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# A RANDOMISED INTERVENTIONAL STUDY TO COMPARE AND EVALUATE TOPICAL AND INTRAVENOUS LIGNOCAINE FOR INSERTION OF LARYNGEAL MASK AIRWAY WITH PROPOFOL

Anaesthesiology

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## ABSTRACT

**Background:** Objective of present study to determine that administration of Intravenous Lignocaine prior to propofol is as effective as topically on the posterior oropharynx for LMA insertion. **Methods:** 170 patients of age group 16-45years of both sexes, ASA Grade I and II undergoing elective surgeries. Group 1: (n=85) Patients receiving Lignocaine 1.5 mg/kg IV over 30 seconds. Group 2: (n=85) Patients receiving lignocaine aerosol 40 mg topically. Conditions of LMA insertion, gagging laryngospasm ,coughing noted at time of insertion, ECG, NIBP, SPO2 and ETCO2 were recorded according to scheduled times. **Results:** In Conditions of insertion, difference between groups reached significance, $p<0.05$. In 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. **Conclusions:** Topical Lignocaine 10% aerosol prior to propofol induction provides excellent conditions for LMA insertion without the use of neuromuscular blockages.

## KEYWORDS

## INTRODUCTION

The Laryngeal Mask Airway (LMA) is the most widely used, most studied Supraglottic Airway device. The classic LMA , consists of an oval- shaped , silicone mask, (designed to be reused after autoclaving) with an inflatable cuff that sits in the hypopharynx and forms a seal around the periglottic tissues. 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. Laryngeal mask airway is possibly the most significant recent advance in airway management. The laryngeal Mask Airway serves as a bridge between the facemask and the endotracheal tube. It is a good alternative to intubation in short-duration procedures, being less invasive and less stimulating, thus, Preventing stress response.

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.3

Lignocaine given IV may improve the LMA insertion conditions when propofol is used. Lignocaine was studied previously with thiopentone by giving through intravenous route and topical routes of administration.8 Topical lignocaine provided better LMA insertion conditions (86 %) than intravenous lignocaine (63 %) when used with thiopentone. Intravenous lignocaine can be effective for decreasing airway sensitivity (55%) to instrumentation by depressing airway reflexes and decreasing calcium flux in airway smooth muscles. Intravenous and topical lignocaine have been used with variable success (40 %) to blunt hemodynamic responses to tracheal intubation and extubation.9 According to previous studies when thiopentone and topical lignocaine spray were used in combination the results were found to be the same as with propofol and IV lignocaine.

The purpose of this study is to determine that administration of Intravenous Lignocaine prior to propofol is as effective as when applied topically on the posterior oropharynx for LMA insertion.

## METHODS

This was a randomized prospective study. Hospital ethical committee approval was taken and registration of trial in CTRI with registration number CTRI/2022/11/047181 and study was carried out on 170 un-premedicated patients of age group 16-45years of both sexes, ASA Grade 1 and 2 undergoing elective surgeries.Patients with a history of coronary artery disease, hypertension, endocrinal disorder, metabolic disease, respiratory disease, allergic history or anticipated difficult airway were excluded from the study. Patients were randomly allocated into two groups: Group I: (n=85) Patients receiving Lignocaine 1.5mg/kg IV over 30 seconds (30 seconds prior to injection Propofol). Group II: (n=85) 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 preanaesthetic check up was done with routine investigations for urine, haemoglobin%,TLC, blood urea, blood sugar and serum electrolytes.Baseline chest X-ray and ECG was done. Written and well informed consent was taken. After shifting the patient to operation theatre, IV line taken, basic monitors were applied, after stabilization for 5 minutes basic parameters were recorded. In Group I after preoxygenation with 100% oxygen for 3minutes, IV lignocaine 1.5mg/kg over 30 seconds was In Group II after preoxygenation with 100% oxygen for 3minutes lignocaine aerosol was spread to posterior pharyngeal wall, and its either sides (total 4 sprays,10mg/spray) followed by inj. Propofol 2mg/kg and LMA insertion after 30 seconds of propofol and conditions for LMA insertion and vital parameters were recorded.

