Transpublika International Research in Exact Sciences
https://ojs.transpublika.com/index.php/TIRES
Online ISSN 2828-5921

https://doi.org/10.55047/tires.v5i1.2220

Case Report

Perioperative Management of Asthmatic Patient: A Case Report

Taufiq Gemawan[1], Salsabilla Widarosa[2], Adelia Handoko[3*], Nurfaizah Titisari Sulihah[4], Achmad Wahib Wahju Winarso[5], Achmad Hariyanto[6], Joice Anitta Evlin Manawan[7], Suparno Adi Santika[8], Haris Darmawan[9], Teguh Prastyo[10]

[1,5-9]Anesthesia and Intensive Therapy Department, Faculty of Medicine, Universitas Jember, Jember, Indonesia
[2,10]Medical Department, Faculty of Medicine, Universitas Jember, Jember, Indonesia
[3]Physiology Department, Faculty of Medicine, Universitas Jember, Jember, Indonesia
[4]Biotechnology and Biomolecular Department, Faculty of Medicine, Universitas Jember, Jember, Indonesia
Email: [3)] adelia.fk@unej.ac.id

Received : 08 April - 2026
Accepted : 23 May - 2026
Published online : 02 June - 2026

Abstract

Asthma is a chronic inflammatory disease of the airways, primarily manifested by recurrent episodes of wheezing, shortness of breath, and chest tightness during an acute exacerbation. In the perioperative, asthmatic patients require special consideration, particularly during surgical procedures. Specific anesthetic agents, along with the mechanical irritation of airway instrumentation, potentially trigger acute exacerbations or unexpected bronchospasms that could be fatal. This case report aims to describe the perioperative management and clinical response of an asthmatic patient who experienced unexpected acute exacerbation during anesthesia induction. A 30 year old woman with controlled asthma (ASA II) underwent excision and reconstruction surgery under general anesthesia. Preoperative evaluation included chest X ray and physical examination, both showing normal findings. Sedation was initiated with propofol, fentanyl, ketamine, and atracurium. Clinical manifestations and interventions during surgery were documented. Shortly after induction, the patient developed tachypnea, desaturation (<90%), and diminished breath sounds, indicating acute bronchospasm. Management included aminophylline, dexamethasone, nebulized salbutamol and ipratropium, followed by substitution of atracurium with rocuronium. The patient stabilized, surgery was completed uneventfully, and postoperative recovery was normal. This case highlights that acute asthma exacerbation may occur perioperatively despite long term control, emphasizing the need for vigilant anesthetic assessment, careful drug selection, and readiness to manage bronchospasm promptly.

Keywords: Anesthesia Management, Asthma, Bronchospasm Anesthesia.

1. Introduction

Asthma is a common chronic respiratory disease associated with urbanization and air pollution. Asthma pathophysiology involves hypersensitivity reactions to allergens such as dust, pollen, and pollutants that trigger airway inflammation and airway hyperresponsiveness (Bronte-Moreno et al., 2023; Sampath et al., 2023). According to the World Health Organization (WHO), asthma affected an estimated 262 million people globally in 2019 and caused approximately 455,000 deaths (World Health Organization, 2024). Asthma is an obstacle in important moments during perioperative periods, which is composed of anesthetic induction, airway manipulation, and the risk of respiratory emergency. Some anesthetic agents could affect asthma progression and clinical features. Some could heal and protect

Copyright: © 2026 by the authors.
This is an open access article distributed under the terms and conditions of the CC BY 4.0.

clinical features by inducing bronchodilation, decreasing bronchoconstriction reflexes, or decreasing airway resistance. However, some other agents could have an opposing effect by causing irritation, which leads to the secretion of histamine, which works in the hypersensitivity process (Butterworth et al., 2013; Kamassai et al., 2022). During the surgery process, some respiratory problems may happen. Clinical features, particularly bronchospasm, laryngospasm, desaturation, coughing, and excessive mucus production, may worsen the patient's condition (Bayable et al., 2021).

We present the acute asthmatic exacerbation of a long-controlled asthmatic patient during anesthesia induction. Physician should be aware that asthmatic patients need some additional treatment or drugs and some precautions for medical manipulations during surgery. As such, any complication that happen because unexpected exacerbation could be prevented.

2. Case Report

This study employed a case study approach focusing on asthmatic perioperative patients receiving care at a regional public hospital. A thirty-year-old woman with 150 cm in height and 55 kg in weight came due to a 3x4 cm black-colored mass with hair grown on her left cheek. The mass has an uneven border with a smooth surface. The patient does not experience pain in the mass and no changes in mass size. The patient is in compos mentis condition with normal blood pressure, slight tachycardia, average respiratory rate, oxygen saturation, and temperature. The patient's pupillary size is average, with a positive light reflex. No abnormality was found in the patient's physical examination. No wheezing nor rhonchi was found during chest auscultation, and both lung areas were found vesicular, with typical results from percussion.

