

Anesthetic Management of a Patient with Retrosternal Goiter Using a Double-lumen Endotracheal Tube

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Abstract

Anesthetic management of patients with mediastinal masses remains a formidable challenge as acute cardiorespiratory decompensation may follow induction of anesthesia. In endemic goiter areas, 20% of the population over the age of 70 will have a retrosternal goiter. This group of patients is heterogeneous with respect to the clinical evolution as well as with their various types, sizes, and location of masses. The vital organs in the limited mediastinal space may be affected in different ways. Therefore, the respiratory and hemodynamic responses to anesthesia may vary among individuals. There are sporadic case reports which illustrate acute cardiorespiratory decompensation during the course of anesthesia due to tumor-related compression of mediastinal organs, resulting in life-threatening conditions and even fatal outcomes. We describe the anesthetic management of a patient with multinodular goiter with retrosternal and mediastinal extension posted for total thyroidectomy, who was successfully managed with a double-lumen endotracheal tube.

Keywords: Goiter, one-lung ventilation, sternotomy, thyroidectomy

INTRODUCTION

Any goiter that descends below the plane of the thoracic inlet or grows into the anterior mediastinum for >2 cm is considered retrosternal. A careful preoperative evaluation of the thoracic structures involved and stepwise induction of anesthesia, with standby cardiopulmonary bypass, are essential.^[1] This is particularly the case in high-risk patients, with symptoms seen on lying down such as severe postural symptoms, stridor, cyanosis, radiologic findings such as tracheal compression (>50%), or associated bronchial compression, pericardial effusion, or superior vena caval syndrome.^[2,3] Intermediate-risk patients who have mild-to-moderate symptoms and/or tracheal compression (<50%) are also assessed, and a perioperative care plan should be made for securing the airway. In contrast, low-risk patients who are asymptomatic or mildly symptomatic, without postural symptoms or radiologic findings of significant compression of structures, endure routine general anesthesia with endotracheal intubation.

CASE REPORT

A 34-year-old female was admitted with a complaint of swelling in front of the neck, noticed for the past 5 years and

increasing in size for 1 year. She was otherwise asymptomatic and euthyroid. Her chest X-ray showed a mediastinal shadow in the right anterior mediastinum.

A computed tomography of the neck and chest showed a 7 cm × 6 cm × 4 cm heterogeneously enhanced thyroid mass, with extension into the anterior mediastinal region on the right side measuring 64 mm × 52 mm × 63 mm [Figure 1]. There was no evidence of airway compression. All her laboratory investigations were normal. She was posted for a total thyroidectomy, with a median sternotomy and lung isolation for resection of the mediastinal extension.

Anesthetic management

The patient was preoperatively assessed and premedicated with a proton pump inhibitor and anxiolytic. A written informed consent was obtained, and postoperative intensive care and ventilator requirement were explained. On the day

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of surgery, fasting status was confirmed. The patient was connected to monitors including noninvasive blood pressure, electrocardiography, and pulse oximetry. Two large-bore intravenous cannulas were secured. The cardiothoracic surgeons and heart–lung machine were on standby. As no difficulty in airway management was expected, she was premedicated with injections glycopyrrolate, ondansetron, and midazolam, induced with fentanyl, propofol, and paralyzed with atracurium. A 37-Fr left-sided double-lumen endotracheal tube was inserted and the position was confirmed clinically by auscultation and using a bronchoscope. Anesthesia was maintained with isoflurane, nitrous oxide, and oxygen with controlled ventilation and intermittent doses of fentanyl and atracurium.

Intraoperatively, total thyroidectomy was performed in supine position, with the neck extended. The thyroid was dissected and removed *en bloc*, through the neck incision. However, the image intensifier showed a persisting anterior mediastinal mass. The surgeon decided to proceed with the sternotomy, analgesia was supplemented with fentanyl, and sternotomy was performed. One-lung ventilation was established with the right lung collapsed. The tumor was dissected from its attachment and resected *en bloc*.

