Cardiopulmonary MRI as a diagnostic tool in Pulmonary Hypertension

CS Johns1, JM Wild1, R Solanki1, R Condliffe2, S Rajaram2, D Kiely2, AJ Swift1
1The University of Sheffield, 2Sheffield Teaching Hospitals

Purpose:
Pulmonary hypertension is associated with a poor outcome. Treatment of the correct cause of pulmonary hypertension is associated with an improvement in survival.

Aim:
To derive and assess a non-invasive MRI regression model for estimation of mPAP.

Materials and Methods:
Incident patients at a specialist PH centre with suspected PH from 2012 to 2016 were reviewed. Patients with left atrial volume index >41 were excluded as this is a marker of left heart disease. Biventricular volumes, mass and function and pulmonary artery flow measurements were recorded. The first half were used as a derivation cohort, the second validation. A regression equation was calculated in the derivation cohort, using any cardiac MRI metrics with statistically significant correlations with mPAP. The validation cohort was used to assess for the model’s diagnostic performance.

Results:
Derivation Cohort:
Regression analysis in the derivation cohort:
\[ \text{mPAP}_\text{mri} = -178.7 + 42.730 \times \log_{10} \text{septal angle} + 7.569 \times \log_{10} \text{Ventricular Mass Index} + 3.393 \times \text{Black blood score} \]

Validation Cohort:
Conclusion
A newly derived parametric regression model for mPAP estimation shows strong correlation and high accuracy with RHC-mPAP in a large cohort of patients with suspected PH and normal left atrial volume. This has the potentially allowing the avoidance of right heart catheter in selected patients.