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 and ETCO2 were recorded according to scheduled times:
T0 Base line 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. During recording of second and third minute patients were started on nitrous oxide (66% in O2) and vecuronium in dose of 0.1mg/kg after proper LMA confirmation. 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. 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.

## OBSERVATIONS AND RESULTS

**Table 1: Age Distribution Of Study Subjects**

| Age group (years) | Intravenous | | Topical | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| ≤ 25 years | 23 | 27.1 | 30 | 45.9 | 53 | 36.5 |
| 26-35 years | 25 | 29.4 | 24 | 28.2 | 49 | 28.8 |
| 36-45 years | 37 | 43.5 | 31 | 25.9 | 68 | 34.7 |
| Total | 85 | 100 | 85 | 100 | 170 | 100 |

| | | | |
|---|---|---|---|
| Mean ± SD | 32.62 ± 8.58 | 31.21 ± 7.62 | 31.92 ± 8.12 |
| Chi-square = | 7.963 with 2 degrees of freedom; | P = 0.478 | |

In above table we found that mean age for group I was 32.6 years and for group II it was 31.21 years

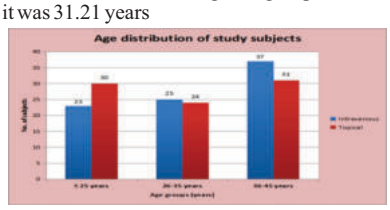



**Table 5: Distribution Of Study Subjects According To No. Of Attempts**

| No. of attempts | Intravenous | | Topical | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| 1 | 71 | 83.6 | 82 | 96.5 | 153 | 90 |
| 2 | 11 | 12.9 | 3 | 3.5 | 14 | 8.2 |
| 3 | 3 | 3.5 | 0 | 0 | 3 | 1.8 |
| Total | 85 | 100 | 85 | 100 | 170 | 100 |
| Chi-square = | 8.362 with 2 degrees of freedom; | | P = 0.015 (S) | | | |

In above table we found that majority 83.6% patients in group I and 96.5% patients in group-II achieved LMA insertion in 1st attempt followed by 12.9% patient in group I and 3.5% patients in group II who achieve LMA in 2nd attempt.

There was significant difference seen in these group as p value was <0.05.

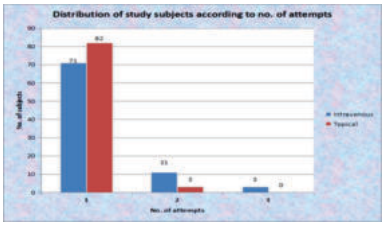



**Table 6: Distribution Of Study Subjects According To Condition Of LMA Insertion**

| Condition of LMA insertion | Intravenous | | Topical | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Excellent | 58 | 68.3 | 71 | 83.5 | 129 | 75.9 |
| Good | 10 | 12.9 | 10 | 10.6 | 20 | 11.8 |
| Poor | 12 | 12.9 | 2 | 3.5 | 14 | 8.2 |
| Unacceptable | 5 | 5.9 | 2 | 2.4 | 7 | 4.1 |
| Total | 85 | 100 | 85 | 100 | 170 | 100 |
| Chi-square = | 7.367 with 3 degrees of freedom; | | P = 0.027 (S) | | | |

In above table we found that majority 68.3% patients in group I and 83.5% patients in group II achieved excellent condition followed by 12.9% patients with good condition in group I and 10.6% patients in group II. There was significant difference found in between these group as p value was 0.02.

