

## Comparison of recovery time of propofol, etomidate and thiopental for electroconvulsive therapy

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### Abstract:

**Background:** Propofol, Etomidate and Thiopental are often used as an anesthetic agent for electroconvulsive therapy (ECT). ECT involves application of electric stimulus for a brief time in psychiatric patients to induce generalized seizure. The purpose of our study was to compare recovery time from anesthesia.

**Aims & Objectives:** To compare recovery time of patient after ECT with propofol, etomidate & thiopental as measured by the post anesthetic Recovery Score of Aldrete and Kroulik [1], using three different types aforementioned anesthetic/ hypnotic drugs.

**Materials and Methods:** A total of 90 patients in the age group of 18-60 years of either sex, who had to undergo ECT therapy were divided randomly into three equal groups. Group A received propofol 1.0 - 1.5 mg/Kg intravenous (IV), Group B received etomidate 0.2 mg/Kg IV, and Group C received thiopentone 2.0 -3.0 mg/ Kg IV.

**Results:** The recovery of cognition, orientation, and neuromuscular coordination was significantly fast in propofol group in comparison to other two groups.

**Conclusions:** These findings suggest that, although there seems to be no difference in the clinical outcome across these three drugs, propofol offers the best recovery profile.

**Keywords:** Anesthesia, electro-convulsive therapy, etomidate, propofol, sodium-thiopentone

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### I. Introduction:

Electroconvulsive therapy (ECT) is a well-established psychiatric treatment in which seizures are electrically induced in patients for therapeutic effects. ECT can produce severe disturbances in the cardiovascular system and a marked increase in cerebral blood flow and intracranial pressure. These cardiovascular changes may be altered using various anesthetic drug.

Ever since its discovery, electroconvulsive therapy has continued to occupy a central place in the armamentarium of psychiatrist's inspite of advances in the psycho-pharmacotherapy. Despite both medical and legal-opposition it is still widely practised as one of the cheapest, safest and yet one of the most effective therapeutic- technique in the whole of medical sciences. ECT is most often used as a treatment for severe major depressive disorders with suicidal tendency, not responding to treatment [2] and is also used in the treatment of mania, catatonia and schizophrenia. It was first introduced in 1930's and gained widespread use as a form of treatment in the 1940's [3] and 1950's. This technique has proved to be simple and replaced pharmacologically produced seizure therapy. Initially lack of adequate anesthesia or muscle relaxation during ECT lead to bone fractures, dislocation of joints, biting of tongue and tearing of muscle fibres. In, addition lack of knowledge about the dose parameters of electric stimulation lead to more adverse cognitive effects. Due to trauma caused to the patient physically and psychologically with unmodified direct ECT in the past it has now been modified with [4,5] anaesthesia. This study was undertaken to compare the effects of intravenous (IV) sodium thiopentone, propofol, and etomidate used as IV anesthetic agents in modified ECT as regards, to recovery time. The aim of this study was to compare post anesthetic recovery between three drugs used in ECT thiopental, propofol and etomidate.

