

Intra-Individual Comparison of 0.5 & 1.0M contrast agents in the evaluation of Chronic Thrombo-Embolic Pulmonary Hypertension

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Purpose

To investigate the role of high-molarity MR contrast agents in chronic thromboembolic pulmonary hypertension (CTEPH). We compared Gd-DTPA (*Magnevist, Schering, Berlin, Germany*) and Gd-BT-D3OA (*Gadovist, Schering, Berlin, Germany*) in both "static" high-resolution pulmonary MRA, and dynamic time resolved pulmonary MRA.

Materials & Methods

All examinations were performed on a 1.5T whole body system (Eclipse, Philips, Cleveland, OH). Using a flexible receive only phased array body coil. Patients were scanned twice within 48 hours; the same dose of contrast was given for each examination. High resolution MRA scans were acquired during 20 seconds of arrested inspiration using a 3D RF-spoiled gradient echo sequence. Bolus timing was determined with a small test bolus. Scan and inject delays were set to ensure that the centre of k-space coincided with the bolus peak. Time resolved MRA was acquired during a breath hold of 22 seconds with a 3D RF-spoiled gradient echo sequence acquired at a rate of 1 frame every 2.5 seconds.

Results

There was greater separation of pulmonary arterial and aortic peaks in the Gd-BT-DO3A examinations when compared to Gd-DTPA, with a faster washout of contrast (figure 1), this was reflected in less contamination of the images by cardiac motion artefacts, pulmonary venous and systemic vasculature. Filling defects and intra-luminal webs were better visualized (Figure 2).



Figure 2: Maximum intensity projections: Note left sided chambers and aorta visible on Gd-DTPA (arrows)

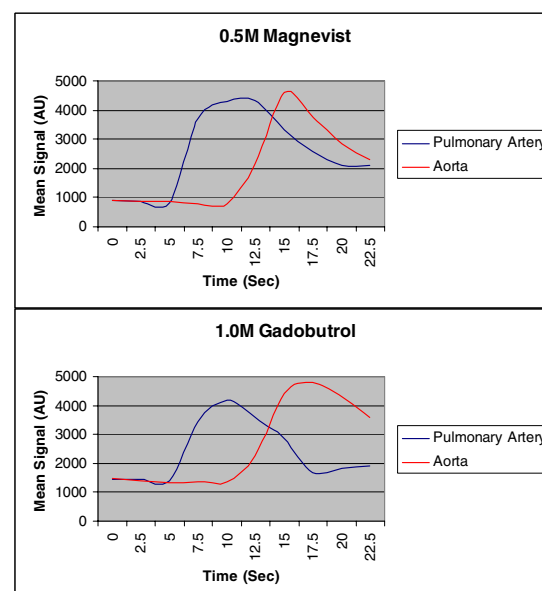


Figure 1: Bolus Profiles

Comparison of parametric maps between the two time-resolved examinations revealed a better separation of the pulmonary arterial and venous circulations using Gd-BT-DO3A.

Discussion

Previous Studies have found no benefits associated with high-molarity MR contrast agents in pulmonary angiography [1,2] However, we found that with accurate bolus timing, the more compact bolus-profile of Gd-BT-DO3A compared to that of the same dose of Gd-DTPA results in less contamination of the arterial phase image by cardiac motion and pulmonary-venous and systemic vasculature. In time resolved pulmonary angiography with a sufficiently high frame rate the sharper bolus shape provides better distinction between pulmonary arterial and venous circulation allowing regions with delayed filling to be better visualized.

1. Fink, C., et al., *Time-resolved contrast-enhanced three-dimensional pulmonary MR-angiography: 1.0 M gadobutrol vs. 0.5 M gadopentetate dimeglumine*. Journal of Magnetic Resonance Imaging, 2004. **19**(2): p. 202-8.
2. Fink, C., et al., *Contrast-enhanced three-dimensional pulmonary perfusion magnetic resonance imaging: intraindividual comparison of 1.0 M gadobutrol and 0.5 M Gd-DTPA at three dose levels*. Investigative Radiology, 2004. **39**(3): p. 143-8.