

Blasts in pleural fluid: A clue to diagnose acute myeloid leukemia

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ABSTRACT

Acute myeloid leukemia is usually diagnosed in older patients, and its incidence increases with age. Most patients with acute myeloid leukemia present with symptoms related to anemia, bleeding, and infections. Blast infiltration into other tissues can occur. Leukemic pleural infiltration has been reported previously but is very rare. Here we discuss a 62-year-old woman diagnosed with acute myeloid leukemia with a leukemic infiltrate in a pleural effusion.

Keywords: AML, pleural effusion, blast cell, leukemic pleural infiltrate

INTRODUCTION

Acute myeloid leukemia (AML) usually presents with constitutional symptoms. Pleural effusion is considered a rare manifestation of AML, and rapidly progressive pleural effusion together with leukemic pleural fluid infiltration is exceedingly rare in patients with AML. Here we discuss a patient with pleural effusion with leukemic blast cells as an initial presentation of AML.

CASE

A 62-year-old white woman with diabetes, hypothyroidism, asthma, and hypertension presented to our hospital with worsening cellulitis. Upon admission, she was noted to be hypoxemic and hypotensive with an oxygen saturation of 66% on room air; she required non-invasive ventilation and intravenous fluid for resuscitation. Respiratory examination revealed decreased breath sounds and dullness to percussion of the right lung base. Abdominal examination revealed splenomegaly. Chest x-ray showed multifocal opacities with bilateral small pleural effusions. The following day, the effusion increased significantly with total opacification

of the right hemithorax. Thoracentesis was performed to improve her oxygenation. Serosanguinous fluid with numerous blasts were found in the pleural fluid consistent with leukemic exudative effusion (Figure). Pleural fluid analysis: red color, red blood cell 380,000/mm³, white blood cell 8,075/mm³, neutrophil 66%, lymphocyte 20%, monocyte 5%, lactate dehydrogenase 2,851 U/L, protein 2.5 gm/dL, glucose 151 mg/dL with serum protein 4.9 gm/dL and serum lactate dehydrogenase 924 U/L.

Her complete blood counts showed a white blood count of 186.8/μL with 74.1% blasts, Hb 6.6 gm/dL, and

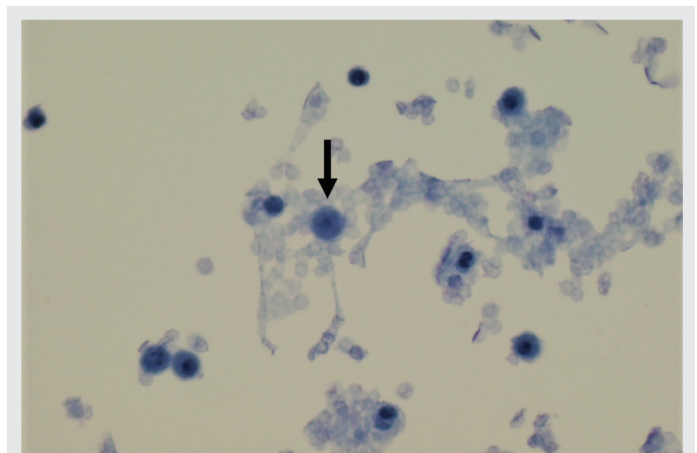


Figure. Blasts with prominent nucleoli in pleural fluid (Thinprep Pap stain 200X).

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platelet count 441/ μ L. Her baseline white blood count was 4.47/ μ L in 2020. Bone marrow aspiration showed 72% blasts. Flow cytometry revealed blasts that expressed CD13, CD33, CD34, CD45, CD 64, CD88, CD 117, and HLA-Dr. Computed tomography of the thorax revealed a right pleural effusion with loculations and reactive mediastinal lymphadenopathy. The patient initially required chest tube drainage for eight days.

She underwent leukapheresis that was complicated by tumor lysis syndrome. She then developed shock, which required vasopressors and multiple blood transfusions and atrial fibrillation that was controlled with diltiazem and amiodarone. She then required additional chest drainage for eight more days. Given her critical medical condition, she was given less intense chemotherapy using azacitidine and venetoclax. Repeat bone marrow biopsy showed morphologic and immunophenotypic findings consistent with persistent acute leukemia with 56% blast morphology. The patient was transferred to MD Anderson Cancer Center in Houston, Texas, for further management. She has not followed up in our hematology clinic.

