

ORIGINAL RESEARCH

A prospective randomised comparative study between propofol and sevoflurane for ease of laryngeal mask airway insertion and haemodynamic stability

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Received: 12 March, 2023

Accepted: 18 April, 2023

ABSTRACT

Propofol is commonly used for the intravenous induction of anesthesia during laryngeal mask airway (LMA) insertion due to its suppressant effect on airway reflexes. However, bolus propofol administration has been associated with adverse effects such as hypotension, apnea, and pain on injection, thus it is crucial to explore suitable alternatives. Sevoflurane, a volatile anesthetic agent, offers advantages such as smooth and rapid inhalational induction of anesthesia and quick recovery, making it well-suited, for day care anesthesia. With its low blood gas solubility and minimal respiratory irritant properties, sevoflurane is particularly suitable for inhaled induction of anesthesia and LMA insertion. The LMA technique, serving as an alternative to end tracheal intubation, is employed for securing the airway during short surgical procedures requiring general anesthesia. This study aims to compare the effects of sevoflurane and propofol on patients undergoing laryngeal mask airway insertion. (1-3) A total of 110 patients were randomly assigned to two treatment groups. Group S consisted of 55 patients who received inhalational induction with 8% sevoflurane, while Group P included 55 patients who received intravenous injection of propofol 2.5mg/kg administered intravenously over 30 seconds. In this randomized prospective study, we found that the two groups' rates of induction were remarkably similar. This study concluded that Sevoflurane required significantly more time to insert the LMA in comparison of Propofol. Both groups maintained hemodynamic stability. Consequently, Sevoflurane is a good substitute for Propofol when inserting an LMA.

Key words: Propofol, sevoflurane, supraglottic devices

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INTRODUCTION

Propofol is commonly employed as an intravenous induction agent for laryngeal mask airway (LMA) insertion due to its ability to suppress airway reflexes. However, the use of propofol is associated with certain drawbacks such as hypotension, apnea, and injection pain, prompting the need for alternative agents. Sevoflurane, a volatile anesthetic, offers several advantages including smooth and rapid

inhalational induction and a smooth recovery time, making it particularly suitable for day care anesthesia^{1,2}. Its low blood gas solubility and minimal respiratory irritant properties also render it well-suited for inhaled induction and LMA insertion. The LMA was invented In 1981 Dr. Archie Brain of the United Kingdom invented the laryngeal mask airway⁴. Is a supraglottic airway device that facilitates controlled ventilation and maintains a seal around the laryngeal

inlet to support spontaneous ventilation. The LMA technique serves as an alternative to end tracheal intubation, providing a means of securing the airway during short surgical procedures. Anesthesiologists utilize supraglottic devices like anatomical face masks, LMAs, and or pharyngeal airways to maintain the airway in patients under anesthesia. Different sizes of LMAs are available based on the patient's weight and specific cuff volume requirements. Understanding the components of the LMA is crucial for successful insertion and effective management of the airway^{5, 6}. Sevoflurane and propofol are commonly used induction agents for LMA insertion, requiring an appropriate level of anesthesia and suppression of airway reflexes.⁴ This study aims to compare the effects of Sevoflurane and Propofol on patients undergoing LMA insertion.

MATERIALS AND METHODS

This prospective randomized controlled trial aimed to compare the effects of sevoflurane and propofol for laryngeal mask airway (LMA) insertion in patients undergoing general anesthesia for elective surgery. The study enrolled patients between the ages of 18 and 60, classified as ASA Grade I or II, and obtained their informed consent. The research was conducted over a period of 18 months, from January 2021 to June 2022.

A total of 110 patients were randomly assigned to two treatment groups. Group S consisted of 55 patients who received inhalational induction with sevoflurane, while Group P included 55 patients who received intravenous injection of propofol. The propofol group received an induction dose of 2.5mg/kg administered intravenously over 30 seconds. The Sevoflurane group underwent inhalational induction with 8% Sevoflurane.

The study evaluated the presence of the eyelash reflex in patients by continuously stroking the eyelashes after the patients spontaneously closed their eyes or lost verbal contact. Women were provided with Size No-3 LMA, while men received Size No-4 LMA.

Baseline heart rate, blood pressure and oxygen saturation were recorded. Additionally, Glycopyrrolate (10µg/kg) and fentanyl citrate (2µg/kg) were administered intravenously.

The researchers noted the time to loss of consciousness and disappearance of the eyelash reflex. Mask ventilation was continued until achieving jaw relaxation. Subsequently, LMA insertion was performed using a standard technique by a single person in both groups. The selection of LMA size was based on patient weight and cuff volume as per the manufacturer's instructions.

This study aimed to provide valuable insights into the use of sevoflurane and propofol for LMA insertion, allowing for a better understanding of their efficacy and safety in the context of general anesthesia for elective surgery.

All relevant details including history, general clinical examination findings were recorded in case reporting form. A database was constituted using SPSS version 22 and electronic Microsoft Excel spreadsheets to store and manage the collected data. Categorical data has been represented as frequency (number) and proportions (percentages). Continuous data has been presented as Mean+Standard deviation (SD). For the analysis of data, student's test and Chi-square tests, Mann-Whitney tests were used. A p-value <0.05 was considered as statistically significant.

