

Comparison of Supraglottic Airway Devices and Endotracheal Intubation in Selected Surgical Procedures

Ms Itrat Fatima¹, Mr Deeptangsu Nayek²

Assistant Professor, Lecturer, Bhai Gurdas Institute of Allied Sciences, Sangrur, Punjab, India

Abstract:

Airway management is a fundamental component of general anaesthesia. Supraglottic airway devices (SGAs) provide an alternative to endotracheal intubation (ETT) for selected patients and procedures. This paper proposes a prospective comparative evaluation of SGA and ETT with emphasis on insertion characteristics, haemodynamic response, ventilation, airway-related complications, and postoperative recovery. Contemporary systematic reviews indicate that SGAs may reduce postoperative sore throat, hoarseness and coughing compared with ETT in appropriately selected surgical patients, while ETT remains advantageous when a protected tracheal airway and a higher degree of airway security are required. The proposed study will compare predefined perioperative outcomes in adult patients undergoing selected elective surgical procedures under general anaesthesia. No clinical outcome data are presented; the methodology is designed to generate original institutional data.

Keywords: supraglottic airway device, endotracheal intubation, airway management, general anaesthesia, haemodynamic response, postoperative sore throat, airway complications.

I. INTRODUCTION

Effective airway management is central to safe general anaesthesia. Endotracheal intubation provides a cuffed tube within the trachea and is widely used when airway protection, controlled ventilation, or a secure airway is required. Supraglottic airway devices occupy the hypopharyngeal region and create a seal around the laryngeal inlet without placing a tube through the vocal cords. Modern second-generation SGAs also incorporate features intended to improve airway sealing and provide a pathway for gastric drainage.

The choice between an SGA and ETT is patient- and procedure-dependent. Factors such as aspiration risk, surgical position, duration and type of surgery, ventilation requirements, airway anatomy, and operator expertise influence selection.

II. REVIEW OF LITERATURE

A systematic review and meta-analysis of randomized controlled trials in laparoscopic surgery found postoperative airway symptoms including sore throat, hoarseness, dysphonia and cough to be more frequent with ETT than with SGA, while several measures of insertion and other complications did not differ significantly. An updated meta-analysis of 21 randomized trials involving 2,213 adults similarly reported lower postoperative sore throat and hoarseness with SGA. A 2024 systematic review of second-

generation SGAs in adult abdominopelvic surgery reported reduced major perioperative airway complications and lower rates of sore throat, hoarseness, emergence coughing and postoperative nausea and vomiting, although certainty varied by outcome.

III. RATIONALE OF THE STUDY

Although SGAs are increasingly used in modern anaesthesia, their performance relative to ETT may vary with the surgical procedure and patient characteristics. A local comparative study can provide practical information regarding insertion time, first-attempt success, haemodynamic response, ventilation, airway leak, intraoperative events, and postoperative discomfort. Such information is relevant to anaesthesia technologists because airway preparation, assistance during insertion, monitoring, fixation and postoperative airway care are integral to perioperative practice.

IV. AIM AND OBJECTIVES

The primary aim is to compare supraglottic airway devices and endotracheal intubation in selected surgical procedures performed under general anaesthesia. Objectives are to compare first-attempt insertion success; insertion time; heart rate and blood pressure changes; oxygenation and ventilation parameters; airway-related complications such as coughing, laryngospasm, blood staining, sore throat and hoarseness; and postoperative recovery characteristics.

Table 1. selected findings from recent comparative evidence

Evidence source	Population / design	Key finding
Updated systematic review, 2023	21 randomized trials; 2,213 adults undergoing laparoscopic surgery	SAD group had 44% lower sore-throat risk (RR 0.44) and 38% lower hoarseness risk (RR 0.38) than ETT group.
Second-generation SGA meta-analysis, 2024	51 studies; 5,110 adults undergoing abdominopelvic surgery	Lower major perioperative airway complications, sore throat, hoarseness and emergence coughing; inadequate ventilation was more frequent with SGA.
Network meta-analysis, 2024	111 RCTs; 12,045 patients	Compared multiple SGA devices using postoperative sore throat, first-attempt success, bleeding and leak pressure outcomes.

