

Case report

## Propofol-related myoclonic seizures

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### Abstract

Propofol is a popular agent for induction and maintenance of anaesthesia, as well as an excellent sedative agent widely used in ambulatory anaesthesia. Although involuntary movements due to propofol are well known, the occurrence of propofol-related seizure activity in patients with no previous history of epilepsy is less well highlighted. These seizures may occur at all stages of anaesthesia: induction, maintenance, emergence as well as early and late recovery. The cause of these seizures is as yet unknown. The occurrence of seizures with propofol may raise cautions on its use, especially in ambulatory anaesthesia.

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### 1. Introduction

Propofol (2,6-diisopropylphenol) is a commonly used intravenous agent for induction and maintenance of anaesthesia [1]. It is also used for sedation in minor procedures and in the intensive care unit. Propofol has been reported to cause seizures in patients who are otherwise well [2–10]. This case report highlights the occurrence of seizures after propofol anaesthesia in a patient who presented for ambulatory surgery and discusses its implication.

### 2. Case report

A 49-year-old female with menorrhagia presented for hysteroscopy and dilatation as well as curettage in the ambulatory surgery unit. She had previously undergone bilateral tubal ligation and minor breast lump surgery under general anaesthesia, which she remembered to be uneventful. As her previous anaesthetic notes were not available, it was not known if she had received propofol during those procedures. She had an episode of mild depression 8 years ago when she found a lump in her breast and was treated by her general practitioner. This was resolved when the lump was proven to be benign. She had no personal or family history

of epilepsy and was classified as American Society of Anesthesiologist Functional Class I. At the time of surgery, she was on no prescription or over-the-counter medication.

She received oral rofecoxib 25 mg as premedication. Anaesthesia was induced with intravenous propofol 120 mg and fentanyl 50 µg. A laryngeal mask airway was inserted and she was maintained on inhaled sevoflurane 1–2% in an O<sub>2</sub>/N<sub>2</sub>O mixture of 33:66% delivered via a circle system with a carbon dioxide absorber. Blood pressure, heart rate and oxygen saturation after induction were 116/67 mmHg, 64 min<sup>-1</sup> and 100%, respectively, and remained stable throughout surgery. Capnograph tracing appeared normal with end-tidal carbon dioxide levels of 39–46 mmHg. The procedure took 10 min. The airway was removed when the patient regained consciousness, and she was transferred to the recovery area. At arrival, her blood pressure was 130/97 and heart rate was 76 min<sup>-1</sup>. Oxygen saturation was 99%. Ten minutes after arrival in the recovery area, she developed myoclonic jerks involving the right upper and lower limbs. During these episodes, she was able to obey simple commands and seemed unperturbed by the involuntary movements. Blood pressure, heart rate and oxygen saturation were normal. Initially, the seizures occurred about 3–4 times every minute for 20 min, then became less frequent and she was fit-free after 1 h. She was immediately referred to the on-call neurologist and psychiatrist for assessment. Neurological examination did not reveal any other focal signs. She was calm and cooperative during the assessments, with relevant and coherent speech. She demonstrated

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good memory but was unable to recall the events in the recovery area. She was admitted for observation, but no further seizure activity was noted. Blood sugar level and electrolytes including calcium and magnesium were within normal limits. The neurologist consulted was of the opinion that further investigations were not necessary. She was discharged the next day. At follow-up in the gynaecology clinic 2 weeks later, she reported no other untoward incidents.

### 3. Discussion

The occurrence of involuntary, purposeful movement during propofol anaesthesia especially during induction is a well-known phenomenon [11,12]. Borgeat et al. [11] studied the electroencephalograms (EEG) obtained during induction of anaesthesia with propofol. They concluded that the movements were not associated with EEG abnormalities and suggested a subcortical origin for these spontaneous movements.

However, more serious seizures and seizure-like phenomena, such as generalized tonic–clonic seizures, focal motor seizures, opisthotonos and myoclonus have also been reported [13]. Kiyama and Yoshikawa [2] reported on the possible causal and temporal relationship between the occurrence of myoclonus intraoperatively during propofol infusion, which ceased when the infusion was stopped and recurred twice, each time when propofol was resumed. The Committee on Safety of Medicines in the United Kingdom [14] estimated the incidence of seizure after propofol to be 1 in 47000. In their review, Walder et al. [13] reported that in 70 patients without epilepsy, 34% of these phenomena occurred during induction, 3% during maintenance, 40% during emergence and was delayed in 23%. Forty-three percent of patients presented with generalised tonic–clonic seizures. Twenty-four patients had electroencephalograms performed; two had generalized spikes and three had general slowing. Twenty patients underwent cranial computed tomogram scans and abnormal results were reported for three of them: one had a small old cerebral infarct; one had a small bleed in the central part of the brain; and the third had radiopaque dye in the ventricles and subarachnoid space after on-table myelography. Magnetic resonance imaging of the brain was performed on four patients; one showed a small bleed. Nine patients underwent lumbar puncture and all results were normal.

It is not clear if propofol is an anti-convulsant or a pro-convulsant. The manufacturer advises caution in its use on patients with epilepsy [15]. However it has been used successfully in the management of status epilepticus [16], and there has been no conclusive clinical or electrographic evidence that propofol causes convulsions [17–21]. At low doses propofol caused activation of the electrocorticogram in patients undergoing surgery for medically intractable epilepsy [19]. At higher doses, it does not appear to trigger seizure activity in patients with epilepsy [18,20].

Propofol-related seizure activity have been reported to occur despite patients' having received benzodiazepines for anxiolysis and sedation prior to induction of anaesthesia [5]. Benzodiazepines were also ineffective for the treatment of recurrent seizures which occurred post-operatively [3,5–7,10], as were thiopentone and diphenylhydantoin [3]. Diltoer et al. [22] reported success with the use of an anticholinergic to treat choreoathetosis in a child after propofol induction.

The occurrence of seizures associated with propofol may increase due to its increasing popularity for short procedures, ambulatory anaesthesia and as a sedative agent. Its popularity stems from its favourable pharmacokinetics and pharmacodynamics [1] and ability to give a clear-headed recovery that is superior to other commonly used induction agents. It is being used increasingly outside the operating theatre. The use of airway devices such as the laryngeal mask airway, which do not require the use of neuromuscular blocking agents to gain control of the airway, may also unmask more incidences of seizures during induction and maintenance of anaesthesia. The occurrence of seizures in ambulatory patients may result in unplanned admissions as well as subjecting the patients to extensive investigations, incurring costs and causing anxiety. These phenomena have also been reported to occur a few hours to a few days after anaesthesia [23]. This is of great concern and may carry medicolegal implications where any occurrence of an excitatory episode may endanger a patient's life while carrying his usual activities and may result in disqualification of his driving licence.

On the basis of current evidence, these seizures and seizure-like phenomenon are idiosyncratic in nature and it is impossible to predict its occurrence in otherwise healthy patients. Clinicians, especially those involved in ambulatory anaesthesia, should be made aware of this complication. All cases of unexplained seizures after propofol anaesthesia should be reported as part of the routine post-marketing drug surveillance. Although propofol is generally a safe drug, it may be prudent for the careful anaesthesiologist to consider the use of alternatives such as gaseous anaesthetics in the management of ambulatory patients with epilepsy or history of seizures associated with the use of propofol.

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