

Comparison of Propofol and Etomidate in Patients under General Anaesthesia

Yogesh Kumar¹

ABSTRACT

Introduction: Induction agents are used to induce anesthesia prior to other drugs being given to maintain anesthesia. Etomidate and propofol are 2 ultra short-acting sedative agents thought to provide these characteristics. The present study was conducted to evaluate the effects of propofol and etomidate.

Material and methods: 60 patients belonging to ASA grade I and II were enrolled in the study. All the patients underwent surgical procedure with endotracheal intubation under general anaesthesia.

Results: Out of 60 patients, 30 were in group I and 30 in group II. Patients in group I showed little change in heart rate (HR) and Mean arterial pressure (MAP) compared to group II. Pain during injection was more profound in propofol group but the myoclonus activity was greater in etomidate group.

Conclusion: Author concluded that etomidate is a better agent for induction than propofol in view of hemodynamic stability and less pain on injection.

Keywords: Induction agents, Etomidate, mean arterial pressure, propofol

INTRODUCTION

The intravenous drugs when given in appropriate dosage cause rapid loss of consciousness are called inducing agents. These are the drugs which are given before the drugs which are used for maintenance of anaesthesia or as a single drug for procedures of shorter duration or as an agent to provide conscious sedation during the procedures which are to be undertaken under local anaesthesia.¹

Etomidate and propofol are 2 ultra short-acting sedative agents thought to provide these characteristics. In spite of their frequent use in routine surgical procedures, their safety has not yet been compared in a randomized controlled fashion.²

Propofol, 2,6-diisopropylphenol is most popular induction agent and provides rapid and smooth anaesthesia with quick recovery. The incidence of vomiting is also less.³ The onset of action is around 45 seconds with the redistribution process beginning within 3-5 minutes into fat and muscles. It also aids in providing reliable amnesia. The side effects of propofol include decrease in blood pressure, depression of ventilation in a dose dependent manner and pain on injection.⁴

Etomidate is a carboxylated imidazole that is characterized by its hemodynamic stability. It has the ability to cause minimal respiratory depression with cerebral protective effects. It is the inducing agent of choice in cardiac patients as it does not exert any effect on sympathetic nervous system and increases coronary perfusion. The onset of action is approximately 1 minute with 5 to 15 minutes of total duration of action. It is the drug which is considered to have the least hemodynamic effect compared to of any other inducing agent. Many studies have considered etomidate as an effective and reliable sedation option with minimal side effects.⁵

Some of the undesirable side effects include pain on injection, thrombophlebitis and myoclonus.

The present study was conducted with the aim to evaluate the effects of propofol and etomidate.

MATERIAL AND METHODS

60 patients belonging to ASA grade I and II were enrolled in the study. All the patients underwent surgical procedure with endotracheal intubation under general anaesthesia.

The following inclusion and exclusion criteria were used.

Inclusion: Patients ranged from 18-60 years of age.

Exclusion:

1. Patients allergic to propofol or etomidate.
2. History of seizure disorder.
3. Hypotensive patients.
4. Patients presenting with any primary or secondary steroid deficiency or receiving any steroid medication.

The patients were divided into 2 groups of 30 patients each. Group I: It consisted of 30 patients who received Inj. Propofol 1% (2 mg/kg of bodyweight). Group II: It consisted of 30 patients who received Inj. Etomidate (0.3 mg/kg of body weight).

All patients were pre medicated with 0.25 mg alprazolam tablets and 150 mg ranitidine tablets and were instructed not to eat anything 8 hours before the surgery. On reaching the operation theater electrocardiogram, non-invasive blood pressure, oxygen saturation and baseline vital parameters were recorded. 10 ml/kg/hr of ringer's lactate was started after securing a 18 G intravenous cannula. Glycopyrrolate 0.2 mg, midazolam 0.02 mg/kg and fentanyl 3 mg/kg I.V. were injected followed by an induction dose of either propofol or etomidate. Patient's myoclonic activity and pain during injection were recorded at the time of induction. Appropriate sized endotracheal tube was used to intubate trachea approximately 3 minutes after 0.1 mg/kg intravenous dose of vecuronium was given. The position of endotracheal tube was confirmed and positive pressure ventilation was initiated. Anaesthesia was maintained with 70:30 ratio of oxygen and nitrous oxide in isoflurane and intermittent doses of vecuronium was given throughout the surgery as required. The reversal of the residual neuromuscular block was done by 0.05 mg/kg neostigmine and 0.01 mg/kg glycopyrrolate intravenously and the patient was extubated after adequate respiration and patient was able to follow verbal

