

Uniportal video-assisted thoracoscopic lobectomy: An alternative surgical method for pulmonary carcinoma

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ABSTRACT

Objectives: To explore the effects and feasibility of single-port video-assisted thoracic surgery (VATS) on lobectomy for pulmonary carcinoma.

Methods: A total of 67 patients were enrolled in this study, in which 21 patients were treated by single-port VATS (Sing-port Group) and 46 patients by double-port VATS (Double-port Group). Blood loss, duration of thoracic drainage, length of post-operative hospital stay and post-operative pain ratings were compared between the two groups.

Results: No significant difference existed in blood loss, duration of thoracic drainage and length of postoperative hospital stay between the two groups. However, Post-operative pain was significantly reduced in Single-port Group compared to Double-port Group.

Conclusion: Single-port VATS was totally feasible with reduced post-operative pain and good looking appearance.

KEY WORD: Uniportal, Video assisted thoracic surgery, Lobectomy, Lung cancer.

doi: <http://dx.doi.org/10.12669/pjms.325.10415>

How to cite this:

Lin F, Zhang C, Zhang Q, Cheng K, Zhao Y. Uniportal video-assisted thoracoscopic lobectomy: An alternative surgical method for pulmonary carcinoma. *Pak J Med Sci.* 2016;32(5):1283-1285. doi: <http://dx.doi.org/10.12669/pjms.325.10415>

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- * Received for Publication: April 18, 2016
- * Corrected and Edited: July 13, 2016
- * Accepted for Publication: July 25, 2016

INTRODUCTION

A growing number of reports have shown more advantages of video-assisted thoracic surgery (VATS) than thoracotomy on clinical indicators.^{1,2} And with the development of technology in VATS, operating methods of VATS are evolving from four port to uniport.^{3,4} Especially, uniportal video-assisted thoracoscopic lobectomy has been developed in recent years, featured by minimal invasion and difficult operation. Hereon, 67 patients who had undergone single-portal VATS (Sing-port Group) or double-portal VATS (Double-port Group) were analyzed.

METHODS

Patients: From October of 2013 to April of 2014, 67 patients treated with VATS were enrolled in China-Japan Union Hospital of Jilin University, in wich 21 patients were treated by single-port VATS (Sing-port Group) and 46 patients by double-port VATS (Double-port Group). All enrolled patients were

Table-I: Baseline characteristics of study patients.

Parameters	Sing-port Group	Double-port Group	P value
Age (year)	59±7.3	62±6.2	0.087
Gender(m/f)	13/8	29/17	0.929
Lobe(left/right)	11/10	19 /27	0.398

* P < 0.05 means significant difference.

free of haematological diseases, dysfunctions of heart, liver, spleen, kidney, stomach or intestine, or history of thoracic injury or operation. Each patient signed an informed consent Form. Approval was obtained from the institutional review committee of Jilin University. The patients were divided into two groups according to the surgical methods: 21 who were treated by single-port VATS (Sing-port Group) and 46 patients by double-port VATS (Double-port Group) (Table-I).

Surgical strategy and technique: All patients in the two groups were anaesthetized by the double lumen intubation method and they were placed in the maximally flexed lateral decubitus position tilted slightly backward to prevent the hip from obstructing downward movement. In Single-port Group, a 3.0 to 5.0 centimeter incision was used as operating and camera hole. In other words, Operating instruments and camera lens were put in the same hole. Pulmonary artery was processed at first in patients with well-developed fissurae interlobaris, and then pulmonary vein and bronchus were processed. In Double Group, another incision of 1.5 centimeter was needed at the seventh interspace along mid-axillary line.

Outcome measurements: Outcome measurements consisted of mean operation duration, length of postoperative stay, operative blood loss, duration of thoracic drainage as well as postoperative pain score in both groups. Postoperative pain questionnaires were recorded by the pain grading method of the World Health Organization (WHO). Briefly, there was no pain in the 0 class. In the I class (mild pain), pain was tolerant, and it did not disturb sleeping or limit daily activity, and people could work. In

Table-III: Postoperative pain ratings.

Pain score	Uniportal Group	Double-port Group	P value
0 ~I	18	3	0.029
II ~III	29	17	

* P < 0.05 means significant difference.

the II class (middle pain), pain was obvious, and it disturbed sleeping, and people usually required general analgesic, sedative, hypnotic drugs. In the III class (severe), pain was acute with autonomic nerve functional disturbance, and it disturbed sleeping dramatically, and people usually required narcotic drugs.

