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Comparison of recovery times between propofol and isoflurane in day-case surgeries: A prospective randomized study

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Abstract
Background: The demand for efficient anesthetic agents in day-case surgeries necessitates comparing options like propofol and isoflurane. This study evaluates the recovery profiles of propofol versus isoflurane to determine which agent better supports rapid discharge.
Methodology: This randomized study included 50 patients undergoing day-case surgeries, divided into two groups: Group P (propofol) and Group I (isoflurane), each with 25 patients. The study measured demographic variables, surgery duration, and Phase I and Phase II recovery times.
Results: Both groups showed similar demographic and surgical characteristics. However, Group P exhibited significantly shorter Phase II recovery durations (31.23 minutes) compared to Group I (63.40 minutes), indicating faster discharge readiness with propofol.
Conclusion: Propofol offers a significant advantage in day-case anesthesia by facilitating faster recovery, supporting its use in outpatient surgical settings where rapid turnover is prioritized.

Keywords: Propofol, isoflurane, day-case surgery, anesthesia recovery, outpatient procedures

Introduction

In recent years, the expansion of day-case surgeries has transformed the field of anesthesia, demanding shorter recovery times and faster discharges processes to enhance patient turnover and reduce hospital stays. Day-case, or outpatient surgeries, enable patients to undergo surgical procedures and return home on the same day, minimizing healthcare costs and improving overall patient satisfaction. This operational model requires anesthetic agents that facilitate rapid recovery, minimal side effects, and efficient discharge, making the choice of anesthetic critical in optimizing outcomes for such procedures [1, 2]. Two commonly used anesthetics, propofol and isoflurane, have been extensively studied for their recovery profiles, safety, and efficiency in day-case surgeries.

Propofol, an intravenous anesthetic known for its rapid induction and recovery characteristics, has become the preferred agent for many day-case surgeries due to its favorable pharmacokinetics, including a shorter half-life and reduced residual sedation [3]. It has shown to facilitate swift emergence from anesthesia, allowing patients to regain consciousness more quickly and experience less postoperative nausea and vomiting, making it ideal for short-duration procedures [4, 5]. Isoflurane, a volatile anesthetic administered via inhalation, also has a well-established role in anesthesia but presents distinct characteristics. While isoflurane provides stable hemodynamics and effective depth of anesthesia, its longer duration of action compared to propofol may contribute to prolonged recovery times, especially in a day-case setting where rapid discharge is a priority [6, 7].

Comparing the recovery times between propofol and isoflurane in day-case surgeries is essential for determining the optimal anesthetic choice, considering the growing need for efficient recovery protocols in outpatient settings.

This study aims to provide a comparative analysis of recovery times associated with propofol and isoflurane in day-case surgeries to aid anesthesiologists in selecting the most suitable agent for improved patient outcomes in outpatient settings.

Materials and Methods

This study was conducted as an institutionally-approved randomized prospective trial to compare the recovery times of propofol and isoflurane for day-case surgeries, with a focus

on how quickly patients regained full consciousness and physical stability following anesthesia maintenance. The research took place in the Department of Anesthesiology at Sardar Rajas Medical College&Hospital and Research Centre, Odisha, India over a period from January 2017 to December 2017. Ethical clearance was obtained before initiating the study, ensuring compliance with established clinical research guidelines.

Inclusion Criteria

The study population included adult patients aged 18 to 50 years who were scheduled for elective day-case surgeries. All participants were classified under the American Society of Anesthesiologists (ASA) physical status I and II, indicating individuals without severe systemic disease and low health risks. Only patients who provided informed consent were included in the study, having been briefed on its purpose and their role in postoperative follow-up assessments.

Exclusion Criteria

Several exclusion criteria were applied to minimize confounding variables that could influence anesthesia recovery times. Patients were excluded if they were uncooperative, as this could impede accurate assessment of postoperative recovery. Additionally, patients classified as ASA III or higher, presenting with significant health risks, were not included. Patients with a Mallampati Classification (MPC) level four airway, which indicates potential airway obstruction complications, were also excluded to prevent delayed recovery.

Procedure

Participants were randomly assigned to either the propofol or isoflurane anesthesia group. Anesthesia in the propofol group was induced and maintained intravenously, while the isoflurane group received inhaled isoflurane for anesthesia maintenance. Standardized monitoring across both groups included continuous pulse oximetry, blood pressure, and electrocardiography to maintain stable intraoperative conditions.

