Original Article

Indian Journal of Anaesthesia and Analgesia
Volume 4 Number 2, April - June 2017 (Part–1)
DOI: http://dx.doi.org/10.21088/ijaa.2349.8471.4217.23

A Comparative Study between Propofol and Thiopentone with Topical Lignocaine for the Insertion of Laryngeal Mask Airway

Sangeetha D.*, Hareesh S.B.*

Abstract

Background: LMA is a device commonly used in the practice of anaesthesia . Insertion of LMA however needs obtundation of upper airway reflexes and relaxation. Aim: Conditions for insertion of LMA, haemodynamic stability and respiratory depression following induction with Propofol was compared with Thiopentone preceded by topical Lignocaine spray. *Methodology:* Sixty ASA I and II patients undergoing short elective surgical procedures like breast surgeries, minor plastic surgeries, short surgical procedures of upper limb and hernia repair, in patients aged between 16-60yrs, were included in the study. They were randomly allocated into two groups of thirty each. The presence of coughing, gagging, laryngospasm, head movements, limb movements and Jaw relaxation during LMA insertion were noted. Number of attempts for insertion and postoperative sore throat were also assessed. Haemodynamic parameters and respiratory depression (presence or absence of apnea) were also observed. *Results:* Adequate jaw relaxation was significantly better in Propofol group than Thiopentone with topical lignocaine group (100% versus 70%). Incidence of apnea, fall in BP and tachycardia was significantly more with Propofol than Thiopentone with topical lignocaine group ($p<0.05$). *Conclusion:* Thiopentone preceded by topical lignocaine spray could be considered for induction prior to LMA insertion, in view of significant haemodynamic fluctuations and respiratory depression caused by Propofol.

Keywords:
LMA; Propofol; Thiopentone; Induction; Topical ignocaine; Haemodynamics; Apnea.

Introduction

Laryngeal Mask Airway (LMA) is a supraglottic device, which is designed to provide and maintain a seal around laryngeal inlet for spontaneous ventilation and allow controlled ventilation at modest level of positive pressure. Maintenance of clear airway under general anaesthesia can be achieved by endotracheal intubation or by use of face mask. The use of face mask is often difficult and occupies the anaesthesiologists' hands. Good approximation may not be possible in edentulous patients. LMA not only frees the anaesthesiologist's hands, but also provides a satisfactory airway [1,2].

Endotracheal intubation is safe but has its own problems like damaging the teeth, pharyngeal and laryngeal structures. Incorrect placement can have disastrous consequences. But with LMA, there is an ease of insertion without a laryngoscope or muscle relaxant. There is hardly any risk of oesophageal or endobronchial intubation [3]. Cardiovascular response to insertion of LMA is much lower than endotracheal intubation. Incidence of postoperative sore throat is lower after LMA use, as compared to endotracheal intubation. The patient can breathe spontaneously or ventilation may be controlled with LMA. It provides an excellent airway patency; hence LMA has bridged a gap between endotracheal intubation and mask ventilation. The ease of insertion, the high quality of airway obtained, lack of serious intra operative and postoperative complications make it a useful technique to add to the anesthesiologist's armamentarium [4]. Propofol is an alkyl phenol with lipophilic properties. It is an induction agent most commonly used to facilitate

Author's Affiliation:
*Assistant Professor, Department of Anaesthesiology, Institute of Nephrourology,Victoria hospital campus,Bangalore-560002, Karnataka, India.

Corresponding Author:
Hareesh S.B., Assistant Professor, Department of Anaesthesiology, Institute of Nephrourology, Victoria Hospital Campus, Bangalore-560002, Karnataka, India.
E-mail: hareeshsb95@gmail.com

Received on 08.02.2017
Accepted on 13.02.2017

the placement of LMA. When used for brief procedures it results in a quicker recovery and early return of psychomotor functions. But it is associated with prolonged apnea (>30 sec) and prominent fall in arterial blood pressure. In view of high cost of the drug and pain on injection, it would be of value to confirm or disprove the advantage of this agent in LMA insertion [5].

