ISSN: 0975-3583,0976-2833 VOL14, ISSUE 01, 2023

# Propofol and Sevoflurane Induction and Recovery in Daycare Adult Tonsillectomies

**Pramod Punlikrao Khanapurkar[1], Rishika Verma[2], Suragani Bhargavi[2]**

[1]Professor, Department of Anaesthesia, MNR Medical College and Hospitals, Fasalwadi, Sangareddy Mandal, Sangareddy District, Telangana, India.
[2]Postgraduate 3rd Year, Department of Anaesthesia, MNR Medical College and Hospitals, Fasalwadi, Sangareddy Mandal, Sangareddy District, Telangana, India.

## Abstract

**Background:** A patient may receive an ambulatory anaesthetic if they are undergoing an elective surgical operation on a deliberately selected day, with all of the necessary components being performed on the same day. It's no exaggeration to say that ambulatory anaesthesia is a hot new field in the field of anaesthesia. **Material and Methods:** The study design was a prospective randomised trial. After receiving approval from an ethics committee and the hospital administration, the researchers in this study conducted their work in the ENT operating room at Department of Anaesthesia, MNR Medical College and Hospitals, Fasalwadi, Sangareddy Mandal, Sangareddy District, Telangana, India, from November 2021 to October 2022. **Results:** To conduct the study, researchers randomly assigned 30 patients to two groups of 15. The first group (n = 15) was given propofol anaesthesia. Sevoflurane Anesthesia was used on Group 2 (n=15). Sevoflurane induction is more difficult and takes longer to recover from compared to Propofol in adult tonsillectomies. Both groups have a similar rate of apnea occurrence. **Conclusion:** Both groups had similar Phase I & II recuperation periods. A statistically insignificant correlation between sevoflurane anaesthesia and postoperative pain incidence was found. Propofol is superior to other sedatives and anaesthetics for inducing and maintaining anaesthesia during outpatient procedures on adults. It has a shorter induction time and lower rates of postoperative nausea, vomiting, and pain.

**Keywords:** Propofol, sevoflurane, induction, daycare adult tonsillectomies.

**Corresponding Author:** Dr. Suragani Bhargavi, Postgraduate 3rd Year, Department of Anaesthesia, MNR Medical College and Hospitals, Fasalwadi, Sangareddy Mandal, Sangareddy District, Telangana, India.

## Introduction

It is possible to do elective surgery on carefully selected patients in just one day by using amenable anaesthesia, which allows for all aspects of the procedure to be finished in one sitting.[1,2] Anesthesia administered in a day case setting is also referred to as outpatient anaesthesia, anaesthesia administered in day care settings, and, more recently, office-based anaesthesia. It would not be an overstatement to say that mobile anaesthesia is one of the most exciting new developments in the science of anaesthesia. In spite of the fact that it has been around for at least as long as general anaesthesia, the notion has only recently came into widespread use and is still being developed.[3,4]

It is responsible for more than 70 percent of all anaesthetic treatments carried out across the world. In the not too distant future, the bulk of elective surgical procedures will be carried out as day cases, as stated in the strategy that was just recently made public by the NHS.[5,6] The anaesthetic medications that are accessible today were created and brought to market in order to satisfy a specialised but critically significant demand in the field of mobile anaesthesia. Propofol and sevoflurane are two drugs that have enabled anesthesiologists in India to provide improved day case treatment for their patients. This study compares the two anaesthetics in terms of their effectiveness in outpatient settings, specifically with regard to

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 01, 2023

the lengths of time required for induction and recovery.[7,8] The purpose of this study is to compare the effects of propofol and sevoflurane when used as the sole induction and maintenance anaesthetic agent in adult tonsillectomies. More specifically, the comparison will focus on the time it takes for patients to lose consciousness, the incidence of apnea, the complications that can arise during induction, the length of time it takes for patients to recover, and the frequency of postoperative nausea, vomiting, and pain.

**Methodology**

The study design was a prospective randomised trial. After receiving approval from an ethics committee and the hospital administration, the researchers in this study conducted their work in the ENT operating room at Department of Anaesthesia, MNR Medical College and Hospitals, Fasalwadi, Sangareddy Mandal, Sangareddy District, Telangana, India, from November 2021 to October 2022. The study's objective was to evaluate the relative efficacy of propofol and sevoflurane as single induction and maintenance anaesthetic agents for tonsillectomy procedures performed on adults at adult day care facilities.

