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Original Research Article

Comparative Evaluation of Propofol and Sevoflurane for Laryngeal Mask Airway Insertion in Adults Undergoing Elective Surgery at a Tertiary Care Center

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Conflict of interest: Nil

Abstract

Background: Propofol and sevoflurane are commonly used induction agents for laryngeal mask airway (LMA) insertion. An ideal induction agent should provide rapid induction, adequate jaw relaxation, optimal insertion conditions, and minimal adverse effects.

Methods: This prospective comparative observational study included 50 ASA I–II patients aged 18–50 years undergoing elective minor surgery under general anaesthesia. Patients were divided into two groups of 25 each: Group P received intravenous propofol (2–2.5 mg/kg) and Group S received inhalational sevoflurane (8%). Time to loss of verbal contact, loss of eyelash reflex, jaw relaxation, successful LMA insertion, insertion attempts, insertion conditions, insertion scores, and peri-induction adverse events were recorded. Data were analysed using the unpaired Student's *t*-test and Chi-square test, with $p \leq 0.05$ considered statistically significant.

Results: Propofol produced significantly faster loss of verbal contact (36.8 ± 6.4 vs. 52.9 ± 8.3 s), eyelash reflex (48.6 ± 7.2 vs. 67.8 ± 9.4 s), jaw relaxation (63.4 ± 8.9 vs. 88.2 ± 10.7 s), and LMA insertion (78.5 ± 10.8 vs. 108.7 ± 13.2 s) (all $p < 0.001$). Excellent insertion conditions were observed in 84.0% of patients receiving propofol compared with 60.0% receiving sevoflurane ($p = 0.048$). The overall insertion score was significantly higher with propofol (17.64 ± 0.81 vs. 15.84 ± 1.52; $p < 0.001$). First-attempt insertion success was high in both groups (96.0% vs. 84.0%). Patient movement during insertion was significantly lower with propofol ($p = 0.041$).

Conclusion: Intravenous propofol provided faster induction, superior LMA insertion conditions, and better suppression of airway reflexes than sevoflurane. Although transient apnoea was more frequent with propofol, it remained the preferred induction agent for smooth and successful LMA insertion in adult elective surgical patients.

Keywords: Propofol; Sevoflurane; Laryngeal Mask Airway; General Anaesthesia; Airway Management; Induction of Anaesthesia; Elective Surgery.

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Introduction

General anaesthesia plays a vital role in modern surgical practice by ensuring safe airway management, adequate oxygenation, and patient comfort during operative procedures. Supraglottic airway devices have become an essential component of airway management because they provide effective ventilation with less invasiveness than endotracheal intubation [1]. Among these, the laryngeal mask airway (LMA) is widely used for elective surgeries due to its ease of insertion, reliable airway seal, lower airway trauma, and favourable safety profile.[2]Introduced by Archie Brain in 1983, the LMA has transformed anaesthetic practice by providing a secure airway without routine laryngoscopy or neuromuscular blockade. Compared with endotracheal intubation, LMA insertion produces less haemodynamic stress and is associated with a lower incidence of postoperative sore throat, coughing, and airway trauma while facilitating both spontaneous and controlled ventilation. It also plays an important role in difficult airway management

