



## Anaesthesiology

## A COMPARISON BETWEEN THE EFFICACY OF BLOCKBUSTER LARYNGEAL MASK AIRWAY AND i-GEL IN PAEDIATRIC SURGERIES – A PROSPECTIVE RANDOMIZED STUDY

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### ABSTRACT

**Background and Aims:** Supraglottic airway devices have time and again proved that they are a safe and efficient alternative to endotracheal tube in general anaesthetic procedures lasting for a short time even in the paediatric population. The aim of our study was to compare the efficacy of the well-known i-Gel and the newer Blockbuster LMA in anesthetized paediatric patients. **Material and Methods:** Eighty paediatric patients who received general anaesthesia for less than 120 minutes were randomly divided into two groups of 40 patients each. In one group, Blockbuster LMA (BLMA group) was inserted and in the other group i-GEL (i-GEL group) was inserted. Standard anaesthesia protocol was followed and the supraglottic airway device was inserted. We compared the time needed for insertion, ease of insertion and airway sealing pressure. **Results:** There were no significant differences in demographic data. However, the ease of insertion was better in the BLMA group. The mean insertion time was 1.08 minutes  $\pm$  0.59 in the Blockbuster LMA group while it was 2.63 minutes  $\pm$  1.27 in the i-Gel group, p value being  $<0.0001$ . Similarly, in the BLMA group, most of the patients had the device inserted successfully without any additional maneuvers. The p value being  $<0.0001$ . In 88% of the patients of the BLMA group, airway was secured in the 1<sup>st</sup> attempt where as in 47% of the patients in the i-GEL group, airway was secured in the 1<sup>st</sup> attempt. p value is 0.001. But, the oropharyngeal leak pressure (OLP) was found to be higher in the i-GEL group, Mean values being 30.10  $\pm$  4.96 cm of H<sub>2</sub>O in the i-GEL group compared to 21.20  $\pm$  2.46 cm of H<sub>2</sub>O in the BLMA. **Conclusion:** Blockbuster LMA is good alternative to i-GEL as an airway device for short surgeries in the paediatric populations.

**KEYWORDS :** i-Gel, blockbuster LMA, paediatric anaesthesia, supraglottic airway device, oropharyngeal leak pressure

### INTRODUCTION:

Supraglottic Airway Devices (SADs) are devices that help in ventilation and oxygenation with devices that do not penetrate the vocal cords. These devices have the advantages of better ease of insertion, higher seal pressures, drain gastric fluid and facilitate intubation.

They have been classified into different generations based on their various safety features added to the newer ones.<sup>2</sup> The SADs have been a part of difficult airway algorithms for both adult and paediatric population. It is used when there is difficulty ventilating, when there has been failed intubation, or both.<sup>3,4</sup>

i-gel (Intersurgical Ltd., UK) is a novel supraglottic airway device with anatomically designed, non-inflatable mask, which is soft gel like and transparent made of medical grade thermoplastic elastomer called styrene ethylene butadiene styrene.

A newer LMA called Tourens BlockBuster<sup>®</sup> LMA invented in 2012 (Tuoren Medical Instrument co, Ltd, Changyuan city, China) is being used increasingly due to the increased safety and quality of anaesthesia.<sup>6</sup>

We conducted this study to compare the efficacy of i-Gel<sup>™</sup> with that of Blockbuster<sup>™</sup> LMA in pediatric patients as data available is less in this population.

### METHODS:

After institutional ethical clearance, 80 paediatric patients undergoing surgeries under general anaesthesia were considered for the study.

Paediatric patients weighing between 10-25 kg of ASA physical status 1 and 2 undergoing surgeries of duration less than 2 hours under general anaesthesia were included.

Exclusion criteria included patients weighing more than 25kg, undergoing surgery for more than 2 hours, patients with neck pathology, previous or anticipated problem with upper airway or upper gastrointestinal tract, laparoscopic surgeries, those at increased risk of aspiration and of ASA physical status  $\geq 3$ .