Thirty people who needed to have their tonsils removed were chosen. They were between the ages of 14 and 42. It was determined that only those individuals with within-normal ranges for clinical, biochemical, radiological, and haematological markers should be included. All patients or their legal guardians in the case of minors provided signed informed consent. Lots were drawn to determine which patients would get propofol and which would receive sevoflurane. Each section was designated by a letter, with "P" representing propofol and "S" representing sevoflurane.

**Inclusion Criteria**

1. Evaluated the physical condition I and II of ASA patients Haematological and biochemical parameters that are normal
2. People in the 13–40 age range
3. No known drug or egg hypersensitivity MPC I and II for Airway
4. Having an adenoidectomy and tonsillectomy Surgery lasts approximately one hour.
5. Patients who often have good mobility
6. An educated participant who can follow directions.

**Exclusion Criteria**

1. The patient is unwilling for ASA class III or above
2. People who are allergic to eggs or H/O drugs anticipated challenging airway
3. H/O significant anesthesia-related adverse experiences severe metabolic disease, RS, CVS, and N.S.

The health of the patients was checked before any procedures were performed. The patient was briefed on the procedure, and their consent was acquired. Any potential red flags were carefully considered during the evaluation process. There was a strong emphasis on the recuperation tests and the necessity of following all given directions to the letter. No premedication via IM route was administered to the patients. Preventative antiemetic medication was not administered. Before inducing anaesthesia, all patients were given Glycopyrrolate 5 mg/kg and Fentanyl 2 mg/kg.

**RESULTS**

The participants in the trial were divided into two groups of 15 patients each. Propofol anesthesia was administered to Group 1 (n=15). Sevoflurane anesthesia was given to Group 2 (n=15).

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 01, 2023

**Table 1: Age breakdown of cases according to groupings**

| Age | Group 1 | Group 2 | p-value |
|---|---|---|---|
| No. of cases | 15 | 15 | 0.26 |
| Mean | 21.3 | 18.2 | |
| S.D. | 8.01 | 8.20 | |
| Median | 15.9 | 15 | |
| Range | 14 – 40 | 13 – 42 | |

Although it was noted that Group 1 had a higher mean age than Group 2, this difference was not statistically significant.

**Table 2: Distribution of cases by sex and by groupings**

| Sex | Group 1 (n=15) | | Group 2 (n=15) | | p-value |
|---|---|---|---|---|---|
| | No. | % | No. | % | |
| Male | 8 | 53.33 | 9 | 60 | 0.81 |
| Female | 7 | 46.66 | 6 | 40 | |

In Group 1, there were more women than men, while Group 2 participants were split equally. It is not statistically significant that the two groups' distributions differ.

**Table 3: Distribution of weight of cases by groups**

| Weight | Group 1 | Group 2 | p-value |
|---|---|---|---|
| No. of cases | 15 | 15 | 0.31 |
| Mean | 42.7 | 41.2 | |
| S.D. | 11.58 | 9.21 | |
| Median | 30 | 30 | |
| Range | 15 – 30 | 15 – 30 | |

The distribution of cases by weight and the difference in the mean values were observed to be not statistically significant between Group 1 and Group 2.

**Table 4: Case weight distribution by group**

| ASA | Group 1 (n=15) | | Group 2 (n=15) | | p-value |
|---|---|---|---|---|---|
| | No. | % | No. | % | |
| Grade I | 15 | 100.0 | 15 | 100.0 | 1.00 |
| Others | 0 | 0.0 | 0 | 0.0 | |

On ASA, each case from each group received the same grade, Grade I. As a result, the two groups' ASA scores are identical.

**Table 5: Case distribution by MPC and group**

| MPC | Group 1 (n=15) | | Group 2 (n=15) | | p-value |
|---|---|---|---|---|---|
| | No. | % | No. | % | |
| Grade I | 12 | 80.0 | 13 | 86.66 | 0.28 |
| Grade II | 3 | 20.0 | 2 | 13.33 | |

The distribution of cases by MPC and the two groups did not reach statistical significance, with Group 1 having a higher percentage of Grade I cases than Group 2.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 01, 2023

**Table 6: Groups' allocation of time for LOC**

| Time to location | Group 1 | Group 2 | p-value |
|---|---|---|---|
| No. of cases | 15 | 15 | <0.002 |
| Mean | 40.1 | 70.9 | |
| S.D. | 18.21 | 25.81 | |
| Median | 34 | 74 | |
| Range | 15 – 30 | 15– 30 | |

Group 1 had a shorter mean time to LOC than Group 2, and this difference was statistically significant (p 0.002).

