A Cross-Sectional Study to Assess the Postoperative Throat Complaints After Tracheal Intubation and Classic Laryngeal Mask Airway

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ABSTRACT

Background: Airway management is a critical component of general anaesthesia, with endotracheal intubation and laryngeal mask airway (LMA) being the most commonly used techniques. However, both are associated with postoperative throat complications such as sore throat and hoarseness, which can affect patient comfort and recovery. The incidence and severity of these complications may vary based on airway device and patient characteristics, particularly gender.

Aim: To compare postoperative throat complaints following endotracheal intubation and classic laryngeal mask airway, and to assess the influence of gender on these outcomes.

Materials and Methods: This cross-sectional study was conducted in a tertiary care center and included 72 patients aged 18–60 years undergoing surgery under general anaesthesia. Patients were equally divided into four groups: E(M), E(F), L(M), and L(F), with 18 patients in each group. Standard anaesthesia protocols were followed. Postoperative sore throat and hoarseness were assessed and compared between groups. Statistical analysis was performed to determine significance.

Results: Postoperative sore throat was significantly higher in the endotracheal groups, with mean scores of 2.33 ± 0.59 in E(F) and 1.66 ± 0.48 in E(M), compared to 1.72 ± 0.75 in L(F) and 0.72 ± 0.46 in L(M) ($p < 0.05$). Hoarseness followed a similar pattern, with highest severity in E(F) (2.55 ± 0.61). Female patients consistently showed higher symptom severity across both airway modalities.

Conclusion: Endotracheal intubation is associated with significantly higher postoperative throat morbidity compared to laryngeal mask airway, with female patients being more affected. LMA may be preferred in suitable cases to reduce postoperative discomfort and improve patient outcomes.

Keywords: Endotracheal Intubation, Laryngeal Mask Airway, Postoperative Sore Throat, Hoarseness, Airway Management, General Anaesthesia, Gender Differences, Mallampati Classification, Body Mass Index

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Introduction :

Airway management is a fundamental aspect of anaesthetic practice and plays a pivotal role in ensuring perioperative safety and optimal patient outcomes. Among the commonly used airway devices, the laryngeal mask airway (LMA) has emerged as an effective supraglottic device that provides a less invasive alternative to conventional endotracheal intubation [1]. Alongside this, systematic airway assessment remains essential in identifying potential difficulties and minimizing complications during airway management [2]. A detailed understanding of airway anatomy further aids clinicians in selecting appropriate airway techniques and reducing the risk of trauma during instrumentation [3].

The choice of airway device significantly influences perioperative morbidity. Supraglottic airway devices, including the LMA, have been compared extensively with endotracheal tubes, particularly in patients undergoing general anaesthesia, with evidence suggesting differences in complication profiles and patient outcomes [4]. While endotracheal intubation remains the gold standard for airway protection, it is inherently invasive and associated with laryngotracheal irritation and mechanical trauma [5]. This has led to increasing interest in alternative airway strategies that minimize airway-related complications.

Postoperative sore throat (POST) is one of the most frequently encountered complications following airway instrumentation during general anaesthesia [6]. Although often considered a minor adverse event, it has a substantial impact on patient comfort and satisfaction in the postoperative period. In addition to sore throat, hoarseness of voice is another clinically relevant symptom that reflects transient vocal cord irritation and contributes to postoperative morbidity.

Gender has been identified as an important determinant in the incidence of postoperative throat complaints, with studies demonstrating a higher prevalence of sore throat and hoarseness among female patients [7]. These differences are thought to be related to anatomical variations in airway size and mucosal sensitivity. Furthermore, advancements in supraglottic airway devices, such as the development of newer LMA variants, have shown improved performance characteristics and reduced airway trauma in clinical settings [8].

Preoperative airway evaluation plays a crucial role in predicting difficult airway scenarios and guiding the choice of airway device [9]. In particular, patients with increased body mass index (BMI) pose unique challenges in airway management, as obesity is associated with altered airway anatomy and increased risk of complications [10]. The influence of BMI on clinical outcomes has been well documented, highlighting its importance as a contributing factor in perioperative risk stratification [11].

Comparative studies evaluating different types of laryngeal mask airways have demonstrated variability in outcomes depending on device design and clinical application [12]. In addition, recent evidence emphasizes the importance of safety protocols and standardized airway management practices in reducing complications, particularly in high-risk environments [13]. From a patient-centered perspective, postoperative discomfort, including sore throat and hoarseness, significantly affects patient-reported outcomes and overall satisfaction following anaesthesia [14].

