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CONGENITAL CARDIOLOGY SOLUTIONS (ADULT CONGENITAL AND PEDIATRIC CARDIOLOGY)

IMPAIRED ADENOSINE-INDUCED MYOCARDIAL PERFUSION IN CHILDREN WITH MILD/MODERATE AORTIC STENOSIS IDENTIFIED USING QUANTITATIVE MAGNETIC RESONANCE IMAGING

ACC Poster Contributions

Ernest N. Morial Convention Center, Hall F

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Aortic stenosis (AS) is a relentless disease that may have a prolonged asymptomatic phase followed by a rapidly downhill course. Valve replacement is often postponed in children with mild AS because of technical limitations although they likely have an abnormal cardiac microcirculation that contributes to lifelong morbidity and early death. We aimed to quantify myocardial blood flow (MBF) in children with mild or moderate AS using adenosine-induced hyperemia. 11 children with a mean Doppler pressure gradient 10.3 ± 10 torr were compared to a group with hemodynamically normal hearts (C), mean gradient 3 ± 1.5 torr (n=20). For rest and hyperemia MRI acquisitions the LV myocardium was divided into two slices and each slice into six regions. The time course of average regional signal intensity during contrast transit was used to quantify absolute flow (ml/g/min) by deconvolution of the tissue curves with the arterial input of contrast. A linear mixed effects statistical model was employed to account for inter-subject variance (AS Vs C) and intra-subject variance (resting/adenosine, slice, and region), and also included interaction terms between AS and C, and treatment. Age 8.4 ± 4.4 y was not different between the groups. LV mass was significantly greater in AS than C (64.8 ± 13 Vs 48.9 ± 14 gm/m², p = 0.01). While adenosine increased MBF in all regions in both slices (p < 0.0001) the absolute increase in the AS group was significantly less than C (1.02 ± 0.10 Vs 1.52 ± 0.09 ml/gm/min, p < 0.0001). After adjusting for resting MBF, hyperemic flow was lower in the AS group (p < 0.0001). The myocardial perfusion reserve (adenosine/resting flow) was significantly lower in AS compared to C (2.006 ± 0.5 Vs 2.625 ± 0.962 , p = 0.024). In the AS group gadolinium late enhancement was not observed. Adenosine-induced MBF is impaired in children with mild/moderate AS. These data suggest that improved surgical and catheter techniques to relieve afterload obstruction in younger children would be beneficial. Innovative medical strategies that induce cardiac angiogenesis in childhood may alter the long-term adverse effects of the abnormal microcirculation in AS.