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## A comparative study of side effects of intravenous etomidate (0.3mg/Kg) versus propofol (2mg/Kg) during induction of anaesthesia and endotracheal intubation

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### Abstract

Patients given propofol should be constantly monitored and facilities for maintenance of a patient airway, artificial ventilation, oxygen enrichment and other resuscitative facilities should be readily available at all times. Apnoea often occurs during induction and may persist for more than 60 seconds. Group 1 patient following premedication receives injection Propofol 2mg/kg i.v. and group 2 patient following premedication receives inj. Etomidate 0.3mg/kg i.v. for induction of anaesthesia. Required parameters in haemodynamics and side effects were compared with the help of proforma data analysis. the mean value of Ramsey sedation scale for etomidate group was  $2.1 \pm 0.58$  whereas it was  $2.18 \pm 0.75$  for propofol group. There was no statistical significance between both groups on inter-group analysis.

**Keywords:** Etomidate, propofol, endotracheal intubation

### Introduction

Propofol is highly lipophilic and rapidly metabolized primary to its inactive glucuronide conjugate and to the corresponding quinol. The metabolites are excreted in the urine.

The total body clearance of propofol following a single bolus dose varies between 1.3 - 2.2 L/min. This high clearance rate far exceeds liver blood flow, suggesting that extra-hepatic or extra renal metabolism (possibly in the lung) may contribute to the elimination of propofol. The effect of liver cirrhosis on propofol pharmacokinetics indicate that even in patients with reduced hepatic metabolism, the clearance of propofol from blood is similar to that of normal patients. The reduction in clearance in aged suggest that metabolism of propofol is diminished in the elderly, possibly as a result of the reduction in the hepatic blood flow and/or cardiac output, that occurs with ageing<sup>[1, 2]</sup>.

Blood levels required for anaesthesia during minor surgery are 1.5-4.5µg/ml and that for major surgeries vary from 2.5-6µg/ml. Awakening usually occurs below a concentration of 1.6µg/ml and orientation below 1.2 µg/ml. Age affects the propofol concentration required to provide adequate anaesthesia<sup>[3]</sup>.

Patients given propofol should be constantly monitored and facilities for maintenance of a patient airway, artificial ventilation, oxygen enrichment and other resuscitative facilities should be readily available at all times. Apnoea often occurs during induction and may persist for more than 60 seconds.

As propofol is an emulsion, caution should be exercised in patients with disorders of lipid metabolism, such as primary hyperlipoproteinemia, diabetic hyperlipidaemia and pancreatitis.

As with other intravenous anaesthetic agents, caution should be applied in patients with cardiac, respiratory, renal or hepatic impairment; or in hypovolemic or debilitated patients. Propofol lacks vagolytic activity and has been associated with reports of bradycardia (occasionally profound) and also asystole. The intravenous administration of an anti-cholinergic agent before induction or during maintenance of anaesthesia should be considered<sup>[4]</sup>.

Clinical features of anaphylaxis which may include bronchospasm, erythema and hypotension occurs in patients allergic to propofol.

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The incidence of post operative nausea and vomiting (PONV) is either significantly decreased or shows a tendency towards a decrease when propofol is administered, irrespective of the anaesthetic technique or drug used. Propofol exerts its anti-emetic action by the modulation of some sub-cortical pathways. Sub-hypnotic doses of propofol (10-15mg IV) may be used in recovery room to treat PONV, particularly if it's not vagal origin.

Etomidate [R-1-(1-ethylphenyl) imidazole-5-ethyl ester] is a unique drug used for induction of general anaesthesia and sedation. The first report on etomidate was published in 1965 as one of several dozen aryl-alkyl imidazole-5-carboxylate esters synthesized by Janssen Pharmaceuticals. Initially developed as anti-fungal agents, the potent hypnotic activity of several compounds was observed during animal testing, and several compounds, including etomidate appeared significantly safer than barbiturates [5, 6].

**Methodology**

Group 1 patient following premedication receives injection Propofol 2mg/kg i.v. and group 2 patient following premedication receives inj. Etomidate 0.3mg/kg i.v. for induction of anaesthesia. Required parameters in haemodynamics and side effects were compared with the help of proforma data analysis.

1. Group 1: (Inj.Propofol)- 2mg/kg Intravenous.
2. Group 2: (Inj.Etomidate)- 0.3mg/kg Intravenous.

A detailed pre anaesthetic evaluation of each case was done. After recording medical history, a thorough systemic

examination was carried out to detect the presence of any systemic disorder. Relevant investigations would be done accordingly. All patients was kept nil per orally 6 hours for solids and 2 hours for water prior to surgery.

All patients was premedicated with Tab. Diazepam 5mg H.S and 5 mg in morning (60-90 mins) prior to surgery, with a sip of water along with Tab. Ranitidine 150 mg P.O.

