Original Article
DOI: https://doi.org/10.70749/ijbr.v3i3.887

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://induspublishers.com/IJBR
ISSN: 2960-2793/ 2960-2807

Comparison of Post-Operative Recovery Characteristics by Using Isoflurane and Sevoflurane in Adult Patients under General Anesthesia

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ARTICLE INFO

Keywords

Sevoflurane, Isoflurane, General Anesthesia, Bradycardia, Tachycardia, Hypotension, Hypertension, Hypoxia, Salivation, Dyspnea and Suffocation.

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Declaration

Authors' Contribution: All authors equally contributed to the study and approved the final manuscript.
Conflict of Interest: No conflict of interest.
Funding: No funding received by the authors.

Article History

Received: 07-11-2024, Revised: 04-02-2025
Accepted: 01-03-2025, Published: 24-03-2025

ABSTRACT

Background: Inhaled volatile anesthetics remain the most widely used drug for the maintenance of general anesthesia, because of the ease of administration and predictable intraoperative and recovery characteristics. Over the past years, there have been three gases and thirteen volatile anesthetic agents made available for clinical use. **Objective:** To determine which agent is safer and causes good post-operative recovery characteristics. **Methodology:** This comparative cross-sectional study was conducted in four hospitals including 150 patients and divided into 75 males and females each. Sevoflurane and isoflurane were given to 75 each. Both drug groups were supervised closely in the recovery unit and data was collected through a well-constructed performa and analyzed through SPSS version 26th and M.S Excel 2013. **Results:** Postoperative recovery characteristics of sevoflurane and isoflurane were observed, i.e. tachycardia, bradycardia, hypoxia, hypotension, hypertension, dispend, salivation, suffocation and vomiting. Both groups were closely observed and after a full comparison of postoperative recovery characteristics statistically, it is proved that sevoflurane was showing good results in every characteristic in comparison to isoflurane. **Conclusion:** The current research study concludes that sevoflurane has good post-operative recovery characteristics in comparison with isoflurane in adult patients having ASA physical status-1. So, sevoflurane should be preferred in patients where better postoperative recovery is needed.

INTRODUCTION

Advancements in airway management and anesthesia induction techniques have contributed to the success of procedures. The greatest daycare anesthetic should be simple to use, offer the most favorable surgical circumstances, and cause little adverse effects. The effect site concentration should be promptly changed to swiftly modify the anesthetic depth. Despite the fact that no single anesthetic drug completely satisfies all of these requirements, pharmacological developments over the past few decades have brought us closer to achieving this (1).

The most popular medications for maintaining general anesthesia are Sevoflurane and isoflurane. The straightforward administration and consistent intraoperative and recovery characteristics are to blame for this. Thirteen volatile anesthetics and three gases have been made accessible for therapeutic usage in recent years. Since they have so many negative effects, most have been abandoned (2). Our objective was to determine whether sevoflurane was non-inferior to isoflurane on a clinically important primary outcome in a heterogeneous group of adults undergoing surgery. A planned surgery where the patients requiring early recovery and discharged to admit for a short stay for surgery on a non-resident basis. Advances in anesthetic induction agents and airway management have contributed to the success of these surgeries. An ideal day-care anesthetic agent should have rapid smooth induction; provide optimum surgical conditions with rapid recovery and minimal side effects. One should be

able to rapidly alter the effect site concentration, allowing the anesthetic depth to be altered easily. Although no single anesthetic agent completely satisfies all these requirements, pharmacological developments over the past decades have brought us considerably closer (3).

In recent times, inhalational agents like isoflurane and sevoflurane have shown promising results (4). This study was conducted to compare isoflurane and sevoflurane as anesthetic agents for anesthesia use in surgery. The study was designed to determine if these agents offered advantages in terms of postoperative hemodynamics, cardiorespiratory effects, recovery profile, emergence times, and adverse effects including severity of airway hyperreactivity. A Planned surgery where the patients requiring early recovery and discharge are admitted for a short stay for surgery on a non-resident basis (5).

