



Management of Anesthesia in Mandibular Tumors with Difficult Airway

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Abstract

A 39 year old female patient with a diagnosis of mandibular tumor underwent mandibulectomy and Free Fibular Flap reconstruction. Preoperative evaluation is carried out on patients, namely by carrying out anamnesis, physical examination and supporting examinations to determine the problem and conclude the patient's physical status. The patient's physical status is ASA III. The patient was intubated awake with a video laryngoscope. After that, sedation and muscle relaxants are given. The operation lasted 10 hours with stable hemodynamics. Post-operatively, patients are treated in the ICU, vital signs are observed and post-operative pain is managed. A closed study conducted by the Professional Committee of the American Society of Anesthesiologists (ASA) revealed that the risks and serious complications of anesthesia are most often closely related to airway management problems. Success in dealing with complications depends on early detection of symptoms and corrective action to prevent the situation from getting worse. In this patient, airway management was based on the Difficult Airway Algorithm.

Introduction

Airway management is one of the most important parts of an anesthesia procedure. Because some of the effects of drugs used in anesthesia can affect the state of the airway to run properly. Airway management is carried out to ensure free airway so that the air entry into the lungs is normal and ensures adequate oxygenation of the body. Effective airway management keeps the airway free from secretions, contamination, obstruction, and minimizes complications. Certain complex interactions of patient factors, settings, and practitioner skills can lead to difficulty in airway management.

The biggest difficulty is when the airway cannot be secured. Managing patients with a normal airway is an important key in patient management exercises. In patients who have difficult airway anatomy, it is important to treat. This is a clinical situation where the anesthesiologist has difficulty venting the upper airway, difficulty intubating the trachea, or both. A study conducted from May 2011 to October 2013 found that 885 (2.3%) of 37,805 patients undergoing general anesthesia and airway intervention experienced difficulties in airway management.

The effects of respiratory difficulties can take many forms, from brain damage to death. This risk is related to inadequate management of the patient's airway as evidenced by the number of malpractice cases examined by the American Society of Anesthesiologist Closed Claims

Project. In the closed cases, the highest number of incidents of brain damage and death were caused by respiratory difficulties. Sedatives, narcotics, analgesics, and muscle paralyzing drugs used in surgery are suspected to have an effect on airway stability and protection. A closed study by the American Society of Anesthesiologists (ASA) Professional Committee revealed that the risks and severe complications of anesthesia are most often closely related to airway management problems. Success in overcoming complications depends on early detection of symptoms and corrective actions to prevent the situation from worsening.

Methods

Patient Identity

Name : Mrs. S
Age : 39 years old
Diagnosis : Mandibular Tumor
Action : Mandibulectomy and Fibular Flap Reconstruction

Anamnesis

The patient was a referral from Tengku Rafian Siak Hospital with complaints of a lump in the right jaw area that had been felt since 1 year before entering the hospital. Complaints of lumps are initially unbothersome with a size approximately as large as marbles and then get bigger and bigger. In October 2022, the patient felt a lump as big as a ball and was felt to interfere with activities to the point of difficulty swallowing and speech, so the patient checked with a doctor at Tengku Rafian Siak Hospital, but due to limited examination facilities, the patient was referred to Arifin Ahmad Hospital Riau Province. The patient is a farmer, there is no interference in carrying out daily activities. History of tremors, excessive sweating, palpitations, weight loss denied, normal appetite, bowel movements and bowel movements without complaints.

History of previous diseases : The patient has never experienced the same complaint before, a history of systemic disease is denied.
History of drug and food allergies : None
Treatment history : None
History of systemic disease : None
Surgery history : None
Social history : The patient is a farmer, there is no interference in carrying out daily activities.

Physical Examination

Weight 40 kg; Height 160 cm; BMI 15.6 kg/m²; Axilla temperature 36°C; NRS photo 0/10, NRS move 2/10.

Central nervous system : Consciousness of the compos mentis, GCS E4V5M6, isochore pupil 3 mm/3 mm
Respiration : Respiratory rate 18 times per minute, vesiculars in both pulmonary airfields, rhonki and wheezing absent, peripheral oxygen saturation 98% of the water room.
Cardiovascular : Blood pressure 120/70 mmHg; pulse 80 times/minutes, single, regular, murmur heart sounds 1 and 2 are absent.
Gastrointestinal Tract : Supel, bowel sounds (+) normal, ascites (-), Pain Press (-)
Urogenital : Spontaneous urination.
Musculoskeletal : Flexion of good neck deflection, Mallampati IV, teeth is intact.