Globally, the burden of postoperative sore throat remains considerable, with systematic reviews reporting a wide incidence range and highlighting the need for preventive strategies and optimized airway management techniques [15]. Despite existing evidence, there remains a need for structured comparative studies evaluating postoperative throat complaints across different airway devices and patient subgroups, particularly with respect to gender differences and baseline clinical characteristics.

Therefore, the present study was undertaken to compare postoperative throat complaints following endotracheal intubation and classic laryngeal mask airway insertion. By analyzing variations across gender and airway modalities, this study aims to provide clinically relevant insights that may help refine airway management strategies and improve postoperative patient outcomes.

Methodology :

This cross-sectional study was conducted in the Department of Anaesthesiology at a tertiary care center over a period from January 2024 to January 2025. The study included a total of 72 patients aged between 18 and 60 years who were scheduled to undergo surgical procedures under general anaesthesia. Patients

belonging to American Society of Anesthesiologists (ASA) physical status classes I, II, and III were included. Ethical clearance was obtained from the Institutional Ethics Committee of the tertiary care center, and written informed consent was obtained from all participants prior to inclusion. Patients with pre-existing upper respiratory tract infections, known airway abnormalities, or those who declined consent were excluded from the study.

The study population was equally divided into four groups, each comprising 18 patients: Group E (M) included male patients who underwent airway management with endotracheal intubation, Group E (F) included female patients managed with endotracheal intubation, Group L (M) included male patients managed using a classic laryngeal mask airway, and Group L (F) included female patients managed using a classic laryngeal mask airway. Preoperative airway assessment was performed in all patients, including evaluation of Mallampati classification, body mass index (BMI), and relevant clinical parameters.

All patients underwent standard anaesthesia protocols. Airway management was performed using either endotracheal intubation or classic laryngeal mask airway based on the assigned group. The number of attempts required for successful airway placement was recorded. Postoperatively, patients were monitored and assessed for throat-related complications, specifically sore throat and hoarseness of voice. These outcomes were evaluated and recorded systematically for all groups.

The collected data were compiled and analyzed to compare postoperative throat complaints between endotracheal intubation and laryngeal mask airway groups, with additional subgroup analysis based on gender. Appropriate statistical methods were applied, and results were interpreted accordingly.

Results :

A total of 72 patients were included in the study and equally distributed into four groups based on airway device and gender, and their demographic characteristics, airway parameters, and postoperative throat complaints were analyzed.

Table 1. Age Distribution of Study Population (n = 72)

Age Group (years)	E (M) n (%)	E (F) n (%)	L (M) n (%)	L (F) n (%)
18–30	6 (33%)	6 (33%)	3 (16%)	4 (22%)
30–50	10 (55%)	10 (55%)	13 (72%)	12 (66%)
50–60	2 (11%)	2 (11%)	2 (11%)	2 (11%)
Total	**18 (100%)**	**18 (100%)**	**18 (100%)**	**18 (100%)**

Interpretation

The majority of participants across all groups belonged to the **30–50 years age group**, accounting for 55% in both endotracheal groups and up to 72% in the LMA male group. Younger patients (18–30 years) were comparatively fewer in LMA groups, while older patients (50–60 years) were uniformly distributed (11%) across all groups. This indicates a **homogeneous age distribution without major intergroup variation**, ensuring comparability.

Table 2. BMI Distribution of Study Population (n = 72)

BMI (kg/m²)	E (M) n (%)	E (F) n (%)	L (M) n (%)	L (F) n (%)
18–25	5 (27%)	2 (11%)	5 (27%)	7 (38%)
25–35	13 (72%)	16 (88%)	13 (72%)	11 (61%)
Total	**18 (100%)**	**18 (100%)**	**18 (100%)**	**18 (100%)**

Interpretation

Most participants across all groups had a BMI in the **25–35 kg/m² range**, with the highest proportion observed in the **E(F) group (88%)**, indicating a predominance of overweight individuals. The L(F) group had relatively more patients in the normal BMI category (38%). Overall, BMI distribution was comparable, suggesting **minimal confounding effect of obesity on outcomes**.

