Comparison of Thiopentone Sodium and Propofol for Electro Convulsive Therapy (ECT)

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Abstract

Objective: For safe conduct of electro convulsive therapy (ECT), general anaesthesia is administered to the patients. In this study we compared thiopentone sodium and propofol as induction agents for ECT.
Patients and Methods: Twenty five patients each undergoing at least 2 sessions of ECT at the psychiatry department were included in the study. Each patient either received thiopentone or propolol for induction of sleep in a randomized manner. Drugs were evaluated regarding their effects on ECT induced haemodynamic changes (Blood pressure, Heart rate), seizure duration related to the procedure and recovery from sleep. Any side effects during the procedure and recovery were also noted.
Results: Propofol offered a superior haernodynarnic stability during the procedure and a quick recovery from sleep.
Conclusion: Propofol was found to be a better induction agent for ECT compared to thiopen tone sodium. JPMA 50:60, 2000).

Introduction

The role of Electro Convulsive Therapy (ECT) is now well established for the treatment of major affective disorders. lt is commonly used for the treatment of depressive illness in patients who have failed a trial of anti-depressant medications. In most centers, anaesthetists an part of a team providing ECT in order to improve the safety of the procedure. Use of an intravenous induction agent and a short acting muscle relaxant plus general care of the patient are the hall nmrk of standard anaesthetic practice. Anaesthetic agents used for ECT should provide a rapid smooth induction, quick recovery and attenuation of various physiological changes. These agents should also have a minimum antagonistic effect on ECT induced seizure activity.
In Pakistan thiopentone sodium and diazepam are commonly used as induction agents for ECT. Propofol is a new hypnotic agent which has been recently introduced in anaesthetic practice in Pakistan and has already gained a place in day case surgery. The aim of this study was to compare and evaluate the two intravenous induction agents, propofol and thiopentone sodium in patients undergoing ECT regarding their effect on ECT induced haemodynamic changes, seizure duration and recovery features.

Patients and Methods

The study was approved by the ethical committee of the hospital and written informed consent was obtained from all patients. Patients planned for ECT at Aga Khan University Hospital's Psychiatry department, usually receive 3-5 therapies on alternate days depending upon the clinical response of the patient. Two sessions of ECT per patient were included in our study. Each patient received either thiopentone or propofol for induction of sleep in a randomized manner. Patients with diabetes rnellitus, ischemic heart disease, hypertension, history of myocardial infarction in the last six months or patients on drugs which altered the haemodynamic parameters were excluded from the study.
All patients were pre-oxygenated with 100% oxygen using Magill's circuit for 3 minutes. Intravenous induction agent were used in the following doses: Thiopentone sodium (2.5 mg/kg) and Propofol (1.5

mg/kg). Suxamethonium was given as muscle relaxant in a dose of 0.5 mg/kg body weight after the onset of sleep. When adequate relaxation was ensured a mouth prop was inserted and bitemporal ECT was performed. Patients were ventilated manually with 100% oxygen at a rate of 10-14 breaths/minute until spontaneous breathing returned satisfactorily.

During the procedure ECO (lead II) and oxygen saturation with pulse oximeter were monitored continuously. Non-invasive blood pressure readings were taken before induction of anaesthesia, after giving the dose of intra-venous induction agent, after suxamethonium and from the start of application of electrical current to the end of seizure activity at 1 minute interval.

One of the upper limb was isolated with sphygmomanometer cuff inflated to 100 mm Hg^5 above the systolic blood pressure to see the duration of seizure activity. This isolation was done before the administration of muscle relaxant.

Parameters noted during the procedure to monitor quality of anaesthesia were discomfort or pain after injection of intravenous induction agent. any movements during the procedure due to light anaesthesia, hiccoughs, laryngo-bronchospasm, cough and any other associated finding.

Patients were observed in the recovery room for 30 minutes and following were noted: Any complaint of headache, nausea and vomiting, evidence of laryngospasm, restlessness, ability to obey vocal commands and ability to sit up unaided. Blood pressure and heart rate were monitored at 5 minute interval for I 5 minutes. Time at which patient was discharged from the recovery room was also noted.