**Results**

**Table 1:** Age distribution of the patients

		Drug		Total
		Etomidate	Propofol	
AGE	18-30	21 (42.00%)	20 (40.00%)	41 (41.00%)
	31-40	7 (14.00%)	8 (16.00%)	15 (15.00%)
	41-50	8 (16.00%)	9 (18.00%)	17 (17.00%)
	51-59	11 (22.00%)	13 (26.00%)	24 (24.00%)
	60-65	3 (6.00%)	0 (0.00%)	3 (3.00%)
Total		50 (100.00%)	50 (100.00%)	100 (100.00%)

The minimum age in the etomidate group was 20 years and the maximum was 60 years. The minimum age in the propofol group was 18 years and the maximum was 60 years. The mean age of patients in the etomidate group was 39.68 with standard deviation of 14.73 and mean age of patients in the propofol group was 37.82 with standard deviation of 14.04. On statistical analysis there was no significant difference between the two groups. (p value 0.419).

**Table 2:** Incidence of post-operative nausea and vomiting

		Drug		Total	P value
		Etomidate	Propofol		
Nausea + vomiting Total	N Y	34 (68.00%)	40 (80.00%)	74 (74.00%)	0.171
		16 (32.00%)	10 (20.00%)	26 (26.00%)	
		50 (100.00%)	50 (100.00%)	100 (100.00%)	

Table 2 shows that 32% of patients in the etomidate group had PONV with etomidate whereas only 20% of patients in the propofol group had PONV.

**Table 3:** Incidence of post-operative sedation

Sedation	Etomidate	Propofol	0.637
Mean ± Stdev	2.1 ± 0.58	2.18 ± 0.75	
Median	2	2	
Min-Max	1-3	1-4	

Table 3 shows that the mean value of Ramsey sedation scale for etomidate group was 2.1 ± 0.58 whereas it was 2.18 ± 0.75 for propofol group. There was no statistical significance between both groups on inter-group analysis.

**Table 4:** Incidence of myoclonus with etomidate

Myoclonus	Frequency	Percentage
No	37	74.00%
Yes	13	26.00%
Total	50	100.00%

Table 4 shows that 26% of patients in the etomidate group had myoclonus, whereas none of the patients in the propofol group had myoclonus.

**Discussion**

In our study, the age of patients ranged from 18 to 65 years, the mean age in the etomidate group was 39.68 ± 14.73

years and the mean age in the propofol group was 37.82 ± 14.04 years. This was comparable with a study conducted by Govardhane TB *et al.* 2018 which included almost similar age groups (18-60 years) [7]. Similar distribution of mean age groups was seen in the study by Allolio *et al.* in 1984 [8].

The gender distribution in our study showed almost equal distribution of male and female patients. This was comparable to the gender distribution seen in a study done by kumar *et al.* 2018) and meena k *et al.* in 2016. However in another study which was conducted by Govardhane TB *et al.* in 2018, only female patients were included [7]. In another the study by Allolio *et al.* in 1984 a higher ratio of male patients were there in the study [8].

Out of the study population, 32% of the etomidate group had nausea whereas in the propofol group only 20% patients had nausea as side effect. None of the patients in either of groups had vomiting. Statistical analysis was not significant in either study groups. (p value 0.171). Similar results were seen in the study by Baradari *et al.* which had higher incidence of nausea associated with etomidate [9]. However in another study by Kumar *et al.* a higher incidence of PONV was found among the propofol group (30%) compared to 20% in the etomidate group. In studies by

Mayer *et al.* and Pierre M *et al.* it was observed that induction of anaesthesia with etomidate does not increase PONV as compared to induction of anaesthesia with propofol. In another study by Govardhane *et al.* a higher incidence of PONV with etomidate (22%) compared to (14%) in the propofol group). The lower incidence of PONV in our study can be attributed to the fact that propofol itself has anti-emetic action<sup>[10]</sup>.

In our study the mean value of sedation according to Ramsey sedation scale in the etomidate group was  $2.1 \pm 0.58$  with a range of 1-3 whereas in propofol group mean was  $2.18 \pm 0.75$  with a range of 1-4. This shows a higher incidence of sedation in the propofol group. Statistical analysis was not significant in either study groups. (p value 0.637). However in the study by Heath *et al.* in 1988 it was found that etomidate causes greater degree of sedation as compared to propofol when used for procedural sedation. In another study by Fruergaard *et al.* it was concluded that the mean time for recovery was shorter in the propofol group than etomidate group.

In our study population myoclonus was observed only in the etomidate group. None of the patients in the propofol group had myoclonus. Myoclonus was observed in 26% of patients induced with etomidate. In study by Kumar *et al.* also myoclonus was noted only in the etomidate group (6%). Our results were also comparable to the study by Aggarwal *et al.* where they found that the incidence of myoclonus was more in the etomidate group (20%) as compared to propofol group (1.8%). However in a study by Govardhane *et al.* none of the patients in either of groups had myoclonus. This was attributed to the pre-treatment with Midazolam (0.5mg/kg) along with fentanyl (2µg/kg). In another study Miner *et al.* noted higher incidence of myoclonus (20%) in etomidate group versus (1.8%) in propofol group.

One patient in the etomidate group had symptomatic bradycardia upto 40bpm after induction requiring Inj Atropine (0.6mg IV) to be given. No other hemodynamic instability was observed in this patient throughout the surgery and at the time of extubation.

## Conclusion

- In our study, patients belonging to the etomidate group had more incidence of PONV (32%) while 20% patients in the propofol group had PONV.
- Patients in the propofol group had prolonged postoperative sedation when compared to the etomidate group.
- Myoclonus was noticed only in the etomidate group (26%).

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