Syntax Literate: Jurnal Ilmiah Indonesia p–ISSN: 2541-0849
e-ISSN: 2548-1398
Vol. 10, No. 2, Februari 2025

AIRWAY MANAGEMENT USING AWAKE FIBEROPTIC IN THYROID TUMORS: CASE REPORT

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Abstract

This case report aims to evaluate the effectiveness of the awake fiberoptic intubation (AFOI) technique in airway management for a patient with a thyroid mass. This is a descriptive case report that provides a detailed account of airway management in a patient with a thyroid mass. The subject of this study is a 47-year-old female with a thyroid mass. Data were collected through history-taking, physical examination, radiographic evaluation, and assessment using criteria such as MOANS, LEMON, and RODS to identify potential airway challenges. Anesthetic management and the intubation process were meticulously documented during surgery, including vital signs, drug administration, and the intubation procedure. The data were then presented in a narrative format, supported by preoperative clinical images, radiographic evaluation, and intraoperative monitoring. The results indicate that various airway assessment tests can predict difficult airway scenarios, and this case was successfully managed following ASA guidelines. The AFOI technique, which includes premedication, local anesthesia, and sedation, demonstrated a high success rate with minimal complications. In this case, AFOI was successfully performed via the oral route, with the patient remaining calm, awake, and cooperative throughout the procedure.

Keywords: AFOI, airway management, thyroid mass, difficult airway

Introduction

Difficult intubation occurs in 1.5% to 8% of patients undergoing elective surgery under general anesthesia, with inadequate airway management could lead to respiratory events resulting in permanent cerebral damage or death due to hypoxia (Apfelbaum et al., 2022). The American Society of Anesthesiologists (ASA) Task Force defines difficult endotracheal intubation as requiring more than three attempts or more than 10 minutes with conventional laryngoscopy. Difficult Airway Society (DAS) guidelines defined difficult airway as as 'the clinical situation in which a conventionally trained anesthesiologist experiences difficulty with face mask ventilation of the upper airway, difficulty with tracheal intubation, or both' (Galway et al., 2023).

Thyroid cancer is a relatively uncommon malignancy, accounting for approximately 1-2% of all cancers worldwide, with an estimated incidence of 10-15 cases per 100,000 individuals per year (Zhang & Xu, 2024). The majority of thyroid cancers are well-differentiated, including papillary (80-85%) and follicular carcinoma (10-15%), which generally have favorable prognoses. However, poorly differentiated and anaplastic thyroid cancers, although rare, present significant clinical challenges due to their aggressive nature and potential for extensive local invasion.

One of the major concerns in thyroid malignancies is airway management, particularly in cases where the tumor causes tracheal compression, deviation, or infiltration. Patients may present with symptoms of dyspnea, stridor, dysphagia, or voice changes, indicating potential upper airway obstruction (Shaha, 2008). These factors significantly increase the risk of difficult airway management, necessitating a well-prepared and multidisciplinary approach, especially during anesthesia induction.

This case report discusses a patient with thyroid cancer presenting as a difficult airway, highlighting the challenges encountered, airway management strategies employed, and perioperative considerations to ensure a safe and effective outcome.

Research Methods

This study employs a descriptive case report, aimed at providing a detailed account of the anesthetic management in a patient with thyroid cancer presenting as a difficult airway. The subject is a 47 year-old female weighing 50 kg, with a height of 150 cm and a body mass index (BMI) of 22.22 kg/m². The patient has a history of progressive thyroid enlargement, leading to tracheal compression, deviation, and airway obstruction, resulting in difficult airway management challenges.

Data were collected through physical examinations, radiographic evaluations, and airway assessments using criteria such as MOANS, LEMON, RODS, and SMART to evaluate the complexity of intubation. Detailed data on anesthetic management and the intubation process were recorded intraoperatively. Additionally, vital signs, medication administration, airway management strategies were meticulously documented as part of the perioperative monitoring process.

The collected data were analyzed descriptively to portray the patient's clinical condition before and after intervention, and to assess the effectiveness of the anesthetic and surgical approaches in ensuring airway safety and optimal surgical outcomes. The results of this analysis will be presented in a narrative format, supported by preoperative imaging, intraoperative findings, and postoperative outcomes.