Criteria MOANS

Mask seal/ male sex/ Mallampati: female patient, beard and mustache absent, Lump appears in the cheek area measuring 7 cm x 7 cm with infirm border, solid consistency, pressure (+), Mallampati score IV.

Underweight : BMI patient 15,6 kg/m² (<18,5 kg/m²).

Age : 39 years old.

No teeth : normal teeth.

Stiff lung/snoring : patient do not have COPD, Asthma, ARDS.

Lemon Criteria

Look externally :

1. There is a lump in the cheek area measuring 7 cm x 7 cm, the boundary is not firm, the consistency is solid, the pressure pain (+)
2. Beard and mustache are absent
3. Large incisor teeth are missing
4. Big tongue is absent
5. Facial trauma is not present

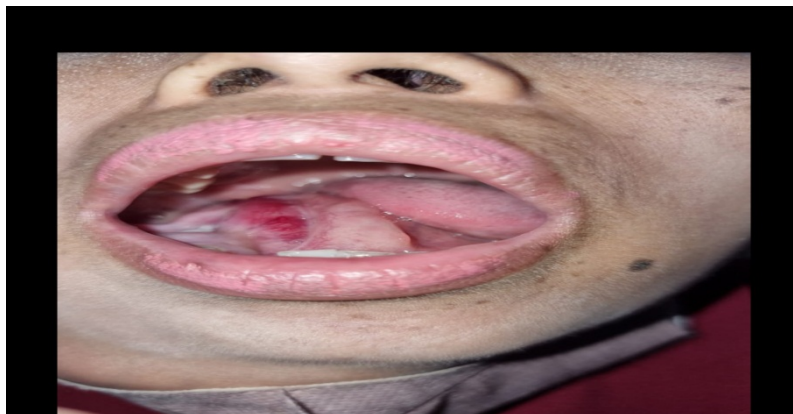


Figure 1. Enlarged Tumor or Mass in the Face and Neck Area

Evaluated : Open the mouth 2 narrow fingers
Mallampati : III.
Obstruction : Mass appears in the mandibular dextra with a periosteal reaction that infiltrates the surrounding muscles.

Neck mobility : Normal neck flexion and deflection.

Criteria RODS

Restricted mouth opening :none.

Obstruction/obesity : Mass appears on the gingiva superior dextra, size 4x3 cm, recumbent, irregular edges.

Disrupted or distorted airway : Patients have no permanent spinal flexion deformity, neck injury with hematoma, and pharyngeal abscess.

Stiff : Patients do not have intrinsic barriers to ventilation such as asthma and pulmonary edema.

Smart Criteria

Surgery (recent or remote) :none.

Mass : there is no hematoma or infective process of abscess or mass in the cricothyrotomy pathway

Access/Anatomy : Patients do not have a short neck or pannus

Radiation : the patient has never received radiation therapy before.

Tumor : There is a tumor in the location of the patient's superior gingiva dextra, no tumor in the cricothyrotomy pathway.

Supporting Examination

Lab 10 October 2022

Hb/Leu/Plt/Ht : 11,8/9.51/223000/35.9

PT/INR/APTT : 15.3/1.07/34.1

AST/ALT : 35/42

Albumin : 4.3

Ur/Cr :15.0/0.77

Blood sugar : 118

Total bilirubin : 1.05

Bilirubin indirect : 0.69

Bilirubin direct : 0.36

Rontgen thorax PA (10/10/2019)

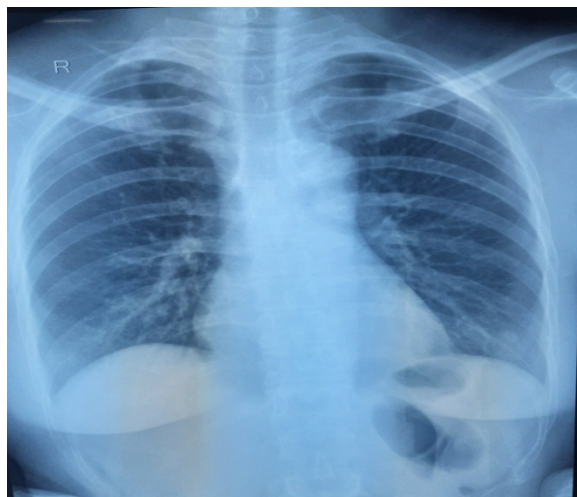


Figure 2. The cast and pulmo that do not appear abnormal.

CT Scan of the Head (28/7/2022)

Hyperdense mass with description of the mandible dextra with a periosteal reaction that infiltrates the surrounding muscles, post contrast appears to enhance inhomogeneous tissues.

