

Pneumocystis Jirovecii Pneumonia (PCP) in HIV Patient: A Case Report

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Abstract: *Pneumocystis jirovecii pneumonia (PCP) caused by the Pneumocystis jirovecii fungus is an opportunistic infection that often manifests itself in Human Immunodeficiency Virus (HIV) patients. PCP is responsible for two - thirds of disease in the AIDS and estimated 75% of HIV - infected patients will develop PCP during their lifetime. The diagnosis of PCP is relatively difficult because the symptoms, blood tests, and chest radiography are not pathognomonic for PCP. Untreated PCP can be fatal and increase mortality. The main choice of PCP treatment is Trimethoprim - sulfamethoxazole (TMP - SMX) orally or intravenously for 21 days which is a combination of 2 enzyme inhibitors on pneumocystis folate synthesis. The severity of the infection and the high mortality rate in PCP make prevention very important in at - risk groups. This case report discusses a patient with complaints of fever, non - productive cough, and shortness of breath who was diagnosed with PCP. The patient received treatment in the form of cotrimoxazole 3x960 dose for 21 days. Treatment response was achieved on the seventh day and then the patient could go on an outpatient basis.*

Keywords: Human Immunodeficiency Virus (HIV), Pneumocystis jirovecii pneumonia (PCP), Trimethoprim - sulfamethoxazole (TMP - SMX)

1. Introduction

Pneumocystis jirovecii pneumonia (PCP) caused by the fungus Pneumocystis jirovecii fungus is a life - threatening opportunistic infection that often manifests itself in immunocompromised individuals. PCP condition is often a manifestation of Acquired Immunodeficiency Syndrome (AIDS) in patients with Human Immunodeficiency Virus (HIV) infection, especially in HIV patients with CD4 less than 200 cells/ul. PCP is responsible for two - thirds of disease in the AIDS cohort and an estimated 75% of HIV - infected patients will develop PCP during their lifetime.¹ Most cases of PCP occur in patients who do not know their HIV status or who are not taking ARVs.²

There are currently shifting epidemiological trends in resource - rich countries, areas with highly active use of antiretroviral therapy, as well as routine primary PCP prophylaxis, that there has been a decrease in the number of HIV - associated PCP patients. At the same time, PCP is now becoming a concern in patients with non - HIV - related immune deficiencies such as patients on medications to treat malignancies, autoimmune diseases, and inflammatory diseases, and patients with organ transplants. Although infection rates have decreased significantly, these opportunistic infections are still most prevalent in HIV patients and cause a significant burden of disease in immunocompromised individuals.³

Patients with PCP can show symptoms such as fever, cough, dyspnea, and respiratory failure. The Pneumocystis jirovecii fungus is suspected to be transmitted through the air. Asymptomatic lung colonization may occur in persons with normal immune systems and they may unwittingly serve as reservoirs (asymptomatic carriers) for spread to immunocompromised individuals. PCP mortality is estimated to be in the 10 - 20% range during initial infection and increasing with the need for mechanical ventilation.⁴

The diagnosis of PCP is relatively difficult because the symptoms, blood tests, and chest radiography are not pathognomonic for PCP. The fungus Pneumocystis jirovecii

cannot be cultured which needs further histopathological or cytological examination, fluid from broncho - alveolar lavage (BAL), or samples from induced sputum are needed to definitively diagnose PCP. Apart from BAL fluid and sputum induction, fungal DNA can also be detected by PCR in oropharyngeal smears. Nasopharyngeal aspiration can help patients who are intolerant to bronchoscopy or sputum - induced procedures.⁵ Despite all the obstacles, detecting PCP cases as early as possible must still be done so that they can be treated promptly and prevent mortality.

