Original Article

A Comparison of Propofol and Sevoflurane for Smooth Laryngeal Mask Airway Insertion

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Objective: To compare the study the easiness of LMA insertion and its associated complications with sevoflurane and propofol.

Methods: 200 patients, aged 12-50 years, having ASA physical status I and II, undergoing elective surgical procedures in general anesthesia were allocated randomly in two equal groups. Group A received Propofol 2.5 mg/kg intravenously along with 100% oxygen through face mask while patients in Group B received 8% Sevoflurane in 50% N2O and O2 at flow rate of 8 litres/minute for 30 seconds. Losing eyelash reflex was taken as an end point of induction in two groups under study. Insertion of Laryngeal Mask Airway was attempted by an experienced anaesthesiologist who was blinded to technique of induction. Full mouth opening, LMA insertion at first attempt and complications including coughing, gagging, patient movements and laryngospasm, were recorded. Smooth LMA insertion was labeled if criteria fulfilled.

Results: Smooth LMA insertion was observed in 89 patients in Group A and in 83 patients of Group B. It appears that greater number of patients had smooth LMA insertion in Group A . There was no statistically significant difference between to groups (p-value=0.221). Complications associated with laryngeal mask insertion in both groups were not statistically significant as well.

Conclusions: Sevoflurane and propofol are equally good and safe for successful insertion of LMA and there is no significant difference in case of insertion and associated effects between the two study groups.

Keywords: laryngeal mask airway insertion, propofol, sevoflurane.

Introduction

The Laryngeal Mask Airway (LMA) has been used quite frequently above alternative to endotracheal tube. It is a supraglottic airway device which is made for provision of seal around the inlet of larynx for spontaneous ventilation and allows mechanical ventilation at modest level of positive pressure.[1,2,3,4] Coughing, gagging and laryngospasm are common undesirable responses associated with Laryngeal Mask Airway insertion.[5] An ideal induction agent is required for sufficient depth of anaesthesia, adequate relaxation of jaw and absent upper airway reflexes without compromising cardiorespiratory systems for successful insertion of Laryngeal Mask Airway.[3,4,6] Various anaesthetic agents such as thiopentone, propofol, ketamine, etomidate, lidocaine, halothane and sevoflurane (either alone or in combination with each other or with a muscle relaxant) has been used for insertion of Laryngeal Mask Airway.[4] Propofol, an intravenous induction agent is commonly used for laryngeal mask airway (LMA) insertion. It provides adequate suppression of oropharyngeal and cough reflexes.[7,8] But, certain adverse effects such as pain, hypotension, apnea, and excitatory patient movements are associated with its use.[7,9,10,11] Sevoflurane is a non-pungent inhalation agent which is not irritating for the airways and thus can be used for insertion of the LMA while preserving spontaneous ventilation.[9] It is known for lesser breath holding, cough and lower incidence of laryngospasm.[4] Sevoflurane is advantageous because of better hemodynamic stability and provides smooth transition towards the maintenance phase without an apnea phase as compared to propofol. But, sevoflurane is known for delay in relaxation of jaw and more time required to insert the LMA.[9] Many comparative studies have shown the induction of anaesthesia after inhalation of sevoflurane and intravenous propofol.[12] Previous studies have shown contradictory results on the comparison of sevoflurane and propofol for smoother insertion of Laryngeal Mask Airways. Thus the objective of this study is to compare the frequency of easier insertion of Laryngeal Mask Airway following induction of anaesthesia with intravenous propofol or sevoflurane inhalation and to observe any complications that might occur during insertion.

Methods

We conducted this randomized controlled trial in Services Hospital Lahore after approval from Institutional Ethical and Review Committee. Af written and informed consent, 200 patients having ASA physical status I and II planned for elective orthopedic, urological and general surgery were enlisted for this study. Patients were allocated randomly using random number table to one of the

two groups (A&B) comprising 100 patient each. Patients having pharyngeal diseases (e.g. abscess) or obstruction, low pulmonary compliance (restrictive airway disease), diabetes mellitus, pregnancy, hiatus hernia gastro esophageal reflux disease, allergy to any anesthetic agents and all emergency surgical procedures were excluded from this study.

