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Prevalence And Associated Risk Factors Of Postoperative Sore Throat Following General Anesthesia

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Abstract

Background: Postoperative sore throat (POST) is a frequent complication following general anesthesia, particularly with tracheal intubation. Although often considered minor, POST significantly affects patient comfort and satisfaction. Its incidence and associated risk factors vary widely, and data from developing countries remain limited.

Objective: To determine the incidence of postoperative sore throat and identify associated risk factors among patients undergoing elective surgery under general anesthesia.

Methods: This observational cross-sectional study was conducted at Lady Reading Hospital, Peshawar, over a period of 4–6 months. A total of 196 patients aged 10–65 years, classified as ASA I–III, undergoing elective surgery under general anesthesia with endotracheal intubation or laryngeal mask airway were included. Data were collected using a structured questionnaire covering preoperative, intraoperative, and postoperative variables. POST was assessed within 24 hours after surgery. Data were analyzed using SPSS version 25, and associations were evaluated using the Chi-square test, with a p-value < 0.05 considered statistically significant.

Results: The incidence of postoperative sore throat was 18.4% (n=36). POST was significantly more common in females than males (35.4% vs. 9.9%, $p < 0.001$). A

strong association was observed between higher Mallampati classification and POST, with all patients in Mallampati Classes II and III developing sore throat ($p < 0.001$). Longer duration of anesthesia was also significantly associated with POST ($p < 0.001$). The majority of patients had first-attempt intubation and received preventive measures, including airway lubrication.
Conclusion: Postoperative sore throat remains a common complication after general anesthesia. Female gender, higher Mallampati score, and prolonged anesthesia duration were significant risk factors. Optimized airway assessment and routine preventive airway management strategies can effectively reduce the incidence of POST.

Introduction

Postoperative sore throat (POST) is one of the most common complications following general anesthesia, particularly when airway management involves tracheal intubation (Chen et al., 2025). Although often considered minor, POST significantly affects patient comfort, satisfaction, and postoperative recovery. Patients may experience throat pain, dryness, or irritation that interferes with swallowing and speaking. While symptoms usually resolve spontaneously, they may persist for several days or weeks, negatively impacting quality of life and increasing healthcare utilization (Obsa et al., 2022).

The development of POST is primarily attributed to mechanical trauma and inflammation caused by airway instrumentation. Endotracheal intubation, though essential for airway protection, can injure airway structures during laryngoscopy and tube insertion (El-Boghdadly et al., 2016). Friction and pressure from the endotracheal tube (ETT) may cause mucosal edema and microvascular injury, while supraglottic and subglottic trauma may occur from laryngoscopes and inflated cuffs, respectively (Khan et al., 2025). Excessive cuff pressure exceeding tracheal mucosal perfusion pressure leads to ischemia and tissue injury; maintaining intracuff pressure below 20–30 cm H_2O reduces this risk (Teshome et al., 2024). Inflammatory mediators released in response to mucosal irritation further contribute to postoperative pain (Zhu et al., 2024).

The reported incidence of POST varies widely, ranging from 12.1% to 70%, depending on patient characteristics, airway devices, and assessment methods. Higher rates are consistently reported with tracheal intubation compared to laryngeal mask airways (LMA) or face mask anesthesia. POST occurs in approximately 14.4%–50% of intubated patients, compared to 5.8%–34% with LMA use (Obsa et al., 2022), with significantly higher prevalence reported in surgeries using ETTs (Wang et al., 2021).

Several patient-related and procedural factors influence the occurrence of POST. Female sex has been identified as a significant risk factor, possibly due to smaller airway dimensions and hormonal influences on pain perception (Wallen et al., 2025; Lai et al., 2021). Younger age, smoking, and pre-existing respiratory conditions such as asthma or recent upper respiratory infections also increase susceptibility (Bekele & Melese, 2023; Khan et al., 2025). Procedural factors include larger ETT size, prolonged duration of anesthesia, repeated intubation attempts, excessive laryngoscopic force, use of succinylcholine, coughing during emergence, and insertion of nasogastric tubes (Gurung et al., 2023; Ali et al., 2024; Zhu et al., 2024; Obsa et al., 2022). Use of smaller ETT sizes has been associated with a reduced incidence of POST (Tadesse et al., 2024).

