Acta Scientific MEDICAL SCIENCES (ISSN: 2582-0931)

Volume 7 Issue 8 August 2023

Case Report

Case Report: A Case of Post-covid19 Encephalitis Presented with Tonic-Clonic Seizures

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Received: June 29, 2023

Published: July 05, 2023

Abstract

COVID-19 infection causes multiple manifestations, including respiratory, gastrointestinal, and others. In our case, we concentrate on neurological manifestations such as cerebrovascular accidents, and encephalitis.

Postinfectious encephalitis is an immune-mediated disease that appears weeks after infection it presents with seizures and confusion, with MRI, EEG, and CSF analysis, the diagnosis can be made, using IVIG and steroids can treat the disease.

At first, our case presented with pneumonia, but one week later, she developed tonic-clonic seizures. With multiple investigations and laboratory findings, the diagnosis of post covid encephalitis was considered and treated effectively.

Keywords: COVID-19; Central Nervous System (CNS)

Introduction

Even though COVID-19 was once thought of as just a lung disease, it is now recognized as a multisystem disease with substantial neurologic symptoms and syndromes as potential manifestations. There is increasing evidence that COVID-19 affects the Central Nervous system (CNS) as the pandemic spreads, demonstrating its potential neurotropic and neuroinvasive abilities [1,2].

Together, myalgias, headache, encephalopathy, dizziness, dysgeusia, and anosmia made up 95.8% of the neurologic symptoms at COVID-19's beginning and 91.4% of the symptoms throughout acute COVID-19 [3], reports of encephalitis/encephalomyelitis from autoimmune and viral causes are rare [4], Encephalitis was found in 2.2% of the COVID-19 patients with neurological symptoms, according to a recent multicenter retrospective investigation by the Spanish Society of Neurology [12] although It is extremely uncommon to have the viral SARS-CoV-2 RNA in the CSF of patients with encephalitis/encephalomyelitis [5].

Encephalitis is an inflammation of the brain parenchyma that causes severe neurological dysfunction which presents as disorientation, altered or diminished levels of consciousness, fever, headache, seizures, status epilepticus, and movement problems, the onset of encephalitis can be before, with, or after the onset of respiratory manifestations of COVID-19, the extent of the condition is mostly affected by the infection's intensity, the extent of any pulmonary damage, the extent of any neurological dysfunction, and the location of that damage [6,7].

Diagnosis is reached via a combination of laboratory tests, neuroimaging studies, and electrophysiologic findings [8,9]. While some cases of encephalitis have been recorded with normal neuroimaging, there are common MRI findings such as diffuse white matter hyperintensities and potential hemorrhagic lesions [10,11]. Regardless of the underlying mechanism of COVID-19-related encephalitis, there is currently no single validated therapy regimen for the condition, options include monotherapy or combinations of corticosteroids, rituximab, intravenous immunoglobulin, and plasma exchange [8].

In this case report we are presenting a COVID-19-positive child who had developed encephalitis in the form of status epilepticus days after respiratory symptoms had started.

Presentation

An 18-month-year old female patient was admitted to the hospital as a case of pneumonia, sputum Direct Fluorescent Antibody test was positive for Adenovirus. Her chest x-ray showed right-sided infiltration. As management, she was put on O2 by nasal cannula, and started on IV Ceftriaxone and normal saline nebulizers.

Her fever and hypoactivity were persistent so on the third day of admission a lumbar Puncture (LP) was performed but it was clear, the chest x-ray was repeated and it showed improvement. Serum electrolytes were done and showed hypokalemia (K = 1.9). An Echo was done and showed increased echogenicity of proximal coronaries with normal size.

On the 6th day of admission, her fever was still present, a repeated chest x-ray was worse than the previous, and she was started on Vancomycin. On the same day, she developed generalized tonic-clonic convulsion with staring of eyes and mouth twitching, which progressed into status epilepticus, also she developed respiratory depression, the blood gases showed a (pCo2 = 75), so she was transferred to the ICU and was intubated and connected to a mechanical ventilator.

For the suspicion of viral encephalitis, herpes simplex virus 1 and Adenovirus were ruled out by testing the cerebrospinal fluid (CSF). IV Acyclovir was started before CSF culture showed a negative result, and stopped after that.

