JOURNAL OF AGROMEDICINE AND MEDICAL SCIENCES (AMS)
ISSN: 2460-9048 (Print), ISSN: 2714-5654 (Electronic)
Available online at http://jurnal.unej.ac.id/index.php/JAMS

Modifikasi Masker Anestesi Umum pada Jalan Napas Sulit: Laporan Kasus

Modified Mask of General Anesthesia in Difficult Airway: A Case Report

Taufiq Gemawan[1], Adelia Handoko[2*)], Muhammad Irsyad Amien [3], Nurrul Izza Misturiansyah[3], and Muhamad Rizal Hadi Pratama [4]
[1]*Department of Anesthesia and Intensive Therapy, Faculty of Medicine, University of Jember – Dr. Soebandi Jember, Indonesia*
[2] *Department Physiology, Faculty of Medicine, University of Jember*
[3]*Student of Faculty of Medicine, University of Jember–Dr. Soebandi Jember, Indonesia*
[4]*Internship Doctor of Mojowarno Hospital Jombang, Indonesia*

Article Info

Article History:
Received: August 04, 2023
Accepted: October 26, 2023
Published: 31 October 31, 2023

**)Corresponding author:*
E-mail: adelia.fk@unej.ac.id

How to cite this article:

Gemawan, T., Handoko, A., Amin, M.I., Misturiansyah, N.I., Pratama, MR.H. (2023). Modified Mask of General Anesthesia in Difficult Airway: A Case Report. Journal of Agromedicine and Medical Sciences, 9 (3): 118-122.

https://doi.org/10.19184/ams.v9i3.41778

Abstrak

Ketika berhadapan dengan gangguan klinis yang dikenal sebagai jalan nafas yang sulit, manajemen jalan nafas selama anestesi umum masih menjadi tantangan. Sebuah studi cross-sectional yang dilakukan di Indonesia pada tahun 2016 menemukan bahwa 28 dari 250 pasien yang menerima anestesi umum mengalami masalah pernapasan. Tata laksana yang baik dan efektif diharapkan mengatasi masalah ini. Laporan kasus ini membahas tentang pasien anak usia 14 bulan dengan limfoma preauricular kanan yang akan menjalani operasi biopsi tumor dengan menggunakan anestesi umum. Ukuran massa tumor yang telah tumbuh dan menutupi jalan napas pasien membuat jalan napas sulit dikelola selama anestesi umum, sehingga intubasi tidak dapat dilakukan. Untuk mengatasinya dilakukan anestesia umum melalui masker dengan modifikasi teknik membalik posisi masker pada pasien selama anestesia umum. Operasi dapat dikerjakan dan pasien diperbolehkan pulang setelah perawatan. Penatalaksanaan yang tepat selama perioperatif terkait jalan napas akan menentukan bagi keluaran dan keselamatan pasien. Dengan adanya laporan kasus ini, diharapkan dapat menambah pengetahuan dan teknik ventilasi alternatif jika menemui kasus serupa.

***Kata Kunci**:* anestesi umum, jalan napas sulit, limfoma preaurikular

Abstract

When dealing with clinical disorders known as difficult airways, airway management during general anesthesia is still a challenge. A cross-sectional study held in Indonesia in 2016 found that 28 out of 250 patients in general anesthesia have had respiratory problems. A proper and effective management should resolve this issue. This case report described a 14-month-old patient with right preauricular lymphoma was planned to do tumor biopsy surgery under general anesthesia. The size of the tumor mass was large enough to covered the patient's airway and made these difficult to manage under general anesthesia, and also made intubation impossible. To resolve it, General Anesthesia trough bag and mask was modified by of reverse position during anesthesia and procedure. Procedure was safely done and the patient was discharged shortly after it. Appropriate management during perioperative especially related to airway management determined patient outcome and safety. This case report hopefully could add knowledge and an alternative ventilation technique if you encounter a similar case.

***Keywords**: difficult airway, general anesthesia, lymphoma preauricular*

Introduction

Difficult airway is a clinical scenario which is physician struggle to control airway with usual airway management techniques. Difficult airway is one in which "a trained anesthesiologist experiences difficulty with upper airway obstruction ventilation, difficulty with tracheal intubation, or both," according to the American Society of Anesthesiologists (ASA) (Apfelbaum et al., 2022).