Results and Discussion

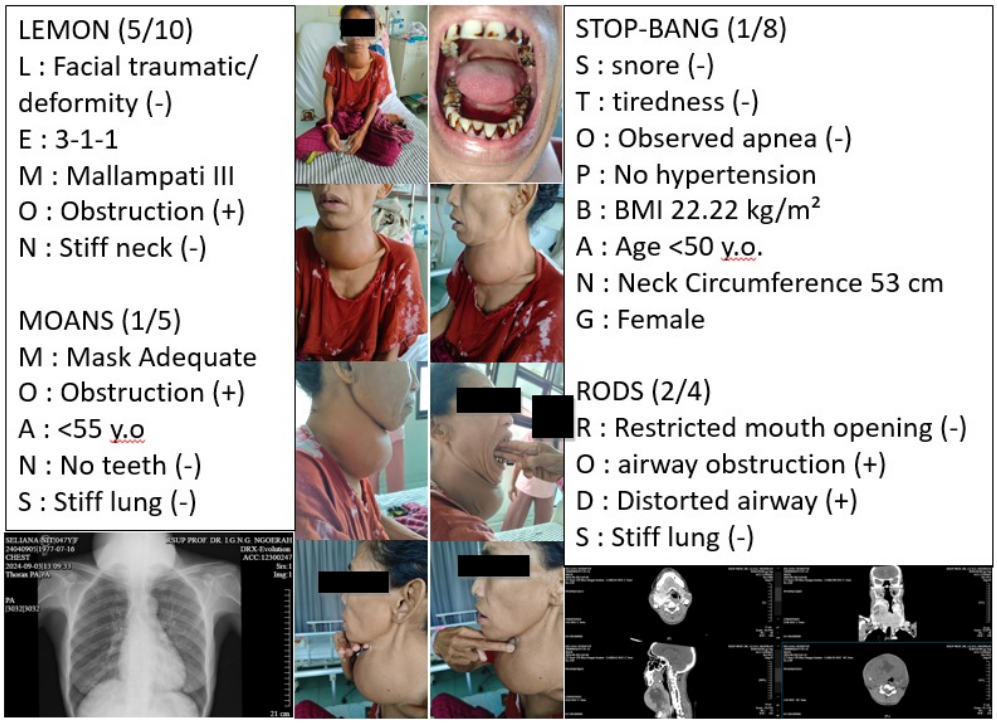


Figure 1. Difficult Airway Assessment

A 47-year-old female, weighing 50 kg, with a height of 150 cm and a body mass index (BMI) of 22.22 kg/m², presented with progressive thyroid enlargement causing airway compression and deviation. The patient reported symptoms of dyspnea, dysphagia, and intermittent stridor, indicating significant airway obstruction.

Physical examination revealed a palpable anterior neck mass, firm in consistency with limited neck extension due to mass effect and potential tracheal deviation. Laryngoscopic examination showed narrowing of the glottic opening, while radiographic imaging (CT scan and X-ray) confirmed tracheal displacement and possible invasion into adjacent structures. The patient also had hoarseness, suggesting vocal cord involvement.

Given the high-risk airway status, a thorough preoperative evaluation was conducted using MOANS, LEMON, RODS, and SMART criteria to assess potential intubation difficulties. The presence of restricted neck mobility, airway compression, and distorted anatomy necessitated careful planning for airway management during anesthesia induction.

As seen in Figure 1, assessment using various scoring criteria further highlighted the challenges posed by the patient's condition. The LEMON score for this patient was 5 out of 10, indicating a moderate risk of difficult intubation. The Look evaluation found no traumatic deformity or facial fractures. The Evaluate component scored 3-1-1, indicating moderate difficulty in airway assessment. The Mallampati classification was III, suggesting a higher risk of difficult intubation. Additionally, the presence of airway obstruction contributed 2 points, while neck mobility was not limited.

The MOANS score was 1 out of 5, with an adequate mask seal but a positive finding for obstruction. The patient was under 55 years old, had no missing teeth, and had no stiff lungs. While the mask seal was satisfactory, the presence of airway obstruction indicated a potential challenge during airway management. The STOP-BANG score was 1 out of 8, suggesting a low risk for obstructive sleep apnea (OSA). The patient did not snore, and there were no significant findings for observed apnea, tiredness, hypertension, or BMI concerns. However, the patient's neck circumference was 53 cm, which presented a potential concern for airway management. The RODS score was 2 out of 4, indicating a moderate risk for difficult intubation. There was no restricted mouth opening, but airway obstruction and distortion were present. The Upper Lip Bite Test classified as II, indicating some difficulty with laryngoscopy. There were no issues with stiff lungs or cervical spine mobility. The Wilson Risk Criteria score was 2, suggesting possible difficult intubation. This score was influenced by the patient's moderate receding mandible (1 point) and moderate buck teeth (1 point), while other anatomical considerations (weight, head and neck mobility, inter-incisor gap) did not contribute additional risk. The patient was a housewife, engaging in daily moderate activities. She was a non-smoker with no history of alcohol consumption. Other physical examination findings, thoracic radiographs, and laboratory tests showed relatively normal results, except for mild anemia (Hb: 10.8 g/dL) and elevated thyroid function tests (TSH suppressed, high FT4 levels). The anesthetic classification was ASA III, indicating a moderate-to-severe pre-anesthesia condition due to airway compromise and thyroid dysfunction. The surgical diagnosis was thyroid carcinoma with airway compression, requiring a total thyroidectomy. The planned surgical intervention included total thyroidectomy for adequate tumor resection and airway decompression.

