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Case report

Simultaneous bilateral pneumothorax in an immunocompromised HIV patient with *Pneumocystis jirovecii* pneumonia

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A B S T R A C T

Pneumocystis in humans is caused by a unicellular and eukaryotic organism called *P. jirovecii*. The overall incidence of *P. jirovecii* pneumonia (PCP) has decreased with the use of highly active antiretroviral therapy and the use of chemoprophylaxis with trimethroprim sulfametoxazole (TMP/SMX) in cases of immunosuppressed patients. However, approximately 85% of patients with advanced HIV infections continue to experience this disease with inadequate management. Pneumocystis infection can present with spontaneous pneumothorax in 2–6% of cases [8] which can be a potentially fatal complication.

We report the case of a 32-year-old man presented with *P. jirovecii* pneumonia who developed cystic lesions and spontaneous bilateral pneumothorax in spite of TMP/SMX treatment. We consider it an interesting clinical case because few simultaneous bilateral pneumothorax cases have been described directly related to the PCP.

1. Introduction

Pneumocystis in humans is caused by a unicellular and eukayotic organisms called *P. jirovecii*. The name pneumocystis refers to the microscopic image of the fungus and no to the radiological pattern of the disease [2]. Humans appear to be a reservoir for this fungus. More than 90% of *P. jirovecii* pneumonia cases occurred in patients with $CD4^+$ T lymphocyte counts less than 200 cell/mm^3 [2].

We report the case of a 32-year-old man presented with *P. jirovecii* pneumonia who developed cystic lesions and spontaneous bilateral pneumothorax in spite of correct TMP/SMX treatment. Few simultaneous bilateral pneumothorax cases have been described directly related to the PCP, and clinicians should be aware that abrupt deterioration within minutes in patients with PCP is unlikely to be due to infection alone and we have to search for abnormalities like this one we describe.

2. Case report

A 32-year-old non-smoker man with an unremarkable medical history, presented to the emergency department with non-productive-cough, night sweats and fever which began 20 days before, after a business trip to Bolivia. He worked in a consultancy, which leads him to travel a lot for business. He had visited many Asian and South American countries in the past year such as India, China, Venezuela or Chile. He denied having homosexual relationships or intravenous drug use.

On admission, the temperature was 36 °C, with an oxygen saturation of 90% and a blood pressure of 104/72 mmHg. Auscultation of his lungs revealed rhonchus in the left lower lung lobe and chest radiography confirmed an alveolar infiltrate in the same location. The complete blood cell count showed a white blood cell count of 7260/mm^3 (neutrophils 62.8%, 22.6% monocytes) with normal hemoglobin and platelet levels.

Finally, following these tests a diagnosis of Community-acquired Pneumonia was made, prescribing a treatment with intravenous (i.v) levofloxacin. However, the patient didn't want to be hospitalized and was discharged against medical advice, taking oral treatment during 10 days.

Two months later he visited the hospital again without fever but this time with dry and persistent cough, dyspnea and weight loss he couldn't specify. Physical examination showed a respiratory rate of 36 breaths per minute and a pulse of 115 beats per minute. Arterial blood gas analysis measured while breathing room air showed arterial oxygen partial pressure (PaO2) of 64 mmHg. Complete blood cell count was similar to previous one. On initial simple-chest-X-ray diffuse bilateral basal infiltrates were observed (Fig. 1).

In this clinical context, he was hospitalized in the department of Respiratory Medicine to further investigation. High resolution

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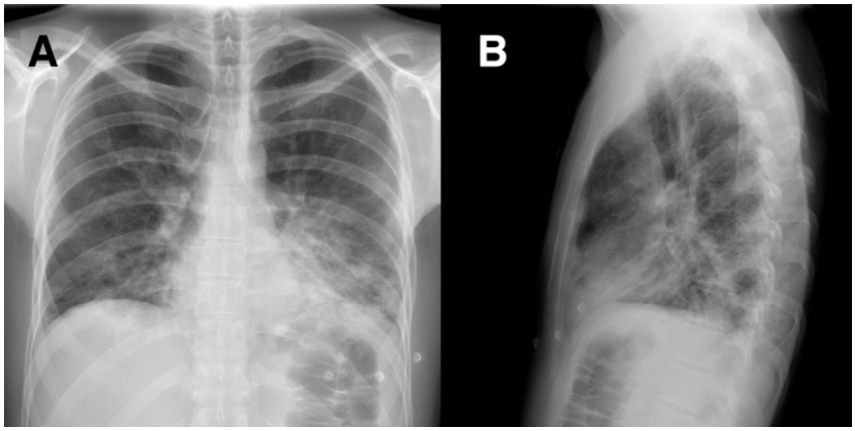

Fig. 1. Initial simple-chest-X-ray. Posterior-anterior (PA) projection. It shows diffuse bilateral basal infiltrates.

