

Difficult Airway Management in Pediatric Patient with Neck Contracture

Pradipta Arief Pramono¹, Fitri Hapsari Dewi,¹

¹Department of Anesthesiology and Intensive Therapy, Medical Faculty of Sebelas Maret University, Indonesia

ABSTRACT

Background: A specific airway evaluation and physical examination should be performed in all pediatric patients undergoing anesthesia. Pediatric difficult airway problems can occur due to congenital, inflammation, trauma, or malignant disorders. Laryngeal mask airway (LMA) is an alternative breathing device for difficult airway cases.

Case: We reported a 5-year-old girl, 12 kg of weight, with a diagnosis of Colli region contracture planned for contracture release. Physical examination revealed glasgow coma scale score 15, with a pulse of 98 beats per minute, a breath rate of 22 times per minute and SpO₂ of 98% on the room air. In the airway evaluation, it was found that the lower mouth was pulled down by the contracture tissue, 2-fingers-wide of mouth opening, the mallampati score was difficult to evaluate, there was no obstruction and neck motion was limited due to contractures. In this report, intubation via video laryngoscope was failed due to the severely restricted neck motion caused by the contracture. The use of LMA became an alternative difficult airway management in this patient after failed intubation with a video laryngoscope.

Conclusion: Preoperative evaluation for assessing and evaluating difficult airway in pediatric patients greatly determines the success of airway management. The use of airway devices such as LMA is still very helpful in cases of pediatric difficult airway.

Keywords: difficult airway, LMA, neck contracture, pediatric, video laryngoscope

Correspondence:

Pradipta Arief Pramono,
MD*

Department of Anesthesiology
and Intensive Therapy, Medical
Faculty of Sebelas Maret
University, Indonesia
e-mail: dipta.arief@gmail.com



Received: April 2022, **Revised:** September 2022, **Published:** September 2022

How to cite this article: Pramono, PA, FH Dewi. Difficult airway management in pediatric patient with neck contracture. *Journal of Anaesthesia and Pain*. 2022;3(3): 54-56. doi: 10.21776/ub.jap.2022.003.03.04

INTRODUCTION

Ensuring airway patency is the most important consideration in pediatric anesthesia. Evaluation and specific examination of the airway should be performed in all pediatric patients undergoing sedation or anesthesia. Some pediatric cases include problems with the airway as a result of various causes including congenital, inflammation, trauma, metabolic or malignant disorders.¹⁻³

Data from the Pediatric Difficult Intubation (PediDI) shows that pediatric patients with difficult airways are often given muscle relaxants when the ventilation is already controlled. This is aimed to avoid airway activation (laryngospasm, bronchospasm, cough) during airway management. The depth of anesthesia, however, must be maintained during airway manipulation, especially when multiple attempts of intubation are performed.²

The use of Laryngeal Mask Airway (LMA) plays an important role in airway management in pediatrics. Many case reports and clinical experiences prove the success of LMA in maintaining the airway when both ventilation and intubation are

considered difficult or impossible. LMA itself is defined as a tool used for non-emergency pathway (cannot intubate, can ventilate), and emergency pathway (cannot intubate, cannot ventilate) from The American Society of Anesthesiologists (ASA) difficult airway algorithm. It can be used for definitive airway management in some conditions, as intubation conduit, or used temporarily when other options are being performed such as in airway surgery.³

Currently, many types of LMA are reported to be useful in the management of difficult airways in pediatrics, but comparative studies are still lacking. Therefore, this case is selected as one of the comparative studies for the use of LMA in pediatric difficult airway management.²

CASE

A 5-years-old girl 12 kg came with complaints of scars appearing in the neck and chest area that made the lower chin and neck fuse, with a history of burns from hot water 8 months before. When the patient first got burns, she was treated once with general anesthesia, but she never came back for a check-up

after that. The patient also complained that it was difficult to close her mouths and she had quite difficulty eating or drinking.

