

Original Article

Comparative Study of Survival following Videothoroscopic Lobectomy Procedures for Lung Cancer: Single- versus Multiple-port Approaches[☆]



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ARTICLE INFO

Article history:

Received 11 February 2016

Accepted 26 June 2016

Available online 17 September 2016

Keywords:

Single-port

VATS

Lung cancer

Surgery

Lobectomy

Survival analysis

ABSTRACT

Introduction: Video-assisted thoracoscopic surgery has become the technique of choice in the early stages of lung cancer in many centers although there is no evidence that all of the surgical approaches achieve the same long-term survival.

Method: We carried out a retrospective review of 276 VATS lobectomies performed in our department, analyzing age, sex, comorbidities, current smoker, FEV1 and FCV, surgical approach, TNM and pathological stage, histologic type, neoadjuvant or coadjuvant chemotherapy, relapse and metastasis time, with the main aim of evaluating the survival rate and disease-free time, especially with regard to the two/three versus single port approach.

Result: The one/four year global survival rate was 88.1% and 67.6% respectively. Bivariate analysis found that the variables associated with survival are comorbidity, histological type, stage, surgical approach and need for chemotherapy. When we independently analyzed the surgical approach, we found a lower survival rate in the single-port group vs the two/three-port group (VATS). Stratifying by tumoral stage (stage I) and by tumor size (T2) survival was significantly lower for patients with single-port group in comparison to VATS approach. In the multivariate analysis, single-port group is associated with a higher risk of death (HR=1.78). In analyzing disease-free survival, differences were found in both cases in favor of two/three port VATS: $P=.093$ for local relapses and $P=.091$ for the development of metastasis.

Conclusions: These results challenge the use of the single port technique in malignant lung pathologies, suggesting the need for clinical trials in order to identify the role this technique may have in lung cancer surgery.

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Estudio comparativo de la supervivencia tras procedimientos videotoroscópicos para la lobectomía del cáncer de pulmón: abordaje por puerto único frente a múltiple

RESUMEN

Introducción: La cirugía toroscópica videoasistida se ha convertido en la técnica de elección para las intervenciones de cáncer de pulmón en estadio inicial en muchos centros, a pesar de que no se ha probado que la supervivencia a largo plazo sea la misma con todos los abordajes quirúrgicos.

Método: Efectuamos una revisión retrospectiva de 276 lobectomías practicadas en nuestro servicio mediante cirugía videoasistida, y analizamos la edad, sexo, comorbilidades, tabaquismo, FEV₁ y FCV, abordaje quirúrgico, estadios TNM y patológico, tipo histológico, quimioterapia neoadyuvante o coadyuvante y

Palabras clave:

Monoportal

VATS

Cáncer de pulmón

Cirugía

Lobectomía

Análisis de supervivencia

[☆] Please cite this article as: Borro JM, Regueiro F, Pertega S, Constenla M, Pita S. Estudio comparativo de la supervivencia tras procedimientos videotoroscópicos para la lobectomía del cáncer de pulmón: abordaje por puerto único frente a múltiple. Arch Bronconeumol. 2017;53:199–205.

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tiempo hasta la recidiva o la detección de metástasis con el objetivo de evaluar la tasa de supervivencia y la duración del periodo sin enfermedad en relación con el abordaje quirúrgico, dos/tres puertos o puerto único, de los pacientes.

Resultados: Las tasas de supervivencia global al cabo de uno y cuatro años fueron del 88,1 y 67,6%, respectivamente. En el análisis bivariable se observó que las variables que se asociaban con la supervivencia eran las comorbilidades, el tipo histológico, el estadio, el abordaje quirúrgico y la necesidad de quimioterapia. Al analizar el abordaje quirúrgico de forma independiente, se observó que la tasa de supervivencia era inferior en el grupo en el que se utilizó la técnica monoportal frente al grupo en el que se utilizaron dos o tres puertos (VATS). Al estratificar a los pacientes según el estadio tumoral (estadio I) y el tamaño del tumor (T2), la supervivencia fue significativamente inferior en los pacientes tratados con el abordaje monoportal, en comparación con la VATS. En el análisis multivariante, el riesgo de muerte fue mayor con la técnica monoportal (HR=1,78). En el análisis del tiempo transcurrido sin enfermedad se observó una tendencia hacia una mayor supervivencia favorable a la VATS con dos/tres puertos, tanto para la recidiva local ($p=0,093$) como para el desarrollo de metástasis ($p=0,091$).

