Journal of Cardiovascular Disease Research
ISSN: 0975-3583,0976-2833 VOL13, ISSUE 03, 2022

ORIGINAL RESEARCH

A Comparison of Propofol Versus Sevoflurane For Laryngeal Mask Airway Insertion In Adults

[1]Dr. J Soujanya Reddy, [2]Dr Syed Akram Moin, [3]Dr Syed Ibrahim Zubair, [4*]Dr Nargula Sadanandam

[1]Senior Resident: Department of Anaesthesiology: Telangana Institute of Medical Sciences: Gachibowli, Hyderabad, Telangana

[2,3,4]Assistant Professor: Department of Anaesthesiology: Gandhi Medical College/ Gandhi Hospital, Secunderabad, Telangana.

Correspondence:
Dr Nargula Sadanandam
Assistant Professor: Department of Anaesthesiology: Gandhi Medical College/ Gandhi Hospital, Secunderabad, Telangana, India
Email: drnaragulasadanandam11@gmail.com

ABSTRACT: ***Introduction*:** The use of a laryngeal mask airway to manage the patient's airway during surgery is becoming more popular. At low levels of positive pressure, the laryngeals mask airway seals over the laryngeal intake to allow for both spontaneous breathing and regulated ventilation (less than 20cms of H2O). ***Aim***: When sevoflurane inhalation and IV propofol are used to induce anaesthesia, it is important to look at how well LMAs can be inserted. ***Materials and Methodology*:** 60 patients between the ages of 18 and 50 who were undergoing minor surgical procedures under general anaesthesia and were classified as ASA grades I and II were studied in this observational clinical investigation. Group P received Propofol 2–2.5mg/kg body weight at a rate of 40mg every ten seconds. Patients were instructed to inhale and hold their breath for as long as possible. This group received 8L of oxygen and 8 percent sevoflurane, and patients were instructed to hold their breath for as long as possible. ***Results*:** There were significant differences in the mean times for loss of verbal contact, eye reflex, and appropriate jaw relaxation between groups P and S (p 0.0001), and the mean times for successful LMA placement in P were significantly shorter than those in S (p 0.0001). The overall circumstances of LMA insertion were rated good in 26 propofol patients and in 19 sevoflurane patients (both with a score of 18). Three of the sevoflurane patients scored 17 or higher. Only four patients in the propofol group and eight patients in the sevoflurane group had LMA placement graded as satisfactory, which resulted in an overall score of 16. ***Conclusion*:** With propofol 2.5mg/kg IV, induction to successful laryngeal mask installation was much faster than with sevoflurane 8 percent. More patients in the propofol group than in the sevoflurane group had favourable conditions for LMA insertion.

Keywords: Propofol, Laryngealmask, Sevoflurane,

Introduction

The use of a laryngeal mask airway to manage the patient's airway during surgery is becoming more popular. At low levels of positive pressure, the laryngeals mask airway seals over the laryngeal intake to allow for both spontaneous breathing and regulated ventilation (less than 20cms of H2O). [1]

The laryngeal mask airway has been used by millions of patients in a variety of surgical procedures and is widely regarded as a safe method. It provides greater airway control than a facemask while keeping the anesthetist's hands free and avoiding the drawbacks of an endotracheal tube, such as pressor reaction during intubation and postoperative sore throat, croup, and hoarseness. Using a laryngeal mask is a simple and effective way to solve many difficult intubation situations. As a result of LMA, there is no need for muscle relaxation, laryngoscopy or other hemodymanic changes during the procedure. [2]

LMA may be used to get that kind of reaction. The ideal induction agent for LMA installation would elicit a rapid loss of consciousness, jaw relaxation, and the absence of upper airway reflexes without impairing cardiopulmonary function. Most current induction agents have been tested, but propofol and sevoflurane are probably the best intravenous and volatile agents, respectively, while neither is ideal. IV propofol is the chosen sedative for laryngeal mask airway placement. One reason propofol has become the medicine of choice for laryngeal mask airway insertion is its favourable recovery profile and low incidence of side effects. With the use of a mask inducing agent, the halogenated, volatile anaesthetic medication sevoflurane has been connected to an extremely low incidence of breath retention, coughing and laryngospasm. [3]

Additionally, low blood and tissue solubility facilitates rapid induction and predictable recovery times. The combination of a high sevoflurane inspired concentration and breaths of necessary capacity produce perfect conditions for the implantation of an LMA. A great hemodynamic stability may be achieved with this method, which has a low number of excitatory events. Sevoflurane may be utilised as a single agent for anaesthesia induction and maintenance with a rapid insertion of LMA after vital capacity breath induction, reducing transition time and saving money.

