## Week 4: Neonatology

### Cardiology: Neonatal Cardiology

**Tuesday, July 21  4:30-6:00 pm EDT**

**Moderators**
Heike Rabe  
Subhrajit Lahiri

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Note: Schedule subject to change based on presenter availability.
CONTROL ID: 3374931

TITLE: Assessment of Myocardial Function in Neonates Conceived by Assisted Reproductive Technologies Using Deformation Imaging

PRESENTER: Aisling Smith

AUTHORS (LAST NAME, FIRST NAME): Smith, Aisling1; Franklin, Orla2; Mocanu, Edgar V1; McCallion, Naomi1; EL-Khuffash, Afif F1

AUTHORS/INSTITUTIONS: A. Smith, E.V. Mocanu, N. McCallion, A.F. EL-Khuffash, Neonatology, The Rotunda Hospital, Dublin, IRELAND; O. Franklin, Our Lady's Children's Hospital, Crumlin, Dublin, IRELAND;

CURRENT CATEGORY: Neonatology

CURRENT SUBCATEGORY: Neonatal Cardiac Physiology/Pathophysiology

KEYWORDS: Assisted Reproductive Technologies, Deformation Imaging, Cardiac Function.

SESSION TITLE: Cardiology: Neonatal Cardiology | Cardiology: Neonatal Cardiology

SESSION TYPE: Platform/Webinar

ABSTRACT BODY:

Background: Recent data suggest that fetuses conceived by assisted reproductive technologies (ART) undergo cardiovascular remodelling resulting in altered myocardial performance. Data on whether this persists during the early postnatal period is lacking. We hypothesise that infants conceived by ART may demonstrate alterations in myocardial performance during the early neonatal period.

Objective: Our aim was to assess left (LV) and right (RV) ventricular function in infants conceived by ART during the early neonatal period and compare the findings with a control group conceived spontaneously.

Design/Methods: This was a prospective cohort study which included 25 term infants conceived by ART and 25 infants term infants conceived spontaneously. All those infants were clinically stable. Echocardiography was performed on days 1, 2, and 3 following birth. LV and RV function was measured using strain, Tissue Doppler imaging and Tricuspid annular Plane Systolic Excursion, in addition to LV eccentricity index (LV EI), and pulmonary artery acceleration time (PAAT). Linear regression was used to control for the effect of important potential confounders on LV and RV function.

Results: ART infants were of a lower gestation (38.8 ± 1.0 vs. 39.8 ± 1.0 weeks, p<0.01) but similar birthweight (3.6 ± 0.6 vs. 3.7 ± 0.4 Kg, p=0.35). There was no difference in the rate of cesarean section (72% vs. 52%, p=0.24), female gender (40% vs. 64%, p=0.16) or 5-minute Apgar score (10 vs. 10, p=0.08) between infants conceived by ART and controls. Mothers conceiving by ART were older (39 ± 4 vs. 34 ± 4 years, p<0.01). On Day 1, ART infants demonstrated a higher LV EI (1.8 ± 0.2 vs. 1.5 ± 0.2, p<0.01) and a lower PAAT (61 ± 14 vs. 70 ± 10, p=0.02) indicating more septal flattening and increased pulmonary vascular resistance. ART infants demonstrated lower RV and LV function over the study period (Figure). The relationship between ART and lower LV and RV function remained significant on linear regression when controlling for gestation, maternal age, gender and mode of delivery (all p<0.05, model R² between 0.29 – 0.42, standardised β coefficient between 0.63 – 0.74).

Conclusion(s): Infants conceived by ART present with evidence right and left ventricular dysfunction during the early neonatal period. Those findings further reinforce the concept of myocardial remodelling in infants conceived by ART and highlight the importance of early monitoring of those infants.
Low Birth Weight Neonates Undergoing Cardiac Surgery: Have Outcomes Improved Over Time?

Background: Low birth weight (LBW) has been associated with poor outcomes in neonates undergoing congenital heart surgery (CHS). We previously reported 23.8% mortality in this population between the years 2000 and 2004.

