CASE REPORT

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Nonconvulsive Status Epilepticus After COVID-19

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ABSTRACT The coronavirus disease-2019 (COVID-19) is an RNA virus that spreads around the world and often causes respiratory diseases. Since it was first described, it has been known to cause numerous neurological symptoms. These symptoms have been reported, especially in patients with severe infection. In addition, seizures on first admission or during severe illness have been reported. In this case report, we focused on a patient who was recently diagnosed with non-convulsive status after having a COVID-19 infection with mild symptoms. The patient responded well to anti-epileptic drugs.

Keywords: COVID-19; status epilepticus; COVID-19 drug treatment

The coronavirus disease-2019 (COVID-19) has affected worldwide since December 2019. It is caused by a new type of coronavirus, an RNA virus that can cause acute severe respiratory distress syndrome. Although it mostly belongs to the respiratory system, it is a neurotropic and neuroinvasive virus. It causes many neurological pathologies such as disturbance of consciousness, cerebrovascular events, taste and smell dysfunction, seizures, headache, and dizziness. Neurological symptoms have been reported, especially in patients with severe infection.[1]

The majority of previously reported cases of nonconvulsive status epilepticus (NCSE) detected in conjunction with COVID-19 are critical ill patients.These ones were treated in intensive care units and had certain chronic systemic diseases. The present patient had neither comorbid diseases nor severe COVID-19 infection. Because NCSE was developed after the COVID-19 clinical course completely recovered, this case became intriguing.

CASE REPORT

COVID-19

A 52-year-old right-handed male patient admitted to the hospital with cough, high fever and feeling unwell, two weeks before NCSE. The real-time polymerase chain reaction (PCR) test from nasopharynx and oropharynx samples was found COVID-19 positive. Besides, peripheral predominantly nodular ground-glass areas and consolidation appearance in both lungs were consistent with moderate atypical viral pneumonia in chest computed tomography (known as COVID-19 findings). Then, an outpatient treatment was planned because clinical apperance was mild. In the initial five days, a total of 8 g favipiravir was prescribed. In addition, paracetamol and vitamin C were given as supportive therapy and acetylsalicylic acid for antiaggregant treatment. The patient recovered and had improved laboratory tests on the 10th day of treatment.

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NONCONVULSIVE STATUS EPILEPTICUS

The patient admitted to emergency service with meaningless speech, nonrecognition of relatives, inappropriate movements, and agitation on 5th day after COVID-19 treatment finished. In the neurological examination, he had an apathetic appearance and had also a dysfunction of co-operation and orientation. There were no lateralizing findings and neck stiffness. Besides, cranial nerve examinations, deep tendon reflexes, plantar responses were normal. He had not abnormal vital signs but in laboratory test results, C reactive peptide (63.2 mg/L), D-Dimer (2.01 μg/mL), fibrinogen (678 mg/dL), ferritin (342.54 ng/mL), sedimentation rate (66%) were significantly impaired. Others including complete blood count and biochemical parameters (procalcitonin, coagulation tests, vitamin B_{12}, vitamin D_3, folic acid, and thyroid hormones, etc.) were in normal ranges. The radiological investigations including brain computed tomography, diffusion, and contrast-enhanced magnetic resonance imaging findings were normal in the emergency service.

He had not a seizure before and had not a family history. He had also no comorbid chronic disease. When electroencephalography (EEG) was performed due to confusion, NCSE was diagnosed (Figure 1). He was hospitalized in the intensive care unit and administered a loading dose of 2,000 mg levetiracetam intravenously. Because he did not show any clinical improvement, a loading dose of midazolam 0.2 mg/kg was administered and infusion was started at 0.1 mg/kg/hour. On the 2nd day in intensive care, his clinical appearance and EEG findings improved (Figure 2). The midazolam infusion was gradually stopped and the treatment continued in the neurology service. After 2 days in service, he was discharged with oral levetiracetam 2,000 mg/day. We followed up him for six months and he had not any seizure yet. The patient gave written informed consent for publication.

