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COMPARATIVE EVALUATION OF INTRAVENOUS MIDAZOLAM AND TOPICAL LIGNOCAINE FOR INSERTION OF LARYNGEAL MASK AIRWAY WITH PROPOFOL

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ABSTRACT

Background: To evaluate whether midazolam or topical lignocaine eases LMA insertion during propofol anaesthesia. **Material And Method:** 60 patients of age group 16-45years of both sexes, ASA Grade I and II undergoing elective surgeries. Group 1: (n=30) propofol (2.0mg/kg) & midazolam (.04mg/kg) & Group 2 : (n=30) Propofol (2.0mg/kg) & lignocaine aerosol 40 mg topically. Conditions of LMA insertion, gagging laryngospasm ,coughing noted at time of insertion, ECG, NIBP, SPO2 &ETCO2 were recorded according to scheduled times. **Results**: In Conditions of insertion, difference between groups reached significance, $p< 0.05$. In both groups at first min, rise in heart rate, fall in DSP,SBP and MAP was significant. At two and three minutes post LMA insertion these parameters change slightly but statistically not significant. **Conclusion**: Topical Lignocaine 10% aerosol prior to propofol induction provide excellent conditions for LMA insertion without the use of neuromuscular blockages.

KEYWORDS: LMA Laryngeal mask airway, Topical Lignocaine aerosol , Midazolam

INTRODUCTION

Laryngeal mask airway is possibly the most significant recent advance in airway management. Devised to be passed into the hypopharynx without a laryngoscope, it is a relatively new non-invasive ventilatory device which has allowed a radical change in the management of modern general anaesthesia. Insertion of LMA avoids direct laryngoscopy, instrumentation of larynx and vocal cord visualisation. Thus the placement of an LMA is less stimulating and leads to less pressor response than direct laryngoscopy **(1)**. Studies were conducted to find the various techniques to attenuate the pressor response to laryngoscopy, endotracheal intubation, bronchoscopy, bronchography and extubation. Insertion of LMA requires the airway reflexes to be obtunded by general/topical anaesthesia or muscle relaxants. Intact airway reflexes may cause gagging, coughing or laryngospasm. If general anaesthesia is used, LMA insertion requires a depth almost similar or more to that necessary for insertion of an oropharyngeal airway but not as deep as is needed for tracheal intubation2. In day-care surgery, the anaesthetic techniques should be tailored to allow early patient recovery with minimal side effects.

The most popular induction agent for LMA insertion continues to be propofol as this agent best obtunds oropharyngeal reflexes, supresses cough reflex & decreases the sensitivity of upper airway. For LMA insertion, use of only propofol as sole induction agent

has less success rate. So many co-induction agents had been tried to get better success rate. Much research has therefore been conducted using a variety of supplimentary drugs to find a compound which eases LMA insertion e.g. midazolam, lignocaine, fentanyl & succinylcholine **(3,4,5)**. Benzodiazepines like midazolam when given intravenously produce significant depression of upper airway sensitivity. Midazolam is found to act synergistically with propofol & improve LMA insertion condition. Lignocaine given topically may improve the LMA insertion conditions when propofol is used. We have conducted this study to observe the ease of LMA insertion using midazolam or topical lignocaine as a co-induction agent to propofol with haemodynamic changes & side effects.

MATERIAL AND METHOD

This was a randomized prospective study.Hospital ethical committee approval was taken and the study was carried out on 60 unpremedicated patients of age group 16-45years of both sexes, ASA Grade 1 and 2 undergoing elective surgeries. Patients having abnormal airway anatomy or mouth opening <2.5 cm, risk of gastric regurgitation & >2 attempts during LMA insertion were excluded from the study. Other cases which could have made insertion of LMA difficult such as limited neck extension, prominent incisors and large tongue excluded.

Patients were randomly allocated into two groups:

Group I: (n=30) Group PM patients received intravenous midazolam 0.04mg/kg. 3 minutes before intravenous propofol 2 mg/kg

Group II: (n=30) Patients receiving lignocaine aerosol 40 mg topically. (4 sprays of lignocaine 10% spray, 10mg/ spray, were used 3 minutes prior to injection propofol at interval 30 sec each)

In all patients, detailed pre anaesthetic checks up was done with routine investigations for urine, haemoglobin %, TLC, blood urea, blood sugar & serum electrolytrs. Baseline chest X-ray and ECG was done. Written and well-informed consent was taken.

After shifting the patient to operation theatre, an IV line was taken, basic monitors were applied, after stabilization for 5 minutes, basic parameters were recorded. In Group I patients received intravenous midazolam 0.04mg/kg. 3 minutes before intravenous propofol 2 mg/kg and in Group II lignocaine aerosol was spread to the posterior pharyngeal wall, and its either sides (total 4 sprays,10mg/spray) 3 minutes before intravenous propofol 2 mg/kg. LMA insertion was attempted by using standard technique after 30 seconds of propofol and conditions for LMA insertion, and vital parameters were recorded.

