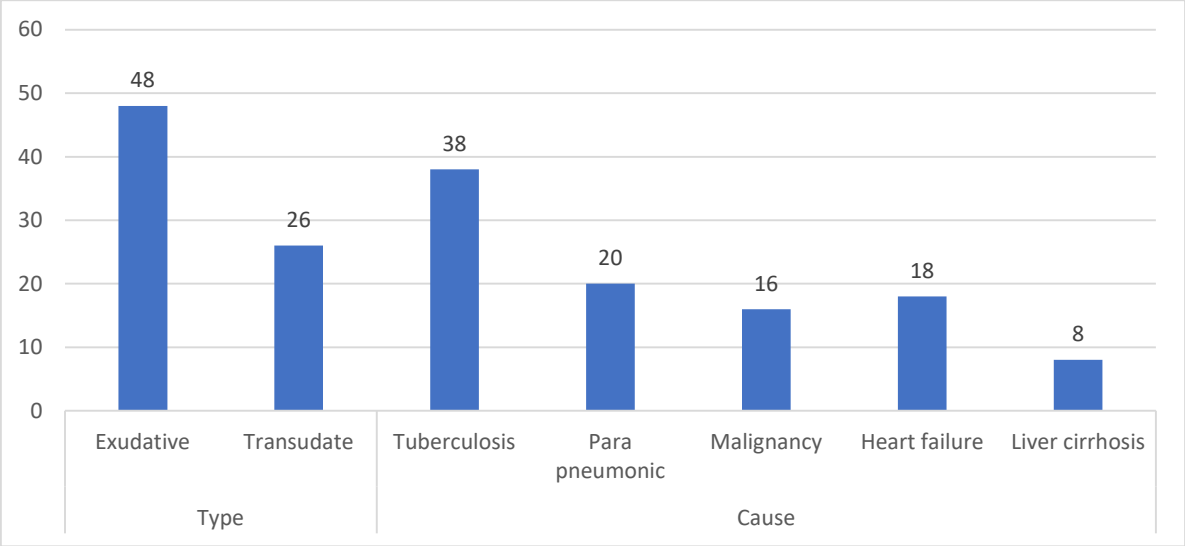
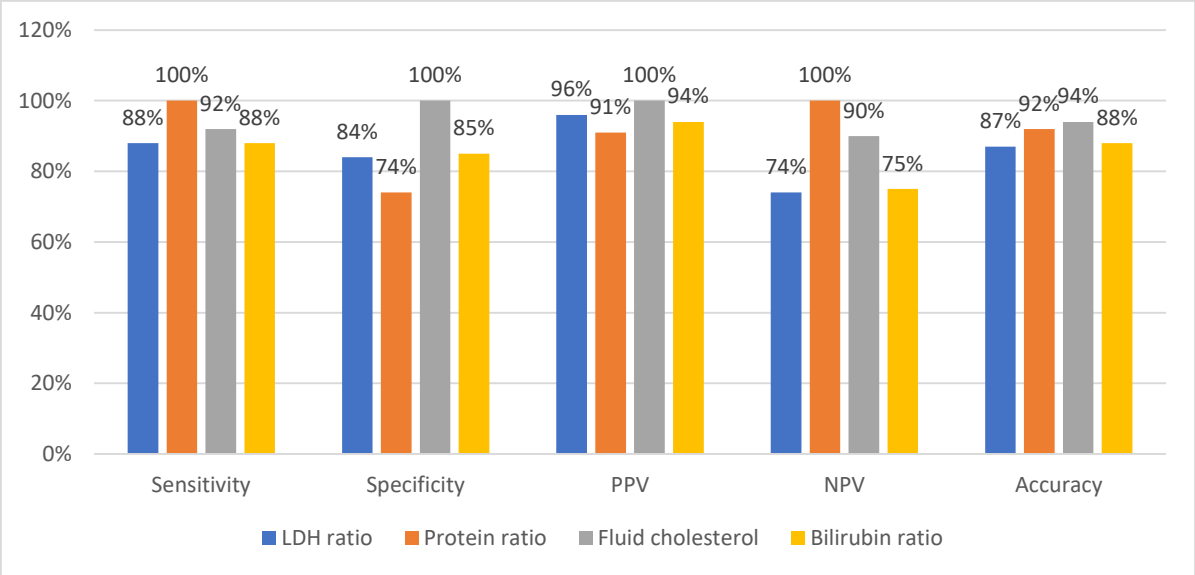


