Case Report on Thoracic Surgery

Troubleshooting hilar and interlobar lymphadenopathy during thoracoscopic lobectomy for benign disease—case report

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Abstract: The completion of thoracoscopic lobectomy can be more difficult in the setting of clinically positive lymph nodes, which may be found in the setting of a proximal tumor causing bronchial obstruction or a larger tumor which may create an inflammatory state, both of which cause benign significant enlargement of hilar lymph nodes. Knowledge of the typical locations of these enlarged nodes facilitates the conduct of the operation. For all video-assisted thoracoscopic surgery (VATS) lobectomies, it is prudent to remove all visible lymph nodes prior to arterial and bronchial dissection. Moreover, in cases of significant hilar adenopathy, this strategy becomes more important and effective. For left upper lobectomy, the removal of level 11 lymph node anteriorly improves visualization of both bronchi, the interlobar pulmonary artery, the arterial aspect of the fissure, and the lingular artery. Subsequent dissection of the level 10 lymph node superior to the upper lobe bronchus exposes the main pulmonary artery and the truncal branches. For right upper lobectomy, dissection of the level 11 lymph node posteriorly not only exposes the upper lobe bronchus, but also the adjacent posterior ascending pulmonary artery. Dissection of the level 10 lymph node at the superior hilum facilitates exposure of the right pulmonary artery.

Keywords: Thoracoscopy; video-assisted thoracoscopic surgery (VATS); mediastinal lymph node dissection

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Introduction

In recent years, video-assisted thoracoscopic surgery (VATS) has emerged as a viable alternative to open approaches, with comparable long-term outcomes, and overall oncologic efficacy for early-stage non-small cell lung cancers (1-4). With advancements in imaging modalities, and as institutional experience in thoracoscopic techniques accrues, there has been widespread utilization of VATS in various areas of thoracic surgery including lobectomy, pneumonectomy, esophagectomy and mediastinal lymph node dissections (5).

The lessons learned from experience with VATS lobectomy may be applied to the management of hilar lymphadenopathy. Therefore, we present a case report to highlight several aspects pertinent to the application of VATS surgery in the management of mediastinal lymphadenopathy including strategies to help circumvent the various challenges faced during hilar and inter-lobar lymph node dissection during VATS lobectomy.

Case report

A 70-year-old female with extensive smoking history initially presented to the emergency room with chest discomfort and fever. Workup revealed an abnormal chest X-ray, which was further evaluated by a computed tomography (CT) scan of the chest that was notable for an ill-defined area of consolidation in the left upper lobe of the lung, measuring 9.5×8.9 cm^2, and extending from the left hilum to the left apex with obvious occlusion of the postero-medial segmental bronchus. Positron emission tomography

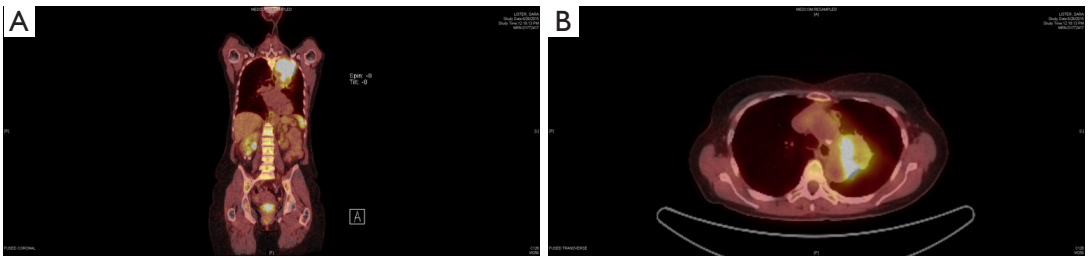

Figure 1 Positron emission tomography (PET)/computed tomography (CT) scan images (coronal and axial) demonstrating left lung tumor mass and mediastinal lymphadenopathy.

(PET)/CT scan demonstrated dense 10 cm opacity in the left upper lobe with intense standardized uptake value (SUV) of 11.2, but no evidence of metastatic disease in the abdomen, pelvis or brain (*Figure 1*).

Before proceeding to the operating room for bronchoscopy, mediastinoscopy, left thoracoscopy with lobectomy, and left VATS mediastinal lymph node dissection, patient underwent extensive preoperative evaluation (4,5). This process entailed pulmonary function testing, a thorough physical examination and routine preoperative laboratory tests, all of which were within normal limits.

