

## Transmediastinal Left-Sided Video-Assisted Thoracoscopic Lung Volume Reduction Surgery after Right Upper Lobectomy for Destroyed Upper Lobe

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**Rec:** October 10, 2017; **Acc:** December 31, 2017; **Pub:** December 31, 2017

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### Abstract

Exploration of the contralateral pleural cavity via transmediastinal access has been described for minor lung resections in close proximity to the mediastinum. Also simultaneous thoracoscopic bilateral bullectomy through mediastinal access has been described as an alternative to bilateral sequential thoracoscopic procedures in highly selected patients with bilateral spontaneous pneumothorax. We herein describe a more complex procedure during which a video-assisted lung volume reduction surgery was performed through an anterior transmediastinal access following right sided thoracotomy and lobectomy of a completely destroyed upper lobe in a patient with borderline lung function and severe bilateral lung emphysema.

**Keywords:** Emphysema; Thoracoscopy/VATS; Lung volume reduction surgery (LVRS); transmediastinal

### Introduction

For decades thoracic surgeons have strived to reduce surgical access trauma and refine surgical techniques with the aim of improving the patient's outcomes. The preferred approach has changed from thoracotomy to video-assisted thoracoscopic surgery (VATS) whenever applicable. Furthermore, in order to reduce the access-related trauma of surgery by avoiding bilateral incisions, minor procedures such as bilateral bullectomy or metastasectomy have been carried out through a transmediastinal access in highly selected cases [1,2]. In the following case a challenging situation was managed by using a transmediastinal access for contralateral lung volume reduction surgery and hereby avoiding bilateral thoracic incisions.

### Case Presentation

A 65-year-old male patient with bilateral severe pulmonary emphysema (COPD stage 3; Lung function before pneumonia: FEV1 1.2 L (37% pred), RV 210%, was admitted with severe pneumonia of the right upper lobe (UL) which resulted in complete necrosis of the whole lobe and sepsis despite extended-spectrum antibiotics. Due to respiratory insufficiency the patient had to be intubated and required daily bronchial lavage in order to clear bronchial secretions. Bronchoscopy showed no signs of malignancy, but infection with *Influenza B*, *Aspergillus niger*, *Candida albicans* and *C. tropicalis*, requiring a combined antibiotic/-viral regimen consisting of Oseltamivir, Cefepim, Metronidazol and Fluconazol. Despite this treatment the patient's condition further deteriorated resulting even in a NSTEMI in the septic and severe hypoxemic context. In the situation of a completely

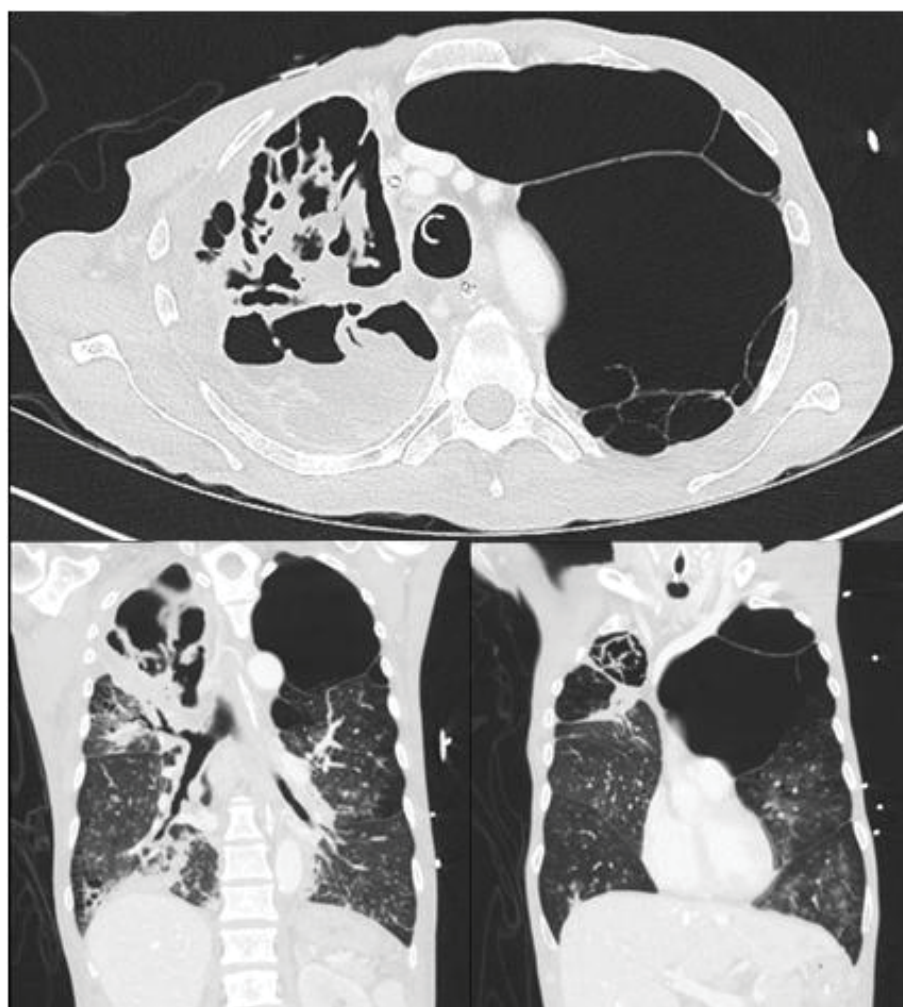
destroyed right UL and severe bullous emphysema of the left UL (Figure 1), further restricting the patient's capacity to oxygenate sufficiently, the decision for surgery was made. Due to the patient's septic state an epidural anesthesia was contraindicated.

