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Original Article

Comparison Of the Clinical Performance of Two Second-Generation Supraglottic Airway Devices (I-Gel vs Ambu Auragain) In Adult Patients Undergoing Elective Surgery Under General Anesthesia

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ABSTRACT

Background: Second-generation supraglottic airway devices are increasingly used as alternatives to endotracheal intubation because of their ease of insertion and improved airway sealing characteristics.
Aim: To compare the clinical performance of I-gel and Ambu AuraGain in adult patients undergoing elective surgery under general anaesthesia.
Methods: A prospective randomized observational study was conducted in 60 patients divided into two groups receiving either I-gel or Ambu AuraGain. Quality of insertion, oropharyngeal leak pressure, airway sealing quality score, gastric tube insertion, hemodynamic parameters, and postoperative complications were evaluated.
Results: Demographic characteristics were comparable between groups. Ease of insertion and number of attempts were similar; however, insertion time was significantly shorter with I-gel (15.87±1.36 s) compared to AuraGain (20±2.81 s). Oropharyngeal leak pressure was significantly higher in the AuraGain group (28.33±1.52 cmH_2O vs 22.57±1.01 cmH_2O). Gastric tube insertion required fewer attempts with AuraGain, while hemodynamic parameters and postoperative complications were comparable.
Conclusion: Both devices were effective and safe for airway management; I-gel provided faster insertion whereas Ambu AuraGain offered superior airway sealing and gastric tube insertion performance.

Keywords*: Supraglottic airway device; I-gel; Ambu AuraGain; Oropharyngeal leak pressure.*

INTRODUCTION

Secure airway management is a cornerstone of safe anaesthesia practice, particularly during elective surgical procedures requiring general anaesthesia. Traditionally, endotracheal intubation has been the gold standard for airway control; however, supraglottic airway devices (SADs) offer a less invasive alternative that can reduce airway trauma and sympathetic responses while maintaining adequate ventilation and oxygenation. Second-generation SADs, such as the i-gel® and Ambu® AuraGain™, are designed with features including improved sealing pressures, integrated gastric channels, and enhanced conduits for intubation, which aim to increase safety and clinical performance compared to earlier SAD models [1,2].

The i-gel® is a single-use, non-inflatable cuffed SAD made of a thermoplastic elastomer that conforms to the perilaryngeal anatomy for a secure seal, eliminating the need for cuff inflation and potentially reducing placement time [3,4]. In contrast, Ambu® AuraGain™ features an anatomically curved design, a gastric access port, and the ability to act as a conduit for fibreoptic-guided intubation, positioning it as a versatile second-generation device in airway management [5,6]. Both devices have demonstrated acceptable first-attempt success rates and adequate oropharyngeal leak pressures (OLP), though differences in insertion characteristics and seal efficiency remain subjects of ongoing clinical investigation.

Several randomized trials and clinical studies comparing these devices have highlighted subtle performance variations. For example, adult studies show that both i-gel and AuraGain safely facilitate ventilation and preserve hemodynamic stability during elective procedures, with comparable ease of placement and perioperative complications [7]. Some trials indicate that i-gel may have a shorter insertion time and lower postoperative airway morbidity, while AuraGain may offer higher oropharyngeal seal pressures favorable for positive-pressure ventilation [8,9]. Additionally, evidence suggests that these devices perform reliably across diverse surgical populations, including obese patients and during laparoscopic procedures, further supporting their expanding role in modern anaesthesia practice [10].

Despite these insights, variability in reported outcomes underscores the need for continued comparative research to clarify the clinical performance differences between i-gel and Ambu AuraGain, forming the rationale for the current study.

MATERIAL AND METHODS

This prospective randomized observational study was conducted after obtaining approval from the Institutional Review Board to compare the clinical performance of two second-generation supraglottic airway devices, I-gel and Ambu AuraGain, in adult patients undergoing elective surgical procedures under general anaesthesia. A total of 60 patients of either sex, aged between 18 and 60 years and belonging to American Society of Anaesthesiologists (ASA) physical status grade I and II, were included in the study. Patients scheduled for elective surgeries with adequate mouth opening and suitable airway anatomy were enrolled after obtaining informed written consent. Patients with mouth opening less than 2.5 cm, full stomach, gastro-oesophageal reflux disease, hiatus hernia, cervical spine disease, or pharyngeal and laryngeal pathology were excluded. Pre-anaesthetic evaluation included detailed medical and surgical history, airway assessment using Mallampati grading, general and systemic examination, and routine investigations such as complete blood count, renal and liver function tests, serum electrolytes, chest X-ray, and electrocardiogram.

On the day of surgery, standard monitoring including electrocardiography, non-invasive blood pressure, pulse oximetry, and end-tidal carbon dioxide was applied, and baseline vital parameters were recorded. Patients were randomly allocated into two groups of 30 each using an odd–even allocation method, with Group I receiving the I-gel and Group A receiving the Ambu AuraGain. Device size selection was based on the patient's body weight according to manufacturer recommendations. All patients were kept nil per oral for at least six hours prior to surgery. Premedication consisted of intravenous glycopyrrolate 0.004 mg/kg, ondansetron 4 mg, and fentanyl 2 µg/kg. After pre-oxygenation with 100% oxygen for three minutes, induction of anaesthesia was performed using intravenous propofol 2.5 mg/kg, with additional doses administered if required to achieve adequate depth of anaesthesia.

