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ORIGINAL RESEARCH

COMPARISON OF INTUBATION RESPONSE OF I GEL AND LARYNGEAL MASK AIRWAY UNDER SEVOFLURANE ANAESTHESIA IN PEDIATRIC PATIENTS

T. Balaji[1], Anjaneya Varaprasad S[2]

[1]Assistant Professor, Department of Anesthesiology, Govt Medical College, Kadapa, AP, India

[2]Assistant Professor, Department of Anesthesiology, Govt Medical College, Anantapur, AP, India

Corresponding Author:

Dr .T. Balaji, Assistant Professor, Department of Anesthesiology, Govt Medical College, Kadapa, AP, India

ABSTRACT

Background: This study aims to compare insertion parameters, ventilatory parameters, hemodynamic parameters and post-removal complications that occur during LMA insertion and I-gel insertion in pediatric patients for surgical procedures under sevoflurane anesthesia. Supraglottic airway devices are increasingly being used in children as they are less invasive than endotracheal intubation and cause less discomfort in the post-operative period.

Materials and Methods: In our study, 60 children ASA grade I & II aged between 1-5years, scheduled for elective short surgical procedures were allotted to two groups LMA and I-gel of 30 patients each randomly. The efficacy of I-gel in children during intubation, its hemodynamic changes and post-operative complications were compared to LMA under sevoflurane anaesthesia.

Results: I-gel insertion was done easily in 93.3% patients while LMA insertion was done easily in 86.67% patients. The changes in hemodynamic parameters i.e., heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure were not statistically significant between both the groups ($p>0.05$). Saturation of haemoglobin is maintained above 97% with both devices which shown no statistical significance. Incidence of postoperative complications like cough, laryngospasm, lip/dental injury were comparable between both the groups with $p>0.05$. However, there was a substantial difference in the incidence of postoperative sore throat between both the groups, with the LMA group having a greater frequency.

Conclusion: In conclusion, neither LMA nor I-gel induces any substantial changes in the patients' hemodynamic condition, nor does SPO2. The postoperative complications in LMA and I-gel patients are not considerably different. I-gel insertion is substantially easier and faster than LMA insertion.

Keywords: LMA Insertion, SPO2, Hemodynamic condition, I-gel, Postoperative.

INTRODUCTION

The gold standard technique for the purpose of maintenance of airway,[1] is endotracheal intubation, but some undesirable complications are associated with it e.g., trauma to lips, teeth, tongue, epiglottis, larynx and even trachea, hemodynamic instability, sore throat subsequently are common as it requires laryngoscopy and manipulation of vocal cords.[2] Supraglottic Airway Devices (SGD) is used to ventilate patients by delivering anesthetic gases/oxygen beyond the vocal cords which are designed to overcome the disadvantages of endotracheal intubation. SGD have been demonstrated in pediatric anesthesia to adequately secure the airway without any major intraoperative morbidity for spontaneous and controlled ventilation.[3] Varieties of SGDs are used for securing and maintaining airway for general anesthesia in pediatric patients during spontaneous and controlled ventilation. LMA was invented in 1983 by Archie Brain consists of a connecting tube and an inflatable silicon mask. It is placed into the pharynx blindly, creating a low-pressure seal around laryngeal inlet and allow gentle positive pressure ventilation.[4] I-gel, is a novel SGD that uses a gel-like thermoelastic elastomer,[5] to create an anatomically tailored mask. It possesses features that divide the gastro-intestinal and respiratory tract, also the ability to aspirate gastric contents through the gastric tube. The tensile quality of I-gel bowl, its form and the ridge at the proximal end, contribute to device's stability. It becomes smaller and longer as it slides beneath the Pharyngo-epiglottic fold, exerting an outward strain against tissue. The device is held in place by the proximal bowl ridge, which grips the base of the tongue and prevents it from slipping upward.[6] Inhaled anaesthetics allow rapid emergence from anaesthesia because of easy titratability, with inherent neuromuscular blocker potentiating effects. The availability of less soluble inhalation anaesthetics such as sevoflurane made us rethink about the selection of volatile anaesthetics for surgical procedures. Sevoflurane is projected to induce and emerge from anaesthesia faster than typical inhalational anaesthetics due to its low solubility and low blood: gas partition coefficient (0.69). The intubation responsiveness of the I-gel and LMA in paediatric patients was compared in this study under sevoflurane anaesthesia.

Aims and objectives

This study aims to compare insertion parameters, ventilatory parameters, hemodynamic parameters and post-removal complications that occur during LMA insertion and I-gel insertion in pediatric patients for surgical procedures under sevoflurane anesthesia.

