



## COMPARISON OF INDUCTION WITH PROPOFOL AND SEVOFLURANE FOR LARYNGEAL MASK AIRWAY INSERTION DURING ELECTIVE SURGERIES

### Anaesthesiology

**Dr. Anjani Sravanthi Kotturi\*** Assistant Professor, Department of anaesthesiology, Maharajah's institute of medical sciences (MIMS), Nellimarla, Vizianagaram, Andhra Pradesh. \*Corresponding Author

**Dr. Geetha Bhavani** Junior Resident, Department of anaesthesiology, Maharajah's institute of medical sciences (MIMS), Nellimarla, Vizianagaram, Andhra Pradesh.

### ABSTRACT

**Background And Aims:** Laryngeal mask airways are gaining popularity these days in airway management and can be used for various types of surgeries and also during resuscitation. The aim of the study is to compare the induction characteristics and hemodynamic changes associated with intravenous injection of Propofol or inhalational Sevoflurane induction for LMA insertion during elective surgeries.

**Materials And Methods:** It is a prospective, single blind, randomized controlled study that is conducted at Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram from January 2019 to July 2019. The study consists of sixty patients belonging to ASA grade I & II, aged between 20-60 years of both sexes, undergoing elective surgical procedures, which were randomly divided into 2 groups of 30 each. Patients in Group-A were induced with intravenous injection of Propofol 2mg/kg and inhalation of 100% Oxygen whereas in Group-B were induced with inhalation of 8% Sevoflurane in 100% Oxygen. The data regarding time for induction, LMA insertion and hemodynamic parameters were recorded and compared in both the study groups.

**Results:** The mean time taken for induction and insertion of LMA was less in Group A (100±13.6sec) compared to Group B (120±14.2sec) and this difference is statistically significant. The fall in MAP and HR in group - A is also significant.

**Conclusion:** The quality of anaesthesia provided by propofol is better when compared to Sevoflurane for LMA insertion, even though Sevoflurane is associated with better haemodynamic stability.

### KEYWORDS

Laryngeal mask airway, Propofol, Sevoflurane, Induction.

#### INTRODUCTION:

The Laryngeal mask airway (LMA) is a commonly used Supraglottic airway device and was first developed by British anaesthesiologist, Dr. Archi Brain. Laryngeal mask airways can be inserted blindly and by inexperienced operators also. LMA can be used to maintain the airway patent during surgery or resuscitation as a temporary measure. LMAs are used during spontaneous ventilation and also during positive pressure ventilation at moderate levels of pressure (<20 cm H<sub>2</sub>O)<sup>1</sup>. The advantages of LMA over endotracheal intubation include easier placement by inexperienced personnel, avoidance of laryngoscopy and muscle relaxation, minimal hemodynamic changes during insertion<sup>2</sup>. For satisfactory insertion of LMA, we require adequate depth of anaesthesia and suppression of airway reflexes. Though no induction agent is ideal, Propofol is one of such agent, which provides good relaxation of pharyngeal and laryngeal muscles and suppression of airway reflexes. The adverse effects of propofol include pain at the site of injection, cardiovascular and respiratory depression. Sevoflurane is one of the best inhalational agent for LMA insertion with the advantages of pleasant odour, non-irritating to the airway with low incidence of cough and laryngospasm<sup>3,4</sup>. It can be used as a sole agent both for the induction as well as maintenance of anaesthesia.

#### AIMS AND OBJECTIVES:

To study and compare the

- Induction characteristics and time taken for insertion of Laryngeal Mask Airway using intravenous Propofol versus inhalational Sevoflurane.
- Hemodynamic changes associated with both the agents.

#### MATERIALS AND METHODS:

- This study is a prospective, single blind, randomized controlled study.
- After obtaining approval from the Institutional Medical Ethics Committee, we have conducted the study after taking written informed consent from all the selected patients.

#### Inclusion Criteria

- Sixty patients belonging to ASA grade I-II.
- Age between 20-60 years of either sex.
- Mallampati grades of I-II
- Patients undergoing elective surgical procedures.

#### Exclusion Criteria

- Patients with difficult airway
- Previous history of hypersensitivity reactions to Propofol or

inhalational anesthetics.

- High Body mass index
- Chronic smokers
- Patients with history of systemic or chronic diseases like cardiovascular disease, liver disease, renal impairment, diabetes and hypertension.