An electroencephalogram (EEG) was done and showed: polyspike and wave discharge appear on the general right side (Temporal) more than the left as shown in figure 1.

Her fever persisted, and due to abdominal distention an abdominal Ultrasound was done and showed mild free fluid in the abdomen.

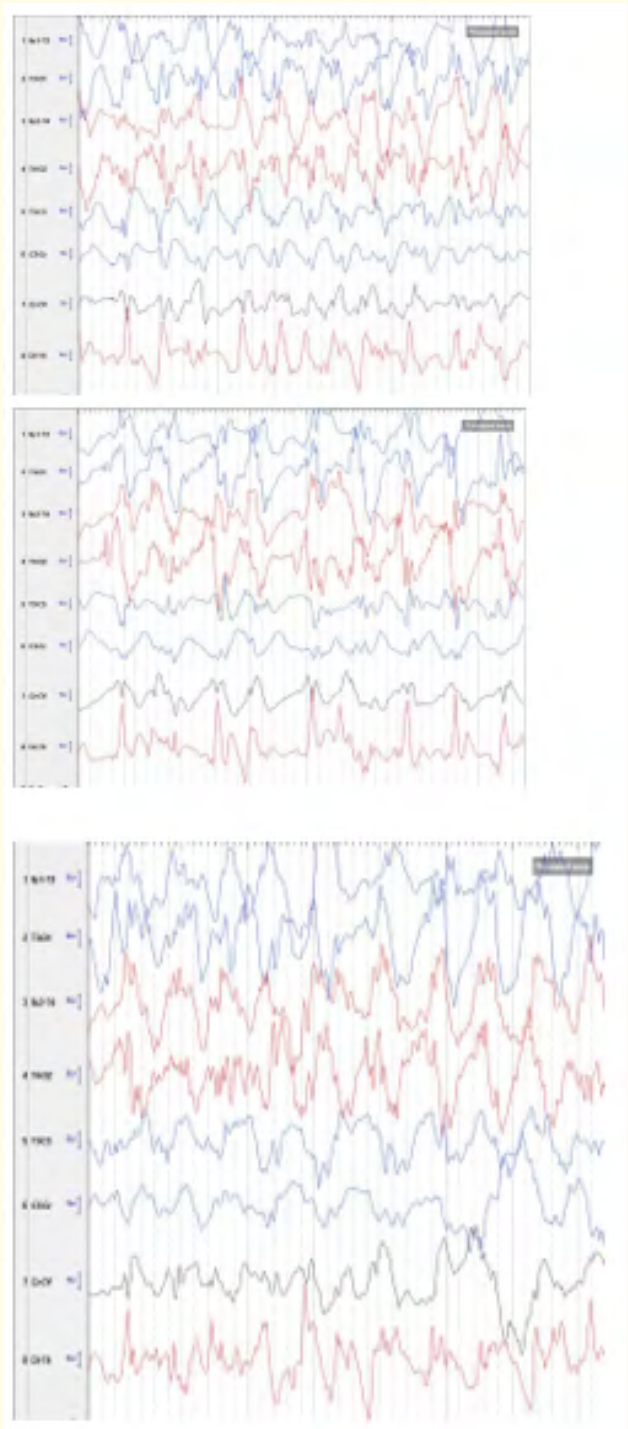

Figure 1: Polyspike and wave discharge appears in general right side (temporal) more than the left.

IgG was done for covid19 and it was positive so A diagnosis of post COVID encephalitis was made she was started on IVIG (2 gm/kg) over 12 hours and IV Levetiracetam loading dose (40 mg/kg) then started regularly on 20 mg/kg/day twice daily.

Yet she developed seizures twice and the fever persisted, so the following was repeated: LP but was clear, an Echo showed a minimal amount of pericardial effusion with normal coronaries, and inflammatory markers were worse. Vancomycin level was tested and was normal, but D-Dimer and Ferritin were high. IV Methylprednisolone pulse therapy was started. A right sided femoral venous central line catheter was inserted, a Heparin drip was started and IV phenobarbital (10 mg/kg) was given due to a seizure.

