Clinical History:

58-year-old woman without prior history of epistaxis or other relevant clinical events, found incidentally to have an opacity in the lower lobe of her left lung on chest radiograph. Chest computed tomography (CT) was recommended. Unlikely to have Hereditary Haemorrhagic Telangiectasia (HHT) per Curacao criteria [1].

Imaging Findings:

Simple PAVM in left lower lobe. CT (Fig. 1) and digital subtraction angiographic views (Fig. 2) show direct connection of the feeding artery and draining vein via an aneurysmal sac. Immediately after embolization, angiography (Fig. 3) shows absence of residual contrast opacification of the sac and the draining vein. On CT examination two months later (Fig. 4), AV shunting remains absent, feeding artery and draining vein have shrunken back to normal size, and the radioopaque Amplatzer vascular plug is seen in left lower lobe adjacent to pericardium.

Discussion:

Pulmonary arteriovenous malformations (PAVM) are located preferentially in the lower lobes (65%) [2], can be multiple (40%) and bilateral (40%), and are characterized as simple (80%) or complex (20%) depending on the number of feeding arteries [3].

Left untreated, 50% of patients with PAVM will develop disabling or fatal complications. Treatment of the adult and symptomatic paediatric PAVM was previously recommended for feeding arteries greater than 3 mm, however, reports of symptomatic paradoxical emboli in <3 mm feeders led to more recent guidelines suggesting treatment in as low as 2 mm [4, 5]. Embolization alone of innumerable bilateral PAVMs fails to improve symptoms and severe hypoxia [7, 8]. The role of treatment in the asymptomatic paediatric population is decided on a case by case basis [4].

Endovascular embolization of the feeding artery is the therapy of choice, performed on an outpatient basis and intravenous heparin coverage. Historically, detachable balloons [2] (with gold valve latex and silicone balloons being equally effective [9]) have been replaced by microcoils [3, 10] and, more recently, the Amplatzer Vascular Occluder.
There is no role for liquid embolics. For coils, the anchor and the scaffold techniques have been described to decrease the risk of inadvertent distal migration [3]. With AVO, a single plug that is 30-50% larger than the artery feeding the PAVM is usually recommended [7, 10, 12], and is positioned as close as possible to the sac to prevent distal recanalization [6, 12]. Large PAVMs (feeding artery > 8-9 mm) and complex angioarchitecture may require technical adjustments, including combinations of microcoils in the venous sac and plugs in the feeding artery [11] or both AVO and coils in it [6]. The ability to reposition the AVO before full detachment allows for improved safety and efficacy as embolization >1 cm from the sac is a key predictor of future recanalization/reperfusion of the PAVM [13]. Patients are consented for coil/AVO migration.

Technical success of AVO embolotherapy is 91% [11] to 100% [6-7, 10, 12], 30-day mortality is 0%, and recanalization rates range from 0% [6, 10] to 6.7% [12].

Patients should obtain a CT 6-12 months after treatment to ensure sac involution and every 3-5 years thereafter to monitor for interval growth of other PAVMs [4]. Lifelong prophylaxis for bacteremia inducing procedures and IV catheter precautions to prevent air is recommended [4]. Screening for Hereditary Haemorrhagic Telangiectasia (HHT, Osler-Rendu-Weber) must be considered [4].

**Differential Diagnosis List:** Pulmonary arteriovenous malformation., Abnormal systemic vessels, Hypervascular lung mass, Rasmussen's aneurysm, Pulmonary artery aneurysm, Pulmonary varix, Pulmonary venous aneurysm

**Final Diagnosis:** Pulmonary arteriovenous malformation.

**References:**


Description: Axial slice shows the aneurysmal sac that connects the feeding artery with the corresponding draining vein. Origin: Dept. of Diagnostic Radiology & Nuclear Medicine, University of Maryland Medical Center, Baltimore, MD (USA)
Description: Coronal reconstruction though the level of the aneurysmal sac. Origin: Dept. of Diagnostic Radiology & Nuclear Medicine, University of Maryland Medical Center, Baltimore, MD (USA)
Description: 3D reconstruction shows the connection between the feeding artery, the aneurysmal sac, and draining vein. Origin: Dept. of Diagnostic Radiology & Nuclear Medicine, University of Maryland Medical Center, Baltimore, MD (USA)
Description: Digital subtraction angiogram of left lung. Pigtail catheter injection in left pulmonary artery shows the arteriovenous shunt and early opacification of the draining pulmonary vein. Origin: Dept. of Diagnostic Radiology & Nuclear Medicine, University of Maryland Medical Center, Baltimore, MD (USA)
Description: Non-subtracted left pulmonary arteriogram Origin: Dept. of Diagnostic Radiology & Nuclear Medicine, University of Maryland Medical Center, Baltimore, MD (USA)
Description: Digital subtraction angiogram of left lung after deployment of Amplatzer plug (type 2) in afferent artery of the pulmonary AVM. Origin: Dept. of Diagnostic Radiology & Nuclear Medicine, University of Maryland Medical Center, Baltimore, MD (USA)
Description: Non-subtracted image of left pulmonary arteriogram: AV shunting and early venous drainage have disappeared. Origin: Dept. of Diagnostic Radiology & Nuclear Medicine, University of Maryland Medical Center, Baltimore, MD (USA)
Description: Axial slice: metallic Amplatzer plug is seen adjacent to the left ventricular wall. Origin: Dept. of Diagnostic Radiology & Nuclear Medicine, University of Maryland Medical Center, Baltimore, MD (USA)
**Description:** Coronal reconstruction: metallic Amplatzer plug is seen adjacent to the left ventricular wall.

**Origin:** Dept. of Diagnostic Radiology & Nuclear Medicine, University of Maryland Medical Center, Baltimore, MD (USA)
Description: Sagittal reconstruction: metallic Amplatzer plug is seen adjacent to the left ventricular wall.

Origin: Dept. of Diagnostic Radiology & Nuclear Medicine, University of Maryland Medical Center, Baltimore, MD (USA)
Description: 3D reconstruction Origin: Dept. of Diagnostic Radiology & Nuclear Medicine, University of Maryland Medical Center, Baltimore, MD (USA)