algorithms.[3,4]Successful LMA insertion depends on achieving an adequate depth of anaesthesia. The ideal induction agent should provide rapid loss of consciousness, excellent jaw relaxation, suppression of airway reflexes, and optimal insertion conditions while maintaining cardiovascular and respiratory stability. Inadequate anaesthesia may result in coughing, gagging, laryngospasm, patient movement, or failed insertion, whereas excessive anaesthesia may lead to hypotension, respiratory depression, and delayed recovery. Therefore, the choice of induction agent is a key determinant of successful LMA placement and perioperative safety.[5,6]Propofol remains the intravenous induction agent of choice for LMA insertion because of its rapid onset, profound suppression of airway reflexes, excellent jaw relaxation, and smooth recovery profile. However, its use is frequently associated with dose-dependent hypotension, bradycardia, transient apnoea, and pain on injection, which may limit its use in patients with reduced cardiovascular reserve.[7,8]Sevoflurane has emerged as an effective inhalational alternative owing to its low blood–gas partition coefficient, rapid induction and recovery, pleasant odour, minimal airway irritation, and better preservation of spontaneous ventilation and haemodynamic stability. Using high inspired concentrations, satisfactory LMA insertion can often be achieved without additional intravenous induction agents, making it an attractive option in selected patients.[9,10]Several studies have compared propofol and sevoflurane for LMA insertion. Although propofol consistently provides superior jaw relaxation and suppression of airway reflexes, sevoflurane offers comparable insertion success with improved haemodynamic stability in selected populations. However, conflicting results regarding induction time, insertion conditions, airway complications, and haemodynamic responses have been reported because of differences in study populations and anaesthetic techniques.[11,12]In tertiary care centres, where LMAs are routinely used for elective surgery, identifying the induction agent that provides optimal insertion conditions with minimal adverse effects remains clinically important. Therefore, the present study was undertaken to compare intravenous propofol and inhalational sevoflurane for LMA insertion in adults undergoing elective surgery.

Materials and Methods

This prospective, comparative, observational clinical study was conducted in the Department of Anaesthesiology .The study included 50 adult patients, who were allocated into two equal groups of 25 patients each based on the induction agent used for laryngeal mask airway (LMA) insertion. A total sample size of 50 patients was included in the study. Twenty-five patients received intravenous propofol for induction (Group P), while twenty-five patients underwent inhalational induction with sevoflurane (Group S).

Study Population

Inclusion Criteria: Patients fulfilling the following criteria were included:

- Age between 18 and 50 years.
- American Society of Anesthesiologists (ASA) physical status I or II.
- Scheduled for elective minor surgical procedures under general anaesthesia requiring LMA insertion.
- Willingness to participate in the study and provision of written informed consent.

Exclusion Criteria: Patients were excluded if they had:

- Morbid obesity.
- Limited mouth opening (<2 finger breadths).
- Anticipated difficult airway.
- History of cardiovascular disease, hypertension, renal disease, gastroesophageal reflux disease (GERD), or hiatus hernia.
- Pregnancy beyond 14 weeks or lactation.
- Known hypersensitivity to propofol or sevoflurane.
- Requirement for major surgical procedures necessitating neuromuscular blockade or endotracheal intubation.

Preoperative Assessment: All patients underwent a detailed pre-anaesthetic evaluation on the day preceding surgery.

A comprehensive medical history was obtained, followed by general physical examination, systemic examination, and airway assessment. Appropriate laboratory investigations were reviewed, and fitness for anaesthesia was confirmed. Written informed consent was obtained from all participants. Patients were maintained on standard preoperative fasting according to institutional protocol.

Anaesthetic Technique: Upon arrival in the operating room, an intravenous cannula was secured and standard monitoring, including electrocardiography (ECG), non-invasive blood pressure (NIBP), and pulse oximetry (SpO_2), was established. Baseline haemodynamic parameters were recorded. All patients received intravenous ondansetron 4 mg and midazolam 1 mg as premedication. Intravenous fentanyl (1.5–2 µg/kg) was administered before induction.

Patients were preoxygenated with 100% oxygen at a fresh gas flow of 8 L/min for 3 minutes.

Group P (Propofol Group): Patients in Group P received intravenous propofol (2–2.5 mg/kg)

administered at a rate of approximately 40 mg every 10 seconds until adequate induction of anaesthesia was achieved.

Group S (Sevoflurane Group): Patients in Group S underwent inhalational induction with 8% sevoflurane delivered in 100% oxygen at a fresh gas flow of 8 L/min. Patients were instructed to take a vital capacity breath and hold it for as long as possible to facilitate rapid induction.

