Video assisted thoracoscopic thyroidectomy for retrosternal goitre

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ABSTRACT

INTRODUCTION Thyroidectomy for retrosternal goitre is usually carried out through a cervical incision. Around 4–12% of patients, however, require an extracervical approach, usually by sternotomy. Anatomically, the thyroid extends deep behind the great vessels in the pretracheal fascia. A sternotomy is therefore not only a substantial incision but this anterior approach is also not ideal for exposure. We report the use of video assisted thoracoscopic surgery (VATS) instead of a sternotomy or thoracotomy in conjunction with a transverse cervical incision for these patients.

METHODS A retrospective descriptive study was carried out of seven patients with retrosternal goitre who underwent a VATS thyroidectomy.

RESULTS Twenty-one patients with retrosternal goitre were referred to our institution for surgical excision with the anticipation of requiring an extracervical incision. Of these, seven (median age: 68 years, range: 58–73 years) underwent a VATS thyroidectomy. The median operating time was 218 minutes (range: 120–240 minutes). The median diameter of the retrosternal goitre was 70mm (range: 40–145mm). Only one patient required conversion to a manubriectomy to deliver the bulky thyroid and one patient suffered a transient right recurrent laryngeal nerve palsy. The median postoperative pain scores for days 0 and 1 were 1 (range: 0–5) and 0 (range: 0–3) respectively. The median length of stay was 5 days (range: 3–7 days).

CONCLUSIONS The use of VATS in thyroidectomy for retrosternal goitre offers a minimally invasive approach resulting in less morbidity while affording excellent exposure.

KEYWORDS

Thoracoscopy – Video assisted thoracoscopic surgery – Mediastinal tumour – Mediastinum – Thoracic outlet

Accepted 29 August 2014

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Thyroidectomy is advocated for patients with retrosternal goitre. While most of these retrosternal goitres can be excised through a standard cervical collar incision, 4–12% of patients will require an additional thoracic incision such as a manubriectomy, sternotomy, thoracotomy or mediastinotomy.^{1–5} Although these incisions facilitate the removal of the goitre, they are invasive and involve disruption of the thoracic skeleton. They may therefore result in significant morbidity including pain, prolonged hospital stay and recovery. Furthermore, anatomically, the thyroid often extends down in the pretracheal fascia behind the great vessels, meaning an anterior approach is both invasive and poorly adapted.

We have previously reported a pure video assisted thoracoscopic surgery (VATS) resection of an ectopic retrosternal goitre in the posterior mediastinum causing obstructive sleep apnoea.⁶ We now describe how a VATS thoracoscopy can be used in conjunction with the standard collar incision for standard retrosternal goitre excision.

Methods

The thoracic surgery department at Glenfield Hospital in Leicester is a quaternary referral centre for the regional thyroid surgery service for retrosternal thyroid cases where there is an anticipated high likelihood of needing a thoracic incision.

Following induction of general anaesthesia and single lung ventilation with a double lumen endotracheal tube, the patient was placed in a supine position with a support below the right shoulder to rotate the right hemithorax by 30° so as to allow access to the anterolateral chest wall. The right arm was raised above the patient's head on an arm board.

A transverse collar incision was made approximately one finger's breadth above the sternal notch. The platysma was divided, and the superior and inferior subplatysmal flaps were raised from the superior thyroid cartilage down to the sternal notch. A Joll retractor was used to aid exposure. The

deep cervical fascia was divided and the strap muscles were retracted laterally. The superior, middle and inferior thyroid veins of the left thyroid lobe were ligated and divided. The superior and inferior thyroid arteries were then ligated. The recurrent laryngeal nerves were identified and protected. The thyroid was mobilised. Following establishment of single left lung ventilation, right VATS was performed via two 2cm incisions in the fourth and seventh intercostal space in the midaxillary line, and a 4cm incision in the fifth intercostal space at the anterior axillary line.

At thoracoscopy, the thyroid mass could be identified as a swelling in the paratracheal space. The overlying mediastinal pleura was opened, and the goitre was mobilised by both blunt and sharp dissection from the surrounding structures using electrocautery. Once the goitre had been mobilised, it could be delivered cephalad to the neck incision. In one case, it was delivered down from the cervical incision into the chest owing to its large size and anatomical location posterior to the trachea. The goitre was then retrieved with an Endo Catch™ bag (Covidien, Dublin, Ireland) through the 4cm anterior VATS port. A single 28F intercostal drain was placed and the ports were closed.

A Mann–Whitney U-test was used to compare the length of stay although the number of cases using the open thoracic approach was small.

