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Evaluation and comparison of clinical efficacy of Ambu AuraGain with i-gel, in patients undergoing laparoscopic cholecystectomy

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Abstract

Background and Aim: Second and third-generation supraglottic airway devices (SADs) are increasingly used in laparoscopic surgeries due to their improved oropharyngeal seal and gastric drainage. This study evaluated and compared the clinical efficacy of the Ambu AuraGain (AAU) and the i-gel in patients undergoing laparoscopic cholecystectomy.

Materials and Methods: In this prospective, randomized comparative study, 80 adult patients (ASA I and II) were randomly assigned to two groups (n=40 each): Group A (Ambu AuraGain) and Group G (i-gel). The primary objective was to compare oropharyngeal leak pressure (OLP). Secondary objectives included insertion time, ease of insertion, success rate, fiberoptic view of the glottis, and postoperative complications. OLP and peak airway pressure (PAP) were measured at various intervals, including during carboperitoneum.

Results: The mean OLP was significantly higher in Group A than in Group G, both after insertion (32.9 ± 3.45 vs. 26.53 ± 1.61 cm H_2O; p<0.001) and after deflation of carboperitoneum (34.15 ±2.9 vs. 28.2 ±1.71 cm H_2O; p<0.001). The margin of safety (OLP–PAP) was significantly higher in the AAU group at all times (p<0.001). However, the i-gel was significantly faster to insert (14.8 ±2.94 vs. 22 ± 3.74 seconds; p<0.001) and easier to place (100% easy vs. 37.5% easy; p<0.001). Fiberoptic alignment was significantly better in the i-gel group, with 70% achieving a Grade 4 view compared to 29% in the AAU group (p<0.001). Postoperative complications were low and comparable between groups.

Conclusion: Ambu AuraGain provides a superior oropharyngeal seal and a higher safety margin against leaks during laparoscopic surgery compared to i-gel. Conversely, i-gel is superior in terms of ease of insertion, speed, and anatomical alignment with the glottis, making it a better conduit for fiberoptic-guided intubation.

Keywords: Ambu AuraGain, i-gel, Laparoscopic cholecystectomy, Oropharyngeal leak pressure, Supraglottic Airway device.

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1. Introduction

Classic Laryngeal mask airway (cLMA), a first generation supraglottic airway device (SAD), invented by Archie Brain in 1981, has limitations of low oropharyngeal seal pressure and a risk of pulmonary aspiration of regurgitated gastric contents.[1] Hence came the second generation SADs such as LMA Proseal, i-gel and LMA Supreme which have overcome the limitations of cLMA. Higher oropharyngeal seal pressure, inbuilt gastric drainage tube and better design have helped them to gain popularity. Many studies have established their safety in short duration laparoscopic procedures.[2-5]

i-gel is a single use device made up of medical grade thermoplastic elastomer which is a soft, gel like, transparent material. It is designed to anatomically fit the perilaryngeal and hypopharyngeal structures and provides a reliable oropharyngeal seal, without an

inflatable cuff. It has been used for both spontaneous and controlled ventilation.[6]

Ambu AuraGain (AAU) is a single use anatomically curved third generation supraglottic airway device with a gastric conduit and intubation capability. The integrated gastric access channel is designed with a low friction inner surface to facilitate easy placement of a gastric tube. The original preformed anatomical curve to follow the anatomy of the human airway, and the soft rounded curve of the AAU ensures rapid placement. The thin and soft inflatable cuff is designed to deliver high oropharyngeal seal pressures.[7]

A study found that the oropharyngeal leak (seal) pressures (OLP), ease of insertion and success rate at first attempt were comparable for ProSeal LMA and Ambu AuraGain in patients undergoing laparoscopic cholecystectomy under general anesthesia and controlled ventilation.[8] A recent study reports higher OLP of AAU in comparison to LMA Supreme in patients undergoing gynecologic laparoscopy.[9]

There is paucity of comparative studies between AAU and i- gel in literature. Therefore, we evaluated and compared clinical efficacy of AAU with i-gel as a ventilatory device in patients undergoing laparoscopic cholecystectomy under general anesthesia with controlled ventilation.

