

Unusual Malignancies Involving Pleural Fluid with Cytomorphology and Ancillary

Vandana¹, Roushini Kumari², Swarnim Kumari³, C.P.Jaiswal⁴

¹Tutor, Department of Pathology, Nalanda Medical College and Hospital, Patna, Bihar, India

²Tutor, Department of Pathology, Nalanda Medical College and Hospital, Patna, Bihar, India

³Tutor, Department of Pathology, Nalanda Medical College and Hospital, Patna, Bihar, India

⁴Professor and HOD, Department of Pathology, Nalanda Medical College and Hospital, Patna, Bihar, India

Received: 13-07-2023 Revised: 10-08-2023 / Accepted: 15-09-2023

Corresponding author: Dr. Roushini Kumari

Conflict of interest: Nil

Abstract

Aim: The aim of the present study was to analyse the spectrum of these unusual malignancies involving pleural fluid with cytomorphology and ancillary studies.

Methods: The retrospective study was conducted in the Department of Pathology. The pleural effusion samples submitted to cytology section of department of pathology. A total of 1000 samples were reviewed.

Results: The total number of pleural fluid samples received during the study period was 1000. Out of them, 300 samples were positive for malignancy. Among 300 malignant samples, 250 were positive for metastatic adenocarcinoma and 50 cases were positive for uncommon malignancies. The age of these patients ranged from 2 to 63 years with 30 male and 20 female cases. The infiltrations were classified into hematology (36/50 cases) and non hematology neoplasms (14/50). Among the hematology neoplasms, 22 cases of Nonhodgkin lymphoma, 10 cases of acute lymphoblastic leukemia, 3 cases of chronic myeloid leukemia and 1 case of multiple myeloma infiltration were noted.

Conclusion: There are malignancies other than adenocarcinoma which can infiltrate pleural cavity and present with effusions but their occurrence is unusual. Cytomorphological features play a significant role in detecting these uncommon malignancies in pleural fluid. However in certain rare cases, clinical history and ancillary studies help in confirming the diagnosis.

Keywords: Pleural fluid, Uncommon malignancies, Adenocarcinoma, Cytomorphology

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Malignant disease involving the pleura is the second leading cause of exudative pleural effusion after parapneumonic effusion. The latter, however, is not always subjected to cytological examination, as the quantity is small in many cases. Most common malignancies producing positive pleural effusions are lung and breast carcinomas, [1] but the cytopathologist must be aware of unusual malignancies, which can involve the pleura. With an incidence of 150,000 new cases a year, [2] malignant pleural effusion has long been recognized as a cause of significant morbidity in cancer patients. Malignant pleural effusions (MPE) can result from primary malignancies of the pleura or from underlying intrathoracic or extrathoracic malignancies that reach the pleural space by hematogenous, lymphatic, or contiguous spread. It is characterized by the presence of malignant cells in the pleural fluid. [3] The presence of MPE denotes

systemic dissemination of cancer and has been staged as M1a disease, as per the American Joint committee on Cancer TNM staging system. [4]

Cytological examination of serous fluid is one of the commonest investigations executed worldwide. The accurate identification of cells as either malignant or reactive mesothelial cells is a diagnostic problem in conventional cytological smears. The cell block (CB) technique is one of the oldest methods for the evaluation of body cavity fluids. [5] The principal advantage of cell block over conventional smears are morphological preservation of tissue architecture, an additional yield of malignant cells, thereby, increasing the sensitivity of the cytodiagnosis. Malignant disease involving the pleura is the second leading cause of exudative pleural effusion after parapneumonic effusions. The two most common aetiologies of malignant pleural

effusion include carcinomas of the lung and breast. [1] Pleural effusions may be the first presentation of a haematological malignancy or may develop during the course of the disease. [6]

The aim of the present study was to analyse the spectrum of these unusual malignancies involving pleural fluid with cytomorphology and ancillary studies.

Materials and methods

The retrospective study was conducted in the Department of Pathology, Nalanda Medical College

and Hospital, Patna, Bihar, India for 10 months. The pleural effusion samples submitted to cytology section of department of pathology, in our hospital for analysis were retrieved from the register. A total of 1000 samples were reviewed. Cases with diagnosis other than adenocarcinoma were selected and their cytomorphological details were analysed. Three smears for each case were available for analysis, two of which were wet fixed and stained by Papanicolaou stain and the other one was dry fixed and stained with MayGrunwald Giemsa stain.

Results

Table 1: Spectrum of malignancies in pleural fluid cytology

Unusual malignancies in pleural fluid	Number of cases
Hematolymphoid neoplasms	36/50
1. Nonhodgkin lymphoma	22
2. Acute lymphoblastic leukemia	10
3. Chronic myeloid leukemia	3
4. Multiple myeloma	1
Non hematolymphoid neoplasms	14/50
1. Squamous cell carcinoma	4
2. Small cell carcinoma	1
3. Small round cell tumours	7
4. Germ cell tumour	1
5. Juvenile granulosa cell tumour	1

The total number of pleural fluid samples received during the study period was 1000. Out of them, 300 samples were positive for malignancy. Among 300 malignant samples, 250 were positive for metastatic adenocarcinoma and 50 cases were positive for uncommon malignancies. The age of these patients ranged from 2 to 63 years with 30 male and 20 female cases. The infiltrations were classified into hematolymphoid (36/50 cases) and non hematolymphoid neoplasms (14/50). Among the hematolymphoid neoplasms, 22 cases of Nonhodgkin lymphoma, 10 cases of acute lymphoblastic leukemia, 3 cases of chronic myeloid leukemia and 1 case of multiple myeloma infiltration were noted.

