# A Case of Pneumocystis Pneumonia in an HIV/AIDS Patient from Sudan

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November 09, 2024

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**Consent for Publication**

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

## Acknowledgments

None.

**Funding:**

None

## Disclosure

The author reports no conflicts of interest in this work.

**Key clinical message:**

Pneumocystis pneumonia (PCP) should be considered in individuals with HIV/AIDS presenting with respiratory symptoms, such as low-grade fever, weight loss, and a productive cough. Combining different diagnostic techniques will aid in the final diagnosis and thus accurate patient management.

**Abstract:**

Pneumocystis pneumonia (PCP) is a common opportunistic infection in individuals with weakened immune systems, particularly those living with HIV/AIDS. It is challenging to diagnose due to its nonspecific clinical manifestations. This case presentation describes the clinical course of a 39-year-old male with persistent respiratory symptoms who was eventually diagnosed with PCP. The patient's positive HIV status, cytological

examination together with imaging supported the diagnosis, and treatment with Septran resulted in significant clinical improvement. This case highlights the importance of considering PCP in immunocompromised individuals with respiratory symptoms and the need for prompt diagnosis and management.

**Keywords:**

Pneumocystis pneumonia; opportunistic infection; HIV/AIDS; respiratory symptoms

## 1 Introduction:

Pneumocystis pneumonia (PCP) is an opportunistic infection commonly seen in individuals with weakened immune systems, particularly those living with HIV/AIDS [1, 2]. Despite the advancements in antiretroviral therapy, PCP remains a significant cause of morbidity and mortality in this population [3]. The diagnosis of PCP is challenging due to its non-specific clinical manifestations, which can mimic other infectious and non-infectious diseases [4,5]. In this case presentation, we discuss the clinical course of a 39-year-old male with persistent respiratory symptoms, including low-grade fever, weight loss, and a productive cough. Initial treatment with antibiotics proved ineffective, leading to further investigations. Chest X-ray and CT scan revealed characteristic radiological findings, and bronchial washings exhibited honeycomb-like alveolar casts. The patient's positive HIV status supported a presumptive diagnosis of PCP. Timely initiation of appropriate treatment with Septran (sulfamethoxazole and trimethoprim) resulted in significant clinical improvement. This case highlights the importance of considering PCP in the differential diagnosis of respiratory symptoms in immunocompromised individuals and emphasizes the need for prompt diagnosis and management to improve patient outcomes.

## 2 Case History:

A 39-year-old male presented to the pulmonology clinic with several complaints. He had been experiencing low-grade fever, weight loss, and a productive cough for the past month. The patient had previously taken multiple antibiotics, including a recent course of amoxicillin 1g twice per day for 7days, with no relief. He reported a decrease in appetite and had lost approximately 9 kg of weight.

## 3 Methods:

His vital signs were stable (His blood pressure was 107/66 mm Hg, his pulse was 88 beats/min, respiratory rate was 15 breaths/min and his weight was 43 kg), and physical examination revealed normal respiratory sounds with no added sounds. However, chest X-ray showed bilateral diffuse interstitial prominence with nodular infiltrates.

The patient was initially started on empirical antituberculosis therapy due to the high burden of tuberculosis in Sudan. However, after one month, there was no improvement in symptoms. The patient returned to the clinic with worsening fever, which was almost persistent during the night. CT scan findings showed a patchy area of ground glass with relative sparing of the apices and intralobular septal thickening, along with nodular infiltrates in both lung fields (figure 1).

As the patient agreed to undergo bronchoscopy, normal airways with normal mucosa were observed. Bronchial washings were collected from the lower lobes bilaterally for microbiology, culture, and cytology testing. Blood cultures showed no growth of any organism. Acid-fast bacilli smear and culture, Nocardia and fungal smears and cultures, and GeneXpert testing for tuberculosis were all negative. Cytological examination ruled out malignancy and showed a three-dimensional alveolar cast exhibiting the characteristic honeycomb appearance; immediately a special stain was requested and the smear stained with methenamine silver and after visualization under the microscope, a spherical cysts (cup shaped, crinkled and crescent) were noticed approximately in the size of the diameter of red blood cells (Figure 2). The patient's blood was tested for HIV, which came back reactive.

## 4 Conclusion and results:

Given the overall clinical picture, a presumptive diagnosis of Pneumocystis pneumonia was made, and

the patient was initiated on therapy. Septran double strength, containing sulfamethoxazole (800 mg) and trimethoprim (160 mg), was started, and the patient tolerated the treatment well for a total of 21 days. After one week of treatment, the patient showed improvement in breathing and became afebrile. Follow-up chest X-rays also demonstrated signs of improvement, and eventually, the patient fully recovered.

