

# Airway management in a case of severe tracheal narrowing by retrosternal goiter- A case report

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## Citation

D Tripathy, R M.. *Airway management in a case of severe tracheal narrowing by retrosternal goiter- A case report*. The Internet Journal of Anesthesiology. 2009 Volume 23 Number 2.

## Abstract

A 60 year old female diagnosed with multi nodular goiter with retrosternal extension and severe tracheal narrowing was posted for total thyroidectomy. Careful pre operative airway assessment revealed severe long segment narrowing of trachea. The airway was successfully managed with flexible fibroscope using a guide wire and tube exchanger.

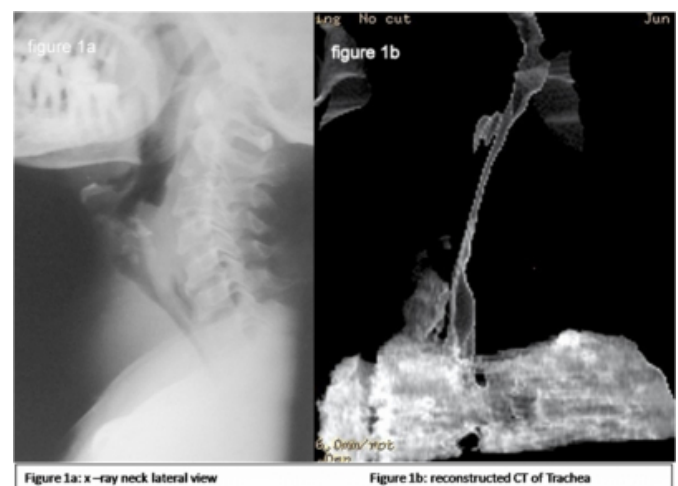
## INTRODUCTION

Thyroid surgery presents myriads of challenges to the anaesthesiologist<sup>1</sup>, of which airway management is of paramount importance. Preoperative detection of difficult intubation is very much essential<sup>2,3</sup>, as failed intubation is associated with serious complications<sup>4</sup>. Large and longstanding thyroid gland or that with retrosternal extension is likely to produce tracheal narrowing. Awake fiberoptic guided intubation is being used successfully in these types of airway narrowing<sup>5</sup>. In this particular case, because of severe long segment narrowing, we had used guide wire and tube exchanger for intubation.

## CASE REPORT

A 60 year old female came to emergency department with complaints of occasional chest pain, dyspnoea, cough with expectoration for 5 days, midline neck swelling for past 14 years. She was provisionally diagnosed and treated for chronic obstructive pulmonary diseases. Her symptoms improved with antibiotic and bronchodilator. She had swelling in front of neck for past 14yrs, which was progressively increasing in size. She had developed breathlessness, which was increasing in supine position and decreasing in prone, lateral and sitting positions for the past six months. She had also complained of change of voice since last six months. There was no history of dysphagia nor any other systemic illness. Surgical consultation was done for thyroid swelling. She was diagnosed with multinodular goiter with retrosternal extension posted for total thyroidectomy.

Figure 1

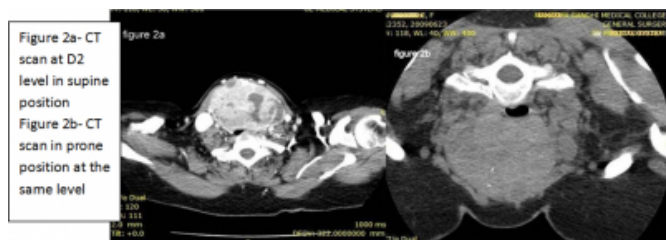


The patient was well built, weighing 65kg, comfortably breathing and talking in sitting posture with a slight forward bend. Auscultation revealed normal vesicular breath sounds without any added sounds and rest of the physical examination did not reveal any abnormality. In sitting position, HR was 86/min, Blood Pressure was 130/70 mmhg. She developed dyspnoea and inspiratory stridor when asked to lie in supine position. The thyroid swelling was 8cm×7cm large, larger on the left side with lower pole not palpable. Neck veins were not engorged. Suprasternal pulsation was present and pemberton sign was positive. Trachea was deviated to right side. Mouth opening was adequate, upper incisors were absent, and mallampati class was II.

