



RESEARCH ARTICLE

Perioperative Management of Ameloblastoma in Patients with Challenging Airways: A Case Report

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ARTICLE INFO	ABSTRACT
Received: May 21, 2024	<p>Ameloblastoma is a head and neck tumor whose cases are quite rare. This case is more common in the third and fourth decades of age group. The cause is still not known for certain, but inflammation, chronic trauma, and the possibility of infection by HPV are strongly suspected to be factors in the occurrence of ameloblastoma. This disease can cause severe disability, affect the anatomical structure of the airway which usually directly affects ventilation and intubation techniques. Ameloblastoma is treated surgically, this process requires anesthesia which is a challenge for anesthesiologists. This tumor can also cause trismus and intraoral extension leading to airway obstruction and difficulty in visualizing the glottis during intubation. Case Presentation: A 36-year-old woman complaint of difficulty opening her mouth. The patient underwent surgery in 2021 and underwent left mandibular resection, plate reconstruction and bone graft et causa left mandibular ameloblastoma. At this time, plate removal from previous surgery will be performed. Perioperative evaluation revealed facial deformity, which made it difficult to intubate because the maximum mouth opening was 1.5 cm, which included ASA 3. Difficult airway equipment had been prepared, the procedure for this surgery is awake intubation with fiberoptic laryngoscope (FOL), a trans-laryngeal block was performed for ETT installation, during the operation, intermittent fentanyl maintenance was given. As a result, the operation went smoothly, the patient breathed spontaneously, was extubated and was in a good conscious position. Utilization of FOL appears as a safe substitute to achieve visual access to the airway in individuals with difficult airway conditions, especially when the use of direct laryngoscopy becomes impossible.</p>
Accepted: Jul 13, 2024	
Keywords	
Ameloblastoma	
Anesthesia Management	
Difficult Airway	
Surgical Challenges	
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INTRODUCTION

Ameloblastoma is a head and neck tumor that is quite rare with an estimated annual incidence of 0.5% per 1 million population (Adeel et al., 2018). These tumors originate in the epithelial lining of odontogenic cysts, enamel, or lamina of teeth (Evangelou et al., 2020). In the case of Ameloblastoma, the incidence of this disease is more common in adults aged in the third and fourth decade (Medina et al., 2021). Ameloblastoma is also more common in the mandible than in the maxilla (Aloqab et al., 2019). The management of ameloblastoma involves surgery as the main approach (Anpalagan et al., 2021; Jam et al., 2017). The choice of surgical technique, whether conservative or radical, depends largely on the type and size of the tumor present. Conservative techniques, such as enucleation or marsupialization, are often the first choice (Boffano et al., 2021) and can be performed with or without additional approaches such as the use of Carnoy's solution or liquid nitrogen (Pinos et al., 2021). However, when the tumor reaches a larger

size or exhibits a more invasive nature, radical surgical approaches such as mandibulectomy or segmental resection of the lesion become necessary (Sozzi et al., 2022; Kanval et al., 2024). This surgical process is not only challenging for the surgeon, but also for the anesthesiologist in charge of the patient's anesthesia during the procedure. Ameloblastoma can cause serious complications that affect the airway and surrounding anatomical structures (Ghai, 2022). This requires adjustments in ventilation and intubation techniques, especially since tumors can cause trismus and intraoral extensions that inhibit glottis visualization during intubation (Aloqab et al., 2019; Jam et al., 2011).

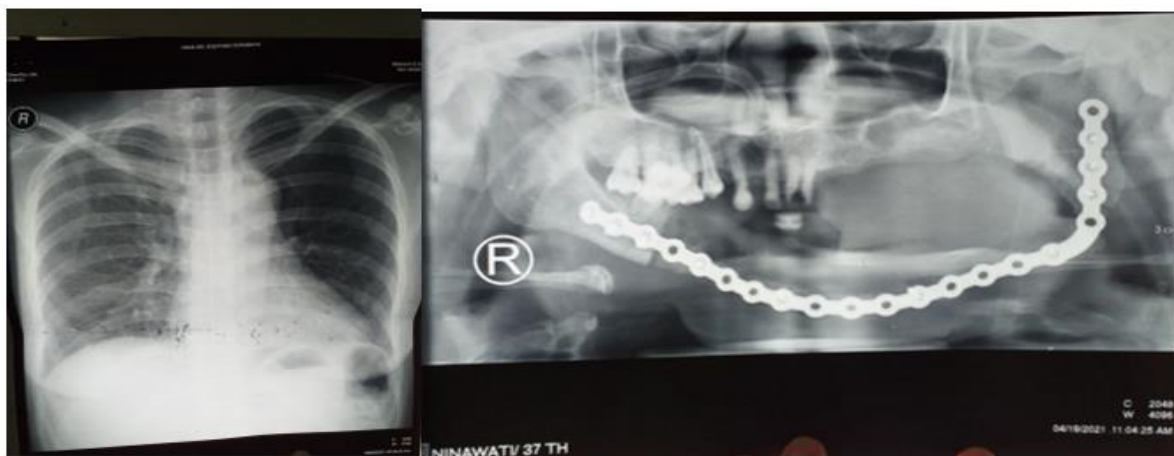
Therefore, this study aims to explore the challenges of anesthesia in patients with ameloblastoma, as well as review effective algorithms and treatments to overcome airway difficulties that may occur. With better understanding, it is expected to improve clinical outcomes and quality of life of patients undergoing Ameloblastoma surgery.

