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Predictors of Electroconvulsive Therapy Postictal Delirium

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Background: *Postictal delirium is a common adverse effect of electroconvulsive therapy (ECT) and can be dangerous to both patient and staff caring for them in the postanesthesia care unit. However, little is known about predictors of postictal delirium.* **Objectives:** *The aim of this study was to identify predictors of postictal delirium. We hypothesized that both patient and ECT treatment variables might influence the likelihood of postictal delirium.* **Methods:** *We prospectively monitored postictal delirium in the postanesthesia care unit using the Confusion Assessment Method for the Intensive Care Unit after the first ECT treatment of 96 consecutive patients. Patient and treatment variables were extracted retrospectively by chart review. A multiple logistic regression model was developed to assess the effect of these variables on the likelihood of developing delirium.* **Results:** *Seizure length was found to be a statistically significant predictor of postictal delirium after adjusting for other covariates (p = 0.003). No other variables were predictive.* **Conclusion:** *A long ECT seizure increases the likelihood of delirium in the postanesthesia care unit at the first treatment. This finding suggests that postanesthesia care unit staff may benefit from knowledge about seizure length for predicting postictal delirium and anticipating the best management of post-ECT patients.*

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Electroconvulsive therapy (ECT) is a highly effective treatment for major depressive disorder and other psychiatric conditions. A common adverse effect of ECT immediately following the procedure is the emergence of postictal delirium. This state is characterized by a lack of awareness, disorientation, agitation, and sometimes erratic and even violent behavior lasting between 5 and 45 minutes,[1] occurring in as many as 52% of patients.[2] Although postictal delirium generally lasts less than 1 hour, overall consciousness remains blunted for several hours.[3] In contrast, Katznelson et al., using the confusion assessment method for the intensive care unit (CAM-ICU), found only 11.9% were delirious after cardiac surgery, and Radtke et al. reported a postoperative delirium rate of 11% in the postanesthesia care unit (PACU) using the NuDeSC, another screening tool for delirium.[4,5] The increased frequency and severity of postictal delirium is thought to be due to the seizure itself.

During postictal delirium following ECT administration, patients become a hazard to themselves as well as others, such as nurses in the PACU.[1] Delirious patients, especially the elderly, may also be at increased risk of falls post-ECT.[6] Additionally, postictal delirium is also significant as a predictor of later ECT-related cognitive side effects, including memory loss. Sobin et al. found that time to orientation post-ECT predicted the magnitude of retrograde amnesia in the week after the course of ECT and at 2-month follow-up.[7]

As postictal delirium is potentially dangerous to both patient and staff and is associated with later cognitive side

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effects, it would be helpful to identify predictors of this state. Previous studies have yielded mixed results. Sackeim et al. examined electrode placement in 2 patients, 1 left-handed and the other right-handed, receiving ECT with right unilateral (RUL), left unilateral, and bilateral (BL) placement at different times. They found left unilateral placement was not associated with postictal delirium, unlike RUL and BL placements.[1] Conversely, Leechuy and Abrams reported postictal delirium in a right-handed man receiving ECT with left unilateral placement.[8] Devanand et al. analyzed potential predictors in a retrospective case control study consisting of 24 patients who experienced postictal delirium and 24 controls who did not.[9] The 2 groups did not differ in age, gender, diagnosis, anesthesia and succinylcholine dosages, electrode placement, mean seizure duration, or clinical outcome.[9] More recently, Sackeim et al. showed that BL placement was associated with both an increased rate of prolonged disorientation and a longer time to recover orientation compared with RUL placement.[10] In contrast, Kikuchi et al. found that pretreatment catatonic features were the only significant predictor of postictal delirium severity. Kellner et al. also examined reorientation scores at 20 minutes post-ECT and did not find a difference due to electrode placement when averaging across the full treatment course, although there was a trend towards RUL and bitemporal placement being associated with higher scores than bifrontal placement.[11]

To help monitor postictal delirium in the PACU, we recently began assessing ECT patients with the CAM-ICU. The CAM-ICU is a brief delirium assessment tool for nurses, which has been demonstrated to have high interrater reliability, sensitivity, and specificity.[12] Our nurses also monitor the RASS (Richmond Agitation-Sedation Scale), a sedation scale used to characterize the patient's alertness and responsiveness.[13] We assessed whether a variety of patient and ECT treatment variables might influence the likelihood of postictal delirium.

METHODS

Setting

The setting for this study was The Johns Hopkins Hospital in Baltimore, Maryland, which has a large inpatient psychiatric unit attached to the general hospital. The ECT suite is open for treatment 3 days per week. Approximately 125 inpatients per year are treated with ECT at Johns Hopkins. The ECT PACU is directly adjacent to the treatment room and is staffed by the ECT nurse coordinator, plus one other registered nurse of a small pool of 5 nurses who are PACU-credentialed.

Design and Sample

The study population was all consecutive inpatients beginning an acute series of ECT within the time frame October 2009–September 2010. Outpatients were not included as the CAM-ICU only began being administered to them at the end of 2010. Only data from the first ECT treatment of a series were considered in this report, as the presence of delirium at subsequent treatments might be affected by changes designed to minimize delirium at subsequent treatments. For example, if patients are agitated in the PACU after their first treatment, we may premedicate them with a low-dose neuroleptic for subsequent treatments or accelerate their taper from concurrent psychotropic medications.

Ninety-six patients were included in the study. Of these, 95 had CAM-ICU assessments and 94 had RASS ratings. Data on both dependent and independent variables was gathered from a retrospective review of the electronic record of all included patients.

This study was reviewed and approved by The Johns Hopkins Institutional Review Board. To protect patient confidentiality, medical record data were recorded using nonidentifiable codes and kept separate from patients' names or medical history numbers.

ECT Administration

ECT was administered as previously described.[14,15] Before each treatment, patients were prehydrated overnight with lactated Ringer solution. General anesthesia was induced by 1–1.5 mg/kg of methohexital, and 1–1.5 mg/kg of succinylcholine was used as the muscle relaxant. Charge was based on age, being 5 × age in millicoulombs (mc) for RUL placement with brief pulses, 2.5 × age for RUL with ultrabrief (UB) pulses, and 2.5 × age for BL with bitemporal or bifrontal placement. Typical electrical parameters at the first treatment were as follows: pulse width—0.3 ms (UB) or 1 ms (brief, regardless of electrode placement); stimulus duration—6 s (UB) or 4 s (brief, although usually less for BL placement); frequency varies with age so that total charge was a product of patient age as described above; and current was always 800 mA. Higher charge was used in