PATTERN OF COGNITIVE IMPAIRMENT AFTER GIVING TOTAL INTRAVENOUS ANAESTHESIA VS GENERAL ANAESTHESIA FOR ELECTROCONVULSIVE THERAPY IN PATIENTS WITH DEPRESSIVE EPISODE SEVERE

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ABSTRACT

Objective: To study the pattern of cognitive impairment after giving total intravenous anesthesia Vs general anesthesia for ECT for patients of Depressive Episode Severe.
Study Design: Randomized controlled trial.
Place and Duration of Study: Combined Military Hospital Skardu, from 15 Jul 2015 till 15 Jan 2016.
Material and Methods: Hundred patients fulfilling the inclusion criteria were included by consecutive sampling technique for this study and divided in to two groups of 50 each. Patients of group A were given TIVA (propofol + succinylcholine). Patients in group B received GA (propofol + succinylcholine + isoflurane). Cognitive functions of patient were assessed by psychiatrist via mini mental state examination (MMSE) test before ECT and two weeks after ECT respectively.
Results: Both the groups were assessed for cognitive impairment after TIVA Vs GA. In group A the MMSE showed less cognitive impairment as compared to group B ($p<0.05$).
Conclusion: Cognitive impairment is less in total intravenous anesthesia as compared to general anesthesia for ECT in patients of depressive episode severe.

Keywords: Anesthesia general, Anesthesia intravenous, Depressive disorder, Electroconvulsive therapy, Neuropsychological test.

INTRODUCTION

Depression is one of the most common mood disorder characterized by sadness and distrust. It may develop due to a deficiency of dopamine, norepinephrine and serotonin or altered receptor activity. Up to half of patients with severe depression, over secrete cortisol and have impaired circadian secretion[1]. Total intravenous anesthesia or general anesthesia required to ensure amnesia and neuromuscular blockade to prevent injuries has renewed interest in ECT and decreased mortality rate (1 death per 10,000 patients[2]).

Propofol as compared to methohexital has shown improved cognitive performance after anesthesia but statistical significance has been observed in only two cognitive trials. Therefore propofol is considered safe for ECT treatment[3].

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ECT is a well established treatment for severe depression. Intravenous anesthetic medications are used to minimize subjective unpleasantness and adverse side effects of induced tonic clonic seizure. Anesthetic agents should be chosen on the basis of adverse effect, emergence and affect on seizure duration[4]. ECT is seldom prescribed as an initial treatment for an episode of depression. There are a few circumstances, such as catatonia, severe suicide risk etc, where this option may be exercised.

Patient preference and prior excellent response to ECT may result in a patient receiving ECT as the initial treatment in an episode of major depression, but these are unusual circumstances. Indeed, medication failure in today's clinical environment is essentially a precondition for initiation of ECT[9].

ECT has been used for the treatment of severe depressive patients. Initially it was applied in patients only with sedatives without muscle

relaxants, but now we employ muscle relaxants to avoid convulsion and its complications. It is called modified ECT. General anesthesia using muscle relaxant for ECT is now increasingly employed in some country. Further more, there are some reports that ECT is effective not only in depressive patients but also in chronic pain patients[10].

ECT is an effective treatment for some types of depression and psychotic disorders. Although ECT is considered effective and reasonably safe, the treatment team must be familiar with how to deal with adverse effects. The American Psychiatric Association recognizes no absolute contraindication except brain tumor with increased intracranial pressure. However, patients who have other medical problems are at risk of complications. Optimizing the safety and efficacy of treatment is a goal when providing ECT. Muscle relaxants, barbiturate anesthesia, anticholinergic agents, and oxygenation are used to lessen the risk of complications. The use of ECT requires knowledge of the effect of anesthetic agents on seizure activity[13].

This study was designed to study pattern of cognitive impairment after TIVA and GA for ECT in patient with severe depressive episode. The purported significance of this study is that if it proves that administration of TIVA is better than GA for ECT, it will enable us to prevent significant impairment and prolonged hospital stays as well as avoid unnecessary economic burden to patient.

