Left upper lobectomy for a large incidental simple arteriovenous malformation

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ABSTRACT

We present an incidental finding of a large left upper lobe diffuse pulmonary arteriovenous malformation (PAVM) presenting with cyanosis, exertional shortness of breath, polycythemia, and low peripheral oxygen saturation. PAVMs are mostly diagnosed in symptomatic patients with therapeutic embolization as the first choice of therapy. This young woman had no symptoms but showed signs of hypoxemia, and further investigation revealed a huge central left upper lobe PAVM. A successful upper lobectomy resulted in a quick recovery and immediate return to normal peripheral oxygen saturation levels with no further comorbidity or recurrence during 3 years of current follow-up.

KEYWORDS Arteriovenous malformation; hypoxemia; lobectomy; polycythemia; thoracotomy

Pulmonary arteriovenous malformations (PAVMs) are abnormal connections between the pulmonary artery and veins that bypass the capillary oxygenation in the lungs to create a right-to-left shunt, resulting in hypoxemia. PAVMs have an overall prevalence of 1 in 2600.¹ The incidence in women is twice as high as that in men.² If present on the surface, arteriovenous malformations (AVMs) appear as red markings known as telangiectasia. Chronic hypoxia from PAVM can lead to polycythemia, depleted serum iron levels, increased blood viscosity, higher risk of thrombus formation, stroke, heart attack, pulmonary embolism, kidney dysfunction, and death.³

CASE DESCRIPTION

A 23-year-old female college student involved in a motor vehicle accident was brought to the emergency department where her oxygen saturation was 86% at rest. Hemoglobin was 17 g/dL and iron level 48 µg/dL. She reported dyspnea with exertion and cyanosis of the nail beds. On 6-minute walk test without oxygen, her oxygen saturation levels dropped to 72%. A chest radiograph showed infiltrate in the upper left lung. A computed tomography scan of the chest

revealed the infiltrate to be a large AVM originating off the left main pulmonary artery (*Figure 1*).

A left upper lobectomy was performed. The AVM was located in one anatomic lobe. The option of cardiopulmonary bypass was made available in case there were complications. The patient was placed in the right lateral decubitus position and a limited left thoracotomy was performed through the fourth intercostal space. A large AVM was found in the posterior segment of the left upper lobe. The left main pulmonary artery was extremely thin walled. It was dissected out, encircled, and controlled using umbilical tape. The arterial branches were also thin walled and fragile but held vascular staple fires, which were deployed to divide them. The superior pulmonary vein was also large and was transected first using a vascular stapler to circumvent the risk of embolism. All vessels were divided without incident and the lobectomy was completed uneventfully. An arterial blood gas level of 100% was taken prior to division of the vasculature.

Prior to the lobectomy, the patient's pulmonary shunt fraction was calculated to be 35%. Immediately after lobectomy it was 17%. The patient had an uneventful postoperative course and is well at 3-year follow-up with no respiratory symptoms or cyanosis.

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Figure 1. Computed tomography scan of the chest showing left upper lobe pulmonary arteriovenous malformation with feeding and draining vessels.

DISCUSSION

PAVMs are diagnosed by transthoracic contrast echocardiography or a chest computed tomography scan. A typical PAVM includes a feeding pulmonary artery, an aneurysmal sac, and an enlarged draining vein. Symptoms include dyspnea, chest pain, hemoptysis with signs of hypoxemia, cyanosis, clubbing, and pulmonary bruits. The main objective of treatment is to remove the AVM safely. Smaller PAVMs are treated by coiled embolization, whereas larger complex PAVMs are surgically resected. Careful and timely treatment of PAVMs is required to prevent embolization-related cerebrovascular sequela and hemodynamic consequences.

Most cases of PAVMs are symptomatic with a long history of therapeutic embolizations. The rare cases that are refractory to therapy are then considered for surgical intervention. This patient was relatively young and had physical signs of hypoxemia but no active symptoms. Due to the large

size of the PAVM, the central location, and hypoxemia signs, it was deemed safer to intervene and resect the entire upper lobe via limited left thoracotomy rather than going for therapeutic embolization to reduce the risk of morbidity and to improve the quality of life.

Though therapeutic embolization is considered the therapy of choice for PAVM, decisions for pursuing either embolization or surgical intervention must be made on a case-by-case basis. In this case, surgical resection for an incidental finding of a large central PAVM proved to be a curative therapy with no recurrence reported during 3 years of follow-up.

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