
COMPLEX CASE OF COPD EXACERBATION WITH LUNG CANCER AND PARANEOPLASTIC SYNDROME: A CASE REPORT

Syazili Mustofa^{1*}, Faizah Zahrah Sidik², Evi Kurniawaty¹, Miftahur Rohman²,
Nisa Karima³

¹Departement Biochemistry, Molecular Biology and Physiology, Faculty of Medicine,
Universitas Lampung, Bandar Lampung, Indonesia

²Medical Professional Study Program, Faculty of Medicine, Universitas Lampung,
Bandar Lampung, Indonesia

³Student Pulmonologist Program, Faculty of Medicine, Universitas Lampung, Bandar
Lampung, Indonesia

*E-mail: syazili.mustofa@fk.unila.ac.id

Abstract: Complex Case of COPD Exacerbation with Lung Cancer and Paraneoplastic Syndrome: A Case Report. Managing Chronic Obstructive Pulmonary Disease (COPD) alongside advanced lung cancer is highly complex, especially when complicated by multiple paraneoplastic syndromes. We present a 70-year-old male with shortness of breath, hemoptysis, and significant weight loss. Evaluation revealed an acute COPD exacerbation unmasking a metastatic right lung cancer with a rare combination of concurrent paraneoplastic syndromes (anemia, hyponatremia, and hypocalcemia). The uniqueness of this case lies in how these overlapping systemic manifestations masked the acute respiratory exacerbation, creating a profound diagnostic dilemma. Clinically, this implies that physicians must maintain a high index of suspicion for underlying malignancies when treating atypical or refractory COPD exacerbations. The key lesson learned is that managing such intertwined conditions requires prompt, individualized, and multidisciplinary coordination to prevent delayed interventions and optimize patient outcomes.

Keywords: COPD, Hemoptysis, Lung Cancer, Malnutrition, Paraneoplastic Syndrome.

Abstrak: Kasus Kompleks Eksaserbasi PPOK dengan Kanker Paru dan Sindrom Paraneoplastik: Laporan Kasus. Tata laksana Penyakit Paru Obstruktif Kronik (PPOK) yang muncul bersamaan dengan kanker paru stadium lanjut sangatlah kompleks, terutama jika dipersulit oleh adanya beberapa sindrom paraneoplastik. Kami melaporkan sebuah kasus pria berusia 70 tahun yang datang dengan keluhan sesak napas, hemoptisis, dan penurunan berat badan yang signifikan. Evaluasi klinis menunjukkan adanya eksaserbasi akut PPOK yang mengungkap kanker paru kanan metastatik disertai kombinasi langka dari sindrom paraneoplastik yang muncul secara bersamaan (anemia, hiponatremia, dan hipokalsemia). Keunikan dari kasus ini terletak pada bagaimana manifestasi sistemik yang tumpang tindih tersebut mengaburkan gambaran eksaserbasi pernapasan akut, sehingga menciptakan dilema diagnostik yang mendalam. Secara klinis, kasus ini berimplikasi bahwa dokter harus mempertahankan indeks kecurigaan yang tinggi terhadap adanya keganasan tersembunyi saat menangani eksaserbasi PPOK yang atipikal atau refrakter. Pelajaran penting yang dapat dipetik adalah bahwa penanganan kondisi yang saling berkaitan ini membutuhkan koordinasi yang cepat, individual, dan multidisiplin untuk mencegah keterlambatan intervensi dan mengoptimalkan luaran (*outcome*) klinis pasien.

Kata Kunci: PPOK, Kanker Paru, Sindrom Paraneoplastik, Hemoptisis, Malnutrisi.

INTRODUCTION

Chronic obstructive pulmonary disease characterized by persistent disease (COPD) is a progressive lung respiratory symptoms and airflow

limitation due to airway and/or alveolar abnormalities typically caused by significant exposure to noxious particles or gases. It is one of the leading causes of morbidity and mortality worldwide, significantly impacting patients' quality of life and imposing a substantial burden on healthcare systems (Huan et al., 2021). COPD exacerbations are acute events characterized by a worsening of the patient's respiratory symptoms, often leading to hospitalization and increased risk of mortality (Mendogni et al., 2020).