Laryngeal Mask Airway Insertion: The onset of induction was considered from the administration of propofol in Group P or commencement of 8% sevoflurane inhalation in Group S. Loss of verbal contact was assessed by calling the patient's name. The time to loss of eyelash reflex was subsequently recorded. Jaw relaxation was assessed every 15 seconds after abolition of the eyelash reflex until adequate relaxation was achieved. Once satisfactory jaw relaxation was obtained, an appropriately sized laryngeal mask airway was inserted using the standard Brain's technique by an experienced anaesthesiologist. The number of insertion attempts was documented. Following successful LMA placement, anaesthesia was maintained with a mixture of 66% nitrous oxide, 33% oxygen, and 2% sevoflurane.

Outcome Measures

Primary Outcome

- Time from initiation of induction to successful LMA insertion.

Secondary Outcomes

- Time from induction to loss of verbal contact.
- Time to loss of eyelash reflex.
- Time to adequate jaw relaxation.
- Number of attempts required for successful LMA insertion.
- Overall conditions for LMA insertion.

Assessment of LMA Insertion Conditions: The conditions for LMA insertion were assessed by an independent observer using a standardized six-component scoring system. Each component was graded on a three-point scale. The individual scores were summed to obtain a total score, with a maximum possible score of 18. Based on the cumulative score, the overall insertion conditions were classified as:

- Excellent
- Good
- Poor

Statistical Analysis: Data were entered into Microsoft Excel 2018 and analysed using SPSS .26statistical software. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. Comparisons of continuous variables between the two groups were performed using the Student's unpaired t-test, whereas categorical variables were analysed using the Chi-square test. A p-value ≤0.05 was considered statistically significant.

Results

A total of 50 patients were included in the study, with 25 patients each in the Propofol (Group P) and Sevoflurane (Group S) groups. The baseline demographic and clinical characteristics were comparable between the two groups. There were no statistically significant differences in age, gender distribution, body weight, body mass index (BMI), or ASA physical status (all $p > 0.05$), indicating that the study groups were well matched at baseline (Table 1).The induction characteristics differed significantly between the two groups. Patients in the propofol group achieved loss of verbal contact, loss of eyelash reflex, adequate jaw relaxation, and successful LMA insertion significantly faster than those in the sevoflurane group (all $p < 0.001$). The mean time to successful LMA insertion was 78.5 ± 10.8 seconds in Group P compared with 108.7 ± 13.2 seconds in Group S (Table 2, Figure 1).Successful LMA insertion on the first attempt was achieved in 96.0% of patients in the propofol group compared with 84.0% in the sevoflurane group. Although first-attempt success was numerically higher with propofol, the difference between groups did not reach statistical significance ($p = 0.157$) (Table 3).Assessment of overall LMA insertion conditions demonstrated superior insertion conditions in the propofol group. Excellent insertion conditions were observed in 84.0% of patients receiving propofol compared with 60.0% of those receiving sevoflurane, whereas poor insertion conditions were observed only in the sevoflurane group. This difference was statistically significant ($p = 0.048$) (Table 4, Figure 2).Evaluation of individual LMA insertion scores showed significantly better jaw relaxation, ease of insertion, reduced coughing, reduced gagging, and less patient movement in the propofol group compared with the sevoflurane group ($p < 0.05$ for all). The laryngospasm score was comparable between the groups ($p = 0.149$). The overall LMA insertion score was significantly higher with propofol (17.64 ± 0.81) than with sevoflurane (15.84 ± 1.52, $p < 0.001$), indicating superior insertion conditions with propofol (Table 5, Figure 3). The incidence of peri-induction adverse events was generally low in both groups. Although apnoea occurred more frequently in the propofol group (20.0% vs. 4.0%) and coughing and gagging were more common in the sevoflurane group, these differences were not statistically significant. However, patient movement during LMA insertion was significantly more frequent in the sevoflurane group (24.0%) than in the propofol group (4.0%) (p

= 0.041). The incidence of laryngospasm and oxygen desaturation was low and comparable between groups (Table 6).