Discussion

Malignant cells when observed in pleural fluid impart poor prognostic significance to an oncologic patient by defining a higher clinical stage. The most common type of cancer metastasising to pleura and producing effusion is adenocarcinoma with the primary in lung, breast, ovary and gastrointestinal tract. Adenocarcinoma in fluids is relatively easier for a cytopathologist to diagnose.

The total number of pleural fluid samples received during the study period was 1000. Out of them, 300 samples were positive for malignancy. Among 300 malignant samples, 250 were positive for metastatic adenocarcinoma and 50 cases were positive for

uncommon malignancies. The age of these patients ranged from 2 to 63 years with 30 male and 20 female cases. The infiltrations were classified into hematolymphoid (36/50 cases) and non hematolymphoid neoplasms (14/50). Among the hematolymphoid neoplasms, 22 cases of Nonhodgkin lymphoma, 10 cases of acute lymphoblastic leukemia, 3 cases of chronic myeloid leukemia and 1 case of multiple myeloma infiltration were noted. Pleural effusion is a relatively common finding in patients with Non-Hodgkin lymphoma with a frequency of up to 20%. [7] The various mechanisms for the formation of pleural effusion includes lymphomatous infiltration of pleura which is the most common followed by lymphatic obstruction due to infiltration of pulmonary and mediastinal lymphnodes and obstruction of thoracic ducts. [8,9] As described by Gupta et al. in their audit the most important aspects of cytology of NHL and leukemia was that the neoplastic cells did not exhibit genuine attachment to each other and there is massive necrosis/karyorrhexis which is never seen in carcinomas. [10] Also we observed the presence of lymphoglandular bodies in the background in such cases in our study.

Malignant myelomatous pleural effusions are very rare and occur in less than 1% of the cases of multiple myeloma. [11] In multiple myeloma cases pleural effusion usually occurs due to concurrent

disease process or coexisting illness such as heart failure, amyloidosis, pulmonary embolism etc and rarely due to myeloma cells infiltration. Our case was an elderly female who presented with pleural effusion and paravertebral mass. Pleural

fluid smears revealed plasma cells with mature and immature morphology. The compelling role of fluid Cytology is the examination of serous effusion for the presence of malignant/cancer cells. Malignant effusions are often inceptive manifestation of cancer (especially in occurrence of lung, ovary, and mesothelial malignancies). An early and accurate diagnosis may warrant appropriate therapy and a better life expectancy for these patients. [12,13]

Conclusion

There are malignancies other than adenocarcinoma which can infiltrate pleural cavity and present with effusions but their occurrence is unusual. Cytomorphological features play a significant role in detecting these uncommon malignancies in pleural fluid. However in certain rare cases, clinical history and ancillary studies help in confirming the diagnosis.

References

1. Light RW. Primary effusions related to metastatic malignancies. In: Pleural Diseases, 4th edn. Light RW (ed.). Philadelphia, PA: Lea & Febiger; 2001: pp. 108–34.
2. Arora RD, Boster J. Malignant Pleural Effusion. Treasure Island (FL): StatPearls Publishing; 2022.
3. Egan AM, McPhillips D, Sarkar S, Breen DP. Malignant pleural effusion. QJM. 2014;107(3):179–84.
4. Wrona A, Jassem J. The new TNM classification in lung cancer. Pneumonol Alergol Pol. 2010;78(6):407–17.
5. Wojcik EM, Selvagi SM. Comparison of smears and cell blocks in the fine needle aspiration diagnosis of recurrent gynecologic malignancies. Acta Cytol. 1991;35(6):773–6.
6. Berkman N, Breuer R, Kramer MR, Polliack A. Pulmonary involvement in lymphoma. Leukemia & lymphoma. 1996 Jan 1;20(3-4):229–37.
7. Berkman N, Breuer R, Kramer MR, Polliack A. Pulmonary involvement in lymphoma. Leuk Lymphoma. 1996;20(3-4):229–37.
8. Celikoglu F, Teirstein AS, Krellenstein DJ, Strauchen JA. Pleural effusion in non-Hodgkin's lymphoma. Chest. 1992;101(5):1357–60.
9. Alexandrakis MG, Passam FH, Kyriakou DS, Bouras D. Pleural effusions in hematologic malignancies. Chest. 2004;125(4):1546–55.
10. Gupta S, Sodhani P, Jain S. Cytomorphological profile of neoplastic effusions: an audit of 10 years with emphasis on uncommonly encountered malignancies. J Cancer Res Ther. 2012;8(4):602–9.
11. Deshpande AH, Munshi MM. Pleural effusion as an initial manifestation of multiple myeloma. Acta Cytol. 2000;44(1):103–4.
12. Ong KC, Indumathi V, Poh WT, Ong YY. The diagnostic yield of pleural fluid cytology in malignant pleural effusions. Singapore Med J. 2000;41(1):19–23.
13. Johnston WW. The malignant pleural effusion. A review of cytopathologic diagnoses of 584 specimens from 472 consecutive patients. Cancer. 1985;56(4):905–9.
14. Pradhan SB, Pradhan B, Dali S. Cytology of body fluids from different sites: an approach for early diagnosis of malignancy. JNMA J Nepal Med Assoc. 2006;45(164):353–6.