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Cavitary TB in the Setting of DKA in a Type 2 Diabetic: A Case Report

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Abstract
Individuals diagnosed with diabetes mellitus (DM) are more likely to contract tuberculosis (TB) and frequently have worse outcomes[1]. Two-thirds of the estimated 440 million people with DM are expected to come from low-income nations by 2030[2]. Co-occurring disorders like diabetes mellitus can exacerbate tuberculosis. DM is the most common co-morbid condition in the field of pulmonary tuberculosis. Compared to the general population's 0.8% risk of contracting TB, patients with diabetes have a 4.8% risk of doing so[3]. Individuals with unmanaged diabetes mellitus show increased susceptibility to tuberculosis. DM is a moderate to strong risk factor for the onset of tuberculosis, according to numerous studies[4][5]. DM patients who require more than 40 units of insulin per day are specifically twice as likely to likely to contract TB[6[Hyperglycemia plus cellular insulinopenia increases vulnerability to Mtb-induced diseases directly]. When it comes to lung field involvement on radiography, DM patients with TB typically show lower lung field involvement, while non-DM patients typically show more upper lung field complications [7][8].

In this intricate case report, we present a case of a 39-year-old female with a longstanding history of Type 2 Diabetes Mellitus which is managed by anti-diabetic medication along with insulin, who presented with pulmonary symptoms reminiscent of pneumonia and was later diagnosed with Tuberculosis (TB), she battled pleural TB six years prior and completed treatment, but also shed light on the immediate metabolic peril of Diabetes Ketoacidosis (DKA). This multidimensional case emphasizes the diagnostic conundrum when chronic metabolic conditions intersect with acute infectious and metabolic entities.

Introduction

Diabetes Mellitus, a global pandemic in its own right, predisposes individuals to a myriad of infections, with Tuberculosis (TB) being one of its sinister allies. The coexistence of these conditions can manifest as a complex clinical picture, posing significant diagnostic and therapeutic challenges.

Case Report

This is a case of a 39-year-old woman on insulin therapy who has been diagnosed with diabetes for 20 years, came into the outpatient department complaining of increasing dyspnea during the previous 48 hours. Originally diagnosed as MMRC 2, the dyspnea has escalated to MMRC 3, becoming more uncomfortable during light exercise and improving after rest. She denied having wheezing, orthopnea, or paroxysmal nocturnal dyspnea. This was accompanied by a 2-day history of coughing up yellowish mucopurulent sputum that did not smell bad, did not have any blood tinge to it, with no positional variation to cough. The expectoration volume was calculated to be between 20 and 30 milliliters, with a nighttime peak and no seasonal variation. In addition to her respiratory problems, she also complained of sporadic high fevers that were without chills or rigors subsided on medication with no discernible diurnal variation.

Her medical history provided a clear picture, including a 2016 episode of extra-pulmonary tuberculosis that was treated with a six-month course of anti-tubercular therapy from a government facility. She had also been taking treatment hypertension for eleven years and diabetes for fifteen, both of which she was on drugs.