After arrival in the operation theatres, non-invasive blood pressure, heart rate, electrocardiography and oxygen saturation with pulse oximetry were monitored. According to the requirements of each patient and procedure, intravenous fluids were administered. Before induction of anaesthesia, patients were pre-oxygenated in both groups. Group A received intravenous Propofol 2.5 mg/kg along with 100% oxygen through the face mask in group B. The anaesthesia circuit was primed with 8% Sevoflurane in 50 % N2O and O2 at flow rate of 8 Litres/minute for 30 seconds every patient was advised for maximum exhalation followed by connecting the primed circuit to the face mask. All patients were adviced to take vital capacity breaths. Losing the eyelash reflex was taken as end point of anesthesia induction in both groups. Insertion of Laryngeal Mask Airway was attempted by an experienced anaesthesiologist who was blinded to technique of induction. The insertion of Laryngeal Mask Airway was considered smooth if there was full Mouth Opening (inter-inciser gap >three fingers or 6 cm), placement in 1st attempt and no patient movement, coughing or gagging. Anaesthesia was maintained by using 50% nitrous oxide (N2O) , 50% oxygen (O2) and Sevoflurane (1.5 MAC) in both groups. All the data was analyzed by utilizing SPSS version 24.0. The ages of the patients were presented by calculating mean and standard deviation. Gender and presence or absence of smooth insertion of Laryngeal Mask Airway was presented by calculating frequency and percentage. Frequency of smooth Laryngeal Mask Airway insertion and complications in two groups were compared by applying chi square test. P value ≤0.05 was taken as significant.

Results

Mean age of the patients was 31.58±11.05 years in two groups. In Groups A and B, average ages of patients were 30.57±11.46 and 32.60±10.57 years respectively. **(Table-1)** Gender distribution in both groups shows that in Group A 74 were male patients and 26 were females paients. Whereas Group B, 62 patients were male and 38 patients were female. x**(Table-2)** Statistically significant difference was not seen in complications associated with laryngeal mask insertion in both the groups. Only 3 patients had coughing in group A in comparison to 5 patients of group-B. Gagging was absent in both groups. Only 1 patient of group A had laryngospasm while none of the patients had laryngospasm in group B. Patient movement was seen in 5 patients of group A in comparison to 9 in group B. **(Table-3)** Smooth LMA insertion was observed in 89 patients of group A compared to 83 in group B.

Table-1: Age in both groups.

	Group A (n=100)	Group B (n=100)	Total (n=200)
Mean±SD	30.57±11.46	32.60±10.57	31.58±11.05

Table-2: Distribution of gender.

		Group A (n=100)	Group B (n=100)	Total (n=200)
Gender	Male	74 (74%)	62 (62%)	136 (68%)
	Female	36 (26%)	38 (38%)	64 (32%)
	Total	100	100	200

Table-3: Complications observed in patients.

		Group A n (%)	Group B n (%)	Total n (%)
Coughing	Yes	3 (3%)	5 (5%)	8 (4%)
	No	97 (97%)	95 (95%)	192 (96%)
	Total	100 (100%)	100 (100%)	200 (100%)
Gagging	Yes	0 (0%)	0 (0%)	0 (0%)
	No	100 (100%)	100 (100%)	200 (100%)
	Total	100 (100%)	100 (100%)	200 (100%)
Laryngospasm	Yes	1 (1%)	0 (0%)	1 (0.5%)
	No	99 (99%)	100 (100%)	199 (99.5%)
	Total	100 (100%)	100 (100%)	200 (100%)
Patients Movement	Yes	5 (5%)	9 (9%)	14 (7%)
	No	95 (95%)	91 (91%)	186 (93%)%
	Total	100 (100%)	100 (100%)	200 (100%)

Table-4: Smooth LMA insertion.

		Group A n (%)	Group B n (%)	Total n (%)	P-Value
Smooth LMA insertion	Yes	89 (89%)	83 (83%)	172 (86%)	
	No	11 (11%)	17 (17%)	28 (14%)%	0.221
	Total	100 (100%)	100 (100%)	200 (100%)	

It appears that greater number of patients had smooth LMA insertion in group A patients in comparison to group B patients but in terms of p-value, no statistically significant association was present. (p-value =0.221) **(Table -4)**

