

Original Article:

Study of usefulness of I-gel versus a classic laryngeal maskairway (cLMA) in children(age 1-6yrs)

¹Dr. Priyanka Rathi , ²Dr. Sae Gosavi

¹Assistant Professor, ²Senior Resident

Department of Anesthesiology, GMC, Miraj

Corresponding author-Dr. Sae Gosavi

Abstract:

Introduction: Newer generation devices started incorporating gastric channel for gastric drainage tube, elevated leak pressures thus providing more dependable positive pressure ventilation, integrated bite blocks and disposability thus facilitating one-time use.

Material and methodology: This was an observational prospective Study. A total of 60 patients posted for day care surgeries were included in the study period from January 2017 to December 2017 considering inclusion and exclusion criteria. Amongst them I-gel inserted in 30 patients and classic LMA inserted in 30 patients.

Results: In the study there was significant difference in mean ETCO₂ between two groups at 1st min and 3rd min. At these interval ETCO₂ was significantly high in LMA group. At other intervals there was no significant difference in mean ETCO₂ between two groups. In the study there was significant difference in mean Pulse rate or Heart rate(only pulse rate,cut heart rate) between two groups from 1st min to 7 min. At all these intervals mean Pulse rate or heart rate was significantly high in LMA group than in I-GEL group.

Conclusion: Overall hemodynamic parameters were well within stable range. From the results of our study ,the time required for insertion with I-gel was more than classic LMA due to less experience with I-gel but ease of insertion was better with I-GEL.

Introduction:

Newer generation devices started incorporating gastric channel for gastric drainage tube, elevated leak pressures thus providing more dependable positive pressure ventilation, integrated bite blocks and disposability thus facilitating one-time use. ¹The I-gel is a second generation supraglottic airway device by Intersurgical launched in 2007. I-gel is a recently developed disposable supraglottic airway device. The whole device is made of a soft, gel-like, transparent thermoplastic elastomer (styrene ethylene butadiene styrene) that provides a perilaryngeal seal using a noninflatable cuff(4)cut avoiding the compression trauma that can occur with inflatable SADs. The claimed potential advantages include easier insertion and stability following insertion.Supraglottic airway devices are currently used during pediatric surgeries that require general anesthesia. The aim of this study was to observe the usefulness of I-gel versus a classic laryngeal mask airway (cLMA) in children for day care surgeries.²

Material and methodology:

This was an observational prospective Study.

A total of 60 patients posted for day care surgeries were included in the study period from January 2017 to December 2017 considering inclusion and exclusion criteria. Amongst them I-gel inserted in 30 patients and classic LMA inserted in 30 patients.

Inclusion Criteria:

- Age group: 1-6yrs
- Weight : 10-20kg
- Type of surgery: Pediatric day care surgeries.
- ASA I and II

Exclusion Criteria:

- ASA III and IV
- Emergencies
- A known difficult airway
- Congenital malformations involving the respiratory tract

Anesthesia was maintained using 50% nitrous oxide and 2 vol% sevoflurane. Patients was ventilated to a tidal volume of 8-10 ml/kg.

Oropharyngeal leak pressure suggesting airway sealing ability was assessed by closing the expiratory valve of the circle system at a fixed gas flow rate of 3 L/min and at this time, any gas leaks present were evaluated by auscultation at the patient's mouth using a stethoscope.

- Good - no leak audible
- Poor- leak audible

We recorded hemodynamic data including pulse rate, SPO2 and ETCO₂ at 1, 3, 5, 7, and 10 minutes after insertion.

The patient's respiratory rate was controlled to maintain the ETCO₂ between 30-35 mmHg. An inspiratory-expiratory ratio of 1: 2 was maintained.

Sliding out was defined as a gross emergence of the device from the mouth, or a requirement to use physical force (e.g. adjusting head and neck position, holding the tube) to maintain ventilation despite fixation with tape. If the device is pushed out, we would try to insert it again without removal and then more firmly fix it in place with adhesive tapes.

