DOI: https://doi.org/10.54393/pjhs.v6i5.2500

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (E): 2790-9352, (P): 2790-9344
Volume 6, Issue 05 (May 2025)

Original Article

OPEN ACCESS

Frequency and Risk Factors Associated with Postoperative Sore Throat (POST) in Adults Undergoing General Anesthesia during ENT and Eye Surgery:A Cross-Sectional Study

Asad Khan[1], Inam Ullah[2], Aroob Zaki Khawaja[3], Abdul Bary[3], Taimoor Riaz Ullah[2], Sumbal Shahbaz[2*] and Niaz Ali[4]

[1]Department of Anesthesia, College of Medical Technology, Bacha Khan Medical College, Mardan, Pakistan
[2]Department of Health Professional Technologies, The University of Lahore, Lahore, Pakistan
[3]Department of Anesthesia, Rahbar Medical and Dental College, Lahore, Pakistan
[4]Department of Anesthesia, Jibran College of Health Sciences, Institute of Nursing, Swat, Pakistan

ARTICLE INFO

Keywords:
Postoperative Sore Throat, General Anesthesia, Postoperative Complications, ENT Surgery

How to Cite:
Khan, A., Ullah, I., Khawaja, A. Z., Bary, A., Ullah, T. R., Shahbaz, S., & Ali, N. (2025). Frequency and Risk Factors Associated with Postoperative Sore Throat (POST) in Adults Undergoing General Anesthesia during ENT and Eye Surgery: A Cross-Sectional Study: POST in Adults Undergoing General Anesthesia During ENT and Eye Surgery.Pakistan Journal of Health Sciences, 6(5), 110-116. https://doi.org/10.54393/pjhs.v6i5.2500

***Corresponding Author:**
Sumbal Shahbaz
Department of Health Professional Technologies, The University of Lahore, Lahore, Pakistan
sumbal.shahbaz@dhpt.uol.edu.pk

Received Date: 1st November, 2024
Revised Date: 5th May, 2025
Acceptance Date: 20th May, 2025
Publication Date: 31st May, 2025

ABSTRACT

Postoperative Sore Throat and hoarseness are two common complications after intubation during general Anesthesia. It is crucial to understand the frequency and associated risk factors of POST to improve patients' outcomes and reduce its incidence in patients of ENT and eye surgeries undergoing General Anesthesia (GA). **Objectives:** To emphasize the frequency and risk factors of POST after endotracheal intubation in patients undergoing GA for elective ear, nose, throat (ENT) and eye surgeries. **Methods:** A DHQ Hospital hosted this cross-sectional study from August 2024 to October 2024. The number of participants was 215. A consecutive non-probability sampling technique was used for patient selection. The ASA tool was used to assess the health status of patients undergoing GA. All participants were observed perioperatively, including for 10 minutes in the Post Anesthetic Care Unit (PACU). This was not a blinded study. **Results:** In this study, female subjects comprised 62.8% of the total sample. Complications included sore throat in 102 patients (47.4%) and hoarseness in 25 (24.2%). After the surgeries lasting for 31-60 minutes (51 cases, p=0.01) and in throat surgeries (89 cases, p=0.006), the sore throat was more common. **Conclusions:** Sore throat and Hoarseness are two common complications reported postoperatively with high frequency.The problem may arise more frequently during long surgical procedures; other factors may include the type of surgery, use of an NG tube, and large diameter ETT size. Knowing these hazards makes it clear that the best airway management techniques are required to reduce patient discomfort and enhance recovery.

INTRODUCTION

General anesthesia with endotracheal intubation is associated with the occurrence of Postoperative Sore Throat (POST), which is common and unwanted [1]. The globally reported incidence of POST ranges from 21% to 65% [2], with findings from India showing rates as high as 54.25% in patients undergoing general anesthesia with endotracheal intubation [3]. The incidence may depend on various factors, including gender, age, size of the endotracheal tube (ETT), tube cuff pressure, duration of the tube insertion, number of tube insertion attempts, the number of suctioning of the tube, cuff design, and intraoperative tube movement, etc [4]. A study conducted in Pakistan reported an incidence rate of 38.9% of POST, with higher prevalence in females (45.9%) compared to males (30.5%) and a significant increase when using larger ETT sizes (63.6% for size 7.5 tubes) [5]. Zhu *et al.*, findings clearly state that during emergency patient awakening and changes in intracuff pressure are the two most significant factors that may be associated with increased incidence of POST and hoarseness [6].An endotracheal tube cuff

