

CASE REPORTS

Electrocardiography abnormality in a suicide attempt with levetiracetam

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Abstract

We present a case of suicide attempt with levetiracetam (LEV) in an epilepsy patient. Multifocal ventricular contractions were observed together with bradycardia in this patient due to LEV overdose. Reported patient of LEV overdose in the literature rarely show electrocardiography findings. Although LEV is less toxic than other antiseizure medications, clinicians should be aware of its potential cardiac side effects.

Keywords: Epilepsy, suicide, drug, arrhythmia, cardiotoxicity

INTRODUCTION

Epilepsy is one of the most common neurologic diseases. The prevalence of active disease is 6.38 per 1000 population, and the lifetime prevalence is 7.60 per 1000 population.¹ The main treatment of epilepsy is by antiseizure medications (ASMs).

Levetiracetam (LEV) is a novel ASM that is mainly used to treat focal onset seizures. The therapeutic dosage ranges from 1000 to 3000 mg/day. LEV has a half-life of 6-8 hours and is eliminated through the kidneys. It has rapid absorption and limited adverse effects.² Reported cases of LEV overdose symptoms frequently include the gastrointestinal and neuro-psychiatric systems, but cardiotoxicity is rare.

We report here a patient with epilepsy who attempted suicide by LEV in whom cardiotoxicity was seen.

CASE REPORT

A 22-year-old man was admitted to the emergency department approximately 2 hours after ingesting 75.000 mg of LEV in a suicide attempt. He was diagnosed with temporal lobe epilepsy confirmed with electroencephalography and was using Keppra® tablets (2 × 1000 mg/day only for three years). On physical examination, he was somnolent but extremely agitated and aggressive

with verbal or painful stimuli. His blood pressure was 118/87 mm Hg, pulse: 52/min, respiratory rate: 22/min, body temperature: 36.7°C, and oxygen saturation 99%. In the neurological examination, he had impaired orientation and cooperation. There were generalized hyporeflexia and hypotonia.

The patient was observed for urinary, clinical, and hemodynamic findings and cardiac monitoring. Gastric lavage and activated charcoal were administered because he did not vomit after the suicide attempt. Arterial blood gas, cardiac enzymes, and complete blood count were normal. No ethanol, drug use or other medications (amphetamine, methamphetamine, methadone, opiates, cocaine, cannabinal, phencyclidine, acetaminophen, salicylate, benzodiazepine or barbiturates) were detected. The initial electrocardiogram (ECG) in the emergency department revealed sinus bradycardia. The patient was transferred to the intensive care unit. Four hours after the LEV overdose, deep tendon reflexes (DTRs) and muscle tone remained unchanged. Orientation and cooperation became normal. Cardiology consultation was sought. Bidirectional ventricular extrasystoles were observed together with bradycardia in the 4th-hour ECG (Figure 1). Clinical findings and biochemical test were normal, but the ECG changes persisted

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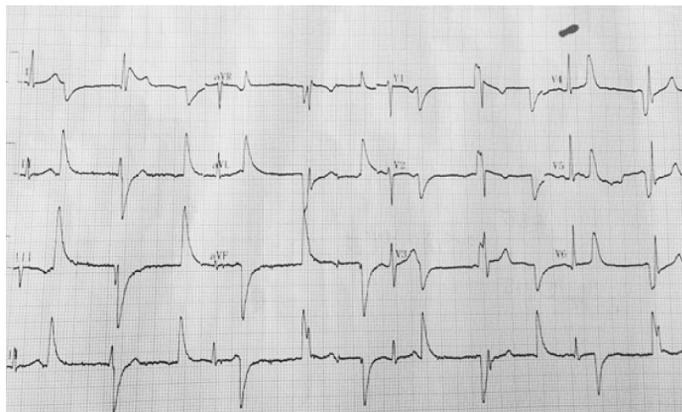


Figure 1. The ECG of the patient at 4th hours

for 12 hours after the overdose (Figure 2). The blood LEV level was 277 $\mu\text{g/mL}$ at 8 hours (therapeutic range: 3-34 $\mu\text{g/mL}$). No additional medication was given. Twenty-four hours after the LEV overdose, the ECG rhythm normalized. The patient was subsequently seen in the psychiatry clinic. Depressive mood disorder with life stress was diagnosed. Levetiracetam was changed to carbamazepine with a titration schedule.

