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Original Research Article

COMPARATIVE ANALYSIS OF ENDOTRACHEAL INTUBATION AND SUPRAGLOTTIC AIRWAY DEVICE USE IN ELECTIVE SURGICAL PROCEDURES

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ABSTRACT

Background: Airway management is a critical component of general anaesthesia in elective surgical procedures. Endotracheal intubation has traditionally been considered the standard method for securing the airway because it provides a definitive airway and reliable ventilation. However, supraglottic airway devices have gained increasing acceptance as an alternative because of their ease of insertion, reduced airway stimulation, and lower incidence of postoperative airway-related morbidity. A comparative evaluation of these two techniques is important to determine their relative effectiveness, safety, and clinical utility in elective surgical patients. **Aim:** To compare endotracheal intubation and supraglottic airway device use in elective surgical procedures with regard to airway insertion characteristics, haemodynamic responses, intraoperative airway performance, and perioperative complications. **Material and Methods:** This hospital-based comparative observational study was conducted in the Department of Anaesthesiology at a tertiary care hospital. A total of 92 adult patients undergoing elective surgical procedures under general anaesthesia were included and divided into two groups of 46 patients each. Group I underwent airway management with endotracheal intubation, while Group II was managed using a supraglottic airway device. Demographic variables, pre-anaesthetic airway assessment findings, ease of insertion, number of attempts, time for airway placement, haemodynamic parameters, adequacy of ventilation, peak airway pressure, and perioperative complications were recorded. Statistical analysis was performed using SPSS version 27.0. Quantitative variables were expressed as mean ± standard deviation, while qualitative variables were expressed as frequency and percentage. A p-value of less than 0.05 was considered statistically significant. **Results:** Baseline demographic and pre-anaesthetic characteristics were comparable between the two groups. Ease of insertion was better in the supraglottic airway device group (89.13%) than in the endotracheal intubation group (73.91%). First-attempt success was higher in the supraglottic airway device group (93.48% vs. 78.26%), and the mean insertion time was significantly shorter (15.36 ± 3.88 seconds vs. 21.84 ± 4.62 seconds). Haemodynamic responses after airway placement were significantly greater in the endotracheal intubation group, with higher heart rate and blood pressure values. Both groups maintained effective oxygenation and ventilation intraoperatively, although peak airway pressure was significantly lower in the supraglottic airway device group. Postoperative complications such as coughing, sore throat, and hoarseness of voice were significantly more common in the endotracheal intubation group. **Conclusion:** Both endotracheal intubation and supraglottic airway devices were effective for airway management in elective surgical procedures. However, supraglottic airway devices offered easier and faster insertion, better haemodynamic stability, lower peak airway pressure, and fewer postoperative airway-related complications. They may therefore be considered a safe and effective alternative to endotracheal intubation in appropriately selected elective surgical patients.