Advances in anesthetic induction agents and airway management have contributed to the success of these surgeries (6). An ideal anesthetic agent should have rapid smooth induction; provide optimum surgical conditions with rapid recovery and minimal side effects (7). One should be able to rapidly alter the effect site concentration, allowing the anesthetic depth to be altered easily (8). Although no single anesthetic agent completely satisfies all these requirements, pharmacological developments over the past decades have brought us considerably closer (9). In recent times, inhalational agents like isoflurane and sevoflurane have shown promising result (10). This study was conducted to compare isoflurane and sevoflurane when used as maintenance anesthetic agents for anesthesia in surgeries those patients who have no other history of any chronic or congenital disorder to evaluate which drug has the most effective, early, and minimal side effects postoperative recovery characteristics on patient's health. Surgery is increasingly performed on a day-case basis. Suitable anesthetic drugs should have a rapid recovery profile and be free of complications (11).

Isoflurane is widely used in this context and has a good track record as far as complications, patient acceptability, and recovery profile are concerned (12). Traditionally, isoflurane has been the agent of choice for avian anesthesia because of its rapid induction and recovery times and minimal cardiovascular adverse effects (13). Sevoflurane is a volatile anesthetic agent that has potential advantages over isoflurane. Compared with some inhalation agents, sevoflurane has a low blood-gas solubility that allows for more rapid induction and recovery rates. Furthermore, sevoflurane is less irritating to the airways, as indicated by decreased breath holding, coughing, excitement, and laryngospasm in humans (14). This study aimed to determine which agent is safer and causes good post-operative recovery characteristics.

METHODOLOGY

Research Design, Setting, and Duration

The comparative cross-sectional study was performed to compare the post-operative recovery characteristics between sevoflurane and isoflurane. The study was conducted at two private and two public health care hospitals in Islamabad for six months i.e. August 2022 to January 2023. The time tenure was fixed according to patient induction in the O.T room.

Sample Size, Sampling Technique, and Selection Criteria

A total of 150 patients were taken as sample size with 75 males and 75 females each. Individuals from 18 to 48 years of age undergoing General anesthetic surgeries were selected using convenience sampling. Patients having ASA-1 physical status were included in this study. Other than general anesthesia like Gynae patients or patients with any other co-morbidity were excluded from this study.

Ethical Consideration, Data Collection, and Analysis

The study was conducted after successful approval from the institutional ethical committee of the Prime Institute of Health Sciences Islamabad. Informed consent was taken before data collection and data was collected through a questionnaire after a detailed history and examination were done by an anesthetist supervision. SPSS has been used for manipulation and analysis of data. The descriptive statistics, cross tabulation, and chi-square test were used for the statistical analysis of the study.

RESULTS

Among the total 150 (75 male and female each) participants, 49.33% male and 50.66% of female patients have received sevoflurane, while 50.66% of male and 49.33% of female patients had received isoflurane. The bradycardia occurs in sevoflurane vs isoflurane was 10.70% vs 22.70%, tachycardia in 16% vs 24%. Hypoxia occurs in 4% vs 13.40%, hypotension in 9.40% vs 24%, hypertension10.70% vs 18.70%, dyspnea occurs in 4% vs 10.70%, salivation occurs in 9.40% patient's sevoflurane and in isoflurane it was 20%, suffocation in 9.40% vs 18.70%, vomiting in 6.70% vs 16% and all characteristic had shown significant ($p>0.05$) association (Fig-1, Table-1).