Table 1 Conditions for LMA insertion

S. No.	Conditions of LMA insertion	Gagging	Laryngospasm	Coughing
1.	Excellent	Grade 0/1	None	None
2.	Good	Grade 0/2	None	None
3.	Poor	Grade 2	None	Present
4.	Unacceptable	Grade 3	Present	Present

Grades of Gagging:

Grade 0- No Gagging, Grade 1- Gagging settled within 30 secs, Grade 2-a further dose of induction agent required, Grade3 -Suxamethonium was required
ECG, NIBP, SPO2 & ETCO2 were recorded according to tocheduled times:
T0 Baseline reading
T1 Thirty seconds after induction with propofol
Post LMA insertion
T2 One Minute
T3 Two minutes
T4 Three minutes

Patient's lungs were not manually ventilated and they did not receive volatile agents or nitrous oxide before the first set of readings was taken post-LMA insertion. After confirming the proper LMA position, intravenous fentanyl 1µg/kg was given & anaesthesia was maintained with sevoflurane 2-3% and O2/N2O 50:50. Further anaesthesia was maintained with standard protocol for general anaesthesia as per surgery. Continuous monitoring of ECG, HR, BP, SPO2, ETCO2 were done at every 5-minute intervals. At the end of the procedure, all anaesthetics were discontinued except 100% oxygen. LMA was removed after patients followed the verbal commands. After removal, the surface of the LMA was checked for the presence of blood. In post anaesthetic care unit

(PACU), patients were followed up for the presence of sore throat & regarding the experience of anaesthesia.

Statistical analysis was performed using paired t-test and categorical data analysed using chi-square test. A p-value of<0.05 was accepted as statistically significant.

Reviewer Comments: Please mention p values in tables and figures, wherever applicable. Figures on hemodynamic parameters may also be clubbed together, if possible

OBSERVATIONS

Both groups were comparable & no statistical difference was found among these groups with respect to age, sex, ASA status and type of surgeries.

Table 2 Age and Sex distribution

	Sex distribution		Age distribution	
	Male	Female	10-25	08
Group A	22	08	26-35	14
			35-45	08
Group B	24	06	10-25	04
			26-35	07
			35-45	19

In Conditions of insertion, For statistical analysis, the poor and unacceptable groups were combined and the difference between groups reached significance, p< 0.05. (Table 3)

Reviewer Comment: In Table 3 Group I, The sample size under this group in this table is coming 32 (not 30). Please check this table.

Further, this table may possibly be merged with Table 4.

Lastly, data in Table 3 is not corresponding with the data in Table 4

Table 3Conditions of LMA insertion in Groups

Condition	Group I	Group II
Excellent	20	25
Good	4	3
Poor	4	1
Unacceptable	2	1

Table 4: Patient responses to LMA insertion

Airway Characterstics		Group I IV Midazolam	Group II Topical Lignicaine
Gagging :	**0. Absent**	24	27
	1. < 30 Sec.	2	1
	2. Propofol Required	3	2
	3. Suxamethonium Required	1	0
Coughing:	**Absent**	27	29
	Present	3	1
Laryngospasm:	**Absent**	28	29
	Present	2	1
No. Of Attempt:	**One**	27	29
	Two	3	1
	More	0	0

In Group 1, three patients out of 30 required more propofol to suppress gagging, and one patient required suxamethonium.

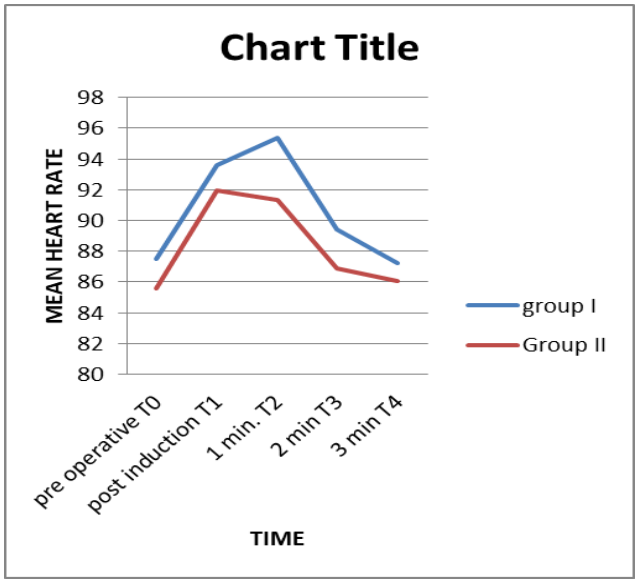

Figure 1 Mean heart rate in two groups at diff. stages

This figure (figure 1) shows a significant rise in mean heart rate post induction in both groups ($p>0.05$). At two and three minutes post-LMA insertion heart rate remains slightly high from the baseline but was not significant.

