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Original Research Article

Combined Use of Pleural Fluid Adenosine Deaminase (ADA), Cytology, Pleural Biopsy and Mantoux test In the Diagnosis of Tuberculous Pleural Effusion

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Abstract: The objective of the present study is to evaluate the use of pleural fluid ADA, cytology, pleural biopsy and Mantoux test in the diagnosis of tuberculous pleural effusion. This prospective study was conducted on 92 patients December 2011– October 2013 at Government Chest Diseases and Tuberculosis Hospital, Hanamkonda. Diagnostic accuracy of pleural fluid cytology (L/N ratio >0.75) , ADA >40 U/L , Pleural biopsy and Mantoux test were 65.22%, 73.91%, 92.13%, 65.22% respectively .Combined pleural fluid ADA , Cytology , pleural biopsy and Mantoux test results were analyzed sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy were 93.33 %, 93.75%, 96.55%, 88.23% ,93.48 % respectively in the diagnosis of tuberculous effusions among all exudative effusions were better than individual alone. Lymphocyte predominant exudates with high Adenosine deaminase value > 40U/L & caseous granuloma on pleural biopsy are highly suggestive of Tubercular pleurisy. Combined use of ADA, Cytology, Pleural biopsy and Mantoux test are more helpful in diagnosing Tubercular pleural effusions rather than individual alone.
Keywords: Cytology, ADA, pleural biopsy, Mantoux test, Lymphocyte/Neutrophil (L/N Ratio), Diagnostic accuracy.

INTRODUCTION:

Many infections, benign and malignant tumors can cause pleural effusion [1]. The etiological diagnosis is very important. As many as 15% to 20% of all pleural effusions remain undiagnosed despite intensive efforts [2]. In developing countries like India, infections particularly tuberculosis is still the predominant cause [3, 4]. More than 40% of patients with an undiagnosed pleural effusion that was followed without treatment developed tuberculosis within 7 years. This study suggested that the tuberculosis should be a strong consideration in the diagnosis of undiagnosed pleural effusion [5]. By pleural biopsy, 49.1% of undiagnosed pleural effusions could be diagnosed [6]. Closed pleural biopsy provides the highest diagnostic yield in cases of pleural tuberculosis and malignancy ,the two most important causes of exudative pleural effusion [7].

Amitabha basu conducted a study in 44 patients and found that Pleural biopsy is a very important tool for diagnosing tuberculous pleural effusion without any major complication. ADA values > 70 U/L are highly suggestive of tubercular etiology and correlated well with histopathological findings of pleural biopsy [8]. Nance K.V. Shermer R W, Askin F B worked on diagnostic efficacy of pleural biopsy as compared with that of pleural fluid examination and found that Cytology was diagnostic in 71% and Pleural biopsy was positive in 45% [9]. Suri J C, Goel A, Gupta D K33 showed diagnostic yield of pleural biopsy in cases of tuberculous and malignant effusions was 93.5% and 66.7% respectively. When combined with pleural fluid cytology, a definitive diagnosis of malignancy could be established in 80.95% of the cases [10].

The present study is undertaken to assess the value of combined use of Biochemical, Cytological, Microbiological, Closed pleural biopsy was done with Cope's pleural biopsy needle and Mantoux test parameters had been taken into consideration while going for the diagnostic yield of tubercular effusion.

MATERIALS AND METHODS:

This prospective study was conducted after taking ethical committee permission on 92 patients December 2011– October 2013 at Government Chest Diseases and Tuberculosis Hospital, Hanamkonda.

Patients with signs & symptoms of pleural effusions were admitted.

Routine investigations which include chest X-ray, complete blood picture, blood urea, urine routine examination were done. Specific investigations like sputum for AFB, pleural fluid analysis includes cytology, Adenosine deaminase (ADA) and Pleural biopsy were done.

Statistical Analysis:

Data was analysed by statistical package for social sciences (SPSS) Version 16.0. Numerical data was summarised by mean ± standard deviation for continuous normal data and median ± Inter-Quartile Range for continuous non normal data/ordinal data. Categorical data was summarised by count and percentages. The association between categorical variables was done by Chi square test. All the P values less than 0.05 were considered as statistically significant.

RESULTS:

In the present prospective observational study 92 patients with exudative pleural effusions by Light's criteria of different etiology were studied. In present study out of 92 cases commonest type of effusion being confirmed as tuberculous (60) remaining suspected TB cases includes probable tuberculous (20) nonspecific (5) and, undiagnosed cases (4) and 3 cases were malignant.

Pleural fluids analysis was done, majority were clear straw yellow colour fluid, in cytological examination lymphocyte predominant (L/N ratio> 0.75), Adenosine deaminase > 40U/L, pleural AFB positive were diagnosed as tuberculous effusions. Pleural biopsy suggestive as granuloma with central caseous necrosis, pleural tissue AFB positive and Mantoux test > 10 mm were diagnosed as tuberculous effusions. In HIV patients with pleural effusions were low ADA levels, less induration in Mantoux test comparable with pleural effusions of non HIV effusion cases.