The soft tissues of the nasopharynx, oropharynx, and hypopharynx appear normal.

Impression: Mass of mandible dextra susp malignat.

Limfadenopati submandibula bilateral.

No bleeding, infarction, intracranial SOL

EKG (29/8/2019)

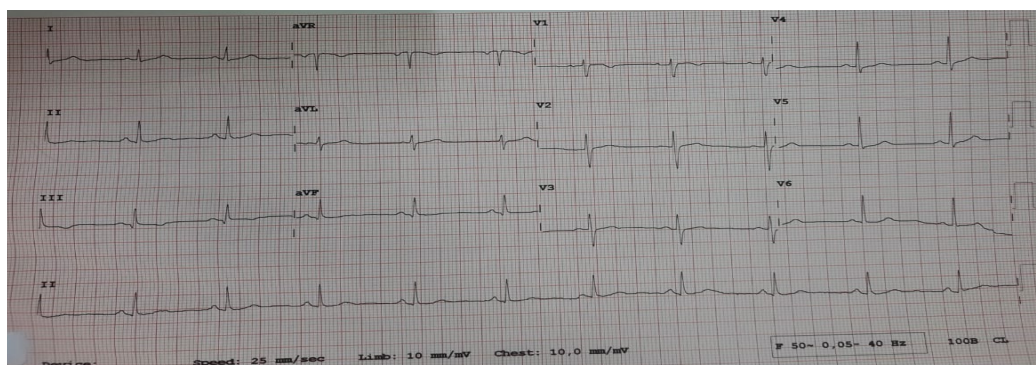


Figure 3. Normal sinus rhythm

Problems and Conclusions

Actual Problems : *Difficult Airway Management (Difficult to Intubate)*

Potential Problems : Desaturasi

Surgery : Location in Mandibula Dextra

Position : Head up

Duration : 10 hours

Manipulasi : Mandiblectomy with Free Fibula Flap Reconstruction

Conclusion : ASA III Physical Status

Table 1. Anesthesia Preparation

	Preparation In The Treatment Room	Evaluation of the patient's identity Psychic preparation Patient anamnesis Explain to the patient and his family about the anesthesia plan that will be carried out starting from the reception room, operating room to the recovery room
		Physical preparation Fasting 6 hours before surgery Remove jewelry before going to the operating room Change into special clothes before going to the operating room Examine status present, status physical and supporting examination results Checking the operation approval letter Installing IV line, a fasting replacement fluid with ringer lactate with 20 drops per minute
	Preparation in The Pre Operative Room	Double check the patient's medical records, identity, approval of surgery Ask again about the preparations made in the treatment room Reevaluate present state and physical state Explanation repeat to sufferer about anesthesia plans.
	Preparation in The Operating Room	Setting up the anesthesia machine and gas flow Setting up the monitor and anesthesia card Preparing medications and anesthesia equipment Preparing medications and resuscitation devices Re-evaluation of the patient's present status

Operations Management

Anesthesia Plan

STATICS Anesthesia

Awake Intubation GA-ETT

Preparation: Video Laryngoscope, Fiber Optic, Boogie

Premediation : -

Analgetik : Fentanyl 100 mcg IV

The patient was awake intubated using a direct laryngoscope but the plica vocalis was not visible at all then it was decided to use a video laryngoscope but the plica vocalis was not visible, then it was decided to use fiber optic but also the plica vocalis was not visible so that because the patient already looked tired and mucus was getting more and more in the mouth, the last option was decided with a tracheostomy with local anesthesia.

Table 2. During Operation

1.	Hemodynamic	Blood pressure systole and diastole 100-140 mmHg/ 60-80 mmHg, heart rate 60-90x/min, respiratory rate 14 x/min, oxygen saturation 98-99%.
	Inlet liquid	EBV : 2600 ml
		Maintenance : 80 ml
		Fast : 640 ml
		Operation : 240 ml
		1 Hour : 640 ml
		2 Hours : 480 cc

		3 Hours : 480 ml
		4 hours on wards
		Length of operation
	Post operation	Analgesic : Fentanyl 20- 30 mcg/jam iv
		Therapy : ICU Room

