

To Evaluate the Effect of Intravenous Induction Agent Etomidate and Propofol on Hemodynamic Stress Response to Laryngoscopy and Endotracheal Intubation in General Anaesthesia

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Conflict of interest: Nil

Abstract:

Background & Methods: The aim of the study is to evaluate the effect of intravenous induction agent ETOMIDATE and PROPOFOL on hemodynamic stress response to laryngoscopy and endotracheal intubation in General Anaesthesia. Patient was kept nil per oral instructions 8 hours prior to the surgery. After shifting the patient to the operating room, non-invasive blood pressure, five leads electrocardiography and pulse oximetry were connected to patient and baseline vitals heart rate, Mean arterial pressure, oxygen saturation of patient were recorded after 5 mins settling in operating room.

Results: Pain on injection was observed in 23 (76.7%) patients in propofol group and 6 (20%) patients in etomidate group.

Conclusion: Demographic parameters of the groups like gender and ASA grade were comparable without any statistically significant difference between both the groups. Hemodynamic parameters like HR and MAP of the groups were comparable at baseline level. The groups which received etomidate showed stable hemodynamic parameter at the time interval of 1, 2, 3, 5 and 10 minutes after intubation when compared to propofol group with statistically significant p value <0.05. Pain on injection which was statistically significantly lower in group received iv inj. etomidate when compared to propofol group with p value 0.003.

Keywords: Intravenous, Etomidate, Propofol, Hemodynamic, Laryngoscopy, Endotracheal & Anaesthesia.

Study Design: Observational Study.

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Introduction

Laryngoscopy and endotracheal intubation is a crucial part of General Anaesthesia. In General Anesthesia airway management and patient safety is the most important aspect of patient management. Endotracheal intubation is the gold standard and safest method for protecting the airway, delivering anesthetic gases and ensuring protection against aspiration. Stimulation of laryngeal and tracheal tissues during intubation causes catecholamine discharge, with an increase in sympathetic-adrenergic activity and also an increase in systemic arterial pressure and heart rate [1]. It produces varieties of stress response to cardiovascular system, respiratory system and other physiological system. Hypertension, tachycardia and arrhythmias caused by laryngoscopy and endotracheal intubation. Hemodynamic changes may cause imbalance between oxygen supply and demand.

Induction method for surgeries conducting under General Anaesthesia are usually based on

hemodynamic stability and stress response due to Laryngoscopy and endotracheal intubation. Induction drugs are so formulated to minimize hemodynamic changes and stress response occur during Laryngoscopy and endotracheal intubation [2].

PROPOFOL and ETOMIDATE are well known intravenous inducing agent which are commonly used for induction of General Anaesthesia. PROPOFOL is an intravenous hypnotic inducing agent which is most commonly used as an induction agent due to its rapid onset of action, short duration of action, sedative, anti-emetic and anti-convulsant properties. Recovery from propofol is more rapid and accompanied by less light headedness than recovery from Etomidate, Thiopentone and Ketamine [3].

The major cardiovascular effect of propofol is a decreased in arterial blood pressure due to

decreased in systemic vascular resistance, preload and cardiac contractility.

Propofol impairs normal baroreceptor reflex to hypotension and leads to reflex bradycardia. Changes in Heart rate and Cardiac output are usually transient and insignificant in healthy patient but could be severe in patient in extreme ages and with impaired ventricular dysfunction [4].

Propofol is a respiratory depressant that usually causes apnea following an induction dose. It inhibits hypoxic ventilatory drive and also causes histamine release. Propofol decreases cerebral blood flow, intracranial pressure and intraocular pressure. Safely administered to epileptic patients.

Material and Methods

After obtaining institutional ethics committee approval, the study was conducted in 60 patients belonging to ASA I & II aged between 18-50 years undergoing surgeries in General Anaesthesia. Pre-anaesthetic assessment of the patient was done with a complete history, physical examination and routine investigations and informed written consent was taken.