DOI: https://doi.org/10.54393/pjhs.v6i5.2500

pressure of less than 20 centimeters of water is the risk factor identified by Obsa *et al.*, to be substantially linked with the development of hoarseness [7].Intraoperatively, cuff pressure should be monitored regularly [8].In Azad Kashmir, local studies show that preoperative dexamethasone administration significantly reduces POST incidence, lowering rates from 54.5% to 16.4%, suggesting a potential preventive strategy [9].The use of tracheal tube stylet for difficult airways has been demonstrated widely in clinical practice.However, this technique for difficult intubation may have some other stylet-related complications, including subglottic injury, palatal perforations, postoperative pharyngeal pain, and oropharyngeal injury [10].According to an international study, the incidence of sore throat and hoarseness is significantly lower in patients intubated with a laryngeal mask airway (LMA) than in patients intubated with ETT as a result of follow-up for one hour postoperatively [11]. However, the incidence of hoarseness may rise when using a double lumen endobronchial tube (DLT) for one lung ventilation in thoracic surgeries instead of an endobronchial blocker.When hoarseness occurs as a result of using DLT for one lung ventilation, it does not last for more than three days [12].The incidence and severity of hoarseness and sore throat associated with tube size can be minimized by using a small-sized endotracheal tube [13]. When compared to an endotracheal tube with a cylindrical cuff, intubation with a tapered cuff reduced the incidence and severity of POST as well as the incidence of hoarseness after surgery [14].Before induction of anesthesia, a prophylactic intravenous injection of dexamethasone 8 mg reduces the incidence and severity of postoperative sore throat and hoarseness [15, 16].To minimize the chances of airway difficulty and sore throat, the airway scope (video laryngoscope) has been used extensively for orotracheal intubation in patients with difficult airways [16].Currently, there are no universally effective medications for preventing postoperative painful throat or hoarseness in patients, particularly when a DLT is used during surgery [2]. In contrast to IV dexamethasone, using betamethasone gel on tracheal tubes effectively reduces postoperative sore throat [17].According to Mohseni and Christiansen *et al.*, applying betamethasone gel to the tracheal tube reduces the incidence of postoperative sore throat, cough, and hoarseness of voice [18, 19].An article published in the Society of Ambulatory Anesthesiology suggested that spraying benzydamine hydrochloride on the ETT cuff reduces the incidence and severity of POST simply and effectively [20].Despite these findings, Liu *et al.*, state that: 'use of ketamine (50 mg) and magnesium sulphate (500 mg) just 15 minutes before induction of anesthesia and endotracheal intubation reduces the incidence of Postoperative sore throat (POST) in patients undergoing general anesthesia [21].While there are several studies conducted on POST during general anesthesia.The research, especially focusing on ENT and eye surgeries, is limited.In multiple studies, there are generalized findings of POST in different surgeries, which may not accurately determine the unique risk factors and frequency of POST in ENT and eye surgeries during general anesthesia [14].

This study aims to provide a focused analysis of post-incidence and risk factors in ENT and eye surgeries, helping to enhance surgical and anesthetic practices for better patient outcomes.The objectives of this study were to determine the frequency of postoperative sore throat (POST) in adults undergoing general anesthesia with endotracheal intubation (ETT) in Ear, Nose, Throat, and Eye surgical procedures and to evaluate its associated risk factors.

METHODS

This cross-sectional study was conducted in the District Quarter Hospital Buner, Pakistan, from August 2024 to October 2024. After taking approval from the hospital ethical committee (IRB Ref # REC-UOL-/306/08/24), ensuring compliance with ethical standards for human research. The data were then collected through a questionnaire, and patients were examined during the perioperative period.The study adhered to ethical principles, ensuring patient confidentiality and voluntary participation. The formula used for sample size calculation was n=p(1-p)(Z/E)2. Putting the values in the formula, we get n = 0.5 (1-0.5)(1.96/0.07)2. n=196 Since an estimated 10% of non-subjects' rate will be added, an additional margin of 19% was taken. Thus n=196+ 19=215. For this study, we consecutively enrolled 215 elective patients from the ENT and Eye Department who underwent general anesthesia requiring endotracheal intubation (ETT), having ASA Physical status class I and II, aged 15 years and older. Patients excluded from this study were; patients with the age of less than 15 years, patients with emergency surgery, cigarette smokers, preoperative history of any upper respiratory tract infection, pre-identified sore throat and hoarseness and surgical time more than 2-hours as these are the confounding factors which increases the risk of the occurrence of post operative sore throat that's why such patients were excluded from the study. Confounding factors were controlled by applying strict exclusion criteria. Statistical adjustments were not applied, as confounders were minimized at the study design stage through specific patient selection criteria. All patients were anesthetized by experienced anesthetists at the hospital. We recorded all the patient's personal information, including age, gender, weight, and airway management tools like endotracheal tube size, Nasogastric Tube (Yes/No), and type and duration of the procedure. Cormack-Lehane Grading was used for the laryngeal view during direct laryngoscopy. For the determination of the frequency and risk factors of sore