DISCUSSION

Patients with AML usually present with constitutional symptoms such as fatigue or infection associated with pancytopenia. Although malignancy is the second leading cause of pleural effusion after infection, pleural effusion is uncommon in patients with AML, and

fewer than 20 cases have been reported.^{1,2} In patients who developed malignant pleural effusions during their disease courses, approximately 1 in 5,000 had AML.^{1,3} In our report, a patient with no underlying hematological disorder presented to the hospital with respiratory symptoms and hypoxemia. Her chest x-ray showed a new pleural effusion. The differential diagnosis of pleural effusion includes infection, heart failure, malignancy, and collagen vascular disease. A complete blood count with markedly elevated leukocytes along with blast cells found on peripheral blood smear suggested an underlying malignancy in this patient. Thoracentesis revealed an exudative pleural effusion with blast cells.

Her pleural effusion represented leukemic infiltration into the pleural space; the underlying pathophysiology remains poorly understood, and the prognosis of disease in the presence of pleural effusion in AML is unknown. However, some reports suggest worse outcomes in these patients.⁴ The table summarizes representative cases in which the peripheral white blood cell count was reported. The white blood cell counts ranged from 6,500–86,000/ μ L, and the percent blasts ranged from 1% to 92%. The pleural effusion in our patient resolved after chest tube drainage and the initiation of chemotherapy. Treatment with hydroxyurea was previously used in an AML patient who initially presented with diffuse pulmonary infiltration and respiratory distress, and this drug decreased the blast cell count in the pleural fluid.⁵ Other chemotherapeutic regimens for ALM have led to resolution of leukemic pleural

Table. Summary of Representative Case Reports of AML in Pleural Effusions which Report Peripheral White Blood Cell Counts

Case	Age	Gender	WBC (μ L)	Blasts (%)	Treatment	Response
Duhan ⁶	26	Female	72,000	82	Cytarabine, daunorubicin, and cladribine	Death
Chang ⁷	74	Female	31,900	56.5	Cytarabine	Complete remission
Chang ⁷	74	Male	9,600	22	Supportive care	Death
Raynold ⁸	26	Male	6,500	1	Blood transfusions and oxytetracycline	Death
Agrawal ⁹	45	Male	86,000	92	Induction therapy (Exact medication not reported)	Death 1 week later
Ou ¹⁰	43	Male	11,500	Not reported	Idarubicin, cytarabine	Complete remission after cytarabine

effusions.⁴ Patients with relapsing pleural effusions may require intrapleural chemotherapy or pleurodesis.⁶

In summary, leukemic infiltration of pleural fluid as a manifestation of acute myeloid leukemia is very unusual, and its pathogenesis is not fully understood. This case demonstrates the importance of pleural fluid analysis and cytologic studies to make a diagnosis in a patient who had no prior diagnosis of hematologic malignancy.

Consent: This patient gave consent for this publication.

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REFERENCES

1. Cakir E, Demirag F, Aydin M, et al. A review of uncommon cytopathologic diagnoses of pleural effusions from a chest diseases center in Turkey. *Cytojournal* 2011;8:13. doi:10.4103/1742-6413.83026
2. Pemmaraju N, Chang E, Daver N, et al. Extramedullary acute myeloid leukemia: leukemic pleural effusion, case report and review of the literature. *Front Oncol* 2014;4:130. doi:10.3389/fonc.2014.00130
3. Awasthi A, Gupta N, Srinivasan R, et al. Cytopathological spectrum of unusual malignant pleural effusions at a tertiary care centre in north India. *Cytopathology* 2007;18(1):28–32. doi:10.1111/j.1365-2303.2007.00382.x
4. Faiz SA, Bashoura L, Lei X, et al. Pleural effusions in patients with acute leukemia and myelodysplastic syndrome. *Leuk Lymphoma* 2013;54(2):329–335. doi:10.3109/10428194.2012.713478
5. Huang PH, You JY, Hsu HC. Extensive pulmonary infiltration by leukemic blasts successfully treated with hydroxyurea—a case report. *Haematologia (Budap)* 2002;32(1):87–91. doi:10.1163/156855902760262826
6. Duhan A, Kalra R, Kamra HT, et al. Leukaemic pleural effusion as a manifestation of acute myeloid leukaemia: a case report and review of literature. *Ecancermedicalscience* 2014;8:397. doi:10.3332/ecancer.2014.397
7. Chang H. Acute myeloid leukemia with leukemic pleural effusion. *Diagn Cytopathol* 2013;41(10):909–913. doi:10.1002/dc.22859
8. Raynolds AH, Olivetti RG, Ekstrand RW. Aleukemic stem cell leukemia with polyserositis; report of case. *Blood* 1955; 10(1):81–86.
9. Agrawal R. Acute Myeloid Leukaemia (AML) presenting as a bilateral pleural effusion. *J Clin Diagn Res* 2013;7(1):187. doi:10.7860/JCDR/2012/4633.2705
10. Ou MC, Hwang WL, Teng CL. Leukaemic pleural effusion in acute myeloid leukaemia. *Br J Haematol* 2011;154(6):669. doi:10.1111/j.1365-2141.2011.08722.x