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Original Research Article

T-Cell Lymphoblastic Lymphoma with Peripheral Eosinophilia: A Rare Clinical Presentation

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Abstract:

T-cell lymphoblastic lymphoma (T-LBL) is a rare and aggressive form of Non-Hodgkin's lymphoma, comprising less than 1% of all adult NHL cases. The co-existence of peripheral eosinophilia with T-LBL is an exceptionally uncommon presentation with significant prognostic implications. We present a case of a 34-year-old male poultry farmer who presented with right-sided pleuritic chest pain, dyspnea on exertion, and dry cough. Clinical and radiological investigations revealed right-sided pleural effusion with anterior mediastinal mass encasing the superior vena cava and ascending thoracic aorta. Pleural fluid analysis demonstrated exudative features with elevated adenosine deaminase (ADA), while absolute eosinophil count was markedly elevated (>1900/µL). Histopathological examination of CT-guided mediastinal biopsy confirmed T-cell lymphoblastic lymphoma with immunophenotyping showing positivity for TdT, CD3, CD4, CD5, CD7, CD8, CD10, and BCL2. The presence of concurrent peripheral eosinophilia associated with T-LBL is documented in only a few cases globally and carries poor prognostic implications with high risk of subsequent myeloid neoplasia. This case highlights the importance of comprehensive evaluation of unexplained hypereosinophilia and the diagnostic challenges in recognizing this rare clinicopathological entity.

Keywords: T-cell lymphoblastic lymphoma, eosinophilia, mediastinal mass, non-Hodgkin's lymphoma, immunophenotyping

Introduction

T-cell lymphoblastic lymphoma (T-LBL) is a rare, highly aggressive form of Non-Hodgkin's lymphoma (NHL), representing less than 1% of all adult NHL cases [1]. The disease predominantly affects males with a male-to-female ratio of approximately 3:1[1]. The most common clinical presentation of T-LBL is a mediastinal mass, occurring in 60-70% of cases, which frequently leads to cardiopulmonary complications including superior vena cava (SVC) syndrome, pericardial effusion, and pleural effusion [1].

The association of T-LBL with peripheral eosinophilia is exceptionally rare, with only a handful of cases documented in the international medical literature since the first description by Spitzer and Garson in 1973[2]. This clinicopathological variant represents a distinct entity with particularly poor prognosis and carries a high risk of subsequent myeloid neoplasia, even

following adequate multiagent chemotherapy [3]. Marked eosinophilia can mask the underlying lymphoproliferative disorder, making early recognition and comprehensive investigation of unexplained hypereosinophilia critical for diagnosis.

We report a case of T-cell lymphoblastic lymphoma with peripheral eosinophilia presenting with pleural effusion and mediastinal mass, emphasizing the diagnostic approach to this rare presentation.

Case Presentation

Clinical History

A 34-year-old male, occupationally exposed as a poultry farmer, presented to the Department of Pulmonary Medicine with a 2-3 week history of:

- Right-sided pleuritic chest pain
- Dyspnea on exertion
- Dry cough (non-productive)

Past Medical History

- Known case of hypothyroidism (on treatment)
- History of allergies to smoke and dust exposure

Prior Management

Before seeking tertiary care, the patient was prescribed oral corticosteroids and anti-parasitic agents by a local practitioner, presumed based on the occupational exposure and eosinophilia.

Physical Examination

Vital Signs: All stable within normal range

General Physical Examination: Within normal limits

Respiratory System Examination:

- Tactile vocal fremitus (TVF): Decreased on the right side with involved middle, inferior anterior axillary zones
- Percussion: Stony dull note over the affected right-sided area
- Auscultation: Breath sounds and vocal resonance reduced over the corresponding area

Investigations and Diagnostic Workup

Laboratory Investigations

Investigation	Finding
Absolute Eosinophil Count	>1900/µL (markedly elevated)
Serum IgE	109 IU/ml
Sputum CB-NAAT	Negative for MTB
Pleural Fluid CB-NAAT	Negative for MTB

Imaging Studies

Chest X-ray: Revealed right-sided pleural effusion with mediastinal widening

Contrast-Enhanced CT Thorax (CECT): Demonstrated an anterior mediastinal mass with direct involvement and encasement of:

- Superior vena cava (SVC)
- Ascending thoracic aorta

Pleural Fluid Analysis

USG-guided thoracocentesis was performed with the following pleural fluid characteristics:

Table 1: Pleural Fluid Analysis Characteristics

Parameter	Result
Appearance	Exudative
Adenosine Deaminase (ADA)	114 U/L
Cytology	Dense lymphocytic infiltration
Atypical/Malignant Cells	Absent

Histopathological and Immunological Examination

CT-guided biopsy of the mediastinal mass was performed with the following findings:

Histopathology: Lymphoproliferative disorder

Immunohistochemistry (IHC) Panel:

Table 2: Immunophenotypic Profile of Mediastinal Mass

Marker	Status
Positive Markers	
TdT	Positive
CD3	Positive
CD4	Positive
CD5	Positive
CD7	Positive
CD8	Positive
CD10	Positive
BCL2	Positive
Negative Markers	
Pan CK	Negative
CD20	Negative
CD2	Negative
CD30	Negative
PAX-8	Negative
Ki-67 Proliferation Index	90%

Diagnosis: T-cell Lymphoblastic Lymphoma

Clinical Course and Management

The patient's clinical presentation combined with laboratory, radiological, and histopathological findings established the diagnosis of T-cell lymphoblastic lymphoma with concurrent peripheral eosinophilia. Bone marrow aspiration and biopsy were indicated to assess for myeloid involvement and to further characterize the disease; however, the patient declined this procedure.