INTRODUCTION

Airway management remains one of the most fundamental responsibilities of the anaesthesiologist during elective surgical procedures performed under general anaesthesia. The primary objective is to maintain a patent airway, ensure effective oxygenation and ventilation, and provide safe conditions for surgery while minimizing airway-related trauma and physiological disturbance. Among the available techniques, endotracheal intubation has long been regarded as the traditional standard for securing the airway because it offers a definitive route for ventilation and a high degree of protection against aspiration. However, supraglottic airway devices have emerged as widely accepted alternatives in selected patients and procedures because they are less invasive, easier to insert in many routine settings, and increasingly supported by modern airway management strategies. As surgical practice advances toward enhanced recovery, shorter procedures, and greater emphasis on perioperative comfort and safety, the comparative role of these two airway approaches has become increasingly important.[1] Endotracheal intubation is often preferred when a secure airway is essential, particularly in procedures requiring controlled ventilation, unusual positioning, prolonged surgery, or a higher risk of aspiration. It permits tracheal isolation and reliable delivery of positive pressure ventilation, making it a dependable technique across a broad range of anaesthetic situations. Despite these strengths, the process of laryngoscopy and tracheal tube insertion is associated with a sympathetic stress response that may lead to tachycardia, hypertension, and increased myocardial oxygen demand. In addition, endotracheal intubation may be associated with postoperative throat pain, hoarseness, coughing, mucosal trauma, and other airway-related complications. These concerns are especially relevant in elective surgical patients in whom airway management should ideally be not only effective but also atraumatic, hemodynamically stable, and compatible with smooth recovery.[2] Supraglottic airway devices, in contrast, occupy a position above the glottis and provide an airway conduit without the need for passage through the vocal cords. Over time, they have evolved from first-generation devices designed primarily for simple ventilation to second-generation devices incorporating improved seal pressure, gastric drainage channels, and design modifications aimed at better safety and performance. These developments have expanded the utility of supraglottic devices beyond short, uncomplicated procedures to a much broader elective surgical population. Their use is particularly attractive because they can often be inserted quickly, with less force and less airway manipulation than endotracheal tubes. This may translate into easier airway management, reduced requirement for multiple attempts, fewer hemodynamic fluctuations, and lower incidence of postoperative pharyngolaryngeal symptoms in appropriately selected patients.[3] At the same time, the choice between endotracheal intubation and a supraglottic airway device is rarely absolute and must be tailored to the patient, procedure, and anaesthetic plan. Important considerations include fasting status, airway anatomy, risk of regurgitation, obesity, anticipated difficulty in airway management, surgical duration, need for muscle relaxation, and the pressure requirements of ventilation. Although supraglottic devices are increasingly regarded as safe and effective in many elective settings, concerns remain regarding airway leak, displacement, inadequate seal during positive pressure ventilation, and reduced protection from aspiration compared with cuffed tracheal tubes. Therefore, the decision to use a supraglottic device instead of endotracheal intubation should be based on careful patient selection and a clear understanding of the strengths and limitations of each technique.[4] Recent advances in device design and perioperative practice have renewed interest in comparing these two methods in routine surgical care. Modern supraglottic devices such as the i-gel and other second-generation airway devices have demonstrated favorable clinical performance in adult elective surgery, including effective ventilation, acceptable seal pressure, and relatively low complication rates. In parallel, enhanced perioperative protocols increasingly value methods that minimize stimulation, shorten airway placement time, and improve postoperative comfort. As a result, clinicians are now more frequently faced with choosing between the traditional security of endotracheal intubation and the practical advantages of supraglottic airway devices. This choice is clinically meaningful because even small differences in airway insertion characteristics, hemodynamic response, intraoperative performance, and postoperative morbidity may influence patient safety, efficiency in the operating room, and the overall quality of recovery.[5] Comparative evaluation of these airway techniques is also relevant from the standpoint of evidence-based anaesthesia. Contemporary literature suggests that the performance of airway devices should not be judged solely by whether ventilation is achieved, but also by how smoothly the airway is established, how stable the patient remains during insertion, how effectively ventilation is maintained throughout surgery, and how many postoperative airway complaints occur afterward. Parameters such as ease of insertion, number of attempts, time to secure the airway, heart rate and blood pressure response, adequacy of chest expansion, capnographic confirmation, peak airway pressure, airway leak, sore throat, hoarseness, and coughing are therefore valuable clinical outcomes. These factors are especially important in elective surgery, where there is usually sufficient time for standardized assessment and where subtle differences in perioperative airway performance can be measured more reliably.[6]

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MATERIALS AND METHODS

This hospital-based comparative observational study was conducted in the Department of Anaesthesiology at a tertiary care hospital. The study was designed to compare the use of endotracheal intubation and supraglottic airway devices in adult patients undergoing elective surgical procedures under general anaesthesia. A total of 92 patients were included in the study and were allocated into two groups based on the airway management technique used during surgery. Group I consisted of patients managed with endotracheal intubation, while Group II consisted of patients managed with a supraglottic airway device.

The study population comprised adult patients of either sex scheduled for elective surgical procedures requiring general anaesthesia. Patients aged 18 to 65 years, belonging to American Society of Anesthesiologists (ASA) physical status I and II, and posted for surgeries of short to moderate duration in which either endotracheal intubation or a supraglottic airway device could be appropriately used were considered eligible. A total of 92 patients meeting the selection criteria were enrolled, with 46 patients in each group.

Inclusion and exclusion criteria: Patients aged 18–65 years, of either gender, with ASA grade I or II, and planned for elective surgery under general anaesthesia were included in the study. Patients with anticipated difficult airway, restricted mouth opening, risk of aspiration, obesity with significant airway compromise, upper respiratory tract infection, pregnancy, emergency surgeries, and those with major cardiopulmonary instability were excluded. Patients undergoing procedures requiring prone positioning or surgeries where use of a supraglottic airway device was not feasible were also excluded.

Methodology

Pre-anaesthetic evaluation and baseline assessment: All patients underwent a detailed pre-anaesthetic evaluation before surgery. Demographic variables such as age, sex, body mass index, and ASA physical status were recorded. Airway assessment included Mallampati grading, mouth opening, thyromental distance, neck mobility, and dentition status. Baseline clinical parameters including heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, respiratory rate, and peripheral oxygen saturation were noted before induction of anaesthesia. Relevant history, clinical examination findings, and routine investigations were reviewed and documented.

Grouping and airway management technique: The patients were divided into two groups according to the airway device used during maintenance of general anaesthesia. In the endotracheal intubation group, airway was secured using an appropriately sized cuffed endotracheal tube following laryngoscopy. In the supraglottic airway device group, airway was maintained using an appropriately sized supraglottic airway device selected according to patient characteristics and manufacturer recommendations. Device insertion in both groups was performed by an anaesthesiologist experienced in airway management, under standard monitoring and uniform anaesthetic technique as far as feasible.