2. Materials and Methods

After obtaining institutional ethics committee approval and written informed consent from the patients, this prospective and interventional randomized comparative study was conducted in a tertiary healthcare center. This study included 80 adult patients of 18 to 60 years of age, of either gender, American society of Anesthesiologists (ASA) physical status I and II, weighing 30 to 70 kg, undergoing elective laparoscopic cholecystectomy surgery under general anesthesia with controlled ventilation in supine position.

Patients with anticipated difficult airway, cervical spine pathology, pregnancy and at high risk of aspiration were excluded from the study.

Block randomization in series of blocks of ten was done to allocate patients to two groups based on sealed envelope method. Patients were randomly allocated to two groups of 40 each.

Group A received AAU as the ventilation device (n=40) and Group G received i-gel (n= 40).

All patients underwent a through preanesthetic check-up and given tablet alprazolam 0.25 mg orally on the night before surgery and made to fast thereafter.

In the operation theatre, the standard monitors for non-invasive blood pressure, electrocardiography and pulse oximetry (SpO2) were attached and baseline readings obtained. Intravenous line was established with 18G cannula. Induction of anesthesia was standardized with 3 minutes preoxygenation, intravenous fentanyl 2 µg/kg, propofol 2-2.5mg/kg titrated to loss of verbal response and vecuronium bromide 0.1mg/kg. Face mask ventilation was done with 50% oxygen and 50% nitrous oxide in isoflurane (1-1.5%) for 3 minutes and then appropriate airway device was inserted as per group allocation (**Table 1**).[10,11] Size of the devices was selected according to weight of the patient as per manufacturer's recommendation.

Table 1: Table of device insertion

Device / Size	Ambu AuraGain	I-gel
3	30 - <50 kg	30 - <50 kg
4	50 - <70 kg	50 - <70 kg

2.1. Technique of insertion of device

Group A- Cuff of AAU was fully deflated and lubricated with water soluble lubricating jelly.[10] Appropriate size was inserted in the oral cavity with the patient's head in sniffing position. The airway tube was held in the dominant hand with the cuff outlet facing chin of the patient. The tip of the cuff was pressed upwards against the hard palate in midline and the cuff was flattened against it. The mask was swung inwards with a circular motion, pressing the contours of the hard and soft palate. AAU was then advanced into the hypopharynx until a definite resistance is felt. After placement, cuff inflated with air to 60cm of water using cuff pressure gauge (Covidien, Germany). Intracuff pressure was checked every 30 minutes and adjusted to 60 cm of water throughout anesthesia.

Group G - Appropriate size i-gel was lubricated and with the cuff outlet facing towards the chin of the patient it was inserted into the mouth of the patient in a direction towards the hard palate. The device was glided downwards and backwards along the hard palate with a continuous but gentle push until a definitive resistance was felt. At this point the incisors should be resting on the integral bite-block. i-gel has a non-inflatable cuff and does not need inflation.

Airway tube of the device was connected to closed circuit. Effective airway was said to be present: if there was bilateral symmetrical chest expansion, bilateral equal air entry on auscultation, square wave form tracing on capnograph, lack of gastric insufflation and no audible leak at peak airway pressure of 20 cm of water during manual ventilation. Airway manipulations such as jaw thrust or lateral rotation of device while inserting the device, head and neck flexion or extension, chin lift and change in the depth of device needed for achieving effective airway was noted.

If effective airway is present, a lubricated gastric catheter was passed though the gastric vent tube and its correct placement was confirmed by detection of injected air on epigastric auscultation. For Ambu AuraGain, a 16 G gastric tube was used for all sizes. For i-gel, 14 G gastric tubes through sizes 4 and 12 G for size 3 was used.

Achieving both an effective airway and a successful insertion of gastric tube was considered as a successful insertion of the device.

