

Malignant Pleural Effusion: A Study on Clinical and Investigative Profiles – A Prospective Study

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Abstract

Background and Objective: Malignant pleural effusion (MPE) is a known complication of both thoracic and extrathoracic malignancies. A detailed clinical and investigative profile of patients presenting with MPE would allow us to intervene early in the disease and would ensure a better prognosis.

Materials and Methods: A prospective study of 60 cases of MPE was carried out in the Department of Thoracic Medicine and Cardiothoracic surgery, Thanjavur Medical College Hospital, Thanjavur, from October 2017 to May 2018, with respect to age, sex, clinical findings, biochemical analysis, radiological, cytological investigations, and histopathology.

Results: The most common age group of MPE is between 60 and 70 years, male-to-female ratio was 1:1. The right-sided pleural effusion was a more common finding compared to the left-sided effusion; pleural fluid biochemical analysis revealed a mean adenosine deaminase of 23.97 u/l, mean pleural fluid protein/serum protein ratio was 0.95, and mean pleural fluid glucose was 38.75 mg/dl. Of 60 cases, the most common cause of MPE was adenocarcinoma of lung which accounted for 30 cases, followed by metastatic carcinoma 24 cases and squamous cell carcinoma lung 3 cases and pleural mesothelioma in 3 cases.

Conclusion: Pleural fluid cytology analysis for malignant cells was sufficient to diagnose MPE in 85% of cases, and in remaining cases, pleural biopsy can be helpful. The most common primary in cases of MPE was adenocarcinoma of lung.

Key word: Clinical and investigative profile, Malignant pleural effusion, Adenocarcinoma

INTRODUCTION

Malignant pleural effusion (MPE) is defined as the presence of neoplastic cells in the pleural fluid. MPE is a commonly encountered complication of advanced malignancy. MPEs secondary to metastatic disease are the second most common type of exudative pleural effusion. These are the most common cause of exudative effusion in patients >60 years of age. The three tumors that cause approximately 75% of all MPEs are lung carcinoma, breast carcinoma, and lymphoma.^[1] Other tumors include spread from liver metastasis, rarely an ovarian or a gastric cancer. About 7% of cases show unknown primary. Mediastinal

invasion with lymphatic blockage presenting with effusion is suggestive of Hodgkin's lymphoma. Very rarely few cases of multiple myeloma presenting as bilateral pleural effusion have also been noticed. It is usually a late complication and is associated with a poor prognosis.^[2]

Malignant pleural mesothelioma is the most common neoplasm of pleura.^[3] It is a cancerous proliferation of mesothelial cells that involve a large extent of pleural cavity.^[4] A strong etiological correlation with asbestos exposure is well proven.^[3,5]

MATERIALS AND METHODS

This study was carried out in the Department of Thoracic Medicine and Cardiothoracic Surgery at Thanjavur Medical College Hospital, Thanjavur, Tamil Nadu, India. It was based on age, sex, clinical findings with biochemical, radiological, cytological, and histopathological correlations. A total of 60 cases of MPE with positive pleural biopsy

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www.ijss-sn.com

Month of Submission : 01-2019
Month of Peer Review : 02-2019
Month of Acceptance : 02-2019
Month of Publishing : 03-2019

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for malignancy or presence of malignant cells in the pleural fluid were analyzed with clinical details; biochemical findings were recorded in the pro forma. Pleural aspiration and biopsy were performed in all cases. Macroscopic findings, cytological, and biochemical analysis of pleural fluid were performed all patients.

RESULTS

In our study done on 60 cases of MPE, 30 cases were male and 30 cases were female giving a male:female ratio 1:1. The most common age group of MPE in our study was 60–70 years. 54 cases had right-sided pleural effusion and six cases had left-sided pleural effusion. The pleural fluid samples were exudative with mean adenosine deaminase (ADA) in pleural fluid of 23.97 u/L; the mean pleural fluid protein/serum protein ratio was 0.95; the mean value of pleural fluid glucose was 38.75 mg/dl. Cytological examination in our study showed positive for malignant cells in three cases, and in 20 cases, cytology cellblock study showed positive for malignancy.

DISCUSSION

In our study, it was found that the male-female ratio for the occurrence of MPE was 1:1. This is in fact not usually seen in other studies where males were more affected than the females. The most common age group of malignant pleural effusion in our study is between 61 and 70 years old which is similar to studies done by Soe *et al.*^[6] In our study, MPEs were more common on the right side and the reason for this disparity is unknown. This is contrary to findings seen in the study by Soe *et al.*^[6]

In our study, breathlessness, cough, chest pain, weight loss, loss of appetite, and sputum production are common symptoms of MPE which is consistent with findings by Neragi-Miandoab.^[7]

ADA catalyzes the conversion of adenosine to inosine.^[8] Our pleural fluid samples were found to be exudative with a mean ADA in pleural fluid of 23.97 u/L which is consistent with the fact that mean ADA activity (SD) in MPE was general low.^[6] Similarly, in another study by Safianowska *et al.*^[9] in the malignant group of patients, no one ADA level exceeds 40 U/L which is again consistent with our findings.

Although a number of tests have been proposed to differentiate pleural fluid transudates from exudates, the tests first proposed by Light *et al.* have become the criterion standards.^[10] According to these criteria, all exudates have at least one of the following while transudates have none.

- Ratio of pleural fluid protein to serum protein > 0.5.
- Ratio of pleural fluid lactate dehydrogenase (LDH) to serum LDH > 0.6.
- Pleural fluid LDH > 2/3 of the upper limit of serum LDH.

Worldwide, exudative effusions are usually due to empyema, malignancy, tuberculosis, pulmonary embolism, and connective tissue diseases.^[11,12] In our study, the mean pleural fluid protein/serum protein ratio was 0.95 which according to Light's criteria points toward the presence of exudates.

Glucose measurement is commonly requested on pleural fluid samples. A glucose concentration >95 mg/dL is nearly always associated with a transudate. Lower concentrations are reported in exudates with infections and in malignancy, but the glucose concentration is extremely variable in exudates overlapping many diseases.^[13,14] Tuberculous and malignant effusion have pleural glucose level <60 mg/dL.^[15] There are two reasons suggested for this. These are overutilization of glucose by pleural fluid and pleural thickening causing transport defect of glucose. In our study, the mean value of pleural fluid glucose was 38.75 mg/dl which is low and consistent with the above-mentioned literature.

Cytological examination in our study showed positive for malignant cells in three cases, and in 20 cases, cytology cellblock study showed positive for malignancy. Cellblock study technique is simple, safe, cost-effective, and reproducible even in resource-limited rural areas. In contrast, in a study by Ghosh *et al.* among a total of 60 cases of suspected MPE, 56 were confirmed to be of malignant etiology by all modalities. Only cellblock preparation diagnosed 46 cases.^[16]

ACKNOWLEDGMENT

The authors thank the staff of the Department of Thoracic Medicine and Cardiothoracic Surgery, Thanjavur Medical College and Hospital who helped a lot to carry out this study. They also acknowledge the immense help received from the scholars whose articles are cited and included in the references of this article. Special gratitude goes to the patients who willing took part in this pilot study.

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How to cite this article: Selvamani G, Manimaran A, Karthick G, Venkatesan R. Malignant Pleural Effusion: A Study on Clinical and Investigative Profiles – A Prospective Study. Int J Sci Stud 2019;6(12):179-181.

Source of Support: Nil, **Conflict of Interest:** None declared.