

## Case Report

# Fatal Meningoencephalitis in a COVID-19 Patient in Bangladesh — A Rare Case Report

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Naser Ahmed<sup>1\*</sup>, Niaz Mostafa<sup>2</sup>, Manik Chandra Das<sup>3</sup>, Nazmul Islam<sup>4</sup>, Debashish Das<sup>5</sup>

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 Sheikh Sayera Khatun Medical  
 College (SSKMC), Gopalganj,  
 Bangladesh

\*Corresponding Author



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## ABSTRACT

**Introduction:** The following case report delves into a unique and intricate manifestation of COVID-19 involving meningoencephalitis and a traumatic subdural hematoma (SDH). This particular case centers on a 54-year-old woman who had a complex medical history, including pre-existing conditions such as diabetes, hypertension, chronic kidney disease, and ischemic heart disease. This case is particularly noteworthy due to the simultaneous occurrence of meningoencephalitis and a traumatic SDH in a COVID-19 patient with an extensive list of comorbidities. **Case Presentation:** The patient's presentation was undeniably complex, necessitating careful examination and intervention. Her underlying health conditions, including diabetes, hypertension, chronic kidney disease, and ischemic heart disease, established a challenging backdrop for managing her

COVID-19-related complications. The initial mild fever progressed to severe respiratory distress and neurological symptoms, leading to her admission to the Intensive Care Unit. At this point, her condition was characterized by a Glasgow Coma Scale (GCS) score of 10/15 and an oxygen saturation (SaO<sub>2</sub>) of 88% on room air. Diagnostic tests left no room for doubt, confirming both SARS-CoV-2 infection and elevated inflammatory markers. **Conclusion:** This extraordinary case underscores the intricate interplay of COVID-19 with various comorbidities, resulting in a complex clinical presentation. Of particular interest is the concomitant occurrence of meningoencephalitis and a traumatic subdural hematoma

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1. Consultant, Department of Medicine, Combined Military Hospital, Dhaka, Bangladesh
2. Consultant, Department of Medicine, Combined Military Hospital, Dhaka, Bangladesh
3. Scientific Platform for Outreach, Research, and Education (SPORE) Foundation, Dhaka, Bangladesh
4. Scientific Platform for Outreach, Research, and Education (SPORE) Foundation, Dhaka, Bangladesh
5. Department of Medicine, Centre for Tropical Medicine and Global Health, Oxford, United Kingdom

*in a patient grappling with multiple pre-existing health conditions. The diagnostic challenges presented by the absence of advanced tests like cerebrospinal fluid RT-PCR for SARS-CoV-2 cannot be overstated.*

**Keywords:** Encephalitis, Meningitis, Viral, Infection, Diagnosis, SARS-CoV-2

## INTRODUCTION

The SARS-CoV-2 virus, the causative agent of the COVID-19 pandemic, has had a profound and far-reaching impact on global health. Initially identified as a respiratory illness, the virus has since been associated with a plethora of complications that extend well beyond the respiratory system. These complications include but are not limited to cardiovascular issues such as myocarditis, renal failure, gastrointestinal symptoms, and a wide array of neurological manifestations like encephalitis, stroke, and seizures [1,2]. The complexity of the disease has made it a subject of intense research and scrutiny, as healthcare professionals worldwide grapple with its multifaceted presentations. Globally, the pandemic has had devastating effects, overwhelming healthcare systems, causing significant morbidity and mortality, and disrupting economies. In Bangladesh, the impact has been particularly acute, affecting not only the healthcare system but also the economy and social structures. Studies have indicated that naturally ventilated healthcare settings in Bangladesh may pose a high risk for exposure to SARS-CoV-2, thereby necessitating a reevaluation of existing healthcare infrastructure [3,4]. Additionally, the weather conditions in Bangladesh have been identified as a factor affecting the frequency of COVID-19 cases and mutations in the country, adding another layer of complexity to the management of

