EAS Journal of Anaesthesiology and Critical Care
Abbreviated Key Title: EAS J Anesthesiol Crit Care
ISSN: 2663-094X (Print) & ISSN: 2663-676X (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-3 | Issue-5 | Sept-Oct-2021 | DOI: 10.36349/easjacc.2021.v03i05.005

Original Research Article

Evaluation of Systolic Function Changes During Total IV Induction on Using Propofol vs. Balanced Anesthesia Method

Dr. Abu Sayeed Al Mamun[1*], Dr. A. K. M. Tanvirul Haque[2], Dr. Mohammad Iqbal Kabir[3], Dr. Laila Rezoana[4], Dr. Shahnuma Tarannum[5], Dr. Bidhan Kumar Fowjdar[6], Dr. Mohammad Ali Chowdhury[7]

[1,3]Assistant Professor, Department of Anaesthesia, Kushtia Medical College, Kushtia, Bangladesh
[2]Junior Consultant, Department of Anaesthesia, Critical Care & Pain Medicine, Rajshahi Medical College Hospital, Rajshahi, Bangladesh
[4]Sonologist, Queens Hospital, Jessore, Bangladesh
[5]Sonologist, Medipath Diagnostic Complex, Rajshahi, Bangladesh
[6]Junior Consultant (Anaesthesia), Puthia Upazila Health Complex Rajshahi, Bangladesh
[7]Junior Consultant (Anaesthesia), Mohonpur Upazila Health Complex Rajshahi, Bangladesh

Article History
Received: 13.09.2021
Accepted: 21.10.2021
Published: 25.10.2021

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: ***Introduction:*** Propofol, a popular intravenous anesthetic, is now on the trade. It's a common tool for both starting and keeping anesthesia going. Antiemetic and anticonvulsant properties and the speed of induction and recovery are its primary benefits. Intubation without a muscle relaxant, day surgery, and the installation of a laryngeal mask airway has all been effective using this technique. Injection discomfort, dosage-dependent hypotension, and severe bradycardia are the primary drawbacks of the drug's use. ***Objectives:*** Researchers set out to see how much of a difference complete intravenous anesthesia with Propofol made in mean systolic function roughly equivalent to balanced anesthesia (Thiopentone; Isoflurane; Nitrousoxide). ***Results:*** Multicentered based randomized quasi-experimental prospective study was performed in Kushtia Medical College Hospital, Kushtia, Bangladesh, from January 2019 to December 2020. In our study, out of 60 cases (30 in each group), 70 %(n=21) in Group-A and 63.33%(n=19) in Group-B were between 12-30 years of age while 30%(n=9) in Group-A and 36.67%(n=11) in Group-B were between 31-60 years of age, mean±SD was calculated as 27.90±8.91 and 29.8±8.49 years respectively. 60 %(n=18) in Group-A and 53.33%(n=16) in Group-B were male while 40%(n=12) in Group-A and 46.67%(n=14) in Group-B were females. Comparison of mean hemodynamic changes using Propofol as total intravenous anesthesia with balanced anesthesia technique (thiopentone isoflurane-nitrous oxide) shows that heart rate after intubation in Group-A was 83.4±2.36 and 90.36±1.95 in Group-B, the p-value was 0.001 while meaning arterial pressure in Group-A was recorded as 78.6±2.25 and in Group-B 89.43±1.73, the p-value was 0.000. ***Conclusion:*** A substantial improvement in supportive care is seen in surgical interventions when using Propofol as a complete intravenous anesthetic vs. balanced anesthesia (thiopentone-isoflurane-nitrous oxide).

Keywords: Balanced Anaesthesia, Surgical Intervention, Propofol, Kushtia Medical College Hospital.

INTRODUCTION

In that anesthesia, the medical intervention does not affect the illness process currently taking place in the body. It creates ideal circumstances for additional medical/surgical interventions to be performed with ease. There is a triangle of analgesia, sedation, and muscular relaxation in the anesthetic mix. Numerous medications, such as intravenous hypnotics, analgesics, muscle relaxants, and anesthetic gases, are used to fulfill these multiple objectives. They all have a different function in establishing a safe anesthetic environment [1, 2].

Even while medication type matters when coming up with an anesthetic strategy to deal with a certain surgical procedure, the anesthesiologist's knowledge of a particular method or drug is more significant. Patients. Each medication and technique has benefits and drawbacks determined by the patient's medical/surgical history and the kind of operation [3]. Fast-onset, easy induction, and quick recovery are the finest features of the best anesthetic agent for providing a pleasant surgical anesthetic [4].

