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Research Article

COMPARISON OF INDUCTION OF GENERAL ANESTHESIA WITH PROPOFOL AND SEVOFLURANE FOREASE OF I GEL INSERTION: A RANDOMISED CONTROLLED TRIAL

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ABSTRACT

Objectives: The aim of this study is to compare the conditions for supraglottic airway device (I Gel) insertion following induction of anesthesia with inhalation of Sevoflurane or intravenous induction with propofol in patients undergoing short surgery (<3 h) and comparison the loss of eye reflex, Hemodynamic parameters, Jaw opening, Ease of insertion, coughing, gagging, laryngeal spasm are taken into consideration.

Methods: It is randomized control trial was conducted in the Department of Anaesthesia at Command Hospital (Air Force) Bengaluru after obtaining permission from the Institutional Ethical Committee. A total of 140 patients included in the study with written consent, during the 18-month period between May 2020 and November 2021. Patients were randomized into one of the two groups as group P: Propofol and group S: Sevoflurane for induction of anesthesia. Both groups receive IV Lignocaine (2 mL of 1%) before induction of anesthesia. The grading condition for insertion between the groups were noted and compared using appropriate statistical tool using SPSS v21 operating on windows 10.

Results: There was no significant difference in the mean age of patients between propofol group and sevoflurane group. Overall propofol group had the better performance compared to the sevoflurane group. There was higher incidence of repeat administration in the sevoflurane group (2.9%) compared to propofol group (1.4%), which was statistically insignificant.

Conclusion: The present study found comparable results for supraglottic airway device (I Gel) following induction of anesthesia with inhalation of Sevoflurane or intravenous induction with Propofol.

Keywords: Sevoflurane, Propofol, Supraglottic airway device, Laryngospasm.

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INTRODUCTION

Supraglottic airway device (I Gel) is a standard and safe technique in variety of surgical procedures and shows that an it can reduce post-operative pain after laproscopic surgery [1]. The goal of its development was to create an intermediate form of airway management face mask and endotracheal tube [2]. It ensures a better control of airway than the facemask, leaving the anesthetist's hands free and avoiding the disadvantages of endotracheal tube-like presser response of intubation, sore throat, croup, and post-operative hoarseness [3]. The supraglottic airway device (I Gel) has gained widespread popularity in airway management during surgery. It is an effective and simple solution in the management of difficult airway. With the use of supraglottic airway device (I Gel), muscle relaxation is not required, laryngoscopy is avoided, and minimal hemodynamic changes during insertion [4,5].

Recently, vital capacity breath inhaled induction of anesthesia with sevoflurane has been used as an alternative to intravenous induction in adults. This is rapid, less airway excitatory response, high patient acceptance, and good hemodynamic stability [6]. After vital capacity breath induction may allow the use of sevoflurane as a single drug for the induction and maintenance of anesthesia, which would ease the transition period and lead to cost saving.

Our study aimed to compare the I Gel insertion following induction of anesthesia with inhalation of Sevoflurane and intravenous induction with Propofol.

METHODS

This is Single blinded, randomized control trial was done at Command Hospital (air force) Bengaluru from May 2020 to November 2021, after obtaining approval from the institutional research Ethical board (CHAFB/IEC/02/2021 Dt. 13 Feb 2021), CTRI Approval (CTRI/2022/06/043227 Dt. 13/06/2022) and written, informed consent from the patients. 140 patients with ASA physical status I or II aged between 20 and 70 years undergoing general anesthesia for short surgery of <3 h are included in the study. Patients with predicted difficult airway (Mallampatti grade III or IV), ASA 3 and more, history of GI reflux, receiving anti-epileptic medication, history of cardiovascular, renal, hypertensive disease or known allergy to any anesthetic, and patients who are unable to open their mouth were excluded from the study.

All patients were examined during the pre-operative visit and routine investigations were done. Patients were randomly allocated into two groups (group P and group S) using computer-generated random number. On arrival to the operating room, patient baseline parameters were recorded (electrocardiogram, non-invasive blood pressure, SpO_2, and $ETCO_2$). IV access was secured with 20 G IV cannula and ringer lactate was started. Pre-medication comprising of intravenous Midazolam 0.03 mg/kg and lignocaine 1.5 mg/kg given 15 min and 90 s prior induction, respectively.