Pre-anaesthetic evaluation was done for all the patients for assessing their general condition and airway. Systemic examination of respiratory, cardiovascular, and central nervous systems was also done.

Investigations like blood Hemoglobin%, fasting and postprandial sugar levels, liver function tests, blood urea and serum creatinine levels, coagulation profile, chest X-ray PA view and a 12 lead ECG were done.

Routine preoperative preparation was followed.

On the morning of the surgery, patients were examined for airway and vitals were recorded.

#### TECHNIQUE:

- On arrival to the operation room the patient is connected to standard monitors for noninvasive blood pressure, electrocardiogram and pulse oximeter and intravenous access was secured.
- Before induction, patients in both the study groups were pre oxygenated for 3 minutes using 100% Oxygen at a flow rate of 8 liters/minute. Premedication agents such as inj. Glycopyrrolate 0.20 mg, inj. Ondansetron 4.0 mg and inj. Midazolam 1.0 mg were given intravenously.
- Based on the weight of the patient appropriate size of LMA was selected. For patients weighing less than 70 kg size 3 and size 4 for those weighing more than 70 kg is selected.
- The study population was divided into 2 groups, Group-A and Group-B comprising of 30 patients each, by using random number tables.
- Group-A patients were induced with Propofol 2mg/kg intravenously along with inj. Loxicard 0.3 mg/kg for reducing pain at the site of injection.
- From the initiation of injection till eyelash reflex lost, it is measured as induction time.
- 1 min following induction, after achieving adequate relaxation of the jaw, LMA placement was attempted. A maximum of 3 attempts were made with a gap of 1 min after providing spontaneous/assisted

ventilation of Nitrous oxide 50% and Oxygen 50%. Each attempt was preceded by a bolus dose of 0.50 mg/kg of Propofol intravenously.

— In Group-B patients, induction was done with inhalation anesthetic mixture comprising of Sevoflurane 8% with 100% oxygen at a fresh gas flow of 6L/min. These patients were instructed to take vital capacity breaths.

— End point of induction is taken into consideration when eyelash reflex is lost.

— LMA placement was attempted after 1 minute following induction, after assessing for adequate jaw relaxation.

— If unsuccessful, spontaneous /assisted ventilation was done with 8% Sevoflurane in 50% Nitrous oxide and 50% Oxygen. Attempts were repeated for every 1 min up to maximum of 3 attempts

— Proper placement of LMA will be confirmed if

— Air entry is equal bilaterally

— Equal chest movements bilaterally and

— When auscultated over epigastrium gastric insufflation is not heard.

— NIBP, SPO<sub>2</sub>, HR and ECG changes were observed and recorded every minute until 5 minutes.

— An independent observer recorded:

1. Time taken for induction.

2. Time taken to jaw relaxation.

3. Time taken to completion of successful insertion of LMA

4. Number of attempts taken for successful insertion of LMA.

### Statistical Methods:

Statistical tests applied for this study include Student's unpaired t-test for demographic data and hemodynamic changes. Chi-square test is used to assess the association among the two study groups for the variables of induction and Laryngeal Mask Airway insertion. P- value less than 0.05 was taken as statistically significant.

### RESULTS:

#### Demographic Data

The mean age and standard deviation in Group A and B were 31.2800±5.32600 and 31.8200 ± 5.87642 respectively (P value: 0.690) and mean weight in Group A and B were 54.430 ± 5.540 and 57.530 ± 6.460 respectively.

**Table 1: Induction Characteristics In The Study Groups**

Parameter	Group-A	Group-B	P-value
Time to induction (seconds)	50.10± 8.980	72.80± 15.860	0.00006
Time to jaw relaxation (seconds)	107.30±17.510	49.40± 5.690	0.0001
Time to LMA insertion (seconds)	100.0 ± 13.60	120.0 ± 14.20	0.001

#### Number Of Attempts:

LMA insertion was done in second attempt in 2 patients belonging to Group A and 4 patients belonging to Group B, due to incomplete jaw relaxation during the first attempt.

