

Posterior Reversible Leukoencephalopathy Syndrome with Rotavirus Gastroenteritis

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Abstract

Rotavirus is the primary cause of severe gastroenteritis in children. Generally, rotavirus infection is localized in the intestine, but there are some reports with extraintestinal involvement. It is occasionally associated with the central nervous manifestations. Herein, we report posterior reversible leukoencephalopathy syndrome in a 6-month-old boy with rotavirus gastroenteritis.

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Introduction

Rotavirus is an important cause of severe gastroenteritis in children especially under the ages of 5 years (1). Although rotavirus affects primarily intestine, it has also been detected in areas other than them, eg. the central nervous system, kidney and liver (2). CNS manifestations of rotavirus infection are widely recognized. Afebrile seizures, encephalopathy, and death have been described (3). How it affects systems other than intestines, is unknown. It might have direct effects on neural cells or secondary effects on viral infections (4).

Posterior reversible encephalopathy syndrome (PRES) is a disorder with typical radiological findings of bilateral gray and white matter abnormalities in the posterior regions of the cerebral hemispheres and cerebellum. Decreased alertness, mental abnormalities, changed behavior ranging from drowsiness to stupor, seizures, vomiting, and cortical blindness are seen in this syndrome (5). The disease is generally acute or subacute; clinical features usually recover with appropriate treatment and the majority of the patients recover without sequela. If treatment is delayed, permanent damage was seen (5).

There are few reports on viruses, such as hepatitis C and HIV, and PRES but no rotavirus-

related PRES is present in literature (6). Although CNS manifestation in rotavirus gastroenteritis is widely recognized, there is no report about PRES during rotavirus infection. We describe the case of a 6-month-old boy with rotavirus gastroenteritis who developed clinical and radiological manifestations consistent with this syndrome.

Case Report

A previously healthy 6-month-old boy presented to the emergency department with diarrhea and tonic-clonic seizures in an unconscious state. His development was normal, and his past history was unremarkable. He had severe diarrhea and vomiting for two days before hospitalization. He also had tonic-clonic seizures and was unconsciousness approximately 4 h before admission.

On examination, the patient was unconscious, dehydrated, and afebrile. He had a temperature of 36.8°C, heart rate of 118 beats/min, blood pressure of 80/60 mmHg, and respiratory rate of 18 breaths/min. The pupillary light reflex was evident; anisocoria was not observed, and there was no neck stiffness. He received bolus intravenous fluid and was admitted to the intensive care unit. For the seizures, phenobarbital and phenytoin were administered.

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The initial investigation revealed the following laboratory values: hemoglobin level, 11.9 g/dL; leukocyte count, 35300 mm³ (55% neutrophils, 40% lymphocytes, and 5% monocytes); and platelet count, 600000 mm³. The blood urea nitrogen level was 21 mg/dL, serum creatinine level was 1.1 mg/dL, ALT level was 40 IU/L, AST level was 117 IU/L, LDH level was 843, Na level was 146 mg/dL, and CL level was 112 mg/dL, and blood gas analysis was consistent with metabolic acidosis with bicarbonate level of 10 mg/dL, BE level of -15, pH of 7.22, and increased anion gap of 27. Urinalysis was negative. Cerebrospinal fluid (CSF) analysis did not show any pleocytosis, elevation in protein, and reduction in sugar levels. After taken blood, CSF, urine culture cefotaxime and acyclovir therapy were started empirically. On admission, the feces sample was found to be positive for rotavirus antigen by enzyme immunoassay and 5 days after the onset of CNS and gastrointestinal symptoms. Results of blood, urine and gaita, and CSF culture were negative. Toxoplasma, cytomegalovirus, rubella, herpes, Epstein-Barr virus, and salmonella serologies were negative. Diffusion-weighted magnetic resonance imaging (MRI) of the brain identified the diffuse edema in the white matter of the occipital lobe of the brain (Figure 1). Electroencephalograms showed generalized slowing. We thought acute encephalopathy associated with rotavirus infection. Over the next day, he did not continue to have seizure activity with anticonvulsant therapy. By the fifth day after admission, he was transferred to the pediatric service. On day 6 after admission, the diarrhea was resolved. On day 20, the second MRI showed recovery imaging of the occipital lobes (Figure 2). By day 30, the patient showed functional impairment, and he remained hypotonic and lost the ability to make eye contact. After 1 month of hospitalization for seizure control and prolonged rehabilitation, he was discharged with physical therapy and anticonvulsant regimen. After 6 months, he had persistent deficits in his motor and mental dysfunctions.

