Original Article
MVP Journal of Medical Sciences, *Vol 8(2), 179-182, July-December 2021*
ISSN (Print) : 2348–263X
ISSN (Online) : 2348-2648
DOI: 10.18311/mvpjms/2021/v8i2/318

Comparison Between Propofol and Etomidate in General Anaesthesia as Induction Agents at a Tertiary Care Centre

Alka Rajesh Koshire[1], Amala Anirudha Godse[2], Sarita Phulkar[3] and Hemant Pawar[3*]

[1]Professor and Head, Department of Anaesthesia, Dr. Vasantrao Pawar Medical College Hospital and Research Centre, Nashik – 422003, Maharashtra, India
[2]Former PG Resident, Department of Anaesthesia, Dr. Vasantrao Pawar Medical College Hospital and Research Centre, Nashik – 422003, Maharashtra, India
[3]Associate Professor, Department of Anaesthesia, Dr. Vasantrao Pawar Medical College Hospital and Research Centre, Nashik – 422003, Maharashtra, India; dr.hemantpawar@gmail.com

Abstract

Aims: To compare hemodynamic changes occurring due to Propofol and Etomidate during general anesthesia as induction agents at a Tertiary Care Centre. **Materials and Methods:** 68 Adult ASA1 and ASA 2 Patients undergoing elective surgeries under gender anaesthesia in the department of Anaesthesia, Medical college and tertiary health care Centre after considering and satisfying the inclusion and exclusion criteria were selected and divided in two equal groups. They were given Propofol (2mg/kg) and Etomidate (0.3mg/kg) and hemodynamics were compared. **Results:** Etomidate was having more stable hemodynamic conditions as compared to Propofol induced anaesthesia**.** There was significant reduction in heart rate and blood pressure leading to hypotension in propofol group while etomidate group had stable hemodynamics. **Conclusion:** This study concludes that etomidate is a better agent for induction than propofol in view of hemodynamic stability.

Keywords: Induction Agents, Hemodynamic Changes, Propofol, Etomidate

1. Introduction

Induction agents are drugs that, when given intravenously in an appropriate dose, cause a rapid reversible loss of consciousness.

Propofol, 2,6-diisopropylphenol is most popular induction agent with its favorable characteristics of rapid and smooth induction and recovery, decrease incidence of nausea and vomiting, etc.[1]. Propofol can lead to profound reduction in heart rate[2–4]. Induction of anaesthesia with propofol could drop arterial pressures as much as 25 to 40% in all patients irrespective of any underlying conditions[5,6].

Etomidate, carboxylated imidazole is characterized by hemodynamic stability, minimal respiratory depression and cerebral protective effects[7]. Administration of etomidate leads to a stable hemodynamic status[8–17].

This study is an attempt to evaluate the effects of propofol and etomidate by comparing certain parameters such as change in blood pressure and heart rate during induction and intra-operative period.

2. Aims and Objectives

To compare hemodynamic changes occurring due to Propofol and Etomidate during general anesthesia as induction agents.

3. Materials and Methods

Study Design: Observational study
Study Setting: Department of Anaesthesia of Dr. Vasantrao Pawar Medical College Hospital and Research Centre, Nashik, Maharashtra, India.

*Author for correspondence

Study Duration: August 2018 to December 2020.
Study Participants: Sample Size: 68

3.1. Inclusion Criteria

1. All patients being operated under general anaesthesia-elective cases
2. American Society of Anesthesiologists (ASA) Grade I and ASA grade II patients.
3. Age group 18—60 years irrespective of gender.

3.2 Exclusion Criteria

1. Contraindications for drugs
   1. Pregnant women and breastfeeding mothers
   2. Patients with previous history or known case of seizure disorder.
   3. Patient having recent MI, AV heart block, sinus bradycardia.
   4. Patients with previous history of stroke
   5. Patients with psychiatric illness
   6. Patients having chronic kidney disease
   7. History of drug allergy to study drug or patients with drug abuse
   8. Patient refusal.
2. Contraindications for easy intubation
   i. Mouth opening <2.5 cm
   ii. Patients with BMI more than 35

4. Results

Table 1. Mean SBP amongst different study population at various time interval

SBP [mm Hg]	Group P		Group E		p value
	Mean	SD	Mean	SD	
One day prior	110	8.6	108	7.5	0.42
Before induction	124	11.6	118	7.8	0.576
During induction	108	12.6	111	10	0.461
5mins after induction	94	11.7	106	10.3	0.001
10 mins after induction	101	10.6	112	9	0.001
After induction	106	11	118	10.9	0.001

