



PROPOFOL VERSUS SEVOFLURANE: A COMPARATIVE STUDY OF INDUCTION AND RECOVERY IN ADULT AMBULATORY TONSILLECTOMY

Dr. S T Priyadarshan¹, Dr. Balakrishnan^{2*}

¹Junior Resident, Department of Anaesthesiology, Sree Mookambika Institute of Medical Sciences, Kanniyakumari, Tamilnadu, India.

^{2*}Professor, Department of Anaesthesiology, Sree Mookambika Institute of Medical Sciences, Kanniyakumari, Tamilnadu, India.

Corresponding Author: Dr. Balakrishnan

Professor, Department of Anaesthesiology, Sree Mookambika Institute of Medical Sciences, Kanniyakumari, Tamilnadu, India.

ABSTRACT

Background: Ambulatory anaesthesia has become an important component of modern surgical practice due to rapid recovery, early discharge, reduced hospital stay, and improved patient satisfaction. Propofol and sevoflurane are commonly used anaesthetic agents for day-care surgeries because of their favourable pharmacological properties. The present study was conducted to compare the induction and recovery characteristics of propofol and sevoflurane in adult patients undergoing day-care tonsillectomy.

Methodology: This randomized prospective study was conducted in the Department of Anaesthesiology, Sree Mookambika Institute of Medical Sciences, Kulasekharam, from January 2025 to December 2025. Eighty patients aged between 13 and 40 years belonging to ASA physical status I and II undergoing elective tonsillectomy and adenoidectomy were included in the study. Patients were randomly allocated into two groups of 40 each. Group P received propofol for induction and maintenance of anaesthesia, while Group S received sevoflurane. Haemodynamic parameters, induction characteristics, Phase I and Phase II recovery profiles, and postoperative complications were assessed and compared.

Results: The distribution of Mallampati classification between the two groups was statistically comparable ($p=0.28$). Mean arterial pressure values were generally lower in the propofol group at all observed time intervals; however, the differences were not statistically significant. The Phase I recovery profile showed no statistically significant difference between Group P and Group S ($p=0.29$). Similarly, the Phase II recovery profile was also statistically comparable between the groups ($p=0.19$). Both anaesthetic agents provided satisfactory induction, stable intraoperative conditions, and rapid recovery suitable for ambulatory surgery.

Conclusion: Both propofol and sevoflurane were found to be safe and effective anaesthetic agents for day-care adult tonsillectomy. The induction characteristics, haemodynamic responses, and recovery profiles were comparable between the two groups. Hence, both agents can be effectively used in ambulatory tonsillectomy procedures depending on clinical preference and patient suitability.

Keywords: Ambulatory Anaesthesia, Propofol, Sevoflurane, Tonsillectomy, Recovery Profile, Day-Care Surgery.

INTRODUCTION

Ambulatory anaesthesia refers to anaesthetic care provided for elective surgical procedures in carefully selected patients who are admitted, operated upon, and discharged on the same day. It is also known as day-care surgery, day-case surgery, outpatient surgery, or office-based anaesthesia.

¹ The concept of ambulatory surgery has evolved significantly over the past few decades owing to advancements in surgical techniques, anaesthetic drugs, monitoring systems, and postoperative care. Today, ambulatory anaesthesia has become an integral component of modern surgical practice because of its advantages, including reduced hospital stay, lower healthcare costs, decreased risk of hospital-acquired infections, and faster return to normal daily activities.²

The global trend towards minimally invasive and short-duration procedures has further increased the demand for effective ambulatory anaesthetic techniques. In the United States, nearly 70% of all surgical procedures are currently performed on an outpatient basis.³ Similarly, the National Health Service (NHS) in the United Kingdom has projected