In the event of failure of insertion of device or failure to achieve effective airway or inability to pass a gastric catheter, the device was removed and reinsertion of the device was attempted. Removal of the supraglottic device from mouth after insertion was counted as a failed attempt.

Three failed attempts of insertion of device were considered as failure of device and in such an event the airway was secured with a cuffed endotracheal tube.

Any change in the size of the device on the subsequent attempts was noted. In case of failure of device, airway was secured with endotracheal intubation with a cuffed oropharyngeal tube of appropriate size.

If SpO2 fell below 95% at any time during an attempt of insertion, the attempt was aborted and patient was mask ventilated with 100% oxygen. Lowest SpO2 during device insertion was noted.

OLP was measured by closing the circle system's expiratory valve at fixed gas flow of 3 l/min with ventilator at bag mode (manual) and noting the airway pressure (max 40 cmH2O allowed) at which equilibrium is reached. Audible air leak at mouth and presence or absence of gastric insufflation by epigastric auscultation was also checked during leak pressure testing.[12]

Peak airway pressure and difference between OLP and peak airway pressure was noted at 1 minute after ventilating patient on volume control mode of ventilator initially, just before starting carboperitoneum, 5 minutes after achieving carboperitoneum and 5 minutes after deflation of carboperitoneum.

Hemodynamic parameters were measured at regular intervals.

The intra-abdominal pressure was maintained constant at 12 mmHg by an automatic high flow carbon dioxide insufflation unit.

Rest of the anesthesia and surgery was as per standard protocols.

Insertion characteristics were judged by the number of attempts taken to place the device, time to achieve effective airway (It was noted from holding the supraglottic device at the teeth for insertion to obtaining the first square wave capnograph tracing confirming the effective airway in patients with successful insertion of device), number of patients requiring manipulation during or after placement of SAD , ease of insertion of the device (**Table 2**) and ease of gastric catheter insertion in patients with successful insertion of device which was graded subjectively as:

Score1- Easy if inserted in first attempt

Score 2- Difficult if inserted in second attempt.

Table 2: Ease of SAD insertion

Score	Level	Ease of Insertion of SGD
1	Easy	Insertion successful at first attempt without any tactile resistance
2	Slightly difficult	insertion successful at first attempt with tactile resistance
3	Difficult	insertion successful at second attempt
4	Very difficult	insertion successful at third attempt
5	Impossible	insertion failed at third attempt

Finally, anatomical alignment of the supraglottic device was assessed and graded by passing a flexible fiberoptic bronchoscope through the airway port (**Table 3**).[13]

Table 3: Fiberoptic view of glottis

Score	Fiberoptic view of glottic opening
4	Full view of vocal cords
3	Part of vocal cords and posterior surface of epiglottis seen
2	Part of vocal cords and anterior surface of epiglottis seen
1	Vocal cords not visible

Intraoperative and postoperative adverse events such as desaturation (spO2<92%), aspiration or regurgitation (gastric fluid in airway port or in hypo pharynx), bronchospasm, laryngospasm, any airway obstruction and airway manipulations required to maintain a patent airway, any failure to maintain effective airway even with airway manipulations and need for replacement of device with a tracheal tube was noted.

Any visible trauma to lip, tongue, teeth and oral tissues and any staining of device with blood was noted postoperatively.

Postoperative pharyngolaryngeal morbidity was evaluated by interviewing the patient at 1 hour & 4 hours and any problems encountered such as sore throat, dysphagia and hoarseness of voice was noted. Interviewer was blind to group allocation.

