

## ORIGINAL ARTICLE

# Desflurane and Sevoflurane for Recovery Profile and Airway Responses: A Comparative Study

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### ABSTRACT:

**Background:** Multiple studies have demonstrated that desflurane allows for a more rapid emergence than sevoflurane, and this may be beneficial for outpatient surgery, where quick case turnover and reduced post-anesthesia care unit (PACU) time is essential to ensure a good workflow. **Aim of the study:** To compare Desflurane and Sevoflurane for recovery profile and airway responses. **Materials and methods:** The study was conducted in the Department of Anesthesia of the medical institute. The ethical clearance for the study was obtained from the ethical board of the institute prior to commencement of the study. For the study, we selected 60 patients with American Society of Anesthesiologists physical status I and II scheduled for surgical procedures at General Surgery department. The patients were randomly grouped into two groups with 30 patients in each group, Group 1 and Group 2. Group 1 patients received Sevoflurane for maintenance of anesthesia and Group 2 patients received Desflurane for the maintenance of anesthesia. **Results:** A total of 50 patients were included in the study. Mean age of patients in group 1 was 58.25 years and in group 2 was 59.45 years. Total recovery time in group 1 was 49.58 min and in group 2 was 30.12 min. Time duration to sit in bed with support was 45.31 min and 21.28 min. On comparison the results were observed as statistically significant. **Conclusion:** Desflurane has an overall better quality of early recovery in patients as compared to sevoflurane.

**Keywords:** Desflurane, Sevoflurane, anesthesia.

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### INTRODUCTION:

Desflurane and sevoflurane are the two most commonly administered inhaled anesthetics for outpatient surgeries due to their favorable pharmacokinetic profiles and low incidence of untoward effects. Both of these agents have been safely used for anesthesia maintenance using a laryngeal mask airway (LMA).<sup>1, 2</sup> Multiple studies have demonstrated that desflurane allows for a more rapid emergence than sevoflurane, and this may be beneficial for outpatient surgery, where quick case turnover and reduced post-anesthesia care unit (PACU) time is essential to ensure a good work flow.<sup>3,4</sup> Rapid recovery is desirable in neurosurgical patients to enable early post-operative neurological evaluation and prompt treatment of surgical complications. Residual effects of inhalational anaesthetic agents may contribute to delayed emergence from anaesthesia thereby precluding an early assessment of post-operative neurological function.<sup>5</sup> Because of the low blood-gas partition coefficient of sevoflurane and desflurane, rapid emergence from anaesthesia is expected following their use, as compared to other inhalational agents.<sup>6</sup> Hence, the present study was conducted to compare Desflurane and Sevoflurane for recovery profile and airway responses.

### MATERIALS AND METHODS:

The study was conducted in the Department of Anesthesia of the medical institute. The ethical clearance for the study

was obtained from the ethical board of the institute prior to commencement of the study. For the study, we selected 60 patients with American Society of Anesthesiologists physical status I and II scheduled for surgical procedures at General Surgery department. The patients were randomly grouped into two groups with 30 patients in each group, Group 1 and Group 2. Group 1 patients received Sevoflurane for maintenance of anesthesia and Group 2 patients received Desflurane for the maintenance of anesthesia. The anesthesia was induced for each patient according to the standardized guidelines. During the maintenance of anesthesia and during post-operative period, we studied the occurrence of cough, hiccups, breathholding and larygospasm. Another qualified anaesthetist, who was unaware of the inhalational agent used, assessed the time taken from switching off of the vaporiser to eye opening, time to obey verbal commands (tongue protrusion), time to sit with support, time to shift out of the recovery room and orientation in time, place and person. The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

**RESULTS:**

A total of 50 patients were included in the study. Table 1 shows the demographic data of the patients. Mean age of patients in group 1 was 58.25 years and in group 2 was 59.45 years. Number of male patients in group 1 was 11 and in group 2 were 14. Mean weight of patients in group 1 was 63.15 kg and in group 2 was 66.89 kg. Table 2 shows the comparative analysis of Recovery variables for Group 1 and 2. Total recovery time in group 1 was 49.58 min and in group 2 was 30.12 min. Time for opening eyes postoperatively was 12.32 min and 5.89 min. Time taken to respond to verbal commands was 13.11 min and 7.25 min. Time duration to sit in bed with support was 45.31 min and 21.28 min. On comparison the results were observed as statistically significant. (p<0.05) [Fig 1]