Materials and Methods

This observational clinical study was conducted in the department of Anesthesiology and Critical care at Gandhi medical college and hospital, Secunderabad. The research included 60 patients aged 18 to 50 years old who were approved by the institutional ethical committee.

Inclusion criteria: ASA grade I and II patients between the ages of 18 and 50 having minor surgical operations under general anaesthesia.

Exclusion criteria: Patients who are morbidly obese or have limited mouth opening (less than two fingers), have a history of cardiovascular, hypertensive, or renal disorders, GERD, or hiatus

hernia, are 14 weeks pregnant or breastfeeding, or have known allergies to propofol or sevoflurane. Patients who are undergoing major surgeries that require muscle relaxation.

The day before surgery, a preanesthetic examination was completed, and the results were reviewed the day of operation. A thorough examination of the airways was carried out. A thorough medical history was obtained. A systemic review was conducted, and suitable investigations were recommended. All patients signed an informed written permission form. A nil per oral status was maintained for all patients. The patients were premedicated with Ondansetron 4mg and Midazolam 1mg IV. SPO2 and NIBP monitors were added to the IV line. The ECG and NIBP were also connected. Fentanyl injections of 1.5 to 2 g/kg were administered before induction. For 3 minutes, all patients received 100% oxygen at an 8 l/min fresh gas flow to pre-oxygenate. Propofol was given as an induction medication to patients in group P, whereas Sevoflurane was given to patients in group S.

Group P – Propofol 2–2.5mg/kg body weight was administered at a rate of 40mg every 10 seconds.

Group S – Patients were told to take a vital capacity breath and hold it for as long as they could after being given sevoflurane 8% in a fresh gas flow of 8L of oxygen.

Propofol or sevoflurane at a concentration of 8% were considered to be the starting point of induction. In both techniques, the purpose of induction was to reduce verbal contact, which was evaluated by the patient's response to their name being called. A recording was then made of the instant when the eyelash reaction faded away. An anesthesiologist next assessed whether or not the patient's jaw had relaxed after the removal of the eyelid reflex. It was examined every 15 seconds if the jaw relaxation was inadequate. Once the patient's jaw had loosened sufficiently, the LMA was implanted. The following data was recorded.

- Time taken from the start of the induction to the loss of verbal contact, the loss of the eyelash reflex, jaw relaxation, and the successful insertion of the LMA.
- Number of attempts of LMA insertion.

Six factors were taken into consideration by the observer when grading the circumstances surrounding LMA implantation on a three-point scale. The overall circumstances for LMA insertion were graded as excellent, good, or bad based on the total score that was calculated by aggregating the individual evaluations of each component. A total of 18 points can be earned.

Brain's method was used to implant the LMA. A combination of 66% N2O and 33% O2+Sevoflurane was used to maintain anaesthesia following the insertion of the LMA (2 vol percent). It was determined that the patient had attained an adequate level of anaesthesia and was in a stable state after the LMA was placed.

Statistical Analysis- For the statistical analysis, MS-Excel 2018 was employed. The data were analysed using the Student Unpaired t test and the Chi Square test. If the p value is less than or equal to 0.05, the results are considered statistically significant. All data are described by their mean standard deviation.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 03, 2022

Results

Research comprised 60 adults aged 18 to 50 who had been diagnosed with ASA I or II and planned for minor surgical operations under general anaesthesia, regardless of gender. Patients who were given IV Propofol as induction agent were included in group P and those receiving Sevoflurane were included in group S.