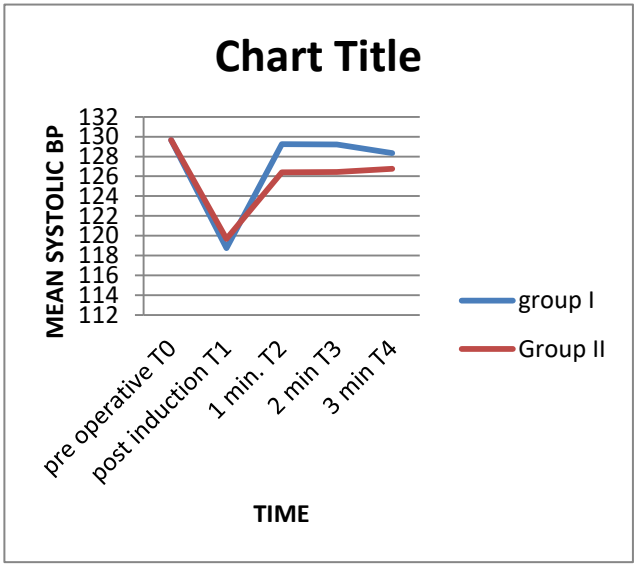

Figure 2 Mean systolic BP In two groups

Post induction there was a fall in SBP, DBP and MAP in both the groups which was significant in individual groups ($p<0.05$) but when compared in between both groups, changes were not significant (Fig 2,3,4).

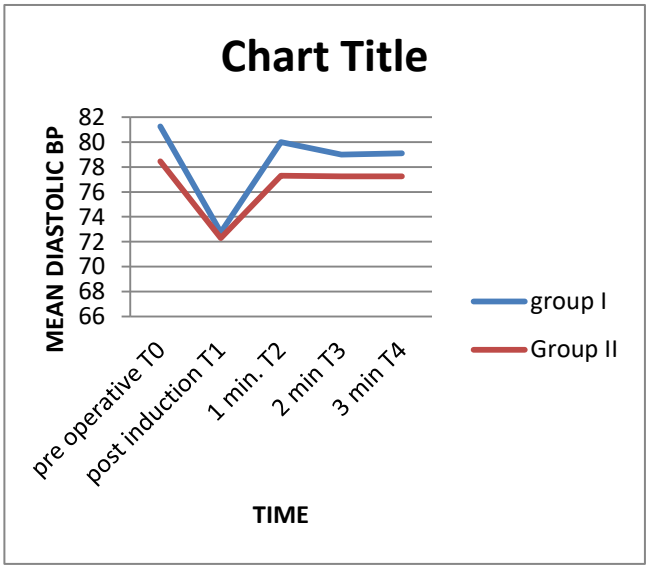

Figure 3 Mean diastolic BP in two Groups

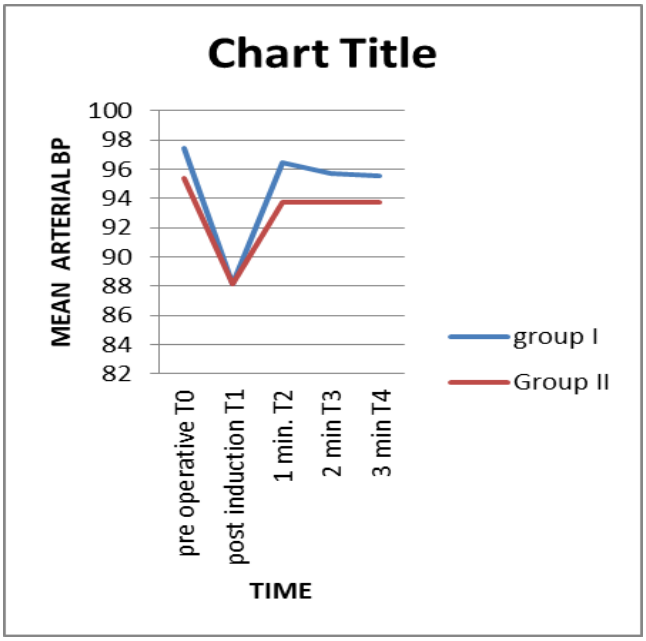

Figure 4 Mean arterial BP In two groups

Table 5 SIDE EFFECTS

Side Effects	Group I	Group II
Blood on LMA	0	1
Sore throat	2	1

No significant difference was seen in both groups in view of side effects blood on LMA & sore throat ($p>0.05$).

