Regional Prenatal Congenital Heart Disease Detection and Practices

Jenny Ecord, APRN
Ward Family Heart Center
Wichita
Objectives

• Review current local and regional detection of CHD admitted to CMH
• Discuss Multi-disciplinary process in prenatal detection and counseling
• Review of contemporary prenatal interventions for congenital heart disease
• Review of impact of neonatal hemodynamic instability and neurologic outcomes
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)
- Jaeggli 2001 (n=659)
- Tegnander 2006
- Acherman 2007 (n=1474)
- Pinto 2007 (n=1474)
- 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
- Candidacy for prenatal cardiac interventions

(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
CMH Prenatal Detection for Major Congenital Heart Disease 2010-2014

Number of Fetal Echocardiograms with (Percentage of Prenatal Detection of CHD)

- 2010: 59 Follow-up, 3 New (27.4%)
- 2011: 106 Follow-up, 7 New (43.0%)
- 2012: 115 Follow-up, 44 New (44.2%)
- 2013: 177 Follow-up, 123 New (49.2%)
- 2014: 294 Follow-up, 186 New (46.5%)
CMH Prenatal Detection By Diagnosis

- **Percent Prenatal Detection**

  - **All Critical Cardiac Lesions**
  - **HLHS (Stage I)**

<table>
<thead>
<tr>
<th>Year</th>
<th>All Critical Cardiac Lesions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>30.0%</td>
</tr>
<tr>
<td>2011</td>
<td>40.0%</td>
</tr>
<tr>
<td>2012</td>
<td>50.0%</td>
</tr>
<tr>
<td>2013</td>
<td>60.0%</td>
</tr>
<tr>
<td>2014</td>
<td>70.0%</td>
</tr>
</tbody>
</table>
Multidisciplinary Teams

Cardiology

Child Life/Chaplains

Social Work/PACT

MFM/OB

Neonatology

Genetics

CV surgery
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.*