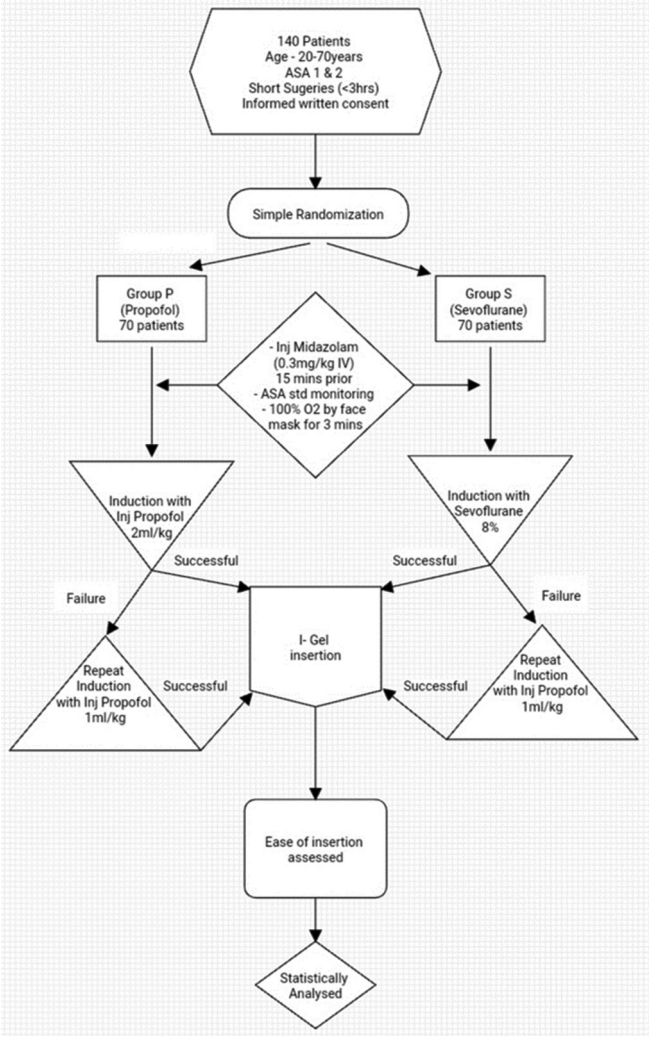
Before induction of anesthesia, patients of both groups had a face mask placed over their face and were breathing spontaneously. Group P received

intravenous Propofol (2 mg/kg) with 100% oxygen via the face mask. In group S, the anesthesia circuit is primed with Sevoflurane 8% in O_2 (flow rate–8 L/min.) for 30 s. Each patient was asked to exhale maximally and the primed circuit was then connected to the face mask. Loss of eyelash reflex was considered as the end point of induction in both groups. IV Fentanyl (2 mcg/kg) was injected immediately after loss of eyelash reflex and I Gel insertion attempted by an experienced anesthesiologist. If the first attempt is unsuccessful and there is a requirement for more anesthetic, repeat administration of either Propofol or Sevoflurane (Propofol 1 mg/kg or 4% Sevoflurane). The time for induction i.e. the time (in seconds) taken from induction of anesthesia to the loss of eyelash reflex, and the time for supraglottic airway device (I Gel) insertion i.e. the time (in seconds) taken from loss of eyelash reflex to successful supraglottic airway device (I Gel) insertion are recorded in both the groups. Grading of condition for suprglottic airway device insertion as per Table 1.

Hemodynamic parameters (mean arterial pressure and heart rate) were recorded at baseline, at induction, and every minute for 5 min after induction.

Fiberoptic bronchoscope score of the position of the supraglottic airway device (I Gel).

- 4 - Only vocal cords seen
- 3 - Cords + Posterior epiglottis seen
- 2 - Cords + Anterior epiglottis seen
- 1 - Cords not seen but function adequate.



CONSORT Diagram

Statistical analysis

The collected data were summarized as mean, standard deviation, frequency, and percentage. The summarized data were represented using tables. Student's unpaired t-test was used for continuous variable data and Chi-square test incorporating Fisher's exact test and the Mann–Whitney test were used for the variables for categorical variables. A $p<0.05$ was considered as statistically significant.