Thiopentone is a short acting hypnotically active barbiturate. It is accompanied by short duration of apnea approximately 25 seconds and arterial pressure is maintained or slightly decreased. It does not suppress the laryngeal reflexes to the same extent as Propofol, resulting in gagging, coughing and laryngospasm. This study was designed to assess whether the application of Lignocaine to posterior oropharynx prior to the use of Thiopentone, would allow the insertion of LMA as easily as Propofol [6].

Methodology

60 patients undergoing short elective surgical procedures were included in the study. The elective surgical procedures were breast surgeries, minor plastic surgeries, short surgical procedures on upper limb and hernia repair.

Inclusion Criteria

1. ASA Grade I and Grade II patients.
2. Age group of 16 to 60 years.
3. Both the sexes.
4. Short elective surgical procedures such as breast surgeries, minor plastic surgeries.
5. Short surgical procedures on upper limb and hernia repair.

Exclusion Criteria

Patients with-

1. Increased risk of aspiration
2. Local laryngeal and pharyngeal pathology
3. History of adverse reaction to Propofol, Thiopentone and lignocaine
4. Emergency surgeries
5. ASA physical status III and more
6. Patients in whom LMA could not be inserted in less than two attempts were not included in the study.

Preoperative Preparation

The study protocol was approved by hospital ethics committee. All the patients underwent preanaesthetic evaluation on the day prior to surgery and informed written consents were obtained. All the patients were fasted overnight. All of them received oral Diazepam 5 mg and oral Ranitidine 150mg, one each in the night day before surgery and one on the morning of the surgery.

Basic laboratory investigations were conducted. This included Haemogram, random blood sugar, blood urea, serum creatinine and urine analysis. Chest X-ray and ECG were done when needed.

Method of Collection of Data

Sixty patients were randomly allocated into two groups (group I, n=30 and group II, n=30). All patients received inj. Glycopyrrolate, 0.2 mg i.v, and inj. Sufentanil 0.3 μ gm/kg, intravenously before induction of anaesthesia. All the patients were pre-oxygenated for three minutes before administration of induction agents. Group I received Propofol 2.5mg/kg over 30 seconds. Group II; received topical Lignocaine 40mg (four sprays of Lignocaine 10%, 10mg/spray) two sprays applied to each side of posterior pharynx and inj Thiopentone (5 mg/kg). data Statistical analysis

Results

A prospective, randomized, comparative study consisting of 60 patients allocated into two groups, with 30 patients each, was undertaken to compare the conditions for the insertion of LMA and hemodynamic pattern.

Table 1: Comparison of basic characteristics of the study groups. SD

Basic characteristics	Group I	Group II	P value
Age in years (Mean ± SD)	31.53±10.11	31.43±10.28	0.970
Weight in k(Mean ± SD)	56.47±8.90	55.17±7.92	0.554
Male: Female	15:15	15:15	0.999

In the present study, Age, weight and sex are matched between two groups (P>0.05). The above table shows that the average age was 31.53±10.11 yrs in group I and 31.43±10.28 yrs in group II. The average weight of the patients were 56.47±8.90 kgs in group I and 55.17±7.92 kgs in group II. Each group consisted of equal number of male and female patients.

Table 2: Comparison of baseline haemodynamic parameters between the two groups

Baseline values	Group I	Group II	P value
Systolic BP	118.27±9.31	119.30±7.59	0.639
Diastolic BP	73.33±5.69	72.23±5.32	0.442
Pulse rate	82.63±7.65	85.30±7.76	0.185
SPO_2	98.80±0.49	98.97±0.18	0.741

