Clinical features of benign convulsions with mild gastroenteritis in Chinese infants

Yun-Feng Wang, Zhong-Shu Zhou
Beijing, China

Background: **Benign convulsions occur in infants during the course of mild gastroenteritis. It is now recognized as a distinct clinical entity in many countries. However, its occurrence in China has not yet been widely recognized by Chinese pediatricians.**

Methods: **A retrospective study was conducted in 48 patients with convulsions between January 1, 2004 and December 31, 2009.**

Results: **The age of onset of gastroenteritis was between 13 months and 24 months in 34 patients (70.83%). The episodes occurred at a distinct autumn/winter peak (75%). The seizures mostly occurred within the first 5 days of gastroenteritis, especially within the first 3 days, peaking on day 2 (39.58%). Thirty-five patients (72.92%) had clustered seizures in their episodes. Most episodes were symmetric, generalized tonic–clonic (83.33%) and brief (93.75%). The seizures were induced by pain and/or crying in 19 (39.58%) patients. Stool culture was positive for rotavirus in 21 (53.85%) of the 39 patients. Twenty patients (20/41, 48.78%) still had clustered seizures after the administration of a single anticonvulsant. The seizures persisted even after the administration of two combined anticonvulsants in 5 (26.32%) of 19 episodes. All patients exhibited normal psychomotor development.**

Conclusions: **Benign convulsions with mild gastroenteritis are not rare in China, and rotavirus infection is a major cause.**

World J Pediatr 2013;9(1):73-75

Key words: **gastroenteritis;**
infant;
seizure

Author Affiliations: Department of Pediatrics, China-Japan Friendship Hospital, Beijing, China (Wang YF, Zhou ZS)

Corresponding Author: Zhong-Shu Zhou, Department of Pediatrics, China-Japan Friendship Hospital, Beijing, China (Tel: +86-10-84206180; Email: wangyf252@126.com)

doi: 10.1007/s12519-012-0393-x

Introduction

Benign convulsions with mild gastroenteritis (CwG) occur in infants during the course of mild gastroenteritis. This condition is characterized by: (1) afebrile generalized seizures associated with symptoms of gastroenteritis in previously healthy children aged between 6 months to 3 years; (2) seizures often occurring in clusters; (3) mild dehydration (less than 5% of body weight); (4) normal laboratory examination results including electrolytes, blood glucose and cerebrospinal fluid; (5) normal interictal electroencephalography; and (6) always a good prognosis without sequelae.[1,2]

CwG was firstly reported in Japan,[1,3,4] and now the condition is recognized not only in Asian areas,[5,6] but also in the United States[7] and some European countries.[8-10] However, the occurrence of CwG in China has not yet been widely recognized by Chinese pediatricians with only a few reports.[11] The disease can easily be mistaken for meningitis or encephalitis and can, therefore, result in unnecessary treatment. In the present study, we firstly described in detail the clinical, electroencephalographic and etiologic features of 48 patients with CwG in China.

Methods

A retrospective study was conducted in 48 children with CwG who were hospitalized at the China-Japan Friendship Hospital between January 1, 2004 and December 31, 2009. The diagnosis of CwG was made when a patient met both of the following criteria: 1) seizures associated with gastroenteritis without clinical signs of dehydration or electrolyte derangement; 2) a body temperature less than 38.0ºC before and after the seizures. Patients with bacterial or aseptic meningitis, encephalitis/encephalopathy associated with a viral infection or an apparent history of epilepsy were excluded. All seizures were categorized as either generalized or partial based on information from the caregiver before admission to the hospital and from medical staff after admission.

Results

In this cohort, there were 48 patients with the age of onset ranging from 5 months to 41 months (Table 1). A minority of patients had a family history of febrile or afebrile seizures, or had a history of febrile seizures. The incidence of CwG was high in autumn/winter season (75%).

There were no abnormalities in serum biochemistry tests, including complete blood counts, blood film, serum urea, creatinine, electrolytes, glucose, calcium and magnesium levels (Table 1). Rotavirus antigen was positive in stools in 21 (53.85%) of 39 patients analyzed. Unfortunately, no other virus pathogens were tested due to the limited laboratory conditions. Interictal EEGs were performed in all patients, and no definite epileptic discharges were found. Cerebrospinal fluids and computerized tomography/magnetic resonance imaging were all normal in the patients examined.

Gastroenteritis manifestation

The day of onset of gastroenteritis was considered as the first day of illness. Yellowish watery diarrhea occurred in all patients, and persisted for 2 days to 7 days. Vomiting was observed in 19 (39.58%) of the 48 patients.

