Video-Assisted Thoracic Surgery Lobectomy for Lung Cancer in Ramathibodi Hospital

Montien Ngodngamthaweesuk MD*,
Sukasom Attanawanich MD*, Narumol Kijjanon RN**

** Division of Thoracic Surgery, Department of Surgery, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand*
*** Department of Nursing, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand*

Background: *Although the public perceives video-assisted thoracic surgery (VATS) as advantageous because it is less invasive than a standard thoracotomy. There are questioned the safety of VATS lobectomy and its adequacy as a cancer operation. This study is reviewed to assess this issue.*

Material and Method: *This retrospective study was performed between January 2009 and June 2011 in 58 patients who underwent VATS for a standard anatomic lobectomy with lymph node sampled or dissection for lung cancer 43 women (74%) and 15 men (26%) and mean age 60.28±11.14 years. None of this study group had any pleural effusion or pleural dissemination.*

Results: *The most symptom and sign of patients with lung cancer were normal [48 cases (83%), 54 cases (93%) respectively]. The most risk factor was smoking [12 cases (20%)]. The most lobectomy of VATS lobectomy was right upper lobectomy [17 cases (29%)] and the longest duration of VATS lobectomy was left upper lobectomy was 237.00±38.60 minutes. Thirty-one patients (53.4%) were adenocarcinoma. The VATS lobectomy was adequate for lung cancer surgery because malignant cells were not found from cytologic study of pleural lavages. The conversion rate from VATS to standard thoracotomy lobectomy was seven cases (12%), which the common causes were pleural symphysis and inadequate one lung ventilation. The postoperative courses showed minimal blood transfusion (0.11±0.37 ū), intensive care unit (ICU) stay (0.61±0.56 days) and intercostal drainage (ICD) duration (6.10±5.79 days). There were no intra-and post-operative death. Seven cases (12%) had many complications; the most complication was bacteria pneumonia. A case needed re-thoracotomy due to medical treatment failure for chylothorax.*

Conclusion: *VATS lobectomy (anatomic lobectomy and lymph nodes sampled or dissection) for lung cancer can be performed with low morbidity and no mortality.*

Keywords: *Video-assisted thoracic surgery (VATS), Lung cancer pleural lavage*

J Med Assoc Thai 2013; 96 (7): 819-23
Full text. e-Journal: *http://jmat.mat.or.th*

Pulmonary surgery using video-assisted thoracic surgery (VATS) techniques was first described over the 15 years since the first VATS lobectomy[1,2]. It involves a less invasive operation than a standard thoracotomy. Published reports have shown that the VATS lobectomy can be performed with reasonable safety and advantages of the procedure[3-5]. This report described lung cancer resection (lobectomy) by using minithoracotomy with video-assisted thoracic surgery.

Material and Method

This retrospective study was performed by review medical records between January 2009 and June 2011 at Ramathibodi Hospital. None of the present study group had any pleural effusion or pleural dissemination. Preoperative and intraoperative factors, cytology of pleural lavages, pathological reports, TNM classification, pathological stage[6] and postoperative complications of patients with VATS lobectomy for lung cancer were reported. Committee on Human Rights Related to Research Involving Human Subjects, Ramathibodi Hospital, Mahidol University on November 29, 2011 (ID 11-54-19).

Correspondence to:
Ngodngamthaweesuk M, Division of Thoracic Surgery, Department of Surgery, Ramathibodi Hospital, Mahidol University, Bangkok 10400, Thailand.
Phone: 0-2201-1315, Fax: 0-2201-1316
E-mail: ramnn@mahidol.ac.th

Technique

All procedures were performed in the operating room by a thoracic surgeon. The patient was placed in the lateral decubitus position and general anesthesia using a double-lumen endotracheal tube that allowed ventilation of the contralateral lung while the ipsilateral lung remained in atelectasis. There were

three mini-incision sites (Fig. 1). The first incision started on the anterior border of the lattissimus dorsi and extended anteriorly for 5 to 7 cm in length at the fifth or sixth intercostal space. A small thoracic retractor was used to access the pleural space and lung. The second incision was done at the eighth intercostal space in the anterior axillary line for introduction of a 10 mm rigid thoracoscope with a 30-degree len. The third incision (1.5-2.0 cm in length) was done at the seventh or eighth intercostal space in the posterior axillary line for lung retraction (Fig. 2). The lung was explored via the first incision (minithoracotomy) and grasped with sponge-holding forceps through the third incision. If there were pleural symphysis, it would be managed by an electrocautery instrument under direct thoracoscopic visualization. The surgeon stood on the dorsal side of the patient and the dissection began in the hilum. Hilar dissection was performed with standard thoracotomy instruments such as Metzenbaum scissors, DeBakey pickups. The pulmonary vessels were ligated with 2-0 silk and divided. The bronchial stump was repaired with interrupted 4-0 prolene. The incomplete fissure was transected and repaired with continuous and interrupted 2-0 vicryl. The lymph nodes were either sampled or dissected. For example, paratracheal nodes were removed dissecting in the planes along the trachea and the pericardium over the ascending aorta. Three pleural lavages for cytologic study were performed. The first pleural lavage with 500 ml of physiological saline solution was performed after minithoracotomy. The second pleural lavage with 500 ml of physiological saline solution was immediately performed after lobectomy and lymph nodes dissection. The third pleural lavage with 500 ml of physiological saline solution was performed after washing the pleural cavity with 5,000 ml of physiological saline solution just before closure of the chest wall. The patients whose three pleural lavage specimens were, all negative were defined as the negative lavage group, and the patients who had more than one specimen with a positive cytological finding were defined as the positive lavage group.