Table 3: Comparison of conditions for insertion of LMA

Parameters	Condition	Group I (n=30)	Group II (n=30)	P value
Gagging	Absent	28 (93.3%)	22 (73.3%)	0.094+
	Mild	2 (6.7%)	6(20.0%)	
	Moderate	-	2(6.7%)	
	Severe	-	-	
Coughing	Absent	30 (100.0%)	30 (100.0%)	1.000
	Present	-	-	
Laryngospasm	Absent	30 (100.0%)	30 (100.0%)	1.000
	Present	-	-	
Apnea	Absent	18 (60.0%)	28 (93.3%)	0.002**
	Present	12 (40.0%)	2 (6.7%)	
Number of attempts for insertion	One	27 (90.0%)	22 (73.3%)	0.095+
	Two	3 (10.0%)	8 (26.7%)	
Limb movement	Absent	30 (100.0%)	25 (83.3%)	0.052+
	Present	-	5 (16.7%)	
Head movement	Absent	30 (100.0%)	26 (86.7%)	0.112
	Present	-	4 (13.3%)	
Jaw relaxation	Absent	-	9 (30.0%)	0.002**
	Present	30 (100.0%)	21 (70.0%)	
Post-op sore throat	Absent	22 (73.3%)	21 (70.0%)	0.774
	Present	8 (26.7%)	9 (30.0%)	

Results are presented in Mean ± SD

All the baseline parameters are statistically similar between the two groups (P>0.05)

Mild gagging was observed in 6.7% of patients in group I compared to 20% in group II. Moderate gagging was seen in 6.7% patients in group II, but none in group I. Coughing and laryngospasm was not observed in either of the groups.

Apnea was present in 40% of patients in group I and 6.7% patients in group II, which was statistically significant (P0.002). In group I 90% of patients required one attempt for insertion, compared to 73.3% in group II. 16.7% of patients in group II showed limb movements during insertion, but no one in group II developed limb movements. Head movement was absent in group I, but was present in 13.3% of group II patients. All patients in group I had adequate jaw relaxation as against 30% in group II,which was statistically significant (P0.002). Post operative sore throat was seen in 26.7% and 30% of patients in group I and group II, respectively.

Discussion

Endotracheal intubation has a long history as one of the most widely accepted technique in anaesthetic practice. The haemodynamic response to laryngoscopy and tracheal intubation reflects the increase in response of oropharyngeal and tracheal stimulation.

The LMA has proved to be a popular addition in the range of equipments available for airway

management. The LMA was developed primarily as a means of offering some of the advantage of endotracheal intubation while avoiding its fundamental disadvantage. The simplicity of the device and the ease of insertion have made LMA to gain firm position in anaesthetic practice.

It is less invasive than intubation and offers greater security than the face mask, bridging the gap in airway management between endotracheal tube and face mask.

Propofol was the induction agent most commonly used for insertion of LMA [7]. Satisfactory insertion of LMA requires sufficient depth for suppression of airway reflexes to prevent coughing, gagging and laryngospasm [2]. Propofol has the advantage of depressing airway reflexes [7]. At the same time propofol has its own disadvantage like increased incidence of apnea, hypotension, high cost and pain on injection [8]. Comparatively, Thiopentone causes less apnea and hypotension. But it does not abolish upper airway reflexes to the same extent as propofol[7]. Lignocaine, a local anaesthetic is known to have cough suppression effect, when administered intravenously or topically [9,10].

A study was done, where in we assessed whether Thiopentone preceded by topical Lignocaine spray would provide similar/better conditions for LMA insertion as compared to propofol. A comparison was also made as regards haemodynamic stability and respiration, with propofol as against thiopentone with topical lignocaine.

The study was a prospective, randomized, comparative study carried out at Victoria hospital, Bowring and Lady curzons hospitals, Bangalore. Sixty patients belonging to ASA I and ASA II physical status undergoing short elective surgical procedures like breast surgeries, minor plastic surgeries, short surgical procedures of upper limb and hernia repair were included in the study. All patients were premedicated with Tab.Diazepam 5mg and Tab.Ranitidine 150 mg, H.S and morning of surgery, Inj.glycopyrrolate 0.2mg. I.V. and Inj.Sufentanil 0.3µ gm/kg. I.V. patients were divided into two groups of thirty each, based on which drug was given. Group I received propofol 2.5mg per kg for induction. Group II received Thiopentone 5mg per kg for induction, preceded by topical lignocaine spray 40mg (10%, 10mg per spray).

