

Original article

Comparative Success Rate of Laryngeal Mask Airway Verses Endotracheal Tube for ENT Procedures

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ABSTRACT

Background: Airway selection during short ear, nose and throat procedures must balance reliable ventilation and airway protection against insertion-related physiological responses and postoperative airway morbidity. **Objective:** To compare first-attempt placement success of the laryngeal mask airway and endotracheal tube in adults undergoing elective short ENT procedures. **Methods:** This single-center comparative study included 46 adults aged 18–50 years at Mayo Hospital, Lahore. Participants were assigned in equal numbers to LMA and ETT groups (23 per group). The primary outcome was first-attempt placement success. Secondary observations included insertion attempts, oxygenation, airway pressures and perioperative complications. Analyses were performed using IBM SPSS Statistics version 26.0; categorical comparisons used exact methods where cell counts were small. **Results:** First-attempt placement was reported in 21/23 patients receiving LMA (91.3%) and 19/23 receiving ETT (82.6%). The absolute difference was 8.7 percentage points (95% CI –12.2 to 29.4), with a risk ratio of 1.11 (95% CI 0.88–1.39; Fisher's exact $p=0.665$). Across the cohort, the most frequent postoperative events were sore throat (10/46, 21.7%), hoarseness (8/46, 17.4%) and cough (5/46, 10.9%). **Conclusion:** LMA showed a numerically higher first-attempt success rate, but the small sample produced substantial uncertainty and did not demonstrate a statistically reliable difference. Larger prospective studies with prespecified allocation and device-specific safety outcomes are required. **Keywords:** Airway management, Endotracheal intubation, Laryngeal mask airway, Otorhinolaryngologic surgery, Postoperative complications

EDITORIAL INFORMATION

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Ethical Approval: Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan.

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INTRODUCTION

Airway management is central to safe general anesthesia because reliable oxygenation and ventilation must be maintained while adverse airway responses are minimized. Ear, nose and throat (ENT) surgery creates additional challenges because the anaesthetist and surgeon work in or near the same anatomical field, and blood, secretions, surgical positioning and movement of the airway device may compromise ventilation or surgical access. The optimal device therefore depends on the procedure, aspiration risk, ventilation requirements, anticipated airway difficulty and the clinician's ability to rescue a failed airway (1–4).

Endotracheal intubation provides a cuffed conduit within the trachea, permits controlled ventilation and offers greater protection from contamination of the lower airway. These advantages make it important when aspiration risk, airway soiling or restricted access demands a secure airway. Laryngoscopy and tracheal intubation, however, stimulate the larynx and trachea and may produce sympathetic responses, coughing, mucosal injury, sore throat and hoarseness (5–8). Postoperative throat symptoms are influenced by tube size, cuff pressure, insertion trauma, sex, duration of anaesthesia and airway manipulation; device selection is therefore only one component of risk (9–12).

The laryngeal mask airway is positioned above the glottis and can often be inserted without direct laryngoscopy. Since its introduction, supraglottic airway devices have been used extensively in

appropriately selected elective procedures because they can reduce airway stimulation and facilitate rapid placement and recovery (13–16). Comparative studies have generally reported less coughing and laryngopharyngeal morbidity with supraglottic devices, although sealing pressure, displacement, gastric insufflation and limited protection against aspiration remain clinically relevant concerns (17–20). Evidence from adenotonsillectomy and nasal or paranasal sinus surgery suggests that reinforced or flexible LMA devices can provide acceptable operative conditions, but failure or conversion to tracheal intubation remains possible (21–23).

The relative performance of these devices is especially important in ENT surgery, where airway access may become restricted after positioning, draping or commencement of the operation. FESS and septoplasty can expose the airway to blood and irrigation fluid, whereas tonsillectomy directly involves the oropharynx and may increase the consequences of device displacement or inadequate sealing. Tympanoplasty generally presents a different surgical field but still benefits from controlled ventilation, limited patient movement and smooth emergence. These procedural differences mean that placement success alone cannot represent overall airway effectiveness. Adequate ventilation, airway pressure, oxygen saturation, surgical access, rescue requirements and postoperative symptoms should be considered together. ETT may provide greater security against airway contamination, while an appropriately selected LMA may reduce laryngoscopy-related stimulation and facilitate a smoother recovery. Consequently, comparison should account for patient risk and procedural requirements rather than assuming that one airway device is universally preferable (1–8,17–23).

