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INCIDENCE RATE OF POST-OPERATIVE LARYNGOSPASM IN PEDIATRIC PATIENTS AT LADY READING HOSPITAL PESHAWAR

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Abstract

Laryngospasm is most common in children during general anesthesia that is the involuntary closure of glottis muscle. In general anesthesia, laryngospasm is most common in which airway obstruction occur and the anesthetist considers it a different thing. If laryngospasm is not recognized early and if not treated then it leads to severe complications. The complication include respiratory depression, cardiac arrest and patient should be intubated, ventilated and oxygenated.The primary aim of this study was to evaluate the incidence of post-operative laryngospasm in the pediatric population, its common clinical presentations, and outcomes at Lady Reading Hospital, Peshawar.This was a Descriptive Cross Sectional study conducted at Lady Reading Hospital Peshawar, A total of 231 patients aged 1–12 years were included through Non Probability Convenient Sampling technique. Data were collected using a structured questionnaire and analyzed using SPSS version 26. In our study, out of total 231 respondents, 83 participants (35.9%) had age between 1 to 3 years. Those with 4 to 6 years of age accounted for 75 individuals, or 32.5% of the total. Another 55 participants (23.8%) reported having age between 7 to 9 years. Lastly, 18 individuals (7.8%) were 10 to 12 aged. Out of the 231 participants surveyed, 30 individuals (13.0%) responded "Yes," indicating the occurrence of the event in question. Four participants (1.7%) answered "No," while the majority–197 individuals (85.3%)–specifically replied "No Laryngospasm." Concerning the type of surgeries, it was found that elective surgeries prevailed, representing 79.2 percent of cases, with the other 20.8 percent accounting to emergency surgeries. The data also concludes that a relatively small proportion of the participants (14.7%) has had post-operative laryngospasm. Most of them did not need reintubation and mechanical ventilation, and only 6.9 percent of the individuals who needed them developed laryngospasm complication needing additional measures. This indicates that most patients do not have to go through major procedures in case their laryngospasm occurs.

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INTRODUCTION

Laryngospasm is most common in children during general anesthesia. It is the involuntary closure of glottis muscle. It protects foreign material from the trachea. By producing these effect the glottis close the trachea and block the respiration (Khan, 2022). This causes hypoxia and hypercapnia. But, in some cases, the spasm remain present as long as the stimulus is present, and it leads to morbidity and mortality e.g , such as cardiac arrest, arrhythmia etc. Laryngospasm occurs frequently during the administration of anesthesia to pediatric patient. The pathophysiological mechanism of laryngospasm during anesthesia is unclear (Ooi *et al.,* 2025a). The incidence of laryngospasm after tonsillectomy and adenoidectomy to be as frequent as 21%–26% this has not been experienced in our institution. Although if laryngospasm is early diagnosed and treated so it protects us from morbidity and mortality. In some time the laryngospasm is not properly diagnosed so it harms the patient for example cardiac arrest, pulmonary edema, and left ventricular hypertrophy (Chekol & Melesse, 2020).

In general anesthesia, laryngospasm is most common in which airway obstruction occur and the anesthetist considers it a different thing. If laryngospasm is not recognized early and if not treated then it leads to severe complications. The complication include respiratory depression, cardiac arrest and patient should be intubated, ventilated and oxygenated. Laryngospasm is the involuntary contraction of upper airway muscle it protect us from any material entering to the trachea but it cause apnea, respiration cessation and cardiac abnormality (Ricci *et al.,* 2024). In complete laryngospasm the vocal cord is complete closed and in partial little bit space is available. In complete laryngospasm the chest movement is absent and the bag does not inflate and deflate so it needs artificial ventilation and respiration. But in partial laryngospasm the chest movement is slightly present and stridor sound is there. Mostly laryngospasm occur in children during general anesthesia in ketamine anesthesia by the procedure of anal dilation (Li & Zhu, 2024). The important causative factors which are responsible by causing laryngospasm are respiratory tract infection, presence of nasogastric tube, oral endoscopy, post extubation and Surgical procedures e.g. adenoidectomy and tonsillectomy. In general anesthesia laryngospasm occur due to two reason: firstly, the central nervous system is not depressed and the glottic reflexes are present and secondly due to presence of stimuli. There are a lot of causes of laryngospasm in anesthesia e.g light anesthesia and extubation in light anesthesia, secretion and blood in vocal cord, an artificial airway laryngoscope and suction (Manouchehrian *et al.,* 2022). Laryngospasm occurrence is more common in children after general anesthesia mean that it is inversely related with age. Children with asthma and upper airway infection are more prone to develop laryngospasm. The principal mechanism of pulmonary edema is the forced inspiration on closed glottis and trans-pulmonary pressure gradient difference, which leads to leakage of fluid in interstitial spaces (Napitu *et al.,* 2024). From the last 40 years there is improvement in surgical procedures, anesthetic and postoperative in such patients, as a result the chances of morbidity and mortality has decreased. The spasm prevents air from entering the lungs and may cause stridor, hypoxia, cyanosis, and even cardiac arrest if not promptly resolved. The pathophysiology involves a reflex arc stimulated by irritants such as secretions, blood, or foreign materials near the vocal cords, which triggers afferent signals through the internal branch of the superior laryngeal nerve, causing glottic closure via the recurrent laryngeal nerve (Zhipeng *et al.,* 2020). Laryngospasm is an involuntary sudden spasm of vocal cord resulting in partial or total obstruction of airway. This is the life-threatening disorder that may develop in a number of clinical situations, especially, in the perioperative period. Even though it is a protective reflex that is designed to prevent aspiration, laryngospasm may have an opposite extreme effect, which is serious respiratory compromise. This glottis closure by the muscle may persist until the stimulus causing this condition is removed or until some medical facility undertakes medical treatment measures. Most typically, it can be observed in the course of

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induction or emergence from a general anesthetic and is of major concern to anesthesiologists and surgical teams (Sagdeo *et al.,* 2021).

The anatomy of infants and neonates also contributes towards the gravity of the airway obstruction posed by laryngospasm given that nasal breathing is the main respiratory pattern at this stage of life. Notably, pediatric patients might not display characteristic symptoms, including stridor, and display rather non-specific manifestations, including chest retractions, silent breathing, or rapid desaturation (Bezerra *et al.,* 2024). This makes the duo even difficult to diagnose and treat in time. Children are also susceptible to laryngospasm owing to specific anatomical and physiological peculiarities. Children and particularly children below the age of five possess narrower airways, bigger tongues in relation to the oropharyngeal area, and hence, an increase in rate of consuming oxygen. All these increase the clinical relevance of even a short episode of airway obstruction, relative to adults. Besides, they have the underdeveloped pharyngeal muscle tone and the airway reflexes are more sensitive predisposing to the development of laryngospasm (Haile *et al.,* 2015).

