



COMPARISON OF SEVOFLURANE V/S PROPOFOL FOR CLASSIC LARYNGEAL MASK AIRWAY INSERTION AND HAEMODYNAMIC RESPONSE IN PATIENTS UNDERGOING GYNECOLOGICAL PROCEDURES ,A RANDOMISED COMPARATIVE STUDY.

Anesthesiology

Dr. Trishala Jain	Senior professor, Department of Anesthesiology, S.M.S. Medical College and attached hospitals, Jaipur, Rajasthan, India.
Dr.Khemraj*	PG Student, Department of Anesthesiology, S.M.S. Medical College and attached hospitals, Jaipur, Rajasthan, India. *Corresponding Author
Dr.jaipal	MD anesthesia, Department of Anesthesiology, S.M.S. Medical College and attached hospitals, Jaipur, Rajasthan, India.

ABSTRACT

Background: the laryngeal mask airway has gained wide spread popularity for airway management during surgery. IV propofol is the induction agent of choice for laryngeal mask airway insertion but now Sevoflurane became a good alternative for LMA insertion because low incidence of breath holding, coughing, and laryngospasm. Aim of our study compare the induction characteristics, ease of LMA insertion, hemodynamic changes and complications in cases of following induction of anesthesia by propofol V/S inhalation of 8% sevoflurane.

Material and Methods: A prospective randomized study of 92 American Society of Anesthesiologists' Grade I and II patients was conducted (Permission from institutional ethics committee no.339/MC/EC/2020) and patients were randomly allocated into 2 groups with 46 each undergoing gynecological procedures under general anesthesia. Group- A (n=46) - patients received inj. Propofol 2.5 mg/kg IV and Group- B (n=46) - patients received 8% sevoflurane inhalation. At the end point of induction, the LMA insertion was attempted. Scoring systems were used to grade the conditions for insertion of the LMA. Induction, LMA insertion characteristics, hemodynamic changes, complications were assessed. Data were recorded and analyzed.

Results: In this study the time for jaw relaxation and LMA insertion was taken more with sevoflurane group than propofol group. Ease of LMA insertion with propofol was significantly easy. Full jaw relaxation was more with propofol group. LMA was successfully inserted in 95.65% patients at first attempt in group A as compared 86.96% in Group B. Haemodynamically stability was more with sevoflurane than propofol group. Coughing, Biting was comparable in both group but not significant. Chavan SG et al, Lian et al also supporting our study.

Conclusion: We concluded that sevoflurane is associated with good haemodynamic stability but quality of anesthesia with faster and easier induction and insertion of LMA provided by propofol is superior.

KEYWORDS

INTRODUCTION

The laryngeal mask airway has gained wide spread popularity for airway management during surgery. The laryngeal mask airway is an ingenious supraglottic airway device that is designed to provide and maintain a seal around the laryngeal inlet for spontaneous ventilation and allow controlled ventilation at modest levels (<20cmH₂O) of positive pressure without direct laryngoscopy. Several methods have been introduced for LMA insertion while no standard anesthesia induction method has been proposed to guarantee a proper placement of LMA.

Ideal induction agent for LMA insertion would provide loss of consciousness, jaw relaxation, absence of upper airway reflexes rapidly without cardio-respiratory compromise. Most currently available induction agents have been used for LMA insertion are propofol, which is probably the best intravenous agent and sevoflurane, which is the best volatile agent.

IV propofol with and without opioid is the induction agent of choice for laryngeal mask airway insertion. Propofol is associated with desired jaw relaxation and prohibits reflexes such as coughing or bucking following LMA insertion. On the other hand, it is of some unwanted complications such as excitatory movements, pain on injection, hypotension, prolonged apnea. With an elimination half-life of 4-7 hours, propofol is distributed rapidly in the circulation and enter central nervous system fastly. Because of its favourable recovery profile and low incidence of side effects, propofol has become the drug of choice for insertion of laryngeal mask airway.

Sevoflurane, a halogenated, volatile anesthetic agent is non irritating to the airway, and mask induction with this agent is associated with a very low incidence of breath holding, coughing, and laryngospasm. Induction technique using a high inspired concentration of sevoflurane and vital capacity breaths provides good conditions for insertion of LMA. Recently, vital capacity breath inhaled induction of anesthesia with sevoflurane has been used as an alternative to iv induction. Rapid insertion of LMA after vital capacity breath induction may allow the use of sevoflurane as a single drug for the induction and maintenance of anesthesia.