Major hazards include unsuccessful intubation, laryngospasm, pulmonary embolism, and even cardiac arrest, while mild risks include nausea and vomiting. Postoperative nausea and vomiting and readmission to the hospital are minimal concerns [5].

Inhalational anesthetics have long been the go-to option for keeping patients asleep during surgery. Volatile anesthetics can be delivered with ease using modern delivery methods, allowing the doctor administering the anesthesia fine-tune control over the concentration. This is a significant factor in why anesthesia is so widely used [5]. An inhalational anesthetic, isoflurane3 protects the brain tissue against negative events including apoptosis, degeneration, inflammation, and energy failure caused by chronic neurodegenerative illnesses such as ischemia, stroke, or nervous system damage by showing neuroprotective properties [3].

There have been several breakthroughs and improvements in the field of general anesthesia. A brand-new approach is an anesthetic administered entirely through an intravenous line. Since it was first used in clinical settings, this method has undergone several refinements. Multiple medications have been attempted to identify the optimum one for this method, but no one can give optimal conditions for anesthesia induction and maintenance [6, 7]. Hypotension, sedation, and hypnotic effects on various brain regions are Propofol's most potent effects [8].

GABA responses are amplified, and GABAAR activity is activated directly by propofol [2, 6], diisopropylphenyl), a dialkylphenyl. 8 When Propofol was first discovered, it was believed that only the subunit was responsible for activating the GABA receptor directly [9]. Other subunits, however, were thought to be involved in the modulatory actions of the drug. Bradyarrhythmias and the conversion of tachyarrhythmias to sinus rhythm are occasionally promoted by 9, and this medication interacts with the CCS, [10] this suggests. Many mechanisms are proposed to explain these effects, including direct electrophysiological effects on the CCS or indirect effects such as alterations in the ANS tonus and acid-basic changes in the autonomic nervous system [11] Increased automaticity and reentry-related conduction anomalies are the two primary causes of SVT production [12].

Anesthesia strategy (thiopentone-isoflurane-nitrous oxide) reduced heart rate after intubation to 82.2 ± 3.17 in a trial with complete intravenous Propofol. In contrast, heart rate after intubation increased to 90 ± 3.14 in the balanced anesthesia technique group (p-value = 0.001). Similarly, the mean arterial pressure after intubation with complete intravenous Propofol was 76 ± 313.14, while the mean arterial pressure with the balanced anesthetic method was 88.53 ± 4.05 (p-value = 0.001).

Other studies have shown the same hemodynamic effects of complete intravenous Propofol and balanced anesthesia. With the balanced anesthetic method, the heart rate was 94.33 ± 21.03 with total intravenous Propofol and 91.05 ± 17.2 (p-value = 0.482). Mean arterial pressure with total intravenous Propofol was 86.1±19.13 and with balanced anesthesia 86.5±17.07 (p-value = 0.93) [13]. Anesthesia method leads in varying mean arterial pressures and heart rates depending on which study you look at. Thus, this research aimed to evaluate a potential treatment option for patients that would result in reduced variation in mean arterial pressure and heart rate.

OBJECTIVE

Aims of the research included: A balanced anesthetic method and complete intravenous anesthesia with Propofol are both used (thiopentone isoflurane-nitrous oxide).

Inclusion Criteria

- Age ranges from 12-60 years of both genders—patients undergoing elective surgery.
- ASA I (for individuals with no other systemic diseases) and ASA II (for patients with additional systemic diseases) (with some mild systemic illness but no functional limitation).

Exclusion Criteria

- Difficult-to-breathe individuals.
- The patient has to go through emergency surgery.
- Patients have previously experienced an allergic reaction to Propofol.

MATERIALS AND METHODS

In this study was performed in Kushtia Medical College Hospital, Kushtia, Bangladesh, from January 2019 to December 2020. Patients in group A were induced with an I/V propofol bolus and maintained with Propofol and nitrous oxide in oxygen until there was no longer any vocal response (50:50). To induce sleep in patients in Group B, we used thiopentone and kept them asleep with isoflurane and nitrous oxide in oxygen until they lost their eyelash response (50:50). To anesthesia, all patients were awakened from their sedations. Heart rate and mean arterial blood pressure were measured in the operating room at baseline and after 10 minutes of tracheal intubation as primary outcome measures (as defined operationally).