From the physical examination, we found the patient was fully conscious, alert and oriented with glasgow coma scale score (GCS) score 15, Eye 4; Verbal: 5, Motoric: 6, with adequate pulse of 98 beats per minute, a breath rate of 22 times per minute and SpO₂ of 98% in the room air with supine position.

In the airway evaluation, it was found that the lower mouth was pulled down by the contracture tissue to the neck and chest, 2 fingers wide of mouth opening, the mallampati score was difficult to evaluate, there was no obstruction and neck motion was limited due to contractures (Figure 1).



Figure 1. Preoperative clinical image of the patient: A). Front view, B). Side view

Laboratory tests showed a hemoglobin value of 12 g/dl, 37% hematocrit, a leukocyte count of 10,100/mm³. The results of other laboratory tests were within the normal range.

The patient was diagnosed with contractures in anterior, right and left regions of the colli, Pro contracture release with physical status of American Society of Anesthesiologists (ASA) II. The contracture release was planned by the plastic surgery department. From the anesthesia department, preparations are performed in the operating room prior to anesthesia, especially the preparation of difficult airway management in pediatric patients. Some of the tools were prepared including ETT and LMA of several sizes, pediatric laryngoscope and video laryngoscope, pediatric stylet, boogie and jet insufflation.



Figure 2. Clinical image during surgery: A). Front view, B). Side view

After approval of the anesthesia procedure, the patient was sedated in the operating transit room using midazolam 0.1 mg/kg and ketamine 1 mg/kg. In the operating room, the monitor is installed according to ASA recommendation. The patient's condition was obtained with a blood pressure of 100/60 mmHg, a pulse of 108 beats per minute and O₂ saturation of 98%.

Before induction, ventilation check was performed with a cuff of size number 3, and the ventilation was successful. After

the airway was controlled, the patient was given 2 vol% of Sevoflurane gas in FiO₂ 60% with N₂O, and the analgesic of fentanyl 2 µg /kg was administered. After the onset was obtained, a trial of video laryngoscope was carried out but failed because the blade could not enter. Then the manual ventilation was performed and the anesthesia was deepened using 2 volume% of sevoflurane inhalation gas. 0.1 mg/kg of dexamethasone was administered to prevent spasms. After the anesthesia was deep enough, the LMA number 2 installation trial was carried out and it was successful.

After being connected to the anesthesia machine, the LMA was confirmed for being precisely inserted by ensuring the same right and left chest expansion. The anesthesia was maintained with 2 volume% of sevoflurane in 60% oxygen in N₂O. Fentanyl was given 10 µg intermittently. The LMA had shifted or malpositioned once during surgery, therefore extubation and re-ventilation were performed. After the patient was ventilated, re-insertion of the LMA was performed and the fixation was strengthened (Figure 2).

Contracture release surgery was performed with a duration of approximately 2 hours, the hemodynamic status was stable and we performed awake extubation technique (Figure 3). After that, the patient was observed in the recovery room. Metamizole at a dose of 20 mg/kg was administered per 8 hours for postoperative management. On the third day after surgery, the patient was discharged from the hospital ward for outpatient treatment.

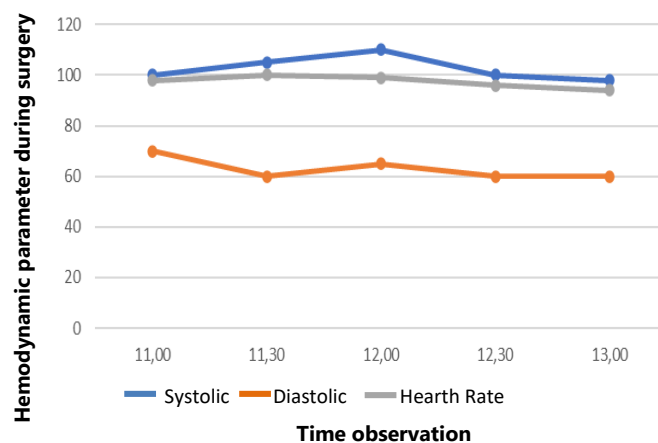


Figure 3. Hemodynamic graph during surgery

DISCUSSION

Preoperative evaluation of the airway in this patient was very important to determine the plan for anesthesia. Examination of airway patency, mouth opening, mallampati score, and neck movements were carried out the day before the procedure. If the losing control of the airway in pediatric patients is not treated promptly, undesirable consequences would appear. Data from ASA states that respiratory complications are one of the causes of perioperative morbidity and mortality in pediatric patients. Successful management of difficult airway in pediatrics, either predictable or unpredictable, should be facilitated in advance with assessment and preparation before the procedure is performed.^{3,4}

