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Case Report

# Dexmedetomidine for Awake Intubation Procedure in Subtotal Thyroidectomy

Riandini Pramudita[1], Paramita Putri Hapsari[2]
[1]Residency Program of Anesthesiology and Intensive Therapy, Medical Faculty, Universitas Sebelas Maret, Surakarta, Indonesia
[2]Department of Anesthesiology and Intensive Therapy, Dr Moewardi Hospital, Surakarta, Indonesia

**ABSTRACT**

**Background:** Giant struma makes airway management difficult for the anesthesiologist due to the risk of tracheal intubation failure. Awake fiberoptic intubation (AFOI) is the gold standard in the management of a predicted difficult airway. Giving analgesia and sedation can facilitate operator and patient comfort during the awake intubation procedure.
**Case:** We report the case of a 63-year-old woman with a giant struma who was planned for a subtotal thyroidectomy. We provide ondansetron and dexamethasone premedication, analgesia and sedation using dexmedetomidine, propofol induction, muscle relaxant atracurium, with maintenance anesthetic sevoflurane. Dexmedetomidine was administered on loading dose 0.8 µg /kg/hour in the first 10 minutes then continue on analgesia dose 0.2 µg /kg. During the AFOI procedure, 100% oxygenation was given with the patient's hemodynamic range, namely systolic blood pressure of 110-131 mmHg, diastolic blood pressure of 75-93 mmHg, heart rate of 77-91 beats per minute, and SpO2 of 98-100%. Postoperatively the patient was transferred to the Intensive care unit (ICU) with an endotracheal tube intube. Monitoring of postoperative complications such as production of thyroid crisis drainage and extubation 24 hours after surgery was confirmed by the cuff leak test.
**Conclusion:** Giving dexmedetomidine is better than opioids in the AFOI procedure because of its minimal respiratory depressant effect. Maintaining hemodynamic stability during the AFOI procedure is very important to avoid hemodynamic fluctuations so it can minimize the risk of perioperative complications.

Keywords: giant struma, airway management, AFOI, dexmedetomidine, thyroidectomy

**Correspondence:**
Riandini Pramudita Riyanti, MD*
Residency Program of Anesthesiology and Intensive Therapy, Medical Faculty, Universitas Sebelas Maret, Surakarta, Indonesia
e-mail: riandini.pramudita@student.uns.ac.id

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## INTRODUCTION

The struma refers to an abnormal enlargement of the thyroid gland.[1] The prevalence of struma varies from 80% in iodine-deficient areas (Southeast Asia, South America, and Africa) to 1%-4% in iodine-rich regions of developed countries.[2] Patients with very large neck enlargement make airway management difficult for the anesthesiologist because the failure of tracheal intubation can result in significant morbidity and mortality. In cases such as a large multinodular struma, there is limited neck movement, limited mouth opening, tracheal deviation, and tracheal compression. Awake fiberoptic intubation (AFOI) is the gold standard in managing a predicted difficult airway. This method is a technique that allows a flexible oral/nasal route to provide clear visualization of the vocal folds and the endotracheal tube from the endotracheal tube (ETT) into the trachea with direct vision through a live screen.[3] This method can be performed on an awake patient after administration of a local anesthetic, with sedation or a combination of both to limit airway reactivity. During the AFOI procedure, cough and laryngeal spasm can be problematic as a side effect of intubation. Hence, analgesia and sedation are mandatory for patient comfort and surgical procedure. When AFOI is used without sedation, the patient will become uncomfortable, resulting in a hemodynamic response and inducing catecholamine release due to sympathetic stimulation. Sedation can relieve awake intubation, but it must be done with caution and monitored because it can cause airway obstruction and hypoxemia.

## CASE

A 63-year-old female patient was hospitalized with a diagnosis of Giant Struma and was planned for a subtotal thyroidectomy treatment. The patient came on March 21, 2021, with complaints of a lump on the left side of the neck for the last 15 years.

The lump was initially the same size as a marble, but over time it grew. The patient did not complain of lumps elsewhere. The patient complains of hoarseness because the lump is getting bigger, and it is difficult to sleep in the supine position. The patient has a history of hypertension but does not take medication regularly. History of other diseases such as diabetes mellitus, asthma, and medicine allergy was denied.

On physical examination, the patient appeared compos mentis, GCS E4V5M6, with a blood pressure of 170/90 mmHg, pulse rate of 76 beats per minute, respiratory rate of 16 beats per minute, and O2 saturation of 92% supine position with room air, 96% with a nasal cannula with the supine position. On examination of the airway, the airway is free from obstruction, open mouth with three fingers, mallampati II, limited neck motion, and toothless (+). On local status examination, a mass measuring 21x18x18 cm was found, mobile, color-like surrounding tissue, with no tenderness in the left colli region (Figure 1). For physical examination of other body systems within normal limits. Based on the history and physical examination, a thyroid giant goiter was suspected. This is the basis for scoring the Wayne index and obtaining a euthyroid classification.