2.2. Statistical analysis

On the basis of a study, mean values of oropharyngeal leak pressure of i-gel was 25.6 ± 4.9.[14] Assuming an increase of 15% in value of oropharyngeal leak pressure with Ambu AuraGain, over i-gel, the minimum required sample size with 90% power of study and 5% level of significance was calculated to be 35 patients in each study group. To reduce margin of error, total sample size taken was 40 patients per group. Statistical analysis was done using Statistical Package for Social Sciences 26.0. Categorical variables were presented in number and percentage (%) and continuous variables as mean ± SD and median. Normality of data was tested by Kolmogorov-Smirnov test. If the normality was rejected then non parametric test was used. Normally distributed quantitative variables were compared using Unpaired t-test/Mann-Whitney Test and Paired t-test/ Wilcoxon test was used within the groups across follow-ups. Qualitative variable was compared using Chi-Square test /Fisher's exact test. A p value of <0.05 was considered statistically significant.

3. Results

The demographic profile of both the groups was similar. Airway assessment, size of SAD used and duration of surgery were also comparable (**Table 4**).

Time taken to insert SAD was higher in the AAU (22±3.74 seconds) group as compared to i-gel group (14.8±2.94 seconds) and it was statistically significant (p<0.001). Ease of insertion was significantly better in i-gel group with 100% of the patients getting score 1 whereas only 37.5% patients of group AAU got score 1 (**Figure 1**). Number of patients requiring manipulations to achieve an effective airway was also significantly higher in the AAU group. However, number of attempts of insertion, ease of passing a gastric catheter and intraoperative manipulations of the SAD did not show any significant difference between the two groups. The OLP after device insertion was 32.9 ± 3.45 cm of H2O in Group A and 26.53 ± 1.61 cm of H2O Group G. The oropharyngeal leak pressure after deflation of carboperitoneum was 34.15 ± 2.9 cm of H2O in group A and 28.2 ± 1.71 cm of H2O in group G. This difference was statistically significant with p<0.001. On assessing the fiberoptic view of the cord's anatomical alignment of the i-gel to glottis was better than that of Ambu AuraGain (p<0.003). In group A fiberoptic view of the cords was graded as 1 (worst view) in 3% cases, 2 in 29% cases, 3 in 39% and 4 (best view) in 29%, whereas in group G, 0% cases were reported as grade 1 and 16.5% cases were reported as grade 2, grade 3 in 13.5 % and grade 4 in 70% patients. (**Figure 2**) Intra-operative hemodynamic parameters like pulse rate, blood pressure, SpO2 and EtCO2 were comparable in both the groups at all times.

Dynamic parameters like inspiratory and expiratory tidal volumes and peak airway pressures were comparable amongst the two groups.

A statistically significant difference was seen in the difference between oropharyngeal leak pressure and peak airway pressure, which was higher in Group A at all times as compared to Group G (p <0.001) (**Table 5**).

Post-operative pharyngeal morbidity was evaluated by assessing degree of sore throat, dysphagia and hoarseness of voice. No significant difference was seen between the two groups.

Table 4: Table showing demographic profile of the patients

	Group A	Group G	p value
Age (years)	41.12 ± 6.11	41.08 ± 7.71	0.976
Height (cms)	160.18 ± 8.02	162.33 ± 6.13	0.187
Weight (kgs)	54.2 ± 7.63	55.68 ± 8.29	0.416
BMI (kg/m^2)	21.31 ± 3.91	21.29 ± 3.95	0.986
Duration of Surgery (mins)	121.03 ± 9.41	123.3 ± 10.78	0.323

