ORIGINAL RESEARCH

A prospective observational study of ease of insertion for blockbuster laryngeal mask airway with sevoflurane and propofol and hemodynamic response in patients undergoing urological procedures

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ABSTRACT

Background: A common method for laryngeal mask airway insertion (LMA) is with the use of propofol.However, propofol bolus doses have adverse side effects like hypotension, apnea and pain on injection.Hence, alternative methods are needed to attenuate the adverse effects with propofol.**AIMS:**We aimed to study the induction characteristics,ease of Blockbuster LMAinsertion,hemodynamic changes with inhalation of 8% Sevoflurane and propofol.**Material and Methods:** A prospective observational study of 60 American Society of Anaesthesiologists (ASA) Grade 1 and 2 patients was conducted with 2 groups with 30 each undergoing Urological procedures under general anaesthesia.Group A received the injection propofol and Group B received Sevoflurane.At the end of induction, Blockbuster LMA insertion was attempted.Differentmethods were used to grade the conditions for LMA insertion like LMA size, loss of verbal contact,loss of eyelash reflex,jaw opening, ease of insertion and complications like coughing, laryngospasm were assessed.Hemodynamicresponse such as Heart rate and Mean arterial pressure were also assessed.Data was recorded and analysed using unpaired t test,Mann-Whitney test and Chi-square test. **Results:** Sevoflurane took more time for induction and Blockbuster Insertion than propofol.There was no statistically significant difference between Group A and Group B with respect to LMA insertion characteristics, heart rate and mean arterial pressure.**Conclusion:**It is concluded that Sevoflurane is associated with good hemodynamic stability and may be used in cases where adverse effects of propofol is not needed.

Keywords: Blockbuster laryngeal mask airway, propofol, Sevoflurane, hemodynamic response.

INTRODUCTION

Propofol is a preferred induction agent for laryngeal mask airway (LMA) insertion due to its propensity of suppressing oropharyngeal and cough reflexes.[1] Adequate jaw relaxation is an absolute prerequisite for successful LMA placement. However, use of propofol in dosages (usually >2.5 mg/kg) required for adequate jaw relaxation and adequate depth of anesthesia for LMA insertion may result in arterial hypotension, apnea, and collapse of upper airways.[1,2,3,4]

Sevoflurane is a nonpungent inhalation anesthetic agent which can be used as an induction agent. Its nonpungent odor with minimal respiratory irritant properties makes it suitable for inhalation induction of anesthesia and insertion of the LMA while preserving spontaneous ventilation.[5] Sevoflurane as compared to propofol has the advantage of providing better hemodynamic stability and a smoother transition to the maintenance phase without a period of apnea.[6] However, sevoflurane is associated with delayed jaw relaxation and a longer time for the insertion of the LMA.[7,8] This study was based on our hypothesis that induction of anesthesia with the combination of sevoflurane and small dose of propofol may optimize the insertion conditions of LMA while reducing the

incidence of associated side effects of individual drugs.

METHODS

After getting,written informed consent from patients, sixty adult American Society of Anesthesiologists Physical Status I–II patients aged 18–65 years with 2 groups 30 patients in each group undergoing Urological procedures under general anaesthesia. Group A received the injection propofol and Group B received Sevoflurane.

Routine preoperative preparation was followed. In the morning of the surgery, patients were examined and blood pressure, pulse rate, and respiratory rate were recorded for further comparison.The patients were then allocated to the following two groups.

- Group A: Patients were induced with IV injection propofol only (2 mg/kg).
- Group B: Patients were induced with circuit primed with sevoflurane 8%, nitrous oxide and oxygen (67%:33%) at fresh gas flow (FGF) rate 8 L/min by vital capacity breath (VCB) technique.

Patients in Group *A* were induced with IV propofol 2 mg/kg given over 15 s. Midway through induction at 10 s, the patients were asked if they were feeling any pain from the injection. Loss of consciousness was assessed. Time to loss of consciousness was calculated from the time of start of injection of propofol until loss of eyelash reflex and inability to open eyes upon verbal command. After the completion of propofol induction, ease of mouth opening was assessed.If inadequate, attempts every 30 s up to a maximum of four were made, each time preceded by IV propofol bolus of 0.5 mg/kg. In case of apnea, ventilation was assisted by bag and mask ventilation between Blockbuster LMA insertion attempts. Additional propofol was given if there was any adverse response such as movement, gagging or coughing. Noninvasive arterial blood pressure, oxygen saturation, and heart rate were recorded every minute for 5 min. An independent observer recorded.