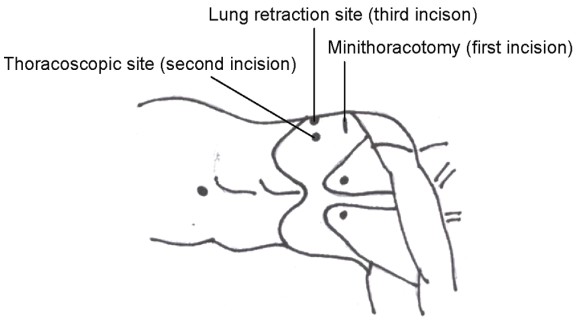

Fig. 1 Three mini incision sites.

Fig. 2 The lung was explored via three incisions.

Results

The authors performed 58 patients underwent VATS lobectomy with lymph node sampling or dissection in 43 women (74%) and 15 men (26%), mean age 60.28±11.14 years. The preoperative study is shown in Table 1.

Table 1. Pre-operative study: symptoms, signs and risk factors (n = 58)

Symptom	Number	Sign	Number	Risk factor	Number
No	48	No	54	Smoking	12
Cough	9	Cerebullum dysfunction	1	Colon cancer	2
Dyspnea	2	Sick sinus syndrome	1	Cervix cancer	1
Hemoptysis	1	Leg edema	1	Uterus cancer	1
Shoulder pain	1	Atrial septal defect	1	Breast cancer	1
Headache	1			Urinary bladder cancer	1
Brain dysfunction	1			Lung cancer	1

Table 2. The type of pulmonary resection, duration of resection ana intraoperative bleeding (n = 58)

Type of Resection	Number	Duration of resection (minutes) mean ± SD	Intraoperative bleeding (mL) mean ± SD
Right upper lobectomy	17	213.53±51.83	202.94±90.95
Right middle lobectomy	3	190.00±34.64	166.67±28.87
Right lower lobectomy	15	210.00±46.75	210.67±159.04
Left upper lobectomy	10	237.00±38.60	190.00±102.20
Left lower lobectomy	13	205.38±29.61	207.69±135.16

The type of pulmonary resection, duration of resection, and intraoperative bleeding is shown in Table 2.

The pathological diagnosis for the 58 cases that include the following primary and secondary lung cancer is shown in Table 3.

The cytologic study of three pleural lavages was done and is shown in Table 4.

The TNM classification and pathological stage of nonsmall lung cancer[6] is shown in Table 5.

Conversion to standard thoracotomy

In seven cases (12%), the VATS lobectomies were converted to standard thoracotomies because of pleural symphysis (2 cases), inadequate one lung ventilation (2 cases), oncologic reason (1 case), intraoperative bleeding (1 case), and incomplete fissure (1 case).

The postoperative course

The postoperative courses were consisted of blood transfusion (mean SD, units) = 0.11±0.37, intensive care unit (ICU) stay (mean ± SD, days) = 0.61±0.56, and intercostal drainage (ICD) duration (mean ± SD, days) = 6.10 ±5.79.

Mortality and morbidity

There was no intra and postoperative deaths. Seven cases (12%) had complications in 58 patients: pneumonia (2 cases), chylothorax (1 case), brain infarction (1 case), delirium (1 case), fever unknown origin (1 case) and recurrent cancer at VATS incision (1 case).

A case needed re-thoracotomy and thoracic duct ligation due to medical treatment failure for chylothorax.

