

Large Retrospective Clinical Database of Electroconvulsive Therapy Allows Investigation of Therapeutic Effects Associated with Postictal Suppression and Anesthesia Type

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Background/Introduction: Electroconvulsive therapy (ECT) is an effective and rapid treatment for severe depression. While seizure duration is commonly believed to predict clinical therapeutic response to treatment, it may not be optimal¹. Small prospective studies suggest that other measurable electroencephalogram (EEG) parameters, specifically postictal suppression (the speed and degree of the EEG voltage drop at the end of the seizure) may be better correlated with therapeutic response to ECT treatment²⁻⁴. In addition, limited studies suggest that postictal suppression may be influenced by the type of anesthesia and duration of anesthesia prior to seizure induction⁵. A large number of electronic clinical records provided the opportunity to compare our retrospective experience with the smaller series reported in the literature.

Methods: We created a large clinical database of ECT treatments and related parameters over several weeks of part-time effort. Cases during a four-year period for a single treating psychiatrist at an integrated health care system were selected, from June 1st, 2013 – May 31st, 2017. A total of 127 patients received 2038 inpatient and outpatient ECT treatments. All data were available electronically, facilitating rapid compilation. Routinely recorded unstructured data including scans of EEG ictal parameters, Beck's Depression Inventories, and Mini-Mental Status Examinations were collected by retrospective chart review. These were merged with structured data acquired from electronic health records (EHR) including patient demographics, anesthetic medications and dosages for each ECT. These data were analyzed for associations between anesthetic medications and dosage with measured EEG parameters (e.g. seizure duration, post-ictal suppression index). Analyses involved mixed effect models, linear regression, and t-tests to test associations between anesthetic type and dosage, EEG parameters, and therapeutic clinical outcomes.

Results: Approximately 70.4% of ECT treatments resulted in detected seizures. Of those with detected seizure, postictal suppression indexes ranged from <10% to 98%, with a mean of 57.7% and a median of 60.7%. Only a quarter of ECTs with detected seizure resulted in a postictal suppression index of 77.6% or greater. Approximately 24.9% of ECTs with detected seizures were performed using propofol, 72.2% were performed using methohexital, and 2.9% were performed using other agents (e.g. ketamine, etomidate, etc.). Propofol has been reported to provide greater post-ictal suppression, however, our results show methohexital having a higher mean post-ictal suppression index (58.6%) than propofol (54.1%).

Conclusions: Postictal suppression has emerged as a compelling correlate for use in predicting therapeutic improvement in depression following electroconvulsive therapy. This retrospective study established a large database of anesthetic and EEG parameters from over 2,000 ECTs. Initial results show that methohexital produced a higher mean postictal suppression index than

propofol. To our knowledge, this is the largest study reported to date investigating the interaction of anesthesia, postictal suppression, and ECT therapeutic response.

References:

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