High-resolution computed tomography with three-dimensional reconstruction for assessment of chronic pulmonary thromboembolic disease

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This 60-year-old man developed progressive dyspnea on exertion and was found to have pulmonary hypertension on echocardiography (estimated right ventricular pressure 91 mm Hg). Pulmonary thromboembolic disease was diagnosed by computed tomography (CT) as shown in Figure 1. Hematologic evaluation revealed essential thrombocytopenia and *JAK2* V617F mutation positivity. The patient was referred for pulmonary thromboendarterectomy, which he underwent successfully (Figure 2). Preoperative pulmonary arterial pressures with the patient under general anesthesia were 63 mm Hg systolic and 23 mm Hg diastolic, mean 37 mm Hg, with a cardiac output of 5.8 L/min. Postoperative pulmonary arterial pressures were 42 mm systolic and 16 mm Hg diastolic, mean 26 mm Hg, at a cardiac output of 6.1 L/min.

With advances in high-resolution CT scanning, we have migrated away from pulmonary arteriography in the preoperative evaluation of patients with chronic pulmonary thromboembolic disease. High-resolution CT also provides a simple means of evaluating the operative result before discharge from the hospital (Figure 3). Scans are performed with electrocardiographic gating with a dual-source 128-row scanner (Siemens AG Healthcare Sector, Erlangen,
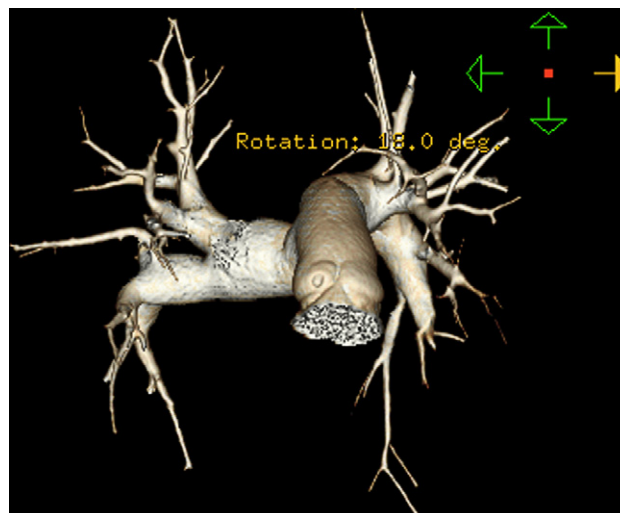

FIGURE 1. Preoperative volume-rendered 3-dimensional computed tomographic image demonstrating proximal disease bilaterally.

Germany). A biphasic injection protocol is used, including 80 mL of iodinated contrast medium followed by 80 mL of a 50:50 mix of contrast medium and saline solution at an injection rate of 5 mL/s. The CT acquisition is triggered by bolus tracking with a region of interest in the main pulmonary artery, and images are acquired from the top of the lungs through the lung bases. Thin-section reconstructions are performed (1.5 mm thick at 1-mm increments) and used to produce the volume-rendered 3-dimensional images. Additional axial and short-axis multiphase images are reconstructed (6 mm thick at 3-mm increments) and used for the measurement of right ventricular volumes and function.
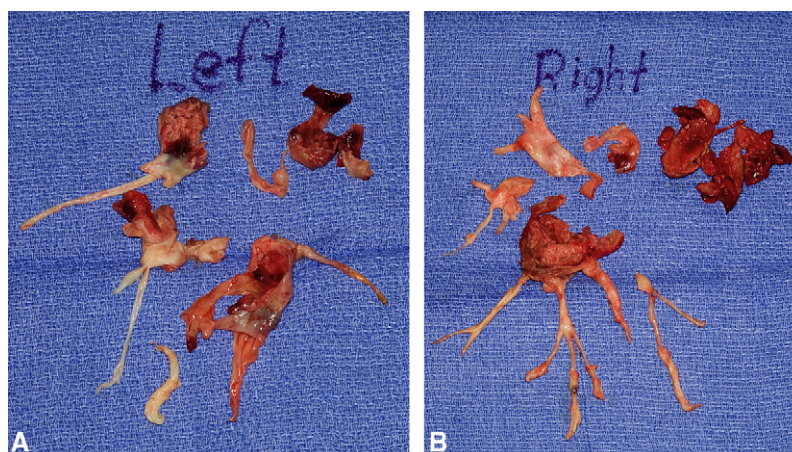

FIGURE 2. Intraoperative specimens from left (A) and right (B) pulmonary arteries.
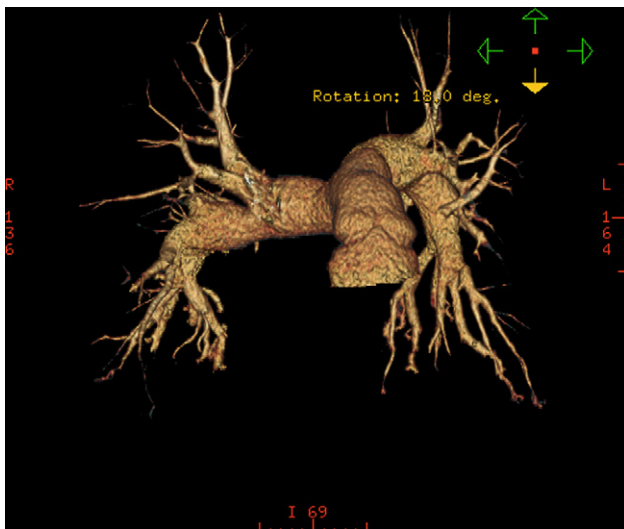
FIGURE 3. Postoperative result, as demonstrated by volume-rendered 3-dimensional computed tomographic image.