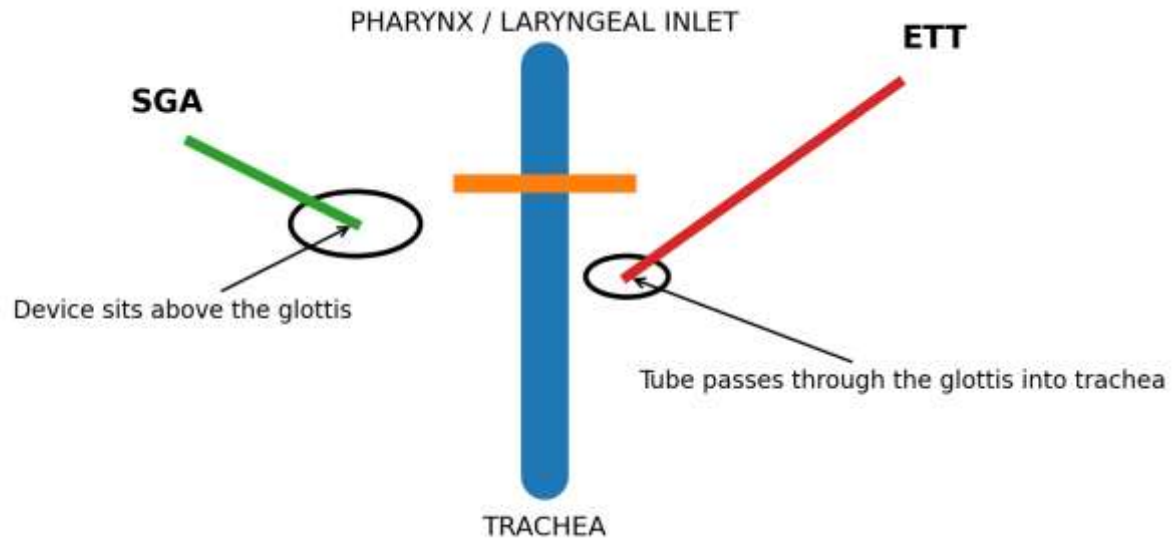


Figure 1. anatomical concept of supraglottic airway and endotracheal tube placement

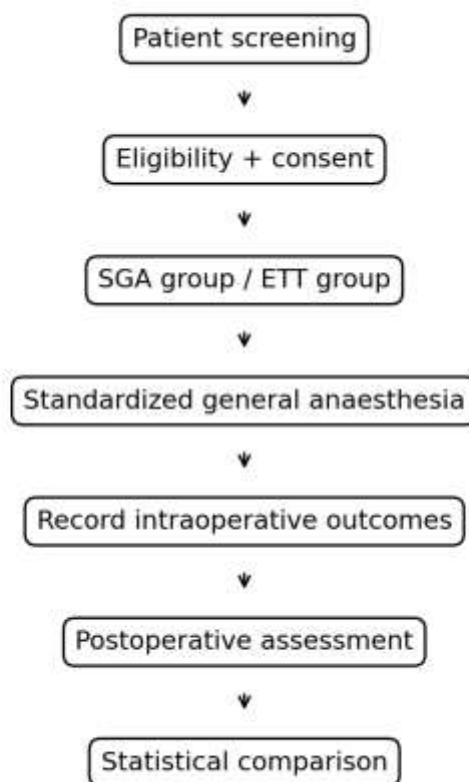


Figure 2. proposed methodology flowchart

V. RESEARCH METHODOLOGY

Study design: prospective comparative study. Study setting: Department of Anaesthesia/Operation Theatre of the participating institution. Study population: adult patients scheduled for selected elective surgical procedures under general anaesthesia. The final procedure list should be defined in the institutional

protocol; suitable examples may include selected short-to-intermediate duration procedures in which either airway technique is clinically acceptable.