The patient was subsequently referred to a higher-order cancer institute for specialized oncological management and potential chemotherapeutic intervention.

Discussion

Clinical Significance of T-LBL with Eosinophilia

The co-existence of T-cell lymphoblastic lymphoma and peripheral eosinophilia is an exceptionally rare clinical entity, with only a limited number of cases reported in medical literature since 1973[2]. The case presented herein is significant for several reasons:

First, the simultaneous presentation of mediastinal T-LBL with marked peripheral eosinophilia (>1900/μL) represents an unusual clinicopathological variant that has important diagnostic and prognostic implications [1]. Second, this combination may represent a distinct biological entity with heightened risk for progression to acute myeloid leukemia (AML), even in the setting of complete remission following multiagent chemotherapy [3].

Diagnostic Challenges and Clinical Implications

Marked peripheral eosinophilia can mask or obscure an underlying lymphoproliferative disorder, particularly when circulating blasts are absent in the peripheral blood [4]. In this case, the initial management by the local practitioner—focusing on anti-

parasitic therapy—highlighted the common diagnostic pitfall of attributing eosinophilia to parasitic infection without comprehensive malignancy screening. This case reinforces that any unexplained or persistent hypereosinophilia (defined as absolute eosinophil count >1500/μL) warrants thorough investigation to exclude hematologic malignancies including T-LBL, even in the absence of circulating blasts [4].

Immunophenotypic Characterization

The immunophenotypic profile in our case demonstrates a T-cell lineage commitment with a complex immunological signature. The expression of CD3 (pan-T-cell marker), CD4 and CD8 (T-cell subset markers), CD5, CD7, along with CD10 and BCL2, with marked positivity for TdT (terminal deoxynucleotidyl transferase), is consistent with a T-lymphoblastic neoplasm [1]. The high Ki-67 proliferation index of 90% indicates an extremely aggressive biological behavior.

The negativity for CD20 effectively excludes B-cell lymphoma, while negativity for CD30 excludes peripheral T-cell lymphoma, not otherwise specified. The absence of Pan CK and PAX-8 ruled out epithelial and renal origins. The elevated pleural fluid ADA (114 U/L) supports the lymphoproliferative nature of the pleural effusion, though the pleural cytology lacked overt malignant cells—a finding not uncommon in T-LBL-related effusions.

Prognostic Implications

T-cell lymphoblastic lymphoma generally demonstrates an initial response to intensive multiagent chemotherapy regimens; however, relapse is common and overall survival remains poor [1]. The association of eosinophilia with T-LBL further worsens the prognosis. Reported cases of T-LBL with eosinophilia have demonstrated a propensity for myeloid dysplasia and progression to acute myeloid leukemia (AML), even after achieving complete remission with chemotherapy [2,3]. The patient in this case ideally required bone marrow examination to assess for evidence of myeloid involvement or dysplasia, which would further stratify prognostic risk.

To date, hematopoietic stem cell transplantation (HSCT) remains the only known potentially curative therapeutic modality for this aggressive malignancy [1].

Definition of Hypereosinophilia

For reference and clarity, the following definitions are useful in clinical practice:

- **Eosinophilia:** Absolute eosinophil count (AEC) of 500-1500 cells/μL
- **Hypereosinophilia:** AEC of >1500 cells/μL

Hypereosinophilia is most frequently associated with hypereosinophilic syndrome (HES), eosinophilic leukemias, and lymphomas [4].

Clinical Lessons and Recommendations

This case underscores several important clinical principles:

1. Unexplained or persistent hypereosinophilia requires comprehensive hematologic and immunologic evaluation, including consideration of malignancy screening
2. Mediastinal masses in young adults should prompt consideration of T-LBL, particularly when associated with pleural effusion and constitutional symptoms
3. Immunophenotypic analysis is essential for definitive diagnosis of lymphoproliferative disorders
4. The combination of T-LBL with eosinophilia carries poor prognosis and necessitates intensive multimodal therapy and consideration of stem cell transplantation
5. Bone marrow assessment is indicated to screen for myeloid involvement when T-LBL is diagnosed

Conclusion

T-cell lymphoblastic lymphoma with peripheral eosinophilia is an exceptionally rare presentation of an aggressive hematologic malignancy. This case demonstrates the diagnostic importance of recognizing this rare clinicopathological association and highlights the potential risk of diagnostic delay when eosinophilia is attributed to more common etiologies without appropriate malignancy screening. Comprehensive evaluation of unexplained hypereosinophilia, combined with histopathological and immunophenotypic characterization, is essential for accurate diagnosis and prognostic stratification. The poor prognosis associated with this entity necessitates early recognition and referral for specialized oncological management and consideration for intensified chemotherapy with hematopoietic stem cell transplantation.

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