Table 2. Mean DBP amongst different study population at various time interval

DBP [mm Hg]	Group P		Group E		p value
	Mean	SD	Mean	SD	
One day prior	84	6.9	88	6.3	0.333
Before induction	86	6.9	85	5.6	0.873
During induction	64	10.9	78	7.5	0.112
5mins after induction	60	9.5	71	6.8	0.001
10 mins after induction	71	9.9	83	7	0.001
After induction	76	9.1	79	7.1	0.001

Table 3. MAP: Amongst different study population at various time interval

MAP [mm Hg]	Group P		Group E		p value
	Mean	SD	Mean	SD	
One day prior	93	7	95	6.4	0.18
Before induction	99	7.8	96	5.8	0.321
During induction	79	10.5	89	8.2	0.001
5mins after induction	71	8.9	83	7.3	0.001
10 mins after induction	81	13.1	93	6.6	0.001
After induction	86	8.6	92	7.1	0.001

Table 4. Mean Heart rate amongst different study population at various time interval

HR [minute]	Group P		Group E		p value
	Mean	SD	Mean	SD	
One day prior	83	10.4	83.9	12	0.72
Before induction	76.8	11.1	81	13.1	0.11
During induction	90.5	11.2	96.6	15.1	0.29
5mins after induction	83.3	13.2	90.5	12.7	0.008
10 mins after induction	77.3	12.6	84.6	11.4	0.04
After induction	72.7	12.4	80.2	11.3	0.03

5. Discussion

In the present study, both the groups each consisting of 68 patients were compared in terms of age, sex, height, weight and ASA status. We aimed to observe and compare SBP, DBP, MAP, Heart rates of these patient.

Table 5. Grade of Myoclonic Movements amongst different study population at various time interval

Grade of Myoclonic Movements	Group P		Group E		Total	
	N	%	N	%	N	%
0	32	94.00%	18	52.90%	50	73.50%
1	2	5.90%	15	44.10%	17	25.00%
2 & 3	0	0.00%	1	2.90%	1	1.50%
Total	34	100.00%	34	100.00%	68	100.00%

Table 6. Grade of pain on injection amongst different study population at various time interval

Grade of pain on injection	Group P		Group E		Total	
	N	%	N	%	N	%
0	6	17.60%	29	85.30%	35	51.50%
1	24	70.60%	5	14.70%	29	42.60%
2	4	11.80%	0	0.00%	4	5..9%
Total	34	100.00%	34	100.00%	68	100.00%

The prime side effects like pain on injection, myoclonic jerks were assessed and compared. In the present study, the SBP, DBP was significantly lower in propofol group as compared to etomidate group. This is due to induction with propofol causes vasodilatation leading to a decrease in systemic vascular resistance and therefore hypotension. Propofol also causes a decrease in cardiac output and alters the sensitivity of baroreceptors, thus explaining the fall in blood pressure observed after induction. We also observed higher incidence of myoclonic activity in the form of myoclonic jerks which was seen in more in etomidate group as compared with propofol group. Pain on injection during or post drug administration can be a bad experience for patients which is seen more in the Propofol group in comparison with Etomidate group.

6. Conclusion

In this study, we found that etomidate was having more stable hemodynamic conditions as compared to propofol induced anaesthesia. There was significant reduction in heart rate and blood pressure leading to hypotension in propofol group while etomidate group had stable hemodynamics. Incidence and severity of pain on injection was more with propofol while incidence of myoclonus was more with etomidate. Thus, we can conclude that etomidate can be a better choice of induction for general anaesthesia as compared to propofol, only drawback being higher incidence of myoclonic movements.

7. Summary

There was significant difference in mean SBP at various time intervals between two groups. The SBP was significantly lower in propofol group as compared to etomidate group from 5mins after induction till after induction.There was significant difference in mean DBP at various time intervals between two groups. The DBP was significantly lower in propofol group as compared to etomidate group from 5mins after induction till after induction. There was significant difference in mean MAP at various time intervals between two groups. The MAP was significantly lower in propofol group as compared to etomidate group from 5mins after induction till after induction.There was significant difference in mean heart rate at various time intervals between two groups (Table 4). The heart rate was significantly lower in propofol group as compared to etomidate group from 5mins after induction till after induction.

