A Comparative Evaluation Of Propofol Vs Sevoflurane For Insertion Of Blockbuster Laryngeal Mask Airway

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Background: A second-generation supraglottic airway device, the Blockbuster laryngeal mask airway, is intended for faster blind intubation and less painful throat and less aspiration. When induced with propofol or sevoflurane, this research compared insertion qualities, time spent for induction and insertion of laryngeal mask airway (LMA), haemodynamic parameters, and emergence score.

Material and methods: A total of 80 patients, ranging in age from 18 to 60 years, were split into S and P groups (n=40) for general anaesthesia lasting one to three hours. They were then intubated via blockbuster LMA and were compared with respect to their characteristics of insertion, time taken for induction, and insertion of blockbuster LMA and endotracheal tube (ETT) insertion, haemodynamic parameters and emergence score calculated by Modified Aldrete Score.

Results: Both the Modified Aldrete Score (p=0.014) and the time required for induction (p=0.001), insertion of Blockbuster LMA and ETT (p=0.001) were statistically significant between the two groups. Comparing the two surgical groups revealed no difference in postoperative problems (p>0.05).

Conclusion: Sevoflurane's emergence score was greater than propofol's in the research, although the induction, blockbuster LMA insertion, and ETT insertion times were all shorter with propofol. Haemodynamically both groups were stable.
INTRODUCTION:
To avoid the need for endotracheal intubation while still allowing patients to breathe, oxygenate, and receive anaesthetic gas administration, the SGA device can be inserted into the pharynx. Primary airway control, rescue ventilation (when facemask ventilation is challenging) and endotracheal intubation are all possible uses for these devices in anaesthesia.\(^1\)

In the operating theatre, laryngeal mask airways (LMAs) and other similar devices are the most commonly used SGAs (eg, Combitube, laryngeal tube, pharyngeal tube). With the tip of the hollow shaft or tube resting in the oesophageal opening, the LMA is placed in the hypopharynx, facing the glottis.\(^2\)

It was Dr. Archie Brain, who first invented LMAs in 1981, which he called classic LMA or the cLMA that came in use in 1983.\(^3\) This was incredibly adaptable and could be utilised on a range of patients. They also provided a hands-free technique of airway management that was associated with a low failure rate and good patient satisfaction, which was likely due to less sore throat. Then, in subsequent years, various other LMAs were discovered like the LMA flexible, fastrach, proseal, i-gel, laryngeal tube suction, SLIPA, supreme, Cobra, baska, 3gLM etc. For better understanding of these LMAs, Tim Cook, divided them into 3 generations, on the basis of the product design:\(^4\)

First generation devices like LMA Classic, LMA Flexible, intubating LMA (ILMA), Ambu-aura, etc are simple airway device with low pressure pharyngeal seal. The second generation like Proseal LMA, LMA supreme, I-gel, etc have an additional gastric drain tube to prevent pulmonary aspiration. D.M. Miller first used the term third generation SAD to describe a self-sealing cuff i.e. Baska and 3gLM.

In 2012, a newly discovered 2nd generation device invented by Prof. Ming Tian was Blockbuster Laryngeal Mask Airway, which was used in 2015.\(^5\) It is pharyngeally introduced, with a different passage for inserting a nasogastric tube to prevent gastric aspiration. It is meant to provide higher airway seal pressures around the laryngeal aperture. This device is different from all other SADs in terms that it also facilitate fiberoptic guided tracheal intubation along with blind ETT insertion.

Professor Ming tian stated that this LMA offered improved hypolarynx ventilation and a better green channel for intubation. Because of the design of this LMA, it has fewer post-intubation sore throats and, because of the gastric port, a lower risk of aspiration. This LMA offers some unusual features, such as a 95-degree angulated airway that allows for better ventilation and intubation.\(^6\)

For intubation using the blockbuster laryngeal mask airway, a silicone wire reinforced tube with a Parker flex-tip known as the blockbuster tube is advised.