Table 1: Baseline Demographic and Clinical Characteristics

Variable	Group P (Propofol) (n=25)	Group S (Sevoflurane) (n=25)	p-value
Age (years), Mean ± SD	33.8 ± 8.1	34.6 ± 7.5	0.721
Male/Female, n	14/11	15/10	0.774
Weight (kg), Mean ± SD	64.8 ± 8.2	66.1 ± 7.9	0.562
BMI (kg/m²), Mean ± SD	24.3 ± 2.7	24.7 ± 2.9	0.618
ASA I, n (%)	15 (60.0)	14 (56.0)	0.772
ASA II, n (%)	10 (40.0)	11 (44.0)	

Table 2: Comparison of Induction Characteristics

Variable	Group P (n=25)	Group S (n=25)	p-value
Time to loss of verbal contact (seconds), Mean ± SD	36.8 ± 6.4	52.9 ± 8.3	<0.001*
Time to loss of eyelash reflex (seconds), Mean ± SD	48.6 ± 7.2	67.8 ± 9.4	<0.001*
Time to jaw relaxation (seconds), Mean ± SD	63.4 ± 8.9	88.2 ± 10.7	<0.001*
Time to successful LMA insertion (seconds), Mean ± SD	78.5 ± 10.8	108.7 ± 13.2	<0.001*

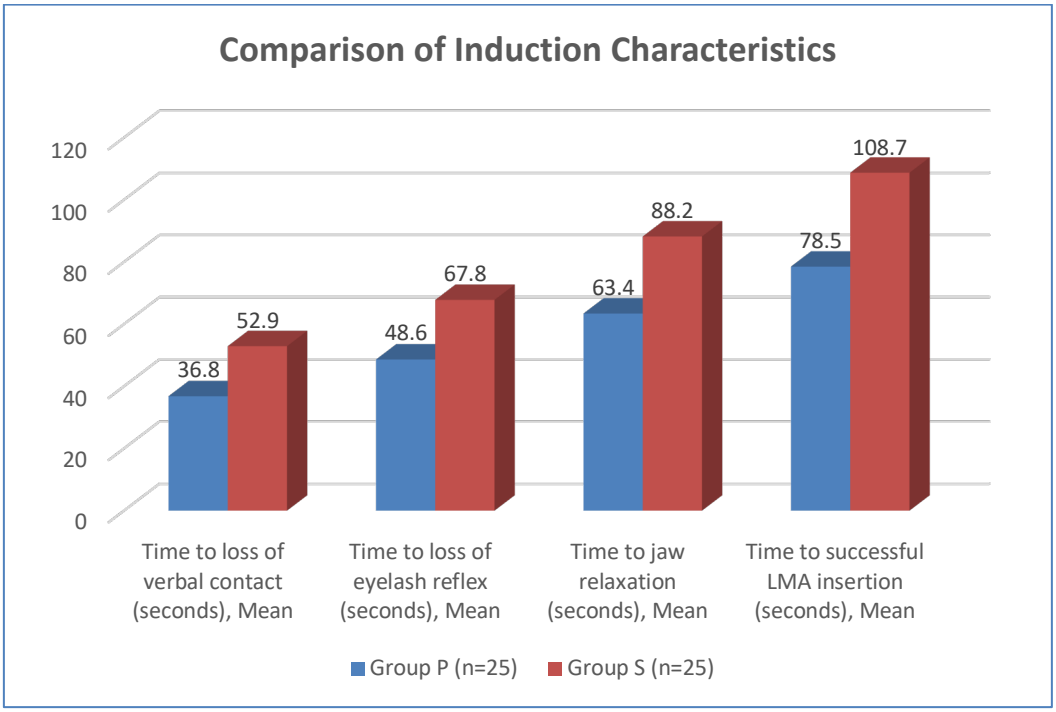

Figure 1: Comparison of Induction Characteristics

Table 3: Number of Attempts Required for LMA Insertion

Attempts	Group P (n=25)	Group S (n=25)	p-value
First attempt	24 (96.0)	21 (84.0)	0.157
Second attempt	1 (4.0)	4 (16.0)	
Third attempt	0 (0.0)	0 (0.0)	

