CASE REPORT: EXCISION OF LEFT MAXILLARY OSTEOSARCOMA IN A 16-YEAR-OLD BOY UNDER GENERAL ANESTHESIA WITH DIFFICULT AIRWAY PROCEDURE

Listyo Lindawati Julia[1*], Christopher Kapuangan[2]

[1]Anesthesiologist, Gatot Soebroto Army Hospital, Jakarta, Indonesia, [2]Division of Pediatric Anesthesiologist, Department of Anesthesiology and Intensive Care, Faculty of Medicine, University of Indonesia - Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia

eISSN: 2828-4070
Proceedings ICE on IMERI. 2024.
Received: November 28th, 2024
Accepted: December 30th, 2024
Published online: January 17th , 2025

Corresponding Author
Name : Listyo Lindawati Julia
Email : listyojulia@gmail.com

Abstract

Osteosarcoma is a rare, malignant bone tumor commonly found in adolescents, affecting the long bones. Maxillary involvement, though less frequent, can present significant challenges in surgical resection and anesthetic management. This case describes a 16-year-old male with a maxillary osteosarcoma sinistra undergoing excision under general anesthesia, performed with difficult airway intubation devices. Endotracheal tube (ETT) insertion via nasal intubation is performed with awake intubation. At the end of surgery, the patient was extubated uneventfully and referred to ICU.

Keywords

Difficult airway, pediatric, osteosarcoma, general anesthesia, awake intubation

Introduction

A difficult airway is when an anesthetist faces challenges with mask ventilation, tracheal intubation, or both, posing risks to patient safety. Proper management relies on early recognition and anticipation. According to the American Society of Anesthesiologists (ASA), factors include anatomical abnormalities such as intraoral masses, facial fractures, or head and neck trauma, as well as conditions such as obesity, musculoskeletal or endocrine disorders, infections, age, and ethnicity.[1] The DAS Difficult Airway Society guidelines highlight many signs of facial asymmetry, limited mouth opening, restricted

neck movement, and prior airway interventions. Effective strategies involve preoperative assessment tools (MOANS, LEMON) and preparation of alternative airway devices or techniques, including video laryngoscopy or emergency tracheostomy.[2]

Osteosarcoma is a malignant bone tumor that primarily affects the long bones but can occur in the maxilla and mandible, representing approximately 6-8% of head and neck osteosarcoma cases. Maxillary osteosarcomas are less common but often aggressive, with late diagnoses due to nonspecific symptoms such as swelling and pain.[3] The standard therapy includes surgery with clear margins as the primary approach, often complemented by neoadjuvant chemotherapy and, in select cases, radiotherapy to control local and metastatic disease.[4]

Patients with maxillofacial tumors or injuries often struggle with intubation because of anatomical changes such as fractures, swelling, or tumor blockages. Advanced techniques, namely fiberoptic or video-assisted intubation, are frequently needed. Sometimes, alternative methods like nasal intubation or tracheostomy are used. This report highlights a successful case where a patient with maxillary osteosarcoma had their airway managed using awake nasal intubation.

Case Report

A 16-year-old male was referred for advanced oncology care with a two-month history of progressive upper jaw swelling, initially presenting as a toothache. The tumor grew larger, causing pain, bleeding, difficulty eating, and weight loss. Examination showed stable vital signs but revealed a deformity with significant swelling in the left maxilla and nasal regions. Head MSCT showed an 8.8 × 9.07 × 6.44 cm hypodense mass with contrast uptake, destroying the left maxillary bone, sinus, and nasal bones, infiltrating adjacent structures, and displacing the tongue. The patient was diagnosed with a left maxillary tumor, likely squamous cell carcinoma (SCC), and planned for wide excision-reduction surgery.

