

Video-assisted Thoracoscopy: Role in the Management of Intrathoracic Pathology

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Abstract

A retrospective study was done from October 1992 to December 1996 of 48 patients who underwent video-assisted thoracoscopy. A male to female ratio of 3.7:1 was seen, with a mean age of 50 ± 19 years. The underlying diagnoses included spontaneous pneumothorax ($n = 23$), malignant pleural effusion ($n = 16$), lung disease ($n = 4$), trauma ($n = 2$), empyema ($n = 2$) and oesophageal carcinoma ($n = 1$). The use of this modality is discussed in the treatment of various intrathoracic pathologies.

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Introduction

Thoracoscopy was first introduced by Jacobaeus nearly a century ago.¹ With the development of endoscopic equipment and the recent surge of interest in minimally invasive surgery, video-assisted thoracoscopy (VATS) has found many uses, both diagnostic and therapeutic, in the management of intrathoracic pathology.

Video-assisted thoracoscopy was first introduced into our hospital in 1992 and has since become a useful tool as an alternative to thoracotomy. We sought to review our experience with the use of this modality with the aim of assessing its usefulness and scope of applications.

Patients and Methods

From October 1992 to December 1996, a total of 75 thoracic operations were performed at the Toa Payoh Hospital, now named the Changi General Hospital. Of these, case notes were available for 66 cases. A retrospective analysis was performed. Forty-eight VATS procedures were performed in 47 patients.

Thirty-seven of the patients were males, 10 were females, giving a male to female ratio of 3.7:1. Their mean age was 50 ± 19 years with a distribution as shown in Figure 1. VATS was performed for spontaneous pneumothorax in 23 cases, malignant pleural effusion in 16, lung disease in 4, trauma in 2, empyema in 2 and staging in 1 case (Fig. 2). With the exception of three cases, a senior cardiothoracic surgeon had performed the operations.

General anaesthesia with endobronchial intubation and collapse of the ipsilateral lung was used. Surgery was performed with the patient in the lateral decubitus

position. We used the 10-mm rigid thoracoscope linked to a video camera. Three, occasionally four, intercostal ports were created. The procedure performed varied according to the underlying pathology. Adhesiolysis was done by a combination of coagulation with scissors followed by division. Endoscopic staples were used for pulmonary resections. These were supplemented by endoloop ligation to achieve haemostasis. Talc, nitrogen mustard and hypertonic saline were used for pleurodesis. Pleural drains were inserted at the end of the procedure.

Postoperatively, the patients were nursed in the intensive care or high-dependency unit.

Results

Spontaneous Pneumothorax

Twenty-three procedures were done. The mean age was 40 ± 19 years. Eleven cases had primary spontaneous pneumothorax (mean age 31 ± 12 years) compared with 12 cases which were secondary to an underlying pathology such as asthma, chronic obstructive lung disease, pulmonary tuberculosis and Marfan's syndrome. The mean age was 49 ± 21 years in this group.

Preoperative intercostal tube drainage was used in 8 (34.8%) cases with a mean duration of 9.1 ± 4.8 days. The indications for surgery were persistent air leak ($n = 9$), recurrent ipsilateral pneumothorax ($n = 11$), and haemothorax after chest drain insertion due to torn adhesions ($n = 3$) (Table I). Resection with pleurodesis was carried out in 14 cases (60.9%), of which 6 had primary idiopathic pneumothorax and 8 had secondary pneumothorax from an underlying cause. Pleurodesis alone was done in the remaining cases (39.1%), with 5 having

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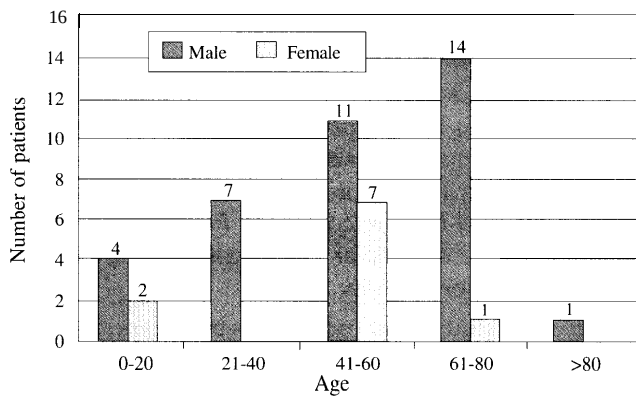