Lung cancer, particularly non-small cell lung cancer (NSCLC), is one of the most common malignancies associated with COPD, given their shared risk factors, particularly smoking (Živković Z et al., 2023). The overlap between COPD and lung cancer creates a complex clinical scenario, as both diseases exacerbate each other's symptoms and complicate management strategies. The presence of paraneoplastic syndromes, which are systemic manifestations of cancer that are not directly related to tumor invasion, further complicates the clinical picture. These syndromes can involve multiple organ systems and significantly impact the patient's prognosis and quality of life (Ghisalberti M, et al., 2020).

However, cases presenting with the specific combination of acute COPD exacerbation, advanced lung cancer, and concurrent paraneoplastic syndromes manifesting as anemia, hyponatremia, and hypocalcemia are rarely reported. Paraneoplastic syndromes occur in approximately 10% of lung cancer cases and typically present as a single dominant clinical entity rather than multiple simultaneous manifestations (Anwar et al., 2019). Cases involving multiple paraneoplastic syndromes in a single patient have only been rarely described in the literature, often limited to isolated case reports (Ren et al., 2016). Additionally, while electrolyte disturbances such as hyponatremia are well recognized, they are usually reported individually, and complex combinations of metabolic and hematologic abnormalities remain

uncommon (Franco and Thomas, 2017). Mr. A, a 70-year-old male, presents with a multifaceted case involving an exacerbation of COPD, right lung cancer with suspected metastasis, and paraneoplastic syndrome. His clinical presentation includes chronic respiratory symptoms, significant weight loss, and systemic manifestations indicative of advanced malignancy. This case report aims to provide a comprehensive overview of his diagnostic process, therapeutic interventions, and clinical outcomes, highlighting the challenges and considerations in managing patients with coexisting COPD and lung cancer.

CASE REPORT

Mr. A, a 70-year-old male, on May 17, 2024, was admitted to the hospital with complaints of worsening shortness of breath, a dry cough that occasionally produced blood-tinged sputum, and significant weight loss over the past three months. He had been experiencing right-sided chest pain and general weakness. His past medical history revealed that he was diagnosed with COPD in 2018 and rectal adenocarcinoma in 2021 and had undergone colostomy and chemotherapy. He also had a long-standing history of smoking, consuming approximately 12 cigarettes per day for 25 years, resulting in a significant Brinkman Index of 300.

On physical examination, Mr. A appeared moderately ill and was conscious. His vital signs showed a blood pressure of 110/70 mmHg, a heart rate of 102 beats per minute, a respiratory rate of 24 breaths per minute, a temperature of 36.7°C, and an oxygen saturation of 90% on room air. He had a BMI of 16.6 kg/m², indicating malnutrition. Examination of his head and neck revealed pale conjunctiva, while his chest examination showed asymmetric chest wall movement with left-sided lag. Decreased tactile fremitus, dull percussion, and reduced vesicular breath sounds were noted on the left side of his chest. His heart sounds were regular without any murmurs or gallops, and his abdomen

was normal. There was no edema in his extremities, and his capillary refill time was less than two seconds.

Laboratory investigations showed a hemoglobin level of 9.8 g/dL, a hematocrit of 31%, white blood cell count of 15,460/mm³, and platelet count of 471,000/mm³. His serum sodium, potassium, calcium, and chloride levels were within normal limits, but his albumin level was low at 29 g/L, indicating hypoalbuminemia. Chest X-ray revealed an opacity in the right upper hemithorax, suggestive of pleural effusion, which was confirmed by the presence of fluid drained via a chest tube. The pathological examination result from a lung biopsy using the FNAB

method on May 30, 2024, showed the presence of columnar-shaped cells with granular cytoplasm, irregularly shaped nuclei, hyperchromatic nuclei, and prominent nucleoli, indicating malignancy. The cancer cells formed glandular or acinar-like structures. It was diagnosed as acinar-type lung adenocarcinoma. Based on pathological and radiological findings, clinical staging was performed: T (Tumor): T2a (Tumor size > 3 cm but not yet reaching 4 cm), N (Nodes): N1, where the cancer has spread to ipsilateral hilar lymph nodes, and M (Metastasis): M0, meaning no distant metastasis. Staging Conclusion: Stage IIA (T2a, N1, M0).

