



COMPARISON OF ISOFLURANE WITH PROPOFOL DURING LOWER LIMB SURGERY BY USING BISPECTRAL INDEX MONITOR

Anesthesiology

Dr. Tarun Lall

Professor, Dept of Anesthesiology, Sawai Man Singh Medical College & associated Hospitals, Jaipur, Rajasthan, India

Dr. Nipun Lamba*

Senior Resident, Dept of Anesthesiology, Sawai Man Singh Medical College & associated Hospitals, Jaipur, Rajasthan, India *Corresponding Author

ABSTRACT

Background : Awareness can be defined as the subjective experience of external or internal stimuli. Recent review of reported cases of awareness suggested the absence of volatile agents or intravenous agents during maintenance of anesthesia².

Material & Methods: The study was conducted in SMS Medical College and attached hospital, Jaipur after approval from the institutional ethical committee.

The present study was conducted in 50 patients 25 in each group of ASA physical status ½ posted for elective spinal surgery under general anesthesia, age between 20-50 years, weight the groups was analyzed using Chi Square test using SSP Software, which were further analyzed by using post hoc test (Chi Square test) and the difference in proportion were analyzed by using chi square test. P value <0.05 was consider significant. 40-80 kg.

Results: Mean value of recovery time 8.14+/-0.805 and 9.06+/-0.766 min with significant difference (p<0.05) in group A and group B respectively. Calculated average propofol infusion concentration throughout anesthesia was 5mg/kg/hrs and average isoflurane concentration was 1 vol%. Values for BIS were similar between both the groups during surgery.

Conclusion: Propofol based anesthesia provides early and better recovery with clear headedness for early neurological assessment for spine surgery.

KEYWORDS

Propofol, Isoflurane, Bispectral index, Hemodynamic Changes, Endotracheal Intubation

BACK GROUND

Awareness can be defined as the subjective experience of external or internal stimuli. Recent review of reported cases of awareness suggested the absence of volatile agents or intravenous agents during maintenance of anesthesia².

- 1). Potential Risk Factors:
 - a) History of awareness.
 - b) Absence of volatile agent or propofol during maintenance of anesthesia:
 - c) Certain surgical procedures :
 - i. Cardiac surgery.
 - ii. Caesarean section.
- (2). Cause of awareness:
 - a) Overly light anesthesia:
 - b) Increased anesthetic requirement:

Method of assessing depth of anesthesia is;

A.Subjective methods

1. Autonomic response
2. Isolated forearm technique

B. Objective methods

1. Spontaneous surface electromyogram (SEMG)
2. Lower esophageal contractility (LOC)
3. Heart rate variability (HRV)
4. Electroencephalogram and derived indices
 - Bispectral index.
5. Evoked potentials

In October 1996, Bispectral index system (BIS) achieved approval by FDA as the first electroencephalogram (EEG) – based monitor of anesthetic effect. BIS reduces complex EEG processing to a simple number ranging from 100 to 0. BIS decreases with increasing depth of anesthesia and adequate level of anesthesia is achieved with BIS ranging from 40 to 60. BIS monitoring allows reduction in the total amount of anesthetic that patients are exposed to and appears to decrease time for emergence and recovery.^{5,6,7} Incidence of intraoperative awareness has been reported to be 1.14%⁴

^BBIS monitor appears to be a valuable monitor to measure effect of anesthetic agent on level of consciousness, thereby helping to reduce incidence of awareness.^{8,9,1}

Aims and Objective

Aim of the study to compare propofol with isoflurane in maintenance of anesthesia during Bispectral index (BIS) monitor.

Primary Objective is: Hemodynamic Changes (SBP, DBP, and HR)

– **Secondary Objectives** are: Significant side effects of the drug used.

Materials and Methods

The study was conducted in SMS Medical College and attached hospital, Jaipur after approval from the institutional ethical committee. The present study was conducted in 50 patients 25 in each group of ASA physical status ½ posted for elective spinal surgery under general anesthesia, age between 20-50 years, weight 40-80 kg. And height >140 cm. Informed consent was taken from each patient.

STUDY DESIGN-

The study was conducted in a prospective randomized single blinded fashion. All patients under study were subjected to a detailed preanaesthetic examinations and investigations.

SAMPLE SIZE – Expecting the time of recovery in seed article, the sample size required to detect this difference at 95% confidence interval and 80% power came to 25 patients in each group.

Inclusion Criteria – ASA physical status I/II posted for elective spinal surgery under general anesthesia, age between 20-50 years, weight 40-80 kg and height > 140 cm. Informed consent was taken from each group.

Exclusion criteria are-

Patient on antihypertensive treatment, history of arrhythmias, uncontrolled hypertension. Known allergy to one of the drugs used, severe renal and hepatic impairment.

Patients were randomly divided using sealed envelope technique into two groups of 25 patients in each group.