Conclusiones: Estos resultados cuestionan el uso de la técnica monoportal en las neoplasias malignas de pulmón, lo que sugiere la necesidad de efectuar ensayos clínicos que permitan identificar la función de esta técnica en la cirugía del cáncer de pulmón.

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Introduction

Lung resections using video-assisted thoracoscopic surgery (VATS) for lung cancer have been performed for more than 20 years.^{1–3} However, it was only after the publication of studies in the early 2000s detailing the extensive experience from a single center with very good results,⁴ and a multi-center study of 11 surgeons from six centers who underwent certification to assure the uniformity of the procedure,⁵ that lobectomies using VATS with systematic lymph node dissection became a widespread standard procedure for early-stage non small cell lung carcinoma (NSCLC) in many thoracic surgery departments. The procedure has been shown to decrease postoperative morbidities, shorten length of hospital stay,⁶ and has a comparable five-year survival rate.^{7,8}

A number of meta-analyses on the safety and effectiveness of VATS lobectomies in the early stages of NSCLC suggest lower relapse rates and lower five-year mortality rates in VATS patients,^{9,10} although the recent report published by Mathisen¹¹ and other studies¹² have questioned these results, raising the need for randomized studies.

At the Thoracic Surgery Department in A Coruña, standard VATS resections were first performed in 2007. After reading about the experiences of the Duke Group using only two ports,¹³ we gradually began to use this technique in suitable cases.¹⁴

In 2010, a number of surgeons in our department began to use uniportal (SP) VATS, based on the initial description from a Chinese research group,¹⁵ starting with lower lobectomies and gradually extending the technique to other types of resection surgery.

There are obvious differences between conventional VATS or a SP approach, such as the field of vision, ability to reach all parts of the thoracic cavity, possible bacterial or oncological contamination due to the more frequent insertion of surgical instruments through an unprotected incision, and the need to leave a drainage tube in the incision.

Nevertheless, studies from a number of groups demonstrated the possibility of carrying out different resections using SP, with essentially similar initial results,^{16–18} and a recent paper from Ng et al.,¹⁹ titled “Uniportal VATS – a new era in lung cancer surgery,” discusses the presumed benefits of this technique.

These short-term results may suffice in the case of benign pathologies,²⁰ but in the case of lung cancer, the most important aspect for the patient is their long-term survival.

As a result, five years after starting to use the uniportal technique in our hospital, we decided to conduct a retrospective review of the pulmonary lobectomies performed in our department on patients

with malignant disease and at least 1 year of follow up, with the main objective of analyzing their long-term survival.

Patients and Method

This is a retrospective study that was carried out at the Department of Thoracic Surgery of the University Hospital of A Coruña in Spain (CHUAC). The Institutional Review Board (CEIC) of the Galician Health Service (SERGAS) approved the study, and all patients provided their written informed consent before the procedure. The primary endpoint was survival after the new uniportal VATS pulmonary resection procedure vs the conventional two- or three-port VATS.

We reviewed the computerized clinical records of the 276 patients who underwent pulmonary VATS lobectomy with curative intent with or without preoperative induction chemotherapy due to malignant pathologies at CHUAC between April 2010 and December 2013.

The variables studied for each patient included age, sex, comorbidities, smoking status, forced expiratory volume in 1 s (FEV1) and forced vital capacity (FCV), surgical approach, TNM and pathological stage, histological type and neoadjuvant or adjuvant chemotherapy, relapse and metastasis time, last follow up and moment of death.

Operability criteria determine whether the patient will tolerate general anesthesia and pulmonary resection. Patients with angina pectoris, or those with known underlying cardiovascular disease were risk stratified by additional functional testing. The general functional status of patients was evaluated, and pulmonary function tests with forced vital capacity (FVC), forced expiratory volume in 1 s (FEV1) and carbon monoxide diffusion capacity (DLCO) were obtained in each case to evaluate the extent of surgical resection the patient will tolerate.

Mediastinoscopy or endoscopic staging were usually decided when computed tomography (CT) and/or positron emission tomography (PET) showed mediastinal nodes larger than 1 cm in the short axis, or any node with a maximum standardized uptake value (SUVmax) greater than 1.5 times background.

Systematic lymph node sampling or dissection is typically performed at the time of surgery to rule out the presence of hilar or mediastinal nodal metastases.

Thoracoscopy was performed at the start of most procedures to assess the extent of the tumor. Patients with early-stage tumors I, II were usually treated using video assisted primary surgical resection, and more advanced cases were usually resected using thoracotomy.

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