Preoperative airway assessment using the MOANS and LEMON criteria indicated a potential for a difficult airway. As a precaution, preparations were made for awake

intubation and possible tracheostomy. The patient was classified as ASA 3 due to the tumor, which represented a severe activity-limiting but non-incapacitating systemic disease. The patient and family were informed of the surgical plan and possible complications.

The patient was instructed to fast for six hours before surgery. Anesthesia was performed with awake intubation using intraoral lidocaine spray, followed by 2 mg of midazolam intravena and fentanyl intravena at a dose of 1 mcg/kg body weight. Nasal intubation was successfully performed using video laryngoscopy with a 5.5 non-kinking endotracheal tube with a cuff. After endotracheal tube placement at the vocal cords, intravenous propofol 100 mg intravena and atracurium 30 mg iv were administered for maintenance, alongside sevoflurane at 2% in an oxygen-air mixture. We also inserted CVC in the right subclavian vein.

The surgery lasted three hours, with total anesthesia duration of four hours. Bleeding was 1400 ml and replaced by PRC transfusion of approximately 700 ml. Patient was successfully extubated without any complications and was referred to ICU.

Discussion

Airway management is crucial in anesthesia but can sometimes lead to fatal outcomes. Difficult face mask ventilation occurs in 1.4–5.0% of cases, while impossible ventilation is seen in 0.07–0.16%.[5,6] Intubation with a classic laryngoscope is difficult in 5–8% and impossible in 0.05–0.35% of cases.[7] The rare but critical "cannot intubate, cannot oxygenate" situation (0.0019–0.04%) can result in serious complications, including dental injury or death.[8]

Maxillofacial tumors often predict difficult airways due to the nature of the disease. Key predictors in this case include the patient's functional airway capacity (e.g., limited mouth opening, inability to prognath, and inability to perform upper lip bite test) and anatomical factors (e.g., high Mallampati scores, restricted interincisor distance, and increased tongue volume).[8]

Figure 1. Difficult intubation and mask-ventilation in this patient with maxillofacial tumors

The ASA published the Practice Guidelines for Management of the Difficult Airway in 2022, which define difficult airway scenarios as follows: difficult face mask ventilation, difficult laryngoscopy, difficult supraglottic airway ventilation, failed or difficult tracheal intubation, failed or difficult extubation, and failed or difficult invasive airway management. The guidelines recommend awake intubation for both adults and cooperative pediatric patients with a difficult airway.[1]

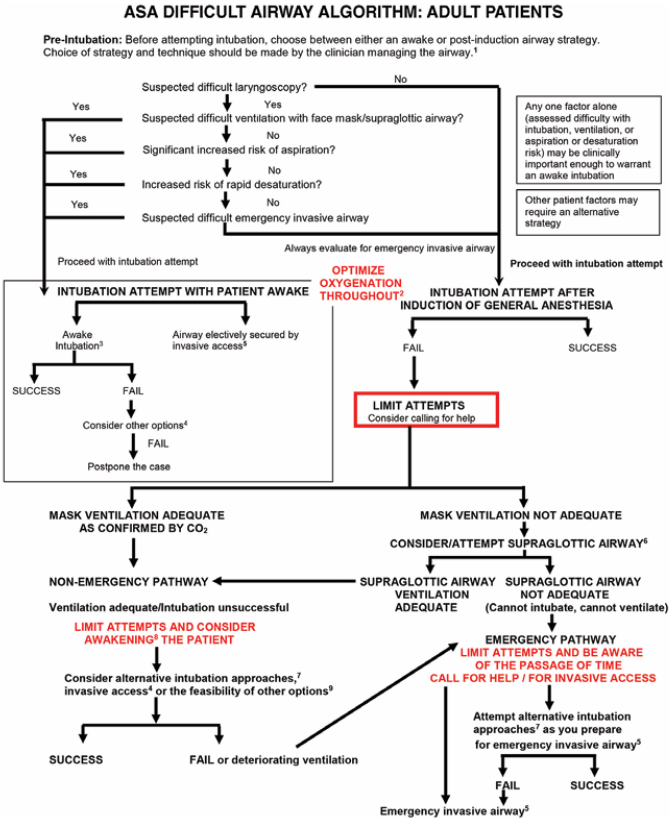

Figure 2. Difficult Airway Algorithm in Adult Patients (ASA, 2022)