Difficult airway should be managed in several ways, depending on the patient's features, medical and surgical history, evaluation of the airway, clinical setting (such as the type of the surgical treatment), and vital signs. (Huitink and Bouwman, 2015). Predicting difficult airway and its management in certain patients, determined by physician training and experience, patient risk assessment, and clinical judgment are considered crucial. (Nørskov et al., 2015).

National and international organizations like the ASA and the Difficult Airway Society have developed algorithms for managing difficult airways. It is important for all physician to understand it for a successful intubation. Therefore, the training in airway management will be able to handle its difficulties without incident. (Ahmad et al., 2019).

Pediatrics is a group of patients who require special care in the field of anesthesia to perform effective and safe anesthesia. Different anatomy, physiology and pharmacology between children and adults are important to performed surgery or medical procedures safely and satisfactory outcome. Neonates and infants have proportionately larger heads and tongues than body proportions. The shorter airway makes it difficult to perform mask ventilation and laryngoscopy because of the reduced space in the upper airway. (Harless et al., 2014; Schmidt et al., 2014; Pardo and Miller, 2018).

Some certain conditions make pediatric airway narrower and result more serious airway obstruction. These abnormalities include growth of tissues in the airways (such as hemangiomas), developmental disorders during the embryo (such as tracheomalacia), iatrogenic, and compression of the airways by masses (such as preauricular lymphoma). The condition of the narrow airway needs to be evaluated further before performing ventilation so complication could be avoided. (Harless et al., 2014).

In management guidelines of Difficult Mask Ventilation in Pediatric Patients according Difficul Airway Society (Figure 1). It was explained that steps A, B, and C is intended to manage difficult airways in pediatrics (Difficult Airway Society, 2015). Furthermore, there are examples and management of difficult cases in the work of Saddawi-Konefka et al (2015) which can be used as additional treasures of our knowledge if one day we experience difficulty in ventilation.

The essence of this case report describes the modification of ventilation techniques in patients who have anatomic abnormalities in the facial region. This case report aims to share experiences with readers so that if readers encounter similar cases it can be used as an alternative to ventilation modifications.