Since placement of an epidural catheter was not an option and thus optimal pain control could not be guaranteed in the postoperative course, we wanted to prevent bilateral thoracic incisions whenever possible. On the other hand severe emphysema on the contralateral side would definitely further compromise the patients capacity to oxygenate sufficiently in the postoperative phase. Besides the trauma of an operation, we also wanted to keep the operating time as short as possible, which could be achieved by avoiding repositioning of the patient and again preparation for left sided surgery. For these reasons we planned to perform an open upper lobe resection on the right side followed by left transmediastinal LVRS, which could both be done with the patient in the same position.

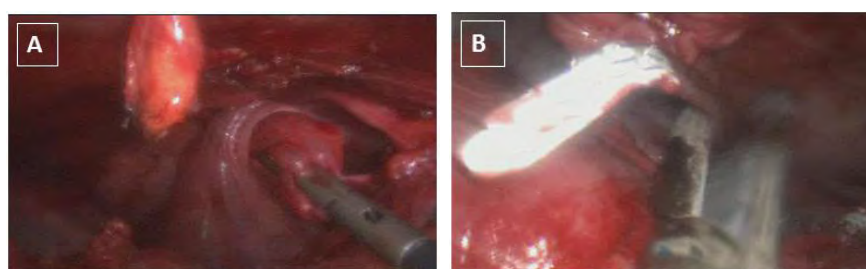
### Surgical procedure

After dual lumen intubation, the patient was put in a left semi supine position. An anatomic right upper lobectomy was performed through a standard anterolateral thoracotomy and after decortication the remaining lung was vital and well expanding on re-ventilation. Under constant ventilation of

**Citation:** Nguyen TL, Schmid RA, Kocher GJ. Transmediastinal Left-Sided Video-Assisted Thoracoscopic Lung Volume Reduction Surgery after Right Upper Lobectomy for Destroyed Upper Lobe. Case Rep J. 2017;1(1):005



**Figure 1:** Preoperative CT-scan showing complete emphysematous and infectious destruction of the right upper lobe and severe emphysema of the lung apex on the left.



**Figure 2:** A) Transmediastinal view of the apical part of the left upper lobe which is grasped and rolled up on a forceps. B) Transmediastinal reinforced stapling of the emphysematous part of the left upper lobe.

the remaining right lung and intermittent phases of apnea of the left lung, the mediastinal pleura was opened in the antero-apical part and the left thoracic cavity was entered with a 5 mm, 30° angled thoracoscope (Figure 2). In two steps the severely emphysematous apical part of the left lung was resected using a reinforced stapling device (Endo GIA™ Reinforced Reloads (purple) with Tri-Staple™ Technology, Medtronic). After placement of one chest tube (24 Fr) into the

left and two drains (24 Fr and 28 Fr) into the right chest, the thoracotomy was closed in layers.

#### Postoperative course

Except for a minor prolonged air leak on the left, which ceased spontaneously on postoperative day 7 with consecutive removal of the chest drains (Figure 3), there were no substantial postoperative complications and a first



**Figure 3:** Chest X-ray after chest tube removal on POD 7 showing a well expanded left lung after LVRS.

attempt to extubate the patient was performed on POD 3. Due to pre-existing swallowing difficulties and difficulty to clear tough bronchial secretions, the patient needed to be reintubated the day after and the decision for a tracheotomy was made, which was performed on POD 6. Two days later the patient was weaned from the respirator and was discharged from the ICU back to the referring hospital where he recovered slowly but steadily during the following 6 weeks during which also the tracheostomy tube could be removed. The antibiotic therapy with cefepime and metronidazol was stopped 2 weeks after surgery, as was the case for voriconazol. Oseltamivir was already stopped on POD 4. To date, 3 months after surgery, the patient is well and has stable respiratory function with an FEV1 of 1.7 L (52% pred).

### Discussion

Nasari et al. [3] were the first to report a posterior transmediastinal approach via right axillary minithoracotomy for open bilateral apical bullectomy and pleurectomy in 13

patients. A similar, but completely thoracoscopic approach for the treatment of patients with bilateral spontaneous pneumothorax through the anterior mediastinum was later described by Cho et al. [1] as well as Wu et al. [4]. For the treatment of patients with bilateral lung lesions, Kodama et al. [2] used a thoracotomy approach with transmediastinal removal of lung nodules in close proximity to the anterior mediastinum.

Choong et al. [5] on the other hand described their bilateral approach for lung cancer resection combined with contralateral LVRS through a median sternotomy in 10 patients.

To our knowledge, this is the first reported case using the VATS technique to perform a more complex procedure such as a contralateral transmediastinal lung volume reduction surgery after ipsilateral thoracotomy for lobectomy. Although our presented case shows the successful management of a very particular situation, it demonstrates the feasibility of the transmediastinal approach for contralateral lung resection even in a high risk patient undergoing a high risk procedure.

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