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Cardiac arrest soon after returning home in a patient who had received treatment for a convulsion

Youichi Yanagawa*; Kei Jitsuiki; Ken-ichi Muramatsu; Yoshihiro Kushida; Hiroki Nagasawa; Ikuto Takeuchi; Jun Shitara; Hiromichi Ohsaka; Kazuhiko Omori; Yasumasa Oode

Department of Acute Critical Care Medicine, Shizuoka Hospital, Juntendo University, Japan

***Corresponding Author(s): Youichi Yanagawa**

Department of Acute Critical Care Medicine, Shizuoka Hospital, Juntendo University 1129 Nagaoka, Izunokuni City, Shizuoka, Japan, 410-2295.

Tel: 055-948-3111; Email: yyanaga@juntendo.ac.jp

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Abstract

The patient was a 37-year-old woman with a past history of hypertension, convulsion, palpitation and depression who experienced tonic convulsion at her home. She was transported to our hospital. After the initial arrival, she had a 2nd convulsive episode in the emergency room. A neurologist checked her. As her vital signs were stable and she was free of neurological symptoms, the neurologist decided to discharge her to home. Within two hours after returning home, she suffered cardiac arrest. She received basic life support and electric shock twice at the scene and a return of circulation was obtained. On the 2nd arrival, she was comatose and had supra-ventricular tachycardia following another convulsive episode. Tracheal intubation was performed. Cardiac echo showed diffuse hypokinesis with an increased level of troponin T. Coronary angiography showed no significant lesions. She was diagnosed with Takotsubo syndrome triggered by convulsion, and induced hypothermic therapy was performed in the intensive care unit with the administration of anticonvulsant medication. Fortunately, her consciousness and cardiac function returned to normal after these treatments and she was discharged on foot.

This is a rare case of cardiac arrest induced by Takotsubo syndrome due to two convulsive episodes. Physicians should check the heart function and consider observational admission after convulsion.

Introduction

Epilepsy is associated with a two- to three-fold increase in mortality in comparison to the general population [1,2]. This increased risk is partly due to co-morbidities and the underlying etiology of epilepsy, and partly due to seizures. Among the major causes of epilepsy-related death, which include accidents and status epilepticus, the most common is sudden unexpected death [1,2]. We herein present the case of a patient who experienced cardiac arrest after returning home following treatment for convulsion at our hospital.

Case presentation

A 37-year-old woman with a past history of hypertension, two previous episodes of convulsion, palpitation and depression experienced tonic convulsion in her home. She was transported to our hospital. Her husband also had psychiatric disease. On initial arrival, her convulsion spontaneously ceased. Her vital signs were as follows: Glasgow Coma Scale, E4V5M6; blood pressure, 132/84 mmHg; heart rate, 100 beats/min; respiratory rate, 16 breaths/min; percutaneous saturation, 99% (room air); body temperature, 35.9°C. There were no specific

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physical findings. Electrocardiography (ECG), chest roentgenography, and head computed tomography (CT) revealed no specific findings. The results of a venous blood gas analysis, blood cell count and biochemical study are shown in Table 1. While waiting for the blood examination, she experienced a 2nd convulsive episode in the emergency room. Monitoring showed only sinus tachycardia. The convulsions ceased spontaneously and she regained consciousness. A neurologist performed brain magnetic resonance imaging and a cerebrospinal fluid analysis by spinal tap; however, these examinations showed no abnormalities. As her vital signs were stable and she was free of neurological symptoms, the neurologist decided to discharge her to home. In the two hours after returning home, her husband noticed that she was snoring loudly. Her husband immediately checked her, but she did not respond to stimulation. The husband called an ambulance again. When the emergency medical technicians checked her, she was in a state of cardiac arrest. ECG showed torsades de pointes (Figure 1). She received basic life support and electric shock twice at the scene, and spontaneous circulation and respiration were obtained. She was transported to our hospital again. On the 2nd arrival, her vital signs were as follows: Glasgow Coma Scale, E1V1M1; blood pressure, 150/110 mmHg; heart rate, 200 beats/min (supra-ventricular tachycardia); respiratory rate, 20 breaths/min; percutaneous saturation, 100% (O_2 10 L/min); and body temperature, 36.7°C. An infusion adenosine (10 mg) was administered to treat arrhythmia. After her heart rate decreased, she experienced another convulsive episode and tracheal intubation was performed with sedation. The 2nd whole body CT scan was negative; however, cardiac echo showed diffuse hypokinesis with an increased troponin T level (Figure 2). Coronary angiography showed no significant lesions. She was diagnosed with Takotsubo cardiomyopathy (syndrome) triggered by a convulsion, and induced hypothermic therapy was performed with the administration of anticonvulsant medication in the intensive care unit. Fortunately, her consciousness and cardiac function returned to normal after these treatments and she was discharged on foot.