Statistics: Quantitative variables were expressed as mean±standard deviation (±s) and analyzed by t-test. Qualitative variables consisted of gender, postoperative pain score and were analyzed by χ^2 test. A value of $P < 0.05$ was considered statistically significant. All data were processed by SPSS 17.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

All cases by VATS were operated successfully without conversion to thoracotomy in both groups. And no postoperative death occurred in both groups. Postoperative pathology showed 17 lung cancers, two inflammatory pseudotumors, one pulmonary tuberculosis as well as one carcinoma metastaticum in the Uniportal Group, and 35 pulmonary carcinomas, 6 inflammatory pseudotumors, three pulmonary tuberculosis as well as two carcinoma metastaticum in the Double-port Group.

No significant difference happened in blood loss, duration of chest drainage and length of postoperative hospital stay between the two groups. However, Post-operative pain was significantly decreased in Single-port Group compared to Double-port Group. ($P < 0.05$). Meanwhile, operation time was longer significantly in the Uniportal Group than in the Double-port Group ($P < 0.05$) (Table-II, III).

Table-II: Efficacy of the two groups.

	Sing-port Group	Double-port Group	P value
Operation duration(min)	132.3±13.2	105.4±12.5	0.012
Blood loss (ml)	115.5±14.5	109.3±13.2	0.089
LOS* (day)	7.8±1.6	7.2±1.3	0.108
Chest tube duration (day)	4.9±1.4	4.4±1.2	0.138

* LOS: Length of postoperative stay, P < 0.05 means significant difference.

DISCUSSION

Uni-portal VATS was for the first time applied in the diagnosis of hydrothorax and pulmonary lesions. Rocco et al.⁵ reported the usage of uniportal VATS on partial lobectomy of lung, followed by thoracic sympathectomy, fenestration of pericardium and Mediastinal lymph node biopsy.⁶⁻¹⁰ Then till 2010, D Gonzalez had completed pulmonary lobectomy and even more complex operations by uniportal VATS.¹¹⁻¹⁴ Based on previous developed VATS techniques,¹⁵ we also developed the uniportal VATS on pulmonary lobectomy and summarized up our own experience in recent years.

This study observed that postoperative pain was significantly lower in Single-port Group than Double-port Group. Previous studies¹⁶⁻¹⁸ have suggested postoperative pain is caused due to compression of intercostal nerve. So if hinder handle hole is removed and camera hole is integrated into frontal handle hole of 5.0 centimeters, postoperative pain would be reduced apparently, which has been confirmed in this study. On the other hand, the procedure duration was longer in the Uniportal Group than in the Double-portal Group. We suspected that it may be related to relatively long operation durations of the first few cases because of unskilled surgical techniques in uniportal VATS. Meanwhile, there existed no significant differences in intraoperative blood loss, duration of thoracic tube drainage and mean length of postoperative stay.

Conclusively, the uniportal thoracoscopic lobectomy applied in this study has proved feasible with reduced postoperative pain, and worth recommending as a safe surgical technique.

Declaration of interest: None.

