

Original Article

A comparison of Desflurane and Sevoflurane for efficacy in Ambulatory Surgical Procedures

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ABSTRACT:

Background: Anesthetics used for ambulatory anesthesia should have the following characteristics: smooth and rapid induction, easily controllable depth of anesthesia in the maintenance phase, rapid emergence and recovery from anesthesia, and few adverse reactions after general anesthesia. **Aim of the study:** To compare the efficacy of desflurane and sevoflurane in ambulatory surgical procedure. **Materials and methods:** The study was conducted in the Department of Anesthesia of the medical institution. For the study we selected 60 patients belonging to 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 S and Group D. Group S patients received sevoflurane for maintenance of anesthesia whereas Group D received desflurane for maintenance of anesthesia. The anesthesia was induced for each patient according to the standardized guidelines. **Results:** A total of 60 patients were included in the study. Mean age of patients in group S was 49.21 years and in group D was 47.32 years. Number of male patients in group S was 17 and in group D were 18. Mean weight of patients in group S was 63.18 kg and in group D was 68.5 kg. The mean height of patients in group S was 161.21 cm and in group 2 was 159.68 cm. Total recovery time in group S was 42.11 ± 10.31 min and in group D was 29.33 ± 7.23 min. Time for opening eyes postoperatively was 10.32 ± 5.12 min and 5.02 ± 1.41 min. Time taken to respond to verbal commands was 11.21 ± 5.12 min and 7.69 ± 3.12 min. **Conclusion:** Sevoflurane and Desflurane are efficacious in ambulatory surgical procedures. Some of the recovery parameters were seen to be taking more time duration in cases with Desflurane cases as compared to Sevoflurane cases.

Keywords: ambulatory surgery, anesthesia, general anesthesia, sevoflurane.

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INTRODUCTION:

Anesthetics used for ambulatory anesthesia should have the following characteristics: smooth and rapid induction, easily controllable depth of anesthesia in the maintenance phase, rapid emergence and recovery from anesthesia, and few adverse reactions after general anesthesia.^{1, 2} Two anesthetics currently used for ambulatory anesthesia are propofol and sevoflurane. Emergence from propofol anesthesia is rapid because the context-sensitive half-time is less than 30 minutes even after 5-hour continuous infusion.³ Emergence from sevoflurane anesthesia is also rapid, as seen from the blood-gas distribution coefficient at 0.65 and tissue-gas partition coefficient at 1.1 for major tissues other than fat. However, desflurane is pungent and can be irritant to the airway leading to coughing, breathholding, laryngospasm and copious secretions.⁴ This property may

make sevoflurane an agent of choice for cases on spontaneous respiration. There are limited studies on desflurane with spontaneous breathing.^{5, 6} Hence, the current study was planned to compare the efficacy of desflurane and sevoflurane in ambulatory surgical procedure.

MATERIALS AND METHODS:

The study was conducted in the Department of Anesthesia of the medical institution. 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 belonging to 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 S and Group D. Group S

patients received sevoflurane for maintenance of anesthesia whereas Group D received desflurane for 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 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 20.0 for windows. The Student’s t-test and Chi-square test were used to check the significance of the data. The p-value less than 0.05 was predetermined as statistically significant.

RESULTS:

A total of 60 patients were included in the study. **Table 1** shows the demographic data of the patients. Mean age of patients in group S was 49.21 years and in group D was 47.32 years. Number of male patients in group S was 17 and in group D were 18. Mean weight of patients in group S was 63.18 kg and in group D was 68.5 kg. The mean height of patients in group S was 161.21 cm and in group 2 was 159.68 cm. **[Fig 1]****Table 2** shows the comparative analysis of recovery variables for Group S and D. Total recovery time in group S was 42.11±10.31 min and in group D was 29.33±7.23 min. Time for opening eyes postoperatively was 10.32±5.12 min and 5.02±1.41 min. Time taken to respond to verbal commands was 11.21±5.12 min and 7.69±3.12 min. Time duration to sit in bed with support was 33.12±7.29 min and 18.18±6.21 min. On comparison the results were observed as statistically non-significant. (p>0.05) **[Fig 2]**

Table 1: Demographic details of the patients

Parameters	Group S	Group D
No. of subjects	30	30
Mean age (years)	49.21	47.32
No. of male patients	17	18
Mean weight (kg)	63.18	68.5
Mean height (cm)	161.21	159.68

