Complementary results of computed tomography and magnetic resonance imaging of the heart and coronary arteries: a review and future outlook.

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MR and CT imaging are emerging as promising complementary imaging modalities in the primary diagnosis of CAD and for the detection of subclinical atherosclerotic disease. For the detection or exclusion of significant CAD, both cardiac CT (including coronary calcium screening and non-invasive coronary angiography), and cardiac MRI (using stress function and stress perfusion imaging) are becoming widely available for routine clinical evaluation. Their high negative predictive value, especially when combining two or more of these modalities, allows the exclusion of significant CAD with high certainty, provided that patients are selected appropriately. The primary goal of current investigations using this combined imaging approach is to reduce the number of unnecessary diagnostic coronary catheterizations, and not to replace cardiac catheterization altogether. For the diagnosis of obstructive coronary atherosclerosis and for screening for subclinical disease, CT and MRI have shown potential to directly image the atherosclerotic lesion, measure atherosclerotic burden, and characterize the plaque components. The information obtained may be used to assess progression and regression of atherosclerosis and may open new areas for diagnosis, prevention, and treatment of coronary atherosclerosis. Further clinical investigation is needed to define the technical requirements for optimal imaging, develop accurate quantitative image analysis techniques, outline criteria for image interpretation, and define the clinical indications for both MR and CT imaging. Additional studies are also needed to address the cost effectiveness of such a combined approach versus other currently available imaging modalities.

PMID: 14719573 [PubMed - indexed for MEDLINE]