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Electroconvulsive therapy pre-treatment with low dose propofol: Comparison with unmodified treatment

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ABSTRACT

Background: Whilst electroconvulsive therapy (ECT) is routinely administered under anesthesia in developed nations, in many developing countries, ECT is still administered unmodified. This practice has attracted considerable scrutiny with calls to ban unmodified ECT. However, there are no affordable alternatives for many poor, acutely ill psychiatric patients. We evaluated whether administration of intravenous propofol 0.5 mg/kg for sedation by the ECT psychiatrist just prior to otherwise unmodified treatment improved acceptance of and reduced anxiety surrounding the treatment.
Method: We conducted an open label trial at The King George's Medical University in Lucknow, India. Forty-nine patients received propofol pre-treatment and 50 patients received unmodified treatment as usual.
Results: Socio-demographic profiles, diagnoses and clinical responses were comparable. Patients who received propofol experienced less anxiety monitored by the State-Trait Anxiety Inventory just prior to ECT ($p < 0.001$), and had a more favorable attitude towards treatment assessed by an established questionnaire (Freeman and Kendell, 1980). Propofol patients were less likely to experience post-ictal delirium monitored by the CAM-ICU ($p = 0.015$) and had fewer cognitive side-effects on the MMSE ($p = 0.004$). There were no adverse events associated with propofol administration.
Conclusion: Whilst unmodified ECT should never be used when modified ECT under anesthesia is available, we have found low dose propofol can be safely administered by the ECT psychiatrist to sedate patients pre-treatment who would otherwise receive completely unmodified treatment. The intervention was associated with reduced anxiety and a more positive attitude towards ECT, without compromising efficacy. A randomized double blind controlled study is necessary to confirm these benefits.

1. Background

Although ECT has been an established treatment for major mental illness since the 1930's and has been administered under anesthesia since the development of muscle relaxants in the late 1940's, in many developing countries it is still administered without anesthesia or unmodified (Andrade, 2003; Andrade et al., 2003; Bhave, 2003; Chanpattana and Kramer, 2004; Gallegos et al., 2012). Indeed, unmodified ECT is still sometimes practiced even in more developed nations such as Japan (Chanpattana et al., 2005; Motohashi, 2012), Russia (Nelson, 2005), Spain (Bertolin-Guillen et al., 2006; Leiknes et al., 2012) and China (Leung et al., 2009). Surveys of psychiatrists in Asia and India suggest tens of thousands of patients receive unmodified ECT around the world every year (Andrade et al., 2012; Chanpattana et al., 2010). Unmodified ECT persists in developing countries because many patients with major mental illness are poor. Accordingly, they cannot afford anesthesia and unmodified ECT may be a cheaper and quicker alternative than psychotropic medication. Such patients also lack medical insurance coverage that would pay for anesthesia,

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which is also scarce (Andrade, 2003; Andrade et al., 2003; Bhave, 2003; Chanpattana and Kramer, 2004, Chanpattana et al., 2010).

Despite its benefits as a treatment for depression (Havens, 1958; Kendell, 1981; Seager, 1959), unmodified ECT is considered by many to be inhumane and degrading (CPT, 2006). Sometimes patients must be forcibly brought to the ECT suite to receive treatment. Since a muscle relaxant is not administered during unmodified ECT, patients must be physically restrained to protect themselves from harm during a seizure. Until an electric current induces the seizure, patients are fully alert and cognizant. Staff and doctors administering unmodified ECT view the treatment negatively and have described it as unethical (Farrant et al., 1979; Selis et al., 2008). Both older studies conducted in the West and more recent studies in the developing world suggest ECT administered without anesthesia is frightening for the patient and their families (Andrade, 2003; Andrade et al., 2003; Fink, 1999; Fisher et al., 1953; Gallinek, 1956; Gottesfeld and Baker, 1946; Tharyan, 2003; Waikar et al., 2003). Unmodified ECT also appears to be associated with significantly more severe post-ECT delirium and agitation compared with modified treatment (Gallinek, 1956; Havens, 1958; Shukla, 1981). An additional concern is fracture risk. However, fractures and dislocations are kept low during unmodified ECT through the use of physical restraints, including tightly wrapping the patient in a thick canvas and holding them down during the induced seizure (Andrade et al., 2000; Shah et al., 2010; Tharyan et al., 1993). In recent studies there have been very few fractures reported (Andrade et al., 2000; Shah et al., 2010; Tharyan et al., 1993).

Delivery of ECT unmodified likely also contributes to negative perceptions about the treatment itself and mental health service in general, limiting funding and support (Andrade et al., 2010; Brownell, 1957; Challiner and Griffiths, 2000; Gallegos et al., 2012; Gallinek, 1956; Hirshbein and Sarvananda, 2008; Hughes et al., 1981; Kendell, 1981). In fact, unmodified ECT has come under considerable scrutiny in recent years in India and other developing and developed nations with proposals for its banning (Heitman, 1996; Mudur, 2002). Human rights organizations, including the World Health Organization, have called for a worldwide ban of unmodified ECT (Andrade et al., 2003). However despite these understandable concerns, for many patients with severe mental illness, no other affordable treatment alternatives are available to unmodified ECT, which typically triggers a rapid, therapeutic response.

