

COMPARISON BETWEEN PROPOFOL AND THIOPENTONE SODIUM FOR LARYNGEAL MASK AIRWAY INSERTION IN DAY CASE SURGERY

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ABSTRACT

Objective: To assess the effectiveness of laryngeal mask airway insertion after induction with propofol or thiopentone in one hundred urological patients.

Material and Methods: This study was carried out in the Department of Anaesthesiology Khyber Teaching Hospital Peshawar from January 2007 to June 2007. Hundred urological patients coming for day case surgery were included in the study. Patients were divided in to two groups (A & B) of fifty each. Group A (Propofol Group) received propofol (2.5mg/kg) and Group B (Thiopentone group) received thiopentone sodium (4-6 mg/kg) IV. Management of anaesthesia was identical in both groups. Midazolam 0.03 mg/kg body weight was used for co-induction. Laryngeal mask airway was inserted after adequate level of anaesthesia. The presence of gagging, coughing, laryngospasm and movement was noted and graded.

Results: Thiopentone was associated with an adverse response in 76% of patients, compared with propofol in 26% ($p < 0.01$). Head movement, laryngospasm, inadequate jaw relaxation were more common using thiopentone ($p < 0.05$). The quality of anaesthesia according to patients was significantly higher in the propofol group (Group A, 80%) than in thiopentone group (Group B, 30%).

Conclusion: Adverse responses in propofol Group were less than thiopentone Group. Propofol, therefore is superior to thiopentone as an induction agent for laryngeal mask airway.

Key words: Intravenous, Propofol, Thiopentone, Airway, Laryngeal Mask.

INTRODUCTION

The increasing emphasis on day case anaesthesia has led to the greater use of the laryngeal mask airway (LMA) as an alternative to the face mask and in some cases to tracheal intubation. Adverse responses to introduction of LMA such as gagging, coughing and laryngospasm may make correct positioning difficult or impossible. Thiopentone has been assessed for its usefulness in aiding LMA insertion but produces less satisfactory conditions than propofol.¹ In the setting of day case anaesthesia with its emphasis on early ambulation, propofol with its short elimination half life would appear to be the induction agent of choice.

The LMA provides and maintains a seal around laryngeal inlet for spontaneous ventilation and allows controlled ventilation. Although the use of LMA for routine airway management is usually problem free but complications may occur and also there are several relative contraindications. The

most common problem in patients with no obvious anatomic abnormalities is failure to achieve correct placement.² Common causes of poor LMA placement are inadequate anesthesia or inadequate relaxation, pharyngeal or laryngeal muscle spasm. The LMA can be inserted successfully after suppressing of airway reflexes by deep anesthesia.³ Various anesthetic agents such as sevoflurane, and thiopentone are used for insertion of LMA.⁴ Propofol is considered the drug of choice for the insertion of the laryngeal mask air way during induction of anesthesia because of its depressant effect on airway reflexes. The induction dose is 1-2.5gm/ kg body weight. It has got rapid and smooth recovery with no hangover effect but is associated with adverse effects like pain on injection and hypotension.^{5,6} Propofol has significantly improved anesthetic practice for day case surgery. Anaesthesia with propofol is associated with a swift clear headed recovery, minimal nausea and vomiting. These features make propofol especially appropriate for day case

DEMOGRAPHIC DETAILS OF PATIENTS

Variables	Group A (Propofol group) n=50	Group B (Thiopentone Group) n=50
Age (years)	33 ± 12.43	37.53 ± 13.2
Gender (male/female)	35/15	38/12
Weight (kg)	67.4 ± 14.7	75.4 ± 17.6

Note: Weight and age values expressed as mean ± S.D

TABLE 1

anesthesia.

Thiopentone sodium is another common intra venous induction agent. It is used in a dose of 5-7 mg/kg body weight. The hypnotic action is potent and consciousness is usually regained in 5-10 minutes.⁷ Elimination half life is 11 hours so recovery is slow and there are more chances of hang over effect. Although thiopentone is cheaper than propofol but takes longer to recover therefore propofol is preferred over thiopentone for out patient anesthesia. Propofol has gained wide spread popularity and has become the drug of choice for induction of anesthesia.⁸⁻¹⁰

We conducted this comparative study of propofol and thiopentone sodium as induction agent for short urological procedures lasting less than thirty minutes to select a better induction agent for LMA insertion. Also we compared the incidence of side effects such as coughing, gagging, laryngospasm in patient's movement after LMA insertion. The effort was to improve the quality of anesthesia with a better induction agent for LMA insertion and by using better anesthetic technique to avoid the postoperative complications.

