The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 9, 2025

FREQUENCY OF PERIOPERATIVE LARYNGOSPASM IN PATIENTS WITH A HISTORY OF COVID-19 INFECTION AT LADY READING HOSPITAL, PESHAWAR

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DOI: https://doi.org/10.5281/zenodo.17181275

Keywords
Covid-19,Laryngospasm,perioperative.

Article History
Received: 05 July 2025
Accepted: 06 September 2025
Published: 23 September 2025

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Abstract

Background: Laryngospasm is a protective laryngeal airway reflex response, which may be a partial or complete closure of the vocal cord. There are many factors such as patient-related, surgical-related, and anesthesia-related factors that cause or increase the incidence of laryngospasm perioperatively. It may be common in those patients having hyperactive airway disease such as Covid-19 infection. Objectives: The primary purpose of the study was to determine the frequency of perioperative laryngospasm in a patient with a history of Covid-19 infection. The secondary purpose of the study was to evaluate the major factors which may increase the incidence of perioperative laryngospasm. Methods: A cross-sectional observational study was undertaken at Lady Reading Hospital-MTI, Peshawar. The University Ethical Committee Review Board approved the study. We processed 217 samples. We got informed consent. Lab results revealed Covid-19 infection in the patient. Regular regular monitoring and SOPS were followed. Patient monitoring and questionnaire completion occurred throughout the operation. Data were analyzed using SPSS 22.0. Crosstab was used to determine the relationship between laryngospasm and numerous risk factors, while descriptive statistic frequency was produced and tabulated. Results: Patients with Covid-19 infection had 21% preoperative laryngospasm. 95% of laryngospasms occurred during light extubation and 5% during deep. Airway irritants were identified in 6.5% of laryngospasm patients. 26% of smokers had laryngospasm. In 3% of patients, the supraglottic airway device (LMA) was employed, but laryngospasm was minimal. 97% of laryngospasm patients were induced with propofol and the rest with ketofol. Conclusion: This study examined Covid-19-infected patients' preoperative laryngospasm rates. Evaluation of their risk variables was needed to eliminate confounding. The findings showed that COVID-19 infection is a strong risk factor for perioperative laryngospasm. COVOD-19-infected surgical patients should have all laryngospasm drugs and management options available promptly.

INTRODUCTION

Laryngospasm is a protective airway reflex of laryngeal muscles caused by voice cord closure. Foreign particles, fluids, airway irritants, and aspiration cause laryngospasm. It blocks foreign particles from entering the tracheobronchial tree and lungs. The superior laryngeal nerve prolongs

glottis closure. Untreated laryngospasm can cause hypoxemia, bradycardia, negative pressure pulmonary edema, and cardiac arrest[1,2]. The larynx protects the airway and lung route in the respiratory system. It is between the 3rd and 6th cervical vertebrae. In mammals, the larynx separates the alimentary canal and respiratory tract[3]. The thyroid, cricoid, and arytenoid cartilages compose the skeleton, while ligaments, intrinsic laryngeal muscles, and synovial joints support them[4]. A pair of vocal chords. Glottis is the voice cords' medial area. Because it produces voice, it's called a voice box[5]. Laryngospasm can be aware or unconscious. A common perioperative complication, it usually arises following extubation. Perioperative laryngospasm occurs 28%, 24%, and 48% in induction, maintenance, and emergence[6]. Olsson and Hallen recorded 1% laryngospasm in adults and children[7]. Laryngospasm was 10% in pediatric reactive airway patients and 25% in tonsillectomy and adenoidectomy patients[8]. Hallen and Olsson studied 136,929 patients and found 8.6% of adults and 27.6% of children had laryngospasm. A study found that perioperative laryngospasm is more common in children than adults and caused 8% of anesthesia-related cardiac arrest in children[3]. A novel pneumonia-like disease called COVID-19 arose in Wuhan, China, in December 2019. The virus was dubbed SARS-COV-2 after genomic research to pinpoint its etiology[9]. Sarbecovirus subgenus beta coronavirus. From China, the disease spread worldwide, becoming a pandemic. WHO declared COVID-19 a pandemic in February 2020 More than 215 nations reported 9 million confirmed cases[6]. The condition affects the respiratory system, among other things. Thus, surgical patients may have more respiratory issues such apnea, bronchospasm, laryngospasm, cough, and pulmonary edema[10]. We'll see if COVID-19-infected surgical patients have more perioperative laryngospasm. To assess COVID-19-related pediatric airway management problems, a US prospective observational study was done. The study found that COVID-19-positive children had a higher perioperative laryngospasm risk than adults[11,12]. Study statistics were: Intubation produced laryngospasm in 2 of 17 children (12%). Four of 24 children (17%) had laryngospasm during extubation. A study found that COVID-19 patients had a greater incidence of laryngospasm[7] due to the infection's impact on the respiratory system. A damaged airway increases the risk of perioperative problems include pulmonary edema, coughing, and laryngospasm. Thus, it seeks to link COVID-19 to perioperative laryngospasm[13]. COVID-19 infection is a novel research area with few studies. The data will notify healthcare workers to laryngospasm danger and suggest pre-management strategies.

