Current Thoracic Surgery

To cite this article: Kahraman S, Ozdemir A, Bayraktar S, Demirhan R. Treatment of contralateral pneumothorax due to metastasis in a left pneumonectomy patient with single-port VATS. Curr Thorac Surg 2025;10(3):163-165.

Case Report

Treatment of contralateral pneumothorax due to metastasis in a left pneumonectomy patient with single-port VATS

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ABSTRACT

Spontaneous pneumothorax secondary to pulmonary metastasis is a rare but critical condition, particularly when it occurs in the single remaining lung of a patient who has undergone pneumonectomy. We present the case of a 62-year-old male with a history of left pneumonectomy for a malignant mesenchymal tumor who developed a right-sided pneumothorax one year postoperatively. Due to a persistent air leak resistant to tube thoracostomy, a chest CT was performed, revealing a subpleural metastatic lesion. The patient successfully underwent single-port Video-Assisted Thoracoscopic Surgery (VATS) wedge resection and apical pleurectomy under general anesthesia with transient apnea. This case highlights that despite the limited pulmonary reserve in pneumonectomized patients, single-port VATS offers a safe and effective approach for the definitive management of secondary pneumothorax caused by metastasis in the contralateral lung.

Keywords: pneumonectomy, pneumothorax, video-assisted thoracic surgery, lung neoplasms, neoplasm metastasis

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Doi: 10.26663/cts.2025.028
Received 26.07.2025 accepted 24.09.2025

Introduction

Spontaneous pneumothorax often develops due to bullae in the lungs. Pneumothorax secondary to pulmonary metastasis is a rare condition. In patients who have undergone pneumonectomy, a pneumothorax developing in the contralateral lung can be life-threatening. In such cases, in addition to emergency intervention, a permanent solution is also required. In recent years, Video-Assisted Thoracoscopic Surgery (VATS) has become a prominent treatment method in pneumothorax cases. In cases of prolonged air leaks due to pneumothorax, bullectomy and pleurectomy operations performed with VATS provide highly favorable outcomes [1].

Case Report

A 62-year-old male patient had undergone right arm amputation in 2015 due to a malignant mesenchymal tumor. In 2021, the patient underwent metastasectomy via left thoracotomy due to pulmonary metastasis. In 2022, a left pneumonectomy and mediastinal lymph node dissection were performed due to metastasis in the hilar region.

During follow-up, the patient presented with a sudden onset of dyspnea in the first postoperative year. A chest X-ray revealed pneumothorax on the right side (Figure 1), and an 8F catheter thoracostomy with closed underwater drainage was urgently applied. Preoperative echocardiogram showed an ejection fraction (EF) of 55%, and preoperative pulmonary function tests revealed an FEV1 of 82% and DLCO of 70%.

A chest CT scan was performed due to an air leak lasting for more than a week. The CT scan revealed a subpleural lesion in the right upper lobe consistent with metastasis (Figure 2). Because the lung metastasis was both solitary and peripheral, and the air leak had persisted for more than 10 days, surgery was decided.

The patient was intubated under general anesthesia with a single-lumen endotracheal tube. The ventilator was set to apnea mode during the procedure. A wedge resection and apical pleurectomy were performed using a single-port VATS.

The definitive pathology result was reported as lung metastasis of a mesenchymal tumor. The patient's chest drain was removed on postoperative day 3, and he was discharged in good health on day 5. No recurrence of pneumothorax was observed during the 2-year follow-up period. Written informed consent was obtained from the patient and his relatives for the publication of this case report.

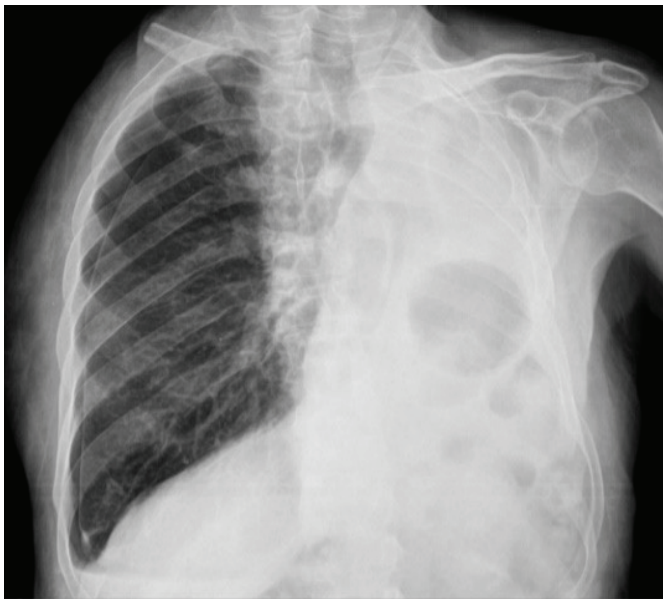

Figure 1. A chest X-ray demonstrated a right pneumothorax.

