Case Report
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# Unilateral Malignant Pleural Effusion as an Initial Manifestation of Acute Lymphoblastic Leukemia: A Rare Case Report

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## Abstract

Unilateral malignant pleural effusion as an initial manifestation that leads to the diagnosis of an underlying acute lymphoblastic leukemia is a rare event. Early and accurate diagnosis of this case is important for prompt and adequate therapy. We present the case of an18-year-old male who presented to the emergency department with severe respiratory distress. Chest X-ray revealed a unilateral massive right-sided pleural effusion. Cytological examination of the pleural fluid led to the diagnosis of underlying acute lymphoblastic leukemia. Subsequent hemogram, bone marrow aspirate and flow cytometry analysis confirmed the diagnosis of T-lineage acute lymphoblastic leukemia. The patient underwent induction chemotherapy which led to significant clinical improvement due to resolution of the pleural effusion. The patient is on follow up at present. This case report exemplifies and highlights the importance of cytopathological analysis of body cavity fluids in the diagnosis of underlying unsuspected malignancies.

## Introduction

Unilateral leukemic pleural effusion as an initial manifestation of acute lymphoblastic leukemia (ALL) is a rare occurrence. Rarely, can an effusion lead to the discovery of an underlying hematologic malignancy.[1] We report the case of an 18-year-old male diagnosed as a case of T-cell ALL following diagnostic and therapeutic thoracocentesis for massive right-sided pleural effusion.

## Case Report

An 18-year-old male presented with chief complaints of progressively increasing heaviness in his chest associated with shortness of breath, mild chest pain and low grade fever for 15 days. There was no history of tuberculosis or any other chronic illness. Physical examination revealed mild splenomegaly. Chest examination revealed dullness on percussion along with decreased vocal fremitus on the right side. Chest X-ray revealed massive right-sided pleural effusion (Figure 1).

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Immediately we performed a pleural tap and 300 ml fluid was aspirated and sent for biochemical and cytological examinations. Biochemical analysis established that this was an exudative effusion. Total Leucocyte Count (TLC) of fluid was 8000/cumm with 100-150 leucocytes per high power field. Differential Leucocyte Count (DLC) constituted 85%-90% lymphoid cells that included blastoid cells and 10%-15% granulocytes. Cytospin smears prepared from the fluid revealed a large number of atypical cells that conformed to the morphology of blasts in a hemorrhagic background (Figure 2). Sudan staining on the cell block preparation of the fluid was negative.

The hemogram showed an anemic profile with a dimorphic picture (Hb: 9 gm%) with leukocytosis (50000 cells/mm$^3$) and thrombocytopenia (platelets: 60000/mm$^3$). The peripheral smear showed the presence of 90% blasts and the remainder of the differential count was comprised of neutrophils and lymphocytes (Figure 3). The patient was diagnosed as a case of acute leukemia. Bone marrow examination revealed a predominant population of atypical cells with a high N:C ratio, fine nuclear chromatin, conspicuous nucleoli, scanty cytoplasm and negative for Sudan stain. Further, flow cytometric analysis led to the diagnosis of T-cell ALL with the gated leucocytes highly positive for CD 5 and CD 10.

The diagnosis of malignant pleural effusion associated with T-cell ALL was thus established. Immediately, induction therapy with methotrexate, vincristin, and doxorubicin was started. The patient responded with remission of his pleural effusion which led to significant improvement in his respiratory distress.

## Discussion

A hematological malignancy rarely manifests with unilateral massive leukemic pleural effusion as an initial presentation. Usually this pleural fluid collection is seen in solid tumors and lymphomas.[2] Acute and chronic leukaemia are rarely accompanied by pleural effusions.[3] Extramedullary infiltration may occur simultaneously, as a complication of medullary involvement, or during treatment. Hepatosplenomegaly, leukemia cutis, lymphadenopathy, bone pain, granulocytic sarcomas, gingival and central nervous involvement may ensue. Leukemic pleural effusion is rarely diagnosed during life; it is a common finding at autopsy.[4] Currently, due to increased patient survival such cases are being reported. However after an extensive internet search, a very few case reports of malignant pleural effusion that have led to the diagnosis of ALL are available. Further, due to the rarity of such cases the underlying etiology of these leukemic effusions is poorly understood.

Faiz et al. published the largest series of 111 cases of pleural thoracocentesis in leukemic patients. In this series, 69 cases were Acute Myeloid Leukemia (AML), 7 were Acute Lymphoblastic Leukemia and 15 were of myelodysplastic syndromes. Major causes attributable to such effusions included associated bacterial or viral infections (47%) and underlying malignancy (36%).[5] Other possible causes may be secondary malignancies, associated autoimmune