Objective: Given recent advances in pediatric cardiac surgical and medical care, we aimed to compare outcomes between LBW and standard birth weight (SBW) neonates undergoing CHS in a contemporary cohort, with the hypotheses that LBW remains associated with worse outcomes, although outcomes in LBW group have improved compared to past.

Design/Methods: This is a single center retrospective study of neonates undergoing CHS with cardiopulmonary bypass (CPB) from 2012 to 2018. LBW (<2.5kg) neonates were matched to SBW via propensity scores (1:3 ratio) using clinically relevant patient characteristics (sex, race, anatomic diagnostic category, and presence of genetic syndrome). The primary outcome was mortality, and secondary outcomes are listed in the attached table. Mortality rates were compared among LBW neonates in the recent era and the previously reported era. Chi-square, Fisher’s exact, and Wilcoxon tests were used to compare outcomes.

Results: A total of 686 neonates underwent surgery with CPB in the recent era including 93 LBW. LBW group had more premature neonates [60.2% vs SBW 5.6%, p<0.01]. The proportion of genetic diagnoses did not differ between LBW and SBW. The most common anatomic diagnostic category was two ventricle without arch obstruction in both groups [LBW 54.8% vs SBW 42.3%, p=0.09]. LBW neonates were older at the time of surgery [median 6 (IQR 4,11) vs SBW 5 (3,7) days, p<0.01]. In the overall cohort, LBW had higher mortality rate [11.8% vs SBW 6.1%, p=0.04], longer hospital stay [29 (19,50) vs 17 (12,30) days, p<0.01], and increased duration of mechanical ventilation [5 (3,11) vs 3 (2.6) days, p<0.01]. These results were robust in the propensity matched cohort with higher occurrences of unplanned catheterization.
in the LBW group (Table). The two groups did not differ in cardiac arrest, mechanical circulatory support, reoperation, seizure, infection, or necrotizing enterocolitis. Compared to our previously reported era, mortality in LBW group decreased from 23.8% to 11.8% ($p=0.03$).

**Conclusion(s):** Mortality following cardiac surgery in LBW neonates has improved over time. However this group maintains significantly higher perioperative mortality, longer length of hospital stay, increased duration of mechanical ventilation, and greater risk for unplanned cardiac catheterizations compared to SBW neonates.

**IMAGE CAPTION:**

**CONTROL ID:** 3382642

**TITLE:** Delayed fetal brain growth is associated with impaired motor and language development in infants with congenital heart disease

**PRESENTER:** Kushal Janardan Kapse

**AUTHORS (LAST NAME, FIRST NAME):** Kapse, Kushal J.¹; Wu, Yao¹; Kapse, Anushree K.¹; Andersen, Nicole R.¹; Lopez, Catherine²; Bannantine, Kathryn³; Donofrio, Mary⁴; du Plessis, Adre J.⁵; Limperopoulos, Catherine⁶

**AUTHORS/INSTITUTIONS:** K.J. Kapse, Y. Wu, A.K. Kapse, N.R. Andersen, Childrens National Hospital, Washington, District of Columbia, UNITED STATES;
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ABSTRACT BODY:

**Background:** Infants with complex CHD are at increased risk for brain injury and long-term neurodevelopmental disabilities. We have previously shown that brain growth is impaired in fetuses and neonates with CHD however its impact on long-term neurodevelopmental outcomes remains unclear.

**Objective:** To examine the relationship between in-utero fetal brain growth and 18-month neurodevelopmental outcomes in infants with CHD.

**Design/Methods:** Women with normal singleton and CHD-complicated pregnancies prospectively underwent two fetal MRI studies in the late second and third trimesters. All newborns (CHD and controls) underwent a neonatal MRI after birth (CHD preoperatively). A 1mm isotropic 3D brain image was used for automatic segmentation including cortical/subcortical gray matter, white matter, lateral ventricles, cerebellum and brainstem. Manual corrections were performed using ITK-SNAP software. Clinical and intraoperative variables were extracted from patient medical records. Neurodevelopment was evaluated using the Bayley Scales at 18-months of age. Linear regression model and generalized estimating equation were used to measure the associations between prenatal and neonatal brain volumes and neurodevelopmental outcomes in CHD infants.

