

Surgical Management of Concurrent Partial Anomalous Pulmonary Venous Return and Lung Cancer of the Same Lobe

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ABSTRACT

Partial anomalous pulmonary venous return (PAPVR) is a rare congenital left-to-right shunt where pulmonary veins drain into systemic circulation. This is a presentation of the case of a patient with concurrent PAPVR and adenocarcinoma of the same lobe. The pulmonary veins of right upper lobe drained into superior vena cava (SVC), whereas the middle and lower lobes veins drained into the left atrium as two distinct vessels. Surgeons should always perform a diligent search for anomalous vascular structure using computed tomographic (CT) angiography prior to surgery. In our case, surgical approach was "safe" because both pathologies developed in the same lobe.

Keywords: PAPVR, Lung Cancer, Congenital Anomaly

Introduction

Partial anomalous pulmonary venous return (PAPVR) is an anatomic variation in which some pulmonary veins connect to the right atrium or its tributaries as opposed to the left atrium. The principal type of PAPVR is related to a sinus venosus malformation; the veins of right upper and middle lobe are connected to the SVC or cavo-atrial junction, and an atrial septal defect (ASD) is present in 90% of the patients [1].

Case Report

A 75-year-old male was diagnosed with adenocarcinoma of the right upper lobe of the lung. Ten years earlier, the patient had undergone triple bypass surgery for coronary artery disease; however, at the time of surgery, he did not present with cardiac problems. The health status of the patient was good, and he did not complain of anything significant apart from dry cough. Non-enhanced computed tomographic (CT) scan demonstrated the veins of the right upper lobe of the lung draining into superior vena cava (SVC) (Figure 1) and an azygos lobe. The stage of cancer was assessed as T1bN0M0, and thus surgical intervention was indicated.

The operation was performed through a right posterior-lateral thoracotomy in the fifth intercostal space. While inspecting the right hilum, it was noticed that three veins of the right upper lobe drained into SVC, totally covering the truncus mediastinalis of the right pulmonary artery (Figure 2). The pulmonary veins of the middle and lower lobes drained into the left atrium as two distinct vessels. It was encountered that no other anomaly was observed except of an azygos lobe and incomplete fissures of second grade (as Craig and David have described). The patient underwent right upper lobectomy. He had an uneventful course after surgery and was discharged from the hospital on the fifth post-operative day.

Discussion

It is well known that the lung is one of the organs with the greatest number of vessel variations and anomalies, particularly the pulmonary veins. Variations in their mode of entrance into the left atrium have significant importance in surgery [2].

All PAPVR are left-to-right shunt, but rarely are accompanied by dyspnea, fatigue, atrial arrhythmias, syncope, pulmonary hypertension, and right heart failure because more than half of them drain into the right side of the heart. The insignificant degree of left-to-right shunt (equal to

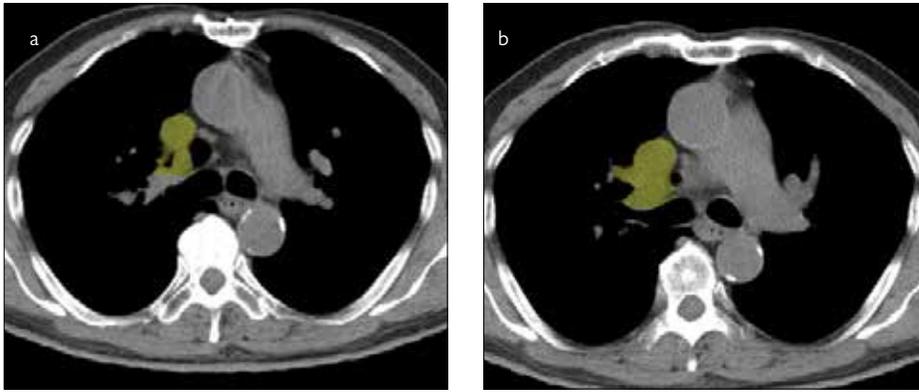


Figure 1. a, b. Computed tomographic (CT) scan showing the existence of abnormal vessels of the right upper lung lobe that communicate with the superior vena cava