MATERIALS & METHODS

After Institutional Ethical Committee approval No. 339/MC/EC/2020. A randomized comparative study conducted. The study includes 92 patients which are undergoing gynecological procedure under general anaesthesia with written Informed consent obtained from the patients for performance of general anaesthesia after complete explanation about the study protocol and the procedure.

Sample Size:

The sample size calculated is 46 cases in each group required at 95% confidence and 80% power to verify the expected minimum difference of 2.96 (± 6.02) in heart rate from base line to at the time of insertion in all 2 study groups. This sample size is adequate to cover all other study variables.

Randomization:

Patient was randomly allocated into two groups of 46 patients each by computer generated random numbers.

Study Groups:

Patients were randomly allocated into 2 groups (46 patients in each group).

- Group- A (n=46) - patients received inj. Propofol 2.5 mg/kg IV
- Group- B (n=46) - patients received 8% sevoflurane inhalation

Procedure

In our study patients included 20-50 yr age, weight 40-70 kg with ASA grade I and II for short gynecological procedures. On arrival in the operation theatre, fasting status, written informed consent and PAC was checked. Routine non-invasive monitors attached and Patient's baseline vitals parameters i.e. heart rate (HR), Systolic blood pressure (SBP), Diastolic blood pressure (DBP), Mean arterial pressure (MAP), SpO₂, & ECG were recorded. Intravenous line was secured, and i.v. fluid R.L started. Patients were premedicated with inj. Ondansetron 4 mg, inj. Glycopyrrrolate 0.2mg i.v. and inj. Midazolam 1mg i.v. 5 minutes prior to study drug. Patients were pre-oxygenated with 100 % O₂ for three minutes. Patients received injection fentanyl 2mcg/kg prior to induction. Patients randomly allocated to one of two groups (46 patients each) using computer generated random numbers.

Group A received iv propofol 2.5mg/kg body weight at the rate of 40 mg every 10 sec and Group B received sevoflurane 8% into fresh gas flow of 8L of oxygen and patient's instructed to take and hold it as long as she could; Propofol took in a 20 mL syringe in 10mg/ml concentration. The point when inj. Of propofol or introduction of sevoflurane 8% considered the starting point of induction. Loss of verbal contact assessed by the response to calling out the patient's name. Procedure allowed to commence after recording of vital parameters and anesthesia was maintained with 60% nitrous oxide & 40% oxygen with 1%-2% sevoflurane. Loss of eyelash reflex considered as the desired end point for induction for both groups. After that, jaw relaxation assessed by an anaesthesiologist. If jaw relaxation is not adequate, for LMA size, it reassessed after every 10sec. Once jaw relaxation was adequate, classical LMA insertion attempted by the standard technique described by Brain. Heart rate, mean arterial pressure, SBP, DBP, Etco₂ and spo₂ were observed at different time interval like pre induction, on induction, at classical LMA insertion and at 1 min., 2 min., 5 min., 7 & 10 min. following LMA insertion. Grading of the LMA insertion done by an observer on a three-point scale using six variables as jaw opening, ease of insertion, coughing, biting, gagging, and laryngospasm. Each variable having three point and total scoring were graded as Excellent:-when total scoring 18, Satisfactory:- 16-17, Poor :-<16. Statistical Analysis was done on the basis of recorded parameters. Result and Conclusion were made on basis of statistical analysis.

RESULTS

Table-1

S. NO.	VARIABLES		GROUP A		GROUP B		P-VALUE
			MEAN / SD / % CASES		MEAN / SD / % CASES		
1.	AGE WEIGHT		32.15	7.83	33.37	7.16	0.511 (NS)
2.			52.83	5.81	52.04	6.69	0.550 (NS)
3.	ASA GRADE	I	41	89.13	40	86.95	0.765 (NS)
		II	4	8.69	6	13.04	

TABLE-1 shows that mean age, mean weight, and mean ASA grade in the both groups were almost same and statistical comparison between the mean age is non-significant. The patients in both Groups ranged from 20 years to 50 years. Both groups were comparable with respect to demographical data with no statistically significant difference.

