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A case of "a left middle lobe of lung" with a left superior vena cava in a patient who underwent lung cancer surgery

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Abstract

We report a case of an 82-year-old man with displaced anomalous bronchus and persistent left superior vena cava who underwent video-assisted thoracic surgery for lung cancer treatment. Chest computed tomography showed a 3.4×2.5 cm solid tumor in the S4 segment of the left lung. Bronchoscopy showed that B^{1+2}+B^{3} and B^{4+5} branched from the left main bronchus separately, and primary lung adenocarcinoma was diagnosed using a transbronchial lung biopsy obtained from B4. Contrast-enhanced chest computed tomography showed that the left main pulmonary artery passed between B^{1+2}+B^{3} and B^{4+5} and the left lung had three lobes like the right lung. Furthermore, a persistent left superior vena cava was observed. The patient underwent left middle lobectomy and no recurrence was noted for 9 years. To our knowledge, this is the first report of middle lobectomy in the left lung for treating lung cancer.

Key words: Displaced bronchus, Persistent left superior vena cava, Lung cancer

Introduction

Tracheobronchial anomalies are classified as supernumerary bronchi and displaced bronchi [1]. In patients who underwent bronchography, it is reported that the incidence of tracheobronchial anomalies is 0.64%, and some cases complicated with tracheobronchial anomalies may also present with other anomalies [2]. Persistent left superior vena cava (PLSVC) is an unregressed left anterior cardinal vein stemming from the embryonic period [3]. We report a case of a patient with displaced bronchus and PLSVC, who underwent video-assisted thoracoscopic surgery for the treatment of lung cancer. Presenting this case report was approved by the ethics committee of the Kindai University Faculty of Medicine (31-068).

Case

An 82-year-old man was initially observed to have a mass shadow in the left middle lung field on chest radiography, without symptoms (Fig. 1a). He was referred to our hospital for further evaluation. He had a history of arrhythmia and was taking beta-blockers, but he had not taken anticoagulants. He was never smoker. The serum levels of tumor markers, including carcinoembryonic antigen, cytokeratin-19 fragment, squamous cell carcinoma antigen, and pro-gastrin releasing peptide, were normal. In arterial blood gas test under room air, the arterial partial pressure of oxygen and carbon dioxide were 94.9 mmHg and 43.9 mmHg, respectively. Chest computed tomography (CT) showed a 3.4×2.5 cm solid tumor in the S4 segment of the left lung (Fig. 1b). Positron emission tomography with ^{18}F-fluorodeoxyglucse showed slight ^{18}F-FDG accumulation in the tumor (Fig. 1c). Bronchoscopy showed that B^{1-3} and B^{4+5} branched from the left bronchus separately (Fig. 2a), and primary lung adenocarcinoma was diagnosed after histological examination of a transbronchial lung biopsy obtained from B^{4}. Three-dimensional CT with multiplanar reconstruction by a standalone workstation (SYNAPSE VINCENT; Fujifilm, Tokyo, Japan) showed the following findings: only B^{1-3} branched directly from the left main bronchus (2nd carina), B^{4+5} branched independently from the bronchus distal to 2nd carina (Fig. 2b), and the left main pulmonary artery passed between B^{1-3} and B^{4+5}

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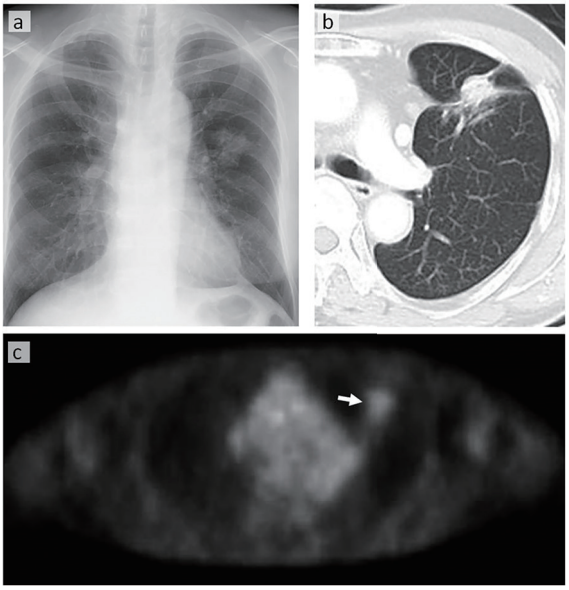

Figure 1.
(a) Chest radiography demonstrates a mass shadow in the left middle lung field. (b) Chest computed tomography shows a 3.4 cm solid tumor in the left S4. (c) Positron emission tomography with ^{18}F-fluorodeoxyglucose (FDG) shows slight ^{18}F-FDG accumulation in the tumor (arrow).

