



Research Week 2022

Harmful Intrauterine Exposure to Stress and Resulting Steroid Requirements in Infants with Congenital Heart Disease

Katlaps I, BS; Ronai C, MD, MEd; Kim A, MD; Gutshall K, RN; Valent A, D.O.; Thornburg K, MD; Madriago E, MD
katlaps@ohsu.edu
Oregon Health & Science University Department of Pediatrics, Department of Obstetrics and Gynecology

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Abstract

Background: Prenatal diagnoses of congenital heart disease (CHD) is a significant event that causes parental stress and anxiety. The presence of elevated cortisol in a pregnant person's blood can lead to placental transfer of this stress hormone and subsequently downregulate the fetus' own cortisol production through negative feedback mechanisms. Babies with CHD often require very stressful interventions postnatally that necessitate a properly functioning hypothalamic-pituitary-adrenal axis in order to mount a sufficient cortisol mediated stress response. We sought to investigate the relationship between maternal stress during pregnancy and need for neonatal steroids

Methods: We conducted a retrospective chart review of pregnancies complicated by a fetal diagnosis of critical CHD who were born between 5/1/2019 and 5/1/2021. Maternal data included demographics and medical co-morbidities. A composite maternal prenatal stress score (PSS) was calculated based upon known contributors to stress. Infants' charts were reviewed for postnatal and post-operative exogenous steroid treatment.

Results: 41 maternal-fetal dyads met inclusion criteria. 63% (26/41) of neonates underwent surgical intervention, with the remainder requiring catheter based intervention at a median of 8 (2-54) days of life. Mothers with higher composite PSS were more likely to have infants that required steroids after CHD surgery compared to mothers with lower scores ($p=.01$). Patients needing bypass were more likely to require post-operative steroids than those not requiring bypass (18/22 vs 0/4, $p<.005$). None of the catheter-based interventions (including those with high risk single ventricle anatomy) required steroids ($p<.0001$). Maternal individual stress sub-categories, severity of prenatal CHD diagnosis, and prenatal counseling during the COVID-19 era did not correlate with steroid treatment.

Conclusion: Maternal prenatal stress is multifactorial and higher composite maternal prenatal stress scores correlate with post-bypass steroid requirements, suggesting that a stressful intrauterine environment can be associated with worse

post-operative outcomes for the neonate. We expanded the current literature by demonstrating how exposure to stress by the mother may impact the development and outcomes of cardiac disease in infants. This pilot project generated preliminary data necessary for a larger federally funded prospective study using hair cortisol to analyze the long-term effects of stress over time in maternal-fetal dyads with congenital disease.