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**Dr. R Arun Kumar**  
Associate Professor,  
Department of  
Anaesthesiology, PSG  
Institute of Medical Sciences  
and Research, Coimbatore,  
Tamil Nadu, India

**Dr. R Arun Shankar**  
Assistant Professor,  
Department of  
Anaesthesiology, Vellammal  
Medical College Hospital and  
Research Institute, Madurai,  
Tamil Nadu, India

**Corresponding Author:**  
**Dr. R Arun Kumar**  
Associate Professor,  
Department of  
Anaesthesiology, PSG  
Institute of Medical Sciences  
and Research, Coimbatore,  
Tamil Nadu, India

## Challenges in extubating a COPD patient with respiratory failure and asymptomatic long standing multinodular goitre with retrosternal extension

**R Arun Kumar and R Arun Shankar**

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### Abstract

Upper airway obstruction by long standing multi nodular goitre is a challenge for anaesthetist due to tracheal compression and associated intubation and extubation problems. This case report is about the problems in extubating a COPD patient with long standing asymptomatic multinodular goitre. 60 years old female, known Diabetic, Hypertensive, Chronic obstructive pulmonary disease with thyroid swelling of 40 years duration presented with history of seizures, for which she was intubated and ventilated. Though Computerised tomogram brain was normal, she had weaning difficulty. Retrosternal goitre was considered as a cause of respiratory failure and hence thyroidectomy was done following which patient was successfully weaned off from the ventilator.

**Keywords:** Retrosternal goitre, Respiratory failure, Stridor, Weaning difficulty, Thyroidectomy

### 1. Introduction

Multinodular goitre (MNG) can cause upper airway obstruction and anatomical distortion of the airway. Airway obstruction caused by MNG is a challenge for anaesthesiologist. Herewith we present a patient with COPD and longstanding thyroid swelling who had difficulty in weaning and needed total thyroidectomy prior to successful extubation.

### 2. Case Report:

60 year old female with asymptomatic thyroid swelling of 40 years duration presented to emergency department with history of generalised tonic clonic seizures. She is also a known case of diabetic, hypertensive and chronic obstructive pulmonary disease for 10 years.

On admission her GCS was 10/15, both sides pupils were 2mm sluggishly reacting to light. Her pulse rate was 102/min, blood pressure 170 over 100 mmHg, respiratory rate 20/min and room air SpO<sub>2</sub> was 81%. Cardiovascular, respiratory system and abdominal examination were normal. Neck examination showed huge thyroid swelling.

ABG showed type 2 respiratory failure (FiO<sub>2</sub>: 21%, pH: 7.32, PaCO<sub>2</sub>: 66.5, PaO<sub>2</sub>: 90.8, HCO<sub>3</sub>: 36, SaO<sub>2</sub>: 81.1%, ABE: 15, Lactate: 9.3). Thyroid function test was normal. Chest X ray showed left upper zone haziness, RBS: 332mg/dl, Serum electrolytes, RFT & LFT were normal. CT scan brain was normal. CT Neck showed diffusely enlarged thyroid mass with mild retrosternal extension of right lobe up to level of brachiocephalic vein. Right lobe measured 12.1 x 7 x 5.8 cms, Left lobe measured 9.9 x 8.1 x 6.4 cms.

Neurologist opined that seizure episode could be due to cerebral hypoxia secondary to respiratory failure. In view of deterioration in GCS from 10/15 to 3/15, she was intubated using bougie and ventilated. There was no difficulty encountered during endotracheal intubation. There was no episode of seizure postintubation and sedation.

In view of improvement in ABG and clinically by GCS on day 2 patients was extubated. Post extubation patient had stridor which was treated with inj Hydrocortisone, Adrenaline nebulisation & Non-invasive ventilation with CPAP. But stridor persisted and she started desaturating, hence she was reintubated and ventilated. Pulmonologist opined that thyroid swelling could have been the cause for respiratory failure, stridor and failed extubation.

On surgical consultation, Fine needle aspiration cytology of thyroid swelling was done and it showed colloid goitre with cystic changes. Hence patient was planned to be taken up for total thyroidectomy with or without sternotomy under general anaesthesia.