Epi-info-6 was used for statistical analysis. The mean change in systolic, diastolic blood pressure, heart rate, seizure duration and recovery time with both agents were compared using student's unpaired Ttest. Nominal variables were analyzed using the Chi-square test. Results are expressed as mean ±. standard deviation (SD). p value of less than 0.05 was considered significant.

Results

Age, sex, weight of the patients and current drug therapy are shown in Table.

Table. Patient characteristics mean ± SD (n=25).

Age (Years)		37.12 ± 14.88
Weight (Kg)		57 ± 10
Sex (M:F)		17:8
Current drug therapy	Benzodiazepines	n=15
	Butyrophenones	n=2
	Phenothiazines	n=9
	Tricyclic antidepressants	n=20
	Lithium	n=0
	Others	n=3

Haemodynamie Changes

Changes in systolic blood pressure (Figure 1),

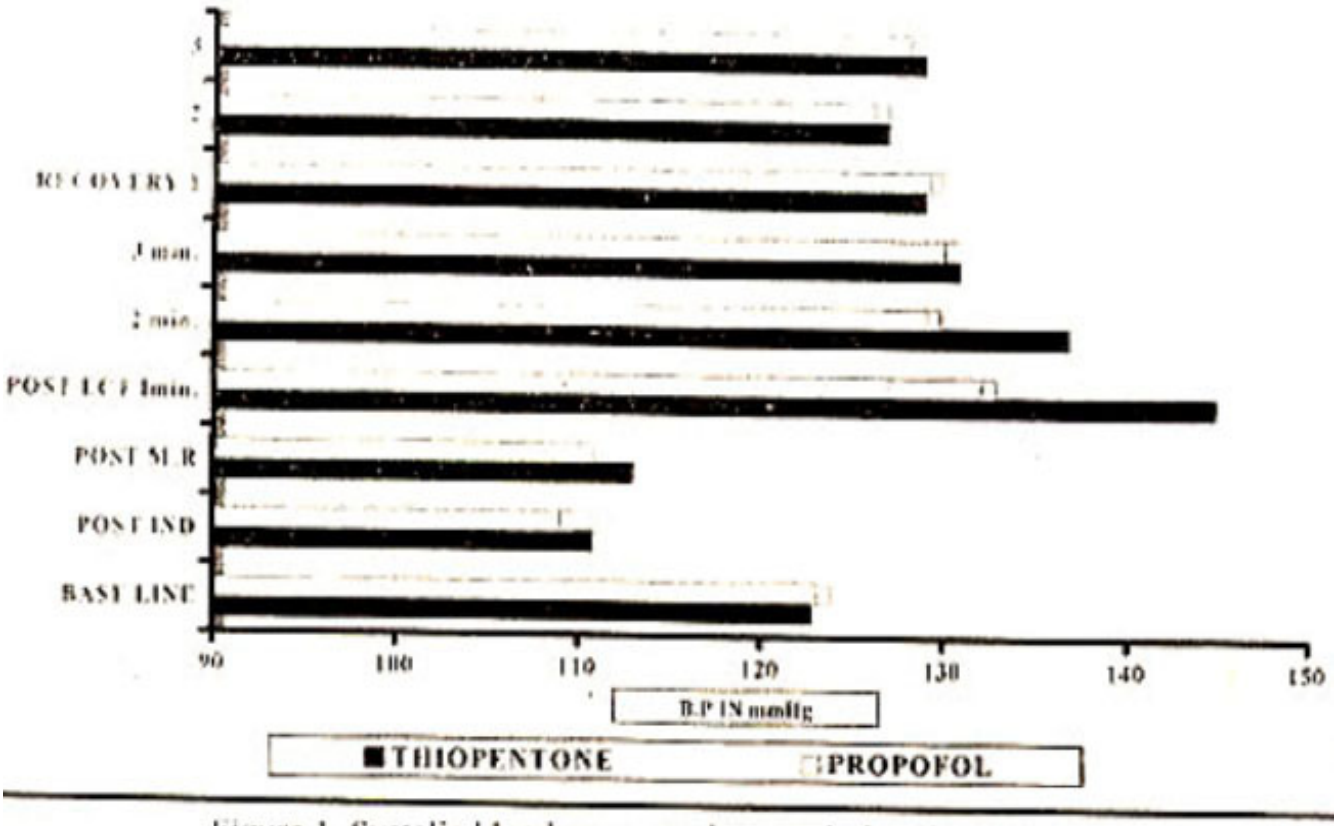

Figure 1. Systolic blood pressure changes during the procedure.

