



ORAL PRESENTATION

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Utility of CMR for differentiating acute from chronic myocardial infarction - Revisiting T2-weighted imaging with inclusion of intermediate aged infarcts

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Introduction

Published reports have concluded that T2-weighted CMR (T2W-CMR) is highly accurate in differentiating acute from chronic MI. However, the majority of patients investigated had infarcts <1-week-old or >6-months-old. Clinically, it would be vital to distinguish an infarct a few days versus a few months old, however some studies suggest T2W-CMR edema may persist for months [Heart 2001;85:639-42, AHJ 2007;154:929-36], possibly precluding this differentiation.

Purpose

The study primary aim was to assess the prevalence of T2W-CMR edema across a range of infarct ages and to assess its accuracy with and without the inclusion of intermediate-aged infarcts. Secondary aims were to evaluate other CMR markers of acute MI, and to compare image quality of CMR techniques.

Methods

221 CMR studies were performed at various time points post-MI in 117 first ST-elevation-MI patients enrolled prospectively and consecutively from two CMR centers. Prespecified markers of "acute" MI were hyperintensity on T2W-CMR, microvascular obstruction (MO) on delayed-enhancement-CMR (DE-CMR), and increased end-diastolic wall thickness (Increased-EDWT, >150% of remote measured quantitatively) on cine-CMR. Images were scored blinded to identity and all clinical information. Individual CMR techniques were interpreted

separately. Image quality and frequency/severity of artifacts were also evaluated.

Results

Mean age was 58±11 years; 84% were men. Prevalence of T2W-CMR hyperintensity steadily decreased for older infarcts starting 1-month post-MI but was still substantial for 1-6 month-old infarcts (Figure 1, Panel A). Even after requiring T2W-hyperintensity to be in the correct infarct-related-artery territory (to reduce false positives post-hoc) prevalence was 59% (1-3 months), 32% (3-6 months), and 4% (>6-months). Individually, prevalence of MO (57%) and Increased-EDWT (45%) was low for <1-week-old infarcts but substantially increased in combination (77%, $p<0.001$) while retaining low prevalence for intermediate-aged infarcts (Figure 1, Panel B). Defining acute and chronic MI as <1 and ≥1-month-old, T2W sensitivity and specificity were 88% and 66%. For combined DE/Cine-CMR this was 74% and 97%. When removing patients with 1-6-month-old infarcts, T2W-CMR specificity increased to 83% ($p<0.01$). One-third of T2W-images were graded poor, nearly 5-fold higher than cine or DE-CMR (Figure 1, Panel C), as 52% and 92% of T2W-images had some myocardial signal drop-out (2.4 ± 1.8 segments of 17-segments) and/or slow flow (7 ± 3.5 segments).

Conclusions

Sensitivity of T2W-CMR to detect <1-month-old infarcts is moderately high, but because edema may persist, T2W-CMR is less specific when including intermediate-aged infarcts (1-6 months). Although mildly less sensitive, the presence of MO or increased-EDWT

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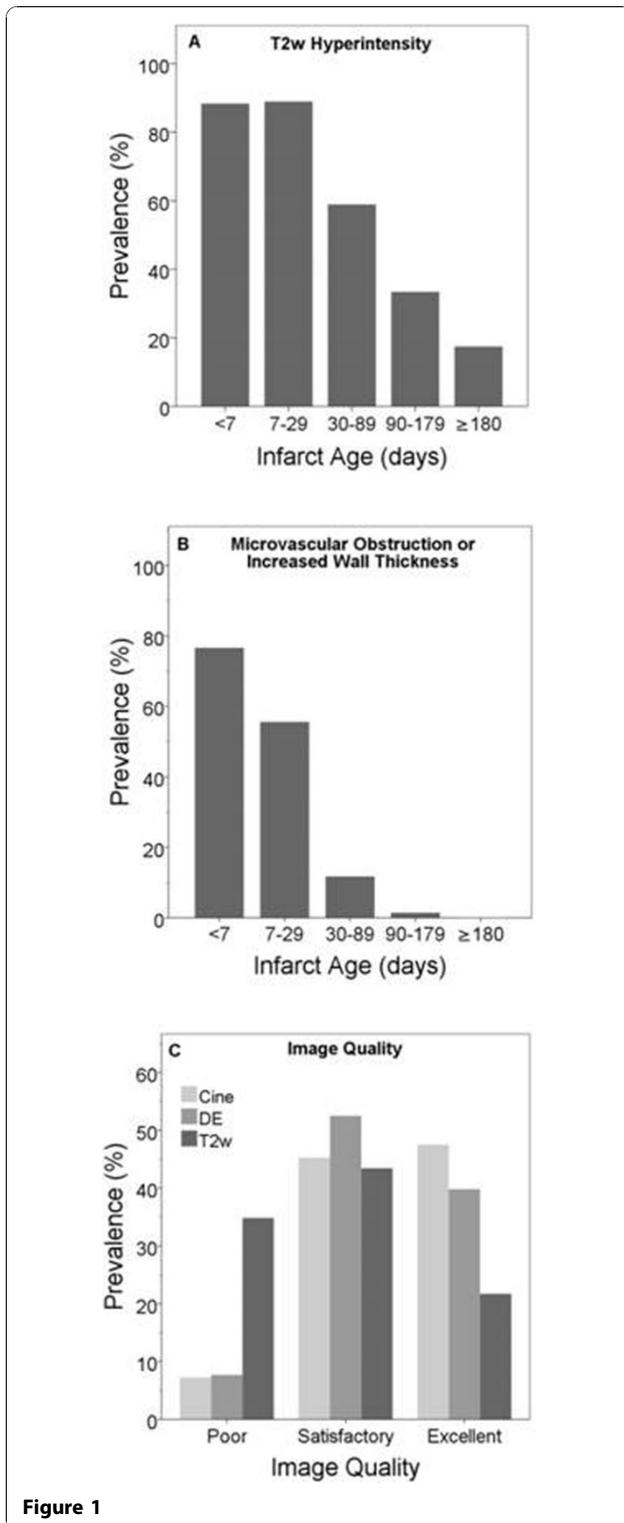


Figure 1

on DE/cine-CMR is very specific, and unlike T2W-CMR image quality is rarely poor.

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