the pandemic [3]. The pandemic has also had a significant impact on the stock market in Bangladesh, leading to economic instability and uncertainty [5]. From a clinical perspective, the range of symptoms experienced by patients with COVID-19 varies widely, from mild to severe. In Bangladesh, stroke patients who tested positive for COVID-19 have been found to have more severe disease at admission and longer hospital stays, thereby increasing the burden on healthcare resources [6]. Moreover, SARS-CoV-2 infection during pregnancy has been associated with moderate to severe disease requiring ICU admission, adding another vulnerable population to the list of those severely affected by the virus [7]. Amidst these varied manifestations, meningoencephalitis emerges as an inflammatory condition affecting both the meninges and the brain. It is often characterized by symptoms such as fever, headache, and altered mental status. The condition can be caused by various pathogens, including bacteria, viruses, and fungi, and requires prompt diagnosis and treatment to prevent severe outcomes [8]. Recent studies have reported cases of meningoencephalitis associated with SARS-CoV-2 infection, presenting with a range of neurological symptoms in both adults and children [9,10]. The pathophysiology behind this association is not yet fully understood but is an area of active research [11]. Given the severity of meningoencephalitis and its potential

association with SARS-CoV-2, understanding this relationship is crucial for effective patient management. Therefore, this case study aims to focus on meningoencephalitis as a rare but significant complication associated with SARS-CoV-2, particularly in the context of Bangladesh. By examining a specific case, this study seeks to contribute to the growing body of knowledge on the neurological complications of COVID-19, thereby aiding clinicians in the diagnosis and treatment of this challenging condition.

## CASE PRESENTATION

### Patient Information

The subject of this case study is a 54-year-old woman who initially presented with mild fever in early July 2020 (day 1). She had a history of diabetes for 20 years, hypertension, chronic kidney disease, ischemic heart disease, and was receiving anti-tubercular medication for recent tubercular lymphadenopathy.

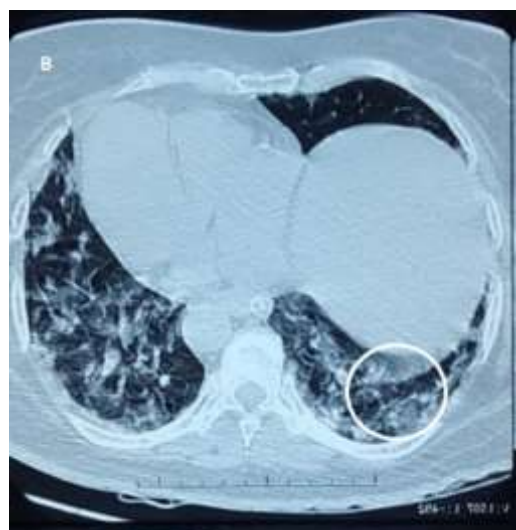
### Clinical Presentation

On day 12, the patient suffered a fall resulting in a head injury and subsequently developed impaired consciousness and dyspnea. She was admitted to our emergency department on day 13 with respiratory distress. Upon admission, her vital signs were within normal limits. Neurological examination revealed a Glasgow Coma Scale (GCS) score of 10/15 (E3 V3 M4) and an oxygen saturation (SaO<sub>2</sub>) of 88% on room air. She exhibited neck stiffness and a positive Kernig's sign. Her pupils were mid-dilated but reactive to light. Fundoscopy revealed signs of hypertensive and diabetic retinopathy. She had normal reflexes, an

equivocal plantar response, and vesicular breathing with prolonged expiration breath sound and crepitations in both lung fields.

### Diagnostic Tests

Diagnostic tests were immediately conducted. A nasopharyngeal swab tested positive for SARS-CoV-2. Complete blood count revealed an increased white cell count ( $11.7 \times 10^9/L$ ) with neutrophil predominance and lymphocytopenia. Biochemical tests showed hyponatremia (127 mmol/L), hypokalemia (3.2 mmol/L), along with elevated serum creatinine (447.41  $\mu\text{mol/L}$ ), creatinine phosphokinase (2861  $\mu\text{g/L}$ ), D-dimer (4.19  $\mu\text{mol/L}$ ), serum ferritin (1730  $\mu\text{g/L}$ ), and C-reactive protein (12 mg/L). Cerebrospinal fluid (CSF) analysis showed clear, colorless fluid with lymphocytic pleocytosis (21 cells/mm<sup>3</sup>, 100% lymphocyte) and elevated protein (138 mg/dL). Imaging studies included a CT scan of the brain, which demonstrated acute left supratentorial interhemispheric subdural haematoma (SDH), and a chest CT that showed involvement of both lungs with ground-glass opacification, crazy paving pattern, dilated vessels, and consolidation.