DOI: https://doi.org/10.54393/pjhs.v6i5.2500

throat and hoarseness, patients were followed throughout the surgery and in the anesthetic Care Unit (PACU) for 10 minutes, because sore throat and hoarseness are the immediate side effects of extubation following tracheal intubation and peak within the first few minutes of recovery. Anesthesia management tools were well-ordered; no other premedications were administered to any patient except tramadol 1mg/ kg was administered for relieving intraoperative pain and atropine was administered to every patient for reducing the bradycardic effects just before the administration of IV anesthetic propofol (2mg /kg), followed by mask ventilation (combination of 100% oxygen and sevoflurane as inhalational anesthetic), muscle paralysis was achieved with 0.5mg/kg atracurium. After 3-5 minutes of mask ventilation, the endotracheal intubation was performed by an expert anesthetist with a Macintosh laryngoscope. The tube was inflated with 3-5 ml of air. The largest tube sizes of 7.0 mm of internal diameter for women and 8.0 mm of internal diameter for men were used. Maintenance of anesthesia was done with atracurium of 0.1mg/kg and isoflurane. At the end of every procedure, patients were administered a combination of neostigmine (0.04 to 0.08mg/kg) for the reversal of neuromuscular blocking agents and together with 1mg of atropine (for reducing the bradycardic effects of neostigmine). The ETT cuff was then completely deflated, and extubation was performed after suctioning the tube. Verbal consent was obtained from each research respondent, and only the participants who agreed were included in this study. All the important aspects of the research were discussed with the participants. All the data of the participants were then statistically analyzed to determine the frequency of sore throat in them. For this statistical analysis, SPSS version 22.0 was used. The p-value≤0.05 was taken as significant. Chi-square test statistics were applied for comparing sore throat incidence with associated risk factors.

RESULTS

The results contain the data about the sociodemographic characteristics of the participants of the study. In total, 215 elective patients from the ENT and Eye departments, most of them were female, 62.8%, while the male ratio was 37.2%. Other variables mentioned in the table below are the ASA physical status of the study participants, with 56.7% of ASA class 1 and 43.3% of ASA class 2.The frequency of patients with diabetes was 2.8%, while the remaining 97.2% of participants were nondiabetic.Most of the participants were candidates for throat surgery (41.4%), while the patients of the nose (28.8%), ophthalmic (21.4%), and ear surgery (8.4%) also participated in the study. The nasogastric tube was only used in 1.9% of patients. In 82.8% of patients, the ETT size with the internal diameter of 5 and 6 was used, while the ETT size of 7 (10.7%) and 8 (6.5%) was used in the remaining participants of the study. In 97.2% of patients, the intubation was done on the first attempt, while the intubation was done on the second attempt in the remaining 2.8% of patients. In 48.8% of patients, the duration of surgery was less than 30 minutes, while in 42.3% of patients, the surgical duration was 30-60 minutes, and in 8.8% of patients, the surgical duration was 1-2 hours. Most of the patients (52.6%) were classified as the Cormack Lehane Grade 2a, while the remaining 44.7% were classified as grade 1, and 2.8% of patients were of the grade 2b. There was no hoarseness in 75.8% of patients, while in the remaining 24.2% of patients, hoarseness was present at the PACU. Further, 52.6% of participants suffered from a sore throat, while there was no sore throat in the remaining 47.4% of participants (Table 1).