Post Operation

Analgesic : Fentanyl 30- 50 mcg/jam iv

Therapy : ICU Room

Result and Discussion

Airway management difficulties are a clinical situation where anesthesiologists have difficulty administering ventilation masks in the upper airway, difficulty intubating the trachea, or both (Apfelbaum et al., 2022; Rosenblatt & Yanez, 2022). Airway management in patients is a major problem in the case of general anesthesia (GA). Airway management involves procedures to ensure that the airway remains open (Brewster et al., 2020; Kornas et al., 2021). An inability to clear the airway ineffectively is the inability to expel secretions or overcome airway obstruction, so that the airway cannot remain open. If this nursing problem is not treated immediately, it can lead to severe breathing difficulties, even leading to death (Auyezkhankyzy et al., 2024; Singh et al., 2023; Hidayati et al., 2022). Airway management difficulties can be classified into Bag Mask Ventilation (BMV) difficulties, intubation difficulties, Supraglottic Airway Device (SAD) difficulties, and cricothyroidotomy difficulties. Airway management based on the Difficult Airway Algorithm and watershed is divided into 4 plans. Plan A facemask ventilation and tracheal intubation, plan B maintaining oxygenation: supraglottic airway device insertion, plan C facemask ventilation, and plan D emergency access in front of the neck.

Airway patent management can prevent airway interference by installing airway devices (Bedolla, 2022; Bao et al., 2023; Miller et al., 2023). Airway management aims to address blockages caused by the tongue, foreign bodies, mucosal fluid, blood, or stomach contents. In addition, cervical fractures can also cause blockages in the airway. This condition can result in an emergency that, if not treated immediately, can be life-threatening or cause disability in the patient (Hasnia et al., 2023). A female patient, 39 years old with a mandibular tumor, will have a mandiblectomy with reconstruction and free fibular flap (Sproll et al., 2020). A surgical procedure is a surgical procedure that involves the left Fibula tissue (Williams et al., 2021). The first thing that is done is to conduct a preoperative evaluation, which is to check the physical status, and also determine the complications that patients can get during surgery or post-surgery and prepare drugs or tools to overcome the complications (Horvath et al., 2021; Nidadavolu et al., 2020). Good preoperative preparation will prevent complications from occurring in a very small number, which is less than 2-3%.

Physical status is obtained from anamnesis, physical examination, and support. This patient has ASA III status. Patients with Mandibular Tumors can pose a challenge for anesthesiologists for airway management because when a failed tracheal intubation occurs, it can lead to significant morbidity and mortality. Difficulties in perioperative airway management in patients with mandibular tumors due to intubation and extubation can be difficult. Therefore, careful evaluation and planning, as well as in-depth discussions with surgeons, are essential to avoid unnecessary complications in patients with mandibular tumors. Some of the factors that can cause airway difficulties during the perioperative period in these patients include

obstruction due to tumor growth, anatomical changes and fibrosis from previous surgery or radiotherapy, edema around the airway due to surgical manipulation, significant risk of bleeding due to surgical procedures or airway manipulation attempts, as well as the risk of pulmonary aspiration. Airway management in patients with mandibular tumors can usually be done with adequate induction of general anesthesia, which is designed to address and reduce these risks. However, careful preparation and collaboration between the surgical and anesthesia teams are essential to ensure the safety and effectiveness of the procedure.

In patients with mandibular tumors, a series of physical examinations are performed to monitor vital and general conditions. This monitoring includes measurements of blood pressure, pulse, body temperature, respiratory rate, as well as routine physical examinations such as height, weight, general condition of the patient, and level of consciousness. In addition to physical examinations, a number of laboratory examinations are also required. It includes blood analysis to measure hemoglobin (Hb) levels, leukocyte count, blood type, hemostasis function, and other clinical chemical parameters. For further evaluation, supporting examinations such as a plain photo of the PA thorax to see the condition of the lungs, an electrocardiogram (ECG) to assess heart function, and a CT scan of the head, midface, and colli were also carried out to get a detailed picture of the tumor and the anatomical structures involved. These examinations aim to ensure the patient's readiness to undergo the necessary medical or surgical procedures and to identify potential complications.

In the examination of the predictor of Bag-Mask Ventilation difficulty in the form of MOANS, 'M' Mask seal/ male sex/ Mallampati was obtained: female patient, beard and mustache were absent, Mallampati score IV. 'U' GUnderweight: Patient's BMI is 15.4 kg/m². 'A' Age: 39 years old. 'N' No teeth: normal teeth. 'S' Stiff lung/snoring: patients do not have COPD, asthma, ARDS. However, the patient snores and hoarseness is absent. In the examination of intubation difficulty with the 'LEMON' criterion, it was found that 'L' Look externally there was a right jaw lump cm with an infirm boundary, solid consistency, and pressure pain (+). Large incisor teeth are absent, large tongues are absent. 'E' Evaluated obtained 3-finger interincisor liquor, 3-finger mentohyoid distance, 2-finger hyothiroid distance. 'M' Mallampati in this patient is a class IV mallampati. 'O' Obstruction appears to be a mass on the right jaw, recumbent, irregular edges. 'N' Flexion and neck deflection are normal.