Although rarely life-threatening, POST adversely affects postoperative recovery by impairing oral intake, sleep, and mobilization, and may contribute to negative perceptions of anesthesia and surgery (El-Boghdadly et al., 2016). Preventive strategies include non-pharmacological measures such as gentle airway manipulation, adequate lubrication, cuff pressure monitoring, and minimizing intubation attempts (Avcı et al., 2024). Pharmacological interventions, particularly intravenous

dexamethasone, have demonstrated consistent effectiveness in reducing POST due to their anti-inflammatory properties (Tanaka et al., 2015; Chen et al., 2025).
Despite these strategies, POST remains common, and evidence from developing countries is limited. In settings such as Ethiopia, data on POST incidence and associated risk factors are scarce (Yan et al., 2023). Therefore, this study aims to determine the incidence of postoperative sore throat and identify its risk factors in the local population to inform targeted preventive strategies and improve perioperative patient care.

MATERIAL AND METHODS

The study was conducted at Lady Reading Hospital, Peshawar, Pakistan, a tertiary care teaching hospital with well-established operation theaters, intensive care units, and perioperative services. An observational cross-sectional study design was employed over a period of 4–6 months. The study included patients aged 10–65 years who underwent elective surgical procedures under general anesthesia with either endotracheal intubation or laryngeal mask airway (LMA) and belonged to ASA physical status I–III. Only patients able to provide informed consent, whose surgical duration was less than four hours, and who could be observed for at least 24 hours postoperatively were included. Patients with pre-existing sore throat, hoarseness, recent upper respiratory tract infection, known airway abnormalities, history of recent airway surgery, emergency surgeries, more than two intubation attempts, or use of nasogastric tubes or oropharyngeal airways were excluded from the study. The sample size was calculated using the formula $n = p(1 - p) \times (Z/E)^2$, assuming a prevalence (p) of 0.5 for maximum variability, a 95% confidence level (Z = 1.96), and a margin of error (E) of 0.07. This yielded a final sample size of 196 participants. A non-probability convenience sampling technique was used to recruit eligible participants.
After obtaining ethical approval from the Ethical Committee of Lady Reading Hospital and written informed consent from all participants, data was collected using a structured questionnaire titled Postoperative Sore Throat After General Anesthesia. Data collection was carried out in three phases. During the preoperative phase, demographic variables such as age, gender, and body mass index were recorded. In the intraoperative phase, details regarding surgery and anesthesia were documented, including ASA classification, Mallampati score, type of airway device used, endotracheal tube size, number of intubation attempts, laryngoscope blade size, duration of anesthesia, and preventive measures such as lubrication of the airway device. In the postoperative phase, patients were assessed within 24 hours after surgery for the presence of sore throat. Information regarding the onset, severity (measured on a 0–10 numerical rating scale), and associated symptoms such as dysphagia or voice changes was recorded. All data were anonymized using unique identification codes and stored securely in password-protected electronic files. Data analysis was performed using SPSS version 25. Descriptive statistics were used to summarize baseline characteristics, while the Chi-square test was applied to determine associations between postoperative sore throat and potential risk factors. A p-value < 0.05 was considered statistically significant.

RESULTS

A total of 196 participants were included, with complete data for age, gender, and body mass index (BMI). Most participants were aged 21–30 years and 31–40 years (each 33.2%, n=65), followed by those aged 51–60 years (30.6%, n=60); the 10–20-year age group was least represented (3.1%, n=6). Males constituted 66.8% (n=131) of the sample, while females accounted for 33.2% (n=65). Regarding BMI, 57.7% (n=113) were underweight, 33.2% (n=65) had normal BMI, and 9.2% (n=18) were overweight (Table 4.1).