TABLE-2

S. NO.	Induction characteristics	Group A		Group B		Result (P value)
		Mean time (sec)	SD	Mean time (sec)	SD	
1.	Loss of verbal contact	59.50	13.14	71.85	10.72	p<0.001 (S)
2.	Loss of eyelash reflex	74.93	12.17	87.83	10.31	p<0.001 (S)
3.	Jaw relaxation time	93.15	13.43	106.74	9.79	p<0.001 (S)
4.	insertion time	104.89	12.84	124.35	11.33	p<0.001 (S)

TABLE-2 Sevoflurane has taken longer time for induction and LMA insertion. Verbal contact, eye lash reflex, jaw relaxation and LMA insertion were earlier than propofol and statistically significant. (p-value < 0.05)

TABLE-3 shows that statistical comparison of ease of LMA insertion, jaw relaxation grading between two groups is significant. While other variable of insertion characteristics statistically not significant with statistically comparable p-value. (p-value > 0.05)

TABLE.3

Variable	Quality Of Variable	Group A		Group B		P-Value
		No.	%	No.	%	
Jaw Relaxation	Full	45	97.83	37	80.43	0.019(S)
	Partial	1	2.17	8	19.57	
	Total	46	100.00	46	100.00	
Ease of Lma Insertion	Easy	44	95.65	36	78.26	0.030(S)

Coughing	Difficult	2	4.35	10	21.73	0.319(S)
	Total	46	100.00	45	100.00	
	Nil	46	100.00	45	97.83	
	Transient	0	0	1	2.17	
Biting	Difficult	44	95.65	44	95.65	0.609(Ns)
	Total	46	100.00	46	100.00	
	Nil	2	4.35	2	4.35	
	Transient	0	0	0	0	
Gagging	Difficult	46	100.00	46	100.00	Nil
	Total	46	100.00	46	100.00	
	Nil	0	0	0	0	
	Transient	0	0	0	0	
Laryngospasm	Difficult	46	100.00	46	100.00	Nil
	Total	46	100.00	46	100.00	
	Nil	0	0	0	0	
	Transient	0	0	0	0	
Number Of Attempts	First Attempt	44	95.65	40	86.96	0.267(Ns)
	Second Attempt	2	4.35	6	13.04	
	Total	46	100.00	46	100.00	

Fig.1

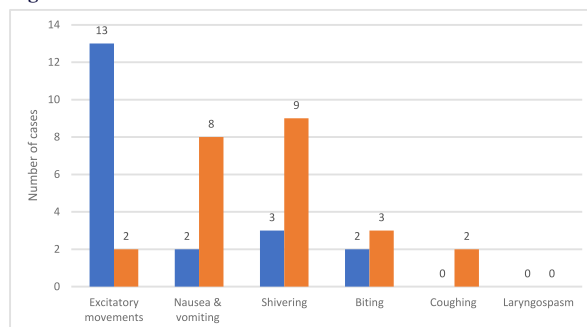
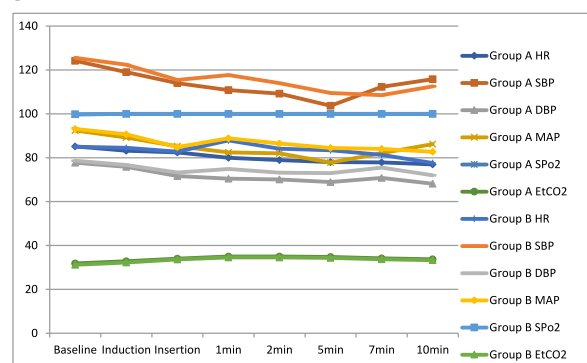


Fig.1 shows the occurrence of complications like excitatory movements were more common with group A which was statistically significant. Other complications like coughing biting, laryngospasm, nausea & vomiting and shivering during induction and LMA insertion did not reach statistical significance in our study.

GRAPH-1



Graph 1: The haemodynamic parameter as mean heart rate, mean systolic blood pressure, mean diastolic blood pressure, mean of mean arterial blood pressure, mean percentage saturation oxygen and mean end tidal CO₂ were plotted in this graph. Which were comparable and statistically non significant in both groups p-value. (p-value > 0.05)

DISCUSSION

LMA is very popularly used now a days for airway management for short duration procedures. LMA was originally discovered by Dr. Brain AJ. For satisfactory use of LMA require adequate depth of anaesthesia and adequate blunting of airway reflexes and adequate jaw relaxation. LMA insertion is associated with hemodynamic changes but less than endotracheal intubation. LMA insertion smooth induction and favorable conditions in terms of sufficient suppression of airway reflexes and jaw relaxation.