Table 3. Number of Attempts for Airway Placement (n = 72)

Number of Attempts	E (M)	E (F)	L (M)	L (F)
1st Attempt	12	9	14	11
2nd Attempt	4	7	2	6
3rd Attempt	2	2	2	2
Total	**18**	**18**	**18**	**18**

Interpretation

Successful airway placement on the **first attempt was highest in the L(M) group (14/18)**, followed by E(M). The **E(F) group showed relatively higher second-attempt rates (7/18)**, suggesting increased difficulty in intubation among females. The number of third attempts was low and equal across groups. Overall, **LMA insertion appeared easier than endotracheal intubation**, particularly in males.

Table 4. Mallampati Classification (MPC) Distribution

Group	Mean ± SD	P-value	Statistical Significance
E (M)	1.88 ± 0.90	0.8650	Not Significant
L (M)	1.83 ± 0.85		
E (F)	2.22 ± 0.87	0.2572	Not Significant
L (F)	1.88 ± 0.90		

Interpretation

The mean MPC scores were slightly higher in females, particularly in the **E(F) group (2.22 ± 0.87)**, indicating relatively more difficult airway anatomy. However, the differences between groups were **statistically non-significant (p > 0.05)**, suggesting that airway difficulty was **comparable across all groups** and unlikely to bias outcomes.

Table 5. Postoperative Sore Throat Complaints

Group	Mean ± SD	P-value	Statistical Significance
E (M)	1.66 ± 0.48	<0.0001	Significant
L (M)	0.72 ± 0.46		
E (F)	2.33 ± 0.59	0.0104	Significant
L (F)	1.72 ± 0.75		

Interpretation

Postoperative sore throat was significantly higher in **endotracheal groups compared to LMA groups**, with the **highest severity observed in E(F) (2.33 ± 0.59)**. Females consistently reported greater symptom severity than males. The differences were **statistically significant**, highlighting that **endotracheal intubation and female gender are major predictors of postoperative sore throat**.

Table 6. Postoperative Hoarseness Complaints

Group	Mean ± SD	P-value	Statistical Significance
E (M)	1.72 ± 0.57	<0.0001	Significant
L (M)	0.83 ± 0.38		
E (F)	2.55 ± 0.61	0.0004	Significant
L (F)	1.72 ± 0.66		

Interpretation

Hoarseness was significantly more pronounced in **endotracheal intubation groups**, with **E(F) showing the highest mean score (2.55 ± 0.61)**. LMA groups had considerably lower scores, especially among males. The results were **highly statistically significant**, indicating that **ET intubation is associated with increased vocal cord irritation, particularly in females**.

Discussion :

In the present study, postoperative throat morbidity was clearly higher in patients who underwent endotracheal intubation compared to those managed with laryngeal mask airway. The mean sore throat score was highest in the E(F) group (2.33 ± 0.59), followed by L(F) (1.72 ± 0.75), E(M) (1.66 ± 0.48), and lowest in L(M) (0.72 ± 0.46). Similarly, hoarseness scores followed the same pattern, with E(F) showing the highest values (2.55 ± 0.61), followed by L(F) (1.72 ± 0.66), E(M) (1.72 ± 0.57), and lowest in L(M) (0.83 ± 0.38). These differences were statistically significant, indicating that both airway device and gender influenced postoperative outcomes. Importantly, baseline variables such as age, BMI, and Mallampati score were comparable across all groups, suggesting that these differences were primarily due to the airway device used rather than patient-related confounders .

El-Boghdadly et al. reported that postoperative sore throat occurs in approximately 21% to 65% of patients depending on airway technique [16]. While their study focused on incidence, our study adds further clarity by demonstrating severity differences, with mean scores reaching up to 2.33 in intubated females, indicating not only higher occurrence but also greater intensity of symptoms.

Christiansen et al. found that sore throat incidence exceeded 50% when larger endotracheal tube sizes were used, and hoarseness was also significantly higher in such patients [17]. In comparison, our study showed mean sore throat scores of 1.66–2.33 in intubated groups versus 0.72–1.72 in LMA groups, which supports the concept that increased tube size and airway contact pressure directly contribute to symptom severity.

Cuff pressure has been shown to be a major determinant of airway morbidity. Zhu et al. demonstrated that maintaining optimal cuff pressure reduced sore throat incidence from 44% to 28% [18]. Similarly, Wang et al. reported a reduction in airway complications by nearly 30% with continuous cuff

pressure monitoring [19]. Kundra et al. also observed higher symptom scores in patients with elevated cuff pressures [20]. Although cuff pressure was not measured in our study, the significantly higher symptom scores in intubated patients (sore throat up to 2.33 and hoarseness up to 2.55) strongly suggest a similar mechanism of mucosal compression and ischemia.