After 4 days of intubation, the child had spontaneous breathing, blood gases were normal, and the chest x-ray was unremarkable, so she was extubated and connected to a low-flow nasal cannula. The child was still in a picture of encephalitis with a Glasgow coma scale (GCS) of 11/15, but was discharged from the hospital against medical advice due to financial issues.

2 days after the discharge, she was admitted again to the ICU, after knowing that her Doppler ultra-sound showed a deep and superficial venous thrombosis (DVT&SVT).

Subcutaneous Enoxaparin was started and given regularly, and she was given Levetiracetam orally, and those were the only medications she was taking at that moment.

The patient developed new-onset fever, labs were done: C - reactive protein (CRP) = 70, White blood cells (WBC) = 17.6. Clinically the patient was well so she was transferred to the pediatric ward.

Magnetic resonance imaging (MRI) was done and showed: subacute infarction involving multiple gyri and subcortical white matter of both cerebral hemispheres, particularly large areas of parietal and temporal lobes as shown in figure 2.

The EEG was repeated and shown: slow for age at delta rhythm, suggestive of encephalopathy, as shown in figure 3.

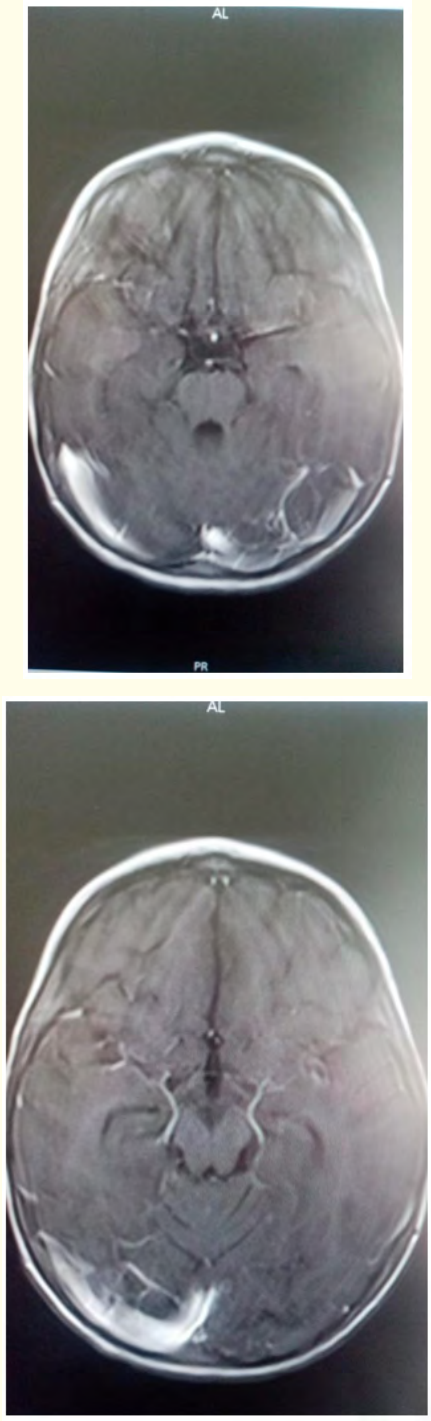

Figure 2: There are large areas of subacute infarction involving multiple gyri and the subcortical white matter of both cerebral hemispheres, particularly large areas of parietal and temporal lobes. There is no evidence of acute intracranial hemorrhage.