The parameters compared are:

- Ease of insertion.
- Number of attempts.
- Heart rate (HR).
- Systolic blood pressure (SBP).
- Diastolic blood pressure (DBP).
- Mean arterial pressure (MAP).
- Oxygen saturation (Spo2).
- Post-removal Cough

- Post-removal Laryngospasm
- Post-removal Lip & dental injury
- Post-removal sore throat.

MATERIALS & METHODS

The goal of this clinical study was to examine various parameters in paediatric patients using a laryngeal mask airway and I-gel.

The study involved 60 children aged 1 to 5 years who were undergoing elective procedures under general anaesthetic.

Following institutional ethical committee permission and informed parental consent, 60 ASA I and II patients of either sex between the ages of 1 and 5 years old were chosen to undergo various elective brief operations under general anaesthesia.The study participants were split into two groups of 30 patients each at random.

Study group L: A suitable LMA was installed, and the cuff was inflated with the required volume of air**.**

Study group I: I-gel of appropriate size was inserted.

The following parameters were observed and compared

Insertion parameters:

- Ease of insertion, number of attempts;

Hemodynamic parameters:

- Systolic blood pressure (SBP),
- Heart rate (HR),
- Diastolic blood pressure (DBP),
- Mean arterial blood pressure (MAP);

Ventilatory parameters:

- Oxygen saturation (SPo2);

Post-removal complications:

- Laryngospasm,
- Sore throat,
- Cough, AND
- Lip & dental injury.

Preanesthetic Evaluation:

A day before the intended surgery, all patients received a full pre-anesthetic assessment. A detailed history, physical examination was done to rule out those coming under the exclusion criteria. The results of the baseline investigations were also assessed.

Inclusion criteria:

- Pediatric patients aged between 1-5 years of both sex.
- Patients with an ASA grade of I or II.
- Posted for elective short surgical procedures.

Exclusion criteria:

- Patients with an ASA grade III and IV.
- Emergency surgeries.
- Patients with known pulmonary and cardiovascular problems.
- Patients with facial abnormalities and or anticipated difficult intubation.

The investigations done were:

1. Complete blood picture.
2. Bleeding time, clotting time.
3. HIV, HbSAg, HCV and Corona screening
4. RBS
5. Blood Urea.
6. Serum creatinine.
7. ECG and chest X-Ray (if required)

Procedure:

After securing an IV line, all children were premedicated with Injection glycopyrrolate 0.01mg/kg. Pulse oximetry and non-invasive blood pressure were used to monitor all of the patients. HR, SBP, DBP, MAP, and Spo2 baseline values were recorded. Patients were preoxygenated for 3 min with Jackson-Rees circuit and inhalational induction was started with 4% Sevoflurane with O2 flow at 6L/min and sevoflurane gradually increased to 6-8% until end points. Loss of eye lash reflex and hypotonia of skeletal muscles were taken as the end points of induction and at this time inj. Fentanyl 2 µg/kg IV was administered. Apnea occurred in almost all the patients and they were manually ventilated during that period. Induction time (time to loss of eye lash reflex).

After induction, jaw relaxation was assessed.

For the group L, the appropriately sized LMA was chosen based upon the weight of the children as follows:

Size 1.5 for 5-10 kgs,

Size 2 for 10-20 kgs, was inserted using the classical approach, once the LMA was in place, air was pumped to create proper seal.

For group I, suitably sized I-gel was chosen depending on the children's weight as follows:

Size 1.5 for 5-12 kgs,

Size 2 for 10-25 kgs,

Position of LMA/I-Gel was confirmed with bilateral chest lift and auscultation of breath sounds. In cases of failure to insert I-gel and LMA in first attempt additional dose of inhalational induction was carried out with Sevoflurane till jaw relaxation was satisfactory and a second attempt was carried out. In both groups, the total number of tries to introduce LMA and I-gel was recorded. In the event that the device was not inserted after three attempts, we choose to perform endotracheal intubation after administering a depolarizing muscle relaxant. After insertion of LMA and I-gel, anaesthesia was maintained with 50%N2O +50%O2, sevoflurane and atracurium. No resistance to insertion until the device reaches the hypopharynx in a single attempt was classified as ease of insertion. There was resistance to insertion in difficult insertions, or more than one movement was necessary for proper placement. Jaw lift, chin thrust, head extension, and neck flexion are examples of airway techniques. The number of attempts and ease of insertion of LMA and I-gel were noted. Hemodynamic changes in HR, BP, MAP and changes in Spo2 were monitored just before induction (baseline), just after intubation/insertion, and then at 1, 3, 5, 10, 20, 30 minutes. Residual neuromuscular blockade was reversed with injections of neostigmine 0.05 mg/kg IV and injection glycopyrrolate 0.01 mg/kg IV at the end of operation. When the

