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BALANCED ANESTHESIA;

COMPARISON OF HEMODYNAMIC CHANGES ON USING PROPOFOL AS TOTAL IV INDUCTION AND BALANCED ANESTHESIA TECHNIQUE.

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ABSTRACT… Introduction: Porpofol is currently available popular intravenous anaesthetic agent. It is widely used for induction and maintenance of anaesthesia. Its main advantages are rapid induction and recovery, antiemetic and anticonvulsant effects. It has been used successfully for tracheal intubation without muscle relaxant, day surgery and for insertion of laryngeal mask airway. Its main disadvantages are pain on injection, dose dependent hypotension and severe bradycardia after induction. **Objectives:** The objective of the study was to compare mean hemodynamic changes using propofol as total intravenous anaesthesia with balanced anaesthesia technique (thiopentone-isoflurane-nitrousoxide). **Setting:** Department of Anaesthesia, Allied Hospital, Faisalabad. **Duration:** 6 months after approval of synopsis, from 18-7-2014 to 17-1-2015. **Study Design:** Randomized control trial. **Results:** 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 anaesthesia with balanced anaesthesia 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, 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, p value was 0.000. **Conclusion:** Propofol as total intravenous anaesthesia shows significanly better stability in haemodynamics when comapred with balanced anaesthesia technique (thiopentone-isoflurane-nitrous oxide) in surgical procedures

Key words: Balanced Anaesthesia, Propofol, TIVAS MAP, Surgical Procedures.

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INTRODUCTION

Anesthesia which is a medical intervention, itself does not provide any medical benefit to the disease process going on in the body but it provides suitable conditions for the other medical /surgical interventions to be done in a comfortable way. The anesthesia is a triangle of sedation, analgesia, and muscle relaxation. These multiple goals are achieved by using multiple drugs like I/V hypnotics, analgesics, muscle relaxants, anesthesia gases. Each of them has their own purpose in providing safe anesthesia.[1]

In order to design an anesthetic plan for a particular type of surgery, the type of drug used is important but not as much as familiarity of the anesthetist with a particular method or drug. Patients. There atre advantages and disadvantages of each drug and method which are decided on the basis of pt,s medical/surgical history and the type of surgery.[2] The best anesthetic agent is which has rapid onset, smooth induction, and rapid recoveryin addition of providing comfortable surgical anesthesia.[3]

Risks of anesthesia can be divided into two types i.e. major and minor, examples of major risks include failed intubation, laryngospasm, pulmonary embolism, and even cardiac arrest. whereas minor risks can include postoperative

nausea and vomiting and readmission to hospital.[4]

Up till now, inhalational drugs have remained the routine choice for maintenance of general anesthesia. One of the major reasons is the ease of use of sophisticated delivery systems for volatile anesthetics, which empowers the anesthetists to have a fine degree of control on the concentration administered to the patient.[4] Isoflurane is an inhalational anesthetic agent,[3] show neuroprotective effects that shield the cerebral tissue from bad proceedings such as apoptosis, degeneration, inflammation and energy failure caused by chronic neurodegenerative diseases, ischemia, stroke or nervous system trauma.[2]

General anesthesia has undergone a lot of advancements and improvements. The latest technique is total intravenous anesthesia. This technique has also undergone a lot of improvements ever since its introduction into clinical practice. In order to find out the best drug for this technique multiple drugs have been tried but no single drug can provide ideal conditions for induction and maintenece of anesthesia.[5,6] However; the most powerful effect of propofol is hypotension, sedating and hypnotic effects on different parts of the brain.[7]

The dialkylphenol, propofol (2,6, diisopropylphenol) potentiates GABA responses and directly activates $GABA_AR$ function.[8] Initially, only the property of direct activation of the GABA receptor by propofol was assumed to be dependent on the β subunit[8,9] while the modulatory effects were considered to involve other subunits.[9] occasionally promotes Brady arrhythmias and conversion of tachyarrhythmias to sinus rhythm,[10] suggesting that this drug interferes with the CCS. Several mechanisms are mentioned for those effects, such as direct electrophysiological effects on the CCS or indirect effects like changes in the autonomous nervous system (ANS) tonus and acid-basic changes.[11] The two basic mechanisms responsible for the generation of SVTs are the increase in automaticity and conduction abnormalities leading the reentry.[12]

In a study in total intravenous propofol group, heart rate after intubation was found to be 82.2±3.17 while with balanced anesthesia technique (thiopentone-isoflurane-nitrous oxide) heart rate after intubation was 90±3.14 (p-value = 0.001). Similarly, with total intravenous propofol mean arterial pressure after intubation was 76±3.14 while with balanced anesthesia technique mean arterial pressure after intubation was 88.53±4.05 (p-value = 0.001).[13]

In another study it was found that both total intravenous propofol and balanced anesthesia technique had same hemodynamic effect. Heart rate with total intravenous propofol was 94.33±21.03 and with balanced anesthesia technique 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).[14] Different studies show different results regarding the use of anesthesia technique in terms of mean arterial pressure and heart rate. So, this study was designed to assess a technique with less change in mean arterial pressure and heart rate that will be offered to the patients in future.