Post-operative laryngospasm is laryngospasm that occurs when the patient is undergoing recovery after a surgical procedure, in the post-anesthesia care unit (PACU) or on the way out of the operating room. It ranks as one of the most frequent complications of respiratory problems on patients undergoing surgery in the pediatric age group (Mojaveraghili *et al.,* 2023). Surveys have implied that it is highly prevalent in children as compared to adults with some cases confirming rates as high as 17.4 per cent in certain vulnerable group of children. There were several risk factors identified to post-operative laryngospasm in children. Among them are recent upper respiratory infection, exposure to passive cigarettes smoking, airway abnormalities, inadequate depth of anesthesia during the off-tubing process, and procedures that incorporate the upper airway requirements such as tonsillectomy, adenoidectomy, and dental surgery (Ooi *et al.,* 2025b) Moreover, when there is a presence of secretions or blood around the glottis during emergence out of the anesthesia, this can lead to direct triggering of the spasm. Post-operative laryngospasm has devastating clinical implications. The condition is also potentially dangerous, causing hypoxemia, bradycardia, pulmonary edema, or cardiac arrest when not treated and identified fast enough. The most common solutions involve positive pressure ventilation, 100 percent oxygen, the elimination of mechanical or chemical stimuli, and, in case of extreme conditions, the application of pharmacological agents such as succinylcholine or propofol (Khan, 2022). Even with these improvements in the methods of anesthesia practices and airway management, the unpredictability of laryngospasm remains to be a huge threat, especially in resource-limited environments where there might be a deficiency of people with anesthesia expertise in children (Bezerra *et al.,* 2024).

Besides increasing the clinical consciousness, epidemiological evidence on the occurrence of laryngospasms will assist in detecting trends according to the kind of surgery, anesthesia method, and thus patient characteristics. The data is important in risk stratification and the formulation of preventive interventions that can apply to the specific needs of the pediatric patients (Zhipeng *et al.,* 2020). The vulnerability of this age group in terms of physiology and the possible rate of deterioration during airway compromise justifies a special consideration in terms of urgent research, particularly in the low- and middle-income countries where anesthesia care of children might not be generalized. Considering the above, this paper seeks to describe the prevalence of post-operative laryngospasm in children, and in particular, highlight some of the risk factors, common clinical manifestations and outcomes. The research aims at supporting better perioperative care, fewer morbidities and mortalities and increased overall surgical safety of children by contributing to the development of a deeper understanding of this condition.

Post-operative laryngospasm is a significant complication in pediatric anesthesia, often leading to critical respiratory distress if not promptly recognized and managed (Ricci *et al.,* 2024). There

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are anatomical and physiological differences that make children especially vulnerable to the airway-related complications. Its clinical significance notwithstanding, little local evidence exists on the incidence of the development of and risk factor of post-operative laryngospasm in a pediatric practice, especially within the healthcare framework of LRH Peshawar. This limitation allows the creation of adequate preventive and management strategies that fit the local situation. By assessing the rates of post- operative laryngospasm among children LRH Peshawar, this research will give evidence-based information on frequency of occurrence, risk factors and presentations. The findings will help inform anesthetic practices, improve perioperative care, and potentially reduce morbidity associated with this complication in pediatric surgical patients within the institution and similar healthcare environments.

METHODOLOGY

Study Design

Descriptive Cross Sectional study .

Study Settings

Lady Reading Hospital (LRH) Peshawar.

Study Duration

Study duration for this research work was 6 months w.e.f March 2025 to August 2025.

Sample Size

The sample size was calculated by using the following Cochran's formula,

$$n = \frac{Z^2.P.(1-P)}{e^2}$$

n= sample size (to be calculated)
z= confidence interval (1.96 for 95 %)
p= prevalence (18.4%) (Chekol & Melesse, 2020).
e= error (0.05 or 5 %)
Putting these values in the above formula

$$n = \frac{(1.96)^2 \times 0.184 \times (1 - 0.184)}{(0.05)^2}$$

$$n = 231$$

Sampling Technique

Non Probability Convenient Sample technique.

Sample Selection

Inclusion Criteria:

- Pediatric patients aged 1 to 12 years undergoing surgery under general anesthesia.
- Those post-operative patients who have gone through endotracheal intubation under general anesthesia.
- Patients who were extubated and observed in the Post-Anesthesia Care Unit (PACU).
- Informed written consent obtained from parents or legal guardians for participation and data use.

Exclusion Criteria

- Patients older than 12 years were excluded to maintain focus on the pediatric demographic.
- Patients undergone surgery with local or regional anesthesia alone, without general anesthesia or airway instrumentation.
- Patients with pre-existing anatomical airway abnormalities (e.g., laryngeal webs, tracheomalacia) or diagnosed obstructive airway conditions (e.g., severe asthma, vocal cord paralysis).
- Patients who remained intubated post-operatively or were shifted to the **ICU** for mechanical ventilation were excluded, as laryngospasm assessment requires spontaneous breathing.
- Any parent or guardian who refused to provide informed consent for participation in the study.

Data Collection Procedure

The data collection for this study was conducted following approval from the Institutional Review Board and the Ethical Committee of Sarhad Institute of Allied Health Sciences Peshawar. An ethical approval letter, signed by the research coardinator, was obtained prior to the commencement of the study. A structured questionnaire was used to gather data, which was divided into several sections. The first section covered demographic information (Questions 1-5). The second section focused on evaluating the incidence of post-operative laryngospasm in

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pediatric patients (Questions 6-10). The third section specifically examined the incidence of post-operative laryngospasm in the pediatric population at LRH Peshawar (Questions 11-14). The fourth section identified key risk factors associated with post-operative laryngospasm (Questions 15-19). The fifth section addressed the common clinical presentations of post-operative laryngospasm (Questions 20-22), and the final section explored the outcomes of post-operative laryngospasm (Questions 23-25). This structured approach ensured a thorough investigation of the incidence and contributing factors of post-operative laryngospasm in the pediatric population.

Data Analysis Procedure:

After data collection process the gathered data was analyzed through SPSS (Statistical Package for Social sciences) version 26.

Ethical Consideration:

Ethical considerations in this study was to prioritize the protection and rights of all participants. Informed consent was obtained from each participant before data collection, ensuring that they fully understand the study's purpose, procedures, potential risks, and benefits. Participants and their attendants were made aware that their involvement is voluntary and that they have the right to withdraw at any time without consequence. To ensure privacy, all collected data was anonymized and confidentiality was maintained by securely storing data in password-protected files. The study was designed to minimize any physical or psychological harm to participants, with non-invasive surveys and the option to withdraw if they experience any distress. Ethical approval was sought from an institutional review board (IRB) or ethics committee to guarantee that the study complies with established ethical standards.

