Section: Anaesthesiology

Original Research Article

COMPARISON OF BASKA MASK WITH I-GEL IN GENERAL ANAESTHESIA WITH SPONTANEOUS VENTILATION IN SHORT-DURATION SURGERIES

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Received : *05/11/2023*
Received in revised form : *12/12/2023*
Accepted : *27/12/2023*

Keywords:
Laryngeal mask airway, Baska mask airway, I-gel, General anaesthesia, SAD seal, Elective surgeries

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DOI: 10.47009/jamp.2024.6.1.14

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (1); 68-72

Abstract

Background: The laryngeal mask airway (LMA) is an alternative with fewer side effects and stress responses and is recommended for emergency and elective surgeries. This study aimed to compare the efficacy, safety, and various parameters during the insertion of the Baska mask airway versus I-gel for short procedures under general anaesthesia. **Materials and Methods:** A prospective, randomised, interventional study was conducted on 70 patients at ESIC Medical College and PGIMSR, Chennai, from August 2019 to November 2020. Seventy patients posted for elective short surgical procedures were randomly (sealed envelope technique) assigned to two groups of 35 patients each to undergo General Anaesthesia with either Baska mask or I-Gel. Standard monitors were recorded, including pulse oximetry for saturation (SpO2), baseline pulse rate, blood pressure, and oxygen saturation. **Result:** There were no statistically significant differences between the groups regarding sex, age, weight, heart rate, or mean arterial pressure ($p>0.05$). There was a statistically significant difference in the ease of intubation between the groups (54.3% in the Baska group and 94.3% in the I-gel group). The number of successful intubation attempts also differed significantly, with 64.7% in the I-gel group succeeding in one attempt, while 88.9% in the Baska group required two attempts. Both groups demonstrated adequate SAD seal, but a significant difference was noted in the need for manipulations, with 64.7% in the I-gel group not requiring any manipulations. **Conclusion:** We conclude that the I-Gel is a better device than the Baska mask in terms of convenience for anaesthetists in securing the airway.

INTRODUCTION

An anaesthesiologist's major responsibility is maintaining a proper airway and providing adequate oxygenation and ventilation, which can be challenging during general anaesthesia. The gold-standard technique for maintaining the airway and respiration is laryngoscopy, followed by endotracheal intubation, a skilled procedure requiring adequate training and expertise. It can end up in complications like hemodynamic instability, loss of airway, desaturation, etcetera, if anaesthesiologists are not vigilant enough.[1,2]

As endotracheal intubation requires expertise and is stressful for both anaesthesiologists and patients, laryngeal mask airway (LMA), a type of supraglottic airway, has come into practice and has evolved over the years as an alternative to endotracheal intubation. These airway devices are associated with comparably fewer haemodynamic side effects and stress responses. Inserting an LMA is easier to learn than endotracheal intubation, making it a good alternative for securing the airway.[3,4]

Supraglottic airway devices have been recommended as rescue airways during difficult airway management, particularly the "cannot intubate, cannot ventilate" scenario. Today, they are not only used for emergencies but also for elective surgeries. Ambulatory surgeries for ASA class 1 and 2 patients are among the most suitable areas. They are also recommended in patients with coronary artery disease for short surgical procedures as their use is associated with lesser hemodynamic responses.[5,6]

Despite certain disadvantages, such as being inappropriate for controlled ventilation and not protective against aspiration, laryngeal masks are being utilised progressively and more frequently than endotracheal intubation or face masks, except in a few situations, such as when fasting cannot be confirmed, gross or morbid obesity, pregnancy,

ISSN (O): 2687-5365; ISSN (P): 2753-6556

multiple or massive injuries, acute abdominal or thoracic injury, and conditions involving delayed gastric emptying, including a history of gastroesophageal reflux and hiatal hernia. They are also of limited value in patients with poor lung compliance as they cannot withstand high inflation pressures.[7,8] Many innovations and improvements have been made in designing LMAs to address these concerns. Certain laryngeal masks also aid in tube insertion in patients with difficult airways and allow insertion of the fiberoptic bronchoscope.

Aim

This study aimed to compare the efficacy, safety, and various parameters during the insertion of the Baska mask airway versus I-gel for short procedures under general anaesthesia.

MATERIALS AND METHODS

A prospective, randomised, interventional study was conducted on 70 patients at ESIC Medical College and PGIMSR, Chennai, from August 2019 to November 2020. Seventy patients posted for elective short surgical procedures were randomly (sealed envelope technique) assigned to two groups of 35 patients each to undergo General Anaesthesia with either Baska mask or I-Gel.

