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(CASE REPORT)

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# Pleural involvement revealing chronic lymphocytic leukemia: A case report

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## Abstract

Pleural involvement revealing chronic lymphocytic leukemia (CLL) is a rare phenomenon. CLL is a hematologic malignancy characterized by an excessive proliferation of B lymphocytes. Although CLL typically presents with symptoms such as fatigue, frequent infections, and lymphadenopathy, in some cases, it may initially manifest with pleural involvement. This involvement can present as a pleural effusion, leading to symptoms such as dyspnea, chest pain, and a dry cough. Diagnosis relies on cytological analysis of pleural fluid, biopsy, and additional tests such as immunophenotyping. Management includes treatment of the underlying CLL, often with a combination of chemotherapy and immunotherapy.

We report the case of a 53-year-old male, a former farmer and chronic smoker, who presented with stage III dyspnea (according to Sadoul), dry cough, and right-sided lower thoracic pain. These symptoms were associated with a general decline in his health status. Clinical examination revealed signs of right-sided pleural effusion, multiple lymphadenopathies (cervical, axillary, inguinal), and hepatosplenomegaly. Laboratory tests showed significant lymphocytosis. A pleural puncture revealed a lymphocytic exudative fluid, and pleural biopsy showed granulomatous inflammation without caseous necrosis. Immunohistochemistry highlighted an abnormal population of B lymphocytes expressing CD19, CD5, CD20, CD23 markers, and a monoclonal population with a predominance of the kappa light chain, thus confirming the diagnosis of chronic lymphocytic leukemia.

After confirmation of the stage C CLL diagnosis, the patient was treated with chemotherapy (CHOP protocol).

**Keywords:** Chronic lymphocytic leukemia (CLL); Pleural effusion; Hyperlymphocytosis; Pleural biopsy; Chemotherapy

## 1. Introduction

Chronic lymphocytic leukemia (CLL) is a malignant hematologic disorder characterized by the accumulation of mature B lymphocytes. Although it is usually asymptomatic in its early stages, clinical manifestations can emerge over time, including pulmonary complications. Management of this disease requires a multidisciplinary approach and close follow-up, especially in cases of extra-lymphatic involvement.

## 2. Case Report

This is a case of a 53-year-old male, a former farmer and chronic smoker with a 10 pack-year history. He has never been treated for pulmonary tuberculosis and has no recent history of tuberculous contact.

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The patient presented with stage III dyspnea according to Sadoul, right-sided lower thoracic pain, and a dry cough. He had no hemoptysis or other thoracic or extra-thoracic signs. The symptoms developed in the context of an afebrile state and a general decline in health.

Clinical examination revealed a conscious patient, eupneic at 18 breaths per minute, with an oxygen saturation of 95% on ambient air, afebrile, heart rate of 89 beats per minute, and blood pressure of 110/70 mmHg. A right-sided pleural effusion syndrome was noted, including decreased vocal fremitus, dullness to percussion, and absence of vesicular breath sounds in the lower two-thirds of the right hemithorax. Abdominal examination revealed hepatosplenomegaly with diffuse abdominal tenderness. The lymph node examination revealed cervical, axillary, and inguinal lymphadenopathy.

A chest X-ray was performed, which showed a watery opacity obliterating the costophrenic and cardiophrenic recesses on the right, occupying the lower two-thirds of the right hemithorax, consistent with a moderate right-sided pleural effusion **(Figure 1)**.

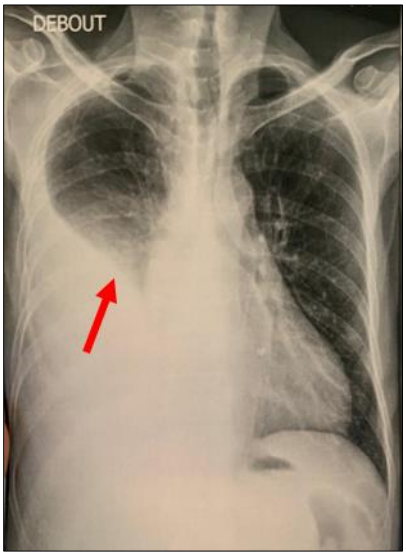


**Figure 1** Chest X-ray showing a watery opacity obliterating the right costophrenic and cardiophrenic recesses, occupying the lower two-thirds of the right hemithorax, consistent with moderate right-sided pleural effusion

The laboratory tests requested included: A complete blood count revealing normochromic, normocytic anemia with a hemoglobin level of 6.6 g/dL, marked leukocytosis at 141,000/$mm^3$ with a predominance of lymphocytes (131,835/$mm^3$). Platelet count was normal at 272,000/$mm^3$. Coagulation tests were normal, with a prothrombin time (PT) of 91%.

