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IMAGING VIGNETTE

BEGINNER

CLINICAL VIGNETTE

Time Trajectory of Pulmonary Artery Involvement in Takayasu Arteritis Confirmed by Histopathology

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ABSTRACT

The early diagnosis of Takayasu arteritis (TAK) remains challenging when TAK-related pulmonary artery involvement occurs as an isolated or initial clinical manifestation. We describe the long-term course of a patient with isolated pulmonary TAK who was initially diagnosed with pulmonary arterial hypertension with in situ thrombus but was re-diagnosed following thromboendarterectomy surgery. (**Level of Difficulty: Beginner.**) (J Am Coll Cardiol Case Rep 2021;3:1294–1296) © 2021 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

CASE PRESENTATION

A 74-year-old woman with a previous diagnosis of pulmonary arterial hypertension with in situ thrombus (**Figure 1A**) presented with exacerbated dyspnea on effort. She was receiving combined treatment of an endothelin receptor antagonist and a phosphodiesterase-5 inhibitor, anticoagulation, and home oxygen therapy. Her heart rate was high at 131 beats/min, blood pressure was 103/61 mm Hg, respiratory rate was 22 breaths/min, and oxygen saturation was 85% on room air. Jugular venous distention and wide splitting of the second heart sound were observed. She reported no history of venous thromboembolism or acquired risk factors for pulmonary embolism. Laboratory evaluation revealed a C-reactive protein level of 0.04 mg/dL, a brain natriuretic peptide level of 255.5 pg/mL, and a D-dimer level of 5.3 μg/mL. No other coagulation abnormalities or deficiencies were noted. Electrocardiography revealed sinus tachycardia, right-axis deviation, and T-wave inversions in leads II, III, aVF, V_1, and V_2 (Supplemental Figure 1). Chest x-ray demonstrated marked enlargement of the main right pulmonary artery, and transthoracic echocardiography demonstrated right ventricular pressure overload (Supplemental Figure 2, Videos 1 and 2). On contrast-enhanced computed tomography, markedly increased chronic thromboembolic material within the dilated central pulmonary arteries and proximal right pulmonary artery was observed over the course of 8 years (**Figure 1B**). Perfusion lung scanning detected several segmental perfusion defects (Supplemental Figure 3). Right heart catheterization at rest confirmed a high degree of pulmonary hypertension. Pulmonary arteriography exhibited 5 typical angiographic patterns, resulting in the diagnosis of chronic thromboembolic pulmonary hypertension (CTEPH) (**Figure 1C,** Videos 3 and 4). Considering the surgical accessibility of thrombi, pulmonary

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thromboendarterectomy was performed. Histological assessment revealed granulomatous inflammatory cell infiltration of the outer membrane and destruction of the elastic smooth muscle, with replacement fibrosis toward the outer third of the media and adventitia, consistent with Takayasu arteritis (TAK) (Figures 1D to 1F). Genetic testing was positive for HLA-B52, whereas no involvement of the aorta or its major branches was detected, suggesting isolated pulmonary TAK. Early postoperative right heart catheterization confirmed decreased pulmonary vascular resistance (from 6.1 to 4.4 WU) and pulmonary artery pressure (from 79/32 [mean: 49] mm Hg to 36/15 [mean: 23] mm Hg), and improved exercise capacity, that no longer required oxygen therapy.

