Comparison of Propofol and Sevoflurane for Laryngeal Mask Airway Insertion

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Abstract

Background: To compare the hemodynamic changes, conditions for the laryngeal mask airway (LMA) insertion and time of insertion between propofol and sevoflurane.

Methods: In this descriptive study sixty adult patients, scheduled for surgical procedure under general anesthesia requiring LMA insertion were included. The selected patients were allocated by balloting in two groups P and S of thirty each. Group-P received IV Propofol 2mg/kg, and Group-S was induced by sevoflurane 6-8%. The loss of eyelash reflex was considered as the desired end point for induction. Total time taken for successful LMA insertion from start of induction was noted. LMA insertion conditions were graded on a three point scale using six variables (jaw opening, ease of LMA insertion, coughing, gagging, patient movement and laryngospasm). The overall condition for LMA insertion was assessed as excellent, satisfactory or poor on the basis of total score.

Results: Induction time was significantly shorter in propofol group than in the sevoflurane group. Excellent conditions for LMA insertion were noted in 93.3% patients of propofol group and 80% patients in sevoflurane group. Conditions for LMA insertion were not statistically significant between groups (p-values= 0.245). Mean arterial pressure was observed statistically significant between groups (p=0.021). Both groups showed significant drop in mean arterial pressure. There was no statistically significant difference in heart rate between groups (p=0.09).

Conclusion: Propofol is superior to sevoflurane for insertion of the Laryngeal Mask Airway.

Key Words: Laryngeal mask airway, Propofol, Sevoflurane

Introduction

The laryngeal mask airway (LMA) has been safely used in spontaneous and controlled ventilation. The LMA can be inserted successfully after suppression of airway reflexes by deep anesthesia. Propofol is considered as the drug of choice for the insertion of LMA because of its depressant effect on airway reflexes. Propofol has several adverse effects including pain on injection, apnea, hypotension and excitation of patient movement. On other hand sevoflurane is non-pungent inhalational anesthetic with a low blood gas solubility coefficient (0.69) and minimal respiratory irritant characteristics that makes it suitable as inhalational agent for induction of anesthesia and insertion of the LMA.

Sevoflurane has added advantages over propofol for providing better hemodynamic stability and smoother transition to the maintenance phase without a period of apnea. Sevoflurane is associated with delayed jaw relaxation and a longer time for the insertion of LMA. Sevoflurane is extensively being used worldwide for its use in LMA insertion but local studies are limited. In countries like Pakistan the supply of many anaesthetic drugs are erratic; therefore there is need for investigating acceptable alternatives. We hypothesized that the haemodynamic changes, condition for LMA insertion and time of insertion is different for propofal and sevoflurane.

Patients and Methods

This descriptive study was carried out in department of Anaesthesiology, Dow Medical University of Health Sciences, Karachi, from November 2007 to April 2008. Sixty Patients of ASA I & II, mallasampati I, II, aged 18-50 of either sex scheduled for elective surgical procedure under general anesthesia requiring LMA insertion, were included. Patients with hypersensitivity to test drugs or taking any sedative drugs which influence the induction time, morbid obese (BMA>30), pregnant and full stomach, were excluded. The selected patients were divided in two groups, of thirty each. Induction was done in Group S by sevoflurane and in group P with propofol. In Group-P Inj: Propofol 2mg/kg (mixed with Inj. Lignocaine 2% 10mg in each 10 ml of propofol to reduce pain on injection) was administered. Patient in Group-S were induced by
sevoflurane 6-8% on vaporizer setting with 50% nitrous oxide in oxygen with a total fresh gas flow of 10 liters/min with circle CO2 absorber circuit.

The loss of eyelash reflex was considered as the desired end point for induction. LMA insertion conditions were graded on a three point scale (1, 2, and 3) using six variables, jaw opening was graded as full, partial and nil, ease of LMA insertion was graded as easy, difficult and impossible, other variables coughing, gagging, patient movement and laryngospasm were graded as nil, minor and severe. The overall condition for LMA insertion was assessed on the basis of total score, excellent (18 points), which was the sum of all component values, satisfactory (16-17 points) or poor (less than 16 points). After insertion of LMA, anesthesia was maintained with isoflurane 0.8% and oxygen in 66% nitrous oxide.

Chi-square test was applied to compare proportion difference between groups for age, sex and ASA status and condition of LMA insertion. p ≤ 0.05 was considered as statistically significant. Bonferroni pairwise comparisons were also applied for each within pair difference.

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**Results**

Induction was more rapid with Propofol. The mean time (in seconds) for induction in Group P was 27.9 ± 6.71 (S.D) and in S group it was 43 ± 8.9 (S.D.) (p=0.001) (Table 1). There was no statistical difference in heart rate between groups (p=0.09). There was no statistically significant decline in heart rate every minute after LMA insertion compared to base line MAP.