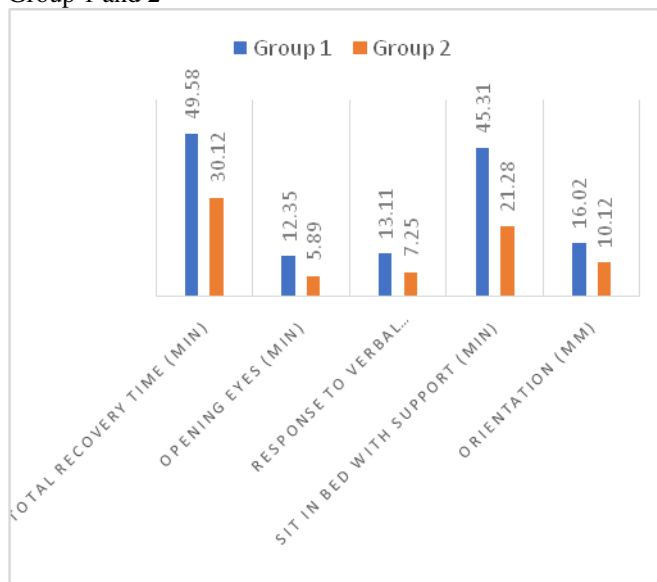
**Table 1: Demographic details of the patients**

Parameters	Group 1	Group 2
No. of subjects	25	25
Mean age (years)	58.25	59.45
No. of male patients	11	14
Mean weight (kg)	63.15	66.89

**Table 2: Comparative analysis of Recovery variables for Group 1 and 2**

Recovery variables	Group 1	Group 2	p-value
Total recovery time (min)	49.58	30.12	0.05
Opening eyes (min)	12.35	5.89	
Response to verbal commands (min)	13.11	7.25	
Sit in bed with support (min)	45.31	21.28	
Orientation (mm)	16.02	10.12	

**Figure 1: Comparative analysis of Recovery variables for Group 1 and 2**



**DISCUSSION:**

In the present study, we compared efficacy of Desflurane with Sevoflurane for recovery profile and airway responses. We observed that Sevoflurane was more efficacious and had less post-operative recovery time. The results were statistically significant. The results were compared with previous studies and results were consistent with previous studies. Khalid A et al compared the recovery profile in terms of time of extubation, eye opening, orientation and mobility and frequency of Postoperative Nausea and Vomiting (PONV) between propofol and isoflurane based anesthesia in patients undergoing laparoscopic cholecystectomy with prophylactic antiemetic. After informed consent, a total of 60 ASA I-II patients scheduled for laparoscopic cholecystectomy were divided in two equal groups I and P. Anesthesia in all patients were induced by Nalbuphine 0.15 mg/kg, Midazolam 0.03 mg/kg, Propofol 1.5 mg/kg and Rocuronium 0.6 mg/kg. Anesthesia was maintained with Isoflurane in group I and propofol infusion in group P, while ventilation was maintained with 50% N2O/O2 mixture in both the groups. All patients were given antiemetic prophylaxis. At the end of surgery, times of extubation, eye opening, orientation (by modified Aldrete score) and mobility (recovery profile) were assessed. PONV was observed and recorded immediately after extubation, during early postoperative period (0-4 hours) and late period (4-24 hours). Antiemetic requirements were also recorded for the same periods in both the groups. Propofol provided faster recovery (extubation and eye opening times) and orientation in immediate postoperative period with statistically significant differences between the groups. Recovery characteristics were comparably lower in group I. More patients achieved full points (8) on modified Aldrete score at different time until 30 minutes in group P. Postoperative nausea and vomiting in early and late periods were significantly reduced in group P. Moreover, requirement of rescue antiemetic doses were significantly lower in group P in 24 hours. This was concluded that in this series, recovery was much faster with earlier gain of orientation with propofol anesthesia compared to isoflurane in the early recovery periods. Singh SK et al compared the early recovery profile of sevoflurane and propofol anesthesia in patients undergoing open cholecystectomy. A total of 60 patients of either sex with American Society of Anesthesiologists grade 1 and 2 scheduled for elective cholecystectomy were prospectively randomized into two groups. Group S (30 patients) were maintained with sevoflurane anesthesia, while in Group P (30 patients) were maintained with propofol infusion in both the groups the anesthetic concentration/dose was so adjusted to keep hemodynamic parameter (mean arterial pressure and heart rate) within 15% of their respective baselines values. It was observed that there was no significant difference between there early recovery profile that includes spontaneous eye opening, following simple verbal command and extubation time but

there was a significant difference in incidence of postoperative nausea and vomiting (PONV) in both groups. It was concluded that propofol is as good as sevoflurane for maintenance of anesthesia in surgeries like open cholecystectomy with an added advantage of lower incidence of PONV owing to its intrinsic antiemetic properties.<sup>7,8</sup>