Inclusion Criteria

The study included individuals aged 18 to 60, with a weight range of 50 to 90 kg, classified as ASA I-II, undergoing elective surgeries lasting approximately one hour under general anaesthesia and Modified Mallampati Grade 1 & 2.

Exclusion Criteria

Patients who were unwilling to participate, those with hypertension, use of beta-blockers or antihypertensive drugs, pregnant individuals, chronic alcoholics, gastric reflux posing an aspiration risk, suspected airway difficulties with mouth opening <2 cm or reduced cervical spine mobility, a history of obstructive sleep apnoea, individuals with a preoperative sore throat or respiratory infection, and those who underwent neck or oropharyngeal airway surgery were excluded.

All patients meeting the inclusion criteria were included after obtaining approval from the Institutional Ethics Committee and obtaining informed consent. The patients underwent the following investigations: preoperative biochemical (RBS and RFT), haematological (Hb%, TC, DC, and PLT count), chest X-ray PA view, and 12 lead ECG. Airway and range of neck movements were assessed to rule out the possibility of difficult intubation.

Standard monitors, including pulse oximetry for saturation (SpO2), noninvasive blood pressure monitoring (NIBP), ETCO2, electrocardiogram (ECG), baseline pulse rate, blood pressure, and oxygen saturation, were recorded. An intravenous line was started before the procedure with an 18G cannula, and crystalloid infusion was commenced. All patients received pre-oxygenation in the supine position with oxygen using a face mask at a flow rate of 8 L/min. for 1 min. All patients were premedicated with Inj midazolam 0.03 mg/kg, Inj glycopyrrolate 5mcg/kg and Inj fentanyl-2mcg/kg intravenously before induction. Heart rate and systolic, diastolic, and mean arterial pressures were recorded before induction. All patients were induced with an injection of Propofol 2.5 mg/kg, and no muscle relaxants were used.

The ease of insertion, number of attempts, manipulations, assistance required, and adequate sealing of a Single Airway Device (SAD) were compared. Oxygen saturation was maintained at 100%, and if three attempts failed, the patient was intubated. A trained anesthesiologist inserted the SAD using airway manipulations such as neck extension, jaw thrust, or chin lift. The size of the SAD was chosen based on the patient's weight and the manufacturer's recommendations. Both SADs were introduced blindly.

Techniques of Insertion

Baska insertion: The patient's head and neck were placed in the morning sniffing position, and the mask was lubricated with water-soluble lignocaine jelly. The proximal firmer part of the Baska mask is compressed between the fingers and thumb and passes between the teeth towards the hard palate, avoiding the tongue. The device was advanced until the resistance was felt.

I-Gel insertion: The patient was placed in the morning air position, and the cuff was lubricated and glided along the palate until resistance was felt. If airway obstruction or leakage was observed, the device was removed. An endotracheal tube was inserted if more than three attempts were required. A circular anaesthesia breathing system was connected, and the patient was ventilated with a tidal volume of 6-8 ml/kg, I: E Ratio of 1:2, and RR of 12/min. Anaesthesia was maintained using sevoflurane (1 MAC), 33% O2, and 67% N2O. The HR, DBP, SBP, and MAP were recorded at various intervals. Propofol 40 mg was administered to maintain haemodynamics if the arterial pressure and heart rate increased. Nitrous oxide and volatile anaesthetics were discontinued after the last skin suture, and the fresh gas inflow rate was changed to 6 L/min of oxygen. After full recovery, the SAD was removed, and complications, such as dysphonia, vomiting, and laryngospasm, were investigated.

Statistical Analysis

Statistical analysis was performed using SPSS software version 23. The characteristics of the study participants are described using descriptive statistics. Means and standard deviations were used to describe normally distributed continuous data; ordinal or continuous nonsymmetrically distributed data were reported as the median. The Student's t-test compared the means between two unmatched groups with continuous data and normal distributions. The chi-squared (χ^2) test was used to compare nominal and ordinal data between the groups. Differences were considered significant when the p-value was <0.05.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

RESULTS

In the I-GEL group, 85.7% of the patients were females, and 14.3% were males. Similarly, in the BASKA group, 88.6% of the patients were females, and 11.4% were males. There was no statistically significant difference between the groups regarding sex (p>0.05).

The analysis of age distribution indicated a mean age of 34.09±7.789 in the BASKA group and 34.14±11.69 in the I-GEL group, with no statistically significant difference between the groups (p>0.05). Additionally, the mean weight in the BASKA group was 63.69±8.659 kg; in the I-gel group, it was 61.43±9.11 kg, with no statistically significant difference observed across the groups (p=0.426) [Table 1].

