Not all lung masses in smokers are malignant: A rare case of Anthracosis mimicking Lung cancer

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ABSTRACT

Anthracosis and Lung cancer may present with similar clinical features such as Dyspnea, cough, and hemoptysis. A chest X-ray and computerized tomography (CT) scan may reveal a lung mass in both conditions, leading to a misdiagnosis. In this case report, we present a 60-year-old female smoker who was initially diagnosed with Lung cancer based on clinical and radiological findings. The lung mass was found to be anthracosis after a bronchoscopy and confirmed by histopathological examination. Thus, we emphasize that overreliance on a single diagnostic modality may lead to a false diagnosis, and a more comprehensive approach is necessary.

Keywords: Anthracosis; Bronchoscopy; Lung cancer; Smoker

INTRODUCTION

Anthracosis (Greek: anthrax, coal) is a chronic lung disease characterized by the formation of black nodules due to the deposition of carbon particles in the interstitial lung tissue, lymphatic vessels, and intrapulmonary lymph nodes. Also known as black lung disease or coal workers' pneumoconiosis[1], anthracosis most commonly affects older patients, with a mean age at diagnosis of 63 years[2]. The term "anthracosis' was coined by Pearson in 1851 and is predominantly seen in coal workers, cigarette smokers, and urban dwellers exposed to high levels of air pollution[3].

The clinical features of Anthracosis typically include dyspnea and cough in most patients, and non-specific chest pain, constitutional symptoms, and hemoptysis are the less common symptoms[4]. These clinical symptoms closely resemble those of lung cancer, leading to challenges in clinical diagnosis, especially if the person is a smoker[5]. Furthermore, radiological investigations may not be able to distinguish between them, leading to a false diagnosis, as happened in our case[4].

In this case, we present a 60-year-old female smoker with anthracosis, initially misdiagnosed as lung cancer based on clinical presentation and radiological findings.

CASE PRESENTATION

A 60-year-old female with 20 pack years of smoking and a history of exposure to biomass fuel in enclosed spaces for 45 years, and resolved pulmonary tuberculosis 1 year back, treated with 6 months of antitubercular therapy (ATT), presented with shortness of breath and cough for 4 months. Shortness of breath was insidious in onset, gradually progressing from Modified Medical Research Council (MMRC) Grade I to Grade II without diurnal or postural variation. Cough was primarily dry with occasional coughing up of blood for 4 episodes. She had no constitutional symptoms, such as fever, night sweats, loss of appetite, fatigue, or weight loss. She didn't give a history of chest pain, chest tightness, palpitation, or pedal edema. She denied any known comorbidities. Her general examinations and respiratory examinations were unremarkable except for wheezing predominantly on the right side.

Given the history, lung cancer was our primary provisional diagnosis along with reactivation of pulmonary TB, Interstitial lung disease (ILD), chronic bronchitis, bronchiectasis, and heart failure as our differentials.

A chest X-ray showed heterogeneous opacities in the right middle zone, suggestive of a lung mass (Figure 1). The blood investigations were unremarkable. The patient underwent CT chest (plain and contrast), which showed an ill-defined hypo-enhancing lesion of size approximately 2.6*2.0*1.3 cm in the right suprahilar region with abrupt cut off of the right upper lobe bronchus (Figure 2). The lesion was encasing the right pulmonary artery, right superior and inferior pulmonary vein, and the azygous vein with significant luminal narrowing. The lesion also abutted the superior vena cava with an indistinct fat plane in places, causing significant luminal narrowing. There were heterogeneously enhancing lymph nodes in the

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right hilar and bilateral paratracheal region. Features were suggestive of bronchogenic carcinoma with nodal metastasis (T4N2M0). Besides, there were centri-lobular nodules giving a tree-in-bud pattern scattered in the bilateral lung fields. A completely occluding non-enhancing filling defect (likely mucus plug) with complete collapse of the right middle lobe was seen. There were COPD changes in the rest of the bilateral lung fields.

