

# Case Report on Table Extubation of a Patient with Tracheomalacia after Thyroidectomy for large Retrosternal Goiter

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## Abstract :

Anesthetic management of patients with retrosternal goiter remains challenging as acute airway compromise may occur both during induction and recovery of anesthesia. We report the case of a 51 year old lady with retrosternal goiter and tracheal deviation who underwent total thyroidectomy. Comprehensive contingency plans were an essential prerequisite for successful management of difficult airway, including rigid bronchoscopy and emergency tracheostomy. Awake oral fiberoptic intubation was performed with wire reinforced endotracheal tube (ETT). The tumor was successfully removed via the cervical approach. There was evidence of tracheomalacia, hence after careful assessment, the trachea was extubated over a ventilating bougie. A close working relationship between anesthesiologists and surgeons was the key to the safe use of anesthesia and uneventful recovery of this patient.

**Key words**- Awake fiberoptic intubation; difficult airway; retrosternal goiter; tracheomalacia

## Introduction:

Anesthetic management of patients with retrosternal goiter remains a formidable challenge. This group of patients is heterogenous with respect to their intrathoracic extension of thyroid. Review of literature<sup>1</sup> reveals various definitions of RSG. These definitions included the presence of a thyroid gland:

- (i) extending below the thoracic inlet with the patient in the surgical position
- (ii) more than 50% of which, lies within the thoracic cavity
- (iii) extending to the level of the fourth thoracic vertebra on chest X-ray
- (iv) extending to the level of the aortic arch.

There are different surgical approaches according to the retrosternal extension. There are sporadic case reports which illustrate acute airway compromise at induction of anesthesia due to features of thoracic inlet syndrome<sup>(2-4)</sup> which often resulted in life-threatening conditions or sometimes fatal outcomes. Postoperatively tracheomalacia is the other dreaded complication of long standing tracheal compression. A high index of suspicion is needed to diagnose the problem. Management varies depending on the severity.

We describe the anesthetic management of a goiter scheduled for total thyroidectomy, with intrathoracic extension, causing tracheal narrowing and deviation. The patient had tracheomalacia postoperatively, managed successfully by graded extubation.

## Case report

A 51yr old female patient (ht 155cms, wt 76kgs, BMI 30.8) presented to our hospital with complaints of difficulty in swallowing for the past fifteen days, progressive increase in a neck swelling for the past one year, with history of noisy breathing in the nights. She was not on any medication. There were no symptoms suggestive of hyper or hypothyroidism and she had no other comorbidities.

Examination revealed normal vital signs, but with a heart rate of 105/minute and a blood pressure of 135/81mmhg. There was no evidence of any bruit over the swelling, dilated superficial veins or any evidence of superior venacaval syndrome. She had a short neck, but neck movements were normal. Her Mallampatti grading was Class 3. Indirect laryngoscopy showed normal vocal cords. Her systemic examination showed no other abnormalities. Her effort tolerance was 4-6 METS.

Blood count, renal profile and arterial blood gas analysis were normal. Her latest thyroid function test revealed T4 of 11.26 pmol/L, T3 1.39pmol/L and TSH of 0.63 mIU/L. Chest radiograph showed a large thyroid mass, the trachea was slightly narrowed and displaced to the right side. Computed tomographs (CT) Scan revealed right lobe of thyroid measuring 5.8 × 3.3 cms and left lobe 8.6 × 6 cms. Inferiorly, the right lobe of thyroid gland extended to the thoracic inlet and the left lobe of thyroid gland went down into the right side of the mediastinum to the level of the arch of aorta. The sagittal diameter at the narrowest point was 10 mm and its transverse diameter was 10 mm. Pulmonary function test showed restrictive pattern, extrathoracic type, with some obstructive component also.

Comprehensive contingency plans were developed preoperatively involving otorhinolaryngologic (ORL)

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surgeon and anesthesiologists emphasizing on the management of difficult airway and airway collapse following induction of anesthesia. The ORL surgeon was on standby in the operating room to initiate rigid bronchoscopy and emergency tracheostomy. A written and informed anesthetic consent was taken. A preoperative fasting of six hours for solids and two hours for clear fluids was followed. Patient was nebulised with salbutamol and budrecortisone before the surgery to optimize the obstructive component of the respiratory system.

Awake oral flexible fiberoptic intubation (FOI) was planned and the patient prepared with lignocaine (4%, 200 mg) nebulization, bilateral superior laryngeal nerves and glossopharyngeal nerves block with lignocaine (2mg) to provide airway anesthesia. Intramuscular (IM) glycopyrrolate (200 mcg) was given as an antisialagogue. No sedative premedication was given.

The right radial artery (20G, Vasofix, BBraun) and one wide bore (Vasofix, 16G, BBraun) intravenous cannulation was done under local anesthesia. The right brachiocephalic central line(Cavafix 375, 14G, BBraun) was also secured. Standard ASA monitoring was used along with temperature, invasive pressure monitoring and anesthetic agent analyzer.

