

Case Report

First awake uniportal video assisted thoracoscopic lobectomy in Turkey

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ABSTRACT

As in all surgical branches, the importance of minimally invasive surgery in thoracic surgery has been increasing in recent years. Especially in the last decade, the preference of thoracic surgeons is mostly in favor of VATS. As a result of today's developing technology and experience, minimally invasive surgery is not limited to surgical technique only, and less invasive non-intubated methods have been started to be used in anesthesia applications. While non-intubated (awake) VATS is usually applied for reasons such as pleural effusion, empyema, hemothorax, pneumothorax, it is now preferred for anatomical resection of the lung. We also prefer the awake VATS method in suitable patients in our clinic. In this study, we aimed to talk about our case in which we performed left lower lobectomy and mediastinal lymph node dissection with awake uVATS (uniportal VATS) method in our clinic.

Keywords: awake anesthesia, uniportal VATS, lobectomy

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Doi: 10.26663/cts.2023.0028

Received 28.03.2023 accepted 24.04.2023

Introduction

Video-assisted thoracic surgery (VATS) is currently the gold standard minimally invasive method. In parallel with the increasing experience, surgeons tend towards the uniportal approach instead of multiportal approach. Uniportal VATS (uVATS) is the most advanced of the minimally invasive methods and has been shown to provide advantages such as less postoperative pain and shorter hospital stay in the patient [1].

Non-intubation anesthesia techniques have been used in non-thoracic surgeries for a long time. However, in recent years, non-intubation surgery has been used especially in thoracoscopic diagnosis and treatment applications. With the development of the equipment used in VATS, it has allowed the surgery to be performed without general anesthesia and without the need for double-lumen intubation. Thanks to the combination of VATS and non-intubation method, patients who cannot handle general anesthesia can be operated on. As a result of lung collapse caused by air entering the thorax, operations can be performed with open pneumothorax without the need for a double-lumen tube [2].

With the publication of new data in many centers around the world in recent years, it is thought that uniportal awake VATS (auVATS) will continue to be performed reliably in an increasing number of patients. We aimed to discuss this case in the light of the literature, since it is the first case in our country who underwent auVATS lobectomy under epidural anesthesia.

Case Report

A 67-year-old male patient with the diagnosis of diabetes mellitus and ulcerative colitis was referred to our clinic after a nodular lesion in the left lower lobe was detected in the abdominal computed tomography (CT) performed due to abdominal pain. Thorax CT revealed a 15x11 mm nodular lesion with spiculated contours in the posterobasal segment of the left lung lower lobe. The patient had a 20 pack/year smoking history and had no smoking history for 15 years. No pathological finding was detected in the physical examination of the patient who described dyspnea with exertion. On positron emission tomography (PET), increased pathological uptake (SUVmax: 3.4) in the nodular lesion in the posterobasal segment of the left lung lower lobe, and increased pathological uptake in the left lower paratracheal, subcarinal, and left hilar lymph nodes (SUVmax: 2.2) were detected (Figure 1). There was also diffuse uptake in the colon.

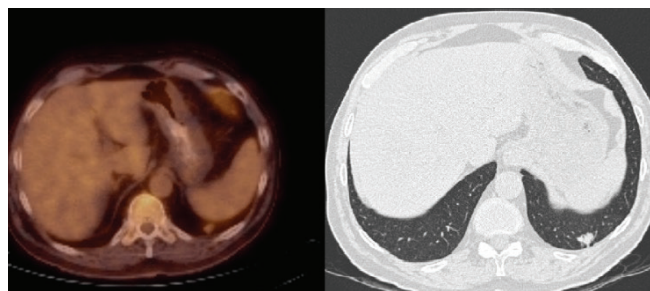


Figure 1. Preoperative thorax tomography and Pet/bt images showing the nodule.

Colonoscopy was performed due to pathological uptake in the colon and endobronchial ultrasonography (EBUS) was performed due to uptake in the mediastinum. The biopsy result taken at colonoscopy resulted in active chronic colitis. No malignancy was observed as a result of needle aspiration biopsy taken from mediastinal lymph node stations 4R, 7 and 11L with EBUS. No space-occupying lesion was detected in brain MRI (magnetic resonance imaging).

In the pulmonary function test (PFT), FEV1 (forced expiratory volume in the first second) was 2.20 liter (78%), FVC (forced vital capacity) was 2.89 L (76%). Stereotactic Body Radiation Therapy was recommended for local treatment for the patient who refused the operation due to general anesthesia and intubation phobia. As the patient also refused radiotherapy, the patient was informed about awake surgery. AuVATS was planned for the case after obtaining informed written consent. Also, written informed consent was obtained from the patient for the publication of his data.