patient became fully awake and replied to commands after regaining appropriate muscle power and spontaneous breathing, LMA was removed after deflating the cuff in group L, while I-GEL was removed when the kid became fully awake and responded to commands in group I. Cough, laryngospasm, sore throat, lip or dental injuries, if any, were noted as post-removal consequences.

RESULTS

The study involved 60 children aged 1 to 5 years who were ASA grade I and II and was undergoing elective surgical procedures under general anaesthetic. These children were divided into two groups: group L (30 patients) received an appropriate size LMA, and group I (30 patients) received an appropriate size I-gel to secure the airway.

Demographic Data: The demographic data is given in the table-8. The data was comparable between the two groups.

Table 1: Age and weight wise distribution of the study groups

Variable	Group	Mean	Std. Deviation	P-Value
Weight	IGEL	14.37	3.469	0.72
	LMA	14.7	3.715	
Age (Years)	IGEL	3.7	1.055	0.3
	LMA	4	1.174	

Age distribution:

The study group included patients as young as one year old and as old as five years old. In terms of age, the LMA and I-gel groups were equivalent, and the p value of 0.3 was not statistically significant.

Weight distribution:

The minimum weight of the patient was 7 kgs and maximum weight was 22 kgs in study group. The weight of the study population was comparable with p-value equal to 0.72 which was not statistically significant.

Table 2: Gender wise distribution of the study groups

			Group		Total
			IGEL	LMA	
Sex	Female	Count	6	9	15
		% within Group Count	20.0%	30.0%	25.0%
	Male		24	21	45
		% within Group	80.0%	70.0%	75.0%
	Total	Count	30	30	60
		% within Group	100.0%	100.0%	100.0%

Among the 60 children in Group L 21 were boys, 9 were girls. In Group I, 24 were boys and 6 were girls. In terms of gender distribution, both groups were comparable.

Ease of insertion:

In Group L the insertion is easy in 86.7%, where as in Group I it is93.3%. In group L difficult insertion is 13.3%, in Group I difficult insertion is 6.7%. The difference between the both groups is statistically insignificant in terms of ease of insertion. (p 0.67).

Table 3: Ease of insertion

			Group		Total
			IGEL	LMA	
		Count	2	4	6
	Difficult		6.7%	13.3%	10.0%
		% within Group	28	26	54
Ease of insertion			93.3%	86.7%	90.0%
		Count	30	30	60
	Easy		100.0%	100.0%	100.0%
		% within Group			
		Count			
Total					
		% within Group			

Number of attempts in placement of LMA or I-GEL:

In group L, LMA was placed correctly in first attempt in 83.3% patients and placed correctly in the 2nd attempt in 16.7%. The I-gel was placed in first attempt in 93.3% patients. The number of attempts in placement of LMA/I-GEL was statistically comparable i.e., p=0.42 which is not significant.

Table 4: Number of attempts in placement

			Group		Total
			IGEL	LMA	
		Count	28	25	53
	1				
		% within Group	93.3%	83.3%	88.3%
No. of attempts					
		Count	2	5	7
	2				
		% within Group	6.7%	16.7%	11.7%
		Count	30	30	60
Total					
		% within Group	100.0%	100.0%	100.0%

Hemodynamic Changes Heart Rate:

The baseline heart rate was 95.47±10.02 in group L and 92.3±9.045 in group I which when compared was statistically insignificant with p value of 0.2. In group L heart rate increased from the baseline value of 95.47±10.02 to 96.9±9.477 immediately after LMA insertion. Similarly in group I heart rate increased from baseline value of 92.3±9.045 to 94.57±7.646

immediately after insertion of I-gel. When the heart rates of both groups were assessed immediately after LMA insertion and after I-gel insertion, the difference was statistically negligible (p value >0.05).The heart rate in group L at 1minute, 3 minutes, 5 minutes, 10 minutes, 15 minutes, 20 minutes compared with group I was statistically insignificant with p value>0.05.In group L heart rate reached the baseline value within one minute. In group I increase in HR reached the baseline within three minutes. The values of heart rate in both groups are given in table-12 and figure-17 below.

