Case Report

Anterior mediastinal teratoma mimicking tuberculosis: A diagnostic challenge in a high tuberculosis-burden country

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ABSTRACT

Mature teratomas are uncommon benign germ cell tumors that can occur in adults, most frequently within the anterior mediastinum. We describe the case of a 45-year-old woman presenting to the respiratory medicine outpatient clinic with a persistent dry cough, left-sided chest pain, and occasional mild hemoptysis for 6–7 months. Initial chest radiograph revealed a left mediastinal opacity with a hilum overlay sign. Computed tomography (CT) suggested a differential of thymolipoma versus germ cell tumor, with histopathological confirmation recommended. CT-guided biopsy established the diagnosis of a mature teratoma, and the patient was subsequently referred for surgical excision. Although benign, mediastinal teratomas may mimic serious pulmonary conditions and cause alarming symptoms such as hemoptysis. Correlating clinical, radiological, and histopathological findings is essential for accurate diagnosis and timely management.

Key words: A Mediastinal teratoma, Extragonadal germ cell tumor, Hilum overlay sign, Tuberculosis mimics

Tuberculosis (TB) remains one of the most pressing public health challenges globally, caused by *Mycobacterium tuberculosis*, and primarily affecting the lungs. It spreads through airborne transmission and can present with symptoms such as chronic cough, fever, weight loss, and hemoptysis. While TB is curable with timely and appropriate therapy, its diagnosis can be complicated by overlapping clinical features with other respiratory and mediastinal conditions. In high-burden countries like India, the sheer volume of cases often leads to presumptive treatment based on symptoms and radiographic findings alone, increasing the risk of misdiagnosis and delayed identification of alternative pathologies. India carries the highest share of global TB, with 2.78 million cases reported in 2023, about 195 cases/100,000 people. This marks a 17.7% drop from 2015, when the rate was 237/100,000. Despite this progress, TB still causes around 323,200 deaths in India every year [1]. According to the World Health Organization Global TB Report 2024, five countries make up over half of the world's TB cases: India (26%), Indonesia (10%), China (6.8%), the Philippines (6.8%), and Pakistan (6.3%). India also has 27% of the world's multidrug-resistant TB cases [2]. In comparison, developed countries have much lower TB rates, which makes diagnosing other conditions, like mediastinal tumors, more difficult in places like India, where TB is so common. In high-burden countries of TB, like India, when a patient presents with chronic cough, hemoptysis, chest pain, and opacity on chest X-ray (CXR), TB remains the top diagnostic priority. However, as no CXR is suggestive of TB, further workup like sputum nucleic acid amplification test (NAAT) test must be done to establish a microbiological diagnosis of TB [2-4]. Mediastinal masses often present a diagnostic dilemma, particularly in high TB prevalence countries. Patients with persistent cough, chest pain, and hemoptysis are frequently presumed to have pulmonary TB, and empirical anti-tubercular therapy (ATT) is often initiated before a tissue diagnosis is obtained. This approach, while common, risks delaying recognition of alternative pathologies and poses a serious consequence to wrong diagnosis.

Teratomas are tumors of germ cell origin and capable of differentiating into tissues from all three germ layers: The ectoderm, mesoderm, and endoderm. While the gonads are the most frequent site, the anterior mediastinum is the most common extragonadal location. In the adult population, germ cell tumors account for approximately 15% of anterior mediastinal masses, whereas in children the proportion is closer to 25% [5]. Benign cystic teratomas generally carry an excellent prognosis when surgically excised [6].

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This report presents a rare clinical manifestation of a mature mediastinal teratoma and discusses the diagnostic challenges and therapeutic approach.

CASE REPORT

A 45-year-old woman presented with a history of persistent dry cough, left-sided chest discomfort, and intermittent episodes of mild hemoptysis lasting for 7–8 months. She had no history of TB or prior ATT and reported no other significant comorbidities.

General examination was unremarkable, and respiratory examination revealed bilateral air entry.

