



## Awake Fiberoptic Intubation in a Patient with Large Thyroid Tumor Invading the Trachea: A Case Report

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### Abstract

The purpose of this case report is to raise awareness of the risk of difficult airway problems in patients with thyroid tumors. We report a case of a patient with a large thyroid tumor invading the trachea, causing trachea narrowing and resulting in breathing difficulties, who required Awake Tracheal Intubation (ATI). A 54-year-old woman required surgery for removal of the thyroid tumor under general anesthesia. The tumor was invading and compressing the trachea, causing difficulty in breathing. To facilitate surgery, thyrocricocentesis and nerve block were considered but would have been difficult to implement. Extracorporeal Membrane Oxygenation (ECMO) is expensive and has several complications during ECMO, such as failure of the oxygenation membrane, rupture of the circuit, coagulation of the system, intracranial hemorrhage, Acute Kidney Injury (AKI) and infections. Placement of a tracheal stent may also worsen airway problems. The process of airway establishment in this case was completed without the need for ECMO or tracheal stent placement. If it refers to the avoidance of more expensive options and complications, an alternative would be local anesthetic to the airway, and successful ATI would reduce healthcare costs associated with other techniques.

**Keywords:** Awake; Fiberoptic intubation; Thyroid tumor; Trachea; Case

### Introduction

Thyroid cancer is a common endocrine malignancy, and its incidence has been increasing for nearly three decades in most developed countries, while the overall mortality has decreased [1,2]. Patients with advanced disease often have difficulty breathing as a result of the thyroid tumor pressing on the trachea. However, there is little reported on the risk of malignant thyroid tumors invading the trachea, which can cause trachea narrowing and result in breathing difficulties. We report a successful Awake Tracheal Intubation (ATI) in a patient with a large thyroid tumor.

### Cases Presentation

A 54-year-old woman, who consented to the reporting of this case, presented for removal of a thyroid tumor during May 2021, which was involving the trachea. On admission, the patient reported repeated dyspnea for 5 years and aggravation for more than 10 days. Ultrasound examination revealed a thyroid tumor that needed immediate surgery. A Computerized Tomography (CT) scan showed that the trachea was significantly compressed; the patient could not breathe lying on her back. The tracheal stenosis caused by tumor invasion was located at C7 to T1 and was only 2 mm wide at its narrowest point and 3 cm in length (Figure 1A, 1B). The patient's medical history included hypertension, controlled by medication. Preoperative fiberoptic laryngoscopy revealed that the tumor was invading and protruding into the trachea under the glottis (Figure 1C). Once in the operating room, the patient was placed at 30 degrees head up, and supplemental oxygen was given by mask, at a rate of 5 L/min. Standard monitoring was performed; the BP was 134/81 mmHg, Heart Rate (HR) 86 beats per minute, and oxygen saturation (SpO<sub>2</sub>) 99%. After obtaining venous access, dexmedetomidine was infused at a rate of 0.7 µg/kg within 10 min, delivered by infusion pump. Topical anesthesia of the larynx was achieved with 2% lidocaine by throat spray in three doses: 2 ml each time, over three minutes each. The local anesthetic was sprayed on the tongue, epiglottis, glottis, and oropharynx. Once the patient was not able to feel discomfort when a sputum suction tube was passed, fiberoptic bronchoscopy commenced. When bronchoscope reached the glottis, 2 ml of 2% lidocaine was administered through the working channel; local anesthesia of

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Received Date: 07 Sep 2021

Accepted Date: 22 Sep 2021

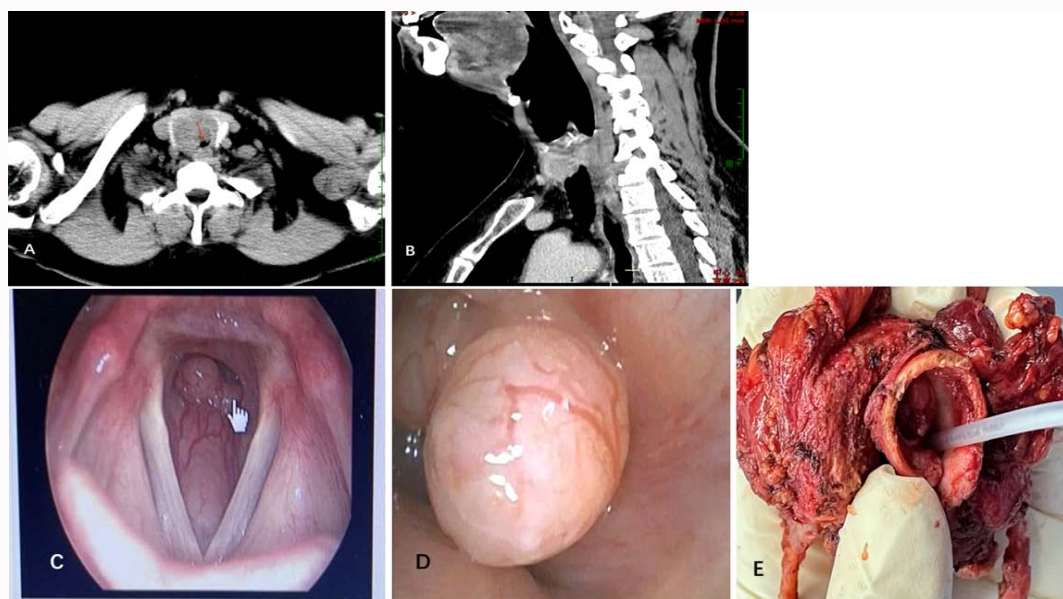
Published Date: 27 Sep 2021

#### Citation:

Ran G, Ning M, Zhang X. Awake Fiberoptic Intubation in a Patient with Large Thyroid Tumor Invading the Trachea: A Case Report. *Ann Clin Case Rep.* 2021; 6: 2009.