Following the discovery of significant lymphocytosis, further tests were performed: Immunophenotyping of the lymphocytes revealed a monotypic B-cell population expressing CD19+, partial CD5+, partial CD23+, partial CD43+, FMC7-, CD79b-, and CD20+, with a weak intensity of the Kappa light chain. Overall, this phenotypic profile was suggestive of chronic lymphocytic leukemia (CLL).

A diagnostic pleural puncture was performed, revealing an exudative pleural fluid with a protein concentration of 39 g/L, predominantly lymphocytic (70%).

The search for Mycobacterium tuberculosis (BK) and the Xpert MTB/RIF gene test on the pleural fluid were negative. The patient underwent a pleural biopsy, yielding 6 fragments for histopathological analysis and 3 fragments for BK testing. The BK test result was negative.

The pleural biopsy revealed a pleural localization of granulomatous inflammation with epithelioid and giant cells, but without caseous necrosis **(Figure 2)**. Immunohistochemistry identified an abnormal population of B lymphocytes expressing CD19, CD5, CD20, and CD23 markers, with monoclonality and predominance of the Kappa light chain, confirming the diagnosis of chronic lymphocytic leukemia (CLL).

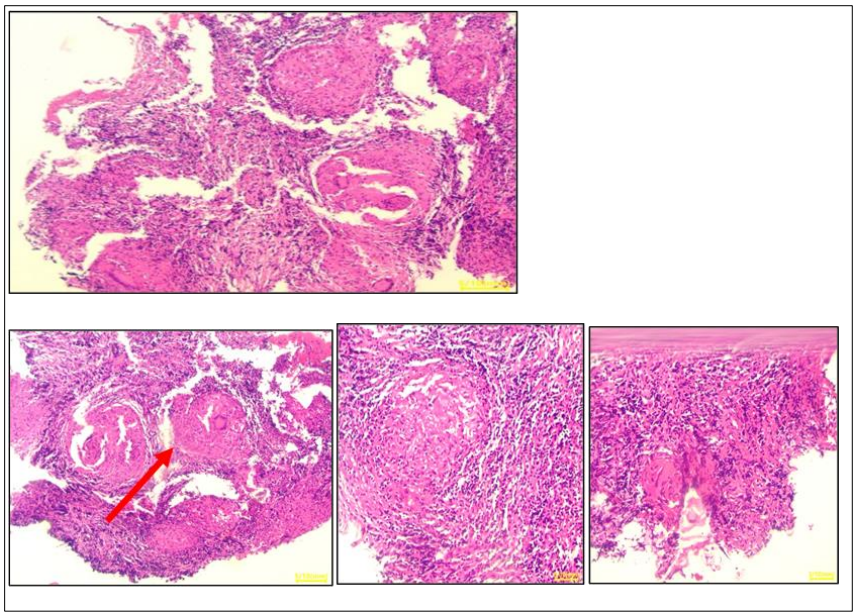

**Figure 2** Histological appearance of a granulomatous epitheloid and giant cell reaction without caseous necrosis

As part of the staging work-up, a thoraco-abdominopelvic CT scan **(Figure 3)** was performed, which revealed: A mass of supra- and subdiaphragmatic lymphadenopathy associated with homogeneous hepatosplenomegaly. A moderate right-sided pleural effusion with passive atelectasis of the adjacent pulmonary parenchyma. Pulmonary micronodules of nonspecific nature.

