Case Report: Fatal Pneumocystis jirovecii Infection in an Elderly Man Receiving Adjuvant Paclitaxel and Trastuzumab Therapy for HER2-Positive Breast Cancer

Colin Vercueil[1], Hamza Ouaz[2], Émilie Schultz[2], and Jean-Marc Limacher[2]

[1]Hôpitaux Civils de Colmar
[2]Hopitaux Civils de Colmar

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Introduction:

Pneumocystis is a common opportunistic infection in patients with severe T-cell immunodeficiency. Its occurrence in patients with solid tumors is relatively rare, unless additional significant predisposing factors are present.

We present the case of a patient who developed a *Pneumocystis jirovecii* pneumonia after the 9th course of Paclitaxel, administered as part of adjuvant chemotherapy for breast cancer.

Case presentation:

The patient, an 84-year-old male distinguished by his robust health and passion for cycling, has no significant medical history. He underwent a mastectomy for a 2cm hormone-receptor positive, HER2-positive, node-negative invasive ductal carcinoma. Based on the patient's favorable health condition as indicated by a Balducci I classification during the oncogeriatric assessment, adjuvant chemotherapy was recommended at the multidisciplinary team meeting. The patient was tested negative for HIV serology before starting chemotherapy. Following current recommendations, treatment combining paclitaxel and trastuzumab was administered using the "Tolaney regimen" (1). The dose of paclitaxel was reduced to 60mg/m^2 to minimize toxicity. Treatment was discontinued after the 9th course due to grade 3 asthenia. There was no lymphopenia observed in the blood count at this stage.

Nine days after the last administration of chemotherapy, the patient was admitted to the emergency department with fever and hypoxemic pneumonia. A CT-scan revealed diffuse interstitial pneumopathy (Figure 1.) and blood analysis showed a decreased lymphocyte count of 0.4 G/l. PCR for *Pneumocystis jirovecii* was positive in the bronchoalveolar lavage fluid. Treatment with sulfamethoxazole/trimethoprim was initiated. Subsequently, the patient's condition necessitated admission to the intensive care unit (ICU) and orotracheal intubation. Sequential administrations of atovaquone were performed.

Despite comprehensive interventions, the patient's clinical status progressively deteriorated, leading to a consensus on therapeutic limitations. The patient passed away twenty-four hours thereafter.

Discussion:

To our knowledge, this is the first article presenting a case of a man who developed pneumocystis following adjuvant chemotherapy for early breast cancer. Haut du formulaire

Bas du formulaire

A case of fatal pneumocystis was reported in Canada 12 years ago in a patient undergoing first line Paclitaxel and Trastuzumab treatment for bone metastatic breast cancer (2). The PJP diagnosis occurred after 8 cycles of chemotherapy over 7 weeks when the lymphocyte count was at its lowest, measuring 400 cells/mm^3. Susceptibility was attributed to factors such as the use of dexamethasone and lymphocyte suppression. Similarly, cases of PJP have emerged in breast cancer patients undergoing docetaxel (3).

Recognized risk factors for pneumocystis, aside from HIV infection, include prolonged use of corticosteroids (defined as >20mg prednisone equivalent daily for > 4 weeks), low CD4 cell counts, coexisting pulmonary diseases and recent chemotherapy (4,5).

Furthermore, having a solid tumor acts independently as a risk factor for increased mortality related to PJP (6).

Following the observation of two cases of HIV-negative pneumocystis in patients undergoing adjuvant chemotherapy for breast cancer, Tolaney et al. initiated a prospective cohort study (7). Their investigation revealed chemotherapy-induced lymphopenia during neoadjuvant or adjuvant breast cancer treatment as a significant concern, notably around 5^{th} cycle, associated with an elevated susceptibility to opportunistic infections.

Current guidelines do not recommend systematic pneumocystis prophylaxis during treatment for solid tumors, except for temozolomide chemotherapy and prolonged use of corticosteroids (8).

This underscores the significance of implementing personalized medical strategies, as exemplified in our case study, where factors extending beyond the administration of Paclitaxel contribute to the risk of *Pneumocystis jirovecii* infection.