First-attempt placement is nevertheless a clinically useful endpoint because repeated airway instrumentation may delay ventilation and increase mucosal trauma, sympathetic stimulation and postoperative discomfort. Its interpretation requires a clear denominator and a consistent definition of effective placement, ideally based on satisfactory chest expansion, capnography, delivered tidal volume and absence of a clinically important leak. Operator experience, device size, head and neck position, depth of anaesthesia and neuromuscular conditions can also affect insertion performance. Postoperative sore throat, coughing and hoarseness should similarly be interpreted cautiously because their occurrence is influenced by cuff pressure, duration of airway placement, suctioning, surgical manipulation and the timing of postoperative assessment (5–12). Reporting both relative and absolute estimates with confidence intervals is therefore more informative than relying only on percentages or statistical significance. This approach is particularly important in small studies, where a numerical difference may be clinically interesting but remain too imprecise to establish superiority.

Published findings cannot be assumed to apply uniformly across adult ENT populations because studies differ in airway-device generation, procedure, operator experience, ventilation strategy and outcome definition. Evidence from resource-constrained settings is also limited. A locally conducted comparison may therefore help characterize placement performance and perioperative event patterns, provided that uncertainty from small samples and non-probability recruitment is recognized. This study compared first-attempt placement success between LMA and ETT in adults undergoing elective short ENT procedures at Mayo Hospital, Lahore. Secondary observations included insertion attempts, oxygenation, airway pressures and perioperative complications.

MATERIALS AND METHODS

A single-center comparative study was conducted over four months in the Department of Anesthesia at Mayo Hospital, Lahore, Pakistan. Using purposive sampling, 46 adults aged 18–50 years who were scheduled for elective short ENT procedures and classified as American Society of Anesthesiologists physical status I–III were enrolled after written informed consent. Patients with Mallampati grade III–IV, body mass index above 35 kg/m², increased aspiration risk, emergency surgery or refusal to participate were excluded. The report follows relevant principles of transparent observational reporting (24).

Participants were recorded in equal LMA and ETT groups (n=23 each). General anaesthesia and airway management followed the hospital protocol and placement was performed by experienced anaesthetists. The primary outcome was successful airway placement on the first attempt. Secondary measures were number of insertion attempts, ease of insertion, oxygen saturation, peak and plateau airway pressures, hemodynamic stability, and intraoperative or postoperative airway events, including leak, desaturation, bronchospasm, sore throat, cough, hoarseness and blood on the device.

Data were analysed using IBM SPSS Statistics version 26.0. Categorical variables are presented as n (%), and the reported mean number of attempts is summarized as mean $\pm$ standard deviation. Device-specific first-attempt success was compared with Fisher's exact test. The risk ratio and Newcombe absolute risk difference are reported with 95% confidence intervals; all tests were two-sided and $p \leq 0.05$ was considered statistically significant (25). Ethical approval was obtained from the Ethical Review Committee, Faculty of Allied Health Sciences, The University of Lahore (Ref. No.: DRC/DHPT022/7/25). Written informed consent was obtained from all participants, and the study was conducted in accordance with the Declaration of Helsinki.

RESULTS

Forty-six participants were included. Their ages were concentrated in the 26–50-year range, with 17 (37.0%) aged 26–35 years and 20 (43.5%) aged 36–50 years; the remaining 9 (19.6%) were aged 18–25 years. Men and women were represented equally. Most participants were classified as ASA I or II, together accounting for 45/46 (97.8%) of the cohort, while one participant (2.2%) was classified as ASA III. FESS and septoplasty were the most frequent procedures, each performed in 14 (30.4%) participants. Tonsillectomy accounted for 12 (26.1%) procedures and tympanoplasty for 6 (13.0%). Thus, sinonasal operations represented 28/46 (60.9%) of the procedural distribution. Based on the internally coherent BMI classification, 25 (54.3%) participants had normal BMI, 17 (37.0%) were overweight and 4 (8.7%) were underweight (Table 1).