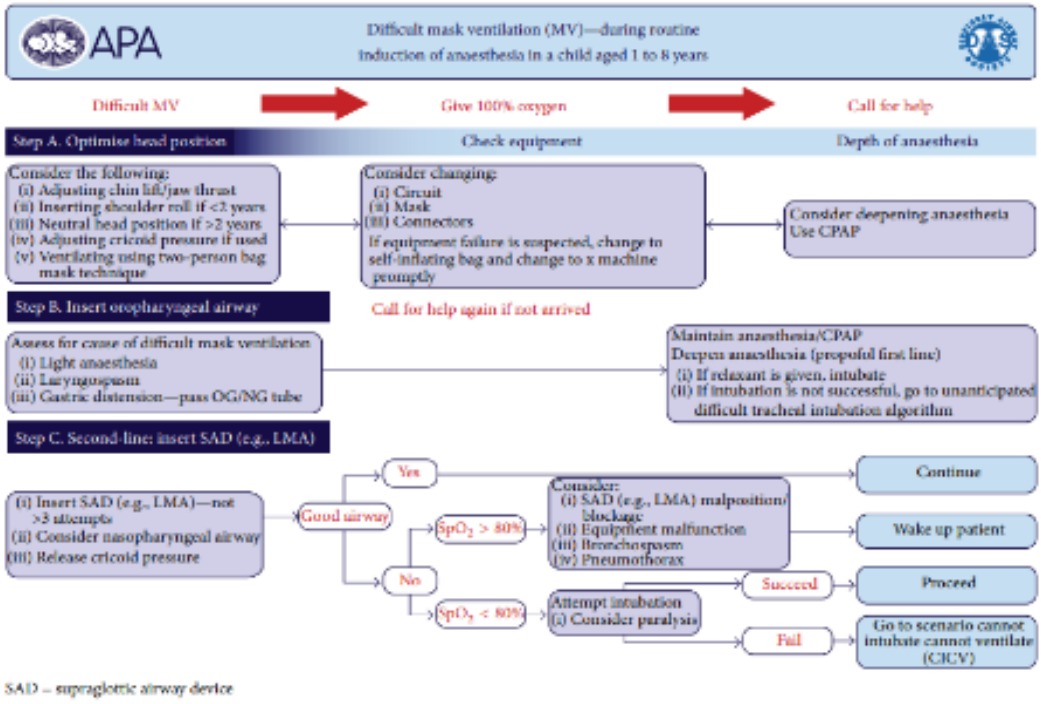

Figure 1. Guidelines for the management of difficult mask ventilation in children aged 1–8 years, published by DAS (Difficult Airway Society) at http://www.das.uk.com/guidelines/paediatric-difficult-airway-guidelines.

Case Report

A 14-month-old boy (weight 14 kgs) complained a tumor that had gotten bigger over the past seven months. A marble-sized mass that was near to the right ear gradually grew larger. His general condition was adequate by physical examination; He is fully awake, heart rate is 125 beat per minute, RR 38 times per minute, and SpO2 99%. A solid tumor, shiny surface, and immobile was discovered on the preauricular to hemifacial dextra during a local examination (Figure 2). His condition is challenging for face mask ventilation under general anesthesia due to airway difficulty. Result of FNAB is impression of a malignant round cell tumor and suspected of lymphoplasmacytic lymphoma.

The patient's diagnosis is Suspected malignant lymphoma in preauricular dextra. Due to inconclusive pathology, this patient was planned for incisional biopsy with PS ASA III physical status (pediatrics, anemia, and difficult for intubation). Prior to surgery, the patient's parents was agree to give informed consent related to the patient's condition, and the patient was fasted for 6 hours before surgery. No pharmacology premedication given. Patient position is supine and general anesthesia was performed using an anesthesia face mask with sevoflurane insufflation (MAC 2 vol%), fentanyl 20 mcg iv slow bolus, and maintenance of anesthesia by giving sevoflurane (MAC 2 vol%). Management of the difficult airway in this patient used an improvised reverse-position technique during the anesthesia and procedure (Figure 3).

The procedure went for 30 minutes. Along with this, he received 50 mL of D5 ½NS as a maintenance fluid and 5 mL of blood as an output. Maintenance and monitoring by assessing the patient's pulse, breathing rate, oxygen saturation, and mask cover during surgery (Figure 4). The patient's vital signs are quite stable with heart rate intervals of 125-140 beats per minute, respiration rate 24-28 times per minute, and SpO2 100%. Postoperatively, the patient was transferred to the post anesthesia care unit for further monitoring. Monitoring for 60 minutes, postoperatively the patient recovered well, the patient's vital signs were quite stable with heart rate intervals of 130-137 beat per minute, respiration rate 24-26 times per minute, and SpO2 100% with O2 mask 6 lpm.

Discussion

All patient that is planned received anesthesia should have their airways evaluated where as difficult airway occurs. It's crucial to have backup methods in place for difficult airway management in case the first attempt failed (Ahmad, I., D. N. Onwochei, S. Muldoon, O. Keane, and K. El-Boghdadly, 2019).

Figure 2. Clinical Photo of the Patient

Figure 3. The improvisation of reversed mask.