White PF et al studied on the controversy regarding the relative perioperative benefits of desflurane versus sevoflurane when used for maintenance of anesthesia in the ambulatory setting. They randomized 130 outpatients undergoing superficial surgical procedures requiring general anesthesia to one of two maintenance anesthetic treatment groups. All patients were induced with propofol, 2 mg/kg IV, and after placement of a laryngeal mask airway, anesthesia was maintained with either sevoflurane 1%-3% or desflurane 3%-8% in an air/oxygen mixture. Assessments included recovery times to eye opening, response to commands, orientation, fast-track score of 14, first oral intake, sitting, standing, ambulating unassisted, and actual discharge. Patient satisfaction with anesthesia, the ability to resume normal activities on the first postoperative day, adverse side effects (e.g., coughing, purposeful movement, oxygen desaturation <90%, sore throat, postoperative nausea, and vomiting), and the requirement for postoperative analgesic and antiemetic drugs were recorded in the early postoperative period and during the initial 24-h period after discharge. The two study groups had comparable demographic characteristics. Although the overall incidence of coughing during the perioperative period was higher in the desflurane group, the incidences of coughing during the actual administration of the volatile anesthetics did not differ between the two groups. Emergence from anesthesia was more rapid after desflurane; however, all patients achieved fast-track recovery criteria before leaving the operating room. Finally, the time to discharge home and the percentage of patients able to resume normal activities on the first postoperative day did not differ significantly between the two anesthetic groups. They concluded that use of desflurane for maintenance of anesthesia was associated with a faster emergence and a higher incidence of coughing. McKay RE et al tested whether the use of a more pungent anesthetic (desflurane) would result in a higher rate of coughing, breath holding, laryngospasm, or desaturation among patients who smoke. They randomly assigned 110 smokers to anesthesia with desflurane or sevoflurane, administered via a laryngeal mask airway. Five patients receiving desflurane and nine patients receiving sevoflurane coughed. Most coughing occurred during induction or emergence, in the setting of airway manipulation and low anesthetic concentration. The rate of breath holding, laryngospasm, and desaturation was similar between those receiving desflurane versus sevoflurane.

A retrospective comparison of this cohort of 110 smokers to a previous group consisting of 100 nonsmokers and 27 smokers receiving an identical anesthetic regimen indicates that cigarette smoking, but not choice of anesthetic, places patients at increased risk of respiratory complications.<sup>9,10</sup>

#### CONCLUSION:

Within the limitations of the study, we conclude that Desflurane has an overall better quality of early recovery in patients as compared to sevoflurane.

#### REFERENCES:

1. Mahmoud NA, Rose DJ, Laurence AS. Desflurane or sevoflurane for gynaecological day-case anaesthesia with spontaneous respiration? *Anaesthesia* (2001) 56:171–4.10.1046.
2. Eshima RW, Maurer A, King T, Lin BK, Heavner JE, Bogetz MS, et al. A comparison of airway responses during desflurane and sevoflurane administration via a laryngeal mask airway for maintenance of anesthesia. *AnesthAnalg* (2003) 96:701–5.10.1213.
3. Saros GB, Doolke A, Anderson RE, Jakobsson JG. Desflurane vs. sevoflurane as the main inhaled anaesthetic for spontaneous breathing via a laryngeal mask for varicose vein day surgery: a prospective randomized study. *Acta AnaesthesiolScand* (2006) 50:549–52.
4. Cohen IT, Finkel JC, Hannallah RS, Hummer KA, Patel KM. The effect of fentanyl on the emergence characteristics after desflurane or sevoflurane anesthesia in children. *AnesthAnalg*. 2002;94:1178–81.
5. Welborn LG, Hannallah RS, Norden JM, Ruttimann UE, Callan CM. Comparison of emergence and recovery characteristics of sevoflurane, desflurane, and halothane in pediatric ambulatory patients. *AnesthAnalg*. 1996;83:917–20.
6. Kim JM, Lee JH, Lee HJ, Koo BN. Comparison of emergence time in children undergoing minor surgery according to anesthetic: Desflurane and sevoflurane. *Yonsei Med J*. 2013;54:732–8.
7. Khalid A, Siddiqui SZ, Aftab S, Sabbar S, Haider S. Recovery profile - a comparison of isoflurane and propofol anesthesia for laparoscopic cholecystectomy. *J Coll Physicians Surg Pak*. 2008 Jun;18(6):329-33.
8. Singh SK, Kumar A, Mahajan R, Katyal S, Mann S. Comparison of recovery profile for propofol and sevoflurane anesthesia in cases of open cholecystectomy. *Anesth Essays Res*. 2013 Sep-Dec;7(3):386-9.
9. White PF, Tang J, Wender RH, Yumul R, Stokes OJ, Sloninsky A, Naruse R, Kariger R, Norel E, Mandel S, Webb T, Zaentz A. Desflurane versus sevoflurane for maintenance of outpatient anesthesia: the effect on early versus late recovery and perioperative coughing. *AnesthAnalg*. 2009 Aug;109(2):387-93.
10. McKay RE, Bostrom A, Balea MC, McKay WR. Airway responses during desflurane versus sevoflurane administration via a laryngeal mask airway in smokers. *AnesthAnalg*. 2006 Nov;103(5):1147-54.