

# The great masquerade: Empyema thoracis as an unusual presentation of primary lung malignancy

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## SUMMARY

Primary lung malignancy presenting as empyema is rare, with a reported incidence of 0.3%. We report a case of a 60-year-old man presenting with unilateral pleural effusion; diagnostic thoracentesis confirmed *Salmonella* empyema. Post-drainage, chest radiograph showed persisting right hemithorax opacity; subsequent computed tomography revealed a right lung mass with right upper lobe bronchus obliteration. Percutaneous biopsy confirmed advanced stage lung adenocarcinoma. We discuss the mechanism of post-obstructive pneumonia in lung cancer-associated empyema and the utility of bedside ultrasound in diagnosis of lung masses. Clinicians are alerted to the possibility of lung malignancy in elderly patients presenting with empyema.

## INTRODUCTION

Primary lung malignancy presenting as empyema is an uncommon encounter, with a reported incidence of 0.3%.<sup>1</sup> Concurrent empyema may mask malignancy, leading to delay in diagnosis and increasing mortality. We report a case of advanced lung adenocarcinoma which masqueraded as *Salmonella* empyema, and also discuss its pathophysiology in relation to radiological imaging, and subsequent management.

## CASE REPORT

A 60-year-old man presented with prolonged productive cough for two months which was intermittently blood stained, accompanied by more recent febrile episodes. He also complained of constitutional symptoms of loss of weight and appetite. He was a chronic smoker, but otherwise had no other significant medical history. He denied high risk behaviour and had no previous history of tuberculosis. Prior to admission, he had sought medical attention twice and had been treated for pneumonia as an outpatient, however no chest radiographs were done.

On examination, his right hemithorax was dull to percussion and had reduced breath sounds. There was no lymphadenopathy or hepatomegaly. Chest radiograph on admission showed a unilateral massive pleural effusion and subsequent diagnostic thoracentesis confirmed the diagnosis of empyema with initial pleural fluid analysis as follows: pH 6.91, lactate 13.3, glucose 0.3mmol/l. Intercostal chest drainage and empirical antibiotics were commenced. Pleural fluid culture revealed *Salmonella enteritidis* sensitive to

ampicillin, chloramphenicol, ciprofloxacin, bactrim, whereby blood culture was negative. In line with sensitivity testing, intravenous ampicillin was commenced for two weeks, followed by oral ciprofloxacin and ampicillin-sulbactam for four weeks. Cytological examination of pleural fluid revealed inflammatory cells, predominantly neutrophils and histiocytes; with no atypical cells suggestive of malignancy. Sputum and pleural fluid smear for acid-fast bacilli were negative; and tuberculosis culture did not yield any positive growth. Further history revealed no preceding history of enteritis, consuming unpasteurized dairy products or other raw food products. Biohazard screening was negative.

Despite improving clinical condition and a reducing drain output, repeated chest radiograph (Figure 1a) of the patient showed a persistent right hemithorax opacity. A bedside ultrasound revealed a heterogenous mass over the right hemithorax, with associated collapse consolidation of the right upper lobe. Subsequent computed tomography of the thorax and abdomen (Figure 1b) revealed a right upper lobe lung mass causing obliteration of right upper lobe bronchus, leading to right upper lobe collapse, with mediastinal lymphadenopathy. There was no evidence of distant metastasis. Radiological staging of the lung mass was T3N2M1a. There was also no genitourinary tract, liver, spleen collections suggestive of infective sources of *Salmonella* infection.

The patient refused bronchoscopy and underwent percutaneous Tru-cut biopsy under ultrasound guidance, which confirmed advanced stage adenocarcinoma with wild type EGFR mutation. Immunohistochemistry stains revealed positivity for thyroid transcription factor-1. The patient was referred to the oncology team for further management. He was unable to tolerate chemotherapy and subsequently only received palliative radiotherapy.

## DISCUSSION

The pathophysiology of lung cancer associated empyema has been attributed to a few factors such as complication of pneumonia on a background of immunosuppressed status, in necrotic tissue following chemotherapy or invasive procedures, or as a sequelae of post-obstructive infection,<sup>2</sup> the latter being most likely, given the radiological findings of collapsed lung with obliterated bronchus. We believe the delay in diagnosis of malignancy in this patient was due to the lack of chest radiograph performed during the initial

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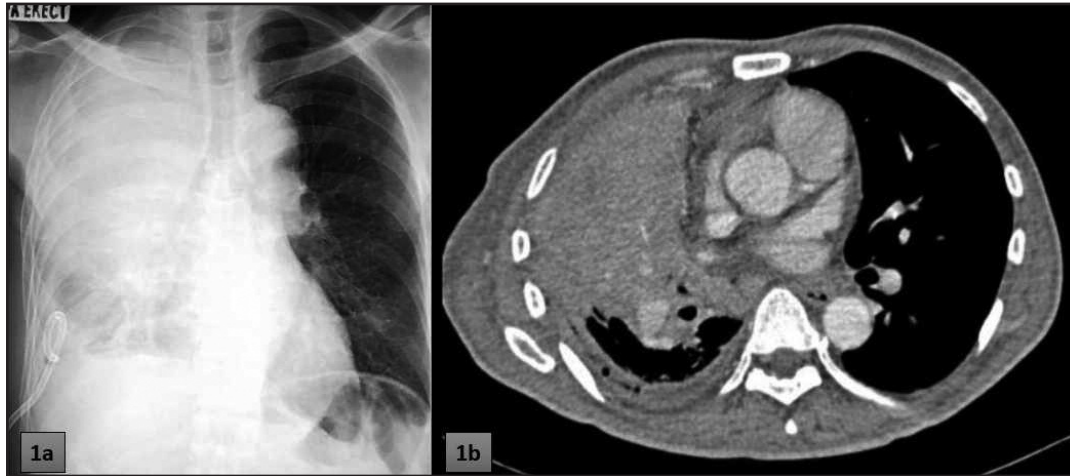


Fig. 1: (a) Chest radiograph (b) Axial view of CT thorax.