Routine blood investigations were within normal limits, and sputum NAAT for *Mycobacterium tuberculosis* was negative. A CXR (Fig. 1) revealed a mediastinal opacity with a hilum overlay sign. Subsequent computed tomography (CT) of the chest (Fig. 2) demonstrated a well-defined anterior mediastinal mass measuring approximately 58 × 54 × 62 mm, containing areas of internal fat density. The lesion was closely related to the pulmonary trunk but without major vascular invasion. Histopathological correlation was advised, and a CT-guided biopsy of the mass confirmed the diagnosis of a mature teratoma (Fig. 3).

The patient was referred to thoracic surgery for definitive surgical resection.

DISCUSSION

Diagnosing anterior mediastinal lesions is particularly challenging in regions where TB is widespread, as masses are often presumed to be tubercular. This case highlights the importance of maintaining a wide differential when evaluating patients with persistent respiratory symptoms. Mediastinal germ cell tumors are uncommon, representing only 1–3% of all germ cell neoplasms. One proposed explanation for their extragonadal occurrence is abnormal migration of primordial germ cells during embryogenesis [7]. Mature teratomas occur in both sexes and across a broad age range. Many remain clinically silent and are identified incidentally. When symptoms are present, they are usually due to mass effect, producing cough, chest pain, or shortness of breath. Rarely, airway involvement can cause hemoptysis [8]. Exceptional presentations include superior vena cava obstruction and trichoptysis (expectoration of hair), which is considered pathognomonic.

Contrast-enhanced CT scanning is regarded as the best imaging tool for suspected germ cell tumors. Mature teratomas usually appear as sharply defined anterior mediastinal masses with heterogeneous composition. Radiological findings may include fat, soft tissue, cystic fluid, calcifications, or mature structures such as bone or hair [9]. Surgical excision is curative, and there is no role for chemotherapy or radiotherapy in benign cases.

This case also emphasizes the risk of misdiagnosis in TB-endemic settings. Starting empirical ATT without histological confirmation can delay appropriate treatment and negatively affect outcomes [10]. In TB-endemic regions, there are diagnostic complexities due to overlapping clinical and radiological features between infectious and neoplastic etiologies [11]. In this case, the patient's presentation, chronic cough, chest pain, and hemoptysis mirrored classical symptoms of pulmonary TB, a common diagnosis in India. However, the absence of constitutional symptoms (fever, weight loss, night sweats), negative sputum NAAT, and atypical imaging findings prompted further evaluation.

Empirical ATT remains a widespread practice in high TB-burden countries, often initiated based on clinical suspicion and radiographic findings alone. This approach, while pragmatic in resource-limited settings,

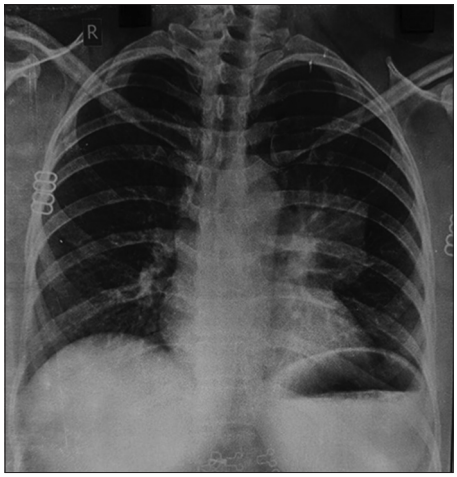

Figure 1: Chest X-ray showing mediastinal opacity with hilum overlay sign

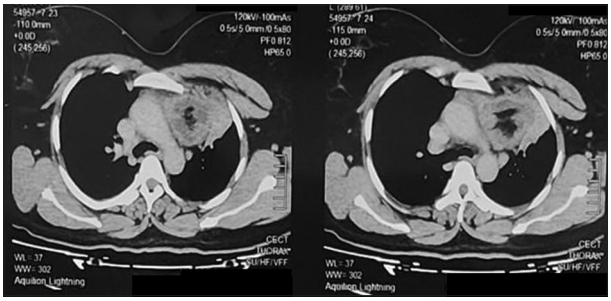

Figure 2: Computed tomography chest depicting an anterior mediastinal mass with internal fat density