DATA ANALYSIS

SPSS V-28. was used to analyze the data. All the variables were subjected to descriptive statistics analysis. After ten minutes after intubation, the mean and standard deviation were determined for all quantitative data, such as age, mean arterial pressure, and heart rate. All qualitative factors, such as gender, were tallied using frequencies and percentages. The mean arterial pressure and heart rate were compared using an independent sample t-test. A p-value of 0.05 or less was considered significant. Stratification was used to regulate effect modifiers like gender and age.

RESULTS

Total intravenous anesthesia with Propofol was compared to a balanced anesthesia approach employing 60 patients (30 in each group) who met the inclusion/exclusion criteria (thiopentone isoflurane-nitrous oxide). When comparing ages, 70% (n=21) of those in Group-A were between the ages of 12 and 30, whereas 30% (n=9) of those in Group-A were between the ages of 31 and 60, mean±SD was calculated as 27.90+8.91 and 29.8+8.49 years, respectively (Table-I).

Table-I: Age distribution (n=60)

Age (in Years)	Group-A (n=30)		Group-B (n=30)	
	No. of Patients	%	No. of Patients	%
12-30	21	70	19	63.33
31-60	9	30	11	36.67
Total	30	100	30	100
Mean±SD	27.90±8.91		29.8±8.49	

Concerning the gender split, Sixty percent (n=18) of those in Group A were men, compared to 40 percent (n=12) of those in Group A and 46.67 percent (n=14) of those in Group B. (Table-II) After intubation, the heart rate in Group-A was lower than in Group-B due to the use of Propofol as a total intravenous anesthetic (thiopentone isoflurane-nitrous oxide). 83.4+2.36 and 90.36+1.95 in Group-B, the p-value was 0.001 while mean arterial pressure in Group-A was recorded as 78.6+2.25 and in Group-B 89.43+1.73, the p value was 0.000. (Table-III) After intubation, heart rate stratification according to age indicates 83.43+2.66 and 90.21+1.93 in Group-A and B, respectively. P-value was 0.00 in patients between 12-30 years of age, while 83.33+1.58 in Group-A and 90.64+2.06 in Group-B, the p-value was 0.00 in patients between 31-60 years of age. Stratification for heart rate after intubation regarding gender shows 83.67+2.57 in Group-A and 90.71+2.40 in Group-B, the p-value was 0.00 in male patients, while 83.22+2.26 in Group-A and 90.06+1.48 in Group-B, the p-value was 0.00 in female cases. (Table-IV)

Table-II: Gender distribution (n=60)

Gender	Group-A (n=30)		Group-B (n=30)
	No. of Patients	%	No. of Patients
Male	18	60	16
Female	12	40	14
Total	30	100	30

Table-III: Comparison of mean hemodynamic changes using propofol as total intravenous anesthesia with balanced anesthesia technique (thiopentone-isoflurane-nitrous oxide) (n=60)

Hamady- names	Group-A (n=30)		Group-B (n=30)		*P*- Value
	Mean	SD	Mean	SD	
Heart rate after intubation	83.4	2.36	90.36	1.95	0.001
Mean arterial pressure	78.6	2.25	89.43	1.73	0.000

Using age as a stratification factor in arterial pressure measurements after intubation shows 78.48+2.46 in Group-A and 89.42+1.46 in Group-B, the p-value was 0.00 in patients between 12-30 years of age, while 78.89+1.76 in Group-A and 89.45+2.21 in Group-B, the p-value was 0.00 in patients between 31-60 years of age. Stratification for arterial pressure after intubation regarding gender shows 78.22+2.37 in Group-A and 89.56+1.55 in Group-B, the p-value was 0.00 in male patients, while 79.17+2.04 in Group-A and 89.29+1.98 in Group-B, the p-value was 0.00 in female cases (Table-V).

Table-IV: Stratification for heart rate after intubation (n=60)

Age (in Years)	Group-A (n=30)		Group-B (n=30)		*P*-Value
	Mean	SD	Mean	SD	
12-30	83.43	2.66	90.21	1.93	0.00
31-60	83.33	1.58	90.64	2.06	0.00

Table-V: Stratification for arterial pressure after intubation (n=60)

Gender	Group-A (n=30)		Group-B (n=30)		*P*-Value
	Mean	SD	Mean	SD	
Male	83.67	2.57	90.71	2.40	0.00
Female	83.22	2.26	90.06	1.48	0.00
Age (in Years)	**Group-A (n=30)**		**Group-B (n=30)**		***P*-Value**
	Mean	**SD**	**Mean**	**SD**	
12-30	78.48	2.46	89.42	1.46	0.00
31-60	78.89	1.76	89.45	2.21	0.00