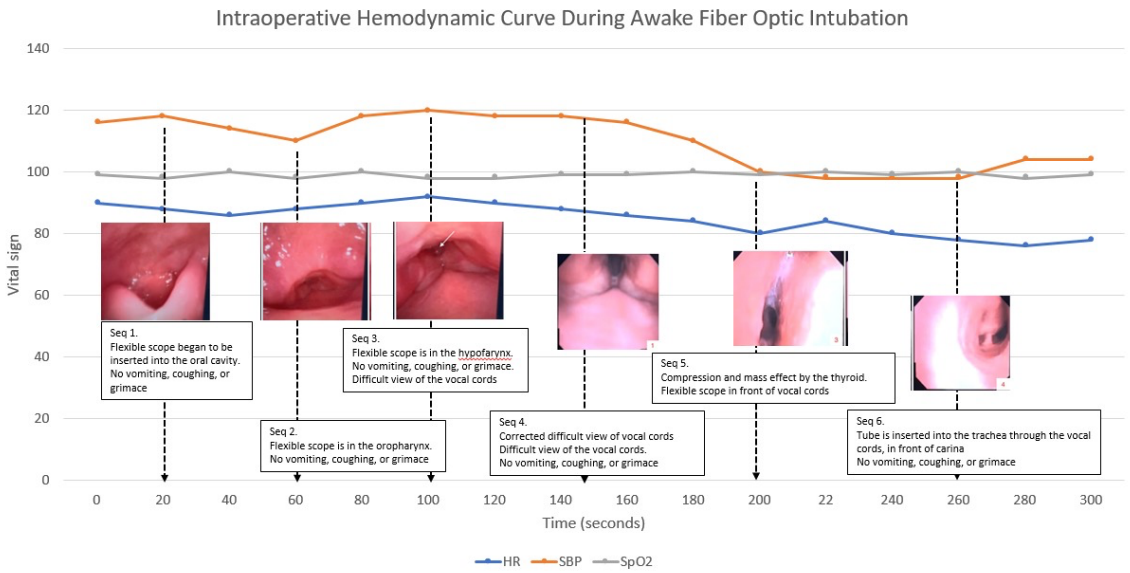


Figure 2. Hemodynamic Monitoring during AFOI. HR : Heart Rate; SBP : Systolic Blood Pressure; SpO2 : Peripheral Oxygen Saturation

A comprehensive anesthesia plan was designed to manage the anticipated difficult airway while ensuring optimal surgical conditions for the total thyroidectomy. The airway management strategy incorporated awake fiberoptic intubation (AFI) due to the presence of airway compression and anatomical distortion from the thyroid mass. Upon arrival in the preoperative area, the patient's vital signs were monitored, and pre-oxygenation with 100% oxygen was initiated. To facilitate airway preparation, the patient received Nebulization with 3 mL of 4% lidocaine (120 mg) and 10% lidocaine spray (10 mg per nostril) for nasal passage anesthesia. In the operating room, additional topical anesthesia was administered to the oral cavity and oropharynx using 10% lidocaine spray (30 mg total). To minimize patient discomfort and suppress the gag reflex, dexmedetomidine (50 mcg, ~1 mcg/kg) was titrated over 10 minutes for mild sedation while preserving spontaneous breathing. A flexible fiberoptic bronchoscope (FOB) was introduced via the oral route under topical anesthesia. At 35 seconds, after successfully visualizing the glottic opening, 2% lidocaine (40 mg) was sprayed using the Spray-As-You-Go (SAYGO) technique, and an additional IV lidocaine (80 mg) was administered to suppress airway reflexes. At 75 seconds, the FOB was carefully advanced into the trachea, ensuring proper positioning. At 150 seconds, a non-kinking endotracheal tube (ETT) (internal diameter 6.0 mm) was inserted under direct FOB guidance, with the patient awake and cooperative. After confirming bilateral chest expansion and appropriate end-tidal CO_2 waveform, the patient was induced with : IV propofol 100 mg, IV fentanyl 150 mcg, IV atracurium 50 mg for muscle relaxation. The patient airway were clear throughout the surgery with no complications.