Fig. 1. Age distribution of patients undergoing VATS

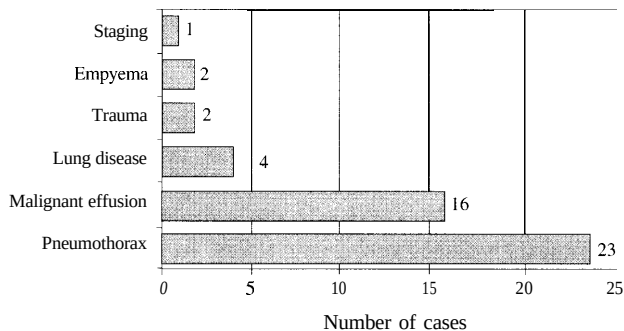


Fig. 2. Diseases in which VATS was carried out in our series.

primary and 4 having secondary pneumothorax. The mean operating time was 101 ± 42 minutes for all cases; for pleurodesis alone, the mean operating time was 79 ± 10 minutes, whereas it was 116 ± 15 minutes when resection was done. Four of the operations required conversion to thoracotomy and all involved lung resection for pneumothorax due to secondary causes. Two cases had dense fibrous adhesions at the lung apex where access was technically difficult; the remaining two had extensive bullae. The median postoperative stay was 6 days (range 2 to 19 days). We had a patient with secondary pneumothorax occurring in both lungs, who had two procedures done on separate hospital admissions.

Complications were seen in 5 cases (21.7%). Two complications developed among those with primary spontaneous pneumothorax: 1 case had postoperative haemothorax due to bleeding through the staple line on the lung, and another had persistent air leak. The remaining 3 complications were 1 case of chest infection and 2 of persistent air leak seen in patients with secondary pneumothorax.

One of the cases underwent VATS twice on separate admissions 4 months apart. He had spontaneous pneumothorax on each side secondary to chronic obstructive lung disease. VATS was used to carry out resection of the affected segment and pleurodesis. Conversion to thoracotomy was necessary on both occasions due to dense pleural adhesions especially at the apices.

TABLE I: INDICATIONS FOR VATS IN SPONTANEOUS PNEUMOTHORAX

Indication	No. of patients
Persistent air leak	
• Without previous pneumothorax	6
• With previous contralateral pneumothorax	3
Recurrent ipsilateral pneumothorax	
• Without previous contralateral pneumothorax	8
• With previous contralateral pneumothorax	2
• Presenting with bilateral pneumothorax	1
Haemothorax after chest drain insertion (due to torn adhesions)	3

VATS: video-assisted thoracoscopy

One death occurred in this group. The patient was a 79-year-old male who had a right pneumothorax with chronic obstructive lung disease and pulmonary tuberculosis as predisposing causes. He was intubated at the Emergency Department due to type II respiratory failure. Thoracoscopic adhesiolysis was followed by chemical pleurodesis with talc. Postoperatively he had a persistent air leak due to bullae at the apex. He underwent a thoracotomy and upper lobectomy a week later. The following day a haemothorax had resulted, due to bleeding from a branch of an intercostal artery, necessitating haemostasis. He subsequently succumbed to a chest infection and perished a month after admission into hospital.

Malignant Pleural Effusion

Sixteen patients were treated for malignant pleural effusion. Their mean age was 62 ± 9.2 years. Eleven had lung cancer. The extrapulmonary cancers seen were from the stomach, thymus, breast, ovary and nasopharynx. Pleurodesis by VATS was carried out in 14 cases while the remainder had thoracoscopy with drainage alone. The mean operating time was 52 ± 15 minutes. None of the cases required a conversion to a thoracotomy. The median duration of postoperative stay was 10.5 days (range 5 to 32 days).