RESULTS

Age wise distribution of the patients

The data shows the distribution of participants based on their years of experience. A total of 231 individuals were surveyed. Among them, 83 participants (35.9%) had between 1 to 3 years of experience, making this the most common category. Those with 4 to 6 years of experience accounted for 75 individuals, or 32.5% of the total. Another 55 participants (23.8%) reported having 7 to 9 years of experience. Lastly, 18 individuals (7.8%) had 10 to 12 years of experience. The cumulative percentages show that 68.4% of participants had 6 or fewer years of experience, while 92.2% had 9 or fewer years.

Table 1. Age wise distribution of the patients

Frequency	Percent	Valid Percent	Cumulative Percent	
1-3 Years	83	35.9	35.9	35.9
4-6 Years	75	32.5	32.5	68.4
7-9 Years	55	23.8	23.8	92.2
10-12 Years	18	7.8	7.8	100.0
Total	231	100.0	100.0	

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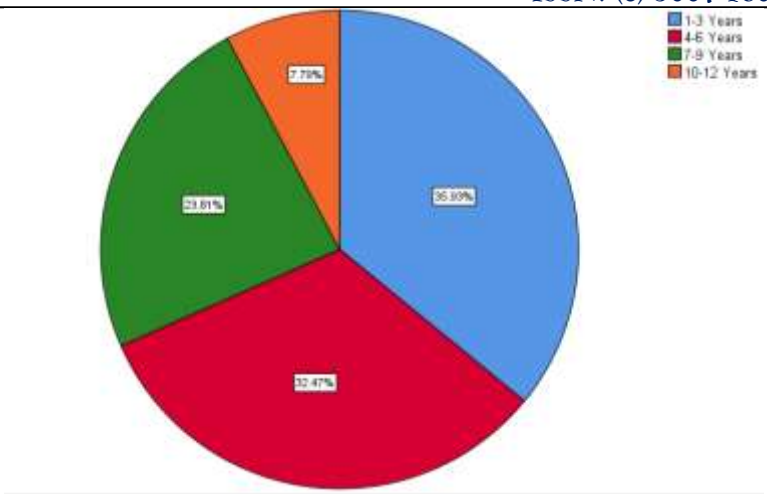

Figure 1. Age wise distribution of the patients

Gender wise distribution

The gender distribution of the 231 participants surveyed shows that the majority were male. Specifically, 190 participants (82.3%) identified as male, while 41 participants (17.7%) identified as female. These percentages are both the valid and total percentages, indicating no missing data. The cumulative percentage reveals that by including female participants, the total reaches 100%.

Table 2. Gender wise distribution of the patients

Frequency	Percent	Valid Percent	Cumulative Percent	
Male	190	82.3	82.3	82.3
Female	41	17.7	17.7	100.0
Total	231	100.0	100.0	

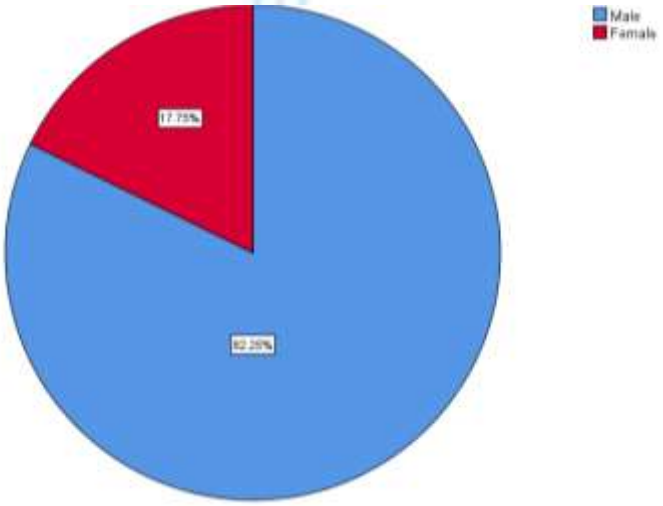

Figure 2 Gender wise distribution of the patients

Types of surgery

Among the 231 participants surveyed, the majority had undergone elective surgery, with 183 individuals (79.2%) falling into this category. In contrast, 48 participants (20.8%) had undergone emergency surgery. These figures represent both

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the percent and valid percent, indicating that all responses were accounted for. The cumulative percentage shows that when emergency surgery cases are included, the total reaches 100%.

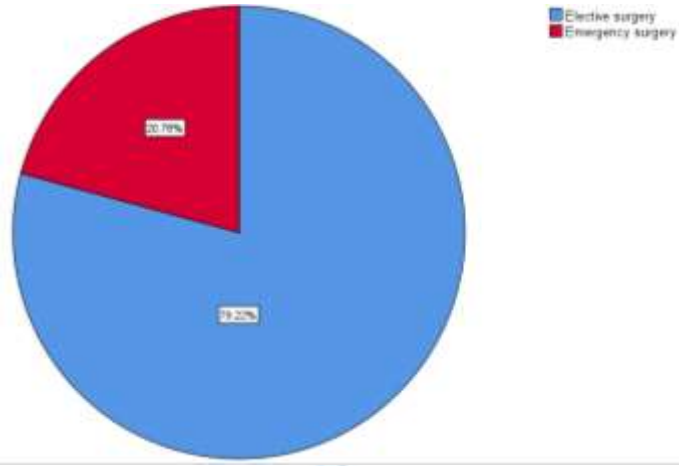

Figure 3 Types of surgery

The surgery performed under general anesthesia with endotracheal intubation.

Out of the 231 participants surveyed, 210 individuals (90.9%) responded "Yes," while 21 participants (9.1%) responded "No." These values indicate that the vast majority of respondents answered affirmatively. The data shows no missing responses, as the valid percent matches the total percent, and the cumulative percentage reaches 100% with the inclusion of both response categories.

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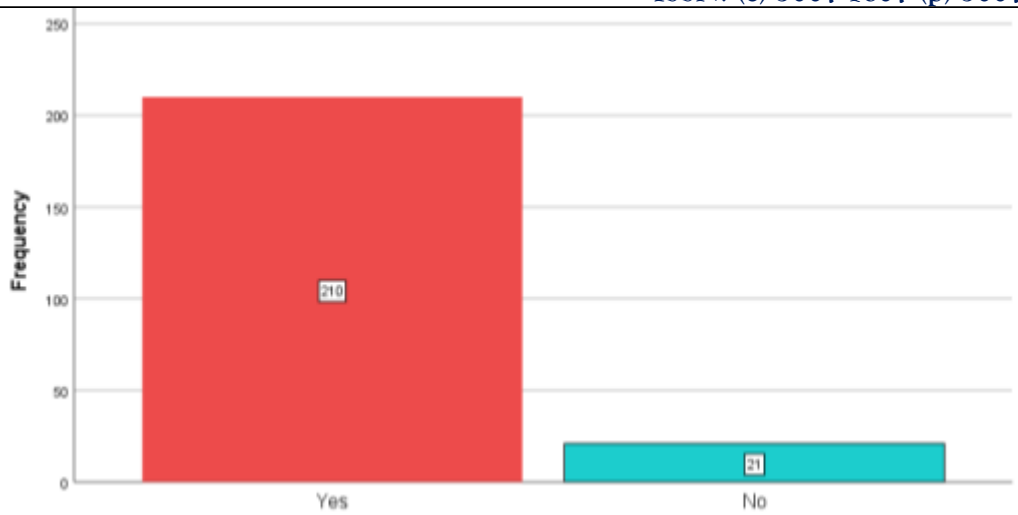

Figure 4 The surgery performed under general anesthesia with endotracheal intubation

Did the patient experience post-operative laryngospasm?

