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Cardiac Magnetic Resonance in Children with Acute Myocarditis

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Background: Diagnosis of acute myocarditis (AM) is challenging because its clinical presentation may overlap with that of common infectious diseases or be diagnosed as idiopathic dilated cardiomyopathy (DCM). While Cardiac Magnetic Resonance (CMR) imaging has emerged as an important non-invasive tool in the diagnostic procedure of AM in adults, data on CMR in children remain scarce.
Aim: To describe feasibility of CMR and its contribution for the diagnosis and follow-up of AM or for the etiology left ventricular (LV) dysfunction of unknown origin in children.
Methods: From November 2008 to April 2011, 43 children underwent CMR for clinical suspicion of AM with or without LV dysfunction of unknown origin. CMR sequences included unenhanced cine-steady state free precession (SSFP), black-blood-prepared T1-weighted images and T2-weighted images and T1-weighted images (EGE) and 3D late gadolinium-enhanced after injection of gadolinium chelate (LGE). The diagnosis of myocarditis was based on the recently consensus criteria. CMR was repeated during follow-up in children with confirmed diagnosis of AM.
Results: AM was diagnosed by CMR in 30/43 children: 22/30 had LV dysfunction, 8/30 had normal LV function but elevated blood levels of troponin I. T2 hyper-signal was present in 21 cases, EGE and LGE were present in 28/44 cases, the 3 patterns were simultaneously present in 11 cases. Two children died during hospitalization. All survivors with LV dysfunction had normal echocardiography after a median follow-up of 10 months. 24/30 patients had control CMR that revealed in 4 cases the persistence of inflammation in T2-weighted images and in 6 case persisting LGE. No children with AM without LV dysfunction developed dilated cardiomyopathy. The remaining 13/43 children without AM on CMR were diagnosed with DCM: 2/13 normalized after 4 and 30 months of follow-up respectively, and 11/13 are still followed for dilated cardiomyopathy.
Conclusion: CMR in children with clinical suspicion of AM or with LV dysfunction of unknown origin is feasible and useful in the diagnostic work-up. It may help to adapt medical targeted therapy and to be more precise in prognosis assessment in infants recently diagnosed with DCM of unknown origin.