

Outcomes of mobilization in the first hour following uniportal video-assisted thoracoscopic surgery for primary spontaneous pneumothorax



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Kardiocirurgia i Torakochirurgia Polska 2024; 21 (1): 19-22

Abstract

Introduction: Although primary spontaneous pneumothorax is a common disease in young adults, each thoracic surgery department performs different procedures for its management.

Aim: The optimal time of postoperative mobilization is not yet standardized in lung surgery.

Material and methods: This study included male patients with a primary spontaneous pneumothorax who underwent wedge resection of the upper lobe of the lungs via uniportal video-assisted thoracoscopic surgery. Patients were encouraged to stand up within the first postoperative hour. Mobilization was defined as standing and walking at least 100 m from the bed. If orthostatic hypotension occurred, mobilization was postponed for 30 min. Immediately after surgery, intravenous fluids were discontinued, and patients were instructed to drink water. The analgesic treatment needs, length of hospitalization, drainage, and discharge times were recorded.

Results: A total of 43 patients were operated on by the same surgeon. All operations were ended with uniportal video-assisted thoracoscopic surgery. Wedge resection is most commonly indicated for recurrent ipsilateral pneumothorax. Patients walked 345 (range: 150–510) m on the department corridor following bed rest. Paracetamol (2 g) and dexketoprofen (100 mg) were intravenously administered as postoperative analgesia to 76.7% of patients. Narcotic drugs were not needed.

Conclusions: Mobilization was recommended in the first hour following uniportal video-assisted thoracoscopic surgery for primary spontaneous pneumothorax.

Key words: bleb, early ambulation, pain, recovery.

Introduction

Primary spontaneous pneumothorax (PSP) is a clinical condition commonly treated by thoracic surgeons and is characterized by subpleural bleb perforation without lung diseases. Professional organizations have different approaches to managing PSP. Treatment options are based on the patient's situation, pneumothorax size, and medical center condition, among other factors [1]. The risk of ipsilateral pneumothorax relapse has been reported as 68% and 6.1% in patients with and without bullae on tomography, respectively [2]. The pneumothorax size is an important indicator of prolonged hospitalization after chest drain placement and the recurrence rate after conservative treatment [3]. Wedge resection of blebs and pleurodesis using video-assisted thoracoscopic surgery (VATS) are preventive options for decreasing the recurrence of pneumothorax [1, 3].

Surgical access during thoracic surgery is one of the most painful incisions despite a minimally invasive

approach being used. Thoracic surgery is associated with significant complications [3]. Therefore, some fast-track procedures have been performed to reduce postoperative pain, morbidity rate, and length of hospitalization [4, 5].

Aim

The time of patient mobilization and bed rest discontinuation are not standardized in lung surgery. Therefore, this study aimed to determine the effects of mobilization during the first postoperative hour after wedge resection using uniportal VATS for PSP.

Material and methods

This study was designed by one author and conducted between December 2017 and March 2021 using historical patient records. Male patients with PSP who underwent wedge resection of the upper lobe and apical pleurectomy using uniportal VATS were included in this study. All pa-

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Received: 5.12.2023, **accepted:** 3.01.2024, **online publication:** 30.03.2024.

tients provided written consent allowing us to use their data in the clinical trial.

Thoracoscopic wedge resection was generally suggested after the second PSP attack. Computed tomographic (CT) findings guided the surgical approach. If blebs were observed on CT images, wedge resection was performed during the first PSP attack. When the patient had stable vital signs in recurrent pneumothorax, VATS was performed without catheter thoracostomy. Air leakage that persists for > 5 days after catheter/tube thoracostomy is defined as prolonged air leakage, and thus surgery is suggested [6]. Preoperative preparation included clinical history taking, physical examination, serum hematology and biochemistry tests, and chest X-ray. Moreover, detailed information about the surgery and the postoperative process were explained in detail to the patients. Pulmonary function tests were not performed preoperatively. Routine intravenous cefazolin sodium (1 g) was administered before skin incision. Patients were intubated using a single-lumen tube under total intravenous anesthesia. No central venous, arterial, or urinary catheter or thoracic epidural anesthesia was used. Preoperative sedatives were not administered to reduce anxiety and facilitate postoperative recovery [5].