Table 4: Overall LMA Insertion Conditions

Grade	Group P (n=25)	Group S (n=25)	p-value
Excellent	21 (84.0)	15 (60.0)	0.048*
Good	4 (16.0)	8 (32.0)	
Poor	0 (0.0)	2 (8.0)	

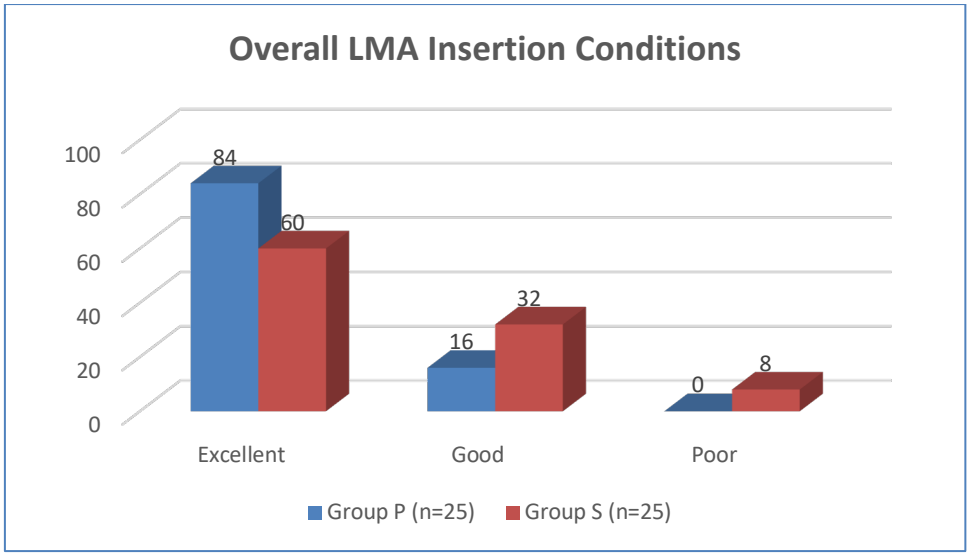

Figure 2: Overall LMA Insertion Conditions

Table 5: LMA Insertion Scores

Parameter (Maximum Score = 3)	Group P (Mean ± SD)	Group S (Mean ± SD)	p-value
Jaw relaxation	2.88 ± 0.33	2.44 ± 0.65	0.006*
Ease of insertion	2.92 ± 0.28	2.60 ± 0.58	0.011*
Coughing	2.96 ± 0.20	2.68 ± 0.56	0.019*
Gagging	2.92 ± 0.28	2.64 ± 0.57	0.022*
Laryngospasm	3.00 ± 0.00	2.88 ± 0.33	0.149
Patient movement	2.96 ± 0.20	2.60 ± 0.58	0.008*
Total Score (/18)	**17.64 ± 0.81**	**15.84 ± 1.52**	**<0.001***

