Exploring through the difficulties: Fiber optic laryngoscope in ameloblastoma patient

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INTRODUCTION

Ameloblastoma is a benign but progressive tumor on the jaw area.¹ It is slow-growing, but locally aggressive and comprises 10% of the odontogenic tumor in the jaw.² Ameloblastoma is the second most encountered odontogenic tumor after odontoma.³ Most patient came with the manifestation of painless swelling or mass, while the other may experience paresthesia and local pain.⁴

Ameloblastoma could be treated in a conservative and radical way. Conservative approach includes enucleation, while radical approach involves local excision and reconstruction.⁵ The progression of the tumor involving the mouth floor could complicate surgery, as the access to the direct laryngoscopy has been impossible. Therefore, different approach in conducting intubation needs to be taken, with consideration to other related complication, e.g., laryngitis.⁶

This study presents a case of a patient with massive ameloblastoma and received local excision and reconstruction surgery with nasal awake fiber optic laryngoscopy (FOL) intubation.

CASE PRESENTATION

A 57-year-old male patient complained of a growing mass in his jaw, approximately equal to the size of a table-tennis ball, since 1995. However, the patient refused to seek medical care. Then, fifteen years later in January 2020, he was persuaded by his family to have an examination at the Airlangga University Hospital. Fine needle aspiration biopsy (FNAB) examination revealed ameloblastoma. Patient was then referred to Dr. Soetomo General Hospital to book a surgery. In October 2020, the mass significantly increased in size, the patient did not feel any pain, however, he only could eat liquid foods and drink. Surgery was initially planned on November 2020, but the patient had cough and fever in the same month, but no dyspnea was felt. In order to stabilize the patient’s condition, surgery was postponed to December, 2020.

Systematic examination was conducted preceding the surgery. Patient denied any allergy and routine medication. Patient received therapy from surgery department as follows: Fluid maintenance using crystalloid, intravenous (IV) Omeprazole 20 mg per 8 hours, IV Tranexamic acid 500 mg per 8 hours, and oral N-acetyl cysteine (NAC) 200 mg per 8 hours.

Patient’s airway was clear. He spontaneously breathed with respiratory rate 20-22 per minute, oxygen saturation was 96-98% room air. Lung auscultation revealed no wheezing and rales. Patient’s extremity perfusion was warm, heart rate was 102 beats per minute regular, blood pressure was 115/70 mmHg.

Heart auscultation revealed no murmur or gallop. There was no activity limitation. He was awake with Glasgow Coma Scale (GCS) 456 and Wong Baker Face Scale

Keywords: ameloblastoma, local excision, reconstruction surgery, nasal awake fiber optic laryngoscopy (FOL) intubation.

ABSTRACT

Introduction: Ameloblastoma is a slow-growing but locally aggressive benign tumor in the jaw, commonly presenting with painless swelling. This study focuses on a case of a 57-year-old male with a massive ameloblastoma who underwent local excision and reconstruction surgery with nasal awake fiber optic laryngoscopy (FOL) intubation.

Case Presentation: The patient’s pre-operative assessment included an evaluation of comorbidities, anesthetic considerations, and an awake FOL strategy. Awake intubation was chosen due to the patient’s facial deformity and large mass, which hindered face mask ventilation and supraglottic airway use. Nasal intubation was performed with non-kinking endotracheal tube (ETT) and topical anesthesia. Post-operative care and extubation were carefully managed. The surgery, lasting 9.5 hours, included a right hemimandibulectomy and reconstruction using a reconstruction plate. Patient vitals remained stable during the procedure. The patient was successfully extubated, and post-operatively, they were mobilized to the recovery room. The patient’s respiratory and hemodynamic parameters were within the acceptable range, and they were fully awake following the surgery.

Conclusion: This case demonstrates the successful management of a patient with a large ameloblastoma using awake nasal fiber optic laryngoscopy for intubation. Airway evaluation and choice of intubation method play a crucial role in ensuring the safety and success of the procedure in patients with difficult airways, especially when faced with tumors and potential complications.


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1-2. Patient's temperature was 36.9° C. Airway examination was done as follows: patient had face deformity, there was no obesity, patient's teeth was incomplete, patient could open mouth as wide as two fingers, and Mallampati score was difficult to observe. He had restriction in opening his mouth and the airway was abnormal.

Patient was slightly anemic with hemoglobin level 10.6 g/dL. Chest x-ray of the patient on November 2020 showed consolidation on left perihilar and pericardiac region, patchy infiltrate on right and left supra-perihilar region, and laminar consolidation on left hemithorax to upper lateral that overlap the left costophrenic sinus on its anterior and posterior sides, consolidation also overlap the area of retrosternal and retrocardiac. These findings suggested bilateral pneumonia and minimum pleural effusion. Cervical x-ray showed lytic lesion, expansile, forming soap bubble appearance, geographic destruction type, narrow transitional zone on the mandible angle to corpus, accompanied with soft tissue swelling around. This image suggested a primary bone tumor. Patient was diagnosed with right mandible ameloblastoma, community-acquired pneumonia (CAP), left pleural effusion, and reactive HBsAg. Patient was assessed as ASA Score III with following comorbidities: difficult airway, malignancy, CAP, minimum left pleural effusion, and reactive HBsAg. Patient was then planned to be operated with general anesthesia by nasal intubation using fiber optic laryngoscopy (FOL) with the patient fully awake.