**Results:** We performed prospective serial MRI studies in 176 subjects: 122 healthy fetal-neonatal dyads at a mean gestational age (GA) of 32.48 weeks (Fetal) and 41.64 weeks (Neonatal) and 54 fetal-neonatal CHD dyads (20 with single ventricle; 32 with 2-ventricle CHD) at a mean GA of 32.88 weeks (Fetal), and 39.27 weeks (Neonatal) for a total of 437 fetal and neonatal scans. Decreased fetal cerebral (subcortical gray matter) and cerebellar volumes were associated with greater impairments in motor skills and expressive language in CHD infants (all p < 0.05). The associations remained significant after controlling for intra- and post-operative factors.

**Conclusion(s):** We report for the first time that impaired in utero regional brain growth impairments in fetuses with CHD is associated with delayed motor and expressive language skills at 18 months of age. These data suggest that delayed prenatal brain development predicts long-term neurodevelopmental impairments in CHD survivors.
Brain volumes in controls (red) and CHD (blue)

**IMAGE CAPTION:**
Fetal and neonatal brain segmentation pipeline

Brain volumes in controls (red) and CHD (blue)

**CONTROL ID:** 3378444

**TITLE:** Protective role of CXCR7 agonism in experimental model of neonatal hyperoxia induced cardiac dysfunction in former preterm survivors

**PRESENTER:** Merline Benny

**AUTHORS (LAST NAME, FIRST NAME):** Benny, Merline\(^1\); Kulandavelu, Shathiyah\(^2\); Sharma, Mayank\(^3\); Chen, Pingping\(^4\); Huang, Jian\(^1\); Levine, Amanda F.\(^1\); Claude, Matteo L.\(^1\); Zambrano, Ronald\(^5\); Chen, Shaoyi\(^1\); Damianos, Andreas\(^6\); Schmidt, Augusto\(^7\); Wu, Shu\(^10\); Vazquez-Padron, Roberto\(^5\); Velazquez, Omaid A.\(^8\); Young, Karen\(^9\)

**AUTHORS/INSTITUTIONS:** M. Benny, J. Huang, A.F. Levine, M.L. Claude, S. Chen, Pediatrics, Neonatology, University of Miami, Miller School of Medicine, Miami, Florida, UNITED STATES; S. Kulandavelu, Pediatrics, Interdisciplinary Stem Cells Institute, Miami, Florida, UNITED STATES; M. Sharma, Pediatrics, University Of Miami Miler School of Medicine, Miami, Florida, UNITED STATES; P. Chen, Pediatrics, University of Miami, Miami, Florida, UNITED STATES; R. Zambrano, R. Vazquez-Padron, University of Miami, Miami, Florida, UNITED STATES; A. Damianos, University of Miami/Jackson Memorial Hospital, Miami, Florida, UNITED STATES; A. Schmidt, Department of Pediatrics, University of Miami Miller School of Medicine, Miami, Florida, UNITED STATES; O.C. Velazquez, Surgery, University of Miami Miller School of Medicine, Miami, Florida, UNITED STATES; K. Young, Pediatrics/Neonatology, University of Miami Miller School Of Medicine, Miami, Florida, UNITED STATES; S. Wu, Pediatrics, University of Miami School of Medicine, Miami, Florida, UNITED STATES;

**CURRENT CATEGORY:** Cardiology

**CURRENT SUBCATEGORY:** None

**KEYWORDS:** Hyperoxia, Cardiac dysfunction, CXCR7.

**SESSION TITLE:** Cardiology: Neonatal Cardiology | Cardiology: Neonatal Cardiology

**SESSION TYPE:** Platform/Webinar

**ABSTRACT BODY:**

**Background:** There is a fundamental knowledge gap in the mechanistic underpinnings linking neonatal O\(_2\)-exposure and its contribution to cardiac dysfunction in former preterm survivors. Chemokine receptor 7 (CXCR7) is a transmembrane receptor that is critically involved in repairing the endothelium and in counteracting fibrosis. Previously, we demonstrated that CXCR7 has systemic vascular protective effects in juvenile rodents exposed to neonatal O\(_2\). Here we test the hypothesis that CXCR7 agonism will preserve cardiac function in juvenile rodents exposed to neonatal O\(_2\).