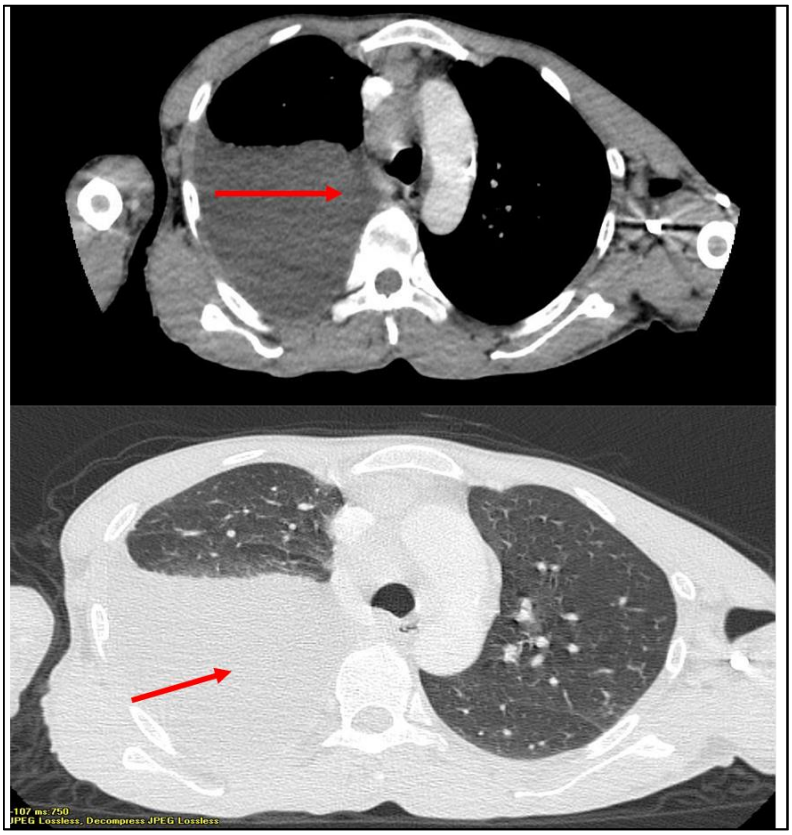

**Figure 3** Thoracic CT scan showing mediastinal and parenchymal cuts revealing a moderate right-sided pleural effusion with passive atelectasis of the adjacent pulmonary parenchyma and nonspecific pulmonary micronodules

The patient was referred to hematology for stage C chronic lymphocytic leukemia (CLL) and started on chemotherapy (CHOP protocol). Given the overall context, this represents a mediastinal, pulmonary, pleural, and lymph node involvement of CLL. These localizations are difficult to diagnose and may either present as the initial manifestation of the disease or develop during its progression.

## 3. Discussion

Chronic lymphocytic leukemia (CLL) is the most common form of leukemia in adults, with an increasing incidence in the elderly, particularly in men [1]. Risk factors include a history of exposure to pesticides and chemicals, as well as smoking, although the link is less direct compared to other pulmonary diseases [2]. In this case, the patient, a former farmer and chronic smoker, presents demographic characteristics typical of individuals with CLL.

Respiratory manifestations in CLL, such as dyspnea and chest pain, can result from lymphoid infiltration in the lungs or pleural effusions secondary to lymphadenopathy [3]. In our case, the patient presented with stage III dyspnea according to Sadoul, associated with pleural effusion, which is consistent with pulmonary involvement of the disease. Atypical chest pain and dry cough are also frequently observed in patients with advanced CLL [4].

The diagnosis of CLL and its complications relies on a combination of clinical examination, imaging, and flow cytometry. Chest radiographs and CT scans are essential for identifying pleural effusions and mediastinal lymphadenopathy [5]. The pleural puncture performed in this case revealed lymphocytic exudative fluid, suggesting a neoplastic etiology. The pleural biopsy showed granulomatous inflammation, highlighting the need to differentiate infectious from malignant causes of pleural effusions.

Managing advanced-stage CLL requires a systemic therapeutic approach. The standard treatment for CLL includes protocols such as CHOP, which combines cyclophosphamide, doxorubicin, vincristine, and prednisone, and has shown significant survival benefits [6]. In addition, targeted therapies, such as Bruton's tyrosine kinase inhibitors (ibrutinib) and monoclonal antibodies (rituximab), offer promising options for patients with advanced disease [7].

Ongoing research is focused on identifying predictive biomarkers and developing new personalized therapies to improve outcomes for CLL patients. Managing pulmonary and mediastinal involvement remains a major challenge, requiring a multidisciplinary approach to optimize prognosis and quality of life for patients [8].`

## 4. Conclusion

The case presented highlights the complexity of chronic lymphocytic leukemia (CLL) and its pulmonary manifestations, particularly pleural effusions and dyspnea, which can complicate the diagnosis. Chemotherapy, such as the CHOP protocol, remains essential, although more targeted options are emerging for advanced forms of the disease. Early recognition of extra-lymphatic localizations is crucial for optimal disease management. A multidisciplinary approach is needed to improve the prognosis and quality of life for patients.

## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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