

# Airway management of a huge thyroid mass: A case report

## Dev tiroidal kitlede havayolu yönetimi: Olgu sunumu

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### Abstract

In large thyroidal masses with excessive tracheal shift, the laryngeal opening is usually in the normal position and intubation may not be difficult. However, in some cases, such as retrosternal big thyroid glands, airway management can get challenging. Failure to successfully manage difficult airways is responsible for 30% of deaths attributed to anesthesia, with approximately 600 deaths annually. Successful awake intubation can be performed in 88-100% by considering the appropriate position and experience of anesthesiologist with a fiberoptic bronchoscope. However, the path to be followed should be determined according to each patient.

**Keywords:** Difficult airway, Fiberoptic, Huge goiter, Intubation

### Öz

Özellikle retrosternal guatra bağlı olarak, trakea üzerine bası yapan büyük tiroidal kitleler nedeniyle havayolu kontrolü zor olabilir. Aşırı trakea kayması olan büyük tiroidal kitlelerde bile laringeal açıklık genellikle normal pozisyonda olup, entübasyon zor olmayabilir. Zor havayolu yönetimini başarı ile yönetememek, yıllık yaklaşık 600 ölümlü birlikte anesteziye atfedilen ölümlerin % 30'undan sorumludur. Fiberoptik bronkoskop ile uygun pozisyon ve anestezi uzmanının tecrübesine de bakılarak %88-100'ünde başarılı uyanık entübasyon yapılabilir. Ancak izlenecek yol, her hasta için hastaya göre belirlenmelidir.

**Anahtar kelimeler:** Zor havayolu, Fiberoptik, Dev guatr, Entübasyon

## Introduction

Thyroidectomy is the most common endocrine surgery. Due to compression on the trachea, airway management can be difficult [1]. Preoperative evaluation and management are critical when planning elective thyroidectomy, in which a change in anatomical sites is expected due to a large or substernal goiter. Altered anatomy, laryngeal edema and an inexperienced team may all cause difficulty in intubation. Intubation is rarely difficult if the larynx can be easily seen in preoperative examination. Even in large thyroidal masses with excessive tracheal shift, the laryngeal opening is usually in the normal position and intubation may not be easy. These patients should usually be intubated with a small-sized endotracheal tube to prevent intraoperative surgical trauma. Intubation should be performed by an experienced anesthesiologist who knows different techniques [2]. A large goiter, tracheal compression symptoms and the possibility of malignancy have been found to increase the incidence of difficult intubation in different studies [3].

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## Case presentation

A 77-year-old female patient, who gave her consent for the case report and was evaluated in our outpatient clinic, weighed 77 kg, was 163 centimeters (cm) tall, and had uncontrolled growth of goiter in her history (15 years). She also had hypertension (15 years), and cerebrovascular disease (3 years - at the end of the right upper and lower limb weakness - 3 / 5). The patient, who was ASA II according to American Society of Anesthesiologists guidelines, was planned to undergo right thyroid lobectomy. The patient's large thyroïdal mass had been present for about 15 years but had been causing dyspnea for the last 15 days. She was a non-smoker and had no alcohol use in her history. Atrial fibrillation (AF) was detected on electrocardiogram (ECG). Preoperative anticoagulant discontinuation and low molecular weight heparin were recommended until the operation. She had no previous anesthesia experience. In the preoperative evaluation, she had an exceptionally large thyroïdal mass and the trachea was absent in the midline (Figure 1). Her Mallampati score equated class III and she had a sternomental distance of approximately 15 cm, while the thyromental distance could not be evaluated due to the neck mass. For this reason, "Difficult Intubation" was noted in the patient's preoperative anesthesia file. Although the patient had labored breathing due to the mass, her breathing was adequate, and she was not hypoxic. After determining the date of operation, preparations, and consultation procedures for tracheostomy or cricotomy were performed.

In addition, her physical examination was unremarkable except for loss of strength in the right upper and lower extremities. In laboratory examination, whole blood, liver-kidney function tests, respiratory tests and thyroid hormone levels were in within normal range. Awake intubation was not considered since the size of the mass and the superior laryngeal nerve could not be blocked. Based on the experience of the team for difficult airway and intubation in the operation room, a standard Macintosh laryngoscope set, a variety of face masks - airways, a fiberoptic bronchoscope, and tracheal tube introducer – a bougie and supraglottic airway devices were prepared. In the operation room, ECG, peripheral oxygen saturation and non-invasive blood pressure monitoring were performed. Premedication was administered as 2 mg intravenous (iv) midazolam. Before induction, 100% oxygen was given for 3 minutes, after which 160 mg propofol and 100 micrograms of fentanyl were given. Before the neuromuscular blocker was administered, the patient was ventilated with a face mask. Then, 50 mg of IV rocuronium was administered (Sugammadex was also made available). After waiting long enough for neuromuscular blockade, Cormack-Lehane score was evaluated as IV on direct laryngoscopic examination. Intubation was performed with a fiberoptic bronchoscope by an experienced anesthesiologist due to lack of glottis in view, when the epiglottis was passed, the glottis was deviated to the left, and the spiral endotracheal tube was directed to the trachea via the fiberoptic endotracheal tube. Intubation was confirmed with end-tidal CO<sub>2</sub> and auscultation (Figure 2). Anesthesia was maintained by 50% O<sub>2</sub> + 50% N<sub>2</sub>O + propofol and remifentanyl infusion.