Figure 1

Sevoflurane vs isoflurane results

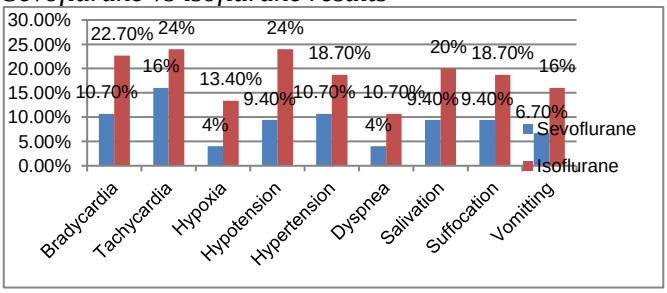
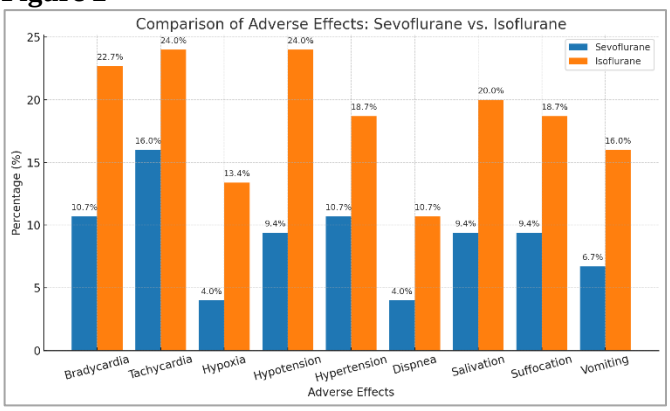


Table 1

Sevoflurane vs Isoflurane Results with p values.

Variables	Sevoflurane	Isoflurane	p Value
Bradycardia	10.70%	22.70%	p=0.041
Tachycardia	16%	24%	p=0.049
Hypoxia	4%	13.40%	p=0.027
Hypotension	9.40%	24%	p=0.034
Hypertension	10.70%	18.70%	p=0.044
Dispenea	4%	10.70%	p=0.029
Salivation	9.40%	20%	p=0.040
Suffocation	9.40%	18.70%	p=0.039
Vomiting	6.70%	16%	p=0.036

Figure 2



DISCUSSION

Our findings align with previous studies highlighting the differences in cardiovascular effects between sevoflurane and isoflurane, a study by Ebert et al., demonstrated that isoflurane tends to cause greater cardiovascular depression due to its vasodilatory effects, leading to hypotension more frequently than sevoflurane (15). Similarly, Maze et al., reported that sevoflurane preserves hemodynamic stability better than isoflurane, which may explain the lower incidence of bradycardia and hypotension observed in our study (16). The increased incidence of tachycardia with isoflurane observed in our study is consistent with research by Pagel et al., which found that isoflurane can cause a compensatory increase in heart rate due to its vasodilatory effects (17). In contrast, sevoflurane is known to exert a more stable effect on heart rate, as corroborated by studies from Wren et al., which suggest that it leads to minimal sympathetic activation (18).

Regarding respiratory effects, our study found that hypoxia and dyspnea were significantly more common with isoflurane same with the findings by Takizawa et al., who reported that isoflurane can impair gas exchange more than sevoflurane due to its greater tendency to cause airway irritation (19). Furthermore, the increased salivation and vomiting with isoflurane may be due to its higher induction of airway reflexes (20). The significantly higher occurrence of suffocation sensations with isoflurane may be caused by its airway irritation effect (21). This suggests that sevoflurane is a more favorable choice for patients at risk of airway complications, particularly those undergoing prolonged procedures.

Overall, our findings support the preference for sevoflurane in patients requiring stable hemodynamics and fewer respiratory complications. All recovery characteristics are significant. and all these characteristics prove that in ASA-1 physical status, sevoflurane is better than isoflurane. So, sevoflurane should be preferred to isoflurane. The current results are in accordance with the previous guidelines of anesthesia and hence can be more susceptible for their validity. Further research, including randomized controlled trials, is needed to establish the long-term implications of these anesthetic agents in diverse patient populations. It was analyzed that sevoflurane and isoflurane both show relatively good postoperative characteristics. But in this cross-sectional study, sevoflurane shows significantly good post-operative recovery characteristics i.e. bradycardia, tachycardia, hypotension, hypertension, vomiting, suffocation, dispend, and salivation in comparison with isoflurane, sevoflurane shows good result in all of the postoperative recovery characteristics.

CONCLUSION

The current study concludes that sevoflurane has good post-operative recovery characteristics in comparison with isoflurane in adult patients having ASA physical status -1. It is observed that sevoflurane shows good results in bradycardia, tachycardia, hypotension, hypertension, suffocation, vomiting, salivation and dispend then isoflurane. So, seveflurane should be preferred used in patients where better postoperative recovery is needed.

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