

Study to Find Hemodynamic Changes and Complications Occurring with Propofol and Etomidate During General Anaesthesia: A Tertiary Care Institutional Based Study

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Abstract

Background: Among general anesthesia induction drugs, etomidate is the only imidazole, and it has the most favourable therapeutic index for single bolus administration. Propofol is non-barbiturate short acting intravenous anaesthetic agent. It is a phenol derivative (2,6-Diisopropylphenol). Hence; the present study was undertaken for assessing the hemodynamic changes and complication occurring with propofol and etomidate during general anaesthesia. **Materials & Methods:** A total of 40 patients scheduled to undergo surgical procedure under general anesthesia were enrolled. All the patients were divided broadly into two study groups with 20 patients in each group as follows: Group 1: Propofol group, and Group 2: Etomidate group. Propofol group received propofol at 2 mg/kg and etomidate group received etomidate at 0.2 mg/kg. Pain on injection and myoclonic movements were recorded, if any at induction. As soon as the onset of unconsciousness occurs consumed dose of anaesthetic were recorded individually. All the results were recorded and analysed by SPSS software. **Results:** Mean heart rate among patients of group 1 at baseline, at induction and at 10 minutes was 85.6, 98.4 and 81.3 respectively. Mean heart rate among patients of group 2 at baseline, at induction and at 10 minutes was 84.2, 96.1 and 82.7 respectively. Mean arterial pressure among patients of group 1 at baseline, at induction and at 10 minutes was 89.3, 80.4 and 94.6 respectively. Mean arterial pressure among patients of group 2 at baseline, at induction and at 10 minutes was 90.1, 88.6 and 95.4 respectively. Significant results were obtained while comparing the mean arterial pressure at induction among the two study groups. Pain on injection was seen in 2 patients of group 1 and 1 patient of group 2. **Conclusion:** From the above results, the authors concluded that etomidate was better in comparison to propofol during general anaesthesia.

Keywords: Propofol, Etomidate, Anesthesia.

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Introduction

Among general anesthesia induction drugs, etomidate is the only imidazole, and it has the most favourable therapeutic index for single bolus administration. It also produces a unique toxicity among anesthetic drugs inhibition of adrenal steroid synthesis that far outlasts its hypnotic action and that may reduce survival of critically ill patients[1-3].

Etomidate has a pK a of 4.2 and is hydrophobic at physiologic pH To increase solubility, it is formulated as a 0.2% solution either in 35% propylene glycol or lipid emulsion (Etomidate-Lipuro; B Braun, Melsungen, Germany), Etomidate appears to facilitate GABA minergic neurotransmission by increasing the number of available GABA receptors, possibly by displacing endogenous inhibitors of GABA binding. At a dose of 0.2 to 0.3 mg/kg, etomidate reduces Cerebral blood flow by 34% along with cerebral metabolic rate by 45% and reduces intracranial pressure, while cerebral perfusion pressure is maintained or increased during etomidate-induced anesthesia[4-6]

Propofol is non-barbiturate short acting intravenous anaesthetic agent. It is a phenol derivative (2,6-Diisopropylphenol). Propofol injection is a sterile, nonpyrogenic emulsion containing 10 mg/ml of Propofol suitable for intravenous administration. Propofol produces

decrease in systemic arterial blood pressure due to decrease in sympathetic mediated systemic vascular resistance. It is more effective than Thiopentone in blunting the hypertensive response of intubations, Propofol decreases cardiac contractility and preload. Profound bradycardia and asystole after administration of Propofol have been described in healthy adult patients despite prophylactic anticholinergic[6-9]. Hence; the present study was undertaken for assessing the hemodynamic changes and complication occurring with propofol and etomidate during general anaesthesia.

Materials & Methods

The present study was undertaken for assessing the hemodynamic changes and complication occurring with propofol and etomidate during general anaesthesia in the Department of Anaesthesiology, Institute of Medical Sciences and SUM Hospital, Kalinganagar, Bhubaneswar, Odisha, India. A total of 40 patients scheduled to undergo surgical procedure under general anesthesia were enrolled. All the patients were divided broadly into two study groups with 20 patients in each group as follows:

Group 1: Propofol group, and

Group 2: Etomidate group

Patient's age 18 to 50 years of both sexes with ASA grade I and II and hemodynamically stable was included in the study. Patients with vascular diseases, habituation to analgesics (cardiac, pulmonary, neurological disease), and allergy to the drug to be used were excluded. All the patients underwent a thorough pre-anaesthetic check-up. Baseline hemodynamic parameters were measured. Propofol group received propofol at 2 mg/kg and etomidate group received etomidate at 0.2 mg/kg. Pain on injection and myoclonic movements were recorded, if any at induction. As soon as the onset

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of unconsciousness occurs consumed dose of anesthetic were recorded individually. All the results were recorded and analysed by SPSS software. Student t test was used for evaluation of level of significance.