OBJECTIVE

The objective of the study was to:
Compare mean hemodynamic changes using propofol as total intravenous anesthesia with balanced anesthesia technique (thiopentone-isoflurane-nitrous oxide).

OPERATIONAL DEFINITIONS

Hemodynamic Changes

It was measured in terms of mean arterial pressure and heart rate.

Mean Arterial Pressure

The time weighted average of arterial pressure during a pulse cycle is mean arterial pressure (MAP). It is estimated as MAP = (SBP+2DBP)/3 (SBP =systolic blood pressure, DBP = diastolic blood pressure).

MAP was recorded 10 minutes after tracheal intubation.

Heart Rate
It is the number of heart beats in one minute. It is measured by pulse oximetry 10 minutes after tracheal intubation.

HYPOTHESIS
Propofol as total intravenous induction is better than balanced anesthesia technique (thiopentone-isoflurane-nitrous oxide) in terms of mean heart rate and mean arterial pressure.

MATERIALS AND METHODS

Setting
Department of Anesthesia, Allied Hospital, Faisalabad.

Duration
6 months after approval of synopsis from 18-7-2014 to 17-1-2015.

Study Design
Randomized control trial.

Sampling Technique
Non probability consecutive sampling.

Sample Size
Total 60 patients were selected for the study and randomly allocated to 2 groups by computer generated tables.

Inclusion Criteria
Age ranges from 12-60 years of both genders.
Patients undergoing elective surgery.

ASA grade I (patients with no other systemic disease) & ASA grade II (with some mild systemic illness but no functional limitation)

Exclusion Criteria
Patients having difficult airway.
Patients undergoing emergency surgery.
Patients with previous history of propofol allergy.

Data Collection Procedure
After taking approval from hospital ethical committee, cases of elective surgery fulfilling the inclusion criteria were enrolled and informed consent was taken after explaining all the procedure to the patient. Patients were visited a night before surgery to make a good rapport. Patients were divided into 2 groups by using computer generated table.

Patients in group A were induced with I/V propofol bolus till the disappearance of verbal response and maintained with propofol and nitrous oxide in oxygen (50:50). Patients in Group B were induced with thiopentone till the loss of eyelash reflex and maintained with isoflurane and nitrous oxide in oxygen (50:50). Anesthesia was stopped at the end of surgery in all the patients.

Primary outcome measures i.e. heart rate and mean arterial blood pressure (as in operational definition) was recorded in operation theatre at baseline and after 10 minutes of tracheal intubation.

Data Analysis
The data was analyzed by using SPSS V-16. Descriptive statistics were calculated for all the variables. Mean and standard deviation was calculated for all the quantitative variables like age, mean arterial pressure and heart rate after 10 minutes of intubation. Frequency and percentage was calculated for all qualitative variables like gender. Independent sample t-test was used to compare mean arterial pressure and heart rate between two groups. P-value less than 0.05 was taken as significant. Effect modifier like age and gender was controlled by stratification.

RESULTS
A total of 60 cases, (30 in each group) fulfilling the inclusion/exclusion critieria were enrolled to compare mean hemodynamic changes using propofol as total intravenous anesthesia with balanced anesthesia technique (thiopentone-isoflurane-nitrous oxide).

When age is compared 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.

(Table-I).

Regarding, Gender distribution 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. (Table-II)

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, 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, p value was 0.000. (Table-III)

Stratification for heart rate after intubation with regards to age shows 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, p value was 0.00 in patients between 31-60 years of age.

Stratification for heart rate after intubation with regards to gender shows 83.67+2.57 in Group-A and 90.71+2.40 in Group-B, p value was 0.00 in male patients, while 83.22+2.26 in Group-A and 90.06+1.48 in Group-B, p value was 0.00 in female cases. (Table-IV)

Stratification for arterial pressure after intubation with regards to age shows 78.48+2.46 in Group-A and 89.42+1.46 in Group-B, 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, p value was 0.00 in patients between 31-60 years of age.

