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*Research Article*

# CYTOLOGICAL DIAGNOSIS OF T- CELL LYMPHOBLASTIC LEUKEMIA/LYMPHOMA IN PLEURAL EFFUSION

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**A R T I C L E I N F O**

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Malignant effusions, such as pleural, pericardial, or peritoneal ones, are extremely uncommon in leukemia, and research on serous effusions has predicted that less than 1% of all effusions will have leukemia involved. The clinical care of patients with a hematologic illness relies on accurate cytological distinction between reactive and malignant effusions. Malignant effusions' prognostic significance has been widely debated in the literature. We present a case of a 33-year-old woman who had complained of having a fever and having shortness of breath for a month. An aspiration of the bone marrow revealed that blast cells had almost completely replaced the bone marrow. A cytopathological investigation of the pleural fluid was conducted after it was transferred to the pathology department. Cytological characteristics demonstrate leukemic infiltration. On a sample of bone marrow aspirate, further immunophenotyping was conducted. The diagnosis of T-cell acute lymphoblastic leukemia was made based on the results of the IPT.



## INTRODUCTION

Acute lymphoblastic lymphoma, which includes B lymphoblastic leukemia/ lymphoma or T-lymphoblastic leukemia/lymphoma, is the clonal proliferation of lymphoid progenitors. Acute lymphoblastic leukemia (ALL) makes for just 20% of acute leukemia in adults, although accounting for 30% of pediatric malignancies. All kinds of acute leukemia, myelodysplastic syndrome, myelodysplastic/ myeloproliferative neoplasms (MDS/MPN), and myeloproliferative neoplasms are known to exhibit extramedullary infiltration (EMI), which is a very common condition. Skin, lymph nodes, gastrointestinal tract, bone, soft tissues, mediastinum, central nervous system, and genitourinary system are the most often reported anatomical sites[1]. Malignant effusions, such as pleural, pericardial, or peritoneal ones, are relatively uncommon in leukemia, and research on serous effusions has predicted that less than 1% of all effusions will have a leukemic component. The most frequent leukemia involving pleural fluid is T-ALL, which is followed by acute myeloblastic leukaemia.[2]

## CASE REPORT

A 33 year old female presented in OPD with complaint of fever and shortness of breath since 1 month. On general physical examination, splenomegaly with cervical and inguinal lymphadenopathy was noted. X –Ray was done which revealed the presence of pleural effusion; hence 50 ml Pleural fluid was obtained and sent to the pathology department for cytopathological examination. On gross examination pleural fluid was hemorrhagic. Smears prepared and examined from pleural fluid were hypercellular and show large number of singly scattered atypical lymphoid cells having high nucleocytoplasmic ratio, irregular nuclear membrane, moderate nuclear pleomorphism with coarse nuclear chromatin, inconspicuous nucleoli and scant to moderate amount of cytoplasm which was vacuolated at places in a hemorrhagic background. Cytological features were positive for leukemic infiltration. Complete blood count (CBC) was also done in which the total lymphocyte count was highly raised and hence peripheral blood film was prepared which revealed the presence of 85% blasts. Bone marrow aspiration was done which revealed near total replacement of bone marrow by blast cells. A diagnosis of acute leukemia was made on bone marrow aspirate. Further immunophenotyping on bone marrow aspirate sample was done. On IPT, CD45 and TdT were dim positive, CD 34,CD 4,CD 7, CD 117,CD 3 were positive whereas CD10,CD19, CD20, CD8, CD64, HLA DR, CD13, CD33, MPO, CD79a were negative. Based on IPT findings –diagnosis of T-cell Acute lymphoblastic Leukemia was made.

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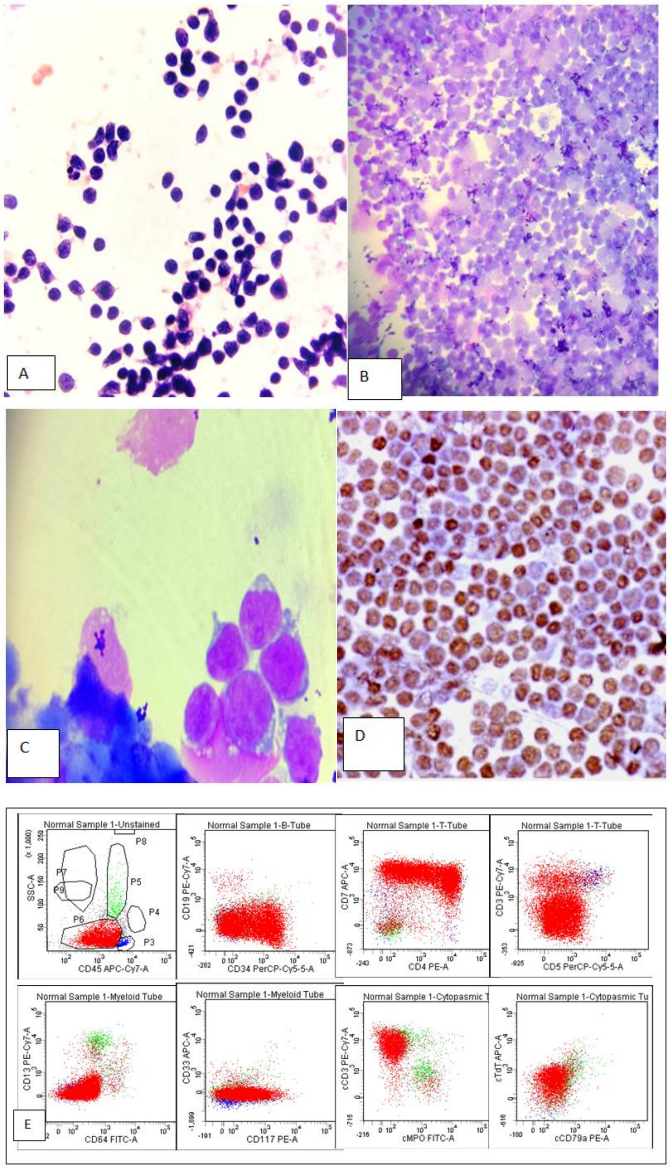