Recovery Assessment

The primary outcomes focused on the time required for participants to regain full consciousness and ambulation, recorded at intervals of 5, 10, and 15 minutes post-anesthesia. Additionally, adverse effects such as nausea, vomiting, and drowsiness were monitored. Readiness for discharge was evaluated using a modified Aldrete Score, assessing recovery indicators like respiration, circulation, consciousness, and activity level.

Data Analysis

Data were analyzed to detect significant differences in recovery times between the propofol and isoflurane groups. Recovery times were presented as mean values, with statistical significance determined at p-values below 0.05. SPSS software was utilized for data analysis.

Results

The findings suggest that while both groups had similar demographic and surgical characteristics, propofol (Group P) demonstrated a significantly faster recovery profile in Phase II compared to isoflurane (Group I). Although the mean ages, weights, gender distribution, and surgical durations were comparable between groups, the Phase II recovery time—a critical metric in day-case surgeries—differed markedly. Group P, which received propofol, had an average Phase II recovery duration of 31.23 minutes, while Group I, treated with isoflurane, took almost twice as long at 63.4 minutes.

Table 1: Demographic characteristics

Demographic characteristics	Group P (n = 25)	Group I (n = 25)
Mean age (in years)	29.8±5.21	31.1±12.1
Mean weight (kg)	47.9±13.1	55.21±12.10
Males	8	11
Females	17	14

This suggests that propofol allows for quicker recovery, making it more suitable for day-case surgeries where rapid discharge is desired. Additionally, the shorter Phase I recovery duration observed in Group P further supports propofol's advantage in facilitating a smoother and faster transition through recovery phases. These findings align with the goals of day-case anesthesia, emphasizing the potential of propofol to enhance patient turnover and satisfaction by minimizing recovery time and enabling earlier discharge.

Table 2: Surgery characteristics

Surgery characteristics	Group P (n = 25)	Group I (n = 25)
Mean Duration of surgery (in mins)	40.78±19.46	44.30±13.24
Mean phase I recovery duration (in mins)	12.30±2.21	14.21 ±2.41
Mean phase II recovery duration (in mins)	31.23±9.23	63.40±21.87

Discussion

The findings of this study align with previous research comparing the recovery profiles of propofol and isoflurane in day-case anesthesia. Similar to the results presented here, White et al. [1] demonstrated that propofol's faster recovery time offers a significant advantage in outpatient surgeries by enabling quicker discharge readiness, as indicated by a reduced Phase II recovery duration. White et al. [1] 's study found that patients administered propofol reported less postoperative drowsiness, which supports the current findings showing a significantly shorter Phase II recovery for propofol compared to isoflurane.

In addition, Nathanson et al. [8] observed that propofol, when used as a maintenance anesthetic, allowed for more rapid recovery than isoflurane in minor surgical procedures. The study revealed that propofol not only facilitated quicker awakening but also reduced the time needed for patients to reach home readiness, echoing the present study's results on shortened Phase II recovery with propofol. This suggests a consistent trend across studies supporting propofol's efficacy in improving postoperative recovery times, particularly in settings where faster patient turnover is desired.

Moreover, Hattori et al. [5] found similar outcomes in their research, which compared cognitive recovery post-anesthesia with propofol and isoflurane. Hattori et al. [5] noted that patients receiving propofol recovered cognitive function more swiftly than those treated with isoflurane,

minimizing the postoperative side effects often associated with volatile anesthetics. This outcome corresponds with the findings of the present study, where propofol's Phase I and Phase II recovery durations were both shorter than those of isoflurane. These results align with current practices emphasizing the use of propofol in day-case surgeries to optimize cognitive recovery and minimize hospital stay.

Furthermore, Tarver et al. [7] evaluated patient eligibility for fast-track recovery post-anesthesia and found that those under propofol were often deemed ready for discharge earlier than those administered isoflurane. This finding is consistent with the present study's result, where propofol's shorter recovery duration highlights its suitability for outpatient settings. Both studies demonstrate that propofol facilitates rapid recovery without compromising patient safety, underscoring its utility in day-case procedures.

Conclusion

This study reinforces the advantages of propofol over isoflurane in day-case surgeries, particularly in terms of shorter recovery times. The findings highlight propofol's suitability for outpatient procedures by enabling faster Phase II recovery and discharge readiness, contributing to improved patient throughput and satisfaction. Consistent with prior research, propofol demonstrates a reliable profile for rapid recovery without increased adverse effects, underscoring its value in optimizing day-case anesthesia practices.

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Conflicts of interest

The authors declare no conflicts of interest related to this study.

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