All the routine investigations and thyroid profile were within normal limits. Ultrasound of the thyroid gland showed intrathoracic extension of thyroid gland. X-ray soft tissue of

neck, lateral view (fig.1a) showed severe narrowing of trachea (80%) and antero-posterior view showed deviation of trachea to the right. CT scan, showed severely narrowed trachea from C6-D2 (fig.1b) with narrowest diameter at D2 level measuring 4mm(fig.2a) and 22mm extension of thyroid gland into the thoracic cavity. Pulmonary function test revealed variable extrathoracic airflow limitation. To know the expandability of trachea, CT scan of trachea was done in prone and left lateral position. In prone position the tracheal diameter increased to 8.5mm (fig2b) and in lateral position diameter increased to 7.5mm at same D2 level. Indirect laryngoscopy showed normal vocal cords.

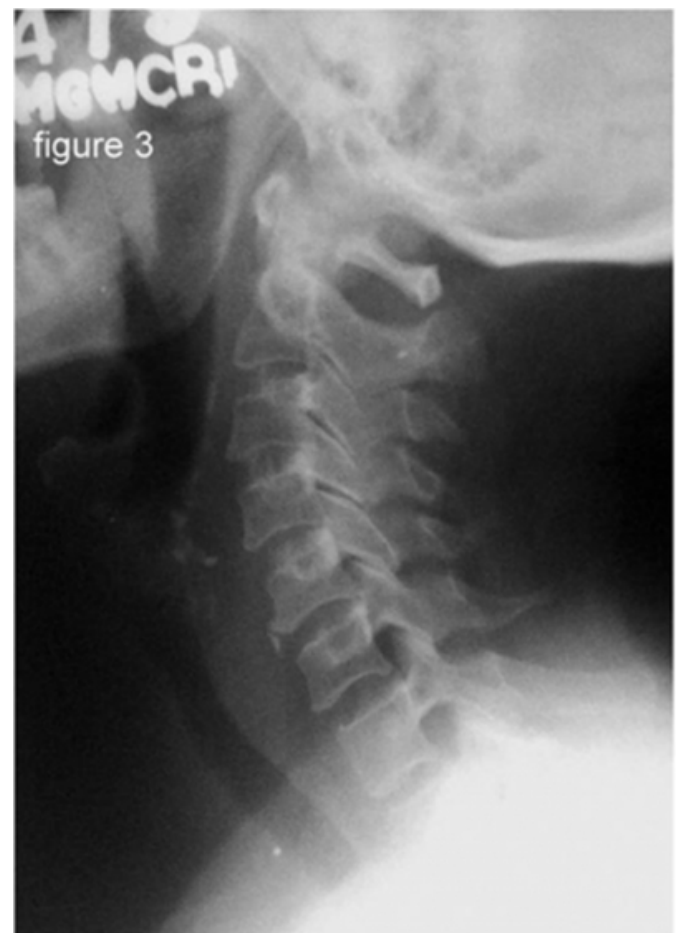
**Figure 2**



After obtaining informed consent, the patient was given inj. Glycopyrrolate 0.2mg I.M. 45 minutes before the procedure. The airway was nebulised with 4ml of 4% Lignocaine 30 minutes before the procedure and vocal cord was sprayed with a puff of 10% lignocaine spray. Under standard monitoring in supine position, Flexible Intubation Fiberscope(FIF) (Karl Storz GmbH, Germany) with 28 F reinforced endotracheal tube mounted on it, was introduced into the trachea and 5 ml of 1% lignocaine was sprayed. Once the fiberscope entered the narrow part of trachea, patient developed difficulty in breathing and stridor which was relieved partially by external tug on the thyroid gland. The 28F reinforced tube was threaded over the fiberscope, which met with resistance at subglottic level. Then a guide wire with flexible tip was inserted through the oxygenation port of the fiberscope and the scope was removed leaving the guide wire at the level of carina. Cooks tube exchanger was then threaded over the guide wire and the guide wire was removed. 5.5mm portex tube was successfully placed into the trachea over the tube exchanger with constant tug on thyroid from outside and cuff was not inflated as it was snugly fitting. Tube position was checked clinically as well as with fiberscope after removal of the tube exchanger. Induction was done with propofol and anaesthesia was maintained with Fentanyl, Oxygen, Nitrous oxide and Isoflurane. Intra operative period was uneventful. After complete removal of the thyroid gland, leak developed

around the tube and so the cuff was inflated with 4 ml of air. After removal of thyroid gland and before closure, again fiberoptic bronchoscopy was done through the fiberoptic port, while anaesthesia was maintained with inhalational agent. Tracheal rings were inspected after withdrawal of endotracheal tube up to cricoids cartilage. The integrity of the cartilages were checked by mechanical compression of tracheal rings by the surgeon and observing through the fiberscope for the recoil to the original shape. This test was done to check the tracheal rings integrity and to rule out the possibility of tracheomalacia. Extubation was done over the tube exchanger, which was uneventful. Post operatively PFT, X-ray neck (fig3a) and CT scan of trachea was done which showed relief of the tracheal compression.

