CASE REPORT

Pneumocystis jirovecii pneumonia in a patient with untreated chronic lymphocytic leukaemia: a novel case and postulations concerning the mechanism

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SUMMARY

Chronic lymphocytic leukaemia (CLL), even when severe, is not directly associated with opportunistic infections. Opportunistic infections that occur with CLL are almost exclusively related to immunosuppression caused by chemotherapeutic drugs used to treat CLL. We report a case of *Pneumocystis jirovecii* (PJ) pneumonia that occurred in a patient with untreated CLL with pulmonary involvement. We suspect that PJ pneumonia resulted from an inadequate immune response in the lung parenchyma resulting from excessive local accumulation of CLL cells.

BACKGROUND

This case is of interest because it describes a new clinical entity, that, to our knowledge, has not been previously reported. Specifically, we report a case of *Pneumocystis jirovecii* (PJ) pneumonia (PJP) in a patient with untreated chronic lymphocytic leukemia (CLL). All previous episodes of PJP in patients with CLL occurred in patients who were previously treated for CLL. Furthermore, we postulate a plausible mechanism for the development of these events. We believe that this report will alert clinicians to consider this entity.

CASE PRESENTATION

An 83-year-old retired physician, diagnosed 4 years previously with CLL, presented to our clinic because of an unintentional weight loss of 20 pounds over the previous 6 months as well as a non-productive cough, dyspnoea on exertion and the development of nodules in his neck. He denied fever but noted occasional night sweats. He had never received treatment for CLL.

INVESTIGATIONS

On presentation, the patient had a respiratory rate of 18 breaths/min and his oxygen saturation was 94% on room air. Enlarged, non-tender cervical lymphadenopathy was identified bilaterally. Chest auscultation did not reveal any adventitious sounds.

Laboratory data revealed a white blood cell count of 7700 c/μL with 60% lymphocytes and 34% neutrophils. Peripheral blood flow cytometry demonstrated a monoclonal B-cell population of 40% with a CLL immunophenotype present.

A chest CT scan demonstrated bilateral, diffuse ground-glass parenchymal opacities (figure 1) and multiple enlarged mediastinal lymph nodes.

Figure 1 Chest CT scan showing bilateral, diffuse, ground-glass parenchymal opacities.

Bronchoalveolar lavage (BAL), transbronchial biopsy and transbronchial needle aspiration under ultrasound guidance (TBNA-EBUS) were performed to attempt to identify the aetiology of the diffuse parenchymal lung opacities and the enlarged mediastinal lymph nodes. Transbronchial and endobronchial lung biopsies showed that the lung interstitium and airway mucosa was infiltrated with CLL. In addition, cytology from TBNA-EBUS of a mediastinal lymph node and BAL fluid was consistent with CLL. Additionally, organisms consistent with PJ were identified by Grocott's Methenamine Silver stain of BAL fluid (figure 2).

Figure 2 Grocott's Methenamine Silver stain of bronchoalveolar lavage showing *Pneumocystis jirovecii*.

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Figure 3 Chest CT scan slice performed 2 months after presentation, at a similar level to that shown in figure 1, demonstrates complete resolution of the ground-glass parenchymal opacities.

TREATMENT

As a result of the bronchoscopy findings, the patient was treated with oral trimethoprim/sulfamethoxazole, but due to adverse effects (hyperkalaemia), was switched to atovaquone to complete a 21-day regimen.

OUTCOME AND FOLLOW-UP

After completion of treatment for PJP, the patient's cough and shortness of breath improved and a subsequent chest CT scan performed 2 months after presentation showed resolution of the parenchymal lung opacities (figure 3).

DISCUSSION

We present the first case, to our knowledge, of PJP in a patient with untreated CLL. The patient had a complete resolution of lung opacities on a chest CT as well as resolution of pulmonary symptoms after treatment for PJP. Although the patient did have CLL infiltration of the lung, the radiographic and clinical improvement occurred prior to the treatment of CLL. In addition, the patient presented with night sweats (a B symptom) which is uncommon even in advanced CLL.

Previous exposure to PJ is common as a high percentage of the population has antibodies to PJ.^{1 2} Sensitive techniques have revealed a frequency of PJ carriage up to 65% in the immunocompetent population.³ Immunocompetent carriers develop frequent self-limited reinfections throughout life and participate in the circulation of PJ as an infective reservoir for susceptible individuals.³ We feel that the patient's BAL findings represented a true PJ infection rather than colonisation given the radiographic and clinical improvement with treatment. Given that PJ colonisation has been documented among healthcare workers,^{4 5} we suspect that our patient could have been previously colonised with PJ during his career as a physician.

PJP occurs when cellular and/or humoral immunity are defective. Chronic lymphocytic leukaemia has been frequently associated with PJP, but to our knowledge, only in patients who

have received chemotherapy treatment or undergone bone marrow transplantation.^{6 7} Untreated patients are not considered at high risk for opportunistic infections such as PJP and are not offered prophylactic antibiotic treatment.⁸ We postulate that our patient developed PJP because parenchymal infiltration with CLL, which was demonstrated on a transbronchial biopsy, could have mechanically interfered with an effective local immune response and clearance of PJ, leading to an increase pathogen load and pneumonia.

Our case demonstrates that PJP should be considered in patients with untreated CLL. Although it is problematic to generalise from this one case, we suspect that patients with CLL infiltration of the lungs may be at particular risk of this complication.

Learning points

- ▶ Despite the lack of previous evidence in the medical literature, *Pneumocystis jirovecii* (PJ) pneumonia may occur in patients with untreated chronic lymphocytic leukaemia (CLL).
- ▶ We postulate the patients with CLL with significant infiltration of CLL cells in the lung interstitium may be at particular risk of developing CLL pneumonia.
- ▶ The PJ pneumonia that develops in patients with untreated CLL pneumonia may reflect clinically important disease as our patients symptoms dramatically improved after treatment of PJ pneumonia and before any treatment of his CLL.

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Competing interests MAJ is a consultant for Janssen, Celgene, Novartis, and T2 Biosystems.

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