

ORAL PRESENTATION

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Cardiac magnetic resonance perfusion imaging and the effects of single intravenous cannulation with the Octopus bionector

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From 16th Annual SCMR Scientific Sessions
San Francisco, CA, USA. 31 January - 3 February 2013

Background

CMR perfusion (CMRP) imaging using adenosine traditionally requires bilateral arm cannulation. Patients with multiple comorbidities often have difficult venous access and dual cannulation often proves impossible. We used a standard two-way adapter (Octopus Vygon with no-reflow valve) to administer adenosine at a standard rate of 140 mcg/kg/minute over 3 minutes for maximum coronary vasodilatation following a bolus injection of gadolinium. High flow bolus injection may cause sinus arrest caused by a flush of residual adenosine in the same arm vein. We acquired 50 sequential R-wave triggered image frames to assess first pass myocardial perfusion and assessed the effect of significant sinus pauses on image acquisition.

Methods

First pass perfusion was performed on a Siemens Avanto1.5T MR scanner (Siemens Medical Solutions, USA) with a standardised acquisition protocol using intra-venous adenosine 140µg/kg/min for 3 minutes. Three sequential short axis slices of 8mm thickness were acquired per cardiac cycle using a hybrid EPI sequence (TR 175 ms, TE 1.03 ms, flip angle 25 degrees and voxel size 2.8 x 2.8 x mm²) after administration of a 0.1 mmol/Kg bolus of intravenous Gadolinium (Gadovist). Fifty sequential R-wave triggered frames were acquired to assess first pass perfusion. We assessed the effect of significant sinus pauses on patient safety and quality of image acquisition.

Results

One hundred and seven CMRP studies using the Octopus two-adapter were compared with 107 standard method

dual vein cannulation for CMR first pass perfusion between May 2012 and August 2012. Twenty seven of 105 patients (25.7% vs 0% in the control group) developed significant episodes of bradycardia. Mean heart rate 69.1 (+/-28.1) Range: 139-18 min⁻¹). Image sequences during first pass perfusion were adversely affected due to gaps in R-wave triggered image frame acquisition during, or just before gadolinium arrival because of the effects of adenosine (Figures 1 and 2).

Conclusions

Crucial image frames are not acquired at the most important time points during first pass perfusion in 26% of patients with the Octopus Bionector. The introduction of a two-way intravenous adapter resulted in an

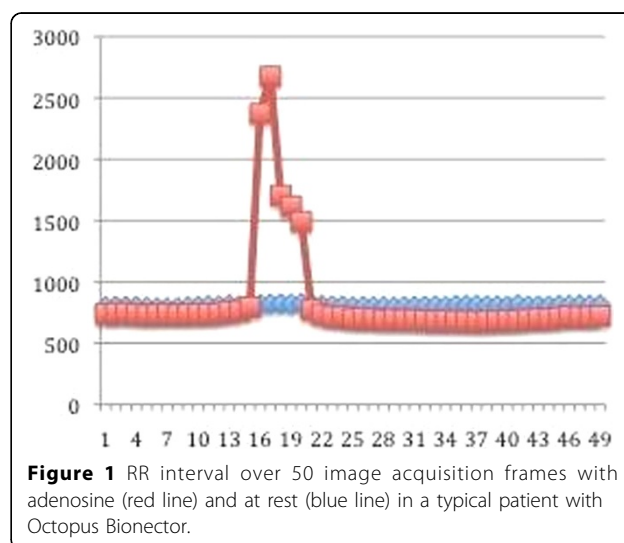
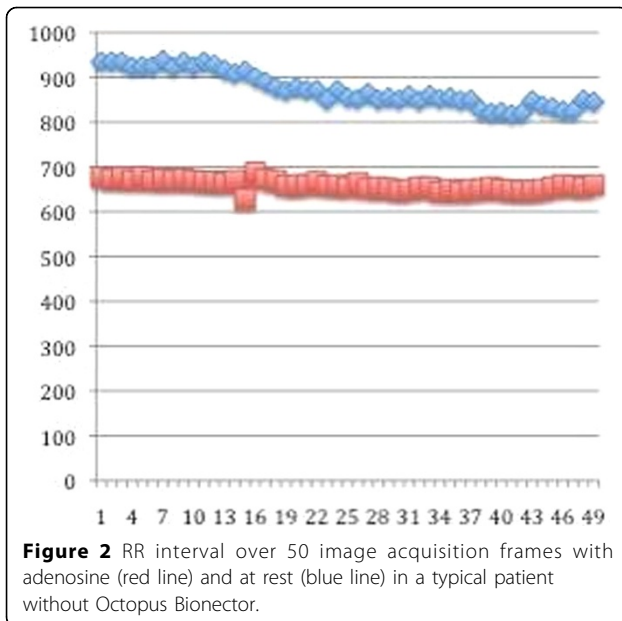


Figure 1 RR interval over 50 image acquisition frames with adenosine (red line) and at rest (blue line) in a typical patient with Octopus Bionector.

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unacceptably high number of patients having sinus pauses/sinus arrest over several seconds, And as image quality is heavily dependent on R wave intervals being regular, this adversely affected image quality. This could have led to underdiagnosis of perfusion defects in the affected patients.

Funding

N/A.

Published: 30 January 2013

doi:10.1186/1532-429X-15-S1-O53

Cite this article as: Kindler *et al.*: Cardiac magnetic resonance perfusion imaging and the effects of single intravenous cannulation with the Octopus bionector. *Journal of Cardiovascular Magnetic Resonance* 2013 **15** (Suppl 1):O53.

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