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Case Study

Case Report on COVID-19-Induced Neurological Symptoms

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ABSTRACT

Coronavirus disease 2019 (COVID-19), caused by a novel coronavirus strain, is primarily known for its respiratory manifestations. However, increasing evidence points to its potential neuroinvasive properties, leading to a spectrum of neurological complications. This may be attributed to the structural similarities between SARS-CoV-2 and its predecessor, SARS-CoV. We report the case of an 73-year-old male with underlying chronic systolic heart failure, atrial fibrillation, and hypertension, who developed new-onset seizures in the setting of COVID-19. Notably, the patient had no prior history of epilepsy. This case underscores the importance of recognizing and managing neurological symptoms in patients with COVID-19, particularly in elderly individuals with pre-existing comorbidities.

INTRODUCTION

Coronavirus Disease 2019 (COVID-19), caused by the SARS-CoV-2 virus, continues to pose significant challenges in patients with pre-existing cardiovascular and systemic comorbidities. Individuals with chronic systolic heart failure, atrial fibrillation, and hypertension are at a heightened risk for severe disease progression and poorer outcomes¹. In addition to respiratory involvement, COVID-19 has been associated with

a wide spectrum of neurological manifestations, including encephalopathy, cerebrovascular events, and seizures. The pathophysiological mechanisms underlying these complications are multifactorial, involving direct viral neuroinvasion, systemic inflammation, hypoxia, and metabolic disturbances. Here, we report a case of an 73-year-old male with multiple comorbidities who developed acute hypoxic respiratory failure and recurrent seizures following COVID-19 infection,

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underscoring the complex and multisystemic nature of the disease in elderly, high-risk populations.

CASE REPORT

An 73-year-old male with a known medical history of chronic systolic heart failure, atrial fibrillation, and hypertension presented with complaints of shortness of breath, generalized weakness, and bilateral hand tremors. The symptoms began shortly after his return from a recent trip to Malaysia. On presentation, he reported progressive dyspnea and worsening weakness. Laboratory investigations were notable for an elevated pro-BNP level of 1,640 pg/mL, thrombocytopenia with a platelet count of 97,000/ μ L, and evidence of acute kidney injury. Computed tomography (CT) of the chest demonstrated bilateral ground-glass opacities. Given the severity of his respiratory symptoms, he was admitted to the intensive care unit (ICU), where he subsequently tested positive for COVID-19. On the second day of hospitalization, the patient developed acute hypoxic respiratory failure necessitating mechanical ventilation. Two days following intubation, he experienced a generalized tonic-clonic seizure. The seizure was promptly managed with intravenous lorazepam, sedation with propofol, and a loading dose of levetiracetam. In light of his supratherapeutic international normalized ratio (INR), a CT scan of the head was performed, which showed no evidence of intracranial hemorrhage, mass lesions, or acute infarcts. Despite initial management, the patient experienced a second isolated seizure the following day, prompting escalation of antiepileptic therapy. Due to resource limitations, an electroencephalogram (EEG) could not be performed. Unfortunately, the patient's condition continued to deteriorate, and he ultimately succumbed to septic shock despite aggressive supportive care.

DISCUSSION

This case highlights the complex and multifactorial nature of COVID-19 in elderly individuals with multiple comorbidities. The patient presented with respiratory symptoms and neurological manifestations, including seizures, shortly after returning from international travel. His underlying conditions, including chronic systolic heart failure, atrial fibrillation, and hypertension, placed him at significant risk for adverse outcomes, which was further compounded by the acute complications of COVID-19. COVID-19 has been associated with a wide array of clinical manifestations, primarily respiratory, but increasingly, neurological symptoms have emerged as a significant concern. Neurological involvement in COVID-19 patients may manifest as encephalopathy, strokes, and seizures, potentially due to direct viral invasion, hypoxia, systemic inflammation, or metabolic derangements. Seizures in critically ill patients with COVID-19 may occur as a result of these factors, as well as from medications used in the intensive care setting, such as sedatives and anti-hypertensive agents^{2,3}. In this case, the patient developed generalized tonic-clonic seizures during his hospitalization, which were managed promptly with intravenous lorazepam, sedation with propofol, and a loading dose of levetiracetam. Seizures in the critically ill are often challenging to manage, and recurrence is not uncommon. This patient's recurrent seizures required escalation of antiepileptic therapy, yet, despite this, the patient continued to deteriorate. The inability to obtain an electroencephalogram (EEG) due to resource limitations may have hindered a more precise evaluation of the patient's neurological status. However, it is clear that the seizures in this case were likely secondary to multiple factors, including hypoxia, the systemic inflammatory response, and possibly the effect of COVID-19 on



the central nervous system⁴. The development of septic shock, despite optimal medical therapy, underscores the severity of the patient's condition and the challenges in managing critically ill COVID-19 patients with comorbidities⁵. Septic shock in COVID-19 patients is often a consequence of secondary bacterial infections or viral-induced inflammation and immune dysregulation. Management in these cases requires aggressive fluid resuscitation, vasopressor support, and the careful administration of antibiotics, although these measures are not always successful in preventing deterioration⁶. This case also highlights the importance of early identification and management of COVID-19 in vulnerable populations, especially the elderly with multiple underlying conditions. The high mortality rate in these patients is often due to a combination of respiratory failure, multi-organ dysfunction, and secondary infections, with neurological complications adding another layer of complexity to their care.

CONCLUSION

This case underscores the severe and multifactorial complications of COVID-19 in elderly patients with underlying comorbidities, particularly chronic heart failure, atrial fibrillation, and hypertension. The patient's clinical course highlights the rapid progression of respiratory failure and the emergence of neurological manifestations, including seizures, which may be triggered by a combination of factors such as viral infection, systemic inflammation, hypoxia, and medication effects. Despite early and aggressive interventions, including mechanical ventilation and antiepileptic therapy, the patient ultimately succumbed to septic shock, demonstrating the difficulty in managing critically ill individuals with multiple organ systems affected. This case also emphasizes the need for heightened awareness of the neurological complications of

COVID-19, as well as the challenges in providing optimal care for high-risk patients in resource-limited settings. Early detection, supportive care, and careful monitoring are crucial in managing such patients, but as this case illustrates, despite best efforts, outcomes may remain poor in those with severe disease and significant comorbidities. Continued research into the pathophysiology, management strategies, and long-term outcomes of COVID-19 is necessary to better guide clinical care in these high-risk populations.

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