Cystic *Pneumocystis* pneumonia

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DESCRIPTION

A person living with HIV (PLHIV) in his 40s was admitted to the emergency department with low-grade fever, progressive dyspnoea, and cough with scanty sputum for 2 months. He was recently diagnosed with PLHIV and did not receive antiretroviral therapy. On vital examination, the pulse was 116 beats/min, the blood pressure was 108/66 mm Hg, the respiratory rate was 30 breaths/min and the oxygen saturation was 90% with high-flow oxygen supplementation through a non-rebreathing mask. The ratio of arterial oxygen partial pressure to fractional inspired oxygen was 94. A high-resolution CT (HRCT) showed variable-sized pneumatoceles, ground-glass opacities (GGOs) with peripheral sparing and interstitial infiltrates in both lungs (figure 1). The pneumatoceles had a predilection for the upper lobes and subpleural location. Sputum examination for bacterial culture, fungal organisms and cartridge-based nucleic acid amplification and culture for *Mycobacterium tuberculosis* were negative. Serum (1-3)-beta-D-glucan level was 417 pg/mL (normal, <60).

A markedly elevated serum (1-3)-beta-D-glucan level in PLHIV with characteristic radioimaging features has a high predictive value for *Pneumocystis* pneumonia (PCP). The patient received oral cotrimoxazole and prednisolone for 3 weeks for severe PCP. However, the diagnosis could not be confirmed by PCR or staining of the cyst because of the inability to perform broncho-alveolar lavage due to a high oxygen requirement. The CD4 count was 16/µL. He was started on antiretroviral therapy with tenofovir, dolutegravir and lamivudine. A spontaneous pneumothorax occurred in the left lung, which required drainage. He improved gradually and was discharged after 1 month of hospital stay.

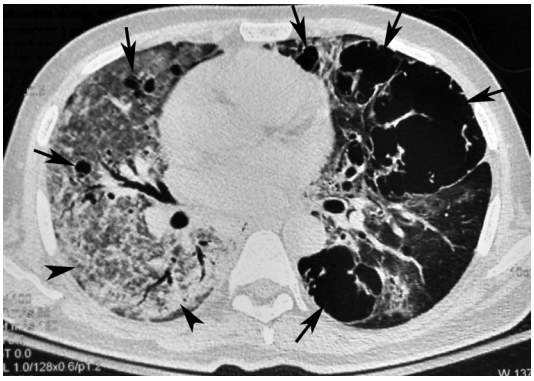

Figure 1 A high-resolution CT showing variable-sized pneumatoceles (arrows), ground-glass opacities with peripheral sparing (arrowheads) and interstitial infiltrates in both lungs.

Thoracic CT remains the cornerstone of diagnosing respiratory infections in PLHIV, especially in the absence of sputum or broncho-alveolar lavage examination. An HRCT has about 90% positive predictive value and about 100% negative predictive value for the diagnosis of PCP in PLHIV.[1,2] Diffuse symmetrical GGOs and interstitial infiltrates are seen in almost all patients, yet not specific.[1] Pneumatoceles or lung cysts are less common, seen in 10%–34% of cases, but are specific for the diagnosis of PCP.[2] Their presence, along with GGOs, is highly suggestive of PCP in PLHIV. A small proportion of cases cause nodules; however, tree-in-bud nodules, mediastinal lymphadenopathy and pleural effusions are rare and suggest an alternate aetiology.

The lung cysts in PCP are usually thin-walled, though they may vary in size and shape. They typically have a predilection for the upper lobes and a subpleural location and may occur bilaterally. Large and subpleural cysts are associated with an increased risk of rupture and spontaneous pneumothorax.[1 2] The exact pathogenesis of cyst formation in PCP is not fully understood; however, the possible mechanisms include bronchiolar obstruction, alveolar damage by macrophage activation or direct cytotoxic effect by the infection.[3] Cystic lung disease represents a longstanding or advanced *Pneumocystis* infection. Prompt adequate treatment of PCP often (but not invariably) resolves the cysts.

Learning points

- Although less common, pneumatoceles or lung cysts are characteristic radiological manifestation of *Pneumocystis* pneumonia (PCP), and helpful in making a rapid diagnosis in person living with HIV with respiratory symptoms in acute care settings.
- Pneumatoceles have a predilection for the upper lobes and a subpleural location, the latter is associated with a high risk of rupture to cause pneumothorax.
- Cystic lung disease often represents an advanced PCP.

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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

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