

# Video-Assisted Thoracoscopic Management of Mediastinal Tumors

Yu-Jen Cheng, MD, Hsing-Hsien Wu, MD, Shah-Hwa Chou, MD, Eing-Long Kao, MD

## ABSTRACT

**Background:** Many successful attempts at removing benign mediastinal tumors with the video-assisted thoracoscopic technique have been reported, but no formal report has been published regarding malignant mediastinal tumors treated with this technique. We report our preliminary experience with video-assisted thoracoscopic removal of mediastinal tumors, benign or malignant.

**Methods:** Seven patients with mediastinal tumors treated with video-assisted thoracoscopic surgery were reviewed from January 1999 to April 2000. Their tumor pathologies included benign or malignant thymoma, neurilemmoma, and teratoma.

**Results:** The mean operation time was 240 minutes. The mean blood loss was 173 mL. The mean insertion time of chest tubes was 3 days. The mean admission time was 6 days. No deaths occurred during the study. Morbidity occurred in 2 patients. No tumor recurrence has been seen during the mean follow-up of 7 months.

**Conclusions:** The short-term results support the feasibility of VATS in managing technically resectable mediastinal tumors. Yet the long-term prognosis for the malignant lesions is deferred and needs further study.

**Key Words:** Video-assisted thoracoscopic surgery, Thymoma, Neurilemmoma, Teratoma.

## INTRODUCTION

Compared with the conventional operation, video-assisted thoracoscopic surgery (VATS) is an alternative method for managing thoracic diseases and has gradually become a standard approach to some mediastinal lesions. Many successful attempts at VATS to remove benign mediastinal tumors have been reported in the literature.<sup>1-5</sup> With regard to malignant tumors, considering the possibility of the incomplete resection, most thoracic surgeons are reluctant to perform VATS resection.<sup>5-8</sup> However, with the advancement in video-equipment and greater experience gained by VATS enthusiasts, it is appropriate to say that we should try to use VATS to remove some resectable malignant tumors with a curative intention. Here is our preliminary report.

## MATERIALS AND METHODS

This was a prospective study. All patients with suspected mediastinal tumors suitable for operation were surveyed and informed about the procedure of video-assisted thoracoscopic surgery (VATS) and the comparison between the conventional operation and VATS. All the patients agreed that VATS was to be performed initially and that it would be continued if the tumor was resectable with VATS, even if the tumor was malignant. Yet, if it were impossible to complete the tumor resection with VATS, an immediate conversion would be performed. From January 1999 to April 2000, 7 patients were included in this study. Four patients were included due to thymoma with or without myasthenia gravis (MG), and 3 patients were included due to mediastinal cystic tumors (**Table 1**). The study included 5 women and 2 men. The mean age was 42 years, with the age ranging from 14 to 65 years.

## RESULTS

The right-thoracic approach was used 4 times and the left-side approach was used 3 times. The mean operation time was 240 minutes, ranging from 120 to 360 minutes. The mean blood loss was 173 mL, ranging from 10 mL to 450 mL. All patients were extubated in the recovery room, except for 2 MG patients who were extubated the

Division of Thoracic Surgery, Department of Surgery (all authors).

Kaohsiung Medical University Hospital, 100 Shih-Chuan 1st Road, Kaohsiung 80708, Taiwan, Republic of China.

Address reprint request to: Yu-Jen Cheng, MD, Division of Thoracic Surgery, Department of Surgery, Kaohsiung Medical University Hospital, 100 Shih-Chuan 1st, Road, Kaohsiung 80708, Taiwan, Republic of China, Fax: 886-7-3213931. E-mail: yujench@ms15.hinet.net

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day after the operation. One or 2 chest tubes were inserted after each VATS procedure, the number of which depended on the individual condition. The mean insertion time of chest tubes was 3 days, ranging from 1 day to 11 days. No deaths occurred during the study. However, morbidity occurred in a patient with benign thymoma with MG, who was extubated the day after the operation, but she required reintubation 4 days after the operation due to progressive dyspnea and required ventilator support for 5 days. She received 1 cycle of plasmapheresis, and was ultimately extubated 9 days after the operation. The other case of morbidity occurred in a patient with malignant thymoma with MG, who suffered from chylothorax after the operation. Fortunately, it subsided after conservative treatment. This was the only patient who needed chest tube insertion longer than 4 days. All patients recovered well, and the mean admission time was 6 days, ranging from 2 days to 12 days. Pathologically, of the 4 thymomatous patients in this study, 1 had the tumor confined in the capsule (Masaoka<sup>9</sup> stage I), 2 had microscopic capsular invasion (Masaoka stage IIA), and 1 had macroscopic capsular invasion (Masaoka stage IIB) (**Table 1**). No tumor recurrence has been seen during the mean follow-up of 7 months, ranging from 2 months to 15 months.