Table 1: Socio-demographic Characteristics of Participants

Variables	Categories	%
Gender	Female	62.8%
	Male	37.2%
ASA Physical Status	ASA Class-1	56.7%
	Asa Class-2	43.3%
Presence of DM	No	97.2%
	Yes	2.8%
Surgery Type	Ophthalmic Surgery	21.4%
	Throat Surgery	41.4%
	Ear Surgery	8.4%
	Nose Surgery	28.8%
NG Tube Used	No	98.1%
	Yes	1.9%
ETT Size	5-6 mm ID	82.8%
	7 mm ID	10.7%
	8 mm ID	6.5%
Intubation Attempt	First Attempt	97.2 %
	Second Attempt	2.8 %
Surgery Duration	≤30 Minutes	48.8 %
	31-60 Minutes	42.3 %
	1 - 2 Hours	8.8 %
Cormack_Lehane_Grade	Grade1	44.7 %
	Grade-2a	52.6 %
	Grade-2b	2.8 %
Hoarseness at PACU	No	75.8 %
	Yes	24.2 %
Sore Throat	No	52.6 %
	Yes	47.4 %

The study contains the details about the risk factors and their association with sore throat, as considered by the p-value of 0.05 significant. According to the data, there was no notable correlation between gender and the occurrence of sore throat, with 68.6% of females and 31.4% of males reporting sore throat, with a p-value of 0.093. Age is also not a crucial factor, as comparable high rates of sore throat were reported across age categories (15–30 years: 95.1%, 31–45 years: 3.9%, >45 years: 1.0%), with a p-value of 0.87. Furthermore, there was no notable difference between the ASA physical status classes and the occurrence of sore throat (p-values of 0.559 for ASA Class 1 and Class 2). In

DOI: https://doi.org/10.54393/pjhs.v6i5.2500

terms of the presence of diabetes, most of the non-diabetic patients reported sore throat (98.0%), but this was statistically insignificant (p=0.483). However, the POST was significantly linked with the type of surgery, particularly the throat surgery (42.2%) and ear surgery (14.7%), with a notable p-value of 0.006, indicating that the post-operative sore throat is significantly linked with the type of surgery. The association between the type of surgery and POST is statistically significant and suggests that ENT surgeries may carry a high risk of POST during these surgeries due to the manipulation of the airway. For the exploration of specific techniques that could mitigate this risk, further research is needed. The use of NG tubes showed an insignificant association (p=0.364), as well as the Cormack-Lehane grading system (p-values ranging from 0.450 to 0.611) was also not a significant factor. Likewise, the intubation attempts were also an insignificant influencer of the sore throat occurrence (p=0.483). While the above factors (age, ASA physical status, diabetes, NG tubes, and intubation attempts) did not reach statistical significance (p>0.05), their influence on POST cannot be entirely ruled out in this study. However, the surgical duration was significantly linked to POST, with a p-value of 0.00 for procedures of more than 30 minutes, indicating that longer surgeries are linked with the increased risk of POST. The strong statistical association of longer surgical duration with POST suggests that, when clinically feasible, minimize the surgical time could be a strategy to reduce the POST's risk in ENT and eye surgery patients. Finally, all the patients in the PACU with the complaint of hoarseness also experienced a sore throat (51.0%) with a p-value of 0.000. Our results indicate a highly significant correlation between surgical duration and sore throat occurrence (p=0.000). Longer surgical duration (≥30 minutes) showed that the POST incidence was high and notable. This suggests that the airway irritation is increased with longer intubation time, which can lead to sore throat and hoarseness. While the duration of surgery is often dictated by the complexity of the procedure and the patient's condition. Some strategies like optimizing the anesthetic techniques, procedural efficiency improvements like pre-operative planning, team coordination, minimizing unwanted airway manipulation, and using protective airway devices may help decrease the surgical time and the POST risk in such surgeries. Importantly, although not all cases allow for reduction in surgical duration due to the complex nature of the surgery, our findings suggest that targeting the surgeries with a duration of ≥30-minute threshold-where feasible-could be a practical focus for quality improvement initiatives in ENT and eye surgeries. Further research is required to determine which specific surgical or anesthetic alterations are most effective in mitigating surgical time and subsequent post-incidence in this patient population (Table 2).