¹Associate Professor, Department of Anaesthesiology, MIMS Barabanki, Lucknow, India

Corresponding author: Yogesh Kumar, Associate Professor, Department of Anaesthesiology, MIMS Barabanki, Lucknow, India

How to cite this article: Yogesh Kumar. Comparison of propofol and etomidate in patients under general anaesthesia. International Journal of Contemporary Medical Research 2016;3(12):3488-3490.

commands.

The systolic blood pressure, diastolic blood pressure, mean arterial pressure, heart rate were monitored throughout the surgery and at 1,3,5 and 10 minutes after intubation. Pain on injection site was measured on a grade scale of 4: 0- no pain, 1- verbal complaint of pain, 2- withdrawal of arm, 3- both verbal complaint and withdrawal of arm. The incidence and degree of myoclonic movements also recorded as follows: Grade 0 = no myoclonic movements, 1 = minor myoclonic movements, 2 = moderate myoclonic movements, 3 = major myoclonic movements. Apnea episode was also noted.

The obtained results were sent for statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table 1 shows that out of 60 patients, 30 were in group I and 30 in group II. Both groups contained equal numbers of males and females. Mean age was 28±12.08 in group I and 27±13.12 in group II. Mean weight was 58±10.02 in group I and 57±11.14 in group II. Number of patients with ASA grade I was 14 in group I and 17 in group II while grade II was 16 and 13 in group I and group II respectively. The difference was statistical non significant.

Table 2 Shows MAP at different time intervals in both groups. In group I, a significant decrease in MAP from baseline at induction with propofol compared to etomidate. The mean arterial pressure of both the groups was comparable (p> 0.05)

Table 3 shows heart rate in both groups. In group I, there was significant increase in heart rate from baseline to induction as compared to group II (p- 0.01).

Figure 1 shows that in group I, number of patients with grade I, grade II and grade III pain was 15 (50%), 9 (30%) and 6 (20%) respectively. In group II, number of patients with grade I, grade II and grade III pain was 27 (90%), 3 (10%) and 0 respectively. The chi square test was applied which showed highly significant value of 0.001.

Figure 1 shows the number of patients with apnea in both the groups. The number of patients with apnea was 21 in group I and 9 in group II while with no apnea, 18 in group I and 12 in group II. The difference was non significant (p- 0.1).

Total- 60			
	Group I	Group II	P value
Sex (F:M)	15:15	15:15	1
Age (yrs) mean±S.D	28±12.08	27±13.12	0.3
Weight (kg) mean±S.D	58±10.02	57±11.14	0.1
Asa grade I/II	14/16	17/13	0.2

Table-1: Demographic data of patients

	Baseline (mm)	At induction	At laryngoscopy	1 Min	3 Min	5 Min	10 Min
Group I	88	78	100	98	92	90	92
Group II	90	88	110	100	96	94	94

Table-2: Mean arterial pressure (map) in both groups

	Baseline (Beats/min)	At induction	At laryngoscopy	1 Min	3 Min	5 Min	10 Min
Group I	82	98	100	88	86	84	82
Group II	80	82	98	84	84	82	80

Table-3: Heart rate in both groups

Figure 3 shows that all patients (30) showed grade 0 myoclonic movements in group I while 18 patients showed grade 0, 6 patients showed grade 1, 4 patients showed grade 2 and 2 patients showed grade 3 movements in group II. The difference