Table 1. Participant and procedural characteristics

Variable	Category	n (%)
Age, years	18–25	9 (19.6)
	26–35	17 (37.0)
	36–50	20 (43.5)
Sex	Male	23 (50.0)
	Female	23 (50.0)
ASA physical status	I	24 (52.2)
	II	21 (45.7)
	III	1 (2.2)
Procedure	FESS	14 (30.4)
	Septoplasty	14 (30.4)
	Tonsillectomy	12 (26.1)
	Tympanoplasty	6 (13.0)
BMI category	Underweight	4 (8.7)
	Normal	25 (54.3)
	Overweight	17 (37.0)

First-attempt placement was reported for 21 of 23 patients in the LMA group (91.3%) and 19 of 23 in the ETT group (82.6%), corresponding to 40/46 (87.0%) participants overall. Initial placement was unsuccessful in 2 (8.7%) LMA cases and 4 (17.4%) ETT cases. The absolute difference was 8.7 percentage points (95% CI -12.2 to 29.4), and the risk ratio was 1.11 (95% CI 0.88–1.39). Fisher's exact test did not identify evidence of a difference between devices ($p=0.665$) (Table 2). Although the point estimate favoured LMA, the confidence interval for the risk ratio included 1.00 and the interval for the absolute difference included zero. The confidence limits were wide, indicating that the sample was compatible with both little difference and a clinically relevant advantage for either device. Accordingly, the observed numerical separation should be interpreted as an imprecise comparative estimate rather than proof of superiority.

Table 2. First-attempt airway placement by device

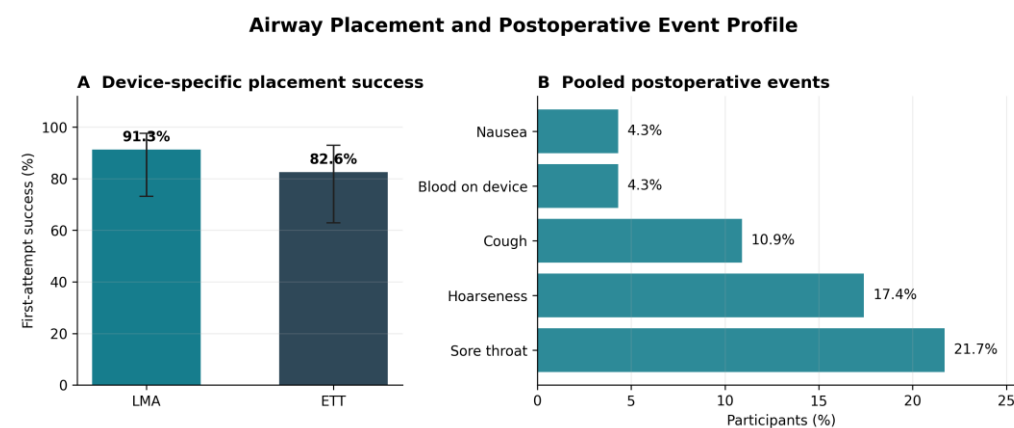
Outcome	LMA (n=23)	ETT (n=23)	Risk ratio (95% CI)	p-value
Successful	21 (91.3)	19 (82.6)	1.11 (0.88–1.39)	0.665
Unsuccessful	2 (8.7)	4 (17.4)	—	—

In the pooled cohort, 35 participants (76.1%) had no recorded intraoperative complication, leaving 11/46 (23.9%) with one of the reported intraoperative events. Airway leak and desaturation were each recorded in 4 (8.7%), and bronchospasm in 3 (6.5%). Nineteen participants (41.3%) had no recorded postoperative event, whereas 27/46 (58.7%) were assigned to a postoperative event category. The most frequent postoperative events were sore throat in 10 (21.7%), hoarseness in 8 (17.4%) and cough in 5 (10.9%). Blood on the device and nausea were each recorded in 2 (4.3%) participants (Table 3). Sore throat and hoarseness together accounted for 18 of the 27 recorded postoperative event classifications. Because these outcomes were available only as pooled frequencies, no risk difference, relative risk or significance test comparing LMA with ETT was calculated. The figures therefore quantify the overall postoperative event profile without attributing the observed events to either airway device.