Stratification for arterial pressure after intubation with regards to gender shows 78.22+2.37 in Group-A and 89.56+1.55 in Group-B, p value was 0.00 in male patients, while 79.17+2.04 in Group-A and 89.29+1.98 in Group-B, p value was 0.00 in female cases. (Table-V)

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	

Table-I. Age distribution (n=60)

Gender	Group-A (n=30)		Group-B (n=30)	
	No. of Patients	%	No. of Patients	%
Male	18	60	16	53.33
Female	12	40	14	46.67
Total	30	100	30	100

Table-II. Gender distribution (n=60)

Haemodynamics	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

Table-III. Comparison of mean hemodynamic changes using propofol as total intravenous anesthesia with balanced anesthesia technique (thiopentone-isoflurane-nitrous oxide) (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-IV. Stratification for heart rate 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

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	78.22	2.37	89.56	1.55	0.00
Female	79.17	2.04	89.29	1.98	0.00

DISCUSSION

Propofol a widely used anesthetic as induction agent or sedativeis favorite because of its pharmacokinetic properties, such as rapid awakening, absence of hangover effects, and easy titratability.[15] undesireable effects include reduction in mean arterial pressure (MAP) as a result of decrease systemic vascular resistance (SVR), which is not followed by a compensatory increase in heart rate (HR).[16] Other important advantages are antiemetic and anticonvulsant effects. It has been used successfully for tracheal intubation without muscle relaxant, day surgery and for insertion of laryngeal mask airway. Its major disadvantages are pain on injection, dose dependent hypotension and severe bradycardia after induction. Unlike thiopental, it does not potentiate neuromuscular blockade caused by depolarizing and nondeprolarizing neuromuscular blocking agents. Propofol produces no effect on the evoked electromyogram or twitch tension; but more favorable intubating conditions after propofol alone have been reported.[17] Propofol does not trigger malignant hyperpyrexia as wellas does not cause any histamine release and is probably the anesthetic of choice in patients with such conditions.

In contrast to another induction agent Etomidate which causes adrenal suppression on a single dose Propofol does not cause it even after prolonged infusion.[18] Propofol has some antiemetic activity and been used successfully to treat postoperative nausea vomiting as a bolus dose of 10 mg as well as for management of refractory postoperative nausea and vomiting.[19,20] The recovery of patient with propofol anesthesia is more rapid and better then balanced anesthesia technique.[21,22,23]

The reason behind this study was that different studies show controversy regarding the use of anesthetic technique in terms of mean arterial pressure and heart rate. So, this study is conducted to assess a technique with less change in mean arterial pressure and heart rate that may be offered to the patients in future.

In our study, out of 60 cases (30 in each group), 70%(n=21) and 63.33%(n=19) were between 12-30 years of age in Group A and B respectively, while 30%(n=9) and 36.67%(n=11) in Group-A and B were between 31-60 years of age respectively, mean+sd was calculated as 27.90+8.91 and 29.8+8.49 years respectively. in Group-A and B 60%(n=18)and 53.33%(n=16) were male while 40%(n=12) and 46.67%(n=14) in Group A and B were females respectively. Comparison of mean hemodynamic changes using propofol as total intravenous anesthesia with balanced anesthesia technique (thiopentone-isoflurane-nitrous oxide) and to conduct surgical procedures with least hemodynamic instability for the patients shows that heart rate after intubation in Group-A was 83.4+2.36 and 90.36+1.95 in Group-B, 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, p value was 0.000.

Our findings are somewhat similar with a study in total intravenous propofol group, heart rate after intubation was found to be 82.2±3.17 while with balanced anesthesia technique (thiopentone-isoflurane-nitrous oxide) heart rate after intubation was 90±3.14 (p-value=0.001). Similarly, with total intravenous propofol mean arterial pressure after intubation was 76±3.14 while with balanced anesthesia technique mean arterial pressure after intubation was 88.53±4.05 (p-value = 0.001).[13]

Another study found that both total intravenous propofol and balanced anesthesia technique had same hemodynamic effect. Heart rate with total intravenous propofol was 94.33±21.03 and with balanced anesthesia technique 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)[14], our findings are in contrast with this study.

In a study done by Grounds et al[24] there was no

change in heart rate after propofol injection while after thiopenone there was initial tachycardia. The results of another study performed by Coley et al[25] showed that propofol blunts the laryngoscopy and intubation related tachycardia and hypertension. We observed a rise in mean heart rate and mean arterial BP after tracheal intubation in Group B patients but there was no significant change when compared to baseline. It shows that the propofol maintains the hemodynamics. On comparing the heart rate (HR) and mean arterial blood pressure (MABP) it was found that they were always on the higher side immediate after intubation, during maintenance of and emergence phases in patients who were anaesthetised with balanced anesthesia.

However, the findings of our study in agreement with other international studies justify the hypothesis that "Propofol as total intravenous induction is better than balanced anesthesia technique (thiopentone-isoflurane-nitrous oxide) in terms of mean heart rate and mean arterial pressure.

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