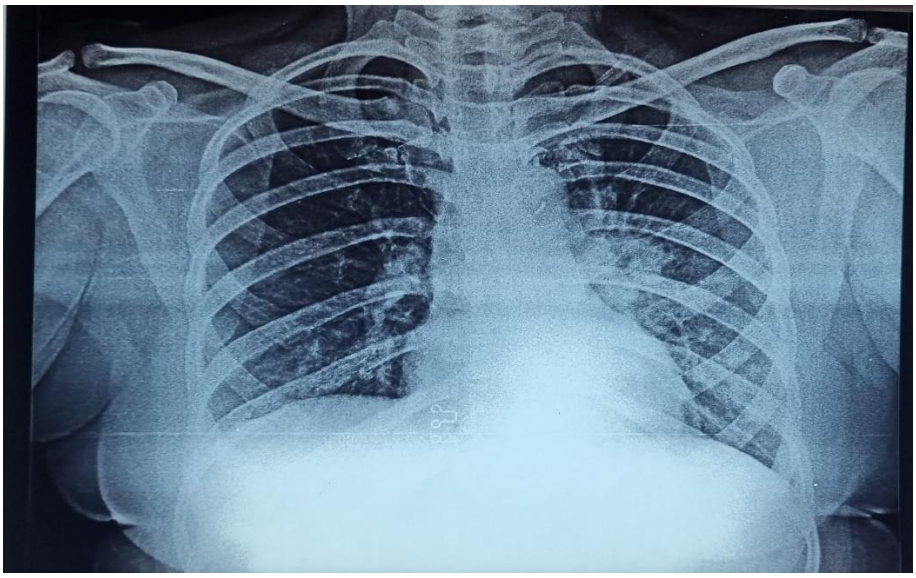
She appeared cooperative, focused, and awake upon assessment. A tachycardia with a heart rate of 120 beats per minute and a slightly elevated breathing rate of 27 breaths per minute were noted by the vital signs. Her oxygen saturation level on ambient air was 93%, and her blood pressure measurements remained steady at 130/80 mmHg. Pallor, icterus, cyanosis, clubbing, and lymphadenopathy were not seen on physical examination, although minor pitting edema was present. An extensive study of the respiratory system revealed a normal upper tract; however, the lower tract was quite revealing. Vocal fremitus was more prevalent, particularly across the left mammary and interscapular regions. Auscultation confirmed the results even more, revealing bilateral crepitations, with the left side showing the most prominent crepitations, especially in the infra-scapular area.

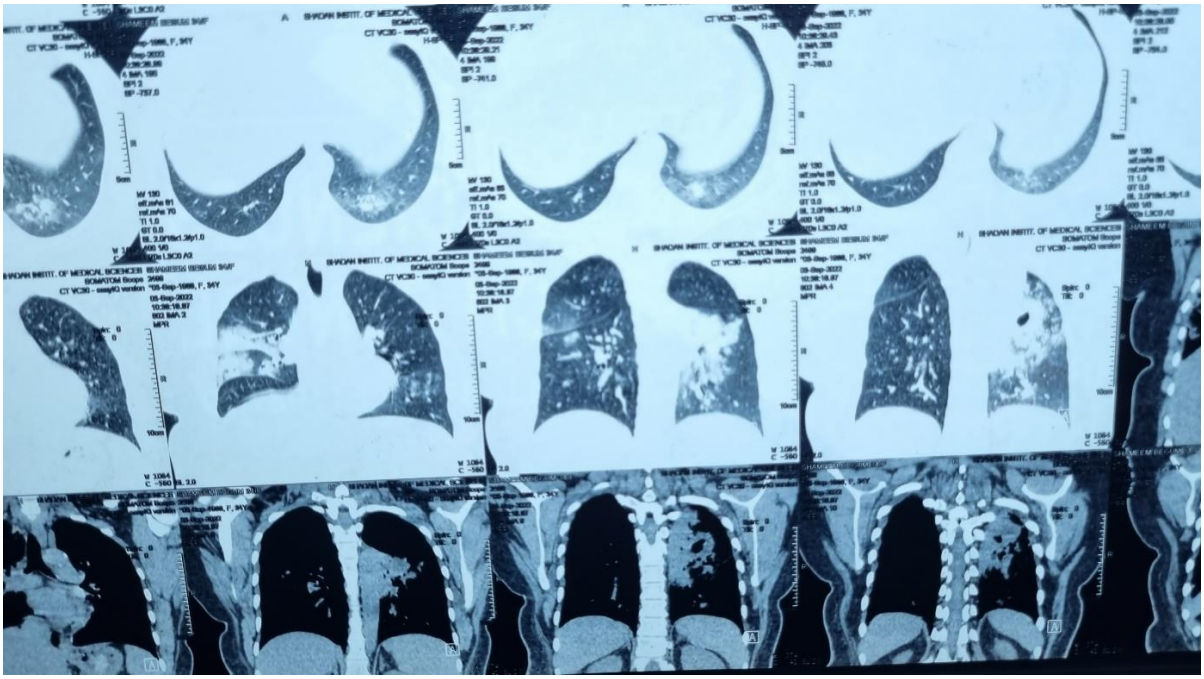
Empirical antibiotic therapy was started with Cefoperazone (1000 mg) + Sulbactam (500 mg) IV twice daily and Tablet Azithromycin 500 mg once daily due to a provisional clinical diagnosis leaning toward pneumonia. Concurrent delivery of supportive and symptomatic care was made.