Anesthesia Technique

In the operating room, intravenous peripheral catheter was placed in the forearm and a continuous infusion of isotonic 0.9% NaCl solution was started. The patient was monitored with five lead electrocardiography, invasive arterial blood pressure, heart rate, pulse oxygen saturation (SpO₂), end tidal carbon dioxide (ETCO₂), respiratory rate, axillary body temperature, and urine output. Mean arterial blood pressure (MAP), heart rate and SpO₂ were measured in the perioperative period. Patient was arterial blood pressure value as normal but the SpO₂ value is 90% or less was regarded as hypoxic. Lidocaine (Jetmonal 2%, Adeka Pharmaceutical, Turkey) was administered by inhalation 30 minutes before operation due to suppress cough reaction in the intraoperative period [3].

In the sitting position thoracic epidural anesthesia was performed by insertion of an epidural catheter at the T5-6 interspace with an 18-gauge Tuohy needle (B-Braun Medical, Abbott, Turkey) via the saline loss of resistance technique. The catheter was advanced 3 cm cephalically and a test dose of 20 mg of 2% lidocaine was given to rule out subarachnoid or intravascular placement of the catheter. After preparation of a 0.125% solution of bupivacaine (Buvasin 0.5%, Vem Pharmaceutical, Turkey) with 1 µg/ml fentanyl (Talinat 0.1 mg/2 mL, Vem Pharmaceutical, Turkey) a bolus dose of 10 ml was given followed by a continuous infusion of 0.1 mL/kg/h through catheter intraoperatively. This solution was continued postoperatively for 24 hours. Pain intensity was evaluated by using a 10 cm visual analog scale (VAS), where zero represented no pain and 10 cm represented worst possible pain. During the surgery and postoperatively, we increased the continuous infusion dosage by 10% in patient whose VAS score was 4 or greater and reduced it in patient who had respiratory depression (rate, 8 breaths/min) by 10%.

Sensory blockade was assessed by pin prick every 5 min for up to 25 min after epidural injection. Loss of sensation from the T2 and T8 dermatomes was achieved. The surgery was started only when this was no response by the patient to a pinprick in the surgical field. Target-controlled infusion of remifentanyl was used.

During the thoracoscopic procedure, via a face mask, at least 2-4 L/min oxygen was continuously administered along with detection of ETCO₂. Patient received 4-6 L/min oxygen and sedated by 2 mg/kg/h propofol (Propofol 1%, Fresenius Pharmaceutical, Turkey). Sedation level was kept at cooperated, oriented and tranquilized at Wilson 2 level and the sedation was terminated during wound closure [4]. We terminated infusion of remifentanyl for about 5 minutes before the end of surgery.

After insertion of catheters, hypotension (MAP being 20% of the baseline value or lower) was administered with a bolus of isotonic fluid and an intravenous 10 mg of ephedrine bolus (Ephedrine, Osel Pharmaceutical, Turkey). Bradycardia (decrease in heart rate below 45 beats/min) was treated with intravenous atropine (Atropin sulfate, Biofarma Pharmaceutical, Turkey) at a dose of 0.01 mg/kg. Respiratory depression (respiratory rate below 8 per min) was treated with 100% oxygen supplementation through a face mask.

Surgical Technique and Postoperative Follow-up

For thoracoscopy, a 3 cm incision was made in the fifth intercostal space and the left hemithorax was accessed with the help of a thoracoport. After performing an open pneumothorax, the ipsilateral lung gradually collapsed. In order to prevent coughing during thoracoscopic manipulation, the tracing of the vagus nerve was followed and intrathoracic vagal block was created at the level of the aorticopulmonary window and hilum by injecting 2 mL of 0.25% bupivacaine (Buvacin 0.5%, Vem İlaç Sanayi, Turkey). Wedge resection was performed on left lower lobe and underwent intraoperative frozen section analysis. After fifty five minutes, the frozen result was reported as "primary malignancy of the lung, compatible with adenocarcinoma", the patient underwent left lower lobectomy. Left lower lobectomy and mediastinal lymph node dissection 6, 7, 10, 11 were performed through the same incision. A 24 F (french) thoracic drain was placed and the layers were closed in accordance with the anatomical plan. In order to reexpand the collapsed lung of the patient, the patient was asked to take a deep breath and cough. The operation time was 210 minutes in total. The patient, who was kept under observation in the recovery unit for half an hour after the operation, was taken to the ward and mobilized in the 2nd postoperative hour.

For postoperative VATS incision pain, an infusion of fentanyl and bupivacaine was continued through the epidural catheter for 24 hours. In addition, paracetamol (Paracerol, Polifarma İlaç Sanayi, Turkey) and diclofenac (Dilcomec 75 mg, Abdi İbrahim İlaç Sanayi, Turkey) were used for drain pain and pain control after removal of the epidural catheter. The patient did not have any complication. The drain of the patient was terminated on the second postoperative day. The patient was discharged healthy on the third day.