RESULTS

In our study, total of 140 patients included who were divided into two groups with 70 patients in each group. The demographic feature and ASA PS are comparable in both group P and group S (Tables 2 and 3).

There is no significant difference in the ease of insertion, jaw opening, coughing, gagging, and laryngospasm between the groups (Table 3).

Group P had a better performance compared to Group S. There was higher incidence of repeat administration in the sevoflurane group (2.9%) compared to propofol group (1.4%), which was statistically insignificant (Table 2).

DISCUSSION

Ideal induction agent for supraglottic airway device (I Gel) insertion would provide loss of consciousness, jaw relaxation, and absence of upper airway reflexes rapidly without cardiorespiratory compromise. Propofol is best intravenous induction agent for supraglottic airway insertion and sevoflurane is the best volatile agent, though neither is ideal. Our aim is to compare the conditions for supraglottic airway device insertion (I Gel) following induction of anesthesia with inhalation of Sevoflurane or intravenous induction with Propofol.

Total 140 patients were included in the study and divided into two groups with 70 patients in each group. Demographic features are comparable in both groups. There was no statistically significant difference in the scores for ease of insertion, jaw opening, coughing, gagging, and laryngospasm between the propofol and sevoflurane. However, the overall scores were better among the propofol group compared to sevoflurane group. We found higher incidence of repeat administration in group S (2.9%) compared to group P (1.4%), which was statistically insignificant.

In study by Singh *et al*., propofol required less time to achieve eyelash reflex loss, jaw relaxation, and effective insertion of a laryngeal mask airway (LMA). Propofol increased the percentage of patients who had successful LMA implantation on the first try. Apnea lasted longer in the propofol group. The group propofol had greater excitatory movement. Propofol did not cause coughing or laryngospasm. Both groups were free of hiccups. Coughing and gagging were absent during LMA insertion in the sevoflurane group, while laryngospasm was absent in the propofol group. Propofol patients experience increased movement. The current study revealed that propofol was superior to sevoflurane for adult LMA insertion [7]. Ti *et al*., in their study opined that the induction time, LMA insertion conditions, and the number of attempts for proper placement and complications were equivalent between the sevoflurane and propofol groups [8]. Siddik-Sayyid *et al*., have found that the insertion time was similar in the both groups which was in agreement with our study [6].

Only difference between Singh *et al*. and this study is use of thermoplastic elastomer in place of LMA. Otherwise in results statistically propofol was better inducing agent in Singh *et al*.

Udaybhaskar *et al*., results demonstrated Sevoflurane takes longer to induce and relax the jaw than propofol. In terms of LMA insertion timing and circumstances, there was no statistically significant difference between the two groups. The propofol group had higher

Table 1: Grading of conditions for supraglottic airway device (thermoplastic elastomer) insertion were noted

Introduction of the supraglottic airway device (thermoplastic elastomer)	**3**	**2**	**1**
Jaw opening	Full	Partial	Nil
Ease of insertion	Easy	Difficult	Impossible
Patient response	**3**	**2**	**1**
Coughing	Nil	Minor	Severe
Gagging	Nil	Minor	Severe
Laryngospasm	Nil	Partial	Total
Patient movements	Nil	Moderate	Vigorous
Total score	18		
18	Excellent satisfactory poor		
16–17			
<16			

Table 2: Comparison of the mean variables between the groups

Demographic and insertion characterstic	**Propofol group**		**Sevoflurane group**		**p-value**
	Mean	**SD**	**Mean**	**SD**	
Age in years	40.6	13.8	40.5	11.2	0.957
Ease of insertion	2.9	0.4	2.8	0.5	0.429
Jaw opening	2.9	0.3	2.9	0.4	0.612
Coughing	2.9	0.3	2.8	0.5	0.150
Gagging	2.9	0.3	3.0	0.2	0.736
Laryngospasm	3.0	0.1	3.0	0.0	0.319
Total score	14.66	0.98	14.54	1.13	0.522

Table 3: Comparison of the gender and characteristics during insertion between groups

