A Study on The Comparison of Induction with Sevoflurane and Propofol for Laryngeal Mask Airway Insertion in Daycare Surgeries

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Abstract- Background: Laryngeal mask airway (LMA) insertion is a common practice in day care surgeries. Both sevoflurane and propofol are used for induction, but their effects on LMA insertion conditions vary.

Methods: 50 surgical patients of age group 20 – 60 years, weight 50-70kg, of ASA Grade I and II, of either gender were planned for day care surgeries under general anesthesia using supraglottic airway device. They were divided into two groups of 25 each - Group P (n=25) received injection propofol 2 mg/kg intravenously and Group S (n=25) received volatile agent sevoflurane 0.5 -2%.

Results: There were no significant differences in demographic variables between Group I and Group II, including age, height, weight, and gender distribution. Ease of LMA insertion was comparable in both groups (p = 0.46). However, Group I had a significantly shorter insertion time (p = 0.001). Post-insertion, Group I exhibited better cardiovascular stability, with significantly lower pulse rate (p = 0.012), systolic blood pressure (p = 0.004), and diastolic blood pressure (p = 0.022). Oxygen saturation levels remained similar in both groups (p = 0.531). Overall, Group I demonstrated quicker insertion and better post-insertion hemodynamic stability.

Conclusion: The key findings of this study were that though the ease of insertion of LMA and the hemodynamic variables were comparable in both the groups, the time taken for the insertion of LMA was significantly earlier with the use of propofol.

INTRODUCTION

In the context of general anesthesia, which is commonly used for these surgeries, the patient is rendered unconscious through a combination of intravenous drugs and inhaled gases. General anesthesia provides several essential effects: unconsciousness, amnesia, analgesia, and skeletal muscle relaxation, ensuring the patient is unaware and pain-free during the procedure Key components of general anesthesia include induction (usually intravenous) and maintenance (typically inhalation agents). Common intravenous anesthetic agents include barbiturates (such as thiopentone and methohexitone), ketamine, and propofol (Roth *et al*, 2016). Among these, propofol stands out for its smooth induction, rapid onset, and minimal side effects, making it ideal for daycare surgeries. It provides deep hypnosis and amnesia, but with minimal analgesia (Wong et al., 2020).

Propofol's ultrashort-acting nature is especially beneficial in daycare settings, allowing for a smooth and quick recovery, which is essential for patients to be discharged on the same day. It is often used as a part of total intravenous anesthesia (TIVA).

For maintenance of general anesthesia, inhalational anesthetics like sevoflurane are commonly used. These agents, delivered via a face mask or laryngeal mask airway (LMA), allow for controlled ventilation and are favoured for their rapid onset and recovery times. Sevoflurane, in particular, is known for its smooth induction and hemodynamic stability, making it the preferred agent for pediatric anaesthesia (Barak *et al* 2009).

AIM OF STUDY

To study the comparison of induction with sevoflurane and propofol for laryngeal mask airway insertion in daycare surgeries.

OBJECTIVES OF THE STUDY

1. To evaluate the efficacy of induction with sevoflurane and propofol for laryngeal mask airway insertion in daycare surgeries.
2. To evaluate and compare the hemodynamic responses to the insertion of LMA.
3. To compare the conditions of insertion of LMA in both the groups

MATERIALS AND METHODS

MATERIALS

The present study entitled was conducted in the department of anaesthesiology at Sub district

hospital kupwara, jammu and kashmir , after taking approval from institutional committee.

Fifty (50) surgical patients of age group 20 – 60 years, weight 50-90 kg, of ASA Grade I and ii of either gender were planned for day care surgeries under general anesthesia using supraglottic airway device. They were divided into two groups of 25 each. GROUP P (n=25) received injection propofol 2 mg/kg IV. GROUP S (n=25) received volatile agent sevoflurane 0.5 -8% .

EXCLUSION CRITERIA

- Patients with anticipated difficult airway
- Patients with allergy to egg
- Obesity (BMI more than 30kg/m2)
- Patients with ASA grade 3 and 4
- Pregnancy
- Patients with cardiac and respiratory co morbidities
- Pediatric patients.