Participants will be allocated to an SGA group or ETT group according to the approved study protocol. Airway management will be performed by appropriately trained anaesthesia personnel, with rescue airway equipment immediately available. Standard monitoring should include pulse oximetry, non-invasive blood pressure, electrocardiography and continuous capnography when available and clinically indicated. Primary outcomes will include first-attempt success and insertion time. Secondary outcomes will include haemodynamic changes, oxygen saturation, end-tidal carbon dioxide, airway pressure or leak characteristics where applicable, need for airway manipulation, blood staining, laryngospasm, bronchospasm, coughing at emergence, sore throat, hoarseness, nausea/vomiting and recovery-room observations.

VI. INCLUSION AND EXCLUSION CRITERIA

Inclusion criteria may include adults aged 18 years or older, elective surgical procedures under general anaesthesia, and procedures for which both airway techniques are clinically acceptable. Exclusion criteria should include anticipated difficult airway when an alternative secured airway strategy is required, significant aspiration risk, major upper-airway pathology, severe respiratory instability, emergency surgery, contraindication to the selected SGA, and any situation in which the treating anaesthesiologist determines that one airway method is mandatory.

VII. COMPARISON OF SGA AND ETT

An SGA is generally positioned above the glottic opening, whereas an ETT passes through the vocal cords into the trachea. The ETT provides a more definitive tracheal airway and is preferred when airway protection from aspiration and reliable positive-pressure ventilation are priorities. SGAs may offer easier or less stimulating placement and may reduce postoperative pharyngeal symptoms in selected patients. However, adequacy of ventilation and airway seal must be assessed continuously, with conversion to ETT whenever clinically necessary.

VIII. PROPOSED OUTCOME MEASURES

Domain	Variable	Measurement	Interpretation
Insertion	First-attempt success	Yes/No	Higher success preferable
Insertion	Insertion time	Seconds	Shorter may indicate easier placement
Haemodynamics	Heart rate/BP	Baseline and post-insertion	Smaller perturbation may indicate less stimulation
Ventilation	SpO ₂ /EtCO ₂	Continuous/serial	Adequate ventilation required
Airway	Leak/pressure	Device-appropriate measure	Adequate seal required
Recovery	Cough/sore throat/hoarseness	Graded assessment	Lower symptom burden preferable

Safety	Laryngospasm/aspiration/other events	Occurrence	Lower complication rate preferable
--------	--------------------------------------	------------	------------------------------------

IX. DATA COLLECTION AND STATISTICAL ANALYSIS

A standardized case-record form should be used. Baseline variables should include age, sex, body mass index where relevant, American Society of Anesthesiologists physical status, surgical procedure, duration of anaesthesia, and airway device. Insertion time and first-attempt success should be defined consistently. Haemodynamic variables should be documented at baseline and at predefined intervals surrounding airway insertion. Postoperative symptoms should be assessed using a standardized scale at predetermined recovery intervals.

Continuous variables may be expressed as mean $\pm$ standard deviation or median with interquartile range according to distribution. Categorical variables may be presented as frequency and percentage. Appropriate statistical tests should be selected after assessment of distribution and study design. A two-sided P value <0.05 may be considered statistically significant, with confidence intervals reported where appropriate.