A) Peripheral blood film : Leishman stained smear showing presence of blasts
B.) Pleural fluid cytology:((20X)Leishman stained smears prepared and examined are hypercellular and show large number of singly scattered atypical lymphoid cell.
C.) Cytospin preparation(40X): Leishman stained smear shows large number of singly scattered atypical lymphoid cells having high nucleocytoplasmic ratio, irregular nuclear membrane , moderate nuclear pleomorphism with coarse nuclear chromatin ,inconspicuous nucleoli and scant to moderate amount of cytoplasm which is vacuolated at places in a hemorrhagic background.
D.) Immunohistochemistry(20X) :Terminal deoxynucleotidyl transferase (Tdt ) nuclear positivity.
E.) IPT : T – Acute lymphoblastic leukemia SSC/CD45 blasts positive for CD34, CD7, CD4, cCD3 and CD 45 (dim). Negative for CD19, CD5, CD13, CD64,CD33,CD117, cMPO, cCD79a and Tdt

## DISCUSSION

Malignant effusions in leukemia are relatively uncommon, and research on serous effusions has predicted that less than 1% of all effusions will be affected by leukemia. Leukemia can cause malignant effusion at any point in the disease's progression, including at the time of the original diagnosis, during advancing refractory disease, during recurrence, and even following stem cell transplantation. In a retrospective study conducted by Kaur *et al* on 9732 effusions, only 0.4% (n = 40) showed leukemic involvement and the most common site of involvement being pleural cavity (n = 30), followed by the peritoneal cavity (n = 7) and the pericardial cavity (n = 3). T - ALL (41.9%) was the most common leukemia involving pleural fluid, followed by AML (23.3%). Accurate diagnosis was given on cytomorphology in 72.5% (29/40) cases.

Faiz *et al*, In a retrospective review, reported the largest, nonautopsy, cohort of patients with acute leukemia and MDS with pleural effusions. Most pleural effusions in patients with ALL reported by Faiz *et al*. were malignant. Hematologic pleural effusions should be thoroughly investigated for medication toxicity, underlying infectious, secondary neoplastic, or very rarely autoimmune causes2.The following can be used to illustrate how pleural effusion occurs in these patients: Lymphatic obstruction, thoracic duct obstruction and pleural invasion by cancerous cells.[3]

As established by review performed by Koh *et al*. on lymphoproliferative disorders involving body fluid , the clinical care of patients with a hematologic illness depends on accurate cytologic classification between reactive and malignant effusions. High cellularity, cellular atypia/pleomorphism, monomorphic cell population, and frequent apoptosis are cytomorphologic traits that support malignant condition, whereas absence of atypia, polymorphic cell population, and predominance of tiny T cells typically reflect benign reactive process[4]. To get around these diagnostic difficulties, ancillary methods like immunocytochemistry, flow cytometry, or molecular analyses can be easily carried out on effusion specimens. Cell blocks are excellent choices for immunocytochemical evaluation of effusions[5].

Body cavity effusions caused by leukemia are a rare finding. These could be the disease's initial symptoms. Effective clinical therapy could be sped up with a timely diagnosis based on effusion cytology. Malignant effusions' prognostic significance has been fiercely debated in the literature. In fact, patients with a positive effusion cytology, particularly if present at presentation, had the worst prognosis, according to current research, which implies that its existence may be highly relevant[6].

## CONCLUSION

A rare occurrence in leukemia, leukemic effusion has an undetermined prognosis. The simplest but most reliable tool for diagnosing a leukemic effusion is cytology. Confirmatory tests include a bone marrow aspirate and flow cytometry. Even though they are uncommon, leukemic effusions are a rich source of knowledge about the extramedullary niches of hematopoietic stem cells, their migration, and the mechanisms that cause leukemic cells to homing, which may offer important insights into various leukemia diagnostic, prognostic, and therapeutic targets. The novelty of this case lies in the rarity of leukemia involving pleural effusion and the importance of accurate cytological and immunophenotypic investigations to reach a definitive diagnosis. The case adds to the limited body of knowledge regarding leukemia's presentation in malignant effusions and underscores the need for further research and understanding in this area.

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