3D TIME-RESOLVED MR PERFUSION IN PATIENTS WITH CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION

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Objectives

Chronic thromboembolic pulmonary hypertension (CTEPH) is a severe progressive condition associated with a poor prognosis. Right heart catheterisation remains the gold standard investigation, providing the key diagnostic parameters of mean pulmonary artery pressure (mPAP), pulmonary vascular resistance index (PVRI) and cardiac index (CI). Hence a reliable non-invasive alternative would be desirable. With this study we aim to define the relationship of 3D MR pulmonary perfusion data with invasive haemodynamic indices in patients with CTEPH.

Methods

14 patients with CTEPH and seven patients with 'No PH' underwent MR perfusion imaging using a time resolved 3D spoiled gradient echo sequence and right heart catheterisation within 48 hours. MR scans were performed on a 1.5T whole body MRI system. All image processing was performed on a GE advanced workstation using 'functool' software. Time to peak (TTP) and mean time to enhance (MTE) values were generated from ROI's placed in the main pulmonary artery (PA). ROI's were also placed in a perfusion defect and in an adjacent area of perfused lung to derive values of TTP and MTE in the patients with CTEPH.

Results

TTP was significantly prolonged in patients with CTEPH compared to patients with 'No PH' ($p<0.0001$), **Figure 1**. MTE values were significantly greater in patients with CTEPH compared to those with 'No PH', $p=0.003$. CI and PVRI showed the strongest correlations with TTP, $r=-0.87$ and $r=0.77$ respectively ($p<0.0001$), the correlation between TTP and

mPAP was weaker r=0.55, p=0.012. TTP and MTE measured within perfusion defects were found to be significantly prolonged compared to adjacent perfused lung tissue, p=0.0005 (**Figure 2**) and p=0.0128 respectively.

Conclusions

3D MR perfusion is a useful tool for evaluating pulmonary haemodynamic function in patients with CTEPH. Global and regional analysis of 3D MR perfusion transit times may be of value for the non-invasive evaluation and monitoring of patients with CTEPH and for regional assessments of disease response following endarterectomy.

Figure 1

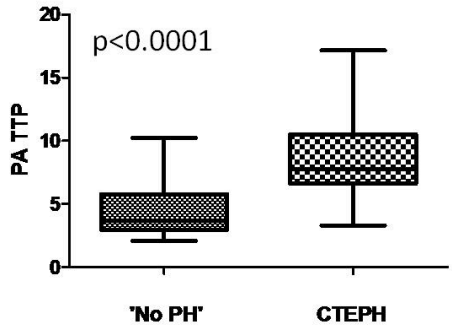

Figure 2