Airway management is the main task of an anesthesiologist, in which difficulty in inserting an endotracheal tube is crucial and cardiac arrest is most likely to occur in patients with pre-intubation shock or hypoxemia, with a reported incidence of 1% (Artawan et al., 2024). The prevalence of difficult laryngoscopy or intubation varies between 0.7% and 31.3%. Difficult airway assessments are essential for preoperative evaluation in patients undergoing total thyroidectomy, as large goiters, tracheal deviation, and limited neck extension may contribute to airway management challenges (Raval & Rahman, 2015). Anticipating a difficult airway allows anesthesiologists to formulate appropriate airway strategies to ensure patient safety during anesthesia induction and intubation. A difficult airway may lead to complications such as difficult mask ventilation, multiple intubation attempts, and increased risk of hypoxia (Kollmeier et al., n.d.). Various clinical predictors are used to assess airway difficulty, including Mallampati grading, thyromental distance, sternomental distance, neck circumference, and cervical mobility (Kaur et al., 2017).

The American Society of Anesthesiologists (ASA) 2022 Guidelines for managing difficult airways provide a structured approach using a decision tree model. The LEMON criteria—evaluating external appearance (L), the 3-3-2 rule (E), Mallampati score (M), obstruction (O), and neck mobility (N)—is valuable in predicting difficult intubation (Kaur et al., 2017). In this case, a LEMON score of 7/10 suggested a high likelihood of difficult laryngoscopy due to restricted neck mobility and airway compression from the

goiter (Apfelbaum et al., 2022). The patient had no airway obstruction or severe mask-seal issues, but tracheal deviation and limited neck extension increased the risk of difficult ventilation. The RODS criteria (Restriction, Obstruction, Disrupted anatomy, Short thyromental distance), showed an elevated score indicated potential difficulty due to tracheal deviation and mass effect from the goiter (Baik et al., 2018).

Considering these factors, awake fiberoptic intubation (AFOI) was chosen. The ASA guidelines strongly recommend AFOI for anticipated difficult airways in order to maintain spontaneous ventilation, reducing the risk of hypoxia and "cannot intubate-cannot oxygenate" scenarios (Galway et al., 2023; Johnston & Rai, 2013). AFOI is reported to have a success rate between 88–100% depending on operator expertise, with a lower risk of complications compared to conventional intubation techniques (Bodilsen et al., 2020). Awake fiberoptic intubation (AFOI) is a suitable option for anticipated difficult intubation. However, the success and comfort of AFOI depend a lot on airway anesthesia.(Gede Patria Demoina et al., 2019)

AFOI involves three key components: premedication, topical anesthesia, and sedation. To facilitate a smooth and comfortable intubation, dexmedetomidine infusion (50 mcg over 10 minutes) was administered due to its anxiolytic, sedative, analgesic, and respiratory-preserving effects (Verma et al., 2021). A study of eligilble 135 patients undergoing tracheal intubation reported that AFOI resulted in fewer airway complications, reduced hemodynamic instability, and minimized postoperative airway edema compared to direct laryngoscopy (Kriege et al., 2023). As shown by Mishra et al, that inadequate of topicalization of local anesthesia remains a leading cause of AFOI failure, causing a reattempted intubation (Vasu et al., 2017). A systematic review of awake intubation techniques highlighted the advantages of dexmedetomidine over traditional sedatives, as it provides better patient tolerance, stable hemodynamics, and minimal respiratory depression (Tang et al., 2021). Previous experimental study showed that nebulized lidocaine is more effective than intravenous lidocaine in reducing the hemodynamic changes associated with direct laryngoscopy and endotracheal intubation. (Saeed et al., 2024).

In this patient, we chose AFOI with SAYGO technique to provide topical anesthesia and sedation using Dexmedetomidine and to ensure the intubation process was smooth to reduce the risks of failed intubation or the patient discomfort. Topical anesthesia was achieved using a combination of lidocaine nebulization (120 mg of 4% solution), lidocaine spray (50 mg of 10% solution to nasal, oral cavity, and throat), and the spray-as-you-go (SAYGO) technique with 40 mg of 2% lidocaine solution applied directly to the vocal cords via fiberoptic bronchoscope. The endotracheal tube (ETT) was successfully placed via the mouth using a non-kinking ETT (size 6.0 mm internal diameter) under fiberoptic guidance, with the patient remaining awake, cooperative, and hemodynamically stable throughout the procedure of AFOI. By using this approach, we found several benefits, such as enhanced patient comfort meanwhile maintaining the airway patency by ensuring the effective analgesia and hemodynamic stability. But then, we also found several limitation by this approach, in which, this success of this method

can only be achieved by the patient cooperation, and the detailed calculated lidocaine dosage to avoid the risk of LAST. A Success of AFOI requires fiberoptic equipment and an experienced operator, which may not always be available in emergency settings.

Conclusion

In patients undergoing total thyroidectomy, factors such as large goiters, tracheal deviation, and restricted neck mobility increase the likelihood of airway challenges. Awake fiberoptic intubation (AFOI) remains the preferred technique in these cases, offering high success rates and reduced complication risks.

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