Among the 231 participants surveyed, 34 individuals (14.7%) responded "Yes," while the remaining 197 participants (85.3%) responded "No." This indicates that a significant majority of respondents gave a negative response. The valid percent aligns with the total percent, confirming that there were no missing responses. The cumulative percentage reaches 100% with the inclusion of both categories.

Table 5. Post-operative laryngospasm

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	34	14.7	14.7	14.7
No	197	85.3	85.3	100.0
Total	231	100.0	100.0	

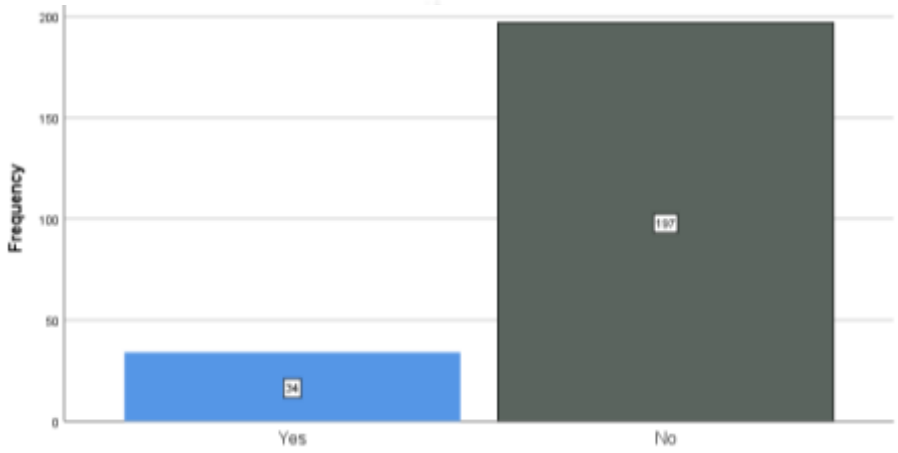

Figure 5 Did the patient experience post-operative laryngospasm?

Onset of laryngospasm

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Out of the 231 participants surveyed, 30 individuals (13.0%) responded "Yes," indicating the occurrence of the event in question. Four participants (1.7%) answered "No," while the majority—197 individuals (85.3%)—specifically replied "No Laryngospasm." These responses collectively account for 100% of the data, with no missing entries. The cumulative percentages show that 14.7% of respondents reported either "Yes" or "No," while the remaining 85.3% indicated no experience with laryngospasm.

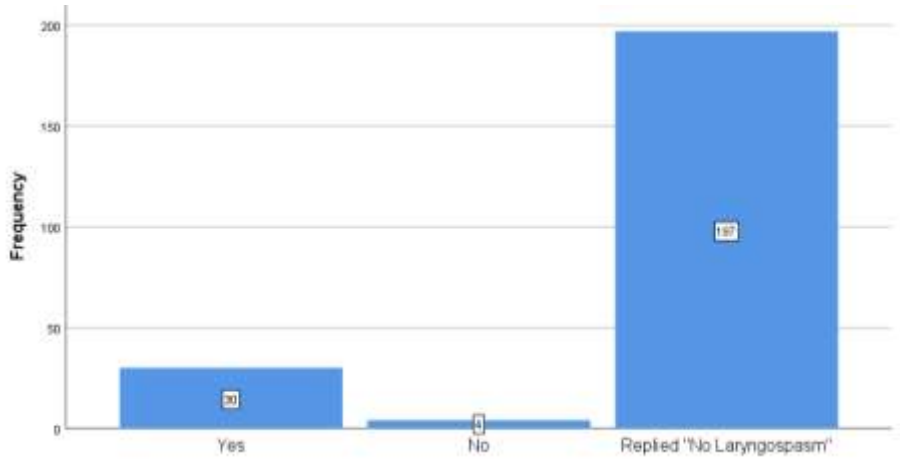

Figure 6 Onset of laryngospasm

Laryngospasm resolve without requiring reintubation

Among the 231 participants surveyed, 32 individuals (13.9%) responded "Yes," and 2 individuals (0.9%) responded "No" regarding the occurrence of the event in question. The remaining 197 participants (85.3%) specifically replied "No Laryngospasm," indicating they had not experienced the condition. These responses together make up 100% of the dataset, with no missing values. The cumulative percentages show that 14.7% of participants provided a direct "Yes" or "No" response, while the majority 85.3% reported no experience with laryngospasm.

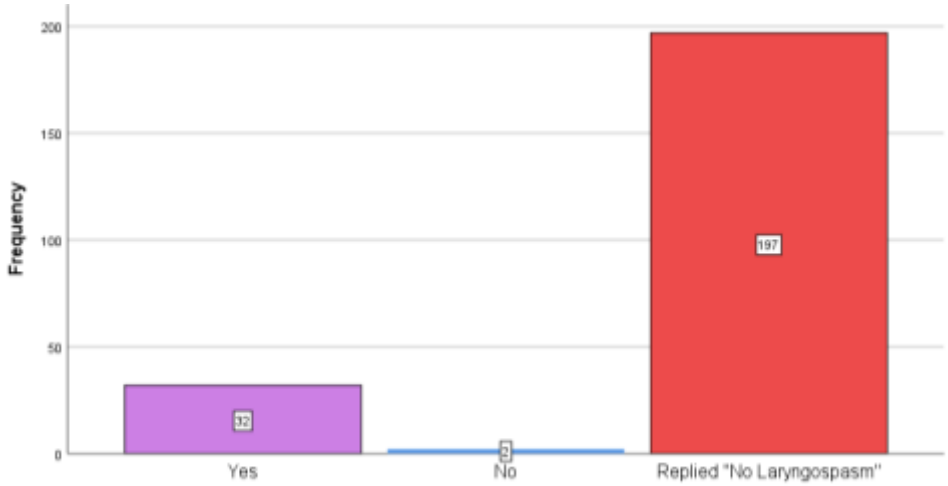

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Figure 7 Did the laryngospasm resolve without requiring reintubation?

Monitored of patient for signs of laryngospasm

In a survey of 231 participants, 34 individuals (14.7%) responded "Yes" to the question posed, while the remaining 197 participants (85.3%) answered "No." This indicates that the vast majority did not experience or agree with the condition or statement in question. All responses were valid, and the cumulative percentage reached 100%, confirming that the dataset is complete with no missing responses.