Table-5: Changes in heart rate (HR)

Timeline	Group	Mean	Std. Deviation	P-value
Baseline	IGEL	92.3	9.045	0.2
	LMA	95.47	10.02	
Just	IGEL	94.57	7.646	0.29
	LMA	96.9	9.477	
1 Min	IGEL	92.83	6.854	0.19
	LMA	95.67	9.575	
3 Min	IGEL	92.4	7.623	0.43
	LMA	94.07	8.741	
5 Min	IGEL	91.73	5.842	0.58
	LMA	90.73	7.961	
10 Min	IGEL	90.2	7.676	0.16
	LMA	93.17	8.595	
15 Min	IGEL	90.13	9.347	0.88
	LMA	90.47	7.925	
20 Min	IGEL	91.6	8.186	0.66
	LMA	92.6	9.409	

Systolic Blood Pressure:

The baseline systolic blood pressure was 100.83±6.259 in group L and 100.27±6.823 in group I which when compared was statistically insignificant with p value equal to 0.73. In group L systolic blood pressure increased from the baseline value of 100.83±6.259 to 104.8±6.697 immediately after LMA insertion. Similarly in group I systolic blood pressure increased from the baseline value of 100.27±6.823 to 102.3±6.503 immediately after insertion of I-gel. The rise in SBP in group L was 4% and in group I was 1.8%. The systolic blood pressure in both groups when compared was statistically not significant with p value 0.14 (>0.05). The systolic blood pressure in group L at 1minute, 3 minutes, 5 minutes,10 minutes,15 minutes, 20 minutes compared with group I was statistically not significant with p value>0.05. In group L systolic blood pressure reached the baseline value within 3 minutes. In group I also increase in systolic blood pressure reached near baseline value at 3 minutes. The values of systolic blood pressure in both groups are given in table-13 and figure-18 below.

Table-6: Changes in systolic blood pressure (SBP)

Timeline	Group	Mean	Std. Deviation	P-value
Baseline	IGEL	100.27	6.823	0.73
	LMA	100.83	6.259	
Just	IGEL	102.3	6.503	0.14
	LMA	104.8	6.697	
1 Min	IGEL	100.97	6.526	0.71
	LMA	101.6	6.76	
3 Min	IGEL	100.4	6.457	0.67
	LMA	99.7	6.444	
5 Min	IGEL	98.47	6.453	0.26
	LMA	100.47	7.224	
10 Min	IGEL	97.37	6.77	0.27
	LMA	99.2	6.008	
15 Min	IGEL	98.17	6.968	0.91
	LMA	98.33	5.307	
20 Min	IGEL	98.1	6.354	0.12
	LMA	100.3	4.504	

Diastolic Blood Pressure:

The baseline diastolic blood pressure was 61.87±7.758 in group L and 58.67 ±11.514 in group I which when compared was statistically insignificant with p value equal to 0.2. In group L diastolic blood pressure increased from the baseline value of 61.87±7.758 to 65.7±7.883 immediately after LMA insertion. Similarly in group I diastolic blood pressure increased from the baseline value of 58.67±11.514 to 60.8 ±11.103 immediately after I-gel insertion. The increase in diastolic blood pressure was 3.83% in group L and 2.13% in group I after insertion of I-gel. The diastolic blood pressure in both groups when compared was statistically not significant with p value 0.05. The diastolic blood pressure in group L at 1 minute, 3 minutes, 5 minutes,10 minutes,15 minutes, 20 minutes compared with group I was statistically insignificant with p value>0.05. In group L diastolic blood pressure reached the baseline value within 3 minutes. In group I diastolic blood pressure reached the baseline value at about 1 minute. The values of diastolic blood pressure in both groups during study interval are given in table-14 and figure-19 below.

Table-7: Changes in diastolic blood pressure (DBP)

Timeline	Group	Mean	Std. Deviation	P-Value
Baseline	IGEL	58.67	11.514	0.2
	LMA	61.87	7.758	
Just	IGEL	60.8	11.103	0.05
	LMA	65.7	7.883	
1 Min	IGEL	59.8	10.987	0.09
	LMA	64.3	9.203	
3 Min	IGEL	58	11.919	0.97

	LMA	58.07	7.478	
5 Min	IGEL	56.1	11.909	0.42
	LMA	58.2	8.138	
10 Min	IGEL	55.17	10.515	0.22
	LMA	58.23	8.724	
15 Min	IGEL	55.63	10.893	0.49
	LMA	57.4	9.164	
20 Min	IGEL	55.3	10.482	0.67
	LMA	56.4	9.485	

