Case Report

Pseudomesotheliomatous lung cancer mimicking malignant pleural mesothelioma: A case report

Supakorn Chansaengpetch, M.D.[(1)]
Ruchira Ruangchira-urai, M.D.[(2)]
Nisa Muangman, M.D.[(3)]
Rathachai Kaewlai, M.D.[(3)]
Trongtum Tongdee, M.D.[(3)]
Teerapat Singwicha, M.D.[(4)]
Narongpon Dumavibhat, MD, Ph.D.[(1)]
From [(1)]Department of Preventive and Social Medicine, [(2)]Department of Pathology, and [(3)]Department of Radiology, Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand,
[(4)]Department of Radiology, Faculty of Medicine, Chulalongkorn University, Thailand.
Address correspondence to N.D. (e-mail: dumavibhat@yahoo.com)

Received 7 August 2024; revised 9 January 2025; accepted 18 January 2025
doi:10.46475/asean-jr.v26i1.924

Abstract

Pseudomesotheliomatous lung cancer (PML) is an uncommon type of primary lung cancer that mimics malignant pleural mesothelioma (MPM); however, data on this specific presentation remain scarce. We reported a 47-year-old Thai female presenting with right-sided chest pain, progressive dyspnea, and weight loss for three months. A computed tomography scan revealed extensive circumferential nodular pleural thickening and multiple irregular pleural-based masses affecting the right hemithorax, along with multiple foci of calcified pleural plaques in the bilateral hemithoraces. These findings raised a concern for malignant pleural mesothelioma with past asbestos exposure. However, a pleural biopsy later confirmed adenocarcinoma of the lung through immunohistochemical studies (positive for thyroid transcription factor-1 and negative for calretinin). Despite receiving five cycles of chemotherapy, her condition deteriorated, and she died

THE ASEAN JOURNAL OF RADIOLOGY
ISSN 2672-9393

approximately ten months following the initial diagnosis. In conclusion, PML with pleural plaques is rarely reported, and immunohistochemistry staining is imperative for an accurate diagnosis.

Keywords: Adenocarcinoma, Lung neoplasms, Malignant, Mesothelioma.

Introduction

Pseudomesotheliomatous lung cancer (PML) is a rare type of primary lung cancer that primarily involves the pleura and is characterized by the absence of significant intrapulmonary lesions [1]. First described by Harwood et al. in 1976, PML is a distinctive variant of primary lung cancer, marked by extensive pleural growth that mimics the clinical and radiological features of malignant pleural mesothelioma (MPM) [2]. MPM, the most common primary malignancy of the pleura, is almost exclusively linked to asbestos exposure [3]. Even minimal exposure to asbestos fibers poses a significant risk of developing MPM [4].

Most cases of PML are adenocarcinoma, and they can be indistinguishable from MPM, making immunohistochemical analysis crucial for accurate diagnosis [5,6]. Both PML and MPM carry a poor prognosis, primarily due to late-stage diagnosis and limited treatment options [4,6].

While a direct causal link between asbestos exposure and PML has not been definitively established, asbestos exposure is a recognized risk factor for pleuropulmonary malignancy, including lung cancer and MPM [6,7]. A thorough assessment of asbestos exposure remains essential for guiding diagnosis and management. In this case report, we presented a patient with PML and calcified pleural plaques, findings that may suggest prior asbestos exposure. This further complicates the differentiation between PML and MPM. This case underscores the importance of immunohistochemical studies, particularly regarding the use of markers such as thyroid transcription factor-1 (TTF-1) and calretinin, in distinguishing PML from MPM, given their overlapping clinical and radiological characteristics.

Case summary

A 47-year-old previously healthy Thai woman presented with a three-month history of right-sided chest pain, progressive shortness of breath, and unintentional weight loss. Upon initial examination, her physical examination and vital signs were unremarkable. However, a chest radiograph revealed multiple pleural-based masses in the right hemithorax (Figure 1A).

Subsequent contrast-enhanced computed tomography (CT) of the thorax revealed concentric nodular pleural thickening and lobulated pleural masses with heterogeneous enhancement along the right pleura (Figure 1 – B-C). Calcified pleural plaques were identified bilaterally at the anterolateral chest walls and along both hemidiaphragms (Figure 2). No discrete pulmonary nodules or masses were evident (Figure 3). These findings thereby raised suspicion of the primary pleural tumor, namely MPM. The patient had no history of smoking or significant past medical histories except for dyslipidemia. In addition, there was no recorded family history of cancers or chronic lung diseases. Her occupation as a housewife was noted; however, the medical records did not document her detailed occupational history or information about potential past asbestos exposure such as a history of para-occupational or environmental exposures.