**DISCUSSION**

The technical goal of thymectomy in the treatment of thymoma, with or without MG, is the complete removal of the tumor and all the related tissues,<sup>9-15</sup> which is the same

as that of thymectomy in MG patients.<sup>16-18</sup> Currently, 6 surgical techniques exist for performing thymectomy with different estimated extents of resection<sup>18</sup> (**Table 2**). Maximal transcervical-transsternal thymectomy is considered the preferred procedure, which has the most extended resection, removing 98% to 100% of the thymus and its related tissues.<sup>18-19</sup> Although the resection extent reached by VATS thymectomy is lower (80% to 85%), it is almost the same as that reached by the widely performed extended transsternal thymectomy.<sup>20</sup> With the benefit of minimal access and the acceptable resection extent,<sup>20-22</sup> the author considers that an adequate resection can be performed with VATS that meets both anatomical and surgical requirements. Therefore, the author prospective-

**Table 2.**  
Estimated extent of resection.\*

Thymectomy technique	Extent
“Maximal” transcervical-transsternal	98-100%
“Extended” transsternal	85-95%
VATS resection	80-85%
“Extended” transcervical	75-80%
“Classical” transsternal	70-75%
“Basic” transcervical	45-50%

\*Rough estimate.  
(From Alfred Jaretzki III. *Neurology* 1997)<sup>18</sup>

**Table 1.**  
Seven patients were included in this study.

Patient	Sex	Age (years)	Tumor location	Pathology	Size (cm)
1	Male	20	Anterior mediastinum	Mature Teratoma	10x6x3.5
2	Female	55	Posterior mediastinum	Neurilemmoma	6x3.5x2.3
3	Female	46	Anterior mediastinum	Benign Thymoma	6.5x4x1
4	Male	65	Anterior mediastinum	Malignant Thymoma*	5.7x4x1.5
5	Female	14	Anterior mediastinum	Malignant Thymoma*	7.5x3x1.5
6	Female	50	Posterior mediastinum	Neurilemmoma	3.7x2.1x0.6
7	Female	44	Anterior mediastinum	Malignant Thymoma†	9x4x2

\*Masaoka<sup>9</sup> Stage IIA  
† Masaoka Stage IIB

ly tried VATS to remove the thymoma in thymomatous patients with or without MG. The right thoracic approach is preferred<sup>5</sup> except in the case of obvious left-sided thymoma. The existence of thymoma is best detected by chest computed tomography (CT), with 85% sensitivity, 98.7% specificity, and a 95.8% accuracy rate.<sup>23</sup> Chest CT can also detect tumor invasion of the peripheral tissue or great vessel involvement, under which condition the VATS procedure is deemed impractical. Landreneau et al<sup>15</sup> suggest that if a patient has an anterior mediastinal mass without evidence of local invasion on computed tomography, exploratory thoracoscopy may be considered. If thoracoscopy fails to reveal intrathoracic metastases or local invasion, thoracoscopic resection of the entire lesion may be undertaken.<sup>15</sup> However, their VATS resection of thymoma was limited to Masaoka stage I only. In the author's opinion, VATS resection of Masaoka stage IIA or IIB is not contraindicated if the resection can remove the entire tumor and the related tissue and if subtle manipulation of tumor tissue to avoid spreading is followed, such as protecting the wound from implantation of a tumor by using a tissue-removing bag.

Three VATS procedures exist in this study for benign mediastinal cystic tumors. One of the benign cystic tumors is a huge mature teratoma with a diameter of 10 x 6 x 3.5 cm.<sup>24</sup> It seems that a huge-sized cystic lesion is not a contraindication to VATS. In a previous report<sup>1</sup> of multicenter VATS experience with mediastinal tumors, the conclusion was that video-assisted thoracic surgery is a safe technique for benign mediastinal tumors, typically for those in the middle and posterior mediastinum. The author believes that in the anterior mediastinum, VATS is also a safe technique.

Surely, this preliminary report has a limited number of cases, and follow-up duration is not long enough. Further observation is needed to verify the role of VATS in the management of mediastinal tumors, especially malignant ones.

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