



Delayed diagnosis of long QT syndrome in a patient with seizures

Hong Kong Journal of Emergency Medicine
2019, Vol. 26(3) 190–193

© The Author(s) 2019

Article reuse guidelines:

sagepub.com/journals-permissions

DOI: 10.1177/1024907918754921

journals.sagepub.com/home/hkj



Seung Yong Shin^{1,2}, Jun Young Hong³ and Dong Hoon Lee³

Abstract

Introduction: Long QT syndrome accompanied by a seizure episode is often misdiagnosed as primary epilepsy. Although patients with Long QT syndrome who are misdiagnosed and improperly managed are likely to result in fatality, their first clinical manifestations are seizure episodes in many cases.

Case presentation: A 17-year-old boy visited the emergency department with poorly controlled seizure during epilepsy treatment was found to have been misdiagnosed with epilepsy when he was 7 years old. His electrocardiography showed a prolonged QT interval. After careful re-evaluation, he was finally diagnosed with Long QT syndrome and recovered without any seizure episodes in the absence of anti-epileptic agents.

Discussion and conclusion: Careful initial assessment including repetitive electrocardiography, when abnormal, is required for those who visit the emergency department with a seizure or who show no definite abnormalities in diagnostic work up process.

Keywords

Long QT syndrome, torsades de pointes, seizure, epilepsy

Introduction

Arrhythmogenic syncope accompanied by a seizure episode is often misdiagnosed as primary epilepsy. Therefore, careful initial assessment is required for those who visit the emergency department (ED) with a seizure. However, patients previously diagnosed with epilepsy are often not adequately assessed when they come to the ED with a seizure episode, which in many cases is the first symptom of long QT syndrome (LQTS). Failure to consider LQTS has been reported as a major cause of delay from initial symptoms to diagnosis. LQTS can lead to fatal ventricular arrhythmia, which requires appropriate assessment by the emergency physicians. A correct diagnosis is also important to prevent sudden death at a young age as well as to identify the proband of congenital LQTS. This case report presents a 17-year-old boy who visited the ED with seizures that had been misdiagnosed as epilepsy when he was 7 years. Now, 10 years later, he was diagnosed with congenital LQTS. We discuss why there was a delay in the diagnosis of LQTS in this case.

Case report

A 17-year-old boy visited the ED after a seizure episode. Before 10 years, he was diagnosed with epilepsy and was on medication until the morning of his visit to the ED. His last seizure episode had been 3 years prior. The night before coming to the ED, he had a seizure for 2 min. The next morning, he was admitted to the ED with another seizure, which lasted approximately 15 s. He was alert but slightly confused. His blood pressure was 124/74 mm Hg, and his heart rate was 81/min. He had no

¹Division of Cardiology, College of Medicine, Chung-Ang University, Seoul, Korea

²Department of Cardiology, Chung-Ang University Hospital, Seoul, Korea

³Department of Emergency Medicine, College of Medicine, Chung-Ang University, Seoul, Korea

Corresponding author:

Seung Yong Shin, Department of Cardiology, Chung-Ang University Hospital, 102 Heukseok-ro, Dongjak-gu, Seoul, 06973 Korea.

Email: theshin04@cau.ac.kr



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons

Attribution-NonCommercial 4.0 License (<http://www.creativecommons.org/licenses/by-nc/4.0/>) which permits non-commercial

use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

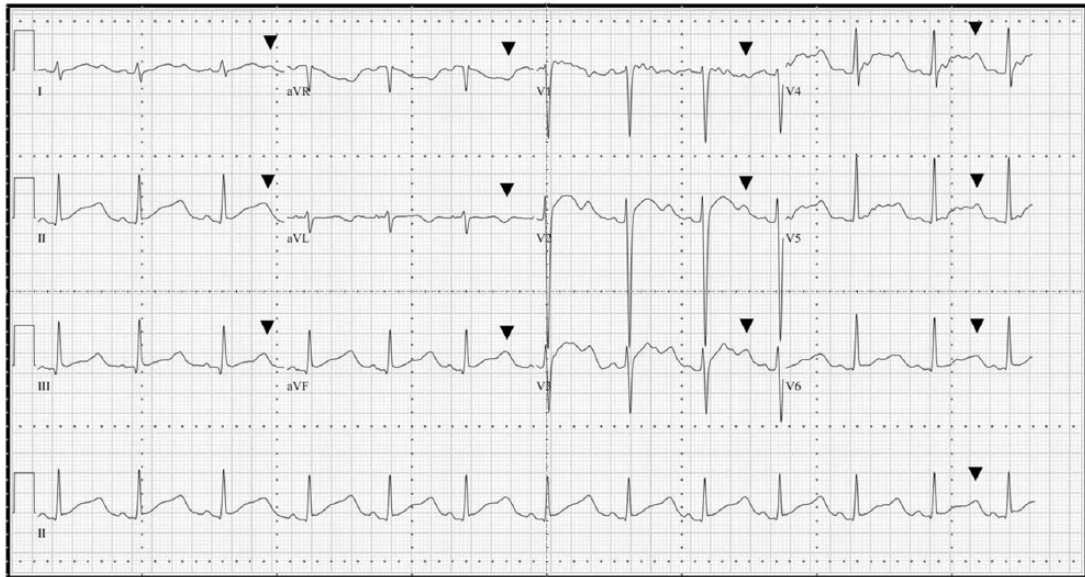


Figure 1. The 12-lead ECG before seizure in the ED; the arrowhead indicates a U wave.