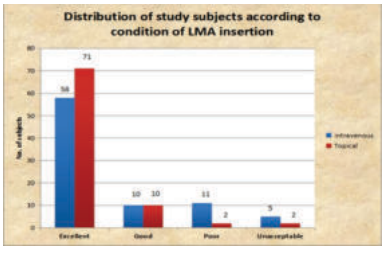



**Table 7: Distribution Of Study Subjects According To Gaging**

| Gaging | Intravenous | | Topical | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| absent | 65 | 76.5 | 77 | 90.6 | 142 | 83.5 |
| <30 sec | 5 | 5.9 | 2 | 2.4 | 7 | 4.1 |
| Propofol required | 14 | 16.5 | 5 | 5.9 | 19 | 11.2 |
| Suxamethonium required | 1 | 1.2 | 1 | 1.2 | 2 | 1.2 |
| Total | 85 | 100 | 85 | 100 | 170 | 100 |
| Chi-square = | 6.563 with 3 degrees of freedom; | | P = 0.114 | | | |

In above table we found that 76.5% patients in group I and 90.6% patients in group II do not faced gaging. In 5.9% patients in group I and 2.4% patients in group II we had seen gagging in <30sec. Here we found that 16.5% patients in group I and 5.9% patients in group II required propofol.

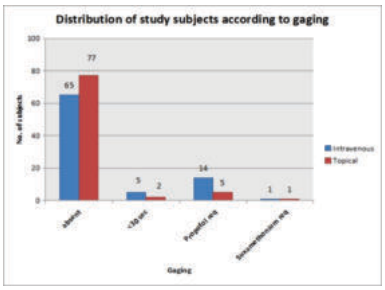



**Table 8: Distribution Of Study Subjects According To Coughing**

| Coughing | Intravenous | | Topical | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Absent | 76 | 89.4 | 82 | 96.5 | 158 | 92.9 |
| Present | 9 | 10.6 | 3 | 3.5 | 12 | 7.1 |
| Total | 85 | 100 | 85 | 100 | 170 | 100 |
| Chi-square = | 2.242 with 1 degree of freedom; | | P = 0.134 | | | |

In above table we found that 10.6% patients in group I and 3.5% patients in group II coughed during the process.

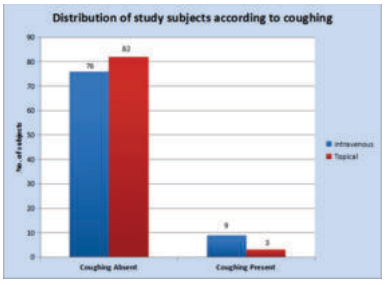



**Table 9: Distribution Of Study Subjects According To Laryngospasm**

| Laryngospasm | Intravenous | | Topical | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Absent | 79 | 92.9 | 82 | 96.5 | 161 | 94.7 |
| Present | 6 | 7.1 | 3 | 3.5 | 9 | 5.3 |
| Total | 85 | 100 | 85 | 100 | 170 | 100 |
| Chi-square = | 0.469 with 1 degree of freedom; | | P = 0.493 | | | |

In above table we found that 7.1% patients in group I and 3.5% patients in group II faced laryngospasm during the process.

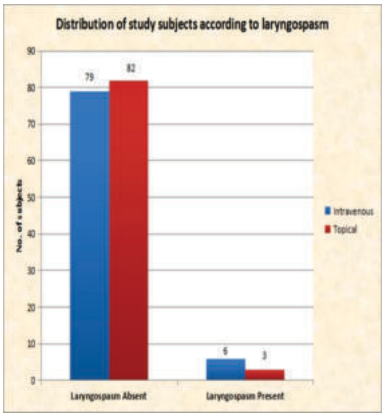



**Table 10: Comparison Of Heart Rate (/min) Among Study Groups**

| Time | Intravenous | Topical | P value |
|---|---|---|---|
| T0 | 83.39 ± 8.92 | 82.42 ± 6.84 | 0.430 |
| T1 | 92.8 ± 7.48 | 91.07 ± 6.54 | 0.111 |
| T2 | 94.94 ± 6.64 | 90.78 ± 6.33 | <0.001 (S) |
| T3 | 88.36 ± 7.43 | 85.94 ± 5.36 | 0.016 (S) |
| T4 | 84.99 ± 7.01 | 84.09 ± 6.26 | 0.382 |

Here we found mean heart rate at different time intervals. The mean heart rate increased till T2 duration after that heart rate tends to decrease in both the groups. We found significant difference between

these group at T2 and T3 interval only.