Mean arterial pressure (mm Hg):

The baseline mean arterial pressure was 74.9±6.429 in group L and 72.77 ±9.141 in group I which when compared was statistically insignificant with p value equal to 0.3. In group L mean arterial pressure increased from the baseline value of 74.9±6.429 to 78.77±6.257 immediately after LMA insertion. Similarly in group I mean arterial pressure increased from the baseline value of 72.77 ±9.141 to 76.20 ±7.073 immediately after insertion. The increase in mean arterial pressure was 3.8% in group L and 3.43% in group I immediately after insertion. The mean arterial pressure in both groups when compared was statistically insignificant with p value >0.05. The mean arterial pressure in group L at 1 minute, 3 minutes, 5 minutes, 10 minutes, 15 minutes, and 20 minutes compared with group I was statistically not.

Table-8: Changes in mean arterial pressure (MAP)

Timeline	Group	Mean	Std. Deviation	P-Value
Baseline	IGEL	72.77	9.141	0.3
	LMA	74.9	6.429	
Just	IGEL	76.20	7.073	0.14
	LMA	78.77	6.257	
1 Min	IGEL	73.47	8.839	0.12
	LMA	76.77	7.417	
3 Min	IGEL	72.07	9.566	0.91
	LMA	71.83	5.995	
5 Min	IGEL	70.3	9.462	0.33
	LMA	72.3	6.058	
10 Min	IGEL	69.2	8.66	0.17
	LMA	71.9	6.337	
15 Min	IGEL	69.77	8.74	0.49
	LMA	71.13	6.485	
20 Min	IGEL	69.6	8.406	0.49
	LMA	70.97	6.82	

Saturation of Hemoglobin (SP02):

The baseline Spo2 was 98.37±0.669 in group L and 98.5 ±0.9 in group I which when compared was statistically insignificant with p value equal to 0.41. Saturation of hemoglobin in group L at immediately after insertion, 1minute, 3 minutes, 5 minutes,10 minutes,15 minutes, 20 minutes compared with group I was statistically not significant with p value>0.05. The values of Spo2 in both groups during study interval are given in table-16 and figure-21 below.

Table-9: Changes in saturation of hemoglobin (Spo2)

Timeline	Group	Mean	Std. Deviation	P-Value
Baseline	IGEL	98.53	0.9	0.41
	LMA	98.37	0.669	
Just	IGEL	99	0.788	0.25
	LMA	98.77	0.774	
1 Min	IGEL	99.1	0.662	0.21
	LMA	98.87	0.776	
3 Min	IGEL	98.67	0.661	0.18
	LMA	98.43	0.679	
5 Min	IGEL	98.1	0.712	0.14
	LMA	98.37	0.669	
10 Min	IGEL	98.27	0.64	0.69
	LMA	98.33	0.661	
15 Min	IGEL	98.43	0.679	0.7
	LMA	98.37	0.669	
20 Min	IGEL	98.33	0.661	0.08
	LMA	98.63	0.669	

Post-removal complications:

Post-removal sore throat:

In group L post-removal sore throat was 13.3%, in group I post-removal sore throat was 0%, with P value of 0.11, which is more than 0.05 with statistical insignificance.

Table-10: Post-removal sore throat

			Group		
			IGEL	LMA	Total
		Count	30	26	56
	No				
		% Within Group	100.0%	86.7%	93.3%
Sorethroat					
		Count	0	4	4
	Yes				
		% Within Group	0.0%	13.3%	6.7%
		Count	30	30	60

Total					
		% Within Group	100.0%	100.0%	100.0%

Post-removal spasm:

In group L post-removal spasm was 0%, in group I post-removal spasm was 0%, with P value of 1 which is more than 0.05, which is statistically in significant.

Table - 11: Post-removal spasm

			Group		**Total**
			IGEL	**LMA**	
		Count	30	30	60
laryngospasm	No				
		% Within Group	100.0%	100.0%	100.0%
		Count	30	30	60
Total					
		% Within Group	100.0%	100.0%	100.0%

Post-removal cough:

In group L post-removal cough was 16.7%, in group I post-removal cough was 6.7%, with p value of 0.42, which is more than 0.05 with no statistical significance.

Table-12: post-removal cough

			Group		Total
			IGEL	LMA	
Cough		Count	28	25	53
	No	% within Group	93.3%	83.3%	88.3%
		Count	2	5	7
	Yes	% within Group	6.7%	16.7%	11.7%
Total		Count	30	30	60
		% within Group	100.0%	100.0%	100.0%

Post-removal lip/dental injury:

Post-removal lip/dental damage was 10% in group L and 3.3 percent in group I, with a P value of 0.61, which is greater than 0.05 and statistically insignificant.