**Objective:** To determine whether endothelial CXCR7 agonism alleviates cardiac dysfunction in juvenile rodents exposed to neonatal O\(_2\).

**Design/Methods:** Newborn rats (n=10-20/group) randomly assigned to normoxia (RA) or hyperoxia (85% O\(_2\)) from postnatal day (P) 1 to 21 were randomly assigned to receive intraperitoneal (IP) injections of CXCR7 agonist, TC 14012, 10 mg/Kg or phosphate buffered saline as placebo (PL) once every three days from P3 to 21. The rat pups were recovered in RA for an additional 3 wk. At 6 weeks, we assessed cardiac function by Ejection Fraction (EF), Fractional Shortening (FS), Cardiac Output (CO), Stroke Volume (SV), Left Ventricular End Diastolic Volume (LVEDV), and LV End Systolic Volume (LVESV). Data are expressed as mean ± SD and analyzed by two-way ANOVA.

**Results:** There was no significant difference in the RA groups. In contrast, hyperoxia PL-treated pups had marked decrease in cardiac function as evidenced by parameters such as EF, FS, CO, SV, LVEDV, LVESV. Administration of CXCR7 agonist improved EF, FS, SV, and LVESV in juvenile rodents exposed to neonatal O\(_2\) as shown in Fig.1 A-C. In addition, whereas hyperoxia PL-treated animals had increased mortality rate (100% Vs 40%; RA-PL Vs Hyperoxia-PL), administration of CXCR7 agonist, TC14012 improved survival (60% Vs 75%; Hyperoxia-PL Vs Hyperoxia-TC14012).
Conclusion(s): CXCR7 activation has a cardioprotective effect in juvenile rodents exposed to neonatal O2. Further mechanistic studies elucidating the mechanistic role of CXCR7 signaling in cardiac function would be necessary.

IMAGE CAPTION:

CONTROL ID: 3369842
TITLE: Cardiac dysfunction in hypoxic ischemic encephalopathy is associated with increase rate of death and brain injury by MRI
PRESENTER: Gabriel Altit

AUTHORS (LAST NAME, FIRST NAME): Altit, Gabriel1; Bonifacio, Sonia L.2; Guimaraes, Carolina3; Bhombal, Shazia4; Sivakumar, Ganesh5; Yan, Elisabeth3; Chock, Valerie Y.5; Van Meurs, Krisa P.3

AUTHORS/INSTITUTIONS: G. Altit, Pediatrics - Neonatology, McGill University - Montreal Children's Hospital, Montreal, Quebec, CANADA; S.L. Bonifacio, Pediatrics, Stanford University School of Medicine, Palo Alto, California, UNITED STATES; C. Guimaraes, G. Sivakumar, E. Yan, K.P. Van Meurs, Pediatrics/Neonatology, Stanford University, Palo Alto, California, UNITED STATES; S. Bhombal, Stanford, Palo Alto, California, UNITED STATES; V.Y. Chock, Pediatrics, Stanford University, Palo Alto, California, UNITED STATES;

CURRENT CATEGORY: Cardiology
CURRENT SUBCATEGORY: None
KEYWORDS: Hypoxic Ischemic Encephalopathy, Pulmonary Hypertension, Speckle Tracking Echocardiography.
SESSION TITLE: Cardiology: Neonatal Cardiology | Cardiology: Neonatal Cardiology
SESSION TYPE: Platform|Webinar

ABSTRACT BODY:
Background: Therapeutic hypothermia (TH) has improved survival and neurodevelopmental outcomes in newborns with moderate to severe HIE. Common cardiac findings include hypotension, cardiac dysfunction, and pulmonary hypertension. The relationship of cardiac dysfunction to outcomes has not been adequately studied.

Objective: Describe the association between cardiac dysfunction during TH and death or moderate to severe MRI abnormalities before discharge.