Discussion

Today, VATS is the least invasive way of operating lung pathologies. Compared to multiportal VATS, uVATS provides less postoperative pain, less residual paresis, and shorter hospital stay [5]. The uniportal approach without general anesthesia has become the least invasive method. Operations performed without intubation minimizes the complaints of ventilation-related lung injury [6], intubation-related airway injury [7], and anesthesia-related nausea and vomiting. In this way, since general anesthesia is not applied, it accelerates the return to daily life.

Some criteria should be considered in the selection of patients who will undergo awake VATS. Although it is a method that can be preferred in cases with reduced lung function who are at high risk for general anesthesia due to advanced age and comorbidities this technique should not be used in the presence of obesity, previous surgeries, adhesions, persistent cough, and inexperienced anesthesiologists and surgeons [8].

While awake VATS was used for spontaneous pneumothorax, pleural biopsy, pleural effusion [9,10], El-Abdullatif et al performed lung resections for awake patients for the first time in 2007. In this series of 79 cases, with awake epidural catheter and suppression of the cough reflex with stellate ganglion blockade, they achieved more positive results in terms of returning to daily life and complications compared to resections performed under general anesthesia. However, they did not clearly state whether major resection cases were performed with VATS [11]. In our clinic, it is frequently used in operations such as pleural biopsy, empyema and pleural effusion drainage, hemothorax-pneumothorax surgery in patients who are not suitable for general anesthesia or intubation (in patients with advanced chronic obstructive pulmonary disease, advanced age, and cardiopulmonary failure).

In 2011, Chen et al presented their first experience with awake VATS lobectomies. In this study, with the three-port VATS technique; concluded that awake VATS lobectomy can be reliably performed in early stage non-small cell lung cancer using an epidural catheter and vagal blockade. They emphasized that intrathoracic vagal nerve blockade should be performed because unexpected lung movement may occur due to cough reflex and spontaneous breathing during hilar dissection [12]. One year later, the same team demonstrated the safety and feasibility of awake lung resections in another case series of 285 patients who underwent VATS resection under awake epidural anesthesia [13]. In our case, anesthetic and analgesic infusion was applied with an epidural catheter, and it was successfully performed by applying vagal nerve blockade to prevent cough reflex.

In 2014, Guo et al [14] achieved good results in segmentectomies performed while awake without intubating. In 2015, Hung et al [15] reported a study in which they successfully performed VATS lobectomy or segmentectomy with a 3-port approach under thoracic epidural anesthesia in a series of 238 cases.

When we look at the literature, while awake VATS lobectomies are usually performed from two or more ports, the first awake uniportal VATS lobectomy was reported in 2014 by Rivas et al. The case who underwent right middle lobectomy; it was successfully applied without the use of epidural catheter and intubation tube, without the need for intrathoracic vagus blockade, only by injecting 5 ml of levobupivacaine (5 mg/mL) into the skin and intercostal space for intercostal nerve blockade. Sevoflurane and remifentanyl infusion were administered for sedation during the surgery. They stated that the single-port approach and awake VATS can be applied safely and more comfortably for the patient [16]. In a recent series in 2020, Furak et al compared awake and intubated uVATS lobectomy cases; found that awake VATS provides fewer postoperative complications, shorter hospital stay and follow-up with a drain [17]. In our clinic, the uniportal approach is mostly used in patients undergoing resection with VATS, and uVATS lobectomy was successfully performed in this case. Our case was mobilized in the second postoperative hour, the drain was terminated on the second postoperative day and patient was discharged on the third postoperative day. No complications were observed in the postoperative period.

The first published case of VATS lobectomy under awake epidural anesthesia in Turkey was presented in 2021 by Özen et al [18]. Right upper lobectomy with two ports was successfully performed by placing an epidural catheter under the guidance of ultrasonography. However, when we look at the literature, our study is the first case of awake uniportal VATS lobectomy with epidural anesthesia in Turkey.

Bleeding requiring thoracotomy that may occur during the operation is the biggest problem of awake surgery. Therefore, it should be performed by surgeons experienced in VATS. Giving the patient a suitable position during the operation is important in making the operation more comfortable. However, depending on the duration of the operation, shoulder pain may be seen due to the position. Since epidural anesthesia is not effective, the patient may need extra analgesia. In our case, only shoulder pain was observed in the first 24 hours postoperatively, and therefore 100 mL of paracetamol (10 mg/mL) was given iv.

In conclusion, lung resections with uVATS under awake epidural anesthesia can be performed successful-

ly and without complications with an experienced surgical and anesthesia team. Although its long-term results are unknown, it represents an important alternative for high-risk patients for intubation and general anesthesia. As the developments in anesthesia and thoracic surgery around the world continue, the number of these cases will gradually increase in the future and will gain an important and reliable place in thoracic surgery.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support.

Authors' contributions

VK,GS,EK,FM,İK: conceived and designed the current case report, co-wrote the paper, collected the clinical data. The authors discussed the case under the literature data together and constituted the final manuscript.

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