**Table 7: Cases by apnoea incidence and group distribution**

| Apnoea | Group 1 (n=15) | | Group 2 (n=15) | | p-value |
|---|---|---|---|---|---|
| | No. | % | No. | % | |
| No | 3 | 80.0 | 2 | 13.33 | 1.00 |
| Yes | 12 | 20.0 | 13 | 86.66 | |

Both groups had an equal number of cases of apnoea, and the difference in distribution was statistically insignificant.

**Table 8: Phase I recovery distribution by group**

| Phase I recovery profile | Group 1 | Group 2 | p-value |
|---|---|---|---|
| No. of cases | 15 | 15 | 0.32 |
| Mean | 11 | 12 | |
| S.D. | 3.21 | 3.12 | |
| Median | 10 | 11 | |
| Range | 9 – 16 | 7 – 18 | |

Between Groups 1 and 2, the distribution of the Phase I recovery profile is not statistically significant.

## DISCUSSION

Many times, intravenous medicines are used to initiate anaesthesia, and then inhaled drugs are used to keep the patient under. Inconsistencies arise when using the approach for ongoing care following induction. To avoid the anaesthetic wearing off too quickly, it is important to inject the inhalational anaesthetic at a deep enough level to prevent the intravenous medicine from being redistributed too quickly. As a result, "single agent" anaesthesia has been rediscovered; this method eliminates the necessity for premedication. Propofol is widely used for total intravenous anaesthesia since it is a short-acting general anaesthetic with a low frequency of side effects. Continued anaesthesia by propofol infusions is also on the rise. However, propofol is only available via intravenous medication delivery, is painful to inject, and slows down the heart and the lungs.[9,10]

Sevoflurane is a safe and versatile inhalational anaesthetic that stands out from the competition. Sevoflurane is useful for inducing and maintaining anaesthesia in both paediatric and adult patients, and it can be utilised in both in- and out-patient settings. Sevoflurane is the anaesthetic with the most ideal combination of physical, pharmacodynamic, and pharmacokinetic properties. It would be ideal if an anaesthetic had the following properties: low reactivity with other drugs; low blood:gas solubility; rapid induction and emergence from anaesthesia; minimal end-organ effects; minimal effect on

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 01, 2023

cerebral blood flow; and a vapour pressure and boiling point that allow delivery using standard vapourization techniques.[11-13]

When used in conjunction with other, more stable Induction and Maintenance Anaesthesia techniques, the availability of this drug offers a welcome alternative (VIMA). Preoperative adult patients were asked about their preferences for inducing anaesthesia, and 33% said they would prefer intravenous (IV) induction, 50% would prefer inhaled (nitrous oxide), and 17% were unclear. Therefore, they suggest, where possible and appropriate, addressing healthy patients undergoing elective ambulatory surgery about their preferred method for the induction of anaesthesia, so long as there is no risk of regurgitation or breathing difficulty. We based our inhalation induction technique on the aforementioned studies.[14,15]

Inhalational induction with sevoflurane was significantly slower compared to intravenous induction with propofol, but was also linked with a lower incidence of apnoea and a shorter time to establish spontaneous breathing, according to research by A. Thwaites, S. Edmends, and I. Smith. Compared to propofol, inhalation induction with sevoflurane is significantly faster, and researchers Brain Fredman, MH. Nathanson, I. Smith, J. Wang, K. Klein, and PF. White observed no difference in the incidence of coughing, airway discomfort, or laryngospasm.[16,17]

Based on our findings, induction with sevoflurane is more laborious and fraught with potential complications. We show that sevoflurane and propofol have similar effects on generating and maintaining anaesthesia in adults, which is in line with the results of a study comparing these two medicines by W. Scott Jellish, MD, PhD, Cynthia A. Lien, MD, H. Jerrel Fontenot, PhD, and Richard Hall, MD, FRCPC, FCCPS. The induction time of propofol has been found to be shorter than that of other anaesthetics. To add insult to injury, sevoflurane was associated with a higher incidence of airway excitation side effects during mask induction than propofol was. This explains why more people in the sevoflurane group experienced bronchospasm.[18,19]

