

A Comparative Study between Sevoflurane and Propofol for Ease of Laryngeal Mask Airway Insertion

Dr. Rama Krishna*

Associate Professor, Department of Anesthesia, Prathima Institute of Medical Sciences, Naganoor, Karimnagar Telangana India

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*Corresponding author

Dr. Rama Krishna

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Abstract: Laryngeal Mask Airway [LMA] is an alternative technique to endotracheal tube for securing airway in short surgical procedures. The most common agent used is Propofol however it has certain adverse effects like hypotension, apnea, and pain on injection. Sevoflurane is a new volatile anesthetic agent it provides rapid induction and recovery we in the present study tried to compare the hemodynamic responses during laryngeal mask airway insertion using sevoflurane and N₂O and propofol and N₂O. This study was performed in the Department of Anesthesia, Prathima Institute of Medical Sciences, Naganoor, Karimnagar. The patients were selected from those undergoing elective surgeries in Orthopedic, General surgical or gynecological procedures where there were indications of use of LMA. All the patients were from ASA I/II category status, the patients age ranges were from 20 – 50 years. Patients were then randomly divided into two groups for induction of anesthesia. The Propofol group (n=25) received induction with 2.5mg/Kg propofol IV for 30 seconds. Lignocaine 1% 2ml was mixed with each 20ml syringe of propofol. The sevoflurane (n=25) received inhalational induction with sevoflurane 8% in N₂O 50% and O₂. The mean time for loss of consciousness in Propofol group was 45 seconds and the mean time of consciousness loss in the sevoflurane group was 27 seconds. The time range of LMA insertion in Propofol group was 1-3 minutes and the mean time was 1.5 min the meantime to LMA insertion in Sevoflurane group was 2.0 ranges 1-3 minutes, the p values were found to be significant. The mean number of attempts taken in propofol group was 1.2 and similarly in the sevoflurane group it was 1.6 the p values were not significant. The incidence of adverse events occurring during insertion of LMA is shown in table III in all the patients muscle relaxants were not required for insertion. The occurrence of head movement was in 12% of the patients of propofol group and 16% of the patient with sevoflurane group and laryngospasm was in 8% of the propofol group and 8% in the sevoflurane group. Inadequate jaw relaxation was seen in 4% of the propofol group and 8% of the sevoflurane group value were found to be not significant. The overall results of LMA insertion were comparable in both the groups. The incidences of adverse events in both the groups were found to be same. However the sevoflurane requires more time than propofol for LMA insertion

Keywords: Sevoflurane, Propofol, Laryngeal Mask Airway [LMA].

INTRODUCTION

Laryngeal Mask Airway [LMA] was first used by Dr. Archie IJ Brain, British Anesthesiologist at London Royal Hospital in 1981 [1]. Laryngeal mask airway (LMA) is a supraglottic device. It has been used safely and effectively in spontaneous as well as controlled ventilation [1, 2]. It has proved to be a very useful airway device both in adults and children [3]. It is a significant advancement in airway management it fills the gap between tracheal intubation and use of face mask [4]. In the difficult airway management, LMA facilitates blind and fiber optic techniques of intubation [3, 5]. Adequate suppression of airway reflexes is mandatory for smooth insertion of LMA and

to avoid undesired responses of airway like coughing gagging and laryngospasm [6, 7]. LMA insertion is associated with less airway stimulation, tachycardia, hypertension, postoperative pharyngeal discomfort and dysphonia as compare to endotracheal intubation, as it does not stimulate the trachea which is considered to be one of the most sensitive parts of the body. Untoward effects associated with LMA insertion include gastroesophageal reflux, aspiration bronchospasm, and laryngospasm [8]. It provides and maintains a seal around laryngeal inlet for spontaneous ventilation and allows controlled ventilation. It is better tolerated during recovery thus reducing the possibility of airway obstruction. It is useful in serving as an

emergency airway in the patients in whom lungs cannot be ventilated using a bag or conventional mask and whose trachea cannot be intubated [9]. Insertion of laryngeal mask airway [LMA] after induction of anesthesia requires sufficient depth of anesthesia for suppression of airway reflexes. Propofol has been used for a long time and is shown to superior to thiopental when these agents were used alone for facilitating insertion of LMA [10]. It has been recommended that the propofol is the induction agent of choice for LMA insertion [11]. However propofol has been associated with adverse effects like hypotension, apnoea cardiovascular depression and pain on injection [10, 12]. Sevoflurane is a halogenated, volatile anesthetic agent with pleasant odor, non-pungency, and low blood gas solubility. A high inspired concentration vital capacity breath induction technique provides good conditions for insertion of LMA [13]. Sevoflurane allows rapid smooth inhalational induction and good cardiovascular stability and excellent recovery in ambulatory anesthesia [14, 15] as a safe inhalational agent it was started to use as induction agent in an increasing number of patients and it was demonstrated to be used successfully in the induction of anesthesia in the elderly patients [16, 17] with this background we in the present study tried to evaluate the conditions for insertion of the LMA using propofol and sevoflurane.

