

MP2-4

Aortopulmonary collateral flow in patients with cavopulmonary bypass is underestimated by fluoroscopic angiography compared to magnetic resonance flow measurements

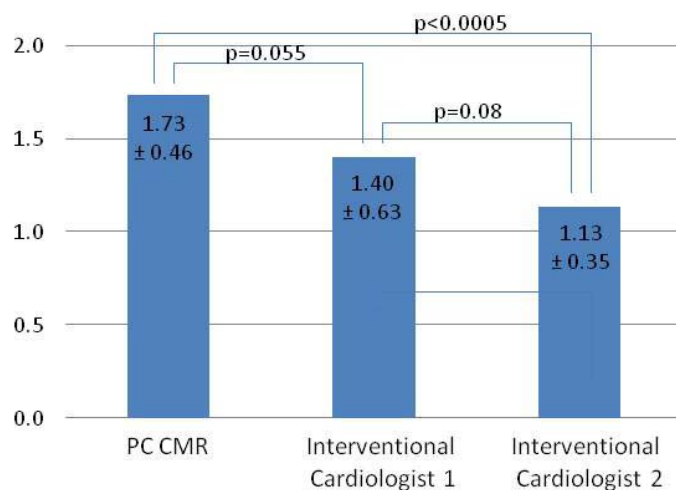
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Introduction: Aortopulmonary collaterals (APCs) in patients with functionally single ventricle after creation of a bidirectional cavopulmonary connection (BCPC) are a predictor of adverse outcome after the Fontan completion. While phase contrast flow velocity mapping (PC) by cardiac magnetic resonance (CMR) is now the gold standard for a quantitative assessment of collateral flow, fluoroscopic angiography is the most frequently used tool in clinical practice. The aim of this study was to compare the accuracy of collateral flow assessment using fluoroscopic angiography to CMR.

Methods: Fluoroscopic angiographies in 15 patients (age 28 ± 8 months) with BCPC were reviewed and compared to APC flow by CMR, obtained under the same anaesthesia. The studies were reviewed by two experienced interventional cardiologists blinded towards subsequent coil occlusion of collaterals and CMR results. APC flow was graded as mild, moderate or severe on the basis of arterial injections into the ascending aorta and its branches (direct visualization of APCs) and venous injections into the superior vena cava (contrast wash-out from unopacified APC flow). APC flow was quantified by PC CMR as the difference of pulmonary venous flow (Qpv) and pulmonary arterial flow, expressed as the percentage of Qpv and classified into mild ($< 20\%$), moderate (20-40%) and severe ($> 40\%$) collateral flow.

Results: Grading of the APC flow differed significantly between the CMR and fluoroscopic method ($p < 0.0005$ and $p = 0.055$ for interventional cardiologist 1 and 2, respectively, Kappa agreement 40% for both). The agreement between the two catheter angiography readers ($p = 0.08$, Kappa overall agreement 79%) was acceptable. There was no correlation between grading by fluoroscopic angiography and PC CMR ($r = 0.266$), with an overall lower grading of APC flow by fluoroscopic angiography (see Figure).

Conclusions: In patients with BCPC, fluoroscopic angiography, although reasonably reproducible, underestimates APC flow systematically as compared to PC CMR. The inaccuracy of fluoroscopic angiography is thought to be due to diffuse collateral flow which is not routinely visualized by fluoroscopic angiography, but captured by PC CMR. PC CMR can guide the cardiac catheterization and the decision to occlude APCs prior to the completion of the Fontan circulation.



Grading of Collateral Flow, mean values