MATERIAL AND METHODS

This comparative study was conducted in the department of anaesthesiology Khyber Teaching Hospital Peshawar from January 2007 to June 2007.

A total of one hundred (100) patients both male and female of the American Society of Anaesthesiologist (ASA) physical status I, II and III, aged between 13 to 80 years were included.

These patients were scheduled for day care urological procedures and were enrolled through the outpatient department after obtaining informed consent.

Selection of the patients was made as per criteria excluding the confounding factors in order to make the valid conclusion.

Following patients were excluded from the study:

1. Patients with pharyngeal pathology.
2. Patients having any anatomical abnormality of mouth, pharynx and larynx.

ASSESSMENT OF LARYNGEAL MASK AIRWAY INSERTION (LUND AND STOVNER ASSESSMENT SCHEME)

Assessment	Group A (Propofol group) n=50	Group B (Thiopentone Group) n=50	P Value
Excellent and satisfactory	46 (92%)	34 (68%)	0.0001
Poor	4 (8%)	16 (32%)	0.0001

TABLE 2

3. Patients having preoperative sore throat.
4. Patients having risk of aspiration (Hx of gastroesophageal reflux or upper gastrointestinal surgery).
5. Full stomach (pregnancy, hiatal hernia).
6. Patients with high airway resistance (bronchospasm).
7. Patients with difficult airway (mallampati class 3 or 4).
8. Low pulmonary compliance (obesity).

An analytical double blind randomized comparative study was conducted to evaluate the ease of LMA placement by propofol anaesthesia compared to thiopentone anaesthesia; on the basis of Lund and Stovner assessment scheme.

Anaesthetic Technique:

Informed consent was obtained from each patient. One hundred enrolled patients were allocated randomly to two equal groups. Group A (n=50) received propofol and group B (n=50) received thiopentone sodium. Patients were kept fasting six hours prior to surgery. They were shifted to the operation room where standard monitoring were attached including NIBP, pulse oximetry: continuous electrocardiograph (ECG)

OVERALL ASSESSMENT OF LMA INSERTION

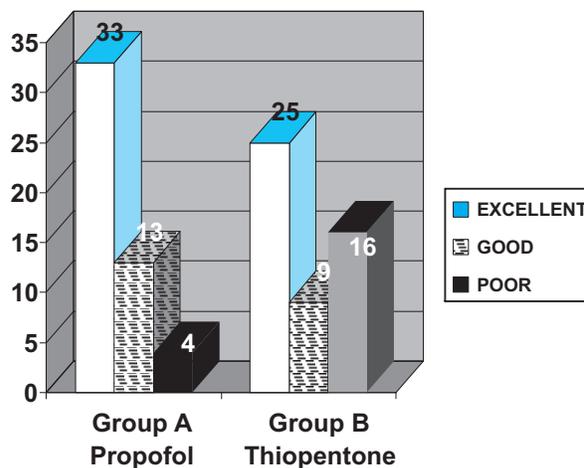


FIGURE: 1

RESPONSE TO LARYNGEAL MASK AIRWAY INSERTION

Assessment	(Propofol group) n=50 Group A	Group B (Thiopentone group) n=50	P Value
Overall Response	13 (26%)	38 (76%)	<0.01
Head Movement	5 (10%)	17 (34%)	<0.05
Laryngospasm	4 (8%)	15 (30%)	<0.05
Inadequate Jaw Relaxation	0 (0%)	6 (12%)	<0.05
Cough	3 (6%)	9 (18%)	NS
Limb Movement	10 (20%)	9 (18%)	NS
Patient Satisfaction	40 (80%)	15 (30%)	<0.01