DISCUSSION

The lifetime prevalence rate of suicide in patients with epilepsy is higher than in the general population. The suicide rate is 1.1-1.2% in the general population, whereas it is approximately 12% in patients with epilepsy. Risk factors for suicide in people with epilepsy were reported as psychiatric comorbidities and family issues, physical health, personality, life stress, and previous suicidal behavior.³ Psychiatric comorbidity in epilepsy is common, especially in temporal lobe epilepsy.⁴ A previous study

demonstrated a higher suicide risk in patients with temporal lobe epilepsy, poorly controlled seizures and in those who take LEV.⁵ Although suicide risk in LEV usage alone is controversial, comorbid conditions, especially psychiatric conditions, may increase this risk.⁶ Our patient had temporal lobe epilepsy for 3 years and was seizure free. The ASM adherence of the patient was good. However, there was no follow-up by a neurologist. He had depressive disorder due to life stress so we changed the epilepsy treatment to carbamazepine because of the suicide attempt.

LEV is known as an effective and safe ASM. However, it can have toxic effect. Wills *et al.*⁷ reported that LEV caused less toxicity than other ASMs and required the least intervention. Potential adverse effects during LEV therapy include headache, asthenia, pharyngitis, somnolence, dizziness, anxiety, agitation, apathy, coordination problems, depression, and emotional instability.⁸⁻¹⁰ In cases of overdose, diminished DTRs and muscle tone, gastrointestinal symptoms, varying degrees of agitation, aggression or impaired

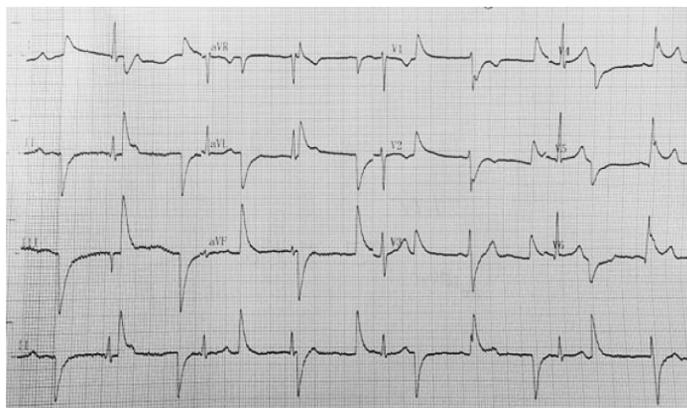


Figure 2. The ECG of the patient at 12th hours

consciousness, coma, and respiratory depression may occur.^{9,10} Despite these adverse effects, the clinical outcomes of LEV overdose in various age groups are generally good. Adverse effects were not observed in infant and children following LEV overdose.^{11,12} Sarfaraz *et al.*¹³ also detected no neurologic, cardiovascular or gastrointestinal adverse effects in an adult who ingested 600 g LEV and 1.5 g topiramate in a suicide attempt. By contrast, Barrueto *et al.* intubated an adult due to impaired consciousness after ingestion of 30 g LEV and reported a global decrease in DTRs and muscle tone.⁹ Although our patient was somnolent on presentation to the emergency department, he reacted to verbal or painful stimuli with agitated and aggressive behavior. In addition, DTRs and muscle tone were globally decreased. However, all these clinical findings returned to normal.

Cardiotoxic adverse effects with LEV overdose are rare. Page *et al.*¹⁴ reported hypotension and bradycardia in a patient who ingested LEV in a suicide attempt. This was attributed to increased muscarinic activity, with stimulation of M₂ receptors resulting in bradycardia, and that of M₃ receptors resulted in peripheral vasodilation, and consequently hypotension.^{15,16} Unlike other ASMs, LEV does not block sodium channels, and no specific antiarrhythmic treatment is therefore recommended for cardiotoxicity.¹⁷ In our patient, sinus bradycardia was detected in ECG, and the patient was normotensive during follow-up. Four hours after the LEV overdose, bidirectional ventricular extrasystoles were observed together with sinus bradycardia. His rhythm normalized spontaneously within 24 hours.

No specific antidote exists for LEV, and support therapy is recommended in cases of overdose. Hemodialysis may be an option in patients with severe clinical symptoms or kidney failure because the drug is eliminated through the kidneys.¹⁸ In our patient, blood LEV levels were very high, even at 8 hours, but hemodialysis was not performed.

In conclusion, comorbid conditions such as mood disorder should be noted in patients with epilepsy. Although LEV has a much safer drug profile compared with other ASMs, it can cause cardiac effects and ECG changes in cases of overdose.

DISCLOSURE

Conflict of interest: None

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