**Table 2: Comparison Of Heart Rate In Both The Groups**

	Group-A	Group-B	P-value
Basal heart rate	88.280 ± 6.60	81.260 ± 5.980	0.0380
At induction	86.400 ± 6.580	85.010 ± 5.980	0.0380
During insertion	92.010 ± 5.860	88.920 ± 6.720	0.0590
1 min	92.080 ± 5.060	91.50 ± 6.340	0.8420
2 min	88.110 ± 6.300	5.91±7.20	0.0010
3 min	80.980 ± 6.090	93.020 ± 7.300	0.000
4 min	79.630 ± 7.350	94.780 ± 6.730	0.0020
5 min	81.780 ± 5.800	89.40 ± 7.230	0.0010

**Table 3: Comparison Of Mean Arterial Pressure In Both The Groups**

	Group A	Group B	P-Value
Baseline	96.980 ± 9.480	98.720 ± 7.500	0.7010
At the time of induction	95.100 ± 8.860	92.880 ± 4.140	0.2030
At the time of insertion	90.180 ± 8.790	89.120 ± 5.040	0.5430
1 minute	86.980 ± 8.780	88.240 ± 5.430	0.329
2 minutes	79.90 ± 7.420	87.120 ± 6.780	0.006
3 minutes	76.50 ± 6.500	89.020 ± 5.780	0.003
4 minutes	69.70 ± 5.950	89.650 ± 4.950	0.002
5 minutes	68.50 ± 6.080	91.320 ± 5.750	0.001

### DISCUSSION:

Laryngeal mask airways are gaining popularity these days due to their cost effectiveness and having the advantages of easier placement even in inexperienced hands, avoidance of laryngoscopy and less airway complications when compared to endotracheal intubation<sup>5,6,7</sup>.

We have aimed to compare Propofol, an intravenous inducing agent with sevoflurane, an inhalational agent, for insertion of LMA. We have observed that Propofol is associated with greater suppression of reflex activity, adequate jaw relaxation<sup>8</sup> but is associated with pain on injection, hypersensitivity reactions, hypotension and even apnea. In our study administration of loxicard intravenously along with propofol reduced the pain of propofol injection.

Sevoflurane can be used as an effective alternative to propofol<sup>9</sup> among the volatile agents and is more acceptable because of its pleasant nature, minimal respiratory irritation, smooth and rapid induction.

Bolus injection of Propofol is compared to the vital capacity induction technique of sevoflurane. As Sevoflurane is associated with stable haemodynamics it has gained better acceptance by the patients<sup>10</sup>.

There are several studies regarding comparison of efficacy of Propofol and Sevoflurane and the results are different in different conditions. In a study by Wajima Z et al, they have compared the efficacy of Propofol and combination of Sevoflurane with Propofol for induction of anaesthesia in 50 patients. In a study conducted by Thwaites et al, they have compared inhalation induction with 8% sevoflurane with propofol in 102 patients undergoing cystoscopy.

Our study is a prospective, single blind, randomized controlled study in 60 patients undergoing elective surgeries divided into 2 groups of 30 each.

The demographic characteristics like age, sex, weight and ASA grade are comparable between the two groups. These results coincide with most of the corresponding studies.

We have observed partial jaw relaxation in 2 patients belonging to Group A and 4 patients in Group B. For these patients, the LMA insertion was done successfully in second or third attempt. Interestingly, Dwivedi et al<sup>3</sup> also reported jaw tightness in several patients after induction with sevoflurane leading to failure in insertion of LMA. However, in our study, this difficulty was observed in 4 out of 30 patients induced with sevoflurane.

In a study conducted by Priya et al<sup>6</sup> they have observed that propofol provides better induction conditions like suppression of reflexes, jaw relaxation and concluded that propofol is the better agent for insertion of LMA when compared with sevoflurane. We have observed similar results in our study. These results were comparable with the studies done by Hall et al<sup>11</sup>, Thwaites et al<sup>12</sup>, Ti et al<sup>13</sup>.

In a study by Sivalingam et al<sup>1</sup>, they have noticed cough in 12% patients in propofol group, 20% of patients in sevoflurane group. Coinciding with the above study, we have observed cough in one patient in Group B (3.3%). Among both the study groups we didn't experience laryngospasm.

In both the study groups heart rate, mean arterial pressure were recorded before induction, at the time of induction, at the time of insertion and each minute till 5 minutes.

At the time of insertion of LMA, there is a significant rise in heart rate from the baseline values as observed in both the study groups.