On the day of the surgery, patient was spontaneously breathing with respiratory rate 16-18 per minute, oxygen saturation was 98%, heart rate was 88 beat per minute, blood pressure was 124/63 mmHg, he was fully awake with GCS 456 and his temperature was 36.2° C. Before surgery, preparation was done to assure the patient, medications, equipment, and anesthetic machine worked properly. Awake FOL strategy was performed using pre-medications, such as: oxymetazoline nasal drops (vasoconstrictor) to prevent septum bleed, nebulie lidocaine 5% 4 ml, topical anesthesia lidocaine spray 10%, and trans-laryngeal injection lidocaine 2% 3ml. Before the procedure was begun, the airway was decongested and anesthetized. Patient was informed that FOL was about to begin, then the endotracheal tube was advanced along the nasal floor, avoiding nasal septum. When the tube was advanced to nasopharynx, the patient was instructed to breathe through the nose. After the tube is properly placed, anesthetic induction could be started. Anesthetic induction was done using propofol and rocuronium, while anesthetic maintenance was performed using oxygen and inhaled isoflurane.

The surgery took place in 9.5 hours. During surgery, the patient's systolic blood pressure was 84-127 mmHg and diastolic blood pressure was 52-71 mmHg. Heart rate was 86-105 beats per minute. Oxygen saturation was 99-100%. Fluid input was from crystalloid 1000 ml, colloidal fluid 200 ml, and whole blood transfusion 800 ml, while fluid output was urine 400 ml and blood 1200 ml. A multilocular capsuled mass was obtained, consistency was solid and tender, size 14x10x11 cm from mandible, right mandible angle to temporo-mandibular joint and 36 teeth region. Right hemimandibulectomy was performed, reconstruction was then conducted using reconstruction plates (2-4 16 holes, screw implantation size 10 mm (3 pieces) and size 8 mm (1 piece)). After the surgery procedure, the patient was then extubated. Patient was pre-oxygenated using 100% oxygen, appropriate suction was done, a bite block (rolled gauze) was inserted, neuromuscular blockade antagonist was given, then the patient was observed to wake.

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 98-99% room air, heart rate 97-104 beats per minute, blood pressure 100/60 mmHg, body temperature 35.9° C and the patient was fully awake with GCS 456. Patient
was given intravenous maintenance fluid ringer lactate 1000 ml per 24 hours, intravenous tramadol 100 mg per 8 hours (for 2 days) and IV metamizole 1 gram per 8 hours (for 3 days).

DISCUSSION

Ameloblastoma is a benign progressive odontogenic tumor. Based on WHO and The International Agency for Research on Cancer, ameloblastoma is classified into: solid/multicystic, extraosseous, desmoplastic ameloblastoma and unicystic. On the radiographic examination, solid or multicystic type ameloblastoma appears as expansile, radiolucent and multiloculated cystic lesion, accompanied with soap-bubble appearance. Further, the mass could expand and erode the cortical plate, often related with tooth displacement and roots resorption of the adjacent teeth. This is consistent to the findings in our patient. Solid or multicystic ameloblastoma is the variant of ameloblastoma with higher recurrence incidence than any other variants. It is contributed by inadequate treatment of ameloblastoma. Therefore, resection and reconstruction surgery are decided on this patient to prevent the recurrence.

Ameloblastoma is located in the jaw and due to its manifestation, which is commonly painless, patients often come with large size tumor. A large mass occupying jaw and mouth floor raises concerns in the anesthetic management of ameloblastoma patients who are planned to be operated. There may be issues due to obstructed airway, distorted face contour which hinder proper jaw thrust and mask ventilation, and tracheal intubation using direct laryngoscopy may be impossible. According to the data by American Society of Anesthesiologists, patients in the operating room may have difficult airway 1.2-3.8%, while the incidence of intubation failure in the operating room as much as 0.13-0.3%. Therefore, in this patient, fiber optic laryngoscopy (FOL) was chosen as the modality to obtain airway visualization because direct laryngoscopy was not possible.

