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Video-Assisted Thoracic Surgery Efficacy in Systemic Nodal Dissection: A Single Institution Experience

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Abstract

Background: According to the European Society of Thoracic Surgeons (ESTS) guidelines, systemic nodal dissection (SND) is mandatory in pulmonary resection for non-small cell lung cancer (NSCLC). Since VATS SND efficacy is still an uncertain issue, this is a key topic to definitively state the oncologic effectiveness of thoracoscopy. Our study compared the number of nodes and stations dissected and cN0-pN2 cases in VATS versus open thoracotomy.

Material and Methods: From June 2013 to December 2014, 30 patients with clinical stage I (T1-2aN0M0) lung cancer underwent lobectomy at our thoracic surgery department. Clinical staging was always obtained by positron emission tomography (PET). All mediastinal nodes suspected were studied by ultrasound-guided bronchoscopy with fine needle aspiration (EBUS-FNA). Patients were referred to VATS or open thoracotomy based on clinical general conditions and tumor characteristics. SND was performed in both the groups.

Results: Among 30 patients who underwent lobectomy, 21 underwent open thoracotomy and 9 VATS. Four (13.3%) showed to have pN2 at definitive pathologic examination: 2 in VATS and 2 in open thoracotomy group. Mean operation time was longer in VATS than in open thoracotomy (p=0.03).There was not significant difference between the two groups in terms of total nodes dissected (p >0.05), mediastinal nodes dissected (p >0.05) and stations removed (p >0.05).

Conclusion: VATS SND is theoretically successful as open thoracotomy but it is technically more demanding and more time-consuming.

Keywords: Vats; Lymphnode dissection; Non-small-cell lung cancer; Thoracotomy; Lymphnode staging

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Introduction

Is widely accepted that VATS lobectomy is associated with decreased post operative pain, shorten hospital stay, fewer post operative complications and therefore better compliance with adjuvant chemotherapy than open lobectomy [1]. These data have prompt some thoracic surgeons to use it routinely in early stage NSCLC.

On the other hand, many Authors still argue that VATS efficacy is uncertain in terms of lymph node dissection and should be avoided particularly in N1 or N2 disease [2]. According to the ESTS guidelines, it is common opinion that systemic nodal dissection (SND) is mandatory in every pulmonary resection for NSCLC [3]. SND is recommended also in clinical N0 patients since about 10% of them have been shown to have pathologic N2 at definitive postoperative diagnosis [4]. Therefore, the possibility to obtain SND by VATS is the key topic to definitively state the oncologic effectiveness of thoracoscopy versus open thoracotomy.

The aim of our study was to compare the number of nodes and stations dissected in patients who underwent lobectomy by VATS or open thoracotomy at our thoracic surgery department and to determine if there was a significant difference in the two groups as concerns the cN0-pN2 patient's percentage.

Patients and Methods

From June 2013 to December 2014, 30 patients with clinical stage I (T1-2aN0M0) lung cancer submitted to lobectomy and SND at our thoracic surgery department were retrospectively reviewed. All data concerning surgical approach, operative time, number of stations and nodes removed and

Figure 1: VATS was always performed by 2 ports and 1 lateral mini-thoracotomy.

number of cN0-N2 cases was considered. The preoperative evaluation included cardiac assessment and pulmonary function according to ESTS algorithm. Clinical staging was always obtained by positron emission tomography (PET) images.

In particular, pre-operative criteria to assess the N0 stage were the followings: 1) nodal diameter at CT< 1 cm and negative PET scan 2) nodal diameter >1 cm and negative PET scan 3) positive PET scan without an evidence of nodal metastasis at histological examination. All mediastinal nodes suspected were studied by ultrasound-guided bronchoscopy with fine needle aspiration (EBUS-FNA).

Patients were classified in two groups based on the surgical approach. Group 1 consisting of 9 patients that underwent VATS and group 2 consisting of 21 patients that underwent open thoracotomy.

Patients were referred to VATS or open thoracotomy by the same thoracic surgeon team based on clinical general conditions and tumor characteristics (size, position, etc.). However, surgical approach was never determined based on nodal status since all patients have already been classified N0.

All procedures were performed by the same Team of two surgeons. We always used the Copenhagen technique [1]. Patents were placed in posterolateral decubitus. VATS procedures were done by two centimeter incisions and a minithoracotomy with the surgeon positioned anteriorly: 1) the first incision, for the camera port, was performed on the anterior axillary line in the 7th intercostal space 2) the second incision in the 5th intercostal space on the posterior axillary line 3) lastly a 4-5 cm minithoracotomy in the anterior 5th intercostal space. The ribs spreader was never used. Open thoracotomy was always a posterolateral incision in the 5th intercostal space with the surgeons positioned at the patients' back. We always performed systemic nodal dissection in both the groups at the end of lobectomy. On the right side the stations dissected were 2,3,4,7,8,9 and 11, on the left side 4,5,6,7,8,9,10 and 11. Subcarinal, pulmonary vein, paraesophageal and hilar nodes were resected singularly. Paratracheal dissection was performed removing the fatty soft tissue including 4L, 2R and 4R nodes. Nodal dissection was initially performed using a bipolar forceps in the two groups then we have introduced the harmonic scalpel.

