**Comparison of Propofol and Etomidate in Patients under General Anaesthesia**

Yogesh Kumar

**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 anesthesia.

**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.

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

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. 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.

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 homodynamic effect compared to of any other inducing agent. Many studies have considered etomidate as an effective and reliable sedation option with minimal side effects.

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 instructions.

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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 propofolin 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).

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

Table-1: Demographic data of patients

<table>
<thead>
<tr>
<th>Baseline (mm)</th>
<th>At induction</th>
<th>At laryngoscopy</th>
<th>1 Min</th>
<th>3 Min</th>
<th>5 Min</th>
<th>10 Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>88</td>
<td>78</td>
<td>100</td>
<td>98</td>
<td>92</td>
<td>90</td>
</tr>
<tr>
<td>Group II</td>
<td>90</td>
<td>88</td>
<td>110</td>
<td>100</td>
<td>96</td>
<td>94</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Baseline (Beats/min)</th>
<th>At induction</th>
<th>At laryngoscopy</th>
<th>1 Min</th>
<th>3 Min</th>
<th>5 Min</th>
<th>10 Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>82</td>
<td>98</td>
<td>100</td>
<td>88</td>
<td>86</td>
<td>84</td>
</tr>
<tr>
<td>Group II</td>
<td>80</td>
<td>82</td>
<td>98</td>
<td>84</td>
<td>84</td>
<td>82</td>
</tr>
</tbody>
</table>

Table-3: Heart rate 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 maintenance to organs.7 On another side etomidate 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 al.12 and Desai et al.13 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