

# *Pneumocystis jirovecii* Pneumonia in a Non-small Cell Lung Cancer Patient on Chemoradiotherapy: A Case Report

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## Abstract

*Pneumocystis jirovecii* pneumonia is a very uncommon complication in lung cancer patients. We report the case of a 59-year-old, Stage IIIB non-small cell lung cancer (epidermoid) patient who was receiving concurrent chemotherapy scheme (cisplatin + vinorelbine) and radiotherapy and developed fever and dyspnea not controlled with classical antibiotics. The patient developed respiratory distress. A high-resolution computed tomography showed a crazy-paving pattern, and a bronchoalveolar lavage confirmed the diagnosis of *Pneumocystis jirovecii* pneumonia. The patient was successfully managed with intravenous trimethoprim/sulfamethoxazole and voriconazole. Few such cases have been reported in the literature, and in most cases, the infection has been found to be associated with aggressive oncological treatments. Therefore, *Pneumocystis jirovecii* pneumonia should be considered in lung cancer patients with its presenting symptoms, especially if the patient is undergoing aggressive chemotherapy and/or radiotherapy.

**Keywords:** Chemoradiotherapy, crazy paving, non-small cell lung cancer, *Pneumocystis jirovecii*

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## INTRODUCTION

*Pneumocystis jirovecii* pneumonia (PJP) is a severe and rare lung complication caused by the fungus *P. jirovecii*. It is characterized by being subacute interstitial pneumonia that requires high oxygen efflux (respiratory distress) and fever that does not respond to commonly used antibiotics. This infection is typical in immunocompromised patients with cellular deficiencies such as acquired immune deficiency syndrome. Other risk factors of PJP include hematological neoplasms, bone marrow transplantation and long-term use of corticosteroids.<sup>[1-3]</sup> However, solid neoplasms are not a risk factor of PJP, and the pathogen is not usually diagnosed in such patients.<sup>[4,5]</sup> We present the case of a patient who

was undergoing multimodal treatment for non-small cell lung cancer (NSCLC) in our department but developed PJP during this period.


## CASE REPORT

A 59-year-old male patient who had been diagnosed with NSCLC (Stage IIIB) 13 months ago and had completed ten sessions of radiotherapy and one cycle of chemotherapy was admitted to our hospital with complaints of 38.7°C fever, dyspnea and cough for 3 days. The patient had an Eastern Cooperative Oncology Group performance status 0 and was hemodynamically stable. Oxygen saturation was 95% (without supplementary oxygen). Clinical exploration

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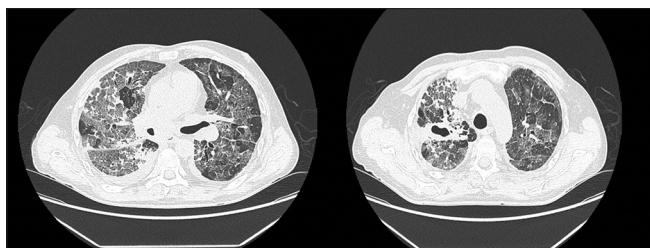
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revealed abundant crackles and rhonchi in all lung fields. Analytic studies (biochemistry and blood count) and chest radiography did not present significant findings.

The patient was started on antibiotic treatment with intravenous piperacillin–tazobactam (4 g/6 h). However, 24 h after admission, the patient exhibited intense dyspnea and oxygen saturation fell to 86% (without supplementary oxygen), requiring contribution with 40% oxygen to maintain oxygen saturation above the threshold of normality (>92%). Despite this, the patient continued to have fever (39.8°C), and thus linezolid (600 mg/12 h) was added to the empirical treatment. In addition, sputum culture, serum galactomannan antigen test, bacilloscopy and computed tomography (CT) scan were carried out. All tests were inconclusive except the CT scan, which revealed lung cavitations and a crazy-paving pattern [Figure 1]. Bronchoalveolar lavage (BAL) was requested for sample obtention and to increase the accuracy of the microbiological studies. The patient's condition worsened and required 60% oxygen to maintain oxygen saturation. During the evolution of the disease, 100% oxygen was needed for maintenance. Based on the CT results and the clinical evolution of the patient, empirical coverage against *P. jirovecii* was provided with intravenous trimethoprim/sulfamethoxazole (160/800 mg, every 8 h). BAL results confirmed our clinical suspicion for *P. jirovecii* and also revealed positivity for *Aspergillus flavus*. The intravenous treatment was optimized with voriconazole 300 mg once daily. Subsequently, the patient's condition began improving with less FiO<sub>2</sub> being required, improvement in lung auscultation findings and disappearance of fever. The patient's serological human immunodeficiency virus test returned positive, but the Western blot results were negative; therefore, the serological result was considered a false positive. As the patient's condition evolved favorably, he was discharged after 2 weeks of treatment with oral trimethoprim/sulfamethoxazole (160/800 mg, every 8 h) for 1 month.

The patient was followed up in the outpatient clinics every 3 weeks. The patient was improving, and prophylactic



**Figure 1:** Computed tomography images that show a crazy-paving pattern compatible with *Pneumocystis jirovecii* infection and an *Aspergillus* cavitory lesion

treatment with trimethoprim/sulfamethoxazole (on alternate days) was carried out for another month. Follow-up CT scan showed that the crazy-paving pattern had completely resolved, and there was improvement in the *Aspergillus* cavitory lesion. The patient's cancer metastasized to the right femur and died a few months later due to progress of NSCLC.

## DISCUSSION

PJP is a very uncommon phenomenon in lung cancer patients, with an incidence of 2.6 cases/100,000 person/year.<sup>[4]</sup> It is associated with high corticosteroid intake and immunosuppression. However, the patient reported here had not taken high doses of corticosteroids. In the literature, few such cases have been published. Velcheti and Govindan<sup>[6]</sup> reported the case of a 73-year-old male with NSCLC who received carboplatin-pemetrexed and chest irradiation (63 Gy) and developed PJP and died (cancer treatment was similar to that of our patient).

In 1980, Fossieck and Spagnolo<sup>[7]</sup> published a series of five cases of PJP associated with lung cancer, where all patients had received polychemotherapy protocols, three had received radiotherapy and two did not take corticosteroids. From these findings, it appears that PJP in lung cancer is related with high aggressive chemotherapeutic and radiotherapeutic protocols, such as those used for locally advanced NSCLC. Similarly, McAleese *et al.*<sup>[4]</sup> recently described a series of cases wherein curative intent radiotherapy protocols were found to be related with PJP in lung cancer patients. This is the same risk factor that might be involved in our case. It should be noted that in lung cancer patients, there appears to be no *P. jirovecii* colonization.<sup>[8]</sup>

Similar relationships have also been found in other solid tumors. For example, primary brain tumors patients receiving the Stupp protocol (temozolomide + radiotherapy) have been shown to be at risk of PJP,<sup>[9]</sup> and thus it is indicated to initiate prophylaxis with trimethoprim/sulfamethoxazole thrice weekly (on alternate days) in such patients. Similarly, in lymphomas, several aggressive chemotherapeutic protocols have been found to increase the risk of PJP, and thus PJP (*P. jirovecii*) prophylaxis is indicated.<sup>[10]</sup>

## CONCLUSION

PJP is a rare complication among lung cancer patients, but it should be considered if such patients present with fever, dyspnea and cough and is undergoing chemotherapy and/or radiotherapy.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient's next of kin has given their consent for his images and other clinical information to be reported in the Journal. The patient's next of kin understands that his name and initial would not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

### Peer review

This article was peer reviewed by one independent and anonymous reviewer.

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### Conflicts of interest

There are no conflicts of interest.

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