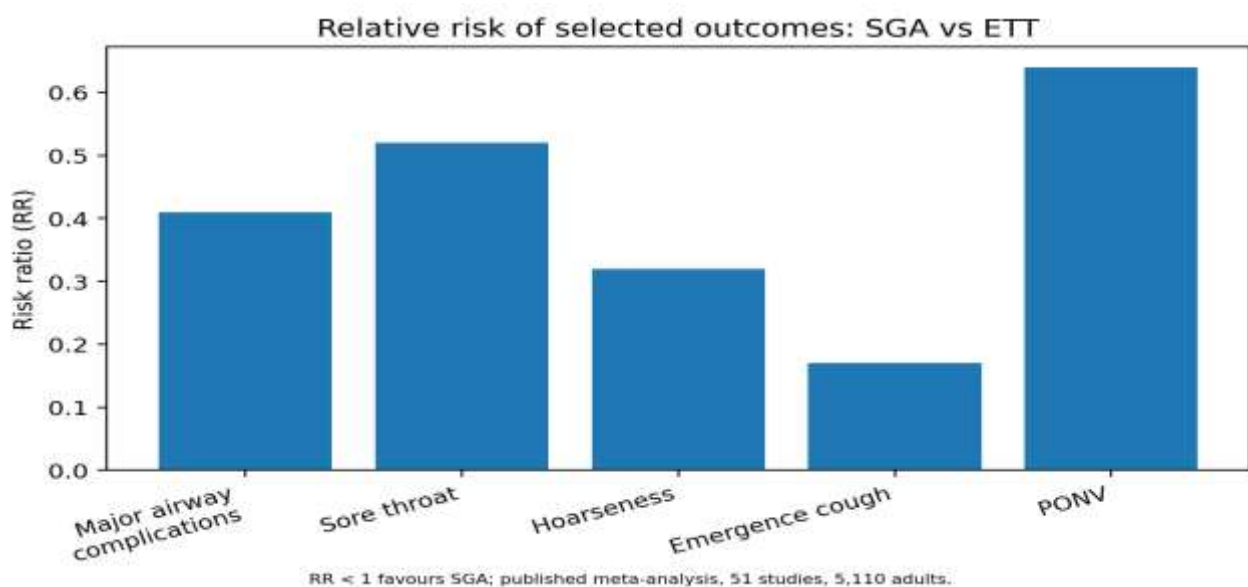


Fig. 3. Relative risk of selected outcomes with second-generation SGAs compared with ETTs.

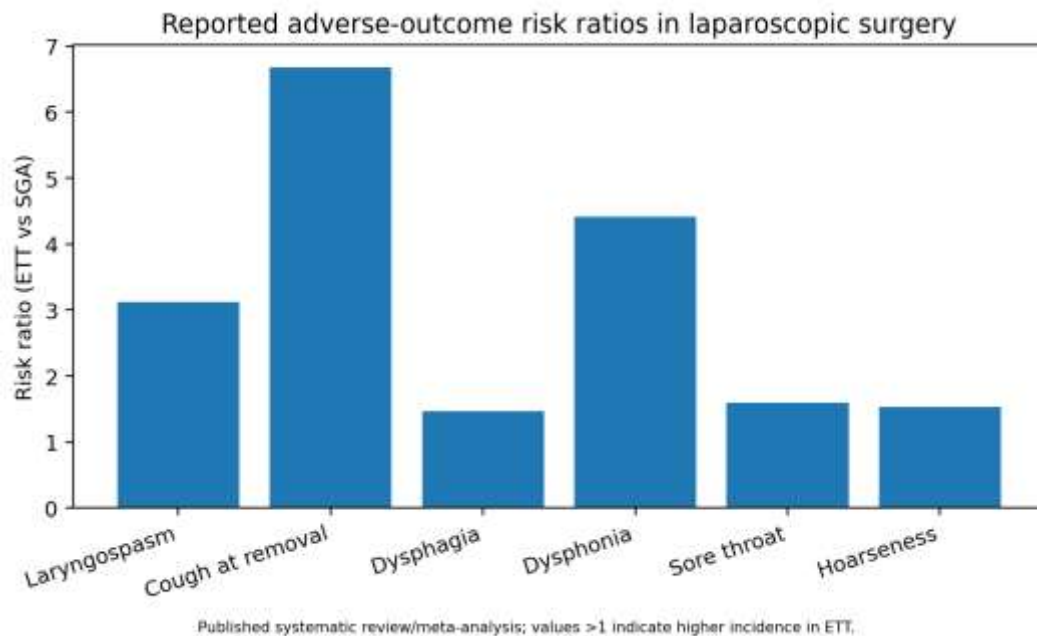


Fig. 4. Reported adverse-outcome risk ratios in laparoscopic surgery comparing ETT with SGA.

X. ROLE OF THE ANAESTHESIA TECHNOLOGIST

The anaesthesia technologist contributes to safe airway management by preparing and checking the anaesthesia workstation, breathing circuit, suction, oxygen source, airway devices, laryngoscope, capnography and backup equipment. During airway placement, the technologist assists with positioning, device preparation, fixation, ventilation and monitoring while maintaining readiness for difficult-airway or rescue-airway equipment. Accurate recording of airway device, insertion attempts, monitoring values and complications also supports high-quality research data collection.