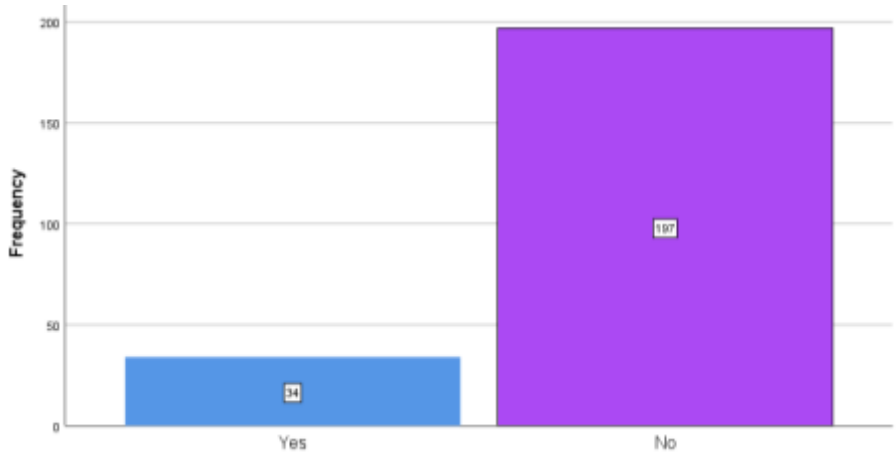

Figure .8 Monitored of patient for signs of laryngospasm

Diagnosed with post-operative laryngospasm at LRH Peshawar

Out of the 231 participants surveyed, 34 individuals (14.7%) responded "Yes," while 197 individuals (85.3%) responded "No." This indicates that a large majority of respondents gave a negative response. The data set is complete, with no missing values, as reflected by the valid percent matching the total percent and the cumulative percentage reaching 100%.

Table 9. Was the patient diagnosed with post-operative laryngospasm at LRH Peshawar?

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	34	14.7	14.7	14.7
No	197	85.3	85.3	100.0
Total	231	100.0	100.0	

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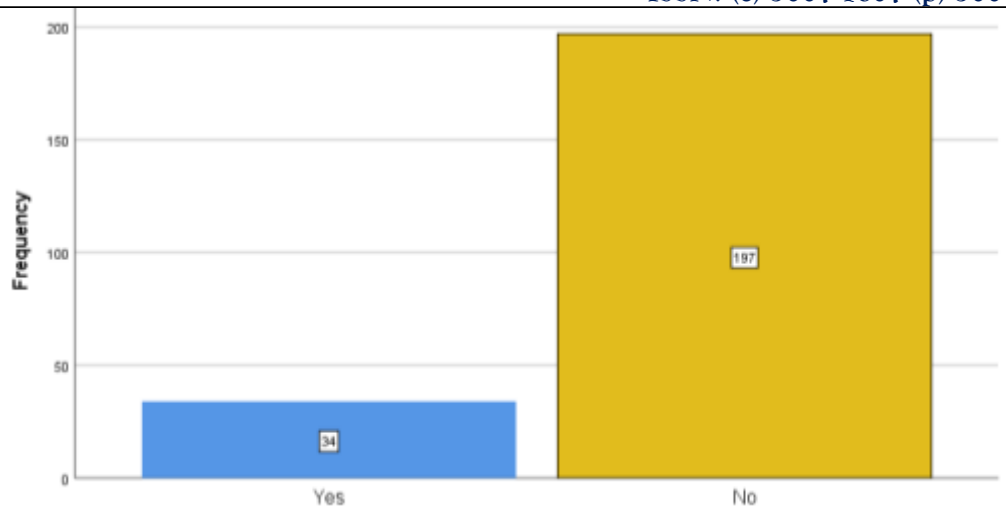

Figure 9: Was the patient diagnosed with post-operative laryngospasm at LRH Peshawar?

Incidence of laryngospasm differ based on the age group of the pediatric patients

Among the 231 participants surveyed, 12 individuals (5.2%) reported experiencing laryngospasm within 1–3 years of their practice, while 10 participants (4.3%) encountered it after 4–6 years. Seven individuals (3.0%) experienced it during 7–9 years of practice, and 5 participants (2.2%) reported it occurring within 10–12 years. The majority of respondents 197 individuals (85.3%) indicated they had not experienced laryngospasm. All responses were valid, and the cumulative percentage reached 100%, confirming that the dataset is complete and fully accounted for.

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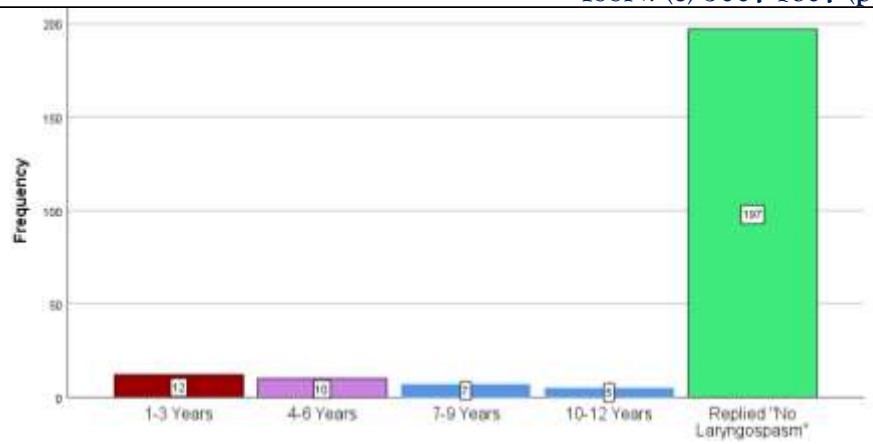

Figure 10 Incidence of laryngospasm differ based on the age group of the pediatric patients

The occurrence of laryngospasm more common in patients undergoing emergency surgeries

Out of the 231 participants surveyed, 22 individuals (9.5%) responded "Yes," and 12 individuals (5.2%) responded "No" to the question asked. The remaining 197 participants (85.3%) had previously replied "No" to an earlier related question. Together, these responses account for 100% of the data, with no missing values. The cumulative percentages show that 14.7% of participants provided a direct "Yes" or "No" response, while the majority had previously answered "No."

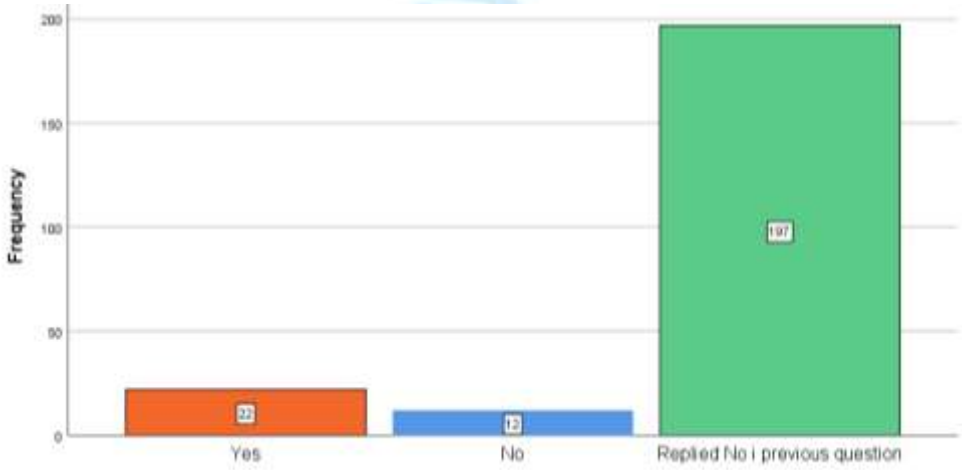

Figure 11 Was the occurrence of laryngospasm more common in patients undergoing emergency surgeries?