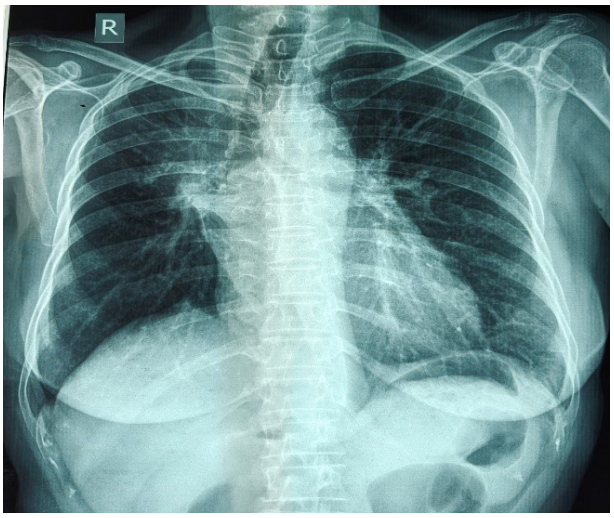
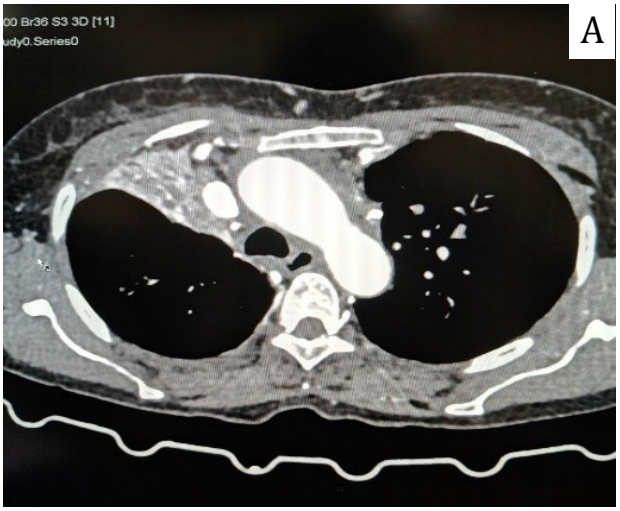
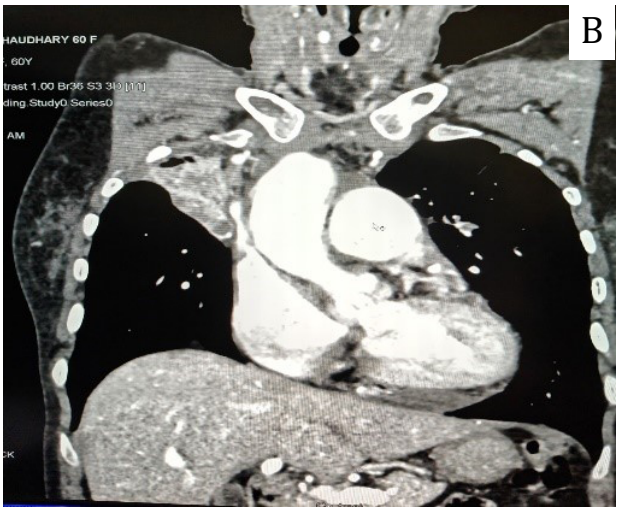


***Figure 1**: Chest X-ray showing a spiculated mass in the Right Hilar region.*





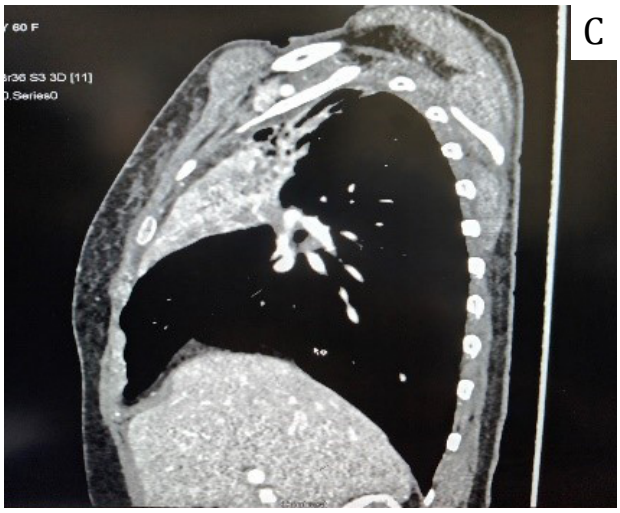


***Figure 2 (A, B, C):** Computerized Tomography (CT) scan of the chest in Axial, Coronal, and sagittal views showing an ill-defined hypo-enhancing lesion in the right suprahilar region with heterogeneously enhancing lymph nodes in the right hilar and bilateral paratracheal region.*

