



Unusual Case of Pulmonary Tuberculosis Presenting as Imaging Counterfeit of Lung Cancer - A Case Report

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Abstract

Introduction: Tuberculosis (TB) is a global health problem with alarming rate of morbidity and mortality. With its multitude presentation, it is considered a diagnostic chameleon as it may resemble several clinical conditions including malignancy, given similarities between the two conditions in terms of clinical and imaging features.

Case Report: Here we present an illustrating case of an 83-year-old nonsmoker male who presented with intractable cough of two months duration. The blood parameters and sputum reports were not contributory to a specific diagnosis. His computed tomography (CT) imaging findings suggested a heterogeneously enhancing mass in right lower lobe and favored a diagnosis of lung cancer. So, for confirmation he underwent a transcutaneous CT guided lung biopsy for the mass but interestingly on histopathological evaluation, it turned out to be tuberculosis.

Discussion: Tuberculosis is a communicable and preventable disease. Pulmonary TB (PTB) can mask or imitate lung cancer imaging features. A battery of tests is available to differentiate between the two, however, microbiological and histopathological results are the gold standard. An accurate diagnosis is must to initiate appropriate treatment and to avoid toxic chemotherapy and unnecessary surgery.

Conclusion: Pulmonary tuberculosis (PTB) can have an atypical radiological presentation where it counterfeits lung cancer imaging. The case highlights that a diagnosis of PTB should always be considered in a TB endemic country like India.

Keywords: Pulmonary tuberculosis, Lung cancer, Contrast enhanced computed tomography.

Introduction

Tuberculosis (TB) is a global health problem. As reported by World Health Organization (WHO) in 2023, a total of 1.3 million people died from TB in 2022 worldwide surpassing HIV and AIDS. India has the highest burden of TB with two deaths occurring every three minutes from tuberculosis^[1]. Tuberculosis is a well-known diagnostic mimicker to many clinical conditions including malignancy. In India where tuberculosis is such a rampant disease, pulmonary tuberculosis (PTB) can present with any radiological feature posing a diagnostic challenge. The pseudotumoral PTB can present like a lung mass in 3.5 to 4.5% of PTB^[2]. It is very important to differentiate it from lung cancer as the natural history of the disease, pathology, treatment and prognosis are altogether different. We present a case of an 83-year-old male, with a presumptive diagnosis of lung cancer that was subsequently proven as PTB instead of malignancy.

Case Report

An 83-year-old nonsmoker male presented with two-months history of intractable nonproductive cough. He had no history of fever, night sweats, hemoptysis, chest pain, decreased appetite or weight loss. There was no relevant past medical history of any TB contact or antitubercular therapy (ATT) intake. His physical examination was unremarkable. The blood parameters including leukocyte count, C- reactive protein (CRP) and erythrocyte sedimentation rate (ESR) were within normal limits. On sputum examination, no acid-fast bacilli (AFB) were detected and sputum cartridge based nucleic acid amplification test (CBNAAT) was negative for *Mycobacterium tuberculosis*. The chest radiograph (Figure 1) showed a nodular radiopacity of size 2 x 1.5cm in right mid zone. Contrast enhanced computed tomography (CECT) of chest (Figure 2a,2b) confirmed a minimally enhancing soft tissue mass of size 42x20 x14mm in superior segment of right lower lobe having

angular and lobulated margins with no calcification. Patchy areas of ground glass haze were seen in bilateral lung fields. There was no mediastinal lymphadenopathy, pleural effusion, centrilobular nodules, tree in bud appearance, segmental lung collapse, fibrotic or bronchiectatic changes. This CT imaging appearance raised the possibility of lung malignancy and a provisional diagnosis of lung neoplasm was kept. So, for confirmation of the imaging diagnosis the patient underwent CT guided transcutaneous lung biopsy for the mass. To a great surprise and also relief, the histopathologic report was positive for caseous granulomatous inflammation and negative result for malignancy. With Ziehl- Neelsen (ZN) staining, a few mycobacteria were detected in necrotic material. Hence, the initial diagnosis of lung cancer was later revised to be PTB. The patient was started on standard anti-TB treatment that constituted of isoniazid, rifampicin, pyrazinamide and ethambutol to which he responded very well and had a drastic improvement in his symptoms within a week of initiating ATT. On follow up CECT done after 3 months (Figure 3a,3b), the mass like lesion in superior segment of RLL showed significant reduction in size (24x20x10mm) and attenuation.

