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Medical Imaging Quiz – Case 73

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A 55-year-old male with no past medical history presented to the emergency department due to severe cough. Physical examination and laboratory tests revealed none abnormality. Chest computed tomography (CT) revealed pathology as an incidental finding (fig. 1).

Comments

Pulmonary arteriovenous malformations (PAVMs) are rare vascular anomalies of the lung, in which abnormally dilated vessels provide a right-to-left shunt between the pulmonary artery and vein. They are generally considered direct high flow, low-resistance fistulous connections between the pulmonary arteries and veins. The estimated incidence is thought to be around 2–3 per 100,000 with female predilection with F:M ratios ranging around 1.5 to 1.8:1.

Despite most patients being asymptomatic, the connection between the venous and arterial system can lead to dyspnoea, as well as embolic events. Although it is assumed that the vascular defects are present at birth, they are seldom manifested clinically until adult life when the vessels have been subjected to pressure over several decades. Clinically a murmur or bruit may be audible over the lesion. Age of presentation vary from infant to old age although most present within the first three decades of life.

In congenital cases, they are considered to result from a defect in the terminal capillary loops which causes dilatation and the formation of thin-walled vascular sacs. They can be multiple in around one-third of cases. These are often unilateral. They can potentially affect any part of the lung, with a recognized predilection towards the lower lobes (50–70%).

They can be classified as simple, complex or diffuse. Simple is the commonest type, where a single segmental artery is feeding the malformation; the feeding segmental artery may have multiple subsegmental branches that feed the malformation, but must have only one single segmental level. Complex type has multiple segmental feeding arteries (approximately 20%) and diffuse type is rare (approximately 5% of lesions); the diffuse form of the disease is characterized by hundreds of malformations; some patients can have a combination of simple and complex AVMs within a diffuse lesion.

PAVMs have been described in association with a number of conditions. Hereditary hemorrhagic telangiectasia (HHT) frequently have PAVMs. PAVMs have been found in hepatic cirrhosis, schistosomiasis, mitral stenosis, trauma, previous cardiac surgery, actinomycosis, Fanconi syndrome, metastatic thyroid carcinoma, tuberculosis.

A number of modalities are available for the diagnosis of PAVMs, including contrast echocardiography, radionuclide perfusion lung

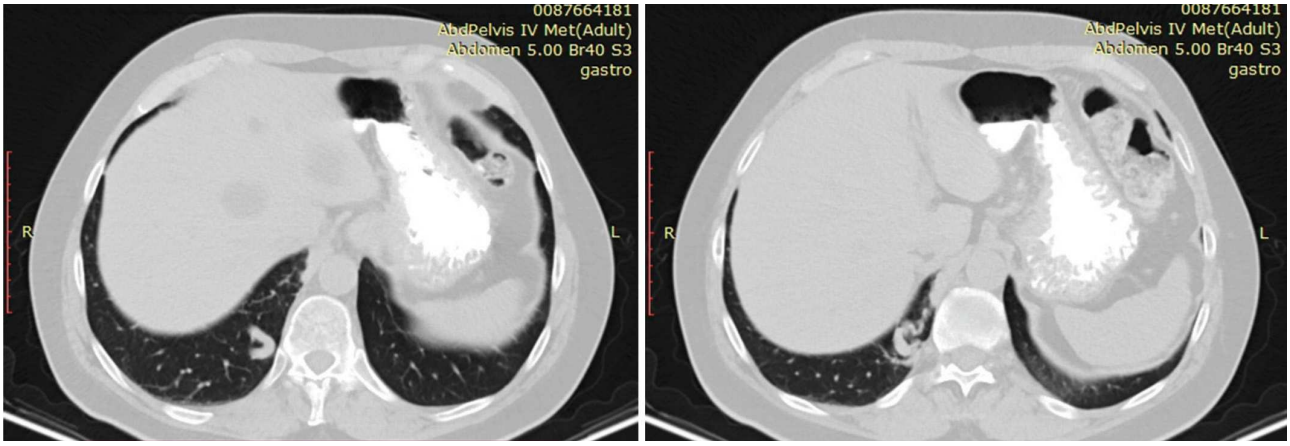

Figure 1. Chest computed tomography revealed a serpiginous mass connected with blood vessels in the right lower lobe.

scanning, CT, magnetic resonance imaging (MRI), and, the gold standard, pulmonary angiography. Pulmonary varix in plain radiography may be apparent as a non-specific soft tissue mass, often with a relatively unusual orientation compared to adjacent vessels.

CT is often the diagnostic imaging modality of choice. The characteristic presentation of a PAVM on non-contrast CT is a homogeneous, well-circumscribed, non-calcified nodule up to several centimeters in diameter or the presence of a serpiginous mass connected with blood vessels. Occasionally, associated phleboliths may be seen as calcifications. Contrast injection demonstrates enhancement of the feeding artery, the aneurysmal part, and the draining vein on early phase sequences.

Three-dimensional contrast-enhanced MR angiography is considered the MR technique of choice for imaging vascular structures in the thorax. Most lesions within the lung have relatively long relaxation time and produce medium to high-intensity signals. Lesions with rapid blood flow within resulting in a signal void and produce low-intensity signals.

Treatment options include trans-catheter coil embolization and or surgery. Treatment is indicated in cases with a feeding artery diameter greater than 3 mm. Once successfully treated, the prognosis is generally good for an individual lesion.

Possible imaging differential considerations can be divided into vascular lesions (abnormal systemic vessels, highly vascular parenchymal mass, other congenital or acquired pulmonary arterial or venous lesions, artery pseudoaneurysm, hepatopulmonary vessel, retroperitoneal varices) and non-vascular lesions (bronchoceles, mucoceles, granulomas, atelectasis).

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