Yilmaz et al., in a randomized trial, reported sore throat incidence of approximately 45% in intubated patients compared to only 12–18% in LMA groups [21]. This closely mirrors our findings, where LMA groups consistently showed lower mean scores (0.72–1.72) compared to intubation groups (1.66–2.33), confirming that supraglottic devices are associated with reduced airway trauma.

Seo et al. showed that thermal softening of endotracheal tubes reduced sore throat incidence from 46% to 28% [22]. However, even with such modifications, our results indicate that intubation still results in higher symptom scores compared to LMA, highlighting that the fundamental invasiveness of the device remains the key factor.

Jeon et al. reported sore throat incidence as high as 60% with double-lumen tubes, which are more invasive than standard tubes [23]. This supports our observation that greater airway manipulation leads to higher symptom severity, as seen in our intubated groups.

Pharmacological strategies have also been studied. Subedi et al. showed that lidocaine and dexamethasone reduced sore throat incidence from 55% to 30% [24], while Yhim et al. demonstrated a 25% reduction with benzydamine [25]. Soares et al. reported lower symptom scores with intracuff lidocaine [26]. Despite these reductions, our study still demonstrated higher mean scores in intubated patients, indicating that such interventions can reduce but not completely prevent airway-related complications.

Ganason et al. reported that proper cuff pressure monitoring reduced complications by approximately 20–30% compared to conventional palpation methods [27]. This highlights that technique optimization is important; however, our findings suggest that even with optimal technique, LMA remains associated with lower morbidity.

Singh et al. found that betamethasone gel reduced sore throat incidence from around 50% to 20% [28]. While this shows the benefit of topical measures, our results again emphasize that the choice of airway device has a more substantial impact than adjunctive therapies.

Tosh et al. reported a 30–40% reduction in sore throat incidence with the Baska mask compared to endotracheal intubation [29]. Similarly, Radu et al. demonstrated significantly lower postoperative discomfort scores with LMA compared to intubation [30]. These findings are directly comparable to our results, where LMA groups had nearly half the symptom severity scores compared to intubation groups.

An important additional observation in our study is the consistently higher symptom severity among female patients, particularly in the E(F) group (sore throat 2.33 ± 0.59 and hoarseness 2.55 ± 0.61). This may be explained by smaller airway diameter and increased mucosal sensitivity in females, which leads to greater mucosal trauma during intubation.

Overall, our study clearly demonstrates that endotracheal intubation is associated with higher severity of postoperative sore throat and hoarseness compared to laryngeal mask airway, with differences of nearly 1-point higher mean scores in several comparisons. When compared with existing literature, our findings not only confirm previous evidence but also provide quantified severity data, making the clinical difference more evident. These results support the preferential use of LMA in suitable cases to reduce postoperative airway morbidity and improve patient comfort.

Conclusion :

The present study demonstrates that endotracheal intubation is associated with significantly higher postoperative throat morbidity, including sore throat and hoarseness, compared to the laryngeal mask airway. The severity of symptoms was notably greater among female patients, particularly in those undergoing endotracheal intubation, indicating a combined influence of airway device and gender on postoperative outcomes. In contrast, patients managed with laryngeal mask airway consistently exhibited lower symptom scores, suggesting reduced airway trauma.

Baseline characteristics such as age, body mass index, and Mallampati classification were comparable across all groups, confirming that the observed differences were primarily attributable to the type of airway device used rather than confounding factors. These findings reinforce the clinical advantage of supraglottic airway devices in minimizing postoperative airway complications.

Therefore, in appropriately selected patients, the use of laryngeal mask airway should be preferred over endotracheal intubation to reduce postoperative throat discomfort and improve patient satisfaction. Additionally, careful consideration of patient-specific

factors, particularly gender, along with optimization of airway management techniques, may further enhance perioperative outcomes.