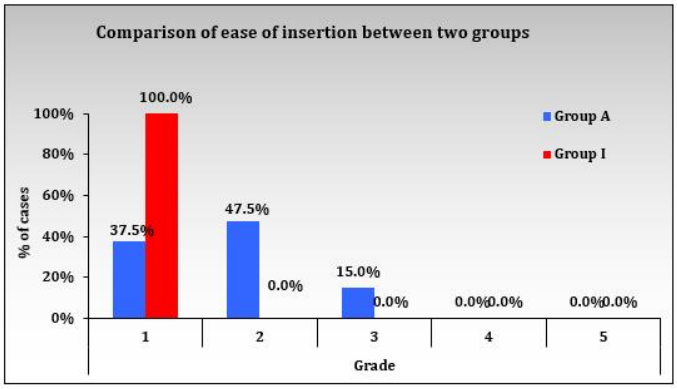

Figure 1: Showing ease of insertion

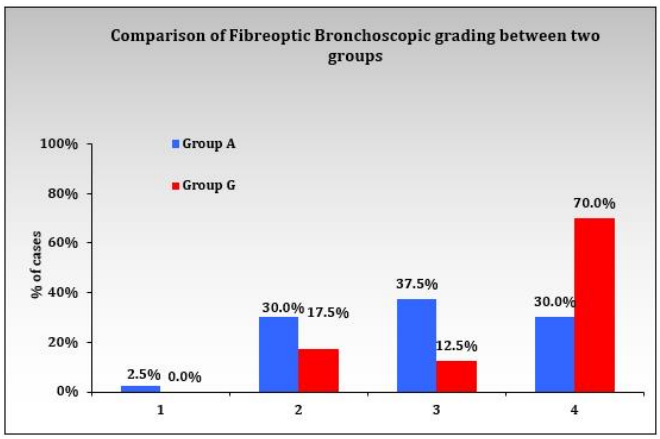

Figure 2: Fiberoptic bronchoscopic grading

Table 5: Table of results

	Group A	**Group G**	**p value**
Time of insertion	22 ± 3.74	14.8 ± 2.94	<0.001
Ease of Insertion			
Grade 1	15 (37.5%)	40 (100%)	0.041
Grade 2	19 (47.5%)	0	<0.001
Grade 3	6 (15%)	0	<0.001
Grade 4	0	0	-
Manipulation Required	30%	2.5%	0.001
OPL Pressure			
After Device Insertion	32.9±3.45	26.53±1.61	<0.001
After Deflation of Carboperitoneum	34.15±2.9	28.2±1.71	<0.001
Fiberoptic View			
Grade 1	1(3%)	0 (0%)	
Grade 2	12 (29%)	7(16.5%)	
Grade 3	15 (39%)	5 (13.5%)	
Grade 4	12 (29%)	28 (70%)	< 0.001
Difference b/w OLP & PAP (mmHg)			
1 min after connecting to ventilator	17.95±3.7	11.45±2.27	<0.001
Before Carboperitoneum	17.95±3.7	11.4±2.3	<0.001
5 min after Carboperitoneum	12.93±4.03	6.08±2.75	<0.001
5 min after Deflation	15.18±3.77	8.75±2.6	<0.001

Intraoperative course was unremarkable in both the groups. Postoperative adverse events like sore throat, hoarseness of voice and dysphagia showed no significant difference between the two groups.