Surgical management with the Awake Intubation technique begins with the administration of fentanyl 100 mcg intravenously. Fentanyl is an opioid with a short-acting and potent analgesic effect. The administration of this drug aims to reduce pain, minimize the somatic and autonomic responses that may arise during the procedure, and help maintain the patient's hemodynamic stability. In addition, fentanyl is also designed to reduce the risk of respiratory depression, although it still provides effective control of pain during the intubation process in awake patients. To ensure the success of ventilation with a facemask, the first step is to choose the size of the facemask that fits the patient's face. A well-fitting mask will cover the nose and mouth well, minimizing the risk of air leakage. Once the right size is selected, the mask is then connected to the anesthesia machine. It is important to ensure that there are no leaks at the joints or around the mask, as leaks can reduce the effectiveness of ventilation and interfere with the optimal oxygen supply to the patient.

The watershed recommends a maximum of three intubation attempts, a fourth attempt by a more experienced one is allowed. If it is unsuccessful, it must be stated that the intubation failed and plan B is implemented. The predictors of the success of plan B in the form of RODS criteria in this patient were obtained, 'R' Restricted mouth opening : none, 'O' Obstruction/obesity : mass appeared in the superior gingiva with an extra size of 4x3 cm, recumbent, irregular edges. 'D' Disrupted or distorted airway : patients have no permanent spinal flexion deformity, neck injury with hematoma, and pharyngeal abscess. 'S' Stif : the patient has no intrinsic barriers to ventilation such as asthma and pulmonary edema. The next

airway management if it still fails can be continued with cricothyroidotomy, where the attempt to install orotracheal intubation has failed or is considered to have a level of risk. Cricothyrotomy is an action to overcome airway obstruction in the larynx. This is done by opening the cricothyroid membrane quickly using a needle (needle cricothyrotomy). Usually, cricothyrotomy is carried out in an emergency with a shorter time (Tama Tobing & Wijaya, 2020).

This procedure involves making an incision in the cricothyroid membrane, which is located between the thyroid and cricoid cartilage, and inserting a tracheostomy tube into the trachea to allow for ventilation. The predictors of difficulties in the form of SMART in this patient are 'S' Surgery (recent or remote): none, 'M' Mass : no hematoma or infective process of abscess or mass in the cricothyrotomy pathway, 'A' Access/Anatomy : the patient does not have a short neck or pannus, 'R' Radiation : the patient has never received radiation therapy before, and 'T' Tumor : There is a tumor in the location of the patient's superior gingiva dextra, no tumor in the cricothyrotomy pathway. Another drug given is ketorolac 30 mg, which is a non-opioid analgetic of the NSAID group that does not stimulate opioid receptors so that it does not cause the effects of depression, breathing, sedation, and euphoria. Ondancetron 8 mg intravenously is administered as a prophylaxis for Post Operative Nausea and Vomiting (PONV). After the surgery was completed, the patient was transferred to the Intensive Care Unit (ICU) to undergo intensive monitoring of his hemodynamic condition. Hemodynamic monitoring involves monitoring blood pressure, heart rate, oxygen saturation, and other important parameters to ensure postoperative cardiovascular stability. Transferring to the ICU aims to provide more intensive care and immediately deal with if there is a change in condition that requires medical intervention.

Conclusion

Airway management difficulties can be classified into BMV difficulties with the "MOANS" predictor factor, intubation difficulties with the "LEMON" predictor factor, SAD difficulties with the "RODS" predictor factor and cricothyroidotomy difficulties with the "SMART" predictor factor. The safest airway management is when potential problems are identified before surgery, allowing the implementation of a strategy, a series of plans, aimed at reducing the risk of complications. Airway management based on the Difficult Airway Algorithm and DAS is divided into 4 plans (A, B, C, D), starting with doing plan A, if plan A does not succeed with plan B, and so on until plan D. Difficulties with airway management and its implications for postoperative care, in addition to verbally, the airway management plan must be documented in the medical record. The plan of anesthesia in this patient is general anesthesia with a Naso-tracheal tube. The patient is given analgetics, then the patient is induced and anesthesia maintenance is carried out during the operation. During surgery, the patient is in a stable condition based on monitoring of the vital signs of the surgical durante. After surgery, the patient was given analgetic medication and in room treatment.

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