MATERIALS AND METHODS

This study was performed in the Department of Anesthesia, Prathima Institute of Medical Sciences, Naganoor, and Karimnagar. Institutional Ethical committee permission was obtained for the study. Written consent was obtained from all the patients involved in the study. The patients were selected from those undergoing elective surgeries in Orthopedic, General surgical or gynecological procedures where there were indications of use of LMA. All the patients were from ASA I/II category status, the patients age ranges were from 20 – 50 years. Patients predicted of having difficult airway (Mallampatti grade III/IV) were excluded from the study, also excluded were patients undergoing emergency surgeries, history of cardiovascular disorders, renal diseases, and pregnancy and known allergies to the anesthetic agents. After establishing IV access slow infusion of crystalloid was started and monitoring were done using ECG, noninvasive BP and continuous pulse oximetry. Before the induction all the patients inspired 100% oxygen. Patients were then randomly divided into two groups for induction of anesthesia. The Propofol group (n=25)

received induction with 2.5mg/Kg propofol IV for 30 seconds. Lignocaine 1% 2ml was mixed with each 20ml syringe of propofol. The sevoflurane (n=25) received inhalational induction with sevoflurane 8% in N₂O 50% and O₂. The eyelash reflex of the patients was sought by continuously stroking the eyelashes after the patient has spontaneously closed their eyes or immediately after loss of verbal contact. Size No. 3 LMA was used in women and Size No. 4 LMA was used in men. Ventilation was spontaneous not manually assisted. In the Propofol group the LMA placement was attempted at one minute following induction of anesthesia confirmed by loss of verbal and loss of eyelash reflex for 15 seconds if unsuccessful, to allow LMA passage into mouth, spontaneous assisted ventilation of N₂O 50% and O₂ was performed by facemask. Additional propofol 1-2mg/K was given if unsuccessful after two minutes or if an adverse response like head movement, cough, or laryngospasm occurred. In the sevoflurane group the patients were pre-oxygenated then sevoflurane 8% and N₂O 50% and O₂ at the rate of 8 L min for 30 seconds was given patients were instructed initially to take long and deep breaths. After the loss of consciousness LMA insertion was attempted at one minute time interval for duration of 15 sec. if attempt was unsuccessful due to coughing, gagging or laryngospasm then patient were allowed to continue spontaneous assisted ventilation on sevoflurane 8% in N₂O 50% and O₂. The second and the third attempt were made at the time of 2 minute and following attempts at the interval of 15 seconds. Additional propofol was given in either group if adverse events occurred. The patient response to LMA insertion was noted including the presence or absence of gagging, coughing, jaw relaxation, limb and head movements or laryngospasm. Time to apnea and successful LMA placement were recorded.

RESULTS

A total number of 50 patients were involved in the study, with n=25 patient in each group, The propofol group patients had the mean average age in years of 31.48 years and out which 15 were male and 10 female 9 patients belong to ASA I category and 16 patients belonged to ASA II category the mean weight in Kg is 57.75. Similarly in the Sevoflurane group n=25 the mean age of 32.08 years and out which male were 14 and female were 11. The 10 patients belonged to ASA I category and 15 patients belonged to ASA II category the mean weight in Kg was 59.6 given in table 1.

Table-1: Demographic profile of the patients included in the study

	Propofol (n=25)	Sevoflurane (n=25)
Age in Years	31.48	32.08
Male/Female	15/10	14/11
ASA I/II	9 / 16	10/15
Weight in Kgs	57.75	59.6

The mean time for loss of consciousness in Propofol group was 45 seconds and the mean time of consciousness loss in the sevoflurane group was 27 seconds. The time range of LMA insertion in Propofol group was 1-3 minutes and the mean time was 1.5 min the meantime to LMA insertion in Sevoflurane group was 2.0 ranges 1-3 minutes, the p values were found to be significant. The mean number of attempts taken in

propofol group was 1.2 and similarly, in the sevoflurane group, it was 1.6 the p values were not significant. The additional propofol required in 25% of the patients of propofol group and 12% of patients in the sevoflurane group the p values were <0.05. Apnea during insertion was for 28 seconds mean values in propofol group and 22 seconds in the sevoflurane group shown in table 1.

