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Original Research Article

Comparative Evaluation of Propofol and Etomidate for LMA Insertion Ease and Hemodynamic Stability: A Randomised Controlled Trail

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Abstract:

Background: Supraglottic airway devices, like the laryngeal mask airway (LMA), have become integral in airway management. While propofol is commonly used for LMA insertion, its dosage can lead to hemodynamic instability. This study investigates the effectiveness of propofol versus etomidate, each in combination with fentanyl and midazolam, aiming to optimize LMA insertion while preserving cardiovascular stability.

Methods: In a randomized trial, 60 ASA I & II patients were allocated to Propofol (P) or Etomidate (E) groups. Both received standardized premedication, and induction involved intravenous Propofol or Etomidate. Key parameters, including jaw opening, LMA insertion ease, adverse effects, and hemodynamics, were assessed. Rigorous randomization and blinding protocols were implemented for unbiased evaluation.

Results: Propofol exhibited superior jaw opening (83.3% vs. 43.3%) and ease of LMA insertion (96.66% vs. 70%) compared to etomidate. Adverse effects like myoclonus were significantly higher with etomidate. Both groups showed a decrease in blood pressure, but significant differences emerged after induction and LMA insertion. Propofol maintained hemodynamic stability, emphasizing its superiority in achieving optimal LMA insertion conditions.

Conclusion: While fentanyl and midazolam with etomidate maintained hemodynamic stability, they did not enhance LMA insertion success. Propofol demonstrated better jaw opening, ease of insertion, and cardiovascular stability. The study underscores the challenge of balancing optimal LMA conditions and hemodynamic stability. Further research is needed to identify co-induction agents that enhance success without compromising cardiovascular parameters.

Keywords: Laryngeal mask airway, Propofol, Etomidate, Fentanyl, Midazolam, Hemodynamic stability, Anesthesia induction.

Introduction

Supraglottic airway devices have become a typical component of airway management because they fill the gap between the tracheal tube and facemask in terms of both anatomical location and degree of invasiveness. These devices give a hands-free way to create a gas-tight airway by carefully situating them in the hypopharynx. The insertion of the laryngeal mask airway (LMA) requires enough anesthetic depth to suppress airway reflexes, but it does not meet the standards for tracheal intubation. [1-4] Unlike tracheal intubation, neither a laryngoscopy nor a neuromuscular blocking drug is necessary. The accompanying hemodynamic changes are less severe and endure shorter periods than tracheal intubation.

Various induction agents, in combination with co-induction agents, have been experimented with for LMA insertion. Propofol has emerged as the preferred choice due to its ability to suppress upper airway reflexes. Fentanyl and midazolam are also recognized for their airway reflex suppression when used as co-induction agents. The standard practice involves utilizing propofol alongside fentanyl and midazolam for LMA insertion. Although this combination effectively suppresses airway reflexes, it comes with the drawback of causing hemodynamic instability. [5-7] Etomidate, known for its hemodynamic stability, is another induction agent to consider. However, it does not possess the capability to suppress airway reflexes. This led us to investigate whether a combination of etomidate with fentanyl and midazolam could enhance LMA insertion compared to the propofol-based regimen while maintaining hemodynamic stability.

In this randomized, prospective, double-blind study, our objective is to compare the efficacy of propofol and etomidate, each in combination with

fentanyl and midazolam, with a dual focus on the ease of Laryngeal Mask Airway (LMA) insertion and the maintenance of hemodynamic stability during the induction of anesthesia. Through a comprehensive assessment of these key parameters, we aim to provide valuable insights into the relative performance of these anesthetic combinations, contributing to the understanding of their clinical applicability and impact on airway management and hemodynamic responses during the anesthesia induction process. [8-10] The double-blind design ensures a rigorous and unbiased evaluation, enhancing the reliability of the study outcomes.