Table 1. Laboratory examinations

	17/05/2024 RSAM	20/05/2024 RSAM	
Hb / Ht / Leuko / Platelets	9.8/31/15.460/471.000	10,3/30/11.300/388.000	13,2-17,3/40-52/150.000-440.000
B/E/B/S/L/M	0/0/0/88/8/4	0/0/0/75/19/6	0-1/2-4/3-5/50-70/25-40/2-8
Random Blood Glucose	116	-	70-200
Ureum / Creatine	51/1,06	-	17-43/ <1,2
SGOT/SGPT	11/7	-	0-50/0-50
Albumin	3,4	-	3.4-5.4
Na/K/ Ca/Cl	130/4,2/8,6/94	134/4.4/8.8/96	135-147/3,5-5,0/8.8-10.3// 95-105
CT/BT	7/2	-	
PTT/APTT	15,2/30,8	-	

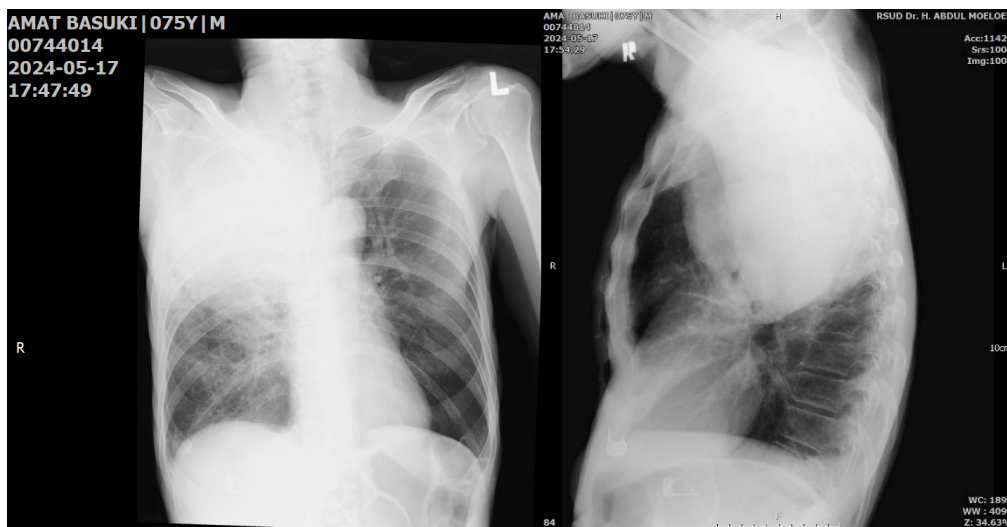


Figure 1. A radiological examination.

Based on his clinical presentation and investigation results, Mr. A was diagnosed with right lung cancer with suspected metastasis and paraneoplastic syndrome, exacerbation of COPD, non-massive hemoptysis, and malnutrition.

The treatment plan included oxygen therapy to maintain an oxygen saturation of 88-92%, intravenous administration of NaCl 0.9% at 20 drops per minute, and intravenous levofloxacin 750 mg every 24 hours. Nebulization with ipratropium bromide and salbutamol every 8 hours was administered to manage his COPD symptoms. Pain management included paracetamol 500 mg every 6 hours and codeine 30 mg every 8 hours. Corticosteroids, specifically dexamethasone 5 mg intravenously every 8 hours, were used to reduce inflammation. Other medications included valproic acid 250 mg every 12 hours and folic acid every 12 hours to address his neurological symptoms and nutritional deficiencies.

Non-medication interventions included thoracentesis to drain the pleural effusion, resulting in the extraction of 10 cc of pus. A chest tube was inserted into the left hemithorax and connected to a water-sealed drainage system, draining 1000 cc of greenish pus. Periodic evacuation of up to 1000 ml of fluid per day was planned, along with spooling every 8 hours. Consultations with a gastroenterologist for his rectal adenocarcinoma and a nutritionist for his malnutrition were also part of the treatment plan.

Monitoring of Mr. A's condition involved regular assessment of his general condition and vital signs, evaluation of pain, and observation for signs of bleeding, re-expansion pulmonary edema, and subcutaneous emphysema post chest tube insertion. Fluid production and the presence of bubbles in the water-sealed drainage system were also monitored.