Discussion

Published series of VATS lobectomy show that this procedure is safe and has advantages[7-10]. The authors have shown that this procedure can be

Table 3. The pathological diagnosis for lung cancer

Pathologic type	Number
Adenocarcinoma	31
Bronchioalveolar carcinoma	23
Squamous cell carcinoma	1
Mucoepidermoid carcinoma	1
Nonsmall cell carcinoma (no subtype)	1
Sarcoma	1

Table 4. Three pleural lavage for cytologic study

Number	After minithoracotomy	After lobectomy	After lobectomy and washing pleural cavity
52	Negative	Negative	Negative
1	Positive	Positive	Negative
1	Positive	Positive	Positive
1	Suspicious	Negative	Negative
1	Positive	Positive	Suspicious
1	Positive	Suspicious	Negative
1	Positive	Negative	Positive

Negative = negative for malignancy
positive = positive for malignancy
Suspicious = suspicious for malignancy

Table 5. Preoperative and postoperative stage of the 56 cases who underwent VATS lobectomy

Stage	TNM classification	Preoperative (number)	Postoperative (number)
I	T1NoMo	42	37
	T2NoMo	-	8
II	T1N1Mo	12	4
III	-	-	
IV	T4NoM1b*	2	2
	T2NoM1a*	-	5

* M1a = malignant pleural effusion; M1b = distant metastasis
Secondary lung cancer 2 cases (primary sarcoma of limb: 1 and colonic adenocarcinoma: 1)

performed safely and advantage such as less tissue injury, short ICU stay, low intraoperative bleeding and cosmetic. The VATS lobectomy performed by capable VATS surgeon does not appear to carry an increased risk of bleeding[11]. A serious complication of VATS is intraoperative bleeding from pulmonary vessels injury because there is limited access to control the hemorrhage. My study, a patient had intraoperative bleeding from pulmonary artery injury. The authors used a sponge stick to apply pressure at the bleeding site and did standard thoracotomy to close bleeding site. A patient developed recurrent tumor in the minithoracotomy incision after the VATS lobectomy. To prevent chest wall tumor recurrence, the patient's lobe should be in a plastic bag for removal though the incision[12]. The VATS lobectomy was adequate for cancer surgery because malignant cell was not found from cytologic study of three pleural lavages. The demographics in the present study reflect the current trends in lung cancer. Although squamous cell carcinoma was the most common cell type in the past, adenocarcinoma is now the most common type of lung cancer.

Conclusion

The present study shows that VATS lobectomy for lung cancer can be performed safely with minimal morbidity and no mortality. The VATS lobectomy is a reasonable treatment option for selected patients with lung cancer.

Potential conflicts of interest

None.

References

1. Roviaro G, Rebuffat C, Varoli F, Vergani C, Mariani C, Maciocco M. Videoendoscopic pulmonary lobectomy for cancer. Surg Laparosc Endosc 1992; 2: 244-7.
2. Lewis RJ, Sisler GE, Caccavale RJ. Imaged thoracic lobectomy: should it be done? Ann Thorac Surg 1992; 54: 80-3.
3. McKenna RJ Jr. Lobectomy by video-assisted thoracic surgery with mediastinal node sampling for lung cancer. J Thorac Cardiovasc Surg 1994; 107: 879-81.
4. Roviaro G, Varoli F, Rebuffat C, Vergani C, Maciocco M, Scalambra SM, et al. Video-thoracoscopic staging and treatment of lung cancer. Ann Thorac Surg 1995; 59: 971-4.
5. Ginsberg RJ. Thoracoscopy: a cautionary note. Ann Thorac Surg 1993; 56: 801-3.
6. Goldstraw P, Crowley J, Chansky K, Giroux DJ, Groome PA, Rami-Porta R, et al. The IASLC Lung Cancer Staging Project: proposals for the revision of the TNM stage groupings in the forthcoming (seventh) edition of the TNM Classification of malignant tumours. J Thorac Oncol 2007; 2: 706-14.
7. Kirby TJ, Mack MJ, Landreneau RJ, Rice TW. Lobectomy—video-assisted thoracic surgery versus muscle-sparing thoracotomy. A randomized trial. J Thorac Cardiovasc Surg 1995; 109: 997-1001.
8. Walker WS, Codispoti M, Soon SY, Stamenkovic S, Carnochan F, Pugh G. Long-term outcomes following VATS lobectomy for non-small cell bronchogenic carcinoma. Eur J Cardiothorac Surg 2003; 23: 397-402.
9. McKenna RJ Jr, Houck W, Fuller CB. Video-assisted thoracic surgery lobectomy: experience with 1,100 cases. Ann Thorac Surg 2006; 81: 421-5.
10. McKenna RJ Jr, Wolf RK, Brenner M, Fischel RJ, Wurnig P. Is lobectomy by video-assisted thoracic surgery an adequate cancer operation? Ann Thorac Surg 1998; 66: 1903-8.
11. Sugiura H, Morikawa T, Kaji M, Sasamura Y, Kondo S, Katoh H. Long-term benefits for the quality of life after video-assisted thoracoscopic lobectomy in patients with lung cancer. Surg Laparosc Endosc Percutan Tech 1999; 9: 403-8.
12. Downey RJ, McCormack P, LoCicero J 3rd. Dissemination of malignant tumors after video-assisted thoracic surgery: a report of twenty-one cases. The Video-Assisted Thoracic Surgery Study Group. J Thorac Cardiovasc Surg 1996; 111: 954-60.