Propofol is the recommended induction agent for laryngeal mask airway (LMA) installation operations because of its propensity to obstruct cough and oropharyngeal reflexes. [11] Enough jaw relaxation is required for LMA installation to be done correctly. But giving propofol at the dosages (often >2.5 mg/kg) needed to provide sufficient anesthesia depth for LMA placement and sufficient jaw relaxation could cause upper airway collapse, apnea, and arterial hypotension. [12–15] As an induction agent, sevoflurane is a nonpungent inhalation anaesthetic medication. It is appropriate for LMA insertion and inhalation anesthesia induction while maintaining spontaneous breathing due to its non-pungent odour and low respiratory irritating qualities. [16] Better hemodynamic stability and a more seamless transition to the maintenance phase without an apnea episode are two benefits of sevoflurane over propofol. Conversely, sevoflurane is linked to a longer period for the insertion of the LMA and delayed jaw relaxation. [17]

Materials and Methods

This prospective, randomized study involved 60 participants categorized as ASA I & II, scheduled for elective surgery with planned general anesthesia utilizing a laryngeal mask airway (LMA). The subjects were randomly assigned to two groups: P (Propofol induction) and E (Etomidate induction), each comprising 30 patients. In both groups, standardized pre-induction medications were administered, including intravenous Glycopyrrolate (4 µg/kg), intravenous Fentanyl (2 µg/kg), and intravenous Midazolam (0.03 mg/kg). Group P received intravenous propofol at a dose of 2.5 mg/kg, while Group E received intravenous Etomidate at 0.3 mg/kg. The double-blind design ensured that both participants and researchers remained unaware of the assigned induction agent, minimizing biases during data collection and analysis.

Study Design- This study implemented a robust study design to compare the effects of Propofol and Etomidate induction in ASA I & II patients undergoing elective surgery with an LMA. The randomized allocation of patients into two groups and the inclusion of a control group (Group P) aimed to reduce selection bias and allow for a more rigorous comparison. The double-blind nature of the study added an extra layer of methodological strength, preventing both participants and researchers from being influenced by the knowledge of the assigned treatment. The study design laid a foundation for assessing the efficacy and safety of the two induction agents, providing valuable insights for anesthesia protocols in elective surgeries with laryngeal mask airway utilization.

Randomization: Participants in this study were randomized using sequentially numbered sealed envelopes, a method designed to ensure a transparent and unbiased allocation process. The use of sealed envelopes enhances the integrity of the randomization, with participant assignments remaining concealed until the moment of unveiling. This approach contributes to the study's reliability by minimizing the potential for selection bias and maintaining a level of unpredictability in group assignments.

Study Protocol: Following baseline readings recorded from various monitors, including electrocardiogram and blood pressure, intravenous access was established, and Ringer's lactate infusion was initiated. Preoxygenation with 100% oxygen occurred before induction, and standardized premedication, including Glycopyrrolate, Fentanyl, and Midazolam, was administered. Induction agents, either Propofol or Etomidate, were injected over 10 seconds, followed by attempts at laryngeal mask airway (LMA) insertion. Maintenance of anesthesia was tailored to the procedure's needs. Various parameters, such as jaw opening, number of insertion attempts, and haemodynamic measures, were recorded, offering a comprehensive evaluation of the induction and maintenance phases. The detailed methodology ensures a systematic and thorough investigation into the effects of the induction agents during elective surgery with LMA.

Inclusion Criteria

- ASA physical status I & II
- Age 18 to 65 years
- BMI ≤ 30
- Elective surgery
- Patient willing to give written informed consent

Exclusion Criteria

- ASA physical status III & IV
- Pregnant and lactating women
- Cardiovascular, respiratory, metabolic, endocrine disease

- Moderate to severe renal or hepatic impairment
- Allergy to any of the study drugs
- Restricted mouth opening
- BMI >30
- Reactive airway disease

Statistical Analysis: The study employed a combination of statistical tests, including Chi-square, student's t-test, and independent samples test, to analyze categorical and continuous variables between Propofol and Etomidate groups. Significance was set at $p < 0.05$, enhancing the reliability of findings and contributing to the study's validity through systematic and robust comparisons.

Ethical Approval: The study received ethical approval from the hospital's ethical committee, and informed consent was obtained from all participating patients.