Figure 2. ECG monitoring during seizure in the ED.

fever or neurologic deficit. He reported having chest pain and dizziness before the morning seizure episode. The seizure was accompanied by cyanosis and upward eyeball deviation. A 12-lead electrocardiography (ECG) showed a prolonged QT interval with a U wave (Figure 1: arrowhead). The heart rate was 75, and the QT/QTc interval by the manual calculation was 600/667 ms. Automatic calculation by the EKG machine measured 400/448 ms (Figure

1). After about 10 min, he complained of chest pain and dizziness, and a seizure was soon under way. The ECG monitor showed torsades de pointes (TdP) (Figure 2). TdP was repeated for a few seconds every 5 min and was accompanied by seizure. Repeated unstable TdP was converted by defibrillation in the ED. After intravenous injection of magnesium, he was transferred to the intensive care unit (ICU).

interval can also cause confusion. Manual measurements are reported to be superior to automated measurements. The automatically measured QT interval in our patient was in the normal range.

A group of expert on LQTS proposed four guidelines for measuring QT interval:^{8,9}

1. Use a limb leads that best reveal the end of the T wave;
2. Measure from beginning of QRS wave to the end of the T wave and include a U wave if it is large enough to be merged with T wave;
3. Measure the QT interval during peak plasma concentration of a QT-prolonging medication;
4. Adjust QT interval for heart rate.

A simple visual assessment of long QT is by comparing the length of QT interval to the length of two R waves. If the QT interval is more than half of the RR interval, long QT should be suspected.

The prevalence of LQTS is approximately 1 in 3000 and may be underestimated.¹⁰ In most cases, the ED is the first place a patient with syncope or seizure episode will be seen by a physician. To avoid misdiagnosing LQTS patients, emergency physicians should obtain a detailed clinical history along with reliable interpretation of the QT interval.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was supported by the Chung-Ang University Research Grants in 2013.

Availability of data and materials

This case report has no restrictions on the availability of data and materials.

Informed consent

The patient provided informed consent.

Ethical approval and human rights

All authors adhered to the Helsinki Declaration; patient confidentiality and anonymity were preserved.

References

1. Pallin DJ, Goldstein JN, Moussally JS, et al. Seizure visits in US emergency departments: epidemiology and potential disparities in care. *Int J Emerg Med* 2008; 1(2): 97–105.
2. McCormick JM, McAlister H, Crawford J, et al. Misdiagnosis of long QT syndrome as epilepsy at first presentation. *Ann Emerg Med* 2009; 54(1): 26–32.
3. Iralde GR, Arazi HC, Waldman S, et al. Should every patient who presents with a seizure have an electrocardiogram? *Am J Emerg Med* 2009; 27(3): 376.e3–376.e7.
4. McKeon A, Vaughan C and Delanty N. Seizure versus syncope. *Lancet Neuro* 2006; 5(2): 171–180.
5. Schwartz PJ, Priori SG, Spazzolini C, et al. Genotype-phenotype correlation in the long-QT syndrome: gene-specific triggers for life-threatening arrhythmias. *Circulation* 2001; 103(1): 89–95.
6. Huff JS, Melnick ER, Tomaszewski CA, et al. Clinical policy: critical issues in the evaluation and management of adult patients presenting to the emergency department with seizures. *Ann Emerg Med* 2014; 63(4): 437–447.
7. Viskin S, Rosovski U, Sands AJ, et al. Inaccurate electrocardiographic interpretation of long QT: the majority of physicians cannot recognize a long QT when they see one. *Heart Rhythm* 2005; 2(6): 569–574.
8. Al-Khatib SM, LaPointe NM, Kramer JM, et al. What clinicians should know about the QT interval. *JAMA* 2003; 289(16): 2120–2127.
9. Anderson ME, Al-Khatib SM, Roden DM, et al. Cardiac repolarization: current knowledge, critical gaps, and new approaches to drug development and patient management. *Am Heart J* 2002; 144(5): 769–781.
10. Taggart NW, Haglund CM, Tester DJ, et al. Diagnostic misuses in congenital long-QT syndrome. *Circulation* 2007; 115(20): 2613–2620.