

*Case Report*

# Reactivation of tuberculosis in Covid-19 infected patient: Case report

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**Tuberculous meningitis is a severe manifestation of extrapulmonary tuberculosis, often associated with substantial morbidity and mortality. This case report discusses a unique presentation of tuberculous meningitis in a 39-year-old male who was concurrently positive for COVID-19. The patient initially presented with symptoms of COVID-19, including fatigue, fever, and respiratory distress. However, subsequent neurological symptoms, including facial asymmetry, ptosis, and dysphagia, led to further evaluation. Imaging and cerebrospinal fluid analysis confirmed the diagnosis of tuberculous meningitis. Treatment involved a multidrug regimen and supportive care in an intensive care unit. The patient was eventually discharged with residual neurological deficits. This case emphasizes the importance of considering tuberculous meningitis in the context of COVID-19, particularly in regions with a high burden of tuberculosis. Timely diagnosis, through clinical evaluation and diagnostic tools such as cerebrospinal fluid analysis and radiographic imaging, is crucial for effective management. The potential risk of TB reactivation in COVID-19 patients underscores the need for continued vigilance and prompt intervention to prevent severe disease outcomes.**

**Key words:** Covid-19, tuberculous meningitis, reactivation

## INTRODUCTION

Tuberculosis (TB) is a significant global health concern and remains one of the leading causes of death worldwide (World Health Organization, 2022a). It is an infectious disease caused by the *Mycobacterium tuberculosis*. TB is spread through the air when an infected person coughs or sneezes. It primarily affects the lungs, but can also affect other parts of the body (Centers for Disease Control and Prevention, 2022).

TB can present in two main forms: latent TB infection and active TB disease. Latent TB infection occurs when a person has been infected with the TB bacteria but does not yet have active disease or symptoms. In this case, the bacteria are dormant and cannot be spread to others. However, people with latent TB infection are at risk of developing active TB disease if their immune system becomes weakened (Centers for Disease Control and

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Prevention, 2022). COVID-19 infection can increase the risk of TB reactivation due to a combination of factors. These factors include immune system suppression, as well as disruptions to TB diagnosis, treatment, and prevention services (World Health Organization, 2022b).

Tuberculous meningitis (TBM) is one of the most severe manifestations of extrapulmonary TB. CNS-TB represented the 13.91% of all cases of meningitis and 4.55% of all cases of TB (Navarro-Flores et al., 2022). The pathophysiology is primarily driven by three components, which also explain the clinical symptoms (Rich and McCordock, 1933; Dastur et al., 1995). Thick gelatinous exudate, which is especially apparent at the basal region of the brain, eventually produces a fibrous mass that encases nearby structures. As a result, periventricular infarcts and cranial nerve palsies are developed. Spasm, constriction, thrombosis, and occlusion of intracerebral arteries are all possible effects of tuberculous vasculitis and the concomitant inflammatory vascular changes (Chan et al., 2005). The intracranial vasculitis is expected to have a major impact on the remaining neurologic deficits (Poltera, 1977).

Clinical approach and diagnostic tools, including CSF analysis and radiographic imaging, are equally important to diagnose TB meningitis (Lewinsohn et al., 2017). The treatment for tuberculous meningitis is very complex. Commonly, the combination of Isoniazid, Rifampin, Pyrazinamide and Ethambutol/Streptomycin/Fluoroquinolone is given for an extended period of time. However, sometimes drug resistance is found which leads to adjustments in treatment (Donald, 2010; World Health Organization, 2017). This case describes the development of tuberculous meningitis in a patient with COVID-19.

## CASE PRESENTATION

39-year-old male presented to the emergency department on June 4, 2022, with fatigue, fever, shortness of breath, nausea, and vomiting. He tested positive for COVID-19. A cardiopulmonary examination showed clear lung fields and normal heart sounds. Neurological assessment showed signs of ataxia, vertigo, and horizontal nystagmus; however, a head CT scan has not shown any pathological features. Two days later, the patient developed new clinical signs, including facial asymmetry with loss of the left nasolabial fold, right-sided ptosis, spontaneous rotatory nystagmus, dysphagia, dysarthria, and trouble coordinating. Jaw jerk and gag reflexes were both diminished. Reduced deep tendon reflexes were present in all extremities, more so on the left. He also suffered from neck rigidity.

