

**Combined X-Ray and MRI-guided cardiac catheterisations (XMR): clinical impact in patients with complex anatomy or raised pulmonary vascular resistance**

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**Introduction:** The benefit of combined X-Ray and MRI-guided cardiac catheterisations (XMR) in reducing patient radiation exposure has already been established. XMR catheterisations were primarily performed in our institution for assessment of pulmonary vascular resistance (PVR). In the past few years the indications of XMR catheterisations have widened to include assessment of anatomy and function of univentricular hearts, cardiac output measurement during pharmacological stress in liver patients prior to transplantation and MR-guided interventions. We report the results and clinical impact of XMR catheterisations performed in our institution.

**Methods:** Prospective and retrospective review of all XMR catheterisations performed between Feb 2002 and Sept 2010. The procedures were either performed in our hybrid XMR lab or in separate MRI and cardiac catheterisation suites. Ethics and UK regulatory authority approval were obtained prior to commencement of the XMR and MR-guided interventional programme.

**Results:** 174 studies were performed in 156 patients with median age and weight of 4.4 years (range 4 days to 67 years) and 15 kg (range 3 -122kg), respectively. The study group consisted mostly of patients with congenital heart disease (biventricular circulation [n=108], univentricular circulation [n=30]). Fourteen patients had liver problems and underwent 19 cardiac output stress studies prior to liver transplantation and 4 patients had normal cardiac anatomy but were catheterised because of suspicion of raised PVR of respiratory aetiology.

The median time from cardiac catheterisation to intervention (medical, catheter or surgical) was 50 days (range 0-208 days). Fifty-seven patients were found to have elevated PVR > 3 WU.m<sup>2</sup> with median of 12 WU.m<sup>2</sup> (range: 3 - 66 WU.m<sup>2</sup>). PVR was between 3-5.3WU.m<sup>2</sup> in 31 patients, 5.3–7WU.m<sup>2</sup> in 7 patients and > 7 WU.m<sup>2</sup> in 19 patients. Of the first group, accurate PVR assessment led to risk stratification and fenestrated, rather than complete closure, of their ventricular or atrial septal defects in eight. Of the 14 liver patients that underwent cardiac output assessment with stress, seven have been transplanted successfully. **Conclusions:** XMR catheterisation facilitates risk stratification and careful management planning for patients with suspicion of raised PVR, complex anatomy or prior to liver transplantation.