Table 4.1: Socio-Demographic Characteristics and Body Mass Index Distribution of Study Participants

Variable	Category	Frequency	Percent (%)
Age (years)	10–20	6	3.1
	21–30	65	33.2
	31–40	65	33.2
	51–60	60	30.6
Gender	Male	131	66.8
	Female	65	33.2
BMI Category (kg/m²)	<18.5	113	57.7
	18.5–24.9	65	33.2
	25–29.5	18	9.2

Among the 196 participants, orthopedic surgery was the most frequently performed procedure, accounting for 57.1% (n=112) of cases. General surgery was performed in 39.8% (n=78) of participants, while obstetric surgery was the least common, observed in 3.1% (n=6) of cases.(Figure 4.1)

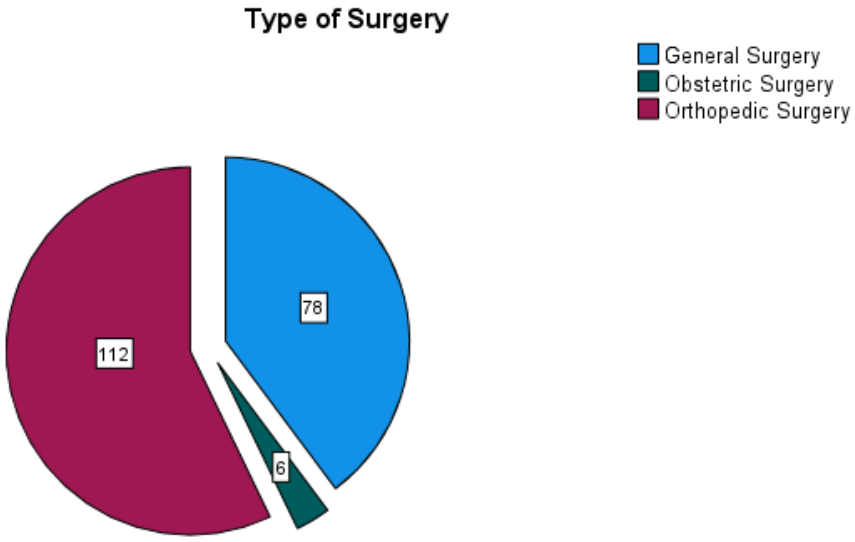


Figure 4.1: Type of surgery

All surgical procedures performed in the study were elective, accounting for 100% (n=196) of cases, with no emergency surgeries reported. Regarding preoperative health status, the majority of participants (87.8%, n=172) were classified as ASA I, indicating a normal healthy status. A smaller proportion (12.2%, n=24) were categorized as ASA II, representing patients with mild systemic disease.(Table 4.2)

Table 4.2: Distribution of Surgery Urgency and ASA Classification among Study Participants

Variable	Category	Frequency	Percent (%)
Surgery Urgency	Elective	196	100.0

ASA Classification	ASA I	172	87.8
	ASA II	24	12.2
Total		**196**	**100.0**

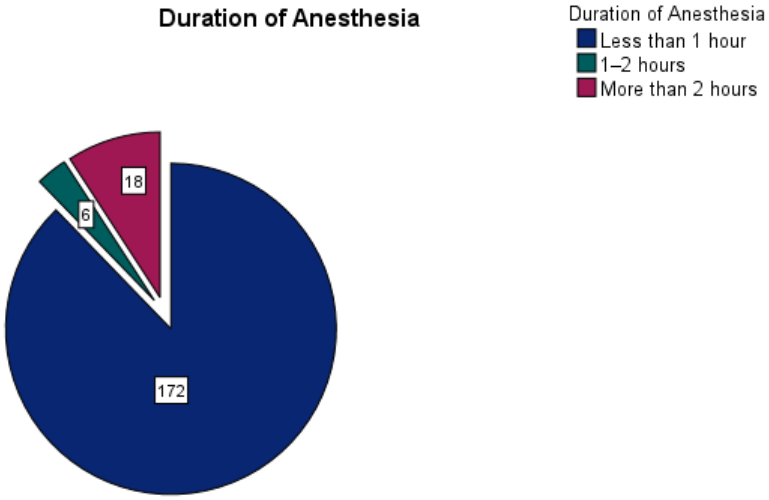
Among the 196 study participants, the majority (87.8%, n=172) had a Mallampati Class 1 airway assessment, indicating a favorable airway view, while Class 2 and Class 3 were each observed in 6.1% (n=12) of individuals. Regarding the endotracheal tube (ETT) size, 60.2% (n=118) of patients were intubated with a 7.0 mm tube, 36.7% (n=72) with a 7.5 mm tube, and a small proportion (3.1%, n=6) with a 6.0 mm tube. Successful intubation on the first attempt was achieved in 87.8% (n=172) of cases, whereas 12.2% (n=24) required more than one attempt. In terms of equipment, a size 4 laryngoscope blade was used in 66.8% (n=131) of procedures, while size 3 was used in 33.2% (n=65).(Table 4.3)

