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Title: MRI assessment of right atrial volume and function in pulmonary hypertension

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Body: Background The role of the right atrium (RA) is under-researched within pulmonary vascular disease. The aim was to investigate the use of magnetic resonance imaging (MRI) derived RA volume and function in the diagnosis and management of pulmonary hypertension (PH). Methods Patients attending the pulmonary vascular clinic were retrospectively analysed. Inclusion criteria were cardiac MRI and right heart catheterisation within 48 hours. Standard cardiac-gated balanced steady state free precession sequences were used. End-systolic volume (ESV) and diastolic volume (EDV) were calculated using Simpson's numeric integral applied to manual RA area tracings in the 4-chamber stack sequence. Results 71 PH patients were included, mean age was 65 ± 15.5 years and 67.6% (48) were female. RA function was shown to correlate with cardiac index (R=0.69) and mean RA pressure (R=-0.64), $P < 0.001$. RA ejection fraction ≤ 28.3% was shown to have moderate sensitivity (80%) and specificity (71%) for identifying patients who met diagnostic criteria. RA ESV ≥48.0 ml was useful (sensitivity 96%, specificity 78%) for identifying patients with a high RA pressure, see figure 1.

Conclusion RA pressure is a known prognostic indicator; this study suggests high RA pressure can be detected using cardiac MRI. RA function has been shown to correlate well with haemodynamic measurements and clinical data. Further research into the natural history of RA volume change in PH is needed.