Variability in Atrial Septal Restriction Influences Cerebrovascular Impedance in the Fetus with Transposition of the Great Arteries

Poster Contributions
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Authors: Haili Su, Zhiyun Tian, Anita Szwast, Jack Rychik, The Children’s Hospital of Philadelphia, Fetal Heart Program, Philadelphia, PA, USA, Xi Jing Hospital, Ultrasound Department, Xi’an, People’s Republic of China

Background: In transposition of the great arteries (TGA) patterns of cerebral oxygen delivery in utero differs from normal. Restriction at the atrial septum may influence cardiac streaming and patterns of cerebral blood flow and oxygenation before birth.

Objective: To investigate the relationship between atrial septal restriction and cerebrovascular impedance in the fetus with TGA.

Methods: Middle cerebral artery pulsatility indices (MCA-PI) were measured in fetuses with TGA and intact ventricular septum, and compared to age-matched controls. As a marker for prenatal atrial septal restriction, postnatal need for balloon atrial septostomy (BAS) was noted.

Results: 36 fetuses with TGA (17=no BAS; 19=BAS) were compared to 126 controls. There was no difference between all TGA and normal; however by atrial septal restriction, BAS group had significantly lower MCA-PI at the end of gestation (36-39 w) than no BAS group (*p<0.01).

Conclusions: MCA-PI is normal in the fetus with TGA and restrictive atrial septum, but is abnormally elevated near the end of gestation when there is an open atrial septum, this at a time when MCA impedance normally drops. Restrictive atrial septum leads to increased mixing in the right atrium, with cerebral oxygen delivery that is closer to normal, while in open atrial septum, streaming leads to severely deoxygenated blood delivery to the brain. Childhood neurocognitive deficits of TGA may in part have their origins in prenatal life as a consequence of variability in flow.