

## Breathing Easy: Non-intubated Video-Assisted Thoracoscopic Surgery

POOJA SINGH<sup>1</sup>, ANKUR VERMA<sup>1</sup>, SHUBHASHISH BISWAS<sup>1</sup>, SURENDER KUMAR DABAS<sup>2</sup>,  
TARUN TYAGI<sup>1</sup> AND TUSHAR GUPTA<sup>1</sup>

From the <sup>1</sup>Departments of <sup>1</sup>Anesthesiology and <sup>2</sup>Surgical Oncology and Robotic Surgery,  
BLK-Max Superspeciality Hospital, Rajendra Place, Delhi 110005.

Correspondence to Dr Pooja Singh, Associate Consultant, Department of Anesthesiology, BLK-Max Hospital, Delhi  
dr.pooja260887@gmail.com; ORCID iD: 0000-0002-0582-6587

Received on March 30, 2023; Accepted on June 12, 2023

### ABSTRACT

A 65-year-old male patient with a previous history of carcinoma of the tongue presented with left sided pleural effusion. A pleural nodule was detected on 18-F-fluorodeoxyglucose positron emission tomography (FDG-PET) scan. The patient was planned for pleural biopsy under uniport video-assisted thoracoscopic surgery (VATS). As the patient was a known case of chronic obstructive pulmonary disease (COPD) and hypertension, endotracheal intubation was potentially risky and thus non-intubated VATS (NI-VATS) was conducted. The procedure was successfully completed without any complication.

**Keywords:** Chronic obstructive pulmonary disease, Pleural nodule, Video-Assisted Thoracoscopic Surgery.

### INTRODUCTION

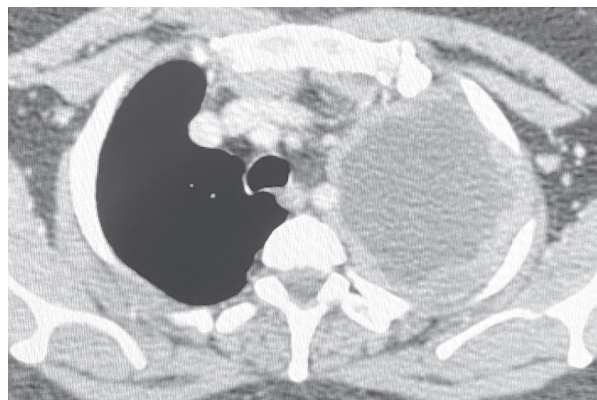
The anesthetic approach to the resection of pulmonary or pleural nodules under video-assisted thoracoscopic surgery (VATS) usually involves general anesthesia and one lung ventilation.<sup>1</sup> However, one lung ventilation requires double lumen endotracheal tube and positive pressure ventilation which involves serious risks such as barotrauma and trauma to the airway related to the intubation.<sup>2</sup> General anesthesia also entails other risks including transient hypoxemia, cardiac arrhythmias and respiratory infections. Often, patients undergoing surgery for pulmonary or pleural nodules have co-existing cardiorespiratory comorbidities such as chronic obstructive pulmonary disease (COPD) or heart failure. Such patients are uniquely sensitive to the adverse effects of mechanical ventilation and are at risk of higher morbidity and mortality. Non-intubated video-assisted thoracoscopic surgery (NI-VATS) is a technique where endotracheal intubation is avoided and the procedure is carried out under regional anesthesia.<sup>3</sup> We describe a patient with underlying COPD who underwent a thoracoscopic pleural biopsy using a NI-VATS procedure.

### CASE DESCRIPTION

A 65-year-old male patient with a previous history of carcinoma of the base of tongue presented with left sided chest pain. His cardiac examination was unremarkable, but the respiratory system examination revealed decreased air

entry on the left side. Radiological imaging of the chest revealed left sided pleural effusion (**Fig. 1**). A left thoracentesis was performed and examination of pleural fluid cytology revealed atypical cells. A fluorodeoxyglucose (FDG) avid pleural nodule was seen on positron emission tomography (PET) scan. The patient was a chronic smoker and a known case of chronic obstructive pulmonary disease (COPD) along with a long-standing history of hypertension. Thus, a pleural biopsy under uniport VATS was planned.