Anaesthesia protocol: All patients were kept fasting as per standard institutional protocol and received routine premedication according to departmental practice. On arrival in the operating room, standard monitoring was instituted, including electrocardiography, non-invasive blood pressure, pulse oximetry, and capnography. After preoxygenation, general anaesthesia was induced using standard intravenous agents. Adequate depth of anaesthesia was ensured before insertion of the airway device. Muscle relaxants were administered in patients undergoing endotracheal intubation as required. Anaesthesia was maintained with oxygen, nitrous oxide and/or air, along with inhalational or intravenous anaesthetic agents, depending on the surgical requirement and institutional protocol. Controlled or assisted ventilation was provided in both groups to maintain adequate oxygenation and ventilation.

Study parameters: The primary parameters assessed in the study were ease of airway device insertion, number of insertion attempts, time required for successful airway placement, and success rate of first-attempt insertion. Hemodynamic responses associated with airway placement were evaluated by recording heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, and oxygen saturation at baseline, after induction, immediately after airway placement, and at predefined intervals thereafter. Intraoperative airway performance was assessed using adequacy of ventilation, chest expansion, capnographic waveform, airway leak, need for repositioning, peak airway pressure, and any difficulty in maintaining airway patency.

Perioperative complications: Intraoperative and immediate postoperative complications related to airway management were carefully observed and recorded. These included trauma to lips, teeth, or oral mucosa, blood staining of the device, coughing, laryngospasm, bronchospasm, desaturation, regurgitation, aspiration, gastric insufflation, sore throat, hoarseness of voice, and postoperative nausea or vomiting. Any requirement for change of airway device, failed insertion, or conversion from supraglottic airway device to endotracheal intubation was also documented.

Statistical Analysis: All relevant clinical and intraoperative data were recorded in a structured proforma and entered into a database for analysis. Statistical analysis was performed using SPSS version 27.0. Quantitative variables were expressed as mean and standard deviation, while qualitative variables were expressed as frequency and percentage. The independent sample t-test was used for comparison of continuous variables between the two groups, and the chi-square test or Fisher's exact

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test was applied for categorical variables as appropriate. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 shows the baseline demographic and pre-anaesthetic characteristics of the study population. The mean age of patients in Group I (ETT) was 42.36 ± 10.24 years, while in Group II (SAD) it was 40.87 ± 9.76 years. The difference was not statistically significant (p=0.456), indicating that both groups were comparable with regard to age distribution. With respect to gender, males constituted 60.87% in the ETT group and 56.52% in the SAD group, while females accounted for 39.13% and 43.48%, respectively. This difference was also not statistically significant (p=0.671), suggesting a similar sex distribution between the two groups. Body mass index was almost comparable in both groups, with a mean BMI of 24.12 ± 3.15 kg/m² in the ETT group and 23.68 ± 2.98 kg/m² in the SAD group, without any significant difference (p=0.512). Similarly, ASA grading showed no statistically significant variation between groups (p=0.668). In the ETT group, 58.70% patients belonged to ASA Grade I and 41.30% to ASA Grade II, whereas in the SAD group, 63.04% were ASA Grade I and 36.96% were ASA Grade II. Pre-anaesthetic airway assessment parameters were also comparable. Mallampati Grade I was observed in 52.17% of patients in Group I and 56.52% in Group II, while Mallampati Grade II was seen in 39.13% and 34.78%, respectively. Mallampati Grade III was present equally in 8.70% of patients in both groups, and the difference was not statistically significant (p=0.819). Adequate mouth opening was present in 93.48% of the ETT group and 95.65% of the SAD group (p=0.645). Normal neck mobility was observed in 95.65% and 97.83% of patients, respectively (p=0.556). The mean thyromental distance was 6.71 ± 0.64 cm in the ETT group and 6.83 ± 0.59 cm in the SAD group, again without significant difference (p=0.351).

Table 2 presents the airway insertion characteristics in both groups. Ease of insertion was achieved in 73.91% of patients in the ETT group compared to 89.13% in the SAD group, while difficult insertion was encountered in 26.09% and 10.87% of patients, respectively. This difference was statistically significant (p=0.048), indicating that insertion of the supraglottic airway device was easier than endotracheal intubation. The success of airway placement on the first attempt was significantly higher in the SAD group than in the ETT group. First-attempt success was achieved in 93.48% of patients in Group II compared to 78.26% in Group I, while second-attempt insertion was required in 6.52% of SAD cases and 21.74% of ETT cases. This difference was statistically significant (p=0.036), showing that SAD placement had a better first-pass success rate. Likewise, the mean number of attempts required for airway placement was significantly lower in the SAD group (1.07 ± 0.25) compared to the ETT group (1.22 ± 0.42), with p=0.028. The time required for successful airway placement was markedly shorter in Group II. The mean insertion time was 21.84 ± 4.62 seconds in the ETT group compared to 15.36 ± 3.88 seconds in the SAD group, and this difference was highly statistically significant (p<0.001). This clearly indicates that SAD placement was faster than endotracheal intubation. With regard to failed insertion and need for change of airway device, no failed insertion occurred in the ETT group, whereas one patient (2.17%) in the SAD group had failed insertion and required change of airway device. However, this difference was not statistically significant (p=0.315).