Design/Methods: Retrospective echocardiography, MRI, and chart review of newborns undergoing TH with moderate or severe HIE by modified Sarnat score from 2008 to 2017. Conventional echocardiography markers and speckle-tracking echocardiography (STE) were extracted by a single reader to quantify RV and LV deformation. Brain MRIs were evaluated by 2 readers. All readers were masked to patient outcomes. Abnormal outcome was defined as death or moderate to severe brain injury on MRI (moderate or severe basal ganglia or watershed injury using Barkovich scoring system). We excluded patients who did not have an echocardiogram, underwent late TH (after 6 hours of life), or were less than 36 weeks gestation.

Results: 53 newborns underwent TH and had echocardiography performed during TH. 11 (21%) died prior to hospital discharge and 44 (83%) had MRI performed at day of life 8 ± 6. Moderate to severe brain injury on MRI was seen in 10 (24%) survivors. Newborns with brain injury on MRI were more likely to receive epinephrine in the delivery room, have more profound acidosis, receive inotropes and have characteristics of multi-organ failure (Table 1). This group more frequently had severe encephalopathy and seizures. Newborns with abnormal outcomes (Table 2) were more likely to
have lower systolic & diastolic blood pressure at echocardiography (p=0.004). TAPSE, a marker of RV systolic function, was significantly decreased (p=0.01) in those with abnormal outcomes and estimates of systolic pulmonary arterial pressure were lower (p=0.009), while the ratio to systolic blood pressure was indicating isosystemic pulmonary pressures in both groups. A multilogistic regression analysis adjusting for weight and seizure status indicated an association between LV longitudinal strain by STE and abnormal outcome - Table 3.

**Conclusion(s):** Newborns with moderate to severe HIE and functional cardiac abnormalities on echocardiography are at higher risk for death or moderate to severe brain injury shown on MRI. Management targeting cardiac dysfunction may improve morbidity and survival.

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**IMAGE CAPTION:**

Control ID: 3379329

**TITLE:** Prenatally diagnosed coronary artery fistulae are associated with lethal aneuploidies and coronary artery stenosis

**PRESENTER:** Andrea Elizabeth Pisesky

**AUTHORS (LAST NAME, FIRST NAME):** Pisesky, Andrea E.¹; Nield, Lynne¹; Rosenthal, Joanna²; Jaeggi, Edgar T.¹; Hornberger, Lisa²

**AUTHORS/INSTITUTIONS:** A.E. Pisesky, L. Nield, E.T. Jaeggi, Pediatric Cardiology, The Hospital for Sick Children
Background: Coronary artery fistulae (CAF) are abnormal connections of a coronary artery to a cardiac chamber or vessel. The prenatal significance of this lesion is unclear. We retrospectively examined our collective experience of pre- and postnatally encountered CAFs.

Design/Methods: This is a multicenter, retrospective cohort study. All cases of CAF between 2002-2016 were identified using hospital databases. Cases with hypoplastic left heart or pulmonary atresia were excluded. Clinical outcomes were compared using chi-square analysis.

Results: There were 12 pre- and 94 postnatal CAF. Median gestation age at diagnosis of 23weeks (17-36 weeks) versus 2.8years (0-15 years). Structural heart defects were present in 5 (45%) pre- and 19(20%) postnatal cases (p=0.011) and genetic conditions coexisted in 5 (45%) pre- and 14 (15%) postnatal cases, respectively (p=0.001). CAFs were large in 11 (91%) pre- versus 22 (23%) postnatal cases (p<0.001). The CAF distribution was similar between cohorts: 75 (71%) from the left and 31 (29%) from the right coronary arteries. The most common exit sites were the MPA (57%), RV (26%) and RA (9%). Among prenatal cases, there was no progression and 6 (55%) disappeared by birth, including one with biventricular dysfunction that normalized. One postnatal case presented with cardiogenic shock; no other postnatal case had ventricular dysfunction, arrhythmias or ischemic changes. Intervention was required for 1 (9%) pre- and 9 (10%) postnatal cases (p=0.95). One prenatal case underwent elective ligation at the time of pacemaker insertion for Long QT Syndrome; seven and two postnatal cases had percutaneous occlusion and surgical ligation, respectively, due to volume overload. One percutaneous occlusion was complicated by acute thrombosis of the coronary artery proximal to the occluded CAF (Image 2). Two prenatal cases had coronary artery stenosis on angiography with normal perfusion testing, a finding not observed in the nine postnatal cases with angiography available. Death occurred in 2 (16%) pre- and 2 (2%) postnatal cases (p<0.001), all due to lethal aneuploidies.