## II. Materials and Methods:

After approval from the Institutional ethical committee and written consent from the patients and relatives, the study was conducted in the department of anesthesiology with collaboration of psychiatric department in our Institute. A total of 90 patients in the age group of 18–60 years of either sex, who had to undergo ECT therapy were enrolled in the study. Patients with full stomach, neuromuscular disorders, hypertension and other cardiovascular disorders, epilepsy, hypopituitarism, drug allergy and major illnesses like bronchial asthma and tuberculosis, were excluded from the study. Patients were divided randomly into three equal groups, consisting of thirty patients each, Group A, Group B and Group C. Group A received propofol 1.0 mg - 1.5mg/Kg, Group B received etomidate - 0.2mg/Kg and Group C received thiopentone 2.0 mg – 3.0 mg/Kg. All the patients were kept fasting for 6 h and continued antipsychotic treatment until the day of the procedure. After entering the procedure room, patients were attached to the multiparameter monitor for continuous monitoring of HR, electrocardiogram, noninvasive blood pressure and oxygen saturation (Spo<sub>2</sub>). An IV line was established, and all the patients were premedicated with IV glycopyrrolate 0.2mg. Patients were preoxygenated with 100% oxygen for 3 min. General anesthesia was induced with IV anesthetic agent as per the group allocated, till loss of eyelid reflexes. IV succinylcholine 0.5 mg/kg was administered to all patients for neuromuscular relaxation. When fasciculations subsided and adequate neuromuscular relaxation was obtained, an adequate sized bite block was -inserted to prevent tongue bite. A brief pulse stimulus for about 1 -3 s, frequency 60- 90 Hz and pulse width of 1 was given to produce seizures. Duration of recovery was recorded from injection of anesthetic agent to time taken to obey vocal commands such as opening of eyes, time for ability to sit unaided and time taken to meet discharge criteria. The collected data were analyzed statistically using one-way ANOVA test. The value of  $P < 0.05$  was considered statistically significant.

## III. Results:

A total of ninety patients were selected for the study and were randomly divided into three groups of thirty patients each. All the groups were comparable with respect to age, weight, and sex. Of the thirty cases in Group A, 17 were males and 13 were females. In Group B, 14 were males and 16 were females, whereas in Group C, 16 were males and 14 were females. No statistical difference ( $P > 0.05$ ) existed between the three groups as regards to sex distribution. The mean age of patients was 36 years in Group A, 33.8 years in Group B, and 36.2 years in Group C, respectively. Comparison between the three groups with respect to age distribution was statistically insignificant ( $P > 0.05$ ). Mean weight of patients was 61.9 Kg in Group A, 52.13 Kg in Group B and 62.43 Kg in Group C, respectively. The difference was again statistically insignificant ( $P > 0.05$ ) [table1]. The, recovery of cognition, orientation, and neuromuscular coordination was significantly fast in propofol group ( $P < 0.001$ ) followed by etomidate group and thiopentone group [Table2] and [Figure 1].

**Table 1:** Age and weight distribution in three groups.

Group	Number of cases, (n)	Age (in years)				Weight (in kg)			
		Range	Mean±SD	P	Remarks	Range	Mean±SD	P	Remarks
A	30	20-58	36±10.4	0.570	Not significant	48-76	61.9±6.5	0.94	Not significant
B	30	21-58	33.8±9.5			51-78	62.13±6.7		
C	30	21-56	36.2±9.06			50-76	62.43±5.8		

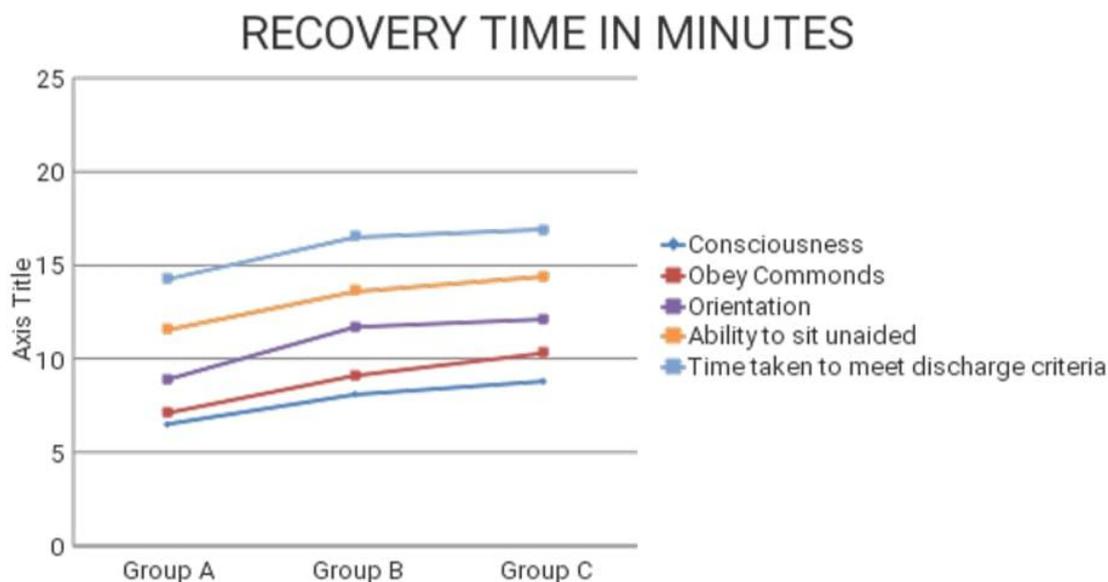
Group A: Propofol; Group B: Etomidate; Group C: Thiopentone; SD: Standard deviation

