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CASE REPORT

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Superinfected COVID-19 in a young patient with posterior reversible encephalopathy syndrome: A case report

Mohammad Javad Nasr[1] | **Ali Alizadeh Khatir**[2] | **Fatemeh Abedi Kebria**[1] | **Bahareh Bazooyar**[3] | **Soheil Ebrahimpour**[4] | **Azin Gooran**[1]

[1]Student Research Committee, Babol University of Medical Sciences, Babol, Iran

[2]Mobility Impairment Research Center, Health Research Institute Babol University of Medical Sciences, Babol, Iran

[3]Department of Neurology, Babol University of Medical Sciences, Babol, Iran

[4]Infection Diseases and Tropical Medicine Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran

Correspondence
Ali Alizadeh Khatir, Babol University of Medical Sciences, Ganjafrooz Street, ZIP code 47176-47745, Babol, Mazandaran, Iran.
Email: alizadeh.ali83@yahoo.com

Key Clinical Message

Posterior reversible encephalopathy syndrome (PRES) is a clinical syndrome with central nervous system (CNS) symptoms usually related to autoregulatory cerebral failure and high blood pressure. Neuroimaging is critical to diagnosis. Neurological presentations of COVID-19 disease are categorized into CNS symptoms and peripheral nervous system (PNS) symptoms. The patient was a 15-year-old female with SARS-CoV-2 pneumonia who developed PRES with a typical clinical and radiological appearance. She was treated with dexamethasone, phenytoin, sodium valproate and remdesivir. The patient was discharged after recovery of symptoms and was in good general condition. It is recommended that in patients affected by COVID-19 with neurological symptoms, the PRES can be considered in the differential diagnosis.

KEYWORDS

COVID-19, encephalopathy syndrome, neurological symptoms, PRES, SARS-CoV-2

1 | INTRODUCTION

Posterior reversible encephalopathy syndrome (PRES) is a clinico-radiological with acute neurological symptoms.[1] Seizure, headaches, disorders of consciousness, and impaired vision are PRES presentation.[2] PRES has many risk factors, triggers, or etiologies of which hypertension is the most common.[3]

Manifestation of human coronaviruses (H-CoV) infections is respiratory and extra respiratory, including central nervous system (CNS) involvement.[4] One third of patients with severe coronary artery disease have neurological symptoms, some of which have been attributed to the systemic involvement of the disease, including headache, dizziness, myalgias, or even cerebrovascular illnesses that might have been triggered by a hypercoagulable state.[5] It has not been confirmed whether the virus increases the risk of PRES. Still, clinicians should consider the possibility of PRES early in the appropriate circumstances, because it is reversible with proper treatment.[6] Here we present a young case without underlying disease with a synchronous diagnosis of PRES and COVID-19.

2 | CASE PRESENTATION

The patient was a 15-year-old female from Northern Iran who presented to the emergency department 2 days before

admission due to bilateral blurred vision and headache but did not consent to hospitalization and diagnostic procedures. She then presented with recurrent seizures, decreased level of consciousness (LOC), intensified headache, and blurred vision without any past medical or drug history. Two weeks before admission, due to a headache and suspicious symptoms of COVID-19 in her family, a rapid test was performed on the patient, which reported positively. Evidence of COVID-19 involvement was seen on lung high-resolution computed tomography (HRCT) (Figure 1). On general examination, vital signs were normal. The patient had no hypertension or fever. Glasgow Coma Scale (GCS) was 10 and neurological examinations showed mid-sized and reactive pupils. She had grade I–II bilateral papilledema and decreased visual acuity. Other examinations were normal. Due to her signs and symptoms, the differential diagnosis was brain tumor, cerebral venous sinus thrombosis (CVST), CNS infection, and PRES. In paraclinical studies, electrolytes, blood urea nitrogen (BUN), creatinine (Cr), and other laboratory data were normal. The level of C-reactive protein (CRP) was 50 mg/dL, white blood cell (WBC) was 12,000/μL, and saturation of O_2 was about 92%. Because of her critical condition, she was admitted to the hospital with seizure, restlessness, and altered LOC and admitted to the intensive care unit due to her critical situation for 3 days. After improving her condition, she was transferred to the neurology ward and was treated for 4 days. Brain computed tomography (CT) without contrast was normal. In brain magnetic resonance imaging (MRI) without contrast, hyperintensities were seen in the axial view of T2 in the bilateral parieto-occipital, which is characteristic of PRES (Figure 2A). No restriction was seen in the diffusion-weighted imaging (DWI) view. Contrast-enhanced brain MRI and brain magnetic resonance venography (MRV) were normal, so CVST was rolled-out.

FIGURE 1 Bilateral multilobar ground glass/consolidation opacities in peripheral parenchyma of the lung.

The patient was treated with phenytoin (125 mg/twice daily), sodium valproate (400 mg/twice daily), dexamethasone (8 mg/twice daily), and remdesivir (100 mg/daily). The patient's symptoms were controlled and she was discharged in good general condition with phenytoin 100 mg TDS and depakine 500 mg BD. The prognosis of the disease was described for relatives. She has been followed up every month for 6 months and the symptoms have been totally cured. Follow-up lung CT-scan was done and the signs of COVID-19 were cured. Also, the second MRI was done 3 months later after discharge and the lesions were resolved (Figure 2B). The clinical signs and symptoms were cured without the use of antibiotics, and the occipital lesions were resolved in a second MRI. Therefore, the CNS infection was rolled-out. In general, the rolling out of other differential diagnoses including CVST, brain tumor, and CNS infection, improvement of clinical symptoms during the treatment, along with reversible lesions in the occipital region confirm the diagnosis of PRES.

