

## Case Report

# Video Assisted Thoracoscopic Thyroidectomy for A Substernal Goiter

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### Abstract

Thoracic approach is helpful for some cases of bulky substernal goiters. This article describes an alternative approach with video assisted thoracoscopic surgery (VATS).

**Case:** A 51-year-old female with accidental diagnosis of substernal goiter from chest x-ray. Her substernal goiter was successfully removed by a cervical approach in combination with VATS in thoracic part dissection.

**Keywords:** Substernal goiter, VATS, Video assisted thoracoscopic surgery

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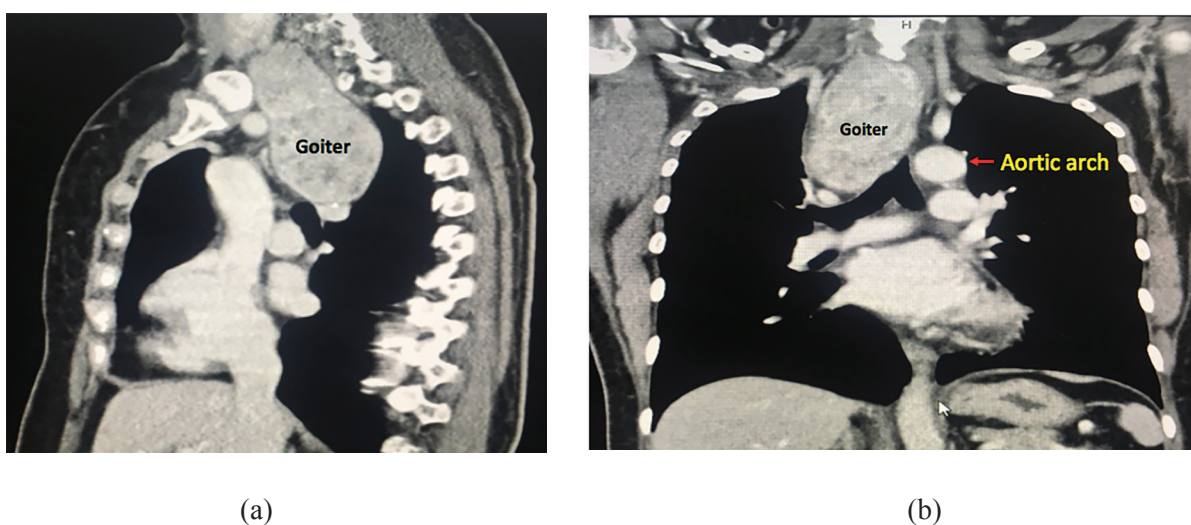
## Introduction

Patients with substernal goiter are always operated successfully through cervical incisions, but some cases need an additional thoracic approach because of the bulky intrathoracic parts. The conventional thoracic operation is an invasive procedure. On the other hand, video assisted thoracoscopic surgery (VATS) is a minimally invasive procedure which may be applied for many cases with thoracic masses. The use of VATS in conjunction with a cervical collar incision for substernal goiter resection will be detailed in this report.

## Case report

A 51-year-old female with accidental finding from chest x-ray showed an anterior mediastinal

mass. She was asymptomatic at presentation and further chest CT scan revealed a right substernal goiter. She was referred for thyroidectomy with the anticipation of requiring a thoracotomy because the goiter's main part was in the thorax and the lowest part was beyond the aortic arch level (Figure 1). In addition, the goiter's shape was like a dumbbell, which makes more difficult to remove this goiter through a cervical incision. Although thoracotomy incisions facilitate the substernal part removal of the goiter, they are invasive and involve disruption of the thoracic skeleton. They may therefore result in significant morbidity including pain, prolonged hospital stay and recovery. We decided to use VATS in this case to minimize postoperative morbidity as a minimally invasive approach.



**Figure 1** (a) A Dumbbell-shaped substernal goiter. (b) The goiter extends beyond aortic arch level.

## Method

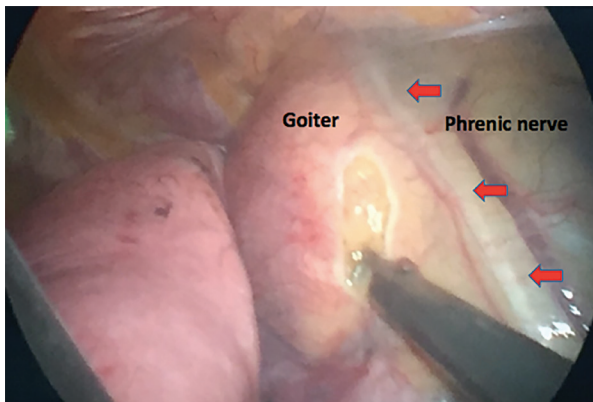
The patient was placed in a supine position with neck extension as the conventional thyroidectomy position. She was single ventilated with a double lumen endotracheal tube. Cervical approach was done first through a transverse collar incision. Intraoperative evaluation found that the whole goiter can not be delivered through the cervical incision, because of inability to palpate the lowermost part of the goiter. Thus the cardiothoracic surgeon started to perform VATS for intrathoracic part dissection. The patient's position was changed for VATS procedure with supporting below the right shoulder to rotate the right hemithorax by 30° and the right arm was raised above the patient's head. This position is

