# Summary and conclusions

Pleural effusion can result from a very wide range of disease processes. The cause of effusion becomes apparent from the associated clinical circumstances, diagnostic thoracocentesis, and percutaneus pleural biopsies with cultures, cytological and histological examination. (163)

The criteria established by **Light et al, 1972** (2) defined exudative effusion to have pleural to serum fluid protein > 0.5 or pleural fluid to serum LDH ratio > 0.6 or pleural fluid LDH concentration > 200 IU/L.

However 20% of pleural effusions remain undiagnosed after initial evaluation. These undiagnosed pleural effusions are important clinical problems. So scientists spent much effort and times in searching for a new parameter to help in the diagnosis of different types of pleural effusions. (5)

So, many tests have been proposed and evaluated to reach more accurate diagnosis for pleural effusions such as pleural fluid cholesterol, (157) pleural to serum cholesterol ratio, (156) pleural fluid viscosity, (158) and pleural-serum albumin gradient. (3)

This study aims to evaluate the value of serum-pleural albumin gradient (serum albumin minus pleural fluid albumin) in seperation between transudates and exudates where exudates were defined to have value equal to or less than 1.2 gm/dl.

The results were always compared to results obtained by using Light's criteria.

This study was carried out on 50 patients with pleural effusions whose age ranged from 20 to 75 years. They were 31 males and 19 females.

According to the underlying etiology, they were classified into two groups, group I (21 patients) with transudative effusions and group II (29 patients) with exudative effusions.

**Group I included:** 13 cases with liver cell failure and 8 cases with congestive heart failure.

**Group II included:** 10 cases with malignant effusions, 10 cases with tuberculous effusions, 7 cases with parapneumonic effusions and 2 cases with rheumatoid effusions.

After taking full medical history and after clinical examination, all patients were subjected to the following investigation:

- Plain chest X-ray (postero-anterior and lateral views), pleural fluid aspiration which was examined for gross appearance, chemical examination as regards to total protein, albumin, glucose, LDH, also cytological and bacteriological examinations.

- Also venous blood samples were taken from the 50 patients and examined for total protein, albumin and LDH, CBC, ESR.

- Sputum examination for acid fast bacilli was done for all patients.

- Some patients were subjected to selective investigations according to suspected underlying etiology e.g.

- Sensitivity, specificity and accuracy for each parameter of Light's criteria and Light's criteria were always compared to sensitivity, specificity and accuracy of serum-pleural albumin gradient in separation between transudative and exudative effusions.

## Results and conclusions:

- As regards pleural to serum protein ratio high statistically significant difference was observed between group I (transudates) and group II (exudates) ($p < 0.001$). Using this parameter alone, 5 cases were misclassified, 2 cases with transudative effusions and 3 cases with exudative effusions yielding accuracy of 90% with sensitivity and specificity 89.7% and 90.4% respectively.

- As regards pleural fluid LDH, high statistically significant difference between group I and group II is observed ($p < 0.001$). Using this parameter alone 5 cases were misclassified, 2 cases with transudative effusions yielding accuracy of 90% with sensitivity and specificity 89.7% and 90.4% respectively.

- As regards pleural to serum LDH ratio, also statistical significant difference was observed between group I and group II. Using this parameter alone 9 cases were misdiagnosed 1 case with transudative effusion and 8 cases with exudative effusions giving accuracy, sensitivity and specificity of 82%, 72% and 95% respectively.

- It is clear that, this is the least parameter regarding specificity and accuracy among different criteria of Light

in separation between transudates and exudates.

- Using the whole Light's criteria to differentiate between transudates and exudates gives 92% for accuracy 96.55%, for sensitivity and 85.7%. For specificity as only 4 cases were misdiagnosed, one case with transudative effusion and 3 cases with exudative effusions.

- It is clear from these results that the whole Light's criteria are more accurate and more sensitive than each individual criterion of Light although specificity of Light's criteria in differentiation between transudates and exudates is still unsatisfactory.

- Concerning serum-pleural albumin gradient, high statistically significant difference between group I (transudative effusions) and group II (exudative effusions) with p value less than 0.001 is observed.

- 5 cases were misdiagnosed, 1 case with transudative effusion and 4 cases with exudative effusions yielding accuracy of 90% with sensitivity and specificity 86% , 95% respectively.

- Also from correlation curves, high positive significant correlations between serum-pleural albumin gradient and

different criteria of Light was observed ($p < 0.001$).

- This means that different criteria of Light and serum-pleural albumin gradient go hand in hand in the same way to differentiate between transudative and exudative effusions with a little difference. This difference could be estimated by more statistical analysis of the results through calculation of accuracy, sensitivity and specificity for each parameter and comparing them to those of serum-pleural albumin gradient.

So in this study if a comparison was done between Light's criteria and serum-pleural albumin gradient to differentiate between transudative and exudative pleural effusions, it was found that:

Light's criteria are more sensitive and more accurate (sensitivity 96.55%, accuracy 92%) than serum-effusion albumin gradient (sensitivity 86%, accuracy 90%). However serum-pleural albumin gradient is more specific (specificity 95%) than Light's criteria (specificity 85.7%).

All cases which were misclassified by Light's criteria and correctly classified by serum-pleural albumin gradient were transudative effusions secondary to congestive heart

failure and liver cell failure and these cases were treated by diuretics on regular bases.

So, serum-effusion albumin gradient is the most useful parameter when transudative effusion is most likely to be the diagnosis.

# Conclusions

1- Light's criteria are still the corner stone for differentiation between transudative and exudative effusions.

2- Serum-pleural albumin gradient is a very useful parameter to differentiate between transudative and exudative

effusions beside Light's criteria to decrease the number of misclassified cases of transudates and to treat the shortage in the specificity of Light's criteria.

3- Serum-pleural albumin gradient is the investigation of choice when effusion has though to be transudate according to the underlying etiology e.g. liver cirrhosis or congestive heart failure particulary when the patient was receiving diuretic therapy.

# Recomendations

1- Light's criteria should be used to differentiate between transudative and exudative effusions as a basic test.

2- Serum-effusion albumin gradient has to be used to differentiate between transudates and exudates when the effusion has thought to be transudate according to the underlying etiology.

3- More trials and more efforts are still needed to reach the diagnosis of pleural effusion as it should be.