This was a double blinded study. Just before the surgery, patients were randomized by the sealed envelope technique. The sample size was then divided into two groups of 40 patients each, the **BLMA group** i.e,

patients in whom Blockbuster LMA was inserted and **i-GEL group** i.e in whom i-GEL was inserted.

A standard anaesthesia protocol was followed in the operation theatre. Non invasive blood pressure (NIBP), pulse oximetry, end tidal CO<sub>2</sub>, and temperature monitoring was done during the entire surgical procedure. After pre-oxygenation anaesthesia was induced using inj Fentanyl 2mcg/kg, inj Propofol 1mg/kg till loss of consciousness. After confirming adequate bag and mask ventilation, patient was ventilated with the facemask. If the patients had no response to anterior jaw thrust, anaesthesia was considered adequate for device insertion.

The selected airway device was inserted as per the group the patient belongs to. After insertion the breathing circuit was connected to the airway device, proper placement and ventilation was confirmed by chest rise, auscultation of breath sounds, and by capnography. Inj. Atracurium 0.5 mg/kg was then given i.v.

Insertion time was recorded and defined as time interval between beginning of insertion and appearance of capnograph.

If the ventilation from device was inadequate, as assessed by delivery of inadequate tidal volumes (leak of  $>20\%$  of set tidal volume) or inappropriate capnographic curve, the following maneuvers like rotating the device, increasing the depth of insertion, or withdrawing it a little, flexing or extending the head was done. Maximum of two attempts were tried with these maneuvers to get adequate ventilation. The number of airway maneuvers needed was also noted. If this failed, tracheal intubation was performed. The number of attempts needed for proper insertion was documented.

Anaesthesia was maintained with isoflurane 1.0% to 2.0% in a mixture of 50% air and 50% oxygen. Patients were ventilated in Pressure control ventilation (PCV) mode to achieve a tidal volume of 5-7 ml/kg and an EtCO<sub>2</sub> between 35-45 mm Hg.

Oropharyngeal leak pressure was measured. With the patient being apnoeic, the fresh gas flow was set at 6 litres/min, the adjustable pressure limiting valve was set at 70 cm H<sub>2</sub>O, and the airway pressure was measured on the anaesthesia machine. Leak pressure was defined as the plateau airway pressure that is achieved or the pressure at which leak is audible. This was documented as oropharyngeal leak pressure<sup>7</sup>.

After completion of the surgery, anaesthesia was reversed. Once the

patient had adequate spontaneous ventilation, the airway device was removed and oxygen supplementation was done via facemask.

The patient was then shifted to Post Anaesthesia Care Unit (PACU) and then discharged from there once stable.

**Statistics**

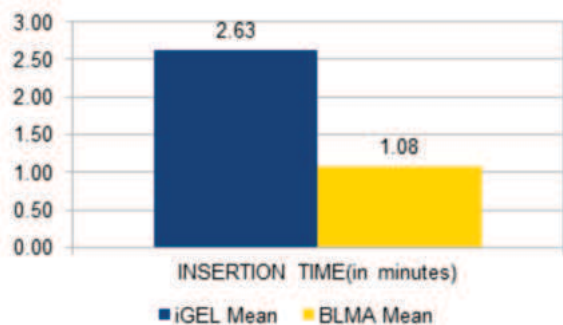
Sample size was estimated by using the difference in Mean Insertion time between i-gel group and LMA Supreme group from the study by Hyuk Kim et al<sup>6</sup> as 17.8 ± 5.3 sec and 15.3 ± 2.6 sec. Using these values at 95% Confidence limit and 80% power sample size of 39.1 was obtained (rounded off to 40) in each group.

Categorical data was represented in the form of Frequencies and proportions. Chi-square was the test of significance. Continuous data was represented as mean and standard deviation. Independent t test was the test of significance to identify the mean difference between two groups. p value <0.05 was considered as statistically significant.

**RESULTS:**

These were the observations made in our study. Demographic variables i.e age, sex, weight, ASA status and duration of surgery were comparable between both the groups.