Results

Twenty-one patients underwent surgery for retrosternal goitre at our institution between 2001 and 2012. Seven (33%) underwent a thyroidectomy with VATS. Ten patients (48%) had their excision achieved entirely through a cervical incision while four (8%) required an open thoracic approach: two with a manubriotomy, one with a sternotomy and one with a right thoracotomy.

The seven patients (4 men and 3 women) who underwent a VATS thyroidectomy had a median age of 68 years (range: 58–73 years). Four patients presented with exertional dyspnoea (three of whom also had stridor), one patient with a persistent cough and one with obstructive sleep apnoea. One patient was asymptomatic and the retrosternal goitre was an incidental finding.

The median operating time was 218 minutes (range: 120–240 minutes). The median diameter of the retrosternal goitre was 70mm (range: 40–145mm). One patient required an additional manubriotomy to deliver the bulky thyroid. One patient suffered a transient right recurrent laryngeal nerve palsy. There were no other complications such as tracheomalacia, hypoparathyroidism or postoperative bleeding.

Five patients had epidural anaesthesia and two had patient controlled analgesia with morphine. The median pain score on the day of surgery was 1 (range: 0–5) and the median score on postoperative day 1 was 0 (range: 0–5).

The median length of stay for the VATS patients was 5 days (range: 3–7 days). In comparison, for the four patients with open thoracic incisions, the median length of stay was 7.5 days (range: 4–9 days) ($p=0.15$).

Histology confirmed a multinodular colloid goitre in all cases with no evidence of malignancy.

Discussion

Retrosternal goitre was first described by Albrecht von Haller in 1749. It can be defined as a thyroid that descends below the thoracic inlet or has more than 50% of its mass inferior to the thoracic inlet.^{3,7} This occurs in 2–14% of all patients undergoing thyroid surgery.⁷ Retrosternal goitre may be primary or secondary. The former is rare and results from ectopic thyroid tissue located in the mediastinum with a blood supply derived from mediastinal vessels. The latter arises from cervical goitre, which descends below the thoracic inlet into the mediastinum. Women are affected more often than men by 3:1, and diagnosis is often made in the fifth and sixth decades of life.⁷

Surgery is undertaken not only in symptomatic cases to relieve symptoms but also in asymptomatic patients if malignancy is suspected or to pre-empt the development of symptoms. Complications of excision of retrosternal goitre include airway collapse from post-thyroidectomy tracheomalacia, hypoparathyroidism, recurrent laryngeal nerve injury and postoperative bleeding.⁸

A number of studies have sought to identify factors that may predict the requirement of an additional thoracic incision. One study found that 6% of patients required an extracervical incision, and factors predisposing this included recurrent goitre following a previous cervical thyroidectomy, primary mediastinal goitre and malignancy.² Other studies have identified goitre size and volume, anatomical location and the degree of intrathoracic extension as other significant factors.^{5,4} In particular, goitres that descend below the aortic arch or are located in the posterior mediastinum are more likely to need an extracervical incision.^{5,4}

If a second incision is required, a sternotomy or thoracotomy is usually carried out. Anatomically, the thyroid extends deep behind the great vessels in the pre and paratracheal space, meaning a sternotomy is not only a substantial incision but the exposure is limited by the overlying great vessels. A posterolateral thoracotomy, on the other hand, allows direct access to the paratracheal space but is associated with significant pain. A right anterior mediastinotomy has also been used successfully as a less invasive approach to facilitate mobilisation.¹

In many other areas of thoracic surgery, VATS (which does not damage the thoracic skeleton) has already been proved to be associated with less pain, lower morbidity, more rapid recovery and even better survival.^{9,10} Here, a thoracoscopic approach may offer a similarly minimally invasive approach with the benefit of both superior exposure of the paratracheal space and cosmesis, and potentially better patient outcomes. There is already a move towards even less invasive approaches for thyroidectomy through transcervical minimally invasive VATS thyroidectomy. This has been shown to be associated with better patient outcomes in terms of pain and cosmesis.¹¹ VATS for the additional thoracic approach is a natural extension of that move towards minimising surgical trauma and improving operative exposure and visualisation.

As the incidence of retrosternal goitre is relatively low, it would be difficult to train non-thoracic surgeons to develop VATS for mediastinal dissection, both because of the

learning curve for VATS in general and because the small case volume limits the opportunity to maintain competence at VATS. We believe that where a thoracic incision is required, discussion and collaboration with a thoracic surgeon would allow avoidance of the more morbid and less anatomical sternal splitting.

Conclusions

With the retrosternal thyroid extending normally deep into the centre of the mediastinum, the benefits of a lateral approach are obvious. We have found a combined cervical and thoracoscopic approach to the retrosternal goitre to be feasible and safe, and it has potential benefits over sternotomy and thoracotomy.

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