Conclusion(s): Pre- and postnatally encountered CAFs are associated with infrequent need for intervention and good outcomes. Although most prenatally encountered CAFs resolved prior to birth, given the association with coronary artery stenosis the implications of CAFs on long-term coronary artery health remains a concern. A high association with genetic syndromes should be considered in prenatal counseling.
**CONTROL ID:** 3378984  
**TITLE:** Percutaneous closure of Patent Ductus Arteriosus in Very Low Weight (≤1.5kg) and Low Weight (≤6kg) Infants: A Systematic Review and Meta-Analysis  
**PRESENTER:** Adrianne R Bischoff  
**AUTHORS (LAST NAME, FIRST NAME):** Bischoff, Adrianne R.¹; Jasani, Bonny²; Backes, Carl³; Sathanandam, Shyam⁴; Weisz, Dany⁵; McNamara, Patrick J.¹  
**AUTHORS/INSTITUTIONS:** A.R. Bischoff, P.J. McNamara, University of Iowa Stead Family Children's Hospital, Iowa City, Iowa, UNITED STATES; B. Jasani, The Hospital for Sick Children, Toronto, Ontario, CANADA; C. Backes, Nationwide Children's Hospital, Columbus, Ohio, UNITED STATES; S. Sathanandam, University of Tennessee Health Science Center, LeBonheur Children's Hospital, Memphis, Tennessee, UNITED STATES; D. Weisz, Newborn and Developmental Paediatrics, Sunnybrook Health Sciences Centre, Toronto, Ontario, CANADA;  
**CURRENT CATEGORY:** Neonatology  
**CURRENT SUBCATEGORY:** Neonatal Cardiac Physiology/Pathophysiology  
**KEYWORDS:** patent ductus arteriosus, transcutaneous, catheter.  
**SESSION TITLE:** Cardiology: Neonatal Cardiology | Cardiology: Neonatal Cardiology  
**SESSION TYPE:** Platform\Webinar  
**ABSTRACT BODY:**  
**Background:** Percutaneous (catheter-based) closure is the procedure of choice for adults and older children with a patent ductus arteriosus (PDA). The practice of device closure in lower weight infants is becoming more common but data on clinical efficacy and safety are limited.  

**Objective:** Investigate the technical success and safety of percutaneous PDA closure in very low weight (≤1.5kg) compared to low weight (≤6kg) infants.  

**Design/Methods:** The study was performed according to the Systematic Reviews and Meta-Analysis checklist and was registered prospectively (PROSPERO). Data sources used included Scopus, Web of Science, Embase, PubMed, and Ovid (Medline) searched through January 2020 with no language restrictions. Study selection included publications with a clear definition of the intervention as percutaneous PDA closure in low weight infants (≤6kg at intervention) and with reported adverse events (AEs). Data extraction and assignment of AE attribution/severity was independently performed by multiple observers. Outcomes were agreed a priori. Data was pooled by using a random-effects model.  

**Results:** Sixteen studies were included, of whom 308 patients ≤1.5kg underwent percutaneous PDA closure. Technical success (defined as patient leaving the catheterization laboratory with a device in place) was 95% (95% CI 0.89–0.99) (Figure 1). Overall AE incidence was 14% (95% CI 0.07–0.23). Mortality related to the procedure was 0.1% (95% CI 0.00–0.02) and overall mortality was 0.2% (95% CI 0.02–0.05). For the population of ≤6kg, a total of 51 studies (n=1512 infants) were included. Technical success was 92% (95% CI 0.89–0.94) (Figure 2). Overall AE incidence was 25% (95% CI 0.19–0.31). Significant heterogeneity and publication bias were observed. Outcomes including post-ligation cardiac syndrome or comparisons with surgical ligation were infrequently reported (Table 1). Although weight at intervention has decreased over time, procedural success has increased (Figure 3).  

