

# Extended thymectomy by a cervical incision additional to bilateral VATS approach

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**Background:** Video-assisted thoracoscopic surgery (VATS) in thymectomy has shown safe and effective with many advantages in myasthenia gravis (MG) patients with or without thymoma than transsternal approach. This video aims to show the procedure of extended thymectomy via a cervical incision additional to bilateral VATS approach in a MG patient with an early stage thymoma.

**Methods:** The patient was a 46-year-old male who had onset of symptoms of blurred vision, dysarthria and dysphagia for 10 months before administration. A diagnosis of MG was then confirmed using anticholinesterase test and electromyography test by neurologists. A CT scan showed enlarged thymus and a mass close to the left innominate vein in the anterior mediastinum with a size of 12 mm × 13 mm. Without any contradictions, the patient was planned to receive a procedure of extended thymectomy.

**Results:** The patient recovered with no complications and was discharged on the 8th postoperative day. Histological pathology examination revealed a type B3 thymoma of Masaoka stage II.

**Conclusions:** Oncological principles and immunological considerations are equally important in surgery for the MG patients with thymoma. All the thymus gland in the mediastinum including ectopic thymic tissue in the cervical region should be removed in the procedure. In conclusion, we suggest this approach to be safe and feasible for thymoma surgery in patients with MG.

**Keywords:** Minimal invasive surgery; thymoma; myasthenia gravis (MG); cervical incision

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## Introduction

Video-assisted thoracoscopic surgery (VATS) in thymectomy has shown safe and effective with many advantages in myasthenia gravis (MG) patients with or without thymoma than transsternal approach including less postoperative pain, better preserved pulmonary function, and improved cosmesis (1,2). Jaretzki *et al.* found the presence of extracapsular foci of thymic tissue in the cervical fat tissues additional to the mediastinum and strongly advocated to remove all these tissues for MG patients (3,4). Shigemura and his colleagues (5) showed that inclusion of the transcervical incision in a bilateral VATS approach was feasible and necessary for complete resection of thymic gland and all of ectopic thymic foci in neck with minimal invasiveness. We began our preliminary exploration 3 years

ago. From then on, 22 cases of MG with thymoma were conducted the procedure of extended thymectomy by the approach of bilateral VATS and a cervical incision. The video aims to show this procedure in a MG patient with an early stage thymoma.

## Methods

In our institute, the inclusion criteria for selection of patients to treat with this approach include: thymoma patients with autoimmune diseases, like MG or Graves' disease, etc.; none contraindication of video assisted thoracoscopic surgery; no history of previous thoracic or neck surgery. The exclusion criteria include: patients with history of previous thoracic or neck surgery; thymic



**Figure 1** Extended thymectomy by a cervical incision additional to bilateral VATS approach (6).

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lesions without autoimmune diseases; contraindications of video assisted thoroscopic surgery. In the present case, the patient was a 46-year-old male who had onset of symptoms of blurred vision, dysarthria and dysphagia for 10 months before administration. A diagnosis of MG was then confirmed using anticholinesterase test and electromyography test by neurologists. The patient was treated by oral pyridostigmine and prednisone and the symptoms were relieved. Half of a month before the administration, the symptoms reoccurred and exaggerated after the patient got a cold. A CT scan showed enlarged thymus and a mass close to the left innominate vein in the anterior mediastinum with a size of 12 mm × 13 mm. Without any contradictions, the patient was planned to receive a procedure of extended thymectomy.

Our procedure (*Figure 1*) began with the left side approach. After intubation, the patient was placed in semi-supine position with a 60-degree retroversion. The left arm was abducted above his head in a holder. An observation port was made in the 7th intercostal space on the mid axillary line. A 10-mm 30-degree thoracoscope was introduced for exploration. A working port and an assistant port both for a 5-mm trocar were introduced in the 5th intercostal space on the mid-axillary line and on the anterior axillary line separately. Artificial CO<sub>2</sub> pneumothorax (pressure limit of 8 cm H<sub>2</sub>O) was installed in the procedure. Trivial adhesion was then divided by an electrocautery hook.

The pleura is dissected below the sternum and above the pericardium, superior to aorta and pulmonary artery. The dissection is cautiously continued using the electrocautery hook anteriorly along the left phrenic nerve, which should

be protected carefully. The lymph nodes in the front mediastinum were also dissected in the procedure. The innominate vein was exposed and protected as carefully as possible. In this case, we found the tumor was very close to the innominate vein and decided to resolve the problem via the right side approach. We also resected all the fatty tissue at the left cardio-diaphragmatic angle. A thoracic drainage was introduced before closure of the incisions. We always kept it in mind that the aim of left side procedure was to expose the left innominate vein as long as possible and to separate the left phrenic nerve from the thymus.

The patient was then turned into semi-supine position with a 45-degree retroversion to the left. A 12-mm airtight trocar was inserted in the 6th intercostal space on the mid axillary line, and a 10-mm 30-degree thoracoscope was introduced for exploration. A second 5-mm trocar is bluntly introduced in the 5th intercostal space on the anterior axillary line and a 3rd 5-mm trocar in the 3rd intercostal space on the midaxillary line. The right lower horn of the thymic gland including the fatty tissue in the right cardio-diaphragmatic angle was dissected. We continued to open the mediastinal pleura along the right phrenic nerve and sternum. The whole thymus was then separated from the pericardium, vena cava. At the point where the innominate vein infused into the vena cava, the dissection was continued along and above the innominate vein. Both upper horns of the thymic gland were explored cephalically as far as possible. We exposed where the tumor was close to the lower border of the innominate vein and divided the tumor from the vein using an Endopath stapler safely.

The patient was then turned to a total supine position by rolling the operation table. A 5-cm low-collar incision was made two fingerbreadths above the sternal notch and one fingerbreadth above the clavicular heads. The thyroid lobes were exposed to identify their inferior polars and the adjacent upper poles of the thymic gland posterior to the strap muscles. All the fatty tissues in front of the trachea and between the bilateral common carotid artery were resected.

The thymic tissue was then retrieved via a 6-cm-long subxiphoid incision.

## Results

The patient recovered with no complications and was discharged on the 8th postoperative day. Histologic pathology examination revealed a type B3 thymoma of Masaoka stage II.

## Discussion

We think oncological principles and immunological considerations are equally important in surgery for the thymoma patients with MG. All the thymus gland in the mediastinum including ectopic thymic tissue in the cervical region should be removed in the procedure. Comparing with the other minimally invasive approach reported in literature for management of similar cases, there are several advantages of the present approach. First of all, the bilateral VATS approach facilitates to resect anterior mediastinal thymus including fatty tissue in the both cardio-diaphragmatic angles, and facilitates to expose and protect left innominate vein and phrenic nerves. When the pleural adhesion is encountered in one side, the thymic gland can be resected via contralateral VATS approach. Second, an additional cervical incision in this procedure is effective to resect unencapsulated lobules of thymic gland and microscopic thymic foci that may be presented in the pretracheal fat.

There are also limitations of this approach. The patient's posture needs to be changed in the operation and re-disinfection is warranted. Bilateral thoracic drainage is also needed in this approach.

## Conclusions

In conclusion, we suggest this approach to be safe and feasible for thymoma surgery in patients with MG.

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## Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

*Informed Consent:* Written informed consent was obtained from the patient. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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