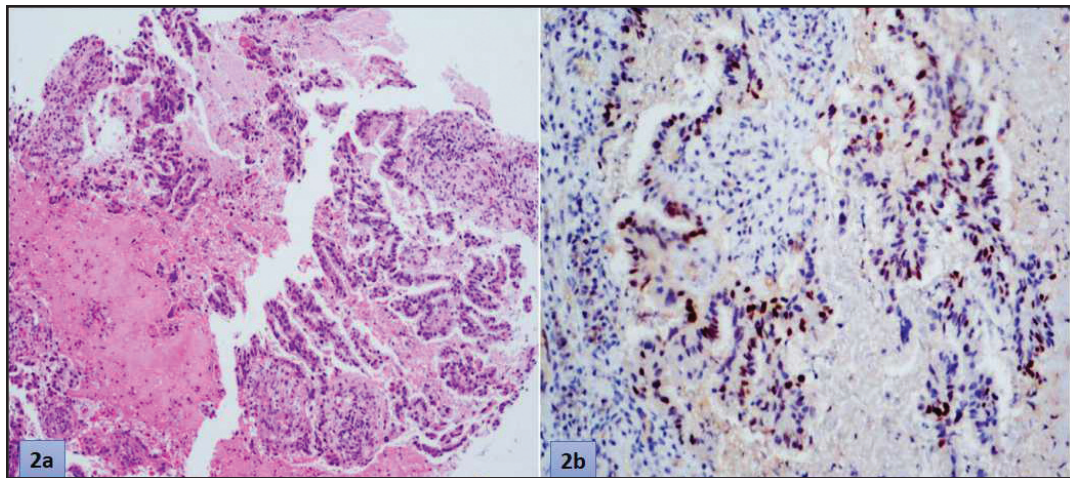


Fig. 2: (a) Adenocarcinoma composed of glandular and papillary structures with extensive areas of necrosis (H&E 100x). (b) Immunohistochemical stain for TTF-1 shows nuclear staining in the neoplastic epithelium. (H&E 400x).

presentation of pneumonia. This resulted in ineffective treatment of pneumonia, which subsequently lead to thoracic empyema. The British Thoracic Society recommends that chest radiography be considered in outpatients who do not improve after 48 hours, or in which the diagnosis of pneumonia is in doubt, especially those at risk of lung cancer, and as a follow-on investigation when the patient does not improve after completion of treatment.<sup>3</sup> Our patient had a 2-month history of haemoptysis, loss of weight and constitutional symptoms, and therefore a CXR should have been done during the initial presentation, not least during subsequent follow-up.

*Salmonella* empyema associated with lung malignancy is rare, with less than fifty cases reported in the last century.<sup>4</sup> The absence of culture-proven bacteraemia and enteritis symptoms does not preclude *Salmonella* infection, as prior reports have shown that only 33% of patients with salmonella empyema will manifest with gastrointestinal symptoms, while most have negative blood culture.<sup>1</sup> These prior reports are consistent to our patient's clinical picture. While antibiotics, thoracic drainage and optimized nutrition

are the mainstays of treatment, surgical intervention has been reported to prove beneficial.<sup>2</sup> In view of our patient's advanced malignancy and improved clinical condition after drainage, we did not seek further surgical intervention for his empyema.

Bedside ultrasound can be a useful adjunctive investigation modality for patients presenting with peripherally located lesions. Furthermore, for lung masses abutting the chest wall with no intervening major vasculature, bedside ultrasound can guide percutaneous biopsy, as was the case in our patient. A small study comparing detection rates of bronchogenic carcinoma in a cohort of 53 patients concluded that ultrasound was superior to computed tomography in detecting peritumoural atelectasis, diaphragm paralysis, supraclavicular lymph node invasion, effusions, consolidations, chest wall invasion and necrosis within a mass, while being inferior in detecting masses and mediastinal node invasion.<sup>3</sup> The same study also quoted a positive yield of 78% for thoracic ultrasound guided biopsy; however, success rates are undoubtedly dependent on the skill of the operator skill.

Our case highlights the rare but important dual pathology of malignancy and empyema. Suspicion should be elicited when an elderly patient presents with chronic symptoms that precede an infective episode, or when symptoms persist despite initial treatment. BTS guidelines recommend that those who have persisting symptoms or physical signs and have risk factors of malignancy such as being smokers and aged above fifty should have a chest radiograph done.<sup>5</sup> Bedside ultrasound can be useful in detecting masses beneath effusions and play a role in biopsy of more superficially located tumours. While remaining a diagnostic challenge; the combination of careful history-taking and radiography remain essential in the detection of lung malignancy in the face of such 'empyematous masquerades'.

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