Complications were seen in four cases, namely recurrence of the effusion, empyema, oesophagopleural fistula and acute myocardial infarction. There were two deaths in this group of patients. The first was a 53-year-old female with advanced phylloides tumour whose postoperative course was complicated by an oesophagopleural fistula leading to empyema formation; the other was a 77-year-old male with carcinoma of the lung who had a massive myocardial infarction.

Lung Disease

The age range was 18 to 87 years in this group of 4 patients with a median of 45 years. There were an equal number with interstitial lung disease (ILD) and pulmonary tuberculosis (PTB). The procedures done were

pleural biopsy for ILD, lymph node biopsy for PTB, drainage of a tuberculous effusion with pleurodesis, and resection of a bullous lung segment with ILD. Adhesions of the pleura due to extensive scarring, requiring thoracotomy, were seen in the last patient, who also succumbed to a myocardial infarction.

Trauma

There was one case each of blunt and penetrating trauma. VATS with evacuation of the haemothorax and drain insertion failed in the patient with a stab wound. He required a thoracotomy to achieve full evacuation of the clots.

Empyema

Video-assisted thoracoscopy was used to drain empyema thoracis in two cases. None required conversion to thoracotomy and no postoperative complications were encountered.

Staging

A case with oesophageal carcinoma was staged using VATS. Infiltration of the tumour into the adjacent lung tissue was seen and the patient was subsequently given palliative care.

Discussion

Video-assisted thoracoscopy is being used with widening indications, both diagnostic and therapeutic.² The advantages include a smaller scar, reduced trauma to the intercostal muscles, less postoperative pain with reduced analgesic requirement, and shorter hospital stay. However, special training in this technique is needed to prevent the potential complications associated with the limitation in the visual field during surgery.

In our series, spontaneous pneumothorax was the most common pathology requiring VATS. This is diagnosed on chest radiography. Patients with secondary pneumothorax were generally older. In addition, VATS in this group was technically more difficult with a higher percentage requiring thoracotomy. Treatment involved pleurodesis for persistence or recurrence of the pneumothorax. Where there were bullae, these were resected to prevent further air leak. Duration of postoperative stay is comparable to earlier reports of around one week^{3,4} although others have reported shorter stays of 4 days.^{5,6}

In malignant pleural effusion, the rapid reaccumulation of fluid after drainage poses a constant challenge in management. Not only is VATS useful in diagnosis by visualising a lung tumour or obtaining effusion fluid for cytology, pleurodesis can also be performed at the same time. The advanced stage of malignancy, general debility of the patients and their older age could account for the major complications that were encountered.

Our experience with lung biopsy by VATS was limited. However, this modality has been reported to be the

best option in obtaining histological confirmation of diffuse lung disease.⁷

In trauma, we used VATS for evacuation of haemothorax. This has been reported to be successful.² In the treatment of empyema, the advantages of VATS are the ability to drain loculations and achieve debridement. VATS was also used successfully in staging a case of oesophageal carcinoma as unresectable, thus avoiding unnecessary thoracotomy.

Video-assisted thoracoscopy has been reported to be used in ligation of patent ductus arteriosus, creation of a pericardial window in pericardial effusion, repair of ruptured diaphragm, closure of bronchopleural fistula, repair of para-oesophageal hernia,⁸ resection of chest wall tumours and sympathectomy for hyperhydrosis.⁹

We had a case that was complicated by bleeding from the staple line after resection was performed. This occurred at the centre portion of the staple line where the lung tissue was thicker due to the contained branches of pulmonary vessels and bronchioles. In comparison, in the peripheral portions the vessels and bronchioles were of smaller calibre. We achieved haemostasis by placing sutures through the tissue to ligate the larger vessels.

Conclusion

Since the introduction of VATS in our hospital, it continues to be employed with greater frequency in the management of intrathoracic pathologies in place of thoracotomy. This review of its usage and audit of the outcomes will serve to further define its role and limitations in the local setting.

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