From the pre-anesthesia examination, the patient scored ASA II due to an asthmatic history. The patient's last attack was more than one year ago. The patient could not remember since it had been so long since her last attack. No recent attack occurred even though the patient does not consume medication; the patient's asthma status is considered controlled. The patient's laboratory examination is in the normal range. This patient went through an X-ray examination of her chest to see any clinical abnormalities, such as hyperaerated lungs. The chest X-ray looks normal without any significant differences.

The patient was planned to undergo an excision and reconstruction surgery under general anesthesia. The sedation process was done with 150 mg of propofol, 100 mcg of fentanyl and 30 mg of ketamine for analgesia, and 25 mg of atracurium as a muscle relaxant. When the drugs were administered, the patient suddenly developed tachypnea with a decrease of oxygen saturation up to less than 90% with diminishing respiratory sound. Then, 25 mg aminophylline and 10 mg dexamethasone injection, along with nebulization of 0.52 mg of ipratropium bromide and 3.01 mg of salbutamol sulfate, were administered. After the patient reached a stable state, 50 mg of rocuronium was given to the patient in exchange for the atracurium as the muscle relaxant, and then intubation was done. A thorough evaluation of the blood pressure, heart rate, respiratory rate, and oxygen saturation was noted during the surgery. This surgery was performed in 1 hour with 500 mL of RL administered. The bleeding was estimated to be up to 100 mL. 20 mL sevoflurane was used for sedation maintenance. At the end of the surgery process, 0.5 mg of atropine sulfate and 1 mg of neostigmine were administered as a reversal.

The patient was brought to the recovery room for further observation of vital signs such as blood pressure, heart rate, respiratory rate, and oxygen saturation. The result was in the

normal range. The patient was considered safe to be transferred to the regular hospital room. The patient complained of pain in the post-surgery area. Observation showed standard vital signs with 100/70 mmHg blood pressure, heart rate 83 bpm, temperature 36.7˚C, respiratory rate 20 x/min, and oxygen saturation 98%. The patient was already able to move on her own. Another observation was performed 12 hours post-surgery, and the vital signs were typical. The patient was considered stable and sent home with mefenamic acid and cefixime for the take-home medication.

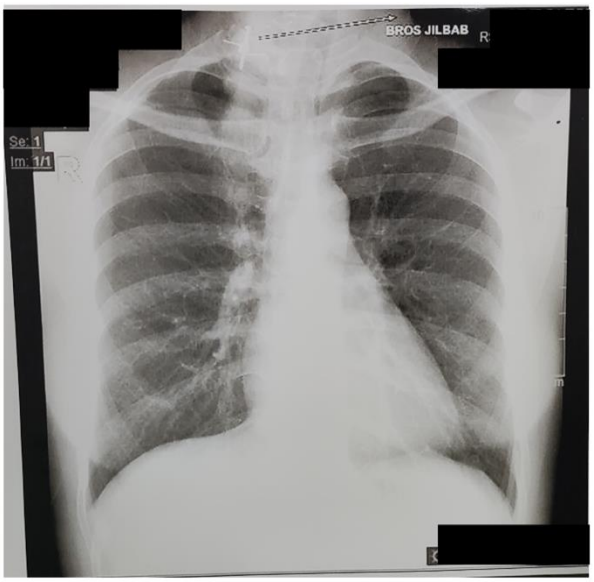


Figure 1. Chest X-Ray

3. Results and Discussion

Asthma is a chronic inflammation of the respiratory tract with episodic attacks. This inflammatory reaction is induced by a hypersensitivity reaction mediated by histamine and prostaglandin (Kasper et al., 2015; Mason et al., 2015). The inflammatory mediators will induce smooth muscle contraction of the respiratory tract, microvascular leak, and increase of mucous secretion in the respiratory tract. Thus, during an asthma attack, the patient will show signs of wheezing, dyspnea, and coughing. These signs were the results of the increment in breathing effort, which will cause hyperventilation and changes in respiratory muscle function, including the use of accessory respiratory muscles (Kasper et al., 2015). Asthmatic patients are allowed to undergo surgical intervention as long as the asthma is controlled and has to be maintained during surgery. Pre-operative evaluation is a must to make sure the asthma is controlled. Ensure when the last asthma attack occurs in the patient, along with a physical examination to find any signs of increased breathing effort and abnormality of the lung field. Supporting examination, such as a chest X-ray, is needed to see signs of air trapping in the lungs, such as hyperaerated lungs (Khara & Tobias, 2023). The patient is considered safe to go through general anesthesia if there are no lung abnormalities and attack-free for over three months (Levy et al., 2023). This patient is considered safe because her last asthma attack was already more than one year ago.