Fig 1: Demographic details of Group S and Group

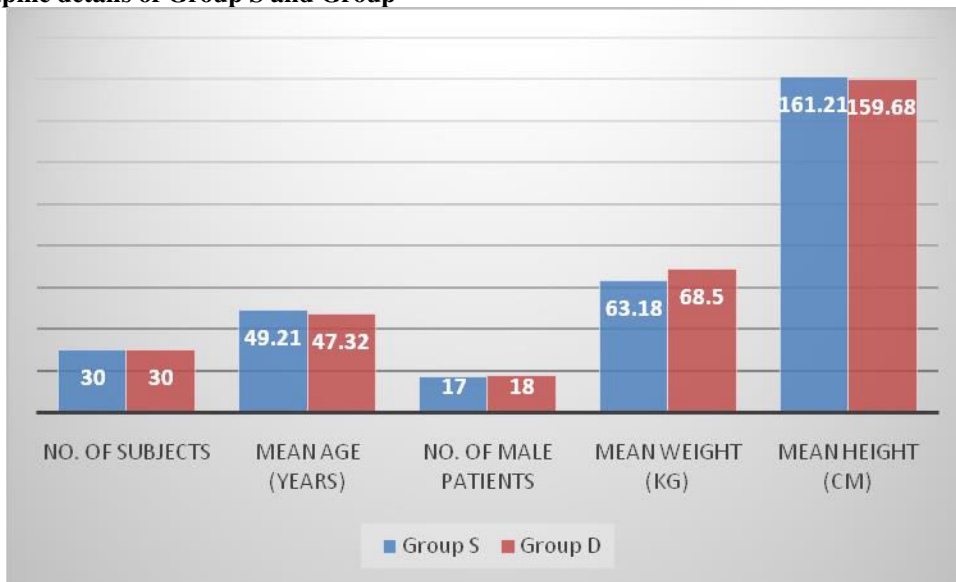
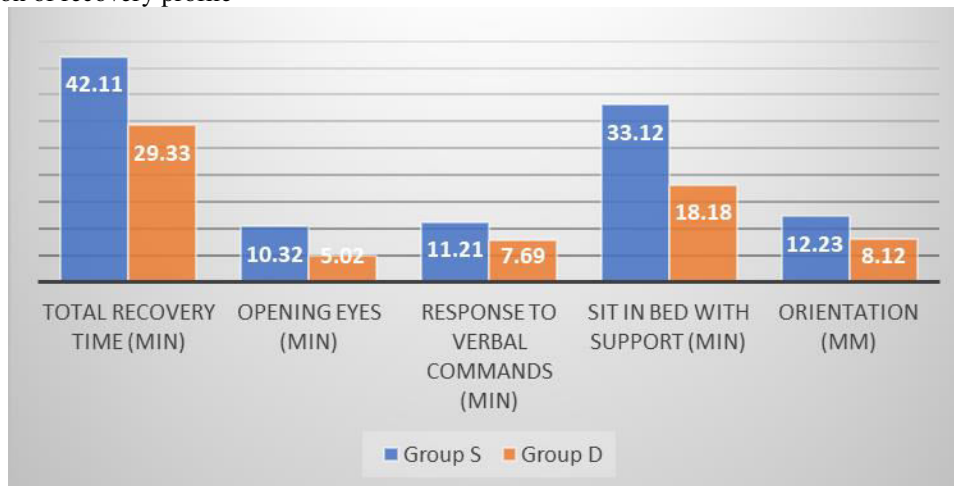


Table 2: Comparative analysis of Recovery variables for Group S and D

Recovery variables	Group S	Group D	p-value
Total recovery time (min)	42.11±10.31	29.33±7.23	0.12
Opening eyes (min)	10.32±5.12	5.02±1.41	
Response to verbal commands (min)	11.21±8.21	7.69±3.12	
Sit in bed with support (min)	33.12±7.29	18.18±6.21	
Orientation (mm)	12.23±3.12	8.12±2.91	

Fig 2: Comparison of recovery profile



DISCUSSION:

In the present study we compared efficacy of Desflurane with Sevoflurane for general anaesthesia in ambulatory surgical procedures. We observed that patients receiving Sevoflurane were more efficacious and had less post-operative recovery time. But the results were observed to be statistically non-significant. The results were compared with previous studies and results were consistent with previous studies. Singh R et al compared the incidence and severity of EA and recovery characteristics in paediatric patients under isoflurane, sevoflurane or desflurane anaesthesia and evaluate the effect of age and duration of anaesthesia on the incidence of EA. Seventy-five American Society of Anaesthesiologists I and II patients, aged between 4 months and 7 years, were included in the study. Patients were induced with sevoflurane and oxygen. Anaesthesia was maintained with O₂ + N₂O and isoflurane, sevoflurane or desflurane according to randomization. Caudal block and paracetamol suppository was administered before the surgical incision. In the Post-Anesthesia Care Unit (PACU), degree of agitation was assessed using the Paediatric Anaesthesia Emergence Delirium Scale. Aldret score, Face, Legs, Activity, Cry, Consolability score and any adverse events were noted. Incidence and intensity of EA were comparable in all three groups. Age and duration of anaesthesia do not appear to have any bearing on the incidence of EA. Rapid emergence with sevoflurane and desflurane did not translate into early discharge from PACU. It was concluded that EA is a multifactorial syndrome. More well-conducted studies using validated scales and standardized protocols should be carried out to better understand this phenomenon. Dogru K et al compared the early recovery properties of desflurane and sevoflurane in patients with American Society of Anesthesiologists physical status I or II undergoing total hip replacement (THR) surgery. This open-label study was performed at the Department of Anesthesiology, Erciyes University School of Medicine, Kayseri, Turkey. Early recovery was assessed

in the surgical suite by measuring the time to 50% decline of end-tidal volatile concentration of desflurane or sevoflurane; time to extubation, eye opening, orientation, and a modified Aldrete Scale (MAS) score >8 (ie, safe to discharge from the surgical suite); and time to discharge from the postanesthesia recovery room. Time to 50% decline of end-tidal volatile concentration of desflurane or sevoflurane, tracheal extubation, eye opening, orientation, and an MAS score >8 occurred significantly more rapidly in the desflurane group than in the sevoflurane group. However, the groups did not differ significantly in duration of anaesthesia; time to discharge from the postanesthesia recovery room; or incidences of nausea, vomiting, dizziness, and drowsiness in the first 24 hours after anaesthesia. In this study population, desflurane provided significantly more rapid early recovery than sevoflurane, but we did not find any beneficial effects of desflurane on intermediate recovery.^{7,8}

Ohkushi K et al determined which anesthetic was preferable for ambulatory anaesthesia: propofol alone or sevoflurane alone. A crossover study was performed to compare the recovery profile and patient satisfaction after 2 anaesthesia methods. Twenty healthy patients with severe anxiety toward dental treatment undergoing 2 sessions of day-case dental treatment received either propofol or sevoflurane anaesthesia. The order of these methods was randomized. The depths of anaesthesia were kept constant using bispectral index (BIS) monitoring. Observations on recovery profiles were performed in the emergence phase, in the recovery phase, and 24 hours after discharge. Patient satisfaction and preference were obtained by a questionnaire. Most of the recovery profiles in the emergence phase such as time to eye opening to respond to verbal command, time to BIS \geq 75, and time to extubation were shorter in the sevoflurane group than in the propofol group. All recovery profiles in the recovery phase showed no differences between the 2 groups. Based on the subject's satisfaction and preference, propofol was evaluated as a better anesthetic for ambulatory

anesthesia than sevoflurane. Higher patient satisfaction and a greater preference for future dental treatment were revealed for propofol anesthesia. Propofol may be more suitable for ambulatory anesthesia for dental treatment. Shan J et al conducted retrospective study to contribute to the existing knowledge of the comparative studies of the volatile anesthetic agents such as isoflurane, sevoflurane and desflurane by evaluating the maintenance and emergence characteristics after volatile anesthetics-induced preconditioning with isoflurane, sevoflurane or desflurane for inpatient ischemia/reperfusion cerebral injury during cerebral or neural surgeries. Methods: The aim was to investigate their neuroprotective mechanisms and effects by analyzing and comparing the superiority of each agent in a Chinese patient population, in terms of faster emergence, and early and intermediate recovery. The intraoperative haemodynamic profiles and postoperative adverse effects of these three agents were also systematically analyzed. Results: We found that sevoflurane, when compared with isoflurane and desflurane, provided anesthesia with similar hemodynamic stability but allowed for a smoother, more rapid emergence and better quality of induction and recovery to surgical patients under clinical conditions, particularly to those who were experiencing substantial cerebral vasodilation. Conclusion: Sevoflurane offers several advantages, including a relative lack of airway irritation, a more rapid onset and recovery, and greater hemodynamic stability than other potent inhaled agents. These properties would appear to afford sevoflurane significant clinical potential.^{9,10}

CONCLUSION:

Within the limitations of the study we conclude that Sevoflurane and Desflurane are efficacious in ambulatory surgical procedures. Some of the recovery parameters were seen to be taking more time duration in cases with Desflurane cases as compared to Sevoflurane cases.

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