**Figure 1: Chest CT performed on admission to the ICU showing ground-glass opacity (Panel A) and consolidation (Panel B) suggestive of COVID-19.**

### Treatment and Outcome

Based on the clinical presentation and diagnostic findings, a diagnosis of COVID-19 pneumonia with meningoencephalitis and a traumatic SDH was made. The patient was admitted to the Intensive Care Unit and was treated with intravenous ceftriaxone, vancomycin, acyclovir, dexamethasone, and heparin.

Fluid and electrolyte imbalances were corrected. Despite receiving high flow nasal cannula with 60 liters of oxygen per minute to maintain her saturation at SaO<sub>2</sub> 92-95%, her consciousness deteriorated to a GCS of 8/15 (E2 V2 M4). Plans for endotracheal intubation and SDH evacuation were made, but her next of kin refused consent. The patient unfortunately passed away on day 21 (ICU admission day 8).

### DISCUSSION

This report presents a complex and atypical case of meningoencephalitis concomitant with SARS-CoV-2 infection in Bangladesh. The case is unique in several respects, most notably the co-occurrence of meningoencephalitis and a traumatic subdural hematoma (SDH) in a patient with multiple pre-existing conditions. These conditions include diabetes, hypertension, chronic kidney disease, and ischemic heart disease, which could have potentially exacerbated the severity of her symptoms and complicated her treatment. The patient was also on anti-tubercular medication, adding another layer of complexity in terms of drug interactions and potential side effects. The patient exhibited inflammatory features consistent with meningoencephalitis, such as neck rigidity, altered consciousness, mild CSF pleocytosis, and elevated CSF protein. While we could not provide evidence of direct viral CNS invasion due to the unavailability of CSF RT-PCR in our hospital, several published case reports have documented COVID-19 encephalitis both with and without a positive CSF RT-PCR for SARS-CoV-2 [8,12-14]. This raises the question of whether the meningoencephalitis in this case was

directly caused by the virus, was a result of a hyperinflammatory response, or was due to post-infectious immune-mediated mechanisms [15]. The case also highlights the challenges in diagnostic and treatment decisions in resource-limited settings. For instance, the absence of CSF RT-PCR for SARS-CoV-2 necessitated reliance on clinical judgment and less specific diagnostic modalities. This case report underscores the need for CSF RT-PCR testing for SARS-CoV-2 to be made available in resource-constrained settings and suggests that potential neurological complications of systemic COVID-19 should be considered. Moreover, the patient's initial presentation with mild symptoms that rapidly escalated following a fall and head injury is another point of distinction. The traumatic SDH could have been a significant contributing factor to the patient's deteriorating neurological status, alongside the meningoencephalitis. This dual pathology necessitated a more nuanced approach to treatment, as anticoagulant therapy commonly used in COVID-19 management had to be discontinued due to the risk of exacerbating the SDH. Lastly, the case underscores the importance of informed consent and family involvement in medical decision-making, as the next of kin's refusal for endotracheal intubation and SDH evacuation had a direct impact on the patient's outcome. This raises ethical considerations that healthcare providers must navigate, particularly in severe and complex cases like this one. In summary, this case adds to the growing body of literature on the neurological manifestations of COVID-19 and highlights the challenges and complexities involved in managing patients with multiple comorbidities and complications.

Further investigations are needed to understand the spectrum and pathophysiological mechanisms of neurologic sequelae of COVID-19.

## CONCLUSION

This case report provides a comprehensive account of a rare and complex presentation of COVID-19, characterized by meningoencephalitis and a traumatic subdural hematoma (SDH) in a patient with multiple pre-existing conditions. The case underscores the multifaceted nature of SARS-CoV-2 infection, extending beyond the respiratory system to involve significant neurological complications. It also highlights the challenges faced in diagnostic and treatment decisions, particularly in resource-limited settings where advanced diagnostic modalities may not be readily available. The case serves as a cautionary tale for clinicians to be vigilant for potential neurological complications in COVID-19 patients, especially those with pre-existing conditions that could exacerbate the severity of the disease. It further emphasizes the importance of family involvement and informed consent in medical decision-making, particularly in complex and severe cases. Given the evolving nature of the COVID-19 pandemic and the emergence of new variants, this case adds valuable insights to the growing body of literature on the neurological manifestations of the disease. It calls for further research to understand the spectrum and pathophysiological mechanisms of neurologic sequelae in COVID-19, and advocates for the availability of advanced diagnostic tests like CSF RT-PCR for SARS-CoV-2 in resource-constrained settings.

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