

Effect of propofol and Sevoflurane as anesthetic for short elective surgeries: A Prospective Comparative Study in a tertiary care Hospital, Telangana, India

Dr. Rodasi Ch¹, Dr. Medi Naga Padma², Dr. Sujay Kumar Parasa^{3*}, Dr. Enugala Swarna⁴, Dr. Kanchi Sneha⁵

- 1. Assistant Professor, Department of Anaesthesiology, Government Medical College, Nizamabad, Telangana, INDIA.**
- 2. Assistant Professor, Department of Anaesthesiology, Government Medical College, Nizamabad, Telangana, INDIA.**
- 3*. Assistant Professor, Department of Anaesthesiology, Government Medical College, Nizamabad, Telangana, INDIA.**
- 4. Post Graduate, Department of Anaesthesiology, Government Medical College, Nizamabad, Telangana, INDIA.**
- 5. Post Graduate, Department of Anaesthesiology, Government Medical College, Nizamabad, Telangana, INDIA.**

Name, Address, Email of the corresponding author

Dr. Sujay Kumar Parasa
Assistant Professor,
Department of Anaesthesiology,
Government Medical College,
Nizamabad,
Telangana, INDIA
Email: drsujaykumar77@gmail.com

Abstract

Introduction: Sevoflurane is one of the general anesthetic having a rapid onset and offset of action. Hence anesthesiologist can control the depth of anesthesia rapidly. Intravenous propofol with rapid induction and recovery is a popular induction agent nowadays for surgical anesthesia. **Objectives:** To compare the effect of sevoflurane and propofol for inducing anesthesia in short elective surgeries. **Methods:** The study was conducted at Government Medical College, Nizamabad, Telangana, India. Hundred patients prepared for elective short surgery were taken into the study. After pre-anesthetic medication, one group of patients were induced with : O₂:N₂O (50:50) + Sevoflurane 3-4% and the other group induced with: O₂:N₂O (50:50) + Propofol 3-5 mg/kg. Parameters like relevant intra-op details, ease of procedure, hemodynamic changes, recovery, and

complication rate were compared between both groups. **Results:** Parameters like jaw opening, attempts for LMA and ease of insertion was comparable in both the groups . Time to loss of consciousness and time to LMA insertion was significantly shorter with Propofol. Mean pulse rate and MAP was significantly higher in Sevoflurane group. **Conclusion:** Inhaled Sevoflurane is better for LMA insertion and intra-operative hemodynamic profile during anesthesia was stable. Sevoflurane can be considered as an alternative induction agent when inhalational induction is required. We should keep in mind that caution still needs to be continued when sevoflurane is used.

Keywords: Day care surgery, Inhalational anesthetic, hemodynamic parameters, sevoflurane, propofol.

Introduction

Sevoflurane is one of the general anesthetic having a rapid onset and offset of action. Hence anesthetist can control the depth of anesthesia rapidly¹. Intravenous propofol with rapid induction and recovery is a popular induction agent nowadays for surgical anesthesia. General anesthetic techniques can be used and in day cases or in office bases setting where these procedures are increasingly performed. Sevoflurane and propofol share many properties that make them nearly out patient anesthesia both provide a rapid smooth induction, allow for easy alteration of anesthetic depth during the maintenance period and have fast emergence and recovery with out serious side effects². There have been several studies published comparing propofol and sevoflurane for the induction ,maintenance and recovery from anaesthesia in various settings with different results. Hence the present comparative study was undertaken to study the effect of Sevoflurane and propofol for inducing anesthesia in short elective surgeries

MATERIALS AND METHODS

This study titled “Effect of propofol and Sevoflurane as anesthetic for short elective surgery: A Prospective Comparative Study in a tertiary care Hospital,Telangana,India ”was carried out during the period from January 2022 to May 2022.The study was conducted on 100 randomly selected patients fulfilling the criteria⁷. The study was conducted at Government Medical College,Nizamabad,Telangana,India. with an aim to compare the Effect of propofol and Sevoflurane as anesthetic for short elective surgeries.