In view of underlying comorbidities, it was decided that since endotracheal intubation would be potentially risky,



**Fig.1** Computed tomogram of the chest showing left sided pleural effusion.

biopsy under non-intubated VATS (NI-VATS) procedure would be more suitable. About twenty minutes prior to the surgery, 5 mL of 4% lignocaine was administered through nebulization. Anesthesia was induced with fentanyl 70 µg and propofol 100 mg intravenously. A Proseal laryngeal mask airway (LMA) of size 4 was inserted. Anesthesia was maintained with air, oxygen and propofol infusion to maintain a BIS of 40-60, and he was mechanically ventilated using pressure support ventilation (PSV) mode. No neuromuscular blockade was used. Gas exchange was carefully monitored using both end-tidal carbon dioxide (ETCO<sub>2</sub>) as well as blood gas parameters. In case of any worsening of hypercapnia, endotracheal intubation was planned. An experienced anesthetist with expertise in lateral decubitus intubation was present throughout the procedure. Patient was placed in a lateral decubitus position. Local infiltration with 2% lignocaine was given prior to the incision. A 3 cm incision was made at the fifth intercostal space and the port was placed in the pleural space, and 1500 ml of sero-sanguineous pleural fluid was aspirated. Intercostal nerve block along with an infiltration of local anesthetic near the vagus nerve was given to obliterate the cough response. A spray instillation of lignocaine was also done on the lung surface for this purpose. The entire parietal pleura was found to be studded with multiple plaques and nodules. Histopathological evaluation revealed metastatic squamous cell carcinoma. Talc pleurodesis was done and a chest tube was placed, followed by wound closure.

## DISCUSSION

The usual protocol for video-assisted thoracoscopic surgery (VATS) includes lateral decubitus positioning with one lung ventilation.<sup>4,5</sup> However, administration of anesthesia in patients with compromised cardiopulmonary reserve can be challenging. Patients with COPD or associated comorbidities are at a high risk for developing bronchospasm in the perioperative period if endotracheal intubation is performed. Further, the risk of pulmonary complications is high after intraoperative mechanical ventilation. After mechanical ventilation, factors such as interstitial edema, surfactant loss, reduced lung compliance, and release of inflammatory mediators, increase the risk of ventilator induced lung injury. There is also an increased risk of lung infections. As the diaphragmatic muscle get paralyzed, atelectasis can occur in several areas of the dependent lung. Post-operative pharyngodynia and airway or vocal cord lesions can be of additional consequences due to airway manipulation. Residual neuromuscular blockade postoperatively is also a concern.

In such situations, NI-VATS is a suitable option. The key aspects of NI-VATS include spontaneous respiration and avoidance of neuromuscular blockade. By ensuring the above, the majority of above-mentioned complications can

be avoided. Mukaida, *et al* performed NI-VATS in a series of four patients with secondary pneumothorax with cardio-respiratory compromise, and reported good outcomes.<sup>6</sup> More recently, difficult surgeries have been performed under NI-VATS. Gonzalez-Rivas, *et al* have performed lung resections employing NI-VATS while robotic tracheal resections under NI-VATS have also been reported.<sup>3,7</sup> However, this technique is contraindicated in patients with suspected difficult intubation, severe obesity, persistent cough, preoperative hypoxia/hypercapnia (due to pulmonary disease), coagulopathies and phrenic nerve palsies. Further, it is crucial to monitor partial pressure of carbon dioxide (pCO<sub>2</sub>) during this procedure; a rise is anticipated in spontaneous breathing surgeries. A significant increase in pCO<sub>2</sub> warrants conversion to orotracheal intubation. NI-VATS can be a safer alternative to endotracheal intubation in high-risk patients undergoing thoracic surgery and has the potential to improve postoperative outcomes in such cases.

CONTRIBUTORS: PS: Acquisition and analysis and interpretation of the work, drafting of the work; AV, SB, SKD: Acquisition and analysis and interpretation of the work, revising it critically for important intellectual content; TT, TG: Acquisition and analysis of the work, drafting of the work.

COMPETING INTEREST: None; FUNDING: Nil.

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