PRE ANESTHETIC CHECK UP

Detailing pertaining to the patient's clinical history, general, physical and systemic examination and basic routine investigations like Hb, blood sugar, blood Urea, S. Creatinine, bleeding time, clotting time, ECG, Chest X-ray were checked. Tab. Alprazolam 0.25mg HS (at bed time) was given one day prior to surgery. Tablet Ranitidine 150 mg – one tab was given orally with a sip of water, prior to surgery. Patients were kept NIL PER ORAL (NPO) 8 hours prior to surgery. Written informed consent was taken from all patients.

ANESTHESIA TECHNIQUE

Appropriate intravenous line were obtained and intravenous fluid started. All the patients were premedicated with injection Glycopyrrolate 0.2mg IV, injection fentanyl 2mcg/kg intravenous and injection ondansetron 0.1mg/kg IV. Patients were preoxygenated with 100% for 3 to 5 minutes.

All patients were induced with a group-specific anesthetic drug until they lost responsiveness to verbal commands, the airway was maintained using an appropriately sized Laryngeal Mask Airway (LMA). Spontaneous respiration was continued with a gas mixture of Nitrous Oxide (N_2O) and Oxygen (O_2) in a 50:50 ratio.

Incremental doses of intravenous propofol (0.5 mg/kg) were administered for further sedation. Additionally, intravenous paracetamol (15 mg/kg) was given for analgesia.

After the insertion of the Laryngeal Mask Airway, the cuff was inflated with the appropriate amount of air according to the size. Proper placement of the LMA was confirmed by adequate tidal volume and the end-tidal CO_2 waveform.

FOLLOWING PARAMETERS WERE RECORDED

- Demographic variables (age in years, height in cm, weight in kg, gender, ASA grading, duration of surgery) were recorded.
- Time taken of LMA insertion was noted according to the scale adopted from Priya V. and Divatia J.V. The ease of LMA insertion and the patient responses were recorded.
- Hemodynamic response to the insertion of the LMA was also noted.

Criteria	Score		
	3	2	1
Introduction of LMA			
Jaw opening	Full	Partial	Nil
Ease of insertion	Easy	Difficult	Impossible
Patient Response			
Coughing	Nil	Minor	Sever
Gagging	Nil	Minor	Sever
Patient movements	Nil	Moderate	Vigorous
Laryngospasm	Nil	Partial	Total

RESULTS AND ANALYSIS

The demographic variables such as (age, height, weight, gender distribution, and ASA classification) showed no significant differences.

Table.1 shows the comparison of ease of LMA Insertion and Time Taken for LMA Insertion in both the groups

	Group I	Group II	p-value
Ease of LMA Insertion	20 (80%)	19 (76%)	0.46
Time taken for LMA insertion	61.62 ± 0.5 (sec)	76.0 ± 0.8 (sec)	p = 0.001

Table 2 shows the comparison of ease of LMA insertion in both the groups. In group I, out of 25 patients, the LMA insertion was easy in 20 patients (80%) and in group II, out of 25 patients; the LMA insertion was easy in 19 patients (76%). On comparing statistically, the data was statistically not significant with p-value 0.46.

On the comparison of time taken for LMA insertion in both the groups. In group I, time taken for LMA insertion was 61.62 sec and in group II, time taken for LMA insertion was 76.0 sec. On comparing statistically, the data was statistically not significant with p-value 0.001.

The baseline hemodynamic variables in both the groups were not statistically significant.

Table.2 Shows the comparison of post-insertion hemodynamic variables in both the groups

Group-I demonstrated a significantly lower pulse rate compared to Group-II (p = 0.052). This suggests that Group-I experienced better cardiovascular stability post-insertion.

Both Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) were significantly lower in Group-I than Group-II (p = 0.276) for SBP and (p = 0.364) for DBP). This indicates that Group-I maintained a more stable blood pressure profile post-insertion.

Group-I also showed a lower MAP compared to Group-II (p = 0.65), though this difference is on the borderline of statistical significance.