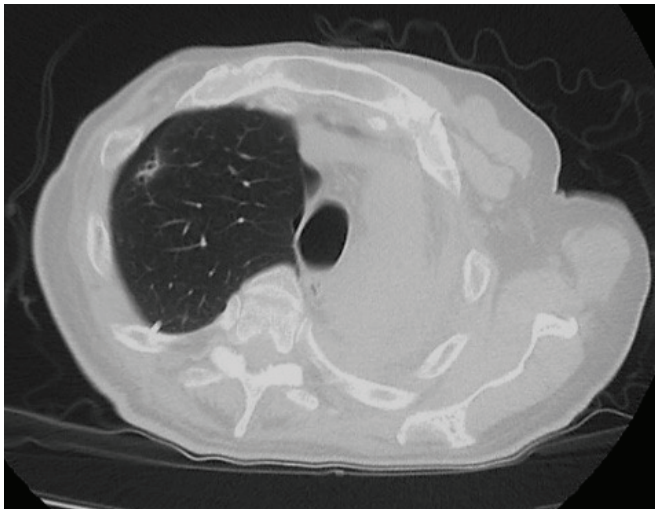

Figure 2. Chest CT performed due to persistent air leak, showing a peripheral metastatic nodule in the right upper lobe.

Discussion

The rate of complications following pneumonectomy procedures has been reported to range between 10% and 45% in various studies [2,3]. Pneumothorax developing in the contralateral lung has been reported in the literature as isolated cases [4,5]. Pneumothorax developing in the contralateral lung after pneumonectomy is a serious condition requiring emergency intervention. The first step should be the application of a tube thoracostomy to relieve the patient. In cases of persistent air leak following pneumothorax, surgical intervention becomes inevitable.

The time of onset of pneumothorax after pneumonectomy varies among studies. In the study by Orki et al, this interval ranged from 2 to 11 years [4]. In the

study by Matsuoka et al, it was reported as 15 days, 3 months, 1 year, and 3 years [5]. In our case, pneumothorax developed in the first year during follow-up. Since the timing of pneumothorax onset can vary and may span several years, careful follow-up of patients who have undergone pneumonectomy is essential.

In cases of dyspnea or chest pain, the possibility of pneumothorax in the contralateral lung must always be considered.

There is no consensus on the nature of surgeries to be performed on the contralateral lung after pneumonectomy. Discussions continue regarding which patients are suitable candidates for such procedures. The general agreement in studies is that surgical intervention can be applied to the contralateral lung in pneumonectomized patients with adequate pulmonary and cardiac reserve [5,6]. Jeon GH et al, in a study involving 13 patients, addressed this issue and reported that, following pneumonectomy, 10 patients underwent single wedge resection, 2 underwent double wedge resection, and 1 patient underwent lobectomy. In that study, complications occurred in 4 patients (36%), and no mortality was reported [6].

In this case, due to the persistent air leak and presence of metastasis in the contralateral lung, wedge resection and pleurectomy were performed using single-port VATS. During the procedure, the lungs were placed in apnea mode on the ventilator. Our patient, who had sufficient lung reserve and no cardiac issues, experienced no complications during or after the procedure.

During the 2-year postoperative follow-up period, no recurrence was observed. The patient remains under regular surveillance with biannual visits.

In conclusion, secondary pneumothorax due to metastatic lung cancers, although rare, may occur. In this patient group with limited respiratory reserve, both initial and definitive interventions can be rapidly performed using minimally invasive methods, yielding successful outcomes. This case highlights that single-port VATS can be a safe and effective option for managing contralateral pneumothorax in patients with limited pulmonary reserve, providing both rapid and definitive treatment.

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' contribution

SK; organized the article and wrote the paper, AO,SB; contributed to the data collection, SB,RD; revised the article. All authors revised the manuscript. The authors read and approved the final manuscript.

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