



"COMPARISON OF PROPOFOL VS ETOMIDATE AS AN INDUCTION AGENT TO EVALUATE HEMODYNAMIC RESPONSE TO LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION"

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ABSTRACT

Introduction: General anaesthesia can broadly be defined as a drug induced reversible depression of the CNS resulting in loss of perception to all external stimuli. Propofol is an IV anaesthetic agent causes profound hypotension and pain on injection. Etomidate offers cardiostability but associated with nausea, vomiting, myoclonus and adreno-cortical suppression. The objective was to compare the Propofol and Etomidate as an induction agent to evaluate hemodynamic response to laryngoscopy and endotracheal intubation. **Materials and Methodology:** After obtaining institutional ethical committee approval and written informed consent, 60 patients of either sex ASA I, II, III in the age group of 20-50yrs were selected, study design- prospective comparative randomized observational single blind study. Study conducted in Civil Hospital, Ahmedabad from October 2021 to October 2022. Patients who were undergoing surgery under general anaesthesia were divided into two groups with 30 patients in each group. 1) Group A: Inj Propofol 3mg/kg IV in 30 patients 2) Group B: Inj Etomidate 0.3mg/kg IV in 30 patients **Discussion:** Following induction with Propofol there was significant hemodynamic changes that is increase in heart rate and decrease in blood pressure when compared to induction with Etomidate. Myoclonus was observed in 18 out of 30 patients in Etomidate group. 24 out of 30 patients complained of pain on injection in Propofol group **Conclusion:** Propofol produced more haemodynamic changes than Etomidate. Thus we conclude that Etomidate is more stable in terms of hemodynamic stability.

KEYWORDS : Propofol, Etomidate, Laryngoscopy, Endotracheal Intubation, Haemodynamics.

INTRODUCTION

An ideal induction agent should have hemodynamic stability and minimal laryngoscopy and intubation stress response, rapid clearance of the drug. The laryngoscopy and intubation causes stress response leading to changes in hemodynamic parameters which can be detrimental, especially to patients who are at cardiac risk⁽¹⁾ These hemodynamic responses can affect myocardial perfusion in a negative way by increasing the myocardial oxygen demand and cardiac work load which can lead to ischemia. During intubation, stimulation of laryngeal and tracheal tissues causes catecholamine release which can cause an increase in sympathetic adrenergic activity causing an increase in heart rate and systemic arterial pressure. Propofol is the most commonly used agent for induction in general anaesthesia. It is a short acting IV anaesthetic agent but it causes hemodynamic instability by causing profound hypotension. It also causes pain on injection. Allergic reactions have also been documented. Etomidate is a recently added drug to the class of intravenous induction agents and is being used in common practice in recent days due to its cardio stable nature. It also have side effects like nausea, vomiting, increase in epileptogenic activity in patient with seizures, myoclonic activity. The primary objective of this study was to compare the efficacy of two different induction agents (Inj. Propofol and Inj. Etomidate) in maintaining hemodynamic stability during induction and following laryngoscopy and endotracheal intubation in elective surgery.

Aim And Objectives

Aim:

To compare the effect of intravenous induction agents

Propofol and Etomidate in maintaining hemodynamic stability during laryngoscopy and after endotracheal intubation.

Objectives:

Primary Outcome Measures:

- 1) To assess the effect of the induction agents on the variation in heart rate during laryngoscopy and after endotracheal intubation.
- 2) To assess the effect of the induction agents on the variation of blood pressure during laryngoscopy and after endotracheal intubation.

Secondary Outcome Measures:

- 1) Perioperative hemodynamic changes.
- 2) Intraoperative or Post-operative complications.

MATERIAL AND METHODOLOGY

Study Design

- Study type: Prospective, comparative, randomized observational study.
- Study site : Department of Anaesthesiology in Major Surgical operation theaters in Civil Hospital, Ahmedabad
- Study duration : October 2021 – October 2022
- Study size: Based on a previous study by Masoudifar et al, it was seen that patients who received Propofol (26%) had hypotension following intubation compared to Etomidate (8%). Based on this study, the sample size was calculated using n Master 2.0 software with an alpha error of 5% and power of 80%. Sample size was found to be 25 per group and rounded off to 30 per group to account for drop outs.

Drugs

This study involved use of Propofol and Etomidate as an induction agent in general anaesthesia and sevoflurane as inhalational anaesthetic agent , O₂ and atracurium besylate as muscle relaxant for maintenance.

Analysis Plan

Collected data was analyzed using statistical package SPSS version 22.0

Inclusion Criteria

- 20 – 50 years of age of either sex.
- Weight 40 to 80 kg.
- ASA grade I, II and III.
- Mallampatti grade I and II.