DISCUSSION

Since the beginning of the COVID-19 pandemic, many neurological diseases have been reported, including seizures. The seizures may occur after infection because the virus can spread into the central nervous system via hematogenous or cranial nerves. Angiotensin-converting enzyme-2 in glial cells and neurons may mediate these effects. It has also been suggested that many factors trigger seizures in these patients, such as hypoxia, fever, electrolyte imbalance, multiple organ damage and cerebrovascular events.[2] The clinical presentation of NCSE varies according to ambulatory or critically ill patients. The main clinical finding is altered consciousness. Therefore, delirium, toxic-metabolic causes, drug intoxications, infections, psychiatric conditions, cerebrovascular diseases, traumatic brain injury, limbic and other autoimmunencephalitis are other pathologies that should be excluded in the differential diagnosis.[3] However, a non-convulsive status epilepticus case, that can be secondary to the inflammatory response after COVID-19, has not been reported yet to the best of our knowledge. In this case, a patient who presented with acute confusional symptoms after a mild COVID-19 infection was reported. It is claimed that the release of cytokines and chemokines could change the permeability of the blood-brain barrier and this might cause neuroinflammation. On the other hand, COVID-19 may also induce the production of antibodies against neurons and glial cells by a molecular mimicking mechanism such as neurotropic viruses.[4] The present patient quickly recovered with a single nonconvulsive status treatment. Unlike other postviral autoimmune disorders, there was no need for immunotherapy. This case suggests that there may be another mechanism that we do not know yet.

Recent studies reported EEG results in COVID-19 patients followed in intensive care units. Diffuse deceleration, discharges in the frontal regions, or generalized periodic waves were found in EEG. NCSE was also reported in 5 cases.[2] Ischemia, meningoencephalitis, signal changes in the medial temporal regions, etc. were observed in brain imagings of some cases. However, the others were normal.[4,5] In our case, normal brain imagings may support the immune response pathology.

The limitation of this case is that lumbar puncture was not performed. Because the patient recovered quickly and responded well to antiepileptic therapy.

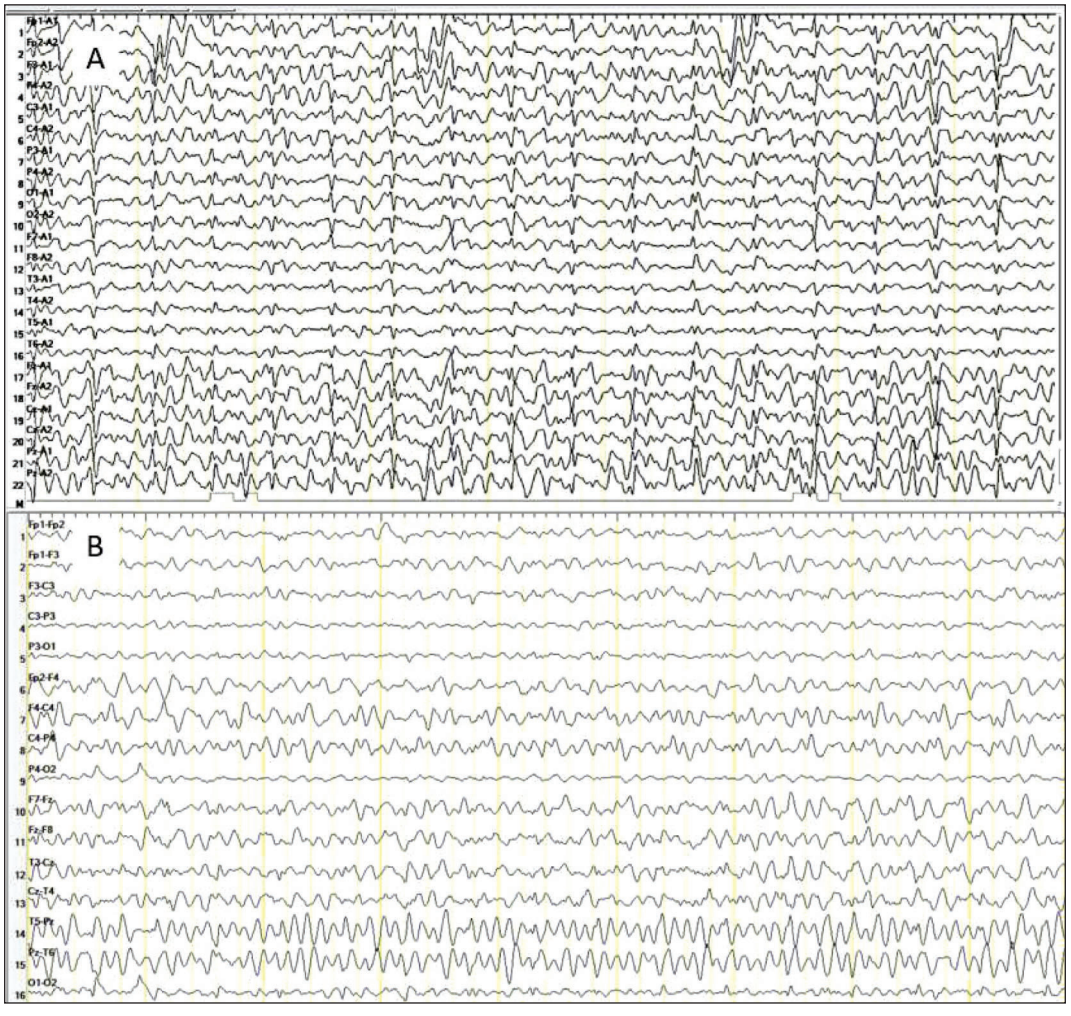

FIGURE 1: Electroencephalography displayed with a monopolar montage (A) and bipolar montage (B) in the 10 – 20 system. Rhythmic spike and sharp□slow wave complexes (A) and generalized paroxysmal theta slow-wave activity (B) in EEG performed on admission.