Note: This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

REFERENCES

- Walker WS, Leaver HA. Immunologic and stress responses following video-assisted thoracic surgery and open pulmonary lobectomy. *Thorac Surg Clin.* 2007;17:241-249. doi:10.1016/j.thorsurg.2007.04.001.
- Garzon JC, Ng CS, Sihoe AD, Manlulu AV, Wong RH, Lee TW, et al. Video-assisted thoracic surgery pulmonary resection for lung cancer in patients with poor lung function. *Ann Thorac Surg.* 2006;81:1996-2003. doi:10.1016/j.athoracsur.2006.01.038.
- McKenna RJ Jr, Houck W, Fuller CB. Video-assisted thoracic surgery lobectomy: experience with 1,100 cases. *Ann Thorac Surg.* 2006;81(2):421-425. doi:10.1016/j.athoracsur.2005.07.078.
- Onaitis MW, Petersen RP, Balderson SS, Toloza E, Burfeind WR, Harpole DH Jr, et al. Thoracoscopic Lobectomy is a safe and versatile procedure: experience with 500 consecutive patients. *Ann Thorac Surg.* 2006;244(3):420-424. doi: 10.1097/01.sla.0000234892.79056.63.
- Rocco G, Martin-Ucar A, Passera E. Uniportal VATS wedge pulmonary resections. *Ann Thorac Surg.* 2004;77:726-728. doi:10.1016/S0003-4975(03)01219-0.
- Yim AP, Liu HP, Lee TW, Wan S, Arifi AA. 'Needlescopic' video-assisted thoracic surgery for palmar hyperhidrosis. *Eur J Cardiothorac Surg.* 2000;17:697-701. doi: 10.1016/S1010-7940(00)00378-X.
- Lee DY, Yoon YH, Shin HK, Kim HK, Hong YJ. Needle thoracic sympathectomy for essential hyperhidrosis: intermediate-term follow-up. *Ann Thorac Surg.* 2000;69:251-253. doi:10.1016/S0003-4975(99)01191-1.
- Lardinois D, Ris HB. Minimally invasive videoendoscopic sympathectomy by use of a transaxillary single port approach. *Eur J Cardiothorac Surg.* 2002;21:67-70. doi: 10.1016/S1010-7940(01)01042-9.
- Rocco G, La Rocca A, La Manna C, Scognamiglio F, D'Aiuto M, Jutley R, et al. Uniportal video-assisted thoracoscopic surgery pericardial window. *J Thorac Cardiovasc Surg.* 2006;131:921-922. doi:10.1016/j.jtcvs.2005.12.014.
- Rocco G, Brunelli A, Jutley R, Salati M, Scognamiglio F, La Manna C, et al. Uniportal VATS for mediastinal nodal diagnosis and staging. *Interact Cardiovasc Thorac Surg.* 2006;5:430-432. doi: 10.1510/icvts.2006.128603.
- Gonzalez D, Paradelo M, Garcia J, Dela Torre M. Single-port video-assisted thoracoscopic lobectomy. *Interact Cardiovasc Thorac Surg.* 2011;12(3):514-515. doi: 10.1510/icvts.2010.256222.
- Gonzalez-Rivas D, Delgado M, Fieira E, Fernandez R. Double sleeve uniportal video-assisted thoracoscopic lobectomy for non-small cell lung cancer. *Ann Cardiothorac Surg.* 2014;3(2):E2. doi: 10.3978/j.issn.2225-319X.2014.03.13
- Gonzalez-Rivas D, Fieira E, Delgado M, Mendez L, Fernandez R, de la Torre M. Is uniportal thoracoscopic surgery a feasible approach for advanced stages of non-small cell lung cancer? *J Thorac Dis.* 2014;6(6):641-648. doi: 10.3978/j.issn.2072-1439.2014.05.17.
- Gonzalez-Rivas D, Delgado M, Fieira E, Pato O. Left lower sleeve lobectomy by uniportal video-assisted thoracoscopic approach. *Interact Cardiovasc Thorac Surg.* 2014;18(2):237-239. doi: 10.1093/icvts/ivt441.
- Lin F, Zhang C, Cheng K, Dang D, Zhao Y. Thoracoscopic excision of two bronchogenic cysts located in highest upper mediastinum: Report of two cases. *Pak J Med Sci.* 2015;31(3):721-723. doi: 10.12669/pjms.313.6921.
- Gonzalez-Rivas D, Paradelo M, Fernandez R, Delgado M, Fieira E, Mendez L, et al. Uniportal video-assisted thoracoscopic lobectomy: two years of experience. *Ann Thorac Surg.* 2013;95(2):426-432. doi:10.1016/j.athoracsur.2012.10.070.
- Gonzalez-Rivas D. VATS lobectomy: surgical evolution from conventional VATS to uniportal approach. *Scientific World J.* 2012;780-842. doi: 10.1100/2012/780842.
- Lin F, Zhang C, Zhang Q, Dang D, Zhao Y. Postoperative pain in treatment of spontaneous pneumothorax with limited two-port thoracoscopy. *Pak J Med Sci.* 2014;30(4):712-715. doi: 10.12669/pjms.304.5047.

Authors' Contributions:

Fengwu Lin conceived, designed and did editing of manuscript.

Chuan Zhang, Kunpeng Cheng did data collection and manuscript writing.

Qiang Zhang did review and final approval of manuscript.

Yan Zhao takes the responsibility and is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.