

Original article:

A Comparative Study of Incidence of Occurrence of Complications between Propofol and Propofol - Sevoflurane Method of Induction of Anaesthesia in Hypertensive Patients at a Tertiary Care Hospital

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Abstract

Background: An increased risk for the occurrence of adverse cardiovascular events is associated with the induction of anaesthesia in hypertensive patients. One of the commonly used intravenous anaesthetic solutions is propofol. It is routinely used because of its favourable properties like quick onset of action, early recovery with the discontinuation of drug and absence of significant nausea. One of the alternatives to the propofol is sevoflurane. Hence; we planned the present study to compare the frequency of occurrence of complications between propofol and propofol-sevoflurane methods of induction of anaesthesia in hypertensive patients.

Materials & Methods: The present study included assessment of 50 patients who underwent elective lower abdominal surgery. Patients taking angiotensin converting enzyme inhibitors stopped taking the drug 24 hours before the operation. After meeting the inclusion and exclusion criteria, all the patients were divided into two study group with 25 patients in each group. Group A included patients who received propofol 2 mg/kg IV and Group B included patients who received propofol 1mg/kg followed by inhalation of 4% sevoflurane. All the hemodynamic parameters of the patients including the heart rate, blood pressure, oxygen saturation etc were continuously monitored. Recording of all the complications was done and assessed.

Results: Non-significant results were obtained while comparing the demographic parameters in between the two study groups. Among the group A patients, Apnoea was the most commonly encountered complication whereas in group B, increased requirement of ephedrine was the most commonly observed complication. No patient in group B complained of post-operative cough whereas one patient in group A complained of post-operative cough. Significant difference was obtained while comparing the occurrence of apnoea and increased requirement of ephedrine in between the two study groups.

Conclusion: Propofol in combination with sevoflurane is better than the induction with propofol alone.

Key words: Anaesthesia, Propofol, Sevoflurane

INTRODUCTION

Hypertension is one of the most common causes requiring medical attention and occurs with higher frequency in many parts of the world. Moreover, the incidence of hypertension increases with age and affects men at a slightly higher rate than

women.^{1,2}Worldwide, hypertension may affect as many as 1 billion people and be responsible for approximately 7.1 million deaths per year.³

An increased risk for the occurrence of adverse cardiovascular events is associated with the induction of anaesthesia in hypertensive

patients.⁴Laryngoscopy is often followed by increased arterial pressure which may lead to myocardial ischemia, transient ventricular failure and arrhythmia. In spontaneous and controlled ventilation, Laryngeal mask airway (LM) has been safely and effectively used.⁵

One of the commonly used intravenous anaesthetic solutions is propofol. It is routinely used because of its favourable properties like quick onset of action, early recovery with the discontinuation of drug and absence of significant nausea.^{6,7} The most commonly reported adverse events with this drug are the development of respiratory depression, hypotension, pain, infection during infusion and myoclonus. One of the alternatives to the propofol is sevoflurane because of its pleasant odor and its properties that does not irritate the airways and provides a rapid induction and recovery.⁸

Hence; we planned the present study to compare the frequency of occurrence of complications between propofol and propofol-sevoflurane methods of induction of anaesthesia in hypertensive patients.

MATERIALS & METHODS

The present study was conducted in the department of general anaesthesia of Dayanand Medical College & Hospital, Ludhiana, Punjab (India) and included assessment of 50 patients who underwent elective lower abdominal surgery. Ethical approval was taken from the institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol.

Exclusion criteria for the present study included:

- Patients with uncontrolled cardio-vascular diseases,
- Patients with history of any other systemic illness,
- Patients with any known drug allergy,

- Patients who underwent any major surgical procedure in the past one year

Patients taking angiotensin converting enzyme inhibitors stopped taking the drug 24 hours before the operation.

Inclusion criteria for the present study included:

- Patient with history of hypertension for which they were being treated and the admission blood pressure was <160 mmHg systolic and <100 mm Hg diastolic
- Patients between 40 to 60 years of age

After meeting the inclusion and exclusion criteria, all the patients were divided into two study group with 25 patients in each group as follows:

Group A: Patients who received propofol 2 mg/kg IV

Group B: Patient who received propofol 1mg/kg followed by inhalation of 4% sevoflurane

All the hemodynamic parameters of the patients including the heart rate, blood pressure, oxygen saturation etc were continuously monitored. Recording of all the complications was done and assessed. All the results were analyzed by SPSS software. One – way ANOVA and Chi- square test were used for the assessment of level of significance. P-value of less than 0.05 was taken as significant.