MATERIAL AND METHODS

Study Design: The study design used for the research work was a cross-sectional observational study design.

Study Settings: Lady Reading Hospital Medical Teaching Institution, Peshawar.

Study Duration: June 2022 to October 2022

Sample Size:

217 Samples (Calculated via Open-Epi)

Frequency: 17%

CI: 95%

Margin of error: 5%

$$n = [DEFF*Np(1-p)]/ [(d^2/Z^2_{1-\alpha/2}*(N-1)+p*(1-p)]$$

Sampling Technique: The Convenience Sampling Technique was used for sample selection. It is the type of non-random sampling method, in which those samples are collected which are easily approachable or have to easy contact.

Inclusion Criteria: All surgical patients undergoing general anesthesia have a concurrent or past history of COVID-19 infection.

ASA class I and II patients.

Exclusion Criteria:

Patient having respiratory diseases.

Patient refusal of consent.

Data Collection and analysis procedure: An observational cross-sectional study was undertaken at Lady Reading Hospital, Peshawar. The University Ethical Committee Review Board approved the study. We processed 217 samples. Lab results revealed Covid-19 infection in the patient. COVID-19 infection history was asked, The patient's NPO and medical history were

recorded. The patient was escorted to the operating room after a physical checkup and informed consent. Patients were premedicated and inducted smoothly. The usual monitoring protocol and SOPS were followed. Patients were monitored throughout the surgery and the questionnaire was filled out.

Data were analyzed using SPSS 22.0. The frequency of descriptive statistics was tallied, and crosstab was used to determine the relationship between laryngospasm and numerous risk factors.

RESULTS

From 7 July 2022 to October 2022, 217 patients undergoing general anesthesia with a history of COVID-19 infection were observed in tertiary care hospitals, Peshawar. The patients were fully vaccinated and many of them recovered from COVID-19 infection about 1-2 years ago. The majority of them had no COVID-19 signs and symptoms. Laryngospasm was diagnosed in 46 cases out of 217 with a frequency of 21% as shown in Figure.1. Laryngospasm was mostly reported in the emergence of general anesthesia. The patient's blood Oxygen saturation fell and had inspiratory stridor. The patients were restless, had labored breathing and required positive pressure ventilation and management. The paradoxical movement of the chest and abdomen was also observed. Even though some of the patients were given Lidocaine (60mg) before extubation as prophylaxis.

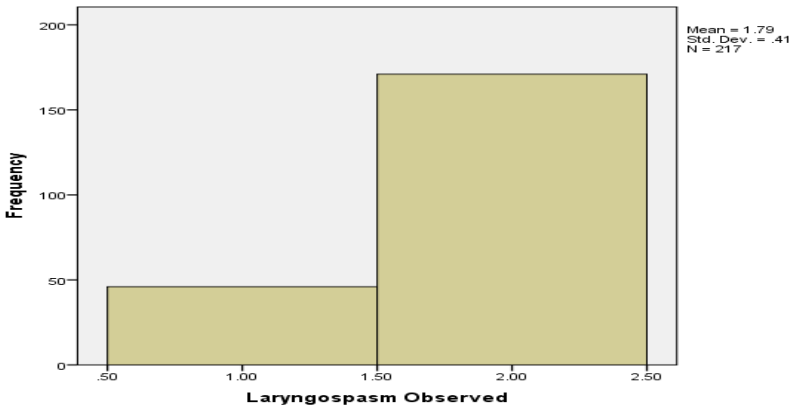

Figure 1: Frequency of perioperative laryngospasm

There were 131 male and 86 female patients. 28 out of 131 male patients were diagnosed as laryngospasm positive as well as 18 out of 28 female patients. Majority of them were lightly extubated and frequency of laryngospasm was higher compared to deep extubated patients. 96% of laryngospasms occurred during light extubation and only 4% in deeply extubated patients.

Table 1: Relationship of laryngospasm with the type of extubation had been performed.