Table 2: Risk Factors and Their Association with Sore Throat

Variables	Categories	Sore Throat		Total	p-value
		No	Yes		
		Frequency (%)			
Gender	Female	65 (57.5%)	70 (68.6%)	135 (62.8%)	0.093
	Male	48 (42.5%)	32 (31.4%)	80 (37.2%)	
Age (Years)	15-30	106 (93.8%)	97 (95.1%)	203 (94.4%)	0.87
	31-45	5 (4.4%)	4 (3.9%)	9 (4.2%)	
	>45	2 (1.8%)	1 (1.0%)	3 (1.4%)	
ASA Physical Status	ASA Class-1	62 (54.9%)	60 (58.8%)	122 (56.7%)	0.559
	ASA Class-2	51 (45.1%)	42 (41.2%)	93 (43.3%)	
Presence of Diabetes Mellitus	No	109 (96.5%)	100 (98.0%)	209 (97.2%)	0.483
	Yes	4 (3.5%)	2 (2.0%)	6 (2.8%)	
Type of Surgery	Ophthalmic Surgery	30 (26.5%)	16 (15.7%)	46 (21.4%)	0.006
	Throat Surgery	46 (40.7%)	43 (42.2%)	89 (41.4%)	
	Ear Surgery	3 (2.7%)	15 (14.7%)	18 (8.4%)	
	Nose Surgery	34 (30.1%)	28 (27.5%)	62 (28.8%)	
Nasogastric Tube Used	No	110(97.3%)	101 (99.0%)	211 (98.1%)	0.364
	Yes	3 (2.7%)	1 (1.0%)	4 (1.9%)	
Cormack_Lehane Grade	Grade- 1	46 (40.7%)	50 (49.0%)	96 (44.7%)	0.450
	Grade- 2a	64 (56.6%)	49 (48.0%)	113 (52.6%)	
	Grade- 2b	3 (2.7%)	3 (2.9%)	6 (2.8%)	
Endotracheal Tube Size in millimeter Internal Diameter)	5-6 mm ID	93 (82.3%)	85 (83.3%)	178 (82.8%)	0.611
	7 mm ID	11 (9.7%)	12 (11.8%)	23 (10.7%)	
	8 mm ID	9 (8.0%)	5 (4.9%)	14 (6.5%)	

DOI: https://doi.org/10.54393/pjhs.v6i5.2500

Intubation Attempt	First Attempt	109 (96.5%)	100 (98.0%)	209 (97.2%)	0.483
	Second Attempt	4 (3.5%)	2 (2.0%)	6 (2.8%)	
Surgery Duration	≤30 minutes	73 (64.6%)	32 (31.4%)	105 (48.8%)	0.00
	31-60 minutes	40 (35.4%)	51 (50.0%)	91 (42.3%)	
	1 -2 Hours	0 (0.0%)	19 (18.6%)	19 (8.8%)	
Hoarseness at PACU	No	113 (100.0%)	50 (49.0%)	163 (75.8%)	0.000
	Yes	0 (0.0%)	52 (51.0%)	52 (24.2%)	

The study shows the overall incidence of sore throat in the study participants, where 60 patients suffered from sore throat, and 155 participants did not face this post-operative complication (Figure 1).

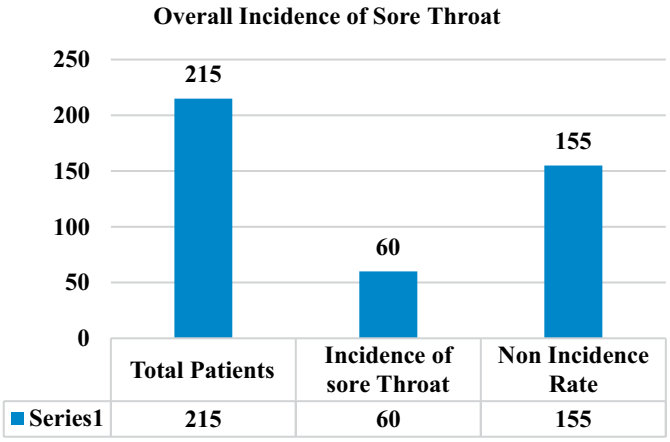

Figure 1: Incidence of Sore Throat

The study shows the overall incidence of sore throat in the study participants, where 60 patients suffered from sore throat, and 155 participants did not face this post-operative complication (Figure 1).