Seizure manifestations

Forty-two patients (87.5%) had seizures within the first 5 days of gastroenteritis (mean, 2.8±1.4 days), while the other six had seizures prior to the onset of gastroenteritis (12.5%). The seizures mostly occurred within the first 3 days of gastroenteritis, peaking on day 2 (19 cases, 39.58%; Table 2). The seizures were often in clusters in which more than one seizure occurred in a 24-hour episode in some patients.[12] The average number of seizures during a single episode was 2.5±1.7, ranging from 1 to 8. No status epilepticus was observed in all patients.

The duration of seizures ranged from 30 seconds to 8 minutes for all episodes, and most were less than 2 minutes (Table 2). The longest duration for a seizure was 8 minutes and occurred in 2 children (4.17%). Most episodes were symmetric and generalized tonic–clonic, while 8 had partial seizures with symptoms such as loss of consciousness, cyanosis and no or subtle convulsive movements. Seizures induced by pain and/or crying were found in 19 patients.

Anticonvulsant therapy

Anticonvulsants were administered in 41 patients. The drugs administered at the first time were intravenous diazepam (0.3-0.5 mg/kg) in 24 patients, intramuscular phenobarbital (5-8 mg/kg) in 13, and enema chloral hydrate (30-40 mg/kg) in 4. Twenty patients (20/41, 48.78%) still had clustered seizures after the administration of a single anticonvulsant drug. The drugs administered at the second time included phenobarbital in 10 patients and chloral hydrate in 9. Seizures persisted even after the administration of two combined anticonvulsants in 5 (26.32%) of the 19 patients. Lidocaine was administerd in these 5 patients, and they all improved.

Outcome

The period of the follow-up was 23.82±7.69 months, ranging from 9 months to 47 months in 44 patients. All patients demonstrated normal psychomotor development at the last follow-up, and none progressed into epilepsy. During the follow-up, 3 (6.82%) patients experienced a recurrence of CwG with similar features to that of the first episodes. The recurrence of gastroenteritis was at 4 months, 5 months and 11 months after the first onset of the convulsions, respectively. Interictal EEGs were all normal in the three patients.

Table 1. Clinical features of the patients with CwG

Variables	*n*
Number of subjects (male/female)	48 (28/20)
Age (mon)	19.7±9.2 (5-41)
Patients between 13-24 mon	34 (70.83%)
Family history	
Febrile seizures	4 (8.33%)
Afebrile seizures	2 (4.17%)
History of febrile seizures	2 (4.17%)
Seasonal distribution of patients	
September-November	17 (35.42%)
December-February	19 (39.58%)
March-May	8 (16.67%)
June-August	4 (8.33%)
Serum biochemistry tests	Normal
Rotavirus antigen in stools	Positive (53.8%, 21/39)
Interictal EEG	Normal
Cerebrospinal fluid	Normal (17)
CT/MRI	Normal (21)

CT: computerized tomographic scanning; MRI: magnetic resonance imaging; EEG: electroencephalogram.

Table 2. Seizure manifestations of the patients with CwG

Seizure manifestations	Number of patients (%)
Days to first seizure from onset of GE	
Within 1 day	7 (14.58)
Within 2 days	26 (54.16)
Within 3 days	36 (75.00)
3 days later	6 (12.50)
Frequency of seizures (seizures/episodes)	
One seizure	13 (27.08)
Clustered seizures	35 (72.92)
Duration of seizures (min)	
<2	37 (77.08)
2-5	8 (16.67)
>5	3 (6.25)
Type of seizures	
Generalized	40 (83.33)
Partial	8 (16.67)
Seizures induced by pain/crying	19 (39.58)

GE: gastroenteritis.

Discussion

As reported by Japanese researchers, the seasonal distribution of patients with CwG indicated a distinct winter/spring peak, associated with the epidemic peak of causative viruses of gastroenteritis in the region.[4] Different from those mentioned above, patients with CwG in the present study showed a clear autumn/winter peak (75%). Rotavirus is a common cause for infantile gastroenteritis in China and its peak incidence occurs in late autumn and early winter. Therefore, the seasonal distribution of the patients is consistent with the epidemic trends of rotavirus in China. More than 50% of patients in the study were detected to be positive for rotavirus, which is similar to previous results,[4] indicating that rotavirus is the main agent causing CwG in China.

Although most episodes were symmetric, generalized tonic–clonic and brief, prolonged seizures or partial seizures were also observed.[1,9] Saadeldin[6] reported a higher incidence of patients developing partial seizures up to 44%, of which 27.2% developed focal and subsequent generalized seizures. It is sometimes difficult to recognize the focality in patients with CwG by only clinical seizure manifestations.