After the operation, which lasted approximately 120 minutes, the right thyroïdal mass (130x100x65mm) (Figure 3) was removed by lobectomy, a drain was placed, and the operation was terminated. The patient was extubated with 2 milligrams of neostigmine and 0.5 milligrams of atropine (IV).

The patient was observed for 1 hour in the postoperative care unit and discharged with medical treatment of the surgical team.



Figure 1: Radiological image of a patient with thyroid mass causing tracheal compression

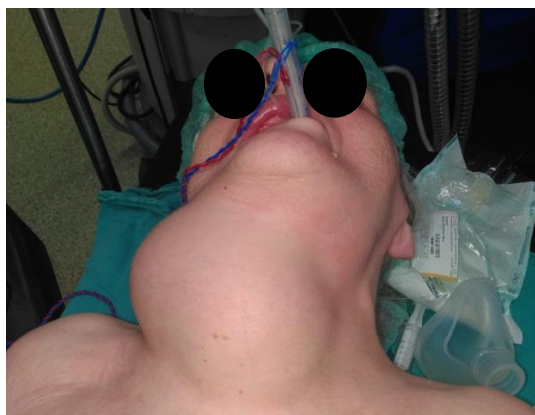


Figure 2: Our case was intubated with an endotracheal tube for neuromonitorization



Figure 3: Mass removed after right thyroid lobectomy

## Discussion

Thyroid tissue growths or malignancies may lead to changes in the airways, leading to difficulties in intubation [4]. Airway control may be difficult in such surgical procedures, due to large thyroïdal masses compressing the trachea [1]. The size of the thyroïdal mass is an objective parameter for difficult intubation and poses a serious risk for difficult airway management and intubation [5]. The thyroïdal mass in our case was exceptionally large and had deviated the airway due to compression of the trachea. This was considered difficult airway management and difficult intubation for us.

Difficult ventilation and intubation increase the morbidity and mortality, depending on the degree of problems encountered in providing airway patency. It may cause hypoxia, myocardial injury, airway trauma and even death [6]. Failure to successfully manage a difficult airway is responsible for 30% of deaths attributed to anesthesia, with approximately 600 deaths annually [7,8].

In different studies, the researchers found the incidence of difficult intubation in thyroid surgery as 4 - 6.8 - 11.1% [3,9]. An enlarged thyroid, tracheal compression symptoms and malignancy have been found to increase the incidence of difficult intubation [3]. During preoperative evaluation, routine Mallampati score, mouth opening, thyromental and sternomental distance, head and neck movements and body mass index are important for the determination of a difficult airway [10]. Intubation can sometimes be difficult due to altered anatomy, laryngeal edema and an inexperienced anesthesia team. Even in large substernal goiters with massive tracheal deviation, laryngeal patency is usually normal and intubation is not difficult [2]. In our case, Mallampati score, thyromental distance, mouth opening to the sternomental distance, and head and neck movements were noted when evaluating preoperatively. Although the patient had severe tracheal deviation on the chest radiograph, it was evaluated that the laryngeal patency was enough. Preoxygenation studies performed with 100% oxygen preoperatively showed that it increased functional residual capacity, provided sufficient time for difficult airway control and increased tolerance to hypoxia [1,11]. Preoxygenation before general anesthesia is recommended to all patients. With proper preoxygenation, the duration of apnea can extend from 1-2 minutes to 8 minutes without desaturation [8,12]. For this reason, the patient underwent preoxygenation on the operating table after 3 minutes of administering 100% oxygen with a face mask under monitorization and in the appropriate head and neck position.

Fiberoptic use is recommended by a senior and experienced anesthesiologist [2]. Successful awake intubation can be performed in 88-100% by considering the appropriate position and the experience of the anesthesiologist with a fiberoptic bronchoscope [13]. Upon the first laryngoscopy performed after induction of our case, the Cormack-Lehane score was IV. Repeated intubation may cause edema and bleeding and may make it difficult to use supraglottic airway devices in the larynx. Accordingly, the Difficult Airway Association (DAS) recommends a maximum of three tracheal intubations, the fourth attempt should be performed by an experienced anesthesiologist. The same technique should not be repeated after an unsuccessful intubation attempt, and changes should be made to increase the

success of the intubation in each additional trial [8]. Video laryngoscope is the first choice for some anesthesiologists because it provides better glottic vision than direct laryngoscopy [14]. In an emergency, fiberoptic bronchoscope should be used by experienced anesthesiologist. Blind techniques should be avoided. In case of failure of tracheal intubation, the patient can be awakened, tracheal intubation can be tried with fiberoptic and supraglottic airway devices, and surgery can be continued using face mask or supraglottic airway devices. However, if ventilation cannot be achieved, airway can be secured by a surgical procedure (tracheotomy or cricotomy) without losing ventilation capacity [8]. There was no postoperative complication in our patient who was extubated after approximately 120 minutes, and the patient was discharged with medical treatment of the surgical team after 24 hours of hospitalization. Approximately one third of complications in difficult airway management occur during extubation or in the postoperative period [15].

In 2015, the management of difficult airway algorithms were revised. The rules should be adapted to the specific skills and individual evaluations of anesthesiologists, the applicability of the devices we have and the patient characteristics [8].

## Conclusion

The preoperative evaluation of the patient who is thought to have a difficult airway is especially important. Furthermore, in accordance with the recommendations of the algorithm published by DAS, preoperative equipment and medical treatments should be available. The path to be followed should be determined according to the patient.

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