Data were expressed as mean +/- standard deviation (SD). Difference between groups with continuous variables were assessed by the X2 test or Fischer's exact test.

Statistical significance was accepted as p <0.05.

Figure 2: Open surgery was always performed by lateral thoracotomy.

Results

30 patients underwent lobectomy for stage I NSCLC. Twenty-one underwent open thoracotomy and 9 VATS. Four (13.3%) showed to have pN2 at definitive pathologic examination (cN0-pN2). Two were in the VATS group and 2 in the open thoracotomy group. Among these patients, 1 presented mediastinal nodal positivity at PET and was determined to be free of metastasis by EBUS-FNA. Both the groups underwent SND.

The two groups were similar as concerning age, sex, histology, pulmonary function (p >0.05). Comparing the operative features, the mean operation time in VATS was longer than in open thoracotomy with a statistical significance (p=0.03), while intraoperative blood loss, chest tube duration and hospital staying were equivalent (p>0.05).

There was no significant difference between the two groups in terms of total nodes dissected (16.2 +/- 5.4 per patients in the VATS group vs. 18.8 +/- 7.8 in the open thoracotomy group, p >0.05), mediastinal nodes dissected (10.5 +/- 5 per patients in the VATS group vs. 12.5 +/- 5.5 in the open thoracotomy group, p >0.05) and stations removed (6.8 +/- 1.6 per patients in the VATS group vs. 8 +/- 2.5 in the open thoracotomy group, p >0.05). However, the overall number of nodes and stations removed in open thoracotomy group was slightly higher. Despite, our data did not allow to statistically analyzing every single station, number 7 and 4L had less nodes removed in the VATS group. The most of patients with cN0-pN2 nodes presented a singular station and singular node metastasis in both the groups (7/8 and 10/11 cases respectively). The analysis of cN0-pN2 nodes in either group revealed that none of PET positive nodes previously studied by EBUS was metastatic.

There were 5 cases of conversion to open thoracotomy that were enrolled in the group 2. All conversions were performed based on technical difficulties as incomplete fissure or severe adhesions. There were no complications or in hospital deaths in either group.

Discussion

Accurate clinical tumor staging is essential in the management of lung cancer since the indication to surgery with curative intent is restricted only to cases with local disease (stage I and II). The N status assessment is probably the most challenging issue in clinical staging. PET scan has improved the accuracy of the non invasive procedures but is still affected by a remarkable percentage of false negative cases as reported by Kim and Co-workers [5]. False negative nodes are related in the most of cases to the impossibility in detecting micro-metastasis. On the contrary, mediastinal nodes enlargement at CT

scan or PET/CT positivity without a real malignant involvement, are frequent in smokers or BPCO patients. Based on these evidences, it is inevitable that postoperative N upstaging could happen as reported in literature by several Authors [6,7]. Therefore preoperative nodal biopsy is recommended in case of suspected malignant involvement.

In summary, invasive procedures can be omitted in patients with peripheral tumors and negative mediastinal (PET) images, whereas PET positive mediastinal findings should always be cyto-histologically confirmed. Transbronchial needle aspiration (TBNA), ultrasound-guided bronchoscopy with fine needle aspiration (EBUS-FNA) and endoscopic esophageal ultrasound-guided fine needle aspiration (EUS-FNA) are techniques that provide cyto-histological diagnosis and are minimally invasive. Their specificity is high but the negative predictive value is low. Mediastinoscopy is more invasive but is the most accurate method. Nowadays, EBUS-FNA and the mediastinoscopy are routinely used to preoperatively perform mediastinal nodal staging.

Despite these non-invasive and invasive techniques, Certfolio and Colleagues have showed that about 10% of clinical N0 become N2 after complete nodal dissection [6].

Based on the evidence that clinical nodal staging is a challenging issue, the ESTS guidelines [3] recommend to always perform an intraoperative complete nodal dissection to resect the all the possible undetected pathologic nodes also in N0 patients. The goal is to obtain the most accurate postoperative nodal status assessment and determine the real prognosis and the best postoperative treatment.