Inclusion Criteria

- Age group- 18 to 60 years
- ASA grade I – II
- Elective short surgeries – requiring general anesthesia with laryngeal maskairway placement e.g. fibroadenoma, hernia, fistula, appendicitis.

Exclusion Criteria

- Allergy to propofol /Egg allergy
- History of upper respiratory tract infection within 1 month of surgery
- Documented uncontrolled hypertension/chronic obstructive pulmonarydisease
- Addiction to alcohol/drug abuse

Ethics: This study was approved by the Institutional Ethics Committee,Government Medical College,Nizamabad,Telangana,India. An informed written consent was taken from all the patients involved in the study after explaining regarding the study.

Study Procedure: Hundred patients⁸ prepared for elective short surgeries were taken into the study. All the patients were explained about the type of surgery, anesthesia, post-operative pain relief, rescue medication and given pre-anesthetic medication. Patients were divided into 2 groups each group containing 50 patients (S-Group:50) and (P-Group:50). S group of patients were induced with : O₂:N₂O (50:50)+ Sevoflurane 3-4% and the P group induced with: O₂:N₂O (50:50) +Propofol 3-5 mg/kg. Parameters like relevant intra-op details, ease of procedure, hemodynamic changes, recovery, and complication rate were compared between both groups. For both the groups, the following were monitored: Conditions during LMA insertion: time to loss of consciousness, time to insertion of LMA, jaw opening, ease of insertion, number of attempts in both sevoflurane and propofol group.

Results :

Table No: 1 Comparison of Demographic characters and loss of consciousness and LMA insertion

Variable	Sevoflurane (n=50)		Propofol (n=50)	
	Mean	SD	Mean	SD
Age	27.35	11.17	24.38	6.24
Weight (Kg)	49.24	4.48	48.28	3.36
Duration of surgery (min)	51.64	11.76	59.42	10.62
Time to loss of consciousness (Sec)	225.20	54.84	44.40	7.46
Time to LMA insertion (Sec)	51.77	10.28	34.70	11.10

From the above table two groups were almost comparable inline with the demographic characters like age, weight and duration of surgery. Time to loss of consciousness in sevoflurane and propofol groups was 225.20 sec and 44.40 sec respectively. Time to LMA insertion was significantly shorter with Propofol group (34.70 sec) when compared with sevoflurane group (51.77 sec).

Table:2 Comparison of various pre-operative parameters among study groups

Variable	Sevoflurane (n-50)		Propofol (n-50)	
	N	%	N	%
ASA grade I	50	100.0%	50	100.0%
Good Jaw Opening	45	83.3%	47	90.0%
Single attempt for LMA	47	86.7%	48	90.0%
Ease of Insertion - Good	42	86.7%	44	80.0%

As per the above results table Jaw opening, attempts for LMA and ease of insertion was also comparable in both the groups.

Table :3 Comparison of Aldrete score in study groups

Aldrete Score	Sevoflurane (n-50)		Propofol (n-50)	
	Mean	SD	Mean	SD
0 min	8.41	0.517	7.14	0.424
10 min	9.15	0.523	8.27	0.413
20 min	9.43	0.316	8.34	0.465
30 min	10	0	8.72	0.363
40 min	10	0	8.60	0.18
50 min	10	0	9.21	0.31
60 min	10	0	9.25	0.36

From the above results table Aldrete score was significantly higher in Sevoflurane in comparison to Propofol from 0 min to 60 min following extubation to 1hr stay in recovery room.

Table No:4 Comparison of Complication rates in study groups

Complications	Sevoflurane (n-50)		Propofol (n-50)	
	N	%	N	%

Cough	7	15.2%	4	8.5%
Nausea/ Vomiting	7	14.3%	4	7.6%

From the above results table we can observe the complication rate was comparable between Sevoflurane and propofol groups (15.2% vs 7.6%).