Intraoperative hemodynamics was stable and the total blood loss was around 1 L which was supplemented with crystalloids and transfusion of one unit of packed cells. After insertion of intercostal drain on the right side and closure of the sternotomy, she was electively ventilated in the Intensive Care Unit overnight, later extubated, and shifted to the ward. The intercostal drain was removed on the fifth postoperative day, and the patient was discharged and asked to follow-up.

DISCUSSION

Mediastinal mass syndrome describes a clinical condition caused by a mediastinal mass in patients undergoing anesthesia.^[4] The most common symptom is a feeling of pressure, due to the compression of the airway or great veins in the neck. It can occur at every stage of anesthesia up to the postoperative period,^[5] even simply by a change of posture.^[6] Acute respiratory and/or cardiovascular decompensation can occur. Direct mechanical compression of the trachea, main bronchi, or both by the tumor may lead to total airway occlusion, whereas external compression of major vessels (i.e., the pulmonary artery and superior vena cava) or even the heart may result in a cardiovascular catastrophe which can be potentially fatal.^[7] A preoperative computed tomography can accurately identify the site of tracheal obstruction, predict difficulty with the airway, and provide excellent views of retrosternal goiters.^[8]

The problems associated with huge goiters include difficult intubation, significant blood loss, prolonged operating time, and postoperative tracheomalacia.^[9] Huge goiters can cause upper airway obstruction due to displacement and rotation of larynx and edema of adjacent structures. However, in patients

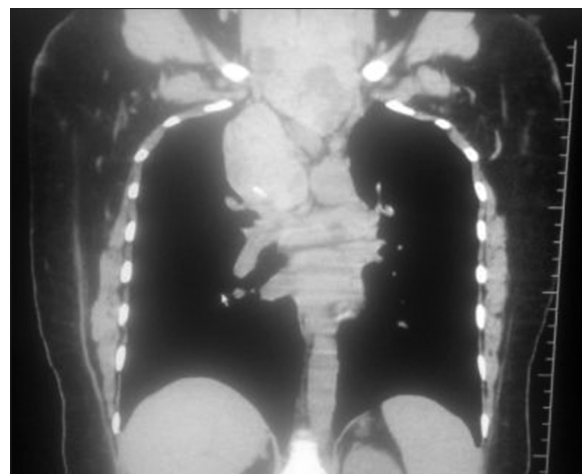


Figure 1: Computed tomography image of retrosternal extension of goiter

with huge goiters, unexpected and total airway obstruction may occur when muscle tone decreases following the induction of general anesthesia.^[10] Hence, awake intubation is indicated in these patients. Nevertheless, awake fiber-optic intubation through Williams airway, laryngeal mask for fiberscope-aided tracheal intubation, awake direct laryngoscopy-aided intubation, and inhalational induction have all been described in cases of huge goiters with retrosternal extension.

Tracheal collapse following thyroidectomy results from prolonged compression of the trachea by a large, neglected goiter, particularly within the confines of the thoracic inlet. It is a life-threatening complication, which should be ruled out before extubation, and management strategies should be available. Management of tracheomalacia requires urgent re-intubation, possibly tracheostomy and some forms of tracheal support such as ceramic rings.

Use of a double-lumen endotracheal tube is an option for some patients with masses externally compressing the carina or bronchus; however, it is not considered for patients with intrinsic airway tumors, invasion of the tracheal wall or long-standing airway compromise, and narrowing of the trachea. Finally, this procedure is not for patients with hemodynamic compromise.

CONCLUSION

Use of double-lumen endotracheal tube in patients with retrosternal goiter and mediastinal extension may be necessary for adequate surgical exposure. However, there is no guarantee that airway patency is maintained perioperatively. Both anesthesiologists and cardiothoracic surgeons have to be prepared for delayed compression of the airway.

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Conflicts of interest

There are no conflicts of interest.

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