ISSN: 2474-1655

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**Figure 1:** A. CT scan, transverse section; B. CT scan, sagittal plane; C. Preoperative laryngoscopy image; D. Fiberoptic laryngoscopy image during intubation; E. Postoperative specimen. The patient's CT imaging demonstrated that the trachea was significantly compressed by the tumor, as shown by the arrows in Figure A & B. The mass can be seen under the glottis by fiberoptic laryngoscopy (Figure C & D). Postoperative anatomy showed that the tumor was compressing the airway, and the space to pass through was very narrow, only enough to accommodate a sputum suction tube (Figure E).

the subglottic trachea was achieved. After two minutes, when the local anesthetic had begun to take effect, the fiberoptic bronchoscope passed through the epiglottis, and a circular neoplasm under the glottis was observed (Figure 1D). The narrowest point was noted to be along the left side of the tumor, in agreement with the CT, and 2 ml local anesthesia (1.5 ml 1% tetracaine and 0.5 ml 0.01% norepinephrine) was sprayed into the airway. After two minutes, the patient was instructed to cough gently to expose the glottis and the bronchoscope successfully crossed the narrowest point and reached the tracheal juga. A size 5.5 Endotracheal Tube (ETT) was guided smoothly through the stenotic site over the bronchoscope. After the End-Tidal Carbon Dioxide (ETCO<sub>2</sub>) waveform was confirmed, induction drugs were given intravenously immediately and surgery commenced. The vital signs are stable: BP 145/95 mmHg, HR 78/min, and SpO<sub>2</sub> 98%. The operation lasted about 7.5 h, and the patient recovered uneventfully.

## Discussion

ATI involves placing ETT in an awake, spontaneously breathing patient, most commonly with flexible bronchoscopy. This allows the airway to be secured before induction of general anesthesia, avoiding the potential risks and consequences of difficult airway management in an anesthetized patient [3]. A thyroid malignancy may make the airway difficult to manage, especially when the tumor invades the airway and causes dyspnea. Establishing an airway is therefore a challenge for anesthesiologists. In this case, establishing an airway was completed without the need for ECMO or a tracheal stent, and our experiences of the case are summarized below. In this case, postoperative anatomy showed that the space of stenosis to pass through was only enough to accommodate a sputum suction tube (Figure 1E). ECMO is expensive and has several complications during ECMO, such as failure of the oxygenation membrane, coagulation of the system, intracranial hemorrhage, acute kidney injury and infections [4,5]. Tracheal stent may help in particular cases [6]. Unfortunately, we do not have facilities to carry out such

a procedure. ATI may be the preferred solution, but if the process is difficult or has to be repeated a number of times, any further airway swelling or bleeding may increase the difficulty of establishing an airway. Therefore, dynamic evaluation of the airway should be performed by an experienced anesthesiologist. If the airway is lost, an alternative airway technique may be required, such as a low tracheotomy, delayed surgery. Malpas et al. [7] reported a case of a large and extensive thyroid tumor with only 1 mm subglottic stenosis; the authors chose to establish ECMO before intravenous induction; endotracheal intubation was attempted, but unfortunately failed. In the current case, the patient's brachiocephalic trunk was found to be deformed and compressed on the trachea ring of C6 and T1. The brachiocephalic trunk could easily have been injured once dissection commenced. ATI is a safe airway management strategy for patients with potential technical difficulties in intubation and ventilation [8]. However, it can lead to unnecessary gag reflex and distress when topical anesthesia is not performed appropriately. Constant communication with and encouragement of the patient was essential for reassurance. In addition, a good relationship should be established with the patient to help build up confidence and cooperate with the procedure. Supplemental oxygen was administered through a bite pad, and there were no episodes of desaturation. Local anesthetic was administered to obtain full topical anesthesia, especially to the laryngopharynx and airway. Fiberoptic intubation should be done gently and not rushed. Although the narrowest part of the trachea was smaller than the outer diameter of the endotracheal tube, the tumor was soft in texture and the stenosis had good extensibility. The bronchoscope passed through it successfully and ETT could therefore be inserted into the airway over a bronchoscope, without airway injury or bleeding.

In conclusion, ATI has a high success rate and a favorable safety profile, but is underused in cases of anticipated difficult airway management. Good anesthetic technical skills, a cooperative patient, and adequate topical anesthesia are the three vital components for success. ECMO and tracheal stent also can solve a number of difficult airway problems. However, a successful ATI could reduce the cost,

complications and the risk to the patient of more invasive procedures.

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