3 | DISCUSSION

PRES presents as a combination of clinical and radiological features.[2] PRES is characterized by headaches, focal neurological deficits, seizures, visual disturbances, and encephalopathy.[1]

After the globalization of magnetic resonance imaging (MRI) use, PRES is becoming more recognizable to physicians.[2] Obtaining imaging is the gold standard for the diagnosis of PRES. An MRI of the brain without intravenous (IV) contrast is the imaging modality of choice, that shows vasogenic edema as a hyperintense signal on T2, most commonly in the parieto-occipital lobe and in the temporal lobe, frontal lobe, brainstem, and deep white matter.[3] Brain MRI and MRV are also used for diagnosis. Without contrast-enhanced brain MRI, hyperintensities were seen in the axial view of T2 in the bilateral parieto-occipital, which is characteristic of PRES.

Sometimes PRES is presented as a manifestation of systemic hypertension, toxemia of pregnancy, uremia, infection, sepsis, lupus, nephrotic syndrome, or chemotherapy.[7] PRES has been reported with a predominance of Gram-positive bacteria, influenza A, varicella-zoster, and parainfluenza viral infections in case reports, although acute and postinfectious encephalitis has been reported in other coronaviruses, including MERS-Co.[6] Recently, atypical leukoencephalopathy patterns

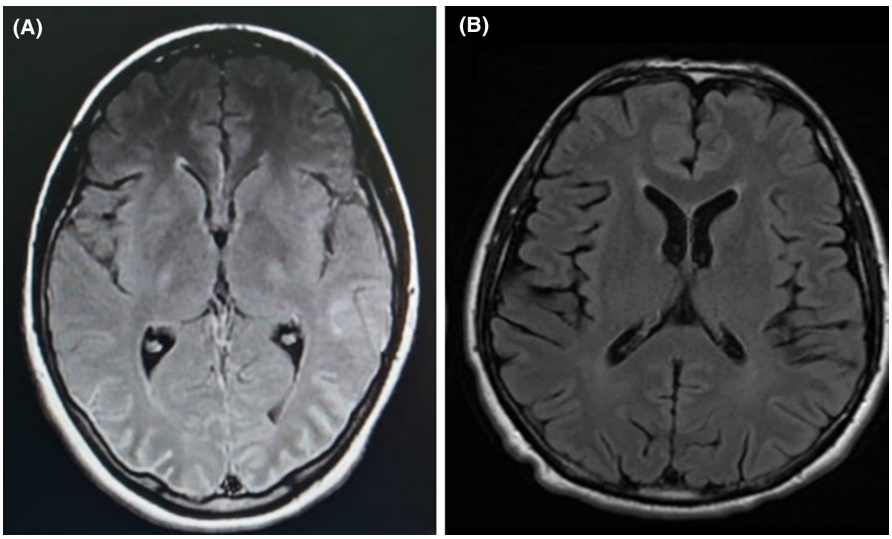

FIGURE 2 (A) Axial T2-weighted fluid-attenuated inversion recovery (FLAIR) MRI sequence showing bilateral parieto-occipital hyperintensities. (B) Axial T2-weighted FLAIR MRI sequence after treatment.

associated with the novel coronavirus have been published. Poyiadji et al. described findings suggestive of acute hemorrhagic necrotizing encephalitis related to the COVID-19 infection and described their results to the related "cytokine storm" seen with the condition.[8] Parauda et al. identified four cases of PRES and SARS-CoV-2 association. Patients were in the age group of 64–75 years.[9] In the study of Colombo et al., six cases of co-occurrence of PRES and SARS-CoV-2 were reported, of which the age group of patients was 54–68 years.[10] Given that there is no specific treatment for PRES, the symptoms will disappear if the underlying factors are removed. It is widely believed that appropriate treatment of hypertension and associated inflammation is essential for treating PRES.[11] We used phenytoin and depakine to control seizures and dexamethasone to reduce cerebral inflammation. In our report, the disease was reported in a teenager. Radiological evidence for PRES was typical. Reported cases of PRES are limited in adolescent patients with SARS-CoV-2. It seems that more studies should be done at this age.

4 | CONCLUSION

PRES is a rare disease that occurs in adults with specific chronic diseases such as lupus and nephrotic syndrome, but in this study, a young patient with no specific underlying disease was introduced in the field of COVID-19. Although PRES is seen in adults with COVID-19, the presentation of this syndrome in a young person without any past medical history is very rare. Therefore, it is recommended that in patients affected by COVID-19 with neurological symptoms, PRES can be considered in the differential diagnosis in all ages.

AUTHOR CONTRIBUTIONS

Mohammad Javad Nasr: Writing – review and editing. **Ali Alizadeh Khatir:** Project administration; supervision. **Fatemeh Abedi Kebria:** Writing – original draft. **Bahareh Bazooyar:** Supervision. **Soheil Ebrahimpour:** Supervision. **Azin Gooran:** Writing – original draft.

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CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in Journal of Neurological Sciences at https://doi.org/10.1016/j.jns.2020.117019, reference number 9.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

ORCID

Mohammad Javad Nasr https://orcid.org/0000-0002-3816-7565
Azin Gooran https://orcid.org/0000-0001-5202-8986

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