Exclusion Criteria

- Patient refusal.
- Emergency surgeries.
- Patients with cardiovascular diseases like Ischemic heart disease (IHD) and hypertension.
- ASA grade IV- V.
- Existence of considerable pathology in pharynx/larynx.
- Uncontrolled diabetic and hypertensive patients.
- Known history of allergy to Propofol or Etomidate.
- History of seizure disorder.

Following the approval by Institutional Ethical Committee, after obtaining written, informed consent from patients and Patient's Relative, study was done. Sixty patients 20-50 years of age , 40-80kg weight, ASA grade I,II and III , Mallampatti grade I and II , scheduled to undergo general anaesthesia were included in study. Preoperative assessment was done and investigations were noted.All the patients were premedicated with intravenous glycopyrrolate 0.004mg/kg , ondansetron 0.15mg/kg and Inj fentanyl 1mcg/kg. ECG , NIBP, SPO₂ were monitored. Baseline hemodynamic parameters were recorded. All the patients were preoxygenated with 100% oxygen for 3 mins.

The patients were randomly allocated into two groups by sealed envelope technique into Group A and Group B,

For Induction Group A patients received Inj Propofol 3 mg/kg IV For Induction Group B patients received Inj Etomidate 0.3mg/kg IV All the drugs that were used in the study were prepared under supervision.

It was decided that if any complication or untoward incidence arise, blinding will be unfolded, patients will be treated accordingly. Speed of injection (10secs) was equal in both the groups. After induction of anaesthesia, hemodynamic variables were recorded. After loss of consciousness, which was confirmed by inability to respond to verbal commands and loss of eyelash reflex, Inj. succinylcholine 2 mg/kg IV was given; patient was ventilated with 100% oxygen, laryngoscopy and endotracheal intubation was done by an experienced anaesthesiologist. Duration of laryngoscopy was kept less than 10 seconds. Cases were excluded when laryngoscopy time exceeded 10 seconds or in patients with unanticipated difficult airway and was proceeded according to difficult airway algorithm. Trachea was intubated with adequate size endotracheal tube. Proper placement of endotracheal tube was confirmed by capnography (wherever available) and 5 point auscultation of chest. Following successful placement of ET tube , anaesthesia was maintained with sevoflurane 1-1.5% dial concentration and oxygen-nitrous oxide at the ratio of 33%:66%. Vitals were recorded at induction, post induction, 1, 2, 3, 5 and 10 minutes after intubation. Later the anaesthesia was maintained as per standard protocol.

Statistical Analysis

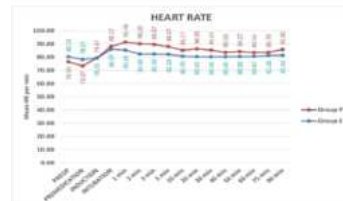
The data collected was analyzed using SPSS software version 22.0 (statistical package for social science). Continuous

variables were given by mean with standard deviation. Categorical variables were given by frequency and percentages. Student t-test was used for testing the significance of all the variables, mean and standard deviation. Chi – square test was used to compare the proportions. All the statistical results were considered significant at the p value of less than 0.05.

RESULTS

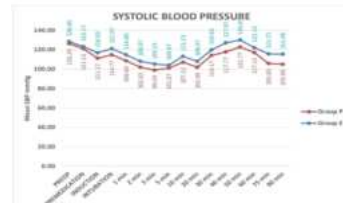
Demographic parameters like age, weight and gender were comparable in all 3 study groups ,p value of three groups is >0.05 which was not statically significant.

HEART RATE



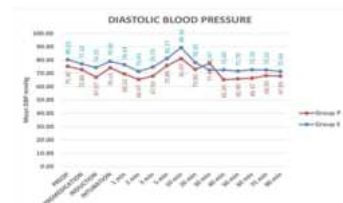
Heart rate in both Propofol and Etomidate group increased after intubation compared to the values at induction. In the Propofol group, the heart rate increased by 7-12 bpm. In the Etomidate group the heart rate increased by 3-7 bpm, which was measured during intubation and 1, 2, 3, 5 and 10 mins after intubation and even further intraoperatively. The difference was statistically significant with a p-value of <0.05.

SYSTOLIC BLOOD PRESSURE



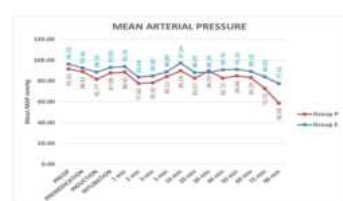
When compared with systolic blood pressure values at the induction, there was a fall in SBP in the Propofol group at intubation as well as 1, 2, 3, 5 and 10 mins after intubation and even further intraoperatively. The difference was statistically significant with respect to the Etomidate group during the same period with a p value of < 0.05.