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that approximately 75% of elective surgical procedures would be conducted as day-care surgeries.⁴ The success of ambulatory anaesthesia largely depends on the use of anaesthetic agents that provide rapid induction, stable intraoperative conditions, quick recovery, minimal postoperative complications, and early discharge readiness. Therefore, the selection of an ideal anaesthetic agent remains an important consideration for anaesthesiologists involved in day-care procedures. Adult tonsillectomy is one of the commonly performed otorhinolaryngological procedures under general anaesthesia in ambulatory settings. The procedure requires smooth induction, adequate depth of anaesthesia, hemodynamic stability, rapid emergence, and minimal postoperative nausea, vomiting, and airway complications.⁵ Since early recovery and patient comfort are essential in ambulatory surgeries, anaesthetic agents with favorable pharmacokinetic and pharmacodynamic properties are preferred.

Propofol and sevoflurane are among the most widely used anaesthetic agents in modern ambulatory anaesthesia practice. Propofol is an intravenous anaesthetic agent characterized by rapid onset, smooth induction, short duration of action, and antiemetic properties, making it highly suitable for day-care surgeries.⁶ Patients receiving propofol generally experience clear-headed recovery with less postoperative nausea and vomiting. However, it may be associated with hypotension and pain during injection.⁷

Sevoflurane, a volatile inhalational anaesthetic agent, is popular because of its pleasant odor, low blood-gas solubility coefficient, rapid induction, and quick recovery profile.⁸ It provides smooth inhalational induction and allows easy titration of anaesthetic depth. Sevoflurane is particularly advantageous in short surgical procedures due to rapid emergence and minimal airway irritation.⁹ Nevertheless, postoperative agitation, nausea, and vomiting may occasionally occur following its use.¹⁰ Both propofol and sevoflurane possess characteristics desirable for ambulatory anaesthesia, yet differences exist regarding induction quality, hemodynamic effects, recovery profile, and postoperative adverse effects. Comparative evaluation of these agents is therefore important to determine the most suitable anaesthetic technique for adult day-care tonsillectomy procedures. The present study was undertaken to compare the induction characteristics and recovery profiles of propofol and sevoflurane in adult patients undergoing ambulatory tonsillectomy and to assess their overall suitability for day-care anaesthesia.

Aim

To compare the induction and recovery characteristics of propofol and sevoflurane in adult

patients undergoing day-care tonsillectomy under general anaesthesia.

Objectives

1. To evaluate and compare the induction time between propofol and sevoflurane anaesthesia.
2. To compare the hemodynamic parameters such as heart rate, systolic blood pressure, diastolic blood pressure, and mean arterial pressure during induction and maintenance of anaesthesia.
3. To assess and compare the recovery characteristics including emergence time, response to verbal commands, and orientation time in both groups.
4. To evaluate the incidence of postoperative complications such as nausea, vomiting, airway irritation, and agitation associated with propofol and sevoflurane.

METHODOLOGY

This randomized prospective comparative study was conducted in the Department of Anaesthesiology at Sree Mookambika Institute of Medical Sciences, Kulasekharam, over a period of one year from January 2025 to December 2025. A total of 80 patients scheduled for elective tonsillectomy and adenoidectomy under general anaesthesia were included in the study. The age of the patients ranged from 13 to 40 years. Ethical committee approval was obtained from the institutional ethics committee before commencement of the study, and written informed consent was obtained from all patients and from parents or guardians in the case of minors.

All patients underwent detailed pre-anaesthetic evaluation including clinical examination and relevant biochemical, haematological, and radiological investigations. Patients belonging to American Society of Anesthesiologists (ASA) physical status I and II with normal biochemical and haematological parameters were included in the study. Additional inclusion criteria were Mallampati airway class I and II, surgery duration of approximately one hour, patients who were normally ambulant, and availability of an educated attendant capable of understanding and following postoperative instructions.

Patients who were unwilling to participate, those belonging to ASA physical status III and above, patients with a history of allergy to drugs or egg products, anticipated difficult airway, previous serious adverse reaction to anaesthesia, and patients with severe cardiovascular, respiratory, central nervous system, or metabolic diseases were excluded from the study.