2. Case Illustration

A 31 - year - old male patient, 60 kilograms complained of a fever that had been up and down for 5 days before admission (BA). The patient has had a fever for 1 month of BA with a cough without sputum, shortness of breath, nausea and vomiting, and diarrhoea. Shortness of breath is felt to interfere with the patient's activities. Nausea, vomiting is felt up to > 5 times per day and complaints of diarrhea up to > 10 times per day. Complaints of nausea and vomiting cause the patient to feel weak. The patient admits that this is the first time she has experienced a series of these symptoms. None of the patient's family experienced anything similar. The patient denied any history of chronic diseases such as hypertension, diabetes mellitus, heart disease, and tuberculosis. The new patient was found to have HIV when he was admitted to the hospital.

Based on physical examination, it was found that the patient was tachycardia and tachypnea with a history of desaturation which improved with oxygen. In addition, oral candidiasis and bilateral coarse wet rhonchi were found in the lungs. The initial examination in the form of a COVID - 19 swab and TCM TB showed negative results. Follow - up tests in the form of RT=PCR SARS CoV2 and Xpert MTB - RIF Assay also showed negative results. Rapid Anti - HIV examination showed reactive results. The patient has an absolute CD4 of 115 cells/mm³. Blood laboratory examination showed leucocytosis and elevated liver enzymes, as well as decreased blood electrolytes. On chest

X - ray examination, infiltrates of both lung fields were seen with the impression of pneumonia.

The patient was diagnosed with PCP. The treatment for PCP given to this patient is co - trimoxazole therapy with a dose of 3x960 for 21 days. After co - trimoxazole administration, the patient experienced improvement, reduced shortness of breath and improved oxygenation, so that on the 7th day of co - trimoxazole administration, the patient was sent home and treatment was continued on an outpatient basis.



Figure 1: Patient Thorax Rontgen

3. Discussion

PCP is the main manifestation of pneumocystis infection in patients with HIV. Based on these conditions, it is important to establish the condition of HIV as a risk factor for PCP. Patients diagnosed with HIV or oral candidiasis who are suspected of having HIV if they complain of fever, shortness of breath, and/or a non - productive cough can be suspected as PCP. PCP symptoms range from mild symptoms that can get worse over days to weeks. These symptoms can appear slowly over a few weeks like in HIV patients, where if not treated immediately they can become shortness of breath at rest.⁶ In this patient, HIV was discovered with complaints of progressive shortness of breath, dry cough, and low fever that had been felt since a month of SMRS.

HIV patients can be recognized by the presence of other symptoms such as oral candidiasis and weight loss on physical examination. The physical examination for PCP is also non - specific. Patients may exhibit symptoms of respiratory distress such as tachypnea, tachycardia, and cyanosis. Physical examination may reveal bilateral rhonchi, but often no significant abnormalities are found in mild cases. In severe cases, the patient may fall into a state of hypoxia.⁷ In this patient, tachycardia and tachypnea were found which corresponded to symptoms of respiratory distress. In this patient, desaturation was obtained in the emergency room (ER) which improved with oxygen administration. On examination of the lung fields, ronchi

were found in both lung fields which confirmed the suspicion of the diagnosis of PCP.

Many HIV patients only know their HIV status when they experience opportunistic infections because of the atypical clinical symptoms, especially in the early stages. CD4 count in HIV patients can help diagnose PCP because PCP mainly occurs at CD4 less than 200 cells/mm³. The patient has an absolute CD4 of 115 cells/mm³ which supports the possible diagnosis of PCP. The initial examination should include a chest X - ray and measurement of arterial oxygenation via blood gas analysis. The chest X - ray shows diffuse bilateral or perihilar infiltrates that may progress to the alveolar diffuse view. PCP can also show unilateral, focal, consolidation, nodule, cavity, pneumothorax and sometimes pleural effusion. In this patient, an infiltrate of both lung fields was obtained which was in line with the PCP theory. In 30% of HIV patients, PCP does not cause any abnormalities on the chest X - ray.⁸