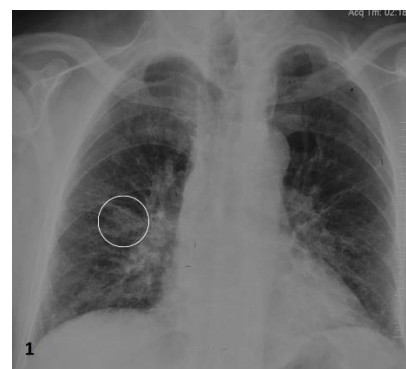


Figure 1: An 83-year-old male presenting with cough for the past two months. Chest X ray shows an oval radiodense nodule in right mid zone showing irregular margins on its lateral aspect.

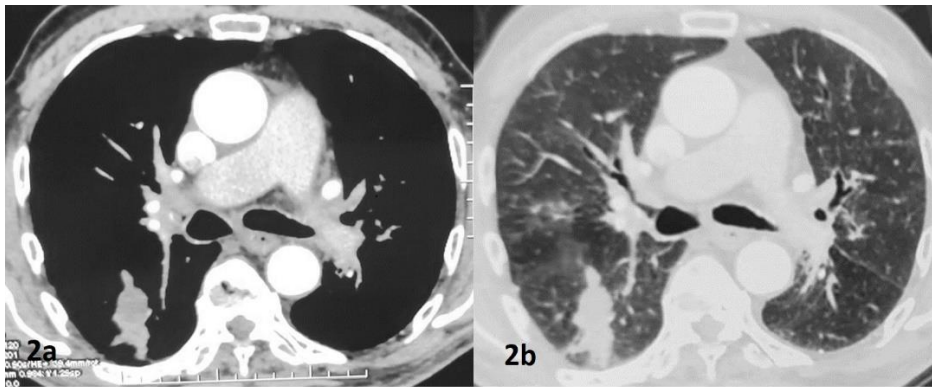


Figure 2: CECT chest of the same patient (a) mediastinal and (b) lung window axial images show a soft tissue mass in superior segment of right lower lobe having lobulated and angular margins.

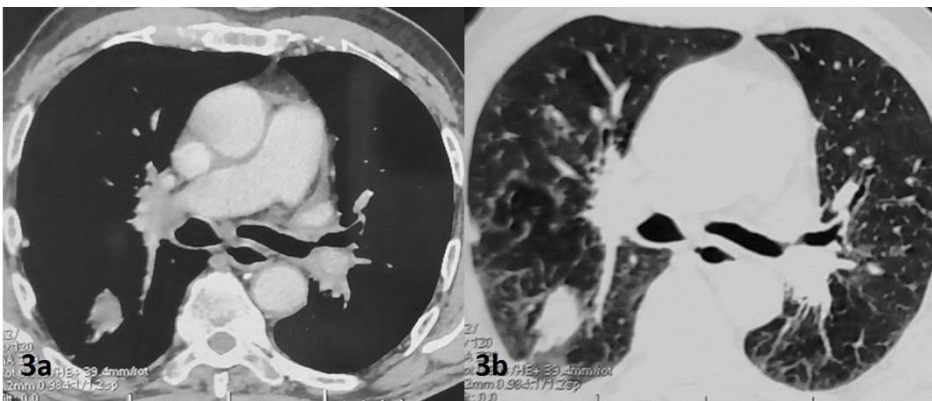


Figure 3: Follow up CECT chest after 3 months (a) mediastinal and (b) lung window axial images show that the mass has significantly reduced in size.

Discussion

Tuberculosis (TB) is a communicable disease caused by *Mycobacterium tuberculosis*^[3]. It is a major cause of morbidity and mortality worldwide. It is one of the top global infectious pandemics after coronavirus disease 2019^[4]. Lung cancer also leads the charts in terms of most common malignancy related deaths worldwide^[5]. Pulmonary TB and lung cancer, both having a high prevalence, can mimic each other symptomatologically as well as on imaging, resulting in misdiagnosis and thereby initiation of wrong or delayed treatment. Moreover, to add to the diagnostic dilemma, both the conditions can coexist complicating further work up of the patient. This coexistence is attributed to the fact that chronic inflammation caused by PTB provides a tumor supporting microenvironment leading to increased incidence of lung cancer in patients with PTB^[6]. So, PTB is a risk factor for

