Regional Prenatal Congenital Heart Disease Detection and Practices

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Objectives

- Evaluate our regional prenatal detection of congenital heart disease
  - Discussion of current local and regional detection of CHD admitted to CMH
  - Discuss statistics of Fetal echo and Integrated consultations completed
  - Discuss Multi-disciplinary process in prenatal detection and Counseling
Background

• 1-3 /100 babies are born with a heart defect
• 6/1000 with Moderate–Severe categories of CHD
• 2.4/1000 Live births require invasive procedure during the first year

(Hoffman and Kaplan 2002)
Background

- In 1994, only 12.7% of CHD detected prenatally.
- In 2009, 34% of all hospital stays were related to cardiac defects.

(AHA, 2013; Hoffman and Kaplan 2002)
Goals of Fetal Cardiology

• Accurate Fetal Diagnosis and Plan of Care
  • Timing and Indication for Referral
  • Components of a Fetal Echocardiogram Including cardiac anatomy, function, and rhythm
  • Complementary evaluation such as MFM US, MRI, and Electrophysiology evaluation
  • Anticipatory Counseling for Family and Care providers about postnatal care

(Donofrio et al 2014)
Goals of Fetal Cardiology

Normal

NOT Normal
Categories of Congenital Heart Disease (CHD)

Severe/Major CHD

• Require surgery in first 30 days of life
• Intensive Care and specialty consultation required
• Examples: D-TGA, Tricuspid and Pulmonary Atresia, Hypoplastic Left Heart Syndrome (HLHS), Single Ventricle Anatomy, Double Outlet Right Ventricle (DORV), Truncus arteriosus, TAPVR, Critical Pulmonary stenosis, Aortic arch abnormalities (COA, IAA, Hypoplastic aortic arch)
National Prenatal Detection

(Donofrio 2014; Levy et al 2013)
National Prenatal Detection

Percent Detection

Bull 1999 (n=4799)
Game 2001 (n=2454)
Jaeggi 2001 (n=659)
Tegnander 2006
Acherman 2007 (n=1474)
Pinto 2007
Khoo 2008 (n=200)
Acharya 2008 (n=25)
Friedberg 2009 (n=39)
Marek 2011 (n=1604)
Levy 2013 (n=93)

74%
Standardized Fetal Echo Screening

- Implemented an educational program for sonographers including 4 chamber view and both outflow tracts in low-risk patients/pregnancy
- Video Clips of prenatal ultrasounds
- Rotating the sonographers with the Pediatric Cardiologists

(Donofrio 2014; Levy et al (2013))
Positives of Prenatal Cardiac Diagnosis

• Improved Morbidity with less intubation, acidosis, or cardiovascular collapse less likely related to ductal closure

• Improved Neurocognitive outcomes in children with d-TGA

• Improved surgical outcome with HLHS and coarctations

(Calderon et al, 2012, Franklin et al, 2002 & Tworetzky et al, 2001)
Positives of Prenatal Cardiac Diagnosis

- NPCQIC Cohort of HLHS patients
  - 75% prenatal detection
  - Prenatal detection group had more stable pre-op course
  - Less post-op ventilation $P=0.002$ (9 vs 12 days) (Brown et al, 2014)
Positives of Prenatal Cardiac Diagnosis

• Birth at closer proximity to the tertiary center (<10 minutes) benefitted neonates with HLHS

• If born >90 minutes away, chance of survival is significantly decreased

(Morris et al 2014)
Positives of Prenatal Diagnosis

- Parental and Family counseling about cardiac diagnosis with multi-disciplinary team
  - Short and Long-term prognosis
  - Surgical planning
  - Plan of Care
  - Co-Morbid Conditions
  - Social and Family Factors of CHD

(Feinstein et al., 2012)
Parental Stress

- 1 month after diagnosis parents can report acute grief patterns and high anxiety
- Need individual and group support from providers

(Fonesca 2011)
Local Detection of Congenital Heart Disease
Process of Fetal Cardiology

- Abnormal OB Screening Ultrasound
- MFM/Perinatal
- Fetal Cardiology
Reasons for Referral

- Concern for CHD
- Maternal Risk Factors
- Fetal Risk Factors
- Arrhythmia
- Genetic Abnormality
- Familial History of CHD
### Fetal Echocardiogram at CMH

**Fetal Echo Frequency**

**2009-August 2014**

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<th>f/u</th>
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CMH Prenatal Detection for Major Congenital Heart Disease January 2010 to July 2014

<table>
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<tr>
<th>Year</th>
<th>Percent Prenatally Detected</th>
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CMH Prenatal Detection By Diagnosis

- HLHS (Stage I)
- Left Sided Lesion (No VSD)
- VSD with Other Lesions (Truncus, IAA, COA)
- ASO
- ASO + VSD
- BT shunt for Pulmonary Blood Flow
- TAPVR
Fetal Cardiac Clinic

Staff:

- 5 Pediatric Cardiologists
- 1 APRN
- 2 RN coordinators
- 1 Fetal Cardiac Ultrasonographer
Multidisciplinary Teams

Cardiology

Child Life/Chaplains

Social Work/PACT

MFM/OB

Neonatology

Genetics

CV surgery
Integrated Consultation

• Family able to meet with multiple disciplines to review plan of care
  • 2012: 169  2013: 246  2014: 177 to date
  • Neonatology, Cardiac Surgery, Heart Center APRN/RN’s, Electrophysiology, Cardiac Interventionalists, Cardiac Anesthesia
  • Genetics and SW
Fetal Cardiac Clinic Vision

- Access to Services
- Support for Families
- Communication between Providers
- Academic Enhancement
- Community Awareness
References


- Morris, SA, Ethen, MK., Penny, DJ et al. (2014). Prenatal Diagnosis, birth location, surgical center, and neonatal mortality in infants with hypoplastic left heart syndrome. *Circulation*.