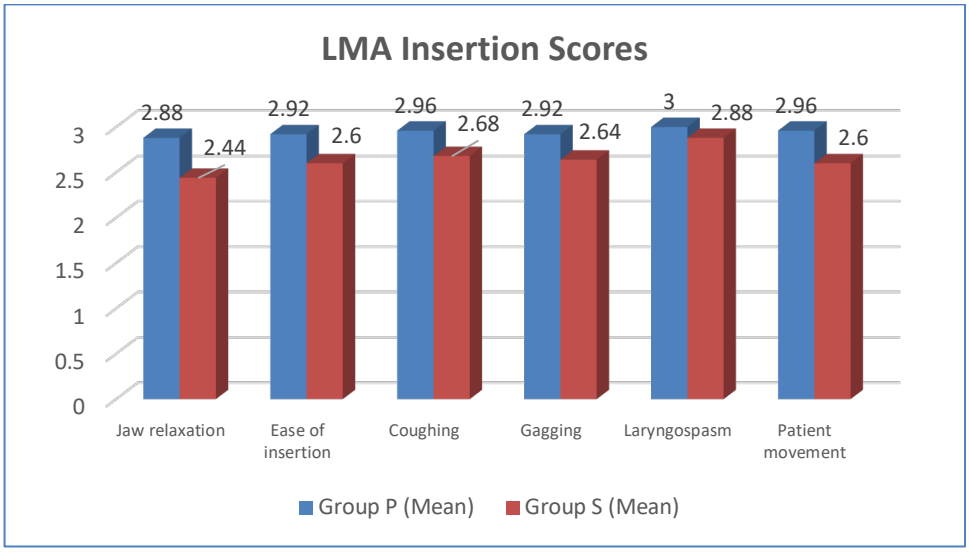

Figure 3: LMA Insertion Scores

Table 6: Peri-induction Adverse Events

Adverse Event	Group P (n=25)	Group S (n=25)	p-value
Apnoea	5 (20.0)	1 (4.0)	0.080
Desaturation (SpO_2 <95%)	1 (4.0)	2 (8.0)	0.551
Coughing	1 (4.0)	4 (16.0)	0.157
Gagging	1 (4.0)	5 (20.0)	0.080
Patient movement	1 (4.0)	6 (24.0)	0.041*
Laryngospasm	0 (0.0)	1 (4.0)	0.312

***Statistically significant (p < 0.05).**

Discussion

The present prospective comparative study evaluated the effectiveness of intravenous propofol and inhalational sevoflurane for laryngeal mask airway (LMA) insertion in adults undergoing elective surgery. The study demonstrated that propofol provided significantly faster induction, earlier jaw relaxation, quicker LMA insertion, and superior overall insertion conditions compared with sevoflurane, while both agents achieved high first-attempt insertion success with a low incidence of complications.

Baseline demographic and clinical characteristics were comparable between the two groups, indicating successful group matching. The mean age, gender distribution, body weight, BMI, and ASA physical status showed no statistically significant differences, suggesting that the observed outcomes were attributable to the induction agents rather than patient-related factors. Similar baseline comparability has been reported by Kumar et al.[13]Propofol produced significantly faster induction than sevoflurane.

The times to loss of verbal contact, loss of eyelash reflex, jaw relaxation, and successful LMA insertion were all significantly shorter in the propofol group ($p < 0.001$). These findings are consistent with those of Biswal et al.[14], who also reported significantly shorter jaw relaxation and LMA insertion times with propofol. Comparable observations were reported by Paneerselvam and Nandakumar,[15] and by the randomized study published in the Journal of Anaesthesiology, Clinical Pharmacology, both of which concluded that sevoflurane requires a longer induction period before optimal LMA insertion. The first-attempt success rate for LMA insertion was high in both groups (96.0% with propofol vs. 84.0% with sevoflurane), although the difference was not statistically significant. Similar findings were reported by Biswal et al.,[14] who observed comparable insertion success between the two techniques.

However, Mathew et al.[16] demonstrated a greater need for repeated insertion attempts with sevoflurane, suggesting that operator experience and induction technique may influence insertion success. Assessment of insertion conditions clearly favoured propofol. Excellent insertion conditions were achieved in 84.0% of patients receiving propofol compared with 60.0% receiving sevoflurane, and the overall insertion score was significantly higher with propofol. Individual parameters including jaw relaxation, ease of insertion, coughing, gagging, and patient movement also showed significantly better scores with propofol. These findings are consistent with the classic randomized trial by Ti et al.,[12] who concluded that although sevoflurane is a useful alternative, delayed jaw relaxation reduces the quality of LMA insertion. The superior performance of propofol is likely related to its rapid onset of hypnosis and more effective suppression of pharyngeal and laryngeal reflexes, producing excellent jaw relaxation and optimal insertion conditions. In contrast, sevoflurane generally requires a longer period to achieve an adequate depth of anaesthesia, resulting in delayed jaw relaxation and prolonged insertion time despite maintaining acceptable insertion conditions. [12,15]

Regarding peri-induction complications, transient apnoea occurred more frequently with propofol, whereas coughing, gagging, and patient movement were more common with sevoflurane. Among these, only patient movement reached statistical significance. Laryngospasm and oxygen desaturation were infrequent in both groups. Similar observations have been reported previously, demonstrating that propofol is associated with a higher incidence of transient apnoea, whereas sevoflurane better preserves spontaneous ventilation but may permit greater patient movement during LMA insertion.[16]

Conclusion

The present study demonstrated that intravenous propofol provided significantly faster induction, earlier jaw relaxation, and quicker LMA insertion than inhalational sevoflurane in adults undergoing elective surgery. Propofol also produced superior LMA insertion conditions, higher insertion scores, and less patient movement during insertion. Although transient apnoea was more frequent with propofol, the overall incidence of adverse events was low and comparable between the two groups.

