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Unusual Combination of Rare Dual Pathologies of the Pleura in a Young Male

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Abstract
We present a rare case of a seventeen-year-old male presenting with acute dyspnoea, fever, and right-sided pleural effusion. Pleural fluid analysis demonstrated a lymphocytic exudate, anti-tuberculosis (ATB) drugs were initially given. Subsequent computed tomography revealed a massive anterior mediastinal mass with internal fat attenuation and lymphadenopathy. Given the atypical clinicoradiological presentation, multisite tissue sampling was performed. Multiple thoracoscopic biopsies from pleural and nodular lesions revealed fungal infection highly suspicious for Aspergillus at one site and features suggestive of germ cell tumour at another. CT-guided biopsy of the mediastinal mass further supported germ cell tumour, while ultrasound-guided right supraclavicular lymph node biopsy confirmed metastatic germ cell tumour deposits. Extragonadal non-seminomatous germ cell tumor with pleural aspergillosis was supported by significantly elevated serum alpha-fetoprotein and beta-human chorionic gonadotropin, underscoring a rare dual pathology and the significance of multidisciplinary evaluation with histopathological confirmation in atypical presentations
Keywords: *Pleural effusion; Mediastinal neoplasms; Teratoma; Aspergillosis; Case report*

Key Messages

It is extremely uncommon for pleural aspergillosis and a malignant mediastinal germ cell tumor to manifest at the same time. In a TB-endemic country, a patient presenting with unilateral exudative pleural effusion should be evaluated thoroughly to establish a definitive primary diagnosis using available resources, including contrast-enhanced CT chest and medical thoracoscopy. This approach may prevent the overdiagnosis of tuberculosis and unnecessary anti-tuberculosis treatment, while also avoiding delayed or missed diagnosis of other important pathologies that may be amenable to curative treatment if identified early.

Introduction

Extragonadal germ cell tumours (EGCTs) are rare neoplasms developing in midline structures, most frequently the anterior mediastinum in adults.[1] Teratomas constitute most mediastinal EGCTs, with behaviour ranging from benign mature variants to highly aggressive malignant non-seminomatous mixed tumours.[2,3] These tumours are often incidental or present with compressive symptoms such as chest pain and dyspnoea. Presentation with massive pleural effusion is exceptionally rare, with only few cases reported.[4,5] Concurrent malignant mediastinal germ cell tumour and pleural aspergillosis in an immunocompetent young patient is exceptionally rare. We

report this rare dual pathology to emphasize comprehensive histopathological evaluation in diagnostically challenging pleural presentations.

Case History

A 17-year-old male with no previous comorbidities presented to the emergency department with a sudden exacerbation of dyspnoea that had persisted over the preceding week. Additionally, he reported a one-week history of dry cough with recurrent episodes of fever, alongside a one-month history of anorexia and weight loss. He denied haemoptysis, chest pain, recent travel, or thoracic trauma. He was a student with no history of occupational exposures, smoking, or family history of pulmonary disorders.

On initial examination, the patient was afebrile and haemodynamically stable. Regional examination revealed palpable bilateral supraclavicular lymph nodes. The trachea was deviated to the left. Examination of the right hemithorax revealed reduced expansion, a stony dull percussion note, and absent breath sounds. Initial laboratory investigations revealed a leukocytosis (16,800/μL), an elevated C-reactive protein (177.8 mg/L), and an erythrocyte sedimentation rate of 45 mm/hour. A chest radiograph demonstrated a massive right-sided pleural effusion with significant contralateral mediastinal shift (Figure 1). An intercostal drain was inserted, yielding two litres of fluid. Pleural fluid analysis revealed a highly cellular lymphocytic exudate (Table 1). Simultaneously microbiological investigations of TB (AFB smear, GeneXpert, Mycobacterial culture) were performed and became negative. Given the endemicity of the disease and the lymphocytic predominance, an empirical trial of anti-tuberculosis therapy was initiated.(6) However, subsequent contrast-enhanced computed tomography (CECT) of the chest demonstrated a heterogeneously enhancing, massive anterior mediastinal mass containing internal fat attenuation foci, associated with right supraclavicular lymphadenopathy (Figure 2). Awaiting a computed tomography-guided core biopsy of the primary mass, the patient underwent fibreoptic thoracoscopy. Multiple loculations of straw-coloured pleural fluid were noted alongside a distinct diaphragmatic pleural nodule (Figure 3). Thoracoscopy guided biopsy of this nodule revealed highly reactive mesothelial cells and morphological appearances of a fungal infection, highly suspicious for Aspergillus.(7) Another biopsy nodule revealed fragments of myxoid spindle stroma containing glandular formations lined by columnar cells with hyperchromatic nuclei, suggestive of a germ cell tumour. Subsequently, the core biopsy of the mediastinal mass was also suggestive of a germ cell tumour. Serum tumour markers were markedly elevated: alpha-fetoprotein (AFP) of 3980 ng/mL, beta-human chorionic gonadotropin (β-hCG) of 251 mIU/mL, and lactate dehydrogenase (LDH) of 722 U/L (Table 2). Ultrasound-guided biopsy of the right supraclavicular lymph node was performed, and histopathology revealed metastatic germ cell tumour deposits, confirming nodal involvement. Based on these integrated findings, a diagnosis of a malignant extragonadal non-seminomatous germ cell tumour with concomitant pleural aspergillosis was established.