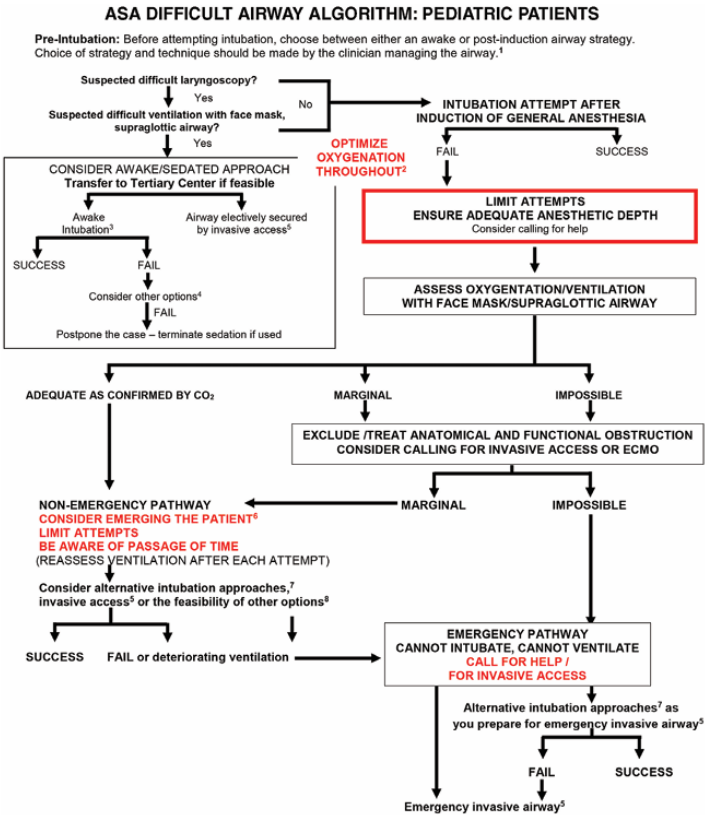

Figure 3. Difficult Airway Algorithm in Pediatric Patients (ASA, 2022)

DAS also issued Guidelines for Awake Tracheal Intubation (ATI) for Adults in 2017. DAS recommends an ATI technique with 4 keypoints as follow: Oxygenate, Topicalise, Sedate, and Perform. This technique is developed to maximize success rate and minimize complications.[9]