Results

The demographic data of the sample studied revealed comparable age distributions between the P and E groups. The mean age in the P group was 41.37±10.29 years, while the mean age in the E group was 39.73±15.47 years ($p > 0.05$), indicating no statistically significant difference.

This suggests that, at a significance level of 0.05, any observed variation in mean age between the groups is likely due to random chance, affirming the similarity in the age profiles of the two study groups. No statistical difference was observed between the two groups with respect to sex distribution ($p = 1.000$).

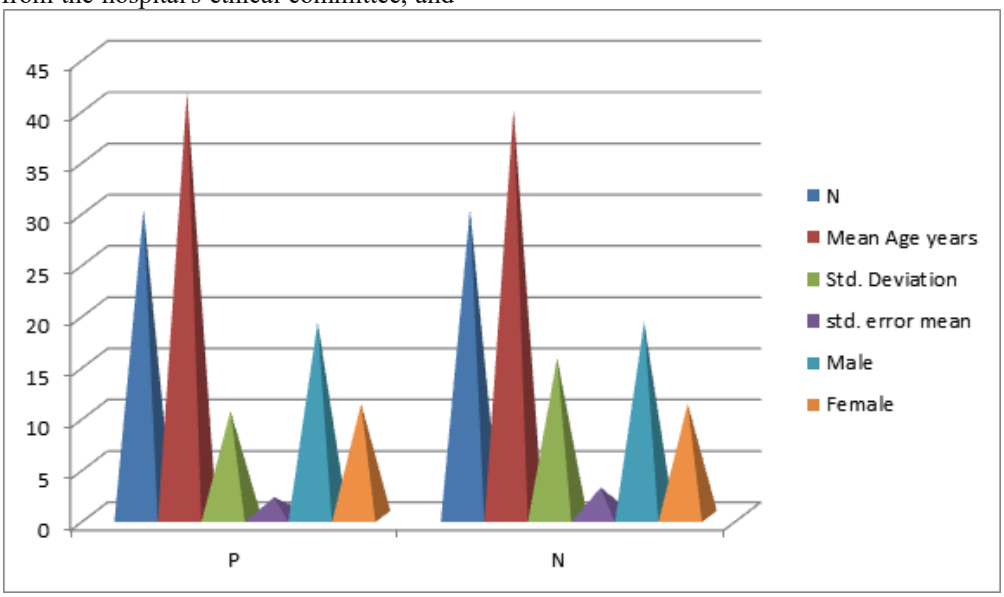

Figure 1: Age distribution

In analyzing the mean Body Mass Index (BMI) between the two groups, the study found no statistically significant difference ($p > 0.05$). This implies that, at a significance level of 0.05, there is no strong evidence to suggest a meaningful contrast in BMI between the two groups. The results suggest that the BMI values observed in both groups are likely to occur by chance, emphasizing the absence of a statistically significant distinction in BMI levels between the compared groups.

Table 1: Body mass index (BMI)

Group	N	Mean BMI	Std. Deviation	Std. Error Mean
P	30	24.85	3.563	0.650
E	30	23.05	3.513	0.641

Table 2: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
BMI	equal variances assumed.	T	df	P-value	Mean Difference
		1.972	58	0.053	1.801