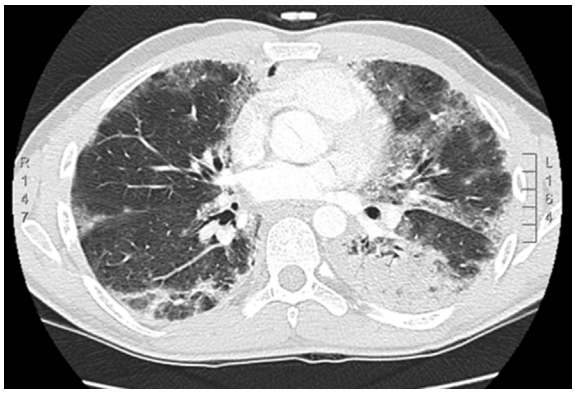

Fig. 2. First chest CT shows ground-glass opacities on both upper lung lobes and consolidations areas in lower lung lobes.

computed tomography (CT) showed ground-glass opacities on both upper lung lobes and consolidations areas in lower lung lobes (Fig. 2). At the same time, HIV, Hepatitis and syphilis blood test were performed, which were positive for syphilis and HIV with initial $CD4^+$ T lymphocyte count of 30/mm^3 and 5785 copies/mL and a high LDH level was confirmed (274 U/L, normal below 225 μL). Accordingly, empiric treatment with TMP/SMX and corticosteroids were initiated.

Next day, a bronchoscopy was performed, detecting *P. jirovecii* in bronchoalveolar lavage (BAL) specimen on PCR test and antiretroviral therapy was started.

Subsequently, he presented with chest pain and dyspnea. A chest radiography showed a bilateral large pneumothorax with indication of endothoracic drainage with chest tube.

Few days later, he was referred to the Intense Care Unit because endotracheal intubation was required due to hemodynamic instability and respiratory failure.

On follow-up CT performed, there was an improvement in ground-glass opacities and consolidations areas with the striking new appearance of multiple cysts compared to the previous CT (Fig. 3).

Additionally a *Capnocytophaga sputigena* pneumonia and bacteremia was confirmed and a combination of amoxicillin and clavulanic acid was added to treatment. Four days later he was extubated because of clinical improvement, and both thoracostomy tubes were removed a month after their placement.

A month and a half after admission, the patient was discharged in a stable condition.

3. Discussion

Pneumocystis spp are unicellular, eukaryotic organisms that exist almost exclusively within the alveoli of the lung. There has been identified five species-specific Pneumocystis and the one that affects humans is *P. jirovecii* [3]. The transmission of the fungus is airborne.

Pneumocystis jirovecii infection often occurs in human immunodeficiency virus (HIV) infected patients with less than 200 cell/mm^3 of CD4 + T cell count [4]. It is also related to a CD4 cell percentage of less than 14 percent, previous episodes of PCP, oral thrush, recurrent bacterial pneumonia, unintentional weight loss, and higher plasma HIV RNA levels.

However, since the widespread use of PCP prophylaxis with TMP/SMX and early antiretroviral therapy, the PCP incidence among individuals with HIV infection has markedly declined, being increasingly diagnosed in non-HIV infected immunocompromised patients such as hematooncologic patients, patients under immunosuppressive drugs due to autoimmune or chronic disease.

PCP symptoms in Acquired Immunodeficiency Syndrome (AIDS) patients includes subacute onset of dyspnea, nonproductive cough and fever, similar to non-HIV-Infected patients, although in the second case there is a more acute onset of symptoms with faster progression of disease and higher mortality [2].

The rapid diagnosis of PCP is crucial as early treatment initiation has been associated with significantly reduced mortality. Such is the case that empiric treatment should be started immediately in case of suspicion of the disease. For several days, medical tests are not altered even under correct treatment.

