

CARDIOVASCULAR FLASHLIGHT

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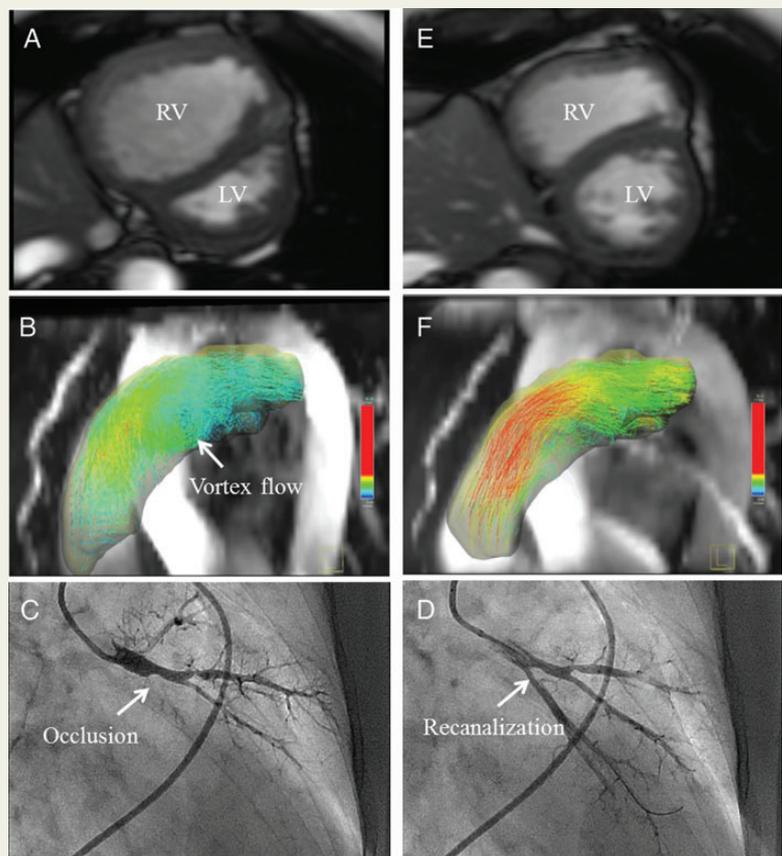
Four-dimensional flow magnetic resonance imaging visualizes drastic change in vortex flow in the main pulmonary artery after percutaneous transluminal pulmonary angioplasty in a patient with chronic thromboembolic pulmonary hypertension

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A 54-year-old woman with a history of venous thromboembolism treated with warfarin for 9 months was referred to our hospital because of exacerbating oedema and dyspnoea. A CT scan showed residual thrombus in the sub-segmental pulmonary arteries (PAs). Cine MRI demonstrated deteriorated right ventricular ejection fraction (RVEF = 24.7%), RV dilatation, RV wall-thickening, and substantial leftward intraventricular septal shift at end-systole and early diastole, indicating RV pressure overload (*Panel A*). Four-dimensional flow MRI demonstrated substantial vortex flow in the main PA at late-systole (*Panel B* and Supplementary material online, *Movie*). Results of right heart catheterization suggested severe pre-capillary pulmonary hypertension [mean PA pressure (mPAP), 48 mmHg, pulmonary vascular resistance (PVR), 1073 dyn s/cm⁵ and pulmonary capillary wedge pressure, 4 mmHg] and angiogram revealed inoperable chronic thromboembolic pulmonary hypertension (CTEPH). After 1 month of oral medication with beraprost and sildenafil, she underwent six-staged sessions of percutaneous transluminal pulmonary angioplasty (PTPA) (*Panels C and D*). We staged the angioplasty procedure to include no more than two segments in each session at a 2- to 12-week interval. No severe complication occurred during the procedures. On completing 6th PTPA session, mPAP and PVR normalized to 20 mmHg and 231 dyn s/cm⁵, respectively. Cine MRI showed improvement of RVEF (48.2%) and intraventricular septal shift (*Panel E*), and the vortex flow in the main PA substantially diminished on 4D flow MRI (*Panel F* and Supplementary material online, *Movie*). To the best of our knowledge, this is the first demonstration of normalization of the main PA flow patterns on 4D flow MRI in a CTEPH patient after successful PTPA.



Supplementary material is available at *European Heart Journal* online.