		Type of extubation		
		Light extubation	Deep extubation	Total
Laryngospasm Observed	Yes	44 95.7%	2 4.3%	46 100.0%
	No	130 76.0%	41 24.0%	171 100.0%
Total		174 80.2%	43 19.8%	217 100.0%

Laryngospasm of 6.5% was recorded in patients with airway irritants (blood, mucus, secretion, etc.) as shown in Table 2. Even though routine airway suction was performed with extubation and just before extubation.

Table 2: Relation of laryngospasm with any airway irritants observed.

		Airway Irritants		
		Yes	No	Total
Laryngospasm Observed	Yes	3 6.5%	43 93.5%	46 100.0%
	No	0 0.0%	171 100.0%	171 100.0%
Total		3 1.4%	214 98.6%	217 100.0%

In all cases, isoflurane was used for the maintenance of anesthesia. Intravenous anesthetics "propofol" was used in 208 cases and laryngospasm was reported in 45 out of 208. Ketofol was also used with a dose of 1mg/kg in only 9 cases. Only one patient out of the 9 diagnosed with laryngospasm.

Table 3: Relation of laryngospasm with IV anesthetics used during induction

		IV Anesthetics		
		Propofol	Ketofol	Total
Laryngospasm Observed	Yes	45 97.8%	1 2.2%	46 100.0%
	No	163 95.3%	8 4.7%	171 100.0%
Total		208 95.9%	9 4.1%	217 100.0%

Majority of those patients' laryngospasm was recorded whose airway was secured via the endotracheal tube. Airway was secured with ETT in 212 patients, but only in 46 out of 212 patients, laryngospasm was recorded. No laryngospasm was reported in the patients whose airway was secured with a supraglottic airway device.

Table 4: Relation of laryngospasm with airway device used perioperatively.

		Airway device		
		SAD	Endotracheal tube	Total
Laryngospasm Observed	Yes	0 0.0%	46 100.0%	46 100.0%
	No	5 2.9%	166 97.1%	171 100.0%
Total		5 2.3%	212 97.7%	217 100.0%

Concerning smoking history, 36 out of 217 patients had a history of smoking in which only 12 out of 36 cases were diagnosed as laryngospasm positive.

Table 5: Relation of laryngospasm with smoking status

		Smoking status		
		Yes	No	Total
Laryngospasm Observed	Yes	12 26.1%	34 73.9%	46 100.0%
	No	24 14.0%	147 86.0%	171 100.0%
Total		36 16.6%	181 83.4%	217 100.0%

Table 6: Frequency of perioperative Laryngospasm in COVID-19 patients

Laryngospasm		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	46	21.2	21.2	21.2
	No	171	78.8	78.8	100.0
	Total	217	100.0	100.0	

DISCUSSION

Our study examined COVID-19 patients' perioperative laryngospasm frequency and risk variables. The data show that COVID-19 infection is a key risk factor for perioperative laryngospasm and is rising. Smoking history, mild extubation, IV anesthetics (ketamine, thiopental), inhalational anesthetics (isoflurane, desflurane), airway irritants (blood, mucus, secretion), endotracheal intubation, etc. were assessed as laryngospasm risk Table 5 shows smokers had a higher rate of laryngospasm than non-smokers. Laryngospasms affect 26% of smokers. Most smokers were deeply extubated. According to the study, smoking has several respiratory system harms. It increases airway and vocal cord irritation, causing coughing and laryngospasm.

The data showed that ETT-secured airways had a higher rate of laryngospasm than supraglottic devices. All laryngospasm patients had ETT airway closure. In 3% of patients, the supraglottic airway device (LMA) was employed, but laryngospasm was minimal. Airway device-related laryngospasm increased in this order:

ETT -> LMA -> Face Mask

Propofol is safe and blunts airway reflex, according to research. 97.8% of laryngospasm patients were induced with propofol and 2.2% with ketofol. Ketofol involves ketamine and propofol. Thiopental and ketamine are respiratory stimulants that do not block airway reflex, according to research. The main risk factors for laryngospasm are thiopental and ketamine, which increase secretions. Thiopental did not induce any patient. The results show that weakly extubated patients had more laryngospasm than profoundly extubated patients. The patient experiences ETT as a foreign body in the airway during gentle extubation. Inflammation and airway reflex stimulation are caused by ETT. Laryngospasm results from ETT-induced airway reactions. In 6% of laryngospasm instances, fluids or blood irritated the airway. Even when oropharyngeal suction was done before and after extubation. Airway irritants replicate and trigger airway reflexes. Compared to literature studies, our 21% laryngospasm frequency is higher. Here, some laryngospasm risk factors were found to increase its incidence. Some factors thought to reduce laryngospasm contradict our findings. Lidocaine before extubation reduces airway irritations and

blunts airway stimulation, according to research. Anticholinergic premedication reduces secretions and laryngospasm Our results show that many individuals received lidocaine for prophylaxis but were diagnosed with laryngospasm. The research recommends extubating patients deep or fully awake, not in between, to reduce laryngospasm. However, our results suggest that some patients had laryngospasm and were deeply extubated. A case with many airway secretions during laryngoscopy is also mentioned. Before intubation, two to three oropharyngeal suctions were done. Despite good extubation suction, the patient had several secretions after recovery. Despite many secretions and multiple suctioning, that patient had no laryngospasm.