Table-1: Demographic distribution in study

Age Group (in Years)	**PROPOFOL GROUP**		**SEVOFLURANE GROUP**	
	N	**%**	**N**	**%**
< 20	0	0	1	3.33
20-29	19	63.33	18	60
30-39	4	13.33	5	16.67
40-49	5	16.67	5	16.67
≥ 50	2	6.67	1	3.33
Total	30	100	30	100
MEAN	30.33 Years		29.87 Years	
S.D.	9.97 Years		8.74 Years	
T stat	0.1900			
p value	**0.8499 (NOT SIGNIFICANT)**			
Gender				
Male	14		10	
Female	16		20	
P-Value	0.291841 (Not Significant)			
Weight in kgs				
Mean	51.37		52.33	
SD	7.76		4.96	
T stat	0.5709			
p value	0.5703 (Not Significant)			
Class 1	24		25	
Class 2	6		5	
p value	0.7386 (Not Significant)			

Table 2: Comparison of Attempts of LMA Insertion between the two groups

Number of Attempts for LMA Insertion	**PROPOFOL GROUP**		**SEVOFLURANE GROUP**	
	N	**%**	**N**	**%**
1	26	86.67	22	73.33
2	4	13.33	8	26.67
MEAN	1.13		1.27	
S.D.	0.35		0.45	
T Stat	1.3451			
p value	**0.1838 (NOT SIGNIFICANT)**			

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 03, 2022

Table-3: Comparison of Mean Time of Loss of Verbal Contact between the Two group

Group	MEAN	S.D	S.E	T stat	p value
Propofol	53.83	11.12	2.03	4.6373	< 0.0001 (Significant)
Sevoflurane	65.67	8.48	1.55		
Time of Loss of Eye Lash Reflex					
Propofol	68.5	10.92	1.99	4.8469	< 0.0001 (Significant)
Sevoflurane	81.17	9.26	1.69		
Time of Jaw Relaxation					
Propofol	85.17	12.76	2.33	6.0628	< 0.0001 (Significant)
Sevoflurane	104	11.25	2.05		

Figure-1: Comparison of Mean Time of Successful LMA insertion between the Two groups