RESULTS

This prospective randomised control trial was conducted on patients of ASA Grade I and II, undergoing general anaesthesia for elective surgery. The study period was during January 2021 to June 2022 (18 months). We aimed to compare laryngeal mask airway insertion with induction of anesthesia by propofol and sevoflurane with reference to- Ease of LMA Insertion and Hemodynamic changes. Postoperative complications if any such as cough, sore throat were looked for. Our observations are summarized as under

Table 1: The mean time to jaw relaxation

Group	N	Mean (secs.)	S.D.	Student t- test
Sevoflurane	55	109.36	16.96	t= 24.72, p<0.001
Propofol	55	50.07	5.37	H. Significant

The mean time to jaw relaxation in Sevoflurane group is 109.36 secs and in Propofol group is 50.07 secs.

The data is statistically highly significant (p<0.001). [Table 1]

Table 2: The mean time to insertion

Group	N	Mean (secs.)	S.D.	Student t-test
Sevoflurane	55	119.78	18.47	t=22.62, p<0.001
Propofol	55	60.11	6.44	H. Significant

The mean time to insertion in Sevoflurane group is 119.78 secs and in Propofol group is 60.11 secs. The

data is statistically highly significant (p<0.001) [Table 2]

Table 3: The mean base line pulse rate

Time	Sevoflurane		Propofol		P value
	Mean	SD	Mean	SD	
Baseline	118.84	10.29	118.36	9.48	0.80
Post induction	107.24	9.17	120.42	9.80	<0.001
Post insertion	110.20	9.13	120.31	9.07	<0.001

The mean base line pulse rate is comparable in both groups as there is no significant difference statistically ($p > 0.01$).

There is statistically significant difference observed ($p < 0.01$) in regard to pulse rate between both groups during induction and post insertion.

Table 4: The mean base line mean arterial pressure

Time	Sevoflurane		Propofol		P value
	Mean	SD	Mean	SD	
Baseline	80.00	5.80	78.69	8.45	0.35
Post induction	69.95	5.52	69.29	7.86	0.61
Post insertion	71.84	5.92	70.49	8.62	0.34

The mean base line mean arterial pressure is comparable in both groups as there is no significant difference statistically ($p > 0.05$).

There is no statistical significant difference observed ($p > 0.05$) in regard to mean arterial pressure between both groups during induction and post insertion.

mean time (in seconds) for induction in Group P was 57.40 ± 15.01 (SD) and in Group S it was 65.40 ± 9.67 (SD) seconds ($p = 0.03$). (7-13).

DISCUSSION

In our study the mean age in Group P was 35.13 ± 12.19 (SD) and in Group S it was 33.95 ± 11.96 (SD) ($p > 0.05$). Similar to our study were the findings observed by Kumari M *et al.*³⁹ They reported no significant difference between the groups with respect to age, weight and ASA grade distribution. The mean age in Group P was 31.16 ± 11.09 (SD) and in Group S it was 37.68 ± 11.89 (SD). Chavan *et al.* showed mean age in group P was 37.8 ± 7.16 years and in group S was 39.3 ± 5.92 years. There was no significant difference in age distribution and body weight of patients between the Group P and Group S group ($P > 0.05$).³⁸ In our study overall males were more than females (3.4: 1) in our study. In group S there were 8 (32%) female and 47 (55.29%) males. In group P there were 17 (68%) females and 38 (44.71%) males. Priya *et al.* in their study observed similar findings as ours with male predominance.⁴⁰ The gender wise distribution of patients was similar in both the groups ($p > 0.05$). These findings were supported by Chavan *et al.* and Choudhary *et al.*^{37, 38}. In present study the mean weight in Sevoflurane group is 52.06 kg and in Propofol group is 50.76 kg. The data is statistically insignificant ($p > 0.38$) and thus both groups are comparable in terms of weight. Chavan *et al.*³⁸ reported similar findings supported by Kumari M, *et al.*³⁹, who reported the mean weight in Group P was 55.7 ± 7.89 (SD) and in Group S it was 54.6 ± 6.10 (SD). Saravanan *et al.* and Priya *et al.* showed weight in similar range.^{40, 60} The mean time to induction in Sevoflurane group is 39.58 secs and in Propofol group is 41.75 secs, which is statistically significant ($p < 0.03$). Kumari M *et al.* observed induction was more rapid with IV Propofol.³⁹ The

CONCLUSION

In this randomized prospective study, we found that the two groups' rates of induction were remarkably similar. Compared to Propofol, Sevoflurane required significantly more time to insert the LMA, but there were fewer attempts overall. Both groups experienced similar insertion conditions. Both groups maintained hemodynamic stability, though sevoflurane slightly outperformed the other. In both groups, postoperative complications were extremely uncommon. Consequently, Sevoflurane is a good substitute for Propofol when inserting an LMA.

SOURCE OF FUNDING: None.

CONFLICTS OF INTEREST: None.

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