The seventh intercostal space and midaxillary line were generally used as guides to create the port. If chest drainage was placed before VATS, the port was created in the same location and intercostal space. First, wedge resection was performed using a thick tissue stapler, and then apical pleurectomy was performed at the fifth intercostal

space. At the end of the surgery, one tube thoracostomy with a simple underwater sealed drainage was implanted without suction. Patients were extubated in the operating room, monitored in the postoperative care unit for 30 min, and transported to their respective rooms. After their vital signs were controlled, patients were encouraged to stand and walk with the assistance of a doctor or nurse within the first postoperative hour. Mobilization was defined as standing and walking at least 100 m from the bed. If orthostatic hypotension occurred, mobilization was postponed for 30 min. Intravenous fluids were discontinued, and patients were encouraged to drink water immediately after surgery. Routine oral intake was started in the sixth postoperative hour.

Analgesic treatment needs, length of hospitalization, drainage, and discharge times were recorded and analyzed.

Statistical analysis

Statistical analysis was performed using JASP, version 0.14.1 (JASP, University of Amsterdam, Netherlands). Quantitative data were presented as means ± standard deviations, and ordinal data were presented as percentages.

Results

Forty-three male patients were operated on by the same surgeon. A total of 29 patients had preoperative drainage (Table I). All operations were ended using uniportal VATS. Procedures were conducted at the right side in 23 patients and at the left side in 20 patients. No patient required thoracotomy. Unavoidable situations were not observed intraoperatively. Four patients underwent bilateral wedge resection at different times. A total of 19 (44.2%) and 24 (55.8%) patients underwent surgery in the first and second episodes of PSP, respectively. Wedge resection was most commonly indicated for recurrent ipsilateral pneumothorax, 17 (39.5%) patients. Other indications are shown in Table I. Seven (16.3%) patients with multiple blebs underwent VATS during the first PSP attack.

Patients walked a mean distance of 345 ±86.9 (range: 150–510) m on the department corridor after postoperative bed rest. Orthostatic hypotension occurred in 3 (7%) patients only. Intravenous paracetamol (2 g) and dexketoprofen (100 mg) were administered as postoperative analgesia for 76.7% of patients. More than one dose (1 g) of paracetamol was needed for 23.3% (10) of patients. Narcotic drugs were not needed. There were no falls or injuries related to early mobilization.

The mean time of postoperative chest drainage and the postoperative length of hospitalization were 3.60 ±1.8 days and 4.81 ±2.5 days, respectively. The complication rate was 9.3% in this study group. Postoperative hemorrhage occurred in 2 patients and was treated conservatively. One patient had an abscess on the operation side on the 14th postoperative day and was treated with antibiotics and postural drainage. Postoperative prolonged air leakage occurred in 1 patient. No postoperative mortality occurred. Postoperative pathological results were chronic pleuritis for pleurectomy

Table I. Clinical features of studied patients

Variables	Patient group (n = 43) (mean ± SD)
Age [years]	14–41 (25.8 ±6.8)
Laterality (right/left)	23 (53.5%)/20 (46.5%)
Cigarette smoking (yes/no)	28/15 (65%/34.9%)
Preoperative drainage (yes/no)	29/14 (67.4%/32.6%)
Preoperative drain number (8/10/28 French)	13/14/2 (30%/32.6%/4.7%)
Indications for VATS:	
Ipsilateral recurrent pneumothorax	17 (39.5%)
Contralateral recurrence	7 (16.3%)
Non re-expansion of the lung/ massive pneumothorax	9 (20.9%)
Multiple blebs	7 (16.3%)
Prolonged air leak	2 (4.7%)
Occupational hazard	1 (2.3%)
Walking distance [m]	150–510 (345 ±86.9)
Complications:	
Prolonged air leaks	1 (2.32%)
Postoperative hemorrhage	2 (4.65%)
Abscess	1 (2.32%)
Postoperative drainage [days]	1–8 (3.60 ±1.8)
Hospitalization [days]	2–14 (4.81 ±2.5)

VATS – video-assisted thoracoscopic surgery.

material and emphysematous-like changes for wedge resection in all patients, except for one (granulomatous inflammation with necrosis in the lung tissue). No pneumothorax recurrence was observed 12 months postoperatively.

