

Sevoflurane Anaesthesia and Propofol Based Anaesthesia- A Comparative Study

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Abstract

Background: Total intravenous anaesthesia (TIVA) is a technique of anaesthesia which involves use of intravenous drugs to anaesthetize the patient without the use of inhalational agents. The present study was conducted to compare sevoflurane (inhalational) anaesthesia and propofol (Tiva) based anaesthesia. **Subjects and Methods :** 80 ASA I and II patients, aged 18-65 years of either sex undergoing surgery under general anaesthesia were randomly divided into two groups. Group I received sevoflurane inhalational induction via a vital capacity rapid inhalational induction (VCRII) technique using 8% sevoflurane. Group II patients were induced with propofol i.v 2-2.5mg/kg. Parameters such as MAP and recovery profile was recorded in both groups. **Results:** Group I comprised of 22 males and 18 females and group II had 16 males and 24 females. The mean MAP (mmHg) in group I and II was 100.5 and 102.1, before induction was 98.2 and 97.7, after induction was 89.0 and 88.4, 5 minutes after intubation was 93.4 and 91.0, at 15 minutes was 100.1 and 97.8, at 30 minutes was 100.0 and 99.3 and at 45 minutes was 100.9 and 99.1 respectively. The recovery profile such as time of spontaneous eye opening was 9.5 minutes in group I and 13.2 minutes in group II, time to verbal communication was 11.5 minutes in group I and 14.3 minutes in group II and time to mental orientation was 15.6 minutes in group I and 19.0 minutes in group II. The difference was significant ($P < 0.05$). **Conclusion:** Sevoflurane is better than propofol in terms of faster induction and rapid recovery.

Keywords: Sevoflurane, Propofol, Intravenous Anaesthesia.

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Introduction

Total intravenous anaesthesia (TIVA) is a technique of anaesthesia which involves use of intravenous drugs to anaesthetize the patient without the use of inhalational agents.^[1] The popularity of propofol as a main component of TIVA has been attributed to its pharmacokinetic and pharmacodynamic properties. Its shorter onset of action, rapid metabolism and no significant accumulation on prolonged use makes it an ideal choice. With the advent of advanced computer drug predictable.^[2] It allows the administration system, the i.v infusion of Propofol has become much safer and anaesthesiologist to vary the depth of anaesthesia by just controlling the rate of infusion of the drug. The TIVA concept is simple, less toxic than inhalational agents, less risk of malignant hyperthermia with no risk of any environmental pollution.^[3]

Propofol can be used through manual infusion or target controlled infusion pump. When propofol infusion is given

in manual infusion pumps, pharmacokinetics of drug to be utilized during infusion otherwise a fixed infusion rate may result in rising, declining or stable concentration leading to underdosage or overdosage. For a stable plasma concentration varying rate of infusion may be required.^[4]

Sevoflurane is a relatively newer inhalational anaesthetic agent. Its insoluble nature, low blood gas partition coefficient, no pungency and rapid wash in and rapid wash out makes it an ideal choice for the volatile induction and maintenance of anaesthesia.^[5] Its good haemodynamic profile and non-irritating nature also adds to its increased acceptance amongst the anaesthesiologists. Use of Sevoflurane for the induction and maintenance of anaesthesia produces a reduction in costs, predominantly through less drug wastage.^[6] The present study was conducted to compare sevoflurane (inhalational) anaesthesia and propofol (Tiva) based anaesthesia.

Subjects and Methods

The present study was conducted from Sept 2018 to Sept 2019 in GMC srinagar and associated hospitals, J& K. It comprised of 80 ASA I and II patients, aged 18-65 years of either sex undergoing surgery under general anaesthesia. All were selected after they agreed to participate.

They were randomly divided into two groups. Group I received sevoflurane inhalational induction via a vital capacity rapid inhalational induction (VCR II) technique using 8% sevoflurane from a closed circuit primed for 1 minute. Maintenance was done with 1.5-2% sevoflurane. Group II patients were induced with propofol i.v 2-2.5mg/kg. Intraoperative maintenance was done with multistep propofol infusion (8mg/kg/hr -3mg/kg/hr) via infusion pump. Parameters such as MAP and recovery profile was recorded in both groups. Results were compared and assessed statistically. P value less than 0.05 was considered significant.