Patient's airway management using an endotracheal tube (ETT)

Out of the 231 participants surveyed, 210 individuals (90.9%) responded "Yes," while 21 individuals (9.1%) responded "No." This indicates that the vast majority of respondents answered affirmatively. The valid and total percentages are the same, showing that all responses were accounted for, and the cumulative percentage reaches 100%.

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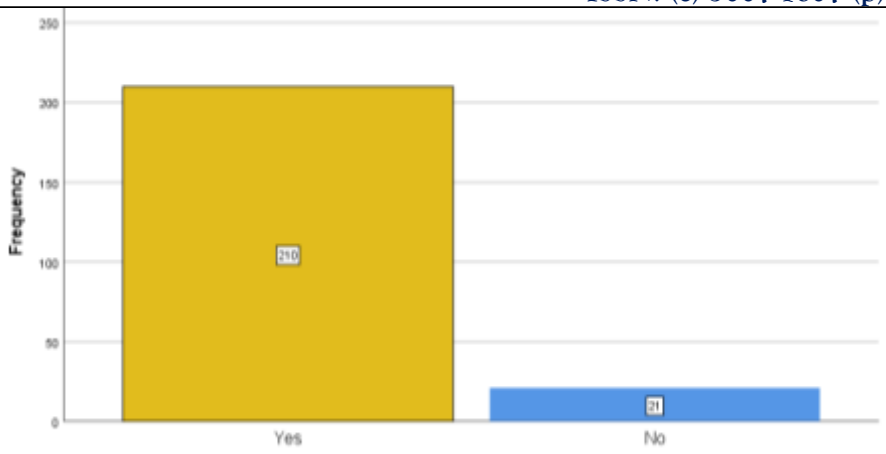

Figure 12 Was the patient's airway management using an endotracheal tube (ETT)?

Patient experience any additional complications following the laryngospasm episode

Out of the 231 participants surveyed, 34 individuals (14.7%) responded "Yes," while the majority—197 participants (85.3%)—replied "No Laryngospasm," indicating they did not experience laryngospasm. These responses account for 100% of the data, with no missing values. The cumulative percentages show that 14.7% reported experiencing laryngospasm, while 85.3% did not.

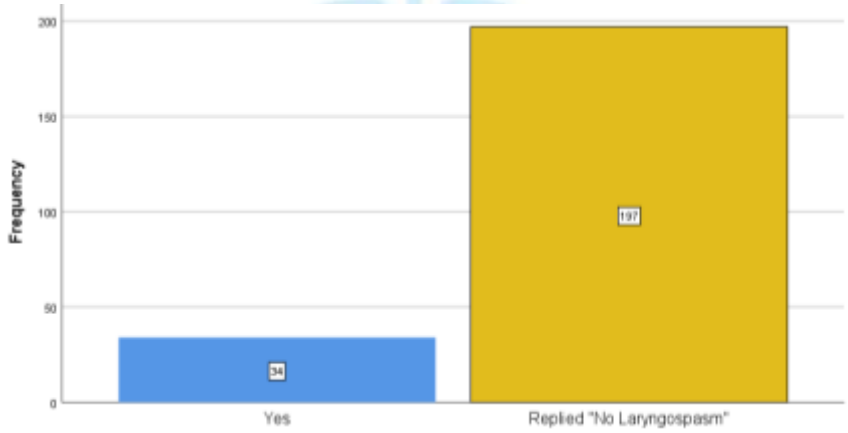

Figure 13. Did the patient experience any additional complications following the laryngospasm episode?

Patient display signs of airway obstruction (e.g., stridor, inability to breathe) during the laryngospasm episode

Among the 231 participants surveyed, 33 individuals (14.3%) responded "Yes," 1 participant (0.4%) responded "No," and the majority—197 participants (85.3%)—replied "No Laryngospasm," indicating they did not experience laryngospasm. These responses collectively make up 100% of the dataset, with no missing values. The cumulative percentages show that 14.7% of respondents gave either a "Yes" or "No" response, while 85.3% reported no occurrence of laryngospasm.

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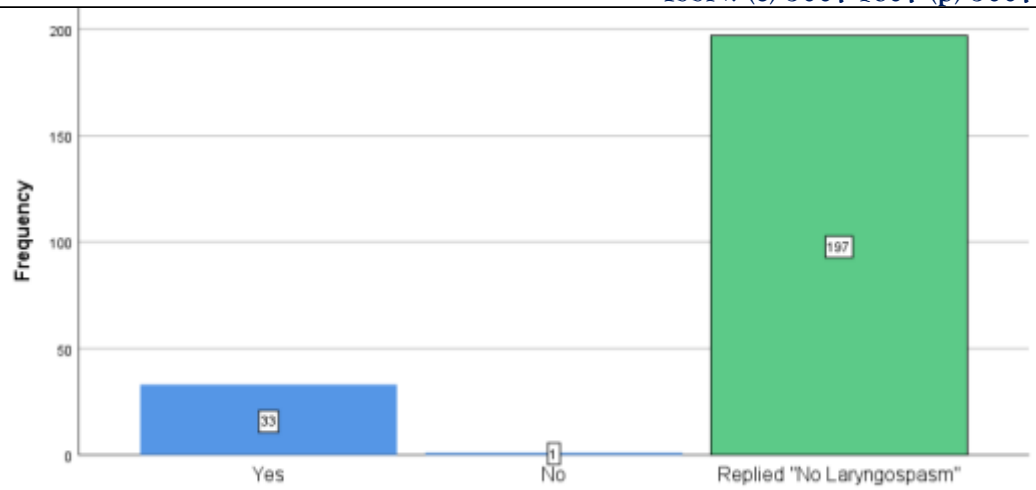

Figure 14. Did the patient display signs of airway obstruction (e.g., stridor, inability to breathe) during the laryngospasm episode?

The patient transferred to the Intensive Care Unit (ICU) following the laryngospasm episode

Among the 231 participants surveyed, 34 individuals (14.7%) responded "No," while the majority—197 participants (85.3%)—had previously replied "No" to an earlier related question. Together, these responses account for 100% of the data, with no missing values. The cumulative percentages confirm that all responses were included in the dataset.