83 Diagnostic accuracy of pleural fluid cytology (L/N ratio >0.75) , ADA >40 U/L ,Pleural biopsy and Mantoux test were 65.22%,73.91%,92.13%,65.22% respectively(Table 1& graph 1) .Combined pleural fluid ADA , Cytology , pleural biopsy and Mantoux test results were analyzed, sensitivity, specificity, positive predictive value , negative predictive value and diagnostic accuracy were 93.33 %, 93.75%, 96.55%, 88.23% ,93.48 % respectively in the diagnosis of tuberculous effusions among all exudative effusions were better than individual alone. My results were well correlated with reference studies.

Table 1: comparison of pleural fluid ADA, cytology, pleural biopsy & Mantoux test in the diagnosis of tuberculous pleural effusions

TESTS	SENSITIVITY	SPECIFICITY	PPV	NPV	DIAGNOSTIC ACCURACY
ADA>40 U/L	83.33%	56.25%	78.13%	64.29%	73.91%
CYTOLOGY	75%	46.88%	72.58%	50%	65.22%
PLEURAL BIOPSY	91.66%	93.1%	96.49%	84.37%	92.13%
MANTOUX TEST	70%	56.25%	75%	50%	65.22%
COMBINED ALL	93.33%	93.75%	96.55%	88.23%	93.48%

TP: True positives, TN: True negatives, FN: False negatives, FP: False positives

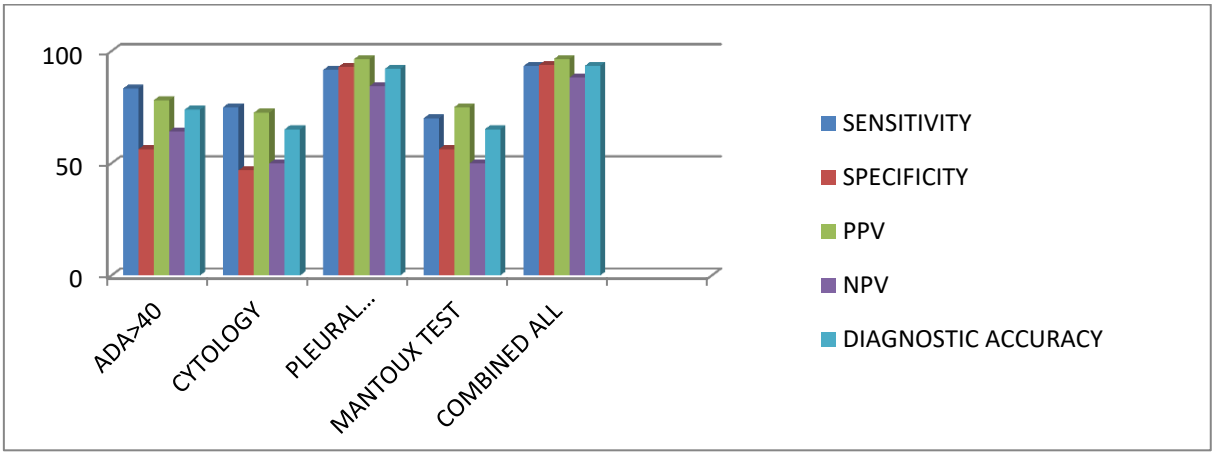

Fig 1: Comparison of tests in diagnosis of tb effusions

DISCUSSION:

Tubercular effusion remains the commonest etiology of all exudative effusions in present study. It involves the young and is associated with fever, breathlessness and cough as the most common presenting symptom. Most of the tubercular effusions were straw yellow colour. In the diagnostic work up of pleural effusion, Adenosine deaminase (ADA), Cytology, Closed Pleural biopsy and Mantoux test were provides a very high diagnostic yield in Tuberculosis. Pleural fluid adenosine deaminase is good screening test in differentiation of exudative effusions in conjunction with cytology. Lymphocytic exudates (L/N ratio > 0.75) with high ADA value > 40 U/L highly suggestive of tuberculous pleurisy. In HIV effusions low ADA levels comparable with non HIV effusion cases. Pleural biopsy granuloma with central caseation highly suggestive in the diagnosis of tubercular pleural effusions. Complications are less with closed pleural biopsy with due care. This can be performed with little instrumental and man power support. Mantoux test with more induration was suggestive of tubercular effusions in conjunction with ADA, Cytology, and pleural biopsy. In HIV positive cases less in duration compared to non HIV cases. Sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of pleural biopsy were higher among pleural fluid adenosine deaminase (ADA), Cytology, Pleural biopsy and Mantoux test. Combined sensitivity, specificity, positive predictive value , negative predictive value and diagnostic accuracy of all four parameters adenosine deaminase (ADA) ,Cytology ,Pleural biopsy and Mantoux test was higher than each individual investigation alone.

CONCLUSION:

Lymphocyte predominant exudates with high Adenosine deaminase value > 40U/L & caseous granuloma on pleural biopsy are highly suggestive of Tubercular pleurisy. Combined use of ADA, Cytology, Pleural biopsy and Mantoux test are more helpful in diagnosing Tubercular pleural effusions rather than individual alone.

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