### Table 1: Patients Demographics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Propofol (n=30)</th>
<th>Sevoflurane (n=30)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>24.4 ± 10.16</td>
<td>28.13 ± 10.25</td>
<td>0.17</td>
</tr>
<tr>
<td>Induction Time (Sec)</td>
<td>27.9±6.71</td>
<td>43.8±8.97</td>
<td>0.001*</td>
</tr>
<tr>
<td>LMA Insertion time (Sec)</td>
<td>11.33±5.27</td>
<td>10.7±3.01</td>
<td>0.57</td>
</tr>
</tbody>
</table>

No significant difference between the groups by T-test for continuous variables and chi-square.

### Table 2: Grading of condition for LMA insertion

<table>
<thead>
<tr>
<th>Excellent</th>
<th>Propofol(P) group</th>
<th>Sevoflurane(S) group</th>
<th>p-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>26 (93.3)</td>
<td>24 (80)</td>
<td>0.24</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>6 (20)</td>
<td>2 (6.7)</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Excellent = 18 score, Satisfactory = 16-17 score, Poor = < 16

### Table 3: Analysis of the haemodynamic parameters

<table>
<thead>
<tr>
<th>Time after start of anaesthetic induction (minutes)</th>
<th>Mean Arterial Pressure</th>
<th>Heart Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base line</td>
<td>Group S</td>
<td>Group P</td>
</tr>
<tr>
<td>At 1 min</td>
<td>99.2 ± 8.9</td>
<td>92.2 ± 8.1</td>
</tr>
<tr>
<td>2 min</td>
<td>80.9 ± 7.7</td>
<td>78.1 ± 7.6</td>
</tr>
<tr>
<td>3 min</td>
<td>79.7 ± 7.7</td>
<td>79.7 ± 7.6</td>
</tr>
<tr>
<td>4 min</td>
<td>77.7 ± 7.7</td>
<td>68.8 ± 7.0</td>
</tr>
<tr>
<td>5 min</td>
<td>77.8 ± 7.7</td>
<td>67.5 ± 6.5</td>
</tr>
<tr>
<td>p-value</td>
<td>0.28</td>
<td>0.07</td>
</tr>
</tbody>
</table>

### Discussion

In present study conditions for LMA insertion were superior with Propofol than with Sevoflurane. Excellent conditions were 93.3% in propofol group and 80% in sevoflurane group which was not a big difference to reach statistical significance between the groups. Similar results were shown by Priya et al in a study using the same end point of induction which was the loss of eyelash reflex in both the groups. However, sevoflurane has been compared favourably with propofol for the LMA insertion in several studies where they concluded that the quality, safety and reliability of sevoflurane makes it an alternative to propofol for LMA insertion in adults.

In the present study LMA was successfully placed in all the patients in first attempt. Induction time was significantly longer with Sevoflurane 8%, than with propofol. Our results are comparable to those achieved by Siddik-Sayyid et al, who compared LMA insertion after induction of anesthesia with Sevoflurane-
Propofol Versus Sevoflurane or Propofol; they reported that induction of anesthesia with propofol allows the fastest insertion of the LMA among the three induction modalities. In a related study Muzi et al achieved insertion of LMA after sevoflurane induction in 1.7 minutes compared with 10.7+ 3:01 seconds, this may be because of the fact that these investigators considered relaxation of the jaw muscles sufficient for a jaw thrust as the end point of induction rather than loss of eye lash reflex. Longer time to jaw relaxation was also observed in a study by Hall et al comparing sevoflurane with propofol for LMA insertion, although no reason was mentioned for the delay. Prolong jaw tightness was also reported by Ti et al. They explained the reason for prolonged relaxation of jaw is related to time lag when alveolar concentration of sevoflurane equilibrates with brain, which results in inadequate anesthesia during the initial attempt at insertion. Inomata and Nishikawa dispute the importance of this lag time. They argue that this is not important with sevoflurane because of its low blood gas partition coefficient.

The other possible explanation for rapid induction is LMA placement requires suppression of the less sensitive hypopharynx for successful placement as well as attenuation of the laryngeal reflexes in order to reduce stimulation of the anterior laryngeal structures. Ummenhofer WC et al have found that Propofol is known to depress laryngeal reflexes, thus facilitating LMA, where as Sevoflurane increases the muscle tone, a finding reported in several other studies.

Significant decrease in Mean Arterial Pressure (MAP) was observed in Propofol group as compared to Sevoflurane group. This is consistent with many other studies. The other shortcomings of propofol, like all other intravenous anaesthetic agents are, its use is not advisable in patients with airway obstruction.

**Conclusion**

Propofol is superior to sevoflurane for insertion of the LMA using loss of eye lash reflex as induction end point.

**References**


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