Table 3 compares the haemodynamic parameters between the two groups at baseline and after airway insertion. At baseline, heart rate was comparable between the groups, being 78.54 ± 8.32 beats/min in the ETT group and 77.96 ± 7.89 beats/min in the SAD group (p=0.712). However, after airway insertion, the mean heart rate increased significantly more in the ETT group to 96.82 ± 9.45 beats/min, compared to 85.43 ± 8.76 beats/min in the SAD group. A similar pattern was observed for systolic blood pressure. Baseline systolic BP was almost identical in both groups, 124.36 ± 10.28 mmHg in Group I and 123.74 ± 9.86 mmHg in Group II, with no significant difference (p=0.781). Following airway insertion, systolic BP rose significantly more in the ETT group to 142.18 ± 11.64 mmHg, compared to 130.52 ± 10.93 mmHg in the SAD group (p<0.001). The same trend was seen for diastolic blood pressure and mean arterial pressure. Baseline diastolic BP was 78.63 ± 7.46 mmHg in the ETT group and 77.94 ± 7.11 mmHg in the SAD group (p=0.652), showing comparability before intervention. After insertion, diastolic BP rose to 89.76 ± 8.24 mmHg in Group I and 82.18 ± 7.96 mmHg in Group II, with a highly significant difference (p<0.001). Baseline mean arterial pressure was also similar in the two groups, 93.87 ± 7.12 mmHg versus 93.21 ± 6.84 mmHg (p=0.650), but after insertion it increased to 107.23 ± 8.76 mmHg in the ETT group compared to 98.41 ± 7.92 mmHg in the SAD group (p<0.001). Respiratory rate and oxygen saturation, however, remained comparable between the two groups. Baseline respiratory rate was 15.41 ± 1.86/min in Group I and 15.26 ± 1.79/min in Group II (p=0.693), while after insertion it was 15.96 ± 1.94/min and 15.54 ± 1.82/min, respectively (p=0.284). Similarly, baseline SpO_2 values were 98.24 ± 0.82% in the ETT group and 98.36 ± 0.76% in the SAD group (p=0.498), while after insertion they remained stable at 98.02 ± 0.91% and 98.18 ± 0.84%, respectively (p=0.362).

Table 4 summarizes intraoperative airway performance in both groups. Adequate ventilation was achieved in 95.65% of patients in the ETT group and 97.83% in the SAD group, with no statistically significant difference (p=0.556). Adequate chest expansion was also comparable, being present in

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97.83% of ETT patients and 95.65% of SAD patients (p=0.556). Normal capnographic waveform was observed in all patients in the ETT group (100.00%) and in 95.65% of patients in the SAD group. Although numerically slightly lower in the SAD group, this difference was not statistically significant (p=0.152). Airway leak was seen in 6.52% of cases in the ETT group and 15.22% in the SAD group, while the need for repositioning was noted in 10.87% and 19.57% of cases, respectively. Difficulty in maintaining airway patency was observed in 4.35% of ETT cases and 13.04% of SAD cases. However, none of these differences reached statistical significance (p=0.182, p=0.238, and p=0.138, respectively).

Peak airway pressure was significantly different between the two groups. The mean peak airway pressure was 18.74 ± 2.86 cm H_2O in the ETT group compared to 16.12 ± 2.45 cm H_2O in the SAD group, and this difference was highly statistically significant (p<0.001). This indicates that ventilation through the supraglottic airway device was associated with lower airway pressures. Desaturation episodes were infrequent in both groups, occurring in 2.17% of ETT patients and 4.35% of SAD patients, with no significant difference (p=0.557).

Table 5 shows the perioperative and postoperative complications observed in the two groups. Trauma to lips or oral mucosa occurred in 15.22% of patients in the ETT group and 6.52% in the SAD group, but this difference was not statistically significant (p=0.182). Blood staining of the device was observed in 17.39% of ETT cases and 6.52% of SAD cases, again without statistical significance (p=0.103). Postoperative airway-related symptoms, however, were significantly more frequent in the ETT group. Coughing occurred in 26.09% of patients in Group I compared to 10.87% in Group II, and this difference was statistically significant (p=0.048). Sore throat was reported by 30.43% of patients in the ETT group compared to 13.04% in the SAD group (p=0.041). Likewise, hoarseness of voice was seen in 21.74% of ETT patients but only 6.52% of SAD patients, with a statistically significant difference (p=0.033). Other complications were uncommon and comparable between the groups. Laryngospasm occurred in 4.35% of the ETT group and 2.17% of the SAD group (p=0.557), while bronchospasm was noted in one patient (2.17%) in the ETT group and in none of the SAD patients (p=0.315). Gastric insufflation was not observed in the ETT group but occurred in 6.52% of the SAD group; however, this difference was not statistically significant (p=0.078). Importantly, no cases of regurgitation or aspiration were recorded in either group. Postoperative nausea and vomiting occurred in 13.04% of ETT patients and 10.87% of SAD patients, with no significant difference (p=0.749).