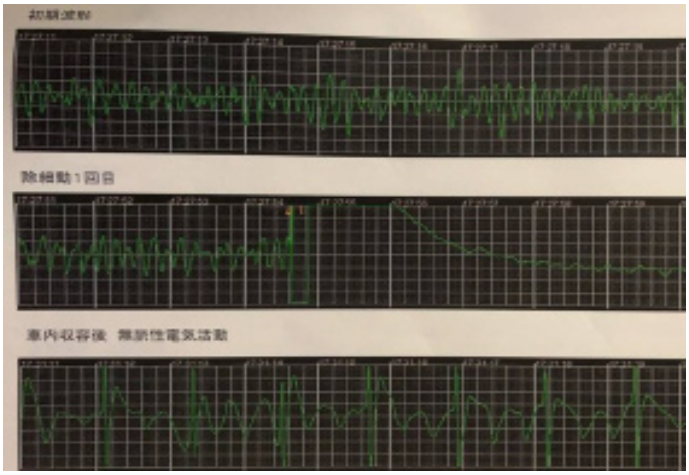

Figure 1: Electrocardiogram (ECG) obtained when emergency medical technicians contacted the patient.
The initial ECG shows torsades de pointes.

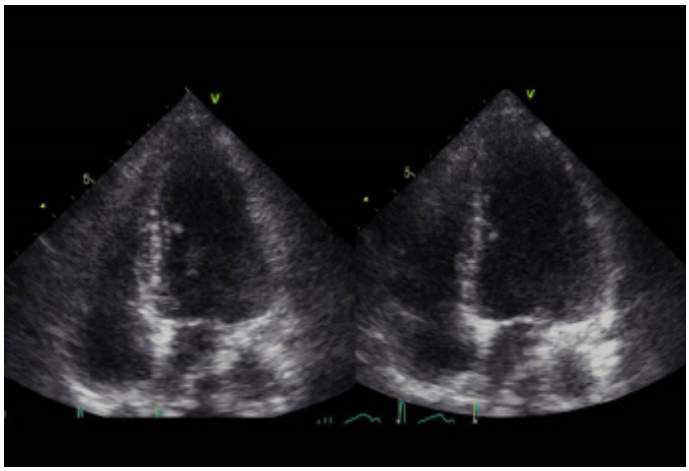

Figure 2: Cardiac echo on the second arrival.
The echo shows hypokinesis.

Table 1: Blood biochemistry on arrival, Venous blood gas analysis

pH 7.352	PCO_2 37.4 mmHg	PO_2 32.0 mmHg
HCO_3^- 20.2 mmol/L	base excess -4.4 mmol/L	lactate 11.9 mmol/L.
Blood		
white blood cell 14,000/μl	hemoglobin 13.6 g/dl	platelet 15.2x10⁴/μl
total protein 7.5 g/dl	albumin 4.2 g/dl	total bilirubin 1.3 mg/dl
glucose 148 mg/dl	amylase 125 IU/l	creatinine 0.60 mg/dl
sodium 146 mEq/l	potassium 3.1 mEq/l	chloride 100 mEq/l
aspartate aminotransferase 287 IU/l	alanine aminotransferase 104 IU/l	
blood urea nitrogen 3.1 mg/dl	lactate dehydrogenase 444 IU/l	
c-reactive protein 0.3 mg/dl		
activated partial thromboplastin time 23.1 (25.7) sec		
prothrombin time 11.2 (11.8) sec		
fibrinogen degradation products 3.4 μg/ml.		
Cerebrospinal fluid		
pH 7.4	specific gravity 1.006	cell count <1
glucose 70 mg/dL	protein 28 mg/dL.	

Discussion

This was a rare case of cardiac arrest induced by Takotsubo syndrome due to two convulsive episodes. Furthermore, this was the 2nd reported case in which fatal ventricular arrhythmia observed on the ECG soon after a convulsive episode [3].

Convulsions can trigger Takotsubo syndrome. Both circulating epinephrine and norepinephrine significantly increase in the acute phase of convulsion. This catecholamine surge leads to epicardial and microvascular coronary vasoconstriction and/or spasm, increased cardiac workload, and myocardial damage [4]. The Central Nervous System (CNS) disorder that most frequently triggers Takotsubo syndrome is subarachnoid bleeding; however, a convulsion/epilepsy is the second most frequent trigger [5]. Takotsubo syndrome could abe the cause of sudden unexpected death in epilepsy. Finsterer et al. reviewed 74 patients with seizure-triggered Takotsubo syndrome in 59 published studies [6]. The outcome was mentioned in 63 of the 74 cases; 2 of the 74 patients died (3%) [6]. Based on these results, they concluded that fatalities were rare in patients experiencing seizure-triggered Takotsubo syndrome. However, fatal cases tend to be unrecorded; thus, they may underestimate true number of fatalities caused by seizure-triggered Takotsubo syndrome [7]. Accordingly, physicians should check heart the function using electrocardiogram, ultrasound and measure cardiac enzyme levels, and consider observational admission after general convulsion.

The differential diagnoses of mechanisms of fatal arrhythmia include drug-induced arrhythmia, simple convulsion associated with arrhythmias that usually arise from the frontal, temporal, and insular cortex, genetic abnormalities that can produce both convulsion and arrhythmia, or preceding asymptomatic myocarditis resulting in the formation of torsades de pointes [3,8,9]. As we did not perform a genetic analysis or examine the heart histology, we could not deny the possibility of these mechanisms.

Conclusion

This was a rare case of cardiac arrest induced by Takotsubo syndrome due to two convulsive episodes. Physicians should check the heart function and consider observational admission when patients experience a convulsion.

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