Therefore, propofol remains the preferred induction agent for facilitating smooth and successful LMA insertion, while sevoflurane serves as an effective alternative when inhalational induction is clinically indicated.

Limitations

This study was conducted at a single tertiary care center with a relatively small sample size, which may limit the generalizability of the findings. Only ASA I and II adults undergoing elective minor surgical procedures were included; therefore, the results may not be applicable to high-risk patients, pediatric or geriatric populations, or those with anticipated difficult airways. Additionally, postoperative recovery characteristics and long-term airway-related outcomes were not evaluated.

References

1. Hagberg CA, Artime CA. Airway management in the adult. In: Miller RD, editor. Miller's

Anesthesia. 8th ed. Philadelphia: Elsevier Churchill Livingstone; 2015. p. 1647-1683.
2. Krohner RG, Ramanathan S. Anatomy of the airway. In: Benumof JL, Hagberg CA, editors. Benumof's Airway Management. 2nd ed. Philadelphia: Mosby Elsevier; 2007. p. 1-19.
3. Brain AIJ. The laryngeal mask—a new concept in airway management. Br J Anaesth. 1983;55(8):801-805.
4. Obsa MS, Sholla AL, Baraki BG, Welde GD, Gelgelu TB, Kuruche MM, et al. Effect of laryngeal mask airway insertion versus endotracheal intubation on hemodynamic responses in pediatric patients undergoing ophthalmic surgery. Anesthesiol Res Pract. 2020;2020:7021641.
5. Smith G, D'Cruz JR, Rondeau B, Goldman J. General anesthesia for surgeons. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025.
6. Ruszkai Z, Szabó Z. Maintaining spontaneous ventilation during surgery—a review article. J Emerg Crit Care Med. 2020;4:5.
7. Folino TB, Muco E, Safadi AO, Parks LJ. Propofol. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025.
8. Trapani G, Altomare C, Sanna E, Biggio G, Liso G. Propofol in anesthesia: mechanism of action, structure-activity relationships, and drug delivery. Curr Med Chem. 2000;7(2):249-271.
9. Miller AL, Theodore D, Widrich J. Inhalational anesthetics. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025.
10. Jabaudon M, Zhai R, Blondonnet R, Bonda WLM. Inhaled sedation in the intensive care unit. Anaesth Crit Care Pain Med. 2022;41(5):101133.
11. 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(1):36-40.
12. Ti LK, Chow MYH, Lee TL. Comparison of sevoflurane with propofol for laryngeal mask airway insertion in adults. Anaesth Intensive Care. 1999;27(4):380-382.
13. Kumar V, Setlur R, Ghodke S, Jahan N, Hiremath RN. Laryngeal mask airway insertion: Comparison of sevoflurane with propofol in adults. Asian J Pharm Clin Res. 2022;15(8):61-65.
14. Biswal D, Dalai H. A comparative study of sevoflurane and propofol for laryngeal mask airway insertion in adults. Journal of Cardiovascular Disease Research. 2023;14(11):1382–1387.
15. Paneerselvam S, Nandakumar MN. A randomized controlled trial on comparison of sevoflurane induction to propofol induction for insertion of laryngeal mask airway in adults. Indian J Clin Anaesth. 2016;3(4):616-620.
16. Mathew S, Peter V, Thomas MK. Hemodynamic responses and intubating conditions in laryngeal mask airway insertion: A comparative study of propofol versus sevoflurane. Int J Med Res Rev. 2017; 5(3):250-257.