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MR Imaging of ventilation and perfusion changes in response to pulmonary endarterectomy in chronic thromboembolic pulmonary hypertension

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A 41-year-old woman with chronic thromboembolic pulmonary hypertension (CTEPH) underwent pulmonary endarterectomy. Mean pulmonary artery pressure fell from 53 to 28mmHg, and WHO class from III to II.

Hyperpolarized ^3He magnetic resonance imaging (MRI) and dynamic contrast enhanced (DCE) perfusion MRI were used to quantitatively visualize lung ventilation (A, E) and perfusion (B, F) pre and post endarterectomy. The ventilated and perfused lung volume (C, G) was calculated from ventilation and perfusion images.

At baseline (A-D) large regions of the lung were ventilated but not perfused. After endarterectomy (E-H) lung ventilated volume increased by 0.2 L, perfused lung volume by 0.8 L, and the volume of the lungs both ventilated and perfused by 0.8L.

The method provides a safe and sensitive means of assessment of regional ventilation and perfusion distributions in CTEPH with excellent spatial resolution, and a safe non-invasive means of assessment of regional V/Q in response to intervention.

The institutional review board for human studies approved the protocols and written consent was obtained from the patient. These images have not been previously published.

Figure Caption

Coronal MR images before (upper) and after (lower) pulmonary endarterectomy. Ventilation (A, E), blood perfusion (B, F), pulmonary tissue which is both ventilated and perfused (C, G) and histograms of ventilation (blue) and perfusion (red) (D, H).