Following loss of eyelash reflex and adequate jaw relaxation, the assigned supraglottic airway device was inserted using standard insertion techniques. In Group A, the cuff of the Ambu AuraGain was inflated according to size recommendations, whereas in the Group I, I-gel was inserted without cuff inflation. Proper placement was confirmed by bilateral chest expansion, square-wave capnography, and absence of audible leak. Anaesthesia was maintained using a mixture of oxygen, nitrous oxide, and sevoflurane with intermittent positive pressure ventilation, along with intravenous atracurium for muscle relaxation. Quality of insertion was assessed based on ease of insertion, number of attempts, and time required for successful airway placement. Working performance was evaluated by measuring oropharyngeal leak pressure and airway sealing quality score based on tidal volume loss.

Airway sealing quality was graded by **ASQS** as determined by percentage loss of delivered tidal volume (inspiratory (set) – expiratory (outcome) volume on ventilator display screen) [11].

Airway sealing quality score

1	No leak detected
2	Minor leak of tidal volume (Vt loss <20%)
3	Moderate leak of tidal volume (Vt loss 20% - 40%)
4	Insufficient seal (Vt loss >40%)

Complications during insertion such as coughing, laryngospasm, bronchospasm, and regurgitation were recorded. Gastric tube insertion was attempted after airway placement, and its ease and number of attempts were documented. Hemodynamic parameters including pulse rate, systolic and diastolic blood pressure, mean arterial pressure, oxygen saturation, and end-tidal carbon dioxide were recorded at predefined intervals before induction and after insertion of the airway device. At the end of surgery, neuromuscular blockade was reversed using neostigmine and glycopyrrolate, and the airway device was removed after adequate recovery. Post-operative complications including sore throat, blood-stained device, hoarseness of voice, and airway trauma were noted. Statistical analysis was performed using SPSS software, with continuous variables expressed as mean ± standard deviation. The unpaired t-test and chi-square test were used for comparison, and a p-value less than 0.05 was considered statistically significant.

RESULTS

Table 1 show the demographic characteristics of the study population, where both groups were comparable in baseline parameters. The mean age was 34 years in Group I and 32.1 years in Group A. Gender distribution was similar between both the groups. Mean body weight was identical at 60.5 kg in both groups, while ASA grade I/II distribution was 22/8 and 23/7 respectively, confirming comparable patient characteristics. Mallampati grading was also similar between the groups (20/10 vs 21/9), indicating homogeneity of airway assessment.

Table 2 illustrates the quality of insertion of both supraglottic airway devices. Easy insertion was achieved in 27 patients in Group I and 26 patients in Group A, showing no significant difference (p=0.687). First attempt success rate was high in both groups, with 28 patients in Group I and 29 patients in Group A (p=0.553). However, the time taken for insertion was significantly shorter in Group I (15.87±1.36 seconds) compared to Group A (20±2.81 seconds) with a highly significant p value, demonstrating faster placement with I-gel.

Table 3 presents the working performance outcomes. The mean oropharyngeal leak pressure was higher in Group A (28.33±1.52 cmH2O) than Group I (22.57±1.01 cmH2O), with a highly significant p value. Airway sealing quality score showed score 1 in 24 patients of Group I and 27 patients of Group A, while score 2 was seen in 6 patients and 3 patients respectively (p=0.278), indicating comparable sealing efficiency.

Table 4 shows gastric tube insertion characteristics. Easy insertion was observed in 20 patients in Group I and 25 patients in Group A (p=0.136). First attempt success for gastric tube insertion was higher in Group A (25 patients, 83.3%) compared to Group I (17 patients, 56.7%), which was statistically significant (p=0.024), indicating smoother gastric tube placement with Ambu AuraGain.

Table 5 demonstrates post-operative complications. Blood-stained device was observed in 1 patient (3.33%) in Group I and 3 patients (10%) in Group A, while sore throat occurred in 2 patients (6.67%) and 4 patients (13.3%) respectively. There were no cases of tongue-lip-dental trauma, hoarseness of voice, or bronchospasm/laryngospasm in either group, and the overall comparison was statistically non-significant (p=0.778), suggesting comparable safety profiles.