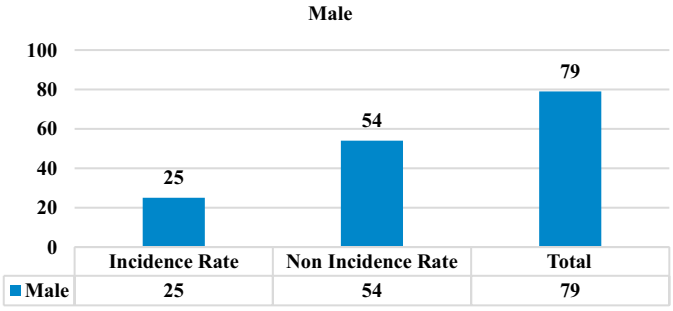

Figure 2: Post-surgical Incidence Among Male Participants

There was information about the female participants of the study, where the incidence of POST was in 35 patients, and the ratio of patients who did not suffer from POST was 101 out of a total of 136 female participants (Figure 3).

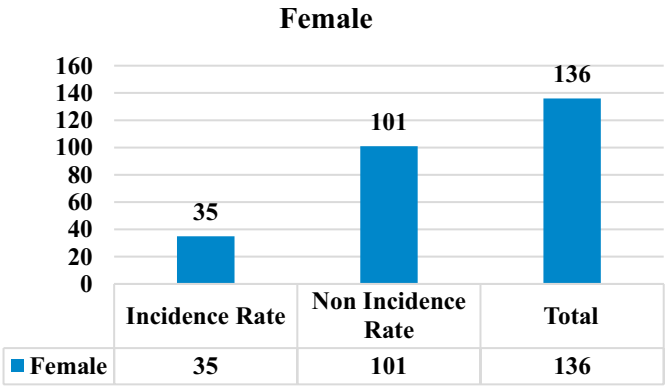

Figure 3: POST in Female Participants of the Study

DISCUSSION

Hoarseness and sore throat are the most common complications arising postoperatively after general anesthesia.Studies are available on these potential complications only in children, but not enough to illustrate these two complications in adult patients. Current study has enough description of these two complications among the adult population.During data collection from participants of this study, we found that the occurrence of sore throat was 102 (47.4%) and that hoarseness was 52 (24.2%).Some of the studies on postop hoarseness and sore throat may support this study, as a clinical report of Stout *et al.*, reveals the occurrence of postoperatively sore throat in a range of 22% to 48% for varying use of ETT sizes [22].They demonstrated that a small diameter of ETT has less chance to produce postop sore throat than does by large diameter of ETT.Likewise, gender differences also the statistically different incidences of sore throat, 68.6% in female and 31.4% in male patients, and we found the greatest identical relation with Tsukamoto *et al.*, for male patients, 32%, whereas many great differences we found with their analysis for female patients (37%) [23].The different statistical results among female participants may be the reasons involved: the use of different techniques or the use of dissimilar ETT sizes. Our observations are in line with Amin *et al.*, as there was no such statistically significant difference in sore throat in males and females because both groups suffered identically [16].Among those patients who responded 'Yes' when questions were asked about hoarseness at PACU, nearly all the patients also suffered from a sore throat.We found a strong association of sore throat with long surgical procedures of intubated patients, which was statistically significant,

DOI: https://doi.org/10.54393/pjhs.v6i5.2500

whereas no association occurred with the use of an NG tube and multiple attempts of ETT intubation.This evidence and findings are in-streak with Wallen *et al.*, findings of 'postoperative throat complications after tracheal intubation [24].Current results showed high statistical significance (0.000) when we compared the duration of surgery with a sore throat, as increased duration of the surgery will lead to increased chances of occurrence of postop sore throat and hoarseness.This finding was not in line with other studies, and the reasons might be the use of dexamethasone injections or local anesthetic gel on the tube [25].In present study, all those patients who were complaining of sore throat had common signs and symptoms(i.e., pain or a scratchy sensation in the throat, hoarseness of voice, and their pain was exacerbated with swallowing or talking).While surgical duration cannot always be mitigated due to the demand of the procedure, certain measures may help decrease this effect.These include careful selection of endotracheal tube (ETT) size, use of humidified oxygen, and pharmacological interventions such as corticosteroids or local anesthetic applications.Future research should focus on identifying optimal anesthesia management techniques to minimize POST risk in prolonged surgeries. Our study has multiple strengths.These include tracheal intubations performed by experienced anesthetists, less frequency of failed intubations, cost-effectiveness, good control over the work, and fewer available studies on POST in adults, which are the main strengths of this study.