For insertion of an SADs or ETT, anaesthesia may be induced with an intravenous inducing agents like barbiturate, propofol, parenteral ketamine, or a volatile agent. Propofol\(^7\) works by modulating the inhibitory activity of the neurotransmitter gama-aminobutyric acid (GABA) via GABA-A receptors in the brain. Propofol is currently considered a first-line drug for the implantation of a laryngeal mask airway because of its enhanced recovery profile and lower adverse effects. Sevoflurane\(^8\), a non-pungent, halogenated volatile anaesthetic drug, enhances the effects of sedation and opioids, as well as non-depolarizing muscle relaxants, and reduces the incidence of breath holding, coughing, and laryngospasm. Because of its limited lipid solubility, it induces more quickly, recovers more quickly, and emerges more quickly.

MATERIAL AND METHODS
For 80 ASA Grade I or II patients ages 18-60 scheduled for elective general surgery, the Institutional Ethics Committee approved a prospective, randomised, and comparative study. A statistician helped determine the sample size by using criteria such as insertion characteristics and previous research, and the resulting sample size had a power of over 85%. Cholecystectomy, fibroadenoma, lumpectomy, incision and drainage, dilation and drainage, gynecomastia, axillary swelling, skin grafting, and MRM were only a few of the procedures that were carried out on the patients belonging to Mallampati Grade I or II, and selected for elective surgical procedures of 1-3 hours duration. All patients with an ASA grade of III or IV, Mallampati grade IV, BMI greater than 30 kg/m2, known or projected risk of pulmonary aspiration, and a difficult airway were excluded out of the study. The LMA was placed in either of the groups by a senior anaesthetist with experience in SGA placement. According to the manufacturer’s guidelines, 3/4 blockbuster LMAs were
used. Before insertion, the device was lubricated with a water-soluble lubricant.

As part of their pre-anesthetic evaluation, a thorough medical history and physical examination were conducted on the patient. Two groups of 40 patients each were to have LMA blockbuster insertion surgery under general anaesthesia with propofol or sevoflurane induction: group P (propofol-induced) and group S (sevoflurane-induced).

Every patient was asked to sign a written informed consent form in their own language. After 12 a.m., the patients were maintained NPO, and a pill of alprazolam 0.5 mg was administered with a sip of water at 6 a.m. before surgery.

When the patient arrived in the operating room, all of these monitors were attached to them: an ECG, NIBP, heart rate, EtCO2, and oxygen saturation (SpO2). All emergency airway equipment and medications were maintained on hand in case of an emergency. The patency and functionality of the blockbuster LMA and tube were checked after they were removed from their sterile packet. After preoxygenating the patient for 3–5 minutes, anaesthesia was induced in the supine position. The OT table was prepared with injections of glycopyrrolate (4microgram/kg), midazolam (0.02mg/kg), and fentanyl (2microgram/kg) prior to induction.

Iv propofol 2.5mg/kg (incremental dosages of 0.5mg/kg provided in case if required) was given over 30 seconds in group P with N2O:O2::60:40 over 30 seconds as an induction agent (propofol). For 30 seconds in Group S (sevoflurane), the circuit was primed with 8 percent sevoflurane in N2O 60% and O2 40%. Start of propofol injection or sevoflurane induction were used to identify the induction's beginning point. Both groups were considered inducible once they had lost their eyelash reaction and relaxed their jaw. All patients were manually ventilated for 3–4 minutes before the supraglottic airway was placed. In order to ensure proper seal, the cuff was inflated to the bare minimum. Intubation was facilitated by a 0.2 mg/kg dose of succinylcholine after ventilation with 5L of oxygen for 1–2 minutes followed by insertion of ETT through LMA. The time it took to insert the device and endotracheal tube was noted and compared between the two groups. It is possible to utilise jaw thrust or neck hypertension if a difficulty arises during insertion. Grading of ease of insertion was done as 1. Easy (inserted within 15s), 2. Slight difficult (inserted in >15s) and 3. Obvious difficult (failure). If there was any coughing, gagging, or body movements during device implantation, further propofol increments were administered to improve the depth of anaesthesia.

Correct induction and intubation was demonstrated by readings of between 35 and 45 mmHg of end tidal carbon dioxide, a square wave on a capnograph, and apparent chest expansion on manual ventilation.