RESULTS

Both the groups consisted of 25 patients each. The mean age of patients in group A and group B were 61.5 and 59.2 years respectively (Table 1, Graph 1). 12 patients in group A were males while 13 were females. In group B, 14 patients were males while 11 were females. Mean weight of the patients in group A and group B were 71.5 and 70.8 kg respectively. Non-significant results were obtained while comparing the demographic parameters in between the two study groups. Among the group A patients, Apnoea was the most commonly

encountered complication whereas in group B, increased requirement of ephedrine was the most commonly observed complication. No patients in the group B complained of difficulty in opening of the jaw whereas one patient in group A complained of difficulty in jaw opening (Table 2, graph 2). Laryngospasm was encountered in one patient of the group A while no patients in group B showed laryngospasm. No patient in group B complained of post-operative cough whereas one patient in group A complained of post-operative cough. Significant difference was obtained while comparing the occurrence of apnoea and increased requirement of ephedrine in between the two study groups.

DISCUSSION

Propofol is one of the potent intravenous hypnotic agents which is widely used for the induction and maintenance of anaesthesia and for sedation in the intensive care unit. Propofol copes under the category of global central nervous system depressant.^{9,10} GABA (A) receptors are directly activated by it. Recovery is rapid even after prolonged use. Sevoflurane is another commonly available anaesthetic solution. Special care is required while handling anaesthesia in hypertensive patients.¹⁰ Hence; we planned the present study to compare the frequency of occurrence of complications between propofol and propofol-sevofluranemethods of induction of anaesthesia in hypertensive patients.

In the present study, we observed that patients on propofol in comparison to patients on propofol in combination with sevoflurane encountered more complications (p -value > 0.05) (Table 2). Our results were in correlation with the results obtained by who Saad El-Din Tolba et al also reported similar findings.¹¹ Weisenberg et al determined a propofol dose that minimizes hemodynamic

changes on induction of anesthesia in patients chronically taking angiotensin-converting enzyme inhibitors (ACEIs). 88 ASA physical status II and II hypertensive patients chronically taking ACEIs, scheduled for elective abdominal surgery with general anesthesia. Patients were premedicated with brotizolam and anesthesia was induced with propofol, fentanyl, and rocuronium; anesthesia was then maintained with isoflurane. Patients were randomly assigned to undergo anesthetic induction with propofol in doses of 1.3, 1.6, 2.0, or 2.3 mg/kg. Oscillometric blood pressure and heart rate were evaluated at one-minute intervals during the first 10 minutes of anesthesia. Administration of any of these drugs was considered a pharmacological intervention. After adjusting for covariables in a model assuming a linear relationship between dose and log-response, each propofol dose increase of 0.3 mg/kg was associated with a 31% increase in mean number of hypotensive/bradycardic episodes requiring interventions. Based on our model, a dose of 1.3 mg/kg resulted in the fewest number of pharmacological interventions. In patients chronically taking ACEIs, low doses of propofol reduce hemodynamic instability.¹² Saad El-Din Tolba et al assessed 90 patients with stable hypertension and divided them into three study groups. Each group consisted of 30 patients. The induction in group S was by sevoflurane 4% + 50% oxygen +50% nitrous oxide by inhalation using the tidal volume technique. The induction in group P was by propofol 2mg/kg IV, and in group PS (combination group) was by propofol 1mg/kg followed by inhalation of 4% sevoflurane. Mean arterial blood pressure (MAP) was significantly lower within each group after induction in comparison to before induction. According to patients induction was pleasant in 90% of patients

in the propofol group and was 88% in the combination group and 40% in the sevoflurane group. From the study, they concluded that in the combination group there is the advantage of patient satisfaction and rapid induction with no apnea which occurred with propofol and had the advantage of hemodynamic stability encountered with sevoflurane.¹¹