**Conclusion(s):** Percutaneous PDA closure is feasible in very low weight infants with few clinically significant adverse events. Procedural success rate remains high, although intervention is performed in smaller patients. There is, however, inconsistent data on other outcomes such as post-intervention cardiorespiratory instability and indices of clinical efficacy.
Figure 1: Forest plot of technical success of transcatheter patent ductus arteriosus closure among infants ≤1.5kg.

Figure 2: Forest plot of technical success of transcatheter patent ductus arteriosus closure among infants ≤6kg.

Figure 3: Trends according to year of publication. A) Number of cases undergoing transcutaneous PDA closure and percentage of successful transcutaneous PDA closure by year of publication; B) Average weight at the time of intervention by year of publication

IMAGE CAPTION:
Background: Infants with cyanotic congenital heart disease who require neonatal intervention are at risk for poor somatic growth. In neonates with symptomatic tetralogy of Fallot (sTOF), intervention may include initial palliation (IP) or primary complete surgical repair (PR). The impact of management strategy on somatic growth and feeding modality has not been evaluated previously.

Objective: To assess the impact of neonatal management strategy on feeding and somatic growth in neonates with sTOF.

Design/Methods: Retrospective multicenter cohort study of neonates (≤30 days) with sTOF who underwent IP or PR from 2005-2017 at the 9 centers of the Congenital Catheterization Research Collaborative. The primary outcome was change in weight-for-age Z score (WAZ) from initial intervention to 4-8 months of age. Secondary outcomes included percentage of patients on all oral (PO) feeds, use of feeding-related medications, caloric content of feeds, and feeding-related readmission. Additional analysis compared the change in WAZ from initial intervention to 1 year of age (in the PR group) and to the time of complete repair (up to 1 year of age, in the IP group). Propensity score adjustment was used to account for baseline differences between groups.

Results: The cohort included 256 IP and 138 PR neonates with sTOF. Prematurity was more common in the IP group (p=0.01), but weight at initial intervention, genetic syndrome, and pre-intervention gastrointestinal pathology were not different between groups (Table 1). There was no difference in the primary outcome, change in WAZ at 4-8 months, between the IP and PR groups (-0.45 vs -0.30, p=0.08). At this timepoint, the likelihood of PO feeding, caloric content of feeds, feeding-related medications, and feeding-related readmission were not different between groups (Table 2). At 1 year, change in WAZ was reduced in the IP group and favored the PR group (-0.44 vs +0.04, p=0.001, Table 3).
Conclusion(s): In this multicenter comparison of sTOF neonates who underwent IP or PR, adjusted for baseline differences, there was no difference in somatic growth or complexity of feeding regimen at 4-8 months. However, PR was associated with a better growth trajectory over the first year of life, suggesting a potential benefit to primary repair.

<table>
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<th>Table 1</th>
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Table 1: Adjusted feeding and growth characteristics at 12 months of age

<table>
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<tr>
<th>Characteristic</th>
<th>Mean (SD)</th>
<th>95% CI</th>
<th>p-value</th>
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<tr>
<td>Birth weight (kg)</td>
<td>2.5 (0.5)</td>
<td>2.49, 2.54</td>
<td>0.56</td>
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<tr>
<td>Gestational age (weeks)</td>
<td>37.5 (2.3)</td>
<td>37.3, 37.7</td>
<td>0.99</td>
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<td>Birth weight percentile</td>
<td>50% (50%)</td>
<td>50, 50</td>
<td>0.97</td>
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<tr>
<td>Gestational age percentile</td>
<td>50% (50%)</td>
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<td>0.97</td>
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Table 2: Adjusted neonatal treatment strategy

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<th>Time</th>
<th>n</th>
<th>Neonatal Treatment</th>
<th>Primary Diagnosis</th>
<th>p-value</th>
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<tr>
<td>24 hours</td>
<td>100</td>
<td>IP</td>
<td>Preterm * * *</td>
<td>0.001</td>
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<td>72 hours</td>
<td>100</td>
<td>PR</td>
<td>Preterm * * *</td>
<td>0.001</td>
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Table 3

IMAGE CAPTION:
Table 1
Table 2
Table 3