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Original article

Differential diagnosis of nonepileptic twilight state with convulsive manifestations after febrile seizures

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Abstract

Background: Nonepileptic twilight state with convulsive manifestations (NETC) is a nonepileptic state following a febrile seizure (FS), which may be misdiagnosed as a prolonged seizure and result in overtreatment. We aimed to describe clinical manifestations of NETC and to determine characteristics that are helpful to distinguish NETC from other pathological conditions.

Methods: We conducted a retrospective chart review from January 2010 to December 2016 and selected the patients who presented with symptoms resembling status epilepticus with fever and a confirmed diagnosis using an electroencephalogram (EEG). We compared the NETC clinical features and venous blood gas analysis results with those of other conditions that mimic NETC. We also compared the characteristics of NETC with past reports.

Results: Our NETC patients presented with short durations of the preceding generalized convulsions followed by tonic posturing, closed eyes, no cyanosis, responsiveness to painful stimulation, and no accumulation of CO_2 in the venous blood gas. Most of these characteristics were consistent with past reports. Prolonged FS or acute encephalopathy with biphasic seizures and late reduced diffusion (AESD) showed several of these features, but all the characteristics were not consistent with our study.

Conclusions: Prolonged FS and AESD need to be differentiated from NETC, and close clinical observation makes it possible to partially distinguish NETC from the other conditions. EEG is recommended for patients with symptoms that are inconsistent with these features.

Keywords: Prolonged febrile seizure; Acute encephalopathy with biphasic seizures and late reduced diffusion; Venous blood gas analysis; Electroencephalogram; Clinical characteristics; Venous blood gas

1. Introduction

Nonepileptic twilight state with convulsive manifestations (NETC) is reported for postictal status with symptoms that resemble prolonged febrile seizures (FSs), such as tonic posturing and eye deviation following a FS [1,2]. Although NETC is reported to be a nonepileptic state that often continues for more than 30 min, but which requires no treatment [2], it is estimated that NETC is frequently misdiagnosed as prolonged FS and is thus treated with intravenous antiepileptic drugs, leading to overtreatment. Even though several clinical features of NETC such as tonic posturing or lack of cyanosis were elucidated [1,2], there are still few reports about NETC, and distinguishing NETCs from prolonged seizures or other pathological conditions remains

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difficult. There is a need to at least partially differentiate NETC from other conditions without using an electroencephalogram (EEG) in emergency rooms.

We report differences between clinical manifestations and EEG findings in NETC after FS and in other conditions with clinically similar presentations. We also compare our patients' NETC symptoms with those of past reports.

2. Methods

We retrospectively reviewed clinical records of patients transferred to Kurashiki Central Hospital from January 2010 to December 2016. We examined the patients presenting with symptoms resembling status epilepticus with fever, in whom an EEG was performed to confirm a diagnosis. We excluded patients with known epilepsy and central nervous system infections. In addition to whether patients showed closed eyes, tonic posturing, and cyanosis, we assessed reaction to painful stimuli, duration of the preceding generalized convulsions, the time required for spontaneous eye opening, and findings of venous blood gas analysis. We made a diagnosis of NETC when no ictal patterns were found in EEG, as previously defined by Yamamoto [2], and consciousness was completely recovered without sequelae. This study was approved by the Kurashiki Central Hospital Ethics Committee.

3. Results

3.1. Clinical observations

During the observation period, 30 patients were clinically suspected as having status epilepticus with fever, and EEG was recorded to confirm diagnosis in six patients. Because no patients fulfilled the exclusion criteria, we analyzed the data from all six patients.

Diagnosis of the six patients was as follows: patients 1–3 had NETC, patients 4 and 5 had a prolonged FS, and patient 6 had acute encephalopathy with biphasic seizures and late reduced diffusion (AESD).

In patients with NETC, the preceding generalized seizure continued for no more than 5 min and tonic posturing followed for over 30 min. During NETC, eyes were closed and no cyanosis was found, as reported previously [1,2] (Table 1). Tonic posturing became gradually intermittent and vanished. Additionally, all patients responded to painful stimuli, including crying, and venous blood gas analysis showed normal pH and pCO_2 levels. Two of the three patients with NETC regained consciousness within 12 h and became alert thereafter (Table 1). The remaining patient was initially misdiagnosed as having a prolonged FS and was treated with antiepileptic drugs that were ineffective.

Table 1
Clinical characteristics of the patients.

Case	Age	Sex	Diagnosis	BT (°C)	Eyes	Eye deviation	Tonic posturing	Cyanosis	Time for opening eyes (h)	Duration of generalized convulsion (min)	EEG findings	pH	pCO_2 (mmHg)	BE (mEq/L)	Number of intravenous AEDs
1	1	M	NETC	39.9	Closed	−	+	−	4	<5	Diffuse δ-θ	7.39	35	−3.3	0
2	1	M	NETC	39.9	Closed	−	+	−	15	<5	Diffuse δ-θ	7.37	38	−2.5	4
3	2	M	NETC	40.8	Closed	−	+	−	9	<5	Diffuse δ-θ	ND	ND	ND	0
4	1	M	Prolonged FS	38.3	Closed	−	−	+	9	5	Diffuse sp-w	7.13	71	−7.3	2
5	3	M	Prolonged FS	38.0	Open	+	+	+	11	0	Left-side dominant diffuse sp-w	ND	55	ND	2
6	2	M	AESD	39.0	Closed	−	+	+	5	55	Diffuse δ	7.10	69	−10.9	2

M, male; F, female; BT, body temperature; NETC, nonepileptic twilight state with convulsive manifestations; FS, febrile seizure; AESD, acute encephalopathy with biphasic seizures with late restricted diffusion; BE, base excess; AEDs, antiepileptic drugs; sp-w, spike and waves; ND, no data.

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