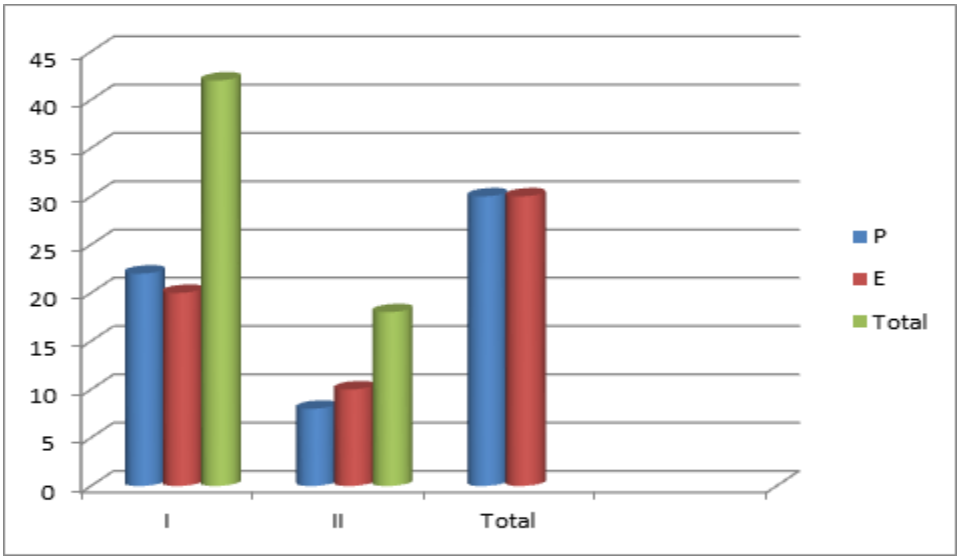

Figure 2: ASA physical status

The ASA physical status between the two groups was found to be statistically similar, with no significant difference ($p > 0.05$). This suggests that, based on the available data, there is not enough evidence to reject the null hypothesis, indicating comparable ASA physical status between the two groups. Researchers commonly use a significance level of 0.05 to determine statistical significance, and in this case, the results do not reach that threshold.

Table 3: Type of surgery

Surgery	**p**	**E**	**%**	**Chi-Square Test**		
General	**8**	**9**	**28.3**	**Value**	**df**	**P value**
Urologic	15	18	55.0	4.109	3	0.250
Gynaecology	7	2	15.0			
Orthopaedic	0	1	1.7			

The distribution of various types of surgeries in the two groups was comparable ($p>0.05$).

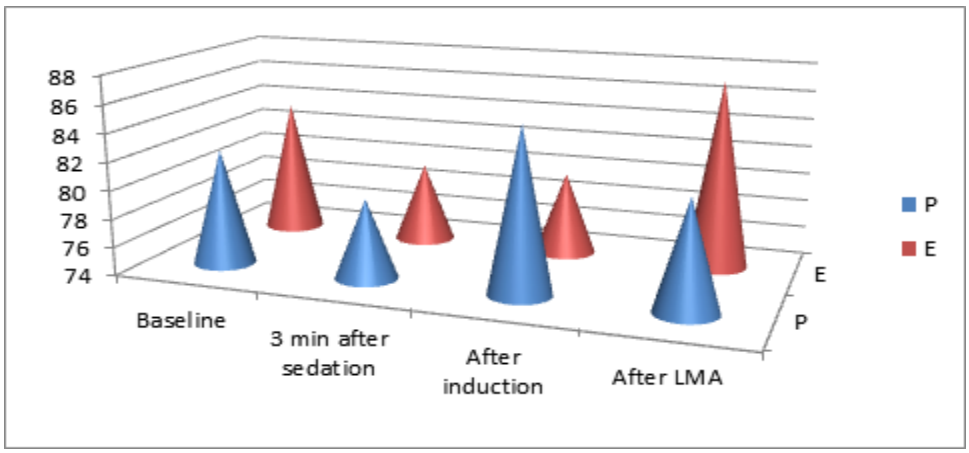

Figure 3: Mean heart rate (HR) in beats/minute (bpm) in two groups

The baseline mean heart rate (HR) was 82.20±12.62 for the P group and 83.53±15.69 for the E group. Three minutes after sedation, HR was 79.60±11.79 for the P group and 79.63±16.48 for the E group. Following induction, HR was 85.60±12.19 for the P group and 79.83±16.32 for the E group. After LMA insertion, HR was 81.70±11.38 for the P group and 87.29±15.67 for the E group.

Notably, the differences in mean heart rate between the two groups at baseline, 3 minutes after sedation, after induction, and after LMA insertion were not statistically significant ($p=0.718$, $p=0.993$, $p=0.127$, and $p=0.124$, respectively). This implies that, based on the given data, there is no strong statistical evidence to suggest a meaningful

difference in mean heart rate between the P group and E group at the specified time points.