Total thyroidectomy was done without sternotomy uneventfully. Post-surgery she was electively ventilated under steroid coverage in view of longstanding thyroid swelling. On 1<sup>st</sup> post-op day with ENT backup for emergency tracheostomy, patient was extubated over airway

exchange catheter after cuff leak test. She didn't have any signs of respiratory distress, maintained saturation & her post-operative period was uneventful & she was discharged on 15<sup>th</sup> post op day.



Figure 1a: Front view and Figure 1b Lateral view of neck swelling



Figure 2a: Coronal and Figure 2b Sagittal view of Thyroid swelling

### 3. Discussion

Goitre is an enlargement of the thyroid gland due to hypertrophy and hyperplasia of the follicular epithelium. It may be associated with hypo, hyper or euthyroid state. If there are more than one nodule is seen it called as multinodular goitre [1]. If the weight of the gland is more than 100g it considered as large size [2]. In endemic areas 15% of the population will be affected by goitre. Location of the enlarged thyroid gland makes significant impact because it may cause tracheal compression [3].

Most of the patient with multinodular goitre are asymptomatic and euthyroid. If it is large enough, it can lead to compressive symptoms like dysphagia, respiratory distress, hoarseness of voice, superior vena caval obstruction and tracheomalacia. The natural history of retrosternal goitre is of a slow relentless increase in size, often presenting as an incidental finding. The majority of patients with retrosternal goiter presents with shortness of breath or asthma like symptoms. In 50-70 % of the patients, tracheal compression may not manifest with symptoms clinically [4]. Airway obstruction due to thyroid gland has been reported up to 31% and difficulty in intubation has been reported in 11%.

MNG is usually diagnosed by palpation, in retrosternal goitre we can't get below the swelling. Tracheal deviation or compression is identified by Anterior & lateral view in neck x ray, CT scan neck & thorax. Chest X ray is the simplest investigation but it gives limited information about tracheal compression and deviation [5]. Regarding retrosternal extension and tracheal compression by large goitre, CT gives detailed information. It shows the size, extent into thorax & tracheal compression [6]. Defining the intrathoracic extension of the large MNG CT is superior to the X ray [7]. Pulmonary function test is useful in assessing the compression of airway by enlarged MNG. Flow volume loops will predict airway obstruction by multinodular goitre [8]. Intrathoracic mass causes obstruction during expiration and extrathoracic mass causes obstruction during inspiration.

Upper airway obstruction due to an enlarged thyroid gland needs prompt intervention, whether it is symptomatic or asymptomatic. Total thyroidectomy is the mainstay of surgical treatment. For resection of retrosternal goitre sternotomy may also required. Thusoo *et al.* observed that 100% improvement in upper airway obstruction by retrosternal multinodular goitre, after thyroidectomy [8]. For

tracheal compression produced by MNG, surgical removal of the gland is the only treatment to prevent the irreversible bronchopulmonary disease [9]. Airway management in retrosternal multinodular goitre is challenging for the anaesthesiologist. Intubation itself is difficult in retrosternal goitre causing airway distortion [10]. Awake fiberoptic intubation is the ideal method for intubation. Second choice will be an inhalational induction. Surgeons should be immediately available to do emergency tracheostomy at anytime. Giving i.v steroid will decrease the incidence of postoperative oedema of the airway which leads to respiratory difficulty.

Pressure atrophy and erosion of the cartilaginous tracheal rings by a large-sized goitre causes tracheal collapse. After surgery due to lack of support from surrounding structures tracheal wall collapses, leads to airway obstruction [11, 12]. In this condition patient may require reintubation and ventilatory support till return of the strength of tracheal wall. Most of the times, cuff leak test done before extubation is the useful one to find out the tracheal collapse in longstanding MNG [13, 14]. Hematoma is also the important complication which causes airway obstruction post operatively. So extubating the patient with the use of airway exchange catheter after assessing the airway obstruction is a safer method. For post-operative analgesia usually NSAIDs will be adequate.

#### 4. Conclusion

Anaesthetist and intensivists should anticipate difficult airway & weaning difficulty in patient with MNG requiring emergency admission in intensive care unit (ICU). In patients with MNG, CT helps us to rule out airway obstruction and the necessity for surgical intervention to help in the process of weaning. Upper airway obstruction, nerve injuries and tracheomalacia are the problems in longstanding multinodular goitre after extubation [15]. Cuff leak test should be done before extubation. Hence reintubation gadgets ± tracheostomy set should be kept ready.

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