Ann Thorac Cardiovasc Surg 2024: 30; 24–00117 doi: 10.5761/atcs.cr.24-00117

Case Report

Lipid Pneumonia Mimicking Lung Cancer in a Middle-Age Woman

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Lipid pneumonia is exceedingly rare, with only a few reported cases to date. A 46-year-old woman with a history of left breast cancer underwent a left-modified radical mastectomy, adjuvant chemotherapy, and radiotherapy. Despite no known exposure to lipids, she presented with chronic non-productive cough and general malaise. Follow-up chest computed tomography revealed progressive ground-glass opacities in the left lower lung, initially suspected to be lobar bronchioloalveolar carcinoma. Surgical intervention was performed for both diagnostic and therapeutic purposes, confirming the lesion as lipid pneumonia upon pathological examination, revealing the presence of foamy histiocytes.

Keywords: lipid pneumonia, foamy histiocytes, cyclophosphamide, lobar bronchioloalveolar carcinoma

Introduction

Lipid pneumonia is inflammation of the lungs caused by the accumulation of fatty substances. It is classified into exogenous and endogenous types based on the origin of the lipids. Exogenous lipid pneumonia (ELP) occurs due to inhalation or aspiration of fats, whereas ELP involves the accumulation of lipids within the alveoli. This condition is rare, and its specific pathogenesis remains unclear to date, with only a few documented case reports in humans.

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Received: July 11, 2024; Accepted: August 25, 2024
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Case Presentation

A 49-year-old woman, employed as a waitress in a restaurant, had a history of left breast cancer (pT2N2M0 stage IIIA). She underwent left modified radical mastectomy at age 38, followed by adjuvant chemotherapy including doxorubicin, cyclophosphamide, and docetaxel, as well as regional radiotherapy. Her chest radiography was normal, and she had no history of oil ingestion.

Seven years later, she presented with general malaise, and chest roentgenograms revealed increased infiltration in the left lung field. Chest computed tomographic (CT) scan showed regional ground-glass opacity (GGO) in the left lower lung (**Fig. 1A**). After 1 year, she developed a dry cough and chest discomfort. A repeat chest CT scan indicated progression in the size of GGO in the left lower lung (**Fig. 1B** and **1C**). The initial impression was a malignancy such as lobar bronchioloalveolar carcinoma. Consequently, she underwent a thoracoscopic lobectomy of the left lower lung.

Pathological examination revealed infiltration of chronic inflammatory cells and alveolar spaces filled with CD163+ foamy histiocytes and proteinaceous exudates, consistent with lipid pneumonia (**Fig. 2**).

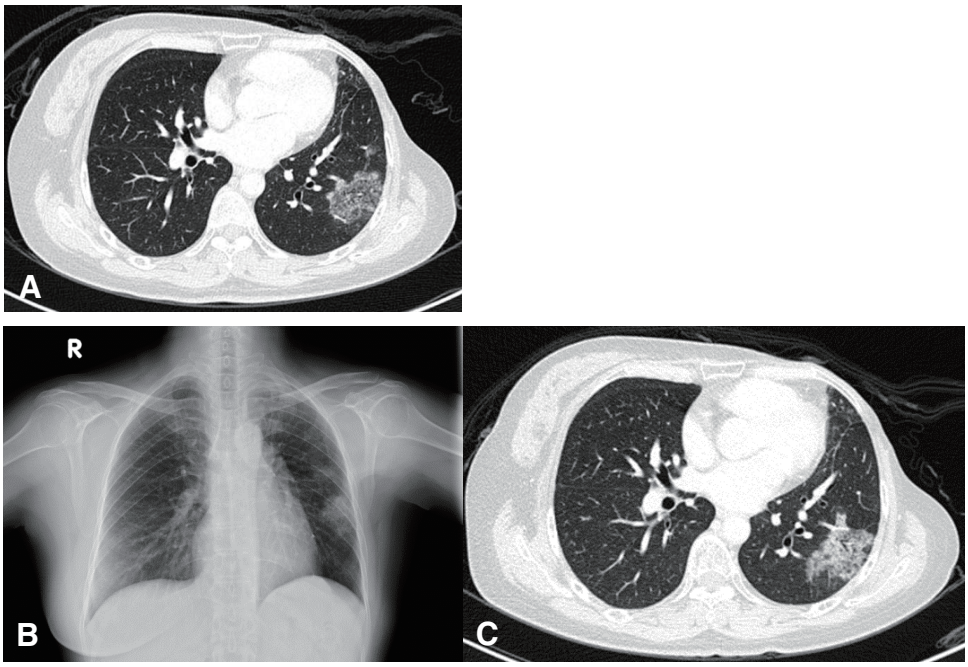

Fig. 1 Image modality survey. (**A**) CT scan disclosed GGO in the left lower lung 1 year before surgery. (**B**) Chest roentgenograms revealed infiltration in the left lung field. (**C**) CT scan disclosed progression in the size of GGO in the left lower lung. CT: computed tomography; GGO: ground-glass opacity

