Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 02, 2023

Original research article

Comparison of sevoflurane and propofol's induction and recovery properties during adult tonsillectomies in daycare

[1]Dr. Himani A, [2]Dr. Nenavath Sudheer Kumar Naik

[1]Assistant Professor, Department of Anaesthesia, Rajiv Gandhi Institute of Medical Sciences, Adilabad, Telangana, India

[2]Assistant Professor, Department of Anaesthesia, Osmania Medical College (deputed at RIMS, Adilabad), Hyderabad, Telangana, India

Corresponding Author:
Dr. Himani A

Abstract

Background: If a patient is having an elective surgical procedure on a day that has been carefully chosen, with all required procedures occurring on the same day, they may be given an ambulatory anaesthetic. Ambulatory anesthesia is a hot new area in the field of anesthesia, and this is not hyperbole.

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, Rajiv Gandhi Institute of Medical Sciences, Adilabad, Telangana, India from June 2021 to May 2022.

Results: 50 patients were divided into two groups of 25 at random for the study. Propofol was used as the anesthetic for the first group (n = 25). Group 2 (n=25) underwent sevoflurane anesthesia. Compared to Propofol, sevoflurane induction during adult tonsillectomies is more challenging and requires a longer recovery period. Both groups experience apnea at about the same rates.

Conclusion: Phase I and Phase II recovery times were comparable for the two groups. There was a statistically insignificant correlation between the incidence of postoperative pain and sevoflurane anesthesia. When it comes to inducing and maintaining anesthesia during outpatient procedures on adults, propofol is superior to other sedatives and anesthetics. It takes less time to induce and has lower postoperative pain, nausea, and vomiting rates.

Keywords: Propofol, sevoflurane, induction, daycare adult tonsillectomies

Introduction

Surgery performed on a patient admitted and released the same day of surgery is a common practice to free up hospital resources for more patients since each patient is released from the hospital sooner [1]. Rapid induction and recovery may result in a quicker turnover in the operating room, a shorter stay in the recovery room, and an earlier discharge to the patient's home [2]. Propofol is rapidly removed from circulation due to its low lipid solubility. Due to its quick onset of action, quick recovery, and low incidence of postoperative nausea and vomiting, propofol is a proven intravenous anesthetic agent for daycare procedures. Sevoflurane is a fluorinated anesthetic that is nonflammable and has a pleasant smell. It has strong hypnotic effects and doesn't really irritate the upper airway [3]. Due to its low blood gas coefficient and quick induction and emergence from anesthesia, sevoflurane exhibits these properties [3]. Sevoflurane is a fast, smooth, and well-tolerated inhalational sedative in both children and adults [4].

It is the source of more than 70% of all anesthetic procedures performed globally. According to the strategy that the NHS just recently made public, the majority of elective surgical procedures will soon be performed as day cases [5, 6]. In order to meet a specialized but crucially important demand in the field of mobile anaesthesia, the anesthetic drugs that are available today were developed and brought to market. Sevoflurane and propofol are two medications that have improved the day case care that anesthesiologists can give to their patients in India. In particular, the durations of induction and recovery are compared between the two anesthetics in terms of their efficacy in outpatient settings [7, 8]. This study compares the effects of sevoflurane and propofol when they are used as the only induction and maintenance anesthetics during adult tonsillectomies. More specifically, the comparison will center on how long it takes for patients to lose consciousness, how often they experience apnea, what issues can occur during induction, how long it takes for patients to recover, and how often they experience postoperative pain, nausea, and vomiting.

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 02, 2023

Material and Method

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, Rajiv Gandhi Institute of Medical Sciences, Adilabad, Telangana, India from June 2021 to May 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.

50 individuals who required tonsil removal were selected. Individuals in the age group of 14 to 42 were included. Individuals with normal clinical, biochemical, radiological and hematological investigations were included. Informed consent was taken from all the patients or legal guardians in case of minors. Patients were randomly divided into two groups. Patients receiving propofol were labelled as "P" , those receiving sevoflurene were labelled as "S" .

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 MPG 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.

Before any procedures were carried out, the patients' health was evaluated. After educating the patient about the procedure, their consent was obtained. During the evaluation process, any potential warning signs were carefully taken into account. The recuperation tests and the importance of strictly adhering to all instructions were emphasized. The patients did not receive any premedication by IM route. There was no antiemetic medication given as a preventive. Glycopyrrolate 0.005mg/kg and Fentanyl 2 mg/kg were administered to all patients prior to inducing anesthesia.

Results

The participants in the trial were divided into two groups of 25 patients each. Propofol anesthesia was administered to Group 1 (n=25). Sevoflurane anesthesia was given to Group 2 (n=25).

Table 1: Age breakdown of cases according to groupings

Age	Group 1	Group 2	p-value
No. of cases	25	25	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 statistically insignificant.

Table 2: Distribution of cases by sex and by groupings

Sex	Group 1 (n=25)		Group 2 (n=25)		p-value
	No.	%	No.	%	
Male	15	53.33	15	60	0.81
Female	10	46.66	10	40	

In Group 1, there were more women than men, while Group 2 participants were split equally. It is sstatistically insignificant.

