

# Convulsive syncope on electroencephalogram

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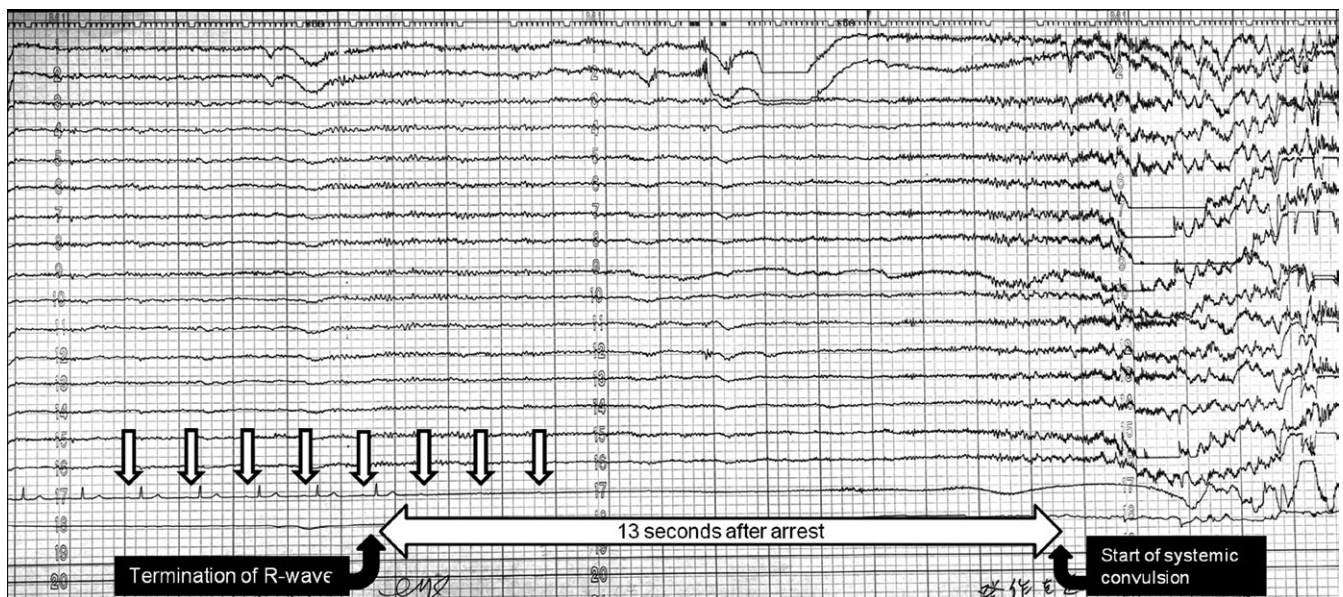
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A 55-year-old woman visited our hospital with repeated episodes of syncope. She had no memories around syncope, but she had incontinence of urine. Her family reported the process of syncope; she screamed suddenly and went into systemic clonic convulsions soon. She slowly returned to normal status over several minutes with lack of memories during attack without any neurological deficit.

On arrival at our hospital, she could present her history fluently. We performed a physical examination, chest X-ray pictures, blood chemistry, and electrocardiogram; however, no abnormal findings were revealed. We took a computed tomography (CT) of her brain; however, it also reveals no abnormal findings. She was suspected of having epilepsy. Thus, we decided to take emergency

electroencephalogram (EEG). In the middle of EEG, she presented systemic clonic convulsion. After few minutes, she recovered her consciousness clearly. Fortunately, we could record attack through EEG (Figure 1). Her EEG pattern was suddenly changed into generalized high voltage with electromyogram artifacts, just after 13 seconds absence of electrocardiographic R wave. Systemic clonic convulsion was brought by whole-brain ischemia from temporary cardiac arrest. After transient R wave pausing, her systemic convulsion was terminated. She recovered her consciousness gradually. EEG also recovered at the same time (Figure 2).