The sedative agent given to this patient is 150 mg of propofol, which is considered safe for asthmatic patients. This drug will reduce airway sensitivity and reduce the risk of bronchoconstriction. A decremental effect on smooth muscle tone was also found as the effect of propofol. Bronchodilatation and increased ciliary motility also help reduce the possibility

of asthma attacks (Grim et al., 2012). Sedative agents to be avoided in asthmatic patients are those in the opioid drug groups, such as morphine, fentanyl, and meperidine, which will cause the release of pro-inflammatory mediators, which will cause a bronchospastic reaction (Nair et al., 2022).

Analgesic drugs administered in this patient are fentanyl and ketamine. Ketamine can relax the airway from sympathetic stimulation. Nevertheless, before the administration of this drug, the clinician has to make sure that the patient is not consuming theophylline because of the risk of seizure (La Via et al., 2022). Ketamine can also cause post-surgery delirium in some patients, making this drug not recommended in patients (Wei et al., 2022). Fentanyl at low clinical doses is generally considered safe in patients at risk of bronchospasm because it produces minimal histamine release compared with morphine. Bronchospasm associated with fentanyl is rare and has been reported more frequently after rapid intravenous bolus administration or high doses. Thus, this drug is chosen as the analgetic agent in this patient, at 100 mcg dose (Butterworth et al., 2022; Rosow et al., 1982).

A muscle relaxant is a drug used to facilitate the intubation process and reduce the risk of vomiting during intubation. Some of this drug works on M2 receptors, such as gallamine, pipecuronium, and rapacuronium. Muscle relaxants working on the M2 receptor may cause bronchoconstriction. Unlike the one that works on the M2 receptor, muscle relaxants working on M3 receptors (vecuronium, rocuronium, and cisatracurium) tend to be safer to be given to asthmatic patients because it does not induce bronchospasm. Other types of muscle relaxants, such as atracurium and mivacurium, only cause bronchospasm in a few asthmatic patients. Atracurium is usually given for quick surgery and is considered safe in most asthmatic patients (Bali et al., 2022; Lin et al., 2016). This patient is receiving atracurium, which is the trigger of asthma exacerbation, manifesting the loss of breathing sound all over the lung field, decreasing oxygen saturation, and increment of respiratory rate.

Asthma exacerbation is managed by deepening the sedation, delivering rapid-acting β2 agonist by nebulization, and injecting corticosteroid and epinephrin (Hines & Marschall, 2008). Sedation deepening was done by giving 50 mg of propofol, nebulization of ipratropium bromide and one ampoule of salbutamol, and injection of dexamethasone 10 mg with 25 mg of aminophylline. Patient clinical symptoms are relieved, with the respiratory rate progressively returning to normal, with gradually increasing oxygen saturation. Some additional conditions, such as ventilation with humid and warm air and the use of a smaller endotracheal tube for intubation, should be considered (Hines & Marschall, 2008).

Volatile anesthetics for sedation maintenance are sevoflurane and halothane, which may cause bronchodilation, which has a good effect on asthmatic patients. Desflurane is contraindicated in asthmatic patients due to its strong scent, which induces bronchoconstriction. Other volatile anesthetics are safer for asthmatic patients because most have a bronchodilator effect (Mondoñedo et al., 2015).

Post-surgical therapy on asthmatic patients is mostly the same as others, as long as the clinical appearance is controlled. Sputum suction is mandatory to free the airway if there are any respiratory disturbances. Giving beta-2-agonist with combination therapy is also an option, and make sure the oxygenation is adequate (Bayable et al., 2021).

4. Conclusion

Asthma is one of the obstacles for perioperative, and it needs particular attention to be managed. An asthmatic attack is still possible even if one has already been attack-free for years. The prevention of any acute exacerbation need conduct, but many anesthetic drugs potentially causing bronchospasm or irritate the airway even in a long-controlled asthma

attack. Any preparation and maneuver need to perform to overcome any complication. Therefore, patient should be closely monitored for any asthmatic clinical symptoms.

5. References

Bali, S., Seglani, S., & Challands, J. (2022). Perioperative management of the child with asthma. *BJA Education*, *22*(10), 402–410. https://doi.org/10.1016/j.bjae.2022.07.001

Bronte-Moreno, O., González-Barcala, F.-J., Muñoz-Gall, X., Pueyo-Bastida, A., Ramos-González, J., & Urrutia-Landa, I. (2023). Impact of Air Pollution on Asthma: A Scoping Review. *Open Respiratory Archives*, *5*(2), 100229. https://doi.org/10.1016/j.opresp.2022.100229

Butterworth, J., Mackey, D., & Wasnick, J. (2022). *Morgan and Mikhail's Clinical Anesthesiology, 7th Edition John Butterworth, David Mackey, John Wasnick*. McGraw Hill Medical.