A bronchoscopy was performed, which revealed a completely obliterated right upper lobe with dense anthracotic pigmentation, with a broncholith seen at the wall. Similarly, anthracotic pigmentation was seen in the right middle lobe, left upper lobe, and at the opening of the lingular bronchus. The right lower lobe and left upper lobe were narrowed due to extrinsic compression. Endobronchial biopsy from the opening of the right upper lobe (RUL) Bronchus and Bronchoalveolar lavage (BAL) from the right upper lobe was taken at the same setting. BAL was negative for malignant cells. The right upper lobe bronchus biopsy was also negative for granulomatous inflammation or malignancy (Figure 3).

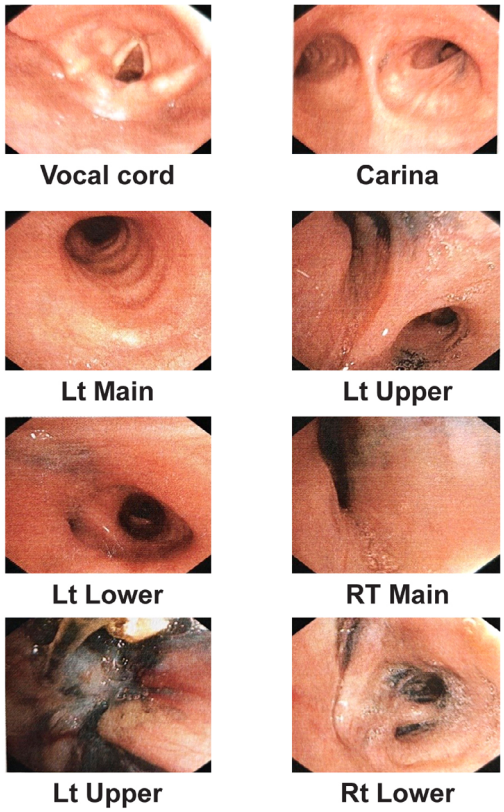


Figure 3: *Bronchoscopy image showing the right upper lobe completely obliterated with dense anthracotic pigmentation, with a broncholith seen at the wall. Anthracotic pigmentation is also seen in the right middle and left upper lobes.*

Subsequently, USG-guided Fine needle aspiration cytology (FNAC) was performed, which showed columnar cells and clusters and aggregates of oval to epitheloid cells with a moderate amount of cytoplasm containing blackish color pigment suggestive of anthracosis and negative for malignant cells (Figure 4).

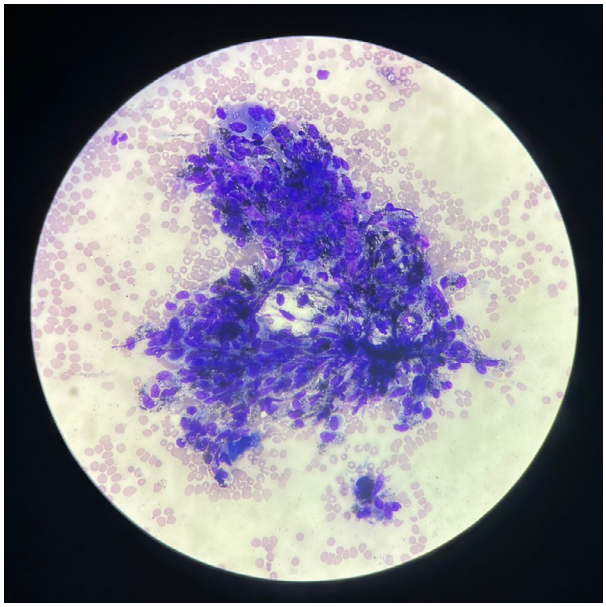


Figure 4: *Histopathological image showing clusters and aggregates of oval to epitheloid cells with a moderate amount of cytoplasm containing blackish color pigment. The features are suggestive of anthracosis.*

As the diagnosis of anthracosis was confirmed, the patient was advised to quit smoking and avoid biomass fuel. She was managed using bronchodilators and inhaled corticosteroids, as well as pulmonary rehabilitation therapy. She was also advised to undergo regular follow-up in the pulmonology outpatient services.