Patients receive either iv inj. PROPOFOL 2mg/kg or iv inj. ETOMIDATE 0.3mg/kg as induction agent for general anaesthesia as per anaesthesiologist's clinical judgement.

Patient was kept nil per oral instructions 8 hours prior to the surgery. After shifting the patient to the operating room, non-invasive blood pressure, five leads electrocardiography and pulse oximetry were

connected to patient and baseline vitals heart rate, Mean arterial pressure, oxygen saturation of patient were recorded after 5 mins settling in operating room. Intravenous line were established with 20G IV cannula. Patients were premedicated with IV Inj. glycopyrrolate 0.004 mg/kg body weight, IV Inj. midazolam 0.02 mg/kg body weight, IV Inj. fentanyl 2mcg/kg body weight and IV Inj. ondansetron 4mg stat and preloading was done with ringer lactate solution 10ml/kg body weight.

Inclusion Criteria:

1. Age group 18-50 years
2. Patients of both SEX
3. ASA Grade I&II
4. Patient who was posted for elective surgery under General Anaesthesia.

1. Exclusion Criteria:

1. Patient refusal
2. Patient aged below 18 and above 50 years
3. Emergency surgeries
4. Patient on steroid medication
5. Patient with Adrenal hormonal insufficiency
6. Allergic to propofol and etomidate
7. Presence of any cardiac /NEUROLOGICAL/RENAL DISEASE.
8. Patient with diabetes mellitus and hypertension.
9. Difficult airway.
10. ASA III & IV

Result

Table 1: Proportional distribution of patients according to their gender and drug administered

Gender	ETOMIDATE n (%)	PROPOFOL n (%)	Total	Pearson Chi-Square	df	p-value
Male	18 (60%)	14 (46.7%)	32	1.071 ^a	1	0.301
Female	12 (40%)	16 (53.3%)	28			
Sex ratio	1.28	0.75	1.14			
Total	30	30	60			

Propofol and Etomidate groups were comparable with respect to gender distribution. Male and Female were more or less equally distributed in both the groups. There were 14 males and 16 females in the propofol group and 18 males and 12 females in the etomidate group. The P value was 0.301 therefore statistically not significant.

Table 2: Asa grade

	ETOMIDATE		PROPOFOL		Total
	frequency	%	frequency	%	
ASA 1	8	26.67	6	20	14
ASA 2	22	73.33	24	80	46
Total	30	100	30	100	60

Table 3: Comparison of mean heart rate in different group of patients

HEART RATE (beats/mins)	PROPOFOL	ETOMIDATE	t-test	df	p-value
	Mean ± SD	Mean ± SD			
Baseline	79.33 ± 10.21	80.27 ± 9.80	-0.361	58	0.719
After drug administration	84.47 ± 13.17	80.83 ± 9.69	1.217	58	0.229
After intubation	90.53 ± 11.90	87.70 ± 8.74	1.051	58	0.298
After 1 minute	93.97 ± 10.34	87.03 ± 8.17	2.882	58	0.006
After 2minutes	92.93 ± 8.71	85.33 ± 10.50	3.051	58	0.003
After 3 minutes	91.80 ± 8.28	85.43 ± 10.71	2.577	58	0.013
After 5minutes	91.47 ± 8.53	85.13 ± 9.78	2.673	58	0.010
After 10 minutes	89.00 ± 9.96	82.97 ± 9.42	2.410	58	0.019

*p value < 0.05: Significant *p value > 0.05: Not Significant Heart rate in both propofol and etomidate group increased after intubation compared to the values at induction. Heart rate was measured 1, 2, 3, 5 and 10 mins after intubation. The difference was statistically significant 1,2,3,5 and 10 mins after intubation.

