Original Research Paper

Volume - 14 | Issue - 08 | August - 2024 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Pulmonary Medicine

TUBERCULOSIS IN THE INTENSIVE CARE UNIT: A CASE REPORT FOCUSED ON UNUSUAL SYMPTOMS AND INCIDENTAL DIAGNOSIS

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ABSTRACT We present the case of a 42-Year-Old Nigerian Male logistic worker who presented to the hospital with complaints of Abdominal Pain Following Castor Oil Ingestion. The patient was diagnosed with pulmonary tuberculosis based on bronchoalveolar lavage (BAL), despite initially being suspected of having Lipoid Pneumonia, Aspiration Pneumonia, Or Pulmonary Alveolar Proteinosis based on HRCT findings showing Crazy Paving Pattern. The patient was started on anti-tuberculosis therapy and had a good clinical response.

KEYWORDS : Tuberculosis, diagnosis, bronchoalveolar lavage, anti-tuberculosis therapy, atypical presentation.

INTRODUCTION:

The infectious disease known as tuberculosis (TB) is caused by the Mycobacterium tuberculosis. Although it can affect other organs as well, it mainly affects the lungs. [1]

TB is an airborne infection transmitted by droplet inhalation, when an infected person coughs or sneezes, and can affect people of all ages, regardless of their socioeconomic status, poor nutritional status and ethnicity. Certain ethnic groups such as Hispanics, Islander, Nigerians appear to be at a greater risk for aquiring TB infection.

In 2021, the distribution of TB disease in the United States was as follows:
- Non-Hispanic Asian persons: 36.0%
- Hispanic or Latino persons: 30.6%
- Non-Hispanic Black or African American persons: 18.0%
- Non-Hispanic White persons: 11.2%

Thus, the percentage of TB in ethnic population in USA is greater than expected based on the percentage of these populations in the USA.

In India, TB remains a major public health challenge despite various control activities.

Between 1990 and 2019, both male and female TB incidence and mortality rates in India decreased, with the decline in female cases being greater.

One of the top 10 causes of death globally, tuberculosis (TB) is thought to be the cause of approximately 1.5 million deaths annually. (2)

With about 26% of all tuberculosis (TB) cases worldwide, India has the highest TB burden in the world, according to recent reports. India was estimated to have 2.64 million cases of tuberculosis in 2020; the nation also accounted for one-third of all tuberculosis deaths worldwide. According to estimates, India has a 199 per 100,000 incidence rate and a 23 per 100,000 mortality rate for tuberculosis. (3)

The high rate of tuberculosis in several Indian states is linked to a number of factors, such as HIV prevalence, overcrowding, poverty, and malnutrition.

The incidence and prevalence of tuberculosis (TB) among refugee and migrant populations, respectively, ranged from 19 to 754 cases per 100,000 population and 18.7 to 535 cases per 100,000 population, according to a systematic review of studies done in India between 1991 and 2017. According to another study, foreign-born migrants account for 60% to 70% of documented cases in low-incidence countries, with their infection rate reaching ten or twenty times higher than that of the autochthonous population.

The Indian government has taken several measures to combat TB, including the introduction of the Pradhan Mantri TB Mukt Bharat Abhiyan initiative, which aims to eliminate TB in India by 2025. The initiative has been successful in detecting and treating TB cases, with over 40,000 Nikshay Mitra supporting over 10.45 Lakh TB patients all over the country.

The symptoms of TB vary depending on the organ system affected. The most common symptom is a persistent cough lasting more than two weeks. Other symptoms may include fever, night sweats, weight loss, and fatigue. TB can also cause chest pain, shortness of breath, and hemoptysis in some cases. (5)

The diagnosis of Pulmonary TB is made through a clinical, radiological and microbiological evaluation in combination with basic tests like chest radiographs, sputum smear microscopy, and culture. TB is not infrequently encountered in the critical care setting but is often under- recognised as a cause of critical illness.