PATIENTS AND METHODS

This randomized controlled trial study was carried out at Anesthesia department of Combined Military Hospital (CMH) Skardu, from 15 Jul 2015 till 15 Jan 2016, after seeking permission from Hospital Ethical Committee. CMH skardu is a secondary care hospital. Inclusion criteria included patient's age between 25–35 years and patients having severe depression diagnosed using Hamilton depression rating scale and refractory to 6 weeks of antidepressant medications. Exclusion criteria included patient's who were unwilling for the study, patient with cardiovascular, pulmonary, renal or liver disease, cerebro vascular accident and patient having history of drug allergy (relative contraindications of GA and ECT). Hundred patients fulfilling the inclusion criteria were included in this study and they were divided into two groups of 50 each. The purpose and procedure of the study and risk benefit ratio of giving total intravenous anesthesia as well as that of general anesthesia were explained to the patient and informed consent was obtained.

Those who were willing and were eligible for the study were divided into two groups (A and B) by consecutive sampling technique. Patients assigned to group A received total intravenous anesthesia (Propofol + succinylcholine). Cognitive test of patient was assessed by psychiatrist via MMSE before ECT and after 2 weeks of ECT. Patients in group B received general anaesthesia (Propofol + succinylcholine + isoflurane) and cognitive impairement of patient was assessed by Psychiatrist via MMSE before ECT and after 2 weeks of ECT.

All the data collected through proforma were entered in the Statistical Package for Social Sciences (SPSS) Version 13.0. Descriptive statistics were calculated. Mean and standard deviation were calculated for quantitative variables. Frequencies and percentages were calculated for qualitative variables. Chi Square test was applied to determine the significance of the difference in cognitive impairment between the two groups. A *p*-value <0.05 was considered as statistically significant.

RESULTS

Out of 100 patients 36 (36%) were female patients and 64 (64%) were male patients. In group A there were 17 (34%) female patients and 33 (66%) male patients while in group B, 19 (38%) female patients and 31 (62%) male patients. The mean age of patient in group A was 29.96 ± 2.28 years while the mean age in group B 29.68 ± 2.79 years. Before total intravenous anesthesia,

cognitive score in group A was 30 on MMSE while in group B it was also 30. The MMSE score of group A after 2 weeks of ECT was reduced to 20-25 and mean score is 24.52 ± 2.01, showing that this group developed mild cognitive deficits while the MMSE score of group B after 2 weeks of ECT was reduced to 10-20 and mean score is 10.48 ± 1.52, showing that this group developed moderate cognitive deficits. A *p*-value of 0.041 is calculated which remained less than 0.05. This clearly indicates that patients receiving total intravenous anesthesia (Propofol + succinylcholine) had mild cognitive deficits and patients in group B receiving general anaesthesia (Propofol + succinylcholine + isoflurane) showed moderate cognitive deficits.

DISCUSSION

ECT is an effective, evidence-based treatment for severe depression. The literature on the efficacy of ECT for treatment of depression is as extensive as for almost any medical treatment. Furthermore, ECT is a rapidly acting treatment. In review of different studies, multiple trials of adequately administered ECT have demonstrated the speed of antidepressant response for patients experiencing severe major depressive episodes. For patients who urgently need relief of depressive symptoms (i.e., those who pose a danger to self or to others), ECT can be the treatment of choice. For patients who have not responded to or can not tolerate medications because of pregnancy, advanced age, multiple co-morbid health conditions or frailty, ECT may be the safest alternative. Modern techniques and brief pulse devices have increased the safety of ECT. Morbidity and mortality are less than that of childbirth. Advancements in anesthetic and ECT administration techniques have greatly mitigated side effects. The most significant concern about ECT is treatment-related cognitive impairment, but even this symptom has been markedly reduced with advances in ECT administration. ECT remains the treatment of choice for severely depressed patients with other concurrent health risks.