Hermanns et al compared the feasibility of cortical SSEP in idiopathic and neuromuscular scoliosis using anaesthetics known to have only minimal effect on SSEP recordings. Total intravenous anaesthesia with propofol and remifentanyl as continuous infusion was standardized for all the patients. Median and tibial nerve cortical SSEP were monitored in 54 patients who underwent surgery for spinal deformity. Twenty-seven had idiopathic scoliosis and 27 had neuromuscular scoliosis. The portion of reproducible results and intraoperative changes were compared between the groups. In both groups, cortical SSEP could be monitored with sufficient reliability. Only in two patients with idiopathic and four patients with neuromuscular scoliosis no reproducible traces could be obtained. The amplitudes in patients with neuromuscular scoliosis were lower than in those with idiopathic scoliosis, but not statistically significant. There were no postoperative neurological deficits. The number of false positive and true positive did not differ between the groups.¹³ Fung et al compared the effect of sevoflurane/ remifentanyl and propofol/remifentanyl anaesthesia on Somatosensory evoked potential (SSEP) during scoliosis corrective surgery and assessed patients' clinical recovery profiles. Twenty patients with idiopathic scoliosis receiving surgical correction with intraoperative SSEP monitoring were prospectively randomised to receive sevoflurane/remifentanyl anaesthesia or

propofol/remifentanyl anaesthesia. During surgery, changes in anaesthesia dose and physiological variables were recorded, while SSEP was continuously monitored. A simulated 'wake-up' test was performed postoperatively to assess speed and quality of recovery from anaesthesia. On cessation of anaesthesia, time to eye-opening and toe movement was shorter following sevoflurane. These findings indicated that propofol produces a better SSEP signal than sevoflurane. However adjustments in sevoflurane concentration result in faster changes in the SSEP signal than propofol. Assessment of neurological function was facilitated more rapidly after sevoflurane anaesthesia.¹⁴

Ku et al compared the effects on SSEP and the clinical recovery profiles of sevoflurane/nitrous oxide and propofol anaesthesia during surgery to correct scoliosis. Twenty adolescent patients were randomized into two groups of 10. One group received sevoflurane-nitrous oxide anaesthesia and the other received propofol.v. anaesthesia. An alfentanil infusion was used for analgesia in both groups. Changes in anaesthetic concentration produced little effect on the latency of SSEP, but the effect on the variability of SSEP amplitude was significant. Sevoflurane produced a faster decrease in SSEP and a faster recovery than propofol. On emergence, patients who received sevoflurane tended to have shorter recovery times to eye opening and toe movement. Those who had received sevoflurane were significantly more lucid and cooperative in recovery. Sevoflurane produces a faster decrease and recovery of SSEP amplitude as well as a better conscious state on emergence than propofol.¹⁵

CONCLUSION

From the above results, the authors concluded that inhalation of propofol in combination with sevoflurane is better than the induction with

propofol alone. However, future studies are recommended for better exploration of this field of medicine.

Table 1: Correlation of demographic details of the patients

Parameter		Group A (n=25)	Group B (n=25)	p-value
Mean age (years)		61.5	59.2	0.42
Gender	Male	12	14	0.15
	Female	13	11	
Mean weight (kg)		71.5	70.8	0.64

