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Case Report

SARS-CoV-2 infection with pneumonia and encephalitis

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ABSTRACT

The pandemic of severe acute respiratory virus (SARS-CoV-2) is characterized by respiratory symptoms with serious consequences, mainly associated with pneumonia and extreme ARDS. There is a lack of data about specific neurological manifestations of covid-19 infections literature. Epidemiological trials in fewer than 30% of a population reported symptoms of headache and delirium (Helms et al., 2020). Covid-19’s neurotropism is still debatable, uncertain and in the present case study patient with Covid-19 is identified. He suffered with extreme respiratory complications during hospitalization and eventually died.

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1. Introduction

Covid-19 was an epidemic in December 2019 which turned to pandemic with initial report warned that SARS-CoV-2 have potential to invade CNS resulting neurological complication including headache, nausea and vomiting.1 CNS symptoms were due to neurological injury mainly through hematological or retrograde neuronal route, similar to SARS and MERS viruses. Retrograde neuronal route can be supported by many patients complain of anosmia.1 This case report describes the patient to be diagnosed with aseptic encephalitis with SARS-CoV-2 RNA in the CSF due to 4 episodes of generalized tonic clonic convulsion (GTC) accompanied by an unconscious state.

2. Case report

A 45-year-old male, known case of hypertension with no travel history brought to ER at 11:00 pm with complain of 4 episodes of GTC with 30 min apart and in unconscious state was initially managed by ER department and asked for consultation to Neurology department. Neurology resident on duty received the patient with 100/80 mmHg BP, 32/min respiratory rate, 110/min pulse and 102°F temperature. He has bilateral coarse crepitation with mild wheeze. His neurological examination was GCS E3M4V3 with moving all four limbs, plantars bilaterally upward extensors and pupil are bilaterally equal but sluggish reactive to light. Motor and sensory examination was limited due to irritability of patient. He planned his CT scan brain and HRCT chest with all the baseline work up. He was consulted by consultant neurologist with all the provisional diagnosis of Encephalitis, he planned his CT scan brain and HRCT chest with all the baseline and HRCT chest was reported as bilateral ground glass appearance with opacities in right sided lower and middle lobe of lung with highly suspicion of Covid-19 (Fig. 1), nasopharyngeal (NP) swab was sent and meanwhile plan for CSF analysis with proper protective suits was performed and shifted to suspected Covid-19 patients bay in ward. Covid-19 PCR in CSF and NP swab came out to be positive and empirical treatment of viral encephalitis was already started and was shifted to the main covid isolation. His initial blood investigation showed increased total leukocyte count with neutrophilic dominance and lymphocytopenia, increased C-reactive protein, D-Dimer and Serum Ferritin. Subsequent investigations included MRI brain demonstrating no gross lesion and brain edema and his cerebrospinal fluid was colorless and turbid with CSF cell count was 8/mmL without red blood cells mildly raised protein and normal glucose. His CSF HSV PCR came out negative after 5 days. After admission he was started on intravenous (IV) ceftriaxone, azithromycin, acyclovir, methylprednisolone, omeprazole and prophylaxis of DVT in start later acyclovir stopped. He was also started IV valproic acid for seizure and oral Umifenovir. Electroencephalogram (EEG) showed generalized slowing with decrease response to acoustic stimuli. He was deteriorated in
terms of saturation and shifting to CPAP. Later on, CPAP, patient deteriorated and patients died eventually. We declare no competing interests. Patient relative’s written consent was obtained for Publication.

3. Discussion

This case shows the neuro-invasive potential of the virus to invade and reside within a neural tissue directly or through an immune-mediated response is still controversial. Recently a study was published which showed that the most characteristic Covid-19 induced central nervous system symptoms include altered level of consciousness, delirious behavior, headaches, and vertigo (Fig. 2). Haider et al. reported a case of acute covid-19 encephalitis proved with NP covid-19 swab and patient was showed no signs of improvement with 2 doses of tocilizumab along with 5 doses of immunoglobulin but showed markedly good improvement with 2 doses of rituximab. The most likely hypothesis proposed is due to frequent involvement of smell and taste fibers providing a route to the brain. Angiotensin converting enzyme-2 (ACE-2) is main receptor for attachment of known coronaviruses, and ACE-2 receptor is found in glial cells of brain and spinal cord and this pathway explained a relevant better invasion mechanism. Another proposed theory blames the release of disastrous cytokines/chemokines released during the inflammatory process which hampers and crosses the blood brain barrier. This results in the cascade of inflammation inside the brain.

This case is of particular interest because our patient had severe neurological symptoms including encephalitis with low GCS and had severe respiratory symptoms. Initial presentation of the patient with no signs of meningeal irritation and new onset seizure and febrile illness suggested encephalitis hence antibiotics and antiviral therapy was initiated in the early course of treatment. However, in our case SARS-CoV-2 was detectable by CSF which indicates the potential invasion of the virus in the brain. Patients

Fig. 1. Showed bilateral ground glass appearance which is highly suspicion of Covid-19.

Fig. 2. EEG showing abnormal frontal slowing.
presenting with altered consciousness having a normal MRI with no signs of meningeal irritation and a rapid response to steroid therapy indicate other unknown pathophysiological mechanisms. It is believed that the neurological manifestations of Covid-19 are due to CNS specific inflammatory cascades and together with normal serial imaging scans with absence of evidence of neuronal injury is suggestive of altered functioning rather than any destructive mechanism in the central nervous system.

Treatment of Covid-19 related encephalitis is mainly supportive and ranging from high- dose steroid, IV immunoglobulin and sometimes immunomodulators like rituximab have been mentioned in different case reports. Helms et al. reported a case series with almost 1/3rd patients were cognitively impaired at discharge and in our case patient didn’t survive during hospital stay.

Conflict of Interest
N/A.

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N/A.

Ethics approval
The study was approved by the institutional review board of Shaheed Zulfiqar Ali Bhutto Medical University.

Consent for publication
Patient relative’s written consent was obtained for publication.

CRediT authorship contribution statement
Muhammad Hassan: Conceptualization, Data Curation, Methodology, Visualization, Writing - original draft. Fibhaa Syed: Conceptualization, Writing - original draft. Haris Majid Rajput: Software, Writing - review & editing. Hafiza Faiza Mushtaq: Writing - original draft. Naveed Ullah Khan: Visualization, Writing - original draft. Mazhar Badshah: Supervisor, Writing - review & editing.

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