Table 3. Pooled intraoperative and postoperative events

Period	Event	n (%)
Intraoperative	None	35 (76.1)
	Airway leak	4 (8.7)
	Desaturation	4 (8.7)
	Bronchospasm	3 (6.5)
Postoperative	None	19 (41.3)
	Sore throat	10 (21.7)
	Hoarseness	8 (17.4)
	Cough	5 (10.9)
	Blood on device	2 (4.3)
	Nausea	2 (4.3)

Figure 1. Airway placement and postoperative event profile. Panel A shows device-specific first-attempt success with Wilson 95% confidence intervals. Panel B shows pooled postoperative event percentages; these values do not support between-device comparisons.



The figure shows an 8.7-percentage-point numerical advantage in first-attempt placement with LMA, although its 95% confidence interval crossed zero. Sore throat (21.7%), hoarseness (17.4%) and cough (10.9%) accounted for the largest pooled postoperative event categories.

DISCUSSION

In this small comparative cohort, first-attempt placement was numerically more frequent with LMA than ETT, but the difference was not statistically reliable and the confidence interval was wide. The appropriate interpretation is therefore not that LMA was superior, but that both devices achieved high first-attempt success under the reported clinical conditions while the study lacked precision to exclude a meaningful difference. Pooled postoperative events were dominated by sore throat, hoarseness and cough, but the available aggregate counts did not permit a valid device-specific safety comparison.

The direction of the first-attempt estimate is clinically plausible. Supraglottic airway placement generally avoids passage through the vocal cords and may require less airway manipulation than direct laryngoscopy and tracheal intubation (13–16). Earlier comparative work has reported acceptable LMA insertion performance and shorter anaesthesia-controlled times in selected elective populations

(15,16). Studies in adenotonsillectomy and sinonasal surgery have also shown that reinforced or flexible LMA devices can provide suitable operating conditions in selected patients (21–23). Nevertheless, the present estimate was compatible with substantial uncertainty, and success depends on device type, patient anatomy, operator experience and the definition used to confirm effective placement.

Postoperative sore throat and hoarseness are multifactorial outcomes. Tracheal-tube size, cuff pressure, mucosal trauma, repeated attempts, sex and duration of anaesthesia may all influence their occurrence (9–12). Meta-analytic and comparative evidence generally indicates less coughing and some forms of airway morbidity with supraglottic devices, although results vary by outcome and study design (5–8,17–20). Because the present complication counts were pooled across devices, they should be interpreted as a description of the cohort rather than evidence that either device reduced morbidity.

Airway security remains central in ENT surgery. ETT provides greater protection when blood or secretions may enter the airway and when positive-pressure ventilation or limited access makes displacement hazardous. LMA may be advantageous for appropriately selected short procedures, but it does not provide the same degree of aspiration protection. Current difficult-airway guidance emphasizes preoperative assessment, planning, oxygenation and readiness to use an alternative technique when the initial approach fails (1–4). Device selection should therefore be individualized rather than based solely on a modest difference in first-attempt success.

This study contributes locally generated data from adult elective ENT practice and used a clinically relevant placement endpoint. Its principal limitations are the single-centre setting, purposive sampling, small sample, limited description of allocation and airway-management protocol, heterogeneous operations and absence of device-specific physiological and complication analyses. The small number of failures also limited statistical power. Future prospective research should prespecify allocation, standardize the airway device and anaesthetic technique, define placement success objectively, measure postoperative symptoms at fixed intervals and report device-specific adverse events with confidence intervals.

CONCLUSION

Among 46 adults undergoing short elective ENT procedures, LMA had a numerically higher first-attempt placement success rate than ETT, but the difference was imprecise and not statistically significant. Both devices appeared to provide high initial placement success in the selected population. The findings support considering LMA as an alternative in appropriately selected patients, while definitive claims about superiority or reduced complications require larger, methodologically rigorous studies with device-specific safety data.

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