Case Report

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Recurrent Syncope Triggered by Temporal Lobe Epilepsy: Ictal Bradycardia Syndrome

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Ictal asystole is potentially lethal, and known to originate from the involvement of limbic autonomic regions. Appropriate treatment must include an antiepileptic drug and the implantation of a pacemaker. We report the case of a 54-year-old male with recurrent syncope secondary to ictal asystole triggered by temporal lobe epilepsy. This was confirmed by combined Holter and video-electroencephalogram monitoring. (Korean Circ J 2012;42:349-351)

KEY WORDS: Bradycardia; Syncope; Electrocardiography.

Introduction

Syncope is defined as a transient loss of consciousness, usually leading to falling, which results from transient inadequate cerebral perfusion.1) The most common causes of syncope are reflex-mediated syncope and orthostatic hypotension. Rarely, cardiac bradyarrhythmias induced by seizures can give rise to syncope. Ictal bradyarrhythmia is a rare cause of syncope but can be a potentially life-threatening syndrome associated with partial epilepsy.2) It has been implicated as a cardiac cause of sudden unexplained death in epilepsy (SUDEP).3)

Cardiac pacemaker implantation along with antiepileptic drug therapy may be necessary to minimize the possibility of death. We report a patient with recurrent syncope secondary to ictal asystole triggered by temporal lobe epilepsy.

Case

A 54-year-old Korean Canadian man was admitted due to the worsening of a recurrent syncope during the past two years. He had experienced syncope once or twice a year, especially during or after eating. He had been treated with carbamazepine at a local clinic. He reported symptoms of jamais vu, dizziness, and a syncope lasting less than a minute, followed by post-ictal confusion for 30 minutes. There was no identified trigger, but the attack was usually developed while eating. He did not smoke cigarettes or drink alcohol and had none of the classic cardiovascular risk factors. His blood pressure was 138/92 mm Hg, respiratory rate was 20/min, and heart rate was 91 beats/min. A physical examination revealed no specific findings. The magnetic resonance imaging result was normal.

He underwent a video-electroencephalogram (EEG) monitoring combined with a Holter monitoring.

The first episode of vacant staring developed while he was eating lunch. His head dropped and showed subtle generalized convulsive movements for a few seconds. EEG showed generalized rhythmic theta activity at that event (Fig. 1). A severe sinus bradycardia and asystole started 22 seconds after seizure onset and lasted 40 seconds (Figs. 1 and 2). Three episodes of seizure attack and a long sinus pause developed during 24 hours of EEG and Holter monitoring (Fig. 2).

On the basis of combined Holter and video-EEG monitoring, the diagnosis of ictal bradyarrhythmia syndrome was confirmed. We recommended permanent pacemaker implantation, but he wanted the implant in his country. Therefore, he was discharged on medical thera-
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py for epilepsy. Later, he had a pacemaker implanted in Canada and did not experience recurrence of syncope.

Discussion

Cardiac rhythm changes occur in a majority of epileptic seizures. The most common cardiac arrhythmia observed during epileptic seizures is sinus tachycardia, which occurs in >90% of seizures and is usually of no consequence. Marked sinus bradycardia or asystole is rarely associated with seizures. Patients with bradycardia and asystole during an epileptic seizure are classified as having ictal bradycardia syndrome. Ictal bradycardia syndrome is a rare feature of patients with focal epilepsy mostly from the temporal lobes and has been implicated as a cardiac cause of SUDEP. Ictal and interictal epileptogenic activity spreading from the temporal lobe areas may interfere with cardiovascular modulation in neighboring structures of central autonomic control, such as the amygdale, the insular or orbitofrontal cortex, the cingular gyrus and their pathways. Electrocardiogram (ECG)-triggered microstimulation of the left posterior insular cortex in rats may lead to complete heart block.

Fig. 1. Electroencephalogram and electrocardiogram. Electroencephalogram showed rhythmic theta activity and sharp waves in the T3 area (arrow) at first, and then generalized rhythmic theta activity. Asystole started 22 seconds after seizure attack, as shown in the electrocardiogram channel (arrow head).