**Table 2:** Comparison between the recovery times in the three groups.

	Group	Time range (in min)	Mean±SD	P
Consciousness	A	5.5-9	6.5 ± 0.28	Group A versus B <0.001
	B	7-10.5	7.5 ± 0.32	
	C	7.2-10.9	8.2 ± 0.70	
Obey command	A	6-9.5	7.1 ± 0.32	Group A versus C <0.001
	B	7.5-10.4	9.1 ± 0.37	
	C	8.2-11	10.3 ± 0.52	
Orientation	A	7.8-9.8	8.9 ± 0.26	Group B versus C >0.05
	B	9-13.4	11.7 ± 0.39	
	C	10-13.8	12.12 ± 0.53	
Ability to sit unaided	A	10-14.5	11.56 ± 0.40	
	B	10.4-16.8	13.6 ± 0.20	
	C	12-18.4	14.4 ± 0.66	
Time taken to meet discharge criteria	A	12.5-18.7	14.25 ± 0.56	
	B	13.6-19.6	16.5 ± 0.70	
	C	14-21.4	16.9 ± 0.76	

Group A: Propofol; Group B: Etomidate; Group C: Thiopentone; SD: Standard deviation

**Figure 1:** Duration of recovery indicative of cognitive, orientation & neuromuscular coordination (minutes).



#### IV. Discussion:

ECT is a unique therapy that initially provokes seizure by applying electrical current to the human central nervous system. ECT has a well-established role in the management of patients who have not responded to psychopharmacological treatment. Many studies documenting the efficacy of ECT for depressive illness have been published. Electroconvulsive therapy, performed in geographically dispersed locations outside the operating rooms, requires scheduling and staffing for anaesthetics which are quite [6] different from those in the operating rooms. Historically, because of its short duration of action and minimal effect on seizure threshold, methohexitone was considered the IV [7] anesthetic of choice for ECT. Psychomotor functions recover more quickly after [8] administration of methohexitone compared with thiopentone and etomidate. Post anesthetic recovery in ECT is a very important issue with practical implications for psychiatrists who work directly with ECT and for practitioners who prescribe it. The more comfortable the treatment, the better will be the patients' compliance and satisfaction. Although all the three drugs used in this study showed a very short time for recovery difference of 2 minutes, the best one was propofol ( $p < 0.001$ ). This, correlates [9] well with the study conducted by Rosa MA et al. Clinical superiority for practical purposes could not be proved, as time differences detected were around only about 2 minutes between drug groups. An important point is that higher charges given are commonly associated with more frequent post ictal confusion. The significantly higher mean charge used with propofol (that could possibly make post ECT recovery worse) did not prevent it to show the best post anesthetic recovery profile. The recovery time was [10] slightly longer than the study conducted by Shah PJ et al.

#### V. Conclusions:

We found that propofol has the advantage of rapid recovery as compared to etomidate and thiopentone. Clinical improvement or memory side effects were not compared in the current study and no conclusion can be drawn about the superiority of any of these drugs in clinical practice.

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