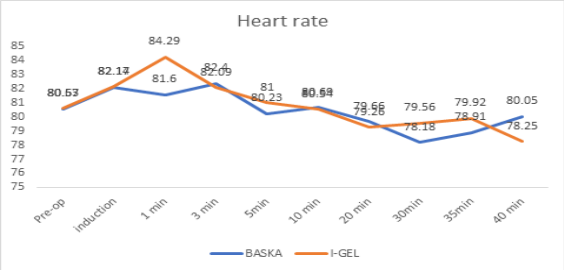

Figure 1: Comparison of heart rate between groups

The comparison of the heart rate and mean arterial pressure between the groups revealed no statistically significant differences (p > 0.05) in both cases [Figure 1 and 2].

There was a statistically significant difference in the ease of intubation between the groups (54.3% in the BASKA group and 94.3% in the I-gel group). The number of successful intubation attempts also differed significantly, with 64.7% in the I-gel group succeeding in one attempt, while 88.9% in the BASKA group required two attempts.

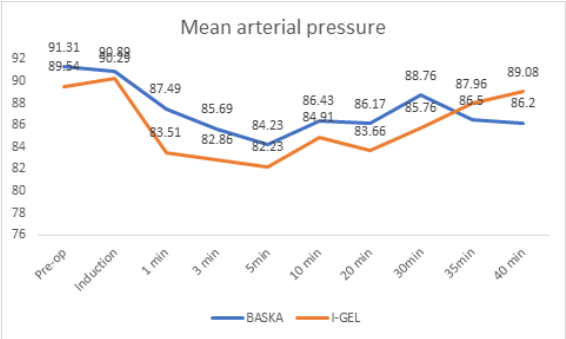

Figure 2. Comparison of mean arterial pressure between groups

Both groups demonstrated adequate SAD seal, but a significant difference was noted in the need for manipulations, with 64.7% in the I-gel group not requiring any manipulations. There was no significant difference in the rescue dose of propofol between groups (p=0.209). Adverse effects were more prevalent in the BASKA group (89%), and vomiting after intubation occurred in only one patient in the I-Gel group. No statistically significant differences were observed in postoperative sore throat or dysphonia in either group [Table 2].

Table 1: Demographic data between groups

		I-GEL	BASKA	P value
Sex	Female	30(85.7)	31(88.6)	0.721
	Male	5(14.3)	4(11.4)	
Age		34.09±7.789	34.14±11.698	0.123
Weight		63.69±8.659	61.43±9.111	0.426

Table 2: Mean parameters of various types of sad across the groups

		BASKA	I-GEL	P value
Ease of intubation	Difficult	1(2.9)	0	0.001
	Easy	19(54.3)	33(94.3)	
	Moderate	15(42.9)	2(5.7)	
Number of attempts	1	18(35.3)	33(64.7)	0.001
	2	16(88.9)	2(11.1)	
	3	1(100)	0	
Manipulation	Jaw thrust	10(83.3)	2(16.7)	0.001
	Tongue pulled	7(100)	0	
	Nil	18(35.3)	33(64.7)	
Rescue dose of propofol	1(40 mg)	20(51.3)	19(48.7)	0.209
	2(40mg)	0	1(100)	
	2(80 mg)	10(71.4)	4(28.6)	
	Nil	5(31.3)	11(68.3)	
Adverse effects	No	23(41.8)	32(58.2)	0.009
	Yes	12(80)	3(20)	
Vomiting	No	35(50.7)	34(49.3)	1
	Yes	0	1(100)	
Dysphonia	No	35(50)	35(50)	-
Post-op sore throat	No	35(50)	35(50)	-
Laryngospasm	No	35(50)	35(50)	-
Seal	Adequate	35(50)	35(50)	-

ISSN (O): 2687-5365; ISSN (P): 2753-6556

DISCUSSION

Supraglottic airway management devices consist of medical devices that provide smooth delivery of anaesthetic gases and oxygen and aid in ventilation without endotracheal intubation. The I-gel is a second-generation SGA that offers better airway sealing properties than the classic LMA. It also has an added drainage tube for stomach decompression to diminish the risk of pulmonary aspiration and is designed for use with spontaneous or positive pressure ventilation (PPV). According to Miller's classification of SAD introduced in 2014, the Baska mask is a 3rd generation supraglottic airway device with additional safety features. Thus, this study compared the Baska mask with I-Gel in General Anaesthesia with spontaneous ventilation in short-duration surgeries among 70 patients (35 in each group).