It is widely accepted that open thoracotomy allows an effective complete nodal dissection. On the contrary, the remaining concern about VATS lobectomy is the completeness of nodal dissection versus open thoracotomy. These concerns are about the followings items: the total number of nodes dissected, the number of stations sampled and tissue fragmentation. In particular, some nodal stations as 7 and 4L are considered very demanding to be reached during thoracoscopy and tissue fragmentation could be associated with seeding risks.

Few studies have faced this important issue. At the beginning of the VATS era, it was generally accepted that nodal dissection by thoracoscopy was not as successful as open thoracotomy. Therefore, frozen section of mediastinal nodes was advocated in order to convert to open thoracotomy in case of a pathologic response. Then, when VATS technique became more familiar to surgeons, some Authors were able to show that the number of stations and nodes dissected in VATS versus thoracotomy were similar [8]. New surgical techniques have also been developed to do the dissection of the most demanding nodal station. For instance, Baste has recently described an anterior approach to dissect nodes number 7 after an inferior left lobectomy [9]. However, serious doubts are persistent in several Authors.

Our data concerning the number of nodes resected by open thoracotomy and cN0-pN2 cases are similar to those reported in literature. The comparison between VATS and open thoracotomy showed that the two techniques were equivalent. These results, according with the latest literature [10,11], seem to confirm the oncologic efficacy of VATS lobectomy.

The most important bias of our paper is the small population enrolled. Moreover, it is a retrospective study therefore patients have been not randomized. However, we underline that surgical approach has never been chosen based on nodes characteristics. These could have influenced the results.

In our opinion, thoracoscopic approach to mediastinal nodes is a controversial technique. Its most interesting advantage is the closer view of the anatomical structures that allows a safer and comfortable dissection. On the contrary, the most disturbing characteristic is the discomfortable access to some deep stations as the number 7 and 4L.

Conclusion

VATS nodal dissection is theoretically equivalent to open thoracotomy but it is technically more demanding and probably more time consuming. In wider terms, VATS approach to pulmonary lobectomy and SND is one of the most specialized procedures in thoracic surgery and should be reserved to high specialized institutions.

References

1. Yan TD, Cao C, D'Amico TA, Demmy TL, He J, Hansen H, et al. International VATS Lobectomy Consensus Group. Video-assisted thoracoscopic surgery lobectomy at 20 years: a consensus statement. Eur J Cardiothorac Surg. 2014; 45: 633-639.
2. Merritt RE, Hoang CD, Shrager JB. Lymph node evaluation achieved by open lobectomy compared with thoracoscopic lobectomy for N0 lung cancer. Ann Thorac Surg. 2013; 96: 1171-1177.
3. De Leyn P, Dooms C, Kuzdzal J, Lardinois D, Passlick B, Rami-Porta R, et al. Revised ESTS guidelines for preoperative mediastinal lymph node staging for non-small-cell lung cancer. Eur J Cardiothorac Surg. 2014; 45: 787-798.
4. Wang S, Zhou W, Zhang H, Zhao M, Chen X. Feasibility and long-term efficacy of video-assisted thoracic surgery for unexpected pathologic N2 disease in non-small cell lung cancer. Ann Thorac Med. 2013; 8: 170-175.
5. Pak K, Park S, Cheon GJ, Kang KW, Kim IJ, Lee DS, et al. Update on nodal staging in non-small cell lung cancer with integrated positron emission tomography/computed tomography: a meta-analysis. Ann Nucl Med. 2015; 2: 6.
6. Cerfolio RJ, Bryant AS, Minnich DJ. Complete thoracic mediastinal lymphadenectomy leads to a higher rate of pathologically proven N2 disease in patients with non-small cell lung cancer. Ann Thorac Surg. 2012; 94: 902-906.
7. Baisi A, Raveglia F, De Simone M, Cioffi U. The role of video-assisted thoracic surgery lobectomy in unexpected N2 cases. Ann Thorac Surg. 2014; 97: 1125.
8. Boffa DJ, Kosinski AS, Paul S, Mitchell JD, Onaitis M. Lymph node evaluation by open or video-assisted approaches in 11,500 anatomic lung cancer resections. Ann Thorac Surg. 2012; 94: 347-353.
9. Baste JM, Haddad L, Melki J, Peillon C. Anterior subcarinal node dissection on the left side using video thoracoscopy: an easier technique. Ann Thorac Surg. 2015; 99: e99-e101.
10. Wang W, Yin W, Shao W, Jiang G, Wang Q, Liu L, et al. Comparative study of systematic thoracoscopic lymphadenectomy and conventional thoracotomy in resectable non-small cell lung cancer. J Thorac Dis 2014; 6: 45-51.
11. Baisi A, Rizzi A, Raveglia F, Cioffi U. Video-assisted thoracic surgery is effective in systemic lymph node dissection. Eur J Cardiothorac Surg 2013; 44: 966.