ACTA Project Grant 2012:

'The Pulmonary Vascular / Right Ventricular Response to Lung Resection'

Interim progress report, October 2015

Background:

This study seeks to explore the hypothesis that right ventricular (RV) dysfunction is common (or more common than is appreciated) after lung resection and aims to provide insight into the mechanisms of such dysfunction. In this prospective observational study, the RV response to lung resection will be characterised by sequential assessment of right ventricular ejection fraction (RVEF) measured using cardiovascular magnetic resonance (CMR). Comprehensive CMR and echocardiographic assessment of the pulmonary vascular - RV axis will allow interpretation of peri-operative changes in RVEF in the context of RV contractility and loading indices. In addition, contemporaneous blood samples will be taken for measurement of biomarkers of myocardial and endothelial dysfunction and systemic inflammation. Association will be sought between parameters of RV function and patient outcome.

Progress:

Recruitment completed on schedule in October 2014. CMR was well tolerated in the post-operative period with 21 of 27 (78%) patients able to complete the protocol on day 2, allowing adequate statistical power for our primary outcome. A further 24 of 27 (89%) patients were able to complete the CMR protocol at 2 months. Echocardiography was similarly well tolerated with more than 24 (89%) patients being able to be scanned at each follow-up time point. One year follow-up, by postal questionnaire, has completed in the last month.

Interim Results:

Two-dimensional speckle tracking echocardiography is a novel technique which has been shown to overcome some of the difficulties associated with other echocardiographic measures of RV function. As part of our interim analysis of this parameter we have shown an association between poor RV function as measured by speckle tracking derived global peak longitudinal strain (GPLS) and longer high dependency unit stay (Fig 1). *An abstract of this work has been accepted for oral presentation at the British Journal of Anaesthesia Research Forum Autumn Meeting, York, November 2015.*

B-type natriuretic peptide (BNP) is a quantitative biomarker of cardiac dysfunction. We have shown association between peri-operative cardiac dysfunction and limited functional capacity at 2-months (Fig2). *An abstract of this work was presented orally at the Society of Cardiothoracic Surgeons / Association of Cardiothoracic Anaesthetists Joint Meeting, Manchester, March 2015.*

Comprehensive analysis of CMR and echocardiographic images is nearly complete and full results will be available soon.