During his hospitalization, several issues needed to be addressed, including chronic shortness of breath due to restrictive lung disease, chronic cough,

chronic back pain (VAS 3/10), leukocytosis, thrombocytosis, gallstones, nausea and vomiting, and hypoalbuminemia.

DISCUSSION

The case of Mr. A is exceptionally complex, involving several interrelated health issues that presented a significant diagnostic and therapeutic challenge. His primary diagnosis of right lung cancer (suspected stage IIIA with metastasis) set the stage for severe systemic complications. What makes this case uniquely challenging and worthy of report is the concurrent presentation of multiple paraneoplastic syndromes (anemia, hyponatremia, and hypocalcemia) masking an acute COPD exacerbation, further complicated by his history of a previous non-pulmonary malignancy (rectal adenocarcinoma). While paraneoplastic syndromes are well-documented in lung cancer, the simultaneous occurrence of multiple syndromes is rare (Pérez-Bucio C, et al., 2025). Similar to unique cases reported in the literature, which described the rare concomitance of multiple paraneoplastic syndromes (such as SIADH and neurological degenerations) (Ren et al, 2016; Franco and Thomas, 2017), our case demonstrates how overlapping systemic manifestations can drastically obscure the primary clinical picture and complicate standard treatment algorithms.

The patient's acute COPD exacerbation was likely triggered by his underlying malignancy, a common occurrence among lung cancer patients (Cortes-Telles et al., 2021) due to shared risk factors like a profound smoking history (Brinkman Index: 300) (Arumsari et al., 2019). Managing this exacerbation required careful clinical decision reasoning, as treatments for COPD can directly impact the malignancy and vice versa (Briones-Claudett et al., 2020). The clinical decision to administer intravenous levofloxacin (Paskaradevan et al, 2020) was made empirically to cover potential secondary bacterial infections—common triggers for

exacerbations—especially given the patient's immunocompromised state and the presence of non-massive hemoptysis. Bronchodilators (ipratropium bromide and salbutamol) were utilized for immediate relief of bronchospasm (Pradana et al., 2020). The presence of hemoptysis presented a diagnostic dilemma: differentiating between tumor vascular invasion and concurrent infection (Shojaan et al., 2023). Given this dual possibility, conservative management with codeine was deliberately chosen not only for pain relief but to effectively suppress the cough reflex, thereby preventing further vascular irritation while awaiting definitive endoscopic or imaging evaluation (Shapiro et al., 2021).

The management of his paraneoplastic manifestations required an aggressive, multifaceted approach. As emphasized in recent literature, the definitive management of paraneoplastic syndromes is inextricably linked to the treatment of the underlying malignancy, supplemented by immediate supportive care (Anwar et al., 2019). In Mr. A's case, the specific manifestations required targeted, individualized interventions (Tran et al., 2021; Gottlieb et al., 2023). His anemia was likely multifactorial, stemming from chronic disease and potential bone marrow infiltration, which prompted a management strategy focused on nutritional support while evaluating the need for blood transfusions or erythropoiesis-stimulating agents (DeMaio et al., 2021). Concurrently, the patient presented with hyponatremia suggestive of the syndrome of inappropriate antidiuretic hormone secretion (SIADH). The clinical rationale for managing this involved meticulous fluid management and sodium correction, which had to be carefully balanced against his delicate respiratory fluid status (Ki et al., 2023). Furthermore, his hypocalcemia, suspected to result from the paraneoplastic production of parathyroid hormone-related protein (PTHrP), necessitated immediate calcium supplementation administered alongside

the ongoing treatment for the primary tumor (Muliaditan et al., 2021).

