Conclusion

Estimates of stress MBF and MPR by perfusion-CMR in this study were greater in diastole than systole in normal and CAD patients. Although the diagnostic accuracy of both phases was similar, the MPR cut-off values were different. These observations are relevant to any form of dynamic myocardial perfusion assessment and are of particular importance to promising developments in 3D perfusion-CMR and CT perfusion imaging where the acquisition phase may be specifically chosen. Different estimates of MBF and different MPR cut-off values between phases mean a universal standard needs to be agreed for 3D acquisitions.

Results

In the 3VD group, high-resolution identified more abnormal segments per patient (7.3 ±3.7 vs 5.2 ±3.9; p = 0.01), more abnormal territories per patient (2.0 ±0.9 vs 1.46 ±1.0; p = 0.02) and a higher overall perfusion score (17.7 ±5.6 vs 13.9 ±10.2; p = 0.03). The number of segments with subendocardial ischaemia was greater for high-resolution (154 vs 70 segments; 47% vs 24%; p < 0.001) (Abstract 086 figure 2). The sensitivity, specificity and area under the curve (AUC) for identifying any perfusion defect were similar for both methods (high-resolution: 92.8%, 74.4% and 0.94 respectively vs standard-resolution: 79.8%, 84.8% and 0.87; p > 0.05).

Conclusion

In patients with 3VD, high-resolution perfusion-CMR detected more ischaemic burden than standard-resolution by identifying more segments with subendocardial ischaemia. High-resolution perfusion-CMR therefore has incremental value in correctly stratifying this high-risk patient group.

Abstract 086 Figure 2

Distribution of transmural ischaemia index. High-resolution perfusion CMR detected significantly more subendocardial ischaemia and fewer normal segments than standard-resolution in angiographically underperfused segments.

Introduction

Although accelerated high-spatial-resolution cardiovascular magnetic resonance (CMR) perfusion imaging has recently been shown to be clinically feasible, there has not yet been a direct comparison with standard-resolution methods. We hypothesised that higher spatial resolution detects more subendocardial ischaemia and leads to greater diagnostic accuracy for the detection of angiographically defined CAD. This study compared the diagnostic accuracy of high-resolution and standard-resolution CMR perfusion imaging in patients with suspected coronary artery disease (CAD).

Methods

A total of 111 patients with suspected CAD were prospectively recruited. All patients underwent two separate perfusion CMR studies on a 1.5 Tesla CMR scanner (Intera CV, Philips Healthcare, Best, the Netherlands), one with standard-resolution (2.5 ×2.5 mm in-plane resolution) and one with high-resolution (1.6 ×1.6 mm in-plane resolution) acquisition. High-resolution demonstrates additional ischaemia in the basal inferior (A), mid inferior, mid inferoseptal (B), apical anterior and apical inferior segments (C), more clearly seen.

Abstract 086 Figure 1

Case example—standard-resolution shows perfusion defects (white arrows) in the basal inferior (A), mid inferior, mid inferoseptal (B), apical anterior and apical inferior segments (C). High-resolution demonstrates additional ischaemia in the basal lateral (D), mid anterior and mid anterolateral segments (E) with a circumferential defect in the apical slice (F), perfusion defects are also better delineated at high-resolution and the transmural extent of ischaemia more clearly seen.

Incremental value of high-resolution cardiovascular magnetic resonance myocardial perfusion imaging in suspected coronary artery disease.
resolution acquisition was facilitated by eightfold k-t broad linear speed up technique (BLAST) acceleration. Two observers visually graded perfusion in each myocardial segment on a 4-point scale. Segmental scores were summed to produce a perfusion score for each patient. All patients underwent invasive coronary angiography. Significant CAD was defined as a coronary artery stenosis of $\geq 50\%$ diameter on quantitative coronary angiography.

Results CMR data were successfully obtained in 100 patients. A typical example is shown in Abstract 087 figure 1. In patients with CAD ($n=70$), more segments were determined to have subendocardial ischaemia with high-resolution acquisition than with standard-resolution acquisition ($279$ vs $108$; $p<0.001$). High-resolution acquisition had a greater diagnostic accuracy than standard-resolution acquisition for identifying single-vessel disease (area under the curve [AUC]: $0.88$ vs $0.73$; $p<0.001$) or multi-vessel disease (AUC: $0.98$ vs $0.91$; $p=0.002$) and overall (AUC: $0.93$ vs $0.83$; $p<0.001$) (Abstract 087 figure 2).

Conclusions Our study shows that high-resolution CMR perfusion imaging has greater diagnostic accuracy than standard-resolution acquisition for the detection of CAD in both single and multi-vessel disease patients and detects more subendocardial ischaemia.

Abstract 087 Figure 1  Case example: Proximal left anterior descending and right coronary artery disease standard-resolution shows possible perfusion defects (white arrows) in the basal anteroseptal, inferoseptal and inferior segments which are difficult to distinguish from dark-rim artifacts (A); and a more convincing perfusion defect in the apical septal segment (C). High-resolution more clearly delineates perfusion defects in the basal infero-septal, basal inferior (D), mid-antero-septal (E) and apical septal (F) segments. At high-resolution, the transmural extent of ischaemia can be clearly assessed (the basal and mid-ventricular defects appear subendocardial) and the perfusion defects are better delineated.

Abstract 087 Figure 2  Receiver-Operator Characteristic Curves. Standard and high-resolution perfusion CMR both had a high diagnostic accuracy for the detection of coronary artery disease but the high-resolution technique was superior. The areas under the curve were $0.83$ (95% CI 0.75 to 0.91) for standard-resolution and $0.93$ (95% CI 0.88 to 0.98) for high-resolution ($p<0.001$).