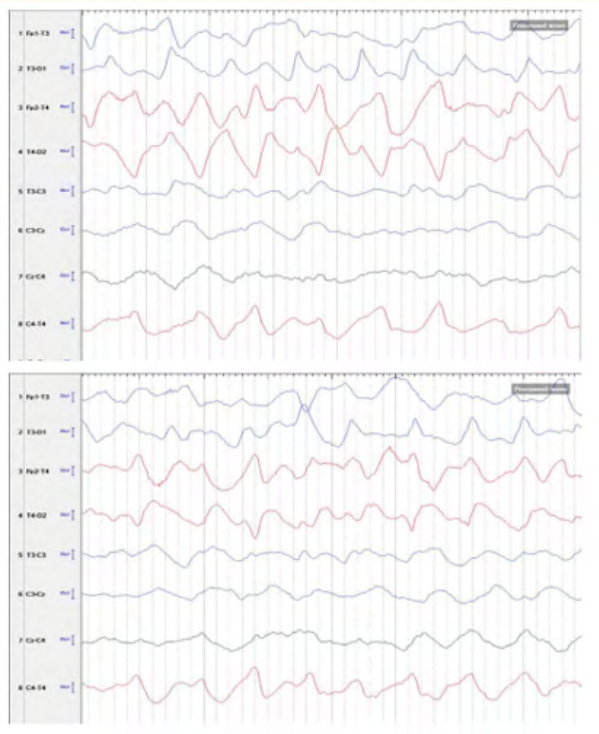

Figure 3: Slow for age at delta rhythm, suggestive of encephalopathy.

An ophthalmologic exam was done: she had poor eye fixation, she was reacting just to light, poor pupillary reaction, normal anterior aqueous, normal fundi, no optic atrophy, and mostly cerebral visual impairment (CVI).

More labs were done and showed: ESR = 45, D-dimer = 1980, IgG = 1329, IgM = 147, IgA = 41, IgE = 346, ferritin, and rheumatoid factor (RF) were normal.

The patient was discharged and advised to follow up and repeat labs in 2 weeks.

Laboratory table.

Lab	Result	Normal value
K	1.6	3.6-5.2
pCO2	75	35-45
CRP	70	<0.9
WBC	17.6	4-11
ESR	45	< = 10
D-dimer	1980	0.4-2.27
IgG	1392	481.8
IgM	147	40-120
IgA	41	27.4
IgE	346	150-300

Table

Discussion

COVID-19 infection affects multiple systems of the body, including the respiratory, gastrointestinal, and nervous systems; here we are focusing on the neurological complications caused by COVID-19 [13,14]. Neurological symptoms have been reported caused by the virus directly invading the CNS, as in encephalitis, cerebrovascular accident, or indirectly postinfectious immune mechanisms [14,15].

An immune-mediated reaction called post-infectious encephalitis usually occurs 2 to 4 weeks following microbial infection.in COVID-19, the MRI images either indicate numerous lesions or intact tissue. A lymphocytic or mixed pleocytosis is frequently visible in the CSF. Only a small percentage of patients can have oligoclonal bands, so the definitive diagnosis for viral encephalitis is to detect the virus. Even if the CSF did not show pleocytosis, the possibility of CNS encephalitis should still be taken into account [14].

Another possible complication of COVID infection is stroke; According to the World Stroke Organization (WHO), about 5% of people will get an ischemic stroke during COVID-19 [16]. The development of ischemic strokes in COVID-19 appears to be caused by three major processes. Cardiomyopathy, vasculitis, and a hypercoagulable condition [16].

The location and degree of CNS involvement determine the clinical presentation. Common symptoms include headache, convulsions, encephalopathy, gait difficulties, Guillain-Barré-syndrome, and impaired sense of smell and taste sensation), [14,17,18].

Our case presented with respiratory symptoms. After one week, she developed multiple tonic-clonic seizures, her symptoms worsened with time without improvement. LP, MRI, and EEG were done, and the diagnosis was post-COVID-19 encephalitis.

Post-infectious encephalitis does not have a standard therapy; High dosage intravenous steroids, plasma exchange, and IVIG are the primary treatment choices [15]. Our case showed a good response to the of use IVIG and high-dose methylprednisolone.

Conclusion

According to the evidence that encephalitis is a possible complication related to COVID-19, any COVID-19-positive patient that presents with acute neurological manifestations such as seizures, confusion, headache, disorientation, status epileptics, and altered mental status should be investigated right away for viral encephalitis. Patients who are suspected of having encephalitis should have further testing, such as a brain MRI scan, Electroencephalography (EEG), and lumbar puncture, even with these investigations the diagnosis of encephalitis still less evident due to the lack of a specific picture of the disease in the brain MRI or CT scan, as well as the negative PCR for SARS-CoV-2 virus in CSF [6], the fact that there is currently very little evidence available on encephalitis in COVID-19 patients makes its diagnosis and treatment further harder, even though it is a serious condition in both pediatrics and adults early detection and treatment of the condition can save the patient's life.

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