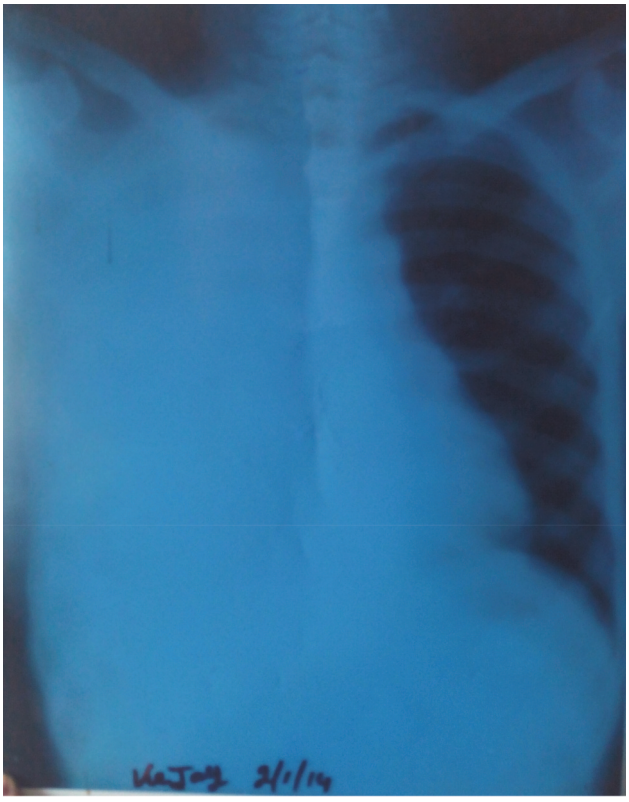

**Figure 1.** Chest skiagram revealing massive right sided pleural effusion.

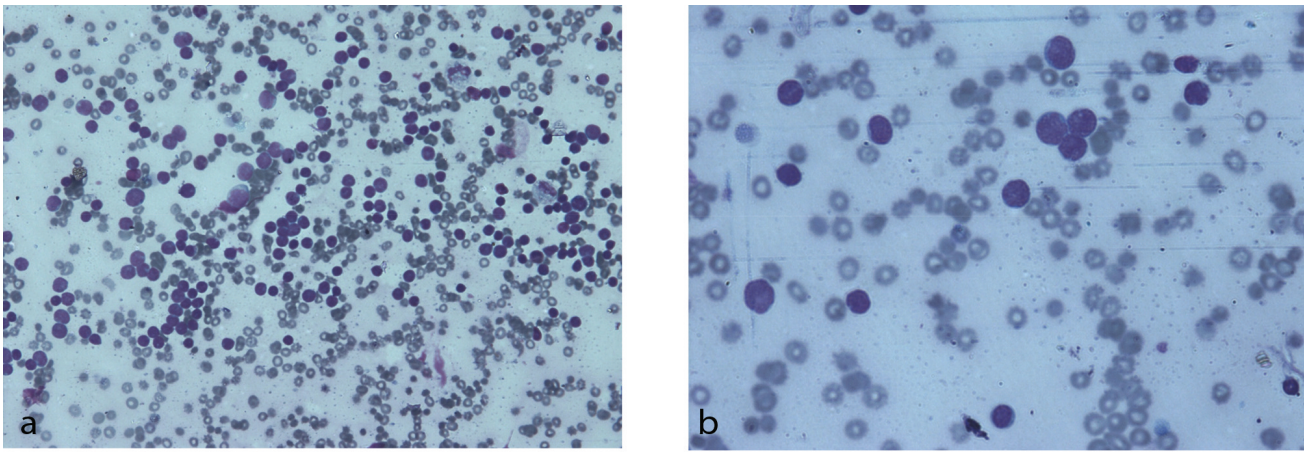


**Figure.** 2a. Cytospin-processed smear of pleural fluid revealing uniformly dispersed haematolymphoid blasts (Leishman; 200×), 2b.(Leishman 400×)

diseases and treatment toxicities due to chemotherapy, radiation or bone marrow transplant. Desatinib, a tyrosine kinase inhibitor has been found to be linked with exudative pleural effusion.[6] There are variable views about the prognostic significance of pleural involvement in leukemias. According to some it does not affect the rate of remission and survival, while others report a worse prognosis. Currently available studies suggest that most of the patients with pleural effusion associated leukemia have active disease at the time of presentation.[5] One important aspect of diagnosing a malignant pleural effusion is that an extramedullary relapse is considered as recurrence of the leukemia in sites other than the bone marrow.[7] It is also known to recur 'isolated' without any recurrence in the bone marrow.[2] Pleural effusions associated with hematological malignancy usually disappear after induction chemotherapy for primary malignancy and result in clinical improvement. However, in some patients no remission occurs and respiratory failure ensues due to massive pleural effusion.[8] Intrapleural chemotherapy and chemical sclerosis is indicated in such cases.[5]

Proper cytological and biochemical assessment of any accumulated body cavity fluid is mandatory as it may lead to prompt and accurate diagnosis of a disease process or an unsuspected malignancy. This permits an early introduction of an appropriate treatment without minimum intervention.

## Conclusion

The diagnosis of any hematological or unsuspected malignancy may be difficult and challenging in the absence of typical clinical symptoms. Most cases of malignant pleural effusion have a known primary but sometimes such effusions can be the first manifestation of an underlying undiagnosed hematological malignancy.

## Conflict of Interest

No conflict of interest is declared.

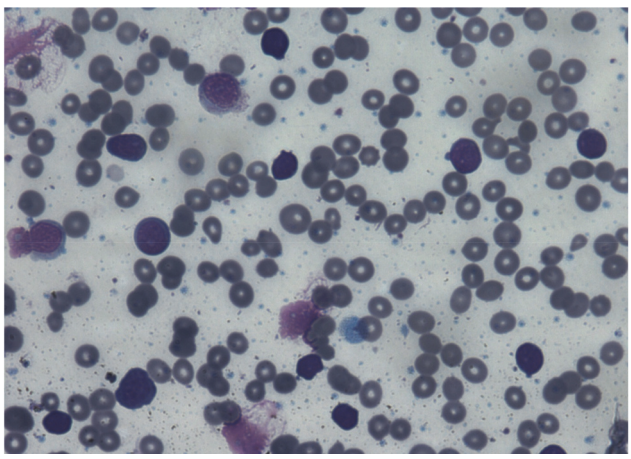

**Figure 3.** Peripheral smear showing blasts (Leishman ; 400×).

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