CONCLUSIONS

It was concluded that hoarseness and sore throat after ETT intubation are the two most common complications during emergence from general anesthesia.We found the strongest association of postoperative sore throat (POST) with the duration of surgery.Many other risk factors may contribute; these include: type of surgery, the large size of ETT, more than one attempt for intubation, and use of an NG-tube.All these are of increased concern for an anesthetist to consider before the anesthesia.Therefore, care must be taken for these potential risk factors, and if possible, appropriate preventive measures should be applied before long surgical procedures.

Authors Contribution

Conceptualization: AK
Methodology: AZK, AB
Formal analysis: TRU
Writing review and editing: AK, IU, SS, NA
All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Tadesse MA, Alimawu AA, Kebede FS, Alemu EA, Matrisch L, Waktasu DO. Effectiveness of Preoperative Ketamine Gargle to Reduce Postoperative Sore Throat in Adult Patients Undergoing Surgery with Endotracheal Tube; Systematic Review and Meta-Analysis of Randomized Control Trials.BioMed Central Anesthesiology.2024 Dec; 24(1): 1-4. doi: 10.1186/s12871-024-02837-7.

[2] Bekele Z and Melese Z. Incidence and Risk Factors for Postoperative Sore Throat After General Anesthesia with Endotracheal Intubation: Prospective Cohort Study.Annals of Medicine and Surgery.2023 Jun; 85(6): 2356-61. doi: 10.1097/MS9.0000000000000786.

[3] Gurung R, Lohani S, Sinha AK. Incidence of Postoperative Sore Throat in Patient Under General Anesthesia with Endotracheal Intubation. International Journal of Academic Medicine and Pharmacy.2023;5(2):1479-82.

[4] Mazzotta E, Soghomonyan S, Hu LQ. Postoperative Sore Throat: Prophylaxis and Treatment.Frontiers in Pharmacology.2023Nov;14:1284071.doi:10.3389/fphr.2023.1284071.

[5] Ali J, Rahman A, Khan K, Nawaz S, Din ZU. Postoperative Sore Throat Following General Surgical Procedures under General Anesthesia with Endotracheal Intubation.Journal of Health and Rehabilitation Research.2024May;4(2):1039-45.doi: 10.61919/jhrr.v4i2.941.

[6] Zhu G, Wang X, Cao X, Yang C, Wang B, Ang Y *et al.* The Effect of Different Endotracheal Tube Cuff Pressure Monitoring Systems on Postoperative Sore Throat in Patients Undergoing Tracheal Intubation: A Randomized Clinical Trial.BioMed Central Anesthesiology.2024Mar;24(1):115.doi:10.1186/s12 871-024-02499-5.

[7] Obsa MS, Adem AO, Bancha B, Gelgelu TB, Gemechu AD, Tilla M *et al.* Global Incidence and Risk Factors of Post-Operative Sore Throat Among Patients Who Underwent Surgery: A Systematic Review and Meta-Analysis.International Journal of Surgery Open.2022 Oct;47:100536. doi: 10.1016/j.ijso.2022.100536.

[8] Singh G and Puri A. In Ear Surgeries Intravenous Dexamethasone Preoperatively Decreases Post-Operative Sore Throat After Endotracheal Intubation in Adult Patients: A Prospective Randomized Control Study. Indian Journal of Otolaryngology and Head and Neck Surgery.2021Mar;73:1-5.doi:10.1007/s12070-019 -01776-x.

[9] Chaudhry SA, Khan MN, Iqbal M. Comparison of the Incidence of Sore Throat After General Anaesthesia and Endotracheal Intubation in Early Post-Operative Period for Abdominal Surgeries Who Are Given Normal Saline and Dexamethasone.Pakistan Journal of Medical and Health Sciences.2022Jan;16(1):408.doi: 10.53350/pjmhs22161408.