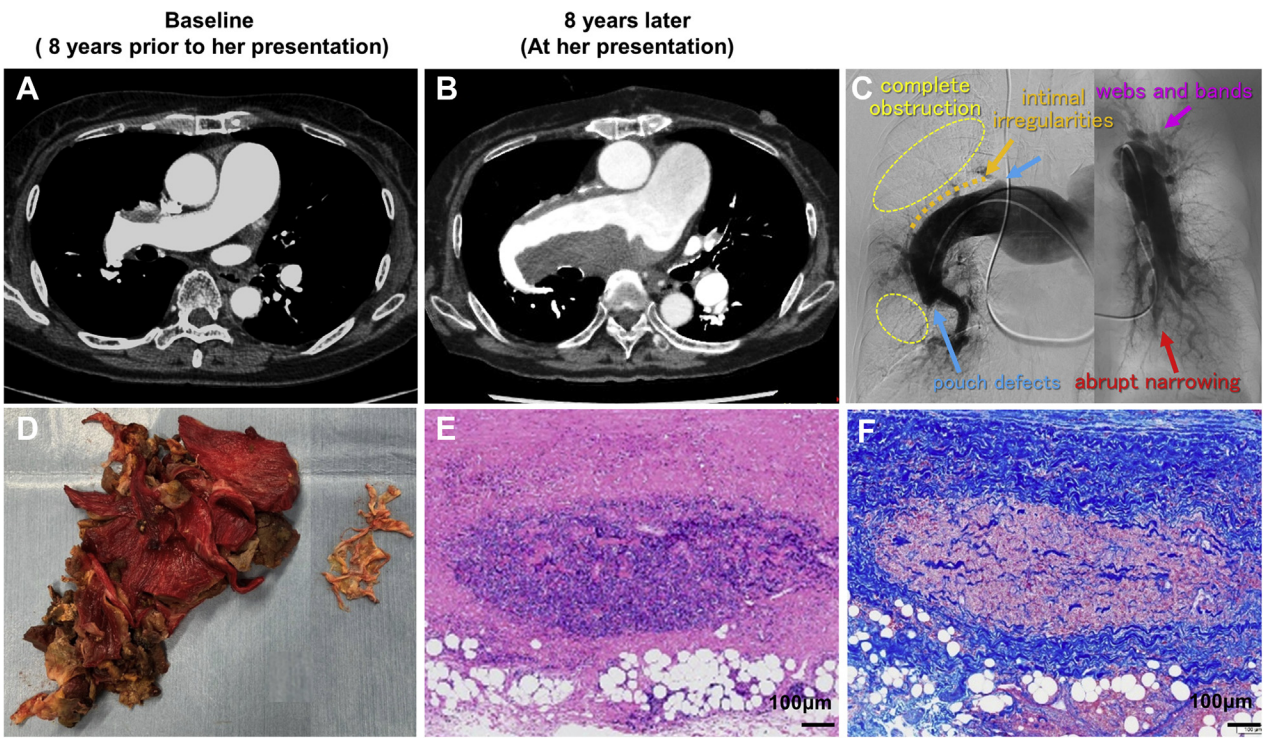
ABBREVIATIONS AND ACRONYMS

CTEPH = chronic thromboembolic pulmonary hypertension

TAK = Takayasu arteritis

This case highlights the importance of a differential diagnosis for in situ thrombus in the workup of pulmonary hypertension. In situ thrombus can be theoretically induced by localized inflammation, endothelial cell damage, and disruption of blood flow. In a recent study by Gong et al. (1), in situ thrombus was observed in 30% of cases of TAK-related pulmonary involvement, and most in situ thrombi were located in the proximal right pulmonary artery, consistent with our case. Thus, in cases of pulmonary hypertension complicated by in situ thrombus, the simultaneous assessment of TAK is clinically imperative due to different clinical management requirements even in the absence of vascular wall thickening, occlusion, stenosis, or aneurysm. TAK is

FIGURE 1 Contrast-Enhanced CT, Pulmonary Angiography Findings, and Histological Samples Obtained From Thromboendarterectomy



(A) Computed tomography (CT) demonstrates an in situ lining thrombus in the right pulmonary artery without evidence of thromboembolic occlusion of the proximal or distal pulmonary vasculature. **(B)** Follow-up CT after 8 years revealed the development of a pulmonary artery aneurysm with increased chronic thromboembolic material and vessel wall thickening. **(C)** Right-sided pulmonary angiography shows multiple findings consistent with chronic thromboembolic disease, including pouch defects, intimal irregularities, and clear complete obstruction of the right lower lobe artery, whereas left-sided pulmonary angiography shows webs and bands, and abrupt cutoffs. **(D)** Gross pathology consists of removal of proximal thromboembolic material with endarterectomy of all the distal branches from the right lung **(left)** and proximal fibrotic component from the left lung **(right)**. **(E)** The hematoxylin and eosin–stained sample exhibits active granulomatous inflammation, indicated by the presence of mononuclear cells, predominantly lymphocytes, histiocytes, macrophages, and plasma cells at the medio-adventitial junction and adventitia. **(F)** The azan-stained sample depicts marked fibrocellular thickening of the adventitia. In addition to inflammation and fibrocellular thickening, moth-eaten loss of elastic fibers, primarily on the adventitia and outer side of the media, is observed.

more prevalent in Asian countries, predominantly in females, and is closely associated with the incidence of HLA-B*5201 (2). Furthermore, CTEPH exhibits a similar frequency of HLA-B*5201 to TAK (40% vs 41%) (3). The frequency of peripheral vein thrombus was significantly lower in CTEPH with HLA B*5201 than in that without. This suggests considerable overlap between TAK-related pulmonary involvement and CTEPH. Therefore, in situ pulmonary artery thrombus or CTEPH without evidence of peripheral vein thrombus should alert the clinician to the possibility of TKA-related pulmonary involvement.

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APPENDIX For supplemental figures and videos, please see the online version of this paper.