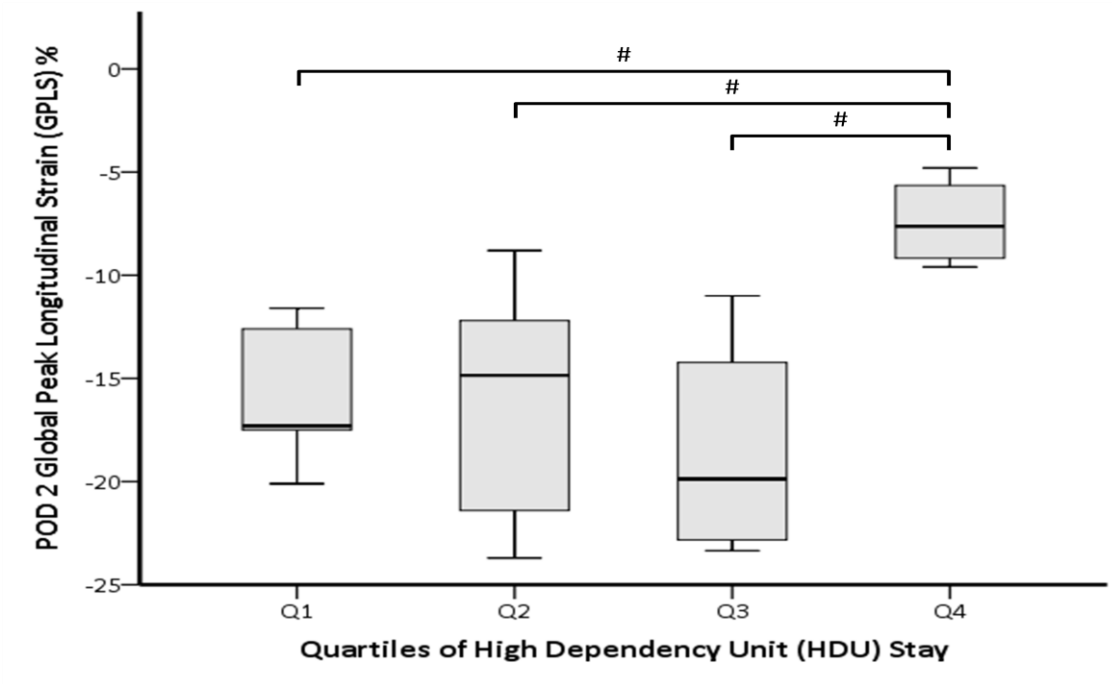

Fig 1. Post-operative Day 2 Global Peak Longitudinal Strain and High Dependency Unit Stay
Association between longest quartile (Q4) of High Dependency Unit Stay and poor Right Ventricular (RV) function as measured by RV Speckle Tracked Global Peak Longitudinal Strain.
# $p < 0.05$ (Mann-Whitney U-Test)

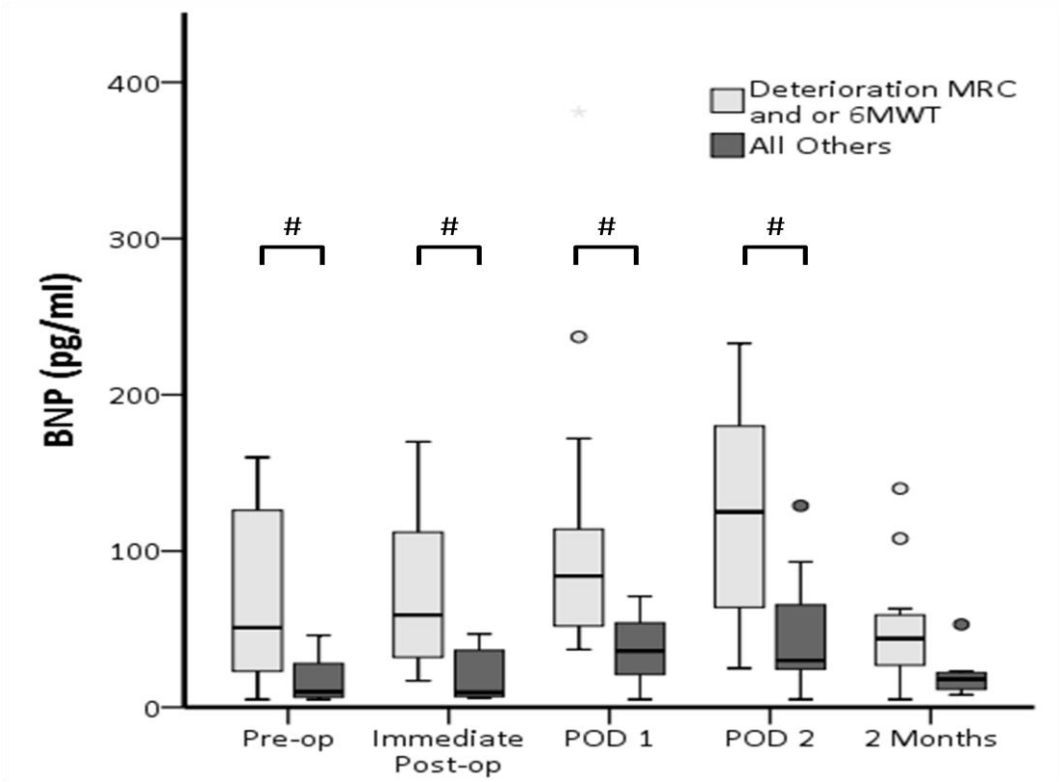

Figure 2. Peri-operative B-type Natriuretic Peptide (BNP) and Functional Capacity at 2-Months
Association between elevated peri-operative BNP and decreased functional capacity at 2-months. Decreased functional capacity defined as a deterioration in Medical Research Council (MRC) Breathlessness Scale and/or deterioration in 6 Minute Walk Test (6MWT) distance from pre-operative values.
# $p < 0.01$ (Mann-Whitney U-Test)