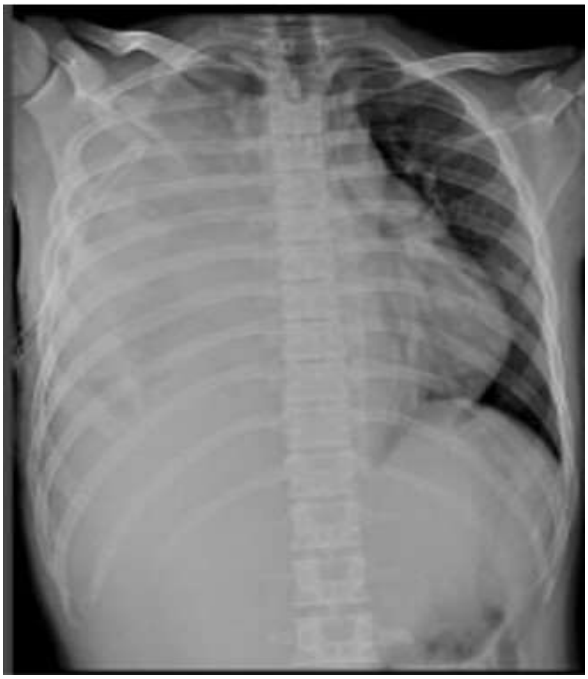

Figure 1: Chest Xray demonstrating a right sided pleural effusion with trachea and mediastinum shifted to left side

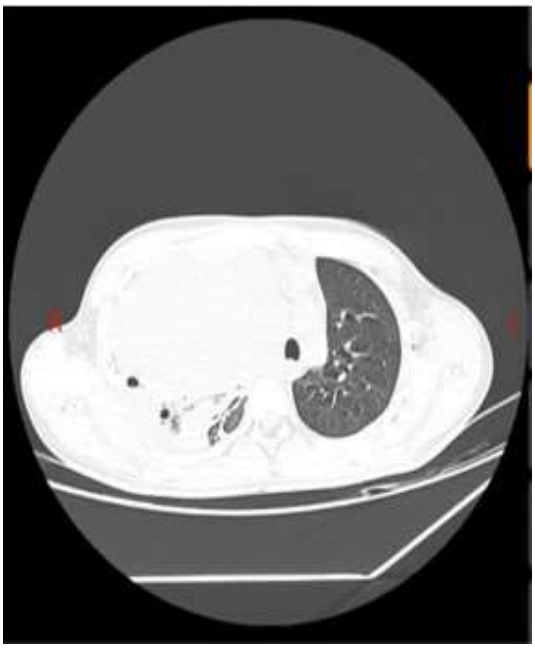

Figure 2: CT chest, a heterogeneously enhanced massive anterior mediastinal mass having internal fat attenuation foci with ipsilateral pleural effusion and lymphadenopathy involving prevascular and right supraclavicular regions.