Table 1: Baseline demographic and pre-anaesthetic characteristics of the study population

Variable	Group I (ETT) (n=46)	Group II (SAD) (n=46)	p-value
Age (years), Mean ± SD	42.36 ± 10.24	40.87 ± 9.76	0.456
Male	28 (60.87%)	26 (56.52%)	0.671
Female	18 (39.13%)	20 (43.48%)	
BMI (kg/m²), Mean ± SD	24.12 ± 3.15	23.68 ± 2.98	0.512
ASA Grade I	27 (58.70%)	29 (63.04%)	0.668
ASA Grade II	19 (41.30%)	17 (36.96%)	
Mallampati Grade I	24 (52.17%)	26 (56.52%)	0.819
Mallampati Grade II	18 (39.13%)	16 (34.78%)	
Mallampati Grade III	4 (8.70%)	4 (8.70%)	
Adequate mouth opening	43 (93.48%)	44 (95.65%)	0.645
Reduced mouth opening	3 (6.52%)	2 (4.35%)	
Normal neck mobility	44 (95.65%)	45 (97.83%)	0.556
Restricted neck mobility	2 (4.35%)	1 (2.17%)	
Thyromental distance (cm), Mean ± SD	6.71 ± 0.64	6.83 ± 0.59	0.351

Table 2: Airway insertion characteristics

Parameter	Group I (ETT) (n=46)	Group II (SAD) (n=46)	p-value
Ease of insertion	34 (73.91%)	41 (89.13%)	0.048*
Difficult insertion	12 (26.09%)	5 (10.87%)	
Successful in first attempt	36 (78.26%)	43 (93.48%)	0.036*
Successful in second attempt	10 (21.74%)	3 (6.52%)	
Mean number of attempts	1.22 ± 0.42	1.07 ± 0.25	0.028*
Time for successful airway placement (seconds), Mean ± SD	21.84 ± 4.62	15.36 ± 3.88	<0.001*
Failed insertion	0 (0.00%)	1 (2.17%)	0.315
Change of airway device required	0 (0.00%)	1 (2.17%)	0.315

Statistically significant

Table 3: Comparison of haemodynamic parameters

Parameter	Group I (ETT)	Group II (SAD)	p-value
Baseline heart rate (beats/min), Mean ± SD	78.54 ± 8.32	77.96 ± 7.89	0.712
Heart rate after insertion (beats/min), Mean ± SD	96.82 ± 9.45	85.43 ± 8.76	<0.001*
Baseline systolic BP (mmHg), Mean ± SD	124.36 ± 10.28	123.74 ± 9.86	0.781
Systolic BP after insertion (mmHg), Mean ± SD	142.18 ± 11.64	130.52 ± 10.93	<0.001*
Baseline diastolic BP (mmHg), Mean ± SD	78.63 ± 7.46	77.94 ± 7.11	0.652

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Diastolic BP after insertion (mmHg), Mean ± SD	89.76 ± 8.24	82.18 ± 7.96	<0.001*
Baseline mean arterial pressure (mmHg), Mean ± SD	93.87 ± 7.12	93.21 ± 6.84	0.650
Mean arterial pressure after insertion (mmHg), Mean ± SD	107.23 ± 8.76	98.41 ± 7.92	<0.001*
Baseline respiratory rate (/min), Mean ± SD	15.41 ± 1.86	15.26 ± 1.79	0.693
Respiratory rate after insertion (/min), Mean ± SD	15.96 ± 1.94	15.54 ± 1.82	0.284
Baseline SpO_2 (%), Mean ± SD	98.24 ± 0.82	98.36 ± 0.76	0.498
SpO_2 after insertion (%), Mean ± SD	98.02 ± 0.91	98.18 ± 0.84	0.362

Statistically significant

Table 4: Intraoperative airway performance

Parameter	Group I (ETT) (n=46)	Group II (SAD) (n=46)	p-value
Adequate ventilation achieved	44 (95.65%)	45 (97.83%)	0.556
Adequate chest expansion	45 (97.83%)	44 (95.65%)	0.556
Normal capnographic waveform	46 (100.00%)	44 (95.65%)	0.152
Airway leak present	3 (6.52%)	7 (15.22%)	0.182
Need for repositioning	5 (10.87%)	9 (19.57%)	0.238
Difficulty in maintaining airway patency	2 (4.35%)	6 (13.04%)	0.138
Peak airway pressure (cm H_2O), Mean ± SD	18.74 ± 2.86	16.12 ± 2.45	<0.001*
Desaturation episodes	1 (2.17%)	2 (4.35%)	0.557