The World Health Organization recommends a standard treatment regimen of four drugs for the first two months (Isoniazid, Rifampcin, Pyrazinamide And Ethambutol), followed by three drugs for the remaining four months (Isoniazid, Rifampcin, Ethambutol). Treatment can be challenging, and adherence to the regimen is essential for a successful outcome. However, is often difficult to ensure.[6]

Prevention of TB can be achieved by several measures, including vaccination, early case detection and treatment, and infection control practices such as wearing masks and improving ventilation in public places. TB is a significant public health concern, particularly in high-burden developing countries which have limited resources for prevention and treatment of public health problems. Increased awareness and investment of resources in research towards rapid diagnosis and shorter regimens are necessary to achieve the goal of TB elimination

Case Presentation :

This case study features a 42-year-old male Nigerian IT professional who complained of stomach pain when he first visited the hospital. The patient was a chronic alcoholic and had ingested beer, packaged fruit juice, coconut oil, and castor oil before developing abdominal distension and vomiting. Patient was tachycardic, tachypneic with fever, abdominal distension and had type 1 respiratory failure.

Supplemental oxygen was needed for the patient, and a high-resolution CT scan of the abdomen and thorax showed dense bilateral

consolidation with subpleural sparing, smooth interlobular septal thickening, and an crazy paving pattern in the lungs.

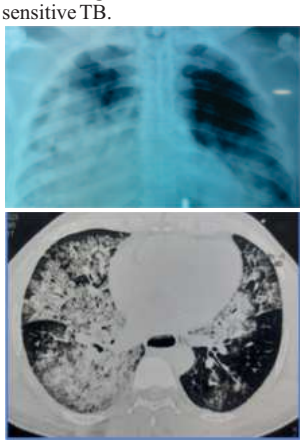
A radiological finding on a chest HRCT or regular CT scan is called a crazy paving pattern. It describes the occurrence of intralobular and interlobular septal thickening superimposed on top of ground-glass opacities. This is a general finding that can be observed under various circumstances. Pulmonary edema, acute respiratory distress syndrome (ARDS), pneumocystic jeroveci infections, cytomegalovirus, acute interstitial pneumonia, bacterial pneumonia, and pulmonary alveolar proteinosis (PAP) are a few of the common causes. The range of conditions that are now included in the differential diagnosis for crazy paving pattern includes neoplastic processes, infectious diseases, and idiopathic lung inhalational disorders.

The patient was started on injection Piperacillin Tazobactam 4.5g IV TDS and Clindamycin 500mg IV BD, keeping a differential diagnosis of lipoid pneumonia, aspiration pneumonia, and pulmonary alveolar proteinosis in mind. Fibreoptic bronchoscopy was performed On February 3 2023 after written and informed consent, under all aseptic precautions under conscious sedation and was uneventful. BAL washings and TBLB (transbronchial lung biopsy) were taken from all segments of the right middle lobe, right lower lobe, left lower lobe, and lingula. The tracheobronchial tree appeared normal, and the bronchoalveolar lavage (BAL) was purulent, not milky, as seen in pulmonary alveolar proteinosis. Hence ruling out the possibility of PAP. Transbronchial lung biopsy was done and sent for histopathology and PAS (periodic acid schiff) staining to rule out PAP from other differentials like lipoid pneumonia and aspiration pneumonia.

Cytomegalovirus (CMV) and Pneumocystis pneumonia (PCP) are opportunistic infections that can affect people living with HIV. CMV is detected frequently in the bronchoalveolar lavage (BAL) using DNA-specific polymerase chain reaction (PCR). In the age of ART, PCP is still a significant opportunistic infection. It did not adversely affect CD4 reconstitution, but it might leave behind pulmonary sequelae.

His blood workup did not show any immunosuppression (HIV negative) and hence, the differentials of infections like cytomegalovirus and pneumocystic jeroveci were kept on the back burner as they are highly associated with immunosuppressed states.

However, INCIDENTALLY, The BAL microscopy showed the presence of 4 AFB per field. Liquid culture (TBMGIT) results were awaited. Following the initiation of anti-tuberculosis therapy, which included pyrazinamide, ethambutol, isoniazid, and rifampicin, his oxygen requirement decreased, and radiological improvement was observed. He was discharged after two weeks on antitubercular regimen for drug sensitive TB.



Differential Diagnosis :

On admission, the patient presented with abdominal pain and respiratory distress after toxic ingestion. The initial differential diagnosis for the patient included Lipoid Pneumonia, Aspiration Pneumonia, And Pulmonary Alveolar Proteinosis.