In recent past many inducing agents were studied in respect of smooth induction, favorable insertion conditions, better hemodynamic stability and less adverse reactions. However many inducing agent options are available now but very less data were available to choose

ideal agent for LMA insertion. In our study we compared propofol and sevoflurane as inducing agent during LMA insertion in various surgical procedures. As there are very less no. of studies were done to compare propofol and sevoflurane as inducing agent during LMA insertion.

Our study include 92 patients which are randomly allocated in to two groups 46 patients in each group by sealed envelope method. In our study, we compare the induction characteristics, easy of LMA insertion, hemodynamic response during LMA insertion and any adverse complication occurred in both groups.

Both groups were comparable in respect of age distribution with P-value of 0.511 (Statistically Non-Significant), in respect of weight distribution with P-value of 0.550 (Statistically Non-Significant) and in respect of ASA grade distribution with P-value of 0.765 (Statistically Non-Significant).

Baseline vital parameters of both groups were also comparable in respect of Heart Rate with P-value 0.956, systolic blood pressure with P-value of 0.417, diastolic blood pressure with P-value of 0.428, mean arterial blood pressure with P-value of 0.265, and percentage oxygen saturation with P-value of 0.315 (Statistically Non-Significant).

Induction characteristics were compared in terms of Loss of verbal contact, Loss of eyelash reflex, Jaw relaxation time, and LMA Insertion time. Loss of verbal contact was statistically significantly lower in Group A (P-value 0.001) in 59.50 ± 13.14 seconds and in Group B in 71.85 ± 10.72 seconds. Loss of eyelash reflex was statistically significantly lower in Group A (P-value 0.001) in 74.93 ± 12.17 seconds and in Group B in 87.83 ± 10.31 seconds. Jaw relaxation time was statistically significantly lower in Group A (P-value 0.001) in 93.15 ± 13.43 seconds and in Group B in 106.74 ± 9.79 seconds. LMA Insertion time was statistically significantly lower in Group A (P-value 0.001) in 104.89 ± 12.84 seconds and in Group B in 124.35 ± 11.33 seconds. The time of loss of eyelash reflex was faster in Group A (Propofol Group) than Group B (Sevoflurane Group) where as jaw relaxation time was also statistically significantly shorter in Group A (Propofol Group). **Sarkar M et al** found that loss of eyelash reflex was faster in Sevoflurane Group than compare to Propofol Group and jaw relaxation time was statistically significantly lower in Propofol Group. **Siddik-Sayyid et al** also found results similar to **Sarkar M. et al**, **Priya V et al** in their study, comparing Propofol with Sevoflurane for LMA insertion concluded that jaw relaxation was better with Propofol Group resulting in easy LMA insertion which same as in our study. **Molloy et al.** and **Thwaites et al.**, reported that LMA insertion condition were better with Propofol Group than Sevoflurane Group.

LMA insertion with propofol was easy for 95.65% of cases (44) and 4.35% (2) of cases had difficult insertion. In Sevoflurane group 78.26% cases (36) had easy insertion and 21.73% of cases (10) had difficulty in insertion. This is statistically significant (p value of 0.030). **Chavan SG et al** reported that ease of insertion was better in propofol group than sevoflurane group. **Jaw relaxation** 97.83% of the subjects in propofol group had full jaw relaxation as compare to 80.43% sevoflurane group (p value 0.019) which was statistically significant suggesting that propofol has more muscle relaxant property as compare to sevoflurane. **Lian et al** supporting our results. LMA was successfully inserted in 95.65% patients at first attempt in group A as compared 86.96% in Group B. There was statistically no significance difference among the group (P-value 0.267). Similar observations were found in study conducted by **Sarkar et al** in contrast **Lian et al** in their study found that more attempts at insertion of LMA were required in patients in sevoflurane group versus those in propofol group. The overall conditions of LMA insertion was graded as excellent in 43 patients belonging to propofol group while 38 patients in sevoflurane group had excellent LMA insertion conditions with score of 18. Grading was excellent in both groups. **Chavan SG et al** also found that there was statistical no significance difference in overall score for LMA insertion characteristics.