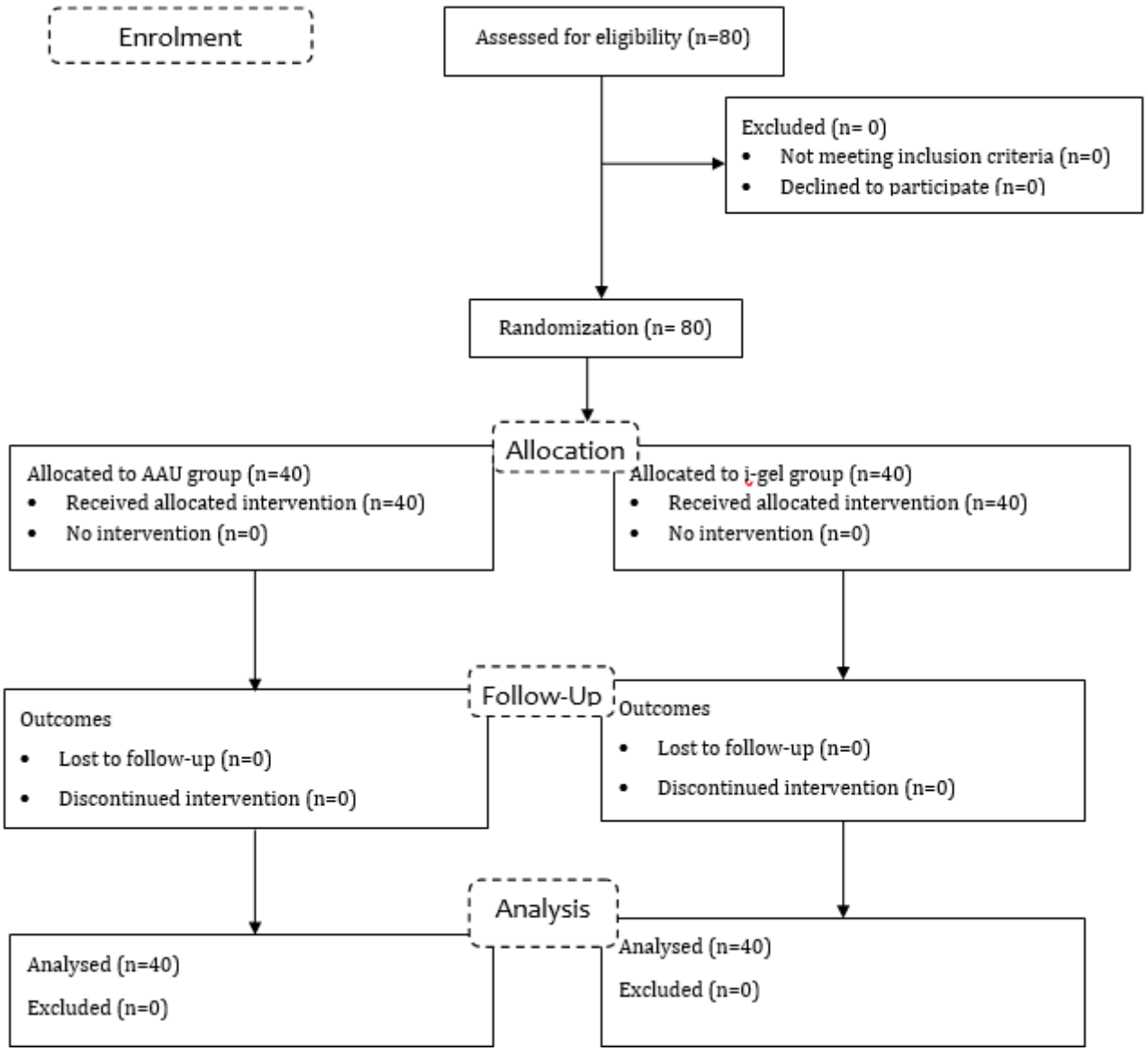

Figure 3: Consort flow diagram

4. Discussion

Supraglottic airway devices encompass a wide range of medical instruments designed to provide a channel for ventilation, oxygen delivery, and the administration of anesthetic gases. Over the past several decades, their use has steadily expanded, making them an essential component of contemporary anesthesia practice. Advantages such as quick and simple insertion, reduced autonomic response, and decreased postoperative discomfort for patients have contributed significantly to their widespread adoption.

i-gel 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. The device has a buccal cavity stabilizer which has a propensity to adapt its shape to the oropharyngeal curvature of the patient. This buccal cavity stabilizer houses airway tubing and a separate gastric channel.

The Ambu® AuraGain™ laryngeal mask airway (Ambu A/S, Ballerup Denmark) is a newer third generation supraglottic airway device launched in June 2014. It is a single use SGD made of polyvinyl chloride (PVC) and is anatomically curved to follow the human airway. In addition, it has an integrated gastric access, a bite block, and a wider airway tube, which provides an intubation conduit.

In our study, we compared the efficacy of AmbuAura Gain, a new third generation supraglottic airway device versus i-gel, a second generation supraglottic airway device in adult patients undergoing elective laparoscopic

cholecystectomy under controlled ventilation with respect to oropharyngeal leak pressure, ease of insertion of device, time taken for insertion, number of attempts taken for successful insertion, no of patients with device failure, ease of gastric tube placement, anatomical alignment of the device to glottic opening and adverse events like bronchospasm, laryngospasm, regurgitation, aspiration, blood staining of the device, tongue, lip & dental trauma, postoperative sore throat, hoarseness of voice and difficulty in swallowing.