Group A – Maintenance with 5 mg/kg/hr propofol

Group B – Maintenance with 1 MAC Isoflurane.

Randomization Method- Randomized, Parallel Group, Active Controlled Single Blinded, Single Center Trial. Randomization was done using the sealed envelope technique.

ANESTHESIA TECHNIQUE-

After institutional review board approval and informed written consent, 50 patients will be enrolled in the trial. Preanaesthetic assessment will be done prior to the day of surgery. Written consent is obtained. All patients kept nil per oral for six hours prior to surgery. All patients received 0.5mg of alprazolam as oral premedication night before surgery. Prior to surgery, standard monitoring of heart rate (HR), non intensive blood pressure (NIBP) Electrocardiography (ECG) and pulse oximeter (SPO2) was used with a multipara monitor. Then patient is cannulated with 16G IV cannula.

Premedication and induction -

Patients are premedicated with injection glycopyrolate 10mcg/kg, injection midazolam 0.05mg/kg injection fentanyl 5 mcg/kg. Patient in group A was induced with BIS guided injection of inj. Propofol 2mg/kg/hr to have between 40-60 throughout along with N2O+O2. The propofol infusion was tapered towards the end of the surgery and was stopped at the skin closure.

Patient in group B were induced with inj. Thiopentone 5 mg/kg in titrated manner until loss of eye lash reflexes and then intubated after adequate muscle relaxation is provided by intubation after adequate muscle relaxation is provided by intubation dose inj. Succinylcholine 0.5mg/kg EtCO2 monitor is connected to Endo tracheal tube. Unique Ziprep electrodes (Aspect Medical system) connected to the forehead and the sensor is connected to the BIS monitor.

Maintenance

Anesthesia was maintained with N2O+O2. Isoflurane was tapered towards the end surgery and stopped at the skin closure. Shift the patient in prone position.

Muscle relaxation in both the groups was achieved with the atracurium 5mg/kg bolus followed by 0.1 mg/kg.

Analgesia was achieved with inj. Fentanyl 2mcg/kg at induction and 1 mcg/kg thereafter every 1 hr. At the end of the surgery.

Extubation-

Neuromuscular blockade was reversed with inj. Neostigmine 50mcg/kg and inj. glycopyrolate 10mcg/kg.

Intraoperative hypotension was managed with fluid bolus inj. mephenteramine 3 mg bolus hypertension was managed by deepening anesthetic depth or analgesia and both.

Recovery time was recorded from duration of infusion or inhalational agent to eye opening on command, head lift and command and achievement of aldrete score=9

Systolic blood pressure, diastolic blood pressure, mean blood pressure, heart rate were recorded every min beginning just before induction until surgical incision and thereafter every 10 min throughout surgery. Total dose of propofol and isoflurane consumed during procedure was noted the two groups were compared in relation to hemodynamic alteration, recovery time and quality, post-operative nausea and vomiting.

There were no significant side effects in both groups.

Results-

The difference between mean value of the groups was analyzed using ANOVA one way test, which were further analyzed by using post hoc test (tukey test) and the difference in proportion were analyzed by using chi square test. P value <0.05 was consider significant.

Pulse Rate -

Comparison of men pulse rate among the groups at different time interval showing in table 8

Pulse Rate		Baseline	At induction	At intubation	Immediate intubation	5	10	20	30	40	60	75	90	At time infusion stop	At end of surgery
A	N	25	25	25	25	25	25	25	25	25	25	25	25	25	25
	Mean	92.12	94.52	100.24	102.72	96.36	95.60	91.56	86.36	83.12	81.56	84.13	83.30	84.56	97.84
	SD	6.60	5.07	7.99	13.15	7.30	8.22	8.84	11.52	11.42	9.33	10.77	8.55	10.80	8.84
B	N	25	25	25	25	25	25	25	25	25	25	25	25	25	25
	Mean	92.92	94.24	103.12	102.60	94.32	91.96	88.52	87.96	82.40	80.36	77.52	80.45	81.52	93.88
	SD	5.53	4.41	7.39	10.21	6.95	5.44	6.10	7.06	9.12	9.76	9.09	7.97	8.72	7.66
Mean diff		-0.80	0.28	-2.88	0.12	1.44	3.64	3.04	-1.60	0.72	1.20	6.61	2.85	3.04	3.96
P value		0.64	0.83	0.19	0.97	0.47	0.07	0.16	0.56	0.81	0.66	0.03	0.44	0.28	0.10
Significance		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Mean blood Pressure-

Comparison of men blood pressure (mm og Hg.) among the groups at different time interval.