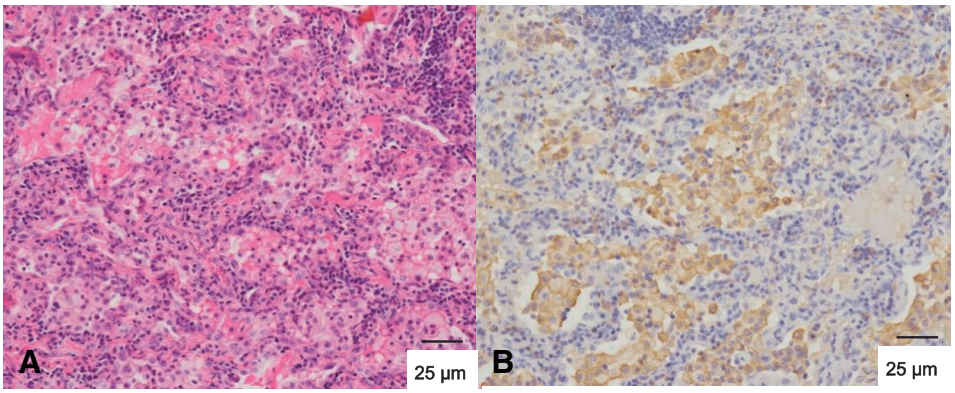

Fig. 2 (**A**) Foamy, finely vacuolated histiocytes within alveolar spaces (hematoxylin and eosin stain; 200×). (**B**) CD163 immunostain highlights foamy histiocytes (CD163; 200×).

One year post-surgery, the patient remained asymptomatic and underwent a chest CT scan as part of postoperative surveillance, revealing newly developed areas of mixed consolidation and GGO in the right middle lung. We will continue to implement an optimal postoperative surveillance strategy for the patient.

Discussion

Lipid pneumonia is pulmonary inflammation caused by the aspiration or inhalation of oily or fatty substances, first reported by Laughlen in 1925.[1] It can be classified into exogenous and endogenous types based on the source of the lipids. ELP occurs due to the inhalation or aspiration of fatty substances. ELP, on the other hand, involves the accumulation of lipids within the alveoli as a consequence of obstruction, chronic lung inflammation, or systemic disease.[2]

ELP is a rare disease, and its specific pathogenesis remains unclear to date. Patients with ELP typically present with nonspecific symptoms such as cough, shortness of breath, chest pain, or respiratory distress.[3] The

diagnosis of ELP requires a lung biopsy, which pathologically confirms the presence of lipid-laden macrophages without evidence of external lipid intake. Based on a few case reports of ELP, some studies have reported improvement after administering corticosteroids, while others have shown no change or worsening despite medication.[4,5)]

In pathological sections, a previous study reported the presence of bronchial arthrofibrosis in patients with ELP, which may be a unique characteristic distinguishing it from exogenous lipoid pneumonia.[3)] However, our patient did not exhibit bronchial arthrofibrosis or interstitial fibrosis.

Our case involves an idiopathic ELP patient with a history of left breast cancer treated with mastectomy, adjuvant chemotherapy, and regional radiotherapy. Based on clinical history, physical examination, and chest CT scan findings, the differential diagnosis was initially considered post-irradiation fibrosis or malignancy. However, radiation-induced lung injury was deemed less likely since the affected region did not correspond with the location of the lesion. Due to suspicion of malignancy, the patient underwent lobectomy surgery.

Previous case reports utilized fluoroscopy-guided transbronchial forceps or CT-guided biopsy to establish the diagnosis of lipid pneumonia.[6,7)] However, in our case, the lesion was located distant from the bronchi, rendering transbronchial biopsy impractical. In addition, after discussing with the radiologists, it was determined that a CT-guided core needle biopsy was not available for the patient due to the lesion being subsolid and heterogeneous. Given concerns that tissue obtained from biopsy might not provide adequate diagnostic material, surgery was deemed essential in our case to confirm the diagnosis definitively and to treat potential malignancy.

Tracing back to the history of our patient, she received adjuvant chemotherapy, including cyclophosphamide, for breast cancer. According to literature reviews, cyclophosphamide has long been recognized for its potential pulmonary toxicity.[8)] Moreover, Sulkowski et al. reported that cyclophosphamide-induced lung injury in rats may be linked to the pathogenesis of ELP.[9)] Their study suggested that pulmonary alveolar proteinosis-like changes resulted from endothelial damage following intraperitoneal cyclophosphamide injection.

To our knowledge, our patient represents the first proposed case where cyclophosphamide may be associated with ELP in humans, although the exact mechanism remains incompletely understood.

Conclusion

We present our clinical experience managing a rare case of ELP mimicking lung cancer, successfully treated and diagnosed via thoracoscopic lobectomy. In certain clinical circumstances, CT-guided or transbronchial biopsy could serve as a pre-operative option for confirmatory diagnosis. Given that our patient received cyclophosphamide, an antineoplastic agent, 7 years prior, there may be an association with the pathogenesis of ELP. Further investigation is urgently needed to establish management guidelines for ELP in the future.

Declarations

Ethics approval and consent to participate

Informed consent was obtained from the patient included in the study.

Consent for publication

The participant has consented to the submission of the case report to the journal.

Funding

No funding was provided for the research.

Disclosure statement

Not applicable.

Data availability

No new data were created or analyzed during this study, and data sharing is not applicable to this article.

Author contributions

Jiun-Chang Wu: data collection and draft manuscript.

All authors reviewed the results and approved the final version of the manuscript.

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