



# Video-assisted thoracoscopic surgery right upper lobectomy after neoadjuvant targeted therapy

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Submitted Sep 01, 2018. Accepted for publication Dec 18, 2018.

doi: 10.21037/jtd.2018.12.104

View this article at: <http://dx.doi.org/10.21037/jtd.2018.12.104>

## Introduction

A 64-year old male patient complained of cough phlegm for half a month. CT scan and PET/CT suggested that a 2-cm nodule in the right upper lobe. At the same time, enlargement of lymph nodes in No. two and No. four was found, and metastasis was considered. A mediastinoscopy had been completed. The biopsy suggested that No. 2 lymph nodes (2/2) and No. 4 lymph nodes (3/3) were positive. The HE coloration was consistent with low-differentiated adenocarcinoma. Gene test suggested the EGFR 19 exon deletion mutation. The patient was diagnosed with lung cancer (pT1N2M0, stage IIIA). Due to refusing chemotherapy, the patient was treated with gefitinib (Iressa) directly as neoadjuvant therapy. Two months after, dramatic regression of the primary nodule and lymph nodes had been showed on the CT scan. The patient had a strong willingness to have a surgical procedure, and then, a three ports video-assisted thoracoscopic surgery (VATS) lobectomy had been completed with an uneventful recovery post-operation. Pathological results showed that tiny amount of adenocarcinoma tissue was found surrounded by inflammatory cell and fibrous tissue proliferation. No residual tumor cells could be found in the mediastinal lymph nodes, which was considered as the changes after 2 months' gene therapy. Radiotherapy and targeted treatment had been implemented sequentially.

## Surgical techniques

### Pre-operation

Gefitinib was used until surgery, for 2 months, and was

stopped 1 week before surgery. No abnormal results of lab test had been found. The pulmonary function showed that a VATS lobectomy was permissible.

### Operation

The patient was placed in a left laterally decubitus position; three incisions were made in the 3<sup>rd</sup>, 7<sup>th</sup>, and 7<sup>th</sup> intercostal space, respectively.

A single-direction lobectomy by VATS was selected in this case (*Figure 1*). Mediastinal pleura near the right hilum were opened by the harmonic, and the right superior pulmonary vein was exposed. In this procedure, distinguishing between the middle pulmonary vein and the superior pulmonary vein is the most important. Usually, a lymph node clues to the gap between middle and superior vein. Meanwhile, the A1+3 artery branches were exposed collectively when the No. 10R lymph node was dissected. The stapler was inserted into the space behind the vein and the first branch of the pulmonary artery, due to the full dissociation. And then, the stapler was stimulated, which was called, "kill two birds with one stone." Once the A1+3 artery branches were divided, an anatomic variation artery was exposed, which has arisen from the pulmonary artery truncus. A hemolok clip was placed proximally, and the distal side was divided by the harmonic. With the lymph node being removed and the fascia over the right upper lobar bronchus being dissected, the stapler can be passed the space behind bronchus and be divided. The inflation of the residual lobes must be tested before cutting the right upper lobar bronchus. Subsequently, the A2 ascending artery branch was exposed clearly.



**Figure 1** VATS right upper lobectomy after neoadjuvant targeted therapy (1). VATS, video-assisted thoracoscopic surgery. Available online: <http://www.asvide.com/article/view/29629>

Additionally, two hemolocks had been used to clip the proximal side of the vessel, which was divided by harmonic. The fissureless technique was used conventionally when the fissure was completed. A plastic bag was used to remove the resected lobe.

As a patient of stage IIIA-N2 non-small cell lung cancer (NSCLC), systematic lymph node dissection is integrant, including stations 2R, 4R, 7, 8R, 10R, 11R, 12R, 13R. An air leak test was performed after systematic lymph node dissection. At last, a chest tube was placed in the post mediastinum for drainage.

### Comments

The treatment strategy in patients with stage IIIA-N2 NSCLC remains controversial. Notably, the role of surgical procedure needs more high-level evidence. According to NCCN guideline, a pulmonary resection has been performed depending on a multidisciplinary team. In the resectable NSCLC, neoadjuvant and adjuvant chemotherapy significantly improve the overall survival (OS), respectively (2). However, the low tolerability and high toxicity response to the chemotherapy reduce the compliance of treatment.

EGFR-TKI (the receptor inhibitor for epidermal growth factor tyrosine kinase) is confirmed conclusively for patients with advanced pulmonary adenocarcinoma harboring EGFR mutations in East Asian. In contrast to chemotherapy (carboplatin/paclitaxel), EGFR-TKI (gefitinib) therapy improves the progression-free survival (PFS), objective response rate (ORR) and health-related quality of life (HRQoL) by IPASS (3). Meanwhile, although the main side

effects include skin rash and diarrhea, gefitinib is regarded as a potential effectively neoadjuvant treatment, which has a more favorable tolerability profile and less toxicity. Several reports and clinical trials have validated advantages of TKI neoadjuvant therapy (4,5). According to CT scan or (and) PET/CT, the bulk of tumor burden diminishment has been verified, which may be a benefit for patients with stage IIIA-N2 NSCLC.

Three patients with stage IIIA-N2 were diagnosed with adenocarcinoma harboring EGFR 19 exon deletion mutation via mediastinoscopy in our medical center. A radical lobectomy and systematic lymphadenectomy had been completed after two months of treatment of gefitinib while dramatic radiographic downstaging happened. Although some clinical trials suggested that EGFR-TKI treatment was feasible and safe, gefitinib was still stopped for one week before surgery to get rid of the wound infection and stump fistula as a result of skin rash, and adjuvant gefitinib therapy would be used at least two years after the drainage tube was removed.

The histopathology of the resected tumor showed that tiny amount of adenocarcinoma tissue was found surrounded by inflammatory cell and fibrous tissue proliferation. No residual tumor cells could be found in the lymph nodes, which were in the mediastinum. The histopathology was consistent with the changes of TKI treatment. Based on previous experience, preoperative EGFR-TKI therapy makes more contribution to complete resection than conventional chemotherapy.

As an alternate approach for neoadjuvant treatment, EGFR-TKI has been proved to be feasible and safe in advance NSCLC with EGFR mutations. Although some clinical trials on neoadjuvant EGFR-TKI therapy are ongoing, the strategy of EGFR-TKI treatment is still debated. More high-level evidence is expected in the future.

### Acknowledgements

None.

### Footnote

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

*Informed Consent:* Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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(English Language Editor: Jeremy Dean Chapnick, AME Publishing Company)

**Cite this article as:** Cao M, Zhao X, Yin H, Fu Y. Video-assisted thoracoscopic surgery right upper lobectomy after neoadjuvant targeted therapy. *J Thorac Dis* 2019;11(1):252-254. doi: 10.21037/jtd.2018.12.104