MBP		Baseline	At induction	At intubation	Immediate intubation	5	10	20	30	40	60	75	90	At time infusion stop	At end of surgery
A	N	25	25	25	25	25	25	25	25	25	25	25	25	25	25
	Mean	95.04	96.37	101.15	100.80	88.31	86.20	84.43	85.84	84.92	84.23	83.37	84.27	83.45	94.17
	SD	5.64	4.97	6.37	4.24	6.63	4.67	5.30	6.26	5.67	6.95	9.21	5.88	18.47	6.21
B	N	25	25	25	25	25	25	25	25	25	25	25	25	25	25
	Mean	93.44	94.96	102.96	99.50	91.21	87.80	86.61	86.43	85.60	84.35	85.51	82.92	88.74	96.39
	SD	4.59	5.68	5.51	5.78	4.88	3.60	4.45	3.89	3.80	4.20	5.34	26.62	3.15	6.30
Mean diff		1.60	-0.12	-0.91	1.29	-2.91	-1.60	-2.19	0-5.9	-0.68	-0.12	-2.13	1.35	-5.29	-2.21
P value		0.28	0.94	0.59	0.37	0.08	0.18	0.69	0.62	0.62	0.94	0.32	0.88	0.60	0.22
Significance		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

BIS Monitor

Comparison of mean BIS score among the groups at different time interval showing in table 11

BIS		Baseline	At induction	At intubation	Immediate intubation	5	10	20	30	40	60	75	90	At time infusion stop	At end of surgery
A	N	25	25	25	25	25	25	25	25	25	25	25	25	25	25
	Mean	91.80	70.16	57.76	60.12	55.60	51.40	45.76	44.88	44.60	44.28	44.29	46.09	59.48	72.64
	SD	4.41	14.87	2.24	2.42	4.88	4.43	5.25	4.84	3.65	3.30	2.99	3.21	7.10	5.07
B	N	25	25	25	25	25	25	25	25	25	25	25	25	25	25
	Mean	91.64	73.16	57.28	58.92	59.76	49.92	45.16	43.32	43.00	43.88	44.36	49.00	62.84	72.48
	SD	5.55	5.25	3.75	4.82	9.38	5.45	5.85	5.45	3.80	5.43	4.00	6.30	4.90	6.30

Mean diff	0.16	-3.00	0.48	1.20	-4.16	1.48	0.60	1.56	1.60	0.40	-0.7	-2.91	-3.36	0.16
P value	0.91	0.34	0.58	0.27	0.55	0.29	0.70	0.29	0.13	0.75	0.95	0.18	0.06	0.90
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

BIS Monitor

Showing BIS value intraoperatively within range of 40–60. There is insignificant difference seen in between groups at different time intervals.

Postoperative Nausea and Vomiting.

Showing the Postoperative Incidence of Nausea and Vomiting Less in patients who received propofol than isoflurane.

DISCUSSION

In this systematic analysis of the literature, the ECG based bispectral index (BIS) monitor has proven to be a useful indicator of anaesthetic depth 56.

The present study was conducted in the department of anaesthesiology, S.M.S Medical college and Attached Group of Hospitals, Jaipur with due permission from committee of the research review board.

There was no statistically significant difference between both groups with regards to age (P- value > 0.05).

Other factors like sex distribution, ASA grade distribution during of surgery and volume of intravascular fluids administered intra operatively were also comparable in both groups (P- value>0.05).

The mean baseline hemodynamic parameters (pulse rate, SBP, DBP, and MAP) AND bis VALUE WERE COMPRABLE IN BOTH THE GROUPS.

Comparison between the two groups revealed that the MAP was comparable at baseline (P- value > 0.05). Just after induction, MAP comparable in both group and may be attributed to the hypotensive effect. After intubation, MAP values in Group A and Group B at all time –points, differences being insignificant just after infusion, 15, 30, 60 and 90 min. and just after reversal (P – value > 0.05).

The mean pulse rate in Group A (Study) decreased during infusion, but the change was not found to be statistically significant (P – value > 0.05). Fall in pulse rate after induction was statistically significant (P – value < 0.05). The mean pulse rate remained below baseline at all time points before extubation, only nearing baseline just after insufflations. None of the patients developed severe hypotension unresponsive to fluids. After extubation, pulse rate increased to cross baseline, but the difference was not found to be statistically significant (P – value > 0.05).

In GroupA (Study), there was a significant fall in the mean BIS value just before intubation. Thereafter, it remained significantly below baseline at all time points (P – value < 0.05). After intubation, to remain nearly constant till end of the surgery, with further increase after reversal and extubation.

Comparison between the two groups revealed that the mean BIS value was comparable at baseline and all time points during maintenance period (P – value > 0.05). In a study conducted by Mishra LD also, the depth of anaesthesia as BIS was comparable between two groups at all time points during maintenance period (P – value > 0.05). In present study, significant indifferences in BIS were found just after, induction, intubation, reversal and extubation (P – value > 0.05).

Conclusion

Propofol based anaesthesia provides early and better recovery with clear headedness for early neurological assessment for spine surgery. This technique is also helpful in achieving an eco-friendly environment around the operating area.

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