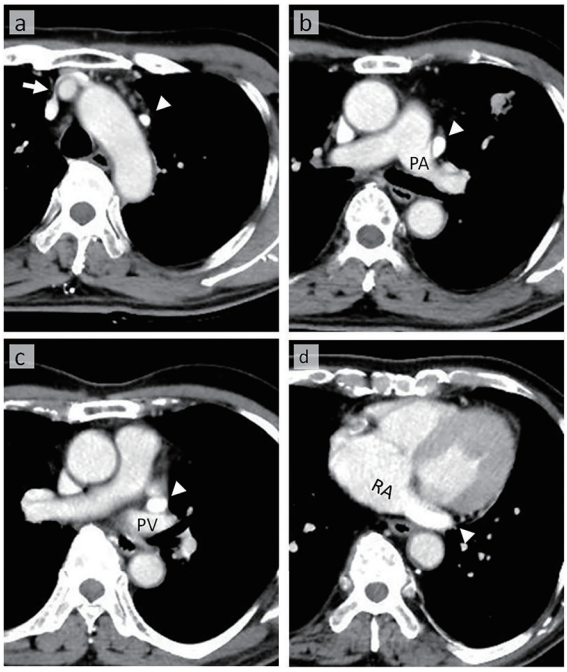

Figure 3.
Contrast-enhanced chest computed tomography shows a persistent left superior vena cava (arrowheads) descending lateral to the aortic arch (a), anterior to the hilum of the left lung, which includes the PA (b) and PV (c), and draining into the right atrium (d). The left brachiocephalic vein is shown but is small (arrow). PA: left main pulmonary artery, PV: left superior pulmonary vein, RA: right atrium

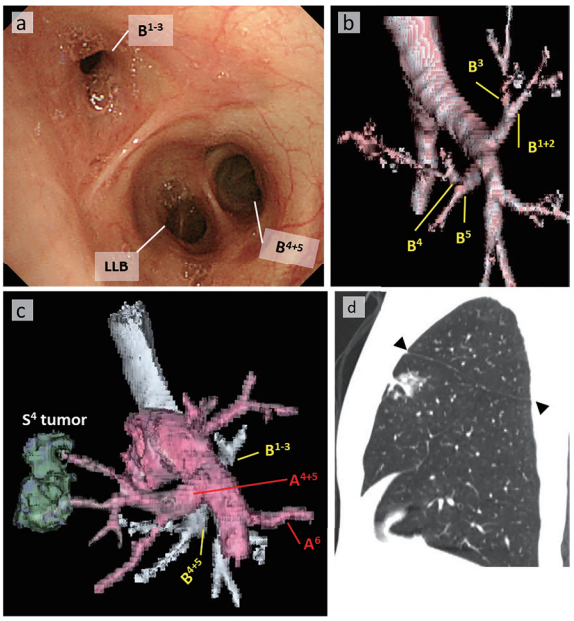

Figure 2.
Similar to the right lung, bronchoscopy (a) and 3D reconstruction contrast-enhanced CT (3D-CT) image (b) show that B^{1-3} and B^{4+5} branched from the bronchus separately. (c) 3D-CT shows the left pulmonary artery passing between B^{1-3} and B^{4+5}. (d) Sagittal section of CT scan shows a horizontal fissure between S^{1-3} and S^{4+5} in the left lung (arrowhead).
CT: computed tomography, LLB, left lower bronchus

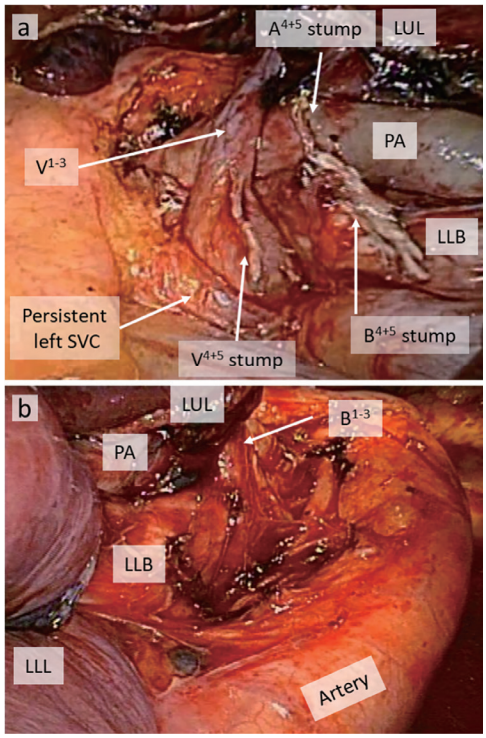

Figure 4.
Intraoperative view after left middle lobectomy (a) anterior to the hilum, (b) posterior to the hilum, LUL: left upper lobe, LLL: left lower lobe, LLB: left lower bronchus, PA: pulmonary artery, SVC: superior vena cava