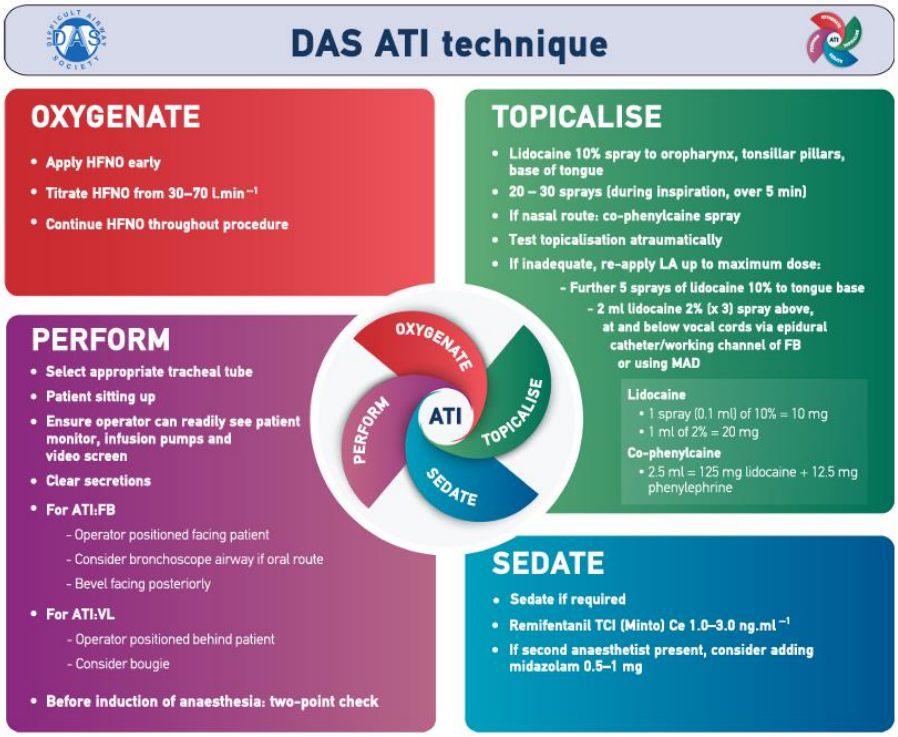

Figure 4. ATI Technique (DAS, 2017)

Although awake tracheal intubation (ATI) is supported by numerous studies showing its safety and high success rate, factors such as patient discomfort, pain, and the need for invasive backup procedures must still be carefully considered.

The success of ATI depends on applying local anesthetics to the airway. Nasal vasoconstrictors are recommended before nasotracheal intubation. In this case, we used lidocaine, an agent commonly used for ATI, which is preferred by DAS Guideline 2017 due to its safety profile and lower risks of cardiovascular and systemic toxicity.[9]

Awake tracheal intubation (ATI) can be stressful for patients, so minimal sedation is used. Remifentanil is preferred for its stable effect and quicker recovery, but due to its unavailability, fentanyl and midazolam were used instead.[10] According to DAS guidelines, these agents are reversible, making them safe for combined use or with other sedatives.[9]

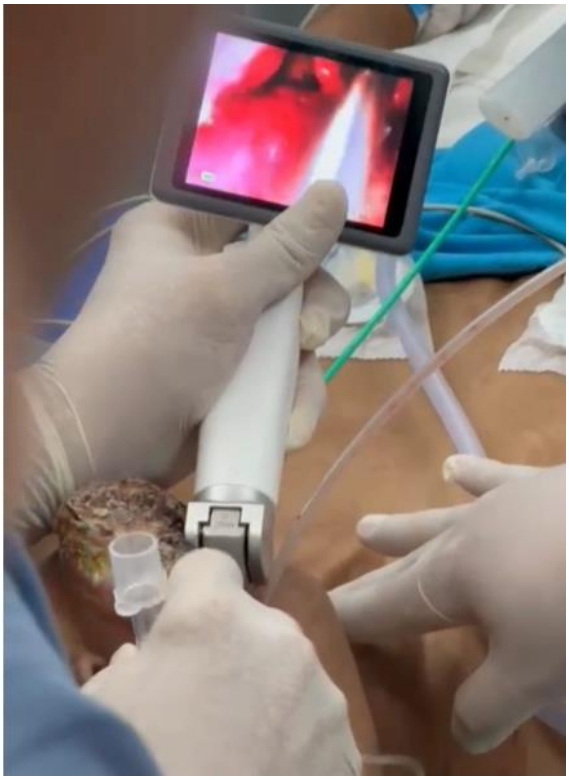

Figure 5. Awake Tracheal Intubation via nasal using Video Laryngosope

In this case, we used a video laryngoscope for nasal awake tracheal intubation (ATI), which research shows reduces intubation time and lowers the risk of oxygen saturation dropping below 90%, compared to fiberoptic bronchoscopy.[11] A small 5.5 non-kinking endotracheal tube (ETT) was also used for easier maneuvering during the nasal approach.