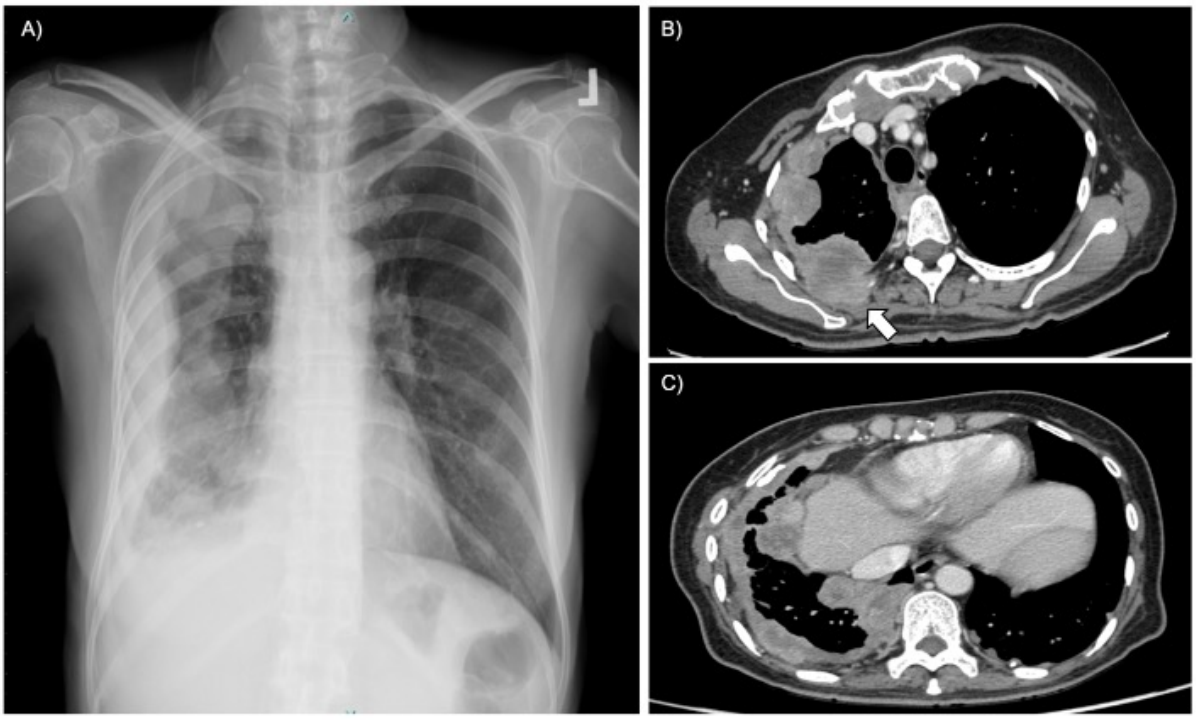

Figure 1. *Initial chest imaging of the patient, A: Chest radiograph showing extensive lobulated pleural masses in the right hemithorax, B-C: Axial contrast-enhanced chest CT images at the upper and lower thoracic levels (mediastinal-window setting) demonstrating concentric nodular pleural thickening and lobulated pleural masses with heterogeneous enhancement, including extension to the posterior chest wall muscles (arrow in B).*