A) Lipoid pneumonia (LP) is a rare pulmonary illness characterized by lipid buildup in the lungs; it is further divided into exogenous (LP) and endogenous (EnLP) LP based on where the pathogenic lipid originates. The aspiration of substances based on oil, such as mineral oils, petroleum jelly, animal fats, etc., is associated with ExLP. Conversely, EnLP may result from several illnesses, including lung tumors, pulmonary infections, obstructive pulmonary disease, and problems with lipid metabolism. Mineral, animal, and vegetable oils—among other oils—generally suppress the natural protective cough reflex. They can also impede cilia movement and impede the expulsion of ingested oils. Lipids build up in the lungs over time and are ingested by alveolar macrophages, which damage lung tissue by triggering local inflammatory reactions. Numerous microorganisms, such as respiratory viruses, fast-growing NTM, mycobacterium tuberculosis, Pseudomonas, Acinetobacter, and Klebsiella, can superinfect people with lipoid pneumonia. Since this patient gave a history of castor oil ingestion, and the presence of GGOS on HRCT, lipoid pneumonia was one of the differentials. The positive BAL microscopy for TB may have either been due to a primary infection or a superimposed secondary TB infection.

B) Aspiration pneumonia is another possible differential diagnosis, especially given the patient's history of ingesting multiple substances before developing abdominal distension and vomiting. Aspiration pneumonia occurs when foreign material, such as food or gastric contents, is aspirated into the lungs, leading to inflammation and infection. It can have a wide variety of presentations, from mild cough and fever to severe respiratory distress. These pneumonias are generally microbiologically rich in anaerobes, however they can be complicated with mycobacterium tuberculosis on certain instances.

C) Pulmonary alveolar proteinosis is a rare lung disorder of alveolar surfactant which impairs gas exchange. It can present with non-specific clinical symptoms, such as cough and dyspnea, and radiological findings that mimic other lung diseases. The diagnosis is confirmed by bronchoalveolar lavage, characteristic findings of which include milky fluid with numerous foamy macrophages and alveolar accumulation of amorphous substances that stain positive with periodic acid schiff stain. There are two types of PAP that are described: primary or idiopathic, which happens when there is no known environmental exposure or other illness; and secondary, which can occur in infections, cancers, immunosuppressive conditions, and situations where chemical agents and mineral particles (silica, aluminum, titanium, and some insecticides) are inhaled. This population has been linked to the following etiological agents: virus, Histoplasma capsulatum, Cryptococcus neoformans, Aspergillus sp., Nocardia sp., Mycobacterium sp., and Pneumocystis carinii. Seldom has the connection between pulmonary tuberculosis and alveolar proteinosis been documented.

According to a case study by Serpil Tekgül and colleagues, Histopathologic analysis of a transbronchial biopsy taken from a 46-year-old male nonsmoker revealed that the alveolar spaces were filled with granular eosinophilic materials that tested positive for Periodic Acid-Schiff (PAS). AFB-staining of the sputum direct smear revealed acid-fast bacilli. Mycobacterium tuberculosis was grown in the culture of previously obtained bronchial lavage fluid. Based on the crazy pattern observed bilaterally in that patient, it was determined that M. tuberculosis originated as a superinfection on PAP. The crazy pattern would be anticipated as localized if the PAP were secondary to tuberculosis.[14]

In another case report by Hao Bai et al., multiple pulmonary miliary nodules around the bronchi and a "crazy-paving" appearance were revealed by high-resolution computed tomography in a 21-year-old Han Chinese patient with suspected lung infection who also had mild restrictive ventilatory dysfunction and diffusion reduction. A small amount of periodic acid-Schiff positive proteinaceous materials was seen in bronchoalveolar lavage. Both an interferon-gamma release test and a serological test for the presence of an antibody against Mycobacterium tuberculosis were positive. This case demonstrated that for patients with mild PAP who also have tuberculosis, diagnostic bronchoalveolar lavage combined with anti-tuberculosis treatment is a safe and useful option.[15]

According to recent findings, patients with low GM-CSF also have dysfunctional alveolar macrophages and decreased clearance of exogenous M. tuberculosis and endogenous SP, making them vulnerable to PAP and tuberculosis. Gene mutations or GM-CSF antibodies cause surfactant imbalance and macrophage dysfunction in PAP cases. A combination of factors, including elevated levels of SP-A and SP-D, facilitate macrophage engulfment of M. tuberculosis and impair macrophage function. On the other hand, tuberculosis might also be the main cause, causing type II pneumocytes to release too

much surfactant and leading to the development of PAP.

