

CONTINUING MEDICAL EDUCATION ΣΥΝΕΧΙΖΟΜΕΝΗ ΙΑΤΡΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

Medical Imaging Quiz – Case 37

An 18-year-old girl presented to the pathologist complaining of acute dyspnea and thoracic pain. She mentioned fever, cough and fatigue lasting for 3 days, a week ago. Initial physical examination revealed pathologic auscultatory sounds. The patient underwent a full laboratory investigation including full blood count, biochemical tests and chest x-ray that revealed abnormal but non specific findings. She had a history of HIV infection since the first year of life, with low compliance to the antiretroviral medication. Measurements of HIV-1 RNA plasma levels were greater than 4×10^3 copies/mL. CD4 T-cell counts at the same time were 230 cells/ μ L. Computed tomography (CT) scan showed characteristic findings (figures 1, 2). Laboratory tests for viral and fungal infection confirmed the diagnosis.

Comment

Pulmonary manifestations of HIV/AIDS are a major contributor to morbidity and mortality related to the disease. The differential in an HIV patient with a chest complaint is broad. Infectious causes are the most common; however neoplasms, lymphoma and interstitial pneumonias also play a significant role.

Infectious

*Although mainly cell-mediated immunity is impaired in HIV infection, humoral immunity is also altered. In particular, B-cell dysfunction is associated with high risk for frequent infections with encapsulated bacteria, such as *Streptococcus pneumoniae*. In recent years, bacterial infections, including infectious airways disease and pneumonia, have surpassed *Pneumocystis carinii* pneumonia (PCP) as the most common cause of pulmonary infection in HIV-positive patients. Most episodes of pneumonia occur secondary to *S. pneumoniae* and *Haemophilus influenzae*, the same organisms that cause most community-acquired pneumonia in the general population. *Pseudomonas aeruginosa* has also recently been recognized as a cause of pulmonary infection in AIDS, especially among patients with a recent history of hospitalization, antibiotic use, or steroid therapy. AIDS patients are also at risk for infection with unusual zoonoses such as *Rhodococcus equi*, an organism that is more commonly encountered in horses, cattle, and swine, and *Bartonella henselae* and *B. quintana*, the causative agents of bacillary angiomatosis.*

Patients with bacterial pneumonia typically present with an acute onset of fever and productive cough. In most cases, bacterial pneumonia presents radiographically as single or multiple sites of focal consolidation, in either a segmental or lobar distribution.

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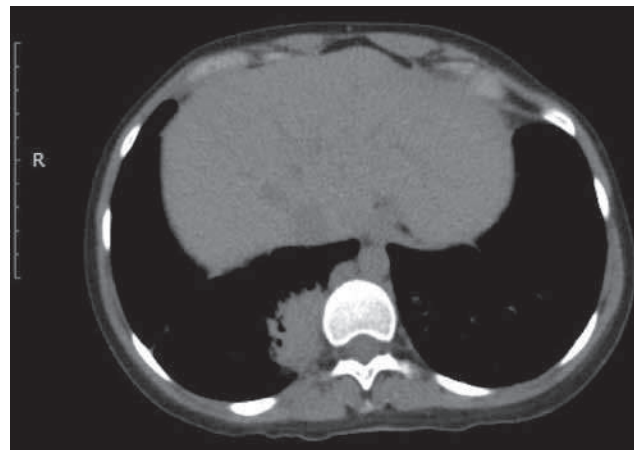


Figure 1. CT reveals solitary pulmonary mass in lower lobe of right lung.

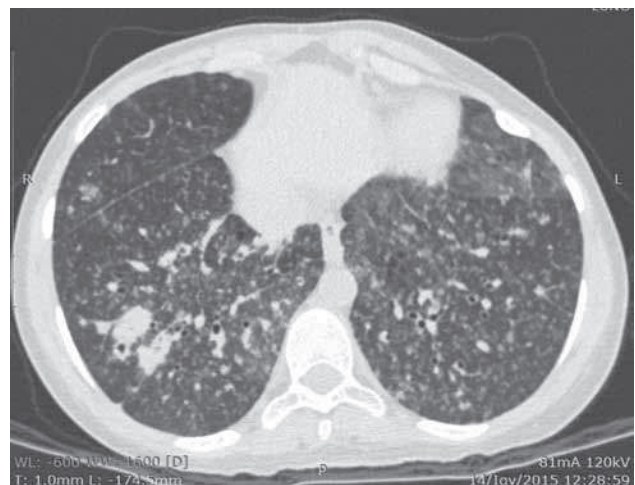


Figure 2. CT reveals reticulonodular opacities in the lower part of right lung.

