Transient acute flaccid paralysis and seizures associated with rotavirus gastroenteritis in a child

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Rotavirus is a common cause of acute gastroenteritis in young children. Neurological complications including seizures are known to accompany rotavirus gastroenteritis. Acute flaccid paralysis (AFP) associated with rotavirus has not been reported previously except for one report. Herein, we describe a case of transient AFP and seizures associated with rotavirus gastroenteritis. We think that transient AFP can be seen during mild rotavirus gastroenteritis in children, but further studies may be necessary to understand the role of rotavirus as a cause of AFP in children.

Key words: acute flaccid paralysis, seizure, rotavirus, gastroenteritis, children.

Rotavirus is a common etiologic agent of diarrhea in infancy and early childhood. The disease is usually self-limited. However, afebrile seizures may occur in some patients with rotavirus gastroenteritis even without severe electrolyte imbalance or hypoglycemia. Acute flaccid paralysis (AFP) is a very rare clinical manifestation in rotavirus gastroenteritis and had only been reported in one recent virological study[1]. We describe herein transient AFP in a child with rotavirus gastroenteritis.

Case Report

A previously healthy three-year-old boy was admitted to our hospital with seizures and fever during a gastroenteritis episode in December 2010. His medical history revealed that he had non-bloody watery diarrhea and vomiting for the last five days. He was admitted to a local hospital with a sudden generalized tonic-clonic seizure lasting for two minutes on the fourth day of the disease. Rectal diazepam was administered and he was referred to our hospital after the seizure was controlled. Three other generalized tonic-clonic seizures lasting for 20 seconds, one minute and two minutes were observed in our emergency department without fever, hypoglycemia or electrolyte imbalance. He was treated with midazolam for the seizures. Physical examination findings of the patient were unremarkable at admission, but on the same day, progressive paresis without paresthesia and areflexia developed in his lower extremities. There were no signs of meningeal irritation or loss of consciousness.

Laboratory investigations revealed: hemoglobin 12.6 mg/dl, white blood cell count (WBC) 11,500/mm^3 and platelets 324,000/mm^3; serum biochemical investigations were in normal range. Lumbar puncture was performed on the fifth day of illness. There were no leukocytes on the microscopic examination of the cerebrospinal fluid (CSF). The concentration of protein and glucose levels were 43 mg/dl (15-45 mg/dl) and 64 mg/dl, respectively. CSF bacterial culture was negative. CSF herpes simplex virus (HSV)-1 and HSV-2 and Enteroviruses (Coxsackie virus A2, A8-22, B1, B6, Echovirus 1-7, 9, 11-21, 24-27, 29-33, Enterovirus 68-71, Poliovirus 1-3) were negative by real-time polymerase chain reaction (RT-PCR). We did not investigate rotavirus in the CSF, because it is not included in the differential diagnosis of AFP. Stool microscopic investigation and bacterial culture were negative, and rotavirus antigen was positive by enzyme-linked immunosorbent assay (ELISA). Interictal electroencephalogram (EEG) and cranial and spinal magnetic resonance imaging (MRI) of the patient were all normal.

Initially ceftriaxone and acyclovir were

administered empirically for possible encephalitis. On the clinical follow-up of the patient, muscle weakness and areflexia of the lower extremities persisted, but the diarrhea resolved in two days. Muscle weakness of the lower extremities showed a remarkable improvement from the third day of the hospitalization. The patient became able to walk unsupported and his deep tendon reflexes (DTRs) became normoactive on the fourth day of hospitalization. No new seizure was observed. He was discharged on the fifth day of hospitalization. Neither residual muscle weakness nor seizures were observed at the follow-up visits at one month, six months and one year from discharge.