Discussion

Neurological findings may occur in 2-5% of rotavirus gastroenteritis (7). These vary from benign convulsions to lethal encephalitis (7). Some studies showed that <4% of rotavirus hospitalizations are associated with CNS diagnoses (7). It is not clear how rotavirus would affect CNS without direct invasion. Kawashima reported that serum and CSF nitric metabolites have been reported to be elevated in patients with rotavirus gastroenteritis-induced convulsions (8). The spectrum of neurological disease associated with rotavirus infection in children varies from uncomplicated febrile seizures to frank encephalitis with residual morbidity. The virus may cause afebrile seizures

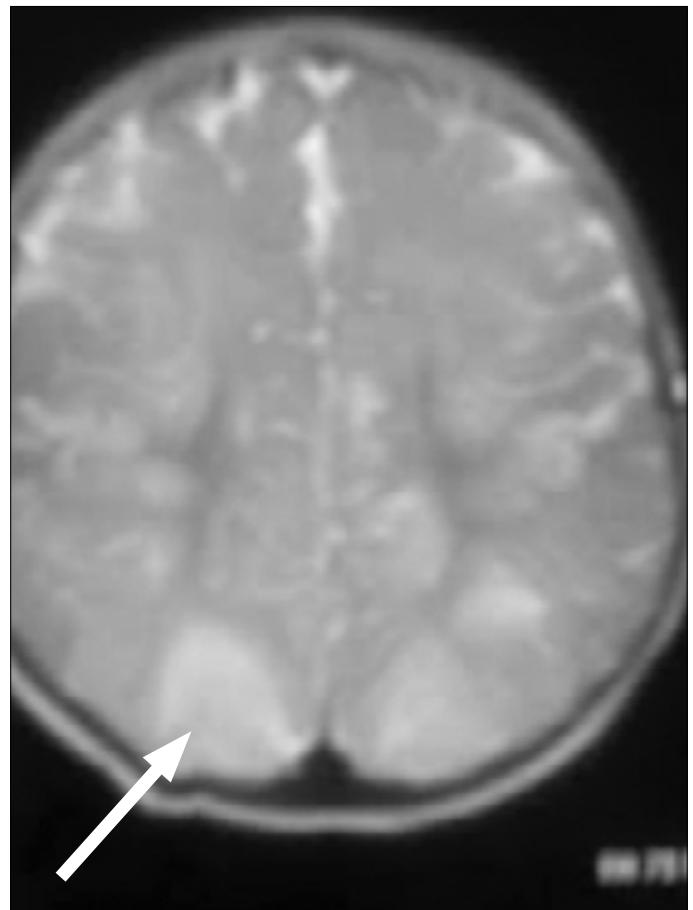


Figure 1. Cranial magnetic resonance imaging (MRI) showing diffuse occipital edema

and encephalopathy without any liquid, electrolyte and metabolic problems. Cerebellar involvement, mutism, transient splenic lesions, dancing eyes, acute disseminated encephalomyelitis, Guillain-Barré syndrome have been described with rotavirus gastroenteritis (9, 10). Generally, these patients present with disturbance of consciousness or seizures.

To date, rotavirus-associated PRES has not been described. To our knowledge, ours is the first rotavirus-related PRES case in literature. The cause of the reversible posterior leukoencephalopathy syndrome is multifactorial. Hinchey et al. (11) used this term for the first time and described 15 patients. Of these, seven were receiving immunosuppressive treatment, and one was receiving interferon for treatment of a melanoma; three had eclampsia, and four had acute hypertensive encephalopathy associated with renal disease.