**Figure 1.** Giant Struma

Blood laboratory examination showed the value of T3: 0.90, FT4: 18.41, and T4: 8.35. Electrocardiographic examination revealed a normal sinus rhythm at 72 beats per minute, with left axis deviation. Posterior-anterior chest radiograph revealed a large mass covering the superior lung area and cardiomegaly (Figure 2). Colli computed tomography (CT) scan showed a large cystic mass, tending to be round, with relatively firm borders measuring 21.8 x 16.8 x 18.3 cm, which most likely grew from the left thyroid, compressing surrounding organs and constricting the trachea to the posterodextra (Figure 3).

Based on the physical examination and supporting examination, the patient had a history of stage II hypertension, so the patient was consulted to the cardiac department and diagnosed with stage II hypertension receiving preoperative therapy of amlodipine 1x10 mg, postoperative therapy of ramipril 1x1.25 mg.

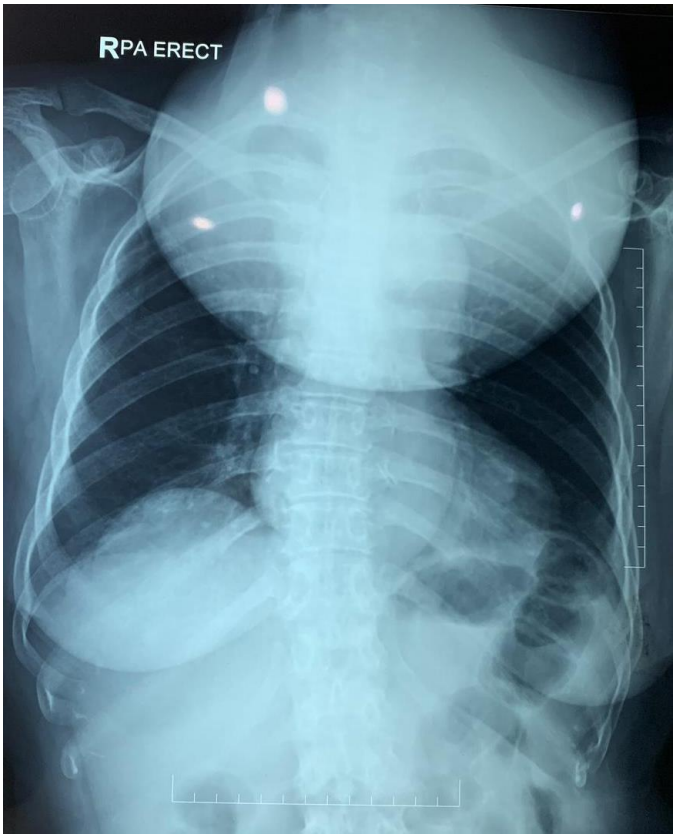


**Figure 2**. Chest Radiograms

**Figure 3**. CT-scan of Colli

The patient physical status was American Society of Anesthesiologists (ASA) II and planned general anesthesia with awake fiberoptic intubation, non-invasive monitoring, and postoperative care in the intensive care unit. Prior to anesthesia, the patient was given premedication using ondansetron 4 mg and dexamethasone 5 mg. The patient was then given dexmedetomidine at a dose of 0.8 µg/kg for 10 minutes and followed by a dose of 0.2 µg /kg/hour with close hemodynamic

monitoring. Five minutes before the fiber optic procedure was performed, the patient was given a spray of prilocaine in the oropharynx as a local anesthetic. The patient was intubated using a size 7.0 non-bend endotracheal tube with 100% oxygenation maintained throughout the AFOI procedure. During the AFOI procedure, the systolic blood pressure was 110-131 mmHg, a diastolic blood pressure of 75-93 mmHg, a heart rate of 77-91 bpm, and a $SpO_2$ of 98-100%. After the patient was intubated and confirmed by auscultation, the patient was anesthetized using 50 mg propofol and given the muscle relaxant atracurium 25 mg, then maintenance using sevoflurane 1.8 vol %. From the operation, a goiter was found, and a subtotal thyroidectomy was performed. During the operation, 700 ml of crystalloid was given, and the operation went smoothly without any complications. After the operation was completed, the patient was transported to the intensive care unit (ICU) with an ET intube. While in the ICU, the patient was monitored for postoperative complications such as drainage of thyroid crisis production for 24 hours and extubation 24 hours postoperatively after confirmation using the cuff leak test.