The patient made only small adjustments to their position during intubation, such as repositioning their hands or feet. Hemodynamic stability and tracheal intubation were not compromised. Patients were more likely to move around during the induction phase of sevoflurane, as reported by researchers J.K. Moore, E.W. Moore, R.A. Elliott, A.S. St. Leger, K. Payne, and J. Kerr, who compared the induction and recovery phases of propofol and sevoflurane. Propofol and sevoflurane both cause apnea, but at different concentrations. These respiratory depressants are more effective when pretreated with opioids2. This explains why the prevalence of apnea was similar between the two groups. While mean arterial pressure (MAP) dropped in both groups during induction of anaesthesia, the drop in the propofol group was more noticeable. Each group's HR increased by around 5 beats after anaesthesia was induced. This is probably due to the use of glycopyrrolate right before induction. Sevoflurane's direct inhibition of the beta- adrenoceptor system may explain why one patient had bradycardia after induction of anaesthesia with the gas. Statistically speaking, sevoflurane does speed up phase I recovery (i.e., emergence from anaesthesia) more than propofol does. Consistent with the results of a study comparing sevoflurane and propofol for inducing anaesthesia, these observations were made by A. Thwaites, S. Edmends, and I. Smith.[18-21]

Our research showed that propofol and sevoflurane anaesthetic induction and maintenance resulted in comparable phase II recovery times. Patients who had sevoflurane anaesthesia reported higher pain, but they also reported more nausea and vomiting after surgery. Multiple studies, including those by Brain Fredman et al. (1995), Cynthia A. Lien et al. (1996), Reader. J. et al. (1997), Hanna Viitanen et al. (1999), and V. Picard et al (2000). Because of propofol's 'intrinsic' antiemetic activity, it's possible that the propofol group experienced less postoperative nausea and vomiting.[19-22] It is possible that sevoflurane's rapid recovery

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 01, 2023

profile and lack of tissue solubility and accumulation contributed to its patients' needing analgesics for a shorter period of time after surgery than those in the isoflurane group. It has been speculated that propofol possesses analgesic properties, however this remains unproven.

## CONCLUSION

Sevoflurane induction is more difficult and takes longer to recover from compared to Propofol in adult tonsillectomies. Both groups have a similar rate of apnea occurrence. Both groups had similar Phase I & II recuperation periods. A statistically insignificant correlation between sevoflurane anaesthesia and postoperative pain incidence was found. Propofol is superior to other sedatives and anaesthetics for inducing and maintaining anaesthesia during outpatient procedures on adults. It has a shorter induction time and lower rates of postoperative nausea, vomiting, and pain.

## REFERENCES

1. The comparative effects of sevoflurane versus propofol in the induction and maintenance of anaesthesia in adult patients: W. Scott Jellish, MD, PhD, Cynthia A Lien MD, H.Jerrel Fontenot, MD, PhD, and Richard Hall, MD, FRCPC, FCCPS. – Anesthesia & Analgesia: 1996:82, 479 -485.
2. Ronald D. Miller. 2005: 6 (1, 2): Inhaled Anaesthetics: 105-316. Intravenous Non opioid anaesthetics: 318 - 326 outpatient Anaesthesia: 2589 - 2636.
3. Robert K. Stoelting 2006: 4: Pharmacokinetics and pharmacodynamics of injected and inhaled Drugs: 3-41. Inhaled Anaesthetics: 42-86. Nonbarbiturate intravenous anaesthetics drugs - Propofol: 155-163.
4. American society of Anaesthesiologists - Committee of ambulatory surgical care, communication: 2003
5. CNS Drugs Reviews: Vol.7, No. 1, Pg 48 – 120: Sevoflurane: Approaching the ideal inhalational anaesthetic - A pharmacologic, Pharmaco economic and clinical review. Leticia Delgado - Herrera,Randall D. Ostroff and Sharon A. Rogers.
6. Sevoflurane - maintained anaesthesia induced with propofol or sevoflurane in small children: induction and recovery characteristics - Hanna Viitanen, MD. Pekka Tarkkila, MD, PhD, Susanna Mennander. MD, Matti Viltanen, MD, Paivi Annila, MD, PhD: Canadian Journal of Anaesthesia, 1999/46:1/ pp 21-28.
7. Sevoflurane for outpatient anesthesia: A comparison with propofol: Brian Fredman. MB, Bch, Michael H. Nathanson, MBBS, MRCP, FRCA, Ian Smith, BSc, MB, Bch, FRCA, Junke wang, MD, Kevin Klein, MD and Paul F. White, MD, PhD, FANZCA Anesthesia & Analgesia: 1995;81:823-8.
8. Propofol and halothane versus sevoflurane in paediatric day - case surgery: induction and recovery characteristics: J. K. Moore, E.W. Moore, R.A. Elliott, A.S.St. Leger, K. Payne and J. Kerr : BJA: 2003; 461-466.
9. Clinical comparison of ‘single agent’ anaesthesia with sevoflurane versus target controlled infusion of propofol: K.R. Watson and M.V. Shaw: BJA: 2000; 85/4/541-546.
10. Sevoflurane versus propofol for Anesthetic induction: A Meta - Analysis: Hwan S.Joo. MD, FRCPC, and William J. Perks, BSC, Phm .
11. A comparison: The efficacy of Sevoflurane - Nitrous oxide or Propofol – Nitrous oxide for the induction and maintenance of general anaesthesia: Cynthia A. Lien, MD, Hugh C. Hemmings, MD, Ph D, Matthew R. Belmont MD, Amy Abalos. RN, Charleen Hollmann. RN, Robert E. Kelly. MD: Journal of clinical anaesthesia: 1996;8: 639-643.
12. Postoperative analgesia and discharge criteria for day - case surgery: Nicole Assmann, Marius Terblanche, Richard Griffith : Anaesthesia and intensive care medicine: 2004; 104-105.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 01, 2023