DOI: https://doi.org/10.54393/pjhs.v6i5.2500

[10] El-Boghdadly K, Bailey CR, Wiles MD. Postoperative Sore Throat: A Systematic Review. Anaesthesia.2016 Jun; 71(6): 706-17. doi: 10.1111/anae.13438.
[11] Gong Y, Xu X, Wang J, Che L, Wang W, Yi J. Laryngeal Mask Airway Reduces Incidence of Post-Operative Sore Throat After Thyroid Surgery Compared with Endotracheal Tube: A Single-Blinded Randomized Controlled Trial.BioMed Central Anesthesiology.2020 Dec;20:1-7. doi: 10.1186/s12871-020-0932-2.
[12] Yan W, Cai J, Zhu C, Chen Y, Fang J, Xu H *et al.* Effect of Thermal Softening of Double-Lumen Endobronchial Tubes on Postoperative Sore Throat in Patients with Prior SARS-CoV-2 Infection: A Randomized Controlled Trial.BioMed Central Anesthesiology.2023Dec;23(1): 403.doi: 10.1186/s12871-023-02363-y.
[13] Higgins PP, Chung F, Mezei G. Postoperative Sore Throat After Ambulatory Surgery.British Journal of Anaesthesia.2002Apr;88(4):582-4. doi:10.1093/bja/88 .4.582.
[14] Chen Z, Zuo Z, Zhang L, Gong M, Ye Y, Jin Y *et al.* Postoperative Sore Throat After Tracheal Intubation: An Updated Narrative Review and Call for Action. Journal of Pain Research.2025Dec:2285-306.doi: 10.2147/JPR.S498933.
[15] Avcı U, Karaman T, Balta MG, Tapar H, Karaman S. The Effect of Controlled Hypotensive Anesthesia on Postoperative Sore Throat.Medical Records.2024 Sep; 6(3): 537-41. doi: 10.37990/medr.1529150.
[16] Wang G, Qi Y, Wu L, Jiang G. Comparative Efficacy of 6 Topical Pharmacological Agents for Preventive Interventions of Postoperative Sore Throat After Tracheal Intubation: A Systematic Review and Network Meta-Analysis.Anesthesia and Analgesia. 2021Jul;133(1):58-67.doi:10.1213/ANE.00000000000 05521.
[17] Gupta N and Gupta A. Clinical Anesthesia (SAE). Wolters Kluwer India Pvt. 2021Jun.
[18] Mohseni M, Rad RF, Jafarian AA, Zarisfi AH, Masoudi N. The Effect of Softening of Endotracheal Tubes on the Decrement of Postoperative Hoarseness and Sore Throat.Anesthesiology and Pain Medicine.2022Nov; 12(5):e123910. doi: 10.5812/aapm-123910.
[19] Christiansen P, Pedersen CH, Selter H, Odder L, Riisager JP, Damgaard K *et al.* How Does Tube Size Affect Patients' Experiences of Postoperative Sore Throat and Hoarseness? A Randomised Controlled Blinded Study.Journal of Clinical Medicine.2021Dec; 10(24):5846. doi: 10.3390/jcm10245846.
[20] Su MP, Hu PY, Lin JY, Yang ST, Cheng KI, Lin CH. Comparison of Laryngeal Mask Airway and Endotracheal Tube in Preterm Neonates Receiving General Anesthesia for Inguinal Hernia Surgery: A Retrospective Study. BioMed Central Anesthesiology. 2021 Dec; 21: 1-7. doi: 10.1186/s12871-021-01418-2.
[21] Liu Y, Ai D, Wang X. Efficacy of Perioperative Intravenous Dexmedetomidine Administration for the Prevention of Postoperative Sore Throat: A Meta-Analysis.Journal of International Medical Research. 2021May49(5):03000605211017686.doi:10.1177/0300 0605211017686.
[22] Stout DM, Bishop MJ, Dwersteg JF, Cullen BF. Correlation of Endotracheal Tube Size with Sore Throat and Hoarseness Following General Anesthesia. Anesthesiology.1987Sep;67(3):419-21.doi:10.109 7/000 00542-198709000-00025.
[23] Tsukamoto M, Taura S, Kadowaki S, Hitosugi T, Miki Y, Yokoyama T.Risk Factors for Postoperative Sore Throat After Nasotracheal Intubation.Anesthesia Progress.2022Oct;69(3):3.doi:10.2344/anpr-69-01-05
[24] Wallen SL, Paul TV, Tubog TD. Intracuff Lidocaine and Postoperative Throat Mucosal Injuries: An Evidence-based Review. Journal of PeriAnesthesia Nursing. 2024 Jun; 40(1). doi: 10.1016/j.jopan.2024.03.005.
[25] Lai CJ, Yeh YC, Tu YK, Cheng YJ, Liu CM, Fan SZ. Comparison of the Efficacy of Supraglottic Airway Devices in Low-Risk Adult Patients: A Network Meta-Analysis and Systematic Review. Scientific Reports. 2021 Jul; 11(1): 15074. doi: 10.1038/s41598-021-94114-7.