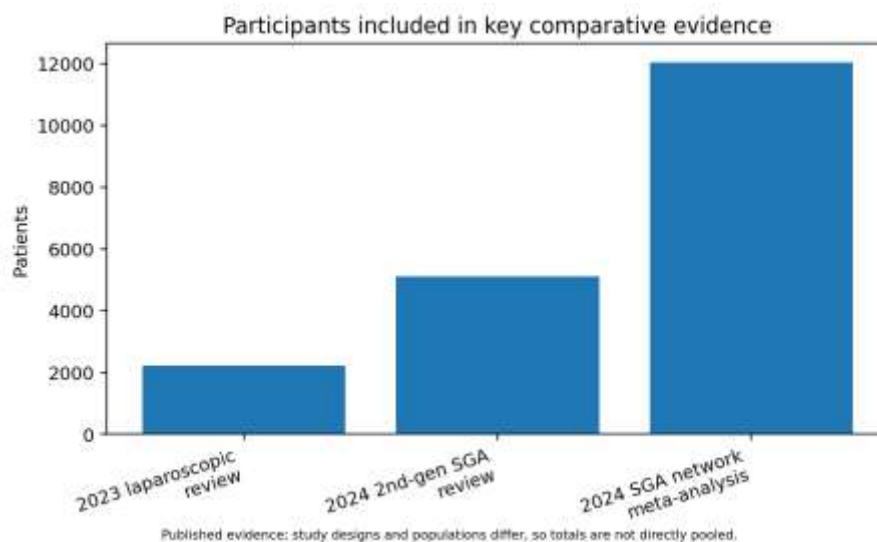


Fig. 5. Sample sizes represented in three key published evidence syntheses.

XI. DISCUSSION

The available literature indicates that the SGA-versus-ETT comparison should be interpreted in the cont-

ext of procedure and patient selection. In laparoscopic and abdominopelvic surgery, contemporary evidence generally demonstrates lower postoperative sore throat and hoarseness with SGAs, with several studies finding no major difference in selected measures of insertion performance. At the same time, SGAs may not provide the same degree of airway protection as a cuffed tracheal tube in every clinical circumstance, and inadequate ventilation remains an important consideration.

The clinically relevant question is therefore not whether SGA is universally superior to ETT, but which airway provides the best balance of security, ventilation, ease of management and postoperative recovery for a particular patient and procedure.

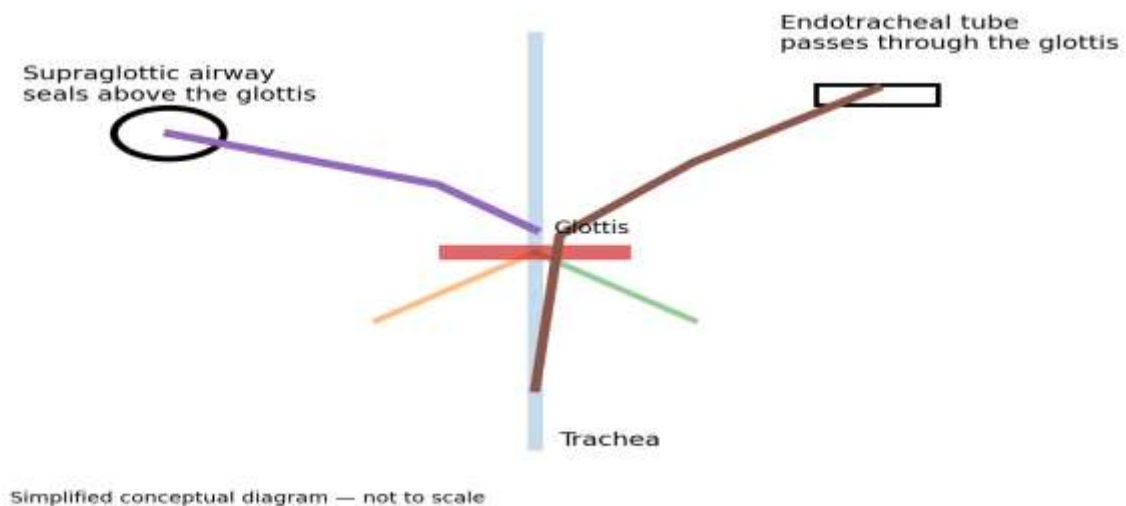
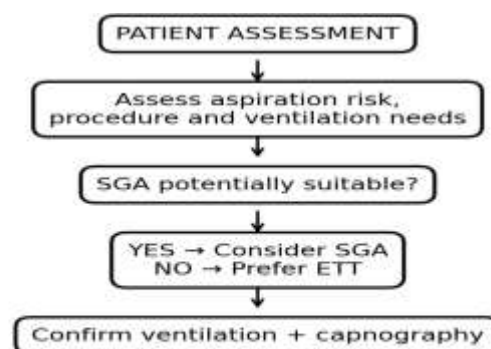