References:

1. Simon LV, Torp KD. Laryngeal mask airway. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024. PMID: 29489214.
2. Mouri M, Krishnan S, Hendrix JM, Maani CV. Airway assessment. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024. PMID: 29262092.
3. Ball M, Hossain M, Padalia D. Anatomy, airway. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024. PMID: 29083624.
4. Nicholson A, Cook TM, Smith AF, Lewis SR, Reed SS. Supraglottic airway devices versus tracheal intubation for airway management during general anaesthesia in obese patients. Cochrane Database Syst Rev. 2013;9:CD010105.
5. Thierbach AR, Werner C. Infraglottic airway devices and techniques. Best Pract Res Clin Anaesthesiol. 2005;19(4):595–609.
6. McHardy FE, Chung F. Postoperative sore throat: cause, prevention and treatment. Anaesthesia. 1999;54(5):444–453.
7. Jaensson M, Gupta A, Nilsson U. Gender differences in sore throat and hoarseness following endotracheal tube or laryngeal mask airway. BMC Anesthesiol. 2014;14:56.
8. Sng BL, Ithnin FB, Mathur D, Lew E, Han NR, Sia AT. LMA Protector in non-paralysed patients. BMC Anesthesiol. 2017;17(1):26.
9. Trambadia DN, Yadav P, A S. Preoperative assessment to predict difficult airway. Cureus. 2023;15(10):e46868.
10. Sharma V, Yadav HP, Prakash A, Yadav N, Kumar M, Abbas H. Predictors of difficult airway in obese patients. Cureus. 2024;16(2):e55005.
11. Zhao Z, Jiang X, Li J, Zhang M, Liu J, Dai S, et al. BMI impact on clinical outcomes. Front Endocrinol (Lausanne). 2021;12:735783.
12. Braun U, Zerbst M, Füllekrug B, Gentzel I, Hempel V, Leier M, et al. Comparison of Proseal vs standard LMA. Anasthesiol Intensivmed Notfallmed Schmerzther. 2002;37(12):727–733.
13. O'Hare B, White N, Bolot R, Hargrave L, Gibbs C, Glasheen J. Safety in airway management. Air Med J. 2024;43(4):303–307.
14. Walker EMK, Bell M, Cook TM, Grocott MPW, Moonesinghe SR. Patient-reported outcomes after anaesthesia. Br J Anaesth. 2016;117:758–766.
15. Obsa MS, Adem AO, Bancha B, et al. Global incidence of postoperative sore throat: systematic review. Int J Surg Open. 2022;40:100536.
16. El-Boghdadly K, Bailey CR, Wiles MD. Postoperative sore throat: systematic review. Anaesthesia. 2016;71:706–717.
17. Christiansen P, Pedersen CH, Selter H, et al. Effect of tube size on sore throat and hoarseness. J Clin Med. 2021;10:5846.
18. Zhu G, Wang X, Cao X, Yang C, Wang B, Ang Y, et al. Cuff pressure monitoring and sore throat. BMC Anesthesiol. 2024;24:115.
19. Wang C, Yan X, Gao C, et al. Continuous cuff pressure monitoring reduces complications. J Clin Monit Comput. 2024;38:1379–1386.
20. Kundra TS, Berry D. Cuff pressure and postoperative sore throat. Asian J Pharm Clin Res. 2024;17:15–18.
21. Yilmaz M, Turan A, Saracoglu A, Saracoglu K. LMA vs endotracheal tube randomized trial. Anaesthesiol Intensive Ther. 2022;54(3):247–252.
22. Seo JH, Cho CW, Hong DM, Jeon Y, Bahk JH. Thermal softening and airway complications. Br J Anaesth. 2016;116:282–288.
23. Jeon J, Lee K, Ahn G, Lee J, Hwang W. Comparison of double-lumen tubes and sore throat. J Cardiothorac Vasc Anesth. 2015;29:121–125.
24. Subedi A, Tripathi M, Pokharel K, Khatiwada S. Lidocaine and dexamethasone for sore throat. Anesth Analg. 2019;129:220–225.
25. Yhim HB, Yoon SH, Jang YE, Lee JH, Kim EH, Kim JT, et al. Benzydamine for sore throat prevention. BMC Anesthesiol. 2020;20:77.
26. Soares SMF, Arantes VM, Modolo MP, et al. Lidocaine cuff and airway morbidity. Anaesthesia. 2017;72:496–503.
27. Ganason N, Sivanaser V, Liu CY, Maaya M, Ooi JSM. Cuff pressure vs palpation method. Malays J Med Sci. 2019;26:132–138.
28. Singh G, Jadeja P, Patnaik RY, Ravinbothayan S, Singh V, Dhawan R. Betamethasone vs lignocaine jelly. Bali J Anesthesiol. 2021;5:11–14.
29. Tosh P, Rajan S, Kumar L. Baska mask vs endotracheal intubation complications. Anesth Essays Res. 2019;13:481–485.
30. Radu AD, Miled F, Marret E, Vigneau A, Bonnet F. LMA vs endotracheal intubation discomfort. Breast. 2008;17:407–411.