Table 5: Perioperative and postoperative complications

Complication	Group I (ETT) (n=46)	Group II (SAD) (n=46)	p-value
Trauma to lips/oral mucosa	7 (15.22%)	3 (6.52%)	0.182
Blood staining of device	8 (17.39%)	3 (6.52%)	0.103
Coughing	12 (26.09%)	5 (10.87%)	0.048*
Sore throat	14 (30.43%)	6 (13.04%)	0.041*
Hoarseness of voice	10 (21.74%)	3 (6.52%)	0.033*
Laryngospasm	2 (4.35%)	1 (2.17%)	0.557
Bronchospasm	1 (2.17%)	0 (0.00%)	0.315
Gastric insufflation	0 (0.00%)	3 (6.52%)	0.078
Regurgitation	0 (0.00%)	0 (0.00%)	—
Aspiration	0 (0.00%)	0 (0.00%)	—
Postoperative nausea/vomiting	6 (13.04%)	5 (10.87%)	0.749

Statistically significant

DISCUSSION

In the present study, the two groups were well matched at baseline, with no significant difference in age, sex, BMI, ASA grade, Mallampati class, mouth opening, neck mobility, or thyromental distance, which supports the internal validity of the comparison. The mean age was 42.36 ± 10.24 years in the ETT group and 40.87 ± 9.76 years in the SAD group, while ASA I patients constituted 58.70% and 63.04%, respectively. This pattern is consistent with the large randomized comparison by Voyagis et al. (1997), who evaluated 879 elective surgical patients (453 ETT, 426 LMA) after formal airway assessment with Mallampati class and head-neck mobility and likewise designed their comparison on broadly comparable preoperative airway characteristics. Thus, as in that study, the differences observed later in our work are more likely to reflect the airway device itself rather than baseline imbalance.[7]

With respect to insertion characteristics, our study showed that SAD placement was technically easier than ETT, with ease of insertion in 89.13% versus 73.91%, first-attempt success in 93.48% versus 78.26%, fewer mean attempts (1.07 ± 0.25 vs 1.22 ± 0.42), and a shorter insertion time (15.36 ± 3.88 s vs 21.84 ± 4.62 s). These findings suggest a clear procedural advantage for SADs in routine elective cases. In contrast, Barreira et al. (2013), in a prospective randomized trial of 60 patients undergoing general anesthesia with LMA Supreme or ETT, reported no significant difference between groups in insertion time, number of attempts, or blood on the device, although postoperative throat-related symptoms were lower with the supraglottic device. The difference from our findings may be explained by variation in device generation, surgical population, and operator familiarity, but both studies support that SADs are at least as feasible as ETT in elective anesthesia.[8]

The superiority of the SAD in first-pass placement in our study is also supported by broader pooled evidence. We observed first-attempt insertion success of 93.48% with SAD compared with 78.26% with ETT, and only 2.17% of SAD cases required device change. Similarly, Dong et al. (2023), in a meta-analysis, reported that the success rate of one-time implantation was significantly higher in the laryngeal mask airway group, with an OR of 0.20 (95% CI 0.07–0.59; P=0.003) compared with endotracheal intubation. Although the magnitude of effect cannot be directly equated across studies because of differing populations and device types, the direction of the finding is similar and strengthens the inference that supraglottic devices are often easier to establish on the first attempt in selected surgical patients.[9]

A major finding of the present study was the significantly attenuated haemodynamic response with SAD use. After airway placement, heart rate rose to 96.82 ± 9.45 beats/min in the ETT group versus 85.43 ± 8.76 beats/min in the SAD group;

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systolic BP increased to 142.18 ± 11.64 mmHg versus 130.52 ± 10.93 mmHg; diastolic BP to 89.76 ± 8.24 mmHg versus 82.18 ± 7.96 mmHg; and MAP to 107.23 ± 8.76 mmHg versus 98.41 ± 7.92 mmHg, all with significant differences. This closely agrees with Obsa et al. (2020), who reported that both devices produced a pressor response, but the LMA group had less haemodynamic change than the ETT group, with systolic and diastolic pressure returning toward baseline within minutes. Their conclusion that avoidance of laryngoscopy reduces sympathetic stimulation is strongly consistent with our results.[10]

The haemodynamic advantage of SADs in our study is further reinforced by the work of Uddin et al. (2012) in hypertensive surgical patients. In our study, the post-insertion MAP was 107.23 ± 8.76 mmHg with ETT compared with 98.41 ± 7.92 mmHg with SAD. Uddin et al. reported that after airway placement, pulse increased from 69 ± 9 to 75 ± 8 and MAP from 89 ± 10 to 104 ± 4 mmHg in the ETT group, whereas in the LMA group pulse changed from 67 ± 7 to 68 ± 5 and MAP from 89 ± 11 to 94 ± 8 mmHg, with all haemodynamic responses significantly lower in the LMA group. Although their population consisted of hypertensive rather than routine elective patients, the pattern is remarkably similar to ours and underscores that the haemodynamic benefit of SADs may be especially relevant when cardiovascular stability is important.[11]

