

Management of poor postictal suppression during electroconvulsive therapy with propofol anesthesia: a report of two cases

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Abstract There is increasing evidence that a greater degree of postictal suppression (the abruptness and magnitude of the EEG voltage drop at the end of the seizure) may be associated with better clinical response to electroconvulsive therapy. Retrospective studies have shown better postictal suppression when propofol is used for induction rather than the more commonly used methohexital. We report two patients in whom poor postictal suppression was rectified by switching from methohexital to propofol. The clinical significance of this improvement in postictal suppression is unclear, and prospective studies will be needed to clarify any clinical benefits.

Keywords Electroconvulsive therapy · Postictal suppression · Propofol · Methohexital · Thiopental · Depression · Bipolar illness

Introduction

Over the past decade it has become increasingly apparent that the predictors of antidepressant efficacy of electroconvulsive therapy (ECT) go well beyond simply the duration of the EEG seizure. Numerous qualitative measures have been studied, one of the most promising being postictal suppression, i.e., the abruptness and magnitude of the EEG voltage drop at the end of the seizure. Greater postictal suppression is believed to be a surrogate of generalization of the seizure, as a more generalized seizure

should render more neurons refractory and thus electrically silent [1]. Several studies have found a clear correlation between greater postictal suppression and greater clinical efficacy [2–4]. While no rigorous factor analysis has been performed to date, much of the available data suggests that postictal suppression may in fact be more predictive of clinical response than the more traditionally cited seizure duration. In a prospective study of bitemporal ECT, Azuma et al. [3] found that postictal suppression was predictive of antidepressant response but seizure duration was not, and Abrams has noted that no consistent relationship between seizure duration and clinical efficacy has ever been demonstrated [5].

There is a relative paucity of literature suggesting how to manipulate postictal suppression, although several studies have demonstrated increased postictal suppression when propofol or thiopental is used as an induction agent [6, 7]. Propofol, however, has greater anticonvulsant activity than the more commonly used induction agent, methohexital [6, 8–10].

We present two patients who exhibited the fortuitous combination of poor postictal suppression but excessive seizure duration. In both patients, postictal suppression improved when propofol was substituted for methohexital.

Case reports

Patient 1. A 63-year-old man was admitted with a first episode of major depression with psychotic features. He had failed to respond to sertraline as an outpatient and we proceeded with an index course of eight bitemporal ECT treatments given three times weekly, using the Thymatron System IV device (Somatics, LLC, Lake Bluff, IL, USA). Anesthesia consisted of methohexital 100 mg and succinylcholine 100 mg, and

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power settings, using the default LOW 0.5 program, were in the 30–60 % range. During the first three treatments, seizure duration was in the 70- to 90-s range but postictal suppression was poor (machine-calculated indices in the low 70 % range), improving minimally during the fourth and fifth treatments after the pulse frequency was increased to 70 Hz. His clinical improvement was very modest during that period.

Propofol 60–80 mg was substituted as the induction agent for the sixth, seventh, and eighth treatments, with power increased to 100 %. Seizure duration remained good, in the 50- to 70-s range, but postictal suppression improved dramatically. Machine-calculated indices were in the mid-90 % range, and his depression improved significantly.

Patient 2. A 55-year-old man with a long history of bipolar illness had been successfully treated with maintenance ECT since 2003. Treatments were generally every four to 6 weeks and were administered with the Thymatron System IV device with bitemporal electrode placement. We began providing maintenance treatments in 2007; anesthesia consisted of methohexital 100 mg and succinylcholine 100 mg, and power settings, using the default LOW 0.5 program, varied between 15 and 35 %. Seizure durations were invariably long, between 150 and 250 s, and efforts to reduce power by even 5 % often resulted in a missed seizure. More notably, postictal suppression was invariably poor, with very indistinct seizure endpoint (machine-calculated postictal suppression indices are unfortunately not available). Pulse frequency was increased to 60 and then 70 Hz with no improvement in postictal suppression. He continued to do well clinically, however.

In 2008 it was decided to change the induction agent to thiopental 350 mg. This required slightly higher power settings, generally 40 or 45 %, but resulted in consistent 60- to 100-s seizures. Postictal suppression improved dramatically and was consistently excellent, with machine-calculated indices invariably over 98 %. In early 2010 we began to have difficulty obtaining thiopental and propofol 150 mg was substituted, with equally good seizure duration and postictal suppression. There was no incremental improvement in clinical benefit.

Discussion

In both patients described here, postictal suppression improved dramatically with the switch to either thiopental or propofol, and as expected, somewhat higher power settings were required to maintain adequate seizure duration. Both patients tolerated the switch with no problems. While greater postictal suppression has been noted with these agents, there have been no reports to date of switching induction agents during a course of ECT in order

to improve postictal suppression. It should be borne in mind that this report is limited to our experience with only two patients, whose responses may have been idiosyncratic. Most importantly, we have not definitively demonstrated that the switch and resultant improved postictal suppression resulted in any improved clinical efficacy. Patient 1's clinical improvement may have been related simply to an adequate number of treatments and not to the improved postictal suppression, and Patient 2 showed no incremental clinical improvement with the switch to thiopental and then to propofol.

Switching the induction agent from methohexital to propofol may have utility in improving postictal suppression during ECT. It has been demonstrated that the use of propofol is associated with shorter seizures than methohexital but with no less antidepressant efficacy [11, 12]; given the lack of correlation between seizure duration and clinical response [5], this is not surprising. In fact, one retrospective analysis noted superior clinical efficacy with propofol or thiopental than with methohexital or etomidate [7]. However, our experience clearly does not allow any determination of superior clinical efficacy with propofol; a randomized prospective study would provide much more compelling evidence that this is a viable option for improving postictal suppression, and far more importantly, for improving efficacy.

Conflict of interest The author has no financial or other conflict of interest pertinent to this work.

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