We found that the mean OLP within 5 minutes of insertion of device and after deflation of carboperitoneum was significantly higher in Group A than Group G. The higher OLP with Ambu AuraGain could be because of its large sized soft and thin inflatable cuff. i-gel has a non-inflatable cuff made of thermoelastic polymer which conforms to perilaryngeal structures.

Lopez AM et al in their study found similar results. They compared the clinical performance of Ambu AuraGain with that of LMA Supreme following pneumoperitoneum in the trendelenburg position in sixty female patients under gynecological laparoscopy. The AuraGain achieved higher seal pressures as compared to LMA supreme (34 ± 5 vs. 29 ± 5 cm of H2O; p = 0.0002). They suggested that the wider airway tube of the AuraGain, designed to allow direct optical intubation, confers a more prominent shape of the back of the cuff that most likely contributed to create a tighter and more consistent perilaryngeal seal.[9]

Singh K et al also reported findings similar to our study. They compared Ambu AuraGain with the ProSeal LMA for patients undergoing laparoscopic cholecystectomy. They reported that Ambu AuraGain and ProSeal LMA had comparable oropharyngeal seal pressure (28.77 ± 4.82 vs 27.17 ± 16.91 cm of H2O, p =0.303).[8]

Therefore, it can be suggested that AAU is superior to i-gel in patients who have high intrathoracic airway pressure due to pneumoperitoneum created for laparoscopic surgery or in patients with poor thoracic compliance and in those at risk of aspiration of secretions.

A 100% successful insertion rate was achieved in our study, though 15% of Group A patients required a second attempt at insertion and manipulation in the form of jaw thrust during insertion too. This could probably be due to the firm tip of the AAU which is less pliable and does not bend easily toward the hypopharynx after hitting the posterior pharyngeal wall.

Similar to our study Singh K et al in their study found that Ambu AuraGain could be inserted in first attempt in only 18 (60%) patients and 12 (40%) patients required second attempt for insertion.[8]

Shariffuddin II et al who did their study on spontaneously breathing anesthetized adult patients, gave similar results and attributed it to the bulky posterior curvature and slightly larger cuff of AAU. A slight jaw thrust maneuver or a paramedian or side-sweeping technique can be used to override this problem.[9,15,16]

Sang Yoong Park et al observed that with i-gel none of the patients required manipulations during insertion of device similar to our study but after creation of pneumoperitoneum, airway manipulations in the form of pushing and pulling of the device, jaw thrust, chin lift, neck extension, or flexion were required in 4 (8.5%) patients to optimize ventilation.[17]

In our study, time to achieve an effective airway was noted at the appearance of a square-wave capnograph. Group A showed significantly longer time to achieve an effective airway as compared to group G. The longer time for achieving effective airway with Ambu AuraGain can be explained by the time required for its cuff to be inflated and cuff pressure to be adjusted to 60 cm of H_2O with a hand-held manometer. i- gel has a non-inflatable cuff and does not require such cuff inflation after insertion. Also 6 patients required two attempts of insertion with Ambu AuraGain which also increased the mean insertion time.

Singh K et al in their study found time of insertion with Ambu AuraGain to be 13.57±1.94 seconds which is much less than that in our study as they measured time for insertion from holding the device till connection of the breathing circuit whereas in our study it was measured till appearance of first capnographic trace after giving positive pressure breath.[8]

Another study reported similar results as they used a side sweeping technique, which took longer time.[15,18]

Various studies have reported insertion of AAU difficult as compared to insertion of i-gel. We also got similar findings in our study as difficulty score 1 was given in 37.5% patients, score 2 in 47.5 % patients and score 3 in 15% patients. Insertion of i-gel was graded easy in all 100% of the patients.[5,15,19] This is again attributed to less pliable, firm tip and the larger cuff which makes manipulation inside the oral cavity difficult.