Regarding adequacy of ventilation and oxygenation, our study found that both devices were clinically effective. Adequate ventilation was achieved in 95.65% of ETT patients and 97.83% of SAD patients, normal capnographic waveform was present in 100.00% and 95.65%, and oxygen saturation after insertion remained stable at 98.02 ± 0.91% and 98.18 ± 0.84%, respectively. These findings are in line with Zaman et al. (2022), who in a randomized clinical trial of 80 patients undergoing longer plastic and reconstructive procedures found that arterial oxygen saturation, recurrent carbon dioxide, laryngeal/tracheal spasm, nausea and vomiting, sore throat, and abdominal distension were not significantly different between LMA and ETT groups, concluding that the classic LMA could be used even for procedures lasting more than two hours. Taken together, both studies indicate that when patients are properly selected, SADs can provide ventilation efficacy comparable to ETT.[12]

In relation to intraoperative airway mechanics, our study showed a significantly lower peak airway pressure with SAD (16.12 ± 2.45 cm H_2O) than with ETT (18.74 ± 2.86 cm H_2O), although airway leak (15.22% vs 6.52%) and repositioning (19.57% vs 10.87%) were numerically more frequent with the supraglottic device and did not reach significance. A similar overall interpretation emerges from the meta-analysis by Park et al. (2016), which included 17 randomized controlled trials in laparoscopic surgery and found that postoperative complications such as cough at removal, dysphagia, sore throat, and laryngospasm were higher with ETT, while no clear difference was shown in insertion success at first attempt and insertion time in that pooled laparoscopic setting. Their synthesis supports the view that SADs can maintain effective ventilation even in more demanding positive-pressure contexts, though minor seal-related issues may occur more often than with a cuffed tracheal tube.[13]

The postoperative pharyngolaryngeal morbidity profile in our study clearly favored SADs. Coughing occurred in 10.87% of SAD patients versus 26.09% of ETT patients, sore throat in 13.04% versus 30.43%, and hoarseness in 6.52% versus 21.74%. These findings are comparable to those of Karaaslan et al. (2021), who in a randomized controlled septoplasty trial reported that sore throat was significantly higher in the ETT group at the 2nd, 6th, and 12th postoperative hours ($p=0.003$, $p=0.017$, and $p<0.001$, respectively), while nausea, vomiting, dysphagia, and dysphonia were otherwise similar. Their study also noted less blood leakage into the airway with LMA-S, suggesting that reduced mucosal trauma may partly explain the lower postoperative throat symptoms, which is compatible with the lower cough and hoarseness rates we observed with SAD use.[14]

Finally, the overall complication pattern in our study supports the broader literature favouring supraglottic devices for reduced airway morbidity in elective anesthesia. Serious adverse events were rare in both groups: there was no regurgitation or aspiration in either group, bronchospasm was uncommon, and laryngospasm was infrequent. However, minor airway morbidity was consistently higher with ETT. This mirrors the systematic review by Yu et al. (2010), who found that compared with LMA, ETT use was associated with a significantly greater incidence of postoperative hoarse voice (RR 2.59), laryngospasm during emergence (RR 3.16), coughing (RR 7.12), and sore throat (RR 1.67). The direction of those pooled estimates closely parallels our own results, particularly for coughing, sore throat, and hoarseness, and supports the conclusion that in appropriately selected elective procedures, SADs provide comparable airway security with less postoperative airway irritation than endotracheal intubation.[15]

CONCLUSION

In conclusion, both endotracheal intubation and supraglottic airway devices were effective in maintaining adequate airway control and ventilation during elective surgical procedures. However, supraglottic airway devices demonstrated easier and faster insertion, higher first-attempt success, better hemodynamic stability, and a lower incidence of postoperative airway-related complications such as sore throat, coughing, and hoarseness. Although endotracheal intubation remains a reliable method for securing the airway, supraglottic airway devices may

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serve as a safe and effective alternative in appropriately selected elective surgical patients. These findings support the wider use of supraglottic airway devices in tertiary care practice for suitable cases.