Case Presentation

A 36-year-old woman, weighing 50 kg and 151 cm tall (BMI 21.92) was diagnosed with ameloblastoma. The patient came with complaints of difficulty opening his mouth. This complaint occurred 4 months ago, the complaint was accompanied by difficulty chewing, and stiffness and pain in the lower jaw since after ameloblastoma surgery in 2021. In 2021 the operation was a left mandibular resection, plate reconstruction and bone graft, the operation was carried out in March 2021, at Dr. Soetomo Regional Public Hospital Surabaya. Denied complaints of fever, blood and pus discharge. The patient also stated that she had no history of certain diseases and denied any history of drug allergies. Before surgery, the patient is examined. The results of the physical examination showed that there was facial deformity, and the patient was only able to open her mouth to a maximum width of 1.5 cm (Figure 1). Routine laboratory tests were conducted, revealing the following results: a Hemoglobin (Hb) level of 12.1 g/dl, a Hematocrit level of 36.3%, a White Blood Cell (WBC) count of 3,610/ml, a platelet count of 329,000/ml, a Blood Urea Nitrogen/Creatinine (BUN/Cr) serum ratio of 6.9/0.63, an Aspartate Aminotransferase (AST) level of 15.7 U/L, an Alanine Aminotransferase (ALT) level of 17.3 U/L, an Albumin level of 3.86 g/dl, a Sodium (Na) level of 140 meq/L, a Potassium (K) level of 3.9 meq/L, a Chloride (Cl) level of 108.9 meq/L, a Prothrombin Time (PT)/Activated Partial Thromboplastin Time (APTT) ratio of 15/3.14, and a random blood glucose level of 129 mg/dl, HBsAg non-reactive and COVID-19 PCR Swab not detected. The results of a plain chest x-ray as well as the ECG results were found to be within normal limits. In the panoramic photo (Figure 2), the results showed that the amputate lesion of the left mandibular corpus to the right mandibular corpus had internal fixation (arch bar and wire) installed. From the results of the physical and supporting examination, the patient's assessment from the surgical field is exposed mandibular plate, history of left mandibular resection, plate reconstruction, bone graft et causa left mandibular ameloblastoma, and plans to be carried out, namely plate removal. Meanwhile, the patient assessment from the anesthesia field based on ASA status is 3, namely difficult airway, the planned action to be carried out is awake intubation with a fiberoptic laryngoscope.



Figure 1: Patient's clinical examination while in outpatient clinic. Massive solid mass occupying left mandible, and was only able to open her mouth with maximum width 1.5cm



(A)

(B)

Figure 2: X-Ray examination of the patient. (A) Chest x-ray suggested normal, while (B) Panoramic x-ray showed lesion from left angle of the left mandible corpus to the right mandibular corpus which has been installed with internal fixation (arch bar and wire)



Figure 3: Airway visualization using fiber-optic laryngoscopy



Figure 4: Patient post-surgery

Prior to the procedure, the patient's assessment showed a clear airway, spontaneous breathing at a respiratory rate of 16 timer per minute, oxygen saturation of 98% on room air, breath sounds in both lung fields were vesicular, no rhonchi or wheezing, warm extremities, capillary refill time <2 seconds, blood pressure 120/80mmHg, pulse rate 89 beats per minute, regular strength, and IV access to the antebrachia sinistra, GCS E4V5M6, normal bladder function, soft abdomen, no edema found in the extremities, body temperature 36.5°C.

