J Echocardiogr (2013) 11:111–112
DOI 10.1007/s12574-013-0171-3

IMAGES IN CARDIOVASCULAR ULTRASOUND

Giant pulmonary artery aneurysm due to pulmonary stenosis

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Received: 8 January 2013 / Revised: 5 February 2013 / Accepted: 28 February 2013 / Published online: 13 March 2013

A 65-year-old woman was admitted to our institution with dyspnea on minor exercise. She had marked limitation on physical activity. Physical examination revealed grade 3/6 systolic murmur at the upper left sternal border. Her blood pressure was 130/80 mmHg and her pulse was irregular at a 75 bpm. She had been diagnosed with hypertension and chronic obstructive pulmonary disease. Chest X-ray imaing showed pleural effusion, cardiomegaly, and dilatation of the pulmonary artery (Fig. 1). Pulmonary artery aneurysm was detected on transthoracic echocardiography (Fig. 2a and video 1 in the Supplementary Material). This pulmonary aneurysm was determined to be 62 mm (left main pulmonary artery 42 mm, right main pulmonary artery 25 mm) by thorax computed tomography (Fig. 2b). On color and continuous-wave Doppler analysis, pulmonary stenosis with a 102 mmHg peak and 62 mmHg mean gradient was shown (Fig. 2c, d and video 2 in the Supplementary Material). As the patient was symptomatic, she was referred to surgery but she refused operation.

The etiology of pulmonary artery aneurysm has a number of differential diagnoses, which can be listed as follows: pulmonary stenosis, pulmonary hypertension, congenital heart disease, Behçet's disease, infections, arteriovenous fistulas, connective tissue diseases, atherosclerosis, and trauma. In the absence of these diagnoses, simple dilatation of the pulmonary trunk was described as idiopathic pulmonary artery aneurysm [1]. The etiology of idiopathic pulmonary artery aneurysm was poorly understood. Congenital weakness of the arterial wall was proposed as the underlying reason.

Generally, poststenotic dilatation of the pulmonary artery is diffuse and involves its left branch [2]. As a result of the sharp angle in the origin of the right pulmonary artery, the high-velocity flow jet directly hits the left pulmonary artery wall. Asymmetrically elevated wall shear stress was thought

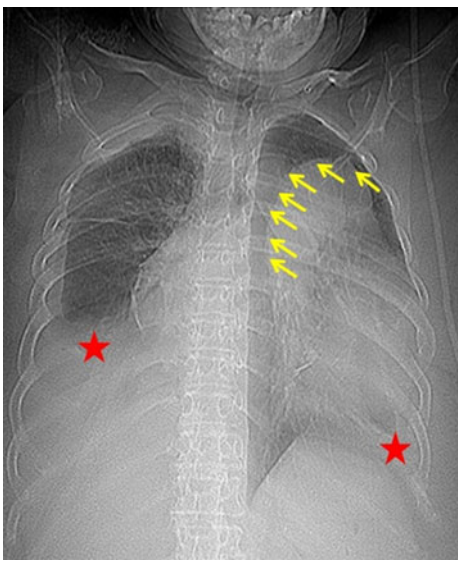

Fig. 1 Chest X-ray imaging showing pleural effusion (*asterisks*) and dilatation of the pulmonary artery (*arrows*)

Electronic supplementary material The online version of this article (doi:10.1007/s12574-013-0171-3) contains supplementary material, which is available to authorized users.