REFERENCES

1. Law JA, Duggan LV, Asselin M, Baker P, Crosby E, Downey A, et al. Canadian Airway Focus Group updated consensus-based recommendations for management of the difficult airway: part 2. Planning and implementing safe management of the patient with an anticipated difficult airway. Can J Anaesth. 2021;68(9):1405-1436. doi:10.1007/s12630-021-02008-z. Available from: https://pubmed.ncbi.nlm.nih.gov/34105065/
2. Thota B, Jan KM, Oh MW, Moon TS. Airway management in patients with obesity. Saudi J Anaesth. 2022;16(1):76-81. doi:10.4103/sja.sja_351_21. Available from: https://pubmed.ncbi.nlm.nih.gov/35261593/
3. Kumar T, Sinha S, Subramaniam R, Ravikumar N. Supraglottic airway devices versus endotracheal intubation for airway complications in patients undergoing laparoscopic surgery: systematic review and meta-analysis. Indian J Anaesth. 2023;67(6):459-470. doi:10.4103/ija.ija_152_23. Available from: https://pubmed.ncbi.nlm.nih.gov/37333696/
4. Nair A, Bailey M, Karyampudi A, et al. Safety and efficacy of the use of supraglottic airway devices in laparoscopic surgeries: a review. Cureus. 2024;16(3):e56886. doi:10.7759/cureus.56886. Available from: https://pubmed.ncbi.nlm.nih.gov/38541053/
5. Werner J, Stricker P, Dullenkopf A, et al. Evaluation of the i-gel® Plus supraglottic airway device in adults undergoing elective surgery under general anaesthesia: a multicentre prospective interventional cohort study. Anaesthesia. 2024;79(11):1284-1291. doi:10.1111/anae.16401. Available from: https://pubmed.ncbi.nlm.nih.gov/39110995/
6. Shen J, Miao X, Wang H, Zhao J, Shi J, Dai Q. Comparison of I-gel and Baska mask in elective surgery: a meta-analysis. BMJ Open. 2024;14(12):e085832. doi:10.1136/bmjopen-2024-085832. Available from: https://pubmed.ncbi.nlm.nih.gov/39806580/
7. Voyagis GS, Kyriakis KP, Dimitriou V, Vrettou I. Comparison of laryngeal mask airway with endotracheal intubation in the presence of difficult airway predictors. Eur J Anaesthesiol. 1997;14(4):401-405. Available from: https://pubmed.ncbi.nlm.nih.gov/9069573/
8. Barreira SR, de Souza CM, Fabrizzi F, Azevedo AB, Lelis TG, Lüdtke C. Prospective, randomized clinical trial of laryngeal mask airway Supreme® used in patients undergoing general anesthesia. Rev Bras Anestesiol. 2013;63(6):456-460. Available from: https://pubmed.ncbi.nlm.nih.gov/24565342/
9. Dong W, Zhang W, Er J, Liu J, Han J. Comparison of laryngeal mask airway and endotracheal tube in general anesthesia in children. Exp Ther Med. 2023;26(6):554. doi:10.3892/etm.2023.12253. Available from: https://pubmed.ncbi.nlm.nih.gov/37941592/
10. Obsa MS, Ahmed A, Megersa B, Tesema T. Effect of laryngeal mask airway insertion versus endotracheal intubation on haemodynamic responses in paediatric ophthalmic surgery: a prospective observational study. Anesthesiol Res Pract. 2020;2020:7021641. doi:10.1155/2020/7021641. Available from: https://pubmed.ncbi.nlm.nih.gov/32565787/
11. Uddin SS, Khan MA, Karim SF. Comparison of hemodynamic responses to use of laryngeal mask airway versus endotracheal tube in hypertensive patients. Pak Armed Forces Med J. 2012;62(3):398-403. Available from: https://www.pafmj.org/PAFMJ/article/download/1622/1388
12. Zaman B, Noorizad S, Safari S, Javadi Larijani SMH, Seyed Siamdoust SA. Efficacy of laryngeal mask airway compared to endotracheal tube: a randomized clinical trial. Anesth Pain Med. 2022;12(2):e122880. doi:10.5812/aapm.122880. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC8995866/
13. Park SK, Ko G, Choi GJ, Ahn EJ, Kang H. Comparison between supraglottic airway devices and endotracheal tubes in patients undergoing laparoscopic surgery: a systematic review and meta-analysis. Medicine (Baltimore). 2016;95(33):e4598. doi:10.1097/MD.0000000000004598. Available from: https://pubmed.ncbi.nlm.nih.gov/27537593/
14. Karaaslan E, Yılmaz M, Karaaslan EF, Colak C, Sener M. A comparison of laryngeal mask airway-supreme and endotracheal tube use with respect to airway protection in patients undergoing septoplasty: a randomized, single-blind, controlled clinical trial. BMC Anesthesiol. 2021;21(1):5. doi:10.1186/s12871-020-01222-4. Available from: https://pubmed.ncbi.nlm.nih.gov/33407130/
15. Yu SH, Beirne OR. Laryngeal mask airways have a lower risk of airway complications compared with endotracheal intubation: a systematic review. J Oral Maxillofac Surg. 2010;68(10):2359-2376. doi:10.1016/j.joms.2010.04.017. Available from: https://pubmed.ncbi.nlm.nih.gov/20674126/.

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