Results

40 subjects were enrolled and were divided into two study groups; group 1 and group 2. Mean age of the patients of group 1 and group 2 was 42.8 years and 39.7 years respectively. There were 12 males and 8 females in group 1 and there were 11 males and 9 females in group 2. Mean heart rate among patients of group 1 at baseline, at induction

and at 10 minutes was 85.6, 98.4 and 81.3 respectively. Mean heart rate among patients of group 2 at baseline, at induction and at 10 minutes was 84.2, 96.1 and 82.7 respectively. Mean arterial pressure among patients of group 1 at baseline, at induction and at 10 minutes was 89.3, 80.4 and 94.6 respectively. Mean arterial pressure among patients of group 2 at baseline, at induction and at 10 minutes was 90.1, 88.6 and 95.4 respectively. Significant results were obtained while comparing the mean arterial pressure at induction among the two study groups. Pain on injection was seen in 2 patients of group 1 and 1 patient of group 2.

Table 1: Comparison of mean arterial pressure

Mean arterial pressure	Group 1	Group 2	p-value
Baseline	89.3	90.1	0.12
At induction	80.4	88.6	0.01 (Significant)
At 10 minutes	94.6	95.4	0.74

Table 2: Comparison of mean heart rate

Mean heart rate	Group 1	Group 2	p-value
Baseline	85.6	84.2	0.14
At induction	98.4	96.1	0.65
At 10 minutes	81.3	82.7	0.58

Table 3: Comparison of incidence of complications

Complications	Group 1 (n)	Group 2 (n)
Pain	2	1
Incidence of myoclonic movements	1	0

Discussion

Drug induced haemodynamic instability and intubation stress responses, are two main anaesthetic hazards during induction of anaesthesia. Wide variation of mean arterial pressure (MAP) is undesirable in neuro-anaesthesia to maintain optimum perfusion of brain and spinal cord. Maintenance of haemodynamic stability, balance between myocardial oxygen demand-supply and amelioration of the stress response to intubation are main considerations in neuro-anaesthesia. Nowadays, propofol is widely used as induction agent because of its rapid onset, shorter duration and minimal adverse effects. However, it causes moderate to severe post-induction and pre-intubation hypotension due to marked reduction in systemic vascular resistance. Etomidate, an alternative induction agent, is commonly used in cardiac anaesthesia for its minimal histamine release and stable haemodynamic property. However, till now as an induction agent, etomidate is not so much popular in neuroanaesthesia[7-10]. Hence; the present study was undertaken for assessing the hemodynamic changes and complication occurring with propofol and etomidate during general anaesthesia.

In the present study, 40 subjects were enrolled and were divided into two study groups; group 1 and group 2. Mean age of the patients of group 1 and group 2 was 42.8 years and 39.7 years respectively. There were 12 males and 8 females in group 1 and there were 11 males and 9 females in group 2. Mean heart rate among patients of group 1 at baseline, at induction and at 10 minutes was 85.6, 98.4 and 81.3 respectively. Mean heart rate among patients of group 2 at baseline, at induction and at 10 minutes was 84.2, 96.1 and 82.7 respectively. Singh et al assessed hemodynamic changes and complications occurring with Propofol and Etomidate during general anaesthesia. A total of 100 subjects were enrolled in the present study and were broadly and randomly divided two study groups with 50 subjects in each group: Group A: Subjects who received 1% Propofol injection, and Group B: Subjects who received 0.3mg/kg of etomidate injection. Monitoring of the blood pressure, mean arterial pressure and heart rate was done throughout the surgery and until 10 minutes after induction. Recording of the pain during injection was done on a scale of 0 to 10 with 0 referring to no pain while 10 referring to maximum pain. No significant difference was observed while comparing the mean arterial pressure and heart rate among

subjects of both the study groups at different time intervals except for at the time of induction. Mean pain score was found to be significantly higher in group A in comparison to group B. Among patients with associated altered hemodynamic status, etomidate is an improved option[10].

In the present study, Mean arterial pressure among patients of group 1 at baseline, at induction and at 10 minutes was 89.3, 80.4 and 94.6 respectively. Mean arterial pressure among patients of group 2 at baseline, at induction and at 10 minutes was 90.1, 88.6 and 95.4 respectively. Significant results were obtained while comparing the mean arterial pressure at induction among the two study groups. Pain on injection was seen in 2 patients of group 1 and 1 patient of group 2. Hosseinzadeh H et al compared three methods of induction of anaesthesia (Propofol, Etomidate, Propofol + Etomidate) in the hemodynamic stability after LMA insertion in elective surgeries. A total of 90 patients with ASA classes I and II undergoing elective surgeries were randomly allocated into one of the following three groups. Before anaesthesia induction, all patients were premedicated. Anaesthesia induction methods included: Group P (propofol 2.5 mg/kg), Group E (etomidate 0.3 mg/kg) and Group P+E (propofol 1 mg/kg plus etomidate 0.2 mg/kg). There was no significant difference between demographic data and BIS, SaO₂, EtcO₂ associated diseases, in three group (P>0.5). There is significant difference in hemodynamic (Systolic, diastolic and mean blood pressures) changes between group 1 in comparison with group 2 and group 3. HR was significantly lower in group 1 than group 2 (P=0.16). There was significant difference in the number of attempts and ease of LMA insertion between group 2 in comparison with group 3 and group 1. The duration of apnea in group 2 was a (8.67± 6) min, where as it was (18.10±6.25) min in group 1 and (12.03±6.4) min group 3. Etomidate plus propofol is an effective and alternative to propofol and etomidate for facilitating LMA insertion with the added advantage of lack of cardio-vascular depression[11].

Conclusion

From the above results, the authors concluded that etomidate was better in comparison to propofol during general anaesthesia.

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