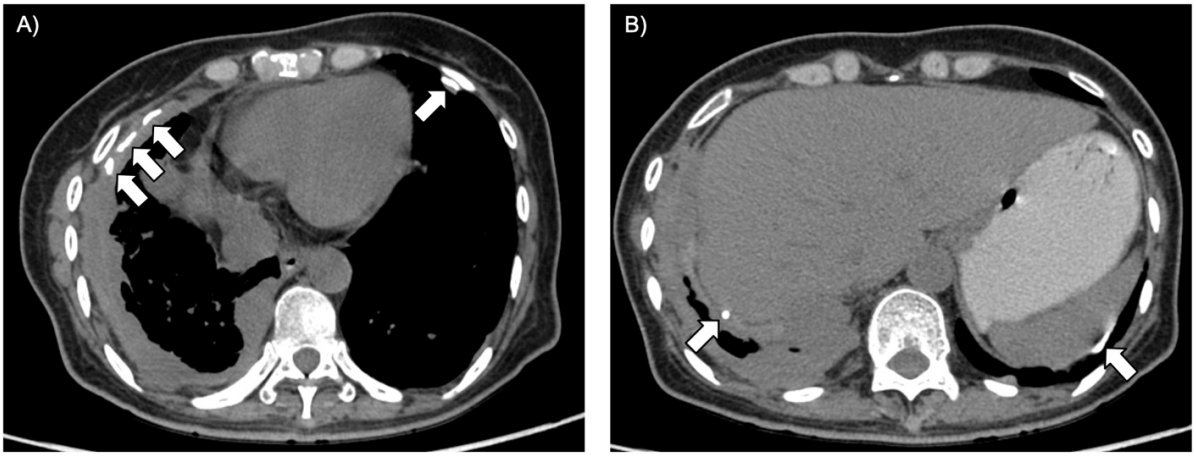

Figure 2. *Axial non-contrast chest CT images (mediastinal-window setting) showing calcified pleural plaques (arrows) at the anterolateral aspect of the bilateral chest walls (A) and along both hemidiaphragms (B).*

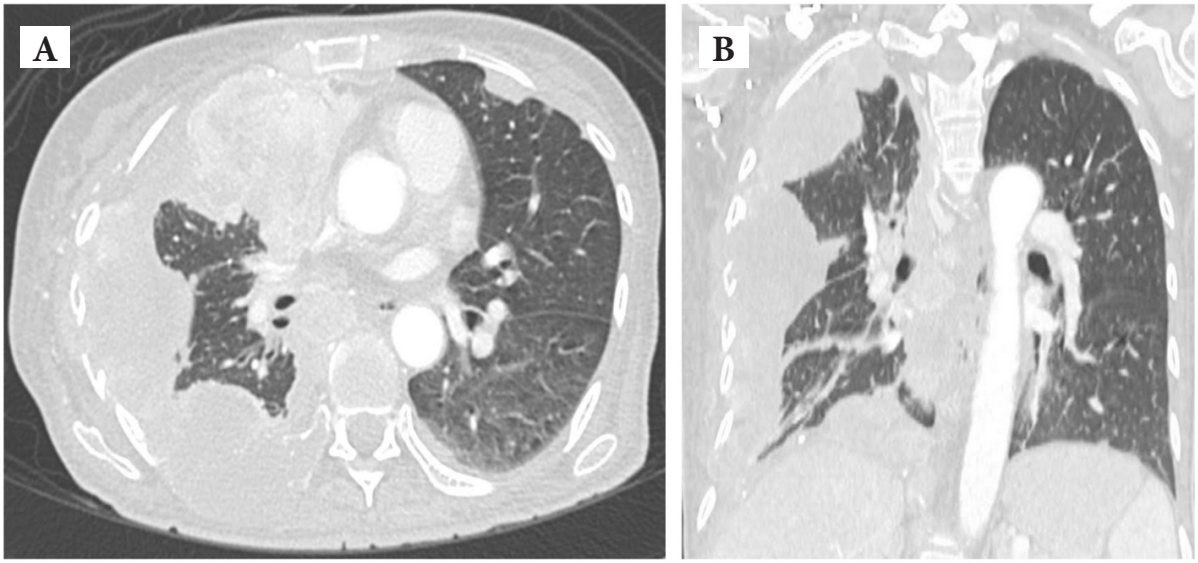

Figure 3. *Axial (A) and coronal (B) contrast-enhanced chest CT images (lung-window setting) demonstrating the absence of discrete pulmonary nodules or masses.*

THE ASEAN JOURNAL OF RADIOLOGY
ISSN 2672-9393

The patient underwent an ultrasound-guided biopsy of the right pleura. Histopathological findings revealed few atypical glandular structures in the stroma alongside scattered malignant cells in an epithelioid appearance. Mucin staining was negative. Importantly, further immunohistochemistry staining confirmed adenocarcinoma of the lung, with positive markers for thyroid transcription factor-1 (TTF-1) and AE1/AE3, while displaying negativity for calretinin. Meanwhile, serum tumor marker levels were within normal limits, including CEA, CA 125, and CA 19-9.

After the diagnosis, the patient received chemotherapy consisting of carboplatin and gemcitabine. However, CT imaging after five cycles of the treatment revealed disease progression, demonstrating a significant interval increase in the size of pleural masses, as well as mediastinal adenopathies and bone destructions at the right 5th and 8th ribs due to adjacent tumor invasion. Correspondingly, a whole-body bone scan demonstrated radioactivity uptake at multiple ribs, suggesting bony metastasis. The CT scans of the brain and abdomen revealed no significant abnormalities. The patient had been under palliative care until her demise, approximately ten months following the initial diagnosis.