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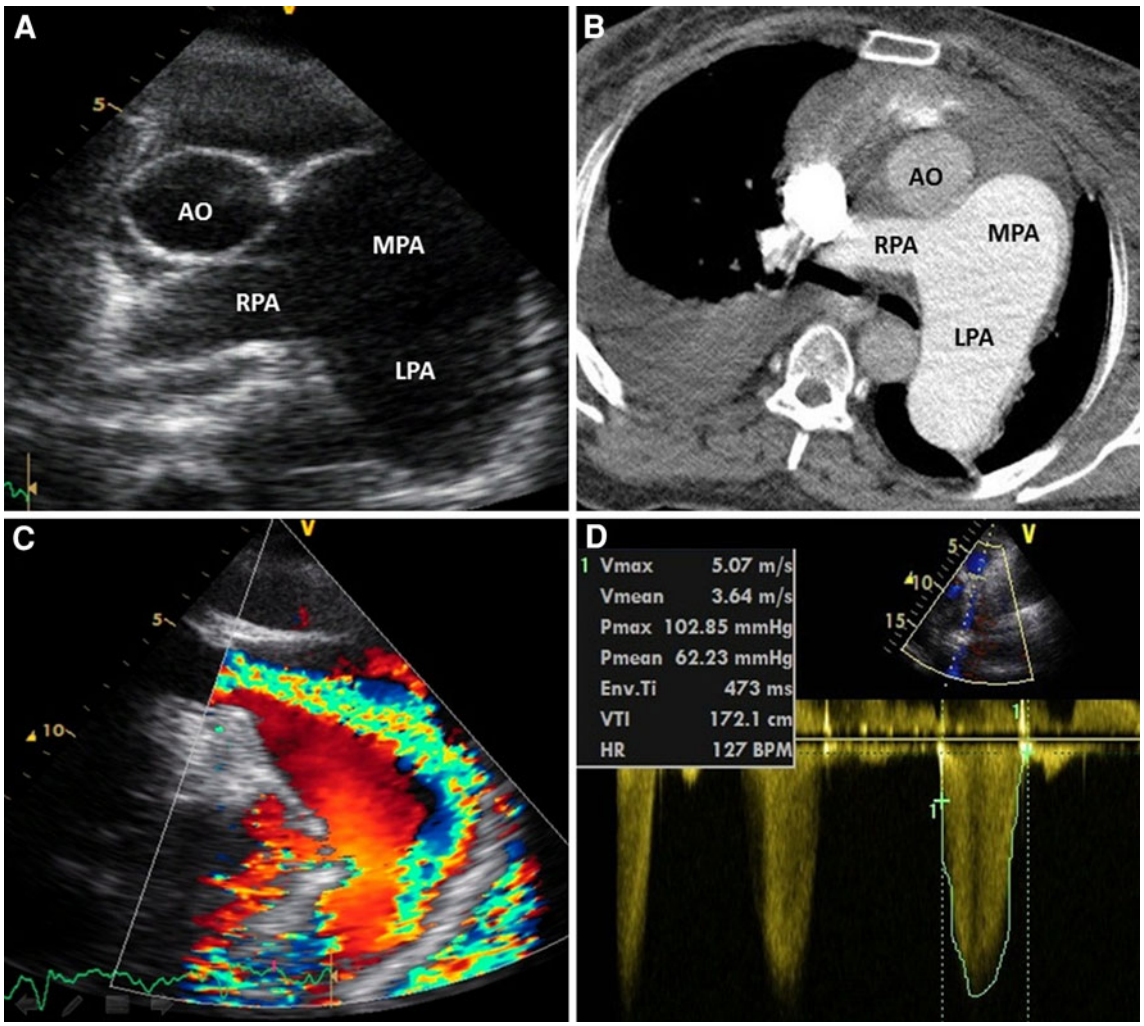

Fig. 2 **a** Transthoracic echocardiography showing a pulmonary artery aneurysm. **b** Thorax computed tomography showing a pulmonary artery aneurysm. **c** Color Doppler echocardiography demonstrating poststenotic flow. **d** Continuous-wave Doppler revealed 102 mmHg maximum and 62 mmHg mean gradient across the pulmonic valve

to be a cause of poststenotic pulmonary aneurysm [3]. Greene et al. [1] reported that pulmonary artery dilatation was observed about in half of pulmonary stenosis patients. However, mild pulmonary stenosis is not considered to be the main reason for pulmonary aneurysm. In this regard, 25 mmHg and lower gradients may accompany idiopathic pulmonary aneurysm [4]. In our opinion, pulmonary stenosis is a major risk factor for pulmonary aneurysm development, but it is not the only reason. Other possible factors involved in its etiology are congenital weakness of the arterial wall, elevated wall shear stress due to the high-velocity flow jet, the shape of pulmonic valves, and the geometry of the pulmonary artery. In our case, poststenotic flow was clearly seen as being directed to the left main pulmonary artery, with a 102 mmHg maximum gradient (Fig. 2c, d). Taking into account the gradient and flow properties, we propose that poststenotic dilatation is the main reason for the pulmonary aneurysm in this patient.

Conflict of interest There are no financial or other relations that could lead to a conflict of interest.

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