1. Time taken to loss of eyelash reflex
2. Time taken to jaw relaxation
3. Time taken for completion of successful insertion of LMA
4. Successful insertion of LMA at first attempt
5. Apnea duration
6. Incidence of apnea.

All the patients in Group B were induced with inhalation anesthetic mixture comprising sevoflurane 8% and N_2O:$O_2$67%:33% and FGF at 8 L/min employing Vital Capacity Breath (VCB)technique.. The patients were instructed to continue breathing normally through face mask during induction of anesthesia. The start of the induction was taken as the time at which patient starts breathing from the circuit (time zero). Patients were further instructed to open their eyes every 10 s. Failure to do so was taken as loss of consciousness, further confirmed by testing for loss of eyelash reflex. In Group B, 90 s into inhalation induction, the ease of mouth opening was assessed as adequate or inadequate.. If mouth opening was inadequate, attempts were made every 30 s up to a maximum of 4. In between attempts, depth of anesthesia was maintained with sevoflurane at 8% in 67%:33% ratio of N_2O-O_2 at 8 L/min.

The presence of complications related to anesthetic induction was noted namely:

1. Biting
2. Cough
3. Hiccup were noted.

The presence of complications during LMA insertion was noted namely:

1. Cough
2. Gagging.
3. Laryngospasm

STATISTICAL METHOD

The observations were compiled in a tabulated manner and statistical analysis was done. Continuous data was analyzed using two sample independent t-tests and categorical variables were compared using Chi-square test/ Fisher's exact test. P Value of less than 0.05 was considered to be statistically significant.

RESULTS

All two groups were comparable with respect to age, sex, weight and ASA class distribution [Table 1]. In all two groups, hemodynamic parameters were comparable at baseline and thereafter every 60 s during induction and insertion of Blockbuster LMA [Tables 2 and 3].There was no statistically significant difference in the overall score for Blockbuster LMA insertion characteristics [Table 4].

Table 1: Demographic profile of the study population

Variables	Group A	Group B	P-Value
AGE(MEAN±SD)	40.048 ± 14.65	39.81 ± 13.95	0.92
WIGHT(MEAN±SD)	62.492 ± 5.46	62.60 ± 4.64	0.90
GENDER(M:F)	16:14	18:12	0.466
ASA(I /II)	19/11	21/9	0.466

*(p-value less than 0.05 considered statistically significant) *(p-value less than 0.001 highly significant)

Table 2: Showing Changes in Heart Rate

Variables heart rate	Group A		Group B		P-Value
	MEAN±	SD	MEAN±	SD	
Base Line	79.79 ±	76.86	79.72 ±	8.85	0.96

BeforeInduction	78.88 ±	17.40	77.34 ±	7.81	0.26
AfterInduction	70.04 ±	5.34	70.65±	5.54	0.54
BeforeLMAInsertion	69.92 ±	5.50	70.10±	5.37	0.85
AfterLMAInsertion	71.90 ±	5.37	72.34 ±	5.41	0.65

*(p value <0.05 considered statistically significant) *(p-value <0.001 considered highly significant)

Table3: Showing Changes in Mean Arterial Pressure(mmHg) between the Groups

Variables Mean arterial blood pressure	Group A		Group B		P-Value
	MEAN±	SD	MEAN±	SD	
Base Line	91.95 ±	6.75	92.32 ±	5.77	0.74
BeforeInduction	92.47 ±	6.08	92.13 ±	5.68	0.75
Afterinduction	81.50 ±	5.53	81.75±	4.53	0.78
BeforeLMAInsertion	81.77 ±	5.50	82.05±	5.05	0.77
AfterLMAInsertion	83.22 ±	5.68	83.46 ±	5.68	0.81

*(p value <0.05 considered statistically significant) *(p-value <0.001 considered highly significant)

Table 4: Overall score for insertion

Variable	Group A	%	Group B	%
<16 (poor)	0	0	0	0
16-17 (satisfactory)	5	16.67	6	20
18 (excellent)	25	83.3	24	80

Occurrence of complications such as coughing, biting, jaw relaxation and laryngospasmduring induction and LMA insertion was statistical insignificant among the study groups [Table 5].