Results

Table 1: Distribution of patients

Groups	Group I	Group II
Agent	Sevoflurane	Propofol
M:F	22:18	16:24

[Table 1] shows that group I comprised of 22 males and 18 females and group II had 16 males and 24 females.

Table 2: Comparison of MAP (mmHg) in both groups

MAP (mmHg)	Group I	Group II	P value
Baseline	100.5	102.1	0.12
Before induction	98.2	97.7	0.32
After induction	89.0	88.4	0.45
5 minutes after intubation	93.4	91.0	0.91
15 minutes	100.1	97.8	0.94
30 minutes	100.0	99.3	0.11
45 minutes	100.9	99.1	0.17

[Table 2, Figure 1] shows that mean MAP (mmHg) in group I and II was 100.5 and 102.1, before induction was 98.2 and 97.7, after induction was 89.0 and 88.4, 5 minutes after intubation was 93.4 and 91.0, at 15 minutes was 100.1 and 97.8, at 30 minutes was 100.0 and 99.3 and at 45 minutes was 100.9 and 99.1 respectively. The difference was non-significant ($P > 0.05$).

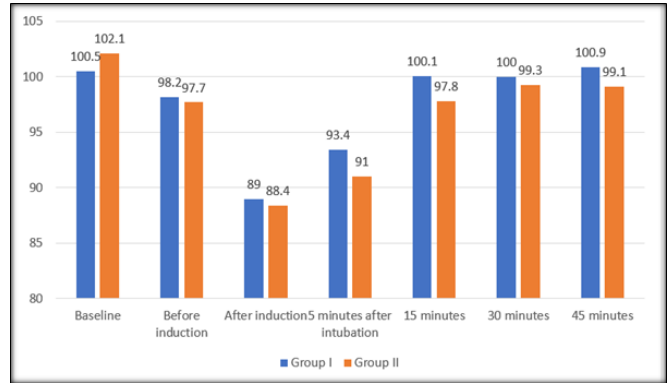


Figure 1: Comparison of MAP (mmHg) in both groups

[Table 3, Figure 2] shows that recovery profile such as time of spontaneous eye opening was 9.5 minutes in group I and 13.2 minutes in group II, time to verbal communication was 11.5 minutes in group I and 14.3 minutes in group II and time to mental orientation was 15.6 minutes in group I and 19.0 minutes in group II. The difference was significant ($P < 0.05$).

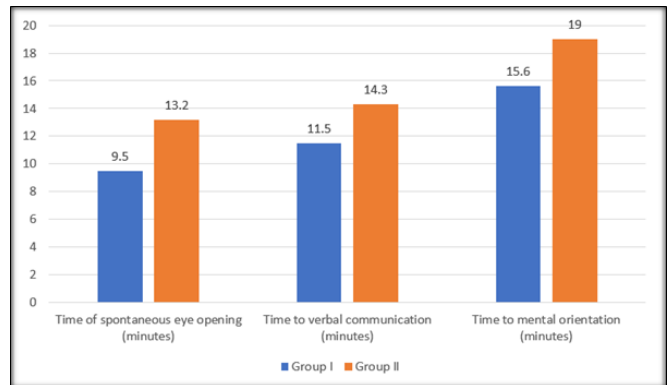


Figure 2: Comparison of recovery profile

Discussion

Propofol causes dose dependent reductions of cerebral metabolic rate and blood flow so coupling of flow metabolism is maintained.^[7] It also causes reduction of intracranial pressure. Carbon dioxide reactivity and autoregulation are maintained. It has property of rapid onset and is short acting, rapid recovery, reduces ICP, antiemetic and anticonvulsant action which is beneficial in neurosurgery. It has no analgesic activity, so propofol combined with intravenous opioids for maintenance of anaesthesia.^[8] Sevoflurane is fluorinated methyl isopropyl ether. Vapor pressure is 160 mm of hg and is