The selected patients were randomly allocated into two groups of 40 patients each by lottery method. Group P received propofol for induction and maintenance of anaesthesia, while Group S received sevoflurane. Patients were adequately counselled

regarding the anaesthetic procedure, recovery assessment tests, and the importance of following postoperative instructions. No intramuscular premedication or prophylactic antiemetic was administered. All patients received intravenous glycopyrrolate 5 µg/kg and fentanyl 2 µg/kg immediately before induction of anaesthesia.

Upon arrival in the operating room, standard monitoring including electrocardiography (ECG), non-invasive blood pressure (NIBP), and pulse oximetry (SpO₂) was instituted, and baseline parameters were recorded. Intravenous access was secured in the non-dominant upper limb. All patients received 1 mL of 2% intravenous lignocaine prior to induction to minimize injection pain and maintain uniformity between groups.

In Group P, anaesthesia was induced with intravenous propofol 2 mg/kg followed by endotracheal intubation using succinylcholine 1.5 mg/kg. After confirmation of endotracheal tube placement, anaesthesia was maintained using a continuous infusion of propofol at 6–12 mg/kg/hour along with nitrous oxide and oxygen in a ratio of 2 L:1 L through a closed circuit system. Neuromuscular blockade was maintained using vecuronium with a loading dose of 0.08 mg/kg followed by intermittent top-up doses equal to one-fourth of the loading dose. Intramuscular diclofenac was administered after intubation for postoperative analgesia.

In Group S, anaesthesia was induced with 4% sevoflurane using patient-controlled inhalational induction with spontaneous ventilation through a Penlon Sigma Delta vaporizer in nitrous oxide and oxygen at a ratio of 4 L:2 L. Endotracheal intubation was facilitated using succinylcholine 1.5 mg/kg. Maintenance of anaesthesia was achieved with sevoflurane 1–2.5% in nitrous oxide and oxygen at a ratio of 2 L:1 L. Neuromuscular blockade and analgesic administration were similar to Group P.

The parameters studied included time to loss of consciousness, induction characteristics, haemodynamic variables such as heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, oxygen saturation, recovery profile, emergence time, response to verbal commands, orientation time, and incidence of postoperative complications including nausea, vomiting, airway irritation, and agitation.

The collected data were entered into Microsoft Excel and analysed using Statistical Package for Social Sciences (SPSS) software version 25.0. Continuous variables were expressed as mean ± standard deviation, and categorical variables were expressed as percentages and proportions. Independent Student's t-test was used for comparison of quantitative variables between the two groups, while Chi-square test or Fisher's exact test was applied for qualitative variables. A p-value of less than 0.05 was considered statistically significant.

RESULT

The distribution of number of cases by MPC and the two groups was not statistically significant (p=0.34) with more proportion of Grade I cases in among Group S than Group P. The actual mean MAP values were generally lesser in Group P than Group S at all time points studied. The difference in the mean values of MAP at induction, Post-op and at discharge compared to the reference value at Pre-op between the two groups was observed to be statistically not significant. The distribution of Phase I recovery profile between Group P and Group S is not statistically significant (p=0.21). The distribution of Phase II recovery profile between Group P and Group S is not statistically significant (p=0.01).

Table 1: Distribution of cases by MPC and group

MPC	Group S	Group P	P value
Grade I	38	32	0.28
Grade II	2	8	

Table 2: Distribution of Phase I recovery by groups

Phase I recovery profile	Group S	Group P	P value
No. of cases	40	40	0.29
Mean ± SD	14 ± 3.65	15 ± 2.75	
Range	10 - 20	10 - 20	

Table 3: Distribution of Phase II recovery by groups

Phase II recovery profile	Group S	Group P	P value
No. of cases	40	40	0.19
Mean ± SD	100 ± 13.45	108 ± 16.65	

Range	80 - 150	80 - 170	
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DISCUSSION

Ambulatory anaesthesia requires agents that provide rapid induction, stable intraoperative haemodynamics, smooth emergence, early recovery, and minimal postoperative complications. In the present study, propofol and sevoflurane were compared with respect to induction and recovery characteristics in adult patients undergoing day-care tonsillectomy. Both agents demonstrated satisfactory anaesthetic profiles with no major perioperative complications.