Demographic and insertion characterstic	**Propofol group**		**Sevoflurane group**		**Chi-square (p-value)**
	Count	**n %**	**Count**	**n %**	
Gender					
Female	39	55.7	42	60.0	0.264
Male	31	44.3	28	40.0	(0.608)
ASA					
1.0	53	75.7	58	82.9	1.087
2.0	17	24.3	12	17.1	(0.297)
Ease of insertion					
1.0	1	1.4	3	4.3	1.032
2.0	6	8.6	6	8.6	(0.597)
3.0	63	90.0	61	87.1	
Jaw opening					
1.0	1	1.4	2	2.9	0.341
2.0	2	2.9	2	2.9	(0.843)
3.0	67	95.7	66	94.3	
Coughing					
1.0	1	1.4	4	5.7	2.123
2.0	2	2.9	3	4.3	(0.346)
3.0	67	95.7	63	90.0	
Gagging					
1.0	1	1.4	0	0.0	1.20
2.0	2	2.9	3	4.3	(0.549)
3.0	67	95.7	67	95.7	
Laryngospasm					
2.0	1	1.4	0	0.0	1.007
3.0	69	98.6	70	100.0	(0.316)
Additional measures					
NIL	69	98.6	68	97.1	3.007 (0.22)
Repeat administration	1	1.4	2	2.9	

apnea time. Propofol caused a greater decrease in heart rate and mean blood pressure. Propofol causes quicker induction, but sevoflurane causes good hemodynamic stability [9].

In a study by Kumari *et al*., showed that sevoflurane is associated with good hemodynamic stability, but quality of anesthesia provided with propofol is superior with a statistically significant p<0.5. Sevoflurane is linked with strong hemodynamic stability, propofol provides greater anesthetic quality. When compared to propofol, prolonged jaw relaxation with sevoflurane may delay LMA implantation. There was no trauma during insertion in either group, as evidenced by the absence of blood in the LMA following removal. Patients who got propofol complained of discomfort during injection, whereas those who received sevoflurane complained of stench while the mask was held. As a result, sevoflurane is a viable alternative to propofol for LMA placement in adults [10].

In comparison to this study, results were almost similar with respect to induction with propofol versus sevoflurane. Overall, propofol was better inducing agent in Kumari *et al*.

In a study by Molloy *et al*., the mean time to successful LMA insertion was 1.3 (1–3) min in P and 2.2 (1–3) min in S. Eleven patients in group P (25%) required extra propofol, compared to 4 (9%) in group S, p=0.05. Complication rates were comparable in both groups, and all patients had LMA placed successfully within 3 min. In most cases, modified vital capacity breath inhalational induction with sevoflurane 8% is effective for LMA installation, however, it takes somewhat longer than propofol [11].

Propofol was repeated doses was significantly more compared to sevoflurane in Molloy *et al*. in contrast to this study where in sevoflurane repetition was more times than sevoflurane. Moreover, study had limited number of patients when compared to this study to conclude the results.

In study by Priya *et al*., excellent circumstances for LMA placement were established in a substantially higher proportion of patients in group P (64%) than in group S (32%), (p=0.02). Group P had a considerably higher mean score for LMA insertion circumstances (p=0.012). In group P, 72% of patients had complete jaw opening compared to 44% in group S (p=0.047). As a result, it can be stated that propofol is superior than sevoflurane for LMA insertion when the loss of eyelash reflex is used as the end point of induction, most likely due to improved jaw relaxation [12]. As a result, it can be stated that propofol is superior than sevoflurane for LMA insertion most likely due to improved jaw relaxation [12]. Priya *et al*. patient group was restricted to breast malignancy for modified radical mastectomy (MRM) whereas in this study has patients underwent various other surgeries.

CONCLUSION

Study found comparable results for supraglottic airway device (thermoplastic elastomer) following induction of anesthesia with inhalation of sevoflurane or intravenous induction with propofol. However, the propofol showed a superior performance compared to the sevoflurane. Study also found that propofol can be effective alternative for sevoflurane for insertion of supraglottic airway devices.

AUTHOR'S CONTRIBUTION

All the authors contributed to the preparation of the final manuscript.

CONFLICT OF INTEREST

None.

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None.

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