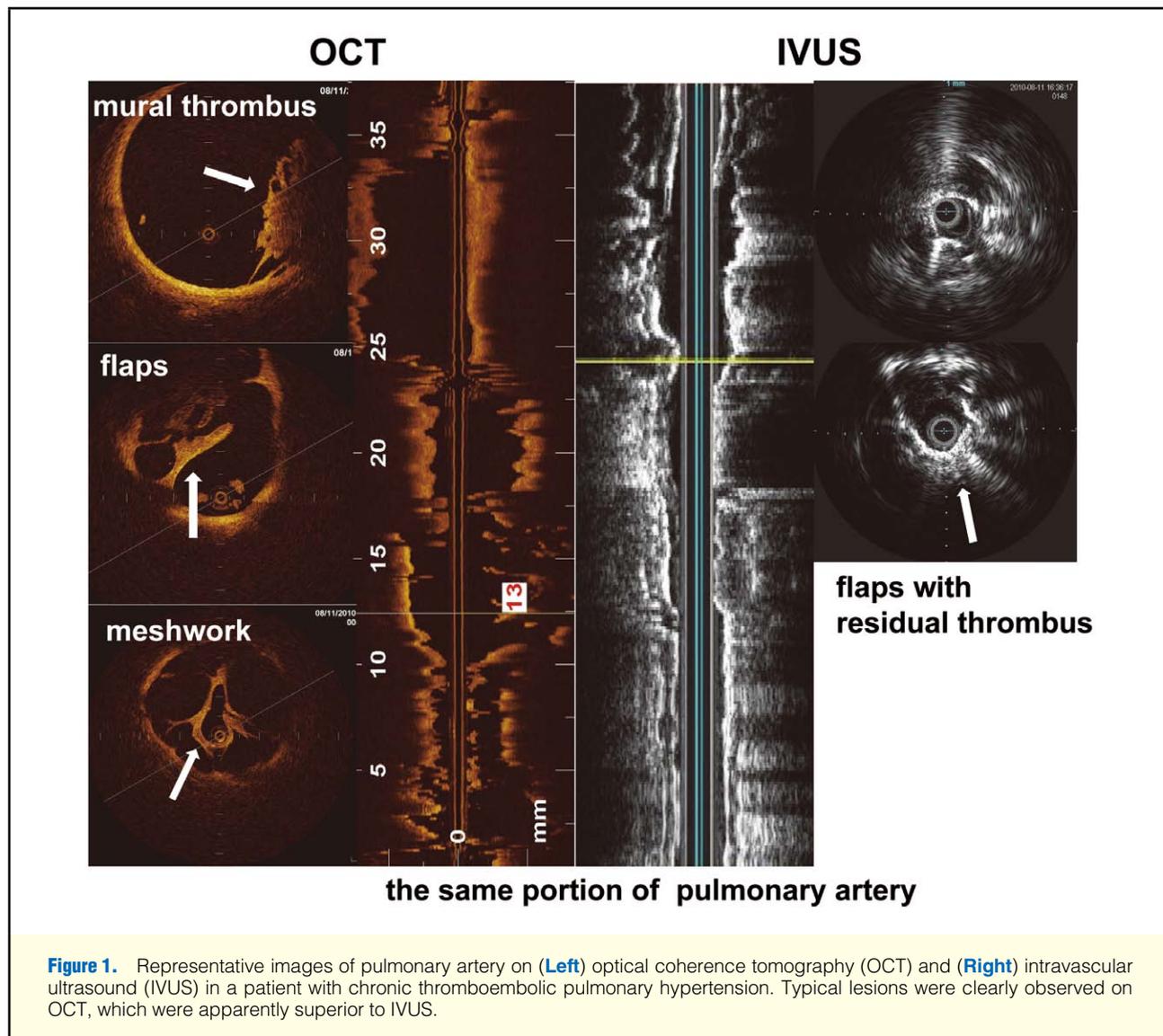


## Optical Coherence Tomography Is Superior to Intravascular Ultrasound for Diagnosis of Distal-Type Chronic Thromboembolic Pulmonary Hypertension