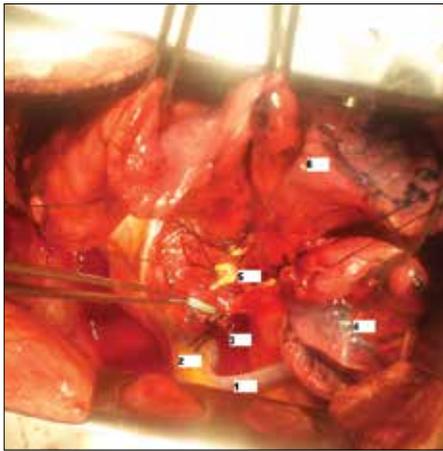


Figure 2. View during operation: 1: azygos vein; 2: superior vena cava; 3: three transected pulmonary veins draining into superior vena cava; 4: azygos lobe; 5: transected truncus mediastinalis of right pulmonary artery; 6: upper lobe of the right lung

or less than 25% of the cardiac output) and the absence of pulmonary hypertension allow such an isolated anomaly to be compatible with normal life expectancy. According to different reports, the PAPVR occurs more frequently in the right pulmonary veins where the most common sites of their drainage are the azygos vein, SVC, right atrium, inferior vena cava (IVC), or coronary sinus. This type of drainage, however, is frequent in patients who have a sinus venosus type of ASD located high in the septum near the SVC orifice. This type of ASD often goes undiagnosed because it does not produce cardiovascular symptoms. In the left lung, PAPVR is mainly present in the upper lobe [3-5].

Usually PAPVR is detected by transthoracic echocardiography, transesophageal echocardiography, or catheter angiography. Multi-detector CT (MDCT) scan is another examination that is helpful in delineating PAPVR and ASDs [3].

MRI will also demonstrate the abnormal pulmonary venous connection, but it could better describe an associated ASD.

The surgical treatment for PAPVR to SVC without cardiac defect is recommended in patients with Qp/Qs greater than 2.0 and consists of complete septal defect closure, with redirection of the abnormal veins into the left atrium, pulmonary venous occlusion, or corruption of sinus node function. In case that the veins enter the SVC in an upright position, the surgical treatment is more demanding [6-8].

In patients with lung cancer where PAPVR is present in the other lobe, the surgical treatment may present serious problems because major lung resection can cause acute right heart failure [5]. Because of that, the pre-operative detection of asymptomatic PAPVR by CT angiography is very important for patients prior to elective lung resection. In cases of asymptomatic PAPVR, it should be corrected before lung resection if major lung resection is required [3, 5-8].

Our case involved an isolated PAPVR of the pulmonary venous drainage of the upper right lobe into SVC, as well as variations of pulmonary venous drainage (the presence of middle lobe vein) and of lung parenchyma architecture (azygos lobe and incomplete fissure of second grade). MDCT was of great help in this case, although a CT angiography would be more accurate in detecting PAPVR prior to surgery. Surgical intervention was necessary due to malignancy; however, it was "safe" because both pathologies developed in the same lobe, thus resolving both issues.

In conclusion, the venous drainage of the upper lobe of right lung into SVC is a PAPVR that is uncommon if it is not accompanied by other

anomalies of the heart. This anomaly presents with other variations of lung vessels and parenchyma. The presence of malignancy may complicate the decision for surgery. Therefore, an accurate radiologic study with CT angiography has to be performed prior to every lung surgery. In all cases, thoracic surgeons must have a broad knowledge of the anatomy of the lung and its variations and anomalies, in order to prevent disasters in surgery.

Informed Consent: Written informed consent was obtained from the patient who participated in this study.

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