DISCUSSION

Our patient presented with complaints that closely resembled those of lung cancer, such as a significant smoking history, shortness of breath, cough, and hemoptysis. The diagnosis of lung cancer was further consolidated by chest X-ray and CT scan, which showed a lung mass with features consistent with lung cancer. Only after performing USG-guided Fine needle aspiration (FNA) of the lung mass and bronchoscopy, the diagnosis changed to Anthracosis. This case highlights a significant diagnostic challenge, as the CT finding was highly suggestive of lung carcinoma; however, histopathological analysis revealed anthracosis.

A study done by Singh et. al. found that patients with anthracosis presented with cough (76.65%), hemoptysis (46.6%), fever (26.6%), dyspnea (90%), and malaise (73.3%). This study also found that 60% of all patients had old or active tuberculosis[6]. These features coincide with a study on lung cancer by Beckles et. al., which found patients presented with cough (75%), dyspnea (60%), chest discomfort (50%), hemoptysis (30%)[7]. By comparing these two studies, it is evident that clinical presentation is ambiguous and may lead to diagnostic difficulty. However, it should be noted that 10% of patients may be asymptomatic and are detected only on chest radiographs[7].

Radiological features of anthracosis include a nonhomogeneous pulmonary infiltrate, subsegmental atelectasis, and mass lesions on chest X-ray[8]. CT scan findings include mediastinal or hilar lymphadenopathy with or without calcification, bronchial narrowing with or without atelectasis, and mass lesions[4,8-10]. These findings are most commonly present in the upper lobe of the lung, according to some authors, but others suggest the right middle lobe as the most common[6,11.] However, these findings commonly lead to a misdiagnosis such as TB, lung cancer, pneumonia, or atelectasis[8]. We were also misguided by the CT scan findings, which suggested bronchogenic carcinoma with nodal metastasis. There have been other incidents where anthracosis has mimicked lung cancer, similar to our case[1,12,13].

Magnetic resonance imaging (MRI) has also been used to differentiate Bronchial anthracofibrosis from lung cancer, according to a study done by Dae Sik Ryu et. al., in which they found low signal intensity of the mass, collapsed lung, and lymph nodes on T2-weighted imaging (T2WI) of anthracofibrosis patients, thus helping in differentiation from lung cancer[14]. Fludeoxyglucose Positron Emission Tomography (FDG-PET) can also be used to diagnose pulmonary pathology, and increased uptake is usually seen in malignancies[4]. However, there have been reports that suggest even in benign conditions like anthracosis, increased FDG uptake is seen, making it challenging to differentiate between them[4,15].

Radiological investigations may not always be able to distinguish between benign pathology, like anthracosis, and malignant pathology, like cancer; a definitive diagnosis can be obtained through histopathology. Biopsy samples show carbon-like particles inside the cytoplasm of macrophages in the bronchial wall and free particles in the mediastinal lymph nodes[8,16]. These findings were present in our case, confirming anthracosis. Another method of diagnosis is through bronchoscopy, and its findings range from simple flat anthracosis to deep-seated retracted anthracosis and protruded black discoloration of mucosa, with or without bronchial narrowing[16]. Additionally, bronchial swelling with infiltration, erythema, and obliteration of bronchi may be seen[8].

There is no specific treatment that affects the underlying pathology of anthracosis. Symptomatic relief is provided

using bronchodilators, inhaled corticosteroids, and mucolytic agents depending upon the symptoms. Furthermore, it is essential to quit smoking and avoid exposure to household smoke to stop the disease progression and flares. More studies are required to establish guidelines for the treatment of anthracosis[4]. We also provided symptomatic relief to the patient, and counselling was done regarding the disease course, and advised for regular follow-up.

CONCLUSION

A mass visualized in X-ray and CT scan may not always be malignant. It is important to consider other differential diagnoses, such as anthracosis, which may have similar clinical as well as radiological findings. This case also highlights the importance of histopathology in the diagnosis of benign from malignant lung masses.

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CONFLICTS OF INTEREST

The authors declare no competing interests.

CONSENT

Written informed consent was obtained from the patient for the publication of this case report.

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