Table-13: Post-removal lip/dental injury

			Group		Total
			IGEL	LMA	
		Count	29	27	56
	No	% within Group Count	96.7%	90.0%	93.3%
Lip injury		% within Group Count	1	3	4
		% within Group	3.3%	10.0%	6.7%
	Yes		30	30	60
Total			100.0%	100.0%	100.0%

DISCUSSION

The I-gel is a novel supraglottic device that doesn't have an inflatable cuff and is intended for use under anaesthesia. It is a latex-free, disposable thermoplastic elastomer device. The perilaryngeal structures are anatomically mirrored in I-gel. An epiglottis blocker is included in the device, which prevents the epiglottis from downfolding and blocking the laryngeal entrance. The soft, non-inflatable cuff conforms to perilaryngeal structures and seals them anatomically. The I-gel also contains a gastric channel that allows air and stomach contents to be vented or a gastric tube to be inserted.

It contains features that allow a gastric tube to be inserted into the stomach while separating the gastrointestinal and respiratory tracts. According to early reports, it could be used as a resuscitation airway. LMA was compared to I-gel in numerous experiments.

For non-anesthetists performing cardiopulmonary resuscitation, the I-gel has potential advantages over alternative supraglottic airways. It's simple to use because there's no cuff to inflate. Its drain tube provides access to the gastrointestinal tract and is designed to prevent stomach inflation and regurgitation. Simple airway manipulations were necessary to aid with device placement, however all devices were successfully implanted in two attempts. Our data corroborate these conclusions.

In instances when there is a high risk of regurgitation and aspiration, I-gel and LMA should not be considered an entirely safe technology (aspiration can occur if the tube is not properly inserted). Hence our study did not include patients who had emergency surgery. Based on the patient's body, we chose the size of the supraglottic airway device. Insertion of device needs adequate mouth opening for its successful placement. In restricted mouth opening patients, device insertion into the mouth is not possible. Hence patients with restricted mouth opening (less than 2 cm) are not included in the study population. There is higher incidence of airway obstruction in children with upper and lower respiratory tract infections, both intraoperatively and postoperatively. Hence these children are not included in the study.

Sevoflurane is one of the most attractive agents for pediatric day care procedures performed using anesthesia because of the sweet smell, smooth induction characteristics, blood/gas partition coefficient is low resulting in rapid induction and recovery, and wide cardiorespiratory safety profile. It provides an optimal condition for insertion of supraglottic devices with minimum requirement for muscle relaxants and IV anesthetics. However, financial cost and environmental impact of sevoflurane remain the major limiting factors. Thus, any measure that can reduce sevoflurane consumption without compromising the quality of anesthesia is desirable, especially for developing countries.

Ease of insertion:

Insertion is easy in 86.7% of Group L cases, but 93.3% of Group I cases. Difficult insertion occurs 13.3% of the time in Group L and 6.7% of the time in Group I. The difference between the two groups is statistically negligible in terms of insertion ease (p 0.67). Similar findings were seen in research by Revi N etal.[7] that compared I-gel to other LMA. In comparison to pLMA 80% (20/25) and cLMA 88% (22/25), I-gel had a 96% (24/25) ease of insertion. However, the results (p=0.194) were not statistically significant.

Number of attempts:

In the LMA group, LMA was placed correctly in first attempt in 83.3% patients which was placed correctly in the 2nd attempt in 16.7%. The I-gel was secured in first attempt in 93.3% patients, the number of attempts in placement of LMA/I-GEL was statistically comparable i.e., p=0.42 which is not significant. Singh J etal,[8] shows the similar result. In 91.7% and 79.2% of the patients, the I-gel and cLMA were effectively inserted on the first attempt, respectively. The proportion of successful insertion for the I-gel stayed unchanged at 91.7% in the second attempt, while the success rate for the cLMA improved to 83.33%.