Intraoperative details

After induction of general anesthesia and orotracheal intubation, the patient was placed in the supine decubitus position. A flexible bronchoscopy was first performed, revealing normal anatomy of the distal trachea, carina, bilateral main-stem and segmental bronchi, and a visible tumor in the left apical posterior segment the lung. Cervical mediastinoscopy demonstrated bulky lymph nodes at stations 4R, 4L and 7, although they did not appear malignant. In order to minimize the possibility of a false negative biopsy, the visible lymph nodes were removed entirely, using a standard video-mediastinoscope and specialized instrumentation. In addition, dissection was carried onto the left bronchus, where hilar lymph nodes were identified and removed.

Following completion of the mediastinoscopy procedure, the patient was repositioned into the right lateral decubitus position. Using two standard port incisions, one in the 8th intercostal space in the posterior axillary line and another anteriorly in the 5th intercostal space, thoracoscopic exploration was performed. Hilar dissection begun by dividing the posterior pleural reflection, effectively lengthening the hilum. The posterior arterial branch was stapled with the linear stapler. Dissection was then performed anteriorly, mobilizing and dividing the left superior pulmonary vein. This strategy helped to expose the bronchial bifurcation, and a large intralobar lymph node that obscured the hilar arterial anatomy. This lymph node was then removed completely, exposing the left upper lobe bronchus and the interlobar pulmonary artery. Attention was then turned to the superior aspect of the left upper lobe bronchus, where a large lymph node (level 10) was notable, obscuring the proximal pulmonary artery. This lymph node was carefully removed by ligating its bronchial artery supply first at the pericardial reflection before dissecting the lymph node distally on the bronchus to the posterior bronchial bifurcation. This maneuver exposed both the proximal pulmonary artery as well as the truncal branches. At this point, the lobectomy was easily completed by stapling the truncal arterial branches, the left upper lobe bronchus, the lingular branches, and the fissure. Lastly, thoracoscopic mediastinal lymph node dissection was performed to include level 5, 7, 10, 11, 12.

Postoperative course

The patient recovered from the procedure without difficulty and was discharged home on postoperative day 2. Her final pathology was benign, notable for a 4-cm chondroid hamartoma in the left upper lung lobe, associated with post-obstructive organizing pneumonia and mucopurulent bronchiolectasis. All the lymph nodes were negative for malignancy.

Comments

The lessons learned from VATS lobectomy over the years have been critical, allowing the authors to develop a unique skill set to address the various surgical challenges encountered during VATS mediastinoscopy and mediastinal lymph node dissection (1,2,4,5). Mediastinoscopy and/or

mediastinal lymph node dissection with biopsy currently plays a pivotal role in defining the clinical stage of primary lung tumors. This information is essential as it helps clinicians design appropriate and timely treatment strategies, which could either involve surgery, chemotherapy, radiation or a combination of these. Through this case report, we highlight some important aspects of these procedures, share our technique and also offer 'tips' to help improve safety and efficacy in the operating room.

Preoperative evaluation for suspected lung cancer can be an extensive process and it initially involves clinical staging with multimodal imaging techniques such as ultrasound, CT scan, PET/CT scans, and in some instances MRI (4). PET/CT scan is most helpful as it helps to identify mediastinal involvement of lymph nodes and rule out distant metastasis. However, accurate histopathological diagnosis can only be achieved with biopsy. Ultrasound guided biopsy techniques (such as endobronchial or transbronchial) with fine needle aspiration, when available, are often the first choice since they are minimally invasive and have high sensitivity to rule in mediastinal nodal disease, especially for N2–N3 disease. But in the setting of tumor negative nodes on aspiration (which is often the case) and high suspicion for malignancy, surgical staging with nodal dissection or biopsy is indicated, for instance, mediastinoscopy with biopsy or with lymph node dissection.

Importantly, in recent years, quality metrics and guidelines have also been proposed to improve diagnostic value of mediastinoscopy. For instance, the European Society of Thoracic surgery (ESTS) recommend biopsy of at least stations 4R, 4L, and 7, and if present, stations 2R and 2L (6). In case of CT-enlarged or PET-positive mediastinal lymph nodes, tissue confirmation is indicated. In fact the combined use of endoscopic and surgical staging results in highest accuracy. In central tumors or those suspicious for N1 disease and more tumors >3 cm, preoperative mediastinal staging is indicated (6).

VATS has experienced significant progress over the last decade, especially with the advent for more sophisticated dissection tools and increasingly robust imaging platforms. Likewise, institutional experiences have grown resulting in demonstrated improvement safety, decreased morbidity, and equivalent oncologic efficacy in the surgical treatment of lung cancer. With this momentum, new avenues have also emerged where the role of VATS has become increasingly important. VATS mediastinoscopy and mediastinal lymph node dissection currently plays a pivotal role in defining the clinical stage of primary lung tumors. While there is no standardized technique available, we hope that this case report will help address some of the challenges faced in incorporating VATS techniques in the management of hilar lymphadenopathy.

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None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Informed Consent: Written informed consent was obtained from the patient. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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