DISCUSSION

The LMA insertion requires the suppression of upper airway reflexes to prevent gagging, coughing and laryngospasm. Different intravenous induction agents have been tried for LMA insertion **(3,4,5)**. Thiopentone has been assessed for the insertion of an LMA but produces less satisfactory conditions than propofol **(6,7)** Propofol is known to suppress both pharyngeal and laryngeal reflexes more effectively than thiopentone. But studies show an incidence of poor insertion ranging from 38-60% with standard induction doses (2-3mg/kg) of propofol associated with side effects like swallowing, gagging, coughing, limb movement, and haemodynamic instability if the excess dose of propofol is used. Various studies have been conducted by adding various drug combinations like opioids, benzodiazepines, muscle relaxants & other volatile anesthetic adjuvants to propofol for ease of LMA insertion (excellent to acceptable) (4,5,8). Benzodiazepines are well known to reduce upper airway reflexes **(9,10,11)**. Propofol and midazolam co-induction also results in a significant reduction of the total dose of propofol **(12,11)**. Salem12 found successful LMA insertion after the first attempt in 95% patients and excellent to good insertion conditions in 100% patients in the propofol & midazolam group. Midazolam, when used with propofol, was found to provide haemodynamic stability 13 which may be useful in elderly patients. There was transient nonsignificant hypotension (P>0.05). Changes in HR were also not significant. However, the use of midazolam in short term surgery may be controversial as its duration of action is long. Lignocaine has been shown to have a cough suppressant effect and is dose-dependent. Lignocaine also reduces the cardiovascular response to tracheal intubation and LMA insertion when used topically (14) or intravenously (15). The haemodynamic responses to LMA insertion are much less marked, and their prevention is rarely necessary. (16) Topical lignocaine has a therapeutic effect for 20-40 mins (17), and its local anaesthetic action would have ceased by the time of recovery. This study was conducted to compare and evaluate the conditions of LMA insertion and haemodynamic response to IV midazolam and topical lignocaine along with propofol induction.

Conditions for LMA insertion:

In the study, we observed that LMA insertion conditions were better when topical lignocaine was sprayed to the posterior pharyngeal wall (Group II) with less incidence of gagging and coughing. This result was in accordance with that reported by Cook and Seavell et el in their study comparing topical and intravenous lignocaine with Thiopentone for LMA insertion **(18)** In the present study, the addition of midazolam to propofol attenuated the physical responses to LMA insertion, providing excellent to acceptable conditions in 80.0% of patients& successful insertion at first attempt in 90% of patients. Addition of topical lignocaine resulted in providing excellent to acceptable conditions in 93.3% of patients& successful insertion at first attempt in 96.6% of patients. This was probably due to suppression of airway reflexes by topical lignocaine applied to the posterior pharyngeal wall. Laryngospasm occurred in 2 patients in Group I.

Comparison of heart rate changes:

Baseline heart rate was comparable in both the groups. There was a significant rise in mean heart rate post induction in both groups. This increase was similar in both the groups (p>0.05). Post LMA insertion at 1 min. Heart rate increased further (T0-T2:7.85 =5.91 of group I, 5.75= 5.99 of group II), the relative increase in Group II was less but was not significant. At two and three minutes post-LMA insertion the heart rate decreased in both the groups and reached to a level similar to baseline.

Comparison of SBP, DBP and MAP:

Post induction there was a fall in SBP, DBP and MAP in both the groups which was significant in individual groups (p<0.05) but when compared in between both groups, changes were not significant. Post insertion of LMA the blood pressure increased but was not significant as compared to baseline in both the groups. At 2 and 3-minute post insertion, changes in blood pressure were not significant. I.G.Wilson et el **(19)** observed that LMA insertion causes a transient increase in SBP. Cook& Seveall et el **(18)** noted no significant difference in SBP post-LMA insertion (IV Lignocaine vs Topical Lignocaine). Our findings were consistent with the finding of Cook& Seveall. The

attenuated pressure response was accounted to decrease stimulation by LMA and by use of midazolam or lignocaine with propofol.

Although there is an improvement in the overall ease of LMA insertion, there is no significant difference in postoperative complications like sore throat & blood on LMA. Other factors like cuff pressure & lubricant may be more important than trauma at insertion in determining the incidence of these complications.

In conclusion, our study demonstrates that topical Lignocaine 10% aerosol, when sprayed on the posterior pharyngeal wall 3 minutes prior to propofol induction provide excellent conditions for LMA insertion without the use of neuromuscular blockage. No. of attempts required for LMA insertion was significantly less in the topical lignocaine group. Even after LMA insertion changes in HR, SBP, DBP, MAP were insignificant in both groups. Hence we conclude that topical lignocaine provides better insertion conditions as compared to IV Midazolam but haemodynamic stability remains the same.

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