Discussion

Laryngeal Mask Airway (LMA) provides a clear airway in majority of patients and is easier to insert than a tracheal tube.[13] Appropriate depth of anaesthesia is required for easy, successful and proper insertion of LMA.[7] Inhalation of sevoflurane and intravenous propofol are commonly used for induction and maintenance of general anaesthesia with LMA.[14] Propofol is among the most commonly used induction agents for smoother insertion of LMA. Insertion of LMAs can be done with or without using neuromuscular blocking agents. However, adequately suppressing the upper airway reflexes is necessary for avoiding adverse responses ,e.g. cough, excessive gagging and laryngospasm.[13,15] Using propofol as induction agent for insertion of LMA is advantageous with quick onset and shorter duration of action and adequately suppresses the reflexes of upper airways. Sevoflurane has also been used as an alternative to propofol in recent times, being a preferred inhalational agent due to its smoother induction and recovery profiles, with lesser excitatory properties and hemodynamically stable as compared to propofol.[15] In this study we compared propofol and sevoflurane induction on the ease of insertion of LMA and the adverse effects that occurred during insertion. Smooth LMA insertion was seen in maximum number of patients of both groups (89% in group A vs 83% in group B), with no significant difference statistically (p=o.22) although successful LMA insertion was more in propofol group. This is in comparison to a study by Rehman et al who found propofol to be more effective than sevoflurane for successful LMA insertion .[3]The results of study by Prabhudev et al were in co-relation to our results. There was smooth insertion of LMA in each of 25 patients in propofol group and 23 patients belonging to sevoflurane group.[15] Chavan et al also showed excellent score of LMA insertion with propofol (83%) when compared to sevoflurane (80%) that was consistent with the results of our study.[4] Dwivedi et al also had similar findings in this respect. The overall insertion characteristic score was excellent in 92% of patients induced with propofol and 86% of patients induced with sevoflurane; this was statistically insignificant and hence comparable in both the groups.[16] A study comparing inhalation of vital capacity breaths with intravenous propofol versus sevoflurane in helping insertion of laryngeal mask airways in adults, Sarkar M et al also showed similar results favoring successful insertion with intravenous propofol (95%) vs sevoflurane (92.5%).[17] Dharmalingam also found ease of insertion with propofol in comaparison to sevoflurane without any significant difference.[6] Bakhshi S et al evaluated induction with sevofurane vs intravenous propofol for laryngeal mask airway insertion in children and found successful insertion of LMA in 98% patients in propofol group and 96% patients in sevoflurane group which was in accordance with the findings of our study.[14]Prakash et al compared vital capacity breath induction with sevoflurane to intravenous propofol for laryngeal mask airway insertion. He found that induction with intravenous propofol and induction with inhalation of sevoflurane vital capacity breaths were almost equally effective for successful insertion of LMAs. He placed LMA successfully in 90% of sevoflurane group and in 88% patients of propofol group. This could be due to difference in methodology.[7] Our results were not significantly different among the two groups regarding complications such as gagging, cough, laryngospasm and patient movements (p>0.05) Coughing in propofol group was seen in 3% vs 5% patients of sevoflurane group. 5% patients of propofol group showed movement vs 9% in sevoflurane. Gagging was not seen in any patient in both groups. Laryngospasm occurred in 1% of patients in propofol group only. (Table-3). These results of our study are comparable with that of Prakash et al who did not find any incidence of complications among two groups when they compared induction with inhalation of vital capacity breaths of sevoflurane with intravenous propofol for insertion of laryngeal mask airway.[7] Chavan et al also failed to show any statistically significant difference in two groups regarding complications [4]. Sarkar M et al showed no significantly different complications in the study groups. Patient movement was seen in 5%, coughing in 2.5% and gagging in 5%. [17]

Balakrishnan compared Propofol and sevoflurane for insertion of Laryngeal Mask Airway in Children for various Surgeries. In contrast to our study they found more coughing (20%) and gagging when 3mg/kg of propofol given intravenously. Movement of patients was significantly higher in the propofol group (43.3% vs 16.7%) for which they had to increase the dose of

the propofol.[10] Ravi et al. compared Propofol and sevoflurane for insertion of Laryngeal Mask Airway in Children and found no incidence of cough, gagging and laryngospasm in two groups. Similar findings were observed by Bakhshi S et al when she compared the two groups in children.[13] Contrary to our study, gagging and laryngospasm was not noted by Prabudev et al. Coughing was seen in 8% of patients with sevoflurane which was not significant statistically.[15]

The limitations in our study was that the depth of anesthesia was not compared in the two induction techniques as we did not have BIS monitor. Also we did not measure the induction time. Further studies can be done to compare depth of anaesthesia and induction time.

Conclusion

We conclude that Propofol and sevoflurane are equally good for successful insertion of LMA and there in no significant difference in adverse effects during LMA insertion among the two study groups.

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