Investigators[4,6,9] have reported that seizures in patients with CwG tend to occur in clusters and are rather refractory to anticonvulsants. This study agreed with previous results that clustered seizures were observed in 72.92% of the episodes. Considering that the clusters of seizures did not persist for more than 24 hours in the majority of cases, an intensive anticonvulsant treatment might be unnecessary. However, repetitive convulsions may not only make the family worried, but also increase the time of hospitalization and cost. Therefore, anticonvulsants are necessary for symptomatic treatments of CwG to cease the seizures. In this study, nearly one-half of the clustered seizures still occurred after the administration of a single anticonvulsant drug and more than one-fourth of the seizures persisted even after the administration of two combined anticonvulsants. Thus, the optimal treatment for clustered seizures in patients with CwG has not yet been defined.

Some EEG recordings achieved in the immediate postictal situation have revealed slow background activity as well as focal or generalized epileptic activity, with variable persistence, but without clinical manifestations.[8,9] These slow activity and epileptiform discharges appear to be in accordance with postictal tracing because the EEGs returned to normal during the follow-up period. As emphasized by other reports, the abnormal EEGs in patients with CwG are transient and cannot be used as indicators for initiating long-term antiepileptic therapy.[8,9] Reports of ictal EEGs are rare in CwG and have shown mainly focal paroxysmal discharges of variable localization: frontal, central, parietal, occipital or parieto-occipital,[6,9,12] occurring mostly with secondary seizures. These facts may reveal the focal onset of seizures that evolve into secondary seizures.

Infantile gastroenteritis, a major disease in a developing country like China, is caused by various viruses, especially rotavirus. Although the exact frequency of CwG has not been clarified, we speculate that it is common in China.

Funding: None.
Ethical approval: Not needed.
Competing interest: None declared.
Contributors: Yun-Feng Wang drafted the manuscript. Zhong-Shu Zhou supervised this study, and revised the manuscript. Zhong-Shu Zhou is the guarantor.

References

1 Komori H, Wada M, Eto M, Oki H, Aida K, Fujimoto T. Benign convulsions with mild gastroenteritis: a report of 10 recent cases detailing clinical varieties. Brain Dev 1995;17:334-337.
2 Okumura A, Tanabe T, Kato T, Hayakawa F, Watanabe K. A pilot study on lidocaine tape therapy for convulsions with mild gastroenteritis. Brain Dev 2004;26:525-529.
3 Sakai Y, Kira R, Torisu H, Yasumoto S, Saito M, Kusuhara K, et al. Benign convulsion with mild gastroenteritis and benign familial infantile seizure. Epilepsy Res 2006;68:269-271.
4 Kawano G, Oshige K, Syutou S, Koteda Y, Yokoyama T, Kim BG, et al. Benign infantile convulsions associated with mild gastroenteritis: a retrospective study of 39 cases including virological tests and efficacy of anticonvulsants. Brain Dev 2007;29:617-622.
5 Wong V. Acute gastroenteritis-related encephalopathy. J Child Neurol 2001;16:906-910.
6 Saadeldin IY. Electroclinical features of benign infantile seizures with mild gastroenteritis. Epileptic Disord 2011;13:8-17.
7 Iyadurai S, Troester M, Harmala J, Bodensteiner J. Benign afebrile seizures in acute gastroenteritis: is rotavirus the culprit? J Child Neurol 2007;22:887-890.
8 Durá-Travé T, Yoldi-Petri ME, Gallinas-Victoriano F, Molins-Castiella T. Infantile convulsions with mild gastroenteritis: a retrospective study of 25 patients. Eur J Neurol 2011;18:273-278.
9 Verrotti A, Nanni G, Agostinelli S, Parisi P, Capovilla G, Beccaria F, et al. Benign convulsions associated with mild gastroenteritis: a multicenter clinical study. Epilepsy Res 2011;93:107-114.
10 Medici MC, Abelli LA, Dodi I, Dettori G, Chezzi C. Norovirus RNA in the blood of a child with gastroenteritis and convulsions—A case report. J Clin Virol 2010;48:147-149.
11 Chen YC, Zhao HL, Liu XY. Benign infantile convulsions associated with mild gastroenteritis: clinical analysis of 26 cases. Zhongguo Dang Dai Er Ke Za Zhi 2007;9:255-256.
12 Maruyama K, Okumura A, Sofue A, Ishihara N, Watanabe K. Ictal EEG in patients with convulsions with mild gastroenteritis. Brain Dev 2007;29:43-46.

Received January 11, 2012
Accepted after revision May 4, 2012