DISCUSSION

For its pharmacokinetic features such as quick walking, the absence of hangover symptoms, and simple titratability [14] propofol is an extremely popular anesthetic for inducing agents or sedatives. Reduced systemic vascular resistance (SVR) causes a drop in mean arterial pressure (MAP), which is not followed by an increase in heart rate to make up for it (HR) [15]. Antiemetic and anticonvulsant properties are also advantageous. Intubation without a muscle relaxant, day surgery, and the installation of a laryngeal mask airway have all been effective using this technique. Injection discomfort, dosage-dependent hypotension, and severe bradycardia are some of the drug's most serious side effects. The neuromuscular blockade induced by depolarizing and nondepolarizing neuromuscular blocking drugs is not potentiated by thiopental, in contrast to the latter. When administered alone, Propofol has been shown to improve intubating circumstances but has no impact on the evoked electromyogram or twitch tension [16]. Propofol is the anesthetic of choice for patients with malignant hyperpyrexia since it does not induce histamine release or provoke malignant hyperpyrexia.

However, Propofol does not produce adrenal suppression compared to another induction drug Etomidate, which is known to do even after a single dose [17]. A bolus dosage of 10 mg of Propofol has been used successfully to treat postoperative nausea and vomiting and manage refractory postoperative nausea and vomiting. Propofol does have some antiemetic action [18]. With propofol anesthesia, patients recover more quickly and more completely than with the balanced anesthesia technique [19, 20].

Several studies have shown disagreement over the use of the anesthetic method concerning mean arterial pressure and heart rate. Thus, this study was undertaken because of this. These researchers are looking at a procedure that has less impact on the patient's blood pressure and heart rate than others that may be available in the future.

In our research, out of 60 cases (30 in each group), 70% (n=21) and 63.33 % (n=19) were between the ages of 12 and 30 in Group A and B, while 30% (n=9) and 36.67 % (n=11) were between the ages of 31 and 60 in Group-A and B, mean±SD were calculated as 27.90±8.91 and 29.8±8.49 years respectively. In Group-A A and B, Among the n=18 and n=16 participants, 60% were men, whereas 40% were women in Groups A and B, respectively. There was a significant difference in heart rate after intubation between Group-A (83.4±2.36) and Group-B (90.3±1.95), with a p-value of 0.001; however, mean arterial pressure was 78.6±2.25 in Group-A and 89.43±+1.73 in Group-B, with a p-value of 0.000; and heart rate was 0.001 in both groups.

When using the balanced anesthetic method (thiopentone isoflurane-nitrous oxide), the heart rate after intubation was determined to be 82.2±3.17, whereas the complete intravenous propofol group's heart rate was 90±3.14 (p-value=0.001). Similarly, the mean arterial pressure after intubation with complete intravenous Propofol was 76±3.14 while the mean arterial pressure after intubation with the balanced anesthetic method was 88.5±34.05 (p-value = 0.001). 13 There was also research that demonstrated complete intravenous Propofol had the same hemodynamic impact as the balanced anesthetic method. The heart rate was 94.33±21.03 with total intravenous Propofol and 91.05±17.2 (p-value = 0.482). After receiving the whole dose of Propofol intravenously, the mean arterial blood pressure was 86.1±19.13 and with balanced anesthesia 86.5±17.07 (p-value = 0.93) 14; our results are at chances of success with those of the other investigation.

CONCLUSIONS

An infusion of Propofol did not affect heart rate, but thiopentone caused early tachycardia, according to [21] findings. Another research by Coley *et al*. [22] found that Propofol reduces tachycardia and hypertension associated with laryngoscopy and intubation. After tracheal intubation, the mean heart rate and mean arterial blood pressure in Group B patients increased, but the difference from baseline was not statistically significant. Propofol keeps hemodynamics stable, as evidenced by this finding. A study comparing HR and MABP in patients under balanced anesthesia revealed that HR was more excellent immediately after intubation, during maintenance and recovery periods. This remained true even after the patient was awakened.

We found that Propofol as a complete intravenous induction is superior to the balanced anesthesia method (thiopentone-isoflurane-nitrous oxide) in terms of mean heart rate and mean arterial pressure, which agrees with this previous worldwide research.

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Cite this article: Abu Sayeed Al Mamun *et al* (2021). Evaluation of Systolic Function Changes During Total IV Induction on Using Propofol vs. Balanced Anesthesia Method. *EAS J Anesthesiol Crit Care*, *3*(5), 91-95.