Table 4.3: Airway Assessment and Intubation Parameters among Study Participants

Variable	Category	Frequency	Percent (%)
Mallampati Classification	Class 1	172	87.8
	Class 2	12	6.1
	Class 3	12	6.1
ETT Size	6.0 mm	6	3.1
	7.0 mm	118	60.2
	7.5 mm	72	36.7
Intubation Attempts	One attempt	172	87.8
	More than one attempt	24	12.2
Laryngoscope Blade Size	Size 3	65	33.2
	Size 4	131	66.8
Total		**196**	**100.0**

The majority of surgical procedures (87.8%, n=172) were completed with a duration of anesthesia of less than one hour. A small proportion of cases lasted between one and two hours (3.1%, n=6), while anesthesia durations exceeding two hours were observed in 9.2% (n=18) of participants.(Figure 4.2)

Figure 4.2:



Duration of Anesthesia

Among the 196 study participants, postoperative sore throat was reported by 18.4% (n=36), while the majority (81.6%, n=160) did not experience this symptom. Regarding the timing of onset, most cases of sore throat occurred within six hours postoperatively (9.2%, n=18), whereas 3.1% (n=6) developed symptoms between six and twelve hours after surgery. In terms of severity, 18.4% (n=36) of patients experienced a moderate sore throat, while 81.6% (n=160) reported no symptoms. Difficulty swallowing or changes in voice were also noted in 18.4% (n=36) of participants, with the majority (81.6%, n=160) experiencing no such complications. (Table 4.4)

Table 4.4: Postoperative Airway Symptoms among Study Participants

Variable	Category	Frequency	Percent (%)
Postoperative Sore Throat	Yes	36	18.4
	No	160	81.6
Onset of Sore Throat	Within 6 hours	18	9.2
	6–12 hours	6	3.1
	Not applicable	172	87.8
Severity of Sore Throat	None	160	81.8
	Moderate	36	18.4
Difficulty Swallowing/Voice Changes	Yes	36	18.4
	No	160	81.8
Total		**196**	**100.0**

Lubricants were applied to the endotracheal tube (ETT) in 63.3% (n=124) of cases, while 36.7% (n=72) underwent intubation without lubricant use. Measures specifically aimed at reducing postoperative sore throat (POST) were implemented in 90.8% (n=178) of participants, whereas no such measures were taken in 9.2% (n=18). (Table 4.5)

Table 4.5: Intraoperative Airway Management Practices among Study Participants

Variable	Category	Frequency	Percent (%)
Lubricant Used on ETT	Yes	124	63.3
	No	72	36.7
Measures to Reduce POST	Yes	178	90.8
	No	18	9.2
Total		**196**	**100.0**

A statistically significant association was found between gender and the occurrence of postoperative sore throat (POST). Among male participants, 9.9% (n=13) experienced POST, whereas a notably higher proportion of females (35.4%, n=23) reported this complication. The Pearson Chi-Square test confirmed a significant relationship between gender and the incidence of POST ($\chi^2 = 18.783$, df = 1, $p < 0.001$), indicating that female patients were significantly more likely to develop postoperative sore throat compared to male patients.