Neuroimaging, in particular MRI, is the best choice, and it shows diffuse edema predominantly of the white matter, selectively involving the parieto-occipital regions of the brain (Figure 1). However, wider reaching affects may be seen sometimes, such as brain stem, cerebellum, basal ganglia, and frontal lobes. The mechanism of PRES

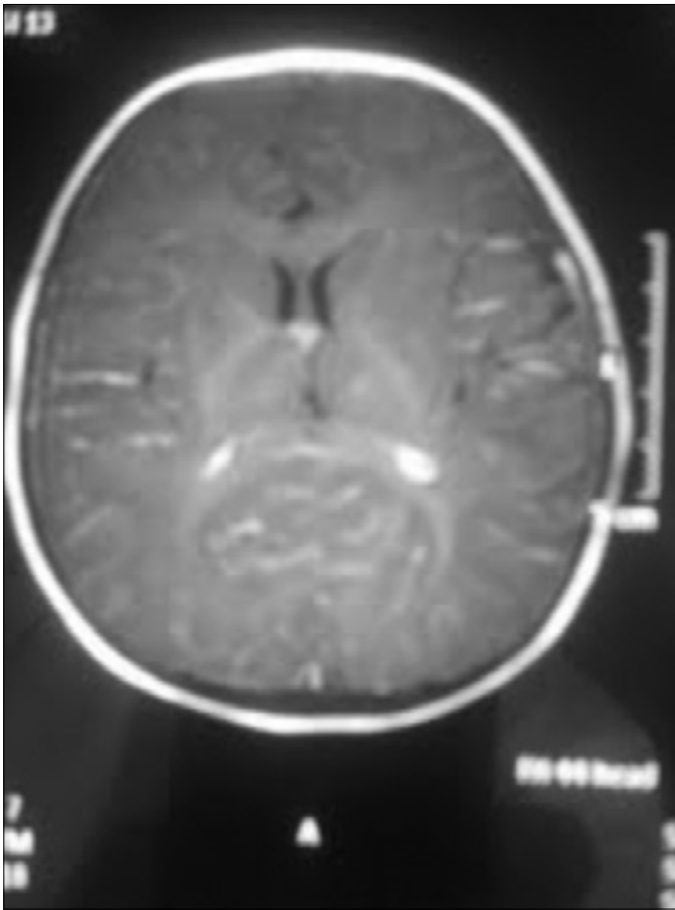


Figure 2. Diffuse occipital edema returned to normal after 3 weeks

is not yet determined; however, it is thought to be related to endothelial cell dysfunction/injury/cytotoxic effects leading to blood-brain barrier leakage, with resultant cortical and subcortical vasogenic edema (12, 13). The clinical findings in these patients are headache, decreased alertness, altered mental functioning, seizures, and visual loss including cortical blindness. In our patient, seizures were the main presenting complaint in this syndrome, and we thought that PRES was the major cause of the convulsions on the basis of no electrolyte abnormality and the normal CSF findings.

Many case reports deliver that PRES had a good prognosis and may recover on its own within a few days or weeks if the underlying factors have been corrected. Otherwise, if left untreated for a long time, it may cause permanent brain damage. One of the largest case series reported that among 22 patients studied, six died and many patients had permanent neurologic disability (14). Intracranial hemorrhage and brain stem involvement associated with poor prognosis in this study (14). Elevated creatinine levels were a risk factor for death, but neither blood pressure levels nor percent elevation from baseline

values appeared to correlate with prognosis (14). Our patient had elevated creatinin level in admission and it may contribute poor neurologic prognosis. Therefore, it is vital for treating clinicians to recognize this syndrome.

Conclusion

In summary, our case demonstrates encephalopathy associated with rotavirus infection with PRES. Rotavirus gastroenteritis-induced convulsions have a wide spectrum and may be related to reversible posterior leukoencephalopathy. Because a delay in the diagnosis and treatment may result in permanent damage to the affected brain tissues, neuroimaging, in particular MRI, should be performed in rotavirus gastroenteritis-induced convulsions.

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