TABLE 3

and end tidal partial pressure of carbon dioxide (ETCO₂). I.V cannula of 18 G was inserted on the dorsum of the hand. All patients received 0.03 mg/kg I.V midazolam as premedication before the operation. Haemodynamic parameters were recorded before anaesthesia. Patients breathed 100% O₂ via a face mask for 3 minutes before induction. Group A received propofol 2.5 mg/kg slow I.V in titrating dosage till the loss of consciousness. Group B received thiopentone sodium 5 mg/kg in 2.5% solution slow I.V in titrating dosage till the loss of consciousness. Heart rate and blood pressure of the patients were measured before and after induction and also immediately and 5 minutes after LMA insertion. Anaesthesia was maintained with Isoflurane in nitrous oxide 50% and O₂ 50% mixture. Patients were kept on spontaneous ventilation. Loss of consciousness was determined by patients no longer opening their eyes and the condition was assured with eyelash reflexes. The LMA was inserted after adequate relaxation of jaw and after the eye lash reflex had been lost and connected to anaesthesia machine. Mask was inflated with 25-30 ml air. Success with LMA insertion was assessed with chest wall expansion and chest auscultation for bilateral equal air entry. LMA insertion conditions were graded recording and using variables that is Jaw opening, ease of LMA insertion, coughing, gagging, laryngospasm, airway obstruction and patient movements. The overall insertion conditions were assessed according to the modified scheme of grading of intubation conditions by Lund and Stovner.

1. Excellent : Insertion easy, no reaction from the patient.
2. Good : Insertion resulting in slight coughing or movement.
3. Poor : Insertion possible but resulting in more marked patient response.

To control immediate post operative pain a

nonopioid analgesic Ketrolac 0.5 mg/kg was given in a loading dose upto 30 mg I.V intraoperatively. After completion of surgery, anaesthesia was turned off. When patient regained consciousness and responded to verbal commands, laryngeal mask was removed. With clear airway patients were shifted to post anaesthesia care unit.

For study purposes a trained anaesthesia personnel who was not informed about the study, the anaesthetic agent used and the technique used, worked as an investigator for the assessment of LMA placement using Lund and Stovner assessment scheme. Score for both the groups was calculated.

Post Anaesthesia Care unit (PACU) monitoring:

In the post anaesthesia care unit, basic monitoring including ECG, blood pressure and pulse oximetry were continuously provided to patients till their discharge from PACU. Patients were positioned on the left lateral side with slight head down tilt to avoid aspiration of secretions, regurgitated or vomited material. The airway was kept clear, oxygen was provided via facemask 4-5 liter/min till full recovery.

Data was analyzed by using SPSS version 10. The mean and standard deviation was calculated for age. Frequency (percentage) of subjects was calculated for gender by Lund and Stovner assessment scheme. Chi-square test was used to compare frequency of different categories of assessment between the two groups. The P-value of less than 0.05 was accepted to be significant.

RESULTS

One hundred patients were equally and randomly divided into two groups; 50 patients in propofol group (A) and 50 patients in thiopentone group (B). There was no significant difference between the groups with respect to age, sex, weight and ASA grade distribution (Table 1). Induction was more rapid with IV propofol. The mean time (in seconds) for induction group A was 41.7 ± 10.1 and in Group B, it was 51.1 ± 10.4 seconds (P=0.002).

There was no difference in the mean time to laryngeal mask airway insertion between the groups. The mean time (in seconds) for laryngeal mask airway insertion in Group A was 16.6 ± 11.6 and in Group B, it was 18.2 ± 12.8 seconds (P=0.65). Insertion of LMA was assessed. In this study insertion of LMA was assessed as poor in 16 (32%) patients (P=0.0001) in thiopentone Group and 4 (8%) in propofol group (Table 2). Superior conditions for LMA insertion were observed in

propofol group compared with thiopentone group ($P=0.0001$). Figure 1 shows overall assessment of LMA insertion.