## DISCUSSION

Subtotal thyroidectomy is a surgical procedure that removes most of the thyroid tissue in both lobes. Massive thyroid enlargement is a major challenge for the anesthesiologist. When the struma is large and retrosternal, it can compromise the airway by causing compression and deviation of the trachea in addition to damaging other airway structures. Bouaggad et al., have shown that there is an increased incidence of difficulty in endotracheal intubation with tracheal deviation, compression, presence of dyspnea, grade III and IV mallampati, and neck mobility < 90°.[3] Our case meets all of these criteria. Because a failed intubation can lead to morbidity and mortality, this should be assessed beforehand, and the possibility of intubation should be planned in advance. Various techniques can be used to treat difficult airways in patients with goiter. If the size of the thyroid swelling is small, the airway examination is normal, and there is no tracheal compression or deviation, we can continue with conventional airway management.[4,5] Our patient was a case of large struma with difficult airway and tracheal compression. Therefore, we chose AFOI to secure the airway. We did not plan direct laryngoscopy because of the large mass, limited neck movement, and hoarseness of the patient's voice, with a CT scan showing a tracheal deviation. Large struma causes decreased neck movement, and dyspnea when lying down shows the tracheal compression.[6] In 2005. Ovassapian et al. stated that several attempts were traumatic and often resulted in failed intubation. We did not plan a tracheostomy in our case because a large goiter covered the trachea.[7]

Dexmedetomidine is a potent specific α-2 adrenergic and is highly selective. Dexmedetomidine has a very high density of α-2 receptors present at the locus pontine coeruleus, an important source of innervation of the forebrain sympathetic nervous system and is an important modulator of wakefulness. The sedative effect of dexmedetomidine usually reflects inhibition of this nucleus. Compared with clonidine, dexmedetomidine is 7 to 10 times more selective as an α-2 receptor and has a shorter duration.[8] Based on this, dexmedetomidine is a full agonist of the α-2 receptor, whereas clonidine is a partial agonist. The sedative effect of dexmedetomidine comes from a decrease in sympathetic nervous system activity and the level of sedation. The use of dexmedetomidine allows the patient to breathe in a spontaneous breathing pattern during the intubation process.[8] Besides hemodynamic stability, there are anxiolytic and analgesic properties. The use of this drug is to show minimal respiratory depression.[9] Dexmedetomidine causes a decrease in pulse rate and blood pressure by inhibiting central sympathetic outflow, which previously suppresses the direct effect of dexmedetomidine on blood vessels.[9] Dexmedetomidine causes minimal respiratory distress and does not decrease arterial oxygen saturation < 90 even if given in large doses.[10] Ramsay and Luterman also reported the use of high-dose dexmedetomidine (0.9-1 μg/kg/hour) in three patients and demonstrated that the airway could be maintained with adequate breathing.[10,11]

Patients who undergo awake fiberoptic intubation should be given drugs that can reduce the sympathetic response to the action of intubation and prevent cardiovascular changes. Various drug options can be given, such as local anesthetics, opioids, benzodiazepines, α-2 adrenoreceptor agonists, or less commonly used such as propofol and ketamine. To achieve ideal conditions for AFOI, the patients must be comfortable and obedient so that there will be no excessive oropharyngeal secretion or blood, and with the ability to maintain spontaneous ventilation to tolerate the fiberscope to facilitate fiber-optic intubation. Good medicine for this procedure is short-acting, easily titrated to obtain an adequate level of sedation, and has minimal effect on spontaneous ventilation. Typically, opioids in combination with benzodiazepines are complete sedation for the action of AFOI. It has been widely reported that sufentanil, alfentanil, fentanyl, and other opioids can minimize hemodynamic changes caused by AFOI procedures. However, opioids carry a risk of respiratory depression. Remifentanil is currently being studied for its analgesic and antitussive effects during awake intubation and patient communication.

Postoperatively the patients could not be extubated quickly because the patient had an abnormal airway. Postoperatively, the neck region required mechanical ventilation in the ICU to monitor the possibility of hemorrhage from the drain and postoperative complications.

## CONCLUSION

Maintaining hemodynamic stability during the AFOI procedure is very important to avoid hemodynamic fluctuations so as to minimize the risk of perioperative complications. In the AFOI procedure, it is very important to give proper analgesia and sedation, such as analgesia that has a fast onset, does not depress the breath and has a sedative effect. This analgesia is given based on the patient's general condition, preoperative conclusions, and other available alternative agents if adequate analgesia targets are not achieved. The administration of dexmedetomidine is superior to opioids in this regard because it has analgesic and sedation and does not suppress respiration.

## ACKNOWLEDGMENT

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## CONFLICT OF INTEREST

None

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