Hemodynamic parameters:

Haemodynamic variables (Heart rate, Systolic blood pressure, Diastolic blood pressure and mean arterial pressure) were recorded at various intervals during the procedure; baseline, before insertion, one minute after insertion, three minutes after insertion, five minutes after insertion and ten minutes after insertion and fifteen minutes after insertion and twenty minutes after insertion. HR, SBP, DBP and MAP were comparable in both the groups and statistically insignificant, LMA was persistently high from the baseline when compared to I-gel. Our findings matched those of other studies conducted by Pratheeba N etal,[9] Comparison of i-gel™ and laryngeal mask airway Classic™ in terms of ease of insertion and hemodynamic response: A randomized observational study, there are conflicting data about the hemodynamic responses to LMA Classic™ and i-gel™. The baseline mean HR and BP levels in this study were comparable and not clinically significant. When compared to I-gelTM, the HR during the first 25 minutes following insertion of LMA ClassicTM was consistently high from baseline and clinically significant P = 0.0001.

Jindal etal,[10] found hemodynamic stability with both the LMA and I-gel devices, with no statistically significant differences between them, which is consistent with our findings.

In comparison to the I-gelTM group, Atef etal,[11] found an increase in heart and blood pressure in the LMA ClassicTM group. These studies corroborated our findings. Revi N etal,[12] "A Comparative Study on Cardiovascular Response and Ease of Insertion in Classical Laryngeal Mask Airway, Proseal Laryngeal Mask Airway and I- Gel During Surgery Under General Anaesthesia", found no significant differences in hemodynamic data across the three groups 1 minute after device implantation. Radhika KS etal,[77] Assessment of suitability of i-gel and laryngeal mask airway- supreme for controlled ventilation in anesthetized paralyzed patients: A prospective randomized trial, Materials and Methods: Forty-two patients were randomly assigned to one of two groups: LMA-S or I-gel, for surgery under general anaesthesia. The heart rates of the two groups did not differ significantly. In both groups, mean blood pressures (MBP) dropped significantly after induction relative to baseline. When comparing the LMA-S group to the I-gel group 3 minutes after insertion of the devices, there was a substantial increase in MBP in the LMA-S group.

Mitra S etal,[13] compared the usefulness of paediatric I-gel size 2.5 against the PLMA in 60 randomly assigned children undergoing elective surgery who were anaesthetized and paralysed. Ease of insertion and hemodynamic data were compared. They discovered that I-gel was easier to apply and that the hemodynamic data between the two groups was comparable.

Nirupa R etal,[14] conducted a prospective, randomised controlled study in 100 surgical patients, aged 2–6 years of ASA Physical Status I–II under GA. The size 2 I- gelTM or PLMATM airway device was given to patients at random. In this study, there were no significant haemodynamic changes on comparing I-gelTM and PLMATM.

Spo2

During the insertion, maintenance, and removal of the airway device, neither group experienced any instances of desaturation (SpO2 95%). In research published by Atef etal,[11] there was no significant change in SpO2 between the groups I-gelTM and LMA ClassicTM in eighty patients scheduled for surgery under general anaesthesia while maintaining spontaneous breathing.

Both groups had minimal incidence of perioperative and postoperative adverse effects (such as laryngospasm or bronchospasm, lip or dental injuries, sore throat, and cough). Inflatable masks may cause tissue distortion, venous compression, and nerve damage, according to Levitan and Kinkle15. I-gel is less stressful to the airway than pLMA, as evidenced by this finding. Gaurav Chauhan etal,[16] and Amr m etal,[17] both found similar results. These findings demonstrate that both devices are safe for paediatric airway control when used jointly.

Post-removal sore throat:

Post-removal sore throat was found in 4 out of 30 patients in Group L whereas no incidence of post-operative sore throat in I-gel group which shows statistically insignificant in the both groups with a p value 0.11 (>0.05) which is statistically insignificant.

Heuer JF etal,[18] conducted a study in which I-gel was compared to C-LMA, proseal and ambu Aura once supra glottic airways. 40 patients were assigned to each of the four groups for post-operative complications. The c-LMA was significantly more likely to cause post-operative sore throat.

Post-removal cough:

In group L post-removal cough was 16.7% (5/30), in group I post-removal cough was 6.7% (2/30), with p value of 0.42, which is more than 0.05 with no statistical significance. It was similar to study found in Helmy AM etal,[17] that 15% (5/40) patients of LMA group have post-removal cough and 5% (2/40) of I-gel group patients had cough, with p value of 0.6, which is statistically not significant.

Post-removal spasm:

No postoperative laryngospasm/bronchospasm was reported in any of the case in this study. Similar result seen in study conducted by Singh I etal,[19] where no postoperative laryngospasm/bronchospasm was reported in any of the case.

Post-removal lip/dental injury:

Lip/dental injury was compared between the both groups. It was found that 3 of 27 group L patients has lip or dental injury, and 1 of 29 group I patients have lip/dental injury with a p-value of 0.32 (>0.05) which is of statistical insignificance.

