



Observational Study to Compare Intraoperative Haemodynamics and Recovery Profile with Desflurane and Sevoflurane in High Risk Patients Receiving General Anaesthesia

KEYWORDS

Desflurane , Sevoflurane , General anaesthesia

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ABSTRACT **AIMS AND OBJECTIVES:** Comparison of desflurane and sevoflurane for intraoperative hemodynamics and postoperative recovery.

MATERIAL AND METHODS: Sixty patients classified in ASA III , IV posted for major surgeries lasting for more than two hours randomly assigned to receive sevoflurane or desflurane in general anaesthesia. After premedication all patients received inj. fentanyl , induces with inj. propofol and scholine, intubated and maintained on oxygen/nitrogen (50%/50%) with intermittent atracurium. Both group received FGF 4 lit/min for first 10 mins. with desflurane (3-4%) in group I and sevoflurane (2-3%) in group II. After 10 mins. FGF was reduced to 2 lit/min. with inhalational gases adjusted to maintain hemodynamic parameter within 20% of baseline values or according to clinical signs. Inhalational anaesthetics were discontinued immediately after closure . Patients were reversed. The times for discontinuation of inhaled anaesthetics to spontaneous eye opening , obeying verbal commands , recal of name and orientation of time and place every 2 mins were measured. In post anaesthesia care unit Aldrete's score was recorded every 15 mins. till a score of 9 was achieved. Hemodynamics measured every 2 mins prior to skin incision and every 10 mins there after.

RESULTS AND SUMMARY: Intraoperative hemodynamics did not differ between the two groups. The time to response to spontaneous eye opening , obeying verbal commands , recal of name and orientation to time and place was shorter after desflurane, however Aldrete score was similar.

CONCLUSION: Desflurane and sevoflurane produce similar hemodynamic changes but immediate recovery was significantly faster after desflurane.

INTRODUCTION

Inhaled anaesthetics used for general anaesthesia should ideally have a rapid onset and offset of action.¹ The Induction and recovery depends on anaesthetic drug solubility, cardiac output, and minute ventilation. Solubility is the primary determinant of the rate of fall of alveolar concentration (F_A). Sevoflurane and desflurane, have low blood gas partition coefficients, and therefore share the advantage of faster onset and recovery from anaesthesia when compared to other inhaled anaesthetics like halothane and isoflurane. Desflurane has the lowest blood gas solubility coefficient among volatile anaesthetics with the fastest recovery profile. The haemodynamic effects of desflurane during maintenance with or without intravenous adjuvants appear similar to those seen with isoflurane. Desflurane is associated with modest increase in heart rate, whereas Sevoflurane does not affect heart rate. Both the agents are associated with decrease in blood pressure². Many studies have compared recovery characteristics of Desflurane and Sevoflurane.^{3,4}

Hence we designed this study to compare the intraoperative haemodynamics and recovery profile of desflurane and sevoflurane in patients receiving general anaesthesia.

AIMS AND OBJECTIVES OF THE STUDY:

- 1) To compare intra operative haemodynamic parameters with desflurane and sevoflurane.
- 2) To compare the recovery characteristics of Desflurane and Sevoflurane.

- 3) To study the side effects / complications with both the gases.

OBJECTIVES:

- Response to painful stimuli
- Opening of eyes
- Response to verbal command
- Time of extubation (from the termination of delivery of inhalational agent till extubation)
- Stating name
- Aldrete's score.

All these parameters were noted from the time of termination of the inhalation anaesthetics.

MATERIAL AND METHODS:

After approval from ethical committee

- written and informed consent were taken
- Patient were divided randomly into two groups(30 patient in each group)and were selected for elective surgery under general anaesthesia.

Inclusion criteria:

- Patients willing to give informed written consent.
- Patients aged between 18 to 60 years or more.
- Patients belonging to ASA Grade III and IV.

Exclusion criteria:

- Patients who refuse to give informed written consent.
- Patients with severely compromising respiratory diseases.

- Patients were equally divided in to two groups: Group S: Sevoflurane and Group D: Desflurane
- A pre-anesthetic check up was done in all patients which included a detailed History, General, Systemic Examination, Airway assessment and Routine Investigations.
- **Monitoring --**
- Temperature , Pulse , NIBP , SPO2 , ECG at regular intervals.
- **Premedication-**
- Inj.Glycopyrrolate (0.004 mg / kg IV)
- Inj.Ondansetron (0.1 mg/ kg IV)
- Inj.Midazolam (0.01-0.02mg / kg IV)
- Inj. Fentanyl (1-2 mcg/kg IV)
- **Induction -**
- Inj. Propofol 1-2 mg/kg,
- Inj. Succinylcholine 1-2 mg/kg IV
- Patient was intubated with direct laryngoscopy after IPPV with 100% oxygen.
- Initial fresh gas flow rate was 6 litres which was reduced to 2 litres after 10 mins.
- O2 + N2O 50 % 50 %
- SEVOFLURANE 2 % - 4%
- O2 + N2O 50 % 50 %
- DESFLURANE 3 % - 5%

Tube was fixed after checking bilateral equal air entry.