**Figure 3**



**Figure 3: X-ray neck post thyroidectomy**

## **DISCUSSION**

Upper airway obstruction due to thyroid gland has been reported up to 31%<sup>6</sup> and difficulty in intubation has been reported 11%<sup>7</sup>. Central airway obstruction produces symptoms of dyspnoea, stridor, or obstructive pneumonia and is often misdiagnosed as asthma<sup>9</sup>. In this patient also

initial symptoms were due to increase in narrowing of the airway by respiratory tract infection. In chronic airway obstruction, patient slowly compensates for the reduction in airway diameter; it is possible to have patients with airway diameter of 3 to 5 mm, who at rest appears to have no stridor although stridor becomes obvious on simple exertion<sup>9</sup>. Airway management in cases of airway obstruction has been described with direct laryngoscopy, rigid bronchoscopy, fiberoptic bronchoscopy, LMA, jet ventilation and femoro-femoral bypass. The success or failure of the airway management largely depends on proper evaluation and planning preoperatively.

In our case X-ray soft tissue lateral showed a severe (80%) and long segment compression of trachea. Further evaluation was done to see exact size and site of the narrowing and maximum expandability of the tracheal lumen.

Before the availability of CT scan, Flow volume loop was used widely to diagnose the upper airway obstruction and even neural networks<sup>8</sup> has been described based on it. 100% Sensitivity and 78% specificity<sup>6</sup> has been reported for the flow volume loop in diagnosing the airway obstruction. In this case PFT showed variable extrathoracic airflow limitation, which was due to collapse of extrathoracic trachea during inspiration.

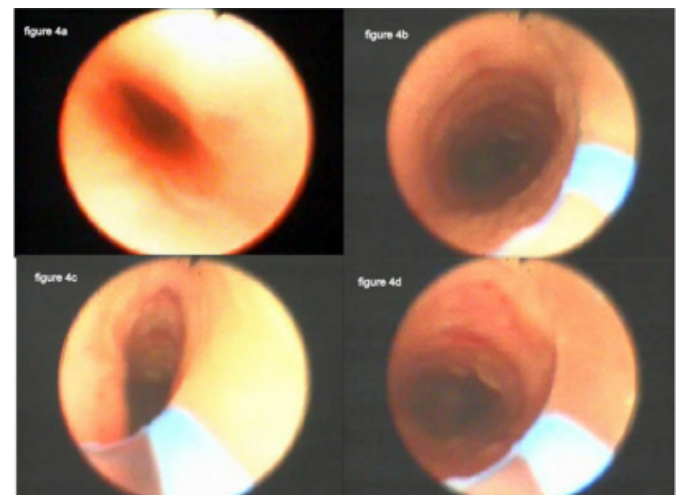
CT scan revealed compression of trachea from C6 to D2 segment with narrowest part at D2 measuring 4mm, which gives an impression that the trachea cannot be intubated. As patient gave history of relief in symptoms in prone and lateral positions, CT was taken in prone and lateral positions which showed change in the tracheal diameter. Based on this findings, we had two choices of endotracheal tubes, one was 5.5mm portex tube (external dia.7.6mm) and 28F reinforced tube (external dia.8.9mm).

Induction of anaesthesia before securing the airway was ruled out based on the principle of "Burning no bridges". In this particular case, induction could be a catastrophe as narrowest part was at D2 level and surgical airway management was also not possible. As our fiberscope external diameter was 3.7mm, prolonged or repeated fiberscopy can produce symptoms of airway obstruction and mucosal injury. To minimize this we planned to use a flexible tip guide wire and Cook's tube exchanger, if there was failure with reinforced tube. Intubation was done leisurely over the tube exchanger with continuous oxygenation supply. As predicted during the procedure

patient developed dyspnoea and stridor which was of very short duration (30 seconds) and did not produce any adverse sequel.

Long standing thyroid swelling with severe tracheal compression (fig.4a) alerted us to have high degree of suspicion for tracheomalacia. But the leak around the endotracheal tube after the gland removal and check fiberscopy showing intact (fig.4b) and prompt recoiling tracheal rings (figs.4c & 4d) reassured safe extubation.

**Figure 4**



Flexible fiberscope view figure 4a- narrowing before intubation, 4b- after removal of thyroid gland, 4c-compression by surgeon on tracheal rings, 4d- recoiling of rings to original shape

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