The basic emergency equipment that has been prepared for the patient is in the form of a scope (stethoscope, precordial stethoscope, Macintosh 3.4 laryngoscope, McCoy), ETT tubes no. 7, 6.5, and 6, airway devices in the form of OPA no. 3, 4, and 5, masks of various sizes, magiil forceps and tampons, tape, introducer or stylet, connector, and suction in the form of connecting suction and suction catheter at least 2 pieces. The equipment used for difficult airways is a fiberoptic laryngoscope, needle cricothyroidotomy, and jet insufflation. Apart from equipment, there are several medicines prepared, for emergency situations there are ephedrine, atropine sulfate, lidocaine and adrenaline. Meanwhile, drugs for the anesthesia process include fentanyl, propofol, relaxants and inhalation agents.

The surgery took time about 1.5 hours. During surgery, the patient's systolic blood pressure was 99-146 mmHg and diastolic blood pressure was 63-88 mmHg. Heart rate was 84-105 beats per minute. Oxygen saturation was 99-100%. Fluid input was from Ringer Lactate 450 ml, and additional fluid 500ml, while fluid output was urine 150 ml and blood 50 ml. Remove plate was performed. After the surgery procedure, the patient was then extubated. Difficult airway fixtures still standby in operation room, spontaneous breathing with tidal adequate volume, hemodynamically stable, reversal entry and extubation with well-conscious position.

Following the surgery, the patient was mobilized to the recovery room (RR). In the RR, the patient had respiratory rate 24 per minute, oxygen saturation 97-98% room air, heart rate 89-103 beats per minute, blood pressure 121/73 mmHg, and the patient was fully awake with GCS 456. Patient was given intravenous maintenance fluid RD5 60 ml per 24 hours, intravenous metamizole 1gr every 8 hours (for 1 day) and IV Metoclopramide 10mg every 8 hours (for 3 day).

DISCUSSION

Ameloblastoma, a rare head and neck tumor, has an estimated annual incidence of 0.5% per 1 million populations. Its origin lies in the epithelial lining of the odontogenic cyst, enamel, or dental lamina. The disease is more common among adults in the third and fourth decades of life (Medina et al., 2021). Additionally, Ameloblastoma tends to affect the mandible more frequently than the maxilla. Despite various theories, the exact cause of Ameloblastoma is still unknown. Proposed mechanisms include inflammation, chronic trauma, malnutrition, vitamin deficiencies, and potential HPV infection. Although metastases are rare, this condition can cause damage to adjacent bone and soft tissue, resulting in asymmetric pain, speech difficulties, malocclusion, and potential paresthesia if the lower alveolar nerve is affected (Neagu et al., 2019). Surgical intervention is the primary treatment for Ameloblastoma, posing unique challenges for anesthesiologists due to the anesthesia required. The anesthesia process for Ameloblastoma differs significantly from standard procedures. The disease itself can cause severe disability, affecting airway anatomy and, consequently, ventilation and intubation techniques. Tumors can induce trismus and intraoral extension, potentially causing airway obstruction and complicating visualization of the glottis during intubation (Aloqab et al., 2019). In this paper, we will delve deeper into the challenges associated with the anesthesia process in a 36-year-old woman with ameloblastoma, as well as outline the algorithm and address the management of airway complications in patients with Ameloblastoma.

Ameloblastoma, a rare head and neck tumor, predominantly affects adults in their third and fourth decades, with a higher occurrence in the mandible (Adeel et al., 2018). Ameloblastoma disease until now the cause is still unknown with certainty. In some conditions where the tumor grows larger, patients will complain of swelling in the jaw or cheeks gradually and not accompanied by pain, In larger tumors that are already pressing on surrounding tissue, it can cause pain, malocclusion, facial deformity, damage to surrounding soft tissue, and tooth loss (Ghai, 2022). This tumor can reaches a larger size or exhibits a more invasive nature, radical surgical approaches such as mandibulectomy or segmental resection of the lesion become necessary (Sozzi et al., 2022). This is in accordance with the findings in patients. Diagnosis of ameloblastoma can be done using a CT scan and biopsy. The CT scan will show uni or multilocular radiolucent lesion which is also a fairly good modality for evaluating bone destruction and soft tissue damage (Mickelson, 2024). Treatment of Ameloblastoma is surgical (de Campos et al., 2022). However, if the tumor is large enough to require radical surgery, mandibulectomy or segmental resection of the lesion may be performed. Ameloblastoma disease until now the cause is still unknown with certainty. The presence of facial deformities creates a challenge for anesthesiologist when a patient undergoes surgery.