Initially, a TV (tidal volume) of 8 ml/kg, an RR of 12–14 minutes, and an I:E ratio of 1:2 were used to begin the ventilation procedure.

End tidal carbon dioxide levels did not stay between 35 and 45 mmHg during positive breathing, which was taken as evidence of insertion failure, and any air leaks were detected through the drainage channel.

Using a manufacturer's recommended gastric tube, a suction tube was inserted into the suction channel of either device after it had been lubricated adequately. Proper insertion of the gastric tube was confirmed by auscultating epigastrium after infusing air with a 10ml syringe.

Anaesthesia was maintained with Nitrous oxide:Oxygen (60:40) along with vecuronium 4mg (loading dose) plus positive pressure ventilation and propofol infusion was started at the rate of 0.1-0.2mg/kg/minute in Group P (propofol) and N2O:O2::60:40 with sevoflurane 2% and vecuronium 4mg (loading dose) plus positive pressure ventilation in Group S (sevoflurane) and analgesia was obtained with paracetamol infusion.

Following LMA and ETT insertion, various haemodynamic parameters were noted:

- Heart rate
- Blood pressure systolic
- Blood pressure in the diastole
- Oxygen saturation

After the surgery, the patient was taken out of anaesthesia and given 100 percent oxygen. We gave the patient neostigmine (0.05 mg/kg) and glycopyrrolate (0.5 mg) to assist him regain muscular tone. When protective airway reflexes returned after oral suctioning, the SGA and ETT were removed. Following removal, the device's shape and blood staining were meticulously examined. The Modified Aldrete Score[9] was used to grade the level of emergent behaviour. At the first hour postoperatively and again at 24 hours, patients were asked if they had any signs of airway morbidity.
OBSERVATIONS AND RESULTS
Following observations and results were carried out after comparing the two groups on the basis of various characteristics.
For the study, the sample size was calculated to ensure that at least 85 percent of the data was collected with at least 5 percent significance (significant at 95 percent confidence interval). Analysis of raw data entered into a Microsoft Excel spreadsheet was carried out using the Statistical Package for Social Sciences (SPSS version 23.00). (IBM Corporation ARMONK, NY, USA). T-tests were used to examine continuous variables like age and gender, which are distributed normally. The Chi-square test was used to analyse categorical data, such as the number of patients and the proportion of cases. There were three distinct categories: non-significant, significant, and extremely significant p values less than 0.01 were all considered to be significant, whereas p values greater than 0.05 were considered to be non-significant.
Statistically significant (p<0.05) were the mean induction time, blockbuster LMA and ETT insertion time, and overall induction time, and the Modified Aldrete Score.

**Table 1: Comparing demographic data**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameter</th>
<th>Group P (n=40)</th>
<th>Group S (n=40)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mean age in years</td>
<td>42.32 ± 12.90</td>
<td>41.05 ± 11.93</td>
<td>0.648</td>
</tr>
<tr>
<td>2.</td>
<td>Mean weight in kgs</td>
<td>62.82 ± 6.15</td>
<td>60.57 ± 8.29</td>
<td>0.124</td>
</tr>
<tr>
<td>3.</td>
<td>ASA Grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>26</td>
<td>24</td>
<td>0.592</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>14</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Mean duration of surgery in minutes</td>
<td>70.75 ± 10.22</td>
<td>69.02 ± 9.55</td>
<td>0.436</td>
</tr>
</tbody>
</table>