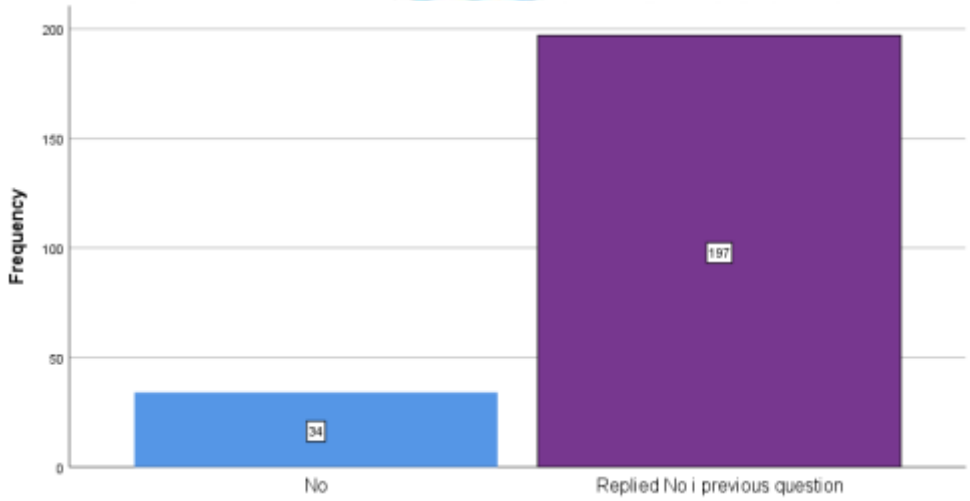

Figure 15 Was the patient transferred to the Intensive Care Unit (ICU) following the laryngospasm episode?

The laryngospasm episode resolved within the first 30 minutes without complications

Out of the 231 participants surveyed, 34 individuals (14.7%) responded "Yes," while the majority—197 participants (85.3%)—had previously replied "No" to an earlier related question. These responses together make up 100% of the data, with no missing values. The cumulative percentages show that 14.7% gave a direct "Yes" response, while 85.3% had already answered "No."

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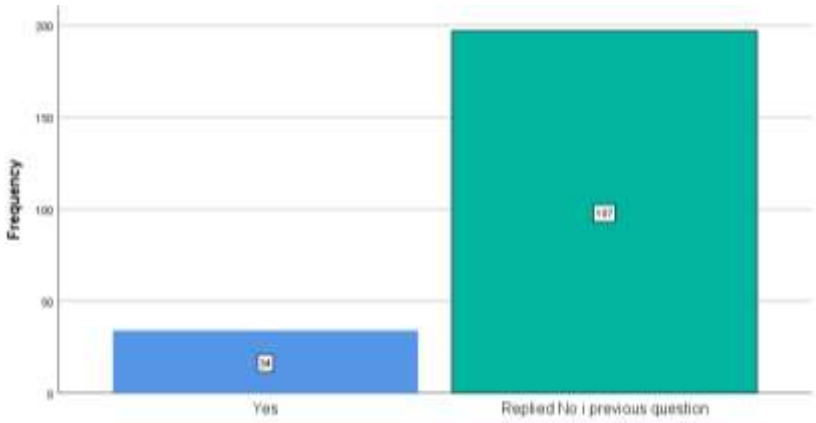

Figure 16 Was the laryngospasm episode resolved within the first 30 minutes without complications?

The patient require additional interventions after the laryngospasm episode (e.g., reintubation, mechanical ventilation)

Table 18 presents data on whether patients required additional interventions after experiencing a laryngospasm episode, such as reintubation or mechanical ventilation. Out of the total 231 patients, 16 (6.9%) required additional interventions, while 18 (7.8%) did not. A large proportion of respondents, 197 (85.3%), indicated that they did not have a laryngospasm episode, hence were not applicable to the question. The total number of responses is 231, with 100% coverage across all categories. The data shows a relatively small percentage of patients needing further interventions after a laryngospasm episode.

	Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	16	6.9	6.9	6.9
	No	18	7.8	7.8	14.7
	Replied No i previous question	197	85.3	85.3	100.0
	Total	231	100.0	100.0	

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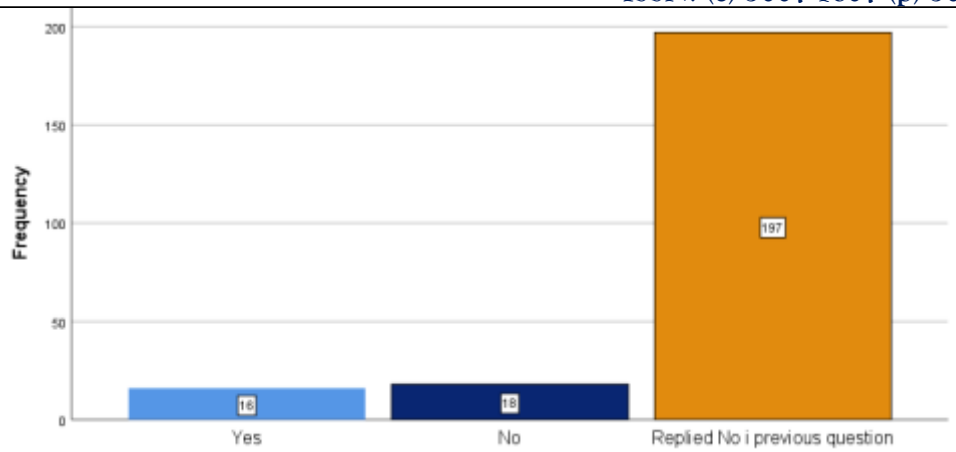

Figure 17 Did the patient require additional interventions after the laryngospasm episode (e.g., reintubation, mechanical ventilation)?

DISCUSSION

The overall incidence of laryngospasm among pediatric patients undergoing surgery under general anesthesia was 14.3%. This is comparable to the 13.1% incidence reported by Chekol and Melesse (2020) in Northwest Ethiopia. Likewise, Hordofa et al. (2025) found an incidence of postoperative respiratory adverse events (including laryngospasm) at 12.8%, reinforcing the idea that perioperative respiratory events are common and require focused preventive strategies. In contrast, Khan (2022) reported a higher prevalence of 21% in children undergoing ENT procedures, likely due to the inherently higher airway reactivity in such surgeries. Most laryngospasm events in our study occurred during extubation (64%), followed by intubation (21%) and maintenance (15%). This pattern is supported by Bezerra et al. (2024), who highlighted extubation as the most frequent trigger point due to reduced airway reflex control. Similarly, Bhatt and Roback (2022) emphasized the vulnerability during emergence due to reduced anesthetic depth and airway manipulation. Yoosefi et al. (2023) also reported higher laryngospasm in "head-up" or active extubation techniques, underlining the need for smoother emergence practices in pediatrics. The children less than five years of age were affected greatly (20%) compared with another group of children. The same is true of the research of Haile et al. (2015) and Birlie Chekol et al. (2020), who have cited an increased risk of individuals of this age group, as their airways are narrower, and their laryngeal reflexes are not as well developed. According to Adane et al. (2021), young age was also found to be one of the key predictors of perioperative respiratory events, and thus they speculate that specific risk-mitigating measures may be necessary in patients of that age group.

