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I-Gel and ILMA for ease of insertion and as conduit for intubation: A comparative study

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Abstract

Background: Supraglottic airway devices (SAD/SGAD) are efficient in the management of anticipated and unanticipated difficulties in the airway. I-GEL, a novel supraglottic airway device with soft and non-inflatable cuff. Intubating laryngeal mask airway (ILMA) can also be used as conduit for endotracheal intubation. This study designed to assess the ease of insertion of I-GEL and ILMA and as conduit for blind endotracheal intubation.

Materials and methods: A total 120 cases undergoing elective surgery requiring general anaesthesia between age group 20-60 years were recruited. Cases were induced with suitable induction agents and non-depolarizing muscle relaxants and ventilated for 3 minutes before SAD insertion and again ventilated for 1 minute before blind ETT intubation. Parameters such as ease of insertion, number of attempts and time period of insertion of SADs and ETT, post-operative clinical complications were assessed.

Results: In group 1, 78.3% cases had 2 attempts for SAD insertion, whereas in group 2, 60% cases had only one attempt for SAD insertion. Cases in group 1 had more attempts for SAD insertion than group 2 which was statistically significant ($p < 0.002$). In group 1, 56.6% cases had 11-15 seconds for SGAD insertion, whereas in group 2, 63.3% cases had less than 5 seconds for SGAD insertion. In group 1, 81.6% cases had one attempt for ETT insertion followed by 10% cases had two attempts. Whereas in group 2, 83.3% cases had two attempts to insert ETT followed by 10% cases had two attempts.

Conclusion: I-GEL is better device for emergency rescue ventilation because of its ease of insertion and less incidence of post-operative complications. ILMA is a better conduit for blind ETT than I-GEL.

Keywords: supraglottic airway devices (SAD/SGAD), I-GEL, Intubating laryngeal mask airway (ILMA), Ease of insertion, Endo tracheal tube (ETT).

Introduction

During anaesthesia or resuscitation, it is mandatory to maintain sufficient gas exchange to secure patient airways. Supraglottic airway devices (SAD/SGAD)/ endotracheal intubation and face masks are utilized commonly to protect air passages^[1, 2]. SADs have greater control on airways than the face masks without any invasive disadvantages of endo tracheal tube (ETT)^[3]. SADs are easy to insert, less haemodynamic derangements, less traumatic and better exposure to glottis area^[4].

I-GEL is a single use SAD, made of gel like Styrene Ethylene Butadiene Styrene (SEBS) which does not have an inflatable cuff^[5, 6]. It is available in all sizes and also been used in rescue airway management and as a conduit for tracheal intubation^[7]. When intubation of direct laryngoscopy is undesirable, intubating laryngeal mask airway (ILMA) used as conduit for ETT^[8]. ILMA is currently a gold standard technique for tracheal intubation through SGA either blindly or by fiberscope guidance^[9, 10]. This study was designed to assess the ease of insertion of I-GEL and ILMA and as conduit for blind endotracheal intubation.

Materials and Methods

The present prospective study conducted in the Department of Anaesthesia, Gandhi Medical College, Secunderabad during April 2018 to August 2019. A total 120 cases undergoing elective surgery requiring general anaesthesia between age group 20-60 years were recruited. Cases belong to ASA grade I&II, undergoing elective surgery under GA and with MPC I&II were included. Cases with MPC III&IV, neck swellings, thyroid disorders, gastroesophageal reflux disease, not willing to participate in this study were excluded.

Informed consent was obtained from all the cases and study protocol was approved by institutional ethics committee. Study participants were randomly divided into 2 groups based

on SADs. Group 1 inserted with ILMA and group 2 inserted with I-GEL after 3minutes of ventilation followed by intubation of endotracheal tube (ETT). Patients were premedicated intravenously with Ranitidine 50mg and Metoclopramide 10mg. Ten minutes before induction, study participants were received intravenous Glycopyrrolate 0.2mg, Fentanyl 2mg/kg and Midazolam 0.03mg/kg. SAD's. Cases were ventilated with 100% oxygen for 3 minutes and induction procedure was completed by using proper inducing agents and muscle relaxants before SAD insertion

and extended ventilation for 1 minute before intubation of endotracheal tube (ETT). Parameters such as ease of insertion, number of attempts and time period of insertion of SADs and ETT, post-operative clinical complications were checked. The data was collected into Microsoft Office Excel 2010. The processes of exporting the coded data from excel to SPSS was employed.