การใช้กล้องส่องทรวงอกผ่าตัดกลีบปอดสำหรับมะเร็งปอดในโรงพยาบาลรามาธิบดี

มณเฑียร งดงามทวีสุข, สุกษม อัตนวานิช, นฤมล กิจจานนท์

ภูมิหลัง: *แม้ว่าเป็นที่ยอมรับทั่วไปว่าการใช้กล้องส่องทรวงอกผ่าตัดกลีบปอดสำหรับมะเร็งปอด มีข้อดีกว่าการผ่าตัดแบบเปิดทรวงอกกว้างตามมาตรฐาน มีคำถามเกี่ยวกับความปลอดภัยของการใช้กล้องส่องทรวงอกผ่าตัดกลีบปอดและวิธีการผ่าตัดมะเร็งปอดที่ถูกต้อง ในการศึกษานี้เป็นการศึกษาถึงความปลอดภัยและวิธีการผ่าตัดมะเร็งปอดที่ถูกต้องของการใช้กล้องส่องทรวงอกผ่าตัดกลีบปอด*

วัสดุและวิธีการ: *เป็นการศึกษาแบบย้อนหลังจากเวชระเบียนเริ่มตั้งแต่เดือนมกราคม พ.ศ. 2552 ถึง มิถุนายน พ.ศ. 2554 ในผู้ป่วย 58 ราย และไม่มีสารเหลว หรือ มะเร็งในช่องเยื่อหุ้มปอดโดยใช้กล้องส่องทรวงอกผ่าตัดกลีบปอดและตัดต่อมน้ำเหลืองออกในมะเร็งปอด โดยเป็นเพศหญิง 43 ราย (74%) และ ชาย 15 ราย (26%) และอายุเฉลี่ย 60.28±11.14 ปี*

ผลการศึกษา: *อาการและอาการแสดงที่พบในผู้ป่วยมะเร็งปอดส่วนมากไม่มีอาการ [43 ราย (83%), 54 ราย (93%) ตามลำดับ] ส่วนปัจจัยเสี่ยงที่ทำให้เกิดมะเร็งปอดมากที่สุดเป็นการสูบบุหรี่ [12 ราย (20%)] การใช้กล้องส่องทรวงอกผ่าตัดปอดกลีบขวาบนทำบ่อยมากที่สุด [17 ราย (29%)] ส่วนการใช้เวลาในการผ่าตัดปอดกลีบซ้ายบนนานที่สุด เฉลี่ย 237.00±38.60 นาที มะเร็งปอดส่วนใหญ่เป็นชนิด adenocarcinoma [31 ราย (53.4%)] การใช้กล้องส่องทรวงอกผ่าตัดปอดเป็นการผ่าตัดมะเร็งที่ดีเพราะไม่พบเซลล์มะเร็งในช่องเยื่อหุ้มปอดหลังผ่าตัดปอดเสร็จจากการตรวจเซลล์มะเร็งของน้ำล้างในช่องเยื่อหุ้มปอด มีการเปลี่ยนจากการใช้กล้องส่องทรวงอกผ่าตัดปอดเป็นการผ่าตัดแบบเปิดทรวงอกตามมาตรฐานพบได้ 7 ราย (12%) โดยมากเกิดจากการมีเยื่อพังผืดยึดระหว่างปอดและผนังทรวงอกด้านใน และไม่สามารถดมยาสลบแบบใช้ปอดข้างเดียวได้ในขณะผ่าตัด มีการให้เลือดแก่ผู้ป่วยเฉลี่ย 0.11±0.37 ยูนิต, ระยะเวลานอนใน ICU เฉลี่ย 0.61±0.56 วัน และระยะเวลาใส่ท่อระบายทรวงอกเฉลี่ย 6.10±5.79 วัน ไม่มีผู้ป่วยเสียชีวิตขณะและหลังผ่าตัด ส่วนภาวะแทรกซ้อนหลังการใช้กล้องส่องทรวงอกผ่าตัดกลีบปอดมี 7 ราย โดยมากเป็นการอักเสบของปอดจากเชื้อแบคทีเรีย ส่วนการผ่าตัดทรวงอกซ้ำมี 1 ราย เนื่องจากภาวะ chylothorax ที่รักษาด้วยยา, ให้สารอาหารทางหลอดเลือดดำ และงดอาหารแล้วล้มเหลว*

สรุป: *การใช้กล้องส่องทรวงอกผ่าตัดกลีบปอดในผู้ป่วยที่เป็นมะเร็งปอดมีความปลอดภัยเนื่องจากอัตราการเกิดภาวะแทรกซ้อนน้อย ไม่มีการเสียชีวิต*