A head MRI revealed hyperintensity in the brainstem and left cerebellum (Figures 1 and 2). CSF analysis revealed lymphocytosis, decreased glucose, and elevated protein. Adenosine deaminase levels and CSF

PCR for tuberculosis were both positive as well. Following the lumbar puncture, treatment with Dexamethasone, Vancomycin, and Ceftriaxone was started immediately due to an increased suspicion of meningitis. After the patient's cerebrospinal fluid results confirmed TB meningitis, the treatment regimen was adjusted to Streptomycin, Rifampicin, Isoniazid, Pyrazinamide and Dexamethasone.

The following day, the patient was diagnosed with purulent endobronchitis based on an X-ray and bronchoalveolar lavage. Soon after, he developed a cytokine storm and was taken to the intensive care unit, where he was intubated, sedated, and mechanically ventilated. Due to a protracted need for breathing support, he underwent tracheostomy placement. The patient was taken off the ventilator on July 9th, 2022, but continued to receive oxygen through a tracheostomy.

On August 1, 2022, the patient was discharged with stable vital signs. Oropharyngeal and cardiopulmonary examinations revealed no abnormalities. During neurological examination, the patient was spatially and temporally oriented and was able to follow simple commands. Pupils were equally round and light-responsive. However, he still displayed dysmetria and Babinski reflex on the left side, along with horizontal nystagmus, as residual neurological deficit. The patient was advised to take Rifampicin and Isoniazid for 9 months.

## Ethics section

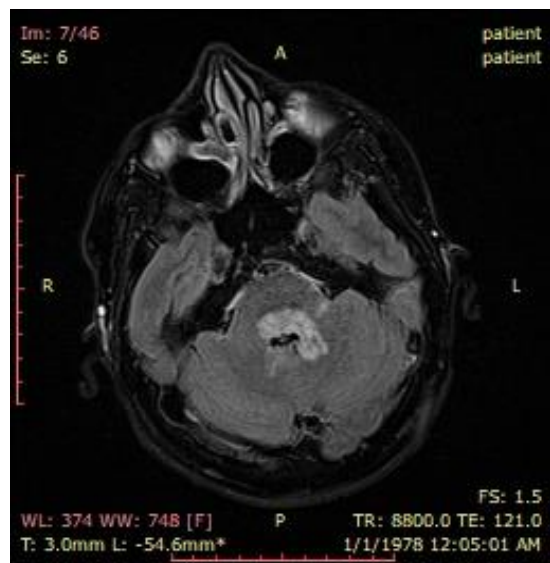
Informed consent was obtained from the patient prior to data collection, ensuring their comprehensive understanding of the study's objectives, potential implications, and the confidentiality of their sensitive medical information. The patient was provided with detailed information about the case report, including its purpose, methodology, and the intended use of medical records and clinical details. It was explicitly communicated that participation in the study was entirely voluntary, and the patient could opt out at any stage without affecting their medical care or rights. Emphasis was placed on the de-identification of all data, ensuring the anonymity of the patient. The patient was reassured that the patient's personal and medical information would be treated with the utmost confidentiality and solely utilized for the purpose of this case report.

## DISCUSSION

Based on this case, it is apparent that even a benign case of COVID-19 may eventually lead to severe consequences, such as TB reactivation. The timely identification of early neurological manifestations allowed for prompt evaluation and diagnosis of TB meningitis,



**Figure 1.** MRI revealed hyperintensity in the brainstem.



**Figure 2.** MRI revealed hyperintensity in the left cerebellum.

which prevented further delays in treatment. So, despite the severity and complexity of the presented case, the overall outcome was positive. However, it should be mentioned that the patient still developed a residual neurological deficit.

## Conclusion

In conclusion, this case highlights that the potential complications and challenges associated with COVID-19 infection extend beyond the impact of a single infectious

agent. The combined effects of multiple factors can significantly affect various organ systems, including the nervous system. COVID-19 affects several organ systems, thus any symptom could be attributed to it and underlying pathology may go unnoticed. The immune system suppression induced by COVID-19 can increase the risk of TB reactivation, thereby complicating diagnosis and treatment. Therefore, it is crucial to consider the possibility of TB reactivation in COVID-19 patients, particularly those from regions with high TB prevalence. Therefore, timely detection and prompt treatment of TB are essential to prevent severe complications and improve clinical outcomes in these patients.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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