Table 4: systolic blood pressure (SBP) (mmHg) in two groups

SBP (mmHg)	Group	n	Mean	Std. Deviation	Levene's Test for Equality of Variances		t-test for Equality of Means	
Baseline	**P**	**30**	**132.37**	**15.160**	**t**	**df**	**P value**	**Mean Difference**
	E	30	126.10	36.483	0.869	58	0.389	6.267
3 min after sedation	P	30	115.20	14.492	-0.044	58	0.965	-0.233
	E	30	115.43	25.386				
After induction	P	30	100.63	15.151	-2.130	58	0.037	-8.200
	E	30	108.83	14.660				
After LMA insertion	P	30	98.23	14.920	-2.541	56	0.014	-11.445
	E	28	109.68	19.245				

The baseline systolic blood pressure (SBP) was 132.37±15.16 for the P group and 126.10±36.48 for the E group. Three minutes after sedation, SBP was 115.20±14.49 for the P group and 115.43±25.38 for the E group. Following induction, SBP was 100.63±15.15 for the P group and 108.63±14.66 for the E group. After LMA insertion, SBP was 98.23±14.92 for the P group and 109.68±19.24 for the E group.

Importantly, the differences in mean systolic blood pressure between the two groups at baseline and 3 minutes after sedation were not statistically significant (p=0.389 and p=0.965, respectively). However, the differences after induction and after LMA insertion were found to be statistically significant (p=0.037 and p=0.014, respectively). At the same time, there were no significant differences in SBP between the groups at baseline and 3 minutes after sedation, there were notable distinctions after induction and LMA insertion.

Discussion

The investigation explores the choice of anesthesia induction agents during the insertion of a laryngeal mask airway (LMA), specifically comparing propofol and etomidate. Propofol is acknowledged for its enhanced suppression of upper airway reflexes, leading to reduced gagging, coughing, and laryngospasm during LMA insertion. Notably, prior studies have mainly focused on optimizing LMA insertion with different induction agents, with limited attention given to improving success rates during etomidate induction. [18]

In the study, the propofol group demonstrated superior jaw opening and ease of LMA insertion compared to the etomidate group. Despite the statistically and clinically insignificant mean changes in heart rate at various time points (baseline, 3 minutes after sedation, after induction, and after LMA insertion), significant alterations were observed in mean systolic blood pressure after induction and after LMA insertion (p=0.037 and p=0.014, respectively). Additionally, there were significant changes in mean diastolic blood pressure and mean blood pressure after LMA insertion (p=0.001 and p=0.001, respectively). It is crucial to note that these changes were deemed within acceptable clinical limits, requiring no additional medication. The study underscores propofol's advantages over etomidate in terms of jaw opening and ease of LMA insertion. [19] While statistically significant changes in blood pressure parameters were observed, they were considered clinically acceptable and did not necessitate further intervention.

The study results reveal significant differences in jaw opening between the propofol (P) group and the etomidate (E) group. In the P group, 83.3% (25/30) of patients achieved full jaw opening, while 16.7% (5/30) had partial jaw opening. On the other hand, in the E group, 43.3% (13/30) achieved full jaw opening, and 56.7% (17/30) had partial jaw opening. The observed difference in jaw opening between the two groups was statistically significant (p=0.001). In comparison, Suzun *et al.* investigated the addition of remifentanil to etomidate for LMA insertion. In their study, 72% (18/25) of patients in the propofol-remifentanil group had full jaw opening, while 28% (7/25) had partial jaw opening. In the etomidate-remifentanil group, 56% (14/25) had full jaw opening, and 44% (11/25) had partial jaw opening. The findings in the current study slightly differ from those of S. Suzun et al., possibly due to variations in co-induction agents.

Another relevant study by Driver *et al.* in 1996 [20] explored the effect of alfentanil and midazolam-alfentanil on LMA insertion in patients receiving propofol for induction. In their study, 70% (21/30) of patients in the propofol-only group had full mouth opening. Interestingly, the propofol-midazolam-alfentanil (PMA) group, which received a lower dose of propofol (1.25 mg/kg), achieved full mouth opening in all patients (100%). This outcome, despite the lower propofol dose, was

attributed to the use of alfentanil in their co-induction regimen. The results of the current study indicate a significant difference in jaw opening between the propofol and etomidate groups. The comparison with other studies underscores the potential impact of different co-induction agents on outcomes and suggests the need for further exploration of optimal combinations for LMA insertion.