13. Propofol - Nitrous oxide versus Sevoflurane - Nitrous oxide for strabismus surgery in children: Yavuz gurkan, MD, Levent Kilickan, MD, and Kamil Toker, MD: Paediatric anaesthesia: 1999; 9:495-499.
14. Quality of recovery in children: Sevoflurane versus propofol: V. Picard, L. Dumont and M. Pellegrini : Acta Anaesthesiologica Scandinavia 2000; 44: 307- 310.
15. Comparison of recovery profile after ambulatory anaesthesia with propofol, isoflurane, Sevoflurane and desflurane: A systematic review: Anil Gupta MD, FRCA, PhD, Tracey stierer. MD, Rhonda Zuckerman. MD, Neal Sakima, MD, Stephen. D. Parker, MD, and Lee. A. Fleisher, MD: Anesthesia & Analgesia, 2004; 98:632-41.
16. Inhalation induction with sevoflurane: a double blind comparison with propofol:
17. A. Thwaites S. Edmends and I. Smith : BJA, 1997; Issue 4: 356-361.
18. Induction of anaesthesia with sevoflurane, Nitrous oxide and oxygen - A comparison of spontaneous ventilation and vital capacity rapid inhalation induction techniques: Masaki Yurino MD, Ph D, and Hitomi Kimura, MD : Anesthesia & Analgesia 1993; 76:598 – 601.
19. Intravenous or inhaled induction of anaesthesia in adults? An audit of preoperative patient preferences: Anton A van den Berg FRCA, Dudley A. Chitty, MD, Ramoun D. Jones, MD, Mir S. Sohel, MD and Ali Shahen MD : Anaesthesia & analgesia: 2005; 100:1422-1424.
20. Vital capacity and patient controlled sevoflurane inhalation induction result in similar induction characteristics: Suntheralingam Yogendran FRCPC, Atul Prabhu, FRCA, Ayman Hendy, MBBS, Glen Mcguire, MD, Charles Imarengiaye, MBBS, Jean Wong, FRCPC and Frances chung, FRCPC :Canadian journal of anaesthesia:2005;52:45-49.
21. Comparison of sevoflurane and Halothane anesthesia in children undergoing outpatient Ear, Nose and Throat Surgery: Julia. C.F. Greenspun, MD, Raafat S. Hannallah, MD, Leila G. Welborn, MD, Janet M. Norden, MSN: Journal of clinical anaesthesia: 1995;7: 398-402.
22. A comparison of sevoflurane - propofol versus sevoflurane or propofol for Laryngeal mask airway insertion in adults: Sahar M. Siddik - Sayyid, MD, FRCA, Marie T. Aouad, MD, Samar K. Taha, MD, Dima G. Daaboul. MD, Patricia G. Deeb. MD, Faraj M. Massouh. MD, Marie Rose A. Muallem. MD and Anis S. Baraka. MD, FRCA : Anesthesia & Analgesia: 2005; 100: 1204-09.
23. Recovery characteristics of sevoflurane or propofol based anaesthesia for day - care surgery: Reader. J, Gupta. A, Pedersen. F.M, Acta anaesthesiologica Scandinavia: 1997; 41: 988-984.