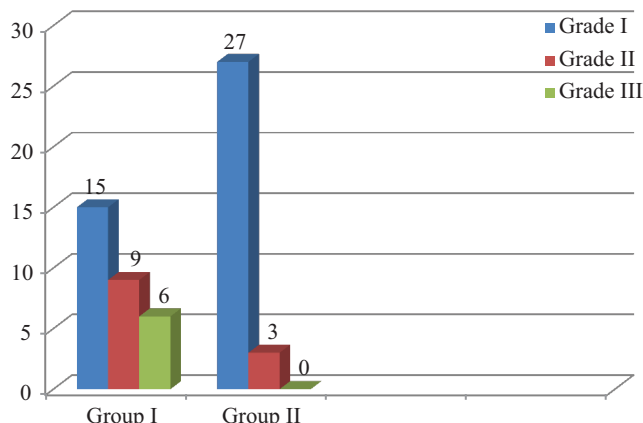


Figure-1: Incidence of pain in both groups

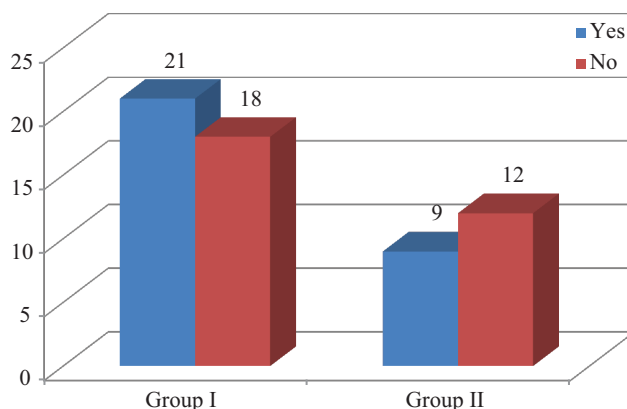


Figure-2: Incidence of apnea in both groups

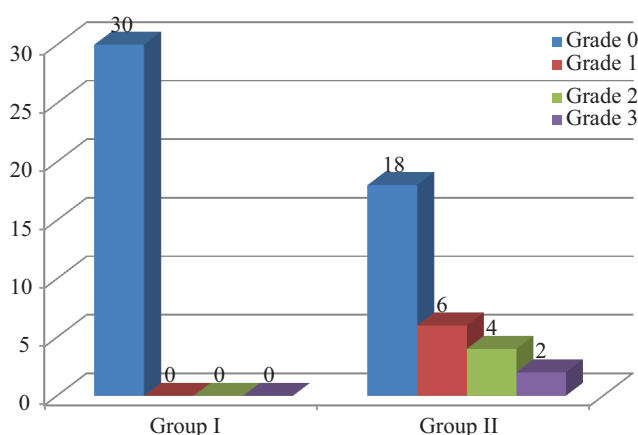


Figure-3: Incidence of myoclonic movements in both groups

was statistical significant (p- 0.02).

DISCUSSION

Mild to moderate degree of hemodynamic variations are associated with the induction of anaesthesia which depend on many factors. In the present study, we included 60 patients divided into 2 groups. Both groups contained equal numbers of males (15) and females (15). In our study, we monitored systolic blood pressure, diastolic blood pressure, mean arterial pressure, heart rate continuously and recorded before induction, at induction and laryngoscopy followed by 1, 3, 5 and 10 minutes after intubation. In group I, a significant decrease in MAP from baseline at induction with propofol in compare to etomidate is observed. In group I, there was significant increase in heart rate from baseline to induction as compared to group II. Hypotension occurs with propofol is mainly due to reduction of sympathetic activity causing vasodilation or its direct effect on vascular smooth muscles.⁶ In patients with coronary artery disease, valvular stenosis, uncontrolled hypertension and shock; sudden hypotension and tachycardia has deleterious effects in maintain circulation to organs.⁷ On another side etiomadate does not exert any effect on sympathetic nervous system and baroreceptor function due to which exceptional hemodynamic stability is observed with this inducing agent. Mayer et al.⁸ and Wu et al.⁹ also concluded that etomidate preserve hemodynamic stability during anesthesia.