The distribution of Mallampati classification (MPC) among the two study groups was statistically comparable ($p=0.28$), indicating that airway assessment was similar in both groups and that airway-related bias was minimized. Although Grade I MPC was more common in Group S compared to Group P, the difference was not statistically significant. Similar findings were reported by Fredman et al., who observed comparable airway characteristics between patients receiving intravenous and inhalational anaesthetic techniques in ambulatory surgeries.¹¹

Haemodynamic stability is an important determinant of the safety of ambulatory anaesthesia. In the present study, the mean arterial pressure (MAP) values were generally lower in the propofol group compared to the sevoflurane group at all measured intervals. However, the differences in MAP at induction, postoperative period, and discharge compared to baseline preoperative values were not statistically significant between the groups. Propofol is known to cause a greater reduction in systemic vascular resistance and myocardial depression, thereby producing lower blood pressure values during induction and maintenance of anaesthesia.¹² Sevoflurane, on the other hand, provides relatively stable haemodynamics due to its lower myocardial depressant effect and rapid titratability.¹³ The findings of the present study are in agreement with those of Philip et al., who reported that although propofol caused slightly lower blood pressure readings, both propofol and sevoflurane maintained acceptable haemodynamic stability in ambulatory patients.¹⁴

Recovery profile plays a crucial role in determining discharge readiness in day-care surgeries. In the present study, the Phase I recovery profile showed no statistically significant difference between the two groups ($p=0.29$). The mean Phase I recovery time was 14 ± 3.65 minutes in Group S and 15 ± 2.75 minutes in Group P, suggesting that both anaesthetic agents provided rapid immediate recovery. This may be attributed to the low blood-gas solubility coefficient of sevoflurane and the rapid redistribution and clearance characteristics of propofol.¹⁵ Similar observations were made by Song

et al., who demonstrated comparable early recovery characteristics between propofol-based total intravenous anaesthesia and sevoflurane anaesthesia in ambulatory procedures.¹⁶

The Phase II recovery profile was also comparable between the two groups, although Group S showed slightly faster recovery than Group P. The mean Phase II recovery time was 100 ± 13.45 minutes in Group S and 108 ± 16.65 minutes in Group P, with no statistically significant difference ($p=0.19$). These findings suggest that both propofol and sevoflurane are suitable for ambulatory tonsillectomy procedures with regard to discharge readiness. Sevoflurane's rapid elimination through the lungs and minimal tissue accumulation contribute to early psychomotor recovery, whereas propofol provides smoother recovery with lower incidence of postoperative nausea and vomiting.¹⁷ Overall, both propofol and sevoflurane proved to be effective anaesthetic agents for day-care adult tonsillectomy. Propofol demonstrated slightly lower MAP values, while sevoflurane showed marginally faster recovery characteristics; however, these differences were not statistically significant. Therefore, both agents can be considered safe and reliable choices for ambulatory anaesthesia depending on patient characteristics, anaesthesiologist preference, and institutional protocols.

CONCLUSION

Both propofol and sevoflurane were found to be safe and effective anaesthetic agents for ambulatory adult tonsillectomy procedures. The induction characteristics, haemodynamic stability, and recovery profiles were comparable between the two groups. Although propofol showed slightly lower mean arterial pressure values and sevoflurane demonstrated marginally faster recovery times, these differences were not statistically significant. Both agents provided smooth induction, adequate intraoperative conditions, rapid recovery, and satisfactory discharge readiness. Hence, propofol and sevoflurane can be effectively used for day-care tonsillectomy surgeries based on patient suitability and anaesthesiologist preference.

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