Figure 6. Successful Awake Intubation via Nasal

Figure 7. Patient successfully Extubated after Surgery

In this case report, we successfully managed a difficult airway using a comprehensive evaluation and thorough preparation for unforeseen challenges, including effective communication with the patient about potential invasive procedures such as tracheostomy. Skilled physicians, combined with use of appropriate equipments and clear

communication with the patient, ensure optimal outcome for patient safety and satisfaction.

Conflict of Interests

The author declares no conflict of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgments

We would like to express our sincere gratitude to our mentor, dr. Christopher Kapuangan, and the Pediatric Anesthesiology Division, for their invaluable insight and support during the manuscript preparation. We also extend our heartfelt thanks to the surgeon and the operating room team at Gatot Soebroto Army Hospital for the opportunity to contribute to this case.

This article was presented at the 9th International Conference and Exhibition on Indonesian Medical Education and Research Institute (9th ICE on IMERI) 2024, Faculty of Medicine, Universitas Indonesia. We are grateful for the outstanding assistance provided by the committee of The 9th ICE on IMERI 2024 throughout the preparation of the manuscript and the peer-review process.

References

1. Apfelbaum JL, et al. American Society of Anesthesiologists Practice Guidelines for management of the difficult airway. American Society of Anesthesiologists; 2022 [Accessed: 25 November 2024]. Available at: https://pubs.asahq.org/anesthesiology/article/136/1/31/117915/2022-American-Society-of-Anesthesiologists.

2. Frerk C, Mitchell VS, McNarry AF, Mendonca C, Bhagrath R, Patel A, et al. Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults. Br J Anaesth. 2015 Dec;115(6):827–48.

3. Opoko U, Sabr A, Da Silva FN, Raiteb M, Regragui M, Slimani F. A case of very aggressive maxilar osteosarcome in a young subject. Adv Oral Maxillofac Surg. 2021 Jul;3:100144.

4. Astl J, Belsan T, Michnova L, Kubeš J, Filipovsky T, Blecha J, et al. Highly Aggressive Osteosarcoma of the Ethmoids and Maxillary Sinus-A Case of Successful Surgery and Proton Beam Radiotherapy in a 65-Year-Old Man. Medicina (Mex). 2022 Aug 23;58(9):1141.

5. Kheterpal S, Han R, Tremper KK, Shanks A, Tait AR, O'Reilly M, et al. Incidence and Predictors of Difficult and Impossible Mask Ventilation. Anesthesiology. 2006 Nov 1;105(5):885–91.

6. Langeron O, Masso E, Huraux C, Guggiari M, Bianchi A, Coriat P, et al. Prediction of Difficult Mask Ventilation. Anesthesiology. 2000 May 1;92(5):1229–36.

7. Levitan RM, Heitz JW, Sweeney M, Cooper RM. The Complexities of Tracheal Intubation With Direct Laryngoscopy and Alternative Intubation Devices. Ann Emerg Med. 2011 Mar;57(3):240–7.

8. Jung H. A comprehensive review of difficult airway management strategies for patient safety. Anesth Pain Med. 2023 Oct 31;18(4):331–9.

9. Ahmad I, El-Boghdadly K, Bhagrath R, Hodzovic I, McNarry AF, Mir F, et al. Difficult Airway Society guidelines for awake tracheal intubation (ATI) in adults. Anaesthesia. 2020 Apr;75(4):509–28.

10. Ulina AH, Airlangga PS, Kriswidyatomo P, Maulydia, Edwar PPM, Atika. Comparative Efficacy and Safety of Remifentanil and Fentanyl for Intraoperative Anesthesia. African Journal of Biological Sciences (South Africa). 2024;6(8):824-830. doi: 10.33472/AFJBS.6.8.2024.824-830.

11. Merola R, Vargas M, Marra A, Buonanno P, Coviello A, Servillo G, et al. Videolaryngoscopy versus Fiberoptic Bronchoscopy for Awake Tracheal Intubation: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. J Clin Med. 2024 May 29;13(11):3186.