Discussion

PSP is generally observed in active working young individuals. The goals of treatment for PSP are to remove air from the pleural space and prevent the recurrence of pneumothorax and hospitalization [7]. Tube drainage and simple aspiration are the most well-known first choices for patients with the first episode of PSP [1, 7, 8]. The British Thoracic Society and French guidelines recommend that patients with persistent air leakage or pneumothorax after 3–5 days on the chest radiograph should undergo surgery [7, 8]. The alternatives of surgical treatments are wedge resection with/without pleurodesis or pleurodesis alone with thoracotomy or VATS [9]. Pleurodesis options are chemical (i.e., talc powder, doxycycline, and iodine), or mechanical (pleural abrasion and pleurectomy) [10]. Our clinical practice is apical wedge resection with apical pleurectomy using uniportal VATS.

The risk factors for recurrence were bullous changes in the CT, pneumothorax size, number of attacks, and continued smoking [3, 11]. Some authors recommended wedge resection using VATS during the first episode of PSP [12, 13]. When they compared pleural drainage to VATS wedge resection with pleurectomy, the prolonged air leakage and recurrence rates were 11.4% and 22.8%, respectively, in the pleural drainage group and 5.7% and 2.8% in the VATS group. VATS had some advantages over thoracotomies, such as less bleeding, milder pain, better postoperative pulmonary gas exchange and shoulder function, and shorter length of hospitalization [3, 14]. VATS is associated with low morbidity (i.e., 2.4–9%) and low postoperative recurrence rates (i.e., 0–10%) [3, 15]. Moreover, the mortality rate associated with VATS has been reported to be 0.07%, and the overall nonfatal complication rate was 4.26% [1]. This single-port procedure is related to positive cosmetic results and less postoperative pain or paresthesia than multiple-port procedures in the first 48 h [15].

Patients undergoing thoracic surgery have many psychological and physiological stressors. Recovery strategies have been developed to help them return to their baseline lives as soon as possible [4, 16]. The European Society of Thoracic Surgeons and Enhanced Recovery After Surgery have published guidelines on enhanced recovery and perioperative management of patients undergoing thoracic surgery [5]. They recommended mobilization within the first 24 h postoperatively. Prolonged immobilization increases bronchial secretions; increases the risk of atelectasis, pulmonary infection, and thromboembolism; prolongs hospitalization; and reduces patient self-confidence [5]. Mobilization and active participation of patients were important to optimize analgesia and improve postoperative outcomes [4, 17, 18]. Early discontinuation of bed rest and mobility improved pain control and increased the ef-

ficacy of cough and secretion clearance [5]. Pain caused hypoxemia, hypercarbia, accelerated myocardial work, and arrhythmia. In this study, atrial fibrillation, ventricular arrhythmia, veno-thrombotic events, pulmonary embolism, and neurological/psychiatric problems did not occur postoperatively. The disruption of pulmonary gas exchange requires postoperative intensive care monitoring and continued oxygen following surgery [19]. Various analgesic agents and procedures have been used to control severe pain and agitation after extubation. Although some authors suggest peripheral locoregional analgesia (paravertebral block, serratus plane block, and intercostal block), paravertebral or epidural blocks were not performed to facilitate mobilization [7, 17]. The side effects of opioids include somnolence, hypotension, and postoperative nausea and vomiting [20]. Total intravenous anesthesia with propofol is associated with lower rates of postoperative nausea and vomiting [4]. Multimodal opioid-sparing analgesia prevented postoperative orthostatic intolerance and delayed ambulation. Contrary to some previous studies, opioid analgesics were not used in the study [14, 21]. Our study suggested that the patient with PSP benefited from mobilization in the first hour following VATS with a low-dose analgesic drug and low complication rate. We believe that a well-informed patient may experience less pain too.

The limitations of this study were its small number of patients and design (case series analysis). Larger randomized series are needed to determine the effects of mobilization in the first postoperative hour after wedge resection using uniportal VATS for PSP.

The complication rates associated with chest tube placement have been reported to be between 3% and 18% [22]. Early VATS reduced the total hospital stay, charges, and readmissions compared to initial tube placement and resolution observation [9]. Early postoperative mobilization decreased air leaks, lung expansion failure, pulmonary infection, and length of hospitalization [23, 24]. A patient with PSP with high recurrence risk during the first attack may benefit more from VATS with early ambulation than from tube thoracostomy.

Conclusions

An opioid analgesic was not necessary after thoracoscopic wedge resection in the study. Mobilization in the first hour is feasible and safe after VATS for PSP.

Disclosure

The author reports no conflict of interest.

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