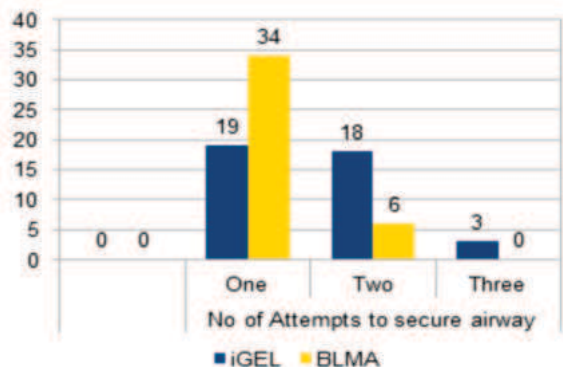
However, the ease of insertion as assessed by the insertion time, number of maneuvers needed to secure airway and number for attempts to secure airway was better in the BLMA group. The mean insertion time was 1.08 minutes ± 0.59 in the Blockbuster LMA group while it was 2.63 minutes ± 1.27 in the i-Gel group ,p value being <0.0001.



Similarly, in the BLMA group, most of the patients(55%) had the device inserted successfully without any additional maneuvers while in the i-GEL group, most of the patients( 47%) needed 2 maneuvers for successful insertion. The p value being <0.0001.

		GROUP			
		iGEL		BLMA	
		Number of Patients	Percent age	Number of Patients	Percent age
No OF MANEUVERS NEEDED	Nil	5	12.50%	22	55.00%
	1.00	7	17.50%	17	42.50%
	2.00	19	47.50%	1	2.50%
	3.00	9	22.50%	0	0.00%

Also, in 88% of the patients of the BLMA group airway was secured in the 1<sup>st</sup> attempt. In 47% of the patients in the i-GEL group, airway was secured in the 1<sup>st</sup> attempt, it was in the 2<sup>nd</sup> attempt in 45% and remaining 8% in the 3<sup>rd</sup> attempt. p value is 0.001.



But, the oropharyngeal leak pressure (OLP) was higher in the i-GEL group. Mean values were 30.10 ± 4.96 cm of H<sub>2</sub>O in the i-GEL group compared to 21.20 ± 2.46 cm of H<sub>2</sub>O in the BLMA group.

	GROUP			
	iGEL		BLMA	
	Mean	Standard Deviation	Mean	Standard Deviation
OROPHARYNGEAL LEAK PRESSURE (in cm of H <sub>2</sub> O)	30.10	4.96	21.20	2.46

**DISCUSSION:**

Supraglottic airway devices are the devices of choice for short surgical procedures due to the various advantages as discussed before. Improvements in the design and availability of suitable sizes and favourable clinical experiences have led to the increasing use of LMA in children.<sup>1</sup>

Studies on the newer Blockbuster LMA in the paediatric population are very few. Our results showed that the oropharyngeal pressure (OLP) was higher in the i-Gel group compared to Blockbuster LMA group like the studies comparing efficacy of i-Gel and other laryngeal mask airways.<sup>8,9</sup>

Many studies have been conducted comparing the OLP between i-Gel and various other SGAs. However, these studies have shown varied results. Few studies like Gasteiger et al.<sup>13</sup> and Saran et al.<sup>14</sup> who observed that the OLP between the two devices was similar, whereas studies like Mihara et al. showed that OLP of i-GEL was more.<sup>9</sup>

However, we found that ease of insertion was better in the Blockbuster LMA group. All our parameters assessing the ease of insertion like insertion time, numbers of attempts needed to secure airway, number of additional maneuvers needed reflected this.

Helmy et al.<sup>15</sup> and Reza Hashemian et al.<sup>16</sup> observed significantly lower insertion times with i-gel™. Theiler et al.<sup>17</sup> found that i-gel™ had a longer insertion time.

Our study has a few limitations that need to be acknowledged. The study was performed in children with normal airway and hence the findings cannot be applied to those with difficult airway or abnormal upper airway anatomy. Also, insertion of devices was performed by experienced anaesthetists and therefore the findings may not apply to inexperienced users.

**CONCLUSION:**

Even though ease of insertion was better with Blockbuster™ LMA, the sealing pressure was better with i-gel™. Therefore, the newer Blockbuster™ LMA is good alternative to i-GEL as an airway device for short surgeries in the paediatric populations.

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