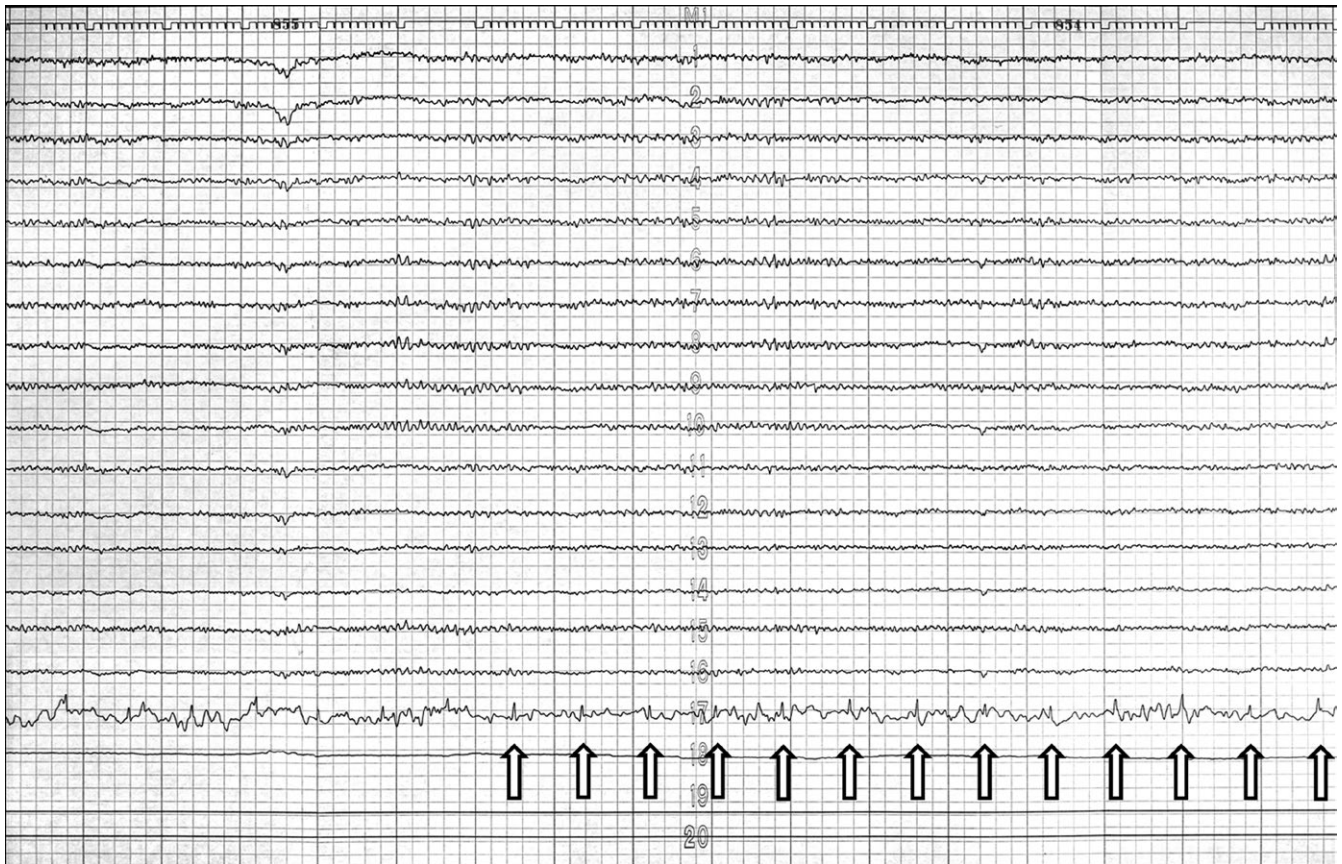
Echocardiography revealed no abnormal findings, such as cardiac valve diseases, cardiac myopathy, and focal asynergy. Of course,



**FIGURE 1** Electroencephalogram (EEG) revealed a sudden termination of R wave of the electrocardiogram. After 13 seconds of cardiac asystole due to advanced AV block, her EEG pattern was suddenly changed into generalized high voltage. Finally, she fell into systemic convulsion. We can recognize regular “P” wave on EEG. White arrows indicate “P wave” of cardiac monitor

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**FIGURE 2** After systemic convulsion, EEG recovered normally. ECG monitor was drifted by her sweat. But we can recognize regular “R” wave on EEG. White arrows indicate “R wave” of cardiac monitor. EEG, electroencephalogram

magnetic resonance (MR) angiography of carotid and cerebral arteries did not reveal any stenoses. Finally, she was diagnosed with advanced AV block. For 5 years of follow-up, she did not have any convulsion after implanting a cardiac pacemaker.

Cardiogenic syncope had a worse life prognosis than any other causes of syncope.<sup>1</sup> It is very important that how to differentiate syncope.<sup>2</sup> Sometimes, it is very difficult to distinguish cardiac problems from epilepsy.<sup>3–5</sup> Curiously, previous paper presented systemic convulsion after 12 seconds of asystole.<sup>3</sup> That case also presented no cardiac abnormality except AV block. Cardiologists are not familiar with EEG. Neurologists are not familiar with Adams-Stokes syndrome. These two cases were very rare to reveal the EEG findings that 13 seconds of cardiac arrest evoked systemic convulsion. Our report revealed EEG changes through cardiac arrest, whole-brain ischemia, and convulsion. Many previous reports revealed the relationship between arrhythmic events and syncope; however, few paper could reveal the cause of systemic convulsion which leads to whole-brain ischemia through EEG.<sup>6</sup> Experimental trial never approaches to human cases such as our case ethically. Only gathering similar cases will reveal clinical features among them. This case will be one of cornerstones.

Physician should make effort to detect Adams-Stokes convulsion like epileptic episode.

#### CONFLICT OF INTEREST

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

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