To address these concerns, Andrade and colleagues recently used pre-ECT benzodiazepines for sedation and to reduce musculoskeletal morbidity associated with the seizure (Shah et al., 2010). In an uncontrolled trial of 56 patients, benzodiazepines, mostly diazepam 10 mg IV, were pre-administered during 162 treatment sessions. All treatments utilized bilateral electrode placement. Anxiety and attitude towards ECT were not monitored. They observed significant improvements in clinical rating scales for depression and psychosis with no orthopedic morbidity. However, it is clear that seizure threshold rises as treatment progresses and thus pre-ECT benzodiazepines may have a deleterious effect on efficacy during a longer treatment course than the mean of 2.9 treatments per patient administered with benzodiazepines in this study (Sackeim et al., 1987). An additional concern is the potential accumulation of benzodiazepines as the elimination half-life of diazepam is 50–100 h (Labbate et al., 2009). Despite these concerns, this is a technique that warrants further study in patients who would otherwise receive completely unmodified treatment.

We evaluated another alternative to completely unmodified ECT namely the ECT psychiatrist pre-treating patients with a sedating, but not anesthetizing, dose of propofol. Propofol is widely used for ECT anesthesia in developed countries, however at low doses it is amnestic and sedating but not anesthetizing. The amnestic properties of propofol could reduce anxiety surrounding the treatment and the sedating properties could reduce fear immediately before the treatment (Andrade, 2003; Andrade et al., 2003; Gallegos et al., 2012; Gallinek, 1956; Tharyan, 2003). In addition, although it is short acting, it may also decrease post-ictal agitation whilst not leaving the patient sedated the rest of the day (Gallinek, 1956; Havens, 1958; Shukla, 1981). Also, because this drug is short-acting, blood levels would not gradually rise with repeated administration. Moreover, although propofol is not a muscle relaxant like benzodiazepines, we did not think this to be a particular disadvantage as fracture rates nowadays appear to be low with unmodified treatment due to physical restraints in place during the seizure. Accordingly, we hypothesized that psychiatrists could safely administer low dose propofol and that it would reduce anxiety-surrounding ECT without compromising efficacy (Havens, 1958; Kendell, 1981; Seager, 1959).

2. Materials and methods

2.1. Setting

This study was initiated by Dr. Reti, Director of the Brain Stimulation Program in the Department of Psychiatry at The Johns Hopkins University (JHU). Dr. Reti and colleagues from the Department of Psychiatry at JHU wrote the protocol with the assistance of Dr. Nguyen from The JHU Department of Anesthesiology and collaborated with Drs Tripathi and Trivedi in its implementation at the teaching hospital of the King George's Medical University (KGMU), in Lucknow, India, an industrial city in the northeast of the subcontinent. The language spoken is Hindi and study rating instruments were translated from English into Hindi.

For more detail about KGMU and its Department of Psychiatry, see Supplementary Material. The Department has a stand-alone ECT suite consisting of a waiting room cum registration room, a procedure room and a recovery room. It is located near the emergency department and cardiology ICU (5 min walk) where personnel specialized in resuscitation are available. Equipment located in the ECT suite includes a sphygmomanometer, pulse oximeter, stethoscope, EKG device, bag valve mask, oxygen tanks and oropharyngeal (Guedel) airways. The crash cart includes emergency medications such as atropine, norepinephrine, chlorpheniramine, hydrocortisone, dopamine and lorazepam.

2.2. ECT administration

Patients treated with unmodified ECT are brought to the waiting room with the assistance of ward staff and family. In the procedure room, the patient is held physically by 3–4 persons during ECT. Two ECT attendants (one ward orderly and one ECT technician), ward staff of the patient's respective ward, and a junior and senior psychiatry resident are present in the procedure room.

ECT is delivered using a brief pulse, constant current device, manufactured by Medicaid Systems (Model no. BPE 591, Chandigarh, India). Maximum charge that can be delivered by the machine is 848 millicoulombs (mC) which utilizes a stimulus duration of 5.9 s, pulsewidth of 1 ms, current of 800 mA and frequency of 90 Hz. Current and pulsewidth are set at 800 mA and 1 ms, respectively, for all treatments. All treatments are administered with bilateral electrode placement. Seizure length is determined by motor activity; EEG readout is not available. At the initial treatment, all patients receive the first stimulation at 57 mC (0.6 s/60 Hz), as prior experience at KGMU has shown that at a lower charge less than 30% of patients have an adequate seizure. Treatment at 57 mC is continued as long as the patient has a motor seizure of at least 15 s.