Untreated PCP can be fatal and increase mortality. Clinically and radiologically in this patient are very directed towards PCP, so some medication is given. In HIV patients with PCP, treatment was given for 21 days and in non - HIV patients for 14 days. The main choice of PCP treatment is Trimethoprim - sulfamethoxazole (TMP - SMX) which is a combination of 2 enzyme inhibitors on the synthesis of pneumocystis folate. Administration of TMP - SMX orally is an option for mild PCP, while moderate to severe PCP or patients with impaired gastrointestinal absorption should receive TMP - SMX intravenously. The recommended dose for PCP therapy is 15 - 20 mg/kg of trimethoprim per day and 75 - 100 mg/kg of sulfamethoxazole per day divided into three or four doses. The main side effects of TMP - SMX are fever, rash, neutropenia, thrombocytopenia, nausea, vomiting, and elevated liver enzymes. Toxicity mainly occurs in the first weeks and is more common in HIV patients (50 - 60%) than non - HIV patients.⁹ In PCP patients with HIV, the response to therapy is usually delayed, but should occur within the first eight days. If this does not occur, it is necessary to seek an alternative diagnosis or alternative regimen.¹⁰ The management of this patient was given cotrimoxazole with a dose of 3x960 for 21 days. The patient's treatment response was achieved on the seventh day then the patient could go on an outpatient basis.

Similar to HIV patients with tuberculosis, HIV patients with PCP need to receive ARV treatment for at least 2 weeks after receiving PCP treatment. Early ARV administration has the risk of causing immune reconstitution inflammatory syndrome (IRIS) or overlapping side effects that complicate treatment. The most common complications of pneumocystis infection are respiratory failure and pneumothorax. Pneumothorax mainly occurs in patients who have used pentamidine aerosol as a prevention of PCP and smokers.¹¹

The severity of the infection and the high mortality rate in PCP make prevention very important in at - risk groups. Although PCP is transmitted through the respiratory system, it is difficult to avoid transmission because pneumocystis is everywhere. Isolation of PCP patients is not recommended, but avoiding treatment places together with patients who

have risk factors can be done. TMP - SMX is also a primary choice of primary and secondary prophylaxis besides dapsone, atovaquone and pentamidine. HIV patients should receive PCP chemoprophylaxis if their CD4 count is less than 200 cells/ul or there is a history of oropharyngeal candidiasis. Chemoprophylaxis is recommended for life, but administration can be stopped in patients who have received ARVs and whose CD4 has increased from <200 cells/ul to >200 cells/ul for 3 months and resumed if CD4 returns <200 cells/ul.⁹

Patients who are intolerant of TMX - SMX can be desensitized. Desensitization can be performed 2 weeks after a non - severe (stage 3 or less) allergic reaction causing temporary interruption of TMP - SMX. Desensitization should not be performed in patients with a history of stage 4 hypersensitivity reactions. Of all these options, TMP - SMX remains the first choice because of the lowest prophylactic failure rate. In patients who have experienced a mild allergic reaction to sulfa, TMP - SMX can be given by escalating the dose within 6 to 13 days until it reaches the full dose.⁹

Mortality in untreated PCP can be as high as 100%. With adequate treatment, mortality in HIV and PCP patients is 10% lower than non - HIV patients (40%). The risk factors for mortality are the severity of hypoxia, old age, recurrent PCP, low haemoglobin levels and the presence of other comorbid diseases. In HIV patients, other prognostic factors are the extent of infiltrate on chest X - ray, increased neutrophils and IL - 8 in BAL fluid, increased LDH, decreased albumin, and CD4 cell count.¹²

4. Conclusion

Pneumocystis carinii pneumonia (PCP) is suspected in a patient with HIV who presents with fever, shortness of breath and/or a non - productive cough. The presence of respiratory distress to hypoxia coupled with the appearance of bilateral diffuse infiltrates on chest X - ray examination supports the suspicion towards PCP. The treatment of choice for patients with PCP is TMX - SMX for 21 days and response to therapy generally occurs in the first 1 week as shown by the patient in this case. To reduce morbidity and mortality, prophylaxis against PCP is important by administering TMX - SMX for a lifetime by looking at the CD4 value.

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