DISCUSSION

Various induction techniques have been used for LMA insertion. In intravenous induction either a single or two drug method is used. In two drug method an intravenous agent is combined either with a local anesthetic, with a muscle relaxant or an inhalational agent. Propofol, Thiopentone, Etomidate, Lignocaine and Thiopentone, Ketamine with Succinylcholine or Midazolam have been found to have markedly improved insertion conditions.¹¹

In this study we compared the response to LMA insertion using either propofol or thiopentone. Thiopentone has been assessed for its usefulness in aiding LMA insertion but produces less satisfactory results than propofol. The Intravent LMA manual specifically recommends propofol for induction of anaesthesia. However there may be problems related to the use of propofol including the relatively high cost of the drug.¹²

Successful insertion of the LMA requires depression of upper airway reflexes. The sequelae of gagging, laryngospasm or coughing can be avoided by succinylcholine, increased dose of induction agent or sedative premedications midazolam, fentanyl and midazolam-alfentanil. The problems with these techniques are unpleasant muscle pain following succinylcholine or cardiorespiratory depression and delayed recovery where narcotics or greater dose of induction agent is given. It is particularly desirable to avoid these in day case anaesthesia. Propofol is particularly well suited for the insertion of the LMA because of its greater depressant effect on the airway reflexes than that of thiopentone.

Scannlon et al¹³ compared the response to LMA insertion after either propofol (2.5mg/kg) or thiopentone (5mg/kg). They showed that thiopentone was associated with higher incidence of adverse responses (76%) than propofol (26%). It is suggested that thiopentone increases airway irritability because of relatively greater depressant effect of the drug on the sympathetic than parasympathetic reflex arch. It is clear that the successful insertion with thiopentone would require either adequate reflex suppression or deeper plane of anaesthesia. In this study coinduction was done with midazolam 0.1mg/kg while Group A was given propofol 2.5 mg/kg and Group B was given thiopentone sodium 4-6 mg/kg body weight to attenuate airway reflexes while ensuring rapid recovery and early ambulation. In a study by Priya

et al¹⁴ the responses to laryngeal mask airway insertion were noted. Excellent responses were obtained in a significantly greater number of patients in propofol group ($P= 0.02$). Analysis of the total scores for conditions for laryngeal mask airway insertion indicated that conditions were superior in propofol group. In this study excellent and satisfactory conditions were 92% in propofol group and 68% in thiopentone group ($P=0.0001$). Results have shown that propofol was the better choice in facilitating LMA insertion. There was less head movement, gagging or laryngospasm in the propofol group and adequate relaxation was better in propofol group. These findings are comparable to other studies.

Taha et al¹⁵ obtained excellent relaxation for intubation in 84% of propofol group and 50% of thiopentone group patients ($P<0.05$). Hashimoto et al¹⁶ found that succinylcholine (0.5mg/kg) was sufficient to provide satisfactory relaxation for LMA insertion with thiopentone. Bandari et al¹⁷ studied the response to LMA insertion in 40 patients by application of topical lidocaine on posterior pharyngeal wall before thiopentone induction. The topical lidocaine group had significantly fewer poor /unacceptable responses to LMA insertion ($p<0.05$). In this study it has been pointed out that LMA insertion has been revolutionized with the development of agents like propofol.

The incidence of coughing was also statistically not significant. This study has shown Laryngospasm in 8% patients in propofol group and 30% in thiopentone group. In a study by Bahk et al¹⁸, even after premedication with diazepam and mask ventilation with oxygen, N₂O and isoflurane (2%) for two minutes, thiopentone (5 mg/kg) resulted in more frequent laryngospasm and even failure (incidence of 11%) to insert LMA because of inadequate relaxation.

When anaesthesia induction is considered in terms of degree of jaw opening and ease of LMA insertion; Ti LK et al¹⁹ reported difficulty in Jaw opening in 21% cases with Propofol. No patient in propofol group had inadequate jaw relaxation as against 6(12%) in thiopentone group ($P<0.05$). These findings are consistent with those by Scannlon et al¹³ who reported no problem in jaw opening with propofol. In our study patient satisfaction regarding quality of anaesthesia was 80% in propofol group as compared to 30% in thiopentone group. These observations are comparable to findings reported by other studies^{13,15,18,19}.

CONCLUSION

It is concluded that propofol is a better

choice for LMA insertion. Incidence of adverse effects such as head movement, laryngospasm and cough are less as compared to thiopentone. Adequate relaxation is better with propofol than with thiopentone.

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