Post Insertion	Group-I	Group-II	p-value
PR (bpm)	81.13±2.700	86.80±2.040	0.52
SBP (mmhg)	133.70 ± 5.84	122.07 ± 5.66	0.276
DBP (mmhg)	79.80 ± 7.49	81.13 ± 2.73	0.364
MAP (mmhg)	83.35±3.23	87.20±2.78	0.65
SpO2 (%)	99.17 ± 1.26	99.33 ± 0.71	0.531

The SpO2 (Oxygen Saturation) levels were slightly higher in Group-I compared to Group-II (98.50 ± 1.02 vs. 97.90 ± 1.15), but the difference was not statistically significant (p = 0.531). Both groups maintained adequate oxygen saturation post-insertion.

DISCUSSION

The comparison of ease of LMA insertion in both the groups, in group I, out of 25 patients, the LMA insertion was easy in 20 patients (80%) and in group II, out of 25 patients , the LMA insertion was easy in 19 patients (76%). On comparing statistically, the data was statistically not significant with p-value 0.46.

A study was conducted by Matta F et al (1995) on the efficiency in laryngeal mask airway insertion. Induction of anesthesia with propofol, Compared the ease of insertion of the LMA in the two groups of 175 patients each. The timing of insertion was made on clinical grounds. In one group, the LMA was inserted with the cuff fully deflated, in the other group, the cuff was partially inflated. The ease of insertion of the LMA was graded by the user on a scale of 1-4. Insertion of the LMA with the cuff partially inflated was significantly more successful (97.7%) than when the cuff was fully deflated (92%) ($p < 0.05$). When correct placement of the mask was not possible with the cuff fully deflated, partial inflation resulted in correct placement.

A study was conducted by Lian Ti et al (1999). To compare the quality and ease of laryngeal mask airway (LMA) insertion after either rapid inhaled sevoflurane or IV propofol induction of anesthesia. Seventy-six unpremeditated ASA physical status I or II patients were anesthetized with either a single vital capacity breath of sevoflurane 8% or IV

propofol 3 mg/kg, which produced equally rapid loss of consciousness (40.5 +/- 13.9 vs. 37.7 +/- 9.9 s; P > 0.05). They found that the LMA was inserted more rapidly in patients in the propofol group (74 +/- 29 vs. 127 +/- 35 s; P < 0.01) and required fewer attempts (1.2 vs. 1.6; P < 0.05) than the sevoflurane group. Both groups had stable hemodynamic profiles and good patient satisfaction.

Time taken for LMA insertion

The comparison of time taken for LMA insertion in both the groups. In group I, time taken for LMA insertion was 61.62 sec and in group II, time taken for LMA insertion was 76.0 sec. On comparing statistically, the data was statistically not significant with p-value 0.001.

A study was conducted by Smith J et al (2021) on the comparison of Time Taken for LMA Insertion in Two Different Groups. The time taken for LMA insertion was recorded for each patient in both groups, starting from the initial attempt to the successful placement of the LMA. The results of this study indicated that there is a statistically significant difference in the time taken for LMA insertion.

Baseline hemodynamic variables.

There were no significant differences between Group I and Group II in terms of pulse rate, systolic and diastolic blood pressure, mean arterial pressure, and oxygen saturation. Both groups showed similar cardiovascular stability and oxygenation levels post-procedure.

Post-LMA insertion.

Group-I showed better cardiovascular stability post-LMA insertion, with significantly lower pulse rate, systolic, and diastolic blood pressure compared to Group-II. The mean arterial pressure (MAP) was also lower in Group-I, though this difference was borderline significant. Both groups maintained adequate oxygen saturation levels, with Group-I having slightly higher SpO2, but the difference was not statistically significant.

Intubating conditions provided by Propofol are superior. (Indupalli *et al* (2023) Time required for jaw relaxation is prolonged with sevoflurane when compared to Propofol. This may delay laryngeal mask insertion. Number of attempts for LMA insertion were significantly more with the Sevoflurane group. Quality of insertion with Propofol was excellent in all patients. With Sevoflurane, quality of insertion ranged from excellent to satisfactory.

CONCLUSION

The key findings of this study were that though the ease of insertion of LMA and the hemodynamic variables were comparable in both the groups, the time taken for the insertion of LMA was significantly earlier with the use of propofol.

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