ECT has been demonstrated to be an effective and safe procedure for many psychiatric disorders and it is treatment of choice in severe depressive episode (F-32.1) not responding to a trail of antidepressant therapy for 6 weeks[5]. However, critics contend that ECT invariably results in substantial and permanent memory loss[6], With some patients experiencing a dense retrograde amnesia extending back several years[8].

In contrast, some authorities have argued that, with the introduction of general anesthesia and more efficient electrical waveforms, ECT's adverse cognitive effects are short-lived, with no persistent effects on memory[7].

Electrically induced seizures have been used commonly to treat psychiatric disease since their beginning in 1938. Seizure activity is the therapeutic feature of this type of treatment, but it is accompanied by inconvenient physiologic consequences. Cardiovascular responses consist of generalized autonomic nervous system stimulation with initial parasympathetic outflow, followed instantly by a sympathetic response. In certain patients the sequence described may result in an initial bradycardia or even asystole, followed by tachycardia, dysrhythmia, and hypertension. General anesthesia for ECT must be administered only in locations equipped for support of the unconscious patient and treatment of complications. The efficacy of ECT requires knowledge of anesthetic guideline, an understanding of the interaction between anesthetic drugs and seizure activity, and an awareness of the physiologic effects of ECT as well as the treatment of those effects[14].

Propofol, as compared with methohexital, results in a more moderate increase in blood pressure and shorter seizure duration. The seizure quality did not differ significantly between the 2 groups. We detected a tendency toward improved cognitive performance after anesthesia with propofol as compared with methohexital, but with statistical significance in only 2 cognition trials. Therefore, propofol is

a safe and efficacious anesthetic for ECT treatment[3].

In a study conducted by Martin et al[11], propofol is a nonbarbiturate anesthetic induction agent known to have anti-convulsant properties. When used as an anesthetic for ECT, it may reduce seizure duration to a significant degree, which may not be fully appreciated. A case is presented in which propofol caused a 63.1% reduction in mean seizure duration compared with preceding and subsequent treatments with thiopental anesthesia. The literature on the use of propofol for ECT was reviewed with specific reference to its effect on seizure duration and any evidence of superiority to the barbiturate induction agents. It is concluded that propofol may have only very circumscribed indications as an anesthetic for ECT. If used, psychiatrists and anesthetists must be aware of its potency as an anticonvulsant[11]. Another study conducted by Bauer et al[12], propofol significantly decreases seizure duration without significant difference in the clinical outcome. Using the employed treatment algorithm, patients anesthetised with propofol received higher electrical charge. MMSE scores suggest that this results in more severe cognitive side effects. Results, however, might be confounded by the differences in age distribution in the groups[12]. All these studies consider total intravenous anesthesia superior to general Anesthesia in causing less cognitive deficits. No local study is carried out in Pakistan to study the pattern of cognitive defects after ECT using these anesthetic techniques. Our study shows consistent results with studies at reference[6-8]. The results, prior to total intravenous anaesthesia, of cognitive score in group A were 30 on MMSE while in group B it was 30. The MMSE score of group A after 2 weeks of ECT was reduced to 20-25 and mean score is 24.52 ± 2.01, showing that this group developed mild cognitive deficits while the mean score MMSE score of Group B after 2 weeks of ECT was reduced to 10-20 and mean score is 10.48 ± 1.52, showing that this group developed moderate cognitive deficits. A *p*-value remained less than 0.05. A study with a large sample sizes and randomized controlled trial, with double blind method using quantitative analysis are warranted to validate the results of this study.

CONCLUSIONS

It is concluded from our study that total intravenous anesthesia is beneficial than general anesthesia for ECT in patients with depressive episode severe (F-32.1) in terms of less cognitive deficits in total intravenous anesthesia than general anesthesia leading to better outcome of depressive symptoms.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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