**Table 2: Comparing time taken for induction, LMA insertion and ETT insertion and total time insertion**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameter</th>
<th>Group P</th>
<th>Group S</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mean time taken for induction (seconds)</td>
<td>53.14 ± 2.23</td>
<td>74.40 ± 3.28</td>
<td>0.001</td>
</tr>
<tr>
<td>2.</td>
<td>Mean time taken for blockbuster LMA and ETT insertion (seconds)</td>
<td>80.33 ± 4.32</td>
<td>110.21 ± 5.61</td>
<td>0.001</td>
</tr>
<tr>
<td>3.</td>
<td>Mean total time taken (seconds)</td>
<td>133.47 ± 5.22</td>
<td>184.60 ± 6.01</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Table 3: Comparing haemodynamic parameters**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameter</th>
<th>Group P</th>
<th>Group S</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Baseline heart rate per minute (beats/minutes)</td>
<td>93.95±6.61</td>
<td>91.25 ± 7.99</td>
<td>0.43</td>
</tr>
<tr>
<td>2.</td>
<td>Baseline systolic blood pressure (mmHg)</td>
<td>127.93 ± 12.29</td>
<td>126.08 ± 7.45</td>
<td>0.21</td>
</tr>
<tr>
<td>3.</td>
<td>Baseline diastolic blood pressure (mmHg)</td>
<td>77.55 ± 4.70</td>
<td>76.30 ± 5.21</td>
<td>0.13</td>
</tr>
</tbody>
</table>

**Fig. 2: Comparing time taken for induction**
Based on the Modified Aldrete Score, there was a noticeable rise in the number of instances. Five separate measurements were used to generate the Modified Aldrete score, which was then given one of three possible values: 0, 1, or 2. (activity, respiration, circulation, consciousness, and oxygen saturation). Overall, group S had a better total score than group P. The difference was statistically significant (p<0.05).

**Fig. 3:** Comparing time taken for blockbust LMA insertion and ETT insertion

**Fig. 4:** Comparing total time taken
No significant postoperative complications like sore throat, coughing, dysphonia, laryngospasm were noted in either of the groups.

**DISCUSSION**

Propofol was much faster than sevoflurane in inducing patients with appropriate jaw relaxation in our trial as the time taken for induction in Group S was (74.4±3.28 sec) compared to in Group P (53.14±2.23 sec). In this study, there was statistically significant difference (p<0.05) between the two groups. In 2019, Shirishkumar Gulabrao Chavan et al[10] did a similar study and found similar results. They discovered a statistically significant difference in induction durations between groups P and S of 53.60±10.25 sec and 79.90±8.48 sec, respectively. For LMA insertion and ETT insertion, the overall mean time for propofol group was 80.33±4.32 sec, whereas for sevoflurane group it was 110.2±5.61 sec. It is consistent with a research conducted by Choudhary S et al.[11]. For LMA insertion, the propofol group's mean time was 77.23±22.73 sec, whereas the sevoflurane group's was 106±17.64 sec. The researchers found the difference was statistically significant (p<0.05) according to the findings.

It took total of 133.47±5.22 seconds from induction to ETT insertion in group P and 184.6±6.01 seconds in group S in our study. Propofol (group P) and sevoflurane (group S) groups had significantly different durations of anaesthesia. According to Shirishkumar Gulabrao Chavan et al.[11], in a 2019 study with the same design, group P took considerably less time than group S (p<0.05).

The time it took to recover from the maintenance anaesthesia to spontaneous eye opening, hand squeezing, and achieving a Modified Aldrete Score > 9 was measured in our study. The sevoflurane group had a considerably shorter duration than the propofol group (p=0.014).

Our findings, which are in line with those of a 2017 research by Gaurav goyal et al.[12], show that in group P, it required 12.50 ± 2.86 min to attain a modified Aldrete score >9, whereas in group S, it took 8.83 ± 2.52 min. Propofol was shown to be significantly longer (p=0.00) than sevoflurane.

**CONCLUSION**

At the end of the day, both sevoflurane and propofol can be used in elective general surgical operations lasting less than 3 hours since they give an option with little changes in haemodynamic parameters. It takes less time to induce and insert blockbuster LMA and ETT with propofol than sevoflurane, requires fewer additional manoeuvres, has a lower failure rate, and provides greater analgesia with less risk of postoperative nausea and vomiting with propofol than sevoflurane. However, the haemodynamics were better in sevoflurane group and the emergence after the surgery as seen by Modified Aldrete Score was better in sevoflurane group. For blockbuster LMA insertion, sevoflurane is a good replacement for propofol, but if hemodynamic stability is a priority, sevoflurane is the preferred choice.
ACKNOWLEDGEMENT
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REFERENCES
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