Fig. 2. Holter recording. Holter recording showed three episodes of a long sinus pause of 40 seconds, followed by junctional escape rhythm, and then sinus tachycardia.
and asystolic death. Electroconvulsive therapy in humans can trig-
ger asystole simultaneous with the onset of the electrical stimulus,
both suggesting a direct mechanism on the heart.

Park et al.\textsuperscript{9} reported a case of frontal lobe brain tumor related to
seizure and complete atrioventricular block, but concomitant Holter
and EEG recording was not conducted during seizure events. In our
case, combined Holter and video-EEG monitoring could confirm the
origin of seizure and diagnosis of ictal bradycardia syndrome simulta-
neously. Concomitant Holter and EEG recording should be con-
sidered when patients with temporal lobe epilepsy develop recurrent
syncope.

There are no guidelines for the management of patients with ictal
arrhythmia. One prospective study\textsuperscript{8} using implantable loop re-
corders to get ECG in patients during typical seizures showed that
4 out of 19 patients had bradycardia or periods of asystole. Three
out of these four had potentially fatal asystoles. These authors con-
cluded that the clinical characteristics of patients with perictal car-
diac abnormalities are very similar to those at greatest risk of SUDEP.
One case reported that implantation of a cardiac pacemaker while
continuing antiepileptic drugs rendered a patient free from ictal symp-
toms and prevented ictal syncope and subsequent trauma.

Our case is a patient with recurrent, unexplained syncope for se-
veral years, with no personal or family history of epilepsy. The pa-
tient suffered symptoms such as jamais vu, which were suggestive
of partial seizures. The attack was usually developed while eating,
but it was different from situational syncope such as swallowing syn-
cope that is caused by a reflex of the involuntary nervous system
called the vasovagal reaction.\textsuperscript{10} To rule out situational syncope, we
performed EEG analysis, which showed rhythmic theta activity and
sharp waves in the left temporal area and generalized rhythmic
theta activity. Asystole started a few seconds after seizure onset. He
was discharged on medical therapy for seizure and later implanted
with a pacemaker.

In conclusion, ictal bradycardia syndrome should be postulated
when patients with temporal lobe epilepsy develop recurrent syn-
cope. The diagnosis can only be confirmed by concomitant Holter
and EEG recording during an event. The double headed treatment al-
 lows an adequate, comprehensive prevention of potentially dele-
terious complications.

References

1. Brignole M, Alboni P, Benditt DG, et al. Guidelines on management (diagnosis and treatment) of syncope-update 2004: executive summary. 
Eur Heart J 2004;25:2054-72.
2. Reeves AL, Nollet KE, Klass DW, Sharbrough FW, So EL. The ictal brady-
cardia syndrome. Epilepsia 1996;37:983-7.
3. Britton JW, Ghearing GR, Benarroch EE, Cascino GD. The ictal brady-
cardia syndrome: localization and lateralization. Epilepsia 2006;47:
737-44.
4. Blumhardt LD, Smith PE, Owen L. Electrocardiographic accompa-
niments of temporal lobe epileptic seizures. Lancet 1986;1:1051-6.
5. Opherk C, Coromilas J, Hirsch LJ. Heart rate and EKG changes in 102
seizures: analysis of influencing factors. Epilepsy Res 2002;52:117-27.
6. Frysinger RC, Harper RM. Cardiac and respiratory correlations with
unit discharge in human amygdala and hippocampus. Electroencepha-
logr Clin Neurophysiol 1989;72:463-70.
7. Freeman R. Cardiovascular manifestations of autonomic epilepsy. Clin 
Auton Res 2006;16:12-7.
8. Rugg-Gunn FJ, Simister RJ, Scurrill M, Holdright DR, Duncan JS. Car-
diac arrhythmias in focal epilepsy: a prospective long-term study. Lan-
cet 2004;364:2212-9.
9. Park KH, Her SH, Lee JM, et al. Brain Tumor is a rare cause of both bra-
dycardia and seizure. Korean Circ J 2007;37:449-52.
10. Kim JS, Ryu JC, Joo SB, et al. Usefulness of head-up tilt test in adults
with syncope or presyncope of unexplained origin. Korean Circ J 1996;
26:855-64.