Based on American Society of Anesthesiologists's data, as many as 1.2 -3.8% of the total patients in the operating room experience difficult airways. In this regard, as many as 1-2% show intubation failure (Auliyah et al., 2021; Karalapillai et al., 2014). Selection of fiber optic laryngoscopy (FOL) in some patients with a difficult airway may be considered as the modality of choice. The use of FOL is used so that airway visualization can be seen better compared to using direct laryngoscopy. In expectation of difficult airway scenarios, the anesthesiologist must guarantee the accessibility of airway handling gear within grasp, and organize for a proficient aide to be present and prepared to intervene if airway complications arise, offering direct support if the overseeing anesthesiologist confronts obstacles. Ensure that surveillance adheres to ASA standards for Basic Anesthesia Monitoring promptly before, during, and after airway handling (Rosboch et al., 2022). Following the procedure outlined in the manual, once the challenging airway has been recognized, the healthcare

provider must then determine whether to proceed with intubation while the patient is conscious or following the administration of general anesthesia. Awake intubation is applied in the conditions such as: (1) difficult ventilation by using face mask or supraglottic airway, (2) aspiration risk increased, (3) incapability of patient in surviving a brief apneic episode, or (4) any expected difficulty with emergency invasive airway rescue (Pinos et al., 2021).

In this patient awake intubation was selected as the preferred approach for managing the patient due to fulfill the first criteria of awake intubation. Patients with ameloblastoma, challenges occur due to facial deformity and the presence of a large mass, so that placing a face mask or intubation using direct laryngoscopy is not effective. In situations where airway management proves difficult, patients are required to maintain spontaneous breathing, rendering the administration of muscle relaxants inappropriate. Nonetheless, it is crucial to ensure adequate patient understanding and cooperation throughout the intubation process.

The patient underwent intubation via the nasal passage using a non-kinking endotracheal tube (ETT). The decision to opt for nasal intubation was made due to the presence of a sizeable mass obstructing the oral cavity and base of the patient. This mass was found to be fragile, and intubation through the oral route could potentially impede the operating field for the surgeon. The selection of a non-kinking ETT was based on its superior flexibility in comparison to ETTs prone to kinking. Utilizing a non-kinking ETT served the purpose of reducing the occurrence of ETT kinking, which could lead to various airway complications like ventilatory impairment, mucus blockage, bronchospasm, ETT blockage, inadvertent bronchial intubation, pneumothorax, or pulmonary conditions in the lungs (D'Mello et al., 2022).

Before carrying out the anesthesia process, in patients who are suspected and known to have a difficult airway condition, the patient is positioned properly, then given oxygen supplementation during the difficult airway management process, including extubation (Apfelbaum et al., 2022). This patient was given 10 lpm oxygen supplementation, then prepared oxygen with nasogastric tube 10lpm intranasally during the intubation procedure. Before conscious intubation, preanesthetic medication is frequently employed to reduce secretions, facilitate sufficient topicalization of the air passage, lower the likelihood of epistaxis, and protect against the risk of aspiration (Abdelmalak & Doyle, 2009). In this patient, we give 0.05% oxymethazoline drops on the nose that feels more relieved. Patients were given Midazolam 1mg and fentanyl 25mcg via intravenous. Following the preparation, patient then given topical anesthesia, using atomizer, nebulizer, or by gargling. In this case, we asked the patient to gargle using lidocaine 4% 5ml as long as possible to anesthetize posterior pharynx wall and tongue base (Pirlich et al., 2017).

Difficulty securing the airway is a clinical situation in which the anesthesiologist experiences obstruction or failure in ventilation through various methods. These difficulties include inadequate ventilation of the face mask, inability to visualize the vocalist's cord during laryngoscopy, or difficult tracheal intubation.

The 2022 ASA guidelines emphasize airway risk evaluation prior to anesthesia, preparation of skilled tools and individuals, and communication with patients and families. Anticipatory management involves strategies for conscious intubation and airway maneuvers, while emergencies require immediate assistance and optimization of oxygenation. Confirmation of intubation using capnography, and extubation is carried out with a prepared strategy. Follow-up includes the use of steroids or epinephrine if needed, as well as providing information to the patient and family about potential airway difficulties in the future.

CONCLUSION

This case study exemplified a proficient handling of the airway in a patient afflicted with a sizable ameloblastoma, utilizing awake nasal fiberoptic laryngoscopy (FOL). The utilization of FOL emerges as a secure substitute for achieving visual access to the airway in individuals with challenging airway conditions, particularly when employing direct laryngoscopy becomes unfeasible. The accurate identification of patients grappling with airway difficulties plays a crucial role in determining the efficacy of the intubation process within the confines of the operating theater. Recognizing and addressing these challenges promptly can significantly enhance the overall success rate of intubation procedures, thereby ensuring optimal patient outcomes in clinical settings. As a result, the operation went smoothly, the patient breathed spontaneously, was extubated and was in a good conscious position.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

AUTHORS' CONTRIBUTIONS

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

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