Table III : Assessment of efficacy

Parameters	**Sensitivity**	**Specificity**	**PPV**	**NPV**	**Accuracy**
LDH ratio	88%	84%	96%	74%	87%
Protein ratio	100%	74%	91%	100%	92%
Fluid cholesterol	92%	100%	100%	90%	94%
Bilirubin ratio	88%	85%	94%	75%	88%

Table III, graph II shows that accuracy of LDH ratio was 87%, protein ratio was 92%, fluid cholesterol was 94% and bilirubin ratio was 88%.

Graph II: Assessment of efficacy



Discussion

The internal surfaces of the thoracic cavity are cover by pleura, includes a cover of mesothelial cells held up by a net of connective plus fibro elastic tissue.[5] Usually, a small amount of fluid within the pleural space works like a lubricant to decrease friction amid chest wall and lung at inspiration and expiration. This fluctuation of fluid is based on the oncotic in addition to hydrostatic pressures within the parietal plus visceral pleura as well as the pressure inside the pleural space its own.[6]

The study of the fluid recovered by thoracentesis is crucial for the clinical evaluation of a patient with pleural effusion. Identifying the precise aetiology is challenging and occasionally impossible. Exudate (protein-rich effusions caused by increased capillary permeability) and transudate (ultra filtrates of plasma resulting from increased hydrostatic pressure or profoundly decreased serum oncotic pressure), depending on their characteristics, are the two easiest ways to separate the pleural effusion.Given the wide range of benign and life-threatening illnesses in the differential diagnosis for pleural effusion, evaluating the patient might be difficult.[7] Additionally, it's possible that the invasive and non-invasive testing necessary to obtain an etiological diagnosis won't be easily accessible in a primary care setting, and patients might need to manage their symptoms until the origin of the effusion is found.[8] Despite the difficulties unique to various settings, a systematic approach to diagnosis and treatment is required to properly orient care.[9,10]The present study was conducted to assess cases of pleural effusion.

In present study, out of 74 patients, males were 44 and females were 30.Lakhotiaet al[11] on 84 patients with pleural effusion, pleural fluid protein, LDH, P/S protein, P/S LDH, and Light's criteria were compared with pleural fluid cholesterol and bilirubin, which have become more significant in recent years. It was discovered that Light's distinguishing criteria are still the best. For Pl. protein (94.11%), P/S protein (94.11%), Pl. LDH (95.5%), and P/S LDH (92.75%), the sensitivity of each test was substantially identical. Pl cholesterol exhibited a somewhat lower sensitivity (88.3%) than P/S cholesterol (91.42%). LDH and Pl. Protein had 100% specificity. The specificity and sensitivity of the lights criteria were both 100%. Pl Protein 5.95%, P/S Protein 5.95%, PLDH 4.76%, and P/S LDH 4.76% were the percentages of cases that were incorrectly classified by various criteria. 13% for P. cholesterol and 9.52 measurement of Bilirubin did not provide any correlation in classifying the effusion and thus did not hold any value.

We found that pleural effusion was exudative in 48 and transudative in 26 cases. The cause was tuberculosis in 38, para pneumonic in 20 and malignancy in 16 cases, heart failure in 18 and liver cirrhosis in 8 cases. In order to differentiate the pleural fluid into transudate and exudate, Kale et al.'s[12] study assessed the diagnostic performance of the pleural fluid protein, LDH, cholesterol, bilirubin, and their ratio with blood values. Using specific biochemical criteria such pleural fluid cholesterol, protein, and LDH, 50 cases of pleural effusion caused by various disorders were examined. Additionally analyzed were their ratio to serum levels and the albumin gradient. Exudative pleural effusions and transudative effusions could be distinguished with great diagnostic accuracy using the pleural fluid protein, its ratio to serum protein, and pleural fluid LDH. Serum LDH levels had no effect on pleural

fluid LDH levels. The ideal level of LDH in pleural fluid was 175 IU/L.