For awake FOI intravenous Fentanyl (80microgms) and 40 mg of 2% lignocaine was given intravenously. Once the glottic structures were identified, 2% lignocaine (40 mg) was sprayed directly onto the glottic inlet. Tracheal intubation was done with 7.0 mm cuffed flexometallic tube, the expected size according to CT Scan finding, maintaining the patient on spontaneous respiration. No hemodynamic fluctuation or airway deterioration occurred after intravenous propofol 80mg and assisted positive pressure ventilation. Then the fibreoptic was removed and the patient was paralysed with atracurium 40mg given IV. Anesthesia was maintained with oxygen(60%), air and sevoflurane with GE Systems, Aespire workstation. Intraoperative analgesia was provided by incremental doses of morphine. There was no instance of any airway compromise during the period of surgery. The incision was anteriorcervical and the thyroid with its retrosternal extension was removed, avoiding the need for a sternotomy. After removal of the gland, the surgeon commented that the trachea felt soft to touch. Muscle relaxation was reversed by Inj glycopyrrolate 0.5mg and Inj neostigmine 2.5mg IV at end of surgery and adequate depth of anesthesia maintained by sevoflurane (1.2 MAC). Direct laryngoscopy was performed, which showed a laryngoscopy view of Cormack and Lehane grade 3 in RAMP position with Mc coy blade (size 3). Clinically

there was no leak evident over the deflated cuff. Before cuff deflation expired tidal volume was on average 300ml, and after deflation it was on average 230ml, so calculated leak was approximately 23. On deflation of ETT cuff, obvious indrawing of the anterior part of neck was seen during inspiration, which suggested tracheomalacia. Comprehensive contingency plan for management of tracheomalacia by ORL surgeon was T tube insertion or reintubation by anesthesiologist. A tube exchanger(Cook) was inserted through the ETT. The trachea was then extubated on the tube exchanger, in view of reintubation, in case if needed. After extubation, patient maintained adequate saturation(100%) with good chest rise at a anesthetic depth of 1 MAC. Anterior neck in drawing was present with inspiration, but it seemed to decrease with reducing MAC. So, the patient was planned for extubation, in view of partial tracheomalacia. The tube exchanger was removed, and a nasopharyngeal airway inserted to avoid tongue collapse and obstruction to the airway. A tight seal with the face mask (size) helped maintain the airway and allowed spontaneous ventilation. On decreasing the depth of anesthesia, indrawing decreased, expiratory tidal volume was 230 ml initially with the face mask. The patient maintained 100 oxygen saturation on 0.5 FiO<sub>2</sub> and was completely awake. The patient then shifted to ICU, in a propped up position for further monitoring. After 2 hrs an arterial blood gas was done, which was found to be normal.

## Discussion

Retrosternal goiter (RSG) poses a great challenge to the anesthesiologist, including difficult airway in view of tracheal compression and deviation, physiological changes due to abnormal thyroid function, difficulty while extubation due to tracheomalacia and recurrent laryngeal nerve injury. Huins and colleagues<sup>1</sup> classified RSGs and they suggested different surgical approaches for thyroidectomy (Table 1). In our patient, the retrosternal part of the thyroid gland was reaching the arch of aorta, so it was expected to be removed by the cervical approach.

Tracheomalacia was first described by Czyhlarz<sup>2</sup> in 1897, and remains a heterogeneous condition with no universally accepted definition and stratification. Although definitive criteria are lacking, a cut-off of a 50% reduction in tracheal lumen<sup>3</sup> is usually considered a prerequisite for diagnosis. Its incidence varies in different studies. Findlay et al<sup>4</sup> conducted study in 334 patients during 30 months period having retrosternal goiter who underwent thyroidectomy found zero incidence in western world. In a study reviewing 34 papers totalling 2426 patients Huins and colleagues<sup>1</sup> described an incidence of tracheomalacia of 1%.

However, in those patients with RSG to the level of the aortic arch this was reported to be as high as 10%. In most of the cases it was managed by tracheostomy.

In a retrospective review done by Dempsey *et al.*, in five hundred and seventy-three patients who underwent thyroidectomy procedure, they documented 34 cases having a RSG. There was one case of failed intubation in the series. All other patients underwent uneventful tracheal intubation via direct laryngoscopy. So, to prevent even one failed intubation, careful assessment of airway diameters with CT Scan, and comprehensive contingency plans including anesthesiologist and ORL surgeons is a must.

The anaesthetic implications for a large retrosternal thyroid mass starts from the preanesthetic evaluation of the patient itself. The patient has to be screened for any other comorbidities, thyroid function and detailed respiratory system evaluation.

Flexometallic endotracheal tube was the option keeping in mind the chances of tracheomalacia. The incidence in western population, according to the journals, is very less. But in our patient, we had certain amount of tracheomalacia. The presence of evident indrawing of the trachea and suggestion by the surgeons that the trachea was soft to feel pointed to a certain degree of tracheomalacia which quantified as average of 23 of expiratory tidal volume. The leak was 10, so postoperative chances of stridor and reintubation was less. IMAC of the anesthetic agent also could have contributed, but it's less. The option of using a ventilating bougie was for two reasons. One, it could help evaluate the patency of the airway with the smaller caliber tube. Secondly, it can help to railroad another ETT, in case of need for the patient, in lieu of the difficult airway.

In conclusion, perioperative management of retrosternal goiter needs special preparation. In most of the cases tracheomalacia can be managed by either reintubation or tracheostomy, which further increases morbidity. So, with careful assessment of leak, patient can be extubated gradually with the help of ventilator assisting devices.

**Table 1**

Grade	Anatomical location	Suggested surgical approach
1	Above aortic arch	Cervical
2	Aortic arch to pericardium	Manubriotomy
3	Below right atrium	Sternotomy

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**Figure 1 Chest X ray – Showing tracheal deviation**



**Figure 2** Cross-sectional view of neck shows the narrowest tracheal point at T2. Normal dimensions at this level in adult female is 23mm in sagittal plane and 21mm in transverse plane, which was 10mm in both planes.

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