diastolic blood pressure (Figure 2)

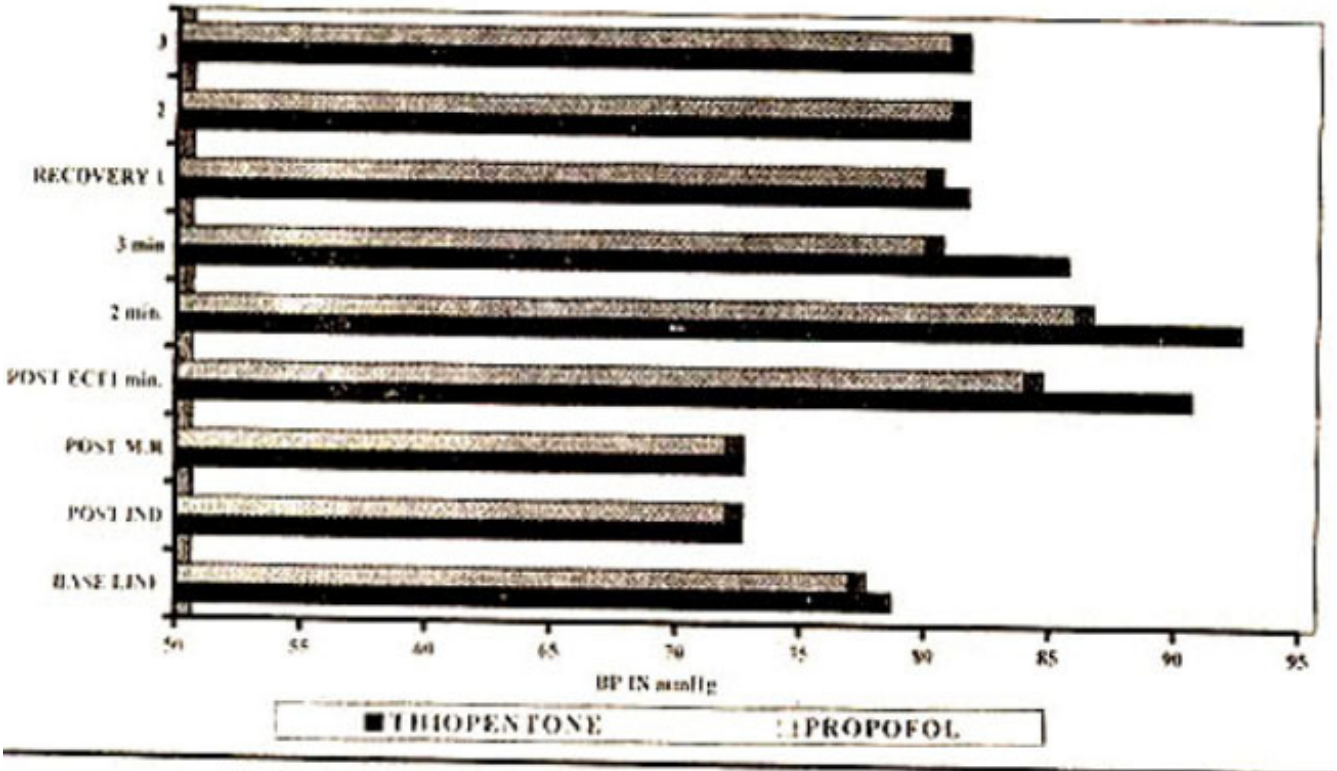

Figure 2. Diastolic blood pressure changes during the procedure.

and heart rate were more pronounced with thiopentone compared to propofol at one minute ($p<0.001$)

after ECT. Diastolic blood pressure changes were also significant at two minutes ($p<0.001$) and three minutes ($p<0.001$) interval after ECT. Similarly heart rate changes were most pronounced at two ($p<0.005$) and 3 minutCs ($p=0.001$) interval following ECT.

Seizure Duration

The mean duration of seizure was 3 1 .08 seconds ± 4.13 with thiopentone and 23.76 ± 3.38 seconds with propofol ($p<0.001$).