suitable for the anterolateral chest wall approach. There were 4 ports for instrument of dissection. One was in the 4<sup>th</sup> intercostal space, anterior axillary line. The other 3 ports were placed along the 6<sup>th</sup> intercostal space as Figure 2. The thyroid gland was identified in upper mediastinum, right paratracheal area. To expose the goiter, we opened the mediastinal pleura using hook cautery with awareness of phrenic nerve injury (Figure 3). The thyroid gland was dissected and mobilized using ultrasonic energy device in combination with hook cautery. In this step, pulling the thyroid gland up through the cervical incision is very helpful for gland mobilization. There are adjacent structures that injury should be avoided such as trachea, phrenic nerve, superior

vena cava and azygos vein. After complete dissection the specimen of right lobe substernal goiter was delivered through the cervical incision. The mediastinal pleura closure is not necessary, and we placed a No.20 intercostal chest tube drain for 24 hours.



**Figure 2** In VATS procedure, there 4 ports along 4<sup>th</sup> and 6<sup>th</sup> intercostal spaces for instrumentation.



**Figure 3** The mediastinal pleura was opened to approach the intrathoracic part of goiter.

## Results

The patient successfully underwent a VATS in combination with a cervical incision for right thyroid lobectomy. The operating time was 180 minutes. The diameter of the retrosternal goiter was 9.7 cm and 15 cm long. The postoperative pain scores for days 0 and 1 were 2 and 1, respectively. The length of the hospital stay was 3 days without serious complications.

## Discussion

Substernal goiter is a thyroid that descends below the thoracic inlet or has more than 50% of its mass inferior to the thoracic inlet.<sup>1,2</sup> Substernal goiter is categorized into primary or secondary type. The primary type is uncommon and results from ectopic thyroid tissue located in the mediastinum with a blood supply derived from mediastinal vessels. The latter arises from cervical goiter, which descends below the thoracic inlet into the mediastinum. Surgical indications for substernal goiters are for relieving symptoms in symptomatic cases and in asymptomatic patients with suspicious features of cancer or to prevent the development of symptoms. Complications of removal of substernal goiter include airway collapse from post-thyroidectomy tracheomalacia, hypoparathyroidism, recurrent laryngeal nerve injury and postoperative bleeding.<sup>3</sup> Many studies have identified factors that may predict the additional thoracic incision requirement. The predisposing factors were recurrent goiter following a previous cervical thyroidectomy, primary mediastinal goiter, malignant goiter, big goiter, anatomical location and the degree of intrathoracic extension of the goiter.<sup>1,4,5</sup> Particularly, the goiters that descend below the aortic arch or are located in the posterior mediastinum are more likely to need a thoracic incision.<sup>1,5</sup> If a second incision is required, a sternotomy or thoracotomy is usually carried out. For approaching the paratracheal space, the posterolateral thoracotomy incision is very useful for goiter mobilization but it always results in a painful wound and delayed recovery. In many other procedures of thoracic surgery, VATS has already been proved to be associated with less pain, lower morbidity and more rapid recovery.<sup>6,7</sup> From literature review, there were evidences that VATS may be an alternative to thoracotomy, with less invasive approach. Gupta et al. reported using VATS procedure in seven cases with retrosternal goiters resulting in one case suffered a transient right recurrent laryngeal nerve palsy and one patient required conversion to manubriotomy. This study showed its potential benefits in less postoperative pain and good exposure to the goiter.<sup>8</sup> Additionally, Bhargav et al. reported a series of posterior mediastinal goitres that were treated through thoracoscopic approach. From 11 cases, there was no major morbidity except for one case of recurrent laryngeal nerve injury.<sup>9</sup>

Here is an example of thoracoscopic approach for substernal goiter that may offer a minimally invasive approach with the benefit of both superior exposure of the paratracheal space, and potentially better patient outcomes terms of pain and cosmesis. Collaboration with thoracic surgeon would allow avoidance of the more invasive sternotomy or thoracotomy.

### Acknowledgments

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Conflicts of interest: None.

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