Haq dad Durrani etal,[20] I-gel and LMA were compared in terms of insertion parameters and post-operative problems in a study. They discovered that the difference in lip/dental injury between the both groups is statistically insignificant, which is consistent with our findings.

CONCLUSION

In our study we compared the two SAD I-gel and LMA using sevoflurane anaesthesia in view of insertion parameters, intubation response (hemodynamic stability) and postoperative complications.

Our results suggested that the insertion parameters, ease of insertion and number of attempts are statistically insignificant. The hemodynamic response comparable between both the groups. Post removal complications like cough, laryngospasm and lip /dental injury is also statically not significant in both the groups. Post-operative sore throat was the only parameter with higher frequency in the group L.

In conclusion, neither LMA nor I-gel induces any substantial changes in the patients' hemodynamic condition, nor does SPO2. The postoperative complications in LMA and I-gel patients are not considerably different. I-gel insertion is substantially easier and faster than LMA insertion.

REFERENCES

1. Souza N, Carvalho WB. Complications of tracheal intubation in pediatrics.Rev Assoc MedBras. 2009 Nov-Dec;55(6):646-50.
2. Shetty AN, Shinde VS, ChaudryLS. A comparative study of various devices as regard ease of insertionanl hemodynamic responses.Indian J Anaesth.2004;48:134-137
3. Lopez-Gil M, Brimacombe J, Alvarez M. Safety and efficacy of the laryngeal mask airway: a prospective survey of 1400 children. Anaesthesia. 1996;51(10):969-972.
4. Brain AIJ. The laryngeal mask airway (Review article). Current opinion in Anaesthesiology 1995;8: 478-484.
5. i-gel® user guide. Intersurgical Complete Respiratory Systems. http://media.intersurgical.com/igel.com/assets/userguide.pdf. Accessed May 27,2015.
6. Levitan RM, Kinkle WC. Initial anatomic investigations of the I-gel airway: a novel supraglottic airway without inflatable cuff. Anaesthesia 2005; 60:1022- 1026.
7. Revi N, Harikishore, Binu Puthur, Ershad. ”A Comparitive Study on Cardiovascular Response and Ease of Insertion in Classical Laryngeal Mask Airway, Proseal Laryngeal Mask Airway and I-Gel During Surgery Under General Anaesthesia”. Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 20, May 18, 2015; Page: 3039-3046.
8. Singh J, Yadav MK, Marahatta SB, Shrestha BL. Randomized crossover comparison of the laryngeal mask airway classic with i-gel laryngeal mask airway in the management of difficult airway in post burn neck contracture patients. Indian Journal of Anaesthesia. 2012 Jul;56(4):348-352. DOI: 10.4103/0019-5049.100815. PMID: 23087456; PMCID: PMC3469912.
9. Pratheeba N, Ramya G S, Ranjan R V, Remadevi R. Comparison of i-gel™ and laryngeal mask airway Classic™ in terms of ease of insertion and hemodynamic response: A randomized observational study. Anesth Essays Res 2016;10:521-5
10. Jindal P, Rizvi A, Sharma JP. Is I-gel a new revolution among supraglottic airway devices? --a comparative evaluation. Middle East Journal of Anaesthesiology. 2009 Feb;20(1):53-58. PMID: 19266826.

11. Atef HM, Fattah SA, Gaffer ME, Al Rahman AA. Perfusion index versus non- invasive hemodynamic parameters during insertion of i-gel, classic laryngeal mask airway and endotracheal tube. Indian J Anaesth. 2013 Mar;57(2):156- 62. doi: 10.4103/0019-5049.111843. PMID: 23825815; PMCID: PMC3696263..
12. Radhika KS, Sripriya R, Ravishankar M, et al. Assessment of suitability of i- gel and laryngeal mask airway-supreme for controlled ventilation in anesthetized paralyzed patients: A prospective randomized trial. Anesthesia, Essays and Researches. 2016 Jan-Apr;10(1):88-93. DOI: 10.4103/0259- 1162.167849. PMID: 26957697; PMCID: PMC4767080.
13. Mitra S, Das B, Jamil SN. Comparison of size 2.5 i-gel with proseal LMA in anaesthetised, paralyzed children undergoing elective surgery North American Journal Of Medical Sciences 2012; 4(10): 453-7.
14. Nirupa R, Gombar S, Ahuja V, Sharma P. Indian J Anaesth. 2016 Oct;60(10):726-731.