Results

Table 1: Demographic parameters of study participants

Demographic parameter	Group 1	Group 2	p-value
	Mean±SD	Mean±SD	
Age (In years)	31.25± 7.62	30.94 ±7.54	0.668
Weight (In kgs)	56.28±5.46	55.88±6.22	0.204
Height (In cm)	158.35±5.28	157.98±4.38	0.871
Neck circumference (In cm)	33.48±3.40	34.12±3.22	0.664
Opening of mouth (In cm)	4.81±1.13	4.84±1.06	0.756
Gender			
Male	22 (36.7%)	25 (41.6%)	0.528
Female	38 (63.3%)	35 (58.3%)	
ASA grade			
ASA grade I	48 (80%)	45 (75%)	0.542
ASA grade II	12 (20%)	15 (25%)	

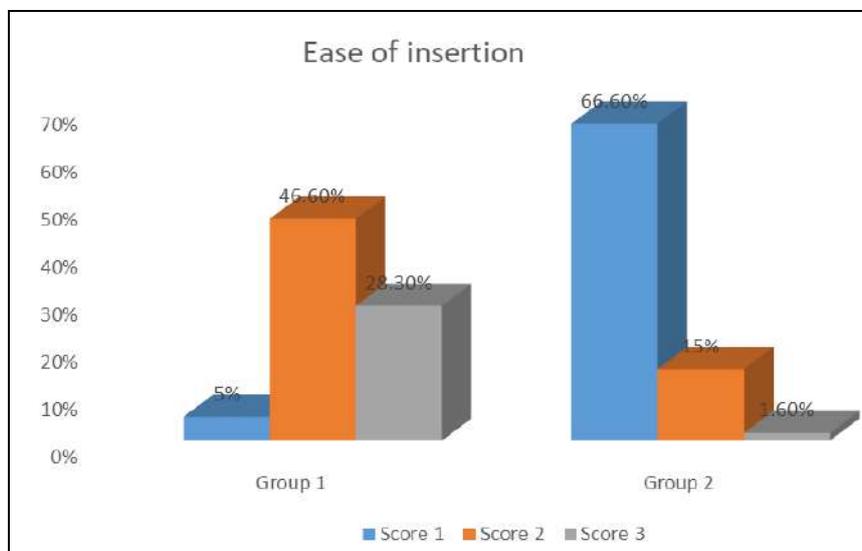


Fig 1: Ease of insertion score among study participants

Table 2: Number of attempts and time period for SAD insertion.

Number / Time period	Group 1		Group 2		P-value
	Number (n=60)	Percentage	Number (n=60)	Percentage	
Number of attempts					
1 st attempt	03	5%	36	60%	0.002
2 nd attempt	47	78.3%	22	36.7%	
3 rd attempt	08	13.3%	02	3.3%	
More than 3	02	3.3%	NIL	-	
Time period of attempts (In seconds)					
Less than 5	NIL	-	38	63.3%	0.0018
6-10	10	16.6%	21	35%	
11-15	34	56.6%	01	1.7%	
16-20	12	20%	NIL	-	
More than 20	04	6.7%	NIL	-	

Table 3: Number of attempts and time period to insert ETT.

Number / Time period	Group 1		Group 2		P-value
	Number (n=60)	Percentage	Number (n=60)	Percentage	
Number of attempts					
No attempt	04	6.6%	NIL	-	0.002
1 st attempt	49	81.6%	02	33.3%	
2 nd attempt	06	10%	50	83.3%	
3 rd attempt	01	1.6%	06	10%	
More than 3	NIL	-	02	3.33%	
Time period of attempts (In seconds)					
No attempt	05	8.33%	NIL	-	0.002
Less than 5	32	53.33%	NIL	-	
6-10	20	33.3%	04	6.66%	
11-15	03	5%	42	70%	
16-20	NIL	-	12	20%	
More than 20	NIL	-	02	3.33%	

Table 4: Details of post-operative complication like dysphasia and sore throat

Post op. Complications	Present	Absent	p-value
Group 1	26	34	0.042
Group 2	14	46	

Table 5: Success and failure rate of insertion of SAD and ETT.