At the end of procedure inhalational agent was stopped and neuromuscular blockade was reversed with inj. Neostigmine 0.05mg/kg and inj. Glycopyrrolate 8mcg/kg.

During anesthetic maintenance and recovery, side effects including post extubation cough and bleeding were recorded

Results:

Mean age of subject in I-GEL group was 3.9 ± 1.6 years and in LMA group was 3.6 ± 1.5 years. In I-GEL majority of subjects were in the age group 3 years (30%) and in LMA group majority of subjects were in the age group 2 years (33.3%).

Table 1: Ease of insertion comparison between two groups

		Group			
		I-GEL		LMA	
		Count	%	Count	%
Ease of insertion	Moderate Difficulty	5	16.7%	4	13.3%
	With Ease	25	83.3%	26	86.7%

$\chi^2 = 0.131, df = 1, p = 0.718$

In I-GEL group, 83.3% **insertion** was done with ease and in 16.7% with moderate difficulty. In LMA group, 86.7% **insertion** was done with ease and in 13.3% with moderate difficulty. There was no significant difference in ease of insertion between two groups.

Table 2: ETCO2 comparison between two groups

ETCO2	Group				P value
	I-GEL		LMA		
	Mean	SD	Mean	SD	
1 min	31.9	1.2	32.5	.8	0.016*
3 min	32.0	1.0	32.5	.7	0.025*
5 min	32.7	1.0	32.5	.7	0.300
7 min	32.7	.9	32.4	.7	0.193
10 min	32.5	1.5	32.7	.6	0.505

In the study there was significant difference in mean ETCO2 between two groups at 1st min and 3rd min. At these interval ETCO2 was significantly high in LMA group. At other intervals there was no significant difference in mean ETCO2 between two groups.

Table 3: SpO2 comparison between two groups

SpO2	Group				P value
	I-GEL		LMA		
	Mean	SD	Mean	SD	
1 min	100.0	0.0	100.0	0.0	-
3 min	99.8	0.4	99.9	0.3	0.723
5 min	99.7	0.5	99.6	0.5	0.791
7 min	99.9	0.3	99.6	0.6	0.016*
10 min	100.0	0.0	99.9	0.3	0.155

In the study there was no significant difference in mean SpO2 between two at all the intervals except at 7 min. At 7 min mean SpO2 was significantly lower in LMA group than in I-GEL group.

Table 4: Pulse rate comparison between two groups

PR	Group				P value
	I-GEL		LMA		
	Mean	SD	Mean	SD	
1 min	118.5	5.8	121.5	5.1	0.034*
3 min	117.7	6.4	121.6	4.9	0.01*
5 min	117.6	6.6	120.6	4.7	0.049*
7 min	117.7	6.0	120.5	4.7	0.045*
10 min	118.1	5.7	120.8	4.8	0.05

In the study there was significant difference in mean Pulse rate or Heart rate between two groups from 1st min to 7 min. At all these intervals mean Pulse rate or heart rate was significantly high in LMA group than in I-GEL group.

Table 5: Oropharyngeal leak pressure (airway sealing ability) comparison between two groups

		Group			
		I-GEL		LMA	
		Count	%	Count	%
Oropharyngeal leak pressure (Airway sealing ability)	Good	26	86.7%	26	86.7%
	Poor	4	13.3%	4	13.3%

$\chi^2 = 0.000$, $df = 1$, $p = 1.000$

In both groups, 86.7% had good airway sealing ability and 13.3% had poor airway sealing ability. There was no difference in Airway sealing ability between two groups.