In our study, the patient's demographic data, including age, sex, weight, and ASA of anaesthesiologist status, showed no statistical differences across the groups. There were no statistically significant differences between the groups regarding heart rate or mean arterial pressure ($p>0.05$). Similar to the study conducted by Choi et al., assessing the clinical performance of I-gel and Baska masks during laparoscopic cholecystectomy is important. The study found no significant difference between groups in demographic data, heart rate, and mean arterial pressure.[2] The hemodynamic changes and oxygen saturation were similar and comparable in both groups with no statistical significance, which was identical to the study conducted by Jadhav et al. and Abdel Aziz and Osman, which aimed to compare I-gel with Baska mask airway for controlled ventilation in obese patients undergoing ambulatory surgery. This may be due to the same stress response both devices produced.[9,5]

In the present study, there was a statistically significant difference between the groups regarding the ease of intubation ($p=0.001$). In the Baska group, 54.3% had easy intubation, and 94.3% had easy intubation. The Insertion of I-Gel was easier than that of the Baska mask and required less time. This finding was comparable to previous studies conducted by Shanmugavelu and Kanagarajan; the insertion time for I-gel was shorter than that for the Baska mask, and the oropharyngeal leak pressure was significantly higher for the Baska mask.[10] El-Refai et al. reported that the mean insertion time for I-gel was significantly shorter than that of the Baska mask (13.87±3.082 vs. 31.67±2.916 s, respectively).[11] According to Sachidananda et al., the Baska® mask and I-gel have similar first-time insertion success rates and times. However, the Baska® mask has a significantly higher mean sealing pressure than the I-gel.[1]

Our study showed that most patients in the I-gel group had successful intubation in one attempt (64.7%). In the Baska group, most patients had successful intubation in two attempts (88.9%). This difference was statistically significant ($p=0.001$). The first-attempt success rate was higher for the I-Gel mask than for the Baska mask. This finding was comparable to previous studies by Shanmugavelu and Kanagarajan, who concluded that both airways are suitable for laparoscopic surgeries. However, the I-gel was quicker to insert, while the Baska mask provided a good airway seal.[10] Kara D et al. reported that the Baska® mask and I-gel have similar first-time insertion success rates and insertion times. However, the Baska® mask has a significantly higher mean sealing pressure than the I-gel.[12]

Alexiev et al. reported that the SAD seal was adequate in all patients in both groups, and the difference was not statistically significant. The results showed that in the Baska group, most patients needed manipulations, such as jaw thrust or tongue pulling, to aid the insertion of the device. Most patients in the I-gel group did not require manipulation (64.7%). This difference was statistically significant ($p=0.001$).[13] No previous studies found in the literature have studied manipulations as separate parameters.

In our study, the rescue doses of propofol across groups showed no statistically significant differences ($p=0.209$). No study has compared the rescue doses of propofol as a separate parameter. The majority of the subjects in the Baska group had adverse effects (89%), mainly blood loss on SAD. There was a statistically significant difference between the groups ($p=0.009$). This finding was comparable to the previous study conducted by Al-Rawahi et al., and the mean sealing pressure was significantly higher in the Baska Mask (BM) group compared to the Proseal laryngeal mask (PLM) group (29.98 ± 8.51 vs. 24.50 ± 6.19) ($p= 0.013$). Both groups had a higher incidence of sore throat compared to dysphagia and hoarseness of voice at 1 and 4 hours postoperatively.[14]

Our study showed that only one patient vomited after intubation in the I-Gel group. There were no statistically significant differences between the groups ($p =1.00$). None of the patients complained of dysphonia, postoperative sore throat, or laryngospasms across the groups. These observations regarding vomiting and other adverse effects contrasted with a study conducted by Alexiev et al. and Al-Rawahi et al.[13,14]

CONCLUSION

The ease of insertion was better for the I-gel than the Baska mask, probably because of Baska's wide cuff contour and the tongue getting stuck in the mask. Moreover, the insertion of the Baska required help from an assistant who had to give jaw thrust to displace the tongue or pull the tongue out with Magill's forceps. Due to the earlier reasons for the difficulty in insertion in the Baska group, the first-attempt success rate was lower for Baska than for the

ISSN (O): 2687-5365; ISSN (P): 2753-6556

I-gel. Hence, we conclude that the I-Gel is a better device than the Baska mask in terms of convenience for anaesthetists in securing the airway.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556