lung cancer with an increased risk of 50% than the general population and 2.5 times more incidence if the history of PTB is of longer than 20 years duration^[7]. The pathogenesis underlying this mechanism is manifold and include proliferation and squamous metaplasia of tubercular cavity wall or dilated bronchial wall in response to chronic tubercular inflammation and subsequent carcinogenesis; abnormal cellular immune function in these patients; and post tubercular calcified parenchymal foci and calcified lymph nodes serving as local irritants to bronchi and promoting carcinogenesis^[7]. Symptoms like long standing productive cough, hemoptysis, chest pain, low grade fever, night sweats, fatigue and weight loss are seen in PTB, but can also be encountered in lung cancer^[7,8]. However, history of smoking and mediastinal symptoms such as hoarseness of voice, dysphagia and superior vena cava obstruction favor lung cancer. Smoking is an independent risk factor of lung cancer with a 13-

fold increased risk in active smokers and 1.5-fold increase in passive smokers as compared to non-smokers^[9]. It is these non-specific symptoms and lack of definitive diagnostic tests that hinder an accurate diagnosis and a timely treatment. Also, PTB being a contagious disease requires that the health care workers should be vigilant to prevent occupational exposure during invasive procedures like routine bronchoscopy. A cost-effective way to reduce diagnostic error in dealing with this great masquerader TB is sputum AFB and CBNAAT examination which interestingly in our case turned out to be negative.

PTB can mask or imitate lung cancer imaging features. The radiographic and CT-imaging features that are indicative of lung malignancy like mass like consolidation, nodular opacity with irregular margins, thick-walled cavities, non – resolving pneumonia and lymphadenopathy may also be seen in pulmonary TB. Swensen et al. in their multicenter study showed that an enhancement of more than 15HU on CT examination has a high sensitivity but a low specificity for diagnosing a pulmonary nodule as malignant. And they also postulated that inactive tuberculomas can be differentiated from active inflammation on the basis of low level of their enhancement. Xie illustrated in his study that lesions that display moderately high radiodensities on enhanced CT are more likely to be malignant, however, there was considerable overlap between enhancement patterns of pulmonary tuberculosis and malignancy^[8]. Atypical radiological feature of PTB like presentation as solitary pulmonary nodule called tuberculoma is described in both primary and post primary form and it is this imaging counterfeit that mimics lung cancer. The tuberculoma may not show activity by AFB smear or polymerase chain reaction PCR test^[10]. Hence, a radiological basis for distinguishing the two disease processes cannot be reliably provided. Also, the role of positron emission tomography CT (PET- CT) to differentiate between the two is limited as SUV values are overlapping as both

show high 18F-fluoro-2-deoxy-D-glucose (18F-FDG) uptake. Tumor markers like carbohydrate antigen 19-9 (CA 19-9) and CA 125 are non-specific and can be raised in PTB and Adenosine deaminase activity (ADA) can be upregulated in lung cancer^[11]. Squamous cell carcinoma antigen (SCC Ag) is increased in patients with pulmonary squamous cell carcinoma but its levels have not been specifically examined in active pulmonary tuberculosis infection. Carcinoembryonic antigen (CEA) and cytokeratin 19 fragments (CYFRA 21-1) when used together as diagnostic tools to differentiate between these two entities show high specificity but low sensitivity resulting in high false negative cases. Other biomarkers like serum human epididymis protein 4 (HE4) also called whey acid protein type four disulphide core 2 (WFDC2) levels also have a high specificity but low sensitivity in diagnosing lung cancer. Its levels are significantly higher in patients with non-small cell lung cancer (NSCLC), but not in those with tuberculosis or in healthy individuals. The increased levels of micro-ribonucleic acid - 182 (miR - 182), miR-183, miR-210 and CEA with decreased miR- 126 in diagnosing NSCLC showed sensitivity and specificity of 88.5% and 92.5%, respectively [8]. The evaluation for serum cell-free DNA (cfDNA) is more sensitive and specific in differentiating NSCLC from tuberculosis than CA125 and CEA. Unfortunately, all these tests are currently not pocket friendly and hence have a low throughput at present. So, the key in the diagnosis of the two disease remains the histopathological and microbiological examination as the gold standard.

Conclusion

In conclusion, tuberculosis is a great diagnostic counterfeit of lung cancer. In terms of clinical and radiographic characteristics, both the diseases may be quite similar and their differentiation can be challenging. The misdiagnosis can result in delay in treatment initiation. It is critical to recognize the typical and atypical radiological presentations

of tuberculosis and find out the distinctions between PTB and lung cancer by integrating the results of radiological, microbiological and histopathological findings.

Conflicts of interest of each author/contributor:

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