

EPILEPTIC SEIZURE DURING ANAESTHESIA INDUCTION WITH ETOMIDATE

HUSEYİN SEN*, AYHAN ALGUL**, MEHMET GÜNEY SENOL***,
ALPAY ATEŞ**, EMRE KILIC*, SEZAI ÖZKAN*,
GÜNER DAĞLI*

Abstract

In this report a 20-year-old male patient who had suffered tonic-clonic seizure after a single induction dose of etomidate until a bispectral index value of 60 is presented. Our best knowledge, this case is the first report of pure etomidate (with induction dose) induced generalized tonic clonic seizure proven with EEG. Anaesthesiologists should be careful against such a complication even in the induction stage of anaesthesia during etomidate use.

Introduction

Etomidate is one of the general anaesthetic drugs used mainly during induction. Besides its general side effects including venous pain at the injection side, postoperative nausea and/or vomiting, suppression on the adrenal gland; it also has central nervous system side effects^{1,2}. It lowers the intracranial pressure, reduces the cerebral blood flow and cerebral oxygen consumption causes electroencephalic activation and myoclonus.³ Unlike barbiturates, it may have disinhibitory effects on the parts of the nervous system that control the extrapyramidal motor activity and this disinhibition has been accepted to be responsible for myoclonus seen in 30-60% of the patients².

Although epileptic seizures have been reported in association with etomidate, the relevant studies comprise either overdose of the drug⁴, its combined use with other drugs^{5,6} or insufficient monitorization⁷. On the other hand, we, herein, report a fully monitored patient who had suffered tonic-clonic seizure after a single induction dose of etomidate until a bispectral index (BIS) value of 60.

Gülhane Military Medical Academy Haydarpaşa Training Hospital.

* MD, Associate Professor. Department of Anaesthesia and Reanimation.

** MD, Associate Professor. Department of Psychiatry.

*** MD, Associate Professor. Department of Neurology Üsküdar, İstanbul, Turkey.

Correspondence: Hüseyin Şen, GATA Haydarpaşa Eğitim Hastanesi, Anestezi ve Reanimasyon Servisi, Üsküdar, İstanbul, Turkey. Tel: 902165422020, E-mail: drhuseyinsen@hotmail.com

Case Report

A 20-year-old male patient physical status ASA-1, was seen in the psychiatry ward due to weird laughs and speech. He was talking to himself and was not able to accomplish his psychophysiological behaviors (eating, drinking, defecation etc). He was diagnosed as major depression and olanzapine 20 mg/day and lorazepam 2 mg/day was commenced accordingly. Because his oral intake was severely diminished, electroconvulsive therapy (ECT) was planned due to the need for an urgent response. He did not have a history of an epileptic seizure before.

The patient was taken to the operation room and no premedication was applied. Infusion of crystalloid solution was started after making a peripheral line on the patient's hand. Heart rate, systolic arterial pressure, diastolic arterial pressure, mean arterial pressure, peripheral oxygen saturation (Datex Ohmeda S/5 Helsinki/ Finland), BIS (A-2000, Aspect Medical Systems Inc, Natick, MA) and electroencephalography (EEG)(Thymartron System IV Somatics, IL, USA) were continuously monitorized. After preoxygenization, etomidate injection was applied until a BIS value of 60 (a total etomidate dose of 16 mg). Thereafter, tonic-clonic convulsions lasting 80 seconds were observed. Generalized slow wave pattern (2 Hz, delta) was observed in the EEG. Midazolam (3 mg) was given to the patient to stop the convulsion. ECT was cancelled and the patient was taken to the Intensive Care Unit. He did not have any other convulsions during his stay in the intensive care unit. After the neurologic consultation, a cranial magnetic resonance imaging was performed and it was normal.

Discussion

Etomidate depresses the reticular activating system and mimics the inhibitory effects of gamma-aminobutyric acid (GABA). Specifically, etomidate appears to bind to a subunit of the GABA type A receptor, increasing its affinity for GABA².

Depending on the clinical context, many anaesthetic drugs are both pro-and anticonvulsants. However, anaesthetic drug-induced clinically apparent seizures are rare, and the formal epidemiological study of this phenomenon is difficult. No anaesthetic drugs

have a clear dose-response with respect to seizures and most of them have been used successfully to treat status epilepticus.⁸ Furthermore, most of these reports are based solely on clinical records of suspicious muscle activity without EEG documentation. In the absence of EEG monitoring, a number of nonseizure-related movements could mimic seizures (e.g., myoclonus, dystonic reactions, extreme shivering). Clearly, abnormal movements during induction are a poor indicator of EEG seizure activity⁹. In this case during seizure we observed, slow wave pattern (2 Hz, delta) on EEG.

Fifty to eighty percent of unpremedicated patients may develop myoclonic movements after etomidate administration.¹ Doenicke et al. suggested that myoclonus results from subcortical disinhibition, similar to the phenomenon of restless legs during normal human sleep, and is not generated by an epileptic focus.¹⁰ Previous reports have shown that pretreatment with opioids reduced myoclonic movements and pain during induction of anaesthesia with etomidate¹. Nicoll et al. reported a case who had spontaneous generalized tonic/clonic seizures during anaesthesia induction prior to his 10th ECT session. The patient was administered an initial 26 mg (high dose) of etomidate before he developed seizures⁴. Two of these studies noted an increase in epileptiform activity with etomidate. One also showed increased fast activity lasting several minutes^{7,11}. Generalized seizures after short durations of etomidate infusion -either during or near the end of the anaesthesia- have been reported^{4,7,11}. Hansen reported a similar case of generalized seizures following short term etomidate anaesthesia. However in Hansen's case, the seizure occurred post-operatively, not during induction.¹¹ Goroszenick et al. reported generalized tonic-clonic seizures after recovery from uncomplicated fentanyl-etomidate anaesthesia where they attributed the seizure activity to fentanyl⁵. Sinha et al. reported generalized tonic-clonic seizures after 10 mg i.v. etomidate and 150 mcg fentanyl induction⁶.

Overall, to our best knowledge, this case is the first report of pure etomidate (with induction dose) induced generalized tonic clonic seizure proven with EEG. Therefore, anaesthesiologists should be careful against such a complication even in the induction stage of anaesthesia during etomidate use.

References

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