In our study in Group A, a maximum raise in HR of 4 beats was observed during LMA insertion and is stabilized after 2 minutes. Whereas, in Group B there was an increase in HR of 7 beats from the baseline during insertion was observed and stabilized after few minutes. Similar results were observed in a study done by Sunder Paneerselvam et al<sup>14</sup>. This difference in mean heart rate between both the groups was found to be significant statistically. (p<0.001)

For both the groups the basal MAP recordings were comparable. In Group A and Group B there was a decrease in MAP after induction and a further decrease after LMA insertion which was found to be statistically significant when compared to the baseline values in both groups.

Following LMA insertion the mean arterial pressure decreased significantly in Group-A at 2 mins, 3 mins, 4mins, and 5 mins, when compared to Group-B ( $p<0.05$ ) and this difference is significant statistically.

Thwaites et al.<sup>12</sup>, during their study observed a reduction in MAP of 20mm Hg in patients induced with Propofol within 2 min of induction, where as in patients induced with Sevoflurane, the decrease was only 10mm of Hg.

W. Scott Jellish et al.<sup>15</sup> while comparing the hemodynamic parameters also observed a reduction in blood pressure values in their study groups. Similarly, a significant fall in blood pressure values were also noted in the studies done by V.Priya et al<sup>7</sup>, Lian Kah et al<sup>16</sup> and S.B.Ganatra<sup>17</sup> et al., especially in patients induced with Propofol.

### CONCLUSION:

— From the above study, it can be concluded that propofol has a faster induction and easier insertion of LMA due to early onset of jaw relaxation when compared with Sevoflurane.

— Sevoflurane is associated with good hemodynamic stability, it serves as an effective alternative in patients where the use of propofol is contraindicated.

### REFERENCES

- Hagberg C, Artime C. Airway management in the adult. In: Miller's Anesthesia. 8<sup>th</sup> ed. Philadelphia: Churchill Livingstone; 2015. p. 1647-58.
- Mizrak A, Kocamer B, Deniz H, Yendi F, Oner U. Cardiovascular changes after placement of a classic endotracheal tube, double-lumen tube, and laryngeal mask airway. *J Clin Anesth.* 2011;23:616–20.
- 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.
- El-Radaideh KM, Al-Ghazo MA. Single breath vital capacity induction of anesthesia with 8% sevoflurane versus intravenous propofol for laryngeal tube insertion in adults. *Saudi Med J.* 2007;28:36–40. [Abstract] [Google Scholar]
- Sukhupragam 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.
- Priya V, Divatia JV, Dasgupta D. Comparison of propofol versus sevoflurane for laryngeal mask airway insertion. *Indian J Anesth.* 2002;46:31–4.
- 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.
- 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.
- Fredman B, Nathanson MH, Smith I, Wan J, Klein K, White PF. Sevoflurane for outpatient anaesthesia: A comparison with Propofol. *Anaesth Analg.* 1995;81:823-8.
- Negargar S, Peirovifar A, Mahmoodpoor A, Parish M, Golzari SE, Molsegi 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.
- Hall JE, Stewart JIM, Harmer M. Single breath inhalation induction of sevoflurane anaesthesia with and without nitrous oxide: A feasibility study in adults and comparison with an intravenous bolus of propofol. *Anaesth.* 1997;52:410-5
- Thwaites A, Edmonds S, Smith I. Inhalation induction with sevoflurane: a double-blind comparison with propofol. *British Journal of Anesthesia* 1997;78(4):356-61.
- Ti LK, Chow MYH, Lee TL. Comparison of propofol with sevoflurane for laryngeal mask airway insertion in adults. *Anaesth Analg.* 1999;88:908-12
- Sunder Paneerselvam, MN Nandakumar. A randomized controlled trial on comparison of sevoflurane induction to propofol induction for insertion of laryngeal mask airway in adults. *Indian Journal of Clinical Anaesthesia,* 2016;3(4): 616-620
- W.Scott Jellish, Cynthia A. Lien, H. Jerrel Fontenot, Richard Hall. The comparative effects of Sevoflurane versus Propofol in the induction and maintenance of anaesthesia in adult patients. *Anaesth Analg* 1996; 82:479-85
- Lian KT, Chow MY, Lee TL. Sevoflurane vs. propofol for LMA insertion in adults. *Anesth Analg.* 1999; 88(4), 908-912.
- S.B.Ganatra, J.D'Mello, M.Butani, P.Jhamanani. Sevoflurane vs. propofol for LMA insertion. *Eur J Anesth,* 2002; 14: 371-375.