Table-2: Features of LMA insertion in two groups

	Propofol (n=25)	Sevoflurane (n=25)	P value
Time to LMA insertion (min)	1.5 (1-3)	2.0 (1-3)	<0.05*
Attempts	1.2 ± 0.8	1.6 ± 0.7	>0.1
Additional Propofol (%)	7 (25%)	3 (12%)	< 0.05*
SPO ₂	95 %	98%	> 0.1
Apnea during Insertion (sec)	28 (15-40)	22 (5-30)	< 0.05*

The incidence of adverse events occurring during insertion of LMA is shown in table III in the entire patient's muscle relaxants were not required for insertion. The occurrence of head movement was in 12% of the patients of propofol group and 16% of the patient with sevoflurane group and laryngospasm was

in 8% of the propofol group and 8% in the sevoflurane group. Inadequate jaw relaxation was seen in 4% of the propofol group and 8% of the sevoflurane group value were found to be not significant. The Cough and limb movements were seen in some patients the values were also not found to be significant.

Table-3: comparison of adverse events during LMA placement in two groups

	Propofol (n=25)	Sevoflurane (n=25)	P value
Head movement	3 (12%)	4 (16%)	<0.05
Laryngospasm	2 (8%)	2 (8%)	> 0.1
Inadequate Jaw relaxation	1 (4%)	2 (8%)	>0.1
Cough	3 (8%)	4 (16%)	> 0.1
Limb movement	9 (36%)	6 (24%)	>0.1

DISCUSSION

In the present study we found that the vital capacity breath inhalational anesthesia with sevoflurane provides good conditions for LMA insertion, comparable to IV propofol. The traditional method of tidal volume induction with incremental increase in inspired sevoflurane concentration was the method used previously for LMA insertion. The main disadvantage of such technique is the induction could be slower [18] to overcome this problem the method used by adopting sevoflurane induction where in the patient take vital capacity breaths with a maximum dial setting (8%) sevoflurane after a deep expiration to residual volume. This technique was studied by many authors for LMA insertion in adults, day care surgeries, and elderly patients and was claimed to be good alternative to reduce the induction time [19-22]. Lian *et al.* [23] compared the quality and ease of insertion of LMA with rapidly inhaled sevoflurane or IV Propofol, although prolonged jaw tightness may delay laryngeal mask airway insertion. Sevoflurane induction resulted in a stable hemodynamic profile during induction of anesthesia. In a similar study by Yurino M *et al.* [13] comparing induction of anesthesia with sevoflurane, nitrous oxide and oxygen using spontaneous

ventilation and vital capacity rapid inhalation induction found sevoflurane is best when used with vital capacity inhalation induction technique because it resulted in fewere excitement movements that could lead to complications. This was in agreement with the present study. The vital capacity breath technique with sevoflurane is known to be associated with less complications then tidal breathing technique. [13] It also provides good conditions for LMA insertion especially with nitrous oxide 50% in oxygen. [13, 24] In the present study a proportion of patients in both groups exhibited some adverse airway event this reflects that most of these events occurred during the first attempted LMA insertion at one minute the frequency was decreased subsequently. In this study we used propofol as rescue agent in even of an adverse response in the either group because of its rapid onset and quickly deepen the level of anesthesia and it is the standard for LMA insertion. But the fact that more number of patients of propofol group required further doses propofol as compared with sevoflurane demonstrates that sevoflurane is equally effective for LMA insertion. Thwaites A *et al.* [25] studying inhalation induction with sevoflurane: a double-blind comparison with propofol found that the majority of

patients of both anesthetic techniques acceptable. Nevertheless, significantly more patients (14%) rated induction with sevoflurane as unpleasant compared with propofol (0) and significantly more patients (24%) would not choose sevoflurane induction compared with propofol (6%). It is contrary to our findings were the patient's satisfaction from propofol was 88% and sevoflurane was 76% and the differences was not significant. The difference occurred between our study and the Thwaites A *et al.* [25] could be because we used the vital capacity inhalation induction technique which is better than the traditional method of tidal volume induction with incremental increase. There was apnea noted in some patients during the induction with incremental increase. There was apnea noted in some patients during the induction in both the groups particularly propofol group because propofol is known to cause apnea. The reason for apnea in sevoflurane group could be mild hyperventilation associated with vital capacity breath technique also because of possible pre-induction anxiety in the patients.

CONCLUSION

The overall results of LMA insertion were comparable in both the groups. The incidences of adverse events in both the groups were found to be same. However the sevoflurane requires more time than propofol for LMA insertion.

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