Fig. 6. Simplified conceptual comparison of supraglottic and endotracheal airway placement.

XII. ETHICAL CONSIDERATIONS

The study should obtain approval from the appropriate Institutional Ethics Committee before recruitment. Written informed consent should be obtained from participants. Airway choice must remain primarily a clinical decision, and no participant should receive an airway technique that is contraindicated. Patient confidentiality should be maintained through coded study identifiers.



Conceptual airway-selection framework; final choice remains clinician- and patient-dependent.

Fig. 7. Conceptual airway-selection and monitoring flowchart for selected surgical procedures.

XIII. LIMITATIONS

The findings of a single-centre study may have limited generalizability. Device type, operator experience, surgical procedure, patient positioning, anaesthetic technique and cuff management can influence outcomes. Heterogeneity between procedures may also confound comparisons. If the study is observational rather than randomized, treatment-selection bias should be acknowledged.

Outcome	Comparison	Effect estimate	Interpretation
Major airway complications	Second-generation SGA vs ETT	RR 0.41	Lower with SGA in 2024 meta-analysis
Sore throat	Second-generation SGA vs ETT	RR 0.52	Lower with SGA
Hoarseness	Second-generation SGA vs ETT	RR 0.32	Lower with SGA
Emergence cough	Second-generation SGA vs ETT	RR 0.17	Lower with SGA
Inadequate ventilation	Second-generation SGA vs ETT	RR 3.36	Higher with SGA; important limitation
Sore throat	Laparoscopic SGA vs ETT	RR 0.44	Lower with SGA in 2023 review
Hoarseness	Laparoscopic SGA vs ETT	RR 0.38	Lower with SGA in 2023 review

XIV. CONCLUSION

Supraglottic airway devices and endotracheal intubation are important components of modern airway management, with distinct advantages and limitations. Evidence from comparative studies suggests that appropriately selected SGAs may reduce postoperative airway discomfort and some perioperative complications, while ETT remains essential when a definitive tracheal airway and greater airway protection are required. A standardized prospective comparison in selected surgical procedures can provide clinically useful local evidence regarding insertion performance, haemodynamic response, ventilation and postoperative recovery.

XV. REFERENCES

1. Yu SH, et al. Comparison between supraglottic airway devices and endotracheal tubes in patients undergoing laparoscopic surgery: a systematic review and meta-analysis. PLoS One. 2016.
2. White LD, Thang C, Hodsdon A, et al. Comparison of supraglottic airway devices with endotracheal intubation in low-risk patients for cesarean delivery: systematic review and meta-analysis. Anesth Analg. 2020;131(4):1092-1101. doi:10.1213/ANE.0000000000004618.
3. Kanakaraj M, et al. Choice of supraglottic airway devices: a network meta-analysis of randomised controlled trials. Br J Anaesth. 2024.
4. Hu B, Bao R, Wang X, et al. The size of endotracheal tube and sore throat after surgery: a systematic review and meta-analysis. PLoS One. 2013;8(10):e74467. doi:10.1371/journal.pone.0074467.
5. Recent updated systematic review and meta-analysis of randomized controlled trials comparing supraglottic airway devices with endotracheal intubation for laparoscopic surgery. 2023.

6. Recent systematic review and meta-analysis of second-generation supraglottic airway devices versus endotracheal intubation in adults undergoing abdominopelvic surgery. 2024.