(Fig. 2c). The sagittal section of the CT scan showed a horizontal fissure between S^{1-3} and S^{4+5} in the left lung (Fig. 2d). From these imaging findings, it was considered that the left lung was divided into upper, middle, and lower lobes, similar to the lobulation of the right lung. A persistent left superior vena cava (PLSVC) was also noted (Fig. 3a-d), and the left brachiocephalic vein was small (Fig. 3a). The patient was diagnosed with left middle lobe lung cancer (cT2aN0M0) with displaced bronchus and PLSVC. A video-assisted left middle lobectomy was performed with a 7 cm access window and two ports. The PLSVC was identified in the anterior region of the hilum (Fig. 4a). In the posterior region of the hilum, B^{1-3} was identified on the dorsal side of the left main pulmonary artery (Fig. 4b). Hilar, superior mediastinal and inferior tracheobronchial lymph node dissection (ND2a-1) were performed as in the case of right middle lobectomy. The patient had a chylothorax on the 3rd postoperative day. He was relieved by fasting and was discharged on the 13th postoperative day. The pathological diagnosis was an adenocarcinoma with a maximal diameter of 25 mm, without lymph node metastasis (pT1cN0M0). By the 9th year after surgery, no recurrence had occurred.

Discussion

According to a previous report of bronchial abnormalities, 75% of bronchial anomalies were detected in the right upper lobe, and bronchial anomalies in the left upper lobe were extremely rare [2]. In another report, similar to the present case, among 15 patients with bronchial anomalies in the left upper lobe, 8 patients had the following anomalies: (1) a displaced bronchus, $B^{1+2} + B^{3}$ branched in the dorsal portion of the main pulmonary artery and (2) an accessory fissure between S^{1-3} and S^{4+5} [4]. However, to our knowledge, there is no report of middle lobectomy in a left lung which showed similar lobulation as the right lung.

There is no consensus regarding the appropriate surgical procedures, including lymph node dissection, for resecting a lung with displaced bronchi, especially for lung cancer treatment. It was reported that in patients with B^{1-3} displaced bronchi, anatomical features such as the lobulation of the left lung into upper, middle, and lower parts were observed as mirror images of the right lung, and that left upper segmentectomy was considered appropriate for treating upper lobe lung cancer [5, 6]. For c-stage IB lung cancer in the left S4 segment, left upper lobectomy is standard surgery. Although this patient was elderly, had good respiratory function, so was evaluated to be able to receive standard surgery. However, he had anatomical features that showed as mirror images of the right lung, and if it was considered that he had left middle lobe lung cancer, was evaluated that left middle lobectomy was appropriate surgery. As a result of left middle lobectomy and hilar-mediastinal lymph node dissection (ND2a-1), in 9 years after the operation, this patient survived without recurrence. Postoperative chylothorax is a rare complication with an incidence of 1.4% after lung resection with lymph node dissection. Furthermore, it is rare after surgery on the left side [7]. It is reported that the thoracic lymphatic system had the various anatomic variations [8]. In the present case, the likelihood of anatomic variation was probably responsible for postoperative chylothorax. In lymph node dissection for lung cancer surgery with anatomical displacement, it may be desirable to be performed carefully using an energy device.

In the present case, the patient had both PLSVC and a bronchial anomaly. It is reported that PLSVC is the most common congenital anomaly of the thoracic venous system, affecting less than 0.5% of the general population, but occurring in approximately 4% of patients with congenital heart disease [9]. The most common congenital heart abnormalities associated with PLSVC are atrial septal defect and ventricular septal defect, followed by aortic coarctation, transposition of the great vessels, tetralogy of Fallot, and anomalous connections of the pulmonary veins. Conversely, the most frequently associated extracardiac anomaly associated with PLSVC is esophageal atresia [10]. In previous studies, in some patients with congenital heart disease, there was drainage to the left atrium or left upper pulmonary vein because of agenesis or absence of the coronary sinus, and the PLSVC caused a right-to-left shunt [11, 12]. In the remaining patients, most PLSVCs drained into the right atrium via the coronary sinus [3, 13]. PLSVC is usually asymptomatic and is an incidental finding during surgery [14, 15], left subclavian vein cannulation, or device implantation [16]. If PLSVC is asymptomatic, treatment is usually not indicated. In the present case, preoperative contrast-enhanced CT confirmed that the PLSVC drained into the coronary sinus instead of the left upper pulmonary vein, and we could safely perform thoracoscopy-assisted lobectomy.

Conclusion

We describe a rare case of cancer in the "left middle lobe of lung". The patient underwent middle lobectomy

and did not experience recurrence for 9 years.

Conflict of interest

The authors declare that they have no conflict of interest.

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