Discussion

Rotavirus is an important agent of viral gastroenteritis in children. Rotavirus gastroenteritis is usually self-limited, and complications such as severe dehydration, shock and death are rare. Children may develop febrile seizures if fever accompanies the diarrhea. Sometimes afebrile seizures may occur in association with dehydration, electrolyte imbalance, hypoglycemia, or hypocalcemia complicating acute gastroenteritis[2]. Benign afebrile seizure in the course of mild acute gastroenteritis has been the best-known neurological complication of rotavirus since 1978[3]. Criteria of benign seizures with mild gastroenteritis were described in 1995[4], and the present case met these criteria. Seizures might be clustered in a 24-hour period in children with rotavirus gastroenteritis. It has been reported that seizures typically occur on or after the third day of illness[5]. Our case had three seizures within 24 hours on the fifth day of diarrhea, compatible with these reports. There are some case series from different countries about benign afebrile seizures during or following rotavirus gastroenteritis, which were similar to our case. The authors of these reports generally concluded that the identification of this entity helps to prevent unnecessary complementary studies and treatment with anticonvulsant drugs. With few exceptions, the neurodiagnostic studies and anticonvulsant treatment do not influence the management or outcome[6-8]. Because of the recurrent seizures, an EEG was performed in our patient and found normal.

The reported central nervous system (CNS) complications of rotavirus other than seizures are meningoencephalitis, encephalopathy, Todd's paralysis, central pontine myelinolysis, and Guillain-Barré syndrome[9-12]. The frequency of acute rotavirus gastroenteritis associated with CNS complications was reported in a range of 2-6.4%[13,14]. The interesting neurological finding of our patient was symmetrical AFP of the lower extremities, which was not reported previously. AFP is a clinical syndrome characterized by rapid onset of weakness in one or more limbs, progressing to maximum severity within several days to weeks with reduced reflexes, flaccid tone, and absence of upper motor neuron signs[15]. The differential diagnosis of AFP includes involvements of anterior horn cells of the spinal cord (e.g., poliomyelitis, Enterovirus 71, West-Nile virus) or acute transverse myelitis, dorsal root ganglia (e.g., rabies virus, herpes simplex virus, Japanese encephalitis virus, cytomegalovirus), peripheral nerves (such as Guillain-Barré syndrome), neuromuscular junction (such as myasthenia, botulism, tetanus), and several drugs that can alter neuromuscular transmission, acting either directly, as in nondepolarizing neuromuscular blocking agents, or through adverse effects (e.g., aminoglycosides, phenytoin), and muscles, such as polymyositis or viral myositis. We excluded poliovirus and non-polio Enteroviruses as causes of AFP by using CSF RT-PCR. The global polio eradication program has eliminated polio from most of the world, including Turkey. The last case of wild virus- associated poliomyelitis was detected in Turkey in 1998, and the national surveillance of AFP has been continuing. Rotavirus had been described as an antecedent infection in Guillain-Barré syndrome[11,16]. As the patient's paralysis improved rapidly and spontaneously, an electromyography (EMG) was not performed. Thus, subtypes of Guillain-Barré syndrome could not be excluded in this case. Acute transverse myelitis, epidural abscess, and spinal cord compression were excluded by the normal cranial and spinal MRIs. Further investigations were not needed because motor weakness and areflexia of the patient resolved spontaneously in four days. Rotavirus was detected in patients with AFP in a recent comprehensive virological study[1]. Viral nucleic acids in stool samples collected from 35 South Asian children (1-174 months of age) with

non-polio AFP were studied. The investigators found that two of 35 children had rotavirus RNA in their stool. One of them was a seven-month-old female patient who presented with AFP. The second patient was an eight-month-old male diagnosed as encephalitis/meningitis in addition to AFP. The first patient had full recovery, but the second patient had residual muscle weakness.

Rotavirus is diagnosed by detecting rotavirus antigen in fresh, whole stool samples using a variety of commercial kits. ELISA detects rotavirus in stool samples, with >90% sensitivity and specificity, in the first few days of illness. The positive and negative predictive values were reported as 94.1% and 100% in one study[17]. Latex agglutination assays are also available for rotavirus, but are less sensitive than ELISA. In our case, rotavirus antigen was detected by ELISA.

Among the neurological complications of rotavirus gastroenteritis, afebrile seizures are the best known entity, while AFP has been reported rarely. We think that transient AFP can be seen during mild rotavirus gastroenteritis in children, and rotavirus should be considered in the differential diagnosis of AFP. However, further investigation to understand the role of rotavirus as a cause of AFP in children may be necessary.

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