Definitive diagnosis is based on identification of the organism on histopathology. *P. jirovecii* does not grow on culture media in vitro, so the diagnosis relies on the visualization of cysts or trophic forms in respiratory material. BAL has more than 90% sensitivity and 100% specificity.

Polymerase chain reaction (PCR) is also an important diagnostic method. It allows to identify and quantitate *Pneumocystis*, even with very low fungal loads [5].

Blood LDH is usually high and X-ray of the chest may show perihiliar intersticial infiltrate. High resolution CT of the chest is preferred, and it often shows ground-glass opacities with a central distribution, although it may differ depending on the patient. Upper lobe predominance has been described.

Spontaneous pneumothorax has been recognized as a complication in patients with PCP since it was first described in 1984 [6]. Pneumocystis infection can present with spontaneous pneumothorax in 2–6% of cases. In fact, pneumothorax occur 450 times more frequently in AIDS patients versus the general population [7].

Not every spontaneous pneumothorax in PCP is related with cysts, but they have been described as an important risk factor to develop it.

Several theories have been proposed to explain the pneumatoceles, whose aetiology is still not exactly known. Most important one explains these cysts due to severe necrotizing alveolitis, leading to replacement

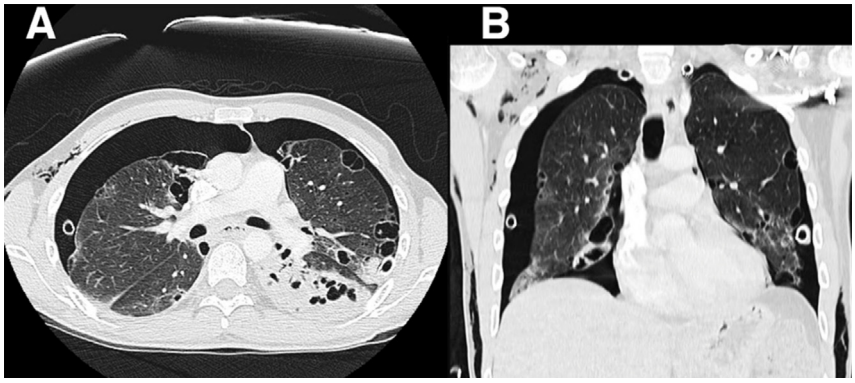

Fig. 3. Follow-up chest CT. It shows an improvement in ground-glass opacities and consolidations areas with multiple cysts as new radiological findings. There could be seen both pneumothorax with both thoracostomy tubes and subcutaneous emphysema.

of the lung parenchyma by cysts and pneumatoceles. Cystic lesions are often small, bilateral and multiple but there has also been described spontaneous pneumothorax due to necrotic subpleural blebs [8].

The name pneumocystis refers to the microscopic image of the fungus and no to the radiological pattern of the disease [2].

In spite of this, a pneumothorax in a HIV patient could be developed due to other causes such as *Mycobacterium tuberculosis,* nontuberculosis mycobacteria, prophylaxis with aerosolized pentamidine, toxoplasma, cytomegalovirus or influenza. Kaposi's sarcoma involving the lung is also a concern.

Cystic lesions are usually absent in non HIV-infected patients with PCP [9].

Patients with small pneumothoraces (less than 15–20%) may have spontaneous resolution. In patients with larger pneumothoraces the treatment of choice is the application of a chest tube thoracostomy. If re-expansion is not achieved by tube thoracostomy patients will need therapy with videothoracoscopy for stapling and pleurodesis.

However, patients with AIDS-related pneumothoraces tend to have persistent air leaks, related often with bronchopleural fistula. For this reason sometimes the surgical approach is avoidable [8].

In conclusion, few simultaneous bilateral pneumothorax cases have been described directly related to the PCP. Cystic lesions can develop in spite of TMP/SMX treatment. Clinicians should be aware of cystic lesions, as the appearance of pneumothorax or even pneumomediastinum, which usually are recurrent in HIV-patients with PCP are a mayor risk. The presence of cysts and pneumothorax is associated with a worse prognosis [10].

We should remember that abrupt deterioration in patients with PCP is unlikely to be due to infection alone and we have to search for other abnormalities.

Conflict of interest

The authors declare no conflict of interest.

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