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 02, 2023

Table 3: Distribution of weight of cases by groups

Weight	Group 1	Group 2	p-value
No. of cases	25	25	0.31
Mean	42.7	41.2	
S.D.	11.58	9.21	
Median	20	20	
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: ASA distribution between groups

ASA	Group 1 (n=25)		Group 2 (n=25)		p-value
	No.	%	No.	%	
Grade I	25	100.0	25	100.0	1.00
Others	0	0.0	0	0.0	

All the patients in both the groups belong to ASA grade I. As a result, the two groups' ASA scores are identical.

Table 5: Case distribution by MPG and group

MPC	Group 1 (n=25)		Group 2 (n=25)		p-value
	No.	%	No.	%	
Grade I	18	76.0	20	80.00	0.28
Grade II	7	24.0	5	20.00	

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

Table 6: Groups' allocation of time for LOC

Time to location	Group 1	Group 2	p-value
No. of cases	25	25	<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=25)		Group 2 (n=25)		p-value
	No.	%	No.	%	
No	8	32.0	3	12.00	1.00
Yes	17	68.0	22	88.00	

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	25	25	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

Often, intravenous medications are used to start anaesthesia, and then inhaled medications are used to

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 02, 2023

maintain the patient's anesthesia. The method for continuing care after induction has inconsistencies. In order to prevent the anesthetic from wearing off too quickly, it's crucial to inject the inhalational anesthetic deeply enough to stop the intravenous medication 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 an inhalational anesthetic that stands out from the competition because it is secure and adaptable. Sevoflurane can be used in both in- and out-patient settings and is effective for inducing and maintaining anaesthesia in both pediatric and adult patients. The anesthetic with the best pharmacodynamic, pharmacokinetic, and physical property mix is sevoflurane. The ideal characteristics for an anesthetic would be low reactivity with other drugs, low blood:gas solubility, rapid induction and emergence from anaesthesia, minimal end-organ effects, minimal impact on cerebral blood flow, and a vapour pressure and boiling point that permit delivery using conventional vapourization techniques [11-13].

The availability of this medication offers a welcome alternative (VIMA) when combined with other, more reliable induction and maintenance anesthesia techniques. When asked about how they would prefer to induce anaesthesia, preoperative adult patients responded that 33% would prefer intravenous (IV) induction, 50% would prefer inhaled (nitrous oxide), and 17% were unsure. So long as there is no chance of regurgitation or breathing difficulty, they advise asking healthy patients having elective ambulatory surgery about their preferred method for inducing anesthesia whenever possible and appropriate. We used the aforementioned studies [14, 15] as the foundation for our inhalation induction method.

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].

According to our research, sevoflurane induction is more difficult and rife with dangers. We demonstrate that sevoflurane and propofol produce and maintain anaesthesia in adults in a manner that is consistent with the findings of a study by W. Scott Jellish, Cynthia A. Lien, H. Jerrel Fontenot, and Richard Hall that compared the effects of these two drugs. 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].

During intubation, the patient only minimally adjusted their position, such as shifting their hands or feet. Tracheal intubation and hemodynamic stability weren't jeopardized. 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 opioids 2. 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].

According to our study, phase II recovery times were comparable after sevoflurane and propofol anesthesia during induction and maintenance. Sevoflurane anesthesia patients reported more pain during surgery, but they also reported more post-operative nausea and vomiting. There have been several studies, such as 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 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

In adult tonsillectomies, sevoflurane induction is more challenging and requires a longer period of

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 02, 2023

recovery than propofol. The frequency of apnea is comparable in the two groups. Phase I and Phase II recovery times were comparable for the two groups. There was a statistically insignificant correlation between the incidence of postoperative pain and sevoflurane anesthesia. When it comes to inducing and maintaining anesthesia during outpatient procedures on adults, propofol is superior to other sedatives and anesthetics. It takes less time to induce and has lower postoperative pain, nausea, and vomiting rates.

Conflict of Interest: None

Funding Support: Nil

References

1. Smith I, Terhoeve PA, Hennart D, Feiss P, Harmer M, Pourriat JL, *et al*. A multicentre comparison of the costs of anaesthesia with sevoflurane or propofol. British Journal of Anaesthesia. 1999;83(4):564-70.
2. Tang J, Chen L, White PF, Watcha MF, Wender RH, Naruse R, *et al*. Recovery profile, costs, and patient satisfaction with propofol and sevoflurane for fast-track office-based anesthesia. Anesthesiology. 1999;91(1):253-61.
3. Bailey CR, Ahuja M, Bartholomew K, Bew S, Forbes L, Lipp A, *et al*. Guidelines for day-case surgery 2019: Guidelines from the Association of Anaesthetists and the British Association of Day Surgery. Anaesthesia. 2019;74(6):778-92.
4. Dhabarde M, Malliwal A. A Comparative Analysis between Desflurane and Propofol as Single Agent Anesthesia. IAIM. 2016;3(5):64-73.
5. CNS Drugs Reviews: Sevoflurane: Approaching the ideal inhalational anaesthetic - A pharmacologic, Pharmaco economic and clinical review. Leticia Delgado - Herrera,Randall D. Ostroff and Sharon A. Rogers. 2001;7(1):48-120
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):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; c2003. p. 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; c2004. p. 104-105.
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: A. Thwaites S. Edmends and I. Smith: BJA. 1997;4:356-361.
17. 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.
18. 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.
19. Vital capacity and patient controlled sevoflurane inhalation induction result in similar induction

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 02, 2023

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.

20. 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.
21. 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.
22. 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.