8. References

1. Stone JG, Foex P, Sear JW, Johnson LL, Khambatta HJ, Triner L. Risk of myocardial ischaemia during anaesthesia in treated and untreated hypertensive patients. British Journal of Anaesthesia. 1988; 61:675–9. https://doi.org/10.1093/bja/61.6.675. PMid:3207540
2. Riznyk L, Fijalkowska M, Przesmycki K. Effects of thiopental and propofol on heart rate variability during fentanyl-based induction of general anesthesia. Pharmacological Reports. 2005; 57:128–34.
3. Basu S, Mutschler DK, Larsson AO, Kiiski R, Nordgren A, Eriksson MB. Propofol (Diprivan-EDTA) counteracts oxidative injury and deterioration of the arterial oxygen tension during experimental septic shock. Resuscitation. 2001; 50:341–8. https://doi.org/10.1016/S0300-9572(01)00351-3
4. Kelicen P, Ismailoglu UB, Erdemli O, Sahin-Erdemli I. The effect of propofol and thiopentone on impairment by reactive oxygen species of endothelium-dependent relaxation in rat aortic rings. European Journal of Anaesthesiology. 1997; 14:310–5. https://doi.org/10.1046/j.1365-2346.1997.00110.x. PMid:9202920
5. Hiller SC, Mazurek MS. Monitored anesthesia care. In: Barash PG, Cullen BF, Stoelting RK, editors. Clinical

Anesthesia. 5th ed. Philadelphia: Lippincott Williams and Wilkins; 2006. p. 1246–61.
6. Reves JG, Glass P, Lubarsky DA, McEvoy MD, Martinez-Ruiz R. Intravenous anesthesia. In: Miller RD, editor. Anesthesia. 7th ed. New York: Churchill Livingstone; 2010. p. 719–58. https://doi.org/10.1016/B978-0-443-06959-8.00026-1
7. Morel J, Salard M, Castelain C, *et al*. Haemodynamic con- sequences of etomidate administration in elective cardiac surgery: a randomized double-blinded study. British Journal of Anaesthesia. 2011; 107:503–9. https://doi.org/10.1093/bja/aer169. PMid:21685487
8. Sarkar M, Laussen PC, Zurakowski D, Shukla A, Kussman B, Odegard KC. Hemodynamic responses to etomidate on induction of anesthesia in pediatric patients. Anesthesia and Analgesia. 2005; 101:645–50. https://doi.org/10.1213/01.ane.0000166764.99863.b4. PMid:16115968
9. Eames WO, Rooke GA, Wu RS, Bishop MJ. Comparison of the effects of etomidate, propofol, and thiopental on respiratory resistance after tracheal intubation. Anesthesiology. 1996; 84:1307–11. https://doi.org/10.1097/00000542-199606000-00005. PMid:8669670
10. Zed PJ, Mabasa VH, Slavik RS, Abu-Laban RB. Etomidate for rapid sequence intubation in the emergency department: Is adrenal suppression a concern? Canadian Journal of Emergency Medicine. 2006; 8:347–50. https://doi.org/10.1017/S1481803500014044. PMid:17338847
11. Lipiner-Friedman D, Sprung CL, Laterre PF, Weiss Y, Goodman SV, Vogeser M, *et al*. Adrenal function in sepsis: The retrospective Corticus cohort study. Critical Care Medicine. 2007; 35:1012–8. https://doi.org/10.1097/01.CCM.0000259465.92018.6E. PMid:17334243
12. Lundy JB, Slane ML, Frizzi JD. Acute adrenal insufficiency after a single dose of etomidate. Journal of Intensive Care Medicine. 2007; 22:111–7. https://doi.org/10.1177/0885066606298140. PMid:17456730
13. Bae JY, Choi do Y, Woo CH, Kwak IS, Mun SH, Kim KM. The BIS and hemodynamic changes in major burn patients according to a slow infusion of propofol for induction. Korean Journal of Anesthesiology. 2011; 60:161–6. https://doi.org/10.4097/kjae.2011.60.3.161. PMid:21490816. PMCid:PMC3071478
14. Ebert TJ, Muzi M, Berens R, Goff D, Kampine JP. Sympathetic responses to induction of anesthesia in humans with propofol or etomidate. Anesthesiology. 1992; 76:725–33. https://doi.org/10.1097/00000542-199205000-00010. PMid:1575340
15. Ouedraogo N, Marthan R, Roux E. The effects of propofol and etomidate on airway contractility in chronically hypoxic rats. Anesthesia & Analgesia. 2003; 96:1035–41. https://doi.org/10.1213/01.ANE.0000053236.52491.69. PMid:12651655
16. Jellish WS, Riche H, Salord F, Ravussin P, Tempelhoff R. Etomidate thiopental based ansthetic induction: Comparisons between different titrated levels of electrophysiologic cortical depression and response to laryngoscopy. Journal of Clinical Anesthesia. 1997; 9:36–41. https://doi.org/10.1016/S0952-8180(96)00211-5
17. Brohon E, Hans P, Schoofs R, Merciny F. Comparison of 4 anesthesia induction protocols on hemodynamic changes in tracheal intubation. Agressologie. 1993; 34:83–4.

How to cite this article: Koshire, A. R., Godse, A. A., Phulkar, S. and Pawar, H. Comparison Between Propofol and Etomidate in General Anaesthesia as Induction Agents at a Tertiary Care Centre. MVP J. Med. Sci. 2021; 8(2): 179-182.