**5 Discussion:**

Pneumocystis, a group of microorganisms causing pneumonia, has traditionally been classified as a fungus due to its similarities to other fungi [6]. However, it is important to note that recent research has revealed that its classification is still a topic of debate in the scientific community [6]. Furthermore, the inability to cultivate Pneumocystis in laboratory conditions poses an additional barrier to studying and understanding this microorganism [6]. Patients with pneumocystis pneumonia (PCP) commonly present with a variety of symptoms, including low-grade fever, productive cough, and shortness of breath. In fact, studies have shown that approximately 80-100% of PCP patients experience low-grade fever, while 95% present with both productive cough and shortness of breath. These symptoms are often nonspecific and can mimic other respiratory conditions, making the diagnosis of PCP challenging [7, 8, 9]. Our patient initially presented with symptoms such as low-grade fever, weight loss, and a productive cough, which persisted despite previous antibiotic treatment.

The diagnosis of PCP poses significant challenges due to the non-specific clinical manifestations that can mimic various infectious disease such as tuberculosis [10, 11]; Nocardia; fungal infections and COVID-19 [12 - 21] as well as non-infectious diseases. Additionally, imaging techniques such as chest X-rays and CT scans are not always definitive in diagnosing PCP. In fact, 25% of initial PCP cases may show normal chest X-ray results, and CT scans may not clearly indicate the type of abnormality. While bilateral interstitial infiltrates are commonly observed in PCP, the radiological findings can also be atypical [22]. In the presented case, the chest X-ray revealed diffuse interstitial prominence with nodular infiltrates which is also can be associated with tuberculosis, fungal infections, Nocardia, sarcoidosis and Metastatic carcinoma with lymphangitis carcinomatosis.

Further investigations, including a CT scan and bronchoscopy, were conducted. The CT scan revealed ground glass opacities with intralobular septal thickening and nodular infiltrates. Bronchial washings were collected for microbiology, culture, and cytology testing. Acid-fast bacilli smear and culture, Nocardia and fungal smears and cultures, and GeneXpert testing for tuberculosis were negative. Additionally, cytology ruled out malignancy but showed a three-dimensional alveolar cast with a honeycomb appearance. Based on the clinical presentation, CT findings, and the presence of honeycomb-like alveolar casts, a presumptive diagnosis of PCP was made. The diagnosis was supported by the patient's positive HIV status. PCP is an opportunistic infection commonly seen in individuals with weakened immune systems, such as those with HIV/AIDS.

Additionally, Trimethoprim-sulfamethoxazole (TMP-SMX) is considered the first-line treatment for mild-to-severe cases of PCP [13]. The recommended dosage for TMP-SMX is typically 15mg/kg/day. However, intravenous pentamidine is also an effective alternative to TMP-SMX. It should be noted that pentamidine carries a higher risk of adverse events compared to TMP-SMX. For individuals with mild or moderate PCP, the oral alternative regimen is atovaquone. Although atovaquone is less effective than TMP-SMX, it is generally better tolerated [22, 34]. In cases of moderate to severe PCP, which is defined as having an arterial oxygen pressure less than 70 torr on room air and an alveolar-arterial oxygen gradient greater than 35 torr, adjunctive corticosteroid therapy is recommended [23]. In our case, the treatment was initiated with Septran (sulfamethoxazole and trimethoprim) for a total of 21 days, resulting in significant clinical improvement. Follow-up chest X-rays showed resolution of the previously observed abnormalities, and the patient fully recovered.

In conclusion, this case emphasizes the significance of including opportunistic infections, like PCP, in the differential diagnosis of respiratory symptoms in individuals with HIV/AIDS. It is crucial to promptly diagnose and initiate appropriate treatment for improved patient outcomes. Collaboration between pulmonologists,

infectious disease specialists, and HIV specialists can greatly assist in accurately diagnosing and managing such cases. The patient's positive HIV status, along with the clinical presentation, CT findings, and the presence of honeycomb-like alveolar casts, supported the diagnosis of PCP.

**Consent for Publication**

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

**Author's contributions:**

EES, ATH, CMM, and AA contributed in the Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Supervision; Validation; Visualization; Writing – original draft and Writing – review & editing of final version.

**Acknowledgments**

None.

**Funding:**

None

**Disclosure**

The author reports no conflicts of interest in this work.

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**Figure legends:**

**Figure 1.** Displays a CT scan that exhibits septal thickening accompanied by nodular infiltrates in both lung fields.

**Figure 2. A:** displays a three-dimensional alveolar cast, displaying the distinct honeycomb pattern, is presented.**B:** *Pneumocystis spp.,* stained with methenamine silver, showing the typical appearance of the cyst form of the organism