The presence of acid-fast bacilli on bronchoalveolar lavage microscopy supported the diagnosis of pulmonary tuberculosis in our patient. Pulmonary tuberculosis can present with a myriad of symptoms from mild cough and dyspnoea to absolute toxemia and due to its varied presentations is difficult to diagnose at times. However, a high clinical suspicion is key in such cases.

DISCUSSION:

The World Bank estimates that there are 219 cases of tuberculosis for every 100,000 people in Nigeria. In 2020, the estimated burden of TB in Nigeria was 452,000 TB cases; of these cases, only 135,784 (30%) were diagnosed and notified to the National Tuberculosis and Leprosy Control Programme (NTP). In Nigeria, tuberculosis (TB) is a major public health concern that must be acknowledged. Every year, around 245,000 Nigerians die from tuberculosis and about 590,000 new cases occur. TB accounts for more than 10% of all deaths in Nigeria.

Several case reports have documented the clinical features of pulmonary tuberculosis, abdominal tuberculosis, which may mimic other abdominal pathologies, and miliary tuberculosis, which may have a milder presentation and course.

In a case series conducted by Mukhopadhyay et al., out of 70 patients with abdominal tuberculosis, 75% had symptoms mimicking acute abdominal pathologies, such as appendicitis or intestinal obstruction, leading to delayed diagnosis and treatment. [9] In another case report by Poplin et al., a patient with miliary tuberculosis presented with fever, jaundice, and abdominal pain, with no respiratory symptoms. The patient's original hepatitis treatment caused a delay in the accurate diagnosis and treatment of tuberculosis. [10]

A 40-year-old man with a history of alcoholism was the subject of another case report from India. He appeared with fever, cough, and bilateral infiltrates on chest radiographs. Based on sputum AFB microscopy and culture, the patient was diagnosed with pulmonary TB. The study suggested alcoholism may reduce immunity and increase the risk of developing pulmonary TB. [11]

The high morbidity and mortality rates of pulmonary tuberculosis make it a major global public health concern. The varied clinical presentation and mimicry of tuberculosis can make diagnosis challenging, and the disease can easily be misdiagnosed or overlooked, especially in cases with atypical symptoms.

This case report highlights the challenges in diagnosing pulmonary tuberculosis, particularly in patients with atypical history and clinical presentations.

A high index of suspicion is necessary for the diagnosis of pulmonary tuberculosis, particularly in patients who have risk factors like alcoholism, malnourishment, and compromised immune systems. When a patient has suspected pulmonary tuberculosis, bronchoscopy combined with bronchoalveolar lavage is a useful diagnostic procedure because it can identify acid-fast bacilli and provide a specimen for smear and culture. According to a study by Ahmad et al., pulmonary tuberculosis could be diagnosed with 73% sensitivity and 100% specificity using bronchoscopy combined with bronchoalveolar lavage. [13]

CONCLUSION:

The heterogeneity of presentation in pulmonary tuberculosis can pose a challenge to case detection in public health programs aimed at controlling the disease. This problem continues to be a major public health concern. Healthcare providers should be aware of the varied clinical presentations of tuberculosis and focus on active case finding for early diagnosis and treatment which will ensure better cure rates and treatment outcomes.

This case report also draws attention to the need for tuberculosis screening in migrants from other countries who seek opportunities for employment and linkage with country specific or local TB control / elimination programs to offer them a standard of care as per the WHO declaration.

These migrants constitute key affected population who are vulnerable to developing tuberculosis either in their native country of residence or to the country they seek employment in and are often ignored by the healthcare system.

India has been taking several initiatives to eradicate tuberculosis (TB) and has demonstrated significant high-level political commitment and action towards ending the disease.

To achieve the target of eliminating tuberculosis by 2030, it is essential to provide a high standard of care for these patients.

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