Otherwise, the effectiveness of adjuvant chemotherapy in elderly individuals remains a subject of debate, prompting critical consideration of its benefits and risks in this specific age group.

The APT trial conducted by Tolaney et al. published in 2015 included 10% of patients aged over 70 years in their cohort (1). Notably, within this cohort, adverse events of grade 4 were observed in only 3 out of 406 patients, with no reported toxic deaths or severe infections.

A recent French propensity score-based study underscores the feasibility of chemotherapy in elderly early breast cancer patients, highlighting its potential for enhancing overall survival, and emphasizing the importance of avoiding undertreatment based on age (9). Yet, in accordance with the Breast Predict tool (10), incorporation of our patient and tumor profiles implies that chemotherapy would have conferred marginal benefit, with 68 out of 100 patients treated with hormone therapy and trastuzumab surviving 5 years, compared to 69 out of 100 patients treated with chemotherapy, trastuzumab and hormone therapy, yielding an increment of 1 additional survivor due to breast cancer-related causes.

Haut du formulaire

Bas du formulaire

While adjuvant and neoadjuvant chemotherapies can reduce breast cancer mortality, there is acknowledgment that they may also increase mortality from other causes (11). Making an ideal treatment choice requires a rigorous analysis that considers the trade-offs between benefits and potential risks, encompassing the broader context of patient health and the evolving landscape of medical progress.

This case emphasizes the importance of carefully assessing the benefits and risks of adjuvant chemotherapy in frail patients, where the potential benefits may be limited, and underscores the necessity of vigilant monitoring to prevent potential opportunistic infections.

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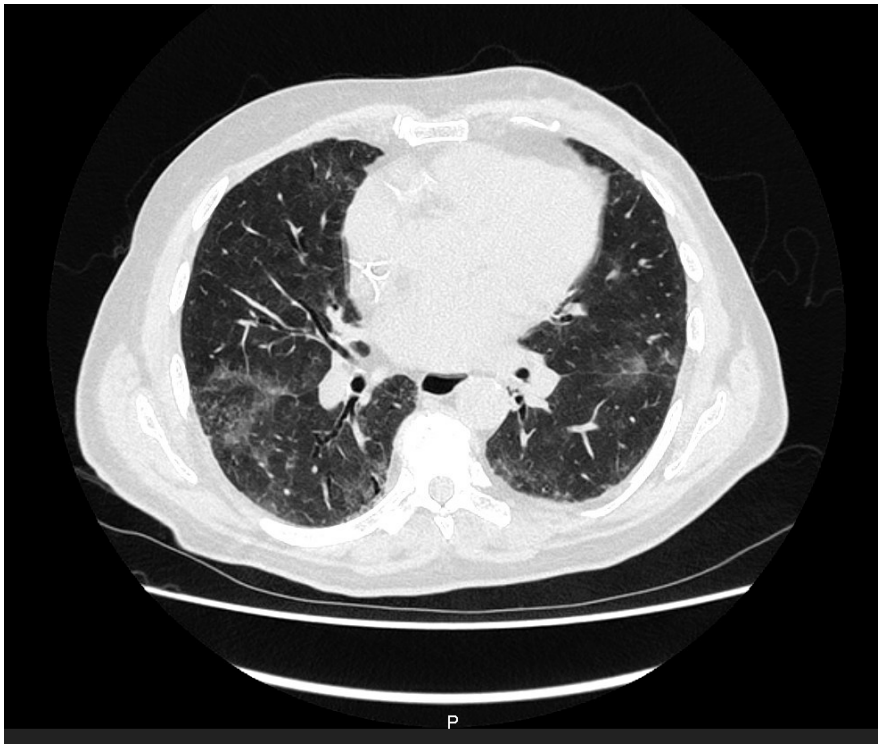

Figure 1. Coronal CT scan view illustrating bilateral ground-glass opacities indicative of diffuse interstitial pneumopathy. The scan was performed nine days post the last chemotherapy administration.