For the management of patients with airway complications, there has been an updated version of American Society of Anesthesiologists (ASA) Practice Guidelines in managing difficult airway 2022. Based on the guideline, difficult airway is defined as any anticipated or unanticipated difficulty or failure experienced by a physician trained in anesthesia care, including but not limited to one or more of the difficulties in: face mask ventilation, laryngoscopy, ventilation using supraglottic airway, tracheal intubation, extubation, or invasive airway. Based on the algorithm provided in the guideline, after identifying the suspected difficult airway, clinician
then have to decide whether intubation is attempted with patient awake or after induction of general anesthesia.\textsuperscript{14}

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.\textsuperscript{15} Awake intubation was chosen to manage our patient because he fulfilled the first condition, where due to facial deformity and large mass, face mask or supraglottic airway was difficult. Airway could not be handled; therefore, patients must always breathe spontaneously and muscle relaxants are contraindicated. However, it is important to assure and educate the patient of the intubation sequential process so that the patient could cooperate.

Patient was intubated through a nasal cavity using non-kinking ETT. Nasal intubation was chosen because the oral cavity and floor of this patient is blocked by a large mass, the mass was friable and intubation could hinder the operation field for the surgeon. Non-kinking ETT was chosen because it offers more flexibility compared to kink ETT. By using non-kinking ETT, the incidence of kinking ETT could be prevented, as it could stimulate airway issues such as ventilatory malfunction, mucus obstruction, bronchospassm, ETT obstruction, bronchial intubation, pneumothorax or lung pulmonary diseases.\textsuperscript{15}

Before intubation, oxygen flush was done using nasal cannula. The objectives of oxygen flush are to give pre-oxygenation, prevent desaturation during FOL procedure, and provide longer desaturation period.\textsuperscript{16} Nasogastric tube was inserted through contralateral nasal cavity for FOL and connected to an oxygen tube. Patient was given premedication such as nasal vasoconstrictor to prevent bleeding in nasal cavity; aspiration prophylaxis using antihistamine, proton pump inhibitors, or metoclopramide; and analgesics.\textsuperscript{17} 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 2% as long as possible to anesthetize posterior pharynx wall and tongue base.\textsuperscript{18}

Management of patients with difficult intubation may involve some alternatives such as flexible video-assisted laryngoscopy, alternative laryngoscope blade, combined techniques, intubating supraglottic airway flexible bronchoscopy, introducer, and lighted stylet or light wand. FOL is ideal for patients with airway complications such as small mouth opening, trauma and rheumatoid arthritis patient with minimized cervical spine movement, obstructed upper airway such as angioedema and tumor, facial deformity and facial trauma.\textsuperscript{19} FOL is more favorable than video laryngoscope in this case, because this patient had difficulty in opening his mouth (small mouth opening) and Mallampati score was difficult to evaluate. By inserting the blade of video laryngoscope, tumor mass may be ruptured and induce bleeding which may block the airway.

The alternative of managing a difficult airway is by retrograde intubation. This procedure involves a puncture on cricothyroid membrane, then a guide wire is advanced through the larynx and out of the mouth.\textsuperscript{20} Tracheal tube is passed through the guiding wire afterwards. Retrograde intubation is an alternative to establish definitive airway when blind nasal intubation fails and fiberoptic bronchoscope is not available.\textsuperscript{21} However, FOL is available at our site, FOL intubation is more favored as it is less invasive for the patient and have a higher success rate than retrograde intubation.\textsuperscript{22,23}

This patient was extubated while awake, as this is important to maintain a free airway. Extubation in difficult airway patients is more challenging. Failed extubation could occur when patient cannot maintain oxygenation, blocked airway patency, failed alveolar ventilation and pulmonary secretion management.\textsuperscript{24}

This case presentation highlights the importance of thorough evaluation in the management of patients with difficult airway. Pre-surgery airway evaluation needs to be conducted carefully in order to prepare and decide best management possible for the patient and mitigating any risk that may be faced during the procedure. Laryngoscopy procedure is an invasive, yet mainly responsible in the airway management before surgery. In the experienced hands, laryngoscope could provide 82% easy viewing, 16% limited viewing, and 2% complex presentation.\textsuperscript{25} However, laryngoscopy could also endanger patient as it may cause aspiration, hypertension, dysrhythmia, eye trauma, dental trauma, laryngospasm, bronchospasm, airway or esophagus perforation, bleeding, edema, and airway obstruction.\textsuperscript{26} In patients with soft tissue tumor, anesthetist needs to be experienced in managing airway, especially when there is a risk of bleeding and/or edema during intubation which may lead to airway obstruction and aspiration.

**CONCLUSION**

Our case demonstrated a successful airway management in patient with large ameloblastoma with awake nasal fiber optic laryngoscopy. Fiber-optic laryngoscopy is a safe alternative to obtain visualization of airway in patients with difficult airway and the usage of direct laryngoscopy is impossible. Identification of patient with difficult airway has a pivotal role in determining the success of intubation in the operating room.

**CONFLICT OF INTEREST**

The authors declare no conflict of interest in this study.

**ETHICAL STATEMENT**

The patient had agreed and signed informed consent regarding publishing his clinical case in an academic journal without exposing his identity.

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**AUTHOR CONTRIBUTION**

All authors contributed equally to this study.

**REFERENCES**