Table 4.6: Association between Gender and Postoperative Sore Throat

Gender	POST Yes	POST No	Total	p-value
Male	13	118	131	
Female	23	42	65	
Total	**36**	**160**	**196**	**< 0.001**

A highly significant association was found between Mallampati classification and the incidence of postoperative sore throat (POST). Only 7.0% (n=12) of participants with Mallampati Class 1 experienced POST, whereas 100% (n=12) of those classified as Mallampati Class 2 and 100% (n=12) of those in Class 3 reported postoperative sore throat. The Pearson Chi-Square test confirmed this strong association ($\chi^2 = 121.550$, df = 2, $p < 0.001$), indicating that higher Mallampati classes were significantly associated with an increased risk of developing postoperative sore throat.(Table 4.7)

Table 4.7: Association between Mallampati Classification and Postoperative Sore Throat

Mallampati Classification	POST Yes	POST No	Total	p-value
Class 1	12	160	172	
Class 2	12	0	12	
Class 3	12	0	12	
Total	**36**	**160**	**196**	**< 0.001**

A highly significant association was found between the duration of anesthesia and the incidence of postoperative sore throat (POST). Among patients with anesthesia lasting less than one hour, 12 developed POST, whereas all patients undergoing anesthesia lasting one to two hours (n=6) and more than two hours (n=18) experienced POST. The Pearson Chi-Square test confirmed this strong relationship ($\chi^2 = 121.550$, df = 2, $p < 0.001$), indicating that longer durations of anesthesia were significantly associated with an increased occurrence of postoperative sore throat.(Table 4.8)

Table 4.8: Association between Duration of Anesthesia and Postoperative Sore Throat

Duration of Anesthesia	POST Yes	POST No	Total	p-value
Less than 1 hour	12	160	172	
1–2 hours	6	0	6	

More than 2 hours	18	0	18	
Total	**36**	**160**	**196**	**< 0.001**

DISCUSSION

This study assessed the incidence and risk factors of postoperative sore throat (POST) following elective surgeries performed under general anesthesia with endotracheal intubation. The findings were compared with existing literature to determine their clinical relevance.

The incidence of POST in the present study was 18.4%, which is relatively low compared to global reports ranging from 20% to 74%, depending on patient characteristics, airway manipulation, and preventive practices (Khan et al., 2025). The lower incidence observed may be attributed to favorable airway characteristics, with a high proportion of patients having Mallampati Class I airways, and the routine use of preventive measures such as airway lubrication in the majority of cases (Khan et al., 2025).

Gender showed a significant association with POST, with a higher incidence observed among females (35.4%) compared to males (9.9%, $p < 0.001$). This finding aligns with previous studies identifying female gender as a consistent predictor of POST (Avcı et al., 2024). Anatomical differences, including smaller airway dimensions, increased mucosal sensitivity, and hormonal influences on pain perception, may explain this association. These findings highlight the importance of individualized airway management strategies in female patients (Avcı et al., 2024).

A significant relationship was also observed between Mallampati score and POST occurrence. Patients with Mallampati Classes II and III experienced a higher incidence of POST, whereas only 7.0% of patients with Mallampati Class I developed symptoms ($p < 0.001$). This is consistent with the findings of Tadesse et al. (2024), who reported that higher Mallampati grades are associated with difficult intubation and increased airway trauma, leading to mucosal irritation and postoperative sore throat. These results suggest that patients with higher Mallampati scores may benefit from alternative airway devices or enhanced protective strategies (Tadesse et al., 2024).

CONCLUSION

Postoperative sore throat remains a common complication following general anesthesia with endotracheal intubation. Female gender, higher Mallampati score, and longer duration of anesthesia were significantly associated with increased risk. The high rate of first-attempt intubation and routine use of preventive airway measures likely contributed to the lower incidence observed. Careful airway assessment and optimized airway management can effectively reduce POST.

RECOMMENDATIONS

Thorough preoperative airway assessment is recommended, particularly in female patients and those with higher Mallampati scores. Routine use of smaller endotracheal tubes, adequate lubrication, and gentle, first-pass intubation techniques should be standard practice. Further studies are needed to evaluate preventive strategies and alternative airway devices.

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