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Congenital Heart Disease

TWIN REVERSED ARTERIAL PERFUSION CAUSES DECREASED FETAL CEREBRAL VASCULAR IMPEDANCE

Poster Contributions
Hall C
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Background: Twin reversed arterial perfusion (TRAP) sequence affects 1% of monochorionic (MC) pregnancies. Abnormal vascular connections between the pump and acardiac twin lead to high output heart failure in the pump twin causing hydrops or demise in up to 50% of pregnancies. Fetal intervention (radiofrequency ablation of blood supply to the acardiac fetus) has increased survival of pump twins to as high as 90%. The effects of a high output cardiac state in the pump twin (and effect of fetal intervention) on cerebral flow and vasculature are unknown. We hypothesize that abnormal cerebral vascular impedance, assessed by the pulsatility index (PI), is present in the pump twin and fetal intervention acutely alters cerebral impedance.

Methods: Fetal echocardiograms (ECHO) performed between January 2010- June 2013 for pregnancies with a diagnosis of TRAP (cases, n= 18) or uncomplicated MC twins (controls, n= 36/18 pairs) were retrospectively analyzed. We compared middle cerebral artery (MCA) PI of the pump twin against normal MC twins. In TRAP pregnancies, combined cardiac output (CCO) was calculated for the pump twin. Mean and 95% confidence intervals were calculated for all parameters. Two-sample t-test was used to compare cases and controls.

Results: The mean gestational age at ECHO was 20 weeks with no difference between groups (p= 0.73). CCO in the pump twins was mildly elevated for gestational age (199.7 +/- 127.2 mL/min). MCA PI was significantly lower in the TRAP pump twin compared to controls (1.55, 95% CI 1.47-1.64 vs. 1.74, 95% CI 1.65-1.82, p = 0.004). Post-intervention ECHO (within 24 hours of intervention) was available in six TRAP cases. MCA PI increased after intervention from 1.56 (95% CI 1.36-1.75) to 1.82 (95% CI 1.5-2.2).

Conclusion: TRAP pump twins in a high output state have decreased cerebral vascular impedance compared to normal MC twins, suggestive of a brain-sparing effect. MCA PI increased acutely in the pump twin after fetal intervention. These findings suggest a fetal cerebral autoregulatory response to a high cardiac output state that begins to normalize after fetal intervention. Long-term implications for neurodevelopmental outcomes in these patients deserves further study.