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Title: Usefulness of optical coherence tomography for diagnosis and treatment in chronic thromboembolic pulmonary hypertension

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Body: Background: Thrombotic occlusion and/or luminal flaps in pulmonary arteries are characterized with chronic thromboembolic pulmonary hypertension (CTEPH). We have recently reported that percutaneous transluminal pulmonary angioplasty (PTPA) markedly improves pulmonary hemodynamics and mid-term prognosis in CTEPH. Here we report the usefulness of optical coherence tomography (OCT), which is an interferometer-based imaging modality with a high resolution, as a novel tool for diagnosis and treatment of CTEPH. Methods and Results: We have prospectively enrolled 79 consecutive patients with pulmonary hypertension, including pulmonary arterial hypertension (PAH, n=46) and CTEPH (n=33). First, the OCT images of CTEPH were completely different from those of PAH. All CTEPH had the occlusion or the unique flaps in pulmonary arteries, whereas the pulmonary arteries larger than 1 mm had no obstruction in PAH. Next, in 30 out of 33 patients with inoperable CTEPH, we have performed PTPA in our modified method, which is combined with the OCT evaluation. PTPA significantly reduced mean PAP [45.5±10.6 to 28.0±8.1 mmHg, P<0.01], when OCT examination in 70 procedures revealed that PTPA destroyed the typical flaps in pulmonary arteries and that shifted them to the pulmonary artery walls. Obviously, the luminal areas of pulmonary arteries were enlarged (% enlargement of luminal area in OCT imaging, 63±81%). However, we were unable to perform PTPA to the fully occluded lesions with thrombus, which could be detected and predicted by OCT. Conclusions: These results indicate that OCT is useful to diagnose CTEPH and to identify the target lesions suitable for PTPA in patients with CTEPH.