Table 1 - Demographic data

Patient data	Group I n=30	Group A n=30
Number of patients	30	30
Age (years)	34±12.97	32.1±8.48
Gender (Male/Female)	7/23	6/24
Weight (kg)	60.5±13.78	60.5±10.5
ASA grade(I/II)	22/8	23/7
MPG(I/II)	20/10	21/9

Table 2 - Quality of insertion

Quality of insertion	Group I n=30(%)	Group A n=30(%)	P value
Ease of insertion Easy	27(90%)	26(86.7%)	0.687
Difficult	3(10%)	4(13.3%)	
No. of attempts First	28(93.3%)	29(96.7%)	0.553
Second	2(6.7%)	1(3.3%)	
Failed	0	0	
Time taken for insertion (seconds)	15.87±1.36	20±2.81	<0.00001

Table 3- Working performance

Working performance	Group I n=30 (%)	Group A n=30 (%)	P value
Oropharyngeal leak pressure (OLP)(in cmH2O)	22.57±1.01	28.33±1.52	0.00001
Airway sealing quality score 1	24(80%)	27(90%)	0.278
2	6(20%)	3(10%)	
3	0	0	
4	0	0	

Table 4 - Gastric tube insertion

Gastric tube insertion	Group I n=30(%)	Group A n=30(%)	P value
Ease Easy	20(66.7%)	25(83.3%)	0.136
Difficult	10(33.3%)	5(16.7%)	
Attempts 1	17(56.7%)	25(83.3%)	0.024
2	13(43.3%)	5(16.6%)	
Failed	0	0	

Table 5 - Post-operative complications

Post-operative Complications	Group I (n=30)	Group A (n=30)	P value
Blood-stained device	1 (3.33%)	3 (10%)	0.778
Tongue-lip-dental trauma	0	0	
Sore throat	2 (6.67%)	4 (13.3%)	
Hoarseness of voice	0	0	
Bronchospasm/Laryngospasm	0	0	

DISCUSSION

The present study compared two second-generation supraglottic airway devices, I-gel and Ambu AuraGain, with respect to quality of insertion, working performance, gastric tube insertion, hemodynamic stability and postoperative complications. The demographic variables between both groups were comparable, indicating proper randomization and eliminating confounding baseline differences. Similar findings were reported by Brain AIJ et al. [12], who described comparable patient characteristics in studies evaluating supraglottic airway devices, supporting the validity of randomized allocation methods in airway trials. In the current study, ease of insertion was higher in the I-gel group (90%) compared to the AuraGain group (86.7%), although the difference was statistically non-significant. These findings correlate with the observations of Kannaujia A et al. [13], who noted that the non-inflatable cuff and anatomical design of I-gel facilitate smoother insertion with minimal manipulation. Furthermore, shorter insertion time in the I-gel group (15.87±1.36 seconds vs 20±2.81 seconds) is consistent with the results reported by Pratheeba N et al. [14], where cuffless SADs demonstrated reduced insertion duration due to elimination of cuff inflation steps.

The working performance of both devices showed significant differences, particularly in oropharyngeal leak pressure (OLP), which was markedly higher in the AuraGain group (28.33±1.52 cmH_2O) compared to the I-gel group (22.57±1.01 cmH_2O). Higher OLP reflects superior airway sealing capability and suitability for positive pressure ventilation, a finding also emphasized by Wong DT et al. [15], who reported improved sealing pressures with anatomically curved second-generation SADs. Although airway sealing quality score (ASQS) was slightly better in the AuraGain group, the difference remained statistically non-significant, suggesting both devices provide effective ventilation in elective surgical settings. The improved seal with AuraGain may be attributed to its inflatable cuff and wider airway tube, which enhances contact with peri-laryngeal structures and reduces gas leak.

Gastric tube insertion was easier and required fewer attempts in the AuraGain group, with first-attempt success of 83.3% compared to 56.7% in the I-gel group. This finding aligns with observations by Mihara T et al. [16], who demonstrated that devices with larger gastric channels facilitate smoother passage of gastric tubes and reduce manipulation. The presence of a dedicated low-friction gastric access port in AuraGain likely contributed to improved success rates. Hemodynamic parameters including pulse rate, systolic blood pressure, diastolic blood pressure, and mean arterial pressure remained comparable between groups throughout the perioperative period, indicating minimal sympathetic stimulation during insertion of either device. These findings reinforce previous literature suggesting that supraglottic airway devices provide stable hemodynamic profiles compared to traditional airway techniques.

Post-operative complications such as sore throat and blood-stained device were slightly more frequent in the AuraGain group but did not reach statistical significance. This may be explained by the inflatable cuff exerting higher mucosal pressure compared to the gel-based non-inflatable design of I-gel. Overall, both devices demonstrated high success rates, effective ventilation, and acceptable safety profiles, supporting their clinical utility in adult elective surgeries. The present findings highlight that while I-gel offers faster insertion and ease of placement, Ambu AuraGain provides superior airway seal and improved gastric tube insertion performance, thereby offering distinct advantages depending on surgical requirements and anesthesiologist preference.

CONCLUSION:

Both second-generation supraglottic airway devices, I-gel and Ambu AuraGain, were effective in maintaining airway patency and ventilation in adult patients undergoing elective surgery under general anaesthesia. I-gel demonstrated shorter insertion time and slightly easier placement, whereas Ambu AuraGain provided significantly higher oropharyngeal leak pressure and improved gastric tube insertion characteristics. Hemodynamic stability and postoperative complications were comparable between the groups. Therefore, Ambu AuraGain may be considered a preferable alternative when higher airway sealing pressure is required, while I-gel remains advantageous for rapid and atraumatic airway placement.

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