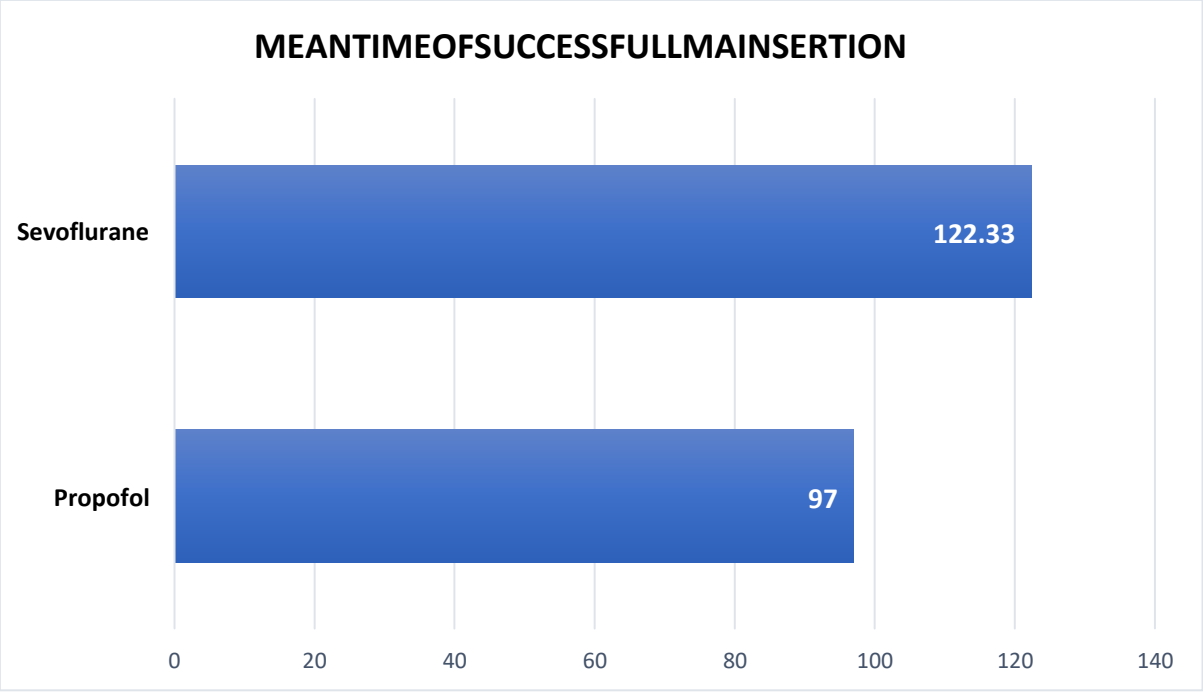


Table-4: Grading of conditions for laryngeal mask airway insertion

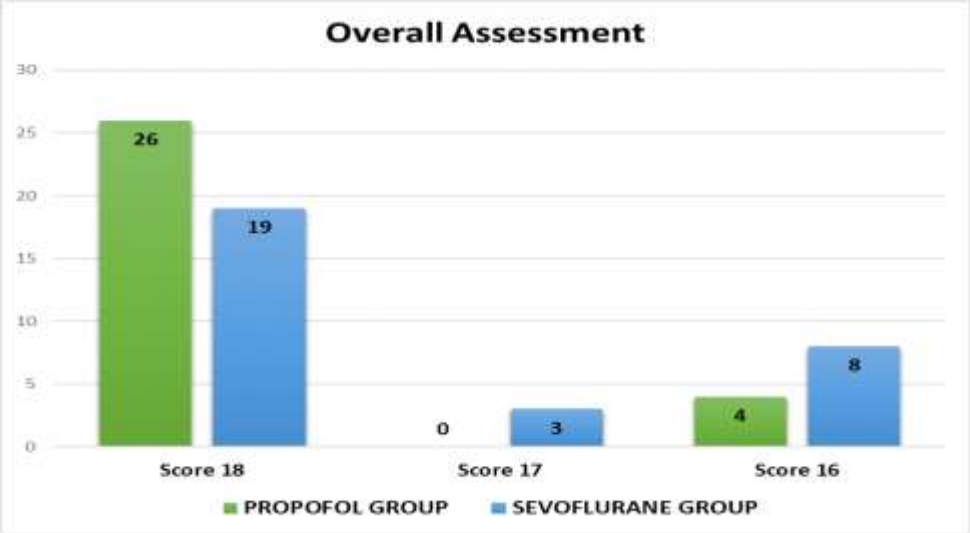
Parameter	Grade	Description	Group P	Group S
Jaw relaxation	3	Full	26	23
	2	Partial	04	07
	1	Difficult	00	00
Ease of LMA	3	Easy	26	23
	2	Difficult	04	07

insertion	1	Impossible	00	00
Coughing	3	Nil	30	26
	2	Transient	00	04
	1	Persistent	00	00
Biting	3	Nil	30	29
	2	Transient	00	01
	1	Persistent	00	00
Gagging	3	Nil	30	30
	2	Transient	00	00
	1	Persistent	00	00
Laryngospasm	3	Nil	30	30
	2	Partial	00	00
	1	Total	00	00

Table-5: Distribution of grading of conditions for LMA insertion

Overall Assessment	**PROPOFOL GROUP**		**SEVOFLURANE GROUP**	
Score	**N**	**%**	**N**	**%**
18	26	86.66	19	63.33
17	0	0	3	10
16	4	13.33	8	26.67
MEAN	17.73		17.36	
S.D.	0.69		0.89	
T Stat	1.7996			
p value	**0.0771 (NOT SIGNIFICANT)**			