The study reports on various investigations comparing different induction agents for laryngeal mask airway (LMA) insertion. In the propofol (P) group, 83.3% of patients had full jaw opening, while in the etomidate (E) group, only 43.3% achieved full jaw opening, with a statistically significant difference (p=0.001). Suzun et al. explored the addition of remifentanil to etomidate for LMA insertion. In the propofol-remifentanil group, 72% had full jaw opening, compared to 56% in the etomidate-remifentanil group. [21] Differences in outcomes may be attributed to variations in co-induction agents.

Driver et al. studied the effects of alfentanil and midazolam-alfentanil on LMA insertion during propofol induction. Interestingly, 100% of patients in the midazolam-alfentanil-propofol group achieved full mouth opening, suggesting the potential benefits of the combination. A year later, Driver et al. compared propofol and thiopentone for LMA insertion using midazolam and alfentanil as co-induction agents. In the propofol group, 91.42% achieved full mouth opening, possibly influenced using alfentanil. Salem investigated the use of midazolam or minidose succinylcholine as co-induction agents with propofol for LMA insertion, finding good jaw relaxation in 95% of patients in the propofol-midazolam group. Jacqueline K.L. Hui *et al.* [22] compared alfentanil and fentanyl with propofol for LMA insertion, with full mouth opening in 53.42% and 50.74% of patients, respectively. The study under discussion observed a higher rate of full jaw opening (83.3%), possibly due to the use of midazolam and a slightly higher dose of fentanyl. The ease of LMA insertion was significantly better in the propofol group (96.66% easy, 3.33% difficult) compared to the etomidate group (70% easy, 23.33% difficult, 6.66% impossible), with a p-value of 0.020.

In our study, propofol showed superiority over etomidate in terms of minimizing involuntary movements, with none observed in the propofol group compared to 10% in the etomidate group. The addition of fentanyl in the propofol group likely contributed to these outcomes. Vocalization occurred in 6.6% of etomidate patients, while none in the propofol group exhibited vocalization (p=0.150), suggesting a potentially lighter plane of anesthesia. Regarding pain on injection, 6.7% of patients in the propofol group experienced pain, and 3.3% in the etomidate group reported pain, with no significant difference. These results differ from a prior study, with Suzun et al. reporting pain in 20% of propofol (nonlipuro) remifentanil patients and 36% in etomidate (lipuro) remifentanil patients. However, the difference was not statistically significant.

The study examined hemodynamic changes in two groups at four intervals: baseline, 3 minutes after sedation, after induction, and after LMA insertion. In the Propofol (P) group, there were no significant changes in mean heart rate (HR) at any interval. In contrast, the Etomidate (E) group showed significant changes at the first two intervals. Both groups experienced significant mean decreases in systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean blood pressure (MBP), with notable differences between P and E groups after induction and LMA insertion. The study affirmed propofol's cardiodepressant effects and etomidate's hemodynamic stability. [23] Despite fentanyl and midazolam use in the etomidate group, no improvement in LMA insertion success was observed, suggesting the need for further exploration of co-induction agents.

Comparisons with other studies revealed consistent findings with a previous propofol study but discrepancies with another study, possibly attributed to variations in fentanyl usage. In conclusion, propofol exhibited cardiodepressant effects, while etomidate ensured hemodynamic stability. Further research is needed to identify co-induction agents that enhance LMA insertion success while maintaining stable hemodynamics.

Conclusion

In conclusion, this study compared the effectiveness of midazolam and fentanyl as co-induction agents with propofol and etomidate for laryngeal mask airway (LMA) insertion. Propofol demonstrated significantly better jaw opening and ease of LMA insertion compared to etomidate. Despite the combination of fentanyl and midazolam with etomidate maintaining hemodynamic stability, it did not improve the success rate of LMA insertion. The incidence of adverse effects, particularly myoclonus, was significantly higher in the etomidate group. Other parameters, including the number of attempts, additional dose requirements, and adverse effects like gagging and vocalization, were comparable between the two groups.