Table 4: Comparison of mean MAP in different group of patients

MAP (mm/hg)	PROPOFOL	ETOMIDATE	t-test	df	p-value
	Mean±SD	Mean±SD			
Baseline	92.93±10.73	95.53±8.17	-1.056	58	0.295
After drug administration	82.53±7.81	87.50±10.52	-2.076	58	0.042
After intubation	86.67±11.11	94.87±9.18	-3.118	58	0.003
After 1 minute	78.03±10.15	89.70±7.83	-4.985	58	0.000
After 2minutes	73.63±6.93	87.03±9.04	-6.444	58	0.000
After 3 minutes	72.30±7.14	84.97±7.75	-6.444	58	0.000
After 5minutes	72.83±7.54	85.00±8.15	-6.003	58	0.000
After 10 minutes	75.03±6.52	84.73±7.85	-5.207	58	0.000

p value < 0.05 : Significant * p value > 0.05 : Not Significant. The trend in Mean Arterial Pressure was similar to the trend in diastolic blood pressure. After intubation and 1, 2, 3, 5 and 10 mins afterwards the mean arterial pressure values were compared in etomidate as well as propofol groups. The difference between the two groups was statistically significant with p value of < 0.05.

Table 5: Pain on injecton

Pain on injection	PROPOFOL Frequency (%)	ETOMIDATE Frequency (%)
Grade 0	07	24
Grade 1	13 (43.3 %)	04 (13.3%)
Grade 2	06 (20 %)	02 (6.7%)
Grade 3	04 (13.3%)	00
TOTAL	30	30

*Pain on injection was observed in 23 (76.7%) patients in propofol group and 6 (20%) patients in etomidate group.

Discussion

In this study, majority of the study participants belonged to the ASA grade 2. The ASA grades between the two groups were comparable without statistically significant difference in distribution with p value of 0.836.

We observed that there was no significant difference in demographic parameter between both the groups. regarding their underlying variables such as Gender, Age, Weight and ASA status; hence, the confounding effect of these variables has probably been neutralized and the results are based on the other parameter that observed in both the groups. Similar result were also observed in following studies Rathore VS[5], et al (2019) and Dai ZL, et al (2021) [6], where the gender distribution among the study groups were

comparable without any significant difference in proportion.

In our study, we observed that the change in heart rate was not found significant at time of induction and while conduction of intubation in both the groups but when HR was observed at time interval of 1, 2,3,5, and 10 minutes after intubation there was significant increase in HR with (p<0.05) in propofol group when compared with the etomidate group.

Saini S, et al (2020) [7], found that there was increase in HR which was significantly more in propofol group as compared to etomidate group (P= 0.041). Similar observation also reported but Dai ZL, et al (2021) [6], observed that HR when compared with the etomidate group, the propofol

group had significantly lower HR with p value >0.05. Similar observation was also reported.

In our study, we observed that After administration of drug and after intubation with the time interval of 1, 2, 3, 5 and 10 mins afterwards the mean arterial pressure values were low in propofol group when compared to etomidate group, the difference between the two groups was statistically significant with p value < 0.05.

Study done by Dai ZL, et al (2021) [6], were also found that there was a statistically significant decrease in MAP in propofol group at the time interval of after administration of drug and 3, and 5 minutes after intubation when compared to etomidate group with p value < 0.05. Similar observation was reported among both the groups in study conducted by Jindal S, et al (2020) [8].

In our study, we observed that there is Pain on injection felt by 23 (76.7%) patients of propofol group which is statistically significant with p value of 0.003 and in etomidate group pain on injection felt by 6 (20%) patients.

Similar observation was found by Saini S, et al (2020) [7-10], in which there were 12 patients who felt pain on injection in propofol group as compared to only 3 patients in etomidate group and it was statistically significant with p value less than 0.001. Same observation was reported in study done by Rathore VS, et al (2019).

Conclusion

Demographic parameters of the groups like gender and ASA grade were comparable without any statistically significant difference between both the groups. Hemodynamic parameters like HR and MAP of the groups were comparable at baseline level. The groups which received etomidate showed stable hemodynamic parameter at the time interval of 1, 2, 3, 5 and 10 minutes after intubation when compared to propofol group with statistically significant p value <0.05. Pain on injection which was statistically significantly lower in group received iv inj. etomidate when compared to propofol group with p value 0.003.

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