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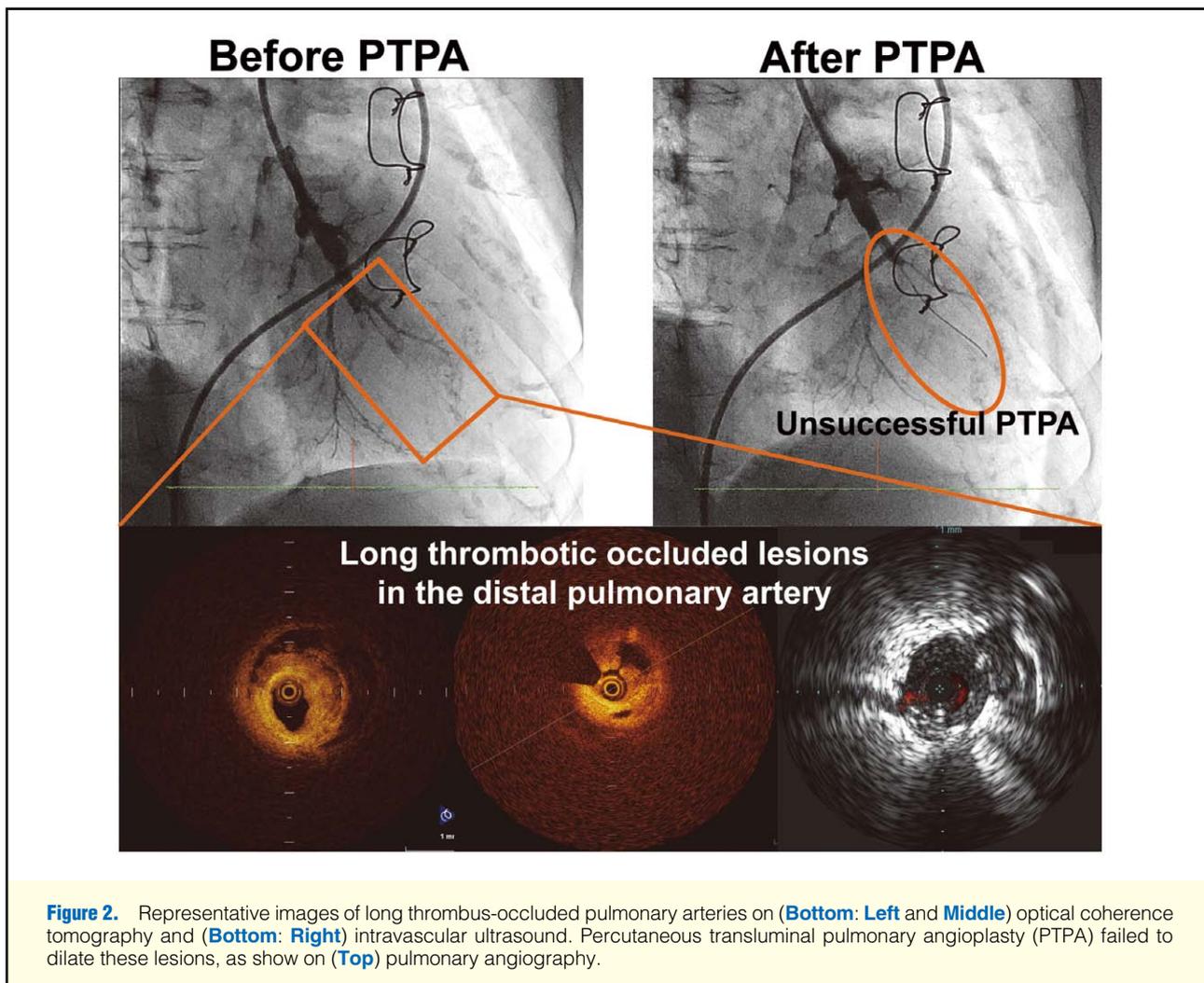
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**C**hronic thromboembolic pulmonary hypertension (CTEPH) is caused by chronic and mechanical obstruction of central and/or distal pulmonary arteries due to thromboembolic masses.<sup>1-4</sup> It is one of the distinct disease entities of pulmonary hypertension (PH), with a mean pulmonary arterial pressure >25 mmHg and is classified into the central- and distal-type CTEPH.<sup>4-9</sup>

As a new therapeutic strategy, percutaneous transluminal pulmonary angioplasty (PTPA) markedly improves pulmonary hemodynamics and long-term prognosis in patients with distal-type CTEPH with no major complications.<sup>10</sup> During this procedure, intravascular ultrasound (IVUS) is used to evaluate the presence of chronic thrombus in pulmonary arteries and to determine the diameter of the target. IVUS image resolution, however, is often inadequate.

Optical coherence tomography (OCT) has recently been shown to be useful to observe the pulmonary arterial lesions in distal-type CTEPH.<sup>3,4,10</sup> OCT is an interferometer-based imaging modality that produces a 2-D image of optical scattering from internal tissue microstructures with a high resolution of approximately 10–20 μm, 10-fold higher than that of IVUS.<sup>11-13</sup> In the present study, we compared OCT with IVUS images in patients with CTEPH during PTPA.

The study protocol was approved by the Ethics Committees

of Tohoku University and all patients provided written informed consent.

From July 2009 to September 2011, we prospectively enrolled 9 patients with distal-type CTEPH (mean age, 59±11 years; 8 female, 1 male; WHO functional class II in 7, III in 1 and IV in 1), who were treated with PTPA using both OCT and IVUS. Although IVUS also detected similar vascular structures in CTEPH, such as intimal thickening, wall irregularity, mural thrombus, abrupt occlusion, flaps and meshwork, the resolution of IVUS was apparently inferior to that of OCT (Figures 1, S1).

OCT was found to be more useful than IVUS, not only to detect chronic thromboembolus but also to measure the exact luminal diameter for PTPA to determine the balloon size. Further, OCT helps to predict the failure of PTPA, in that PTPA is seen to fail to dilate the pulmonary arteries with long thrombus-occluded lesions in distal pulmonary arteries (Figure 2).

Future studies are required to compare the detection ratio of abnormal vascular structures of pulmonary arteries in CTEPH between OCT and IVUS, and to clarify whether the OCT findings during PTPA affect the therapeutic and prognostic outcomes.

In conclusion, OCT is apparently superior to IVUS to diagnose CTEPH, to perform PTPA, and to assess the likelihood

of success of the procedure.

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### Supplementary Files

#### Supplementary File 1

**Figure S1.** Images of pulmonary artery on (Left) optical coherence tomography (OCT) and (Right) intravascular ultrasound (IVUS) in patients 2–9 with chronic thromboembolic pulmonary hypertension.

Please find supplementary file(s);  
<http://dx.doi.org/10.1253/circj.CJ-12-1493>