Ventilation feasibility checking in this patient was performed to determine the next algorithm of the difficult airway management. For this reason, after the patient was sedated, the ventilation in this patient was checked and the result was clear (ventilation could be performed in this patient). The use of

ketamine in this patient was chosen to reduce the risk of developing apnea.¹ Sevoflurane agent was chosen in this patient because it does not stimulate cough and has a strong odor, thus preventing coughing, breathing resistance, and laryngospasm.³

Data from PediDI states that intubating via direct laryngoscope in pediatric patients with difficult airways over two attempts is associated with high failure rates and increased serious complications. From these data, further strategies are suggested to minimize the number of direct laryngoscopy trials. Switching to indirect techniques via video laryngoscope or fiber optics and considering passive oxygenation during intubation with high flow nasal cannulas or modified nasal cannulas can be a choice of strategy. Since ventilation could be performed in this patient, the LMA could also be used effectively and was sometimes a key step for safe management in difficult airways.^{2,3}

The use of a video laryngoscope is not like a regular laryngoscope. Video laryngoscope does not require alignment of the three axes such as the laryngeal, oral and pharyngeal axes to get visualization of the glottis. Several video laryngoscopes have been modified to fit the pediatric patients.⁴ However, video laryngoscope was failed to be used in this patient due to the severely restricted neck motion caused by the contracture.

ACKNOWLEDGMENT

-

CONFLICT OF INTEREST

None

REFERENCES

1. Butterworth JF, Mackey DC, Wasnick JD. *Morgan & Mikhail's Clinical Anesthesiology*. 6th ed. United States: McGraw-Hill; 2018: 1568-1570.
2. Davis PJ, Cladis FP. *Smith's Anesthesia for Infants and Children*. 9th ed. St.Louis (MO): Elsevier; 2018: 1318-1324.
3. Coté CJ, Lerman J, Anderson BJ. *A Practice of Anesthesia for Infants and Children*. 6th ed. Elsevier; 2019: 360-372.
4. Khrisna SG, Bryant JF, Tobias JD. Management of the difficult airway in the pediatric patient. *J Pediatr Intensive Care*. 2018;7:115-125. doi:10.1055/s-0038-1624576
5. Sabato SC, Long E. An institutional approach to the management of the 'Can't Intubate, Can't Oxygenate' emergency in children. *Paediatr Anaesth*. 2016;26:784-93
6. Huang AS, Hajduk J, Rim C, Coffield S, Jagannathan N. Focused review on management of the difficult paediatric airway. *Indian J Anaesth*. 2019;63(6):428-436. doi:10.4103/ija.IJA_250_19

The use of LMA eventually became an alternative management of difficult airway in this patient after the intubation using video laryngoscope was failed. The LMA relieves upper airway obstruction by removing the tongue and internal organs in the posterior pharynx. By forming a seal in the periglottic area, this tool helps oxygenation and ventilation effectively.⁴⁻⁶

Preparation for extubation plan also begins as soon as the airway is secured. Several attempts of intubation in pediatrics can cause edema of the larynx that can be treated with the administration of intravenous dexamethasone at a dose of 0.5-1 mg/kg.² In this patient, awake extubation was performed to ensure that the airway was completely safe during extubation.

CONCLUSION

Preoperative evaluation for assessing and evaluating difficult airway in pediatric patients greatly determines the success of airway management. The use of airway aids such as LMA in the case of patient with neck contracture is still very helpful in cases of difficult airway, both predictable and unpredictable, in pediatric patients.