

Cardiac MRI stress testing in children with myocardial ischaemia.

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Introduction:

Cardiac MRI is a non-invasive, high-resolution imaging modality widely used in patients with congenital heart disease. The role of imaging of inducible myocardial ischaemia and scarring, clinically established in adults, is rarely used in children with acquired or congenital heart disease.

Methods:

We performed 64 scans on 57 children, mean age 12 ± 3 years (range 6-18) with Kawasaki disease (n=10), switch procedure for TGA (n=21), PAIVS (n=10), ALCAPA repair (n=4), anomalous course of coronary artery (n=4) and other pathologies (n=8). The patient's symptoms, heart rate and BP were monitored throughout the procedure. Sedation was not required and patients were familiarised with the scanner/procedure beforehand.

A complete stack of short-axis cine images was acquired to assess LV/RV function. Adenosine was infused intravenously at 140 mcg/kg/min over 3 minutes. Perfusion images were acquired during injection of gadolinium. Breath-hold/non-breath-hold coronary and late enhancement images were acquired to detect the presence of coronary aneurysms and myocardial scar/fibrosis respectively.

Results:

The completed scan was achieved in 57/64 (89%) lasting ~1 hour. No adverse reactions to adenosine or gadolinium were recorded. During adenosine the heart rate increased from 75 ± 15 to 110 ± 10 bpm with no significant change of BP. Inducible perfusion defects were identified in 10/64 (16%), myocardial infarction in 7/64 (11%), all corresponding to a coronary territory. Non ischaemic myocardial fibrosis was identified in 3 patients. Coronary MRA identified coronary dilatation/aneurysm in 6/10 (60%), all with Kawasaki disease.

Conclusions:

Perfusion and scar imaging in children is feasible and uncomplicated. It has the potential to identify myocardial abnormalities non-invasively as seen in the adult population, and it is potentially valuable for guiding clinical management.