

Branch Pulmonary Arterial Phase-Contrast MRI to detect pulmonary venous baffle obstruction after atrial switch procedure.

Miles C. (1), Hussain T. (1), Bell A. (1), Razavi R. (1), Beerbaum P. (1), Tzifa A. (1), Botnar R. (1), Greil G.(1)

National Institute for Health Research Comprehensive Biomedical Research Centre at Guy's and St Thomas' NHS Foundation Trust / King's College London

Introduction:

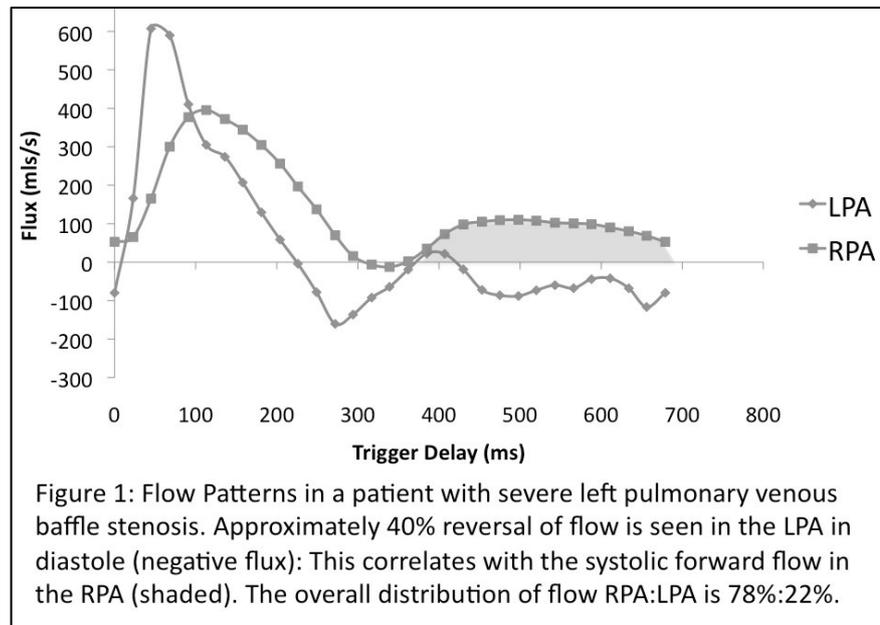
It has been shown that pulmonary vein stenosis results in reduced ipsilateral arterial forward flow with diastolic reversal and contralateral diastolic forward flow (Roman, 2005). However, pulmonary venous baffle stenosis occurs uniquely as a complication of a previous atrial switch procedure for transposition. The aim of this study was to investigate these arterial flow patterns in this setting.

Methods:

We retrospectively reviewed 2006-2009 data. Patients with previous atrial switch procedure & without residual shunts who had undergone flow evaluation in the main (MPA), right (RPA) and left (LPA) pulmonary arteries using Phase-Contrast MRI (PC-MR) were included. PC-MR data was correlated with the severity of pulmonary vein stenosis as defined on contrast-enhanced MR angiography (diameter reduction: mild: 25-50%; moderate: 50-75% and severe: >75%).

Results:

9 patients met the inclusion criteria. One patient had a severe left pulmonary venous baffle stenosis and two patients had a mild left stenosis. No patient had right pulmonary venous obstruction. One patient was not evaluated for continuous or reversed arterial flow due to pulmonary regurgitation. Only one of the sixteen branch pulmonary arteries showed any significant continuous diastolic forward flow and this was in the RPA of the patient with a severe left



pulmonary venous baffle stenosis. Similarly, the LPA in this patient was the only pulmonary artery to show significant flow reversal in diastole (Figure 1). Three patients showed >65% of flow distributed to the RPA, all of whom had left pulmonary venous baffle stenosis. There was a significant correlation of the degree of pulmonary baffle stenosis with RPA/LPA flow ratio (Pearson's Coefficient =0.74 p=0.02) but not with RPA/LPA cross-sectional area ratio (-0.26, p=0.5).

Conclusions:

Redistribution of pulmonary arterial blood flow may make conventional echocardiographic measures of pulmonary venous stenosis difficult to interpret. Arterial flow redistribution appears to be a sensitive marker for pulmonary venous baffle stenosis. In the absence of pulmonary regurgitation, reversed diastolic flow in the ipsilateral and continuous in the contralateral pulmonary artery appears specific for severe obstruction. Branch pulmonary artery PC-MR should be performed routinely for patients who have had an atrial switch for transposition.