Table No: 5 Comparison of Pulse rate and Mean Arterial Pressure (MAP) in study groups

Variables	Sevoflurane (n-50)		Propofol (n-50)	
	0 min	60 min	0 min	60 min
Pulse rate	5	20	3	14
MAP	5	27	3	18

From the above results table the mean pulse rate from 0 min it is 5 and 60 min it is 20 and mean arterial pressure at 0 min it is 5 , 60 min it is 27 for sevoflurane group.and from 0 min to 60 min was statistically significantly higher in Sevoflurane group in comparison to Propofol group.

Discussion:

In this present study we have compared Sevoflurane and Propofol as single agent anaesthesia. The two groups were comparable with respect to demographic characters like age, sex, weight and duration of surgery . Jaw opening, attempts for LMA and ease of insertion was also comparable in both the groups. Time for loss of consciousness and LMA insertion was significantly shorter in Propofol group. Our study was in line with Wai Jellish WS, Lien CA, Fontenot HJ, Hall R^{3,4,5} who did a prospective study on LMA insertion with Sevoflurane related compounds.Hundred patients undergoing elective surgery were divided into two groups to receive either 2.5mg/kg propofol (n= 50) or tidal breath Sevoflurane (n =50) induction followed by LMA insertion. Wrigley, et al. compared induction and recovery characteristics of Desflurane with Propofol in 60 Daycare patients.

Sevoflurane and desflurane caused loss of consciousness in approximately 2 minutes during gaseous inductions. There was also a tendency for other recovery parameters to be faster in the patients receiving sevoflurane though non-significant. They concluded that Sevoflurane and desflurane would be a suitable agent for day care anaesthesia providing for a rapid recovery^{6,7}. Mean pulse rate

and MAP was significantly higher in Sevoflurane in comparison to Propofol. Sevoflurane produces greater sympathetic stimulation, and this stimulation becomes manifest at concentrations greater than 1 MAC. The result of stimulation may be both a greater tendency to sustain cardiac output and blood pressure, and a greater effect on heart rate. Modified Aldrete score was significantly higher in sevoflurane group in comparison to Propofol group from 0 min to 60 min following extubation to 1 hour stay in recovery room.

RASS scale was significantly higher in Sevoflurane group from 0 min to 30 min in comparison to Propofol group whereas no significant difference in RASS scale was found in two groups from 40 min to 60 min. This was in line with study by Dajun Song, et al. who compared Desflurane, Sevoflurane^{9,10,11} and Propofol for maintenance of anaesthesia and discharge criteria on arrival in the post anaesthesia care after Laproscopic tubal ligation surgery. They found that compared with the Propofol group, the times to awakening and to achieve a recovery score of 10 were significantly shorter. Gupta, et al. compared recovery profile after ambulatory anesthesia with propofol, isoflurane, sevoflurane and desflurane in a systemic review and found out no differences between propofol and isoflurane in early recovery. However, early recovery was faster with desflurane compared with propofol and isoflurane and with sevoflurane compared with isoflurane .

Our study was also in line with Wai May Leong and Ee Lyn Ong¹² who did a prospective study on LMA insertion with Desflurane induction. Hundred patients undergoing elective surgery were divided into two groups to receive either 2.5mg/kg propofol (n = 50) or tidal breath desflurane (n = 50) induction followed by LMA insertion. Airway excitation and cough, a main concern during induction with Sevoflurane, occurred in 5% of patients. This contrast in the incidence of airway irritation when compared to other studies.

Conclusion

Inhaled Sevoflurane is better for LMA insertion and intra-operative hemodynamic profile during anesthesia was stable. Sevoflurane can be considered as an alternative induction agent when inhalational induction is required. We should keep in mind that caution still needs to be continued when sevoflurane is used.

