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Assessment of myocardial perfusion-CMR in left main stem disease (LMS) in the CEMARC study

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Introduction

Left main stem (LMS) disease is found in approximately 5% of patients with stable angina and in approximately 7% of patients presenting with an acute myocardial infarction. Accurate assessment of the degree of left main stem stenosis has important prognostic and therapeutic implications. Clinically, angiographic LMS stenosis of 50% or more is considered significant. However, it is not known how accurately myocardial perfusion imaging detects LMS disease at this severity threshold.

Purpose

1. To measure myocardial blood flow by CMR in patients with LMS stenosis of more than 50% on quantitative angiography in the CEMARC study (a large prospective evaluation of CMR against SPECT and coronary angiography[1]).

2. To correlate hyperaemic myocardial blood flow (MBF) and blood flow reserve between territories supplied by the LMS and remote territories.

Methods

Nine patients from the CEMARC study who were found to have significant LMS disease on quantitative coronary angiography underwent perfusion-CMR on a Philips 1.5 T Intera system. Myocaridal perfusion imaging was performed every heartbeat during the first pass of 0.05 mmol/kg gadolinium chelate using a T1-weighted fast (spoiled) GE sequence. Stress perfusion imaging was performed using intravenous adenosine infused for 4 minutes (140mcg/kg/min). Perfusion-CMR data were post-processed off-line using the software PMI[2]. Following motion correction a circular ROI was selected in the left ventricle to measure the arterial input function. MBF maps were created by model-free analysis; myocardial ROIs were drawn on these maps, one in the LMS territory (ROI1: LAD+LCX) and one in a remote region (ROI2:RCA). MBF for these ROIs was calculated using the Fermi model[3]. Statistical calculations were performed using SPSS.

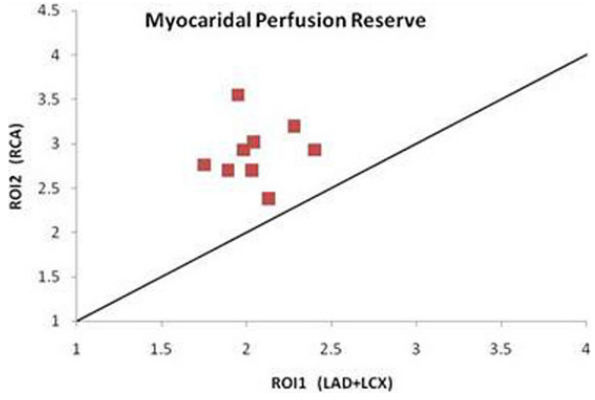

Figure 1 MPR values in LMS diseased terotories

Results

Of the 9 datasets analysed, the results revealed significant differences ($p<0.001$) in myocardial perfusion seen in LMS diseased territories (ROI1) compared to normal segments (ROI2), Figure 1. The mean myocardial perfusion reserve (MPR) of ROI1 was 2.05 (SD ±0.20) and for ROI2 2.97 (±0.33).

Conclusion

This study demonstrates reduced myocardial blood flow reserve in patients with LMS stenosis of 50% or more, although reductions are subtle.

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