Figure-2: Distribution of grading of conditions for LMA insertion



ISSN: 0975-3583,0976-2833 VOL13, ISSUE 03, 2022

Discussion

The use of a laryngeal mask airway to manage the patient's airway during surgery is becoming more popular. The laryngeal mask airway has been used by millions of patients in a variety of surgical procedures and is widely regarded as a safe method. It gives more airway control than a facemask while leaving the anesthetist's hands free and avoids the drawbacks of an endotracheal tube, such as pressor response during intubation and postoperative sore throat, croup, and hoarseness. Using a laryngeal mask is a simple and effective way to solve many difficult intubation situations. Muscle relaxation is unnecessary with LMA, and laryngoscopy and hemodynamic alterations are reduced during insertion. When LMA originally came out, it was thought to be a viable replacement to the facemask. However, its clinical usage now goes beyond the initial guidelines, benefiting patients having surgeries in all surgical and anaesthetic subspecialties. Furthermore, many current surgical methods are much less invasive than previous surgeries, and many patients have their treatments performed in day surgery clinics. As previously stated, LMA is much less stimulating to patients than an endotracheal tube, and it is increasingly widely used for diagnostic and minimally invasive surgical procedures. In patients with difficult airways, the LMA has shown to be exceedingly successful, and in many cases, lifesaving. A sufficient depth of anaesthesia is required for satisfactory LMA insertion after induction of anaesthesia. [4] Because of its higher depressive impact on airway reflexes, propofol is a typical intravenous anaesthetic drug used during LMA installation. [5] Sevoflurane is suitable for inhalational induction even at large dosages because to its low blood gas solubility and minimal respiratory irritating activity. The vital capacity induction approach using sevoflurane was used to make the process comparable to an intravenous bolus dose of propofol. [6]

An induction drug for LMA insertion known as Propofol provides jaw relaxation and eases the process of inserting the device. But the adverse effects, such as hypotension, apnea, and injection pain, make it less than ideal. [7] SVC inhalation with sevoflurane has recently been used as an alternative to intravenous induction for adult anaesthesia. Patient acceptance and hemodynamic stability go hand in hand, and this is no exception. [8] As a consequence, in this study, we compared the quality and speed of LMA insertion in adult patients after sevoflurane VCB inhaled anaesthesia to propofol intravenous anaesthesia. The study was conducted at Secunderabad's Gandhi Medical College and Hospital's department of anesthesiology and critical care. The study's purpose is to compare the settings for LMA implantation after anaesthesia induction with sevoflurane inhalation vs IV induction with propofol. Our study comprised 60 patients between the ages of 18 and 50 with an ASA physical status of I or II who were undergoing minor surgical operations under general anaesthetic. Patients who were given IV Propofol as an induction medication were allocated to group P, whereas those who were given Sevoflurane were assigned to group S. The patients' reactions to the LMA were documented and graded. On a three-point scale, the observer evaluated the conditions of LMA implantation based on six parameters. The overall circumstances for LMA insertion were graded as acceptable, adequate, or unsatisfactory based on the total score produced by summing the individual ratings of each component. There is a maximum potential score of 18. The patients in groups P and S had an average age of 30.33 years and 29.87 years, respectively. The difference was not statistically significant, with a p value of 0.84. The bulk of our patients in both groups were

between the ages of 20 and 29, with 19 individuals in group P and 18 patients in group S. The average age of the propofol group was 27 years old, while the sevoflurane group was 29 years old. There is no statistical difference between the two groups in terms of sex or weight. Women outweigh males in both categories in our study. In groups P and S, the mean weight was 51.37kg and 52.33kg, respectively. Patients with ASA grade 1 were 24 and 25, respectively, in Group P and Group S, while patients with ASA grade 2 were 6 and 5, respectively, in Group P and Group S. When compared to sevoflurane, propofol was substantially shorter. The LMA insertion time for the sevoflurane group was 122.33 seconds, whereas propofol took 97 seconds. Jaw relaxation took longer in the sevoflurane group, with a $p = 0.0001$ significance level. It took 53.83 seconds in Group P and 65.75 seconds in Group S, with a significant p value of <0.0001. It took 68.5 seconds in Group P and 81.17 seconds in Group S, with a significant p value of <0.0001.

Priya *et al* [9] in their study noted that due to its ability to suppress laryngeal reflexes, propofol is an ideal anaesthetic for LMA implantation. When the lack of eyelash reflex is chosen as the induction's end goal, propofol is preferable than sevoflurane for LMA placement. This is because propofol has better jaw relaxation. In our study, propofol induced faster than sevoflurane. Group P lost verbal contact on average after 53.83 seconds, whereas Group S lost contact after 65.75 seconds, with a p value of 0.0001 being significant.

A Thwaites, S Edmends and Smith [10] in their study observed that A smaller percentage of patients had apnea, and it took less time for them to begin spontaneously breathing after sevoflurane induction than after propofol induction.