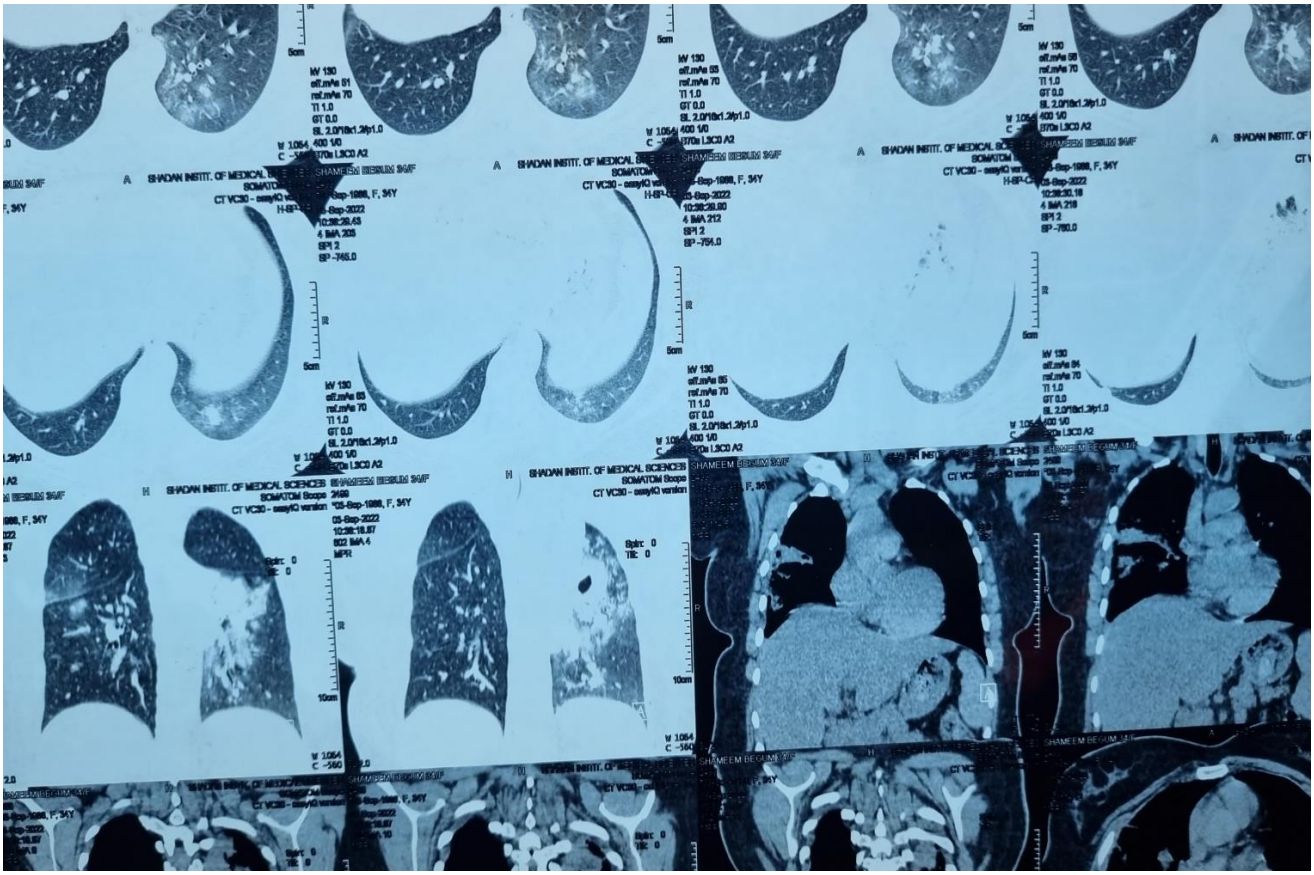
When urine ketones were found, it was discovered that the patient had Diabetic Ketoacidosis (DKA), a serious metabolic complication associated with her pre-existing diabetes mellitus. This added complexity to the case. This called for a combined therapy strategy that addressed the infection and the DKA's metabolic imbalance at the same time. A wide range of biochemical, radiological, and hematological testing were performed. The core of the DKA management structure was the internal medicine department. Among the important results were a HbA1c level of 9.3%, indicating poor glycemic management, and electrolyte readings indicating hypokalemia. C-reactive protein (CRP), was higher than normal at 29.8 mg/L. Consolidation was seen in the left upper lung segment on a chest radiograph.