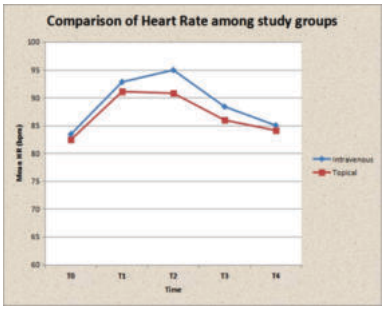



**Table 11: Comparison of SBP (mmHg) Among Study Groups**

| Time | Intravenous | Topical | P value |
|---|---|---|---|
| T0 | 129.33 ± 11.12 | 129.16 ± 10.32 | 0.920 |
| T1 | 119.35 ± 10.72 | 120.13 ± 9.57 | 0.619 |
| T2 | 130.32 ± 11.81 | 125.64 ± 21.81 | 0.084 |
| T3 | 129.36 ± 11.76 | 125.31 ± 9.88 | 0.016 (S) |
| T4 | 128.36 ± 11.76 | 126.95 ± 10.17 | 0.404 |

Here we found mean SBP at different time intervals. The mean SBP increased till T2 duration after that mean SBP tends to stabilized in both the groups. We found significant difference between these group at T3 interval only.

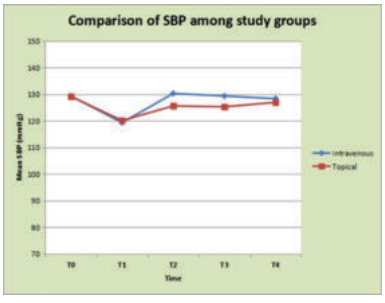



**Table 12: Comparison of DBP (mmHg) Among Study Groups**

| Time | Intravenous | Topical | P value |
|---|---|---|---|
| T0 | 80.54 ± 8.19 | 78.84 ± 7.62 | 0.162 |
| T1 | 71.74 ± 7.4 | 70.78 ± 7.23 | 0.391 |
| T2 | 80.95 ± 8.08 | 76.91 ± 8.19 | 0.001 (S) |
| T3 | 79.51 ± 8.33 | 76.27 ± 7.27 | 0.008 (S) |
| T4 | 78.6 ± 8.64 | 76.76 ± 7.65 | 0.144 |

Here we found mean DBP at different time intervals. The mean DBP decreased till T2 duration after that mean DBP tends to stabilized in both the groups. We found significant difference between these group at T2 and T3 interval only.

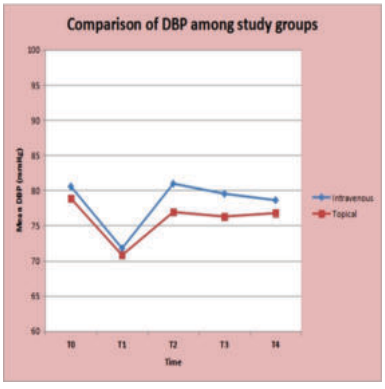
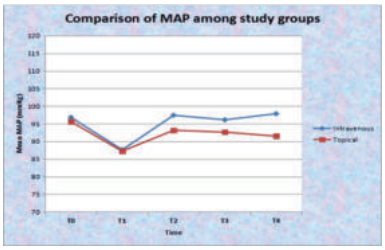