Discussion:

Classic LMA is the first supraglottic airway device that was introduced. It consists of an oval shaped, inflatable silicone mask that is designed to seal around the larynx. It is reusable up to 40 times.³ It forms a low-pressure seal over the laryngeal inlet, thus increasing the incidence of gastric insufflation and aspiration. I-gel is a relatively new, disposable, supraglottic airway device which has an anatomically designed non inflatable gel like cuff made of thermoelastocelastomer which is claimed to seal laryngo-pharyngeal space and to enable rapid, easy, safe and reliable application.⁴

In I-GEL group, 83.3% insertion was done with ease and in 16.7% with moderate difficulty. In LMA group, 86.7% insertion was done with ease and in 13.3% with moderate difficulty. So even if the experience with I-GEL was less but ease of insertion with I-GEL was better than classic LMA. Nirupa R(2016) performed a randomised trial to compare I-gel and ProSeal™ laryngeal mask airway for airway management in 100 paediatric patients and found that ease of insertion of supraglottic device, insertion of orogastric tube and pulmonary mechanics were similar in both the groups.⁵

R. Acharya (2016) studied Comparison between I-gel airway an the proseal laryngeal maskairway in 80 pediatric patients undergoing general anesthesia and found that both devices are easy to insert,with similar insertion times,ease of gastric tube insertion and positionalstability.⁶ YogitaDwivedi (2016) studied the comparison of I-gel™, LMA Proseal™ and LMA Classic™ in spontaneously breathing pediatric patients. 90 patients of ASA grade I and II, weighing between 10-25 kg, posted for elective surgery with a duration of less than 2 hrs, were randomly divided into three groups (30 each). Insertion was assessed as very easy in all three groups. Therefore, it can be reliably used in pediatric anesthesia^{7,8}

In this study both groups, 86.7% had good airway sealing ability and 13.3% had poor airway sealing ability. There was no difference in Airway sealing ability between two groups as assessed by audible leak with stethoscope at patient’s mouth and thus no significant difference in oropharyngeal leak pressure.

In present study it was found that there was significant difference in mean Pulse rate and respiratory rate between two groups from 1st min to 7 min. At all these intervals mean Pulse rate and respiratory rate was significantly high in LMA group than in I-GEL group. The mean oxygen saturation was 99% in both and though there was significant difference in etco2 in 1st and 3rd min there was no significant difference in end tidal CO₂ at other intervals which was maintained between 30-35mmHg.

Conclusion:

Overall hemodynamic parameters were well within stable range. From the results of our study, though experience with I-GEL was less still ease of insertion was better with I-GEL but it is more prone for inadvertent sliding out so should be tightly secured with tape.

References:

1. Micheal R. Hernandez, P.AllanKlock, AdranikOvassapian. Evolution of extraglottic airway: A review of its history, applications and practical tips for success. International Anaesthesia Research Society 2012;114(2):349-68.
2. Ju-Hyun Lee, Hyun-Seok Cho, Won-Jung Shin and Hong Senk Yang. A comparison of supraglottic airway I-gel vs classic laryngeal mask airway in small children. Korean Journal Anaesthesiology 2014;66(2):127-130.
3. Steven E. Sittig, James E. PringHitz. Evolution of an Airway . AARC Times 2001:48-51.
4. Peter Szmuk, TiberinEzri, ShmuelEvron, Yehudah Roth, Jeffrey Katz. A brief history of Tracheostomy and tracheal intubation, from the Bronze Age to the Space age. Intensive care Med 2008; 34: 222-228.
5. SitkiGoksu, Elzemsen History of intubation. The Journal of Academic Emergency Medicine 2015;14:35-36.
6. Adrian A. Matic. An Anaesthesiologist's Perspective on the history of basic airway management. ThePreanaesthetic Era-1700-1846 Anaesthesiology 2016;124:301-11.
7. Ezri T, Evron S, Hadad H, Roth Y, Herafuah. Tracheostomy and endotracheal intubation: a short history. Journal article 2005;144(12):891-3,908
8. Doyle DJ. A brief history of clinical airway management. Anesthesiologia 2009; 32: 16