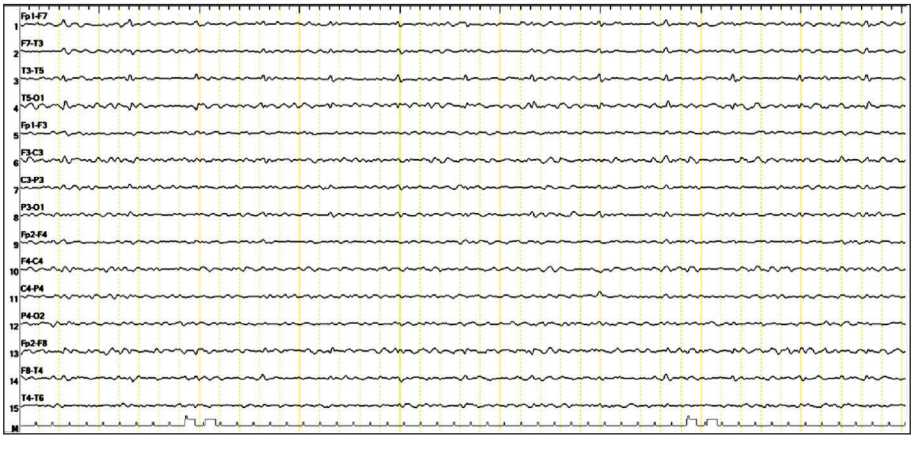

FIGURE 2: Normal electroencephalography activity recorded after clinical recovery.

However, the cerebrospinal fluid PCR tests was found negative in most cases of lumbar punctures.[4,5]

As a result, EEG should be performed in COVID-19 patients with encephalopathy if it has not an explained cause. These patients may benefit from antiepileptic therapy. More studies are needed to elucidate seizure risk in COVID-19. While the pandemic continues, we will continue to learn about the relationship of COVID-19 and epileptogenesis.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Yasemin Ekmekyapar Firat, Mehmet Erten;* ***Design:*** *Yasemin Ekmekyapar Firat;* ***Control/Supervision:*** *Yasemin Ekmekyapar Firat, Mehmet Erten;* ***Data Collection and/or Processing:*** *Yasemin Ekmekyapar Firat, Mehmet Erten;* ***Analysis and/or Interpretation:*** *Yasemin Ekmekyapar Firat;* ***Literature Review:*** *Yasemin Ekmekyapar Firat;* ***Writing the Article:*** *Yasemin Ekmekyapar Firat, Mehmet Erten;* ***Critical Review:*** *Yasemin Ekmekyapar Firat, Mehmet Erten;* ***References and Fundings:*** *Yasemin Ekmekyapar Firat;* ***Materials:*** *Yasemin Ekmekyapar Firat.*

REFERENCES

1. Hepburn M, Mullaguri N, George P, Hantus S, Punia V, Bhimraj A, et al. Acute symptomatic seizures in critically ill patients with COVID-19: is there an association? Neurocrit Care. 2021;34(1):139-43. [Crossref] [PubMed] [PMC]
2. Roberto KT, Espiritu AI, Fernandez MLL, Gutierrez JC. Electroencephalographic findings in COVID-19 patients: a systematic review. Seizure. 2020;82:17-22. [Crossref] [PubMed] [PMC]
3. Baker AM, Yasavolian MA, Arandi NR. Non-convulsive status epilepticus: overlooked and undertreated. Emerg Med Pract. 2019;21(10): 1-24. [PubMed]
4. Asadi-Pooya AA, Simani L, Shahisavandi M, Barzegar Z. COVID-19, de novo seizures, and epilepsy: a systematic review. Neurol Sci. 2021;42(2):415-31. [Crossref] [PubMed] [PMC]
5. Sokolov E, Hadavi S, Mantoan Ritter L, Brunnhuber F. Non-convulsive status epilepticus: COVID-19 or clozapine induced? BMJ Case Rep. 2020;4;13(10):e239015. [Crossref] [PubMed] [PMC]