**Table 13: Comparison of MAP (mmHg) Among Study Groups**

| Time | Intravenous | Topical | P value |
|---|---|---|---|
| T0 | 96.8 ± 7.49 | 95.61 ± 8.3 | 0.327 |
| T1 | 87.61 ± 7.41 | 87.23 ± 7.66 | 0.740 |
| T2 | 97.41 ± 7.92 | 93.15 ± 10.64 | 0.004 (S) |
| T3 | 96.13 ± 8.82 | 92.63 ± 7.69 | 0.006 (S) |
| T4 | 97.85 ± 8.89 | 91.49 ± 8.16 | 0.197 |

Here we found mean MAP at different time intervals. The mean MAP decreased till T2 duration after that mean MAP tends to stabilized in both the groups. We found significant difference between these group at T2 and T3 interval only.




## 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.[6] Thiopentone has been assessed for the insertion of an LMA but produces less satisfactory conditions than propofol. 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 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). Benzodiazepines are well known to reduce upper airway reflexes. Propofol and midazolam co-induction also results in a significant reduction of the total dose of propofol.

Lignocaine has been shown to have cough suppressant effect and is dose dependent. Lignocaine also reduces the cardiovascular response to tracheal intubation and LMA insertion when used topically or intravenously.[8] The haemodynamic responses to LMA insertion are much less marked, and their prevention is rarely necessary. Topical lignocaine has a therapeutic effect for 20-40 mins 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 with topical and IV 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. It gave us ability to rapidly and reliably secure patient's airway with LMA resulting in excellent/acceptable conditions for LMA insertion.Seavell et el in their study comparing topical and intravenous lignocaine with Thiopentone for LMA insertion.12 In Group II number of attempts to pass LMA was also significantly less as compared to Group I. 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

We found mean heart rate at different time intervals. The mean heart rate increased till T2 duration after that heart rate tends to decrease in both the groups. We found significant difference between these group at T2 and T3 interval only.

A similar study by Ahmed S et al. found that Baseline heart rate was comparable in both the groups. There was significant rise in mean heart rate ($p < 0.05$). 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 level similar to baseline. LMA insertion causes pressor response, which is reflected as increase in HR

Comparison of systolic blood pressure Comparison of systolic blood pressure Post induction there was a fall in SBP 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 SBP increased but was not significant as compared to baseline in both the groups. At 2 and 3 minute post insertion, SBP changes were not significant. Wilson et al observed that LMA insertion causes transient increase in SBP.13 Cook and Seveall et

el noted no significant difference in SBP post LMA insertion (IV Lignocaine vs Topical Lignocaine).Our findings were consistent with the finding of Cook and Seveall. The attenuated pressure response was accounted to decrease stimulation by LMA and by use of lignocaine with propofol.

**Comparison Of Diastolic Blood Pressure**

Post induction there was significant decrease in the DBP ($p<0.05$) in the individual groups (T0-T1: 8.5+5.36 of group I, 6.10+4.80 of group II) which was comparable in both groups. After LMA insertion DBP increased but was non significant compared to baseline. These findings were consistent to previous studies done by various researchers

**Comparison Of Mean Arterial Pressure**

The MAP decreased after induction to a significant level (T0-T1:9.34+ in group I, 7.3+3.6 in group II) in both the groups which was comparable ($p>0.05$). When compared intragroup this was highly significant ($p<0.001$). There was increase in MAP in both the groups after LMA insertion at one minute but that was not significant ($p>0.05$) (T0-T2: 1=5.5 in group I, 1.7=8.2 in group II). Similarly at 2 and 3 min. the difference of mean from baseline was not significant either intragroup or in between two groups ($p>0.05$). These findings were similar to Wood and Forest and was accounted to attenuated pressure response to LMA and lignocaine.

## CONCLUSION

In conclusion, present 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. Hence we conclude that topical lignocaine provides better insertion conditions as compared to IV lignocaine but haemodynamic stability remains same with topical as well as IV lignocaine.

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**Conflict Of Interest:** None declared
**Ethical Approval:** The study was approved by the Institutional Ethics Committe

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