CONCLUSION

This study aimed to identify the frequency of perioperative laryngospasm in patients having a history of Covid-19 infection. Evaluating their risk factors was also necessary to exclude confounding. The results indicated that COVID-19 infection is a major risk factor for perioperative laryngospasm. It has more chances to occur during emergence. The anesthetics factors and some of the patient-related factors were also evaluated and the incidence of laryngospasm in such patients was higher than those Covid-19 patients having don't have these risk factors. In our research study, we proposed seven risk factors of laryngospasm to include in our research questionnaire. These factors were, the type of IV anesthetic used perioperatively, type of inhalational anesthetic used, airways device used during induction, patient smoking status, type of extubation performed, any airway irritants identified or not, and aspiration of gastric contents, each of them was evaluated very well. however, our results did not agree with some areas of the literature studies.

Refrences

Wong TH, Weber G, Abramowicz AE. Smooth Extubation and Smooth Emergence Techniques: A Narrative Review. Anesthesiol Res Pract. 2021;2021.

Gavel G, Walker RWM. Laryngospasm in anaesthesia. Contin Educ Anaesthesia, Crit Care Pain [Internet]. 2014;14(2):47–51. Available from: http://dx.doi.org/10.1093/bjaceaccp/mkt031

Sibert KS, Long JL, Haddy SM. Extubation and the Risks of Coughing and Laryngospasm in the Era of Coronavirus Disease-19 (COVID-19). Cureus. 2020;19(5):1–10.

Silva CR, Pereira T, Henriques D, Lanca F. Comprehensive Review of Laryngospasm. 2020;15–8.

Ciotti M, Ciccozzi M, Terrinoni A, Jiang WC, Wang C Bin, Bernardini S. The COVID-19 pandemic. Crit Rev Clin Lab Sci [Internet]. 2020;57(6):365–88. Available from: https://doi.org/10.1080/10408363.2020.1783198

Peterson MB, Gurnaney HG, Disma N, Matava C, Jagannathan N, Stein ML, et al. Complications associated with paediatric airway management during the COVID -19 pandemic: an international, multicentre, observational study . Anaesthesia. 2022;77(6):649–58.

HAMMAD F, SOMOZA-CANO F, RAMSAWAK S, RAHMAN AL ARMASHI A, ABUTEER H, ALSALLAMIN I, et al. Noncardiogenic Negative Pressure Flash Pulmonary Edema in a Young Adult Patient After Laryngospasm: a Case Report. Chest [Internet]. 2021;160(4):A2345. Available from: https://doi.org/10.1016/j.chest.2021.07.2035

Karaman I, Ozkaya S. Differential Diagnosis of Negative Pressure Pulmonary Edema during COVID-19 Pandemic. J Craniofac Surg. 2021;32(5):E421–3.

Kurup, V. (2008). Respiratory disease. Anesthesia and CO-Existing Disease. 5th ed. Philadelphia: Churchill Livingstone, 161-97.

Arslan, S. (2024). Perioperative Evaluation for the Respiratory System. In *Risk Factors and Therapy of Esophagus Cancer* (pp. 241-262). Cham: Springer Nature Switzerland.

Eter, A. M., Yamamoto, T., & Yamamoto, S. (2024). A Complex Case of Laryngospasm Secondary to COVID-19 Infection in a 40-Year-Old Male. Cureus, 16(9), e68828. https://doi.org/10.7759/cureus.68828

Ji, W., Zhang, K., Li, M. *et al.* Do COVID-19 pandemic-related behavior changes affect perioperative respiratory adverse events in children undergoing cardiac interventional catheterization?. *BMC Anesthesiol* **22**, 406 (2022). https://doi.org/10.1186/s12871-022-01951-8

Sibert, K. S., Long, J. L., & Haddy, S. M. (2020). Extubation and the risks of coughing and laryngospasm in the era of coronavirus disease-19 (COVID-19). *Cureus*, *12*(5).

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