Graph 1: Demographic details of the patients

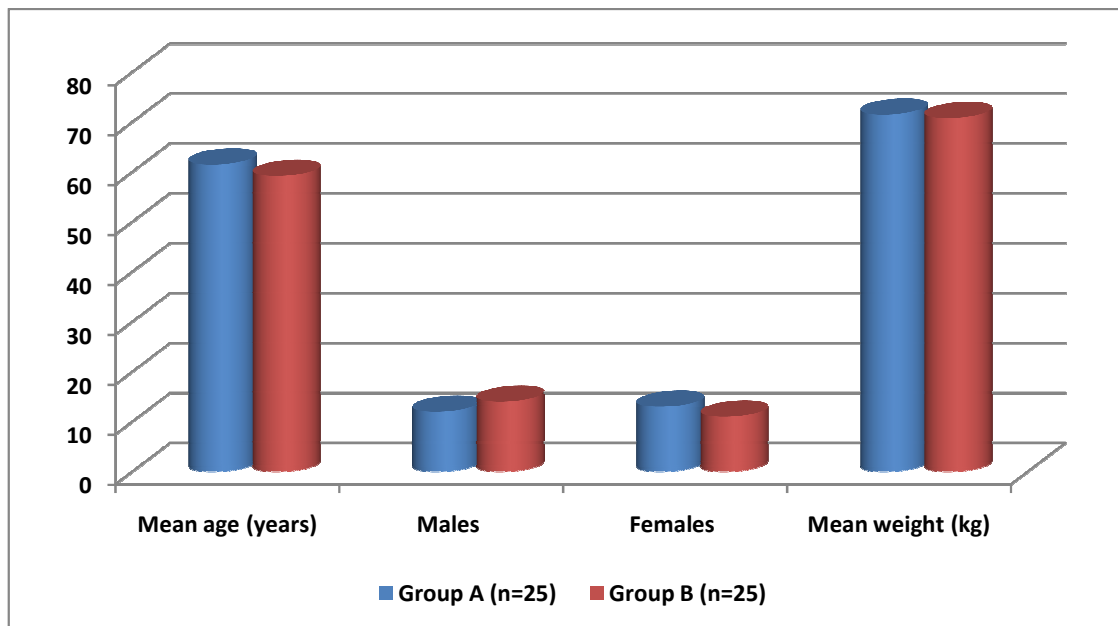
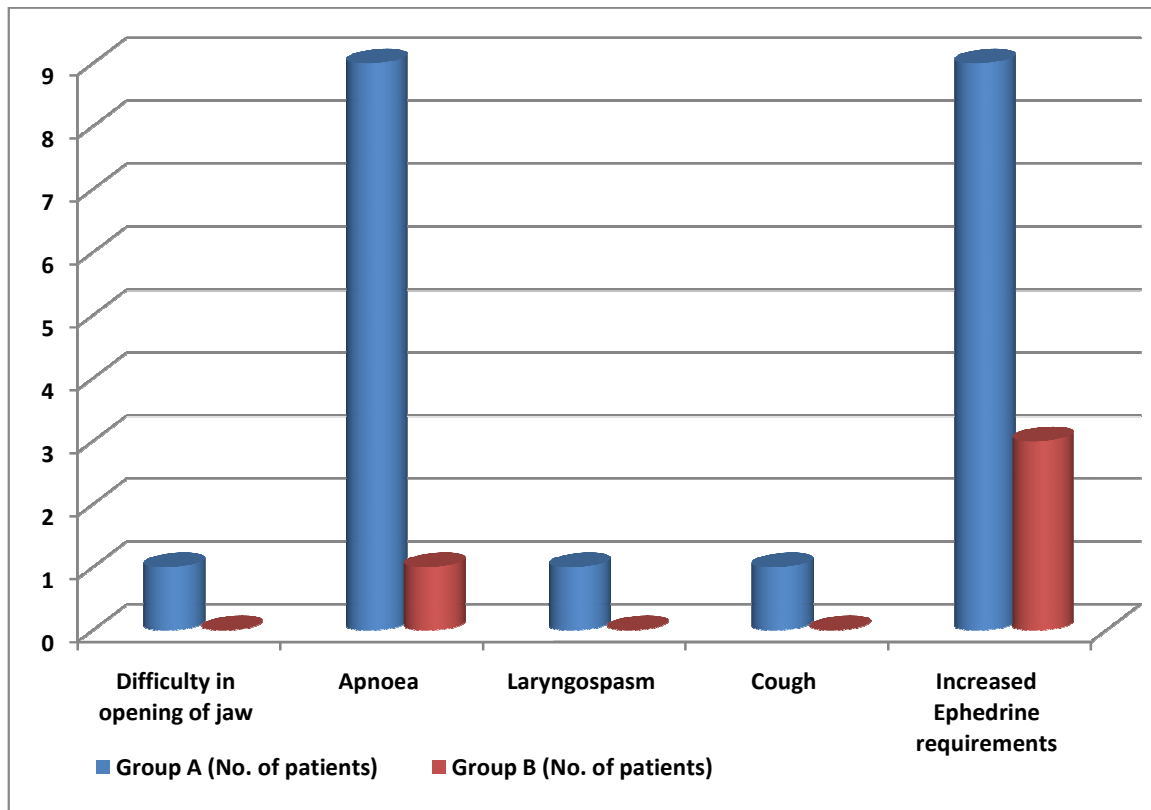


Table 2: Correlation of complications in patients of the two study groups

Complications	Group A (No. of patients)	Group B (No. of patients)	p-value
Difficulty in opening of jaw	1	0	0.33
Apnoea	10	1	0.01*
Laryngospasm	1	0	0.33
Cough	1	0	0.33
Increased Ephedrine requirements	9	3	0.02*

*: Significant

Graph 2: Complications in patients of the two study groups



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