Ravikumar Koppula and Anitha Shenoy [11] in their study noted that the eyelash reaction was quicker with sevoflurane than with propofol. However, both propofol and sevoflurane needed the same amount of time to relax the jaw (group S 98±10.34 sec versus Group P 93.75± 16.34 sec) and implant the LMA (group S 137.05±17.42 sec against Group P 140.16± 21.67 sec).

Lian *et al* [12] in their study achieved LMA insertion with sevoflurane in 127 seconds, which is almost equal to the period necessary in our clinical experiment (122 sec). Sevoflurane induction may delay LMA placement due to prolonged jaw stiffness.

Smith CE *et al* [13], in their study found that N2O, the time to unconsciousness after propofol was quicker than with sevoflurane.

Muzi *et al*. [14] in their study reported Jaw stiffness during sevoflurane anaesthesia induction caused some patients to be unable to have the LMA installed.

Chavan SG *et al* [15] in their study reported Sevoflurane induction and LMA insertion took longer than Propofol induction. A statistically insignificant difference was found between the two groups when it came to LMA inserting characteristics.

Udaybhasker V *et al* [16] in their study reported that sevoflurane required more time for induction and jaw relaxation. There was no statistically significant difference between the two

groups in terms of the timing and circumstances of LMA insertion.

Sahar M Siddik-Sayyid *et al* [17] in their study reported that Propofol or sevoflurane + propofol induction of anaesthesia was associated with a longer time for jaw relaxation and a delay in LMA installation, but sevoflurane induction was not. Propofol relaxes the jaw muscles, while inhaled anaesthetics may produce more muscular tone, according to this study. As a result, for an equal degree of anaesthesia, propofol may provide more jaw relaxation. Jaw relaxation was observed to be insufficient in 4 propofol patients and 7 sevoflurane patients in this investigation. LMA insertion proved problematic in the same patient, necessitating a second try. There was no significant difference between the two groups, according to the Chi square test. Sevoflurane-induced coughing and biting were observed in four patients, but the results were insignificant. Sevoflurane-induced coughing and biting were observed in a patient.

Sivalingam *et al* [18] in their study reported that Patients who received propofol had a 12% cough rate, whereas those who received sevoflurane had a 20% cough rate. Only four people in the sevoflurane group had coughing, compared to zero in the propofol group. 4 patients in the propofol and 7 in the sevoflurane groups had an LMA implanted in the second attempt, most likely due to inadequate jaw relaxation, however this was not statistically significant with p value of 0.18.

When utilising sevoflurane, the most challenging aspect of LMA insertion was the initial difficulty in opening the mouth. Priya *et al*. [9] found no statistical significance in aspects like coughing, gagging, or patient movements. Propofol, according to Priya *et al*, helped me relax my jaw significantly. They found that induction took longer with sevoflurane than with propofol because sevoflurane has weaker relaxing effects than propofol.

Ravikumar Koppula and Anitha Shenoy [11] in their study found that Both sevoflurane and propofol were shown to be equivalent in terms of LMA insertion quality, hence sevoflurane was deemed to be a viable option to propofol.

Ganatra SB, *et al* [19] in their study found there was a significant time savings with propofol over sevoflurane when comparing induction to successful attachment of the laryngeal mask. Protocol and sevoflurane patients both reported excellent or good results in this study.

Lian *et al* [12] in their study found that they discovered that patients receiving sevoflurane required more LMA insertion attempts than those receiving propofol. These findings were attributed to a greater incidence of problematic mouth openings.

Beverly K Philip *et al* [20] in their study noted as expected, the sevoflurane group had more airway-related events (cough, hiccough) whereas the propofol group had more hemodynamic events. In our study, sevoflurane was associated with more airway problems than propofol, although the difference was not statistically significant.

LIMITATIONS OF THE STUDY:

- The level of anaesthesia between the two groups was not matched since comparing the degree of unconsciousness between inhaled and intravenous anaesthetics was problematic.
- The anaesthetists who evaluated induction side effects were not blinded to the procedure used to induce anaesthesia.
- Patients with advanced age and an ASA grade of >II who may need surgical intervention were excluded from the trial.
- A cost-benefit analysis and a patient satisfaction survey may have been conducted.
- The research did not look at post-operative problems including nausea and vomiting since anti-emetic medicines were given to these individuals as a preventive.