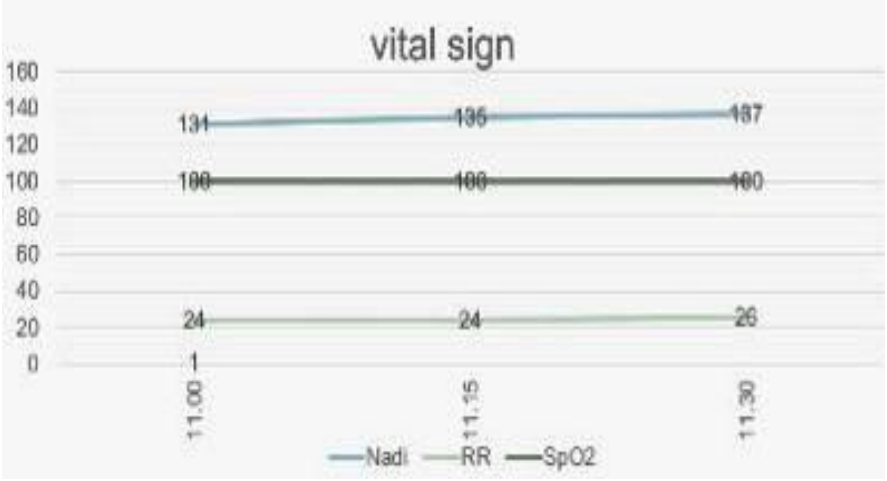

Figure 4. Vital sign durante op.

In this case, the patient is a pediatric with diagnose with preauricular lymphoma with a tumor mass that has expanded and partially covers the airway and will be biopsied. Assessment of the airway cannot be done properly, because the tumor mass has expanded so that it covers part of the airway. Therefore, several procedures such as inserting an ETT cannot be performed, beside airway obstruction threat, these invasive procedures can cause injury to the tumor mass which results bleeding and aspiration. This is in line with earlier research that recommended giving breathing masks to individuals with airway issues (Harless et al., 2014; Schmidt et al., 2014; Pardo and Miller, 2018).

In 2015, the Difficult Airway Society (DAS) introduced an algorithm related to the management of difficult airway conditions in pediatric patients (Figure 1). This patient falls under the category of requiring difficult mask ventilation and being unable to be intubated, according to the algorithm given in the guidelines (Difficult Airway Society, 2015).

The principles of ventilation and oxygenation are positioning the head with a pillow on the back, optimizing the position of the head with a chin lift or jaw thrust, applying pressure to the cricoid bone (Selick's maneuver) if necessary, performing mask ventilation with sufficient bagging in accordance with the patient's tidal volume so that oxygen can delivered 100% during surgery. (Harless et al., 2014). As performed in this case, the pediatric patient was highly unlikely to be intubated. In addition, the anatomical structure of the patient's face and mouth is abnormal due to the presence of a tumor mass, making it difficult to carry out bagging using a mask (Butterworth et al., 2018). However, the only way for the patient to receive adequate ventilation and oxygenation is through a mask. continuous ventilation during operation.

Apart from the explanation of the Difficult Airway Society (THE), Saddawi-Konefka et al (2015) in their journal explained that the causes of ventilation difficulties are generally caused by inadequate mask seal, increased airway resistance, and decreased respiratory compliance. The inadequate mask seal section is explained by examples of it is due to increased growth of facial hair and the presence of edentulism (Saddawi-Konefka et al., 2015). In the paper provided solutions for excessive facial hair growth and edentulism can be given a large occlusive dressing can be placed over the facial hair to provide an adequate surface for the seal. Even a nasal mask or a toddler-sized mask with the lower border resting above the patient's upper lip is used to maintain ventilation with anatomical variations. The outcome of the modification procedure was good results.

In patient case reports, there were abnormalities in the anatomical structure of the patient's face and mouth, which caused difficulty in placing the mask. When putting the mask on for the first time standardly, the operator feels air leaking from the seal gap. To overcome this, improvisation was carried out by placing the mask upside down during the operation, where the position of the mouth on the mask was placed on the patient's nose, and the position of the nose on the mask was placed on the patient's mouth.

By placing the wide side of the mask against the patient's nose, the mask can cover the part of the patient's nose that is being pushed by the mass. This enlarged mass increases the surface area and creates a bulge, so improvising by turning the mask over can avoid gaps between the mask and the skin. These efforts were made to find the right position and adjust the mask cover to the anatomical shape of the patient's face and mouth so that oxygen can fully enter the patient's airway. This technique has proven successful in creating adequate ventilation and oxygenation of the patient during surgery. This is proven by the fact that no air leaks through breathing circuit and the average saturation during the operation ranges from 99-100%.

Conclusion

Anesthesiologists face a unique difficulty when treating patients with tumor diseases that have compromised the patency of their airways. Careful planning and discussion by

the anesthesia team is required so that airway management and a backup plan in case the master plan fails may be devised. An appropriate and complete preoperative evaluation, the availability of equipment and skilled operators, and effective teamwork are also required. To create good results for the health and safety of patients, technical innovation and a comprehension of the methodology in the relevant recommendations are also required.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgments

There is no acknowledgement in this case reports.