Our study shows that during insertion of LMA, Jaw relaxation was significantly better ($p<0.05$) in propofol group than thiopentone and topical lignocaine group. Adequate jaw relaxation was present in all patients (100%) receiving propofol. Whereas, only 70% of patients receiving thiopentone with lignocaine spray had adequate jaw relaxation. K. McKeating, I.M. Bali and J.W. Dundee [11] observed that Jaw tone was more satisfactory after propofol than after thiopentone. Dr. V. Priya, Dr. J.V. Divatia, Dr. D. Dasgupta [12] compared propofol versus sevoflurane for LMA insertion. They observed that propofol provide adequate Jaw relaxation than sevoflurane. Propofol is known to have a relaxant effect on Jaw muscles.

We observed that coughing, gagging, laryngospasm, number of attempts for insertion, head and limb movements with thiopentone preceded by lignocaine spray was not statistically significant from Propofol. A study was done by G,W. Brown, N. Patel, F.R. Ellis [13] on eighty ASA I and ASA II patients. The study was-"comparison of propofol and thiopentone for Laryngeal Mask insertion". In this study Propofol was given in a dose of 2.5 mg/kg and Thiopentone 4.0mg/kg. They found that Propofol is more effective in providing satisfactory condition and that insertion of LMA following induction with Thiopentone resulted in greater incidence of gagging, ($p<0.01$). But they also observed that the use of additional induction agent, where necessary, resulted in no ultimate significant difference between the groups for provision of satisfactory conditions.

K.Mc Keating, I.M.Bali and J.W.Dandee [11], studied the effects of Thiopentone and Propofol on upper airway integrity .They opined that depressed pharyngeal reflexes was observed more often with Propofol than after Thiopentone. Patrick Scanlon, Micheal Carey, Micheal Power [14], in their study, noted that during LMA insertion, Thiopentone was associated with adverse responses(viz, coughing, gagging, laryngospasm and movements) in 76% of patients, compared with Propofol in 26% ($p<0.01$). They concluded that Propofol was superior to Thiopentone as induction agent for insertion of LMA. They observed that adverse responses could be reduced if the dose of Thiopentone is increased or if supplemented with a narcotic. In our study we used inj. Sufentanil 0.3µ gm/kg before induction. It is worth mentioning here that opioids depress pharyngeal reflexes and laryngeal reflexes [15]. But Sufentanil was used in both Group I and Group II, uniformly, in our study.

Hidekazu Yukioka, Noritada Yashimoto, Kiyoji Nishimura and Mitsugu Fujimori [9] observed that intravenous Lidocaine in a dose of 2 mg/kg was effective in blocking cough reflex during tracheal intubation.

Thomas. J. Ponton, Francis. M. James [10] also made similar observation that Lidocaine i.v decreased the activity of pharyngeal and laryngeal reflexes. T.M.Cook, C.R.Seavell,

C.M.Cox [9] used Lignocaine to aid the insertion of LMA with Thiopentone and compared between topical and intravenous administration of Lidocaine. Four sprays of Lignocaine

10%, 10 mg/spray were applied on posterior pharyngeal wall, three minutes before induction with Thiopentone. They observed that topical Lignocaine performed better than intravenous lignocaine in providing good airway conditions. Laryngospasm and number of attempts for insertion of LMA was significantly more ($p<0.05$) with intravenous Lignocaine than with topical Lignocaine. Even when the dose of intravenous Lignocaine as increased up to three folds the airway conditions were inferior to topical Lignocaine.

In our study, pretreating the patients with 40 mg of Lignocaine spray on to the posterior pharyngeal wall, three minute before the induction of anaesthesia, when using Thiopentone as the induction agent for the LMA insertion, provided insertion conditions comparable to Propofol. This may be attributed to the fact that topical lignocaine suppresses airway reflexes [9]. Though inadequate jaw relaxation was more often seen ($p<0.01$) with thiopentone than propofol, number of attempts required for LMA insertion were similar ($p>0.05$).

In another study C.R. Seavell, T.M. Cook and C.M. Cox [7] also made similar observations. They observed that effect of topical lignocaine spray prior to thiopentone allows placement of LMA with as few complications as following propofol and that conditions for insertion of LMA was equal to that of propofol.

Incidence of apnea was significantly greater with protocol in our study. G.W. Brown, N. Patel and F.R. Ellis [13] noted that induction of anaesthesia with propofol was accompanied by a greater degree of ventilatory depression than following thiopentone.

