Medical Image of the Week: Leukemic Infiltrates

Figure 1. AP portable chest x-ray demonstrating diffuse bilateral infiltrates.

Figure 2. Histology showing extensive interstitial and perivascular lymphocytic infiltrates.

Figure 3. Immunohistochemical staining for CD8 positive T-cell immunophenotype.

A 50 year-old white man with newly diagnosed, acute T-cell prolymphocytic leukemia presented with progressive exertional dyspnea and non-productive cough. The patient was due to meet with his hematologist that day to discuss initiation of treatment. The patient had not noted fever, chills, night sweats, chest pain, or lower extremity swelling. Blood pressure was 112/60 mm Hg, respiratory rate was 36/minute and labored, pulse was 110/minute and temperature was 37 degrees Celsius. Oxygen saturation measured by pulse oximetry was 62% on room air at rest, and rose to 90% after the application of a 100% non-rebreather mask. Diffuse rales were present on chest auscultation. Marked splenomegaly was present on abdominal examination. Peripheral white blood count was 112.2 K/ul with 99% lymphocytes. Smudge cells were noted. Hemoglobin was 12.9 g/dl and platelet count was 93K/ul. Procalcitonin level was 0.3 pg/ml. The chest radiograph demonstrated diffuse bilateral infiltrates (Figure 1). The patient developed rapidly progressive hypoxemia, was intubated orally, and mechanical ventilation was initiated. Lung biopsies were performed via a video-assisted thoracic surgical approach of the right middle and right lower lobes. Microscopic examination demonstrated extensive leukemic infiltration of the pulmonary interstitium and perivascular space (Figure 2). Immunohistochemical staining showed that the infiltrating cells expressed a CD8 positive T-cell immunophenotype (Figure 3) pattern similar to the patient's peripheral blood flow cytometry study. Therapy began with an escalating dose of alemtuzumab and intermittent pentostatin, but the patient developed progressive multi-organ failure and expired.

Acute T-cell prolymphocytic leukemia is an aggressive mature T-cell leukemia usually characterized by peripheral blood lymphocytosis and splenomegaly (1). Extramedullary involvement most commonly affects the skin (2). Diffuse interstitial and perivascular pulmonary involvement with respiratory failure has not been previously reported. Pathological involvement of the pulmonary interstitial space should be considered in patients with acute T-cell prolymphocytic leukemia and respiratory insufficiency.

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