Success/Failure	Present	Absent	p-value
SAD			
Group 1	04	56	0.812
Group 2	NIL	60	
ETT			
Group 1	NIL	60	0.454
Group 2	05	55	

Discussion

Anaesthesia involved morbidity is majorly related to difficult mask ventilation and difficult intubation [11]. Almost 1-4% of cases difficult intubation occurs. Supraglottic airway devices (SADs) are game changer in the field of anaesthesia, emergency medicine and are intrinsically more invasive instead of facemask utilization for anaesthesia, but less invasive than tracheal intubation (12). This study was designed to assess the ease of insertion of I-GEL and ILMA and as conduit for blind endotracheal intubation. Among total cases, majority were in between 21-30 years. In this study there was no statistical significance among demographic parameters, ASA grades in between study groups (Table 1). Study by Bharat Choudhary *et al.*, found that there was no significant difference among demographic parameters [13]. In group 1 of this study, 46.60% cases had ease of insertion score 2, followed by score 3 in 28.30%. Whereas in group 2, 66.60% cases had ease of insertion score 1, followed by score 2 (15%) (Figure 1). The ease of insertion score among two study groups was statistically significant ($p < 0.0023$).

In group 1, 78.3% cases had 2 attempts for SAD insertion, whereas in group 2, 60% cases had only one attempt for SAD insertion. Cases in group 1 had more attempts for SAD insertion than group 2 which was statistically significant ($p < 0.002$). Study by Bharat Choudhary *et al.*, found that success rate for SAD insertion in first attempt was 90% and overall success rate was 100% in both study groups [13]. Dr Juby EV *et al.*, stated that, SAD insertion was successful within 1st attempt in 93.02% cases of ILMA group and in 95.35% cases in I-GEL group [8]. Sameer Kapoor *et al.*, found that the successful rate for SAD insertion rate was

96% in ILMA group and 90% in I-GEL group. In the second attempt 100% success rate was achieved in two study groups [14]. Study by Latha Naik *et al.*, found first attempt success rate was 36.67% in I-GEL group compared to 68.33% with ILMA group. The overall success rate was 58.3% with I-GEL group compared to 90% with ILMA group [15]. Study by Bhandari, *et al.*, found 95% success rate in first attempt in I-GEL group [16].

In group 1, 56.6% cases had 11-15 seconds for SGAD insertion, whereas in group 2, 63.3% cases had less than 5 seconds for SGAD insertion. The mean duration of SGAD insertion between two groups was statistically significant ($p < 0.0018$). Study by Juby EV *et al.*, found that time required for SAD insertion in first attempt was 29.78 seconds in ILMA group and 19.69 seconds in I-GEL group. I-GEL insertion had lesser insertion time than ILMA. This values are comparable with the study of Halwagi *et al* [8, 19]. Study by Latha Naik *et al.*, stated that the time required for insertion of I-GEL was comparable with ILMA ($p = 0.860$) [15]. Study by Bhandari, *et al.*, found mean insertion time was 20.91 seconds [16]. M. Kleine Bruggeney *et al.*, demonstrated that successful i- gel insertion time was 23 (± 15) seconds [17]. In the study conducted by Keijzer *et al.*, i- gel insertion time was as short as 8.5 (± 6.3) seconds [18].

In group 1, 81.6% cases had one attempt for ETT insertion followed by 10% cases had two attempts. Whereas in group 2, 83.3% cases had two attempts to insert ETT followed by 10% cases had two attempts. ETT insertion was successfully achieved in less attempts in group 1 than group 2 which was statistically significant ($p < 0.002$) (Table 3). Study by Sood *et al.*, found ease of insertion of ETT in first attempt was observed in 96.7% cases and in 6.7% cases with second attempt of I-GEL group (20). Study by Sahi *et al.*, stated that in I-GEL group, success rate of Endotracheal intubation through SAD was 65% in 1st attempt, 13.33% in 2nd attempt and 10% in 3rd attempt with 11.67% Failed intubation [21]. In group 1, 53.3% case had less than 5 seconds for insertion of ETT followed by 33.3% cases had 6-10 seconds. In group 2, 70% cases had 11-15 seconds for insertion of ETT followed by 20% cases had 16-20 seconds. The time period for insertion of ETT between two groups was statistically significant ($p < 0.002$).

Conclusion

The results concluded that I-GEL was ideal for ease of insertion, number of attempts, time duration for insertion of SADs and post operative dysphagia and sore throat. I-GEL

is better device for emergency rescue ventilation because of its ease of insertion and less incidence of post operative complications. ILMA is a better conduit for blind ETT than I-GEL. But ILMA is expensive and supplied in adult size only and may not be available in emergency conditions. Whereas I-GEL is single use, disposable SAD, cost effective and available various sizes.

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