The incidence of laryngospasm was more when the URTI was present. The discovery is corroborate with that of Hordofa et al. (2025) and Adane et al. (2021) who proved URTI as a powerful risk factor based on the airway hyperreactivity and inflammation. The incidence was also significantly higher in children with URTI as shown by Haile et al. (2015) and the team advised on postponing the elective case when the presence of the infection occurred.

The use of endotracheal tubes (ETT) voted more frequent laryngospasm than that of laryngeal mask airway (LMA). This concurs with the discovery made by Ricci et al. (2024) and Ooi et al. (2025), that the use of LMA will lead to less airway complications, like laryngospasm, because handling of the airways becomes less invasive. On the same note, Bezerra et al. (2024) stated that airways instrumentation, especially ETT, is a documented risk factor of laryngospasm during sedation and anesthesia of children.

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Laryngospasm was lower in patients who took propofol as induction and to come out. This follows a study by Gebeyehu et al. (2021) that the subhypnotic dose of propofol substantially interfered with laryngospasm during adenotonsillectomy. Manouchehrian et al. (2022) were also able to show that propofol is a better alternative to lidocaine to suppress laryngospasm. Moreover, Hosseini et al. (2022) found out that post-extubation respiratory complications were reduced by low-dose propofol used during extubation.

In ENT surgeries, the incidence of laryngospasm was significantly very high as compared to other surgeries. Khan (2022) supported such a trend and in his study children who are subjected to ENT surgeries, particularly tonsillectomy and adenoidectomy, are at more risks of experiencing airway causes and airway complications since there is direct airway manipulation and risk of bleed. In the same breadth, Gebeyehu et al. (2021) highlighted the higher sensitivity of the airway in these procedures, which requires prevention efforts. The vulnerability of this subgroup was also proved by Manouchehrian et al. (2022) who emphasized the role of airway-targeted pharmacologic intervention during ENT operations.

The incidence of laryngospasm was lower in patients extubated under deep anesthesia compared to those extubated awake. This finding is consistent with Zhang et al. (2024), who observed improved airway safety with deep extubation using propofol in pediatric dental procedures. Likewise, Yoosefi et al. (2023) reported lower laryngospasm rates in "no-touch" or deep extubation techniques. In addition, Li and Zhu (2025) in their systematic review concluded that deep extubation—especially with propofol—minimizes peri-extubation complications including laryngospasm.

Topical or IV lidocaine administration before extubation significantly reduced laryngospasm rates. This aligns with the results of Mojaveraghili et al. (2023), who demonstrated reduced laryngospasm incidence when lidocaine spray was used in tonsillectomy cases. Similarly, Manouchehrian et al. (2022) found IV lidocaine to be effective in airway reflex suppression. Furthermore, Jabbar et al. (2023) found lidocaine gel applied to the ETT to be superior to placebo and even other agents in reducing postoperative airway complications, reinforcing its clinical benefit.

Most laryngospasm cases resolved without major complications; however, a small percentage required re-intubation and ICU transfer. This observation corresponds with findings from Napitu et al. (2024), who found that although most peri-anesthetic critical events resolve with timely intervention, they can still contribute to morbidity and extended hospital stay. Adane et al. (2021) also underline that untreated or delayed laryngospasm may develop into hypoxia or aspiration, which once again recalls the need to notice them early and promptly treat them. Bhatt and Roback (2022) warn that, however insignificant a rare, but long-lasting case, it may still result in critical consequences, which is why preventive care should be observed.

The reduction of incidence of the condition laryngospasm in children receiving anticholinergic premedications was more effective relative to other children without this premedication (e.g., atropine). This is in line with the investigations by Haile et al. (2015) who found that there was a protective result of premedication on inhibiting sensitivity in the airways. Birlie Chekol & Yaregal Melesse (2020) also noted a significant decrease in the incidence of laryngospasm during premedication, which makes it useful in the drying of the secretions and the stabilization of the airway tone. On the same note, a study by Adane et al. (2021) revealed that a premedication process was a key risk factor of perioperative respiratory events, especially in surgeries involving children having undergone general anesthesia.

Whether used as induction agent or as part of maintenance anesthesia, the administration of propofol was found to offer protective effect against laryngospasm. This can be strongly affirmed by Gebeyehu et al. (2021), who managed to illustrate that pre-extubation subhypnotic propofol was considerably able to lower the occurrence of laryngospasm. Additional results demonstrated by Hosseini et al. (2022) revealed

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that low-dose propofol used during the emergence process reduced respiratory problems such as laryngospasm in the case of tonsillectomy. On top of this, better profile of propofol compared to sevoflurane in reducing perioperative respiratory adverse events in pediatric patients was confirmed by Li and Zhu (2025) in their meta-analysis.

CONCLUSION

The study was conducted to explore the occurrence, characteristics, and management of post-operative laryngospasm among patients undergoing surgery under general anesthesia with endotracheal intubation. A total of 231 participants were surveyed, and the data presented offers valuable insights into the age distribution, gender demographics, types of surgeries performed, and the prevalence of laryngospasm. Concerning the type of surgeries, it was found that elective surgeries prevailed, representing 79.2 percent of cases, with the other 20.8 percent accounting to emergency surgeries. The data also concludes that a relatively small proportion of the participants (14.7%) has had post-operative laryngospasm. Most of them did not need reintubation and mechanical ventilation, and only 6.9 percent of the individuals who needed them developed laryngospasm complication needing additional measures. This indicates that most patients do not have to go through major procedures in case their laryngospasm occurs. The occurrence of laryngospasm related to the type of surgery was also examined whereby laryngospasm occurred in a small proportion of individuals subjected to emergency surgeries but overall incidence of laryngospasm was not serious. Moreover, the study determined if laryngospasm patients were transferred to ICU or not, and most of the patients did not come up to ICU admission, which once again reflects the idea that post-op laryngospasm has self-limiting nature. Moreover, instances of airway obstruction, stridor, and inability to breathe were indicated in 14.3 percent of the people which implies that airway management cannot be overlooked in such incidences. Although there were some complications, few patients encountered any complication in the long-term or even severe problems after such an episode. Laryngospasm was of relatively low occurrence however it is clinically a significant event and requires appropriate and overdue management so as to prevent progression of future complications. Since laryngospasm was not reported by a substantial number of participants, it might be useful to conduct a further research aiming to discover the risk-factors and enhance protocols on laryngospasm prevention and management. Altogether, the research highlights the necessity of ongoing education and enlightenment of medical workers in order to increase patient safety, as well as improve surgical outcomes.

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