Grim, K. J., Abcejo, A. J., Barnes, A., Sathish, V., Smelter, D. F., Ford, G. C., Thompson, M. A., Prakash, Y. S., & Pabelick, C. M. (2012). *Caveolae and propofol effects on airway smooth muscle*. *109*(April), 444–453. https://doi.org/10.1093/bja/aes130

Hines, R. L., & Marschall, K. E. (2008). *Stoelting's Anesthesia and Co-Existing Disease* (5th ed.). Elsevier Health Sciences.

Kasper, D., Fauci, A., Hauser, S., Longo, D., Jameson, J. L., & Loscalzo, J. (2015). *Harrison's Principles of Internal Medicine* (19th ed., Vol. 1). McGraw-Hill.

Khara, B., & Tobias, J. D. (2023). Perioperative care of the pediatric patient and an algorithm for the treatment of intraoperative bronchospasm. *Journal of Asthma and Allergy*, *16*, 649–660. https://doi.org/10.2147/JAA.S414026

La Via, L., Sanfilippo, F., Cuttone, G., Dezio, V., Falcone, M., Brancati, S., Crimi, C., & Astuto, M. (2022). Use of ketamine in patients with refractory severe asthma exacerbations: systematic review of prospective studies. *European Journal of Clinical Pharmacology*, *78*(10), 1613–1622. https://doi.org/10.1007/s00228-022-03374-3

Levy, M. L., Bacharier, L. B., Bateman, E., Boulet, L. P., Brightling, C., Buhl, R., Brusselle, G., Cruz, A. A., Drazen, J. M., Duijts, L., Fleming, L., Inoue, H., Ko, F. W. S., Krishnan, J. A., Mortimer, K., Pitrez, P. M., Sheikh, A., Yorgancıoğlu, A., & Reddel, H. K. (2023). Key recommendations for primary care from the 2022 Global Initiative for Asthma (GINA) update. In *NPJ Primary Care Respiratory Medicine* (Vol. 33, Issue 1, p. 7). Nature Publishing Group UK London. https://doi.org/10.1038/s41533-023-00330-1

Lin, C.-S., Chang, C.-C., Yeh, C.-C., Chung, C.-L., Chen, T.-L., & Liao, C.-C. (2016). Postoperative adverse outcomes in patients with asthma: a nationwide population-based cohort study. *Medicine*, *95*(3), e2548. https://doi.org/10.1097/MD.0000000000002548

Mason, R. J., Slutsky, A., Murray, J. F., Nadel, J. A., & Gotway, M. B. (2015). *Murray & Nadel's Textbook of Respiratory Medicine E-Book*. Elsevier Health Sciences.

Mondoñedo, J. R., McNeil, J. S., Amin, S. D., Herrmann, J., Simon, B. A., & Kaczka, D. W. (2015). Volatile anesthetics and the treatment of severe bronchospasm: a concept of targeted delivery. *Drug Discovery Today: Disease Models*, *15*, 43–50. https://doi.org/10.1016/j.ddmod.2014.02.004

Nair, A. A., Farber, H. J., & Chen, H. (2022). Risk of asthma exacerbation associated with opioid and nonopioid analgesic use in children with current asthma. *Journal of Managed Care \& Specialty Pharmacy*, *28*(3), 325–335. https://doi.org/10.18553/jmcp.2022.28.3.325

Rosow, C. E., Moss, J., Philbin, D. M., & Savarese, J. J. (1982). Histamine release during morphine and fentanyl anesthesia. *Anesthesiology*, *56*(2), 93–96. https://doi.org/10.1097/00000542-198202000-00003

Sampath, V., Aguilera, J., Prunicki, M., & Nadeau, K. C. (2023). Mechanisms of climate change and related air pollution on the immune system leading to allergic disease and asthma. *Seminars in Immunology*, *67*, 101765. https://doi.org/10.1016/j.smim.2023.101765

Wei, W., Zhang, A., Liu, L., Zheng, X., Tang, C., Zhou, M., Gu, Y., & Yao, Y. (2022). Effects of subanaesthetic {S}-ketamine on postoperative delirium and cognitive function in elderly patients undergoing non-cardiac thoracic surgery: a protocol for a randomised, double-blinded, placebo-controlled and positive-controlled, non-inferiority trial ({SKED} trial). *BMJ Open*, *12*(8), e061535. https://doi.org/10.1136/bmjopen-2022-061535

World Health Organization. (2024). *Asthma*. https://www.who.int/news-room/fact-sheets/detail/asthma