We observed that accuracy of LDH ratio was 87%, protein ratio was 92%, fluid cholesterol was 94% and bilirubin ratio was 88%. 241 consecutive patients with pleural effusion were evaluated by Gazquez et al.[13] 38 (20%) and 155 (80%) of the 193 patients included had transudates and exudates, respectively. Light's criteria had an accuracy of 92%, sensitivity of 97% and specificity of 71% for recognizing exudates. For pleural cholesterol, a cut-off level of 50 mg dl-1 was chosen, which produced a sensitivity and specificity of 84% and an accuracy of 84%. Overall, pleural cholesterol misclassified more exudates as transudates (15 vs. 3.2%, P- 0.001) than Light's criteria did. Pleural fluid/serum protein ratio and lactate dehydrogenase (LDH) or pleural cholesterol together showed similar accuracy to that of Light's criterion.

Conclusion

Authors found that exudate and transudate were the two types of pleural effusion. In the exudate, the reason was discovered to be tuberculosis, para pneumonic, and cancer. In the transudate, the cause was liver cirrhosis and heart failure.

References

1. Heffner JE, Brown LK, Barbieri CA. Diagnosticvalue of tests that discriminate betweenexudative andtransudative pleural fluids - primary studyinvestigators. Chest 1997;111(4):970-80.
2. Jay SJ. Diagnostic procedures for pleuraldisease. Cli Chest Med 1985; 6: 33-48.
3. Chandrasekhar AJ, Palatao A, Dubin A et al.Pleural fluid lactic acid dehydrogenase activityand protein content. Value in diagnosis. ArchIntern Med 1969; 123: 48-50.
4. Light RW. Diagnostic principles in pleuraldisease. Eur Respir J 1997;10(2): 476-81.
5. Joseph J, Badrinath P, Basran GS, Sahn SA. Isthe pleural fluid transudate or exudates? Arevisit of the diagnostic criteria. Thorax 2001;56: 867-70.
6. Jain AP, Gupta OP, Khan N. Comparativediagnostic efficiency of criteria used fordifferentiating transudate and exudates pleuraleffusions. J A P I 1982; 30 (11):823-6.
7. Ortega L, Heredia JL, Armengol R, Mir IRomanillas T, Armengol J. The differentialdiagnosis between exudates and transudates:the value of cholesterol. Med Clin (Barc) Spanish1991; 96(10):367-70.
8. Tietz NW. Text book of Clinical Chemistry. Philadelphia: W.B. Saunders Co; 1986. P. 579- 82.
9. Reinholdnjg. In standard methods of clinicalchemistry. New York and London AcademicPress;1953; 1: 88.
10. Alan H Gowenlock. Varley's practical clinicalbiochemistry. 6th ed. Delhi: CBS Publishers;1988. P. 407-8.
11. Lakhotia M, Shah PK, Yadav A, Gupta A, Modi RK, Sinha HV. Comparison of biochemical parameters in pleural effusion. The Journal of the Association of Physicians of India. 1996 Sep 1;44(9):612-4.
12. Kale A B, Modi M, Thorat A P, Chalak S S, Patil A B. Evaluation Of Biochemical Parameters To Differentiate Transudates From Exudates In Certain Diseases. Journal of Clinical and Diagnostic Research [serial online] 2010 June [cited: 2010 June 14]; 4:2478- 2483.
13. Gazquez I, Porcel M, Vives M, Vicente de, Vera MC, Rubio M et al. Comparative analysis of Light's criteria and other biochemical parameters for distinguishing transudates from exudates. Respir Med 1998;92:762-5.