DIASTOLIC BLOOD PRESSURE



Following intubation the fall in DBP was more in Propofol group compared to Etomidate group with respect to the values at induction. The difference between the two groups was statistically significant with the p value of < 0.05.

MEAN ARTERIAL BLOOD PRESSURE



MAP = DBP+ 1/3[SBP-DBP]. The trend of MAP was similar to the trend of diastolic blood pressure. After intubation and 1, 2, 3, 5 and 10 mins afterwards the MAP 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

Myoclonus And Pain On Injection

	Group E		Group P	
	No of patients	Percentage	No of patients	Percentage
Myoclonus	18	60%	0	0.00%
Pain on injection	0	0.00%	24	80%
Total	30	-	30	-

Pain on injection was observed in 80% patients after injecting Propofol IV.

Myoclonus was observed in 60% patients after administering Etomidate IV.

DISCUSSION

Rapid induction and fast recovery with hemodynamic stability with minimal side effects are the most important characteristics desired from an ideal induction agent.

In this study we compared haemodynamic response to endotracheal intubation using Etomidate and Propofol as induction agents in 60 patients with 30 patients in each group, within the age group of 20- 50 years of either sex, weighing 40-80 Kg.

Regarding the underlying variables such as gender, age, weight and ASA physical status of the patients, there was no significant difference, thus the compounding effects of these variables had been neutralized. Regarding the weight, the Propofol group had a mean of 62.45, and Etomidate group had a mean of 63.03 but this difference between the groups, was not statistically significant.

The effect of Etomidate and Propofol on heart rate is controversial. According to studies of Siedy J et al⁽⁷⁾, Ghafor et al⁽⁸⁾ and Kaur et al⁽⁹⁾, Mean heart rate was comparable in both the groups. Heart rate may increase or decrease or these changes can be minimal following induction with these agents. The reason for this difference is not clear.

In the studies of Ulsamer et al⁽¹⁰⁾, Moffat et al⁽¹¹⁾ they found that Etomidate was associated with unacceptably sudden increase in heart rate, while Shah et al⁽⁴⁾ reported sustained increase in heart rate with Propofol. In our study, the change in heart rate was not much significant at induction and intubation in both the groups but Etomidate group showed decrease in heart rate at 1,2,3,5 mins following intubation which was statistically significant.

Hug et al⁽¹²⁾ conducted a study in 25,000 patients, he found out that Propofol caused bradycardia in 4.2% patients and hypotension in 15.7% patients. In our study, there was no incidence of bradycardia but significant hypotension occurred in 7 patients out of 30 patients which are around 23.33% which is comparable with the above study.

The baseline and premedication values of systolic blood pressure, diastolic blood pressure, mean arterial pressure, were comparable in both the groups. Following intubation with Propofol, there were significant changes in SBP, DBP and MAP compared to Etomidate group and p-values at various time intervals remained significant (<0.05). This hypotension with Propofol due to decrease in preload, was managed with fluids, and by decreasing the concentration of inhalation agent.

In the study of Kahlon A et al⁽⁵⁾, they found that Etomidate caused myoclonus in around 76% in placebo group, 44% in lignocaine group and 28% in midazolam group. In our study myoclonus was observed in 18 out of 30 patients (60%) who

were induced with Etomidate, while no equivalent signs were noted in Propofol group. This finding correlates with the above study.

Picard P et al⁽¹²⁾ did a study on 6264 patients which showed that on an average, 70% of patients complained of pain on injection. In our study, 24 patients out of 30 patients (80%) complained of pain on injection with Propofol group.

Shah et al⁽⁴⁾, Masoudifar⁽⁶⁾ and Beheshtian, Aggarwal⁽³⁾ et al, Meena Kumari⁽²⁾, all the above studies showed that the changes in systolic blood pressure, diastolic blood pressure and mean arterial pressure were less in Etomidate group compared to Propofol group which is in total agreement with our study.

There was no incidence of nausea and vomiting in both the groups. No other complications were noted in both Etomidate and Propofol group.

The study design had some limitations. We did not measure plasma cortisol and adrenocorticotrophic hormone level due to non-availability of the above mentioned tests in our institution

CONCLUSION

As per the results of the study, Propofol produced more hemodynamic changes than Etomidate. Thus we conclude that Etomidate is more stable in terms of hemodynamic stability during laryngoscopy and after endotracheal intubation.

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