Table 5: Blockbuster Laryngeal mask airway insertion characteristics among the study groups

Variables	Group A (mean±SD)	Group B (mean±SD)	P value
Jaw opening	2.98±0.48	2.91±0.41	>0.05
Ease of insertion	2.99±0.71	3.01±0.11	>0.05
Coughing	3.02±0.21	2.99±0.01	>0.05
Biting	2.78±0.32	2.89±0.09	>0.05
Laryngospasm	3.04±0.12	3.01±0.07	>0.05

Group B patients took a longer time for induction and for LMA insertion as compared to propofol. This was statistically significant. Loss of verbal contact, loss of eye lash reflex, adequate jaw relaxation and LMA insertion were earlier with propofol [Table 6].

Table 6: Induction characteristics among the study groups

Variables	Group A (mean±SD)	Group B (mean±SD)	P value
LMA size	3.56±0.53	3.46±0.46	>0.05
Loss of verbal contact	42.15±9.42	52.78±11.45	<0.05
Loss of eyelash reflex	55.58±11.44	72.89±12.32	<0.05
Jaw relaxation	68.48±10.57	92.67±13.12	<0.05
Insertion time	83.64±15.98	109.99±15.65	<0.05

DISCUSSION

LMA was originally discovered by Dr. Brain A J. It is nowvery popular in airway management and is used extensively indifferent types of surgeries. Satisfactory insertion of LMA afterinduction of anesthesia requires sufficient depth of anesthesiaand adequate blunting of airway reflexes.[9] Insertion of LMAis said to be associated with less hemodynamic changes thanendotracheal intubation.[10-12]

One of the most common intravenous induction agents usedfor LMA insertion is propofol due to its greater depressanteffect on airway reflexes [9] and excellent jaw relaxation. It ishowever associated with adverse effects such as pain on injection,hypotension, hypersensitivity and apnea. Among the inhalationalinduction agents, sevoflurane is more suitable due to its pleasant smell, smooth and rapid induction and minimal respiratoryirritant effect. The vital capacity induction technique withsevoflurane is comparable to that of bolus injection of propofol.This is associated with good hemodynamic stability and highpatient acceptance.[13] Administration of fentanyl before LMAinsertion gives synergistic effect with propofol and sevoflurane.[14]

We compared the induction and Blockbuster LMA insertion characteristics, hemodynamic response and complications associated withsevoflurane inhaled induction and propofol intravenousinduction in adult

Urology patients.Priya *et al.*[11] in their study observed that propofol is knownto depress laryngeal reflexes aiding LMA insertion. They concluded that propofol is better than sevoflurane for LMAinsertion using the loss of eyelash reflex as the end point ofinduction probably due to better jaw relaxation.

In our study, propofol took lesser time for induction in comparison withsevoflurane.Our main difficulty regarding the quality of LMA insertionwhen using sevoflurane was initial difficulty in mouth opening. Interestingly, Dwivedi *etal.*[15] also reported jaw tightness aftersevoflurane anesthetic induction, which resulted in failure toinsert the LMA in several patients. However, in our study,LMA was successfully inserted in all patients. Sivalingam*et al*.[12] reported that in propofol group, 12%patients had cough and in sevoflurane group, 20% patientshad cough.

In our study, we encountered coughing in onepatient in Group B (3.3%) and gagging in one patient inGroup A, which concurs with above studies.In our study, we did not encounter laryngospasm in any of thepatients in both groups. In our study, in 29 patients (96.6%),in both propofol and sevoflurane groups, successful insertionof LMA was done in the first attempt.

The hemodynamic responses were stable for both the groups.Priya *et al.*[11] observed the hemodynamic responses were stablewith both groups. There was statistically significant differencein MAP and HR in propofol group, 3 min after induction.

Thus, it can be concluded that induction and insertion ofLMA is faster and easier with propofol and sevoflurane isassociated with good hemodynamic stability and may proveuseful incases in which cardiovascular system compromiseis to be avoided. Using VCB technique, sevoflurane 8% iscomparable to intravenous propofol for insertion of LMA inadults undergoing short general anesthesia procedures.Although more time is required for jaw relaxation withsevoflurane than propofol may delay LMA insertion,[16] thereis a high and same success rate for LMA insertion during thefirst attempt in both the induction techniques.