In group I, number of patients with grade I, grade II and grade III pain was 15 (50%), 9 (30%) and 6 (20%) respectively. In group II, number of patients with grade I, grade II and grade III pain was 27 (90%), 3 (10%) and 0 respectively. In group II, there were 90% of patients which showed grade I pain only. Saricaoglu et al.¹⁰ and Wu et al. in their studies have showed same results. In our study we found that the degree of apnea was less in group II as compared to group I but the difference was non significant. Our results are in agreement with results of Boysen et al.¹¹ In our study, group I patients showed no myoclonic jerks but group II showed high incidence of myoclonic jerks. Miner et al¹² and Desai et al¹³ also concluded high incidence of myoclonus in his study.

CONCLUSION

Author concluded that etomidate is a better option in patients particularly prone to hemodynamic fluctuation at induction like uncontrolled hypertension and septic patients.

REFERENCES

1. Shinn HK, Lee MH, Moon SY, et al. Post-operative nausea and vomiting after gynecologic laparoscopic surgery: comparison between propofol and sevoflurane. *Korean J Anesthesiol.* 2011;60:36-40.
2. Grundmann U, Silomon M, Bach F, et al. Recovery profile and side effects of remifentanyl-based anaesthesia with desflurane or propofol for laparoscopic cholecystectomy. *Acta Anaesthesiol Scand.* 2001;45:320-6.
3. Maruyama K, Nishikawa Y, Nakagawa H, et al. Can intravenous atropine prevent bradycardia and hypotension during induction of total intravenous anesthesia with propofol and remifentanyl? *J Anesth.* 2010;24:293-6.
4. Frazee BW, Park RS, Lowery D, et al. Propofol for deep procedural sedation in the ED. *Am J Emerg Med.* 2005;23:190-5.

5. Ozgul U, Begeg Z, Erdogan MA, et al. Effect of alkalinisation of lignocaine for propofol injection pain: a prospective, randomised, double-blind study. *Anaesth Intensive Care.* 2013;4:501-4.
6. Sarkar M, Laussen PC, Zurakowski D, et al. Hemodynamic responses to etomidate on induction of anesthesia in pediatric patients. *Anesth Analg.* 2005;101:645-507.
7. Burton JH, Harrah JD, Germann CA, et al. Does end-tidal carbon dioxide monitoring detect respiratory events prior to current sedation monitoring practices? *Acad Emerg Med.* 2006;13:500-504.
8. Mayer M, Doenicke A, Nebauer AE, et al. Propofol and Etomidate-Lipuro for induction of general anesthesia. Hemodynamics, vascular compatibility, subjective findings and postoperative nausea. *Anaesthesist.* 1996;45:1082-4.
9. Wu J, Yao S, Wu Z, et al. A comparison of anesthetic regimens using etomidate and propofol in patients undergoing first-trimester abortions: double-blind, randomized clinical trial of safety and efficacy. *Contraception.* 2013;87:55-62.
10. Saricaoglu F, Uzun S, Arun O, et al. A clinical comparison of Etomidate-Lipuro, propofol and admixture at induction. *Saudi J Anaesth.* 2011;5:62-6.
11. Boysen K, Sanchez R, Krintel JJ, et al. Induction and recovery characteristics of propofol, thiopental and etomidate. *Acta Anaesthesiol Scand.* 1989;33:689-92.
12. Miner JR, Danahy M, Moch A, et al. Randomized clinical trial of etomidate versus propofol for procedural sedation in the emergency department. *Ann Emerg Med.* 2007; 49:15-22.
13. Urvi H. Desai, Deepa Shriyan, Dipankar Dasgupta. A Randomized Control Trial Comparing Propofol with Midazolam and Fentanyl Combination for Sedation in Gastrointestinal Endoscopies. *International Journal of Contemporary Medical Research.* 2016;3:2189-2193.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 17-11-2016; **Published online:** 30-12-2016