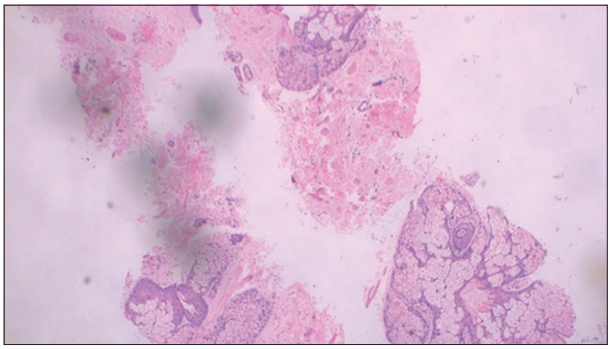

Figure 3: Photomicrograph showing adipose tissue, skin, and hair follicles consistent with teratoma

risks misdiagnosing other clinical conditions such as neoplasms, sarcoidosis, or fungal infections. In our case, the initial chest radiograph revealed a left mediastinal opacity with a hilum overlay sign – suggestive of an anterior mediastinal origin rather than parenchymal lung disease. This subtle radiological clue was pivotal in redirecting the diagnostic pathway.

Contrast-enhanced CT of the thorax revealed a well-defined anterior mediastinal mass with internal fat density, hallmarks of a teratomatous lesion. The differential diagnosis for fat-containing anterior mediastinal masses includes [12]: Mature teratoma: Characterized by fat, fluid, and calcifications; often benign. Thymolipoma: A rare benign tumor composed of thymic and adipose tissue. Lipoma/liposarcoma: Typically, homogeneous fat density; liposarcomas may show soft tissue components. Pericardial fat pad hypertrophy: Usually diffuse and non-mass forming. The absence of vascular invasion and the presence of internal fat favored a benign germ cell tumor. However, thymic neoplasms and malignant germ cell tumors (e.g., seminomas, non-seminomatous variants) remained in the differential, necessitating histopathological confirmation.

CT-guided biopsy confirmed a mature teratoma, revealing differentiated tissues from all three germ layers – adipose tissue, skin, and hair follicles. This underscores the importance of tissue diagnosis before initiating therapy, especially in ambiguous cases. Mature teratomas are typically benign and do not require chemotherapy or radiotherapy unless malignant transformation occurs, which is rare but documented in the literature.

Complete surgical excision remains the treatment of choice for mature teratomas. In our case, the patient is waitlisted for Surgery in a reputed apex Government tertiary hospital, due to financial constraints and limited intake in government hospitals.

This case highlights a broader issue in TB-endemic countries: The over-reliance on empirical ATT and the underutilization of tissue diagnosis. Misdiagnosis not only delays appropriate treatment but also contributes to drug resistance, adverse effects, and healthcare burden [13]. Clinicians must maintain a high index of suspicion for alternative diagnoses when imaging or clinical features deviate from classical TB presentations.

Furthermore, this case advocates for improved access to advanced imaging and biopsy services in peripheral centers, enabling timely and accurate diagnosis. Incorporating structured diagnostic algorithms and multidisciplinary case reviews may help reduce diagnostic errors in complex mediastinal pathologies.

CONCLUSION

In countries where TB is highly prevalent, anterior mediastinal lesions are frequently presumed to represent tubercular pathology. However, alternative causes such as mature teratomas should be suspected when imaging demonstrates features like internal fat density and sharply circumscribed borders. Confirmation with tissue diagnosis is vital to avoid unnecessary ATT and to guide appropriate management. Multidisciplinary involvement of radiologists, pathologists, and thoracic surgeons ensures timely diagnosis and optimal outcomes for these rare but treatable tumors.

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