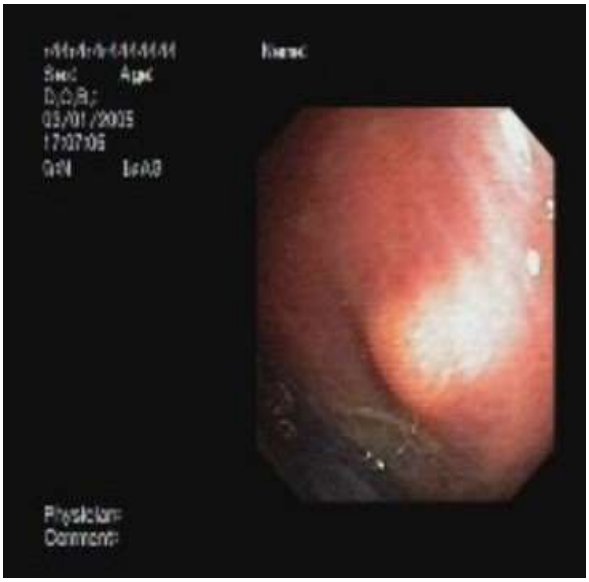

Figure 3: Fiberoptic thoracoscopy demonstrating straw-coloured pleural fluid alongside a distinct diaphragmatic pleural nodule.

Table 1: Pleural Fluid Analysis

Appearance	Yellow/ Cloudy
Glucose	85.7
Protein	36.5
LDH	2757
pH	7.5
RBC	14400
Lymphocytes	90%
Polymorphs	10%
Gram Stain	No organisms
AFB	Not seen
ADA	14.4
AFB smear	AFB not seen
Mycobacterial culture	Negative
GeneXpert	Negative

Table 2: Serum Tumor Markers

	Results	Normal range
Alpha Feto Protein	3980	0.1-12 ng/ml

Serum Beta HCG	251	<5 mIU/ml
LDH	722	225–450 U/L

Discussion

Extragonadal germ cell tumours are rare, with a global incidence of 1.27 per 1,000,000 person-years, peaking predominantly in young males.[1] While mature teratomas share an equal gender distribution, non-seminomatous malignant variants are found almost exclusively in males.[2] Presentation with a massive pleural effusion is a distinctly rare manifestation of a mediastinal teratoma.[4,5] In our patient, the initial clinical picture posed a significant diagnostic trap. A highly cellular, lymphocytic exudative pleural effusion in an adolescent residing in our demographic strongly suggests tuberculous pleuritis, which classically presents with a lymphocyte predominance exceeding 80%.[6] This supported the decision to initiate empirical anti-tuberculosis therapy, despite negative microbiological results from the pleural fluid aspirate, including AFB smear, GeneXpert MTB/RIF, and mycobacterial culture. However, the subsequent identification of a massive fat-containing anterior mediastinal mass rapidly pivoted the diagnosis. The pathogenesis of the massive pleural effusion in this context is likely multifactorial, driven by lymphatic obstruction secondary to the sheer tumour bulk and prevascular lymphadenopathy, compounded by the localized inflammatory response to the secondary fungal infection. The thoracoscopic isolation of Aspergillus from a diaphragmatic nodule in a patient without profound neutropenia is highly unusual.[7] We hypothesize that the immense tumour burden and the resulting cachexia evidenced by his profound weight loss induced a state of localized immune dysregulation, predisposing the pleural space to opportunistic fungal colonization. Another possibility is that the patient may have had an underlying immunodeficiency state that could not be diagnosed due to the unavailability of specific investigations. Accurate classification of mediastinal germ cell tumours is vital for prognostication and management. According to the International Germ Cell Cancer Collaborative Group (IGCCCG), primary mediastinal non-seminomatous germ cell tumours are intrinsically classified as "poor risk" due to their aggressive biology and high rate of metastasis.[8] The marked elevation of both AFP and β-hCG in our patient represents a classic biochemical signature of a non-seminomatous mixed tumour.[3] Because these tumours respond poorly to primary surgical resection alone, management dictates an aggressive, multimodal approach combining intensive platinum-based chemotherapy followed by the surgical resection of residual masses, running concurrently with targeted antifungal therapy for the pleural aspergillosis.[9] This case underscores a critical clinical lesson: while lymphocytic exudates frequently signify tuberculosis in endemic regions, clinicians must maintain a high index of suspicion for underlying malignancies. Empirical therapy should never delay advanced imaging or tissue diagnosis when atypical features such as supraclavicular lymphadenopathy or massive mediastinal shift are present. The identification of this dual pathology highlights the necessity of a multidisciplinary approach, utilizing biochemical markers and dual-site biopsies to ensure precise, life-saving interventions.

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