REFERENCES

- 1.Indu Verma, Chandan Verma, Ramnaresh Sharma, Sandeep Dhaked. Comparative Study of Sevoflurane Versus Desflurane on Hemodynamics in Off Pump Coronary Artery Bypass Grafting. *Anesthesia and Critical Care* 2 (2020): 025-038.
- 2.Jellish WS, Lien CA, Fontenot HJ, Hall R. The comparative effects of sevoflurane versus propofol in the induction and maintenance of anesthesia in adult patients. *Anesth Analg*. 1996 Mar;82(3):479-85. doi: 10.1097/00000539-199603000-00009. PMID: 8623947.
- 3.Joo H S, Perks W J. Sevoflurane versus propofol for anesthetic induction: a meta-analysis. *Anesthesia and Analgesia* 2000; 91(1): 213-219
- 4.Lien CA, Hemmings HC, Belmont MR, Abalos A, Hollmann C, Kelly RE. A comparison: the efficacy of sevoflurane-nitrous oxide or propofol-nitrous oxide for the induction and maintenance of general anesthesia. *J Clin Anesth*. 1996 Dec;8(8):639-43. doi: 10.1016/s0952-8180(96)00172-9. PMID: 8982891.
- 5.Siddik-Sayyid SM, Aouad MT, Taha SK, Daaboul DG, Deeb PG, Massouh FM, Muallem MA, Baraka AS. A comparison of sevoflurane-propofol versus sevoflurane or propofol for laryngeal mask airway insertion in adults. *Anesth Analg*. 2005 Apr;100(4):1204-1209. doi: 10.1213/01.ANE.0000148166.29749.3B. PMID: 15781547.
6. Singh, H., Dhawan, G., Brar, P. K. S., Bhardwaj, S., Barman, M., & Srivastava, R. (2022). Comparative study of sevoflurane versus propofol for laryngeal mask airway insertion in adults. *International Journal of Health Sciences*, 6(S2), 9441–9446. <https://doi.org/10.53730/ijhs.v6nS2.7473>
7. Fatima, N., Moin, S. A., Zubair, S. I., Shatogopam, R., & Kiran. (2022). Comparison of induction and recovery characteristics of propofol and sevoflurane in day care adult tonsillectomies. *International Journal of Health Sciences*, 6(S3), 2311–2322. <https://doi.org/10.53730/ijhs.v6nS3.6014>
8. Barkha, B., Sivakumar, V., Ali, M. M., Kumar, V. P., & Chincholi, I. H. (2022). A comparison between propofol and desflurane anaesthetic agent for short elective

surgery. *International Journal of Health Sciences*, 6(S6), 10790–10796.

<https://doi.org/10.53730/ijhs.v6nS6.12911>

9. Han, S., Park, J., Hong, S.H. *et al.* Comparison of the impact of propofol versus sevoflurane on early postoperative recovery in living donors after laparoscopic donor nephrectomy: a prospective randomized controlled study. *BMC Anesthesiol* **20**, 273 (2020).

<https://doi.org/10.1186/s12871-020-01190-9>

10. Li M, Mei W, Wang P, Yu Y, Qian W, Zhang ZG, Tian YK. Propofol reduces early post-operative pain after gynecological laparoscopy. *Acta Anaesthesiol Scand*. 2012 Mar;56(3):368-75. doi: 10.1111/j.1399-6576.2011.02603.x. Epub 2011 Dec 23.

11. K. R. Watson, M. V. Shah, Clinical comparison of ‘single agent’ anaesthesia with sevoflurane versus target controlled infusion of propofol, *BJA: British Journal of Anaesthesia*, Volume 85, Issue 4, 1 October 2000, Pages 541–546, <https://doi.org/10.1093/bja/85.4.541>

12. Kim, J.E.; Koh, S.Y.; Jun, I.-J. Comparison of the Effects of Propofol and Sevoflurane Anesthesia on Optic Nerve Sheath Diameter in Robot-Assisted Laparoscopic Gynecology Surgery: A Randomized Controlled Trial. *J. Clin. Med.* **2022**, *11*, 2161. <https://doi.org/10.3390/jcm11082161>