Overall, the findings highlight the ongoing challenge of achieving optimal conditions for LMA insertion while maintaining cardiovascular stability. Further research is warranted to explore co-induction agents that can enhance LMA insertion success without compromising hemodynamic parameters.

References

1. Jerry A, Dorsch Susan E, Dorsch. Supraglottic Airway Devices. In Understanding anesthesia equipment. Fifth edition. Philadelphia, USA. Lippincott Williams and Wilkins 2008; 461-518.
2. J. Brimacombe. The advantages of the LMA over the tracheal tube or facemask; a meta-analysis. Canadian Journal of Anesthesia 1995; 42(11): pg 1017-23.
3. 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.
4. 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.
5. Seyedhejazi M, Eydi M, Ghojazadeh M, Nejati A, Ghabili K, Golzari SE. et al. Propofol for laryngeal mask airway insertion in children: Effect of two different doses. Saudi J Anaesth. 2013; 7:266–9.
6. Hosseinzadeh H, Eidi M, Ghaffarlou M, Torabi E, Ghabili K, Golzari SE. Comparison of remifentanil with esmolol to blunt the cardiovascular response to tracheal extubation in patients undergoing neurosurgical procedures for intracranial masses. J Pak Med Assoc. 2013; 63(8):950–4.
7. Yoshitaka Fujii, Hiroyoshi Tanaka, Hidenori Toyooka. Circulatory responses to laryngeal mask airway insertion or tracheal intubation in normotensive and hypertensive patients. Canadian Journal of Anesthesia 1995; 42 (1): 32-6.
8. Patrick Scanlon, Michael Carey, Michael Power. Patient response to laryngeal mask insertion after induction of anaesthesia with propofol or thiopentone. Canadian Journal of Anesthesia 1993; 40(9): 816-8.
9. Morgan M, Lumley J, Whitwam JG. Respiratory effects of etomidate. Br J Anaesth. 1977; 49:233–6.
10. Uzun S, Gozacan A, Canbay O, Ozgen S. Remifentanil and etomidate for laryngeal mask airway insertion. J Int Med Res. 2007; 35:878–85.
11. 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.
12. 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.
13. 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.
14. Saricaoglu F, Uzun S, Arun O, Arun F, Aypar U. A clinical comparison of etomidate-lipuro, propofol and admixture at induction. Saudi J Anaesth. 2011; 5:62–6.
15. 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.
16. Shao G, Zhang G. Comparison of propofol and sevoflurane for laryngeal mask airway insertion in elderly patients. South Med J. 2007; 10 0:360–5.
17. Siddik-Sayyid SM, Aouad MT, Taha SK, Daaboul DG, Deeb PG, Massouh FM, 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. Monica P.L. Lee, Jeffrey S.W.Kua, Wallace K.Y.Chiu. The Use of Remifentanil to Facilitate the Insertion of the Laryngeal Mask Airway. Anesthesia & Analgesia 2001; 93:pg 359-362.
19. 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.
20. Driver S, Howard-Griffin. Midazolam coinduction and laryngeal mask insertion. Anaesthesia 1996 Aug; 51(8): pg 782-784.
21. Pramod Bapat, Ravindra N. Joshi, Edward Young, Roger H.Jago. Comparison of propofol versus thiopentone with midazolam or lignocaine to facilitate laryngeal mask insertion. Canadian Journal of Anesthesia 1996; 43(6): pg 564-8.
22. Jacqueline K L, Hui Lester A, H, Critchley, Manoj K.Karmakar, Patrick K.K.Lam. Co-administation of alfenatanil-propofol improves laryngeal mask airway insertion compared to fentanyl-propofol. Canadian Journal of Anesthesia 2002; 49(5): 508-512.
23. Uzun, A Gozacan, O Canbay, S Ozgen. Remifentanil and Etomidate for Laryngeal Mask Airway Insertion. The Journal of International Medical Research. 2007; 35: pg 878-885.