M.B. Taylor, R.M. Grounds, P.B. Mulrooney and M. Morgan [11] observed that the incidence of apnea as well as duration of apnea was more after propofol than thiopentone. We also noted that fall in SpO_2 following induction with propofol was significantly more than thiopentone, which further substantiates the observation that there was greater respiratory depression following propofol induction.

We observed that fall in systolic and diastolic B.P. was significantly greater in propofol group. Dr. V. Priya, Dr. J.V. Divatia, Dr. D. Das Gupta [8], compared propofol against Sevoflurane for LMA insertion; they came across a statistically significant difference in lower mean arterial B.P. with propofol when compared to Sevoflurane. G.R. Seavell, T.M. Cook, C.M. Cox [7] observed that thiopentone had a significantly smaller reduction in systolic and diastolic B.P. than propofol.

Conclusion

Our results suggest that thiopentone preceded by topical lignocaine spray provides condition for insertion of LMA comparable to propofol except for Jaw relaxation. Ultimately there was no significant difference between the two groups with respect to number of attempts for insertion or adverse events. There was significant haemodynamic fluctuations and respiratory depression caused by propofol. Thiopentone preceded by topical lignocaine spray is equally good for induction prior to laryngeal mask insertion, as compared to propofol. Thiopentone with lignocaine spray is more cost effective than propofol.

References

1. Eleanor o' leary, Anthony J. Cunningham. Laryngeal mask airway. Advances in Anesthesia, 1995; 12: 15-37.
2. Brain. A.I.J. The Laryngeal mask –A new concept in airway management. British journal of anaesthesia, 1983; 55:801-804.
3. Brain A.I.J. The development of Laryngeal mask: A brief history of the invention, early clinical studies and experimental work from which the Laryngeal mask evolved. Eur J Anaesthesiol, 1991; suppl 4:5-17.
4. John H.Pennat, Paul F.White. The Laryngeal mask airway, its uses in Anesthesiology. Anesthesiology, 1993; 79:144-163.
5. Leach AB, Alexander CA. The Laryngeal mask: An overview. Eur J.Anaesthesiol 1991; suppl 4:19-31.
6. Coyen BJ. The use of Laryngeal mask airway in day care and short stay surgery. Ir J Med Sci, 1990; 159: 185-186.
7. C.R. Seavell, T.M. Cook, C.M. Cox. Topical Lignocaine and thiopentone for the insertion of a Laryngeal mask airway-A comparison with propofol. Anaesthesia, 1996; 51:699-701.
8. A Dr. V. Priya, Dr. J.V. Divatia, Dr. D.DasGupta comparison of Propofol versus Sevoflurane for Laryngeal mask airway insertion. Indian Journal of

Anaesthesia, 2002; 46(1):31-34.

9. T.M. Cook, C.R. Seavell, C.M. Cox. Lignocaine to aid the insertion of the Laryngeal mask airway with Thiopentone.Anaesthesia, 1996; 51:787-790.
10. Thomas J. Poulton, Francis M.James. Cough suppression by Lidocaine. Anesthesiology, 1979; 50: 470-472.
11. M.B. Taylor, R.M. Grounds, P.D. Mulrooney, M. Morgan. Ventilatory effects of Propofol during induction of anaesthesia-comparison of Thiopentone. Anaesthesia, 1986; 41:816-820.
12. A Dr. V. Priya, Dr. J.V. Divatia, Dr. D. Das Gupta comparison of Propofol versus Sevoflurane for Laryngeal mask airway insertion. Indian Journal of Anaesthesia, 2002; 46(1):31-34.
13. G.W. Brown, N. Patel, F.R. Ellis. Comparison of propofol and thiopentone for Laryngeal mask insertion. Anaesthesia, 1991; 46:771-772.
14. Patrick Scanlon, Micheal Carey, Micheal Power. Patient response to Laryngeal mask insertion after induction of anaesthesia with propofol or thiopentone. Can J anaesth, 1993; 40:9:816-8.
15. Robert K. Stoelting, Simon C. Hiller. Opioid Agonists and Antagonists. 4th Edition. Pharmacology and Physiology in Anesthetic Practice. Lippincott Williams and Wilkins, 2006.p.87-126.