Conclusion

Compared to sevoflurane, the time from induction to the effective installation of a laryngeal mask was significantly shorter with propofol 2.5mg/kg IV, according to our research. In the propofol group, a substantially larger percentage of patients achieved optimal conditions for LMA placement compared to the sevoflurane group. It took longer for sevoflurane to relax the jaw than propofol, resulting in a longer amount of time for the insertion of an LMA.

References

1. Hagberg C, Artime C. Airway management in the adult. In: Miller's Anesthesia. 8th ed. Philadelphia: Churchill Livingstone; 2015. p. 1647-58
2. Robert G Krohner, Sivam Ramanathan . Anatomy of airway in Benumofs airway management 2nd edition.2006; 1 – 19, 476 – 497, 1027 – 29.
3. 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
4. Ferson DZ, Brimcombe JR, Brain AIJ. The laryngeal mask airway. International Anesthesiology Clinics. 1998: 36:2
5. Brown GW, Patel, Ellis FR. Comparison of propofol and thiopentone for laryngeal mask airway insertion. Anesthesia 1991; 46: 771-2
6. Baker CE and Smith I. Sevoflurane: a comparison between vital capacity and tidal breathing techniques for induction of anesthesia and laryngeal mask airway placement. Anesthesia 1995; 54: 841 – 4
7. Sebel PS, Lowdon JD Propofol: A new iv anesthesia. Anesthesiology 1989; 71 : 260– 77
8. Yurino, Kimura H. Induction of anesthesia with sevoflurane, nitrous oxide and oxygen: A comparison of spontaneous ventilation and vital capacity rapid inhalation induction techniques. Anesth Analg 1993; 76: 598 – 601.
9. V. Priya *et al* "Comparison of propofol versus Sevoflurane for laryngeal mask airway insertion" Indian J Anesthesia 2002; 46 (1) 31-34.
10. A. Thwaites, S. Edmends and I. Smith " Inhalation induction with sevoflurane: a double – blind comparison with propofol" British Journal of Anesthesia 1997: 78: 356- 361.
11. Ravikumar Koppula & Anitha Shenoy "Comparison of Sevoflurane with propofol for

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 03, 2022

laryngeal mask airway insertion in adults" Anesth. Clin Pharmacol 2005; 21(3); 271-274

12. Lian Kah Ti *et al*, "Comparison of Sevoflurane with propofol for laryngeal mask airway insertion in adults"Anesth Analog, 1999; 88; 908 – 912.
13. Charles E. Smith *et al* " Sevoflurane – N2O versus propofol/ Isoflurane – N20 during elective surgery using the LMA in adults" J. Clin Anesth 2000; 12; 392-396.
14. Muzi M, Robinson BJ, Ebert TJ, O'Brien TJ. Induction of anesthesia and tracheal intubation with sevoflurane in adults. Anesthesiology 1996; 85: 536 43
15. Chavan SG,Mandhyan S,*et al*"Comparison of sevoflurane and Propofol for laryngeal mask airway insertion and pressor response in patients undergoing gynecological procedures"Journal of Anesthesiology ,clinical pharmacology,Jan-March 2017,33(1):97-101
16. Vinaya Udaybhaskar ,Amol ,*et al*"Comparison of inhalational vital capacity induction with Sevoflurane to intravenous induction with Propofol for insertion of laryngeal mask airway in adults" Anesthesia,essays,researches Jan-March 2018;12(1):73-79.
17. Sahar M Siddik-Sayyid *et al* A comparison of sevoflurane-propofol versus sevoflurane or propofol for laryngeal mask airway insertion in adults.Anesth Analg 2005;100:1204- 9.
18. Sivalingam P,Kandasamy R,Madhavan G, *et al* Conditions for laryngeal mask insertion.A comparison of propofol versus sevoflurane with or without alfentanil.Anesthesia.1999;54:271-6.
19. 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" European J Anesth 2004, Apr; 21(4): 265-71.
20. Beverly K. Philip, *et al*, "Comparison of Vital Capacity Induction with Sevoflurane to Intravenous Induction with Propofol for Adult Ambulatory Anesthesia" Anesth Analg:1999;89:623–7.