Ease of gastric tube insertion as reported by Park SY et al states that though insertion of gastric tube was successful in first attempt in i-gel, it was difficult to

negotiate it due to the smaller aperture of gastric outlet access, and hence time to insertion was more as compared to the other group.[17] In our study we found no such difference and insertion of gastric tube was found easy in all the patients, depicting correct alignment of drain tube with esophagus in all patients. AAU has larger sized drain tube as compared to i-gel and can accommodate larger bore gastric tube which could be advantageous in patients at risk of regurgitation and aspiration of gastric contents.

The anatomical alignment of the SAD in relation to the glottic opening as assessed by a fiberoptic view of the glottis showed a significantly better alignment in the i-gel group as compared to AAU group in our study. In group i-gel, a full view of vocal cords was seen in 70%of patients as opposed to only 29% in the group AAU. Sharma B et al reported similar results for i-gel.[5] These SADs are also recommended to be used for fiberoptic guided intubation through their airway tube in cases of difficult airway. Better alignment of the i-gel with glottis opening may facilitate intubation through it better than that through AAU.

A significant finding of our study was the difference between OPL pressure and peak airway pressure which was higher in Group A as compared to Group G and this difference was statistically significant at all points of time. Creation of pneumoperitoneum in laparoscopic surgery causes a decrease in the pulmonary compliance and this increase in resistance leads to high airway pressures. Therefore, higher inspiratory pressures are required to provide adequate tidal volume and minute ventilation. If these increased airway pressures become more than the OLP of the used SGD, air leak occurs. This can lead to loss of tidal volume, inadequate ventilation, gastric insufflation and pulmonary aspiration. Therefore, higher the difference between OLP and peak airway pressure, better is the safety margin against air leak and aspiration. Thus, from our study we conclude that AAU provides greater margin of safety against air leak and aspiration as compared to i-gel, especially in patients who have high intrathoracic airway pressure due to pneumoperitoneum created for laparoscopic surgery or in patients with poor thoracic compliance or in those at risk of aspiration of secretions.

Incidence of pharyngolaryngeal morbidity in the form of sore throat, hoarseness of voice and dysphagia was very low and comparable in both the groups in our study. Lopez AM et al and other studies have reported similar results.[9,17]

The cuff of i gel is a soft, gel like non - inflatable cuff, which does not require inflation to provide adequate seal with glottis. This is an important advantage over most of the other inflatable cuffed SGD such as AAU. Over inflation of a continuously inflated cuff can exert an excess pressure and cause injury to the surrounding tissue or can cause nerve damage resulting in dysphonia. Therefore, maintaining the cuff pressure of AAU at 60 cm of water should be strictly adhered to and should be checked at regular intervals.

There are a few limitations to our study as these results cannot be extrapolated to difficult airway patients and to those in whom spontaneous respiration is maintained. Also, the sample size may not be adequate for commenting on the difference in postoperative adverse effects between the two groups as incidence of these is low and the follow up has to be for a longer duration.

5. Conclusion

Ambu AuraGain achieved a higher oropharyngeal leak pressure as compared to i-gel. In a setting of high peak airway pressures such as in patients undergoing laparoscopic surgery, Ambu AuraGain with its higher oropharyngeal leak pressure will provide higher safety margin for aspiration as compared to i-gel.

i-gel is better than Ambu AuraGain™ in terms of faster insertion times and ease of insertion.

As i-gel provides a better alignment with glottis as compared to AAU, it is better suited as a conduit to fiberoptic guided endotracheal intubation. To conclude, Ambu AuraGain™ is comparable to the i-gel in securing a patent airway during controlled ventilation in patients undergoing laparoscopic surgery.

Ethical Approval

S. No. IEC/VMMC/SJH/Thesis/October/2017-006.

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Nil.

Conflict of Interest

Nil.

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