Quality of Anesthesia during Procedure

Discomfort upon intravenous administration of drug occurred in twenty patients with propofol and none with thiopentone. Twelve patients had laryngobronchospasm while 14 had hiccoughs with thiopentone while none with propofol had this problem.

Recovery Features

Recovery features showed that the ability to obey vocal commands like opening of eyes took a mean of 5.04 ± 1.36 minutes with thiopentone and 3.28 ± 0.89 minutes with propofol ($p<0.001$). Patients who were treated with thiopentone were able to sit up unaided after mean period of 8.84 ± 1.51 minutes while with propofol patients took 6.68 ± 1.06 minutes ($p<0.001$). Patients given thiopentone took 13.68 j 1.72 minutes compared to those in the propofol group who took 10.28 ± 1.02 minutes (p

Discussion

ECT induced cardiovascular changes with a parasympathetic sympathetic sequence may be hazardous in patients with severe cardiovascular disease. The commonest causes of mortality associated with ECT are the acute changes in heart rate and blood pressure that follow ECT. In clinical practice many different strategies have been advocated for modification of cardiovascular response to ECT like use of beta blockers[4,5], calcium channel blockers[6], fentany1 and lignocaine[7]. Use of different induction agents is one such strategy employed to obtund the cardiovascular response related to ECT. Propofol is relatively a new hypnotic agent in our country and there was a need of its comparison with the established ones, in our local population, to facilitate the safe conduct of procedure.

Following ECT, changes iii systolic, diastolic blood pressure and heart rate were significantly more pronounced with thiopentone as compared to propofol (Figures 1, 2). This confirms the findings of various other studies comparing the two drugs. These authors have also shown the ability of propofol in obtunding the ECT induced haemodynamic changes with it was compared with other agents[8-10]. Post ECT less obtundation of haemodynamic changes at one minute compared to base line were seen in our propofol group compared to those done by Rampton[9] and Boey[10]. The reason for this may be due to the lower dose of propofol used by us. We used a dose of 1 .5 mg/kg/body weight whereas dosage range in the studies mentioned above was I .6-2 mg/kg/body weight.

Propofol use was associated with a 25% reduction in seizure duration as compared to thiopentone in our study. Mean duration of seizure with propofol was of 23.7 + 3.38 seconds and with thiopentone it was of 31.08 + 4.13 seconds. Relationship between the therapeutic efficacy of ECT and cerebal seizure activity is controversial. Historically gole of ECT was to induce a generalized tonic clonic seizure of at least 20-30 seconds duration. Others thought that cumulative seizure time was more important. This relationship though has been recently questioned[11]. Propofol effect on ECT induced seizure activity is well established[9,12,13]. Outcome studies done with propofol in comparison with other induction agents have observed no difference in outcome[14,15].

Due to short duration of the procedure itself and poor recovery room facilities in ECT areas, anaesthetist wants a quick and rapid recovery after the procedure. Early and quick recovery associated with propofol use is now well established[16,17]. When thiopentone and propofol were compared for ECT, the ability of patients to walk 20 minutes after the procedure was significantly belier after

propofol[18]. Early return of cognitive functions was a feature with propofol when it was compared with methohexitone for ECT as well[18]. On the other hand Matters[19] found no significant difference in psychometric recovery when propofol and methohexitone were compared for ECT, possibly due to a prolonged post ictal effect of ECT. Recovery was assessed by finger tapping and digital symbol substitution tests.

Although we did not use complex psychometric tests for recovery from anaesthesia, simpler tests like ability of patients response to commands and sitting unaided did show a marked superiority with propofol. This is of special importance in Pakistan where recovery facilities are severely lacking in a number of hospitals. Porpofol is more expensive than thiopentone which is also of relevance in developing countries, hut this disadvantage is offset by the shorter time required and early home readiness in addition to safety offered in early recovery.

In conclusion propofol used in a dose of 1.5 mg/kg compared to thiopentone 2.5 mg/kg proved to be a superior agent as far as haemodynamic stability and recovery characteristics were concerned. Although it caused a 25% reduction in seizure duration compared with thiopentone, the current opinion is in favour that this has no bearing on the therapeutic efficacy of ECT. We therefore recommend propofol as a more suitable agent for ECT compared to thiopentone.

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