Beyond respiratory and metabolic challenges, the occurrence of focal seizures raised high suspicion for brain metastasis, a frequent complication in advanced lung cancer (Achrol et al., 2021). Our clinical reasoning for initiating systemic corticosteroids (dexamethasone) was dual-purposed, it served to reduce airway inflammation for the COPD exacerbation (Stefani et al., 2020) while simultaneously acting as a preemptive measure to reduce suspected peritumoral cerebral edema. Concurrently, valproic acid was administered to control seizure activity even before definitive MRI confirmation could be obtained (Le Rhun et al., 2021). Simultaneously, the patient's severe malnutrition (BMI 16.6 kg/m², with a 10 kg weight loss in 3 months) dictated an urgent nutritional intervention strategy (Dalimunthe et al., 2024). Because malnutrition drastically reduces tolerance to oncological treatments, early dietary interventions and strict monitoring of oral intake were established as fundamental components of his care, not just supplementary measures (Muscaritoli et al., 2021).

Ultimately, the management of Mr. A required a highly coordinated multidisciplinary approach. The prognosis remains guarded given the advanced stage, suspected metastases, and the severe burden of his paraneoplastic syndromes. Future directions for his care must prioritize an integrated oncological plan (exploring targeted therapies if applicable), enhanced supportive and palliative care to address his significant symptom burden, and continuous patient education. Seamless coordination among pulmonologists, oncologists, and nutritionists will be critical in adapting his treatment plan as his clinical status evolves.

CONCLUSION

Managing COPD exacerbations in the context of advanced lung cancer requires a multidisciplinary approach. Early diagnosis, prompt treatment of

complications, and supportive care are crucial in improving patient outcomes. Mr. A's case underscores the importance of comprehensive care in managing complex respiratory and oncological conditions. The integration of various medical specialties and continuous re-evaluation of the patient's condition are essential to provide the best possible care and improve quality of life.

REFERENCES

- Achrol, A. S., Rennert, R. C., Anders, C., Soffietti, R., Ahluwalia, M. S., Nayak, L., Peters, S., Arvold, N. D., Harsh, G. R., Steeg, P. S., & Chang, S. D. (2019). Brain metastases. *Nature Reviews Disease Primers*, 5(1), 5. <https://doi.org/10.1038/s41572-018-0055-y>
- Anwar, A., Jafri, F., Ashraf, S., Jafri, M. A. S., & Fanucchi, M. (2019). Paraneoplastic syndromes in lung cancer and their management. *Annals of Translational Medicine*, 7(15), 359. <https://doi.org/10.21037/atm.2019.04.86>
- Arumsari, D., Artanti, K. D., Martini, S., & Widati, S. (2019). The Description Of Smoking Degree Based On Brinkman Index In Patients With Lung Cancer. *Jurnal Berkala Epidemiologi*, 7(3), 249-256. <https://doi.org/10.20473/jbe.V7I3.2019.250-257>
- Briones-Claudett, K. H., Briones-Claudett, M. H., Moreno, A. P., Vargas, D. E., Alvarez, M. E. M., & Andrade, M. G. (2020). Spontaneous pneumothorax after rupture of the cavity as the initial presentation of tuberculosis in the emergency department. *The American Journal of Case Reports*, 21.
- Cortes-Telles, A., Ortiz-Farias, D. L., Perez-Hernandez, F., & Rodriguez-Morejon, D. (2021). Secondary spontaneous pneumothorax: A time to re-evaluate management. *Respirology Case Reports*, 9(8).
- Dalimunthe, M. B., Pradana, A., Tarigan, A. P., & Amelia, R. (2024). The relationship between malnutrition and quality of life in stable chronic obstructive pulmonary disease patients at Prof. Dr. Chairuddin P. Lubis Hospital field. *Journal of Society Medicine*, 3(9), 280-287. <https://doi.org/10.47353/jsocmed.v3i9.164>
- DeMaio, A., & Semaan, R. (2021). Management of pneumothorax. *Clinics in Chest Medicine*, 42(4), 729-738.
- Franco, D. L., & Thomas, L. (2017). [Small cell lung cancer associated with multiple paraneoplastic syndromes]. *Biomedica*, 37(1), 8-10. <https://doi.org/10.7705/biomedic.a.v37i1.2906>
- Ghisalberti, M., Guerrera, F., De Vico, A., et al. (2020). Age and clinical presentation for primary spontaneous pneumothorax. *Heart, Lung and Circulation*, 29(11), 1648-1655.
- Gottlieb, M., & Long, B. (2023). Managing spontaneous pneumothorax. *Annals of Emergency Medicine*, 81(5), 568-576.
- Huan, N. C., Sidhu, C., & Thomas, R. (2021). Pneumothorax: Classification and etiology. *Clinics in Chest Medicine*, 42(4), 711-727.
- Ki, M. S., Jeong, D., Kang, H. Y., Choi, H., Sohn, H., & Kang, Y. A. (2023). Real-world impact of the fixed-dose combination on improving treatment outcomes of drug-susceptible tuberculosis: A comparative study using multiyear national tuberculosis patient data. *BMJ Open Respiratory Research*, 10(1).
- Le Rhun, E., Guckenberger, M., Smits, M., Dummer, R., Bachelot, T., Sahn, F., Galldiks, N., de Azambuja, E., Berghoff, A. S., Metellus, P., Peters, S., Hong, Y.-K., Winkler, F., Schadendorf, D., van den Bent, M., Seoane, J., Stahel, R., Minniti, G., Wesseling, P., ... Preusser, M. (2021). EANO-

- ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up of patients with brain metastasis from solid tumours. *Annals of Oncology*, 32(11), 1332–1347.
<https://doi.org/10.1016/j.annonc.2021.07.016>
- Mendogni, P., Vannucci, J., Ghisalberti, M., et al. (2020). Epidemiology and management of primary spontaneous pneumothorax: A systematic review. *Interactive Cardiovascular and Thoracic Surgery*, 30(3), 337-345.
- Muliaditan, M., & Della Pasqua, O. (2021). Evaluation of pharmacokinetic-pharmacodynamic relationships and selection of drug combinations for tuberculosis. *British Journal of Clinical Pharmacology*, 87(1), 140-151.
- Muscaritoli, M., Arends, J., Bachmann, P., et al. (2021). ESPEN practical guideline: Clinical nutrition in cancer. *Clinical Nutrition*, 40(5), 2898-2913.
- Paskaradevan, J., Sayad, E., & Sockrider, M. (2020). What is a spontaneous pneumothorax?. *American Journal of Respiratory and Critical Care Medicine*, 202(12).
- Pérez-Bucio C, Behere A and Landegren N (2025) Mechanisms of autoimmune-mediated paraneoplastic syndromes: immune tolerance and disease pathogenesis. *Front. Immunol.* 16:1608934. doi: 10.3389/fimmu.2025.1608934
- Pradana, A. D. (2020). Spontaneous tuberculosis-associated tension pneumothorax: A case report and literature review. *Case Reports in Acute Medicine*, 3(2), 35-39.
- Ren, Y., Ren, M., Yang, F., Cui, F., Chen, Z., Ling, L., Wang, F., & Huang, X. (2016). Multiple paraneoplastic syndromes associated with small cell lung cancer: A unique case of concomitant Lambert-Eaton myasthenic syndrome, paraneoplastic cerebellar degeneration and syndrome of inappropriate secretion of antidiuretic hormone. *International Journal of Clinical and Experimental Medicine*, 9(2), 4939-4942.
- Shapiro, A. E., Ross, J. M., Yao, M., et al. (2021). Xpert MTB/RIF and Xpert Ultra assays for screening for pulmonary tuberculosis and rifampicin resistance in adults irrespective of signs or symptoms. *Cochrane Database of Systematic Reviews*, (3).
- Shojaan, H., Kalami, N., Alamdari, M. G., et al. (2023). Diagnostic value of the neutrophil lymphocyte ratio in discrimination between tuberculosis and bacterial community-acquired pneumonia: A meta-analysis. *Journal of Clinical Tuberculosis and Other Mycobacterial Diseases*, 100395.
- Stefani, A., Aramini, B., Baraldi, C., et al. (2020). Secondary spontaneous pneumothorax and bullous lung disease in cannabis and tobacco smokers: A case-control study. *PLoS One*, 15(3).
- Tran, J., Haussner, W., & Shah, K. (2021). Traumatic pneumothorax: A review of current diagnostic practices and evolving management. *The Journal of Emergency Medicine*, 61(5), 517-528.
- Živković, Z., Ostojić, O., Veković, V., et al. (2023). Pulmonary tuberculosis and spontaneous pneumothorax in an adolescent – Case report. *Preventive Paediatrics*, 89-92.