Reference

Ahmad, I., D. N. Onwochei, S. Muldoon, O. Keane, and K. El-Boghdadly. 2019. Airway management research: a systematic review. *Anaesthesia*. 74(2):225–236.

Apfelbaum, J. L., C. A. Hagberg, R. T. Connis, B. B. Abdelmalak, M. Agarkar, R. P. Dutton, J. E. Fiadjoe, R. Greif, P. A. Klock, D. Mercier, S. N. Myatra, E. P. O'Sullivan, W. H. Rosenblatt, M. Sorbello, and A. Tung. 2022. *2022 American Society of Anesthesiologists Practice Guidelines for Management of the Difficult Airway*. 1. *Anesthesiology*.

Bindu, B., A. Bindra, and G. Rath. 2017. Effect of intravenous dexmedetomidine administered as bolus or as bolus-plus-infusion on subarachnoid anesthesia with hyperbaric bupivacaine. *Journal of Anaesthesiology Clinical Pharmacology*. 33(3):306–316.

Butterworth, J. F., D. C. Mackey, and J. D. Wasnick. 2018. *Clinical Anesthesiology*. Edisi 6th. New York: Mc Graw Hill Education.

Checketts, M. R., R. Alladi, K. Ferguson, L. Gemmell, J. M. Handy, A. A. Klein, N. J. Love, U. Misra, C. Morris, M. H. Nathanson, G. E. Rodney, R. Verma, and J. J. Pandit. 2016. Recommendations for standards of monitoring during anaesthesia and recovery 2015: association of anaesthetists of great britain and ireland. *Anaesthesia*. 71(1):85–93.

Difficult Airway Society. 2015. *Paediatric Difficult Airway*. Difficult Airway Society

Fiadjoe, J. E., R. S. Litman, J. F. Serber, P. A. Stricker, and C. Cote. 2019. *The Pediatric Airway*. In A Practice of Anesthesia for Infants and Children. Philadelpia: Elsevier.

Gan, H., M. Cannesson, J. R. Chandler, and J. M. Ansermino. 2013. Predicting fluid responsiveness in children: a systematic review. *Anesthesia and Analgesia*. 117(6):1380–1392.

Harless, J., R. Ramaiah, and S. M. Bhananker. 2014. Pediatric airway management. *International Journal of Critical Illness and Injury Science*. 4(1):65–71.

Huitink, J. . and R. . Bouwman. 2015. The myth of the difficult airway: airway management revisited. *Anaesthesia*. 70(3):241–244.

Ji, SM., Moon, EJ., Kim, TJ.. Correlation between modified LEMON score and intubation difficulty in adult trauma patients undergoing emergency surgery. *World J Emerg Surg* 13, 33 (2018). https://doi.org/10.1186/s13017-018-0195-0

Klučka, Jozef & Stourac, Petr & Štoudek, Roman & Ťoukálková, Michaela & Harazim, Hana & Kosinová, Martina. (2015). Controversies in Pediatric Perioperative Airways. BioMed Research International. 2015. 1-11. 10.1155/2015/368761.

Krishna, S. G. and J. D. Tobias. 2014. An update on airway management in infants and children. *Anaesthesia, Pain and Intensive Care*. 18(1):85–96.

Malbrain, M. L. N. G., P. E. Marik, I. Witters, C. Cordemans, A. W. Kirkpatrick, D. J. Roberts, and N. Van Regenmortel. 2014. Fluid overload, de-resuscitation, and outcomes in critically ill or injured patients: a systematic review with suggestions for clinical practice. *Anaesthesiology Intensive Therapy*. 46(5):361–380.

Nørskov, A. K., C. V. Rosenstock, J. Wetterslev, G. Astrup, A. Afshari, and L. H. Lundstrøm. 2015. Diagnostic accuracy of anaesthesiologists' prediction of difficult airway management in daily clinical practice: a cohort study of 188 064 patients registered in the danish anaesthesia database. *Anaesthesia*. 70(3):272–281.