Chest radiographs of patients with acute bacterial bronchitis are usually normal, but may show bronchial wall thickening. In contrast, the high-resolution CT features of infectious bronchiolitis are

characteristic and include small nodular and branching. Although pyogenic infections are the most common cause of proliferative small airways disease in AIDS patients, viral and mycobacterial infections may produce similar imaging findings.

Tuberculosis (TB) is both highly curable and contagious, prompt diagnosis and treatment are essential. Tuberculosis can occur at any stage of HIV infection. Typical imaging features include parenchymal opacities with associated cavitation, often located within the apical, posterior, and superior segments of the lungs.

Atypical mycobacterial infections in AIDS patients are usually secondary to *Mycobacterium avium-intracellulare* (MAI) and, less commonly, due to *M. kansasii*. Imaging findings in the lungs are variable and include multifocal patchy consolidation, ill-defined nodules, and cavities.

Fungal infections consist a relatively uncommon cause of pulmonary infection in AIDS patients, but are more prevalent in endemic areas. The most common fungal pathogen to involve the lungs in AIDS patients is *Cryptococcus neoformans*. Less common fungal infections include aspergillosis, histoplasmosis, blastomycosis, coccidiomycosis and candidiasis. Fungal pulmonary infection usually occurs in the setting of advanced immunosuppression (CD4 <100/mm³). Imaging findings include nodules, reticular or reticulonodular opacities, and foci of consolidation. Parenchymal abnormalities may be accompanied by lymph node enlargement and pleural effusion.

Cytomegalovirus (CMV) is the most common viral agent identified in the lungs of AIDS patients. The most common imaging features of CMV pneumonitis are ground-glass opacities and alveolar consolidation, which may mimic PCP. Other imaging findings include nodules, masses, and small airways disease.

Neoplasms

Kaposi's sarcoma is a multicentric disease that frequently involves the skin, lymph nodes, gastrointestinal tract, and lungs. Characteristic findings on chest radiography include thickening along the peribronchovascular bundles, often in the perihilar regions. As the tumor grows, reticulonodular opacities may appear, mainly in the lower lobes. The interstitial and ill-defined nodular opacities may coalesce to form dense areas of alveolar consolidation. CT of the chest offers additional benefits over conventional chest radiography by revealing mediastinal lymphadenopathy, which is present in 50% of cases, and improved characterization of the bronchovascular pattern of lung parenchymal opacities.

Non-Hodgkin's lymphoma (NHL) is the second most common

malignancy in AIDS, occurring in 2% to 10% of HIV-infected individuals. The most common radiologic findings consist of multiple pulmonary nodules, areas of consolidation, and pleural effusions. Reticular opacities and masses are also observed relatively frequently. With regard to lung nodules, they are usually well circumscribed and range in size from 0.5 to 5 cm in diameter; air bronchograms are frequently present, and a halo of ground-glass attenuation may be observed around the nodules on thin-slice CT.

Lymphocytic interstitial pneumonia (LIP) is characterized by interstitial lung infiltration by mature lymphocytes and plasma cells creating peribronchovascular nodules without airspace involvement. Lymphocytic interstitial pneumonia is seen in 30% to 40% of pediatric HIV-infected patients with pulmonary disease but less frequently in adults with AIDS. Patients may be asymptomatic or show an insidious onset of respiratory distress with cough and mild hypoxemia. Characteristic findings on chest radiography consist of fine or coarse reticular and nodular opacities with an occasional alveolar component. CT reveals ill-defined 2- to 4-mm nodules, often in peribronchovascular distribution and bilateral areas of ground-glass attenuation.

Even in the current era of potent antiretroviral therapy, pulmonary complications of AIDS remain an important cause of morbidity and mortality among HIV-infected individuals. Interpretation of imaging studies should integrate demographic, clinical, and laboratory information with radiographic pattern recognition.

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