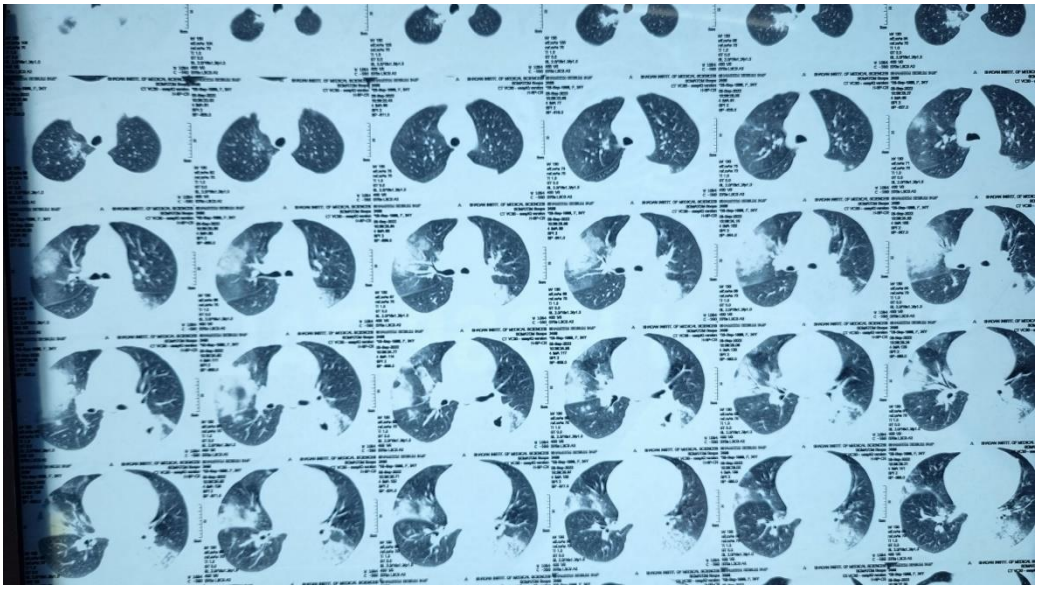
Her fever persisted in spite of aggressive treatment, antibiotics were escalated to three times a day intravenous administration of a stronger antibiotic combination— Piperacillin (4000 mg) and Tazobactam (500 mg). She responded well to adjustment. A Cartridge-Based Nucleic Acid Amplification Test (CBNAAT) for Mycobacterium tuberculosis was performed in accordance with institutional protocols and her

prior history of tuberculosis. After that, she had a chest High-Resolution Computed Tomography (HRCT), which showed consolidation in the right lung and a cavitary lesion in the left lobe. These results, along with the positive CBNAAT, marked the beginning of anti-tubercular therapy.









Discussion

This multifaceted case underscores the diagnostic intricacies and therapeutic conundrums clinicians face when confronted with the overlap of chronic conditions like T2DM and acute presentations suggestive of common illnesses like pneumonia. Diabetes, a state of relative immunosuppression, enhances susceptibility to TB, making it a vital differential in diabetic patients with respiratory symptoms. The simultaneous onset of DKA further complicates the clinical picture. Prompt recognition, holistic evaluation, and multidisciplinary management can ensure optimal outcomes in such complex scenarios.

In regions where TB is endemic, it's crucial for clinicians to maintain a heightened index of

suspicion, particularly in diabetic patients presenting with respiratory complaints. This case serves as a testament to the intricate dance of chronic and acute diseases, emphasizing the need for a thorough and comprehensive approach to diagnosis and management.

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