Sevoflurane can serve as an effective substitute to intravenousinduction in critically ill patients with cardiovasculardecompensation or wherever the use of propofol iscontraindicated. Sevoflurane is an acceptable alternative tothe more commonly used propofol for LMA insertion.[17]

REFERENCES

1. Taguchi M, Watanabe S, Asakura N, Inomata S. End-tidal sevoflurane concentrations for laryngeal mask airway insertion and for tracheal intubation in children. *Anesthesiology.* 1994;81:628–31.
2. Scanlon P, Carey M, Power M, Kirby F. Patient response to laryngeal mask insertion after induction of anaesthesia with propofol or thiopentone. *Can J Anaesth.* 1993;40:816–8.
3. Bilotta F, Spinelli F, Centola G, Caramia R, Rosa G. A comparison of propofol and sevoflurane anaesthesia for percutaneous trigeminal ganglion compression. *Eur J Anaesthesiol.* 2005;22:233–5.
4. Hillman DR, Walsh JH, Maddison KJ, Platt PR, Kirkness JP, Noffsinger WJ, et al. Evolution of changes in upper airway collapsibility during slow induction of anesthesia with propofol. *Anesthesiology.* 2009;111:63–71.
5. Baker CE, Smith I. Sevoflurane: A comparison between vital capacity and tidal breathing techniques for the induction of anaesthesia and laryngeal mask airway placement. *Anaesthesia.* 1999;54:841–4.
6. Suzuki KS, Oohata M, Mori N. Multiple-deep-breath inhalation induction with 5% sevoflurane and 67% nitrous oxide: Comparison with intravenous injection of propofol. *J Anesth.* 2002;16:97–101.
7. Ganatra SB, D'Mello J, Butani M, Jhamnani P. Conditions for insertion of the laryngeal mask airway: Comparisons between sevoflurane and propofol using fentanyl as a co-induction agent. A pilot study. *Eur J Anaesthesiol.* 2002;19:371–5.
8. Yogendran S, Prabhu A, Hendy A, McGuire G, Imarengiaye C, Wong J, et al. Vital capacity and patient controlled sevoflurane inhalation result in similar induction characteristics. *Can J Anaesth.* 2005;52:45–9.
9. Sengupta J, Sengupta M, Nag T. Agents for facilitation of laryngeal mask airway insertion: A comparative study between thiopentone sodium and propofol. Ann Afr Med 2014;13:124-9.
10. Sukhupragarn W, Leurcharusmee P, Sotthisopha T. Cardiovascular effects of volatile induction and maintenance of anesthesia (VIMA) and total intravenous anesthesia (TIVA) for laryngeal mask airway (LMA) anesthesia: A comparison study. J Med Assoc Thai 2015;98:388-93.
11. Priya V, Divatia JV, Dasgupta D. Comparison of propofol versus sevoflurane for laryngeal mask airway insertion. Indian J Anesth2002;46:31-4.
12. Sivalingam P, Kandasamy R, Madhavan G, Dhakshinamoorthi P. Conditions for laryngeal mask insertion. A comparison of propofol versus sevoflurane with or without alfentanil. Anaesthesia 1999;54:271-6.
13. Negargar S, Peirovifar A, Mahmoodpoor A, Parish M, Golzari SE, Molseqi H, *et al*. Hemodynamic parameters of low-flow isoflurane and low-flow sevoflurane anesthesia during controlled ventilation with laryngeal mask airway. Anesth Pain Med 2014;4:e20326.
14. Topuz D, Postaci A, Sacan O, Yildiz N, Dikmen B. A comparison of sevoflurane induction versus propofol induction for laryngeal mask airway insertion in elderly patients. Saudi Med J 2010;31:1124-9.
15. Dwivedi R, Dwivedi S, Chourasia HK. A comparative study of sevoflurane and propofol for laryngeal mask airway insertion in adults. Int J Sci Study 2015;3:67-71.
16. Ravi S, Krishnamoorthy K, Ganesan I. Comparison of Sevoflurane and propofol for laryngeal mask airway in children. Indian J Clin Anaesth2015;2:137-40.
17. Vora KS, Shah VR, Patel D, Modi MP, Parikh GP. Sevoflurane versus propofol in the induction and maintenance of anaesthesia in children with laryngeal mask airway. Sri Lanka J Child Health 2014;43:77-83.