Ethical approval for this case study was waived by the institutional review board, considering its nature as a case report of a single patient. In addition, we have de-identified all patient details.

Discussion

This case report presented the patient with PML. PML is a rare form of lung cancer that primarily involves the pleura. According to a 10-year retrospective study in the United Kingdom, individuals with PML are typically older (median age of 67), predominantly male, and 95% are current or former smokers [6]. Unlike prior reports, this patient was relatively young and had never smoked. Upon diagnosis, the patient presented with advanced disease, which contributed to suboptimal treatment outcomes, with a survival duration of 10 months. This poor prognosis aligns with previous literature, which reports a median survival duration of 8 months (ranging from 0.5 to 14 months) [6]. Additionally, a case series involving seven PML cases found survival durations ranging from 2 to 12 months, with no improvement in patients who underwent chemotherapy or radiation [5].

Given the absence of documented occupational history, tuberculosis, significant thoracic injury, surgery, or radiation, the presence of calcified diaphragmatic pleural plaques may suggest prior asbestos exposure [4]. Thus, the nodular concentric pleural thickening with calcified pleural plaques, particularly on the lower chest walls and diaphragm, strongly suggests MPM with prior asbestos exposure in this patient [3, 8]. However, it is important to note that nodular pleural thickening can also be seen in metastatic carcinoma, particularly adenocarcinoma [8]. Similarly, the presence of pleural plaques in patients with pleural masses does not necessarily indicate MPM. In a PML case series, pleural plaques were found in 60% of cases (12/20), with five detected radiologically [7]. Studies have highlighted the potential link between asbestos exposure and PML. One study found that approximately 80% of PML patients had a history of asbestos exposure [6], while another demonstrated elevated asbestos concentrations in lung tissues of PML patients [7]. Additionally, a retrospective study in Japan identified pleural plaques in 12.8% of primary lung cancer patients [9]. However, data from compensation claims or occupational health studies may influence the characteristics of the study population. This suggests that, despite its rarity, PML should be considered a

THE ASEAN JOURNAL OF RADIOLOGY
ISSN 2672-9393

differential diagnosis alongside MPM. Kobayashi et al. highlighted the challenge of distinguishing the radiological features of PML from MPM, as both can present with fissure involvement, pleural effusion, and hilar or mediastinal lymphadenopathy [5]. Given the overlap in radiological and clinical features, tissue diagnosis is essential for confirmation.

The histopathological examination of this patient indicated adenocarcinoma, which needs further careful differentiation from epithelioid mesothelioma due to overlapping histological features [10]. Immunohistochemical analysis is thereby crucial for distinguishing between these two entities, with TTF-1 and calretinin as the key markers. TTF-1 immunostain, which is a lung-specific marker, showed a positive result in this patient. Importantly, calretinin, which is a specific marker associated with epithelioid mesothelioma, was negative. Previous literature has also consistently reported negative calretinin staining in cases with PML [5,6,11]. As a result, the diagnosis in this patient was, in turn, adenocarcinoma of the lung, the predominant subtype of PML [5,6]. Notably, adenocarcinoma typically occurs in the peripheral lung. Hence, it has been proposed that PML might originate from the subpleural region and spread via subpleural lymphatic systems or through fibrous pleural thickening [1,2].

To our knowledge, this was the first case report of PML coexisting with pleural plaques in Thailand. Diaphragmatic pleural plaques were a critical finding as they are potentially linked with prior asbestos exposure. Nonetheless, some limitations of this case study should be mentioned. Firstly, as this case dates back to 2008, despite our best efforts, lacking a clear history of asbestos exposure from the patient or her close relatives poses a challenge in linking PML and asbestos exposure in this patient. Secondly, the unavailability of histopathological and immunohistochemical images due to storage expiration restricts their visual presentation in this report, as we could only acquire the written pathological reports.

In conclusion, this case study highlights the CT manifestations of PML, a rare but life-threatening thoracic neoplasm that closely mimics MPM. Additionally, the presence of pleural plaques in this patient, potentially linked to past asbestos exposure, further complicates differentiation from MPM. Therefore, immunohistochemical studies, particularly markers like TTF-1 and calretinin, are essential for accurately distinguishing between these two conditions.

Conflict of Interest and source of funding: none declared.

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ISSN 2672-9393

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