Concentration of inhalation agent was adjusted to maintain hemodynamic parameter within 20% of base line value.

Muscle relaxant – Muscle relaxation was maintained by using injection atracurium and top up doses are guided by PNS.

Intravenous fluids and blood loss was calculated and replaced.

Nitrous oxide And inhalation agent were discontinued at the last skin suture.

Time of discontinuation of inhalation agent was noted.

The 'modified' Aldrete Scale			
RESPIRATION	2	1	0
	Able to take deep breath and cough	Dyspnea/Shallow Breathing	Apnea
O2 SATURATION	2	1	0
	Maintains > 92% on room air	Needs O2 inhalation to maintain O2 saturation > 90%	Saturation < 90% even with supplemental O2
CONSCIOUSNESS	2	1	0
	Fully awake	Arousable on calling	Not responding
CIRCULATION	2	1	0
	BP ≥ 20mmHg pre op	BP ≥ 20-50mmHg pre op	BP ≥ 50mmHg pre op
ACTIVITY	2	1	0
	Able to move 4 extremities voluntarily or on command	Able to move 2 extremities voluntarily or on command	Able to move 0 extremities voluntarily or on command

Table 1 showing the distribution of demographic characteristics among the two groups:

	SEVOFLURANE (n=30)		DESFLURANE (n=30)		p Value
	Range	Mean±SD	Range	Mean±SD	
ASA (III/IV)	28/2		25/5		
AGE	21-52	39.45±9.20	21-58	37.75±0.80	0.595

GEN- DER (M/F)	8/22		12/18		0.311
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Change in intra operative Heart Rate.

There was a rise in intraop. heart rate in the first 10 min. in desflurane group. However after the initial rise both agents showed comparable hemodynamics stability.

Changes in intra operative Mean arterial pressure,

Intraoperative mean arterial pressure did not differ in the two groups during the course of anesthesia and were successfully maintained within 20% of baseline values with both anaesthetic. P < 0.005

Table 2. Recovery Characteristics

In response to Pain, Verbal commands, Eye opening, Stating name.

	Sevoflurane (n=30)	Desflurane (n=30)	P value
Response to painful stimuli (min)	6.50 ± 4.40	3.02 ± 2	0.001
Response to verbal commands (min)	7.60 ± 4.30	3.30 ± 2.30	0.001
Spontaneous eye opening (min)	8.5 ± 5.70	3.75 ± 2.3	0.001
Time of Extubation (min)	9.5 ± 9.3	4.10 ± 3.01	0.030
Stating name(min)	10.6 ± 6.90	4.50 ± 6.10	0.054

Modified Aldrete score:

	Sevoflurane	Desflurane	P value
Arrival	7.08 ± 1.22	7.00 ± 1.04	0.242
After 5 min	7.30 ± 1.10	7.80 ± 1.30	0.281
After 10 min	8.15 ± 1.176	8.50 ± 1.452	0.049
After 15 min	9.05 ± 1.15	9.50 ± 0.89	0.074

Discussion:

According to our study

Recovery was significantly rapid after Desflurane compared to Sevoflurane. However the Modified Aldrete score in the PACU was comparable in both groups. Heavener et al similarly suggested that early not intermediate recovery from desflurane is faster than sevoflurane.

Dupont et al found that the emergence time of desflurane was twice as fast as sevoflurane which exactly correlates with our study. This study also suggested that desflurane and sevoflurane differed despite similar blood-gas coefficient. The possible explanation could be higher dose of sevoflurane (0.9 vs 0.6 MAC) required during anesthesia to maintain MAP and HR within 20% of baseline values.

Stable cardiovascular conditions were found with both agents both intra and post operatively except a rise in HR with desflurane in first 10 mins.

Various studies have demonstrated that decrease in HR below baseline after induction was less with desflurane due to sympathetic stimulation.

Conclusion:

Rapid emergence and early recovery were significant benefits with desflurane however both agents provided similar hemodynamics stability and hence are safe to use in patients carrying high risk of anaesthesia.

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