Table 3: Comparison of recovery profile

Recovery profile	Group I	Group II	P value
Time of spontaneous eye opening (minutes)	9.5	13.2	0.02
Time to verbal communication (minutes)	11.5	14.3	0.01
Time to mental orientation (minutes)	15.6	19.0	0.04

used in conventional nonheated vaporizer. Blood gas partition coefficient is 0.69 and so induction and recovery are rapid. It has pleasant odor, non-irritant so, can be used for induction and maintenance of anaesthesia.^[9] The pharmacokinetics of the elimination of inhaled anaesthetics depends on the duration of anaesthesia and blood gas partition coefficient. Computer simulation is used to determine context sensitive half times for volatile anaesthetics.^[10] The present study was conducted to compare sevoflurane (inhalational) anaesthesia and propofol (Tiva) based anaesthesia.

In present study, group I comprised of 22 males and 18 females and group II had 16 males and 24 females. Rasool et al,^[11] conducted a study on 60 patients ASA Grade I and II aged 18-65 years who were randomly divided into two groups. Group A received Sevoflurane inhalational induction via a vital capacity rapid inhalational induction (VCR II) technique using 8% Sevoflurane from a closed circuit primed for 1 minute. Maintenance was done with 1.5-2% Sevoflurane. Group B patients were induced with Propofol i.v 2-2.5mg/kg. Intraoperative maintenance was done with multistep Propofol infusion (8mg/kg/hr -3mg/kg/hr) via infusion pump. Induction time was faster in Sevoflurane group as compared to Propofol group ($p < 0.001$), which was highly significant. The intraoperative haemodynamics were comparable between the two groups with no statistically significant difference. The recovery profile was significantly ($p < 0.001$) better with Sevoflurane group as regards the spontaneous eye opening, verbal communication and mental orientation. Although the total volume of each agent used was almost similar in both groups, but the cost incurred in Sevoflurane anaesthesia is still higher than the Propofol based anaesthesia.

We found that mean MAP (mmHg) in group I and II was 100.5 and 102.1, before induction was 98.2 and 97.7, after induction was 89.0 and 88.4, 5 minutes after intubation was 93.4 and 91.0, at 15 minutes was 100.1 and 97.8, at 30 minutes was 100.0 and 99.3 and at 45 minutes was 100.9 and 99.1 respectively. Kumar et al,^[12] in their study a total of 1621 patients were randomly assigned to either propofol (685 patients) or inhalational anaesthesia (936 patients). There was no difference in unplanned admission to hospital between propofol and inhalational anaesthesia (1.0% vs 2.9%, respectively; $p = 0.13$). The incidence of postoperative nausea and vomiting was lower with propofol than with inhalational agents (13.8% vs 29.2%, respectively; $p < 0.001$). However, no difference was noted in post-discharge nausea and vomiting

(23.9% vs 20.8%, respectively; $p = 0.26$). Length of hospital stay was shorter with propofol, but the difference was only 14 min on average. per patient-anaesthetic episode ($p < 0.001$). Therefore, based on the published evidence to date, maintenance of anaesthesia using propofol appeared to have no bearing on the incidence of unplanned admission to hospital and was more expensive, but was associated with a decreased incidence of early postoperative nausea and vomiting compared with sevoflurane or desflurane in patients undergoing ambulatory surgery.

We observed that recovery profile such as time of spontaneous eye opening was 9.5 minutes in group I and 13.2 minutes in group II, time to verbal communication was 11.5 minutes in group I and 14.3 minutes in group II and time to mental orientation was 15.6 minutes in group I and 19.0 minutes in group II. Shah A and Adoraja RN,^[13] compared the emergence and post operative recovery profile between Sevoflurane and Propofol. They found that Sevoflurane has a better recovery profile than the intravenous Propofol.

Conclusion

Authors found that sevoflurane is better than propofol in terms of faster induction and rapid recovery.

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