Coughing was not present in any patient in Group A where as one patient had cough in Group B which was statistically non-significant (P-value 0.319). Transient **Biting** was in two patients in each Group which was statistically non-significant (P-value 0.609). **Gagging** and **laryngospasm** were not encountered in a single patient in both groups. **Dr. Tabish Hussain et al.** showed that incidence of airway reflexes like coughing, gagging, and biting were greater in Sevoflurane Group than Propofol Group.

Hemodynamic response were stable in both groups but observations were statistically significantly (P-value 0.05) different in both Groups after 1 min. of induction, lower in Group A as similar results were found by **Priya et al.** While **Sarkar M. et al.**, **Siddik-Sayyid et al.**, found that hemodynamics were comparable in both Groups.

Adverse effects such as **Excitatory movements** were present in 28.26% patients in Group A and 4.35% in Group B which was statistically significant (P-value 0.05) but other side effects were statistically non-significant (P-value > 0.05) in both Groups which were **Vomiting** 4.35% in Group A and 17.39% in Group B (P-value 0.094), **Shivering** 6.52% in Group A and 19.57% in Group B (P-value 0.122), **Coughing** 0% in Group A and 2.17% in Group B (P-value 1.00), **Biting** 4.35% in Group A and 4.35% in Group B (P-value 0.609), and no **laryngospasm** found in both Groups.

CONCLUSION

We concluded that sevoflurane is associated with good haemodynamic stability but quality of anesthesia with faster and easier induction and insertion of LMA provided by propofol is superior. Thus, sevoflurane is an acceptable alternative to propofol for LMA insertion in short general anesthesia procedures.

REFERENCES

1. Martin S. Bogetz, using the laryngeal mask airway to manage the difficult airway: *Anesthesiology Clin N America* 2002;20: 863–870.
2. Robert G Krohner, Sivam Ramanathan . Anatomy of airway in Benumof's airway management 2nd edition. 2006; 1–19, 476–497, 1027–29.
3. Chavan SG, Mandhyan S, Gujar SH, Shinde GP. Comparison of sevoflurane and propofol for laryngeal mask airway insertion and pressor response in patients undergoing gynecological procedures. *J Anaesthesiol Clin Pharmacol* 2017;33:97-101.
4. Brain AJJ: A new concept in airway management; *British Journal of anaesthesia*. 1983; 55: 801–805
5. Ravikumar Koppula & Anitha Shenoy "Comparison of Sevoflurane with propofol for laryngeal mask airway insertion in adults" *Anesth. Clin Pharmacol* 2005; 21(3): 271-274
6. Lian Kah Ti et al, "Comparison of Sevoflurane with propofol for laryngeal mask airway insertion in adults" *Anesth Analg*, 1999; 88: 908–91
7. S Vora kalpana et al "Sevoflurane versus propofol in the induction and maintenance of anesthesia in children with laryngeal mask airway" *Sri Lanka Journal of Child Health* ,2014;43(2);77-83
8. A. Thwaites, S. Edmonds and I. Smith "Inhalation induction with sevoflurane: a double-blind comparison with propofol" *British Journal of Anaesthesia* 1997; 78: 356-361.
9. V. Priya et al "Comparison of propofol versus Sevoflurane for laryngeal mask airway insertion" *Indian J Anesthesia* 2002; 46 (1) 31-34.
10. Sarkar M et al A comparative study of vital capacity breath inhalation with sevoflurane versus intravenous propofol to aid laryngeal mask airway insertion in adults *Int Surg J*. 2014 Aug;1(2):73-76
11. Molly ME, Buggy DJ, Scanlon P "Propofol or sevoflurane for laryngeal mask airway insertion" *Can J Anesth* 1999, Apr; 46(4): 322-6.
12. Siddik-Sayyid et al A Comparison of Sevoflurane-Propofol Versus Sevoflurane or Propofol for Laryngeal Mask Airway Insertion in Adults *J Anesth Analg* 2005;100:1204–9
13. Ravi et al. Comparison of Sevoflurane and propofol for laryngeal mask airway in children. *Ind J of Clinical Anaesthesia*, July–September 2015;2(3):137